ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME II

PROPOSED RESIDENTIAL DEVELOPMENT

AT

Cookstown Enniskerry, Co. Wicklow

Prepared by

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AA Appropriate Assessment

ABP An Bord Pleanála

CDP County Development Plan

CMP Construction Management Plan

CA Competent Authority (An Bord Pleanála)

CSO Central Statistics Office

DAHG Department of Arts, Heritage and the Gealtacht

DCENR Department of Communications, Energy and Natural Resources

DEHLG Department of Housing, Planning and Local Government

EIA Environmental Impact Assessment

EIAR Environmental Impact Assessment Report

EMP Environmental Management Plan

EPA Environmental Protection Agency

ESRI Economic and Social Research Institute

GDP Gross Domestic Product

GSI Geology Survey Ireland

IAA Irish Aviation Association

IEEM Institute of Ecology and Environmental Management

IFI Inland Fisheries Ireland

LAP Local Area Plan

NHA/pNHA Natural Heritage Area / proposed Natural Heritage Area

NIAH National Archive of Architectural Heritage

NPWS National Parks and Wildlife Service

NRA National Roads Authority

NPF National Planning Framework

OPW Office of Public Works

PBSA Purpose-Built Student Accommodation

RMP Record of Monuments and Places

RPG Regional Planning Guidelines

RPS Record of Protected Structures

SAC Special Area of Conservation

SMR Sites and Monuments Record

SPA Special Protection Area

SHD Strategic Housing Development

SUDS Sustainable Drainage System

TMP Traffic Management Plan

WFD Water Framework Directive

WCC Wicklow County Council

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1.0 INTRODUCTION AND METHODOLOGY

John Spain Associates, Planning & Development Consultants, have been commissioned by Cairn Homes Properties Ltd., to prepare an Environmental Impact Assessment Report (EIAR) for a proposed development on a site of c. 6.57 hectares. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

The subject lands are located on the south eastern side of Enniskerry, c.1km from the village centre. The lands are situated to southern side of the L1020 (Cookstown Road) and to the east of the R760. The development site under the ownership of Cairn comprises 6.27 hectares with additional areas for footpath and public lighting upgrade (and services upgrade along the Cookstown Road of c. 0.3 hectares), resulting an overall area of 6.57 hectares. The relevant letters of consent are included in the particulars with the SHD application.

The central purpose of the Environmental Impact Assessment Report (EIAR) is to undertake an appraisal of the likely and significant impacts on the environment of the proposed development in parallel with the project design process, and to document this process in the EIAR. This is then submitted to the competent/ consent authority to enable it assess the likely significant effects of the project on the environment. This assessment will then inform the decision as to whether the development should be permitted to proceed.

A full description of the proposed development lands together with a description of the proposed development is provided in Chapter 2 of this EIAR document.

The Strategic Housing Development (SHD) proposal comprises the development of 165 no. dwellings as well as a creche and open space and additional footpath and lighting along the southern side of the Cookstown Road.

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by directives 97/11/EC, 2003/4/EC, 2011/92/EU and 2014/52/EU, as well as implementing legislation, i.e. Part X of the Planning and Development Act 2000, as amended ('***the 2000 Act***'), the Planning and Development (Housing) and Residential Tenancies Act 2016 ("***the 2016 Act***") and Parts 10 and 23 of the Planning and Development Regulations 2001, as amended, in particular as amended by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 ("***the 2001 Regulations***"). A description of the methodological approach to the preparation of this EIAR is provided in the following sections of this chapter.

1.1 DEFINITION OF EIA AND EIAR

Directive 2014/52/EU defines '*environmental impact assessment'* as a process, which includes the responsibility of the developer to prepare an Environmental Impact Assessment Report (EIAR), and the responsibility of the competent authority to provide reasoned conclusions following the examination of the EIAR and other relevant information.

Article 1(2)(g) of Directive 2011/92/EU, as amended by the 2014 Directive states that "*environmental impact assessment*" means a process consisting of:

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

A definition of "*environmental impact assessment*" is also contained under Section 171A of the 2000 Act, as amended as follows:

> *'environmental impact assessment' means a process—*
>
> *(a) consisting of—*
>
> *(i) the preparation of an environmental impact assessment report by the applicant in accordance with this Act and regulations made thereunder,*
> *(ii) the carrying out of consultations in accordance with this Act and regulations made thereunder,*
> *(iii) the examination by the planning authority or the Board, as the case may be, of—*
> *(I) the information contained in the environmental impact assessment report,*
> *(II) any supplementary information provided, where necessary, by the applicant in accordance with section 172(1D) and (1E), and*
> *(III) any relevant information received through the consultations carried out pursuant to subparagraph (ii),*
> *(iv) the reasoned conclusion by the planning authority or the Board, as the case may be, on the significant effects on the environment of the proposed development, taking into account the results of the examination carried out pursuant to subparagraph (iii) and, where appropriate, its own supplementary examination, and*
> *(v) the integration of the reasoned conclusion of the planning authority or the Board, as the case may be, into the decision on the proposed development, and*
>
> *(b) which includes—*
> *(i) an examination, analysis and evaluation, carried out by the planning authority or the Board, as the case may be, in accordance with this Part and regulations made thereunder, that identifies, describes and assesses, in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following:*
>
> *(I) population and human health;*
> *(II) biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive;*
> *(III) land, soil, water, air and climate;*
> *(IV) material assets, cultural heritage and the landscape;*
> *(V) the interaction between the factors mentioned in clauses (I) to (IV),*
>
> *and*
> *(ii) as regards the factors mentioned in subparagraph (i)(I) to (V), such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the proposed development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development;*

The amended Directive (Directive 2014/52/EU) uses the term environmental impact assessment report (EIAR) rather than environmental impact statement (EIS). Where current national guidelines and regulations refer to an environmental impact statement or an EIS, this can be taken to be the same as an environmental impact assessment report (EIAR).

A definition of Environmental Impact Assessment Report (EIAR) has not been included in the revised directive. However the EPA Guidelines (2017)1 provide the following definition:

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

The EIAR is prepared by the developer and is submitted to a CA (Competent Authority) as part of a consent process.

The CA uses the information provided to assess the environmental effects of the project and, in the context of other considerations, to inform its decision as to whether consent should be granted. The information in the EIAR is also

[1] *Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Environmental Protection Agency, 2017*

used by other parties to evaluate the acceptability of the project and its effects and to inform their submissions to the CA.

The EIAR provides a systematic analysis and evaluation of the potentially significant effects of a proposed project on the receiving environment. The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and these factors must be addressed in the EIAR.

The EIAR should be prepared at a stage in the design process where changes can still be made to avoid adverse effects. This often results in the modification of the project to avoid or reduce effects through redesign.

Where significant and likely environmental effects are identified that are unacceptable, the EIA process aims to quantify and minimise the impact specified development projects have on the environment through appropriate mitigation measures. The preparation of an EIAR requires site-specific considerations and the preparation of baseline assessment against which the likely impacts of a proposed development can be assessed by way of a concise, standardised and systematic methodology.

1.2 EIA LEGISLATION

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive 85/337/EC (as amended by Council Directive 97/11/EC, Directive 2003/4/EC, Directive 2009/31/EC, Directive 2011/92/EU and recently Directive 2014/52/EU, which amends the previous EIA Directives in a number of respects by amending the consolidating Directive 2011/92/EU). The purpose of these Directives to ensure that projects likely to have significant effects on the environment are subject to a comprehensive and systematic assessment of environmental effects prior to development consent being given.

1.3 EIA GUIDELINES

EIA practice has evolved substantially since the introduction of the EIA Directive in 1985. Practice continues to evolve, and takes into account the growing body of experience in carrying out EIARs in the development sector. Table 1.1 sets out the relevant key EIA Guidance which has been consulted in the preparation of this EIAR document. In addition, the individual chapters of this EIAR should be referred to for further information on the documents consulted by each individual consultant.

We would also note that the pre-application discussions with the Planning Authority and An Bord Pleanála, including the Board's opinion informed the content of the EIAR.

Table 1.1 – EIA Guidelines Consulted as Part of the Preparation of this EIAR

Irish
• Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, August 2017 • Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018 • Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems - Key Issues Consultation Paper, Department of Housing, Planning, Community and Local Government, 2017. • Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017). • Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoECLG, March 2013). • Development Management Guidelines (DoEHLG, 2007). • Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003). • Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003). • Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).

European Union (in addition to Directives referenced above)
• Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
• EU Guidance on EIA Screening (DG Environment 2001).
• Guidance on EIA Scoping (DG Environment 2001).
• EIA Review Checklist (DG Environment 2001).
• Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002).

The Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports published by the EPA have been prepared to help practitioners interpret the amended EIA Directive and are likely to be updated and finalised following the updates to the Planning and Development Act 2000 (as amended) and Planning and Development Regulations 2001 (as amended).

They provide practical guidance to planning authorities, An Bord Pleanála, and other relevant stakeholders, on procedural issues and the EIA process, and outline the key changes introduced by Directive 2014/52/EU.

The content of this Environmental Impact Assessment Report has been prepared in accordance with the provisions of Article 5(1) and Annex IV of Directive 2014/52/EU and Article 94 and Schedule 6 the 2001 Regulations as amended, in particular by European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

1.4 EIA PROCESS OVERVIEW

The main purpose of the EIA process is to identify the likely significant impacts on the human environment, the natural environment and on cultural heritage associated with the proposed development, and to determine how to eliminate or minimise these impacts. The EIAR summarises the environmental information collected during the impact assessment of the proposed development.

Several interacting steps typify the early stages of the EIA process and include:

- Screening;
- Scoping;
- Assessing Alternatives; and
- Assessing and Evaluating.

Screening: Screening is the term used to describe the process for determining whether a proposed development requires an EIA.

Scoping: This stage firstly identifies the extent of the proposed development and associated site, which will be assessed as part of the EIA process, and secondly, it identifies the environmental issues likely to be important during the course of completing the EIA process through consultation with statutory and non-statutory stakeholders. Scoping request letters were issued to a range of stakeholders at the commencement of this EIA process and the responses received have been considered as part of the compilation of the EIAR.

Assessing Alternatives: This stage outlines the possible alternative approaches to the proposed development. Consideration of alternative sites and layouts within the final chosen site are set out in Chapter 2 of this EIAR.

Assessing and Evaluating: The central steps of the EIA process include baseline assessment (desk study and field surveys) to determine the status of the existing environment, impact prediction and evaluation, and determining appropriate mitigation measures where necessary. This stage of the EIAR is presented in Chapters 3 to 17.

1.5 SCREENING – REQUIREMENT FOR EIA

Screening is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory legislative threshold requirements or by reference to the type and scale of the proposed development and the significance or the environmental sensitivity of the receiving baseline environment. Annex I of the EIA Directive 85/337/EC requires as mandatory the preparation of an EIA for all development projects listed therein.

Schedule 5 (Part 1) of the Planning & Development Regulations 2001 (as amended) transposes Annex 1 of the EIA Directive directly into Irish land use planning legislation. The Directive prescribes mandatory thresholds in respect to Annex 1 projects.

Annex II of the EIA Directive provides EU Member States discretion in determining the need for an EIA on a case-by-case basis for certain classes of project having regard to the overriding consideration that projects likely to have significant effects on the environment should be subject to EIA.

The proposed development falls within categories 10(b)(i) and 10(b)(iv) of Part 2 of Schedule 5 of the Planning and Development Regulations 2001-2015. Category 10(b)(i) refers to 'Construction of more than 500 dwellings'. Category 10(b)(iv) refers to '*Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built up area and 20 hectares elsewhere.'*

For both categories, the proposed development is below the mandatory threshold for EIA at 165 no. dwellings and 6.57 hectares in area, respectively. However, having regard to the environmental sensitivities of the location of the proposed development Landscape and Visual as well as Biodiversity(bats), it is considered appropriate to include an EIAR to enable the Competent Authority to carry out an Environmental Impact Assessment in respect of the proposed development.

Article 299A of the Planning and Development Regulations 2001, as amended, provides that, where a planning application for a "sub-threshold" strategic housing development is accompanied by an EIAR and a request for a EIA screening determination under section 7(1)(a)(i)(I) of the 2016 Act was not made – as is the position in relation to this application – then the application shall be dealt with as if the EIAR had been submitted in accordance with subsection 172(1).

The EIAR provides information on the receiving environment and assesses the likely significant effects of the project and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the Environmental Impact Assessment (EIA) of the proposed development.

1.6 SCOPING

The EPA Guidelines state that '*scoping*' is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is defined in the EC guidance[2] as:

'determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR'.

The applicant is committed to ensuring that all of its development projects are conducted in a responsible and sustainable manner. A scoping process to identify the issues that are likely to be most important during the Environmental Impact Assessment process was carried out by the applicant, design team and EIAR consultants and informed the format of this EIAR.

Section 7(1)(b) of the 2016 Act, as amended, provides that a request for scoping may be submitted to the Board, however this is not mandatory. The second paragraph of Article 5(2) of Directive 2014/92/EU provides that Member States can choose to make it mandatory that competent authorities have to give a scoping opinion irrespective of whether the developer so requests. The transposition of this provision is optional and has not been introduced in Ireland. The consultation paper from the Department indicates that it is not intended to introduce mandatory scoping.

[2] Guidance on EIA Scoping, EC, 2001

The provisions included in the revised EIA Directive and all of the issues listed in Schedule 6, Sections 1, 2 and 3 of the Planning and Development Regulations 2001 (as amended) and in recent guidance documents have been addressed in the EIAR.

In this context the following topics/issues have been reviewed and addressed in the context of the proposed development:

- Introduction and Methodology,
- Project Description and Alternatives Examined,
- Population and Human Health,
- Biodiversity,
- Land and Soils,
- Water,
- Air Quality and Climate,
- Noise and Vibration,
- Landscape and Visual Impact,
- Material Assets Traffic, Waste and utilities,
- Archaeology, Architectural and Cultural Heritage,
- Risk Management,
- Interactions of the Foregoing,
- Principal Mitigation and Monitoring Measures,
- Non-Technical Summary.

In addition to the above a series of standalone reports have been prepared to accompany the application and which have helped inform the above chapters of the EIAR where relevant. Chapter 2 provides details of the envisaged phased delivery of development on the lands.

A series of meetings have taken place with the technical staff of Wicklow County Council and a consultation meeting has taken place between the Applicant and An Bord Pleanála under the strategic housing development process which assisted in the preparation of this EIAR and the SHD planning application.

1.7 INFORMATION TO BE CONTAINED IN AN EIAR

The content of this Environmental Impact Assessment Report has been prepared in accordance with the provisions of Article 5(1) and Annex IV of Directive 2014/52/EU. Article 5(1) states:

> *"The information to be provided by the developer shall include at least:*
> *(a) a description of the project comprising information on the site, design, size and other relevant features of the project;*
> *(b) a description of the likely significant effects of the project on the environment;*
> *(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
> *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
> *(e) a non-technical summary of the information referred to in points (a) to (d); and*
> *(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

Annex IV states:

> *"1. A Description of the project, including in particular:*
>
> *(a) a description of the location of the project;*
>
> *(a) (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;*

(b) (c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;

(c) (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.

2. 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.

3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

4. A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

5. A description of the likely significant effects of the project on the environment resulting from, inter alia:

(a) the construction and existence of the project, including, where relevant, demolition works;

(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

(g) the technologies and the substances used.

The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.

6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

8. A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. W here 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.

9. A non-technical summary of the information provided under points 1 to 8.

10. A reference list detailing the sources used for the descriptions and assessments included in the report."

Article 94 and Schedule 6 of the Planning and Development Regulations 2001, as amended, transpose into Irish law the EIA Directive requirements in relation to information to be contained in an EIAR.

Schedule 6 provides for the following information to be furnished:

1. (a) A description of the proposed development comprising information on the site, design, size and other relevant features of the proposed development.
(b) A description of the likely significant effects on the environment of the proposed development.
(c) A description of the features, if any, of the proposed development and the measures, if any, envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment of the development.
(d) A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment.

2. Additional information, relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected, on the following matters, by way of explanation or amplification of the information referred to in paragraph 1:

(a) a description of the proposed development, including, in particular—
(i) a description of the location of the proposed development,
(ii) a description of the physical characteristics of the whole proposed development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases,
(iii) a description of the main characteristics of the operational phase of the proposed development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used, and
(iv) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases;

(b) a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;

(c) a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge;

(d) a description of the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act likely to be significantly affected by the proposed development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas

emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape;

(e) (i) a description of the likely significant effects on the environment of the proposed development resulting from, among other things—

(I) the construction and existence of the proposed development, including, where relevant, demolition works,

(II) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources,

(III) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste,

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

(V) the cumulation of effects with other existing or approved developments, 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,

(VI) the impact of the proposed development on climate (for example

the nature and magnitude of greenhouse gas emissions) and the vulnerability of the proposed development to climate change, and

(VII) the technologies and the substances used, and

(ii) the description of the likely significant effects on the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act should cover the direct effects and any indirect, secondary, cumulative, transboundary, short term, medium-term and long-term, permanent and temporary, positive and negative effects of the proposed development, taking into account the environmental protection objectives established at European Union level or by a Member State of the European Union which are relevant to the proposed development;

(f) a description of the forecasting methods or evidence used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information, and the main uncertainties involved;

(g) a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of an analysis after completion of the development), explaining the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset during both the construction and operational phases of the development;

(h) a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment 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, emergencies arising from such events.

Article 5(1) of the EIA Directive and Article 94 of the 2001 regulations, also require that the EIAR shall, with a view to avoiding duplication of assessments, take into account the available results of other relevant assessments under Union or national legislation. The available result of other such assessments, where relevant, have been considered in each of the chapters.

The likely significant effects in this EIAR are described using the terminology in the EPA Guidelines, which are presented in the Table below. The use of these terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the proposed development on the receiving environment.

Table 1.2 – Description of Effects

Quality of Effects	**Definition**
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects on the Receiving Environment	**Description of Potential 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 a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Extent and Context of Effects	**Describing the 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 (is it the biggest, longest effect ever?)
Probability of Effects	**Describing the Probability of Effects**
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.
Duration of Impact	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effect	**Describing the Types of Effects**
Indirect Effects	(a.k.a. Secondary Effects) Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.

'Do-Nothing Effects'	The environment as it would be in the future should the subject project not be carried out.
`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Source: Table 3.3 EPA Draft Guidelines EPA

1.8 PURPOSE OF THIS EIAR

The EPA Guidelines state that the main purpose of an EIAR '*is to identify, describe and present an assessment of the likely significant impacts of a project on the environment'*. This informs the competent authority's assessment process, its decision on whether to grant consent for a project and, if granting consent, what conditions to attach. The EIAR focuses on:

- *Impacts that are both likely and significant;*
- *Impact descriptions that are accurate and credible'*

In addition to identifying and predicting the likely predicted significant environmental impacts resulting from the proposed development, the EIAR should describe the means and extent by which they can be reduced or ameliorated, to interpret and communicate information about the likely impacts and to provide an input into the decision making and planning process.

The EIAR documents the consideration of environmental effects that influenced the evaluation of alternatives. It also documents how the selected project design incorporates mitigation measures; including impact avoidance, reduction or amelioration; to explain how significant adverse effects will be avoided.

It is intended that this EIAR will assist An Bord Pleanála, statutory consultees and the public in assessing all aspects of the application proposals.

1.9 OBJECTIVES OF THIS EIAR

The EPA guidelines list the following fundamental principles to be followed when preparing an EIAR:

- Anticipating, avoiding and reducing significant effects;
- Assessing and mitigating effects;
- Maintaining objectivity;
- Ensuring clarity and quality;
- Providing relevant information to decision makers; and
- Facilitating better consultation.

The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and the environmental impact assessment should 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 prescribed environmental factors which are:

(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).

This EIAR documents the assessment process of the prescribed environmental factors in relation to the proposed strategic housing development at Enniskerry, Co. Wicklow.

Pursuing preventative action is the most effective means by which potential negative environmental impacts can be avoided. Avoidance of impacts has been principally achieved through the consideration of alternatives and through the review of the project design in light of identified key environmental constraints. This is outlined in greater detail in Chapter 2.

The EIAR document enables the Board, as competent authority, to reach a decision on the acceptability of the proposed development in the full knowledge of the project's likely significant impacts on the environment, if any.

Decisions are taken by competent/consent authorities through the statutory planning process which allows for public participation and consultation while receiving advice from other key stakeholders and statutory authorities with specific environmental responsibilities.

Public participation and consultation are an integral part of the new Strategic Housing Development process as outlined in the Planning and Development (Housing) and Residential Tenancies Act 2016 and the Planning and Development (Strategic Housing Development) Regulations 2017, which amend the 2001 Regulations to include provisions relating to SHD.

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

Informal scoping of potential environmental impacts was undertaken with the Planning Authority through pre-application meetings. A summary of the pre-application discussions is contained in Appendix 2 of the Statement of Consistency prepared by John Spain Associates.

1.10 FORMAT AND STRUCTURE OF THIS EIAR

1.10.1 EIAR Structure

The structure of the EIAR is laid out in the preface of each volume for clarity. It consists of three volumes as follows:

- **Volume I: Non-Technical Summary**

This is a non-technical summary of the information contained within Volume II.

- **Volume II: Environmental Impact Assessment Report.**

This is the main volume of the EIAR. It provides information on the location and scale of the proposed development, details on design and impacts on the environment (both positive and negative) as a result of the proposed development.

Each of the environmental aspects as listed below are examined in terms of the existing or baseline environment, identification of potential construction and operational stage impacts and where necessary proposed mitigation measures are identified. The interaction of the environmental aspects with each other is also examined. Each chapter includes an assessment of potential cumulative impacts with other existing and planned developments, where relevant. Environmental aspects considered include:

Chapter 3 Population and Human Health;
Chapter 4 Biodiversity;
Chapter 5 Land and Soils;
Chapter 6 Water;

Chapter 7 Climate (Air Quality);
Chapter 8 Noise and Vibration;
Chapter 9 Landscape & Visual;
Chapter 10 Material Assets – Traffic;
Chapter 11 Material Assets - Waste Management;
Chapter 12 Material Assets – Utilities;
Chapter 13 Cultural Heritage (Local History, Archaeology & Architectural Heritage);
Chapter 14 Risk Management;
Chapter 15 Interactions of the Foregoing and Cumulative Impacts;
Chapter 16 Summary of Mitigation and Monitoring Measures;
Chapter 17 References.

- **Volume III: Technical Appendices**

Volume III contains specialists' technical data and other related reports.

1.10.2 EIAR Volume II Structure

The preparation of an EIAR document requires the assimilation, co-ordination, and presentation of a wide range of relevant information in order to allow for the overall assessment of a proposed development. For clarity and to allow for ease of presentation and consistency when considering the various elements of the proposed development, a systematic structure is used for the main body of this EIAR document.

The structure used in this EIAR document is a Grouped Format structure. This structure examines each environmental topic[3] in a separate chapter of this EIAR document. The structure of the EIAR document is set out in Table 1.3 below.

Table 1.3 – Structure of this EIAR

Chapter	Title	Content
1	Introduction and Methodology	Sets out the purpose, methodology and scope of the document.
2	Project Description and Alternatives Examined	Sets out the description of the site, design and scale of development, considers all relevant phases from construction through to existence and operation together with a description and evaluation of the reasonable alternatives studied by the developer including alternative locations, designs and processes considered; and a justification for the option chosen taking into account the effects of the project on the environment.
3	Population and Human Health	Describes the demographic and socio-economic profile of the receiving environment and potential impact of the proposed development on population, i.e. human beings, and human health.
4	Biodiversity	Describes the existing ecology on site and in the surrounding catchment, and assesses the potential impact of the proposed development and mitigation measures incorporated into the design of the scheme.
5	Land and Soils	Provides an overview of the baseline position, the potential impact of the proposed development on the site's soil and geology and impacts in relation to land take and recommends mitigation measures.

[3] In some instances similar environmental topics are grouped.

Chapter	Title	Content
6	Water	Provides an overview of the baseline position, the potential impact of the proposed development on water quality and quantity and recommends mitigation measures.
7	Air Quality and Climate	Provides an overview of the baseline air quality and climatic environment, the potential impact of the proposed development, the vulnerability of the project to climate. change, and recommends mitigation measures.
8	Noise and Vibration	Provides an overview of the baseline noise environment, the potential impact of the proposed development and recommends mitigation measures.
9	Landscape & Visual Impact	Provides an overview of the baseline position, the potential impact of the proposed development on the landscape appearance and character and visual environment, and recommends mitigation measures.
10-12	Material Assets	Describes the existing traffic, waste management and services and infrastructural requirements of the proposed development and the likely impact of the proposed development on material assets.
13	Archaeology and Architectural and Cultural Heritage	Provides an assessment of the site, and considers the potential impact of the proposed development on the local archaeology, architectural and cultural heritage; and recommends mitigation measures.
14	Risk Management	Provides a review of the potential vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned
15	Interactions of the Foregoing and Cumulative Impacts	Describes the potential interactions and interrelationships between the various environmental factors. A description of the potential cumulative impacts is included in each of the relevant chapters and is referenced in this Chapter.
16	Summary of Mitigation and Monitoring Measures	Sets out the key mitigation and monitoring measures included in the EIAR Document for ease of reference.
17	Reference List	List of references within the chapters of the EIAR

This systematic approach described above employs standard descriptive methods, replicable assessment techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration. An outline of the methodology employed consistently in each chapter to examine each environmental topic is provided below:

Table 1.4 – Methodology Employed to Evaluate Environmental Topic

- **Introduction:** Provides an overview of the specialist area and specifies the specialist who prepared the assessment.
- **Study Methodology:** This subsection outlines the method by which the relevant impact assessment has been conducted within that chapter.
- **The Existing Receiving Environment (Baseline Situation):** In describing the receiving environment, the **context, character, significance and sensitivity** of the baseline receiving environment into which the proposed development will fit is assessed. This also takes account of any proposed developments that are likely to proceed.
- **Characteristics of the Proposed Development:** Consideration of the 'Characteristics of the Proposed Development' allows for a projection of the 'level of impact' on any particular aspect of the proposed environment that could arise. For each chapter those characteristics of the proposed development which are relevant to the area of study are described; for example the chapter on landscape and visual impact addresses issues such as height and impact on the surrounding landscape.
- The characteristics of projects must be considered, with particular regard to: (a) the size and design of the whole project; (b) cumulation with other existing and/or approved projects; (c) the use of natural resources, in particular land, soil, water and biodiversity; (d) the production of waste; (e) pollution and nuisances; (f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; (g) the risks to human health (for example due to water contamination or air pollution).
- **Potential Impact of the Proposed Development:** This section provides a description of the specific, direct and indirect impacts that the proposed development may have. This is provided with reference to both the Receiving Environment and Characteristics of the Proposed Development sections while also referring to the (i) magnitude and intensity, (ii) integrity, (iii) duration and (iv) probability of impacts. Impact assessment addresses direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions.
- **Do Nothing Scenario:** In order to provide a qualitative and equitable assessment of the proposed development, this section considers the proposed development in the context of the likely impacts upon the receiving environment should the proposed development not take place.
- **Avoidance, Remedial and Mitigation Measures: Avoidance,** remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential impacts. This includes avoidance, reduction and remedy measures as set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified.
- **Predicted Impacts of the Proposed Development:** This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied.
- **Monitoring:** This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring.

- **Reinstatement:** While not applicable to every aspect of the environment considered within the EIAR, certain measures need to be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.
- **Interactions:** This section provides a description of impact interactions together with potential indirect, secondary and cumulative impacts
- **Difficulties Encountered in Compiling:** This section provides an indication of any difficulties encounters by the environmental specialist in compiling the required information.

1.11 EIAR PROJECT TEAM

1.11.1 EIAR Project Management

The preparation of this EIAR was project managed, co-ordinated and produced by John Spain Associates. John Spain Associates role was to liaise between the design team and various environmental specialist consultants. John Spain Associates were also responsible for editing the EIAR document to ensure that it is cohesive and not a disjointed collection of disparate reports by various environmental specialists. John Spain Associates does not accept responsibility for the input of the competent specialist consultants or the design team.

1.11.2 EIAR Competent Experts/Environmental Specialists

Environmental specialist consultants were also commissioned for the various technical chapters of the EIAR document which are mandatorily required as per the EIA Directive and Planning and Development Regulations 2018. The amended EIA Directive (Directive 2014/52/EU) states the following in relation to the persons responsible for preparing the environmental impact assessment reports:

> *'Experts involved in the preparation of environmental impact assessment reports should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality'.*

In order to outline compliance with this requirement of the amended directive and in line with emerging best practice the EIAR states the names of the environmental consultants who have prepared each element of the EIAR and lists their qualifications and relevant experience; demonstrating that the EIAR has been prepared by competent experts. Each environmental specialist was commissioned having regard to their previous experience in EIA; their knowledge of relevant environmental legislation relevant to their topic; familiarity with the relevant standards and criteria for evaluation relevant to their topic; ability to interpret the specialised documentation of the construction sector and to understand and anticipate how their topic will be affected during construction and operation phases of development; ability to arrive at practicable and reliable measure to mitigate or avoid adverse environmental impacts; and to clearly and comprehensively present their findings.

Each environmental specialist was required to characterise the receiving baseline environment; evaluate its significance and sensitivity; predict how the receiving environment will interact with the proposed development and to work with the EIA project design team to devise measures to mitigate any adverse environmental impacts identified.

The relevant specialist consultants who contributed to the EIAR and their inputs are set out in Table 1.5 below.

Table 1.5 – EIAR List of Competent Experts

Organisation	EIAR Specialist Topics / Inputs
John Spain Associates, Planning & Development Consultants, 39 Fitzwilliam Place, Dublin 2, D02 ND61 T: 01 662 5803 Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt	Introduction and Methodology Project Description and Alternatives Examined Population and Human Health Interactions of the Foregoing Principal Mitigation and Monitoring Measures Non-Technical Summary
Openfield, Padraic Fogarty, MSc, MIEMA MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA) Dr Tina Aughney Bat Eco Services Licenced Bat Specialist - Honours degree in Environmental Science from NUI Galway and Ph.D.	Biodiversity Biodiversity (Bats)
Mr John Considine, Director of Barrett Mahony Consulting Engineers (Civil & Structural), BE, CEng, MIEI, MIStructE, FConsEI Chartered Engineer Mr Paul Stephenson, Senior Geotechnical Engineer BE(Hons), MIEI, CEng, Chartered Engineer	Land and Soils/ Population and Human Health
Mr John Considine, Director of Barrett Mahony Consulting Engineers (Civil & Structural), BE, CEng, MIEI, MIStructE, FConsEI Chartered Engineer Mr Paul Stephenson, Senior Geotechnical Engineer BE(Hons), MIEI, CEng, Chartered Engineer	Water and Hydrogeology
Mr John Considine, Director of Barrett Mahony Consulting Engineers (Civil & Structural), BE, CEng, MIEI, MIStructE, FConsEI Chartered Engineer	Material Assets-Traffic
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Material Assets (Waste Management)
Mr John Considine, Director of Barrett Mahony Consulting Engineers (Civil & Structural), BE, CEng, MIEI, MIStructE, FConsEI Chartered Engineer Margaret Dolan, Tech Cert, BSc (Hons), CEng, MIEI, Chartered Engineer of Waterman Moylan Consulting Engineers	Material Assets (Utilities)
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Air Quality and Climate (Population and Human Health)
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Noise and Vibration (Population and Human Health)
Áit Urbanism + Landscape Margaret Egan Director Landscape Architect MILI	Landscape and Visual Impacts

Organisation	EIAR Specialist Topics / Inputs
Diploma in Environmental Impact Assessment Management , University College Dublin Bachelor of Agricultural Science (Landscape Horticulture/Landscape Architecture), University College Dublin. Bachelor of Science in Environmental Resources Management, Dublin Institute of Technology Cynthia Jayne Dunwoody Landscape Architect MILI MLA Landscape Architecture, University of Edinburgh, Scotland. BSc Mathematics with Geography, University of St. Andrews, Scotland	
Mr John Considine, Director of Barrett Mahony Consulting Engineers (Civil & Structural), BE, CEng, MIEI, MIStructE, FConsEI Chartered Engineer	Risk Management
Faith Bailey MA, BA (Hons), MCIfA Associate Director. Rob Goodbody (BA (MOD), DIP ENV P, DIPABRC, MUBC, MA) of IAC Muireann Ní Cheallacháin (BA, MA, DIP) of IAC Archaeology	Archaeology, Architectural and Cultural Heritage
John Spain, BBS, MRUP, MRTPI, MIPI, Managing Director, John Spain Associates	Review of EIAR

1.12 NON-TECHNICAL SUMMARY

The EIA Directive requires that one of the objectives of the EIA process is to ensure that the public are fully aware of the environmental implications of any decisions.

The EPA guidelines note that the non-technical summary of the EIAR should facilitate the dissemination of the information contained in the EIAR and that the core objective is to ensure that the public is made as fully aware as possible of the likely environmental impacts of projects prior to a decision being made by the Competent Authority. The 2018 EIA Guidelines prepared by the DHPLG state that the Non-Technical Summary *"should be concise and comprehensive and should be written in language easily understood by a lay member of the public not having a background in environmental matters or an in-depth knowledge of the proposed project."*

A Non-Technical Summary of the EIAR has therefore been prepared which summarises the key environmental impacts and is provided as a separately bound document in Volume I.

1.13 LINKS BETWEEN EIA AND APPROPRIATE ASSESSMENT/NIS

Article 6(3) of the Habitats Directive (92/43/EEC) provides that any project not directly connected with or necessary to the management of a Natura 2000 site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to an Appropriate Assessment of its likely implications for the site in view of the site's conservation objectives.

In January 2010 the DoEHLG issued a guidance document entitled '*Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities'*. This guidance document enshrines the '*Source-Pathway-Receptor'* into the assessment of plans and projects which may have an impact on Natura 2000 sites.

The Department of the Environment, Heritage and Local Government are introducing further legislation on this issue of Appropriate Assessment. The Department advises that all projects are screened for Appropriate Assessment.

An Appropriate Assessment screening was undertaken by Openfield in accordance with '*Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC)'.* The AA Screening is submitted with the SHD application.

1.14 AVAILABILITY OF EIAR DOC

A copy of this EIAR document and Non-Technical Summary of the EIAR document is available for purchase at the offices of An Bord Pleanála and Wicklow County Council (Planning Authority) at a fee not exceeding the reasonable cost of reproducing the document. It can also be viewed on the SHD website: www.CookstownroadSHDplanning.com set up by the applicant.

1.15 IMPARTIALITY

This EIAR document has been prepared with reference to a standardised methodology which is universally accepted and acknowledged. Recognised and experienced environmental specialists have been used throughout the EIA process to ensure the EIAR document produced is robust, impartial and objective.

It should be noted that, as highlighted above, an important part of the EIA process is preventative action which causes the project design team to devise measures to avoid, reduce or remedy significant adverse impacts in advance of applying for consent. As a result, where no likely significant impacts have been identified where they might reasonably be anticipated to occur, the design and layout of the proposed development has generally been amended to minimise the potential of any likely significant adverse impacts.

1.16 STATEMENT OF DIFFICULTIES ENCOUNTERED

No particular difficulties, such as technical deficiencies or lack of knowledge, were encountered in compiling any of the specified information contained in this statement, such that that the prediction of impacts has not been possible. Where any specific difficulties were encountered these are outlined in the relevant chapter of the EIAR.

1.17 EIA QUALITY CONTROL AND REVIEW

John Spain Associates is committed to consistently monitoring the quality of EIAR documents prepared both in draft form and before they are finalised, published and submitted to the appropriate competent authority taking into account latest best-practice procedure, legislation and policy. The EPA published draft guidelines on information to be contained in Environmental Impact Assessment Report[4] and the Department of Housing, Planning, Community and Local Government have published a consultation paper[5], which have been consulted in the preparation of this EIAR. This document includes a detailed EIAR Review Checklist which has been used to undertake a review of this EIAR document.

1.18 ERRORS

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

[4] *Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Environmental Protection Agency, 2017*

5 *Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper, Department of Environment, Community and Local Government, 2017.*

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT AND ALTERNATIVES EXAMINED

2.1 INTRODUCTION AND TERMS OF REFERENCE

This section of the EIAR has been prepared by John Spain Associates, Planning & Development Consultants, and provides a description of the proposed development and also explains the evolution of the scheme design through the reasonable alternatives examined. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates, and approved by John Spain, Managing Director.

The description of the proposed development is one of the two foundations upon which an EIAR is based (the other being the description of the existing environment described in this chapter and by each of the specialist consultants in the subsequent chapters). It is also a requirement of the EIA Directive (as amended) to present an outline of the main alternatives considered and a justification of the final proposed development.

2.2 DESCRIPTION OF THE LOCATION OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of 165 no. dwellings and associated ancillary infrastructure as follows:

- 105 no. 2 storey houses (49 no. 3 bedroom houses [House Types B, B1, & B2], 56 no. 4 bedroom houses [House Types A, D, E & E1];
- 56 no. apartments/duplex apartments in 6 no. 3 storey buildings – (28 no. 2 bedroom apartments and 28 no. 3 bedroom duplex apartments) all with terrace;
- 4 no. 1 bedroom Maisonette dwellings in a 2 storey building;
- Part 2-storey and single storey creche (c. 510 sq. m - including storage);
- Open space along southern boundary of c. 0.93 hectares [with pedestrian connections to boundary to '*Lover's Leap Lane'* to the south and to boundary to the east and west], hard and soft landscaping (including public lighting) and open space (including boundary treatment), communal open space for duplex apartments; regrading/re-profiling of site where required [including import/export of soil as required] along with single storey bicycle/bin stores and ESB substation;
- Vehicular access (including construction access) from the Cookstown Road from a new junction as well as 313 no. car parking spaces and 150 no. cycle spaces;
- Surface water attenuation measures and underground attenuation systems as well as connection to water supply, and provision of foul drainage infrastructure (along the Cookstown Road to existing connection at junction with R760) and provision of underground local pumping station to Irish Water specifications;
- 3 no. temporary (for 3 years) marketing signage structures [2 no. at the proposed entrance and 1 no. at the junction of the R760 and the Cookstown Road] and a single storey marketing suite (c. 81 sq.m) within site;
- All ancillary site development/construction/landscaping works, along with provision of footpath/public lighting to Powerscourt National School pedestrian entrance and lighting from Powerscourt National School entrance to the junction of the R760 along southern side of Cookstown Road and pedestrian crossing across Cookstown Road.

The subject lands are located on the south eastern side of Enniskerry, c.1km from the village centre. The lands are situated to southern side of the L1020 (Cookstown Road) and to the east of the R760. The development site under the ownership of Cairn comprises 6.27 hectares with additional areas for footpath and public lighting upgrade and foul connection (along the Cookstown Road) of c. 0.3 ha, resulting an overall area of 6.57 hectares. The relevant letters of consent are included in the particulars with the SHD application.

The lands are currently in agricultural use and are bounded to the north by existing residential development in Enniskerry Demesne, with the Summerhill House Hotel located further to the north. The Powerscourt National School is located immediately adjacent, adjoining the site to the west. A small number of standalone houses are also located in the vicinity, to the east and south. There is zoned residential lands to the west (recently granted permission for a residential development). The Powerscourt Estate and Hotel are located further to the west.

Figure 2.1 – Site Layout

2.3 DESCRIPTION OF THE PHYSICAL CHARACTERISTICS OF THE WHOLE PROPOSED DEVELOPMENT

The Site Layout Plan (figure 2.1) prepared by Mola Architects shows the overall layout in context.

2.3.1 Demolition

There is no demolition of habitable or any other structures relating to the proposed development.

2.3.2 Residential Development

The proposed 165 no. dwellings are as follows:

- 49 no. 3 bedroom houses and 56 no. 4 bedroom houses;
- 56 no. apartments/duplex apartments in 6 no. 3 storey blocks – (28 no. 2 bedroom apartments at ground floor and 28 no. 3 bedroom duplexes above) all units to have terrace;
- 4 no. 1 bedroom Maisonette dwellings in a 2 storey building

Figure 2.2 – View from Northern Boundary

Source CGI no. 1 – 3D Design Bureau

The overall mix is as follows:

Table 2.1 – Overall Dwelling Mix

	1 bedroom	2 bedroom	3 bedroom	4 bedroom	Overall
Houses			49	56	105
Duplex Apartments/Apartments		28	28		56
Maisonette Dwellings	4				4
Overall Mix	4	28	77	56	165
	2.4%	17.0%	46.7%	33.9%	100%

Source: MOLA Architects Schedule of Areas

A wide variety of dwelling typologies are included in the proposal, including 2 storey houses, duplex apartments and apartments, along with Maisonette Dwellings.

2.3.3 Houses

The houses are designed as two storey family dwellings, in semi-detached and terrace configurations. Individual plot layouts provide good separation to ensure privacy and minimise overlooking. The end-row and end terrace house types have been used to turn corners, with front doors and windows giving activity and passive supervision to the sides and avoiding large blank gables.

Figure 2.3 – View from Linear Open Space

Source: CGI no. 3 – 3D Design Bureau

The variety of house types provides for a wide choice to suit all potential occupiers and many household types, as well as permitting a very efficient site layout. The mix of house type in any one row creates visual interest and contribute to the specific character of the development, both overall and in each street.

Figure 2.4 – Private Open Space (houses)

House/ Apartment Type	Unit Type	Description	Gross Unit Area (Sq.M)	Number of Units in Scheme	# Bedrooms	Garden area per bedroom (required)	Garden area per bedroom Quantity in compliance	Garden area 0.64 per unit area required	Garden area 0.64 per unit area achieved (worst case)	Quantity in compliance
House	A	Semi Detached	140.47	30	4	60-75	ALL	89.9008	89.99	ALL
House	B	Semi Detached / End of Terrace	118.80	32	3	60-75	ALL	76.032	77	ALL
House	B1	Semi Detached / End of Terrace - Side Entry	118.80	2	3	60-75	ALL	76.032	76.6	ALL
House	B2	Mid Terrace	119.80	10	3	60-75	ALL	76.672	76.8	ALL
House	D	Semi Detached	143.60	2	4	60-75	ALL	91.904	127	ALL
House	E	Semi Detached	180.24	20	4	60-75	ALL	115.3536	115.9	ALL
House	E1	Semi Detached - Side Entry	181.76	8	4	60-75	ALL	116.3264	116.5	ALL

Source: MOLA HQA

2.3.4 Duplex Apartment Buildings

Figure 2.5 – Duplex Elevation

Source: Mola Architects

It is proposed to provide 56 no. apartments/duplex apartments in 6 no. 3 storey buildings (28 no. 2 bedroom apartments and 28 no. 3 bedroom duplex apartments) all with terrace. The duplex apartments are located in the north western portion of the subject site, with 2 no. buildings fronting onto the Cookstown Road (and 2 no. further blocks located to the south). In addition it is proposed to provide 2 no. further duplex blocks along the eastern boundary.

2.3.5 Maisonette Dwellings

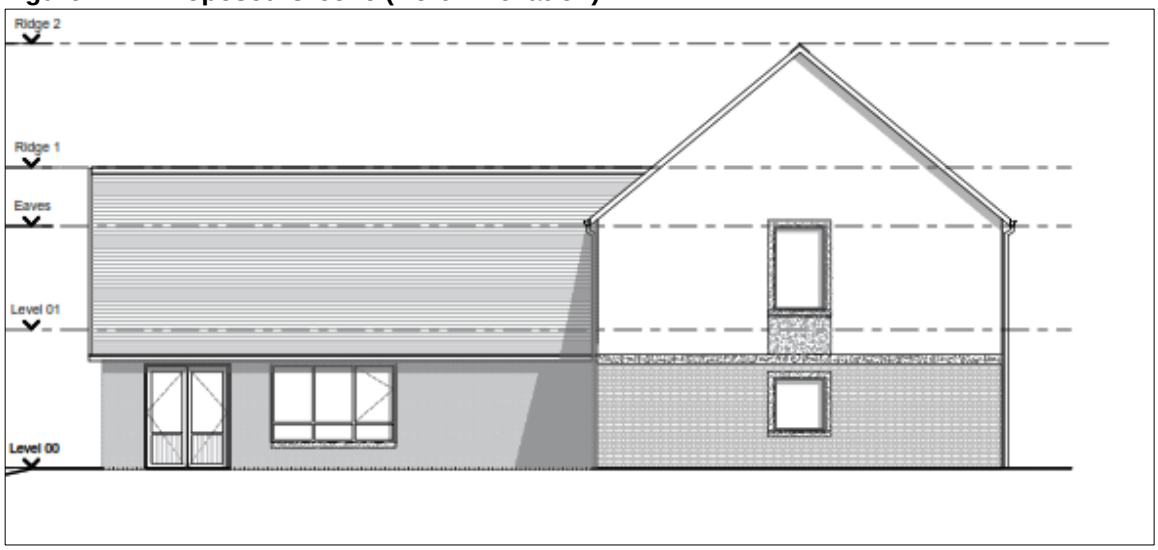
It is proposed to provide 4 no. 1 bedroom Maisonette dwellings in a 2 storey building located in the western portion of the subject site.

Figure 2.6 – Maisonette Elevation (front)

2.4 CRECHE PROVISION

It is proposed to provide a two storey creche of c. 510 sq. m (including storage) along with an external play area. The creche is located to the north of the site, positioned beside Powerscourt National School. The creche will provide c. 100 childcare spaces based on a gross floor space of 5 sq. m for each child. The creche is located on the Community CE zoned lands which is considered appropriate for this use.

Figure 2.7 – Proposed Creche (North Elevation)



Source: MOLA

2.4.1 Refuse Storage

Waste storage is provided for the individual blocks by the provision of a separate bin store. The refuse stores provide adequate storage space to satisfy the three-bin system for the collection of mixed dry recyclables, organic waste and residual waste.

2.4.2 Temporary Marketing Suite and Signage

It is proposed to provide a single storey temporary marketing suite (c. 84 sq. m) within the southern portion of the subject site along with signage (at 3 no. locations) for a period of 3 years.

2.5 INTERNAL ROAD LAYOUT

The internal road layout (as set out in the DMURS Statement of Compliance, prepared by BMCE) has been designed in accordance with the key design principles of the Design Manual for Urban Roads and Streets (DMURS) as follows:

- Design Principle 1: Connected Networks
- Design Principle 2: Multifunctional Streets
- Design Principle 3: Pedestrian Focus
- Design Principle 4: Multidisciplinary Approach

The development strategy maximises connectivity with the local environment through the provision of permeable and legible, orthogonal street networks, with a particular focus on adherence to the hierarchy of road users and sustainable means of travel.

The development proposals make provision for future linkages to adjacent lands to the west and east. This represents good planning practice and allows for the integration of adjacent lands in the future to the subject lands, thereby ensuring that wider permeability can be provided over time as other adjacent lands are developed.

The development incorporates a conspicuous hierarchy of multifunctional streets that offer route choice and flexibility for managing movement within the development. The layout facilitates creation of distinct place-based streets which serve to emphasise the low-speed residential nature of the development, providing safe means of travel for more vulnerable road users such as cyclists and pedestrians.

Both horizontal and vertical deflections have been introduced throughout the road network to address the need for self-regulating traffic-calming. In addition, road levels have been designed to minimise surface gradients to reduce the need for revving engines and associated noise and emissions. Standard local street widths of 5.5m within the development are proposed in compliance with Section 4.4.9 of DMURS and Wicklow County Council Roads

Department's pre-application submission observations. Junctions have been designed to minimise corner radii in line with Section 4.3.3 of DMURS.

Self-regulating shared surface homezones are included in appropriate locations which serve to create a sense of place while balancing the needs of all users. These shared surface homezones are designed with a minimum 4.8m wide carriageway along with associated 1.2m wide flush pedestrian comfort zones as per pre-application observations received from Wicklow County Council Roads Department. Furthermore, these shared surface homezones will be distinguished from standard local streets using contrasting surfacing materials to create a distinct change in environment from standard local streets, further enhancing the sense of place in these areas.

The proposed development layout facilitates the creation of a low-speed residential environment. With respect to the hierarchy of road users outlined in DMURS, the development places a strong focus on creating a vibrant and sustainable pedestrian environment, prioritising pedestrians while balancing the needs of all road users.

Footpaths in the development are designed as 2m wide typically, which meets the minimum requirement of 1.8m widths outlined in Section 4.3.1 of DMURS. Pedestrian crossing points along with associated tactile paving in accordance with the Traffic Management Guidelines are provided at anticipated pedestrian desire lines, while pedestrian priority raised table crossings have been located in line with higher demand crossing locations. Further to this, pedestrian priority will be provided at internal crossroad junctions in the form of raised tables which also serve as a traffic calming measure. Residential shared space homezones with contrasting surface finishes are proposed to encourage lower vehicular speeds and create a more attractive, high quality space for pedestrians.

The design of the layouts involved close collaboration and coordination between the Architect, Structural Engineer, Civil Engineer, Landscape Architect and Mechanical & Electrical Engineer, and takes account of the observations and comments raised by Wicklow County Council and An Bord Pleanála at the preapplication stage of the planning process.

In addition to this interaction, the Architect and Mechanical & Electrical Engineer provided designs to incorporate lighting and building access to the scheme, which has been integrated into the strategy of the landscaping and desire lines for access and egress to buildings by non-motorised users and reflects the overall multidisciplinary approach taken to the overall development design.

2.6 ACCESS AND PARKING

The site's main access will be from the LP1020 (Cookstown Road), with permeability provided to the boundary to the lands to the west, along with pedestrian connection through the open space along the southern boundary to the '*Lover's Leap Lane'*, which connects to the R760 (and pedestrian path), which links to the village centre.

2.6.1 Car Parking and Bicycle Parking

It is proposed to provide 313 no. car parking spaces 2 per house – 210 spaces as well as 103 no. car parking spaces for the duplex/apartment units, maisonette units and the creche as follows:

Table 2.2 – Car Parking for Apartments/Duplex/Creche

Car Parking Requirement				
Apartment/Duplex Unit Type	**No. of Units**	**No. per Unit**	**Spaces Required**	**Spaces Provided**
Block A1	8	1.5	12	12
Block A2	8	1.5	12	12
Block B1 (Part V)	8	1	8	8
Block B2 (Part V)	4	1	4	4
Block B2	4	1.5	6	6
Block C	12	1.5	18	18
Block D	12	1.5	18	18
Unit Types F & F1 (Part V)	4	1	4	4
Creche			20	11
EV spaces (10% of total			9.5	10
Total No. of Spaces			**111.5**	**103**

Source: Mola

In addition it is proposed to provide 150 no. bicycle spaces as follows:

- 88 no. for the duplex/apartment in secure bike storage;
- 12 no. for the creche;
- 40 no. visitor spaces;
- 10 no. visitor spaces – Linear Park;

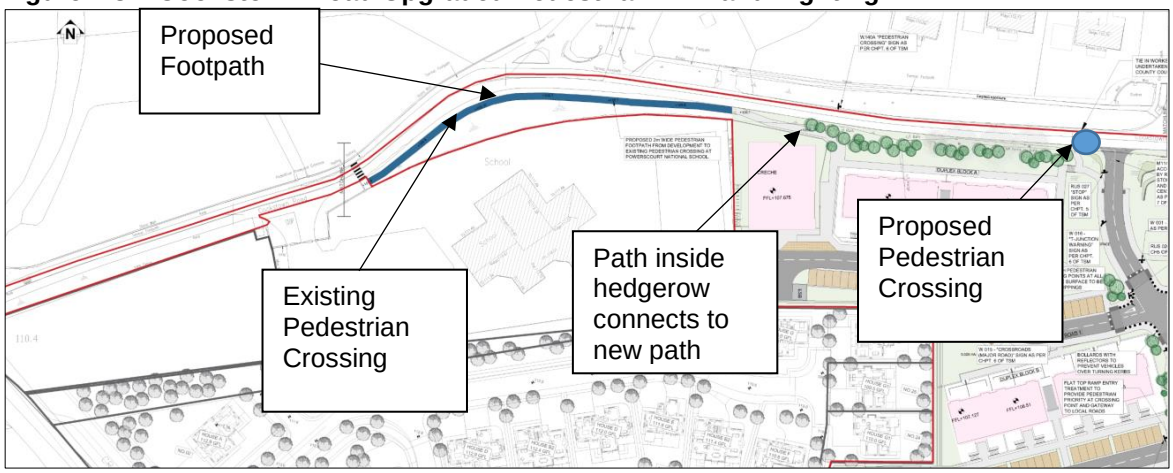
The development includes provision for secure cycle storage. The apartment/duplex blocks will have access to bike stores (88 no. in total). In addition, external Sheffield stands will be located throughout the scheme, providing spaces for use by visitors (50 no. no. spaces). Houses and duplex units with rear garden areas will be able to store bicycles independently.

2.7 FOOTPATH UPGRADES

The proposal includes a footpath upgrade (including lighting) along the southern side of the Cookstown Road to the Primary School where there is a crossing connecting to the norther side of the Cookstown Road, and which connects to the town centre of Enniskerry to the north. In addition it is proposed to provide public lighting between the Primary School and the junction of R760 to the west. The relevant letters of consent are included with the application. Additional lighting is proposed between the school and the R760 to the west. The footpath joins up with the internal footpaths in the scheme (so as to maintain as much as possible the trees along the Cookstown Road).

A lighting plan, prepared by Sabre is included with the SHD application, which was reviewed by Dr Tina Aughney (Bat Specialist for the project) and appropriate mitigation included.

Figure 2.8 – Cookstown Road Upgraded Pedestrian Link and Lighting



Source: BMCE 18243-BMD-00-ZZ-DR-C-1010

In addition, it is proposed to provide a pedestrian crossing to traverse the Cookstown Road to the existing path.

2.8 LANDSCAPING

The Landscape Design Statement prepared by Kevin Fitzpatrick – Landscape Architecture (KFLA) sets out the Landscaping Strategy for the subject lands. Proposed pedestrian routes provide for connection to the adjoining lands to fully integrate the landscape scheme with the surrounding landscape. The pedestrian circulation network is designed to accommodate movement through the space at a gradient of less than 1:20. The layout of the paths and planting allows smaller areas of lawn suitable for passive uses by smaller children and other alternative uses to the kickabout space.

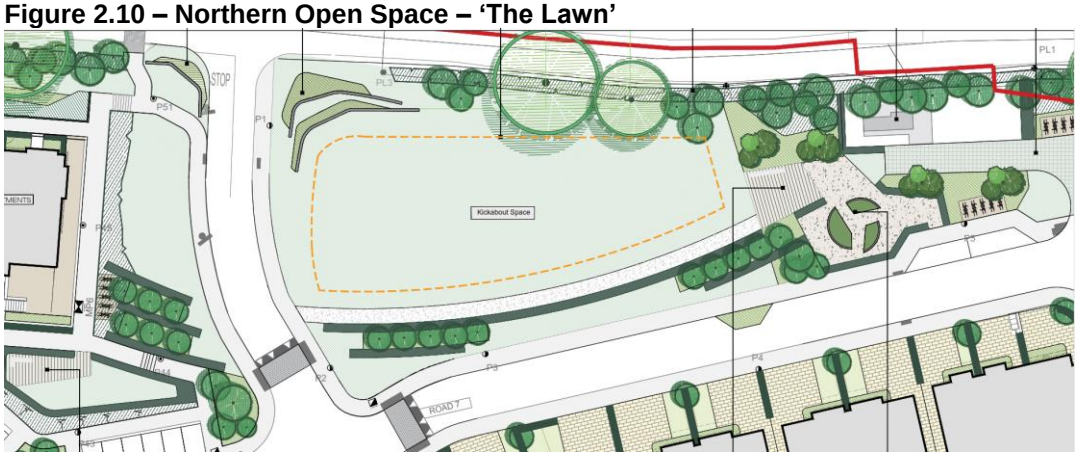
The proposed development includes a substantial linear park open space area (primarily on zoned OS1) along the southern boundary of the subject site of c. 0.93 hectares.

Figure 2.9 – Linear Parkland

Source KFLA

As set out in the KFLA report, this large linear open space of c. 0.93 hectares has been designed as an ecological park with the aim of strengthening local biodiversity while offering a range of uses to residents of the local area. This approach creates new habitats for local flora and fauna and encourages easier movement of smaller mammals through the site. Breaks in the tree and shrub planting have been created to establish a visual connection between the proposed park area and the streetscape, encouraging residents and passers-by to utilise the park and to allow a high level of passive supervision. New connections are also provided to the boundary of amenity walks to the south to *'Lovers Leap Lane'* and surrounds.

Figure 2.10 – Northern Open Space – 'The Lawn'



Source KFLA

In addition to this on the residential zoned area of 5.16 hectares, some 0.4 hectares of open space is provided, equating to 7.7% of the residential zoned land. Combining the two areas amount to 1.33 hectares of the gross site area (or 21.2% of the development site area of 6.27 hectares).

The design of the Northern Open space is centred around a central lawn space for active and passive recreation. A series of formal hedges are used to create an edge to the space and control active activities from spilling out on to the street. The entrance to the scheme from the public road is to be marked by a series of stone walls, drawing on some of the traditional materials and landscape elements found in the local landscape. The walls will be designed in an aesthetic, sculptural arrangement to highlight the entrance area.

This series of spaces has been designed using the linear drainage systems as the focal element of the landscape. The arrangement of these spaces aims to accentuate the vista to the Sugarloaf Mountain.

Figure 2.11 – Central Spaces 'The Vista'

Source KFLA

Figure 2.12 – View towards Great Sugar Loaf

Source: CGI no. 3 – 3D Design Bureau

2.8.1 Communal Open Space

Figure 2.13 – Communal Open Space (Duplex Apartments)

Communal Amenity Space Requirement & Provision

Apartment/Duplex Unit Type	No. of Units	No. per Unit	Hectares Requirement	Hectares Provided
Block A1, A2, B1 & B2				
2 Bed	16	0.0007	0.0112	0.021
3 Bed	16	0.0009	0.0144	0.025
Total Residential	**32**		**0.0256**	**0.046**
Total Hectares			**0.0256**	**0.046**
Block C & D				
2 Bed	12	0.0007	0.0084	
3 Bed	12	0.0009	0.0108	
Total Residential	**24**		**0.0192**	
Total Hectares			**0.0192**	**0.06**

Source: MOLA

With reference to communal open space Blocks A and B require 256 sq. m whereas the communal open space provided is in excess of this requirement at 460 sq. m. For Blocks C and D, the requirement is 192 sq. m communal open space and 1,060 sq. m is provided, both substantially in excess of the 2018 Apartment Guidelines.

Duplex units are provided with private amenity space at both front and rear of the ground floor apartment units, while the upper duplex units are provided with a large terrace area. Communal open space is also provided adjacent to the duplex blocks, with the duplex units over-looking the spaces providing passive surveillance.

2.8.2 Materials

The play areas throughout the scheme are designed as a 'Natural Play Area', this is where a preference is given to natural play features, materials, and objects over the standard manufactured play equipment. There is a greater emphasis on building, creation, exploration and pretending as activities to extend the interest in the play area for users that visit regularly, as is common in a residential landscape space.

The surfaces will be primarily grass, gravel and sand. Level changes, grass mounds and steps will be incorporated into the scheme as a central feature of the space. Within the space created a number of activities are facilitated such as balancing, jumping, climbing and crawling.

Durable and low maintenance materials are specified by the Landscape Architects for the hard landscaping in the scheme. Car parking areas are integrated into the landscape design, using small unit concrete paviors or flags for the on-curtilage car parking and hard landscape areas to the house.

2.8.3 Planting Strategy

The plant species are chosen to respect and enhance the local environment while providing suitable vegetation that is harmonious with a residential area and will be successful through all stages of its maturity. Therefore, the planting palette has a limited number of species chosen for their appropriateness and with a preference for native planting where possible. Large native Oaks are the dominant tree species proposed throughout the main open space areas and will be complimented by large Horse Chestnuts, Limes, Beech and Red Oak trees.

These trees will mature into large parkland specimens. When the trees mature, they will have a strong visual presence and will define the character of the development as the existing trees go into decline. The street trees are chosen due to their more compact habit. These species are appropriate for the scale of the spaces in which they are to be used and are of a variety that will complement other native trees. Each street is to be planted using a single variety of tree and hedge giving a specific landscape character to each part of the development.

The existing trees that are retained within the scheme are to be enhanced and strengthened by additional planting of native and naturalised broadleaf tree planting.

The perimeter planting around the site will be native and naturalized broad-leaf hedgerow and tree-planting, along with dense woodland and understory planting to create visual screening and improve biodiversity. Native plants Blackthorn, Hawthorn, Hazel and Holly are all used in the hedgerow mix and tree-planting in the hedgerows consists of Common Birch, Native Oak, Horse Chestnuts and Common Alder.

2.9 SERVICES

The Civil Engineering Infrastructure Report and Flood Risk Report and drawings prepared by BMCE Consulting Engineers, submitted with the SHD application provides the overall strategy and detail for the services to serve the subject lands.

The proposed development has received both a Confirmation of Feasibility, and a Statement of Design Acceptance from Irish Water.

2.9.1 Surface Water Drainage and Attenuation

The proposed development will be served by a new separate gravity surface water drainage network falling towards the north boundary of the site alongside the Cookstown Road, where it is proposed to install a soakaway designed in accordance with Ciria 756 guidelines. The infiltration rate determined on site at the soakaway location was 0.148m/hr, which is sufficient to allow for a soakaway design.

The development of this site will result in increased paved and impermeable areas that have the potential to create pressure on the environment and existing services due to the generation of increased run-off and pollution. In order to avoid this the development will be designed in accordance with the principles of Sustainable Urban Drainage Systems (SUDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS) and as set out in the CIRIA Guide C753.

A full audit of the surface water design & drawings was carried out by JBA Consulting in October 2020. Questions from JBA arising from the audit were responded to and taken on board in the design. The report from JBA Consulting is contained in Appendix IX of the Civil Engineering Infrastructure Report and Flood Risk Report prepared by BMCE Consulting Engineers.

2.9.2 Foul Sewer

It is proposed for the gravity foul drainage network on site to drain to the northeast corner of the site, which is the lowest point of the development. From here it is to be pumped to the existing 225mm foul sewer at the R760 sewer junction. Wicklow County Council stated that the proposed development should accommodate future connections from neighbouring sites, allowing for the existing Enniskerry Demesne Foul pumping station to be decommissioned in future.

The additional Sites contributing to the foul pumping station are set out in the calculations in Appendix I, (of the Civil Engineering Infrastructure Report and Flood Risk Report prepared by BMCE Consulting Engineers) are as follows:

1. Adjoining site future development 27 no. houses
2. Existing Enniskerry Demesne 14 no. houses
3. Permitted development WCC Reg Ref 16/976 6 no. houses (site adjacent to Enniskerry Demesne on east side)

The new below ground foul pumping station (at the northern portion of the subject site) for the development is proposed to accommodate an average flow of 1.064l/s and has a 24hr dry weather flow emergency overflow storage requirement of that equates to 92m³, which will be met through the provision of a 73m3 concrete storage tank, and the remaining volume within the pumping station ‘wetwell’. The pumping station will be built to the specifications outlined in Irish Waters Code of Practice and standard details. The foul water is then pumped from the new below ground foul pumping station via a 100mm diameter HDPE foul rising main that connects to a new foul standoff/discharge manhole and then by a short gravity connection to the existing foul sewer on the main Enniskerry Road (R760).

2.9.3 Water Supply

There is an existing 180mm HDPE running beneath the northern side of the Cookstown Road, and a 100mm uPVC watermain beneath the south side. Both mains are relatively new, having been installed in 2005 and 2004 respectively.

The site connection will be via a 150mm diameter (internal bore) connection into the existing 180mm HDPE watermain line in Cookstown Road. Twenty-four-hour storage will be provided in each house via an attic tank to cater for possible shut-downs in the system.

Hydrants will be provided on the ring main, subject to fire cert requirements. Sluice valves will be provided at junctions and appropriate locations to facilitate isolation and purging of the system. Air valves will be provided at high points for system verting. All watermains infrastructure is to be to Irish Waters Code of Practice and standard details.

2.9.4 ESB Networks

There is extensive ESB Networks infrastructure in the vicinity of the site and we understand it has the capacity to cater for this new development. The number and approximate locations of substations for providing new power supply to the dwellings on site have been identified to comply with the ESB current guidelines and will also be discussed and agreed once the formal application is made. A formal application cannot be made at this stage but will be made as soon as the planning permission has been granted and the addresses are confirmed.

2.10 CONSTRUCTION MANAGEMENT STRATEGY

2.10.1 Introduction

It is envisaged that the development of the lands will occur for up to approximately 5 years having regard to the nature of the project and the need for flexibility to respond to market demand. A Construction and Environmental Management Plan has been prepared by BMCE and is included with the SHD application. The CEMP will be developed and agreed between the contractor and Wicklow County Council prior to commencement of development.

This EIAR presents proposed mitigation measures to ensure that the planned development of the lands does not generate significant adverse impacts for residential and working communities in the vicinity of the site.

The proposed development, as described, is detailed on the planning application drawings and particulars which accompany the application.

Construction of the development involves the following principal elements:

- Site strip. Earthworks associated with the construction of the houses and roads in the development.
- Construction of new buildings - houses, duplex units & creche.
- Construction of roads, footpaths & hard/soft landscaping.
- Buried site services installation. New foul pumping station. Connection to public services.
- Works to the Cookstown Road along the site boundary, and a new footpath along the southside of the road as far as the existing school crossing.

2.10.2 Liaison with Neighbouring Properties

A monitoring regime will be put in place to protect neighbours & neighbouring properties with a full and detailed vibration, noise, dust and groundwater monitoring regime put in place for the duration of the works.

The Contractor will appoint a competent person to be referred to as the Surveying, Instrumentation and Monitoring Subcontractor (MSC) who will implement the monitoring measures during the construction phase described in this EIAR.

The MSC will be responsible for preparing or organising the preparation of condition surveys of surrounding buildings, walls, hardstanding area etc. prior to the carrying out of any works on site. Extent of surveys to be agreed. The condition surveys shall be carried out to a level of detail, suitable to the nature and extent of conditions encountered in order to obtain an understanding of the general structural condition of the property/structure and/or external environments.

It is proposed that vibration monitoring will be conducted at properties adjacent to or within 50m of the site as required using calibrated vibration monitors and geophones capable of transmitting live text and email alerts to ensure that if vibration levels approach or exceed specified warning and limit values.

2.10.3 Existing Ground Conditions

As set out in the CEMP, the typical sequence of stratigraphy is given below. Rock was not encountered in the trial pits or boreholes.

"1. Stratigraphy: Topsoil overlying mixed soils – sands, gravels, silts overlying typically sandy gravel at depth. Glacial till (boulder clay) encountered also in a number of locations. No rock encountered in the 18 no. trial pits (circa 2m deep typically) or the 3 no. boreholes (7.5m deep).
2. Bearing capacities: The allowable bearing pressure ABP at 1m below ground level is estimated to be in the range 130 to 180 kPa and the at 2m is in the range 160 to 280 kPa which will allow traditional strip foundations under the buildings. Ground bearing ground floor slabs 150mm thick.
3. Groundwater: None encountered in the trial pits or boreholes.
4. Soakaways: The soakaway test results indicate good infiltration values for soakaway & permeable pavement design.
5. Contamination: Contamination testing of 7 no. samples indicates that the material on site is Non Hazardous Inert material.
6. Sulphates & Ph values for concrete: Results are in the acceptable range where no special measures need to be taken in the concrete mix design."

2.10.4 Demolition

There are no demolition works required on the subject lands.

2.10.5 Scope of the Proposed Construction Works

The draft bulk earthworks are associated with the site strip and with some levelling & re-grading of the site to accommodate road/footpath gradients as necessary. The site has been modelled in the Civils 3d software package. Excavated subsoil will be used as fill on the site. The fill volume exceeds the cut volume and so material will need to be imported onto site.

Item	Topsoil (m^3)	Soil (m^3)
*Site Strip	7720	-
Fill above site strip level	-	13,793
Bulk Excavation below site strip level	-	20,894
Allowance for the excavation for buried services	-	1,200
Total excavation less fill		**14,821**

Includes assumed topsoil strip 300mm deep of the development area, which is assumed to be re-used on site.
Source: Table 1 CEMP

2.10.6 Main Stages/phases of Construction

In summary the construction of the development will involve the following:

- Site strip. Earthworks associated with the construction of the houses, duplex units, creche and roads in the development.
- Construction of new buildings - houses, duplex units & creche, including ancillary buildings such as bike stores, bins stores and an ESB substation.
- Construction of roads, footpaths & hard/soft landscaping.
- Buried site services installation. New foul pumping station. Connection to public services.
- Works to the Cookstown Road along the site boundary, and construction/installation of a new footpath and public lighting along the southern side of Cookstown Road towards Enniskerry.

2.10.6.1 Site Accommodation & Site Parking

On site accommodation will consist of:

- Staff welfare facilities (toilets, canteen, offices/meeting rooms,)
- Materials storage areas and drop off Temporary water supply, electricity supply and foul drainage will be required for the new facilities.
- Connections to electricity & water are available close to the site boundary.
- Foul drainage with need to taken to a vented holding tank for regular removal by suction tanker.
- Limited parking for construction personnel will be provided within the site for the period of construction.
- The site is within walking distance of Enniskerry Village which is served by a number of Dublin Bus routes. The contractor parking areas are to be confirmed by the Contractor prior to commencement.

2.10.6.2 Hours of Working

Unless required otherwise by Wicklow County Council, it is proposed that standard construction working hours should apply, i.e.:

- 7am to 6pm Monday to Friday
- 8am to 2pm on Saturdays.

Any works proposed outside of these periods shall be strictly by agreement with the Local Authority in advance. Deliveries of material to site will be planned to avoid high volume periods. There may be occasions where it is necessary to make certain deliveries outside these times, for example, where large loads are limited to road usage outside peak times. There may be occasions where it is necessary to have deliveries within these times. The Contractor will develop, agree and submit a detailed Traffic Management Plan, to WCC, for the project prior to commencement.

2.10.6.3 Construction of Services

Following on from completion of site clearance, demolition, site re-profiling works construction activities will focus on the installation of underground utilities to provide the infrastructure required for storm water drainage, foul water drainage, water supply, power and building utility systems.

2.10.6.4 Temporary Construction Works

During the construction phase it will be necessary to provide contractor welfare facilities for the workers. A site office and staff welfare facilities will be installed at a suitable location centrally within the overall site. All surplus plant and materials shall be stored in this location when not in use. Welfare facilities will include a canteen, drying room, toilets and first aid. Power will be provided using a small petrol generator. The petrol generator and fuel storage containers used for various items of plant will be located within a sealed containment bund.

Temporary portable toilet facilities will be provided on site. These units will be maintained and the waste collected therein will be disposed of using an appropriate contractor. Storage areas will be clearly identified and agreed with all relevant parties in advance of construction.

2.10.6.5 Cranes Tower

Cranes will not be required on site. Mobile cranes may be used for some activities. All materials being lifted by crane will be controlled by guide ropes and will only be carried out under the strict supervision of appropriately qualified and

experienced banksmen. Any works outside of the site boundary will be subject to agreement with Wicklow County Council.

2.10.6.6 Hoarding and Site Segregation

The new works will be hoarded off or fenced off from the public at all times. A 2.4m minimum high plywood painted timber hoarding will be provided along the Cookstown Road boundary after tree/hedge removal here and at any other areas around the site where the perimeter fence/hedge is not deemed sufficient for safety and security reasons. Heras type fencing will be used on short term site boundaries where appropriate to suit the works. The hoarding alignment and specification are to be confirmed by the Contractor prior to commencement. Controlled access points to the site, in the form of gates or doors/turnstiles, will be kept locked for any time that these areas are not monitored (e.g. outside working hours). During working hours, a gateman will control traffic movements and deliveries at any active site access to ensure safe access and egress to & from site onto the public roads. All personnel working on site must have a valid Safe Pass card and be inducted by the Main Contractor with regard to site specific information.

2.10.7 Noise and Dust Management

The main contractor will be required to be accredited with ISO14001 Environmental Management Systems. The main contractor will be required to mitigate the impact of the construction works.

2.10.8 Construction Traffic Management Plan

2.10.8.1 Traffic Management & Construction Access

The works associated with the new development will result in additional traffic on the road network with the vehicles for the importation of earthworks fill material and the delivery of new materials for construction – concrete, concrete blocks, pipes, timber, roof tiles, glazing, road surfacing materials etc. Construction traffic access to the site will be via an entrance off the Cookstown Road at or close to the existing field gate. It is proposed that unloading bays should be provided for deliveries to the site within the hoarding perimeter. Appropriately demarcated storage zones will be used to separate and segregate materials. All deliveries to site will be scheduled to ensure their timely arrival and avoid the need for storing large quantities of materials on site. The storage area is to be located at least 50m from the site access to allow for the possibility of traffic queueing inside the site without any interference with the public road.

A Construction Traffic Management Plan (CTMP) will be developed by the main contractor and agreed with the Planning Authority and An Garda Siochana prior to commencement of development in the event of a grant of permission, to mitigate the potential impacts of construction related traffic on the surrounding road network.

The CTMP will include the following matters:

- The contractor shall be responsible for and make good any damage to existing roads or footpaths caused by his own contractor's or suppliers transport to and from the site.
- The contractor shall at all times keep all public and private roads, footpaths entirely free of excavated materials, debris, rubbish, provide vehicle wheel wash and thoroughly clean all wheels and arches of all vehicles as they leave the site.
- The contractor shall confine his activities to the area of the site occupied by the works and the builders' compound, as far as practicably possible, during any particular phase of the development.
- Haul routes to and from the site will be defined and agreed with the Local Authority.
- Properly designed and designated entrance and egress points to the construction site for construction traffic will be used to minimize impact on external traffic.
- Flagmen shall be used to control the exit of construction vehicles from the site onto the public road, if required.
- Existing fire hydrants are to remain accessible as required.

The following will also be addressed in the CTMP:

- Traffic Management Signage;
- Routing of Construction Traffic / Road Closures;
- Timings of Material Deliveries to Site;
- Traffic Management Speed Limits;
- Road Cleaning;

- Road Condition;
- Road Closures;
- Enforcement of Construction Traffic Management Plan
- Details of Working Hours and Days;
- Emergency Contact Numbers and Personnel;
- Details of Emergency plan;
- Communication;
- Construction Methodologies;
- Particular Construction Impacts; and
- Compound and Staff Car Parking.

Construction traffic access from the N11 will be limited to using the R117 and R760 and via the Local road to the west of the site entrance. Local road L1020, between the site entrance and the N11, to the east is as outlined in the CEMP not suitable construction traffic.

Construction vehicle movements will be minimised through:

- Consolidation of delivery loads to/from the site and scheduling of large deliveries to site to occur outside of peak periods;
- Use of precast/prefabricated materials where possible;
- 'Cut' material generated by the construction works will be re-used on site where possible, through various accommodation works.
- Adequate storage space on site will be provided;
- Construction staff vehicle movements will also be minimised by promoting the use of public transport.
- Car sharing among the construction staff following Covid-19 safety guidelines may be used to reduce traffic numbers. Public Transport: An information leaflet to all staff as part of their induction on site highlighting the location of the public transport services in the vicinity of the construction site.

2.10.9 Reinstatement / Road Cleaning

Prior to the works commencing, detailed photographic surveys (condition schedules) of adjoining walls, roads, footpaths, fences etc. is to be prepared. Copies of the relevant parts are to be made available to adjoining owners and WCC. This record will form the basis of assessing repairs to adjoining areas in the future should a dispute arise as to their cause. Roadways are to be kept clean of muck and other debris. A road sweeping truck is to be provided if necessary, to ensure that this is so.

Reinstatement at completion of the works will involve:

- Testing and cleaning of all watermains in the development to the requirements of the IW / WCC prior to connection to the public watermain. This will reduce the risk of contamination to the public water supply when the new network is connected to the system.
- Repair of any damage to any adjacent public roadways, kerbs, grass verges etc. in accordance with WCC requirements.
- Reinstatement of all excavations to the requirements of WCC.
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during construction works.

2.10.10 Construction Phasing

At present it is envisaged that the development will be constructed in 1 phase. However, the project may be constructed over in a number of phases for commercial reasons. The exact number of phases and the make-up of each will be subject to market conditions and commercial considerations at the time.

2.11 ENERGY STATEMENT

The Waterman Moylan Energy Statement enclosed with the SHD application sets out to demonstrate a number of methodologies in Energy Efficiency, Conservation and Renewable Technologies that will be employed in part or in combination with each other for this development. These techniques will be employed to achieve compliance with the building regulations Part L and NZEB standards.

2.11.1 Environment / Global Issues

Increasing levels of greenhouse gases have been linked with changes in climate and predicted global warming. By far the biggest human contribution to the greenhouse gases is in emissions of carbon dioxide. The development is likely to increase carbon dioxide levels in the atmosphere by the embodied emissions in the building materials used, and in the operational energy consumed during the life of each building.

To minimise the embodied emissions impact, materials will be sourced locally where possible (reducing carbon dioxide emissions associated with transportation), and preference will be given to reusing materials, and using materials in their natural state (reducing the emissions associated with processing). Chapter 7 of the EIAR sets out the potential impacts and mitigation in respect of Air Quality and Climate.

2.12 EMISSIONS AND WASTE

2.12.1 Effluents

Effluent arising from foul drainage from the proposed development will be discharged through piped systems to the local authority sewers. Operation of the development will involve the discharge of uncontaminated surface water from the impermeable areas to a proposed network all linking into the established public system in the environs. Details of the impacts and mitigation measures for surface water and foul drainage are recorded at Chapter 6 of this Environmental Impact Assessment Report. Mitigation measures include measures designed to avoid, reduce, remedy or offset impacts.

2.12.2 Construction Waste Disposal Management

Chapter 11 of the EIAR (Material Assets – Waste Management) and the Construction and Demolition Waste and By-Product Management Plan, prepared by Byrne Environmental (included with the SHD application), provides detail on the construction related waste management for the proposal.

The Objective of the Waste Management Plan is to minimise the quantity of waste generated by construction activities, to maximise the use of materials in an efficient manner and to maximise the segregation of construction waste materials on-site to produce uncontaminated waste streams for off-site recycling.

The Waste Management Plan shall be implemented throughout the construction phase of the development to ensure the following:

- That all site activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.
- To ensure that all waste materials are segregated into different waste fractions and stored on-site in a managed and dedicated waste storage area.
- To ensure that all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.

2.12.3 Contaminated Soil

The BMCE CEMP notes that the trial holes did not encounter hazardous material. In the unlikely event that contaminated soils are discovered, these areas of ground will be isolated, tested for contamination in accordance with *2002 Landfill Directive (2003/33/EC),* and pending the results of laboratory testing, will be excavated and exported off-site by an appropriately Permitted Waste Contractor holding an appropriate Waste Collection permit and that this hazardous material will be sent for appropriate treatment / disposal to an appropriately Permitted / Licenced Waste Facility.

2.12.4 Domestic Municipal Waste/Waste Management

Chapter 11 of the EIAR (Material Assets – Waste Management) and the Operational Waste Management Plan, prepared by Byrne Environmental, provides detail on the domestic waste management for the proposal.

The Objective of the Waste Management Plan is to maximise the quantity of waste recycled by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information to the residents of the development. The Goal of the Waste Management Plan is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 in accordance with The Eastern-Midlands Region Waste Management Plan 2015-2021.

The design of residential houses, maisonettes and duplex units shall provide sufficient internal kitchen space for the storage of up to 10kg of general unrecyclable waste, green recyclable waste and organic waste. Individual houses shall have external storage space for 3 no. 220 litre waste bins for segregating recyclable, non-recyclable and organic waste. Residential houses shall be served by private waste collection contractor.

The apartment/duplex blocks and the Maisonettes shall be served by common waste storage areas and shall include clearly visible guidelines on the appropriate segregation of different waste types. Signage will be posted to inform residents indicating the location of the local can, glass and clothing bring-bank at Bog Meadow Car Park in Enniskerry and the nature of waste materials that can be brought and deposited there.

It is expected that a single Waste Collection contractor shall be engaged to remove all mixed domestic waste and recyclable wastes from the waste storage areas and from individual houses on a minimum weekly basis.

2.12.5 Emissions

The principal forms of air emissions relate to discharges from motor vehicles and heating appliances. With regard to heating appliances, the emission of nitrogen oxides and carbon monoxide will be minimised by the use of modern, efficient heating appliances and as a result, the potential impact is estimated to be negligible. Exhaust gases from motor vehicles will arise from car parking areas and will be discharged directly to the atmosphere. Car parking for motor vehicles is provided at surface level. Chapter 7 of the EIAR sets out the potential impacts and mitigation in respect of Air Quality and Climate.

Noise may be considered in two separate stages, during construction, and when the development is operational. Construction related noise impacts are an inevitable short term limited inconvenience feature which, in general, is accepted by members of the public, subject to the standard controls typical of planning conditions attached to urban based development projects. These impacts can be reduced in a number of ways. It is standard practice to limit construction to normal working hours during the day. In addition, there are a number of regulations relating to noise during construction which the contractor will be expected to adhere to throughout the construction phase. Chapter 8 of the EIAR sets out the potential impacts and mitigation in respect of Noise and Vibration.

2.13 DIRECT AND INDIRECT EFFECTS RESULTING FROM USE OF NATURAL RESOURCES

Details of significant direct and indirect effects arising from the proposed development are outlined in Chapters 3-15 which deal with *'Aspects of the Environment Considered'*. No significant adverse impact is predicted to arise from the use of natural resources.

2.14 DIRECT AND INDIRECT EFFECTS RESULTING FROM EMISSION OF POLLUTANTS, CREATION OF NUISANCES AND ELIMINATION OF WASTE

Details of emissions arising from the development together with any direct and indirect effects resulting from same have been comprehensively assessed and are outlined in the relevant in Chapters 3-15 which deal with '*Aspects of the Environment Considered'*. There will be no significant direct or indirect effects arising from these sources.

2.15 FORECASTING METHODS USED FOR ENVIRONMENTAL EFFECTS

The methods employed to forecast and the evidence used to identify the significant effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines. The general format followed was to identify the receiving environment, to add to that a projection of the *"loading"* placed on the various aspects of the environment by the development, to put forward amelioration measures, to lessen or remove an impact and thereby arrive at net predicted impact.

Where specific methodologies are employed for various sections they are referred to in the Receiving Environment (Baseline Scenario) sections in the EIAR. Some of the more detailed/specialised information sources and methodologies for a number of the environmental assessments are outlined hereunder.

2.16 TRANSBOUNDARY IMPACTS

Large-scale transboundary projects[6] are defined as projects which are implemented in at least two Member States or having at least two Parties of Origin, and which are likely to cause significant effects on the environment or significant adverse transboundary impact.

Having regard to the nature and extent of the proposed development, which comprises a residential development, located in Enniskerry, within the administrative area of County Wicklow, transboundary impacts on the environment are not considered relevant, in this regard.

2.17 ALTERNATIVES CONSIDERED

The EIA Directive (2014/52/EU) requires that Environmental Impact Assessment Reports include: *"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."*

Article 94 and Schedule 6, paragraph 1(d) of the Planning and Development Regulations 2001, as amended, requires the following information to be furnished in relation to alternatives:

> *"(d) A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment."*

The presentation and consideration of various alternatives investigated by the project design team is an important requirement of the EIA process. This section of the EIAR document provides an outline of the main alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison the environmental effects. Alternatives may be described at three levels:

- Alternative Locations.
- Alternative Designs.
- Alternative Processes.

The DHPLG 2018 EIA Guidelines state:

"Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. ***A 'mini- EIA' is not required for each alternative studied."*** *(Emphasis added).*

Pursuant to Section 3.4.1 of the Draft 2017 EPA Guidelines, the consideration of alternatives also needs to be cognisant of the fact that *"in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…"*

The Draft 2017 Guidelines are also instructive in stating:

"Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR… It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics'".

[6] The definition is based on Articles 2(1) and 4 of the EIA Directive and Article 2(3) and (5) of the Espoo Convention, respectively. http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf

The consideration of the main alternatives in respect of the development of the subject lands was undertaken by the Design Team and has occurred throughout an extensive and coordinated decision-making process, over a considerable period of time. The main alternatives considered are identified below.

2.17.1 Alternative Locations

The site is zoned for residential and open space development under the Bray Municipal District Local Area Plan 2018-2024 within the ownership of Cairn Homes Properties Ltd., and as such, consideration of alternative sites is not necessary. In effect, an alternative location in this instance i.e., a *'do- nothing'* alternative for the subject site, would mean that these residential zoned lands would not be utilised for the purposes of meeting the need for new residential accommodation within Enniskerry. If development does not occur sequentially from the existing development footprint, it is likely that pressures for the development of land which is either un-zoned or un-serviced and not as close to the town centre would be greater. This would lead to a dispersed and unsustainable form of development.

A *"do-nothing*" scenario was considered to represent an inappropriate unsustainable and inefficient use of these serviced residential zoned lands within the envelope of the town of Enniskerry.

The Draft EIAR Guidelines also note that:

"Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that level is likely to have taken account of environmental considerations associated, for example, with the cumulative impact of an area zoned for industry on a sensitive landscape."

On the strategic or *'higher'* matters of already determined policy, we refer to the Wicklow County Development Plan 2016-2022 and the Bray Municipal District Local Area Plan 2018 which support the sequential development of Enniskerry.

The location of the site is on lands zoned for residential use under the provisions of the Bray Municipal District LAP and the Wicklow County Plan. The results of the Strategic Environmental Assessment of the Plans, which was undertaken in accordance with the SEA Directive (2001/42/EC) and the results of the AA Screening of the LAP, have been taken into account in preparing this report. However, it is acknowledged that the proposed development exceeds the number of residential units for the site envisaged in the LAP. The EIAR assesses the proposed development (including the net additional no. of units) over the LAP number.

2.17.2 Alternative Uses

In addition to residential use, there are other land uses which are permitted in principle on these lands. As set out in the Statement of Consistency, the lands are zoned for New Residential (R10 and R20), Open Space and CE Community and Education. The proposed development includes residential development on the residential zoned lands, open space on the Open Space zoned lands and a creche facility located on the CE zoned lands. It is not considered that an alternative comprising only Open Space and/or Community and Education use would result in the best use of these lands, particularly having regard to the zoning of the majority of the lands as residential the general acknowledged need for housing. The environs of the subject site are largely residential in nature interspersed with some commercial uses. In this context, the proposal now the subject of this application comprises appropriate land uses in accordance with the proper planning and sustainable development of the area.

2.17.3 Description of Alternative Processes

This is not considered relevant to this EIAR having regard to the nature of the proposed (residential) development. It is noted the proposed construction works comprise relatively standard building construction processes. As such there are no specific alternative construction processes identified. With reference to the operational phase, no new, unusual or technically challenging operational techniques are required, as such no alternative operational processes have been considered.

2.17.4 Alternative Designs and Layouts

The proposed residential development has been prepared in accordance with the requirements of the National Planning Framework, the Regional Spatial and Economic Strategy for the Mid-East area as well as the relevant Section 28 Guidelines including those relating to Urban Development and Building Height Guidelines (2018), Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities December 2020 and the Sustainable Residential Development in Urban Areas (2009) as well as, where relevant, the Wicklow County Development Plan 2016-2022 and the Bray Municipal District Local Area Plan 2018-2024 and has been the

subject of a number of a pre-application meeting with the Planning Authority and An Bord Pleanála, prior to lodgement of the SHD application with An Bord Pleanála.

The key structuring principles of the LAP in respect of the agreed AA3, within which the proposed development is located was also taken into account. The proposal will support the implementation of the population and growth targets in the core strategy for Enniskerry, which has to date not delivered the envisaged numbers of dwellings, also noting that the proposal contravenes the overall no. of units and density identified for the Action Plan area, and this is addressed in the material contravention statement.

The pre-planning meeting notes are set out in Appendix 2 of the Consistency Report prepared by John Spain Associates which accompanies this SHD application. The proposal has also been the subject of a pre-application SHD consultation with the Board, with a number of design alterations arising following the opinion from An Bord Pleanála.

The key environmental and practical considerations which have influenced the design of the proposed development and the alternative layouts on the subject lands have been influenced by the following:

- The need to achieve an appropriate density in the context of the Sustainable Residential Development in Urban Areas Guidelines for Planning Authorities (2009) having regard to the location of the site within an established small town.
- The need to ensure any residential development provides a good mix of housing typologies which meet current market demand and which are deliverable in the short to medium term.
- The need to provide a sustainable level of housing provision on the residential zoned lands.
- The need to deliver good quality open space in appropriate locations with a clear hierarchy
- To have regard to the site's topography and to ensure the design the residential development and associated infrastructure respects the existing features and limits the impacts on the land.
- Protection of existing trees and hedgerows where possible,
- The provision of 10% social housing on site.

2.17.4.1 Alternative no. 1 – Existing Permission (including expansion) and LAP Densities and Sheltered Housing

The first alternative is to implement the existing permission (Planning Reg. Ref. 14/1704 (ABP Ref. PL27.246401) relating to the northern part of the subject lands and expand the proposal using the densities indicated in the LAP and AA3. The permitted proposal related to 26 no. dwelling units all on a site of c. 2.75 hectares, (with a density of 9.5 units per hectare gross). This permission is due to expire on the 17th of November 2021.

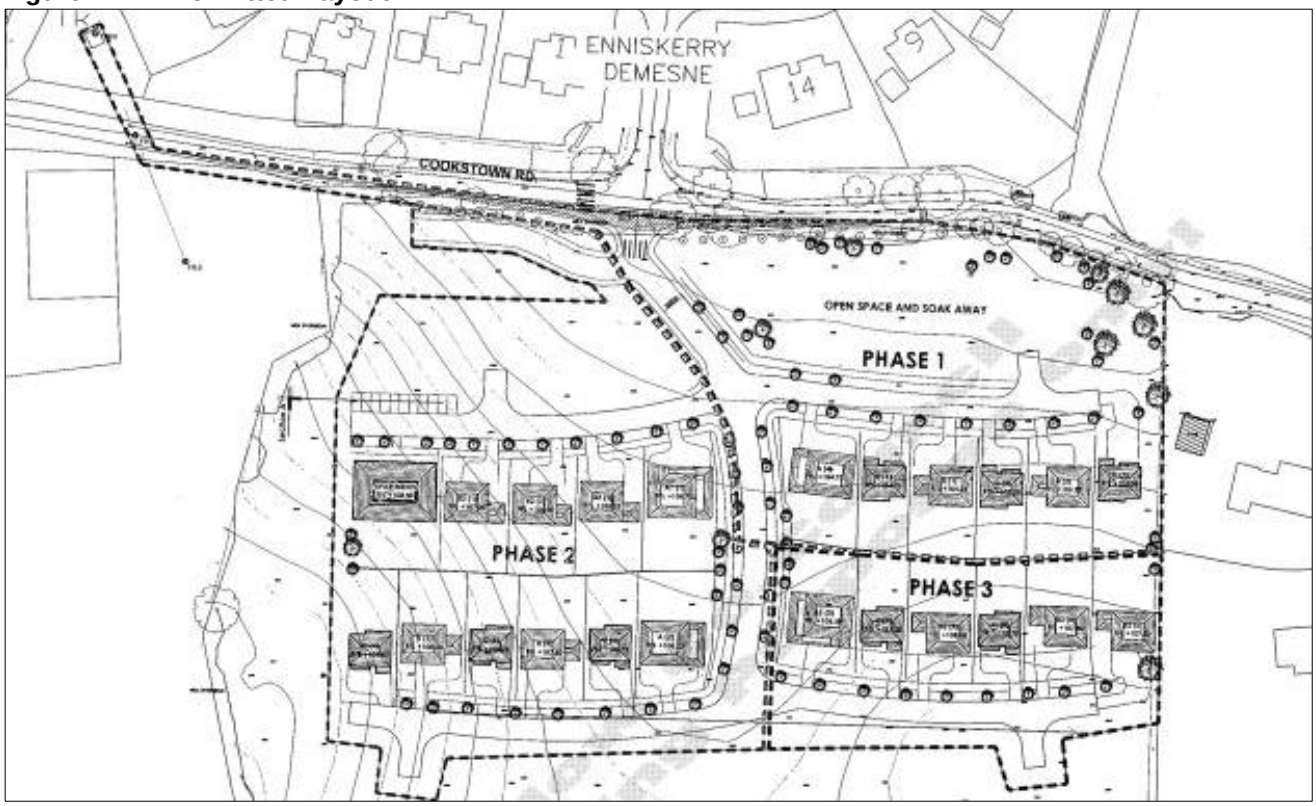
2.17.4.2 Alternative 1 – Comparison of Environmental Effects

Following a detailed review by the design team of the options, and taking into account environmental considerations, and a comparison of environmental effects, this first alternative was considered to be piecemeal development and not integrated to the current ownership boundaries, particularly to the west. The permitted development would be sub-optimal with regards to material assets and water insofar as the permitted development proposed to utilise the existing pumping station located to the west (adjacent to Enniskerry Demesne). The current proposal allows for the proposed development as well as adjacent developments in an Irish Water approved design for a pumping station, which is considered positive.

The LAP indicates a density standard of 10 and 20 units per hectare across the subject lands. The average proposed net densities of 31.9 dwellings per hectare (DPH) in the proposed development (subject of this application) are higher than the 20 and 10 dph prescribed in the LAP for residential-zoned parts of the proposal site and justification for this is set out in the Material Contravention Statement. The density in the permitted development of 9.5 units per hectare is below the range of 20-35 units per hectare set out in the Sustainable Residential Development in Urban Areas 2009 and required in Specific Planning Policy Requirement 4 (SPPR4) of the Building Height Guidelines 2018. The average proposed net densities of 31.9 dwellings per hectare (DPH) in the proposed development are higher than

the 20 and 10 dph prescribed in the LAP for residential-zoned parts of the proposal site. A density of 9.5 units per hectare (and LAP density standards) are contrary to strategic guidance and would not achieve a compact urban form, making the best use of residential serviced zoned land.

Figure 2.14 – Permitted Layout



Planning Reg. Ref. 14/1704 (ABP Ref. PL27.246401) – Source: WCC Website

Having established the number, type and mix of residential units, a series of alternatives were considered by the design team, which evolved to also comply with national guidance (Apartment Guidelines (2020), Sustainable Residential Development Guidelines (2009) and Urban Height Guidelines 2018). This process has enabled the final proposal to promote a more sustainable use of residential zoned land within the proposed development. The desire to promote a sense of place as well as to provide high quality open spaces and the objective to ensure that new buildings deferred to adjoining properties has driven the final layout form and design solution as proposed.

Alternative locations for the various built elements of the development were considered and examined at the design stage. The primary elements determining siting included natural site topography, the proximity of the site to adjoining properties, visual impact considerations and the key elements of the agreed Action Plan 3 as it relates to the subject lands.

2.17.4.3 Alternative no. 2 - Site Layout 2019

Figure 2.15 – Layout Alternative no. 2

Source: MOLA

This alternative was considered to be negative with regard to visual impact as the apartment buildings (3/4 storey) were located at the higher point of the site. The layout of the apartment buildings did not relate to the linear park and would result in a lack of integration with the subject lands. The levels would have resulted in a greater excavation of soils.

Layout Alternative No. 3 Pre-application SHD Submission to An Bord Pleanála

The third alternative was the pre-application submission to An Bord Pleanála. This alternative was reviewed following the pre-application discussions with An Bord Pleanála and the subsequent opinion from the Board. Responses to each of the listed items requiring further consideration within the An Bord Pleanála Opinion have been provided as part of this SHD Planning Application. The scheme has been updated and improved as a result.

The key changes proposed related to:

- (Item no. 1 of ABP Opinion) - Review of the frontage along Cookstown Road to include pedestrian link along southern side of Cookstown Road to the Primary School as well as a DMURs review of pedestrian priority etc.
- (Item no. 2 of ABP Opinion) – Interface with Cookstown Road. the arrangement and architectural design along the Cookstown Road has been reviewed. The key elements include the redesign of the interface in the north western corner to include a reduction in levels, redesign of the creche and redesign of the duplex building and arrangement in the north western corner of the site. The redesign included a reduction in the overall height of the duplex block from 119.3m Ordnance Datum to 116.7m Ordnance Datum, reducing the potential need for retaining walls.

Responses to each of these items have been provided as part of this final application pack, and the scheme has been updated and improved where necessary as a result. The design intent has been to address the issues identified by the Local Authority reports by the various Departments of Wicklow County Council, where possible.

The proposal as now submitted to the Board (alternative no. 4) is considered to be the optimal design solution for the subject site, having regard to the site's constraints and to the objective of making efficient use of the serviced residential lands, while also addressing the potential impacts on the environmental sensitivities relating to the subject lands, in respect of visual and biodiversity impacts (including bats).

Figure 2.16 – Layout Alternative no.3 – An Bord Pleanàla Pre-application

With reference to Population and Human health (and Biodiversity), the potential impacts are broadly similar – the inclusion of a southern public open space area of c. 0.83 hectares is considered a long term and positive impact. The design of the southern open space takes will link into the existing Lover's Leap Lane which will promote exercise and permeability.

With regard to Landscape and Visual Impact, alternatives 2 and 4 will result in a reduced landscape and visual impact compared to Alternative no. 3 which proposed apartments at the higher (southern) side of the subject lands.

With regard to Landscape and Visual Impact, alternative no. 4 (as now submitted as part of this SHD application) was considered a more positive design as it reduced the heights of the duplex apartments compared to the alternative no. 3 (submitted at SHD pre-application stage). Specific design changes related to reducing the duplex blocks overall height (by c. 2.6m) and breaking up the previous single block into 2 no. smaller blocks, reducing the scale and massing.

Air and noise impacts from the alternatives are broadly similar. Principally these impacts will occur as a result of the construction phase of the development as operational impacts would be largely restricted to traffic and these volumes are generally low. As these impacts can be largely mitigated through good construction practices, the residual impact is considered low and temporary in all cases.

The inclusion of pedestrian links through the site, facilitating access to the southern open, which will link to the existing Lover's Leap Lane, is a positive aspect of the proposal, compared to alternative no. 1 and 2, which did not provide as much permeability. The potential impacts relating to archaeology are considered to be broadly similar as the previously unrecorded features, will be preserved *in situ*, which is the case for all of the alternatives. With regard to

Material Assets (Utilities and Waste Management), it is considered the alternatives are similar as they would require servicing and also ESB etc. While the additional quantum of houses will result in increased demand for foul and water supply, these can be accommodated, which is confirmed by Irish Water. Alternatives 3 and 4 are positive in this regard as the pumping station (designed to IW specifications) takes into account the proposed development and permitted development in the area in a co-ordinated and appropriate manner.

The inclusion of footpath and lighting along the southern side of the Cookstown Road is a positive and long-term impact in respect of Alternative no. 4 (subject of this SHD application) for material assts transportation and Population and Human Health, as it will promote sustainable local trips to town centre.

Table 2.3 – Summary Table of Comparison of Main Environmental Effects

Criteria	Alternative 1 Permitted and AA3/LAP compliant	Alternative 2 Q3 2019	Alternative 3 ABP Pre-app	Alternative 4 Final ABP Layout
Population and Human Health	Neutral	Negative	Positive	Positive
Biodiversity	Negative	Negative	Positive	Positive
Land and Soils	Negative	Negative	Neutral	Neutral
Water	Neutral	Neutral	Negative	Neutral
Air and Noise	Neutral	Neutral	Neutral	Neutral
Air Quality and Climate	Neutral	Neutral	Neutral	Neutral
Landscape and Visual	Neutral	Negative	Neutral	Neutral
Material Assets Transportation	Neutral	Negative	Negative	Positive
Material Assets Utilities	Negative	Negative	Positive	Positive
Material Assets Waste Management	Neutral	Neutral	Neutral	Neutral
Risk Management	Neutral	Neutral	Neutral	Neutral
Archaeology	Neutral	Neutral	Neutral	Neutral

2.17.5 Proposed Preferred Alternative

With reference to the final layout, the iterative process outlined above, which included alternative site layouts were considered with the objective of producing a new high quality residential development, which has undergone a robust consideration of relevant alternatives having regard to the comparison of environmental effects and meets the requirements of the EIA Directive, based on the multidisciplinary review across all environmental topics.

The proposed design consideration for the subject lands were subject to a pre-application meeting with Wicklow County Council as well as a formal SHD meeting with An Bord Pleanála. The environmental issues which most informed the design process related to ecology, archaeology, water, noise, and permeability. These considerations have informed the consideration of alternative layouts, open space, the issue of road/footpath and access arrangements up to the submission of the current scheme as a Strategic Housing Development application to An Bord Pleanála.

To summarise it is considered that the final layout:

- Takes into account the Opinion of An Bord Pleanála to improve the design and reduce impacts as well as reviewing and addressing the technical reports of Wicklow County Council
- Provides a sustainable density on the subject lands in accordance with national strategic Government guidance.
- Provides improved permeability through the site, linking to the existing Lover's Leap Lane to the south.
- Includes enhanced pedestrian connections and lighting along the southern portion of the Cookstown Road.
- Avoids significant environmental impacts on the receiving environment.

To conclude, the overall design of the proposed development takes into account all environmental effects raised with respect to the Pre-application design submitted to An Bord Pleanàla, and within the Board's Opinion, and provides for a sustainable development that has been optimised to emphasise positive environmental effects whilst reducing negative environmental impacts wherever possible. The preferred alternative is not considered to give rise to any significant adverse environmental impacts following the mitigation measures to be implemented at the construction and operational phases.

2.18 DESCRIPTION OF THE OPERATION STAGE OF THE PROJECT

Pursuant to the EIA Directive an EIAR document is required to set out a description of the project processes, activities, materials and natural resources utilised; and the activities, materials and natural resources and the effects, residues and emissions anticipated by the operation of the project.

The proposed development is a residential development including associated infrastructural works, creche areas of open space. The primary direct significant environmental effects will arise during the construction stage. As a result, post-construction, the operation of the proposed development is therefore relatively benign and not likely to give rise to any significant additional impacts in terms of activities, materials or natural resources used or effects, residues or emissions which are likely to have a significant impact on population and human health, biodiversity, soils, water, air, climate, or landscape.

The primary likely and significant environmental impacts of the operation of the proposed development are fully addressed in the EIAR document; and relate to Population and Human Health, Landscape and Visual Impact and Noise and Air impacts associated with the traffic generated.

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic – which in many instances – are often difficult to quantify due to complex inter-relationships. However, cumulative secondary and indirect impacts are unlikely to be significant and are addressed in the content of this EIAR document.

2.18.1 Description of Changes to the Project

Draft Guidelines on the information to be contained in environmental impact assessment reports were published by the EPA in August 2017.

The draft guidelines state in relation to change:

"Very few projects remain unaltered throughout their existence. Success may bring growth; technology or market forces may cause processes or activities to alter. All projects change and- like living entities - will someday cease to function. The lifecycles of some types of projects, such as quarries, are finite and predictable. Such projects often consider their closure and decommissioning in detail from the outset, while for most projects a general indication of the nature of possible future changes may suffice. While the examination of the potential consequences of change (such as growth) does not imply permission for such growth, its identification and consideration can be an important factor in the determination of the application."

- *Descriptions of changes may cover:*
- *Growth*
- *Decommissioning*
- *Other Changes."*

As per the draft EPA guidelines and in the interests of proper planning and sustainable development it is important to consider the potential future growth and longer-term expansion of a proposed development in order to ensure that

the geographical area in the vicinity of the proposed development has the assimilative carrying capacity to accommodate future development.

Given the proposed site layout extent and the limitations of physical boundaries, adjoining land uses and land ownership the potential for growth of the proposed development is considered limited and confined primarily to potential minor domestic extensions which will have a negligible impact.

The parameters for the future development of the area in the vicinity of the subject site are governed by the Bray Municipal District Local Area Plan 2018. Any adjacent undeveloped lands will be the subject of separate planning applications in the future, where they are identified as being suitable for development, and where the provision of the requisite physical and other infrastructure is available.

2.18.2 Description of Secondary and Off-Site Developments

No significant secondary enabling development is deemed necessary to facilitate the proposed development. The planning application includes details of the necessary road works, which are required to facilitate this development. These works are assessed within this Environmental Impact Assessment Report.

2.18.3 Risks of Major Accidents and/or Disasters

The surrounding context consists of a mix of residential, agricultural, employment, educational and open space public amenity lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

Article 3 of the Environmental Impact Assessment (EIA) Directive 2014/52/EU, requires the assessment of expected effects of major accidents and/or disasters within an EIA. Article 3(2) of the Directive states that *"The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

2.19 RELATED DEVELOPMENT AND CUMULATIVE IMPACTS

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic which in many instances are often difficult to quantify due to complex inter-relationships. All cumulative, secondary and indirect impacts are unlikely to be significant and, where appropriate, have been addressed in the content of this EIAR document.

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

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

To determine traffic impacts in Chapter 10 the traffic generated by the proposed development is combined with the baseline traffic generated by the traffic on the road network in the area. The potential traffic impacts from other developments were also considered in the assessment (e.g. sites adjacent as well as SHD proposal at Kilgarron).

The proposed pumping station has the capacity to facilitate the adjoining development at Enniskerry Demesne and other permitted development in the immediate vicinity.

For the noise impact assessment in Chapter 8 the potential noise emissions arising from the proposed development during construction and operation are combined (using cumulative AADT figures from Traffic chapter) with background noise levels (predominantly road traffic) were assessed.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments. While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant.

3.0 POPULATION AND HUMAN HEALTH

3.1 INTRODUCTION

The 2014 EIA Directive (2014/52/EU), as transposed into Irish legislation, amended the topics to be addressed in an EIAR and has replaced 'Human Beings' with 'Population and Human Health'.

This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates. In preparing this chapter, consideration has been given to the other inputs to this EIAR including, in particular, the chapters addressing Air Quality and Climate, Noise and Vibration, Traffic and the separate reports addressing Construction and Demolition Waste Management, Sunlight and Daylight and the Construction and Environmental Management Plan.

Population and Human Health comprise an important aspect of the environmental impact assessment to be undertaken by the competent authority. Any significant impact on the status of human health, which may be potentially caused by a development proposal, must therefore be comprehensively addressed.

Population and Human Health is a broad ranging topic and addresses the existence, activities and wellbeing of people as groups or '*populations*'. While most developments by people will affect other people, this EIAR concentrates on those topics which are manifested in the environment, such as the construction of the development, new land uses, more buildings or greater emissions.

3.2 STUDY METHODOLOGY

At the time of writing there is no specific guidance from the EU Commission on the 2014 EIA Directive to indicate how the new term 'Human Health' should be addressed. However, the European Commission's *Guidance on the preparation of the Environmental Impact Assessment Report* (2017) does reference the requirement to describe and, where appropriate, quantify the primary and secondary effects on human health and welfare. Moreover, the European Commission guidance states the following in relation to the assessment of Human Health:

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

In accordance with this approach to Human Health espoused in the Commission Guidance, this chapter addresses human health in the context of other factors addressed elsewhere in further detail within the EIAR where relevant. Relevant factors identified include inter alia water, air quality, noise, and the risk of major accidents and disasters.

In addition, this chapter of the EIAR has been prepared with reference to recent national publications which provide guidance on the 2014 EIA Directive including the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) and the Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in August 2017.

Moreover, the content of the Institute of Environmental Management and Assessment [IEMA] high level primer document (2017), which was prepared having considered the provisions of the 2014 EIA Directive, has also been considered in the preparation of this chapter. The IEMA document posits that human health spans environmental, social and economic aspects and does not merely represent an absence of disease. A broad conception of human health is put forward, that should encompass factors such as local economy and community, rather than relying on a narrower focus on biophysical health factors and determinants. In this regard, the current chapter seeks to address population and human health in a wholistic manner, including consideration of economic factors, settlement patterns, landscape and visual impact, and land-use.

The 2018 EIA Guidelines published by the DHPLG state that there is a close interrelationship between the SEA Directive and the 2014 EIA Directive. The Guidelines state that the term '*Human Health'* is contained within both of these directives, and that a common interpretation of this term should therefore be applied.

To establish the existing receiving environment / baseline, site visits were undertaken to appraise the location and likely and significant potential impact upon human receptors of this proposed development. A desk-based study of published reference documents such as Central Statistics Office Census data, the ESRI Quarterly Economic Commentary, the *Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly, 2019*, the *Wicklow County Development Plan 2016-2022, and the Bray Municipal District Local Area Plan 2018-2024* has also been undertaken. The Strategic Environmental Assessments (SEA) for the County Development Plan and the Bray Municipal District Local Area Plan have also been reviewed, as both provide a consideration of Population and Human Health.

The LAP SEA for the Bray Municipal District LAP states in relation to environmental objectives (for Population and Human Health) is:

"Population and Human Health: Improve people's quality of life based on high-quality residential, working and recreational environments and on sustainable travel patterns."

Section 4.8.4 of the SEA states that:

"The potential impacts on population and human health are generally neutral or positive in nature. The LAP improves accessibility and provides additional housing and employment opportunities to facilitate projected growth within the plan area. The objectives in the LAP would create employment opportunities, improve accessibility and/or provide additional sources of recreation and amenity for the local population thereby improving the quality of life for residents. Further, the LAP also increases the provision of housing within the plan area and improve the vitality, vibrancy of town centres and other characteristics that can strengthen social cohesion within the plan area.

Of relevance to the southern Open Space area adjacent to *'Lover's Leap Lane'*, with reference to 'Greenways', the SEA states:

"The development of greenways is positive for population and human health, air, noise and climate, landscape and visual and material assets. The provision of greenways would optimise land use, encourage active transport and improve opportunities for recreation and amenity in those key locations within the plan area. It is considered that no other significant environmental impacts would arise, therefore all other impacts are assessed as neutral."

The LAP SEA also notes that the County Development Plan sets out provisions for Action Area 3, therefore this represents the baseline and as such neutral environmental impacts are envisaged. The proposal will support the implementation of the population and growth targets in the core strategy for Enniskerry, which has to date not delivered the envisaged numbers of dwellings, also noting that the proposal contravenes the overall no. of units and density identified for the Action Plan area, and this is addressed in the material contravention statement. Notwithstanding this, it is considered that the increase in density and nos. would not materially change the conclusions of the SEA relating to the LAP.

The conclusions of the SEA note, with reference to Biodiversity, the SEA notes that *"the potential impacts on biodiversity are mostly neutral or positive in nature. The LAP generally avoid impacts on natural ecosystems and biodiversity"*.

With regard to Population and Human Health, the SEA outlines that "the potential impacts on population and human health are generally neutral or positive in nature. The LAP improves accessibility and provides additional housing and employment opportunities to facilitate projected growth within the plan area."

In relation to land and soils, the SEA notes that *"the potential impacts on soils and geology are predominantly neutral. The LAP generally avoids impacts on soils and geology."*

The SEA states that *"the potential impacts on water resources are generally neutral as the LAP would avoid negative impacts on water bodies and flood risk."*

The SEA sets out that *"the potential impacts on air, noise and climate are generally neutral or positive in nature. The LAP generally seeks to avoid impacts on air, noise and climate."*

With regard to Landscape the SEA notes that *"the potential impacts on landscape and visual amenity are predominantly neutral with some positive impacts likely to occur… Negative impacts may arise where intrusive*

development is undertaken, particularly in landscape character areas, greenfield sites or low-density zones. It is envisaged that assessment would be undertaken to support such developments in accordance with legislative and planning obligations."

Furthermore, with regard to Action Area 3, the SEA notes that *"the County Development Plan sets out provisions for Action Area 3, therefore this represents the baseline and as such neutral environmental impacts are envisaged."* The quantum of development over and above that envisaged in the SEA for the subject lands is fully assessed in the EIAR and the residual impacts outlined in the relevant chapters. It is considered that subject to the implementation of the mitigation measures the effects on the environment of the proposed development, by itself and in combination with other development in the vicinity, would be acceptable.

It should be noted that there are numerous inter-related environmental topics described throughout this EIAR document which are also of relevance to Population and Human Health. Issues such as the potential likely and significant impacts of the proposed development on townscape and visual impact, daylight and sunlight, archaeology and cultural heritage, air quality and climate, noise and vibration, water, land and soils, material assets including traffic and transport impacts, are of intrinsic direct and indirect consequences to human health. For detailed reference to particular environmental topics please refer to the corresponding chapter of the EIAR.

The Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA states that '*in an EIAR, the assessment of impacts on population & 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'.*

This chapter of the EIAR document focuses primarily on the potential likely and significant impact on Population, which includes Human Beings, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. Where there are identified associated and inter-related potential likely and significant impacts which are more comprehensively addressed elsewhere in this EIAR document, these are referred to. The reader is directed to the relevant environmental chapter of this EIAR document for a more detailed assessment.

3.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

3.3.1 Introduction

A description of the relevant aspects of the current state of the environment (baseline scenario) in relation to population and human health is provided below. Specific environmental chapters in this EIAR provide a baseline scenario relevant to the environmental topic being discussed. Therefore, the baseline scenario for separate environmental topics is not duplicated in this section; however, in line with guidance provided by the European Commission, the EPA and the DHPLG, the assessment of impacts on population and human health refers to those environmental topics under which human health effects might occur, e.g. noise, water, air quality etc. An outline of the likely evolution without implementation of the project as regards natural changes from the baseline scenario is also provided. This is the "Do Nothing" scenario.

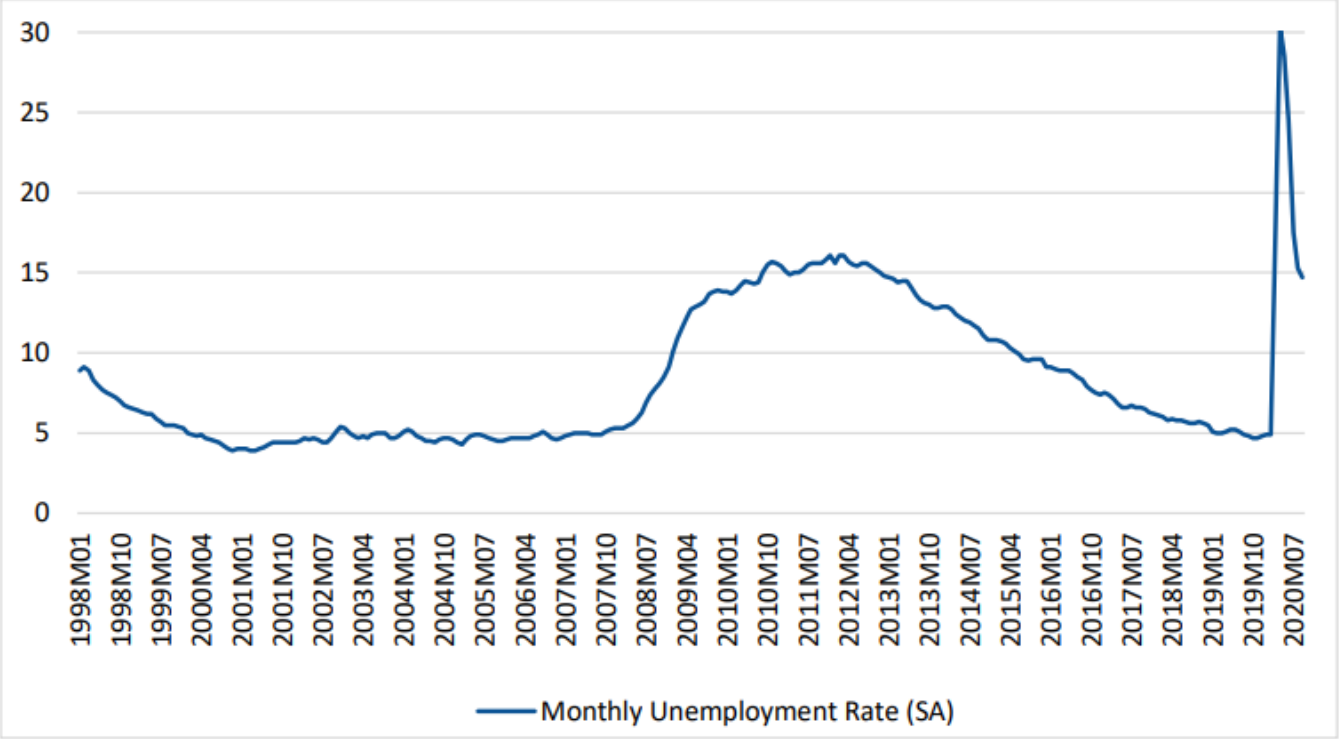
The existing environment is considered in this section under the following headings:

- Economic Activity
- Social Patterns;
- Land Use and Settlement Patterns;
- Employment;
- Health & Safety;

3.3.2 Economic & Employment Activity

The CSO's Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q3 2020, indicated that there was an annual decrease in employment of 31,700 (-1.4%) in the year to the third quarter of 2020, bringing total employment to 2,295,200. This compares with an annual decrease of 77,600 (-3.4%) in employment in the previous quarter and an increase of 2.4% or 53,700 in the year to Q3 2019. The decrease in total employment of 31,700 in the year to Q3 2020 was represented by an increase in full-time employment of 200 (0.0%) and a decrease in part-time employment of 31,900 (-6.7%).

Figure 3.1 – Unemployment by Month (Source: ESRI)



The Quarterly Labour Force Survey indicates that on a seasonally adjusted basis, employment increased by 66,300 (+3.0%) over the previous quarter. This follows on from a seasonally adjusted decrease in employment of 149,500 (-6.3%) in Q2 2020, an increase of 23,100 (+1.0%) in Q1 2020, an increase of 28,900 (+1.2%) in Q4 2019 and an increase of 20,100 (+0.9%) in Q3 2019.

Long term unemployment decreased in the year to Q2 by 15,200 (37.1%). The sharp rise and reverse of long held employment growth can be associated with the ongoing COVID-19 crisis. Using the standard methodology unemployment in Q2 2020 stood at 5.1%. However when adjusted for COVID-19, this rate rises to 23.1% (531,412).

Prior to the economic impact of COVID-19, employment increased in 13 of the 14 economic sectors over the year. The largest rate of increase was recorded in the *Information and Communication* sector (+10.7% or +12,300). Whilst the effects of the Covid-19 crisis resulted in output contracting by 7.1%.

The ESRI quarterly economic commentary for Winter 2020 notes that *"COVID-19 has resulted in an unprecedented level of intra-year volatility in most Western economies. This is particularly the case in the Irish context, given the exceptionally strong pace of growth experienced by the domestic economy prior to the pandemic… Q3 2020 has seen a significant recovery in domestic demand, while export growth, which had remained positive even when restrictions were tightest, now appears to be strengthening further. The re-imposition of tight public health restrictions in Q4 2020 will inevitably moderate the degree of the economic recovery; however it is increasingly clear that the second lockdown will not have the same negative impact on growth that the first one did."*

The ESRI anticipates that the Irish economy will grow by 3.4 per cent in 2020 and while a surprising result is due to the relatively strong performance of the export sector through the present year.

The unemployment rate, which had been declining following the lifting of the first general lockdown, was noted as increasing in Q4 2020 and is set to be 20 per cent by the end of 2020.

The ESRI baseline scenario GDP is expected to increase in 2021 by 4.9 per cent, with unemployment averaging 14.5 per cent for the year and the ESRI outline that the presence or otherwise of a vaccine and the speed and efficiency with which one is rolled out to the general public will have major implications for the short- and medium-term outlook for the domestic economy.

The above sources demonstrate that the national economy and employment levels, whilst currently experiencing unprecedented uncertainty and negative effects related to the Covid-19 virus, is now experiencing economic growth again which is projected to continue in 2021 onwards. The Government is faced with the challenge of recovering economic activity and employment levels, which in turn is expected to result in an increased demand for residential dwellings particularly within the Dublin region.

3.3.3 Social Patterns

The CSO data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.8%, bringing the total population of the Irish State to 4,761,865. The rate of growth slowed from 8.1% in the previous census, attributable to the slower economic activity in the early part of the intercensal period resulting in a reduced level of immigration, albeit offset to a degree by strong natural increase. The economy subsequently recovered with consequent population growth predominantly attributed to natural increase, greater economic activity, increased job opportunities and continued immigration.

The Central Statistics Office (CSO) provides information on population and socio-economic aspects of the population residing within the Enniskerry, which the subject lands are located within the administrative area of Wicklow County Council. The most recent census of population by the CSO was undertaken in 2016. The census provides demographic trends for the Country, region, county, town and local levels. The CSO population statistics relevant to this EIAR are set out in Table 3.1 below.

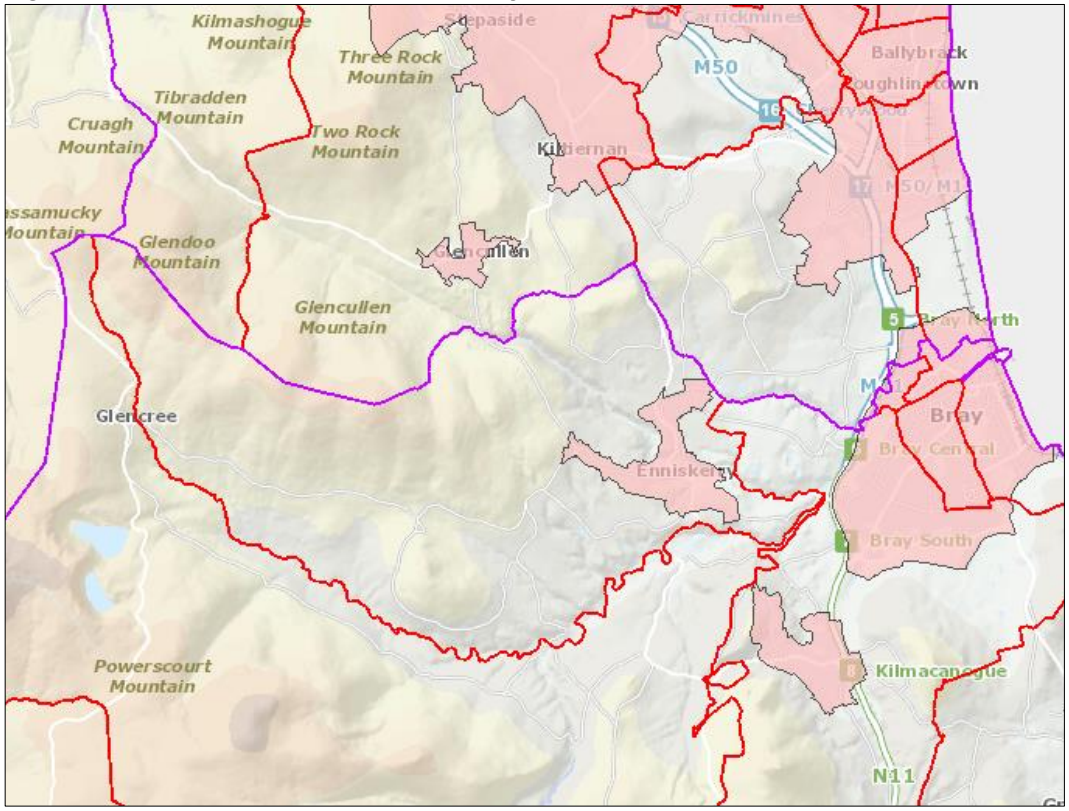
Table 3.1 – Population Change in the State, Wicklow County and Enniskerry 2011 - 2016

Area	Number of Persons		
	2011	2016	% change 11-16
Ireland - State	4,588,252	4,761,865	3.8
Wicklow County	136,640	142,425	4.2
Enniskerry ED	2,765	2,910	5.2
Enniskerry Town	1,811	1,889	4.3

Source: Central Statistics Office 2011 and 2016

Growth within the County was slightly higher than the national average with a growth rate of 4.2%. Growth within the Enniskerry area at 4.3% for the town was higher than the State (3.8%).

Figure 3.2 – ED and Settlement Boundary



Source: http://census.cso.ie/sapmap/

3.3.4 Land Use & Settlement Patterns

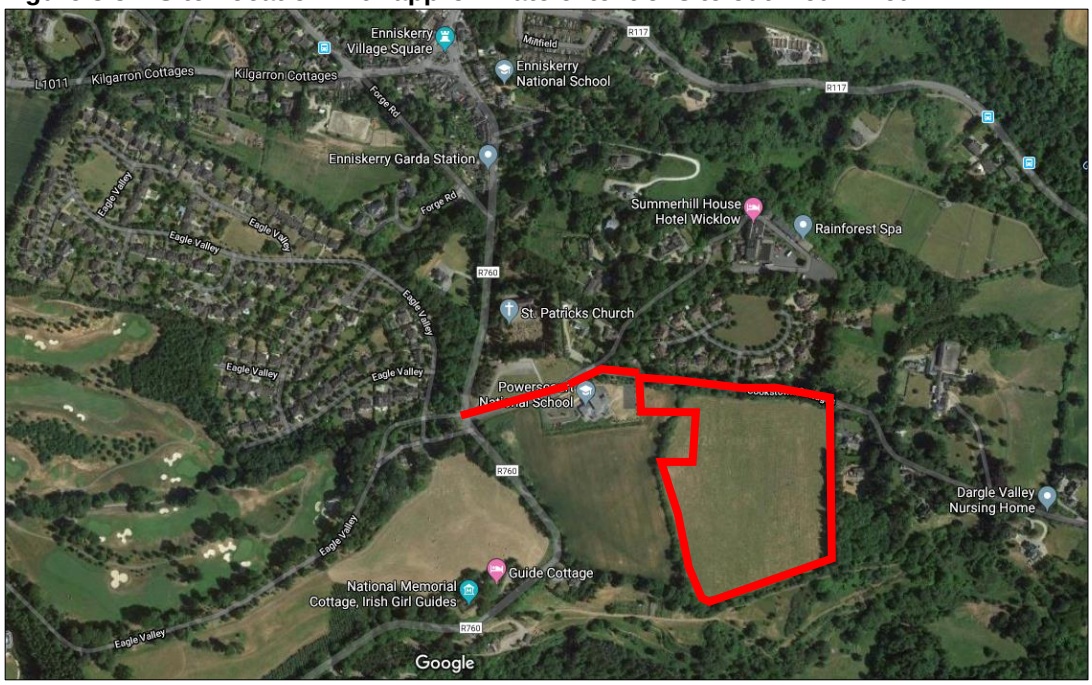
The site is located within the administrative area of Wicklow County Council. The subject lands are located on the south eastern side of Enniskerry, c.1km from the village centre. The lands are situated to southern side of the L1020 (Cookstown Road) and to the east of the R760. The main development site under the ownership of Cairn comprises 6.27 hectares with additional areas for footpath and public lighting upgrade (and services upgrade along the Cookstown Road), resulting an overall area of 6.57 hectares. The relevant letters of consent are included in the particulars with the SHD application.

Enniskerry is a village with a rich built heritage located 20 km south of Dublin City Centre, 5 km west of Bray and approximately 2.5 km west of the N11. The town is located in close proximity to a number of tourism and heritage attractions including Powerscourt Estate and Gardens.

The lands are currently in agricultural use and are bounded to the north by existing residential development in Enniskerry Demesne, with the Summerhill House Hotel located further to the north. The Powerscourt National School is located immediately adjacent, adjoining the site to the west. A small number of standalone houses are also located in the vicinity, to the east and south. There is zoned residential lands to the west (recently granted permission for a residential development). The Powerscourt Estate and Hotel are located further to the west.

The village has an attractive centre and historic streetscape. It provides a range of retail shops and services as well as a number of coffee shops/restaurants and public houses.

Figure 3.3 – Site Location with approximate extent of site outlined in red



(Source: Google Maps)

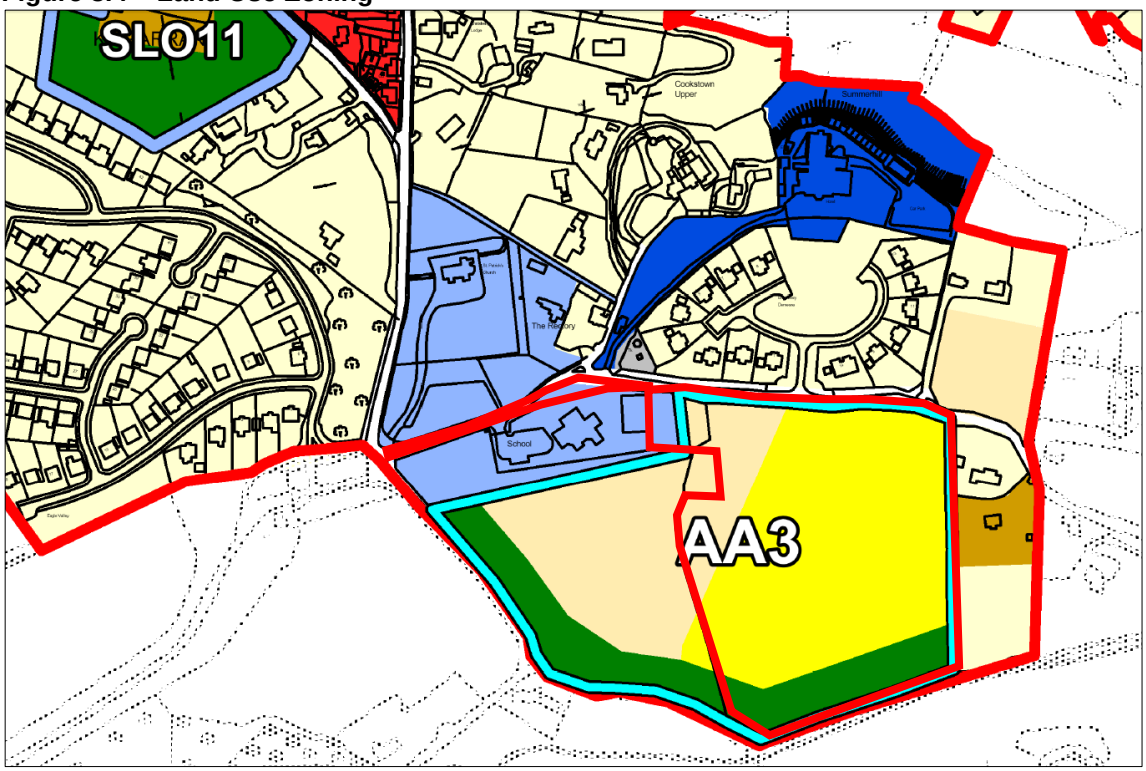
The subject lands are zoned, R10 New Residential, R20 New Residential, OS1 Open Space and CE Community and Education.

The LAP states that uses generally appropriate for residential zoned areas include houses, apartments, residential open space, education, community facilities, retirement homes, nursing homes, childcare, health centres, guest house, bed and breakfast, places of public worship, home based economic activity, utility installations and ancillary development and other residential uses in accordance with the CDP.

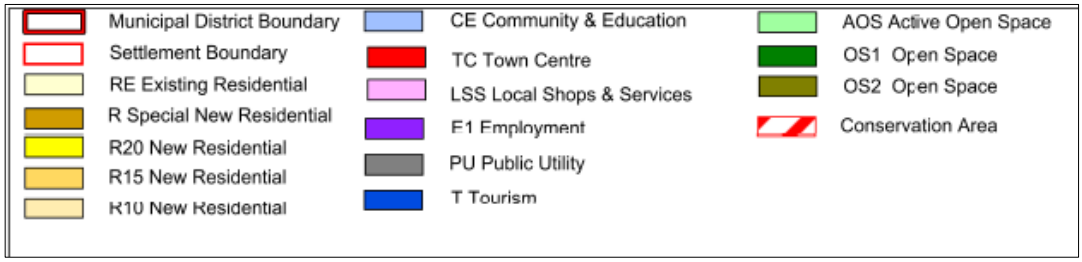
Uses appropriate for open space (OS1) zoned land are formal / informal landscaped parks with off-road walking / cycling paths, as well as playgrounds, skate parks, Mixed Use Games Areas and outdoor gyms.

Uses generally appropriate for community and educational zoned land include community, educational and institutional uses include burial grounds, places of worship, schools, training facilities, community hall, nursing homes, health related developments, sports and recreational facilities, utility installations and ancillary developments for community, educational and institutional uses in accordance with the CDP. The proposed creche facility falls within the description of a "*community use*", which is expressly included as a use "generally appropriate for community and educational zoned land. Thus, the proposed development accords with and does not materially contravene the zoning objective for the subject site.

Figure 3.4 – Land Use Zoning



Source: Bray Municipal District LAP



The proposed development will provide for a high quality, predominantly residential development which increases the density of the subject site at a highly suitable location, which is served by a broad range of facilities and infrastructure and is to include a host of amenities which will serve to benefit the surrounding residential populace. The proposal contravenes the overall no. of units and density identified for the Action Plan area, and this is addressed in the material contravention statement. The quantum of development over and above that envisaged in the LAP is fully assessed in the EIAR.

3.3.5 Housing

In terms of housing delivery, the proposed development is located at a location which is primarily zoned for residential development, with a portion zoned for open space and community/education, and which is appropriate for the uses proposed. There is a significant and established housing need in the Greater Dublin Area, including Wicklow, and the State as a whole, as recognised within Government housing and planning policy, including the 2016 Rebuilding Ireland Plan for Housing and Homelessness.

Recent trends show that population growth is set to continue in the wider Eastern and Midlands Region having regard to the Region's young demographic profile and a return to net inward migration as the country returned to economic growth after a severe economic downturn from 2007. In fact, the level of in-migration to Ireland experienced over the last two years was in the order of 30,000.

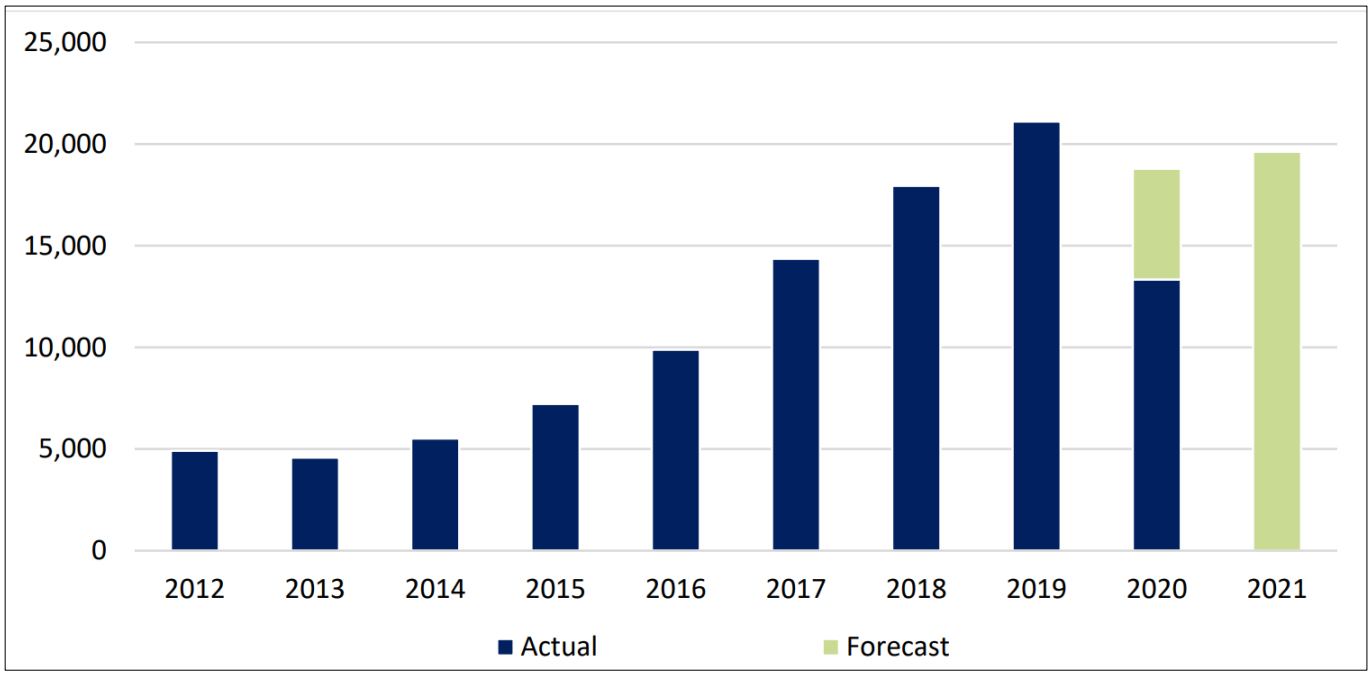
While the number of residential units being completed yearly nationally has rebounded, the level of completions remains significantly less than the estimated equilibrium demand for housing in the State. Moreover, the current level

of housing need and demand is not at equilibrium, being significantly augmented by the extremely low level of housing completions in the decade since 2010. Over this period, a significant shortfall in housing has amassed year on year, which is reflected in the data collected in Census 2016 – which revealed overcrowding and increasing numbers of households living in cramped conditions.

It is further noted that the number of housing completions in the state is expected to reduce significantly (falling well below projected completions) for 2020, due to the impact of the ongoing Covid-19 public health crisis. There had been a gradual increase in the number of completions over the past decade as supply increased to meet the level of structural demand, estimated by the ESRI to be in the region of 35,000 new homes a year. Since the ESRI Winter Commentary (December 2020), further physical restrictions has stopped work on most construction sites. This will impact on the delivery of housing.

According to the ESRI, in Q3 2020 there were 5,118 new residential completions, a 9.4 per cent decline on the same period of 2019 noting: *"While any decline in housing completions is unwelcome given the ongoing issue of undersupply in the market, the scale of the decline is significantly less than that experienced in Q2 when the initial lockdown restrictions were in place. For six weeks over this period all work on construction sites was prohibited as part of the administrative restrictions."*

Figure 3.5 – Yearly housing completions for the State (ESRI Quarterly Commentary Winter 2020)



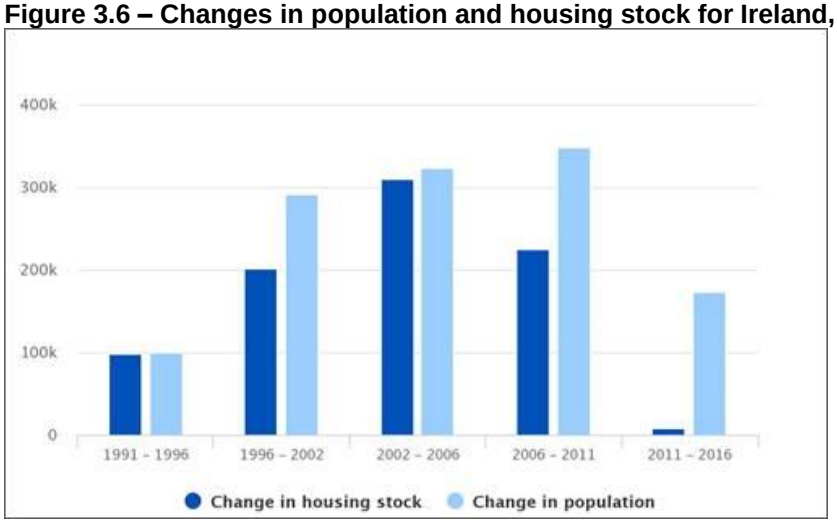
Source: ESRI Winter Commentary

Given the reduced level of activity throughout the year, the ESRI forecast there will be just over 18,500 new completions in 2020 and 19,600 completions in 2021. Though it is noted since the publication of the Quarterly commentary in December, further restrictions on most building sites has occurred which has the potential to reduce the supply of housing for 2021.

Census 2016 revealed an increase in the national housing stock of just 8,800 units during the five-year intercensal period (taking into account obsolescence during that period) representing an increase of just 0.4 percent (as shown in the figure below).

This is notable given the increase in population seen concurrently (173,613 or 3.8%). Furthermore, almost 40% of these additional units were one off houses, the majority of which would never have come to market. Census 2016 also revealed a rise in the average household size (from 2.73 to 2.75) (CSO, 2017). This was attributed to household formation falling behind population growth, another indicator of lacking housing availability and increasing housing need.

Figure 3.6 – Changes in population and housing stock for Ireland, 1991-2016

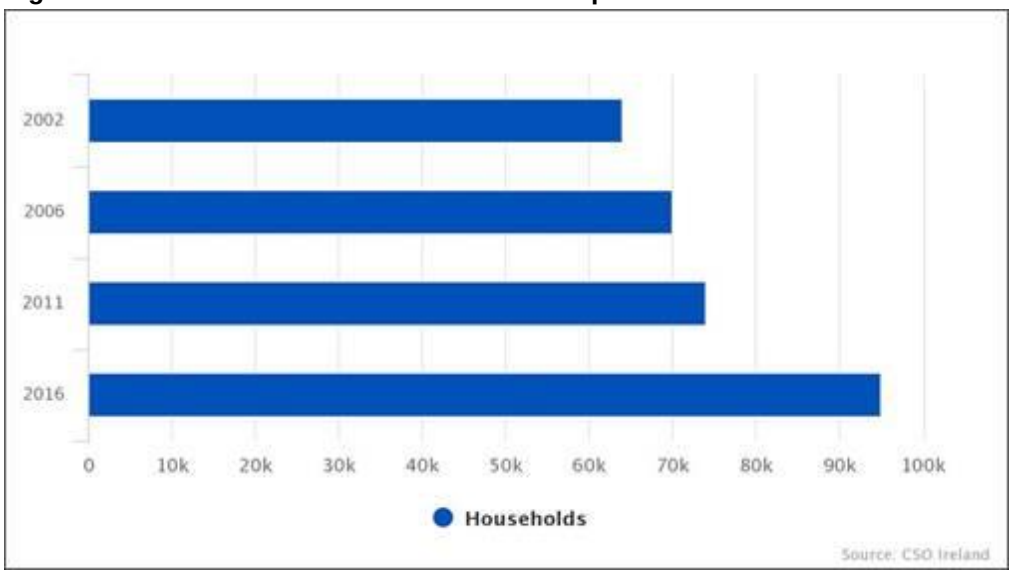


Source: Central Statistics Office, 2017

The 2011-2016 intercensal period also saw a notable increase in the number of households with more persons than rooms in their dwelling (see figure below). There were 95,013 permanent households with more persons than rooms according to Census 2016, a 28 per cent rise on the equivalent number in 2011 (73,997).

Close to 10 per cent of the population resided within these households in 2016 at an average of 4.7 persons per household. This is an indicator of increased overcrowding (and housing need) which may be attributed to lack of housing availability and rising costs.

Figure 3.7 – Number of households with more persons than rooms



Source: Central Statistics Office, 2017

These figures set out above all point to a significant and increasing housing need in the state which is not being met at present.

The Central Bank of Ireland has published a study entitled 'Population Change and Housing Demand in Ireland'[7], which includes the following key points:

[7] Available at: https://www.centralbank.ie/news-media/press-releases/press-release-economic-letter-population-change-and-housing-demand-in-ireland-10-december-2019

- *"Growth in population has significantly exceeded the increase in the housing stock since 2011 and the average household size has risen, reversing a previous long-running trend.*
- *To keep pace with population growth and changes in household formation, our estimates indicate that an average of around 27,000 dwellings would have been required per annum between 2011 and 2019.*
- *Assuming unchanged household formation patterns and net inward migration close to current levels, around **34,000** new dwellings would be required each year until 2030."*

3.3.6 Health & Safety

The surrounding context consists of a mix of residential, employment, retail and recreational lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which might result in a risk to human health and safety. It is not within the consultation zone of a SEVESO Site as defined by the Health and Safety Authority.

3.3.7 Risk of Major Accidents and Disasters

The EIA Directive states that an EIAR must include the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project.

In this respect, taking cognisance of the other chapters contained within this EIAR document, the proposed development site does not present risks of major accidents or disasters, either caused by the scheme itself or from external man made or natural disasters. Chapter 8 (Water) sets out that the proposed development site is located within Flood Risk Zone C, which is appropriate for a residential development.

3.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Consideration of the characteristics of the proposed development allows for a projection of the level of impact on any particular aspect of the environment that could arise. In this chapter the potential impact on population and human health is assessed. A full description of the proposed development is provided in Chapter 2 of this EIAR document.

3.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

3.5.1 Introduction

This section provides a description of the specific, direct and indirect, impacts that the proposed development may have during both the construction and operational phases of the proposed development. As stated, guidance documents from the EPA and the Department outline that the assessment of impacts on population and human health should focus on health issues and environmental hazards arising from the other environmental factors and does not require a wider consideration of human health effects which do not relate to the factors identified in the EIA Directive. Additionally, this section addresses the socio-economic and employment impacts of the proposed development.

The specific chapters of the EIAR (4-15) assess the environmental topics outlined in the EIA Directive.

3.5.2 Economic Activity

Construction Phase

The construction phase of the proposed development is likely to result in a positive net improvement in economic activity in the area of the proposed development site, particularly in the construction sector and in associated and secondary building services industries. The sector has grown strongly in recent years and this development will help to further enhance growth and reduce the increasing pressure on the housing market. The construction sector (including associated services) was documented as one of the most adversely impacted sectors of the Irish economy following the previous economic downturn in 2008. Given the economic impact of COVID-19, this development will help to sustain and promote employment.

The construction of the development and all associated infrastructure will precipitate a positive impact on construction-related employment for the duration of the construction phase. The phased construction of the proposed residential units, open space, and a childcare facility, alongside associated physical infrastructure will result in a construction period over an approximate 24-36 month timeline and will consequently enhance economic activity

during this period. A considerable amount of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction phase.

The construction phase will also have secondary and indirect '*spin-off*' impacts on ancillary support services in the wider area of the site, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions etc. These beneficial impacts on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the phased construction period.

Operational Phase

The operational phase of the proposed development will result in the provision of 165 residential units and a creche. This will provide accommodation for approximately 454 persons, based upon the existing average occupancy rate of 2.74 per household (based on CSO 2016 Census figures for the State). This increase in occupancy in the area will enhance local spending power and will assist with the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities. The proposal will provide much needed residential accommodation within the town of Enniskerry and accords with National Policy on delivering Sustainable Residential Communities.

3.5.3 Social Patterns

Construction Phase

The construction phase of the proposed development is unlikely to have any significant impact on social patterns within the surrounding area. Some additional temporary additional local populations may arise out of construction activity. However, these impacts are imperceptible, temporary in nature and therefore not considered significant.

It is acknowledged that the construction phase of the project may have the potential for some short-term negative impacts on local residents. Such impacts are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These impacts are dealt with separately and assessed elsewhere in the EIAR, including Chapter 2 - Project Description and Alternatives Examined, Chapter 7 - Air Quality and Climate and Chapter 9 - Noise and Vibration and also in the Traffic and Transportation Assessment report. Such impacts will be short term and in the longer term, the completed scheme will have beneficial impacts for local businesses, residents, and the wider community. Any disturbance is predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently and properly managed having regard to neighbouring activities. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts to nearby residents. A Construction Management Plan has been prepared and is submitted with this SHD planning application.

Operational Phase

The addition of new residents and an additional element employment to the area will improve the vibrancy and vitality of the area and will help to support existing community and social infrastructure, in addition to further supporting nearby neighbourhood centre and commercial businesses. As set out within the Social and Community Infrastructure Audit submitted as a standalone report with the application, there is a considerable range of existing community and social infrastructure within Enniskerry and the environs of the subject site, which the proposed development will be able to avail of.

The Social and Community Infrastructure Audit also demonstrates that the extra demand created by the proposal for primary and post primary educational facilities will not be significant in relation to current levels of local provision, while increased levels of demand from the scheme is unlikely to result in significant impact on existing services.

The proposed development includes the provision of a childcare facility with a GFA of 510 sq.m. As set out within the Community and Social Infrastructure Audit report, this childcare facility will accommodate the likely demand arising from the proposed development.

Once operational, the proposed development will give rise to much needed additional residential accommodation. Residents will spend a portion of their income locally which would not happen without the proposed development. The creche will provide some employment opportunities in the operational phase of the development.

The current planning application is accompanied by a Social and Community Infrastructure Audit report prepared by John Spain Associates, which confirms that the area within which the proposed development is situated has the necessary community and social infrastructure to support the proposal.

The proposal includes an element of Part V provision in accordance with the requirements of the Planning Authority, which will provide for an enhanced mix of tenures, and add to the existing social housing stock. The overall benefit to the social patterns of the surrounding area resulting from the development can be considered moderate, long term, and positive.

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

3.5.4 Land-Use & Settlement Patterns

Construction Phase

The construction phase of the proposed development will primarily consist of site clearing, excavation and construction works, and the erection of the proposed new buildings on site and has the potential to impact adversely and result in the temporary degradation of the local visual environment on a short-term basis. The visual impacts precipitated by the proposed development are assessed in greater detail in Chapter 9 of the EIAR 'Landscape and Visual Impacts'.

Secondary land use impacts include off-site quarry activity and appropriate disposal sites for removed spoil and other materials transported off site. Chapter 11 Material Assets Waste considers these potential impacts in more detail and Chapter 11 (as well as the Construction and Demolition Waste Management Plan) describes the relevant mitigation measures).

The phase may result in a marginally increased population in the wider area due to increased construction employment in the area, however, this would be temporary in nature and the impact would be imperceptible.

Operational Phase

The operational phase of the proposed development will result in the introduction of a sustainable density of residential development, delivering wider public realm improvements, in accordance with national and local planning policy objectives which seeks to deliver compact growth at suitable locations. Adequate provision of high-quality housing to serve the existing and future population of the county and the wider Greater Dublin Area is an important contributor to the establishment and maintenance of good human / public health. The high quality design of the proposed development, will contribute to a positive impact on the wellbeing of future residents.

3.5.5 Housing

Construction Phase

The proposed development will not result in any impact in terms of loss of housing stock during the construction stage.

Operational Phase

The operational phase of the proposed development will see the delivery of 165 residential units, in a range of housing typologies (houses, apartments, duplex apartments and Maisonette units).

The proposed development will respond to established housing need and demand in the area of the proposed development, and the wider region. The proposed residential units will assist in addressing the significant shortfall of residential development, which has been further impacted by the ongoing COVID-19 19 crisis.

The proposed development delivers a range of housing unit sizes and types, including two, and three bedroom apartments as well as 3 and 4 bedroom dwellings. The scheme also benefits from a high level of good quality public open space, with new linkages provided through the site improving connectivity to the Lovers Leap Lane to the south.

The delivery of 165 no. well-designed high-quality residential units at an appropriate location will have a direct, positive, and significant impact on the future residents of the proposed development and will support the population growth targeted for the area and the Greater Dublin Area as a whole.

3.5.6 Employment

The impact of the proposed development in relation to employment has been discussed under economic activity.

3.5.7 Health & Safety

The surrounding context consists of a mix of residential, employment, retail and recreational lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which might result in a risk to human health and safety. It is not within the consultation zone of a SEVESO Site as defined by the Health and Safety Authority. Chapter 14 – Risk Management addresses the potential health and safety aspects of the proposed development during the construction and operational phases.

In the absence of mitigation, the proposed development could have a slight negative, short-term impact on the surrounding area during construction phase due to traffic and associated nuisance, dust and noise. These issues and appropriate mitigation measures are addressed in Chapters 7, 8 and 12 of the EIAR, in the Traffic and Transportation Assessment, Construction Management Plan and the Waste Management Plan which accompany the application. The Traffic and Transportation Assessment recommends that a Construction Traffic Management Plan be implemented for the site which will minimise disruption to the surrounding road network.

No significant health and safety effects are envisaged during either the construction or operational phases of the proposed development. The Health and Safety policy, procedures and work practices of the proposed development will conform to all relevant health and safety legislation both during the construction and operational stages of the proposed development. The proposed development will be designed and constructed to best industry standards, with an emphasis being placed on the health and safety of employees, local residents and the community at large.

Construction Phase

The construction methods employed and the hours of work proposed will be designed to minimise potential impacts. The development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact on the construction phase will be reduced. A Construction and Environmental Management Plan has been prepared by Barrett Mahony Consulting Engineers and the measures specified therein will be complied with during the construction phase of the project.

Operational Phase

The operational stage of the development is unlikely to precipitate any significant impacts in terms of health and safety. The design of the proposed development has been formulated to provide for a safe environment for future residents and visitors alike. The paths, roadways and public areas have all been designed in accordance with best practice and the applicable guidelines including DMURS (please refer to BMCE stand-alone DMURS Compliance Report submitted with application). A road quality audit (by ILTP) has been undertaken which has informed the design and which is submitted as part of the application. Likewise, the proposed residential units and childcare facility accord with the relevant guidelines and will meet all relevant safety and building standards and regulations, ensuring a development which promotes a high standard of health and safety for all occupants and visitors.

The Air Quality Chapter (Ch 7) of the EIAR predicts that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health or local livestock welfare and that there will be a negligible impact on local air quality generated by increased traffic movements associated with the development.

The proposed development will not result in any significant impacts on human health and safety once completed and operational.

3.5.8 Risk of Major Accidents or Disasters

Chapter 14 – Risk Management addresses the potential risks of major accidents or disasters relating to the proposed development during the construction and operational phases.

Construction Phase

Having regard to the topography, nature and location of the subject site, and based on the location of the built elements of the development within Flood Zone C as established in the Flood Risk Assessment prepared by BMCE submitted with the application (as part of Civil Engineering Report), it is not considered likely that there will be any impact related to a major accident or disaster during the construction phase of the proposed development, stemming internally from within the development, or externally.

The works proposed in proximity to roadways will be governed by best practice and appropriate safety procedures, ameliorating any risk of a major accident in those contexts.

Operational Stage

The proposed development will be located on land which is not at any significant risk of flooding. A site-specific flood risk assessment (SSFRA) has been carried out by BMCE Consulting Engineers for the subject site and is included as a standalone report. The SSFRA concluded that the proposed development is appropriate for the site's flood zone categories and that the proposed development is considered to have the required level of flood protection.

Therefore, it is considered that there is no significant risk related to major accidents or disasters, external or internal, man-made or natural in respect of the proposed development.

3.5.9 Potential Cumulative Impacts

The potential cumulative impacts of the proposed development on population and human health have been considered in conjunction with the ongoing changes in the surrounding area. Visits to the subject site and surrounding area and desk-based review of online planning files have been undertaken to identify the existing pattern of development, nearby uses, and any permitted / ongoing developments of relevance to the current proposals in the context of population and human health. The surrounding area is defined by a broad and varied mix of uses, including residential, commercial, recreational and civic uses.

It is noted the adjoining site to the west (located in the AA3 lands) has an extant permission for 27 no. dwellings (Planning Reg. Ref. 19/871). There are no further lands available within the Action Plan (AA3) for future development. From a review of the main landbanks in the Enniskerry LAP (table 3.2 of the LAP refers), it is further noted there is a proposal on lands at Kilgarron Hill (on the AA2 lands), which received a reasonable basis opinion from An Bord Pleanála (on the 21st January 2021 – ABP Ref. 308676-20) for 219 no. dwellings. It is noted the SLO10 lands, permission was granted for 12 no. detached dwellings on the 18/4/2020 by An Bord Pleanála (PL27.248914 WCC Ref. 17/15). The Powerscourt Demesne landbank has an extant permission for 47 no. dwellings. There are no recent applications on the Monastery Grove, on the lands to the east of AA3, or SLO11 Kilgarron lands. Other smaller developments are not considered to be relevant. In addition, it is noted the Bray MD LAP includes the development of the Fassaroe lands which is located c. 750m to the north east of the proposed development site, which is identified as an area for development of c. 4,000 dwellings along with supporting retail, commercial and areas of open space.

These developments will influence demographic change, population growth, and the intensity of commercial use in this area, cumulatively contributing to increasing population and employment growth in the wider area which represents a positive cumulative impact which accords with the planning policy context for the area.

An increase in local housing, and some increase in employment opportunities and service provision (crèche) has the potential to generate direct, indirect impacts. The visual appearance of the landscape will be altered with the introduction of the proposed built elements including infrastructure, in cumulation with other development in the area, including the remainder of the Action Plan (AA3) lands, under a separate permitted application. Implementation of the remedial and reductive measures in respect of noise/traffic management etc. in the EIAR would ensure a minimal impact on the existing communities of this area during the construction phase.

The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity, will be a further increase in the population of the wider area. This will have a moderate impact on the population (human beings) in the area. This impact is likely to be long term and is considered to be positive, having regard to the zoning objective for the subject lands.

Chapter 7 (Air Quality) states that the operational phases of the subject development and other permitted residential developments in the local area will not generate cumulative air emissions that will have an adverse impact on local ambient air quality. Measured baseline air quality and National published air quality data confirm that the existing air quality is good and that the operational phases of the subject development and other local proposed developments will have a long-term imperceptible impact on existing air quality.

Chapter 8 (Noise and Vibration) states that once the subject development is completed and if the lands to the east are developed there will be no residual adverse noise impact on the receiving environment associated with their operation. Increased traffic movements associated with both developments will generate a long-term not significant impact on the local noise climate during peak hour times.

The overall cumulative impact of the proposed development will therefore be long term and positive as residents will benefit from a high quality, visually attractive living environment, with strong links and pedestrian permeability. Having regard to the assessment of cumulative impacts, it is not considered that any additional mitigation measures are required further to those which are outlined above.

3.5.10 '*Do Nothing'* Scenario

In order to provide a qualitative and equitable assessment of the proposed development, this section considers the proposed development in the context of the likely impacts upon the receiving environment should the proposed development not take place.

A '*do nothing'* scenario would result in the subject lands remaining green-field and undeveloped. This would be an underutilisation of the site from a sustainable planning and development perspective.

In the do-nothing scenario, the absence of the proposed development would perpetuate the housing shortfall in the area, contrary to the aims and objectives of national, regional, and local planning and housing policy, all of which promote the delivery of additional housing at locations such as the subject site.

The local economy would not experience the direct and indirect positive effects of the construction phase of development, including employment creation. The local construction sector and associated industries and services would be less viable than they might otherwise be.

The '*do-nothing'* scenario would result in the status of the environmental receptors described throughout this EIAR document remaining unchanged. The potential for any likely and significant adverse environmental impacts arising from both the construction and operational phases of the proposed development would not arise. In terms of the likely evolution without implementation of the project as regards natural changes from the baseline scenario, it is considered there would be limited change from the baseline scenario in relation to population (human beings) and human health.

3.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

Avoidance, remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential likely and significant environmental impacts.

3.6.1 Construction Phase

A range of construction related remedial and mitigation measures are proposed throughout this EIAR document with reference to the various environmental topics examined and the inter-relationships between each topic. These remedial and mitigation measures are likely to result in any significant and likely adverse environmental impacts on population and human health during the construction phases being avoided. Readers are directed to Chapter 16 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIAR.

POP & HH CONST 1:

In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction Environment Management Plan shall be submitted by the contractor and implemented during the construction phase.

With reference to the construction phase of the proposed development, the objectives of the Construction Waste By Products Management Plan prepared by Byrne Environmental Consulting Ltd (and also Chapter 11 of the EIAR) is to ensure that waste generated during the proposed construction and operation phases will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts 1996 - 2013 are complied with.

3.6.2 Operational Phase

The operational phase is considered to have likely positive impacts on population in relation to the provision of additional residential units, open space, childcare provision, to cater for the demands of a growing population in accordance with the residential zoning objectives pertaining to the site.

During the operational phase of the development the design of the scheme has undergone a Road Safety Audit and has had regard to Design Manual for Urban Roads and Streets (DMURS) during its design. This will promote a pedestrian friendly environment, promoting sustainable development and reducing the influence of cars. This has the potential to reduce accidents within the proposed development.

No further specific mitigation is required having regard to the mitigation included within the other chapters of this EIAR.

3.7 PREDICTED RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

This section provides a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied. It should be noted that in addition to remedial and mitigation measures, impact avoidance measures have also been built in to the EIAR and project design processes through the assessment of alternatives described in Chapter 2 of this EIAR document. Impact interactions are considered further in Chapter 15.

There are numerous inter-related environmental topics described throughout this EIAR document which are also of relevance to Population and Human Health. For detailed reference to the residual impacts of particular environmental topics please refer to the relevant corresponding chapter of the EIAR (land and soils, water and hydrology, air quality and climate, noise and vibration, traffic, and risk management).

3.7.1 Construction Phase

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works, which will be largely confined to the proposed development site. Notwithstanding the implementation of remedial and mitigation measures there will be some minor temporary residual impacts on population (human beings) and human health most likely with respect to nuisance caused by construction activities, predominantly related to noise and traffic as detailed in chapters, 8 and 10.

It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document, and as controlled through the Construction and Environmental Management Plan, any adverse likely and significant environmental impacts will be avoided. The overall predicted likely impact of the construction phase will be short-term not significant, and neutral. A CEMP has been submitted with the SHD application which will be developed by the contractor and agreed with the Local Authority.

Slight, positive short-term impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development.

3.7.2 Operational Phase

The proposed development will result in a generally positive alteration to the existing undeveloped site in terms of the provision of residential units to serve the growing residential population of the area in accordance with the objectives of the Wicklow County Development Plan 2016-2022 and the Bray Municipal District LAP 2018. Positive impacts on population and human health will include health benefits associated with the provision of a significant

quantity of open space, pedestrian and cyclist routes, a highly permeable layout which connects to adjacent development and delivers the objectives of the Local Area Plan. The provision of creche facilities on site enhances the quality of the development and helps to create sustainable communities.

The implementation of the range of remedial and mitigation measures included throughout this EIAR document is likely to have the impact of limiting any adverse significant and likely environmental impacts of the operational phase of the proposed development on population and human health (as set out in relevant chapters land and soils, water and hydrology, air quality and climate, noise and vibration, traffic, and risk management).

This chapter of the EIAR has provided an assessment of the likely impact of the proposed development on population and human health. As set out above, the proposed development will result in a long-term positive impact on housing and is not likely to result in any significant negative effects on population and human health, and will result in some other positive impacts, including settlement patterns of a sustainable density at an appropriate location and economic benefits derived from the employment opportunities within childcare facility proposed. Through generating additional economic activity in the area, and providing for a high standard of residential accommodation, there will be a slight positive impact arising from the proposed development in the short-term (for economic activity) and in the long term for residential accommodation.

3.7.3 Cumulative

The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity, will be a further increase in the population of the wider area. This will have a moderate impact on the population (human beings) in the area. This impact is likely to be long term and is considered to be positive, having regard to the zoning objective for the subject lands.

Chapter 7 (Air Quality) states that the operational phases of the subject development and other permitted residential developments in the local area will not generate cumulative air emissions that will have an adverse impact on local ambient air quality. Measured baseline air quality and National published air quality data confirm that the existing air quality is good and that the operational phases of the subject development and other local proposed developments will have a long-term imperceptible impact on existing air quality.

Chapter 8 (Noise and Vibration) states that once the subject development is completed and if the lands to the east are developed there will be no residual adverse noise impact on the receiving environment associated with their operation. Increased traffic movements associated with both developments will generate a long-term not significant impact on the local noise climate during peak hour times. The overall cumulative impact of the proposed development will therefore be long term and positive as residents will benefit from a high quality, visually attractive living environment, with strong links and pedestrian permeability. Having regard to the assessment of cumulative impacts, it is not considered that any additional mitigation measures are required further to those which are outlined above.

3.8 MONITORING

In relation to the impact of the development on population and human health it is considered that the monitoring measures outlined in this EIAR in regard to the other environmental topics such as water, air quality and climate and noise and vibration sufficiently address monitoring requirements.

3.9 REINSTATEMENT

While not applicable to every aspect of the environment considered within the EIAR, certain measures may be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.

There are no reinstatement works proposed specifically with respect to population and human health.

3.10 DIFFICULTIES ENCOUNTERED IN COMPILING

No significant particular difficulties were experienced in compiling this chapter of the EIAR document.

4.0 BIODIVERSITY

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

A separate dedicated bat impact assessment was carried out by Dr Tina Aughney which relies on surveys carried out on September 1st-2nd 2017, August 26th -29th 2019 and again on May 23rd-26th 2020.

The planning application will be accompanied by the following biodiversity (flora and fauna) documentation:

- Biodiversity Impact Assessment Chapter (part of Environmental Impact Assessment Report (EIAR);
- Bat Impact Assessment Report;
- Tree Survey;
- Information for Screening for Appropriate Assessment

4.1 METHODOLOGY

The assessment was carried out in accordance with the following best practice methodology: 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' by the Environmental Protection Agency (EPA, 2017), 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (IEEM, 2018), The European Commission's "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment" (2013) and the Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission (2017).

Site visits were carried out on the 30th of July 2019, March 5th 2020, May 27th 2020 and December 2nd 2020 in fair weather. The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000).

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

July and May lie within the optimal survey period for general habitat surveys (Smith et al., 2010) and so it was possible to classify all habitats on the site to Fossitt level 3. March and May lie within the season for surveying breeding birds. March and December are within the optimal season for surveying large mammals (especially Badgers). March is within the optimal season for surveying amphibians. March and December are within the optimal season for surveying wintering birds.

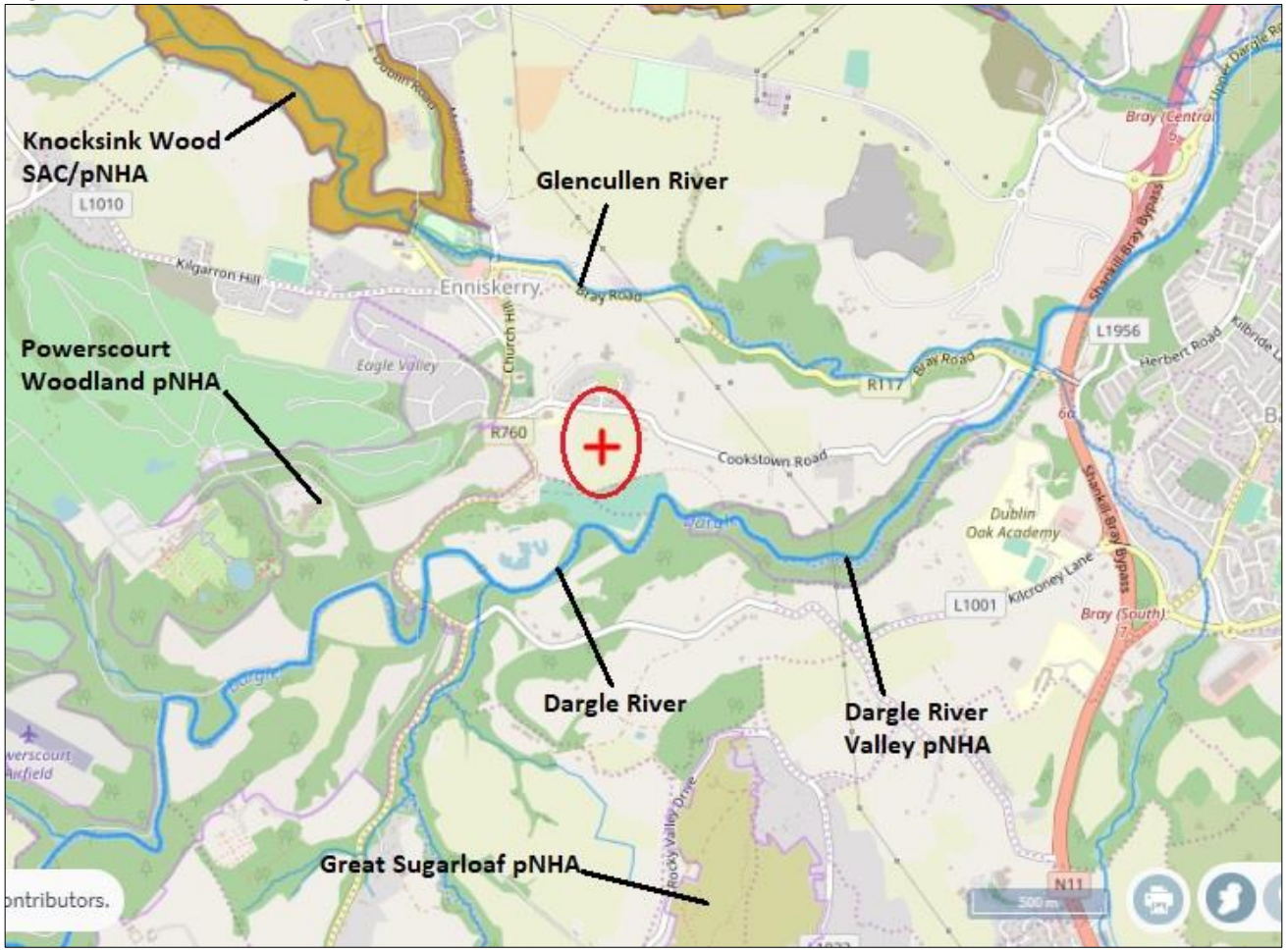
A series of dedicated bat survey was carried out in September 2017, August 2019, May 2020, during the optimal flight period by Dr Tina Aughney.

4.2 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors within 15km from the project footprint have been considered as part of this assessment, and there are no likely significant impacts arising from the proposed development on these sites. Separately, the AA screening which reviewed sites within 15km concluded: *that the possibility of any significant effect on any European Sites arising from the proposed development, whether considered alone or in combination with the effects of other plans or projects, can be excluded beyond a reasonable scientific doubt."*

The site location is shown in figure 4.1.

Figure 4.1 – Location of proposed site



(showing areas designated for nature conservation and water courses from www.epa.ie)

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

4.2.1 Knocksink Wood SAC and pNHA (site code: 0725)

This important woodland site is located near Enniskerry, Co. Wicklow and is within the valley of the Glencullen River. It has mature stands of Oak forest with two important habitats at a European level: alluvial wet woodland, and petrifying springs; both listed on Annex I of the Habitats Directive. The Wood is also of note for its bird and mammal fauna and its particularly rich community of invertebrates.

As well as being an SAC, Knocksink is a National Nature Reserve and a pNHA and so is of significance for a range of wildlife as well as being of amenity value.

The reasons why this area falls under the SAC designation are set out in its qualifying interests. They are either habitat types listed in Annex I or species listed in Annex II of the Habitats Directive. This information is provided by the National Parks and Wildlife Service (NPWS) and is shown in table 4.1 below. The status refers to the national assessments carried out by the NPWS under Article 17 of the Habitats Directive and do not necessarily refer to the status of the SAC in question.

Table 4.1 – Qualifying interests for the Knocksink Wood SAC (from NPWS)

Aspect (Code)	NPWS Assessment
Petrifying springs (7220)	Intermediate
Alluvial forests (21E0)	Bad
Old oak woodland (91A0)	Bad

- **Alluvial Wet Woodland (91E0 – priority habitat)**: This is a native woodland type that occurs on heavy soils, periodically inundated by river water but which are otherwise well drained and aerated. The main pressures are identified as alien invasive species, undergrazing and overgrazing. Pollution from agricultural land may also be significant.
- **Petrifying Springs (7220 – priority habitat)**: These are very localised habitats that arise from the precipitation of excess calcium carbonate in supersaturated running water. They are associated with characteristic bryophytes. They are vulnerable to changes in water quality, flow regime and intensification of land use practices.
- **Old Oak Woodlands (91A0)**: This native woodland type is typified by Sessile Oak *Quercus patrea,* Holly *Ilex aquifolium* and Hard Fern *Blechnum spicant.* Its range is much reduced from historic levels while the principal threats are alien invasive species and overgrazing by deer but also cattle, goats and sheep.

4.2.2 Powerscourt Woodland pNHA (site code: 1768)

The following information is available from the NPWS about this pNHA:

“Powerscourt Woodland is located about 2 km south-west of Enniskerry. It is largely contained within the two large demesnes of Powerscourt and Charleville, and includes a 4 km stretch of the Dargle River. The topography of the area is rolling hillside sloping down to the river. The site includes some parkland with large specimen trees.

Mixed woodland covers most of the site and includes both native and introduced species. Beech (Fagus sylvatica), Sycamore (Acer pseudoplatanus), Horse Chestnut (Aesculus hippocastanum) and many exotic conifers are among the introductions. The native Oak (Quercus petraea) and Ash (Fraxinus excelsior) are locally common.

The shrub layers are variable, sometimes sparse where conifers predominate and otherwise with Holly (Ilex aquifolium), Elder (Sambucus nigra) and Honeysuckle (Lonicera periclymenum). Rhododendron (Rhododendron ponticum) and Laurel (Prunus laurocerasus) are locally abundant.

Typical plants of the ground layer include Bluebells (Hyacinthoides non-scripta), Ramsons (Allium ursinum), Herb Robert (Geranium robertianum), Wood Sanicle (Sanicula europaea), Enchanter's-nightshade (Circaea lutetiana), Germander Speedwell (Veronica chamaedrys), Wood Sorrel (Oxalis acetosella) and Dog Violet (Viola riviniana). The fern and moss floras are well developed in places; Powerscourt is also the site of a rare species of Myxomycete fungus, Didymium clavus.

The Dargle River holds a rich flora on its sandy and rocky banks. Species include Red Campion (Silene dioica), Tufted Wheatgrass (Agropyron caninum), Wood Fescue (Festuca gigantea), Wood Brome (Bromus ramosus), Goldilocks (Ranunculus auricomis) and Wood Rush (Luzula pilosa). Exposed areas in the centre of the river hold Coltsfoot (Tussilago farfara), Water Mint (Mentha aquatica), Welsh Poppy (Meconopsis cambrica), Remote Sedge (Carex remota) and Purple Loosestrife (Lythrum salicaria). There is some wet woodland associated with low-lying areas of the Dargle - Alder (Alnus glutinosa) is the predominant tree species. There are many tributaries to the Dargle at the southern end of the site. They flow through small steep-sided ravines, which are often covered in a Hazel (Corylus avellana) dominated scrub/woodland.

Although the site includes many exotic plant species, the habitats are still of interest and support an interesting flora. The mix of semi-natural habitats and estate woodland is particularly conducive to macro-fungi. The well documented record of land management practices held by the demesnes adds to the scientific interest. The area is also of great educational value, being frequently used for teaching” (NPWS, 1998).

4.2.3 The Great Sugarloaf pNHA (site code: 1769)

The following information is available from the NPWS with regard to this pNHA:

"The Great Sugar Loaf is situated about 5km southwest of Bray. It is a steep mountain, 501 m above sea level, and has been modified greatly by glacial erosion. It stood as a nunatak which was scoured by the Ivernian, Midland and Mountain ice sheets. Its profile thus contrasts with those of a Bray Head and Howth, both over-ridden by ice sheets and flat on top. The main habitats of the site are dry mountain heath and upland grassland. The lower slopes are dominated by Gorse (Ulex europaeus and U. gallii), but Heather (Calluna vulgaris), Bilberry (Vaccinium myrtillus) and Cross-leaved Heath (Erica tetralix) also occur and become more frequent on the upper slopes. Bracken (Pteridium aquilinum) is found in dense patches amongst the Gorse. The heath grades into upland grassland in places; grass species include Nardus stricta, Festuca ovina and Agrostis capillaris. The wetter grassland areas have rushes (Juncus spp.), sedges (Carex spp.) and mosses (Sphagnum spp.). Exposed rocky outcrops or areas of scree occur on the mountain sides, especially on the eastern slopes. The lichen and moss communities are well developed in these places, with species of Cladonia spp., Dicranum spp. and Polytrichum spp. An area of woodland, known as the Quill, occurs on the lower eastern slope. This is secondary woodland dominated by Oak (Quercus petraea), Birch (Betula pubescens) and Holly (Ilex aquifolium). Part of the woodland is wet, with Birch as the dominant species and a ground flora more characteristic of wet heath. The wet seepage areas within the wood have Purple Moor Grass (Molinia caerulea), Bog Asphodel (Narthecium ossifragum), Pondweeds (Potamogeton spp.) and mosses (Sphagnum spp.). A rare liverwort, Cryptothallus mirabilis, has been recorded beneath the Sphagnum layer. The stream running from the woodland provides a hydrological link with another Natural Heritage Area, Kilmacanoge Marsh.

The site is of both ecological and geological interest, and is also a prominant feature in the landscape of north County Wicklow. Because of its ease of access and close proximity to large urban areas, the Great Sugar Loaf is a valuable educational and recreational asset" (NPWS, 1995).

4.2.4 The Dargle River Valley pNHA (site code: 1754)

The following information is available from the NPWS with regard to this pNHA:

"This site is located about 2 km south-east of Enniskerry It is a section of the River Dargle with steep wooded banks. At one point along the river a well exposed series of Ordovician volcanic rocks are faulted against well-exposed Bray group Cambrian strata. Such a clear exposed junction is not seen elsewhere in Co. Wicklow. The area is dominated by mature Oak (Quercus petraea) woodland, with some Hazel (Corylus avellana), Beech (Fagus sylvatica), Birch (Betula spp.) and Holly (Ilex aquifolium). Pockets of mature conifers occur in places, as well as Laurel (Prunus laurocerasus). The ground flora is rather sparse and mainly of Wood Rush (Luzula sylvatica) and Blackberry (Rubus fruticosus agg.). The steep gorges over the river hold a luxuriant growth of mosses, while species common along the river bank include Red Campion (Silene dioica), Yellow Pimpernal (Lysimachia nemorum), Marsh Hawk's-beard (Crepis paludosa), New Zealand Willowherb (Epilobium brunnescens) and Giant Fescue (Festuca gigantea).

A Red Data Book species, Yellow Archangel (Lamiastrum galeobdolon), occurs along the river. This is a very localised species confined to eastern Ireland. The importance of this site is that it is a fine example of a wooded valley. It is likely that this valley has been wooded for a long period and such habitats are becoming rare in north County Wicklow. The removal of the conifers would increase the interest of the site. The site is also of considerable geological importance" (NPWS , 1995).

The NPWS web site (www.npws.ie) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The subject lands are located within the square O21 and six species of protected flowering plant are highlighted. These species are detailed in Table 4.2. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other important and protected species. In summary, it can be seen that of the five species none is current.

Table 4.2 – Known records of protected species from the O21 square (from www.npws.ie)

Species	Habitat[8]	Current status
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	Non-native; Record pre-1986
Hammarbya paludosa Bog Orchid	Wet spongy bogs, usually in tufts of *Sphagnum* moss	Record pre-1970
Mentha pulegium Pennyroyal	Damp, sandy places	Record pre-1970
Scleranthus annus Annual Knawel	Waste places and roadsides on dry, sandy soils	Record pre-1970
Trichomanes speciosum Killarney Fern	Beside waterfalls, crevices between boulders etc in damp, usually dark, sheltered situations	Record pre-1970

Water quality in rivers, canals and estuaries is monitored on an on-going basis by the Environmental Protection Agency (EPA). They assess the pollution status of a stretch of water by analysing the invertebrates living in the substrate as different species show varying sensitivities to pollution. They arrive at a 'Q-Value' where Q1 = grossly polluted and Q5 = pristine quality (Toner et al., 2005). The subject lands are situated across the watershed been the Glencullen River (also marked on some maps as the Cookstown River) to the north, and the River Dargle to the south (www.wfdireland.ie). These are a part of the same river system (the Glencullen is a tributary of the Dargle). The most recent monitoring (2018) along the Dargle shows Q4 status (unpolluted) from a sampling point upstream of the Glencullen confluence. Along the Glencullen, high water quality (Q4-5) was recorded in 2018 2km upstream of the Enniskerry bridge. Overall the status of the Dargle and Glencullen under the Water Framework Directive (WFD) is '*good*' as far as the M11 motorway. Thereafter it deteriorates to 'moderate' until near the centre of Bray, whereupon is once again *'good'* as far as its outfall to the Irish Sea. The coastal waters here are assessed as *'high status'*. Overall, these indicate unsatisfactory conditions. These data are taken from the EPA's mapping tool on www.epa.ie.

In 2018 a second RBMP was published and under which all water bodies in Ireland fall within a single River Basin District. This plan has identified 190 '*priority areas for action'* which will form the focus of resource allocation for the 2018-2021 period. The River Dargle has been included as one of these 'areas for action. According to the www.catchments.ie website, 26 out of 45 water bodies are at 'good status' (58%).

4.2.5 Stakeholder Consultation

Due to the relatively low ecological sensitivity of the subject lands, third parties were not contacted for nature conservation observations.

4.2.6 Plans or policies relating to natural heritage

Convention on Biological Diversity (CBD): The protection of biodiversity is enshrined in the CBD to which Ireland is a signatory. As part of its commitment to this international treaty Ireland, as part of a wider European Union initiative, was committed to the halt in loss of biodiversity by the year 2010. This target was not met but in 2010 in Nagoya, Japan, governments from around the world set about redoubling their efforts and issued a strategy for 2020 called 'Living in Harmony with Nature'. In 2017 the Irish Government incorporated the goals set out in this strategy, along with its commitments to conservation biodiversity under national and EU law, in the third national biodiversity action plan (Dept. of Arts, Heritage and the Gaeltacht, 2017).

County Wicklow Biodiversity Action Plan 2010 – 2015. This plan gives an overview of the biodiversity of the county including significant features and threats. It emphasises the importance of upland areas to the distinctive natural heritage of Wicklow stating that it is the "largest unbroken area of high ground in Ireland". Objectives of the plan have been stated as: to better understand the biodiversity of Wicklow; to raise awareness of biodiversity in Wicklow, its value and the issues facing it; to conserve and enhance habitats and species in Wicklow, taking into account national and local priorities; and to foster participation to help biodiversity in Wicklow, encouraging a

[8] Parnell et al., 2012

partnership approach to help our species and habitats. As such it does not contain measures that relate directly to development control. Appendix A (Volume III of the EIAR) consists of a list of species of county importance.

4.2.7 Site Survey

Aerial photography and historic mapping from the OSI show that this has been in agricultural use for many decades. Neither the OSI nor the EPA show any water courses running through or directly adjacent to the site boundary.

4.3 FLORA

The development lands consist of a field of **improved agricultural grassland – GA1** which is grazed by cattle. This grassland is dominated by grasses such as Yorkshire Fog *Holcus lanatus* and Creeping Bent *Agrostis stolonifera* along with Ragwort *Senecio jacobaea*, Clovers *Trifolium sp*., Knotgrass *Polygonum aviculare* and Common Mouse-ear *Cerastium fontanum*. This is a habitat of low biodiversity value.

Boundary features are composed of either **hedgerows – WL1** or **treelines – WL2**. Hedgerows are of native origin with Hazel *Corylus avellana*, Hawthorn *Crataegus monogyna*, Elder *Sambucus nigra*, Holly *Ilex aquilinum*, Ash *Fraxinus excelsior*, Blackthorn *Prunus spinosa* and Spindle *Euonymus europaeus*. Using methodology from the Heritage Council these hedges are of 'higher significance' due to their age, structure and species diversity (Foulke et al., 2013). Along the roadside there is a tall treeline with large Oak *Quercus sp*., Beech *Fagus sylvatica*, Ash, Holly and Sycamore *Acer pseudoplatanus*. A treeline along the eastern boundary is different in character with mostly coniferous trees. The non-native Leyland Cypress *Cuprocyparis leylandii* and Sitka Spruce *Picea stichensis* are frequent while Sycamore and the native Scot's Pine *Pinus sylvestris* is also found. The roadside boundary is assessed as 'higher significance' while the conifer treeline is 'lower significance'.

Sections of land within the redline boundary are located in front of the school and to the west of the school as far as the junction with the R760. This is a combination of mown **amenity grassland – GA2** and unmown **dry meadow – GS2** with Creeping Bent *Agrostis stolonifera*, Dandelions *Taraxacum sp*., Ragwort *Senecio jacobaea* and scatted, mid-aged Grey Willow *Salix cinerea*.

There are no water courses on the site, bodies of open water or habitats which could be considered wetlands.

There are no plant species growing on the lands which are listed as alien invasive under Schedule 3 of S.I. 477 of 2011. There are no habitats which are examples of those listed in Annex I of the Habitats Directive while there is no evidence that species listed in Annex II of that Directive are present.

Figure 4.2 – Habitat map of the Enniskerry site

4.4 FAUNA

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. Table 4.3 details those mammals that are protected under national or international legislation in Ireland. Cells are greyed out where suitable habitat is not present or species are outside the range of the study area.

Table 4.3 – Protected mammals in Ireland

Species	Level of Protection	Habitat	Red List Status[9]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands	Near Threatened
Lesser horseshoe bat *Rhinolophus hipposideros*		Disused, undisturbed old buildings, caves and mines	Least Concern
Grey seal *Halichoerus grypus*	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	Coastal habitats	-
Common seal *Phocaena phocaena*			-
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats	Least Concern
Natterer's bat *Myotis nattereri*		Woodland	Least Concern
Brown long-eared bat *Plecotus auritus*		Woodland	Near Threatened
Leisler's bat *Nyctalus leisleri*		Woodlands and buildings	Least Concern
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas	Least Concern
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland	Least Concern
Daubenton's bat *Myotis daubentonii*		Woodlands and bridges associated with open water	Least Concern
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats	Least Concern
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats	Least Concern
Pine Marten *Martes martes*		Broad-leaved and coniferous forest	Least Concern
Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows	Least Concern
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands	Least Concern

[9] Marnell et al., 2009

Species	Level of Protection	Habitat	Red List Status[9]
Red squirrel *Sciurus vulgaris*		Woodlands	Near Threatened
Irish stoat *Mustela erminea hibernica*		Wide range of habitats	Least Concern
Badger *Meles meles*		Farmland, woodland and urban areas	Least Concern
Red deer *Cervus elaphus*		Woodland and open moorland	Least Concern
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat	Least Concern
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths	-

(Note: and their known status within the zone of influence[10]. Those that are greyed out indicate either that suitable habitat is not present or that there are no records of the species from the National Biodiversity Date Centre.

Suitable habitat is not present for Pine Marten or Red Squirrel on the site itself although there are records of both species from nearby woodlands. Irish Stoat, Hedgehog, Pygmy Shrew and Irish Hare are considered widespread (Lysaght & Marnell, 2016). There was no evidence that deer are using the site although Sika Deer are known to be widespread in this area.

No signs of Badger activity were noted during either survey and there are no setts on the lands. Badgers are active in the area however and the habitats on this land are suitable for them.

A series of dedicated bat survey was carried out in September 2017, August 2019, May 2020, during the optimal flight period by Dr Tina Aughney. This found that:

"Six species of bat was recorded during these bat surveys: common pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat, Daubenton's bat and soprano pipistrelle. A high level of bat activity was recorded for common and soprano pipistrelles while lower levels of bat activity was recorded for the remainder four bat species.
There are no confirmed bat roosts within the proposed development area. Individual brown long-eared bats from a known maternity roost was recorded commuting to the proposed development site and foraging along the external boundary treelines.
In relation to the bat evidence collected by this report, it is deemed […] that the bat populations recorded within the survey area are of Local Importance".

Non-protected mammals which are likely to be present include Fox *Vulpes vulpes*, Rabbit *Oryctolagus cuniculus*, Wood Mouse *Apodemus sylvaticus*, House Mouse *Mus domesticus*, and Brown Rat *Rattus norvegicus*.

The March 2020 site visit included a survey of breeding birds. Species recorded were Blackbird *Turdus merula*, Song Thrush *T. philomelos*, Robin *Erithacus rubecula*, Wood Pigeon *Columba palumbus*. Hedgerow and treeline habitats provide suitable nesting locations for a range of common garden and countryside birds. During the March 2020 survey, the following breeding birds were recorded: Blackbird Turdus merula, Song Thrush T. philomelos, Robin Erithacus rubecula and Wood Pigeon Columba palumbus. In May 2020 Song Thrush and Hooded Crow Corvus corone were recorded. These species are listed by BirdWatch Ireland as being of '*low conservation concern'* (Green List, Colhoun & Cummins, 2013).

March and December fall within the survey period for wintering birds. No wintering birds were recorded and the lands are not considered suitable for habitually foraging or roosting coastal or wetland birds.

[10] From the National Biodiversity Data Centre, excludes marine cetaceans

There is no suitable habitat for spawning Common Frog *Rana temporaria* or Smooth Newt *Lissotriton vulgaris*. Common Lizard *Lacerta vivipara* is considered common and widespread.

There are no habitats on the site which are suitable for fish. The site is in the catchment of the Darlge and Glencullen Rivers and these are of fisheries significance. Sampling from Inland Fisheries Ireland in 2009 recorded Atlantic Salmon *Salmo salar*, Brown Trout and Sea Trout *S. trutta*, European Eel *Anguilla anguilla* and Flounder *Platichthys flesus*.

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia*, and this is not to be found in intensive agricultural grassland. Other protected invertebrates are confined to freshwater and wetland habitats and so are not present on this site.

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

In summary, it has been seen that the development lands are in agricultural use with linear woodland boundaries. Native hedgerows and the broad-leaved treeline are of high local value to biodiversity however other habitats are of low value. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There are no species listed as alien invasive as per SI 477 of 2011.

There are no water courses on the development site and so there are no direct hydrological links to the River Dargle. Indirect hydrological pathways lead to the River Dargle and the Irish Sea via wastewater and surface water. There are no Natura 2000 sites in these areas of the River Dargle or at its mouth at the Irish Sea.

The River Dargle and Glencullen fall within the hydrological catchment of the development site and these rivers are of fisheries significance while a section of the River Dargle downstream of the development site lies within the River Dargle Valley pNHA.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in table 4.4. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in table 4.4.

Table 4.4 – Evaluation of the importance of habitats and species on the Enniskerry site

Habitat	Significance
Improved agricultural grassland – GA1 Conifer Treeline – WL2 Dry meadow – GS2	Low local ecological value
Hedgerow – WL1 Broad-leaved treeline – WL2	High local ecological value
Amenity grassland – GA2	Negligible ecological value

4.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of 165 no. dwellings and associated ancillary infrastructure on a site of c. 6.57 hectares as follows:

A) 105 no. 2 storey houses (49 no. 3 bedroom houses [House Types B, B1, & B2], 56 no. 4 bedroom houses [House Types A, D, E & E1];
B) 56 no. apartments/duplex apartments in 6 no. 3 storey buildings – (28 no. 2 bedroom apartments and 28 no. 3 bedroom duplex apartments) all with terrace;
C) 4 no. 1 bedroom Maisonette dwellings in a 2 storey building;
D) Part 2-storey and single storey creche (c. 510 sq. m - including storage);
E) Open space along southern boundary of c. 0.93 hectares [with pedestrian connections to boundary to 'Lover's Leap Lane' to the south and to boundary to the east and west], hard and soft landscaping (including public lighting) and open space (including boundary treatment), communal open space for duplex apartments; regrading/re-profiling of site where required [including import/export of soil as required] along with single storey bicycle/bin stores and ESB substation;
F) Vehicular access (including construction access) from the Cookstown Road from a new junction as well as 313 no. car parking spaces and 150 no. cycle spaces;
G) Surface water attenuation measures and underground attenuation systems as well as connection to water supply, and provision of foul drainage infrastructure (along the Cookstown Road to existing connection at junction with R760) and provision of underground local pumping station to Irish Water specifications;
H) 3 no. temporary (for 3 years) marketing signage structures [2 no. at the proposed entrance and 1 no. at the junction of the R760 and the Cookstown Road] and a single storey marketing suite (c. 81 sq.m) within site;
I) All ancillary site development/construction/landscaping works, along with provision of footpath/public lighting to Powerscourt National School pedestrian entrance and lighting from Powerscourt National School entrance to the junction of the R760 along southern side of Cookstown Road and pedestrian crossing across Cookstown Road.

The development will use standard construction materials and will include the installation of homes, access roads, open space and all associated connections to essential infrastructure. Post-construction it will be landscaped and the homes will be occupied. Landscaping material has been prepared by KFLA and is submitted with the SHD application.

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

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation. Methodology for determining the significance of an impact has been published by the NRA. These are reproduced in table 4.5. This is based on the valuation of the ecological feature in question (table 4.4) and the scale of the predicted impact. In this way, it is possible to assign an impact significance in a transparent and objective way. Table 4.4 summaries the nature of the predicted impacts.

Table 4.5 – Site evaluation scheme taken from NRA guidance 2009

Site Rating	Qualifying criteria
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive

Site Rating	Qualifying criteria
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality. Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

4.6.1 Construction Phase

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

1. There will be loss of approximately 400m of higher significance hedgerow and treeline habitat as well as agricultural grassland. This will result in the loss of habitat for a variety of plants and animals which are common and widespread but which is important for its species diversity and for providing ecological connectivity with the surrounding countryside. There will be a loss of foraging habitat for bats, principally arising from the loss of hedgerow and treeline. There will be no impact to Badgers as they are not present on the lands. The impact of this habitat loss is considered to be moderate negative. The bulk of the roadside treeline (c.125m) and southern hedgerow are to be retained. This is shown in figure 4.3.

   This potential impact **without mitigation** in respect of habitat loss is negative, significant, likely and permanent.

2. The direct disturbance of species during demolition, including mortality. This impact is most acute during the bird breeding season which can be assumed to last from March to August inclusive. Suitable bird nesting habitat is present on in hedgerows and treelines on the site and so mitigation will be required to avoid this impact.

There are no bat roosts on the development site. According to the bat survey report:

"The western boundary will not be retained and this will result in the loss of a medium size hedgerow. Some trees within this boundary will be retained.

Sections of the northern boundary will be removed to facilitate entrance to the proposed development site. The removal of vegetation in this area is likely to have a higher impact on local bat populations, as there is extensive mature trees within this boundary. Therefore, minimal removal and additional planting is recommended. In summary the proposed development will result in the removal of approximately 390m of hedgerow and treeline habitat as well as agricultural grassland. This will impact on commuting and foraging bats and potentially impact on roosting sites within the trees located in the hedgerow and treeline. The impact of this habitat loss is considered to be moderate negative. The bulk of the roadside treeline (c.135m) and southern hedgerow are to be retained.

"There are a number of trees deemed to have roosting potential for bats as well as extensive treeline/hedgerow around the proposed development site. This is connected to the wider landscape site. "

Figure 4.3 – Trees to be removed (in red) and trees to be retained (in green)

The bat report also highlights potential disturbance effects to foraging bats during the construction phase from artificial lighting and damage to trees.

This potential impact without mitigation is negative, significant, likely and permanent.

3. Pollution of water courses through the ingress of silt, oils and other toxic substances. There will be some exposure of soil during the construction phase. Surface water pathways lead to the River Dargle, which is of high fisheries value. Although works will be temporary in nature and there is no direct pathway to the River Dargle, a precautionary approach should be taken.

This potential impact without mitigation is assessed as negative, likely, slight and short-term.

4. Impacts to trees to be retained. The movement of machinery and materials within the root zones of trees can result in compaction of soil and so long-term damage to trees to be retained. This impact is assessed as potentially moderate negative.

This potential impact without mitigation is assessed as negative, likely, significant and permanent.

4.6.2 Operational Phase

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

5. Wastewater from any development will be delivered via the mains network to the municipal wastewater treatment plant for Enniskerry and Environs, which discharges into the River Dargle. This plant is operated by Irish Water under licence from the EPA (licence no.: D0088-01). The most recent Annual Environmental Report, from 2019, indicates that the plant was fully compliant with emission limit values set under the Urban Wastewater Treatment Directive in that year. It has a treatment capacity of 6,000 population equivalent (P.E.) and both the mean hydraulic and organic loadings are well within this capacity. There is sufficient capacity at the plant to accept additional flows without affecting the quality of the discharge. Irish Water has confirmed in writing that a connection to the wastewater treatment plant is feasible (the Confirmation of Feasibility and Confirmation of Design included with the SHD application material). This plant discharges treated effluent into the Dargle River, approximately 2km east of the town. Ambient monitoring of the receiving water at points both upstream and downstream of the discharge shows that *"A deterioration in water quality has been identified, however it is not known if it or is not caused by the WWTP. Other causes of deterioration in water quality in the area are unknown. It is unknown if the discharge from the wastewater treatment plant is having a negative impact on the Water Framework Directive status."* Capacity at the plant is well within design limitations and the AER states that capacity is not expected to be exceeded in the next three years. No negative effects to water quality can arise from this source.

   This potential impact without mitigation is neutral, unlikely, imperceptible and permanent.

6. Surface water pathways during operation will lead to the Dargle river system. A new surface water drainage network is to be installed and this will be based upon SUDS principles. As such, no negative effects are predicted to occur to water quality from this source.

   This potential impact without mitigation is neutral, unlikely, imperceptible and permanent.

7. Post-construction, the lands will be occupied and illuminated and this will bring noise and disturbance from artificial light. According to the bat survey report:

"In general, lighting of developments post works (i.e. public street lighting plan) may negatively impact on all bat species in relation to commuting, roosting and foraging potential. But the degree of impact is dependent on how sensitive the particular bat species is to lighting as some bats are tolerant of lighting. It is also dependent on the type of lighting installed and the location of such lighting.

Leisler's bats are tolerant of street lighting. Common pipistrelles and soprano pipistrelles will tolerate low levels of lighting while brown long-eared bats and Myotis species (Natterer's bat and Daubenton's bat) are lighting sensitive bat species.
The bat ecologist has worked with the lighting designers to avoid potential impacts to bats from this source:

The Lighting Plan […], will achieve the recommended bat friendly lighting in two areas of the proposed development site: northern-eastern corner and south-eastern corner. However the public street lighting current LUX level is too high to facilitate movement of light sensitive bat species.

The potential impact on bat fauna without mitigation is negative, significant, likely and permanent.

8. Impacts to Natura 2000 sites (SACs or SPAs) are not predicted to occur, principally due to the lack of pathways between the development site and these areas. An assessment of potential effects to these areas is contained within a separate Screening Report for Appropriate Assessment which concludes that the proposed development, individually or in combination with another plan or project, is not likely to have a significant effect on a European site.

   There is a pathway to the River Dargle Valley pNHA via surface water during construction. Mitigation measures outlined below will ensure that negative effects to water quality do not occur. This potential impact without mitigation is assessed as negative, likely, slight and short-term.

Table 4.6 – Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Loss of habitat	negative, significant, likely and permanent
2	Mortality to animals during construction	negative, significant, likely and permanent
3	Pollution of water during construction phase	negative, likely, slight and short-term
4	Impacts to trees to be retained	negative, likely, significant and permanent
Operational phase		
5	Wastewater pollution	neutral, unlikely, imperceptible and permanent
6	Surface water pollution	neutral, unlikely, imperceptible and permanent
7	Artificial lighting	negative, significant, likely and permanent
8	Impacts to protected areas: Little Dargle pNHA Natura 2000 sites	 negative, likely, slight and short-term neutral, unlikely, imperceptible, short-term,

Overall it can be seen that four potentially significant negative impacts are predicted to occur as a result of this project.

4.6.3 Cumulative impacts

A number of the identified impacts can also act cumulatively with other impacts from similar developments in the north Wicklow/greater Dublin area.

These primarily arise through the urbanisation of the city's hinterland as provided for by land use zoning and include: loss of habitats, particularly hedgerows and treelines; spread of alien invasive species, pollution from surface water run-off and pollution from wastewater generation.

It is noted the adjoining site to the west (located in the AA3 lands) has an extant permission for 27 no. dwellings (Planning Reg. Ref. 19/871). To the north east is an extant permission for 6 no. dwellings (Planning Reg. Ref. 16976). Further to the north west of the town centre, there is a proposal on lands at Kilgarron Hill (on the AA2 lands), which received a reasonable basis for an application for 219 no. dwellings. It is noted the SLO10 lands, permission was granted for 12 no. detached dwellings on the 18/4/2020 by An Bord Pleanála (PL27.248914 WCC Ref. 17/15). The Powerscourt Demesne landbank has an extant permission for 47 no. dwellings. Further to the north, the development permitted by 19/676 relates to the importation of greenfield sol and stone for the improvement of lands for agriculture, to the east of the SAC was also considered. In addition, it is noted the Bray MD LAP includes the development of the Fassaroe lands which is located c. 750m to the north east of the proposed development site, which is identified as an area for development of c. 4,000 dwellings along with supporting retail, commercial and areas of open space.

Considering the nature of the proposed development and the adjacent residential developments, it is considered that the potential cumulative impacts are:

1. A deterioration in water quality, resulting in an impact upon aquatic flora and fauna species. However, given that the proposed development is not anticipated to result in a significant impact upon water quality during either the construction or operational phases, and considering the nature of the development and adjacent residential developments, it is considered that there would be no cumulative water quality impacts which would pose a significant risk to aquatic biodiversity. This impact is neutral, imperceptible and unlikely.

2. Alien invasive species

There are no alien invasive plant species growing on, or adjacent to, the development site.

This impact is neutral, imperceptible and unlikely.

3. Habitat loss. This development will result in the loss of habitat which is likely to contribute to cumulative losses of similar habitat (principally hedgerow and treeline). This impact is negative, significant, likely and permanent.

4.6.4 'Do nothing' impact

In the event that this project does not proceed the land can be expected to remain in agricultural use for the foreseeable future. Existing wildlife populations would remain relatively undisturbed.

4.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This report has identified four impacts that were assessed as significant. Mitigation is therefore recommended to reduce the severity of these effects. The proposed mitigation would apply to the potential cumulative impacts of the proposed development. In addition, best practice is recommended for the avoidance of pollution, even though in the absence of mitigation, no significant impact is predicted.

The principal mitigation that should be considered in any development is avoidance of impact. Detailed consideration was therefore given by the design team to avoid direct or indirect impacts on the boundary and the vast majority of internal hedgerows as well as treelines along the site watercourses are retained. This has ameliorated the majority of the potential impacts for biodiversity.

4.7.1 Construction Phase

Recommendation 1 – Mitigation by reduction and offset

Landscape planting will include new trees including Scots Pine, Beech, Sweet Chestnut, Silver Birch, Oak and Lime, as well as and other native and non-native planting which provides ornamental as well as biodiversity value. This planting scheme as sufficient degree that long-term, negative effects from habitat loss do not occur. This can be seen in figure 4.4.

Figure 4.4 – Landscaping

The following will also be followed:

- Any semi-natural habitats will be protected from potential damage construction phase and post-construction.
- The use of chemicals (weed killers, etc.) will be kept to a minimum within the development zone and will not be used in boundaries.

Landscaping measures will result in the development of the southern boundary as a Linear Parkland which will provide foraging areas for local bat populations. However, consideration is needed to ensure that external boundaries of the proposed development site (eastern and northern boundary) and boundary of the adjacent field is retained and enhanced to ensure that there is commuting routes to the park.

Landscaping has been designed to preserve connectivity and food sources for bats and this will have a wider benefit for other wildlife including birds, flora and invertebrates.

The following mitigation measures are included in the bat survey report and will be implemented:

"Removal of trees
a) Minimise the removal of mature trees, where possible.
b) Approximately 10 trees, deemed as PBRs, are proposed to be removed. If the trees are to be removed, planting will be undertaken to mitigate for tree removal and landscaping plans will planted "like for like" in relation to tree and shrub species removed. Consideration will be given towards hawthorn, blackthorn mix with individual ash, alder and birch to form a native tree hedge) and deciduous trees (native tree species include ash, oak, alder, birch).
c) A 2nd assessment of the trees proposed to be removed will be undertaken prior to tree removal to determine total number of trees to be felled and the tree felling procedure to be undertaken. This will be undertaken in consultation with the tree surgeons.
Where possible, trees, which are to be removed, should be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active).
An assessment of trees according to their PBR value determines the methodology of felling. Trees with PBR Category 1 are highly suitable for roosting bats and require more intensive procedures prior to felling. The trees identified within the survey area are PBR Category 1 and 2. The procedure to fell these is as follows:

Category 1: Trees with roosting features (dead wood, tree holes etc.) should be checked prior to felling. It is recommended that they are physically checked (using an endoscope and high power torch) or a dusk/dawn surveys are completed to determine if bats are roosting within. A tree felling plan will be required in consultation with the tree surgeons. A bat box scheme will need to be erected prior to felling and in consultation with the bat specialist. Any trees showing crevices, hollows, etc., should be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.

• Category 2: Any ivy covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape.

• A bat box scheme is required to be erected prior to any tree felling. The number of bat boxes will be determined by the category and number of trees proposed to be felled. In principle this will follow the following:

For every Category 1 trees to be felled – one bat box is required

For every three Category 2 trees to be felled – one bat box is required

A minimum of 5 IFF Schwegler Woodcrete bats boxes (or equivalent flat open ended bat box) will be erected prior to tree felling to mitigate for tree felling. These will be erected within the Linear Park under supervision by the bat specialist.

Bat boxes scheme will be provided and to ensure that bats use the bat boxes, they will be sited carefully and this will be undertaken by a bat specialist. Bat boxes will be erected prior to tree felling. Some general points that will be follow include:

• Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box.

• Diameter of tree should be wide and strong enough to hold the required number of boxes.

• Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.

• Bat boxes should be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.

• It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensures a range of temperatures are available all day. If the South facing boxes become warm, bats can safely remove to the cooler North facing box.

• Locations for bat boxes should be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

Construction Phase

During the construction phase the following will be undertaken:

- All construction lighting will be turned off each evening and at the weekend once day-time works are completed.

- All mature trees and habitats should be protection from construction works throughout the construction period.

- Bat mitigation measures implemented during construction (e.g. erection of bat boxes) will be protected during construction works.

Recommendation 2 – Mitigation by avoidance
The removal of hedgerows or scrub will not take place from March to August unless this is unavoidable and then vegetation subject to removal must first be inspected for signs of breeding birds. It is an offence to destroy or interfere with a bird's nest or eggs. If no nesting is occurring then vegetation can be removed within 48 hours. If nesting is found then vegetation can only be destroyed under licence from the NPWS.

Recommendation 3 – mitigation by avoidance
Construction will follow guidance from Inland Fisheries Ireland on the prevention of pollution during construction projects (2016). This will include the storage of dangerous substances in bunded areas and ensuring the silt-laden water does not run-off the site. Water will only be permitted to leave the site after passing thorough suitably-sized silt-traps. Pollution prevention measures will be maintained for the full duration of the construction project. The site manager will be responsible for the prevention of pollution. The following specific measures are included in the Construction and Environmental Management Plan (CEMP) prepared for this planning application by Barrett Mahony Construction Engineers:

Prior to the commencement of construction, the appointed contractor will be required to obtain formal agreement from the Local Authority on pollution prevention measures as well as the overall approach and emergency procedures for all construction stages.

- Contractors will have regard to the following best practice guidelines to ensure that water bodies are adequately protected from construction work: Construction Industry Research and Information Association (CIRIA) C649: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006)
- CIRIA C649: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006)

Notwithstanding this, a method statement is to be prepared by the contractor and if necessary agreed with Wicklow County Council prior to commencement of the works, detailing the measures to be taken to ensure that no water run-off from the site occurs during the construction period. It is noted that the site falls towards the Cookstown Road which already has localised winter flooding issues in the vicinity of the site. Any run-off should be intercepted on site. This will be achieved with open drains or French drains and collected to a soakaway. Run-off control measures to include the following:

- Dewatering measures should only be employed where necessary.

For groundwater encountered during construction phase, mitigation measures will include;

- Dewatering by pumping to a soakaway.

- Excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas.

- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface.
- Existing surface drainage channels within the site that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts.
- Any surface water sewer connections should be made under the supervision of the Local Authority/Irish Water and checked prior to commissioning.
- New onsite surface water drains should be tested and surveyed prior to commissioning to prevent any possibility of ingress of ground water.
- All surface water manholes and drains will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur.
- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.

Areas surrounding the site are to be protected as necessary from sedimentation and erosion due to direct surface water runoff generated onsite during construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works, as noted in the points above, until the permanently surface water drainage system of the proposed site is complete.

- Regular inspections of de-watering settlement tanks, if used, are to be carried out and additional treatment used if settlement is not adequate.
- Bunded areas will be created for the storage or use of any fuels, oils, greases, cement, etc.
- Emergency spill kits will be kept close to the works.

4.7.2 Operational phase

Recommendation 4 – mitigation by reduction
In consultation with the arborist, root protection zones will be established around hedgerows and treelines to be retained. These will be maintained for the full duration of the construction phase.

Recommendation 5 – mitigation by reduction
The following mitigation measures are included in the bat survey report and will be implemented:

"*Nocturnal mammals are impacted by lighting. Therefore it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. The principal areas of concern are the treelines/hedgerows remaining within the proposed development area, greenway, woodlands, roosting areas (buildings and bat boxes) and treelined avenues. The following principles will be followed especially in relation to the general residential area and will also be implemented for the greenway and the active open area: - Artificial lights shining on bat roosts, their access points and the flight paths away from the roost must always be avoided. This includes alternative roosting sites such as bat boxes. This is important in relation to the brown long-eared maternity roost in St. Patrick's Church.*
- Lighting design should be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas.
- Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This should be used for habitat features noted as foraging areas for bats.
- Buffer zones can be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected.
- Luminaire design is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2018).
o All luminaires used will lack UV/IR elements to reduce impact.

o LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
o A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Ballard lighting should be considered for pedestrian and greenway areas, if deemed necessary.
o Only luminaires with an upward light ratio of 0% and with good optical control will be used.
o Luminaires will be mounted on the horizontal, i.e. no upward tilt.
o Any external security lighting will be set on motion-sensors and short (1min) timers.
o As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.
Planting of screening will also be effectively used to prevent lighting spillage areas where bat foraging is recorded. In particular, lighting will not shine onto important commuting and foraging areas identified for local bat populations. Specific areas that need to be dark zones include crossing point No. 2 (Figure 10), the proposed Linear Parkland (southern boundary) and north-eastern corner of the proposed development site (See Section 4.5).
5.3.3 Landscaping plan
It is important to ensure that as much treelines / hedgerows are retained within the survey area, particularly on the boundary and in connection with the woodlands along the southern boundary.
In general, the following will also be followed:
- Any semi-natural habitats will be protected from potential damage construction phase and post-construction.
- The use of chemicals (weed killers, etc.) will be kept to a minimum within the development zone and will not be used in boundaries.

4.7.3 'Worst-case' scenario

In a worst case scenario permanent damage to trees and hedgerows could occur from compaction of soil within the root zones. However this would not result in negative effects to bats or other fauna.

4.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied.

4.8.1 Construction Phase

There will be some temporary residual impacts to biodiversity arising from this project and cumulatively with adjoining lands.

- The removal of hedgerow and treeline habitats will result in some mortality to species and habitat loss. These temporary effects are predicted to be not significant. Mortality to protected species is not likely.

- As landscaping matures it is likely that negative effects from habitat loss will be offset.

- No residual effect will arise to water quality.

With mitigation, there are expected to be no residual negative effects to biodiversity which can be considered to be significant.

According to the bat report the residual impacts on bats is as follows:

"If the mitigation measures recommended in this report are strictly followed the potential residual impact of the proposed development (other than the public lighting along Cookstown Road) on local bat populations will be reduced to Minor-Moderate in relation to lighting sensitive bat species and Minor-Moderate, overall, for all other bat species.
• Roost disturbance of maternity roost adjacent to proposed development site effects are assessed as Permanent Minor-Moderate Negative Effects.

• Habitat loss (potential roosting/foraging/ commuting habitat) effects on all bat species are assessed as Permanent Slight to Moderate Negative Effects.
• Roost loss of PBRs on all bat species are assessed a Permanent Slight Negative Effects."
• Disturbance and/or displacement effects on all bat species during the construction phase are assessed as Short-term Slight to Moderate Negative Effect Operational Phase

No residual, negative effects are predicted during the operational phase.

According to the bat report:

"The proposed public lighting along Cookstown Road at the junction of R760 and adjacent to the primary school has been designed, as far as possible (e.g. reduced column height) to reduce the potential impact on commuting brown long-eared bats.
The potential impacting arising from the public lighting along the Cookstown Road on local bat populations is considered to be Permanent Moderate Negative effect in relation to light sensitive bat specie and Permanent Minor-Moderate Negative effect, overall, for all other bat species.
The operation of the public lighting along Cookstown Road is beyond the control of the Applicant and it is recommended that the following is considered by Wicklow County Council in order to further reduce the potential impacts of public lighting along Cookstown Road on local bat populations described above, particularly the brown long-eared bat colony in St. Patrick's Church.
The LUX level for the public lighting will be too high and will act as a barrier for brown long-eared bats roosting in St. Patrick's Church commuting south towards the proposed development site at Location 1 (Figure 10). It is essential that LUX levels are reduced at certain sections of the public road (e.g. Figure 10 – Point 1) to allow bats to cross the road to connecting linear habitats (e.g. Figure 9c for a 25m zone). Wicklow Co. Co. has a policy to dim public lighting by 25% between the hours of 00:00 – 06:00 as standard practice (pers. comm. Sabre Electrical Services Ltd.). It is recommended that consideration be given to greater dimming (50%) for specific seasonal periods and greater number of hours during the - e.g. 11pm to 6am during the maternity season (May to August). Please note that in the height of the summer (May and June), dusk is approximately 11pm and dawn is approximately 3.30 am. Low lighting levels during the lactation period for brown long-eared bats is essential to allow females to emerge and forage before returning to suckle young.
(Please Note: lactation period is for approximately 8 weeks once pups are born. Bats only give birth to one pup, generally from May to mid-June. The pup is suckled exclusively on their mother's milk for approximately 8 weeks before reaching adult size. Female brown long-eared bats emerged approximately 30 minutes after sunset (during good weather conditions) to feed for approximately 1 hour within a 1.5km radius of the maternity roost before returning to suckle young. They will emerge again to feed further before returning to suckle and continue with this feeding pattern during the hours of darkness. This nightly pattern tends to be followed during the lactation period.)"

Table 4.7 – Significance level of likely impacts after mitigation

Impact		Significance
Construction phase		
1	Loss of habitat	negative, moderate, likely and permanent
2	Mortality to animals during construction	negative, not significant, likely and permanent
3	Pollution of water during construction phase	negative, likely, imperceptible and short-term
4	Impacts to trees to be retained	negative, likely, imperceptible and permanent
Operational phase		
5	Wastewater pollution	neutral, unlikely, imperceptible and permanent
6	Surface water pollution	neutral, unlikely, imperceptible and permanent
7	Artificial lighting	negative, moderate, likely and permanent

Impact		Significance
8	Impacts to protected areas: Little Dargle pNHA Natura 2000 sites	 negative, likely, imperceptible and short-term neutral, unlikely, imperceptible, short-term,

4.9 MONITORING

There are no anticipated significant impacts associated with the construction phase of the proposed development, following the implementation of the recommended mitigation measures outlined in Section 4.7.1, which are considered sufficient in reducing the potential for adverse impacts. Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant.

4.9.1 Construction phase

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant. No residual impacts are likely to be significant however the success of mitigation is dependent upon full implementation.

In this case continual monitoring of pollution prevention measures will be required throughout the construction phase.

The following monitoring measures are recommended in the bat survey report and will be implemented:

"Monitoring is recommended post-construction works. This monitoring should involve the following aspects:
- Inspection of bat boxes within one year of erection of bat box scheme/rocket box. Register bat box scheme with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years.
- Monitoring of any bat mitigation measures. All mitigation measures should be checked to determine that they were successful. A full summer bat survey is recommended post-works. This is especially important in relation to lighting plans and its potential impact on the brown long-eared bat colony in St. Patrick's Church.
- Specific monitoring should be undertaken in relation to bats crossing the public street lighting zones and commuting along woodland, treelines and hedgerows in vicinity of the proposed development, adjacent lands and St. Patrick's Church. This should involve the following:
o Static detectors should be erected at specific bat crossing locations (at least 3 locations) and public street lighting zones (at least 3 locations) and set to record for 10 nights. This should be undertaken during the prime bat activity season (months of May to August) during mild weather conditions.
o LUX levels should be recorded during the hours of darkness (e.g. 00:00 hrs) and record LUX level directly below luminaire and/or bat crossing point where the static unit is erected. LUX levels should also be taken at 1m, 5m, 10m and 20m intervals. LUX levels should be taken a 1m height.
o Dusk & Dawn Surveys at static locations should be undertaken for 120 minutes (as per Dusk & Dawn Surveys methodology)."

4.9.2 Operation phase

There are no anticipated significant impacts associated with the operation of the proposed development. Mitigation measures, where recommended in Section 4.8, are considered sufficient in reducing the potential for adverse impacts. Therefore, monitoring is not required as part of the development during the operational phase. No monitoring is required during the operation phase.

4.10 DIFFICULTIES ENCOUNTERED IN COMPILING

This chapter is based on a number of site visits across the seasons, dedicated surveys for specialist species groups, and thorough consultation with statutory stakeholders. No difficulties were encountered in compiling this study.

5.0 LAND AND SOILS

5.1 INTRODUCTION

This chapter has been prepared by John Considine, BE, MIStructE, MIEI, CEng, FConsEIM, Chartered Engineer of Barrett Mahony Consulting Engineers and Mr. Paul Stephenson, BE, MIEI, CEng, Chartered Engineer of Barrett Mahony Consulting Engineers.

This section of the EIAR assesses the impacts that the proposed development at Cookstown, Enniskerry, may have on the Land and Soils (including land take) on the surrounding area during the construction and operational phases. This report also addresses earthworks proposed on site including cut and fill works required.

5.2 METHODOLOGY

This section was prepared in accordance with the Guidelines on the Information to be Contained in Environmental Impact Statements (EPA 2015 (draft)) and Advice Notes for Preparing Environmental Impact Statements (EPA 2015 (draft)). A detailed geotechnical and contamination site investigation of the site has been carried out by Site Investigations Ltd.

5.2.1 Guidelines

The following documents were reviewed in the preparation of this chapter:

- Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environment Impact Statements (Institute of Geologists of Ireland (IGI) 2013);
- Draft Guidelines on the Information to be contained in Environmental Impact Assessments Reports (EPA 2017)
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
- Revised Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2015a);
- Advice Notes for Preparing Environmental Impact Statements (EPA 2015b);

In order to identify the current ground conditions and to establish any potential impacts for the proposed development it is necessary to undertake a desk top review of the existing geological conditions for the subject lands.

5.2.2 Consultation

To establish same the following list of statutory bodies were consulted:

- Wicklow County Council.
- Geological Survey of Ireland.
- Ordnance Survey of Ireland.
- Environmental Protection Agency.
- Teagasc.
- Office of Public Works.

5.2.3 Desktop Study

The following sources of information were reviewed to evaluate the soils, geological & hydrogeological aspects of the site:

- Current & historical Ordnance Survey Maps (1829 – 1842,1837 – 1842 & 1888, 1913),
- Aerial photography (1995 & 2000),
- The Geology of Ireland, Ed. C. H. Holland, (Dunedin Academic Press, 2001),
- Geological maps of the site produced by the GSI,
- Quaternary Maps,
- Bedrock Mapping,
- Groundwater Vulnerability Mapping,

- Aquifer Yield Maps.
- Teagasc & Environmental Protection Agency *Soil Information system*,
- Historic Mines Sites, Inventory & Risk Classification, (EPA & GSI).
- Historic Ground Investigation.
-

5.2.4 Application of Methodology

The potential impact of the proposed scheme on soils and geology environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any potential impact.

This impact assessment methodology takes on board the broad direction of the Guidelines for the Preparation of Soils, Geology & Hydrogeology Chapters of Environmental Impact Statements (IGI 2013).

5.2.5 Study Methodology

The potential impact i.e. significance of the effects of the proposed development is generally understood to mean the importance of the effects (the consequences of the change). Significance is determined by a combination of (objective) scientific and subjective (social) concerns. Effects are assessed on the following.

- Quality (i.e. positive, negative, or neutral);
- Significance (imperceptible, slight, moderate, significant, or profound);
- Duration (short term, medium term, long term, permanent or temporary);
- Extent and;
- Context.

In the collation of information to describe effects, reference has been made to the criteria set out in Table 3-4 Checklist for Information Required to Describe Effects as set out in the EPA document – Guidelines on the Information to be contained in Environmental Impact Assessment Report DRAFT, August 2017.

Assessment should also take consideration of secondary impacts e.g. deterioration of surface water quality in an area due to site clearance and soil run-off. Finally, cumulative impacts are also to be addressed/considered, i.e. the addition of many minor or significant effects, including those of neighbouring projects to create larger more significant effects.

This document outlines a thirteen-step methodology as per the Guidelines for the preparation of Soils, Geology, and hydrogeology Chapters of Environmental Impact Statements, IGI 2013, which has four distinct elements as follows;

- Initial Assessment (Steps 1 – 5);
- Direct & Indirect Site Investigation and Studies (Steps 6 – 9);
- Mitigation Measures, Residual Impacts and Final Impacts Assessment (Steps 10 – 12); and
- Completion of Soils and Geological (Land & Soil) Sections of EIAR. (Step 13).

The initial assessment as outlined in section 5.3 describes the existing land and soil environment and presents a description of the past and present uses of the site and other neighbouring sites.

This section also describes the nature of the site based on both site specific and neighbouring site investigation data from publicly available sources where available.

Section 5.7 lists the predicted (residual) impacts associated with the development of the site. The magnitude of the potential impact is ranked in accordance with the IGI Guidelines and this allows the significance of the impact to be determined.

Following the assessment of the impacts, specific mitigation measures have been developed to avoid, reduce and if possible, remedy any negative impacts on the land soil and water. These are described in section 5.6.

Section 5.9 highlights any monitoring measures that are to be conducted during the construction stage and if any are required during the operational stage.

Section 5.10 describes the reinstatement works required as part of the construction of the development.

Any cumulative impacts as a result of this development and nearby developments are described in Section 5.11.

Section 5.12 describes any difficulties encountered in the preparation of the report.

Interactions between the Land & Soils and other relevant chapters are described in Chapter 15.

5.2.6 Study Area

The soils & geology study area is confined to the clients lands for the submitted application, refer to the planning drawings. The subject lands cover an area of 6.57 hectares.

5.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The subject site is located on lands of c. 6.57 hectares within the townlands of Cookstown, and Powerscourt Demesne Enniskerry, Co. Wicklow of c. 6.57 hectares.

The main site is currently a grass pasture field for the grazing of livestock as well as works within the public road and southern verge along the Cookstown Road. The site boundaries and adjacent land uses are as follows:

- Northside: The site is generally bounded by the Cookstown Road L1020 (with some rising foul main and water main works along the Cookstown Road). The field is separate from the road by a hedgerow just inside the site. This hedgerow includes a number of mature trees. There is a field gate in the hedge accessing onto the road (Photo 1B), which is close to the entrance to the Enniskerry Demesne housing estate on the other side of the road.
- Eastside: Mature hedge along the boundary. 2 no. private residences behind with access off the Cookstown Road.
- Southside: Hedge along the boundary. Public footpath behind. Ground falls toward the River Dargle.
- Westside: Hedge along most of this boundary. Adjoining field, currently pasture but with planning for a housing development by others. The north corner of this field, abutting the primary school site alongside the Cookstown Road, is part of the subject site.

5.3.1 Topography and Land Use

The site is currently primarily used for livestock grazing. A detailed topographical survey of the existing site has been prepared. There is considerable variation in ground levels across the site. In broad terms the site slopes down from south to north from +110 m O.D maximum approx. at the south boundary to +101 m O.D. approx. at the north east corner adjacent to the Cookstown Road, 325m metres approximately. There is a lesser slope down from west to east across the site of 4 metres approx. shows typical spot levels across the site.

The southern site boundary is 125m approx. from the Dargle River. The river is in a valley and is approximately 30 metres below the site level on this boundary and is therefore not considered to be a flood risk. The northern site boundary is 350m approx. from the Glencullen River. This river is in a valley and is approximately 60m below the site level on this boundary and is therefore not considered to be a flood risk.

Figure 5.1 – Site Topography

5.3.2 Quaternary Geology

The natural overburden deposits vary slightly across the site. Two site investigations were carried out in 2014 and 2019 respectively, consisting of numerous trial pits, 3no. boreholes and soakaway tests on both occasions. Typically, the ground conditions consisted of topsoil overlying slightly sand and gravel at 300mm below ground level. This granular material was described as medium dense, with SPT N-values of 14-17 at 1m below ground level.

In 3no. locations, cohesive sandy silty clay was encountered and was described as firm. The clay soils are low plasticity, with indexes of 3% to 15% recorded.

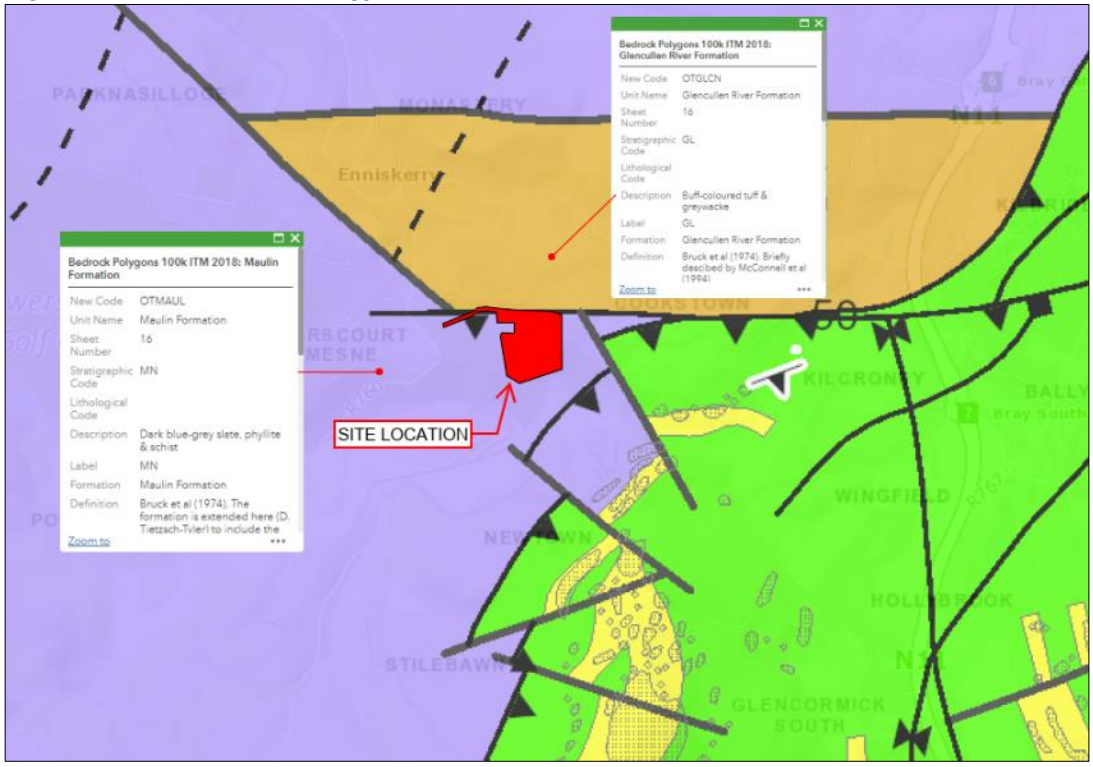
The site is currently undeveloped and is greenfield, predominantly used for agriculture which would indicate that ground contamination is unlikely. Environmental testing was undertaken on seven of the trial pits, and the testing carried out on the samples shows that the material can be classified as non-hazardous material. Refer to the Waste Classification Report, extracted from the Site Investigation and included Appendix B – 5.1 Volume III of the EIAR).

The Total Petroleum Hydrocarbon (TPH) results did record levels above the limit of detection in one of the seven samples (TP04), but the levels recorded are low and not in liquid form so therefore, the sample can be recorded as non-hazardous, based on the Waste Classification Report undertaken as part of the 2019 report by Ground Investigations Irelands Environmental Scientist.

5.3.3 Bedrock Geology

The site is predominantly underlain by the "*Maulin Formation*", with the fault line to the Glencullen River Formation near the northern boundary, refer to **Error! Reference source not found.** below.

Figure 5.2 – Bedrock Geology



The Maulin Formation consist of dark blue-grey slates and phyllites striped with pale siltstone. This is a metamorphosed rock, created by the heat and pressure being applied to siltstone and the presence of many fault lines in the area highlights the geomorphology.

The nearby Glencullen River formation is comprised of tuff and greywacke, which are metamorphosed from sand and silt.

Cable percussion boring in 3no. boreholes terminated at 7.50m below ground level. Bedrock was not encountered in any of these boreholes.

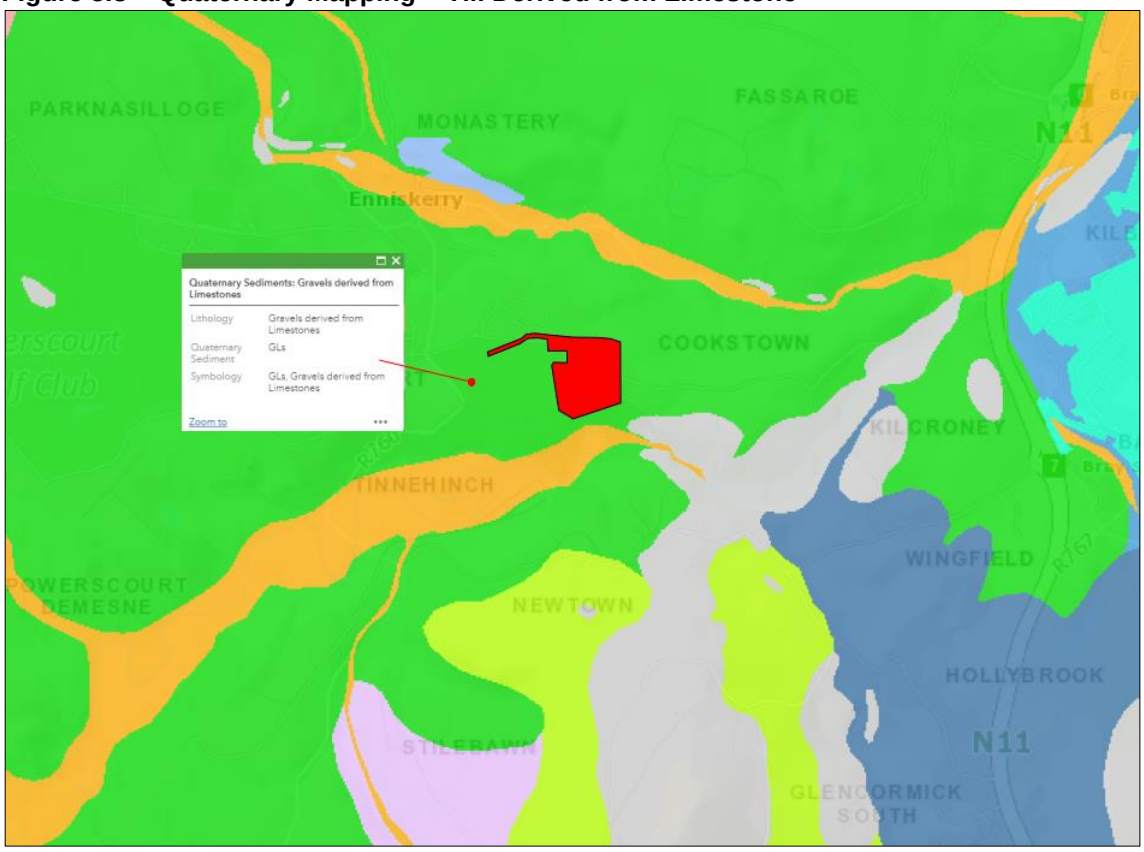
5.3.4 Quaternary & Soil

The quaternary period is the most recent stage of the geological time period. It marks the period of the Ice Age and the postglacial period which extends to the present day. Most surface deposits were deposited in the Quaternary Period and provide the parent materials for the soils in the area.

Most sediments of the Quaternary period were deposited during the Ice Age itself either directly from the huge ice sheets or by meltwater from the sheets as they melted. Ice sheets would have slowly eroded the underlying bedrock producing sediment. This sediment may include particles of all sizes ranging from clay to boulder and which when spread over the surface by glacial ice, takes the form of till (boulder clay). Alternatively, sediment may be carried and sorted by meltwater and deposited as sand and gravel, with silt and clay deposited separately in lake systems or carried away to the sea. Glacial deposits therefore contain fragments of the type of bedrock over which the ice originally passed.

A site survey was performed for the existing development. No groundwater was observed during the trial pits, which is referenced in the Site Investigations Report (Appendix B - 5.2 Volume III of the EIAR).

Figure 5.3 – Quaternary Mapping – Till Derived from Limestone



5.3.5 Hydrogeological aspects

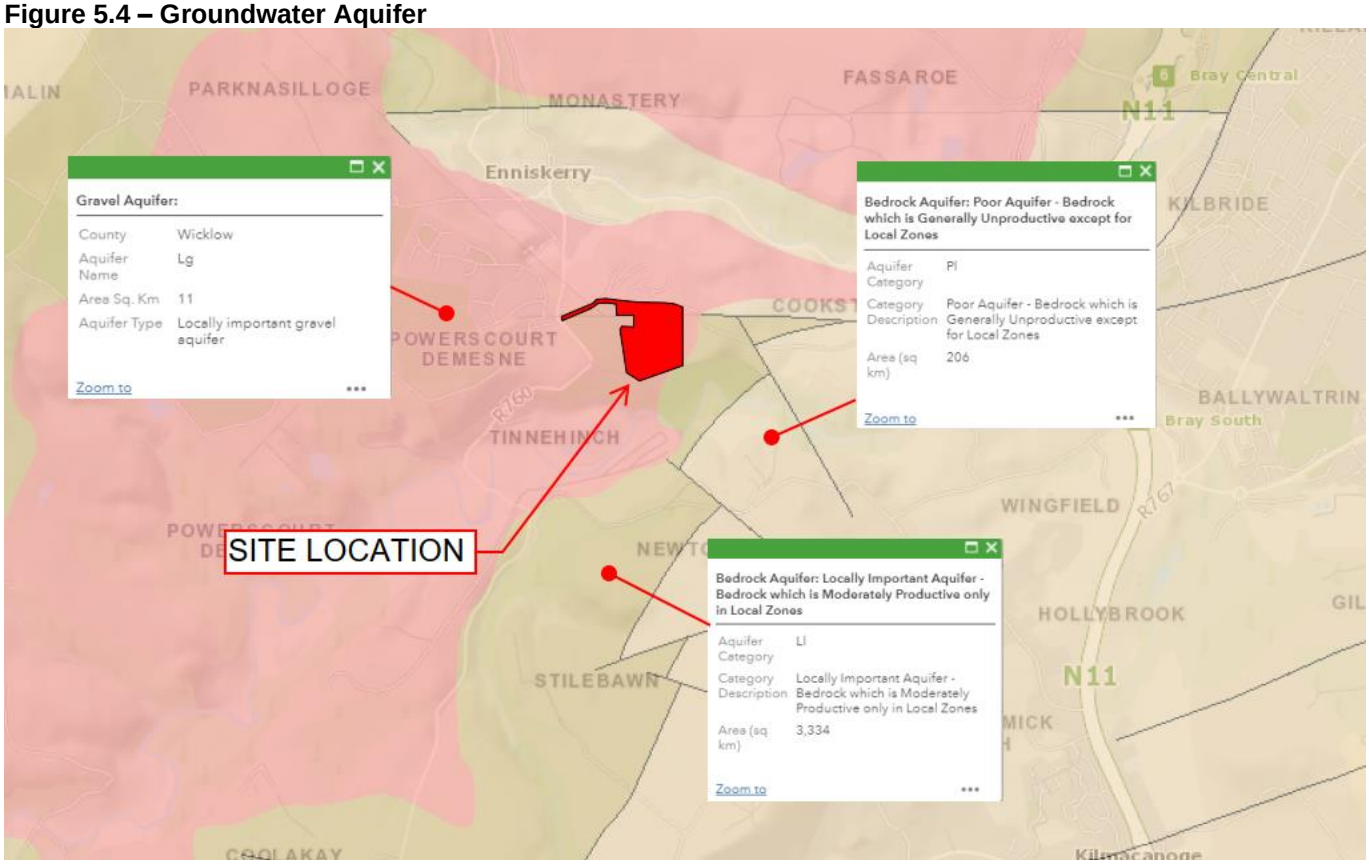
Groundwater can be defined as water that is stored in, or moves through, pores and cracks in sub soils. Aquifers are rocks or deposits that contain sufficient void spaces, and which are permeable enough to allow water to flow through them in significant quantities. The potential of the rock to store and transport water is governed by permeability, of which there are two types, intergranular and fissure permeability. Intergranular permeability is found in sediments, sands, gravels, and clays. Fissure permeability is found in bedrock, where water moves through (and is stored in) cracks, fissures, planes, and solution openings.

When considering groundwater, it is important to consider the underlying geology, its complexity including faults, the large amounts of water and rainfall available for recharge and the overlying Quaternary deposits. The bedrock geology of this area is defined **Error! Reference source not found.** as the Maulin formation. The bedrock mapping f or the area as defined in the GSI is included as above.

The Geological Survey of Ireland has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size, and productivity of the groundwater resource. The three main classifications are Regionally Important Aquifers, Locally Important Aquifers and Poor Aquifers.

In **Error! Reference source not found.** the site area is classified by the GSI as a Locally Important Aquifer. R ainwater falling on the site will be drained into the groundwater system via soakaways on site. Ground water on the site naturally drains towards the Glencullen River, approx. 350m north of the site.

Figure 5.4 – Groundwater Aquifer



5.3.5.1 Groundwater Vulnerability:

Aquifer or groundwater vulnerability is a relative measure of the ease with which the groundwater could be contaminated by human activity and depends on the aquifer's intrinsic geological and hydrogeological characteristics. The vulnerability is determined by the permeability of any overlying deposits. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden. Groundwater vulnerability categories are defined by the GSI as:

- X - Extreme rock at or near surface or karst
- E - Extreme
- H - High
- M - Moderate
- L - Low

The criteria are set out in **Error! Reference source not found.** below.

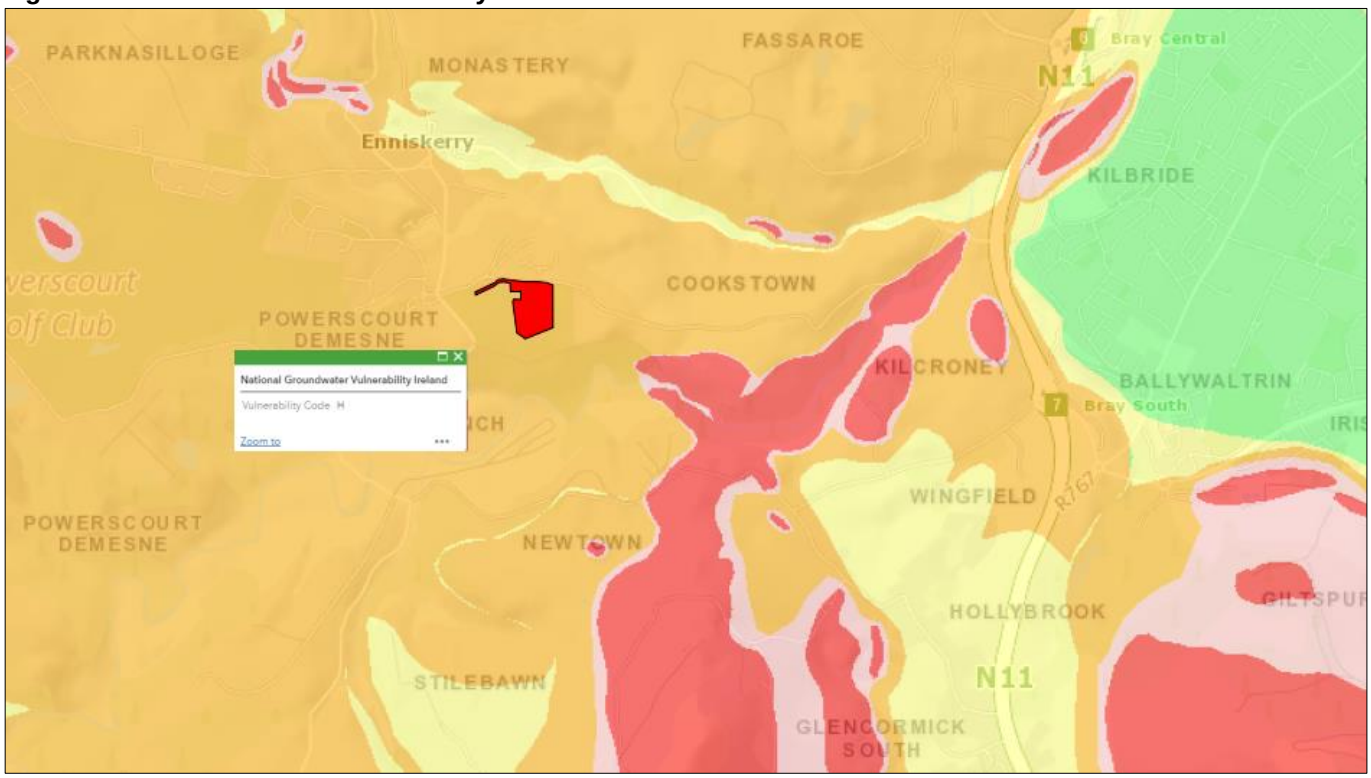
Table 5.1 – Aquifer Vulnerability Criteria (DELG/EPA/GSI, 1999)

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 – 3.0 m	0 – 3.0 m	0 – 3.0 m	0 – 3.0 m	-
High (H)	>3.0 m	3.0 - 10.0 m	3.0 – 5.0 m	>3.0 m	N/A
Moderate M)	N/A	> 10.0 m	5.0 – 10.0 m	N/A	N/A
Low (L)	N/A	N/A	>10.0 m	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

These categories are used for mapping purposes and in the assessment of risk to ground waters. The classifications are based on the thickness and permeability of the sub-soils overlying the aquifer. The GSI has classified the aquifer vulnerability underlying the site into "H" (high) which infers groundwater or bedrock is present within 3 to 10m of the surface below moderately permeable till.

Figure 5.5 – Groundwater Vulnerability



The boreholes in the geotechnical site investigation indicate that the rock level under the site is greater than 7.5m below ground level, owing to no rock being found in the boreholes terminating at this depth. Similarly, no ground water strikes were recorded, indicating a water table depth greater than 7.5m below ground level. This makes sense in the context of the relatively high permeability sands and gravels overburden and the high topographical relief surrounding the site towards the river valleys to north and south.

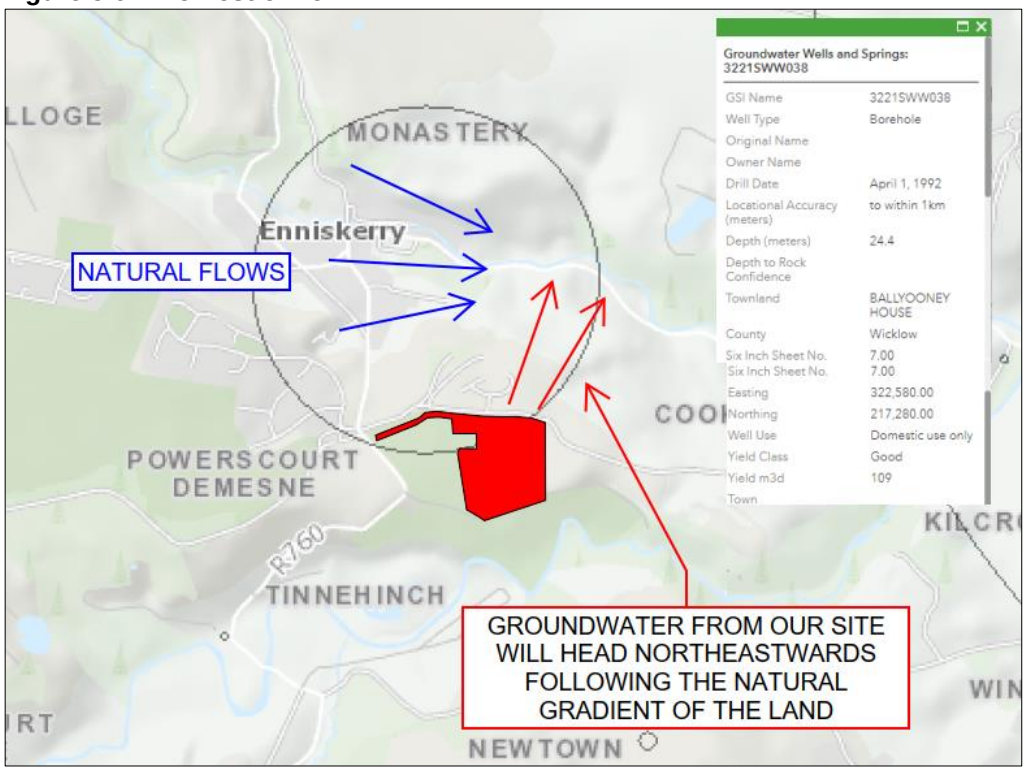
The drainage proposals for the site aim to replicate the natural aquifer recharge by discharging all surface water collected into a soakaway, and ultimately to ground. The depth of soil through which the water will flow before reaching the aquifer, will provide adequate natural filtration in accordance with the best practice guidelines of Sustainable Drainage Systems (SuDS), to ensure no suspended solids reach the aquifer below. Therefore, the aquifer will not be affected by the proposed new site in terms of water quality or water quantity. It is acknowledged that a slightly concentrated recharge flow will occur; however this will not have an impact on the groundwater table due to the permeable overburden and surrounding topography.

- **Local groundwater usage and source protection area:**

The GSI online map identified a domestic well to the north of the site, refer to **Error! Reference source not found.** b elow. As indicated by the red arrows, the surface water infiltrating down to the groundwater table from the site in question will follow the natural flow path and end up in the Glencullen River, which flows east. The water table feeding the river is mostly due to the mountainous nature of the area. The groundwater flow follows the topography, and will tend to follow the river, as shown by the blue arrows. Therefore, any water being drawn from the upper aquifer by the shown well, will emanate upstream, and not from the downstream location where is it postulated that groundwater from the site in question enters the reiver.

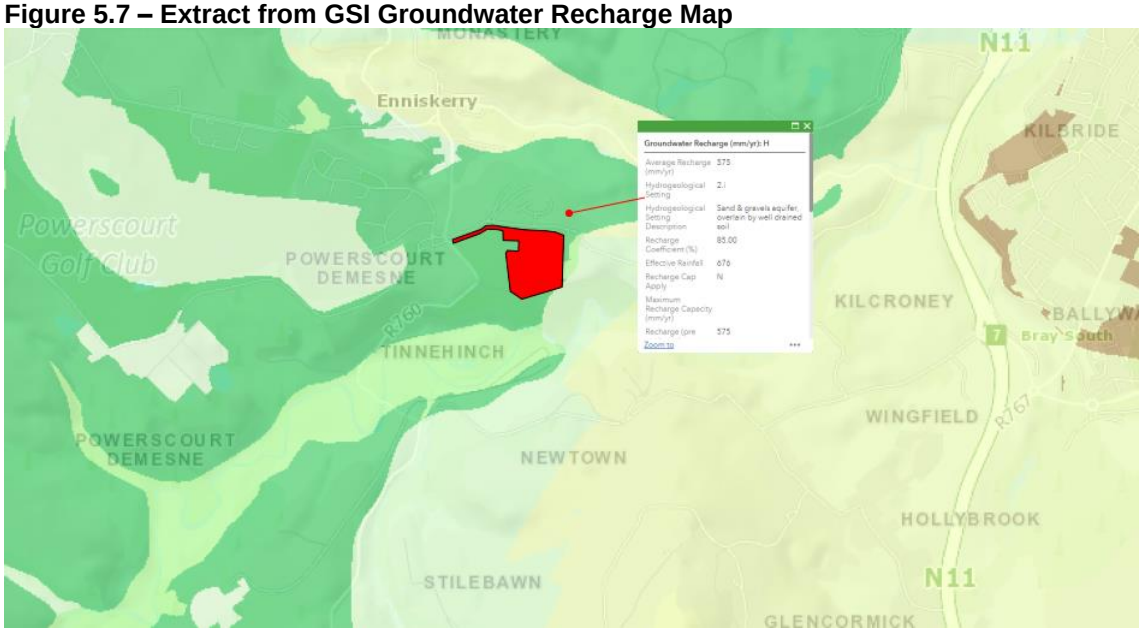
However, based on the well depth of 24.4m, it can be said with a high degree of certainty that this well takes water from the lower aquifer within the rock, as is typically the case for potable water wells, and therefore it has no direct connection with the groundwater infiltrating to the water table from the site.

Figure 5.6 – Domestic Well



5.3.6 Recharge:

Figure 5.7 – Extract from GSI Groundwater Recharge Map



Effective rainfall is the amount of rainfall available as either recharge to ground or run-off to surface water after evaporation or taken up by plants and is 676mm/yr. The recharge coefficient, which is the proportion of effective rainfall to recharge groundwater, is estimated at 85% on the site. Recharge is the amount of rainfall that replenishes the aquifer, it is a function of the effective rainfall, the permeability and thickness of the subsoil and the aquifer characteristics.

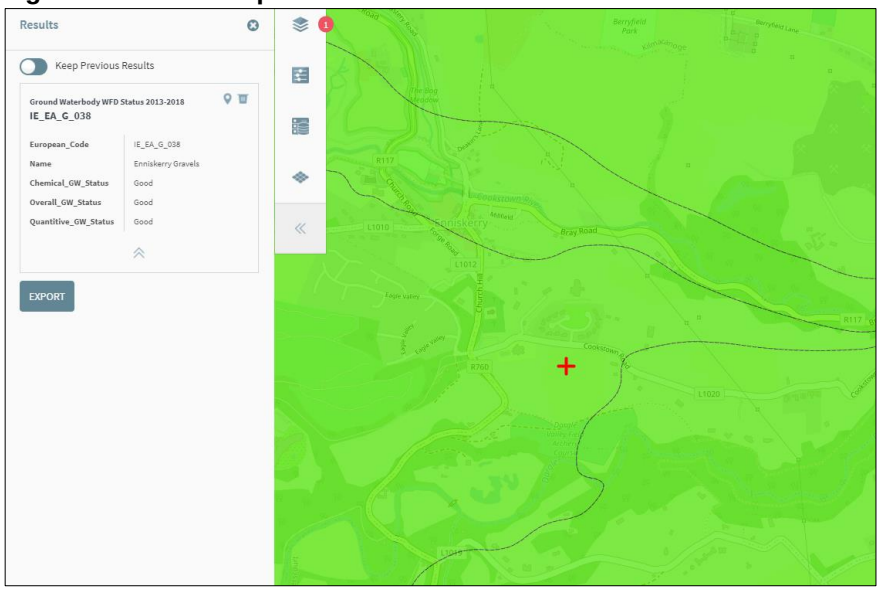
5.3.7 Site Hydrogeology:

The characteristics of the underlying bedrock and local topography appear to have a strong influence in the hydrogeology of the site. Groundwater is likely present within the upper levels of the bedrock with limited groundwater present within the subsoils. Groundwater flows follow the topographical relief of the area and generally flow towards nearby rivers, the River Dargle to the south of the site and the Glencullen River to the north of the site.

5.3.7.1 Groundwater Quality:

Under the requirements of the Water Framework Directive, the groundwater body was classified as having an overall good status for water quality and quantity 2013 - 2018. Please refer to **Error! Reference source not found.**, EPA m ap extract below.

Figure 5.8 – EPA Map Extract



5.3.7.2 Groundwater Flood Risk:

Groundwater flooding can occur during lengthy periods of heavy rainfall, typically during later winter/early spring when the groundwater table is already high. If the groundwater level rises above surface level, it can pond at the local low point on the Cookstown Road and cause periods of flooding.

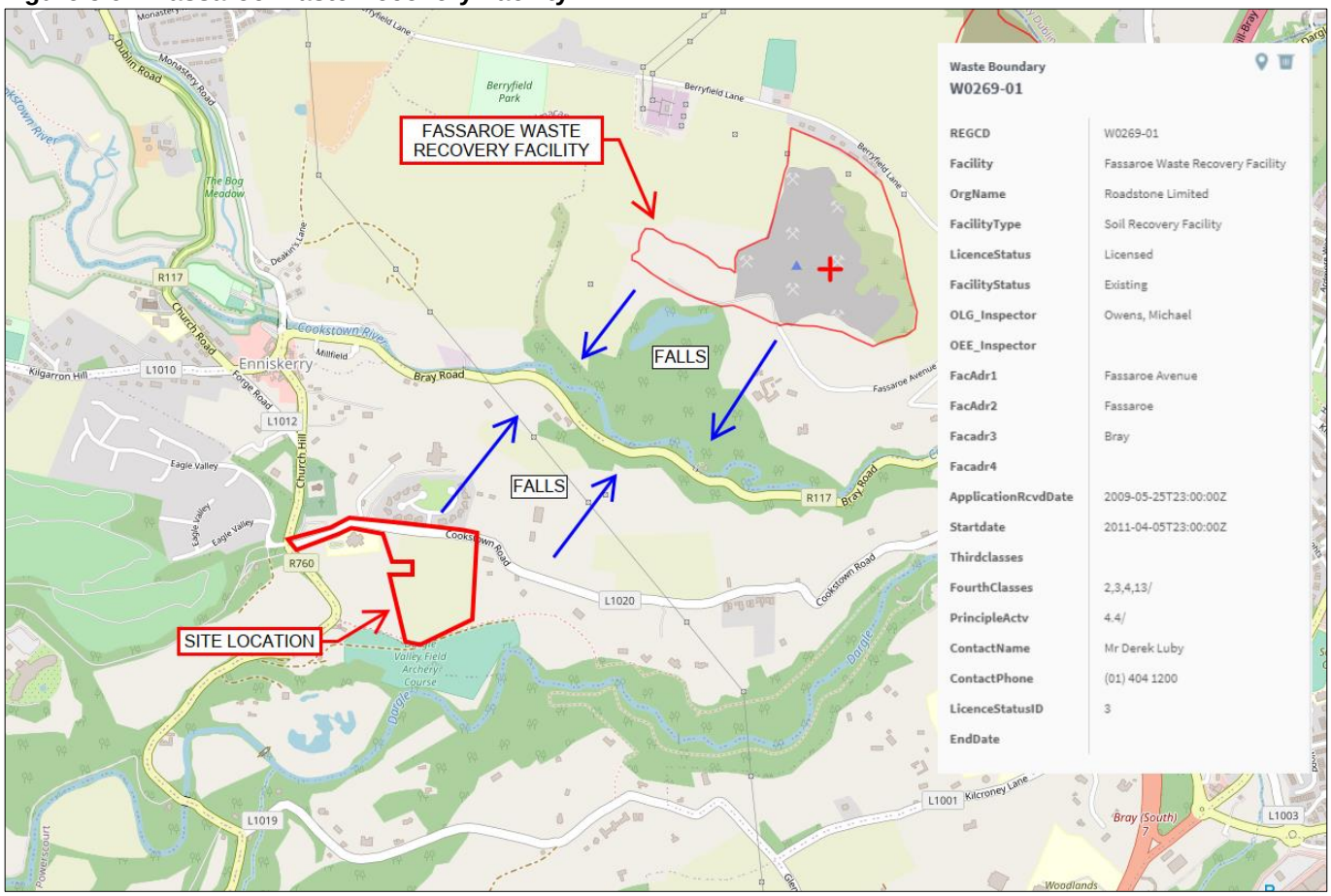
5.3.8 Contaminated land

The National Waste Collection Office (NWCPO) issue waste collection permits for all waste management regions in Ireland. According to EPA Mapping there are no waste licensed IPC facilities on the proposed site.

EPA mapping identifies no waste site boundaries on or adjacent to the site. There is a waste recovery facility, approx. 900m to the North East of the site, reference number W0269-01. Per **Error! Reference source not found.**, this f acility is located in Fassaroe to the north of the Glencullen River valley and not relevant to the site in question.

The likelihood of contaminated land being present at the site is low as it has been in agricultural use for the last 100 years of public records.

Figure 5.9 – Fassaroe Waste Recovery Facility



5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Consideration of the Characteristics of the Proposed Development allows for a projection of the '*level of impact'* on any particular aspect of the proposed environment that could arise. For this chapter the potential impact on land and soils is discussed.

The proposed development is a residential development of consisting of 165no. dwellings, comprised of 105no. houses, 56no. duplex apartments, 4no. maisonette dwellings, along with a creche, public open space and ancillary infrastructure to serve the proposed development (including connections to the public foul and water supply infrastructure on the Cookstown Road). A full description of the proposed development is contained in Chapter 2 of the EIAR.

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

- Removal of topsoil and subsoil to allow road construction, foundation excavation, services installation.
- Construction of the main access routes into the development.
- Installation of main underground services and utilities to serve the site (including on the Cookstown Road).
- Construction of the surface water storage systems (underground and overground).
- Construction of linear park and public open space areas.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

5.5.1 Construction Phase

To facilitate the proposed development land take will be required that will change the existing use of the site from greenfield to residential. Top soil will be stripped, and sub-soil will be removed to facilitate the construction of the development.

As noted above, should material be required to be removed from the subject site it will be done so in accordance with current legislation. The proposed duplex apartment buildings will not have underground basements and as such the volume of material to be excavated will be minimised following detailed design.

Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall groundwater quality.

Potential impacts of the proposed development during the construction phase are:

- Approximately 7,720m³ (approximately 0.3m depth of topsoil across the site) of topsoil shall be excavated from the existing ground level in order to form a building platform for the new houses and associated roads infrastructure. This will result in the exposure of the subsoil to various elements including weather and construction traffic. Therefore, the impact may be characterised as a likely, short term, slight, adverse impact on the natural strength of the subsoil and subsequently resulting in deeper foundations being required.
- Rutting and deterioration of the topsoil layer and any exposed subsoil layers or bedrock by earthworks plant and construction traffic. As such, the impact may be characterised as likely, short term, moderate, adverse impact on subsoil, the consequence of which will be erosion and generation of sediment laden runoff.
- Earthworks are required in the open space areas to accommodate underground surface water soakaway systems and other SuDS features. This landscaping activity will likely have a moderate, positive, permanent, impact on the soil and ground profile. Earthworks to road infrastructure is also required due to the existing steep topography of the site for access.
- During the construction period, large machinery and associated fuel and fuel storage will be present on site. As a result, accidental spills, and leaks (e.g. storage of oils and fuels on site), use of cement and concrete during construction works are inevitable during the construction phase. Therefore, the unlikely impact may be characterised as a likely, short term, moderate, slight impact on subsoil and ground water.
- Approximately 13,793m³ of fill (generally comprising normal stone used in the construction of roads, footpaths, and buildings) will be required across the development, with some of this material originating from cut material on site. Therefore, the likely impact may be characterised as, permanent, slight impact on subsoil and ground water.
- The construction of the site foul wastewater pumped main along the Cookstown Road (L1020) will require works to the public road will involve the excavation of soils/subsoils along the length of its route. The trench will comprise standard backfilled material or imported granular fill. During excavation works for the rising main there is no foreseeable potential for entry of sediment and run-off to the watercourse of other drainage devices in the area.

5.5.2 Stripping of Topsoil

Removal of the existing topsoil layer will be required across the site. Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff.

5.5.3 Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of surface water attenuation facilities.

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

Table 5.2 – Proposed Soil Volumes

Item	Topsoil (m^3)	Soil (m^3)
*Site Strip	7,720	-
Fill above site strip level	-	13,793
Bulk Excavation below site strip level	-	20,894
Allowance for the excavation for buried services	-	1,200
Total excavation less fill		**14,821**

5.5.4 Construction Traffic

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

5.5.5 Accidental Spills and Leaks

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

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

5.5.6 Geological Environment

It is not envisaged that this will have any discernible impact on the geological environment. Excavations associated with development of the site have been designed as shallow as possible and no bedrock was encountered in the site investigation at 7.5m depth as noted previously. If bedrock is encountered it will be crushed, screened, and tested for use within the designed works.

5.5.6.1 Human Health

A potential risk to human health due to the associated works during construction is the direct contact, ingestion, or inhalation of receptors (i.e. construction workers) with any soils which may potentially contain low level hydrocarbon concentrations from Site activities (potential minor leaks, oils and paint).

No human health risks associated with long term exposure to contaminants (via. direct contact ingestion or inhalation) resulting from the proposed development are anticipated.

5.5.7 Operational Phase

Once the development is completed the operational impacts on the land and soils would be minimal. The biggest risk item is cross contamination of ground water from the operational phase of the development from accidental oil spillages, refer to the Mitigation section below for proposed remedial issues.

5.5.8 "Do-Nothing" Scenario

Should no development be proposed for the site and the site remains as open undeveloped land this would remove any potential for contamination issues over the operational or post development phase. Notwithstanding this, the land is zoned for the type of development applied for and as part of the national strategy to provide accommodation, the proposed development is required. As such the "Do-Nothing" Scenario is not applicable.

5.6 MITIGATION MEASURES

5.6.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through a Klargester Bypass Interceptor (or similar approved) prior to out-falling into the proposed soakaway system.

5.6.2 Construction Phase Mitigation

A Construction and Environmental Management Plan (CEMP) (prepared by BMCE) is included in the planning application material. This report will be developed by the Contractor and will be submitted to the local authority prior to commencement on site.

In order to reduce the impacts on the soils, geology and hydrogeological environment a number of mitigation measures will be adopted as part of the construction works on site, as set out in the CEMP. The measures will address the main activities of potential impact which include:

- Control of soil excavation and export from site.
- Sources of fill and aggregates for the project.
- Fuel and Chemical handling, transport, and storage; and
- Control of Water during Construction.

The Construction and Environmental Management Plan (CEMP) sets out how the construction of the project will be managed in a safe and organised manner by the Contractor. The CEMP sets out requirements and standards which must be met during the construction stage and includes the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project.

Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall groundwater quality.

Potential issues can be mitigated against by ensuring that CEMP is adhered to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks.

Soil stripping, earthworks and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction as set out in the CEMP Report. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads as set out in the CEMP report.

The following mitigation measures as set out in the CEMP Report will be taken at the construction site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of bunded refuelling areas on the site (if required).
- Provision of spill kit facilities across the site.
- Where mobile fuel bowsers are used the following measures will be taken.
- Any flexible pipe, pump, tap or valve will be fitted with a lock and will be secured when not in use.
- All bowsers to carry a spill kit and operatives must have spill response training; and
- Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they should be done so secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

5.6.3 Operational Phase

During the operational phase of the proposed development there is limited potential for site activities to impact on the geological environment of the area.

Following best practice, as noted above, the potential for the ground water to become polluted via oil spills will be reduced as far as is practical using an oil separator to take run off from carparking areas and passing through same prior to disposal.

5.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

The proposed development will alter the current land use from agricultural to a residential development. creche and public open space and landscape areas. The impact on land, soil, geology, and hydrogeology from accidental spillages of fuel and lubricants used during the construction phase of the development is predicted to be minimal when stored and used in a responsible manner. After implementation of the mitigation measures recommended above for the construction phase, the proposed development will not give rise to any significant long term adverse impact. Moderate negative impacts during the construction phase, which are described in section 5.5.1, will be short term only in duration.

Implementation of the measures outlined in Section 5.6 will ensure that the potential impacts of the development on soils and the geological environment are minimised during the construction phase and that any residual impacts will be short term, and imperceptible.

Residual Impacts from earthworks haulage and the risk of contamination of groundwater are deemed to be of minor risk. The residual impacts for a residential housing development, creche and open space are deemed to be imperceptible post construction (during the operational phase).

5.8 "*WORST-CASE"* SCENARIO

5.8.1 Construction Phase

Under a '*worst case'* scenario, the accidental release of fuel, oil, paints, or other hazardous material occurs on site during the construction phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur over open ground, then these materials could infiltrate through the soil contaminating the soil zone. If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and surface water receptors and the ground water could become poisonous, undrinkable, and unusable for general agricultural methods. The impacts from such an accident, would be negative and long-term. Given the likely small quantity in any spillage, the effects will be localised and imperceptible.

The contractor must adhere to the CEMP to ensure that all containment is kept in working order which should result in this worst case scenario being unlikely to occur.

5.8.2 Operational Phase

As noted from an operational viewpoint, the worst-case scenario would be an accidental spill of oils from cars or effluent from or a leak in the foul drainage system or damage to the oil separator serving the roads for the proposed scheme.

The worst case impact relates to the potential for oil or effluent entering the ground. There is a potential risk for local residents to come in contact with the contaminated ground. Due to the expected low volume of oil run-off, this impact would be negative, short term and imperceptible. However, the mitigation measures outlined above in section 5.6 should ensure that this does not occur.

5.9 MONITORING

The proposed foul drainage & potable water network will be vested to Irish Water, and as the statutory agency will have responsibility for the maintenance of the foul drainage & potable water network once completed. The stormwater system will be taken in charge by Wicklow County Council who will carry out maintenance on the system if required.

5.9.1 Monitoring measures – construction

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

- Adherence to the "*Construction & Environmental Management Plan (CEMP)*". The developer will be responsible for ensuring adherence with this report. If construction works are not in accordance with the plan, then the developer will ensure that this is remedied.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas. If these are found to be sub-standard then the developer will ensure that they are made fit for purpose.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities. If these measures are found to be inadequate and the adjacent road network is negatively impacted, the developer will ensure that this is remedied and will ensure that dust suppression measures are implemented more regularly and all vehicles exiting the site use vehicle wheel wash facilities provided.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.). The developer is responsible for ensuring that these measures are fit for purpose. If they are found to be inadequate, then the development will ensure that they are made good and fully utilised.
- Soil removed during the construction phase will be monitored to maximise potential for re-use on site.
- The quantities of topsoil, subsoil and rock removed off site will be recorded.

5.9.2 Monitoring measures – operational phase

Monitoring of the *"taken in charge*", public open space area to the south of the site by Wicklow County Council will be on-going. The soakaway and other SuDS features are located in areas that will remain in the charge of the management company who will ensure that are adequately maintained.

5.10 REINSTATEMENT

As part of the project there will be several open space green areas provided for residents and visitors. Please refer to the landscape drawings submitted as part of this application for further details.

5.11 CUMULATIVE IMPACTS

Cumulative phase looks at the increased overall implications the proposed development may have on the environment in cumulation with existing and permitted development in the area, in particular the adjacent possible residential development of 27 no. units on a site abutting the west side of the subject site under Planning Reg. Ref. 19/871) and a proposal for 6 no. detached, two-storey dwellings on 0.9ha (Planning Reg. Ref. 16/976 located to the north of the subject lands).

The primary potential cumulative operational impact considered is local increase in hard standing and subsequent decrease in local groundwater recharge. In the case of this development this does not apply as all rainwater falling on the development discharges to the ground via soakaways as set out on the drawings and Civil Engineering Infrastructure and Flood Risk Assessment Report by Barrett Mahony Consulting Engineers included as part of this planning application.

Given this, given that the adjacent development is low density, and given the geological and hydrogeological environments of the proposed development, i.e. the *"local important*" bedrock aquifer with high vulnerability the potential cumulative impact to the land, soils, geology, and hydrogeology of the local and surrounding areas is deemed to be insignificant.

Cumulative impacts, if any, will be limited to the construction stage and will, therefore, be temporary to short-term in duration. As long as mitigation measures for the developments are carried out as permitted, there will be no significant cumulative impacts on the land, geological and hydrogeological environment.

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

5.12 DIFFICULTIES ENCOUNTERED

No difficulties were encountered while developing this report.

6.0 WATER AND HYDROLOGY

6.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) considers & assesses the potential impacts on Water & Hydrology with regard to the proposed scheme. Measures to mitigate any likely significant adverse impacts of the proposed scheme are reviewed and analysed.

This chapter has been prepared by John Considine, BE, MIStructE, MIEI, CEng, FConsEIM, Chartered Engineer of Barrett Mahony Consulting Engineers.

6.2 METHODOLOGY

The methodology followed for this section is in accordance with the EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) 2017, Advice Notes for Preparing Environmental Impact Statements (Draft) 2015 and 2018 DHPLG Guidelines on Environmental Impact Assessment for Planning Authorities and An Bord Pleanála. The following section outlines the legislation and guidelines considered, and the adopted methodology for preparing this chapter.

6.2.1 Guidelines

The following documents were reviewed in the preparation of this chapter.

- Historical Flood Data, obtained from the national hazard Mapping Website, (www.opw.ie);
- CIRIA C753 – The SuDs Manual.
- *Revised Guidelines on the Information to be contained in Environmental Impact Statements* (EPA 2015a);
- *Advice Notes for Preparing Environmental Impact Statements* (EPA 2015b);
- *Draft Guidelines on the Information to be contained in Environmental Impact Assessments Reports* (EPA 2017);
- Department of Housing, Planning & Local Government (2018). Guidelines for Planning Authorities & Bord Pleanála on Carrying Out environmental Impact Assessments;
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
- Greater Dublin Strategic Drainage Study, (DCC 2005);
- Regional Code of Practice for Drainage Works, (DCC 2005);
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities, Former Dept of Environment, Heritage & Local government, (Government of Ireland 2009);
- Wicklow County Council Development Plan.
- Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters (IFI, 2016)

A Civil Engineering Infrastructure Report and Flood Risk Assessment has been completed by Barrett Mahony Consulting Engineering (BMCE) and accompanies the planning application under separate cover. The findings and outcomes from the report have informed this assessment.

In order to identify the current conditions and to establish any potential impacts for the proposed development it is necessary to undertake a desk top review of the existing water features and site topography conditions for the subject lands. The existing conditions have been interpreted from a desk top study.

To establish same information the following list of statutory bodies were consulted.

- Wicklow County Council.
- Geological Survey of Ireland.
- Ordnance Survey of Ireland.
- Environmental Protection Agency.
- Office of Public Works.

6.2.2 Desktop Study

The following sources of information were reviewed to evaluate the Water & Hydrology aspects of the site.

- Current & historical Ordnance Survey Maps (1829 – 1842,1837 – 1842 & 1888, 1913);
- Aerial photography (1995 & 2000).
- Office of public Works, Historical Flood Mapping.
- Office of Public Works, Flood Risk Management Plans.
- Wicklow County Council, Development Plan, 2017 – 2023.

6.2.3 Assessment Methodology

The potential impact i.e., significance of the effects of the proposed development is generally understood to mean the importance of the effects (the consequences of the change). Significance is determined by a combination of (objective) scientific and subjective (social) concerns. Effects are assessed on the following:

- Quality (i.e. positive, negative, or neutral),
- Significance (imperceptible, slight, moderate, significant, or profound),
- Duration (short term, medium term, long term, permanent or temporary),
- Extent and
- Context.

In the collation of information to describe effects reference has been made to the criteria set out in Table 3-4 *Checklist for Information Required to Describe Effects* as set out in the EPA document – *Guidelines on the Information to be contained in Environmental Impact Assessment Report* DRAFT, August 2017.

Assessment should also take consideration of secondary impacts e.g., deterioration of surface water quality in an area due to site clearance and soil run-off. Finally, cumulative impacts are also to be addressed/considered, i.e., the addition of many minor or significant effects, including those of neighbouring projects to create larger more significant effects.

This document outlines a thirteen-step methodology as per the *Guidelines for the preparation of Soils, Geology, and hydrogeology Chapters of Environmental Impact Statements*, IGI 2013, which has four distinct elements as follows.

- Initial Assessment (Steps 1 – 5);
- Direct & Indirect Site Investigation and Studies (Steps 6 – 9);
- Mitigation Measures, Residual Impacts and Final Impacts Assessment (Steps 10 – 12); and
- Completion of the Hydrogeological (Water) Sections of EIAR (Step13).

The initial site assessment as outlined in section 6.3 describes the hydrological and hydrogeological receiving environment and presents a description of the past and present uses of the site and other neighbouring sites.

This section also describes the nature of the site based on both site specific and neighbouring site investigation data from publicly available sources where available.

Section 6.5 describes the potential impacts associated with the development of the site (in the absence of mitigation). The magnitude of the potential impact is ranked in accordance with the IGI Guidelines and this allows the significance of the impact to be determined.

Following the assessment of the impacts, specific mitigation measures have been developed to avoid, reduce and if possible, remedy any negative impacts on the hydrology & hydrogeology. These are described in section 6.6.

Cumulative impacts are described in section 6.10. The magnitude and significance of these residual impacts have also been classified based on the IGI Guidelines.

6.2.4 Application of Methodology

The potential impact of the proposed scheme on Water & Hydrology environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any potential impact.

6.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The subject site is located on lands within the townland of Cookstown, and Powerscourt Demesne, Enniskerry, Co. Wicklow of c. 6.57 hectares.

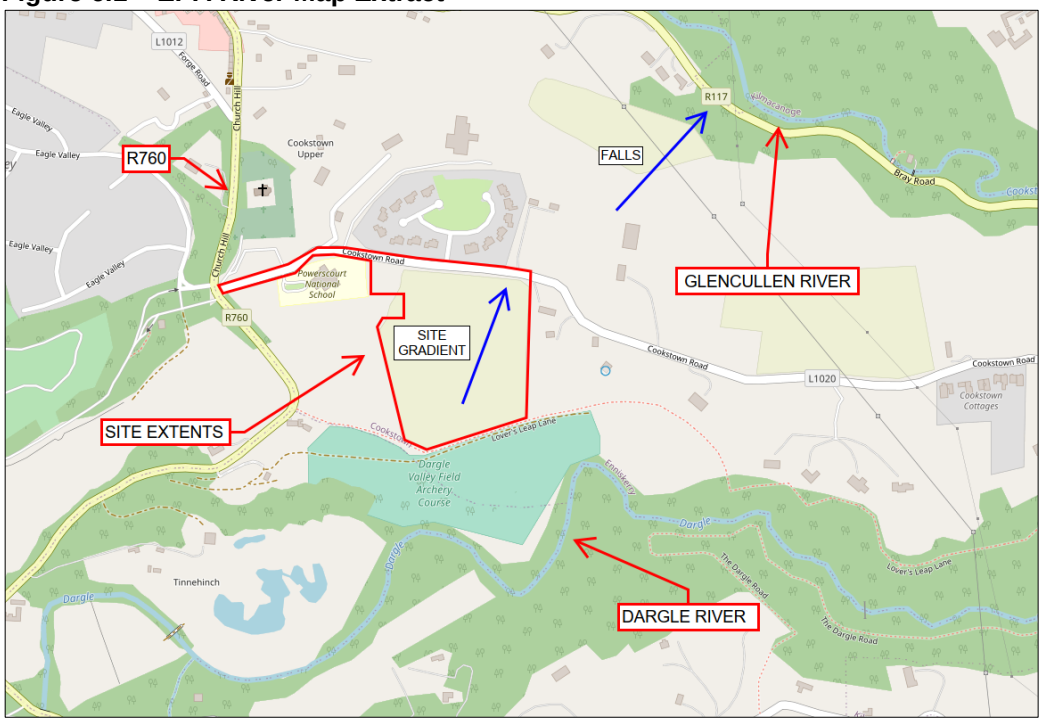
The main site is currently a grass pasture field for the grazing of livestock as well as works within the public road and southern verge along the Cookstown Road. The site boundaries and adjacent land uses are as follows:

- Northside: The site is generally bounded by the Cookstown Road L1020(with some rising foul main and water main works along the Cookstown Road). The field is separate from the road by a hedgerow just inside the site. This hedgerow includes a number of mature trees. There is a field gate in the hedge accessing onto the road, which is close to the entrance to the Enniskerry Demesne housing estate on the northern side of the road.
- Eastside: Mature hedge along the boundary. 2 no. private residences behind with access off the Cookstown Road.
- Southside: Hedge along the boundary. Public footpath behind. Ground falls toward the River Dargle.
- Westside: Hedge along most of this boundary. Adjoining field, currently pasture but with an extant permission for 27 no. dwellings (by others). The north corner of this field, abutting the primary school site alongside the Cookstown Road, is part of the subject site.

6.3.1 Existing Surface Water

Irish Water maps indicate that there is an existing 450mm diameter surface water pipe running beneath the Enniskerry Road (R760) to the west of the site, approximately 500m from the nearest site boundary. It is at a higher level than the north end of the subject site and cannot be reached by a gravity drain from the site. There are no other potential connections within the area.

Figure 6.1 – EPA River Map Extract



The existing site is greenfield site, used for agricultural purposes. There are no existing surface water systems in place on the site, any rainfall on the site is naturally attenuated by the soil and then infiltrates into the ground and then makes its way to either the River Dargle or the Glencullen River, as such there is no existing surface water network within the site area, with rainfall discharging directly to the ground. There are no watercourses in the vicinity of the site that can be reached by gravity, due to the site topography with the site sloping c. 6m downwards towards the north, down to the Cookstown Road (L1020) site. There are 2no. watercourse in the vicinity of the site as follows;

- The River Dargle approximately 50m to the south;
- The Glencullen River approximately 350m to the north;

There are no existing surface water systems in place on the site, any rainfall on the site is naturally attenuated by the soil and then infiltrates into the ground and then makes its way to either the River Dargle or the Glencullen River. This site slopes away from the River Dargle and some groundwater from the site may flow towards it following the rock line under, please refer to **Error! Reference source not found.** below and section 6.3.6.

6.3.2 Existing Foul Water Drainage

There is an existing 225mm diameter foul drain that runs from Powerscourt National School to the foul sewer on the Enniskerry Road (R760) at its junction with the Cookstown Road. The existing Enniskerry Demesne housing estate opposite the development is served by a foul pumping station, which fronts onto Cookstown Road. This station pumps up to the foul sewer on the R760 at its junction with the Cookstown Road.

6.3.3 Existing Water Supply

There is an existing 180mm HDPE running beneath the northern side of the Cookstown Road, and a 100mm uPVC watermain beneath the south side. Both mains are relatively new, having been installed in 2005 and 2004, respectively.

6.3.4 Topography & Land Use

The site is currently primarily used for agricultural grazing. A detailed topographical survey of the existing site has been prepared. There is considerable variation in ground levels across the site. In broad terms the site slopes down from south to north from +110 m O.D maximum approx. at the south boundary to +101 m O.D. approx. at the north east corner adjacent to the Cookstown Road, 325m metres approximately. There is a lesser slope down from west to east across the site of 4 metres approx. shows typical spot levels across the site.

Figure 6.2 – Site Topography

6.3.5 Ground Water

Groundwater can be defined as water that is stored in, or moves through, pores and cracks in sub soils. Aquifers are rocks or deposits that contain sufficient void spaces, and which are permeable enough to allow water to flow through them in significant quantities. The potential of the rock to store and transport water is governed by permeability, of which there are two types, intergranular and fissure permeability. Intergranular permeability is found in sediments,

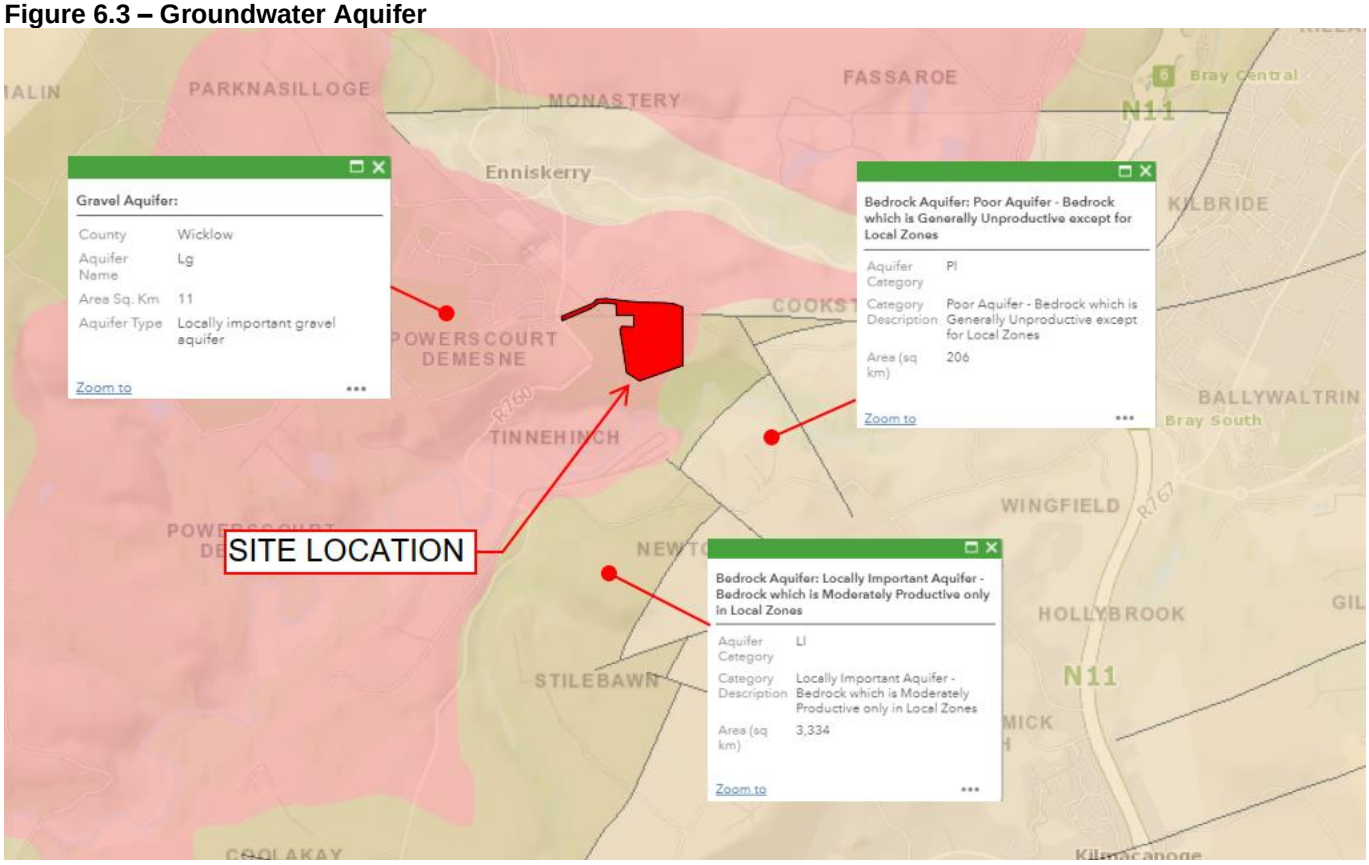
sands, gravels, and clays. Fissure permeability is found in bedrock, where water moves through (and is stored in) cracks, fissures, planes, and solution openings.

When considering groundwater, it is important to consider the underlying geology, its complexity including faults, the large amounts of water and rainfall available for recharge and the overlying Quaternary deposits. The bedrock geology of this area is defined as the Maulin formation. The bedrock mapping for the area as defined in the GSI is included as above.

The Geological Survey of Ireland has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size, and productivity of the groundwater resource. The three main classifications are Regionally Important Aquifers, Locally Important Aquifers and Poor Aquifers.

In **Error! Reference source not found.** the site area is classified by the GSI as a Locally Important Aquifer. R ainwater falling on the site will be drained into the groundwater system via soakaways on site. Ground water on the site naturally drains towards the Glencullen River, approx. 350m north of the site.

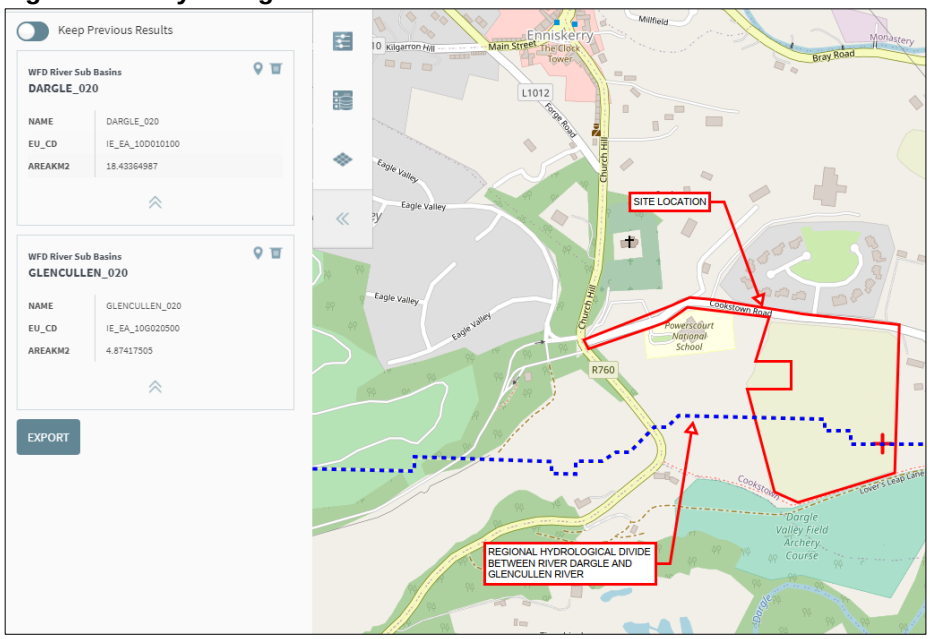
Figure 6.3 – Groundwater Aquifer



6.3.6 Site Hydrology and Groundwater

The characteristics of the underlying granite bedrock and local topography appear to have a strong influence in the hydrogeology of the site. Groundwater is likely present within the upper levels of the bedrock with no groundwater present within the subsoils. Groundwater flows follow the topographical relief of the area and generally flow towards nearby rivers, the River Dargle to the south of the site and the Glencullen River to the north of the site. The site is situated on the regional division between the Dargle River and the Glencullen River, per **Error! Reference source n ot found.**.

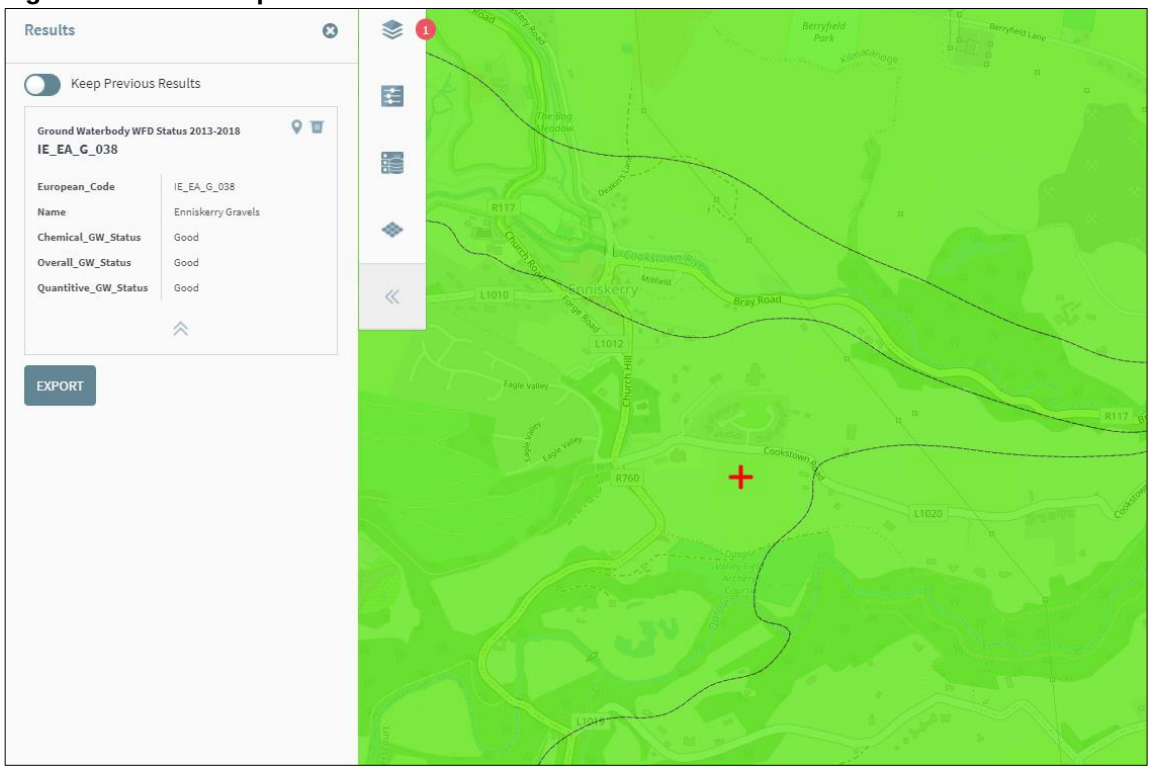
Figure 6.4 – Hydrological River Sub-Basins



6.3.7 Groundwater Quality

Under the requirements of the Water Framework Directive, the groundwater body was classified as having an overall good status for water quality and quantity 2013 - 2018. Please refer to **Error! Reference source not found.**, EPA m ap extract below.

Figure 6.5 – EPA Map Extract



6.3.8 Flooding and Flood Risk

As part of the project planning application, a flood risk assessment has been carried out in accordance with the OPW publication "*The Planning System and Flood Risk Assessment Guidelines for Planning Authorities*". The full details can be found in the Civil Engineering Infrastructure Report and Flood Risk Assessment, prepared by Barret Mahoney Consulting Engineers, included with the SHD Application, with the conclusion of that assessment outlined below.

There is no risk to flooding affecting the site from coastal or fluvial sources. Local knowledge suggests pluvial flooding may impact the lowest points of the site along the northern boundary with the Cookstown Road. To alleviate any surface water which may build-up at local low points of the Cookstown Road it has been proposed to provide drainage to the section bordering the site, and to bring that into the developments surface water network.

There is no appreciable risk in the site from flooding from adjoining lands, and similarly the site does not pose a risk to adjoining sites except the Cookstown Road as noted above, which will be addressed by the mitigation measures above.

Therefore, the development is deemed acceptable from a flood risk assessment perspective.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Consideration of the Characteristics of the Proposed Development allows for a projection of the *'level of impact'* on any particular aspect of the proposed environment that could arise. For this chapter, the potential impact on water resources is discussed.

The proposed development is a residential development of consisting of 165no. dwellings, comprised of 105no. houses, 56no. duplex apartments, 4no. maisonette dwellings and a creche along with public open space and supporting ancillary infrastructure.

6.4.1 Proposed Surface Water Drainage

The proposed development will be served by a new separate gravity surface water drainage network falling towards the north boundary of the site alongside the Cookstown Road, where it is proposed to install a soakaway designed in accordance with Ciria 756 guidelines. Site investigation works were carried out by Site Investigations Ltd. in 2014 and 2019, with soakaway testing performed at the intended site of the soakaway in 2014. This found that the existing ground conditions consist of 1-2m of sandy/silty gravel overlying deep beds of gravel. The infiltration rate determined on site at the soakaway location was 0.148m/hr, which is sufficient to allow for a soakaway design. The 2019 soakaway test, carried out in a different location to the south, determined a similar infiltration rate of 0.128m/hr. Refer to Appendix C - 6.1 (Volume III of the EIAR) for the soakaway test reports.

A Stormtech soakaway/infiltration system is proposed. Substantial measures are proposed to minimise the risk of silt build-up within the soakaway, such as the use of safety factors on the infiltration rate, an isolator row, catchpit manholes on incoming pipes, and infiltration trenches/permeable paving upstream of the tank. These measures, in conjunction with a suitable maintenance schedule will ensure the soakaway operates efficiently throughout its design life.

Wicklow County Council had requested that a surface water connection to the Dargle River to the south of the site be explored. However, as this river is approximately 300m to the south, through lands with multiple owners this option could not be feasibly pursued in this case. Also, as noted above, the natural topography of the site allows drainage to run by gravity to the north, and not naturally towards the river to the south.

All surface water drainage shall be constructed in accordance with Greater Dublin Regional Code of Practice for Drainage Works and Wicklow County Council Requirements.

As part of the development, a number of different SuDS measures are proposed to minimise the impact on run-off water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The SuDS design for the proposed development is based on dividing the site into several smaller catchment areas in order to provide source control.

It is proposed to provide the following SuDS measures:

- Stormtech Soakaway,

- Infiltration trenches,
- Permeable Paving,
- Swale,
- Petrol Interceptor.

Permeable paving will be provided for car parking spaces and driveways within the site. It is proposed to provide storage beneath the permeable paving areas to attenuate any surface water runoff from these areas. These storage areas will have a depth of 300mm and will have a voids ratio of 30%. Refer to Barrett Mahony drawing C1020 for further details.

6.4.2 Foul Drainage

It is proposed that the gravity foul drainage network on site will drain to the northeast corner of the site, which is the lowest point of the development. At this location, there will be a wastewater pumping station in accordance with Irish Water details and from here it is to be pumped to the existing 225mm foul sewer at the R760 sewer junction. Wicklow County Council stated that the proposed development should accommodate future connections from neighbouring sites, allowing for the existing Enniskerry Demesne Foul pumping station to be decommissioned in future. The additional sites contributing to the foul pumping station are set out in the calculations in Appendix C - 6.2 (Volume III of the EIAR), and the sites are as follows:

1. Adjoining site future development 27 no. houses (Planning Reg. Ref. 19/871)
2. Existing Enniskerry Demesne 14 no. houses
3. Permitted development WCC Reg Ref 16/976 6 no. houses (site adjacent to Enniskerry Demesne on east side)

The new below ground foul pumping station for the development is proposed to accommodate an average flow of 1.064l/s and has a 24hr dry weather flow emergency overflow storage requirement of that equates to 92m³, which will be met through the provision of a 73m^3 concrete storage tank, and the remaining volume within the pumping station wet well. The pumping station will be built to the specifications outlined in Irish Waters Code of Practice and standard details.

The foul water is then pumped from the new below ground foul pumping station via a 100mm diameter HDPE foul rising main that connects to a new foul standoff/discharge manhole and then by a short gravity connection to the existing foul sewer on the main Enniskerry Road (R760) at its junction with the Cookstown road (L1020). The peak foul flow breakdown is laid out in the calculations contained in Appendix C - 6.2 (Volume III of the EIAR).

The proposed foul network within the site consists of 225mm diameter pipes with a capacity of at least 21 l/s (at 1:200). The proposed connection to the public sewer is a 100mm rising main, as described above, running in part along the Cookstown Road up to its junction with the R760. The capacities of these pipes more than adequate to accommodate the estimated flows. Laying of the main outside the site will be subject to Irish Water & Wicklow County Council approval. An IW appointed contractor will carry out this work. A letter of consent from Wicklow County Council is included with the SHD application.

The works, using standard Irish Water specifications, will involve the excavation of soils/subsoils for a new water main trench along the length of its route from the subject site to the R760 junction to connect to the IW network. The trench will be backfilled with granular fill and excavated material. The works will be undertaken with the agreement of IW and Wicklow County Council.

As required by Irish Water, who since 2014 are in control of foul drainage services, a Pre-Connection Enquiry, PCE, is required to be submitted for all SHD applications. A Confirmation of Feasibility was received on the 20th of May 2019. In addition, a Statement of Design Acceptance was received on the 7th of August 2020 for the proposed development and is included with the planning application.

All foul drainage will be constructed in accordance with the latest Irish Water Code of Practice.

6.4.3 Water Supply

The site connection will be via a 150mm diameter (internal bore) connection into the existing 180mm HDPE public watermain in the Cookstown Road in front of the site. Twenty-four-hour storage will be provided in each house via

an attic tank to cater for possible shut downs in the system. Refer to Appendix C - 6.3 (Volume III of the EIAR) for water demand calculations.

Hydrants will be provided on the ring main, subject to fire cert requirements. Sluice valves will be provided at junctions and appropriate locations to facilitate isolation and purging of the system. Air valves will be provided at high points for system verting. All watermains infrastructure is to be to Irish Waters Code of Practice and standard details. A bulk water meter will be provided inside the site on the connection to the public watermain.

As required by Irish Water, who since 2014 are in control of public foul drainage and public water supply services, a Pre-Connection Enquiry, PCE, is required to be submitted for all SHD applications. A Confirmation of Feasibility was received on the 20th of May 2019. In addition, a Statement of Design Acceptance was received on the 7th of August 2020 for the proposed development and is included with the planning application.

Refer to Barrett Mahoney Drawing nos. C1020 & C1030, submitted with the SHD application for further information on the proposed site watermain layout and the proposed location of the connection to the existing network.

All watermains will be constructed in accordance with the latest Irish Water Code of Practice.

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

6.5.1 Construction Phase

During the construction phase there will be a number of personnel based on site who will require canteen and toilet facilities. Waste from these facilities will be removed by suction tanker to a licensed facility. At no time during construction will foul sewerage be allowed to discharge to the surface water network.

Construction of the proposed development will require the removal of a large part of the topsoil and earthworks to facilitate the construction of the dwellings, infrastructure service provision, road construction, surface water storage systems etc. Given the extent of disturbance, there is potential for weathering and erosion of the surface soils from precipitation and run-off.

Surface water runoff from the construction phase may also contain increased silt levels or result in pollution from the construction processes. The discharge of these contaminants, such as concrete and cement, which are alkaline and corrosive, have the potential to cause pollution. Accidental oil or fuel spillages or leaks from construction activities also have the potential to find their way into groundwater through percolation. Both increased silt and contaminant levels have the risk of reducing groundwater quality.

Excavation of soil and sub-soil layers will reduce the ability of the lands to recharge groundwater. The majority of rainwater falling on the site during construction will percolate directly into the ground. The permanent works proposal is for the surface water on the site to be infiltrated into the ground. During the construction process, the contractor will imitate this proposal in the form of a temporary swale or similar SuDS measures. Any surface run-off will fall towards Cookstown Road. An interception trench and land drain can be provided inside the site boundary to intercept any overland flow. This can be discharged to a temporary soakaway on the site. These temporary SuDS measures will be separated from any potential pollutant contaminants.

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

- Surface water runoff during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities. This may wash out onto the Cookstown Road at the low end of the site.
- Discharge of rainwater pumped from excavations.
- Accidental spills and leaks associated with storage of oils and fuels, leaks from construction machinery and spillage during refuelling and maintenance contaminating the surrounding surface water and hydrogeological environments.
- Concrete runoff, particularly discharge of wash water from concrete trucks.
- Discharge of vehicle wheel wash water.
- Infiltration of groundwater into excavations.

Accidental pollution of water from plant, machinery or temporary storage areas is possible, due to the nature of construction. This likely but brief impact would be imperceptible in nature as any potential pollution would be indirect

as it would percolate through the soil, prior to reaching the local groundwater. Excavation works are required, to strip the site's topsoil and for the installation of proposed drainage infrastructure.

The majority of rainwater falling on the site during construction will percolate directly into the ground. Given the permeable nature of the ground on site and the low level of the groundwater table, there is unlikely to be any significant ponding of rainwater in excavations.

The temporary effects of these works are anticipated to be imperceptible neutral effects. Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall storm water quality. Refer also to the Construction Management Plan, submitted construction management plan, submitted with the planning application, which indicates the proposed measures required to avoid same.

The construction of the pipelines will be to Irish Water specifications..

6.5.2 Operational Phase

Once the development is completed the operational impacts on the water & hydrology aspects of the site would be minimal. The biggest risk item is cross contamination of surface water from the operational phase of the development from accidental oil spillages, refer to the mitigation section below for proposed remedial issues.

During the operational phase of the development the following potential risks to surface water have been identified:

- Increased impermeable surface area will reduce local groundwater recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate).
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas).
- Foul waste and surface water discharging to ground through leakage in the drainage systems.
- Contamination risks arising from development use / leaking pipes / contaminated surface water runoff.

6.5.3 Potential risks to Human Health (without mitigation)

A risk to human health from water, hydrology and hydrogeology can be linked to the potential for contamination of the potable water supply. The ground water and supply network would present possible pathways. The risk is considered below.

<u>Groundwater Supply</u>
The receiving groundwater is a locally important aquifer. The potential risk to the contamination of this source from polluted surface water run-off from the development during construction and operation is considered to be low in the absence of mitigation.

<u>Network Supply</u>
There is a public health risk if the new water mains associated with the development are not sterilized prior to handover.

6.5.4 "Do-Nothing" Scenario

Should no development be proposed for the site and the site remains as open undeveloped land there will be no alterations to the current arrangements. If the proposed development does not proceed, there will be no impacts to the existing hydrology of the site. The current rate of surface water run-off would continue to operate in its natural state.

Pluvial flooding events would continue as they have historically in this area.

Groundwater status would also remain unchanged if the existing agricultural land use continued.

6.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

6.6.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through a Klargester Bypass Interceptor (or similar approved) prior to discharging into the proposed storm water soakaway system.

Mitigation measures follow the principles of avoidance, reduction and remedy. The most effective measure of avoidance is dealt with during the site selection and design stage, by ensuring that the development does not traverse or come in close proximity to sensitive hydrological attributes.

Where avoidance of the feature has not been possible, consideration has been given to locally modify the proposed development so as to reduce / minimise the extent of the impact. If any modifications are proposed to reduce hydrological impacts, it is necessary to also consider any associated impacts to the hydrological and ecological regimes.

6.6.2 Construction Phase Mitigation

The following mitigation measures will be implemented for the construction phase of the development:

- Any excess surface water on site to be discharged to the ground via soakaways.
- Designated impermeable cement washout areas must be provided.
- Any *in-situ* concrete work to be lined and areas bunded (where possible) to stop any accidental spillage.
- Any spoil or waste material generated from the construction process is to be temporarily stored at an approved location on site, before being removed to an accepting licensed waste disposal facility.
- All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines.
- All surface water infrastructure is to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with Local Authority Requirements.
- Connections to the public network are be carried out to the approval and / or under the supervision of the Local Authority prior to commissioning.
- All new drains are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase. All new water mains to be tested and sterilised in accordance with Irish Water requirements.
- Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall surface water quality.
- The construction of the development will be carried out in accordance with the Construction and Environmental Management Plan in order to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks. A Construction & Environmental Management Plan (CEMP) is submitted with this planning application.
- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater.
- The Construction and Environment Management Plan, incorporating the measures in the CEMP, will be developed, and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction and Environmental Management Plan.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and filter sediment laden runoff prior to discharge to a temporary soakaway.
- Weather conditions and seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced.
- Concrete batching will take place off site or in a designated area with an impermeable surface.
- Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds/soakaways.

- Oil and fuel stored on site for construction will be stored in designated areas. These areas shall be bunded and should be located away from surface water drainage and features.
- Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater.
- Spill kits will be kept in designated areas for re-fuelling of construction machinery.
- Dewatering measures should only be employed where necessary.

6.6.3 Operational Phase

Sustainable Urban Drainage Systems (SuDS) will be incorporated fully into the development, in order to improve the quality of the surface water discharging from site and reduce the runoff volume and rate. The surface water drainage design, for this development, was designed in accordance with the Local Authority requirements. All SuDS measures will be provided in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS systems are established by the Construction Industry Research and Information Association's publication CIRIA C753 – The SuDS Manual.

Following best practice, the potential for the storm water to become polluted via oil spills will be reduced as far as is practical using a Klargester Bypass Interceptor) or similar approved to take run off from carparking areas and passing through same prior to disposal to the on-site soakaway.

Irish Water will maintain the foul & potable water systems while Wicklow County Council will maintain the storm water network.

As such this type of development would not increase the risk to surface water or downstream flooding. All surface water discharges to soakaway's in close approximation of the existing greenfield drainage regime. All surface waters are to pass through an oil separator prior to out falling into the proposed new storm sewer.

The following measures will be employed:

- Surface water runoff from the development will be collected by an appropriately designed system with contaminants removed prior to discharge i.e., petrol interceptor.
- Foul water will be drained to a fully separate system.
- A regular maintenance and inspection programme of the flow control devices, soakaway storage facilities, gullies and petrol interceptor will be implemented during the Operational Phase to ensure the proper working of the development's networks and discharges.
- Operational refuse will be removed from site using licenced waste management contractors.

6.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

Residual impacts comprising the loss of agricultural land, earthworks haulage & the risk of contamination of surface water are deemed to be of minor risk, as the proposal for an apartment & housing type residential accommodation would not be deemed as a potential high risk development post construction.

As surface water drainage design has been carried out in accordance with the GDSDS, and SUDS methodologies are being implemented as part of a treatment train approach, there are no predicted impacts on the water and hydrogeological environment arising from the construction and operational phase. Implementation of the measures outlined in Section 6.6 will ensure that the potential impacts of the proposed development on water and the hydrogeological environment do not occur during the operational phase and that any residual impacts will be short term and imperceptible.

6.7.1 Impact on Climate

The proposed development is likely to have no appreciable impact on the climate.

Further, the surface water drainage network has been designed to allow for an increase in rainfall intensity of 10%; to account for adverse future conditions due to climate change.

6.7.2 Risk to Human Health

Groundwater Supply
The receiving groundwater is a locally important aquifer. The potential risk to the contamination of this source from surface water run-off from the development during construction and operation is considered to be low with the implementation of the mitigation measures proposed in this chapter.

Network Supply
As noted in 6.6, all new water mains will be tested and sterilised in accordance with IW requirements prior to handover so this risk will be fully eliminated.

6.8 WORST CASE SCENARIO

6.8.1 Construction Phase

The worst-case scenario is that there is an accidental on-site pollution incident in which the site development works are ongoing. This could lead to a direct discharge of oils or fuels into the surface water system.

6.8.2 Operational Phase

As noted from an operational view point the worst-case scenario would be an accidental spill of oils or foul effluent from a leak in the foul drainage system or an oil spill from the oil-separators.

6.9 MONITORING

6.9.1 Construction phase

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

- Adherence to the 'Construction and Environmental Management Plan'. If construction works are found to be not in accordance with the plan, then the developer will ensure that measures are put in place to ensure compliance.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of run-off from the site including pumping / dewatering. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.) If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content). If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- A dust management programme will be implemented during the construction phase of the development. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.

6.9.2 Operational phase

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

- A management company on site will ensure the system is regularly inspected and maintained. Areas of the site with significant SuDS features will remain in the charge of this company as set out on the Taking-In-Charge drawing to be submitted as part of the planning application.
- The performance of all SuDS features will be monitored by the management company during the life of the development.

- Monitoring of the installed gullies will be required to prevent contamination and increased runoff from the site.

As noted, once the development is complete the foul drainage system & potable water system will be vested to Irish Water who will then operate and maintain the network. The storm water system will be maintained by the management company.

6.10 CUMULATIVE IMPACTS

Cumulative phase looks at the increased overall implications the proposed development may have on the environment in cumulation with existing and permitted development in the area, in particular the adjacent permitted residential development of 27 no. units on a site abutting the west side of the subject site (under Planning Reg. Ref. 19/871) and a proposal for 6 no. detached, two-storey dwellings on 0.9ha (Planning Reg. Ref. 16/976 located to the north of the subject lands).

The primary potential cumulative operational impact considered is local increase in hard standing and subsequent decrease in local groundwater recharge. In the case of this development this does not apply as all rainwater falling on the development discharges to the ground via soakaways as set out on the drawings and Civil Engineering Infrastructure and Flood Risk Assessment Report by Barrett Mahony Consulting Engineers included as part of this planning application.

Given this, given that the adjacent development is low density, and given the geological and hydrogeological environments of the proposed development, i.e. the *"local important*" bedrock aquifer with high vulnerability the potential cumulative impact to the land, soils, geology, and hydrogeology of the local and surrounding areas is deemed to be insignificant.

Cumulative impacts, if any, will be limited to the construction stage and will, therefore, be temporary to short-term in duration. As long as mitigation measures for the developments are carried out as permitted, there will be no significant cumulative impacts on the land, geological and hydrogeological environment.

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

6.11 REINSTATEMENT

Minor reinstatement works would be required in respect of pipe laying.

6.12 DIFFICULTIES ENCOUNTERED

No difficulties were encountered while developing this report, the range and scope of desk top data.

7.0 AIR QUALITY AND CLIMATE

7.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the proposed residential development at Cookstown Road, Enniskerry, County Wicklow may have on the receiving environment during the construction and operational phases of the project. The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site; a description and assessment of how construction activities and the operation of the development may impact existing air quality; the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and reduce the impact on the local micro climate; and, finally, a description as to how the development will be constructed and operated in an environmentally sustainable manner.

The development will consist of the construction of 165 dwellings comprising 105 no. houses, 56 no. apartment/duplex dwellings and 4 no. bedroom maisonette dwellings, a 490 sqm creche a below ground level pumping station and all ancillary site development works.

Ian Byrne MSc. Environmental Protection, Dip Environmental & Planning Law, is the Principal Environmental Consultant of Byrne Environmental Consulting Ltd and prepared all aspects of this EIAR Chapter. Ian Byrne has over 25 years-experience in the monitoring and assessment of the air quality and climatic impacts that residential, commercial and industrial developments may have on the receiving environment.

7.2 STUDY METHODOLOGY

The general assessment methodology of the potential impact of the proposed development on has been conducted in accordance with:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 2017 EPA Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements.
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
- The European Commission's "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment" European Commission (2013)
- Planning and Development Regulations 2001, as amended, in particular by the European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Climate Action and Low Carbon Development Act 2015

7.2.1 Air Quality Assessment Methodology

7.2.1.1 Receiving Environment (baseline Scenario)

The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources as follows:

- Environmental Protection Agency's Annual Air Quality in Ireland 2019 Report (Published September 2020);
- Site specific air quality monitoring surveys;

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

7.2.2 Impact Assessment Methodology

7.2.2.1 Legislation and guidance

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

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "*Air Quality Standards*" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (Ref Table 7.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011), which implement European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO. Council Directive 2008/50/EC replaces the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. The European 2008/50/EC Clean Air for Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC. The Directive is implemented by the Air Quality Standards Regulations 2011 which replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2019 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site in Co. Wicklow it is characterised as a Zone D area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones in place in Ireland in 2019 are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold. A summary of the EPA's Annual report entitled Air Quality in Ireland 2019 is detailed below in Table 7.2.

Table 7.1 – Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for the protection of human health – not to be exceeded more than 18 times/year Annual limit for the protection of human health Annual limit for the protection of vegetation	40% until 2003 reducing linearly to 0% by 2010 40% until 2003 reducing linearly to 0% by 2010 None	200 µg/m3 40 µg/m3 400 µg/m3 NO & NO2
Lead	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m3
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year Daily limit for protection of human health – not to be exceeded more than 3 times/year Annual and Winter limit for the protection of ecosystems	150 µg/m3 None None	350 µg/m3 125 µg/m3 20 µg/m3
Particulate Matter PM10	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year Annual limit for the protection of human health	50% 20%	50 µg/m3 40 µg/m3
Particulate Matter PM2.5 Stage 1	2008/50/EC	Annual limit for the protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m3
Particulate Matter PM2.5 Stage 2	2008/50/EC	Annual limit for the protection of human health	None	20 µg/m3
Benzene	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m3
Dust Deposition	German TA Luft Air Quality Standard Note 1	30 Day Average	None	350 mg/m2/day

Note 1 Dust levels in urban atmospheres can be influenced by industrial activities and transport sources. There are currently no national or European Union air quality standards with which these levels of dust deposition can be compared. However, a figure of 350 mg/m^2-day (as measured using Bergerhoff type dust deposit gauges as per German Standard Method for determination of dust deposition rate, *VDI 2129*) is commonly applied to ensure that no nuisance effects will result from industrial or construction activities.

Table 7.2 – EPA 2019 Assessment Zone Classification

Pollutant	EPA 2016 Assessment Classification
NO_2	
Zone A & B	Above lower assessment threshold
Zone C & D	Below lower assessment threshold
SO_2	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
CO	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Ozone	
Zone A & B	Below long term objective
Zone C & D	Above long term objective
PM_{10}	
Zone A & B & C	Above lower assessment threshold
Zone D	Below lower assessment threshold
$PM_{2.5}$	
Zone A & B	Below lower assessment threshold
Zone C & D	Above lower assessment threshold
Benzene	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Heavy Metals (As, Ni, Cd, Pb)	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Poly Aromatic Hydrocarbons (PAH)	
Zone A & C & D	Above lower assessment threshold
Zone B	Above upper assessment threshold

7.2.3 Construction Impact Assessment Criteria

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

The construction dust impact assessment reproduced from the TII guidance, are set out in Table 7.3 below.

Table 7.3 – Assessment criteria for the impact of duct emissions from construction activities with standard mitigation in place (TII 2011)

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

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

In relation to construction related traffic, air quality significance criteria are assessed on the basis of compliance with the appropriate standards air limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.2.4 Operational Impact Assessment Criteria

Once operational, the proposed residential development at Cookstown may impact on air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.2.5 Climate Assessment Methodology

Climate has implications for many aspects of the environment from soils to biodiversity and land use practices. The proposed development may impact on both the macro-climate and micro-climate. The macro-climate is the climate of a large geographic area such as Ireland. The micro-climate refers to the climate in the immediate area.

With respect to microclimate, green areas are considered to be sensitive to development. Development of any green area is generally associated with a reduction in the abundance of vegetation including trees and a reduction in the amount of open, undeveloped space. The removal of vegetation or the development of man-made structures in these areas can intensify the temperature gradient.

To assess the impacts of converting vegetative surfaces to hard-standing with residential buildings and its significance, the amount of vegetative surfaces associated with the proposed development that will be converted to residential buildings and hard-standing has been considered.

The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO_2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The Conference of the Parties to the Convention (COP24) occurred in December 2018 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "*Paris Agreement*", agreed by 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions. The EU, on the 23/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National

Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016.The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for PM2.5 (41% reduction).

The following guidelines and EU Directives relating to Climate Change aspects of EIA reports have been applied to this assessment in order to determine the potential impacts that the proposed development may have an climate change.

- 2017 EPA Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018)
- European EIA Directive 2014/52/EU
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.

7.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

7.3.1 Description of the baseline environment

The subject site is located in Enniskerry, Co. Wicklow in a predominantly peri-urban environment and shall be accessed of the Cookstown Road. The local environs are comprised of one-off housing and some small residential estates. The Lodge on Lovers Lane is located to the southwest of the site. The Powerscourt Estate and Golf Course is located c. 500m west of the site. Another unrelated permitted residential development site (Planning Reg Ref 19/871) is located adjoining the western site boundary.

The development area is located within a zone which includes sources of existing transportation related air emissions principally from local road infrastructure and sources of domestic, retail and commercial building heating. It is noted that there are no other major sources of industrial air emissions within 5km of the site.

The general area surrounding the subject site is currently comprised of existing residential developments and undeveloped agricultural lands. Local residential areas generate emissions to air associated with heating systems.

7.3.2 Description of Existing Climate

The nearest representative synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 28km north of the Enniskerry site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall
Precipitation data from the Dublin Airport meteorological station for the period 2011-2019 indicates a mean annual total of about 762 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature
The annual mean temperature at Dublin Airport (2011-2019) is 9.5ºC with a mean maximum of 15.3ºC and a mean minimum of 4.0ºC. Given the relative close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 7.4 sets out meteorological data for Dublin Airport from 2011-2019.

Table 7.4 – Meteorological Data for Dublin Airport 2011-2019

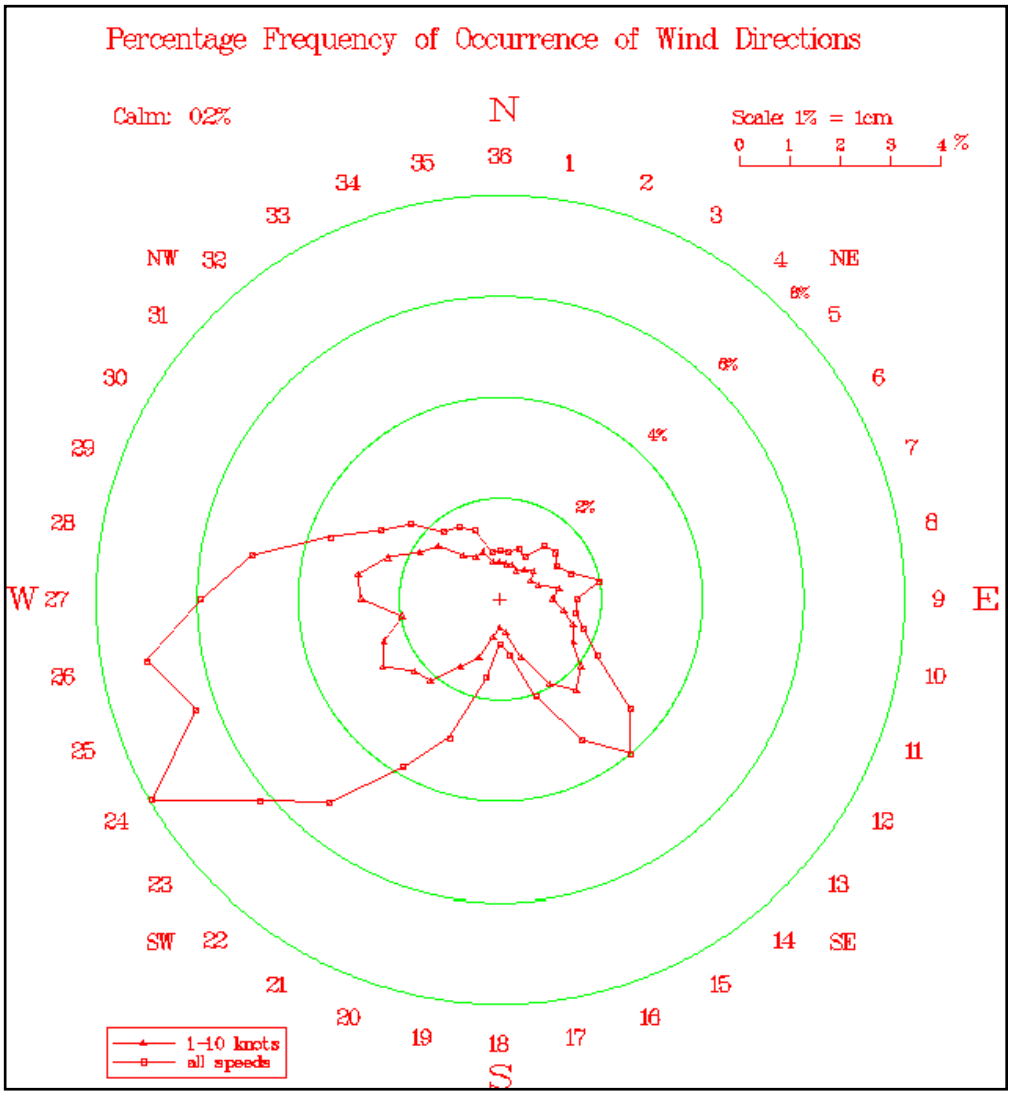
Year	Period	Rainfall (mm)	Maximum mean Temperature (^{0}C)	Minimum mean Temperature (^{0}C)	Mean Temperature (^{0}C)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	725	15.7	4.4	10.1
2017	Annual Mean	661	15.0	5.3	9.9
2018	Annual Mean	709	14.8	4.8	9.7
2019	Annual Mean	886	15.9	5.1	9.6
Mean		767	15.3	4.0	9.5

Note 1: Data supplied by Met Eireann

Wind

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

Figure 7.1 – Windrose for Dublin Airport



7.3.3 Description of existing air quality

The existing ambient air quality at and in the vicinity of the site is typical of an urbanised rural location and as such, domestic and commercial heating sources and road traffic are identified as the dominant contributors of hydrocarbon, combustion gases and particulate emissions to ambient air quality. Agricultural emissions associated with local livestock also contributes to the emissions of Methane and Carbon Dioxide to the atmosphere.

Trends in air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality in Ireland 2019– Key Indicators of Ambient Air Quality*" details the range and scope of monitoring undertaken throughout Ireland. Enniskerry, Co. Wicklow can be catagorised as Zone D.

The most recent 2019 EPA publication includes a number of Zone D monitoring locations which would be broadly comparable to the expected air quality at the subject site. The various Zone D air quality monitoring stations within Ireland provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

Nitrogen Dioxide

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m^3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term NO_2 monitoring was carried out at three Zone D locations in 2019. The NO_2 annual mean for these sites ranged from 4 - 8 µg/m^3. Therefore, long term averages were below the annual average limit of 40 µg/m^3.

Sulphur Dioxide

The Air Quality Standards Regulations 2011 specify a daily limit value of 125 µg/m3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO_2 monitoring was carried out at three Zone D locations in 2019. The daily SO_2 daily means in 2019 for these sites ranged from 0.7 – 6.8µg/m^3. Therefore, long term averages were significantly below the daily limit of 125 µg/m^3.

The annual mean SO_2 concentrations in Ireland have being slightly declining since 2003. This trend is reflective in the shift in fuel choice across Ireland in both residential heating and the energy production sector.

Carbon Monoxide

The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 µg/m^3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at two Zone C locations in 2019 (CO was not monitored in Zone D locations). The 8-hour CO concentrations was 0.1 mg/m^3 in 2019 which is below the 8-hour limit value (on a rolling basis) of 10 mg/m^3.

Particulate Matter PM_{10}

The Air Quality Standards Regulations 2011 specify a PM_{10} limit value of 40 µg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term PM_{10} monitoring was carried out at eight Zone D locations in 2019. The PM_{10} average in 2019 for these sites ranged from 7 - 28µg/m^3. Therefore, long term averages were below the annual average limit of 40 µg/m^3.

Particulate Matter $PM_{2.5}$

The Air Quality Standards Regulations 2011 specify a $PM_{2.5}$ limit value of 25 µg/m^3 over a calendar year.

Long term $PM_{2.5}$ monitoring was carried out at seven Zone D locations in 2019. The $PM_{2.5}$ average in 2019 for these sites ranged from 4 - 15µg/m^3. Therefore, long term averages were below the target value 25 µg/m^3.

Benzene

The Air Quality Standards Regulations 2011 specify a benzene limit value of 5 µg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term benzene monitoring was carried out at one Zone D location. The benzene average in 2019 for Zone D was 0.21 µg/m^3. Therefore, long term averages were below the limit value 5 µg/m^3.

Table 7.5 below presents a summary of the 2019 Air Quality data obtained from the Zone D locations which may be considered to be broadly representative to that of the subject site.

Table 7.5 – Summary of the 2019 Air Quality data obtained from Zone D areas

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2019
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	4 - 8 µg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 µg/m^3	0.7 – 6.8 µg/m^3
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 µg/m^3	100µg/m^3
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	7 - 28µg/m^3
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3	4 - 15 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3	0.21 µg/m^3

7.3.4 Baseline air quality monitoring

A site-specific short-term monitoring study was conducted for Sulphur Dioxide and dust deposition All pollutants were measured at location A1 using a passive diffusion tube over a two-week period. Figure 7.2 identifies the monitoring locations. The baseline survey was conducted during the winter period in December 2020 to January 2021 when domestic heating emissions wound be relatively higher than other seasons in the year.

The monitoring location was chosen in order to obtain short-term sample concentrations for the identified parameters from the principal sources of pollution i.e. vehicle exhaust emissions and home heating fossil fuel emissions from the Cookstown Road and local residential development.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 7.1 above. The survey does, however, aid in identifying the influence of sources in the vicinity of the proposed development site. The results from the monitoring surveys are presented in Table 7.6.

The concentrations of SO_2 and dust deposition levels measured during the short term measurement survey were significantly below their respective annual limit values and comparable with levels reported by the EPA.

Table 7.6 – Results of site air quality monitoring at the Cookstown development site

Pollutant	Sampling period	Concentration A1 Southern Site Boundary	Assessment criteria
Sulphur dioxide	December 2020	0.09 µg/m^3	125 µg/m^3 (as annual average)
Dust	January 2021	17 mg/m^2-day	350 mg/m^2-day

Note 1: Annual limit

Note 2 < value indicates below Laboratory limit of detection

Figure 7.2 – Baseline Air Quality Location A1

7.3.5 Significance

Based on published EPA air quality data for the Zone D area in which the subject site is located together with site specific monitoring data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants. There is therefore currently sufficient atmospheric budget to accommodate the development without adversely impacting existing ambient air quality. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

7.3.6 Sensitivity

The subject site shall be developed by ground clearance and site preparation works and the subsequent construction of residential buildings, a creche and open landscaped areas. The principal local receptors that may be impacted by the development are existing residential developments to the north, east, and northwest of the site and a school located west of the site. Undeveloped agricultural lands to the west and south of the site may also be impacted by dust generated by construction activities if mitigation measures are not implemented.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

When considering a development of this nature, the potential impact on air quality and climate must be considered for each distinct stage: the short (1-3 years) and medium term (3-7 years) impact of the construction phase and the longer term impact of the operational phase. The overall construction phase will be undertaken over a c.2-3 year period. It is important that there are no unacceptable decreases in ambient air quality levels predicted during the construction phases and during the operational phase.

7.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The construction phase of the development has the potential to generate short term fugitive dust emissions during ground preparation and enabling works and from general site construction activities, however, these emissions will be controlled by appropriate mitigation techniques and through the implementation of a construction phase air quality management and monitoring plan throughout the duration of the construction phase to ensure that existing adjacent residential properties and lands will not be adversely impacted by a deterioration in air quality associated with the construction phase.

The operational phase of the development will see the operation of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the building design.

National air quality standards shall not be adversely affected as a result of the short-term construction phase or the operational phase, thus ensuring that the potential for adverse impacts on human health is negligible.

The proposed development does not include the construction of any tall (high) structures which may impact on the local micro climate by means of shadowing effects or wind sheer effects, therefore the proposed development will not to have an adverse impact on shading or temperature profiles at the nearest existing residential properties or on the local receiving environment in the vicinity of the site boundaries.

Road traffic and residential heating are the typical sources of greenhouse gas emissions associated with a residential or mixed-use development. EPA guidance states that a development may have an influence on global climate where it represents *"a significant proportion of the national contribution to greenhouse gases".*

7.5.1 Potential Impacts – Construction & Operational Phases

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the local receiving environment, on adjacent residential properties and on human health which are considered with regard to National Air Quality Standards designed to protect human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this section of the EIAR. The mitigation measures are described in Section 7.8 and the predicted impacts in Section 7.9.

7.5.2 Potential Construction Phase Impacts

Air quality

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

- Enabling works - Site set up and Site clearance
- Construction works including site infrastructure, buildings and landscaping

Construction impacts with both of these phased stages are considered below.

Enabling works - Site Set Up and Clearance

Works activities associated with the '*Site set up'* will be undertaken prior to construction works commencing in each sub-phase. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These temporary activities will have a minimal potential to generate fugitive dust emissions or combustion gas emissions.

Site clearance and ground excavation works will be undertaken in separate phases and these activities have the potential to generate fugitive windblown dust emissions rising from the operation of mechanical plant such as dozers, excavators and tipper trucks and the movement of these vehicles on exposed surfaces at the site. With regard to the phased development approach, only one phase at a time shall be developed with the remaining phased areas remaining generally undisturbed until such a time as they are developed. Infrastructural works will be required to facilitate site services but it is not predicted that there would be bulk excavations of stripped soils until such a time as the development of subsequent phases are commenced.

With regard to the volume of waste material (top and sub soils) generated during site clearance, there will be a requirement for HGV trucks to remove the material from the site. Stripped top-soils shall be stockpiled and covered on site for re-use during final landscaping works. Trucks shall be loaded with material on-site by mechanical excavators and loading shovels which will generate fugitive dust emissions as a result of the transfer of the excavated materials comprised principally of soils and stones from stockpile to truck.

The movements of construction vehicles on the site shall also generate windblown dust emissions. Where dusty waste material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

It is estimated that there will be a maximum of 80 movements per day associated with site clearance works. It is predicted that these works will occur for an approximate 2 - 3 month period.

The impact on local air quality during Site Set-Up and Clearance will be temporary in nature and will result in a potentially minor negative impact on local air quality and sensitive receptors.

Building and Site Infrastructure Construction Works

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site which have the potential to generate fugitive windblown dust emissions.

Construction equipment including generators and compressors will also give rise to some exhaust emissions. However, due to the size and nature of construction activities, exhaust emissions during construction will have a negligible and neutral impact on local air quality and therefore on human health.

Construction traffic to and from the site shall result in a short-term increase in the volume of diesel fueled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts.

In the absence of mitigation, the construction phase activities has the potential to result in a minor negative impact on local air quality.

Climate

During the construction phase, existing vegetated areas throughout the development site will be removed due to site clearance works and associated movement of construction traffic thus impacting the micro-climate. Whilst this will impact the evapotranspiration rates of vegetation, there will be no impact upon the moisture evaporation from the exposed soil. Therefore, there will be no impacts on the local micro-climate.

CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and use of plant. However, emissions associated with such activities will occur over a short-term period (c. 2-3 years) which will not result in a negligible and neutral impact on the local micro or the broader macro climate.

7.5.3 Potential Operational Phase Impacts

Air quality

The operational phase of the proposed development has the potential to result in a slight negative impact for the lifetime of the development on local air quality primarily as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Traffic Emissions

The Traffic and Transportation Assessment Report prepared by Barrett Mahony Consulting Engineers includes a detailed assessment of the traffic impact associated with the proposed development. As part of this assessment,

detailed traffic flow information as Annual Average Daily Traffic (AADT) has been derived for the existing road network for the “No development” and the “With development” scenarios.

The percentage traffic increase associated with the development has considered existing junctions on the local road network and the entrance to the development as detailed in Table 7.7.

Table 7.7 –% Increase in traffic at junctions

Junction	Generated Traffic		Percentage Increase	
	AM	PM	AM	PM
Development Entrance / L1020	104	130	57	120
L1020 /R760	54	82	10.7	11.6
L1020 / R117	54	48	12.1	10.2
N11 / R117	27	29	0.41	0.44

The UK DMRB guidance (UK Highways Agency, 2020), on which the TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes is based, states that road links meeting one or more of the following criteria can be defined as being ‘affected’ by a proposed development and should be included in the local air quality assessment:

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

There will be a negligible impact on local air quality as a result of increased traffic movements associated with the proposed development as none of the above criteria will be reached or exceeded.

House Emissions

The design and construction of all buildings in accordance with National Building Regulations *(The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings)* shall ensure that modern building materials are used and that they are designed to be thermally efficient resulting in a reduction in the volume of fossil fuels required to heat the buildings. It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be minor and ongoing for the life of the development and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

In order to counteract the potential impact of the development on the existing and future climate, the design of the proposed residential apartments and houses incorporates a number of sustainable heating and energy saving features.

Climate

The overall area of the development lands will include open space and landscaped areas. The overall development includes the construction of buildings and roadways which will have the effect of marginally raising localised air temperatures, especially in summer. It is predicted that the proposed development will have a negligible impact on the local micro-climate.

The development of open areas on the site will continue to contribute albeit in a minor way to the adsorption of Carbon Dioxide from the atmosphere and the release of Oxygen to the atmosphere.

The proposed development includes apartment structures which will have a minor impact on the local micro-climate by means of wind sheer effects. There will however be no long-term negative impact within or beyond the overall site.

Greenhouse gases occur naturally in the atmosphere (e.g. carbon dioxide, water vapour, methane, nitrous oxide and ozone) and in the correct balance, are responsible for keeping the lower part of the atmosphere warmer than it would otherwise be. These gases permit incoming solar radiation to pass through the Earth’s atmosphere, but prevent most

of the outgoing infrared radiation from escaping from the surface and lower atmosphere into the upper levels. However, human activities are now contributing to an upward trend in the levels of these gases, along with other pollutants with the net result of an increase in temperature near the surface.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines together with the low volume of traffic movements that will be associated with the development at local road junctions as detailed in Table 7.7 above.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces at each apartment block to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The scheme has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no "*traditional*" passive air vents in the apartments which are both thermally and acoustically inefficient. Mechanical Ventilation and Heat Recovery (MVHR) systems shall be incorporated into the design of the apartments. The MVHR systems together with thermally and acoustically rated window sets will reduce the potential future impacts that the external climate will have in terms of wind and changing temperatures on the internal environment within the residential units. These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

7.6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This section provides the measures that shall be implemented during the construction and operational phase and into the design of the development to minimise the impacts on the receiving environment, local population and human health, livestock and agricultural lands, local flora and fauna, local businesses and on climate.

7.6.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AQ CONST 1: Air Quality Mitigation Measures

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles

are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.

- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the north, south, east and western site boundaries to minimise fugitive windblown dust emissions falling on third party lands and existing residential areas.

7.6.2 Operational Phase

The Operational Phase of the Cookstown development site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

The elements of the development designed to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AQ OP1: Climate Impact Mitigation Measures

- Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.
- All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be “Nearly Zero Energy Buildings” (NZEB’s) by 31st December 2020.
- In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:
  - Passive solar design including the orientation, location and sizing of windows
  - The use of green building materials: low embodied energy & recycled materials
  - Energy efficient window units and frames with certified thermal and acoustic insulation properties
  - Building envelope air tightness
  - Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
  - Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating in all units;
- Inclusion of electric car charging points to encourage electric vehicle ownership;
- Proximity of Bus Eireann and private bus operator’s commuter services;
- Provision of open landscaped areas, to encourage residents to avail of active lifestyle options;

7.7 PREDICTED RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

7.7.1 Construction Phase

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, human health and climate. However, the potential construction phase impacts shall be mitigated as detailed above to ensure the impact on ambient air quality is short-term and not significant for the duration of all construction phase works. The generation of fugitive dust emissions will be the principal impact on local air quality during the construction phase and this impact will be mitigated to a short-term, not significant impact through the implementation of mitigation measures. With the implementation of mitigation measures, other residual impacts during the construction phase will be short-term and not significant.

7.7.2 Operational Phase

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase of the development at Cookstown will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.
It is predicted that the operational phase of the development will not generate air emissions that would have a long-term negative effect on local ambient air quality or local human health or local livestock welfare.

It is predicted that there will be a negligible impact on local air quality generated by increased traffic movements associated with the development.

7.8 CUMULATIVE IMPACTS

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

The cumulative air quality impact of the proposed residential development, existing development and an adjoining proposed residential development (Planning Ref 19/871 and a residential development comprising 6 No. detached dwellings on a site to the north east (Planning Ref.16/976) and local transport infrastructure have been assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient *"atmospheric budget*" to facilitate the proposed development.

This section has considered the cumulative impact of the proposed development in conjunction with future and current developments in the vicinity of the subject site.

It is considered that, in the absence of mitigation measures, there will be the potential for a short term slight negative cumulative impact associated with the construction phase of the subject development and other local developments on ambient air quality and climate.

Should the construction phase of the proposed development coincide with the construction phase of other local construction developments, there is the potential for cumulative dust emissions to impact the nearby sensitive receptors during the construction phases. The dust and air quality mitigation measures outlined above will be applied throughout the construction phase of the proposed development and similar best practice mitigation measures are also required for the construction phase of other developments which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality and climate associated with the construction phase of the proposed development are predicted to be short-term and slight.

The operational phases of the subject development and other permitted residential developments in the local area will not generate cumulative air emissions that will have an adverse impact on local ambient air quality. Measured baseline air quality and National published air quality data confirm that the existing air quality is good and that the operational phases of the subject development and other local proposed developments will have a long-term imperceptible impact on existing air quality.

7.9 'DO NOTHING' IMPACT

The subject site is currently comprised of agricultural lands and if they remain undeveloped the site will continue to have no adverse impact long-term impact on existing ambient air quality or on the local micro-climate. Intermittent minor dust related impacts may occur during periods when the lands are being worked for agricultural purposes.

Based on the projected increase in traffic up to the reference year of 2038, the increase in traffic related emissions, based on projected Traffic Impact Assessment figures without the subject development would be insignificant. This increase above the existing situation would be minor and would not result in a perceptible change in the existing local air quality environment.

7.10 RISK TO HUMAN HEALTH

7.10.1 Construction Phase

Mitigation measures are proposed for the construction phase as detailed in Section 7.6 focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be negative, short-term and imperceptible with respect to human health.

7.10.2 Operational Phase

Operational traffic emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values which are designed for the protection of human health and therefore, will not result in an adverse or harmful impact on human health.

The impact of the proposed development during both construction and operational phases together with other proposed residential developments in the local Enniskerry area will not result in an adverse risk to human health in the local area.

7.11 MONITORING

7.11.1 Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust, particulates and construction vehicle exhaust emissions as NO_2 generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

7.11.2 Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

Figure 7.3 – Dust Monitoring (D1 – D4), NO_2 Monitoring (A1) PM10 & 2.5 Monitoring (PM) Locations

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during the construction phase. The proposed monitoring locations (D1 – D4) are presented below in Figure 7.3.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per *German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic)* is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

PM10 & PM2.5 Monitoring Methodology

Fine particulate matter as PM_{10} and $PM_{2.5}$ shall be monitored using continuous data logging air quality monitoring instrumentation during site preparation and soil stripping works. The monitoring system shall be located in proximity to Powerscourt National School.

NO_2 Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1 year period at the baseline air quality locations, A1. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO_2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone C areas over a similar period. NO_2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m^3, for the protection of human health, over a calendar year.

7.11.2 Operational Phase Monitoring

Monitoring will not be required during the operational phase of the development.

7.12 REINSTATEMENT

Reinstatement issued are not relevant to this Chapter of the EIAR, with regard to the construction and operational phases.

7.13 INTERACTIONS

The interactions between Traffic and Air & Climate have been considered in this chapter and the traffic data used was obtained from the traffic and transport consultant, for the proposed development which is set out in Chapter 12 of this EIAR and the accompanying Traffic and Transportation Assessment Report.

The interactions between Air & Climate impacts and Population and Human Health have been addressed in this chapter. Section 7.6 describes in detail the mitigation measures that shall be implemented to ensure that human health, residential amenity and livestock welfare are not adversely impacted by any aspect of the construction or operational phases of the development. Residual impacts are considered in Section 7.7.

There is also the potential for interactions with Biodiversity in terms of flora and fauna. similarly, the mitigation measures have also been designed to minimise the potential impact that the construction and operational phases of the development may have on the receiving environment which includes flora and fauna.

The concept of control and attenuation at source of potential emission sources that may impact the receiving environment is the principle that has been adapted in the design, construction and operational phases of the development.

7.14 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

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

8.0 NOISE AND VIBRATION

8.1 INTRODUCTION

This section of the EIAR has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential noise and vibrational impacts associated with the proposed presidential development at Cookstown Road, Enniskerry, County Wicklow during both the Construction and Operational Phases of the development.

This document includes a comprehensive description of the receiving ambient noise climate in the vicinity of the subject site; a description of how the construction and operational phases may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on ambient noise levels and the proposed acoustic design features required to minimise the impact of external noise sources on the residential units.

The mitigation measures designed for the development shall demonstrate how the development shall be constructed and operated in an environmentally sustainable manner in order to ensure its minimal impact on the receiving noise climate and to provide adequate sound insulation in residential units from external sound sources and adjoining residential properties.

Ian Byrne MSc. Environmental Protection, Dip Environmental & Planning Law, Member of the Institute of Acoustics, is the Principal Environmental Consultant of Byrne Environmental Consulting Ltd and prepared all aspects of this EIAR Chapter. Ian Byrne has over 25 years experience in the monitoring and assessment of noise and vibration impacts that the construction and operation of residential, commercial and industrial developments may have on the receiving environment.

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

8.1 STUDY METHODOLOGY

The general assessment methodology of the potential noise and vibrational impacts that the proposed development will have on the receiving environment has been prepared in accordance with:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 2017 EPA Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
- Environmental Protection Agency, 2015. Draft Advice Notes for Preparation of Environmental Impact Statements
- Development Management Guidelines (DoEHLG, 2007).
- Planning and Development Regulations 2001, as amended by European Union (Planning & Development) (Environmental Impact Assessment) Regulations 2018.

8.2.1 Noise Assessment Methodology

Baseline Environment

The baseline noise environment in the vicinity of the proposed development site has been defined by field surveys conducted during December 2020 at the closest noise sensitive receptors to the site boundaries. Sound level measurements were conducted in favourable weather conditions when there was no precipitation and when mean windspeeds were <5m/sec.

The existing ambient noise climate in the vicinity of the site has been characterised with information obtained from site specific baseline noise surveys conducted in the vicinity of the closest noise sensitive receptors to the subject site. Baseline noise surveys were conducted in accordance with *ISO 1996-1: 2017*: *Acoustics – Description,*

measurement and assessment of environmental noise and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

8.2.2 Impact Assessment Methodology

The impact of the proposed development has been determined through prediction of future noise levels associated with the scheme using established calculation techniques.

Construction noise and vibration impacts have been assessed in accordance with Transport Infrastructure Irelands (TII) guidance document *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014*). Indicative construction noise calculations have been undertaken using the methodology set out in *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1 2014.*

Impacts associated with road traffic movements on the development when operational have been assessed with regard to the NRA's *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014*). *UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN]* and the *Highways Agency Design Manual for Roads and Brides Part 7 HD 213/11 – Revision 1 Noise and Vibration.*

The operational phase of the development has been assessed with regard the *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Acoustic design of apartments refers to the 2018 Ministerial Guidelines "Sustainable Urban Housing – Design Standards for New Apartments. Paragraph 1.18 of the document refers specifically to the Building Regulations Technical Guidance Documents and states that the construction of the apartment building shall comply with all relevant requirements.

8.2.3 Construction Impact Assessment Criteria

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

Table 8.1 – BS5228-2014 Construction Phase Noise Limit Criteria

Construction Phase Noise Limit Criteria		
Location / Day	**Assessment Period**	**External Noise Limit Criteria**
All Receptors Monday to Friday	07:00hrs – 19:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Monday to Sunday Nightime	23:00hrs – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday	07:00hrs – 14:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Nightime	23:00 – 07:00hrs	Article I. B(A), $L_{Aeq, 1hr}$

8.2.4 Operational Impact Assessment Criteria

Relative impact assessment criteria associated with road traffic noise is set out in Table 8.2 below.

Table 8.2 – Likely impact associated with change in traffic noise level

Change in sound level (L_{10})	Subjective reaction	Impact
<3	Inaudible	Imperceptible
3-5	Perceptible	Slight
6-10	Up to a doubling of loudness	Moderate
11-15	Over a doubling of loudness	Significant
>15		Profound

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would however be noticeable and, depending on the final noise level, there may be a slight or moderate noise impact. Changes in noise level in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or

significant. However, a significant change in traffic volumes or traffic category i.e. increase in the use of a road by HGVs, would be required to result in such increases.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow.

Traffic noise levels in excess of 60dBA (L_{DEN}) are considered to be potentially intrusive. L_{DEN} is the day-evening-night composite noise indicator for assessing overall noise annoyance. For new roads projects the National Roads Authority design goal is to mitigate when predicted levels exceed 60dB L_{den}. However, for existing roads the Dublin Agglomeration, within the Noise Action Plan, have set a level of 70dB (L_{Day}) and 55dB (L_{Night}) above which mitigation measures should be considered.

The World Health Organisation (WHO) in their 2018 publication entitled *Environmental Noise Guidelines for the European Region* has proposed new guidelines for community noise. In this guidance, a L_{DEN} threshold daytime noise limit of 53dB is suggested to protect against adverse health effects. L_{NIGHT} Levels of 45dB or less are proposed at night-time to protect against adverse effects on sleep.

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

Professional Practice Guidance on Planning & Noise: New Residential Developments 02017)(ProPG), IOA is considered in the assessment of the operational phase of the residential development in terms of ensuring that the development will not be adversely impacted by external transport related noise sources.

8.2.5 Vibration Assessment Methodology

Impact Assessment Methodology

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Construction impacts have been assessed in accordance with *BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.*

Operational impacts have been assessed in accordance with the Transport Infrastructure Ireland, TII (formerly NRA) Guidelines for the Treatment of Noise & Vibration in National Road Schemes.

8.2.6 Construction Impact Assessment Methodology

Table 8.3 details the limits above which cosmetic damage could occur for transient vibration. Minor damage is possible at vibration magnitudes which are greater than twice those shown in Table 8.3, and major damage to a building structure would only generally occur at values greater than four times the tabulated values. These values only relate to transient vibration. If there is a continuous vibration, the guide values shown in Table 8.3 shall be reduced by up to 50%.

This guidance is reproduced from *BS 5228-2:2009+A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 – Vibration and BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration.*

Table 8.3 – Transient vibration guide values for cosmetic damage

Type of building	PPV (mm/s) in frequency range of predominant pulse	
	4-15Hz	15Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50mm/s at 4Hz and above.	50mm/s at 4Hz and above.
Unreinforced or light framed structures. Residential or light commercial buildings.	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.

Table 8.4, reproduced from *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014* outlines the vibration levels (in terms of PPV) from construction activities and their likely effect on humans.

Table 8.4 – Guidance on the effect of construction vibration levels on humans

Vibration Level (PPV)	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

8.2.7 Operational Impact Assessment Methodology

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes.

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

8.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

8.3.1 Description of the baseline environment - Environmental Noise Context

The subject site is located in Enniskerry, Co. Wicklow in a predominantly peri-urban environment and shall be accessed off the Cookstown Road. The local environs are comprised of one-off housing and some small residential estates. The Lodge on Lovers Lane is located to the southwest of the site. The Powerscourt Estate and Golf Course is located c. 500m west of the site. Another unrelated permitted residential development site (Planning Reg Ref 19/871) is located adjoining the western site boundary. The Powerscourt National School is located to the northwest of the site.

The general area surrounding the subject site is currently comprised of existing residential developments and undeveloped agricultural lands. Local road traffic movements and agricultural activities are the most dominant noise sources at the current site.

Local road traffic noise associated with the Cookstown Road which runs adjacent to the northern site boundary has been determined to the principal source of noise that may impact the proposed development. The N11 Shankhill-Bray By-Pass is located c. 2km east of the site, however a review of the EPA's Round 3 Road Noise Mapping demonstrates that the impact of motorway traffic noise will be below 55dB during the daytime and below 50dB as shown below in Figures 8.1 and 8.2 respectively. The subject site is therefore not adversely impacted by N11 road traffic noise.

Figure 8.1 – EPA Lden Strategic Noise Map of N11

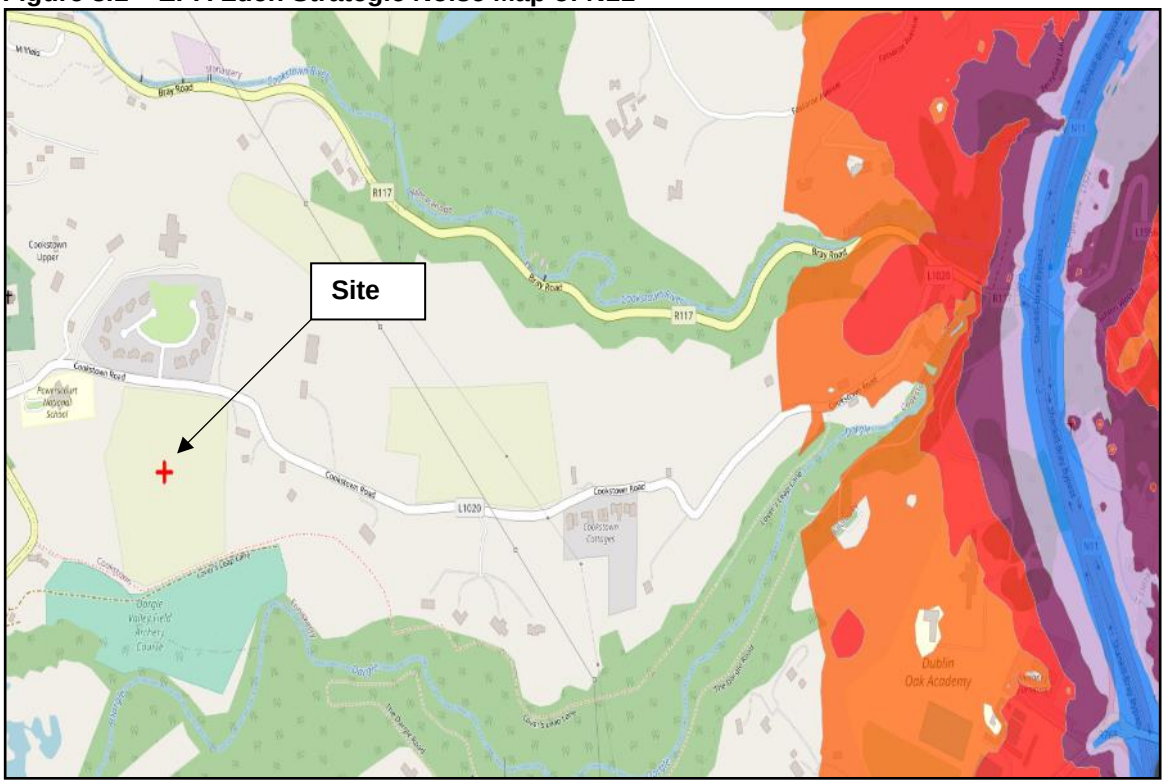
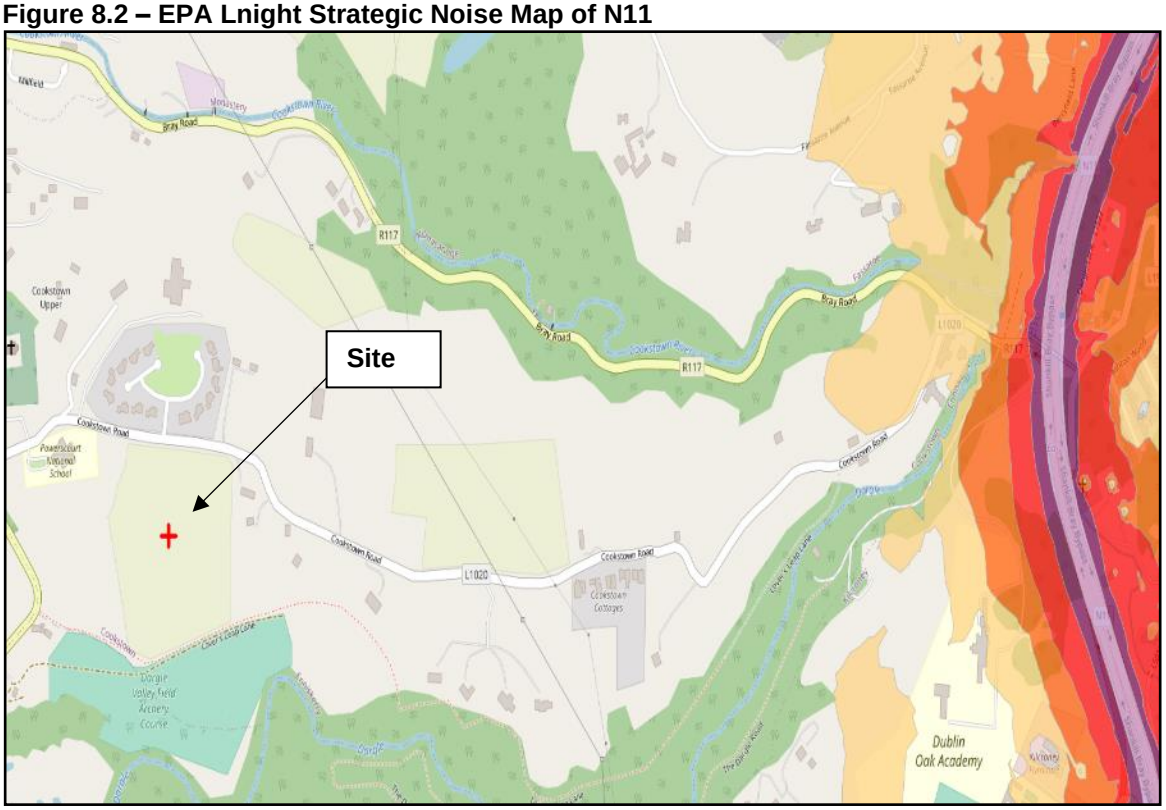


Figure 8.2 – EPA Lnight Strategic Noise Map of N11



8.3.2 Baseline environmental noise survey

Baseline noise data in the vicinity of the closest noise sensitive receptors to the proposed development site boundaries has been obtained from noise monitoring surveys conducted by Byrne Environmental Consulting Ltd during December 2020 during normal traffic movement periods. The baseline monitoring locations were selected in accordance with *ISO 1996,2, 2017: Acoustics – Description, Measurement and Assessment of environmental noise* and the 2016 EPA publication, *"Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* and included locations in proximity to existing residential dwellings adjacent to the development areas and within the site itself to assess the inward impact of local road traffic noise within the site.

8.3.3 Measurement locations

Baseline noise measurement surveys were conducted at N1 & N4 as shown in Figure 8.3 below located adjacent to the development site during the 16th and 17th December 2020 during suitably dry and calm (<5mm/sec) wind conditions. The purpose of these surveys was to characterise the existing ambient noise climate at boundaries and receptors which will allow for the impact of construction noise at off-site receptors to be established.

Baseline surveys were conducted under free-field conditions at a height of approximately 1.5m above ground and approximately 3.5m away from reflecting surfaces for a period of 24 hour periods at each on-site location in order to obtain detailed noise data and assess the existing noise climate at the locations accurately.

Table 8.5 – Baseline noise measurement locations

Location N1	Powerscourt National School
Location N2	Enniskerry Demesne houses
Location N3	Houses adjacent western site boundary
Location N4	Southwestern site boundary

The noise parameters used to describe the existing ambient noise climate are described as follows:

L_{Aeq}:	The equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
L_{A10}:	The sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
L_{A90}:	The sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
L_{Amax}:	The instantaneous maximum sound level measured during the sample period.
1/3 Octave band analysis	The frequency analysis of a sound such that the frequency spectrum is subdivided into bands of one-third of an octave each. Used to determine tonal components of a sound source.
L_{Amax}:	The instantaneous maximum sound level measured during the sample period.
L_{den}	Day-evening-night indicator 24hrs
L_{day}	Day indicator 07:00hrs – 19:00hrs
L_{night}	Night indicator 23:00hrs – 07:00hrs
$L_{evening}$	Evening indicator 19:00hrs – 23:00hrs

Noise levels are measured using a logarithmic noise scale (decibel) and are denoted dBA. The "A" indicates that a frequency weighting has been applied to allow for the variation in the sensitivity of the human ear.

Figure 8.3 – Baseline Noise Monitoring Locations N1 – N4

8.3.4 Baseline noise and vibration measurement results

Table 8.6 – Location N1 Powerscourt National School

Period 17.12.20 10:30hrs Off site receptor –	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,1hr}$	$L_{A10\ 1hr}$	$L_{A90\ 1hr}$	L_{AMax}
Daytime period 07:00 – 19:00hrs Construction Hours	60	62	56	87
Nightime Period 23:45hrs	47	50	44	72

The noise climate at N1 is moderately influenced by traffic on the Cookstown Road through the daytime period.
Recorded vibration levels were negligible (<0.125mm/sec PPV) during the survey period at Location N1.

Table 8.7 – Location N2 Enniskerry Demesne

Period 16.12.20 11:15hrs Off-site receptor	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,1hr}$	$L_{A10,1hr}$	$L_{A90,1hr}$	L_{AMax}
Daytime period 07:00 – 19:00hrs Construction Hours	56	58	48	85
Nightime Period 05:15hrs	47	50	42	71

The noise climate at N2 is moderately influenced by traffic on the Cookstown Road and occasional traffic movements to and from the estate throughout the daytime period.
Recorded vibration levels were negligible (<0.125mm/sec PPV) during the survey period at Location N2.

Table 8.8 – Location N3 Eastern site boundary

Period 16.12.20 09:30hrs Off-site receptor	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,1hr}$	$L_{A10,1hr}$	$L_{A90,1hr}$	L_{AMax}
Daytime period 07:00 – 19:00hrs Construction Hours	52	53	46	69
Nightime Period 06:00hrs	40	45	38	59

The noise climate at N3 is relatively quiet with daytime agricultural activities in the local area being the most notable noise source.
Recorded vibrationlevels were negligible (<0.125mm/sec PPV) during the survey period at Location N3.

Table 8.9 – Location N4 Southern site boundary

Period 17.12.20 12:45hrs Off-site receptor	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,1hr}$	$L_{A10,1hr}$	$L_{A90,1hr}$	L_{AMax}
Daytime period 07:00 – 19:00hrs Construction Hours	54	56	47	73
Nightime Period 05:30hrs	39	41	35	60

The noise climate at N4 is relatively quiet with daytime agricultural activities in the local area being the most notable noise source.
Recorded vibration levels were negligible (<0.125mm/sec PPV) during the survey period at Location N4.

EPA Round 3 Road Noise Mapping Assessment

In order to further establish existing background noise levels associated with the identified dominant noise source identified as being road traffic on the Cookstown Road, a 24-hour noise survey was conducted along the northern site boundary adjacent to the Cookstown Road.

Desirable and undesirable sound levels are defined in the *Wicklow Noise Action Plan 2018-2023* as follows:

Desirable Levels 24-hour Day-Evening-Night Noise Value <70dB(A) Lden

Desirable Nighttime Noise Value <57 dB(A) Lnight

Table 8.10 – 24-hour noise data at Cookstown site

Source	Measured Lden dB(A)	Limit Criteria Lden dB(A)	L_{Night} dB(A)	Limit Criteria L_{Night} dB(A)
Road Traffic	56	<70	45	<55

8.3.5 Significance

It may be concluded that the impact of road traffic noise on the proposed development is below the Lden and Lnight unacceptable noise limit criteria s specified in the *Wicklow Noise Action Plan 2018-2023* and that the proposed development will not be subject to unacceptable or adverse road traffic noise.

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of 165 dwellings comprising 105 no. houses, 56 no. apartment/duplex dwellings and 4 no. bedroom maisonette dwellings, a 490 sqm creche, open space areas, a below ground level pumping station and all ancillary site development works.

Short term noise exposure during the construction phase must be managed and controlled to acceptable levels. There are a number of existing residential noise sensitive receptors located in proximity to the development site boundaries. It is fundamental that the proposed development or any aspect of the proposed development must not adversely impact the existing noise levels experienced at these receptors over the long term.

The operation of the proposed development will not include any commercial or retail activities and noise associated with its operation will be limited to normal domestic activities such as internal residential vehicle movements, children playing, pedestrians, bin collections and occasional delivery van movements.

8.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the receiving on the local receiving noise environment, on adjacent residential properties and on human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this chapter of the EIAR. Cumulative impacts are detailed in Section 8.7. The mitigation measures are described in Section 8.8 and the predicted impacts considering the mitigation measures are presented in Section 8.9.

8.5.1 Potential Construction Impacts

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

- Enabling works - Site set up and Site clearance
- Construction works including infrastructure and building construction and landscaping

Enabling works - Site Set Up and Clearance

Works activities associated with the ‘Site set up’ will be undertaken prior to construction works commencing. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These short-term activities will have a minimal potential to generate excessive noise levels.

The proposed development involves the ground clearance of the existing site to facilitate the proposed development including buildings, internal roads and hard standing areas, services and landscaped areas.

Site clearance, levelling and an element of ground excavation shall also occur at this stage. A variety of items of plant will be in use during site clearance and ground excavation. These will include excavators, dump trucks, compressors and generators. The operation of these items of plant has the potential to generate short term elevated noise levels beyond the site boundary.

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

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

In the absence of mitigation, the impacts arising from the enabling works in terms of noise have the potential to propagate beyond the site boundaries.

Main Construction Works

The proposed development consists of a strategic housing development involving the construction of residential units in a mix of houses, apartments and duplex apartments, internal roads, cycle and pedestrian infrastructure, green open spaces, and site service infrastructure.

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site, and construction traffic, which will all generate noise. The highest noise levels will be generated during the general construction activities. The construction noise levels will be of relatively short-term duration and will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors.

It is predicted that the construction phases shall result in a short-term increase in noise levels in the area as well as introducing tonal and impulsive noise as a result of construction activities such as pneumatic breaking, cutting, excavating, vehicle movements and general manual construction activities.

Due to the phased nature of the development which will occur over an approximate 2-year period, there will be slight to moderate short-term negative impacts on the existing residential estate and houses and receptors located opposite the site boundaries.

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

The proposed construction phase noise mitigation measures as detailed in Section 8.7 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Vibration

Vibration impacts have been considered from various plant items that have the potential to generate perceptible levels of vibration.

The nearest residential receptors to the site boundary are located further to the east (*'Tinnabeg'* c. 29m and *'Pine Heights'* c. 16m) Depending on the methods of construction, there is the possibility of construction related vibration impacts on human beings as a result of ground preparation and foundation excavation activities resulting in a potential short-term and slight impact.

8.5.2 Potential Operational Phase Impacts

The potential noise aspects to be considered for the completed operational development are as follows:

General activity noise from pedestrians, residents and vehicles and the living sound of a residential neighbourhood

Traffic noise impacts

Noise associated with the sub-terranean Waste Water Pumping Station

8.5.3 'Do Nothing' Scenario

If the site remains undeveloped it shall continue to have no noise or vibrational impact on the receiving environment. Based on the projected increase in traffic the increase in traffic noise levels in the area without the subject development would be < 3dB. This increase above the existing situation would be minor and would not result in an perceptible change in the existing noise climate at any local receptor.

8.6 CUMULATIVE NOISE IMPACTS

In accordance with *Schedule 6, Part 2(c) of the Planning and Development Regulations 2001-2018*, this section has considered the cumulative impact of the proposed development in conjunction with existing adjacent development and future development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The potential and predicted impacts of the operational phases of the proposed development have been individually assessed.

Other lands adjoining the eastern site boundary have may be developed for residential housing in accordance with (Planning Reg Ref 19/871) in the future. A further permission (16/976) comprising 6 no. detached dwellings on a site to the north east may also be developed. Other developments in the area are located to the west of the village center and will not contribute to the noise environment in the vicinity of the subject site. The noise impacts associated with future adjacent residential developments will be similar to the noise generated by the subject residential development in that the construction phases will generate short term slight to moderate impacts and the impact of the operational phase will be long-term and not significant.

It is considered that there will be short-term slight to moderate negative cumulative impacts in terms of noise associated with the construction phase of the subject development and the adjoining permitted development should construction activities at each site occur at the same time. However, it is predicted that there will be an overall long term positive cumulative impact as a result of the proposed development, due to the modern residential buildings, significant public open spaces and amenity areas and facilities that are being provided for existing and new residents of the area.

Once the subject development is completed and if the lands to the east are developed there will be no residual adverse noise impact on the receiving environment associated with their operation. Increased traffic movements associated with both developments will generate a long-term not significant impact on the local noise climate during peak hour times.

8.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

8.7.1 Construction Phase

General Construction Site Management

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:

NV CONST 1 Noise Mitigation Measures

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

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

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

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

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

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

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

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

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

Construction Phase Noise Control & Mitigation

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

NV CONST 2 Construction Works Noise Mitigation Measures

- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.
- The Developer shall appoint an acoustic consultant independent of the Contractor to conduct routine noise audit surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Section 8.2.3 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.
- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section.
- Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.
- Where reasonable, practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.
- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order
- Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable.
- Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.
- Selected use of rubber-tyred equipment over steel track equipment where practicable.
- The use of inherently quiet plant is required where appropriate – all compressors and generators will be “sound reduced” or “super silent” models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.
- All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.
- Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
- Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.
- Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.
- Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.

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

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

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

- Excessive reviving of all vehicles shall be avoided.

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

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

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

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

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

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

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

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

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

The images below describe the use of localised noise screens that shall be used during construction activities.

Double height acoustic blanket enclosure

Acoustic blankets screening excavations

3 sided Acoustic enclosure for surrounding breaking, cutting works

Construction Phase Vibration Control & Mitigation

The following specific vibration mitigation and control measures shall be implemented during the construction phase:

NV CONST 3 Vibration Mitigation Measures

- Breaking out concrete elements using low vibration tools
- Choosing alternative, lower-impact equipment or methods wherever possible
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day
- Routing, operating or locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.
- Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest

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

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

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

As detailed in Section 8.2.2 the transient vibration guide values for cosmetic damage as specified in British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz. This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels.

The following mitigation is proposed:

N V CONST 4

In order to protect the amenities enjoyed by nearby residents and premises a full Construction and Environmental Management Plan (CEMP) (including traffic management) shall be included in the application documentation The CEMP will include the mitigation measures set out in this section.

8.7.2 Operational Phase Noise Mitigation

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focussed on this building element to ensure that their insulation is adequate. All apartments shall have external windows shall have acoustically rated windows to prevent breakthrough of external noise. In addition, Heat Recovery and Mechanical Ventilation systems will be incorporated into the design thus there will be no requirement for passive air vents.

All houses shall have acoustically rated double glazed windows.

Acoustic Design requirements for residential buildings

Windows
In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (R_W):

40dB R_W for Living rooms & Bedrooms
37dB R_W for Kitchen – Dining Rooms.

The acoustic performance specifications detailed are the minimum requirements which shall apply to the overall glazing system when installed on site. 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. All exterior wall and door frames will be sealed tight to the exterior wall construction.

Ventilation Systems
The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

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

Roof Construction

The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 40dB Rw to be used for roof spaces. At the earliest stage during the construction phase, residential test units shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.14 above provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoining residential units and to assess compliance with external noise intrusion criteria as defined in *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.*

As set out in Section 8.5.1 the operational phase of the development is predicted not to have an adverse noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

N&V OPERA 2

8.7.3 Internal Noise Control – Residential Units

At the earliest stage during the construction phase, test apartments and houses shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 7 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin residential units.

Table 8.11 – Recommended sound insulation values for internal party walls / floors

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

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.* This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as detailed in Table 8.15. All residential units shall be designed to achieve the specified ambient noise design range.

Table 8.12 – Recommended Indoor Ambient Noise Levels from BS 8233:2014

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

8.7.4 'Worst-case' scenario

The worst-case scenario would be that the attributes and mitigation measure were not carried out and subsequently not appropriately enforced by the local authority.

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

8.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

8.8.1 Construction noise predictions

The predicted construction noise levels that will be experienced at the nearest residential receptors as a result of construction activities have been calculated using the activity L_{Aeq} method outlined in *BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.*

Tables 8.11 to 8.12 detail assumed plant items during the key phases of construction with the associated source reference from *BS 5228: 2009+A1 2014.* The closest residential properties to the proposed development site are located at distances ranging from approximately 10-50m. Construction noise calculations have therefore been conducted both with and without noise mitigation at distances of 10 to 50m from the works for the Site Clearance and Main Construction phases, representing the nearest properties to the works.

Table 8.13 – Predicted construction noise predictions associated with Site Enabling works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		10	50
Generator (enclosed)	C.4 Ref 84	68	54
Compressor (enclosed)	D.6 Ref 19	71	57
Tracked Excavator	C.2 Ref 3	76	62
Wheeled Excavator	C.2 Ref 26	77	63
HGV	C.4 Ref 19	75	61
Dozer	C.2 Ref 11	79	65
Combined $L_{Aeq,period}$ without mitigation	0	**83**	**70**
Combined $L_{Aeq,period}$ with mitigation	-20	**63**	**50**
Predicted level at Pine Heights house 16m from site boundary	**59 dB LAeq**		
Predicted level at Tinnabeg house 29m from site boundary	**54 dB LAeq**		

Table 8.14 – Predicted construction noise predictions associated with building construction works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		10	50
Generator (enclosed)	C.4 Ref 84	68	54
Compressor(enclosed)	D.6 Ref 19	71	57
Tracked Excavator	C.2 Ref 3	76	62
Wheeled Excavator	C.2 Ref 26	77	63
HGV	C.4 Ref 19	75	61
Concrete / Steel Cutting Equipment	Various	82	68
Dump truck	C.2 Ref 30	77	63
Combined $L_{Aeq,period}$ without mitigation	0	**86**	**72**
Combined $L_{Aeq,period}$ with mitigation	-20	**66**	**52**
Predicted level at Pine Heights house 16m from site boundary	**62 dB LAeq**		
Predicted level at Tinnabeg house 29m from site boundary	**57 dB LAeq**		

The results of the assessment has indicated that at distances of greater than 10m from the works site the construction day time noise limit of 70dB $L_{Aeq, 1hr}$ can be complied with during construction works. It is also important to note that the impact due to construction activities will be transient in nature and the noise levels detailed in Tables 8.11 and 8.12 represent worst case scenarios when all items of plant are operating simultaneously.

The proposed construction phase noise mitigation measures as detailed in Section 8.8 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Construction Traffic Noise

Based on the assumption of up to 80 HGV movements per day on the haul routes to and from the site along public roads during the site clearance phase, the resulting average predicted traffic noise level at the closest receptors is calculated as follows:

The predicted noise levels at any receptor located within 5m of the haul route road has been calculated using a standard international acoustical formula as described below.

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

where $L_{Aeq,\ T}$ is the equivalent continuous sound level over time period (T) (3600 sec);
SEL is the A weighted Sound Exposure Level of the noise event (77dB);
N is the number of events over the time period T (60);
r1 is the distance at which SEL is assessed (5m)
r2 is the closest distance to the receptor from the road (10m)

The calculations assumed a maximum scenario of 6 truck movements per hour based on a 10 hour working day a maximum Sound Exposure Level of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest noise sensitive receptors to the public road (10m). No attenuation, above geometric spreading, has been considered within these calculations may be considered the worst case scenario.

The maximum predicted $L_{Aeq,\ period}$ values as a result of the HGV traffic movements at the nearest noise sensitive receptors located along the haul route roads is predicted to be 45 dBA, $L_{Aeq,\ period}$.

It is not expected that the predicted short-term increase in HGV movements associated with the construction phase of the development will have an adverse impact on the existing noise climate of the wider area or on local receptors. The predicted impact will be short-term and slight.

Vibration

Vibration impacts have been considered from any particular plant items that have the potential to generate perceptible levels of vibration.

The nearest residential receptors to the site boundary are located further to the east (*'Tinnabeg'* c. 29m and *'Pine Heights'* c. 16m) Depending on the methods of construction, there is the possibility of construction related vibration impacts on human beings as a result of ground preparation and concrete foundation excavation activities. However, such sources of vibration shall be short-term and minor.

It is predicted that it is highly unlikely that any construction generated vibrations at buildings <10m from the proposed development would result in cosmetic damage. Experience of similar construction projects has shown that beyond this distance there is no risk of cosmetic damage occurring within buildings.

A programme of structural vibration monitoring shall be conducted at residential receptors located adjacent to or within 50m of site activities as required and as detailed in Section 8.9 below.

8.8.2 Operational Phase

The noise aspects to be considered for the completed development relate to traffic movements, neighbourhood noise and the operation of a waste water pumping station.

Traffic Noise Impact

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

The Traffic and Transportation Assessment Report prepared by Barrett Mahony Consulting Engineers submitted with this application includes a detailed assessment of the traffic impact associated with the proposed development. As part of this assessment, detailed traffic flow information as Annual Average Daily Traffic (AADT) has been derived for the existing road network for the "No development" and the "With development" scenarios.

The percentage traffic increase associated with the development has considered 4 existing junctions on the local road network as detailed in Table 7 below which also details the change in noise levels and the associated impacts associated with the increased traffic volumes associated with the operational development.

Table 8.15 – Increase in noise dB associated with % Increase in traffic at junctions

Junction	Traffic & Noise Increase			
	AM	Change in Sound Level	PM	Change in Sound Level
Development Entrance / L1020	57	+2	120	+4
L1020 /R760	10.7	0	11.6	0
L1020 / R117	12.1	0	10.2	0
N11 / R117	0.41	0	0.44	0

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1dBA change in traffic noise levels.

On this basis, the traffic flow increases associated with the development for all year scenarios will result in a long-term not significant impact at the junction of the development entrance onto the L1020.

There will be an inaudible increase in noise levels and a long-term imperceptible neutral impact associated with increased traffic movements at the other 3 specified junctions.

On-Site Noise Sources

Internal Residential Traffic Noise

The subject development includes the provision of surface and under-croft car parking spaces for the residential units. Vehicles within the residential areas will generally travel at speeds <20kmph as a result of speed limit signage and speed reducing ramps throughout the development which result in relatively low noise levels being generated by internal vehicle movements.

Neighbourhood Noise

Within the proposed development, sounds generated by everyday domestic activities including waste collection activities, pedestrians, children, creche, and use of open spaces, are part of everyday living, and are not considered “noise” in the sense of a potential nuisance. These activity noises would not have any potential for impact beyond the boundaries of the site.

Inward Noise impacts on the proposed development

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

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

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

Internal Waste Water Pumping Station

The development will include a waste water pumping station located at the northern site boundary. To ensure that this item of site infrastructure does not have an adverse noise impact on the receiving environment, noise generated by its operation shall be non-tonal, non-impulsive and be no greater than 60dB(A) when measured at a reference distance of 1m. The commissioning phase of the station will include the measurement of operational noise levels by an experienced acoustic consultant to verify that the operational noise achieves its acoustic performance design criteria and will not be audible at the closest residential receptors at Enniskerry Demesne located c 30m north of the

pump station and at the dwellings located further to the east at the boundary of the site as well as the Powerscourt National School.

Vibration Impact

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

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

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

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

8.9.3 Risks to Human Health

Construction phase noise and vibration emissions will be temporary and transient and will be managed so as to minimise impact to population and human health by complying with all relevant guidance, as such the impact will be short-term and have a slight impact overall.

Operational phase noise will also be managed to achieve relevant noise limit values and is predicted to meet all such requirements. No operational phase vibration impacts are predicted. Therefore, the operational phase noise impacts will be neutral for the life of the development.. It has been predicted that the exposure of humans to the cumulative noise associated with increased traffic levels from all developments will be low and the impact will be long-term and not significant with and will not result in an adverse noise impact on the existing or the future population in the local area.

8.9.4 Residual Cumulative Impacts

The residual cumulative construction noise impact will be short-term and slight to moderate if the construction of the subject development coincides with the construction of other developments in the local area.

The residual cumulative operational noise impact will be long-term and not significant when the subject development is operational together with other local proposed developments.

8.10 MONITORING

8.10.1 Construction Phase

Proposed Noise Monitoring Programme During Site Construction

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

On commencement of the site construction activities, routine noise monitoring shall be conducted in the vicinity of the site to assess the impact that site activities may have on ambient noise levels at local receptors.

It is proposed to conduct continuous noise monitoring surveys to establish the noise impacts of site activities at the closest receptors to the site, to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017*: *Acoustics – Description, measurement and assessment of environmental noise* and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4*). The measurement parameters to be recorded include wind speed, temperature, L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , 1/3 Octave Frequency analysis and impact noise analysis.

Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at noise sensitive receptors N1 (school) to No4 (residential house) as per Figure 8.3 above adjacent to the site boundaries and as identified in the baseline noise assessment.

Proposed Vibration Monitoring Programme During Site Construction

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase if and as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries and at properties up to 50m from the site as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in British Standard *BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings* and *Part 2 1993 Guide to damage levels arising from groundborne vibration.*

8.10.2 Operational Phase

No monitoring required during the operational phase of the development.

8.11 REINSTATEMENT

Reinstatement issues are not relevant to this Chapter of the EIAR, with reference to the construction and operational phase.

8.13 DIFFICULTIES ENCOUNTERED IN COMPILING

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

9.0 LANDSCAPE AND VISUAL

9.1 INTRODUCTION

This chapter has been prepared by Áit Urbanism and Landscape (Margaret Egan Director Landscape Architect MILI Diploma in Environmental Impact Assessment Management , University College Dublin, Bachelor of Agricultural Science (Landscape Horticulture/Landscape Architecture), University College Dublin, Bachelor of Science in Environmental Resources Management, Dublin Institute of Technology & Cynthia Jayne Dunwoody Landscape Architect MILI, MLA Landscape Architecture, University of Edinburgh, Scotland) to assess the landscape and visual impact of the proposed residential development at Cookstown Road, Enniskerry, Co. Wicklow.

The proposed development which is the subject of this EIAR consists of the construction of 165no. dwellings and associated ancillary infrastructure. The development includes 105no. 2 storey houses, 56no. apartments/duplex apartments arranged across 6no. 3 storey buildings, 4no. Maisonette dwellings in a 2-storey building and a creche facility. The development will consist of hard and soft landscaping to a linear parkland southern open space, with pedestrian connections provided to '*Lover's Leap Lane*' and adjoining land to the east and west. A central roadside open space, a northern public open space and semi-private communal open space for duplex apartments also exist within the development. Surface water attenuation measures and underground attenuation systems are proposed. Vehicular access from the Cookstown Road from a new junction as well as 313no. car parking spaces and 104 bicycle spaces will be provided. A new footpath will be provided along the northern site boundary leading to the existing pedestrian crossing at Powerscourt National School. Street lighting columns along the southern side of the Cookstown Road and a new pedestrian crossing located to the west of the main access road are also proposed.

This Landscape and Visual Impact Assessment describes the existing receiving environment and contiguous landscape and the methodology utilised to assess the impacts. It assesses the visual extent of the proposed development and the proposal's visual effects on key views throughout the study area. It describes the landscape character of the subject site and hinterland, together with the visibility of the site from significant viewpoints in the locality. The assessment summarises the impact of the proposed development on the visual and landscape amenity of the subject site and contiguous area.

The following visual receptors are addressed in this assessment:

- Protected Views and Prospects;
- Local Amenity and Heritage Feature;
- Local community views to assess the landscape and visual impact of the proposals on those who live and work in proximity to the proposed development as well as those utilising local amenities;
- Relevant local settlement nodes;
- Major routes adjacent to the site.

9.2 STUDY METHODOLOGY

9.2.1 Definition of Landscape

The term '*landscape*' is defined in the Guidelines for Landscape and Visual Impact Assessment (GLVIA) as:

'*Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factor*'.

9.2.2 Forces for Landscape Change

The landscape is not static and is continuously changing. Over time, many different pressures have altered landscapes and will continue to do so in the future. The key drivers of this change come from ongoing development that is required to meet the needs of a growing population and economy. This includes but is not limited to new housing and commercial development, new forms of energy generation and land management.

9.2.3 Guidance

A site assessment was undertaken in March 2020. Desktop studies were undertaken to evaluate the existing site conditions such as topography, vegetation, settlement patterns, contiguous land use, drainage, landscape character as well as overall visibility of the site from surrounding areas. Information was also collated on protected views, scenic routes, special and protected landscapes etc.

The following documents and web resources were consulted for the desktop study:

- Wicklow County Development Plan 2016-2022 https://www.wicklow.ie;
- Bray Municipal District Local Area Plan 2018 https://www.wicklow.ie;
- National Parks and Wildlife Service – Interactive Mapping and Aerial Photography - www.npws.ie;
- Ordnance Survey Ireland – Interactive Mapping and Aerial Photography – www.osi.ie;
- geohive.maps.arcgis.com/apps/webappviewer.

This chapter of the EIAR describes landscape and visual impacts and has been prepared utilising the following guidance documents:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. (Draft) Environmental Protection Agency, August 2017'.
- 'Guidelines on the Information to be Contained in Environmental Impact Statements' Environmental Protection Agency, 2002
- 'Advice notes on current practices (in the preparation of an Environmental Impact Statement), Environmental Protection Agency, 2003
- 'Advice notes for Preparing Environmental Impact Statements. Draft'. Environmental Protection Agency, 2015.
- 'Landscape and Landscape Assessment Draft Guidelines', Department of Environment, Heritage and Local Government (DEHLG) 2000
- 'Guidelines for Landscape and Visual Impact Assessment', The Landscape Institute & I.E.M.A., UK, 2013.
- 'Environmental Impact Assessment Handbook', Scottish Natural Heritage (SNH), Version 5, 2018. Appendix 2: Landscape and Visual Impact Assessment.
- DoEHLG, 'The Landscape and Landscape Assessment Draft Guidelines for Planning Authorities".

9.2.4 Key Principles of the Guidelines for Landscape and Visual Impact Assessment

Use of the Term '*Effect*' vs *'Impact'*

The GLVIA advises that the terms *'impact' and effect'* should be clearly distinguished and consistently used in the preparation of an LVIA.

'Impact' is defined as the action being taken. In the case of the development, the impact would include the construction of the residential accommodation along with the two creches, as well as supporting road and utility infrastructure and public open space. In addition, there is also the localised change on the site, mostly from the existing agricultural use, and the works required to facilitate this change.

'Effect' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

9.2.5 Assessment of Both *'Landscape'* and '*Visual*' Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and '*visual amenity'* refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

9.2.6 Methodology for Landscape Assessment

In section 9.8 of this report the landscape effects of the development are assessed. The nature and scale of changes to the landscape elements and characteristics are identified, and the consequential effect on landscape character and value are discussed. Trends of change in the landscape are taken into account. The assessment of significance of the effects takes account of the sensitivity of the landscape resource and the magnitude of change to the landscape which resulted from the development.

9.2.7 Sensitivity of the Landscape Resource

The sensitivity of the landscape is a function of its land use, landscape patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the landscape. It also relates to the nature and scale of development proposed. It includes consideration of landscape values as well as the susceptibility of the landscape to change.

Landscape values can be identified by the presence of landscape designations or policies which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape.

Landscape susceptibility is defined in the GLVIA as the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies. Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

Sensitivity is therefore a combination of Landscape Value and Susceptibility.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment as presented in Table 9.1 below. The following tables were created using EPA guidelines.

Table 9.1 – Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principal management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong or has evidence of alteration to / degradation / erosion of elements and characteristics. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principal management objective is to facilitate change through development, repair, restoration or enhancement.

Sensitivity	Description
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principal management objective for the area is to facilitate change in the landscape through development, repair or restoration.

9.2.8 Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories are used to classify magnitude of landscape change as described overleaf in Table 9.2.

Table 9.2 – Categories of Landscape Change

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape key elements features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character.

9.2.9 Significance of Effects

In order to classify the significance of effects (both landscape and visual), the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide (see Table 9.3). There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 9.3 – Guide to Classification of Significance of Landscape Effects

		Sensitivity of the Landscape Resource				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Change	**Very High**	Profound	Profound-Very Significant	Very Significant-Significant	Moderate	Slight
	High	Profound-Very Significant	Very Significant	Significant	Moderate-Slight	Slight-Not Significant
	Medium	Very Significant-Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate-Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight-Not Significant	Not significant	Imperceptible	Imperceptible

The matrix above is used as a guide only. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

Landscape effects are also classified as positive, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

9.2.10 Methodology for Visual Assessment

The visual effects of the development are assessed in section 9.8. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the viewpoint sensitivity against the magnitude of change to the view resulting from the development. Definitions of viewpoint sensitivity are provided below in Table 9.4.

Table 9.4 – Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for accommodating change in the form of development is very low. The principal management objective for the view is its protection from change.
High	Viewpoints that that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features focused on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating compositional change in the form of development may or may not be low. The principal management objective for the view is its protection from change that reduces visual amenity.
Medium	Viewpoints representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape which is regarded as moderately scenic. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.

Low	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, or on heavily trafficked routes etc. The view may present an attractive backdrop to these activities but is not regarded as particularly scenic or an important element of these activities.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality.

9.2.11 Magnitude of Change to the View

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

Five categories are used to classify magnitude of change in the view as described below in Table 9.5.

Table 9.5 – Categories of Visual Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

9.2.12 Significance of Visual Effects

As for landscape effects, in order to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 9.3.

9.2.13 Quality and Timescale

The predicted effects are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;

- Neutral – Scheme complements the scale, landform and pattern of the landscape (townscape)/view and maintains landscape quality;

- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Impacts/effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

A statement is made as to the appropriateness of the proposed development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the proposed development based on objective assessment of its likely landscape and visual impacts.

9.2.14 Verified View Methodology

Choice of Views

Following appointment a full list of suggested views is drawn up for review prior to visiting site. This is carried out between 3D Design Bureau, the client, and the planning consultant.

Photography of Site (Refer to 3D Design Bureau Document for Verified Views)

Every baseline photograph is captured in raw settings using a high-resolution digital SLR camera. This allows for the maximum possible information to be retained in the digital file. It also avoids the file being altered by any internal camera processing definitions, which retains the maximum control and fidelity on the end results. The focal lengths used depend on the surrounding context and proximity to the desired area. 3D Design Bureau use high quality lenses with focal lengths that allow for capturing enough surrounding context without compromising quality and fidelity, by avoiding excessive barrelling, distortion, or aberrations. All shots are taken horizontally with the use of a 50mm lens (where possible).

Note: Although the 50mm focal length represents the perceived scale of the human eye, it does not represent the human field of view and therefore should not necessarily be used to show the proposed development in its context. On site and back in the studio, each photo location is correctly recorded and marked as follows:

<u>On-Site:</u>

- The tripod location on site is paint marked and photographed in relation to existing elements. (pictured below)
- The location of each photo is manually marked on a printed map while on site.
- The camera height is recorded.

Upon completion of the baseline photo site visit all photographs go through post processing back in the studio. The full set of photos along with a viewpoint location map are issued to the client for review and to choose the best shots that will demonstrate the visual impact that the proposed scheme may/may not have.

Baseline Photo Surveying

When all baseline photos are chosen for the VVMs, each one is marked up in studio. Fixed reference points within each photo, such as parapet heights, kerbing, lamp posts etc are coloured coded on the baseline photos. All '*marked up'* baseline photos are then issued to our qualified topographical surveyor for surveying purposes.

The survey team records the camera/tripod position using GPS and Total Station to an accuracy of +/-1cm Northing and Easting and to an accuracy of +/- 2cm Elevation. The *'marked up'* fixed reference points identified in each photo are then surveyed to establish exact orientation of the view and to verify the photomontage process.

3D Modelling

An accurate digital 3D model of the '*proposed*' development is produced using 3D software of choice. All of 3D Design Bureau's 3D modelling is carried out within AutoDesk's Revit. The digital 3D model is created from a combination of the third party architectural, engineering and landscape drawings. All proposed model information is contained in the one file and it is always positioned relative to the existing site survey information.

The 'marked up' fixed reference points which have been surveyed, are also modelled along with any other relevant survey information from the supplied top survey drawings. As stated above, the proposed 3D model and survey 3D model information are geospatially positioned relative to one another. This is imperative to ensure the accurate positioning and camera matching of the proposed digital 3D model within each chosen photo.

Visualisation

Once the digital 3D Revit model is complete, it is handed over to the 3D visualisation team for production. This production involves the matching of textures, lighting conditions and asset population for the proposed scheme. This ensures that the digital 3D model is visually represented as close as possible to the intended future 'As Built' development. There are various 3D visualisation software's that are widely used for this stage of the project. 3D Design Bureau use 3D Studio Max for the visualisation process. This is accepted as the industry standard for architectural visualisation work and production of VVMs.

Rendered View

Following the completion the 3D visualisation process (but in some instances prior to this) the following methodology is applied for views to be verifiable.

Camera Matching
All of the information recorded at the time of the baseline photographic site visit, that is, camera co-ordinates, angle of view, and direction of view, is programmed into the virtual camera within the 3D software package of choice - 3D Studio Max. Insertion of digital cameras within the software with matching attributes of the physical camera is carried out. This careful method ensures that the size, position, and height, of the proposed development in each VVM is correct to an accuracy of 0.33% i.e. +/- 1mm on an A3 print.

Rendering
Following the camera matching and 3D visualisation process the view is 'rendered' at high resolution and is placed onto its matching baseline photograph using Adobe Photoshop software. The mathematical accuracy is then double checked and verified by ensuring that existing 'marked up' fixed reference point features which were also rendered line up exactly in the photo.

Post Production
Next, the VVM specialist establishes, which existing features, such as buildings, landscape and trees, are in the foreground of the proposed development and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. When it is found that the development is not visible due to foreground features, its extremities will be indicated with a red outline.

9.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

9.3.1 Relevant Planning Policy

Landscape Planning policies and objectives relevant to the assessment of the impacts of the proposed development are laid out in the *Wicklow County Development Plan 2016-2022 (WCDP)* and in the *Bray Municipal District Local Area Plan 2018* (LAP).

9.3.1.1 Bray Municipal District Local Area Plan (LAP) 2018

The Bray Municipal District LAP was adopted in order to put in place a land use framework for the future sustainable development of settlements in the area boundary, including Bray, Enniskerry and Kilmacanogue. The plan is consistent with the core strategy of the Wicklow County Development Plan 2016-2022. Enniskerry is identified as a 'Small Growth Town' Level 5 in the county settlement hierarchy.

The subject site lies within Action Area Plan 3 as per the *Bray Municipal District LAP 2018* (Action Area Plan 2 in the *Wicklow County Development Plan 2016-2022),* which identifies the development of the land as a residential, open space and community space with the following criteria:

- *A maximum of 105 housing units may be provided in this action area, with density not exceeding 10/ha on the lands zoned R10, and the remainder may be developed at a higher density but not exceeding 20/ha.*
- *A minimum area of 0.4ha shall be provided for voluntary / sheltered housing, of a type to be agreed with the Local Authority, as part of any Part V obligations under the Wicklow Housing Strategy. Permission will not be considered for private housing until sufficient progress has been made on this element.*
- *Access to the site shall be from local road LP-1020.*
- *A public park of a minimum of 2ha shall be established along the full southern and western boundaries of the action area, which shall comprise an amenity walk area along the existing tree lined field boundaries connecting through the development to regional road R760 (Enniskerry – Kilmacanogue) and to the existing pedestrian route along the Dargle. In light of the provision of such an amenity space, the incidental open space required to be interspersed throughout the residential area may be reduced to 7.5% of the total zoned residential area.*
- *Any development shall be so designed to maintain maximum views of the Sugarloaf from Cookstown Road.*

Figure 9.1 –Action Area 3 (Bray Municipal District LAP 2018)

Map No. 3 Land Use Zoning Map within the Bray Municipal District LAP 2018 categorises the site within three different land use zones within an Action Plan Area. The majority of the site is categorised as:

R20 New Residential Objective: *"To protect, provide and improve residential amenities at a density up to 20 units/ha."*

Description: *"To facilitate for the provision of high quality new residential developments at appropriate densities with excellent layout and design, well linked to the town centre and community facilities. To provide an appropriate mix of house sizes, types and tenures in order to meet household needs and to promote balanced communities."*

The western part of the site is categorised under land use zone 'R10 New Residential' as follows:

R10 New Residential Objective: *"To protect, provide and improve residential amenities at a lower density not exceeding 10 units/ha."*

Description*: "To facilitate for the provision of high quality new residential environments with excellent layout and design, reflecting the low-medium density character of the surrounding area."*

The southern part of the site is categorised under land use zone *'OS1 Open Space'*

OS1 Open Space Objective: *"To protect and enhance existing and provide for recreational open space"*

Description: *"To facilitate the further development and improvement of existing parks and casual play areas, to facilitate opportunities for the development of new high quality amenity open areas and to restrict developments / activities (such as the use or development of such lands for formal sports grounds for organisations that are not available for a broad range of the public) that would reduce the opportunities for use by the wider public."*

A small part of the north-west corner of the site which lies outside of the boundary of Action Area 3 is categorised under land use zone *'CE Community and Education'.*

CE Community and education

Objective: *"To provide for civic, community and educational facilities"*
Description: *"To facilitate the development of necessary community, health, religious, educational, social and civic infrastructure."*

A number of zoning objectives relate to contiguous lands surrounding the site. The lands immediately north and east of the site are categorised under *R Existing Residential* and *R Special New Residential*. A portion of land north-east of the site is zoned as *R10 New Residential*. The lands to the north-west of the site including the grounds of Powerscourt National School are categorised under *CE Community and Education*. Further north of the site a portion of land is zoned as *T Tourism*. These land use zones are defined as follows:

RE Existing Residential

Objective: *"To protect, provide and improve residential amenities of existing residential areas"*
Description: *"To provide for house improvements, alterations and extensions and appropriate infill residential development in accordance with principles of good design and protection of existing residential amenity. In existing residential areas, the areas of open space permitted, designated or dedicated solely to the use of the residents will normally be zoned 'RE' as they form an intrinsic part of the overall residential development; however new housing or other non-community related uses will not normally be permitted."*

R Special New Residential

Objective: *"To protect, provide and improve residential amenities in a format and a density specified in the relevant plan."*

Description: *"To facilitate for the provision of high quality new residential environments with excellent layout and design, reflecting the density and character of the surrounding area."*

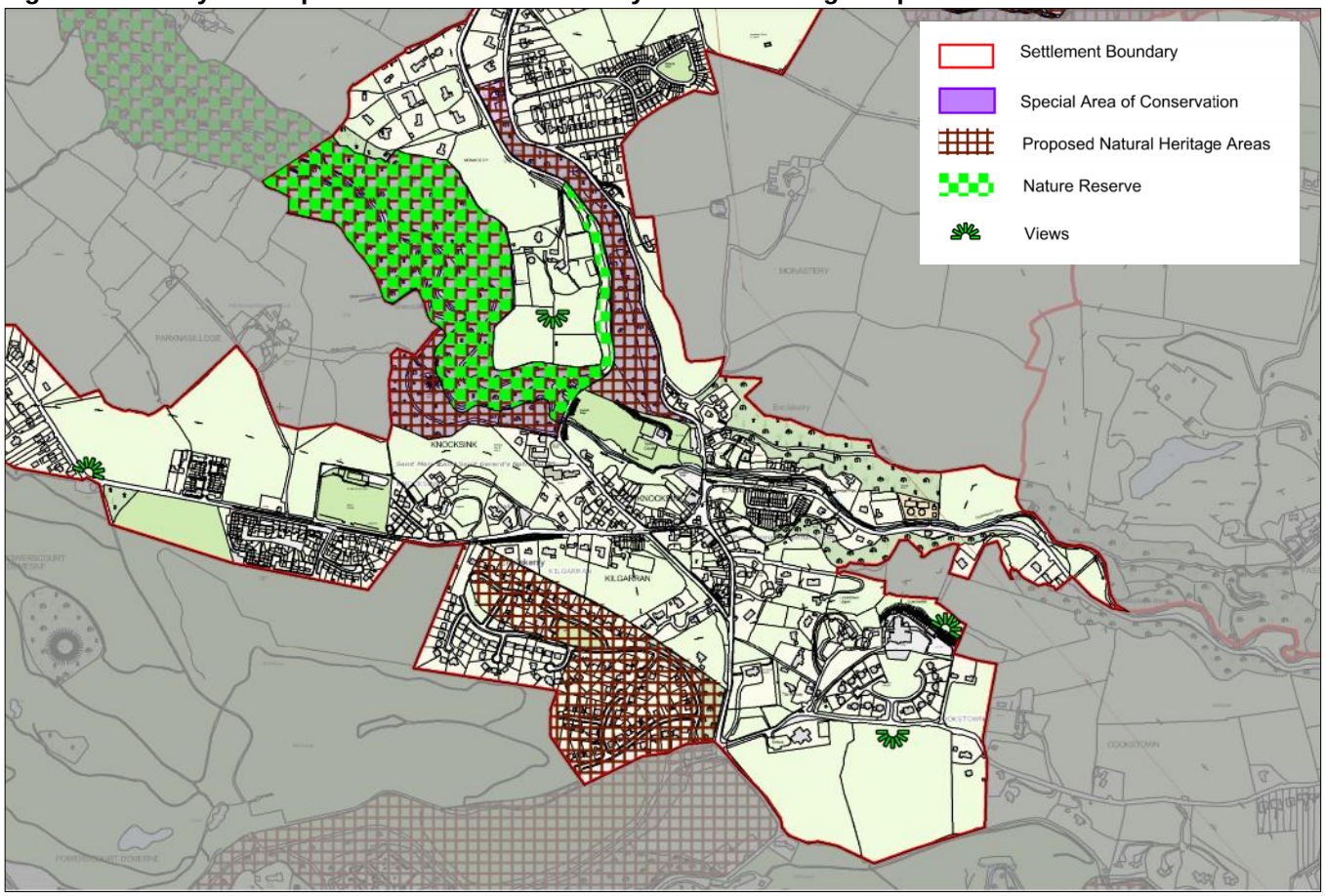
T Tourism

Objective: *"To provide for tourism related development"*
Description: *"To provide for the sustainable development of tourism related structures, uses and infrastructure. To provide for the development of tourism facilities including accommodation of an excellent sustainable design and aesthetic quality. Tourism related office, civic and cultural and commercial development will be facilitated."*

9.3.2 Natural Heritage

Enniskerry town and rural hinterland is renowned for its natural beauty, located in a valley area surrounded by higher ground. The Dargle River runs south of Enniskerry whilst the Glencullen River flows to the north of the town settlement. The landscape surrounding the town and subject site is categorised under the Glencree/Glencullen Area of Outstanding Natural Beauty (AONB) within the Wicklow County Development Plan 2016-2022. There are also several landscape designations in the locality of the site including Proposed Natural Heritage Areas(pNHAs), SAC's and Nature Reserves. Powerscourt Woodland pNHA is situated to the west whilst the Dargle River Valley pNHA is situated to the south-east (refer to Figure 9.2).

Figure 9.2 – Bray Municipal District LAP: Enniskerry Natural Heritage Map



Source: Bray MD LAP Map no. H6

The relevant objectives in relation to natural heritage and the proposed development and site are laid out in *Chapter 10: Heritage, Wicklow County Development Plan 2016-2022 (WCDP)* and *Chapter 9: Built & Natural Heritage, Bray Municipal District Local Area Plan 2018 (LAP).*

Table 9.6 – Natural Heritage Objectives

Objective No. (WCDP)	Objective No. (LAP)	Description
NH1	**B1**	To ensure that the impact of new developments on biodiversity is minimised and to require measures for the protection and enhancement of biodiversity in all proposals for large developments.
NH5	**B3**	To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs) and to protect other designated ecological sites in Wicklow.
	B4	To support the protection and enhancement of biodiversity and ecological connectivity within the plan area in accordance with Article 10 of the Habitats Directive, including linear landscape features like watercourses (rivers, streams, canals, ponds, drainage channels, etc), woodlands, trees, hedgerows, road and railway margins, semi-natural grasslands, natural springs, wetlands, stonewalls, geological and geo-morphological systems, features which act as stepping stones, such as marshes and woodlands, other landscape features and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones that taken as a whole help to improve the coherence of the Natura 2000 network.
NH6		Ensure ecological impact assessment is carried out for any proposed development likely to have a significant impact on proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Statutory Nature Reserves, Refuges for Fauna, Annex I habitats, or rare and threatened species including those species protected by law and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.
NH8		To protect non-designated sites from inappropriate development, ensuring that ecological impact assessment is carried out for any proposed development likely to have a significant impact on locally important natural habitats or wildlife corridors. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.

9.3.3 Green Infrastructure

The relevant objectives in relation to green infrastructure and the proposed development and site are laid out in *Chapter 10: Heritage, Wicklow County Development Plan 2016-2022* and *Chapter 9: Built & Natural Heritage, Bray Municipal District Local Area Plan 2018.*

Table 9.7 – Green Infrastructure Objectives

Objective No. (WCDP)	Objective No. (LAP)	Description
NH31		To recognise the importance and contribution of Green Infrastructure throughout the region for the maintenance of biodiversity and ensuring that the region will be able to, or be ecologically robust enough to, adapt and respond to climate change issues.
NH32		To protect existing green infrastructure resources and to facilitate, in consultation with relevant stakeholders, the development of green infrastructure that recognises the benefits that can be achieved with regard to the following: • Provision of open space amenities,

Objective No. (WCDP)	Objective No. (LAP)	Description
		• sustainable management of water, • protection and management of biodiversity, • protection of cultural heritage, and • protection of protected landscape sensitivities.
NH33		During the review process of the existing local plans, to consider identifying Green Infrastructure resources within and on the edge of the settlement boundary and to consider the inclusion of local green infrastructure proposals in each plan in line with the Green Infrastructure proposals and objectives set out in this section.
NH34	**GI1**	New development and redevelopment proposals, where considered appropriate, are required to contribute towards the protection, management and enhancement of the existing green infrastructure of the local area in terms of the design, layout and landscaping of development proposals.
NH35	**GI2**	To facilitate the development and enhancement of suitable access to and connectivity between areas of interest for residents, wildlife and biodiversity, with focus on promoting river corridors, Natura 2000 sites, nature reserves and other distinctive landscapes as focal features for linkages between natural, semi natural and formalised green spaces where feasible and ensuring that there is no adverse impact (directly, indirectly or cumulatively) on the conservation objectives of Natura 2000 sites.
NH36		To identify and facilitate the provision of linkages along and between river corridors within the county and adjoining counties to create inter connected routes and develop riverside parks and create linkages between them to form 'necklace' effect routes including development of walkways, cycleways and wildlife corridors where feasible and ensuring that there is no adverse impact (directly, indirectly or cumulatively) on the conservation objectives of Natura 2000 sites.

9.3.4 Woodlands, Trees and Hedgerows

The relevant objectives in relation to woodlands, trees and hedgerows and the proposed development and site are laid out in *Chapter 10: Heritage, Wicklow County Development Plan 2016-2022* and *Chapter 9: Built & Natural Heritage, Bray Municipal District Local Area Plan 2018.*

Table 9.8 – Woodlands, Trees and Hedgerows Objectives

Objective No. (WCDP)	Objective No. (LAP)	Description
NH14		To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, in the interest of amenity or the environmental, as set out in Schedule 10.08 and Map 10.08 A, B & C of this plan.
NH16		Development that requires the felling of mature trees of environmental and/or amenity value, even though they may not have a TPO in place, will be discouraged.
NH17		To discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling where possible.
NH18		To encourage the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development management process, and require the planting of native, and appropriate local characteristic species, in all new developments.

NH19		To encourage the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site (unless otherwise agreed by the Planning Authority).
	GI4	To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, where considered to be viable, safe and in line with sound arboricultural management, in the interest of amenity or the environmental, as set out in the Heritage Schedules of this plan.

9.3.5 Landscape

The subject site is zoned within landscape category type 'Urban Area' within *Chapter 10: Heritage, Wicklow County Development Plan 2016-2022.* Relevant policies and objectives in relation to the landscape are as follows:

Table 9.9 – Landscape Objectives

NH49	All development proposals shall have regard to the County landscape classification hierarchy in particular the key landscape features and characteristics identified in the Wicklow Landscape Assessment (set in Volume 3 of this plan) and the 'Key Development Considerations' set out for each landscape area set out in Section 5 of the Wicklow Landscape Assessment
NH51	To resist development that would significantly or unnecessarily alter the natural landscape and topography, including land infilling / reclamation projects or projects involving significant landscape remodeling, unless it can be demonstrated that the development would enhance the landscape and / or not give rise to adverse impacts.

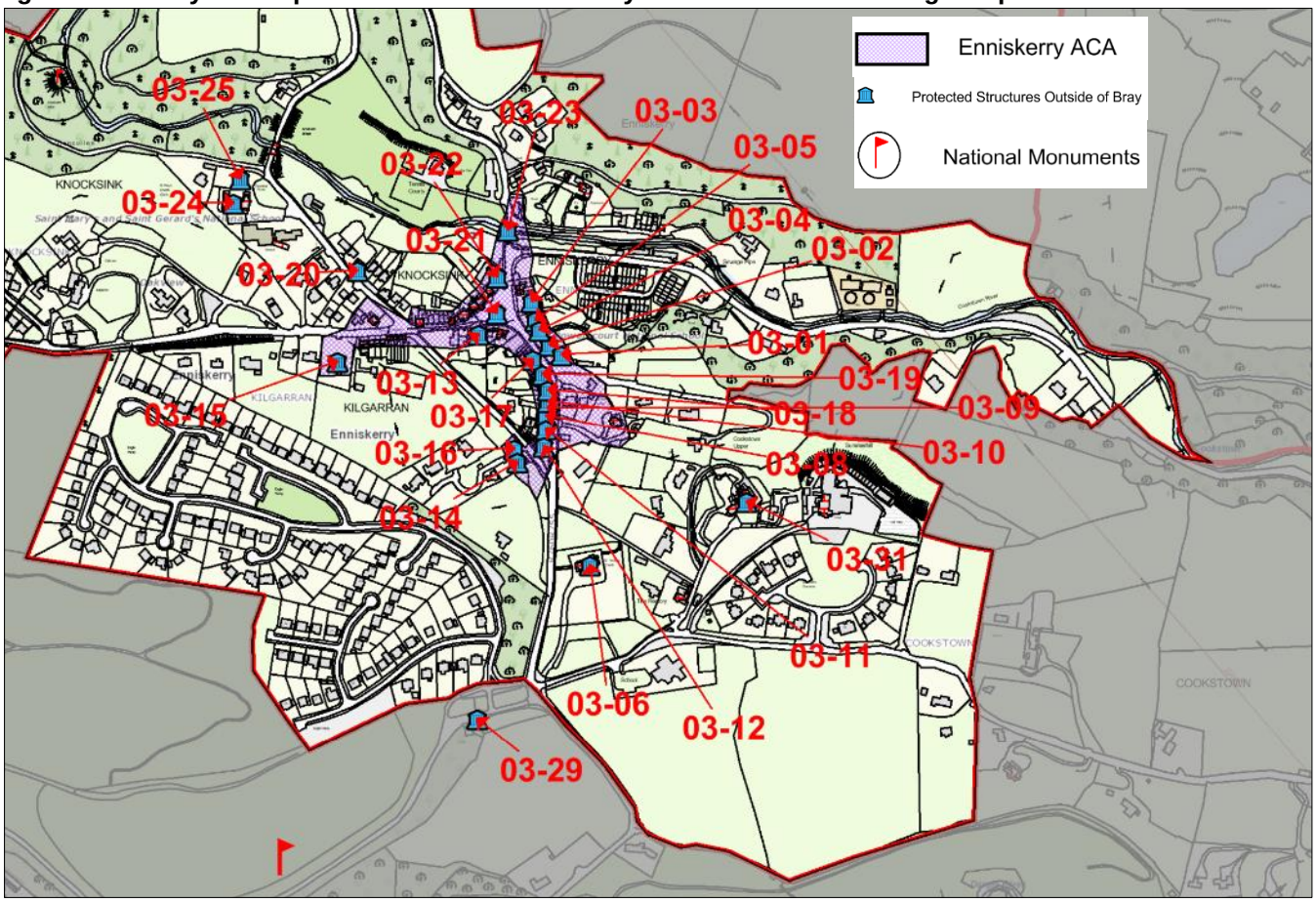
9.3.6 Architectural Conservation Area (ACA)

The town centre of Enniskerry is designated as an *Architectural Conservation Area* (ACA). The Wicklow County Development Plan 2016-2022 identifies a number of protected structures in close proximity to the site as follows:

Table 9.10 – Protected Structures in Vicinity

03-29	**Powerscourt Enniskerry Entrance gates**	Mid-18th Century, pedimented, granite ashlar entrance arch surmounted by an eagle. The arch has unusual ribbed rustication, iron gates, pedestrian gates and piers with balls and granite walls.
07-11	**Powerscourt County House**	Main residence by Richard Castle circa 1740. The north front is of granite ashlar, rising from a rustic (raised basement) with a pedimented, engaged portico of six, Corinthian columns on a façade of nine bays and three storeys. The main block is flanked by curtain walls with pedimented arches. The garden façade dates from the mid-19th Century and is by Daniel Robertson.
03-06	**St. Patrick's Church of Ireland**	T-plan church of *opus incertum*, granite ashlar with a tower and broach spire on the north side and a porch on the south side. The windows are 13th Century-revival in style with lancets in the transepts and mullioned windows in the nave. The church is dated 1859.
03-31	**Blundell Hill**	Former hotel (now three separate houses)

Figure 9.3 – Bray Municipal District LAP: Enniskerry Settlement Built Heritage Map



Source: Bray MD LAP Map no. H5

Additional NIAH listed structures (to the protected structures above) are included below in the vicinity of the proposed development, which include the Old Rectory to the east, Powerscourt Rectory to the north, Summerhill House Hotel and Silver Vale House further to the north of Enniskerry Demesne (a residential estate).

Figure 9.4 – Historic Map Viewer

Source: https://maps.archaeology.ie/HistoricEnvironment/

9.3.7 Protected Views

Views of Special Amenity Value or Special Interest listed in the *Wicklow County Development Plan 2016-2022* that are relevant to the development site are as follows:

View No. 7:
Origin of view: From Cookstown Road
Description: View towards the Great Sugarloaf Mountain

The relevant objectives in relation to views and prospects and the proposed development and site are laid out in *Chapter 10: Heritage, Wicklow County Development Plan 2016-2022.*

Table 9.11 – Views and Prospects

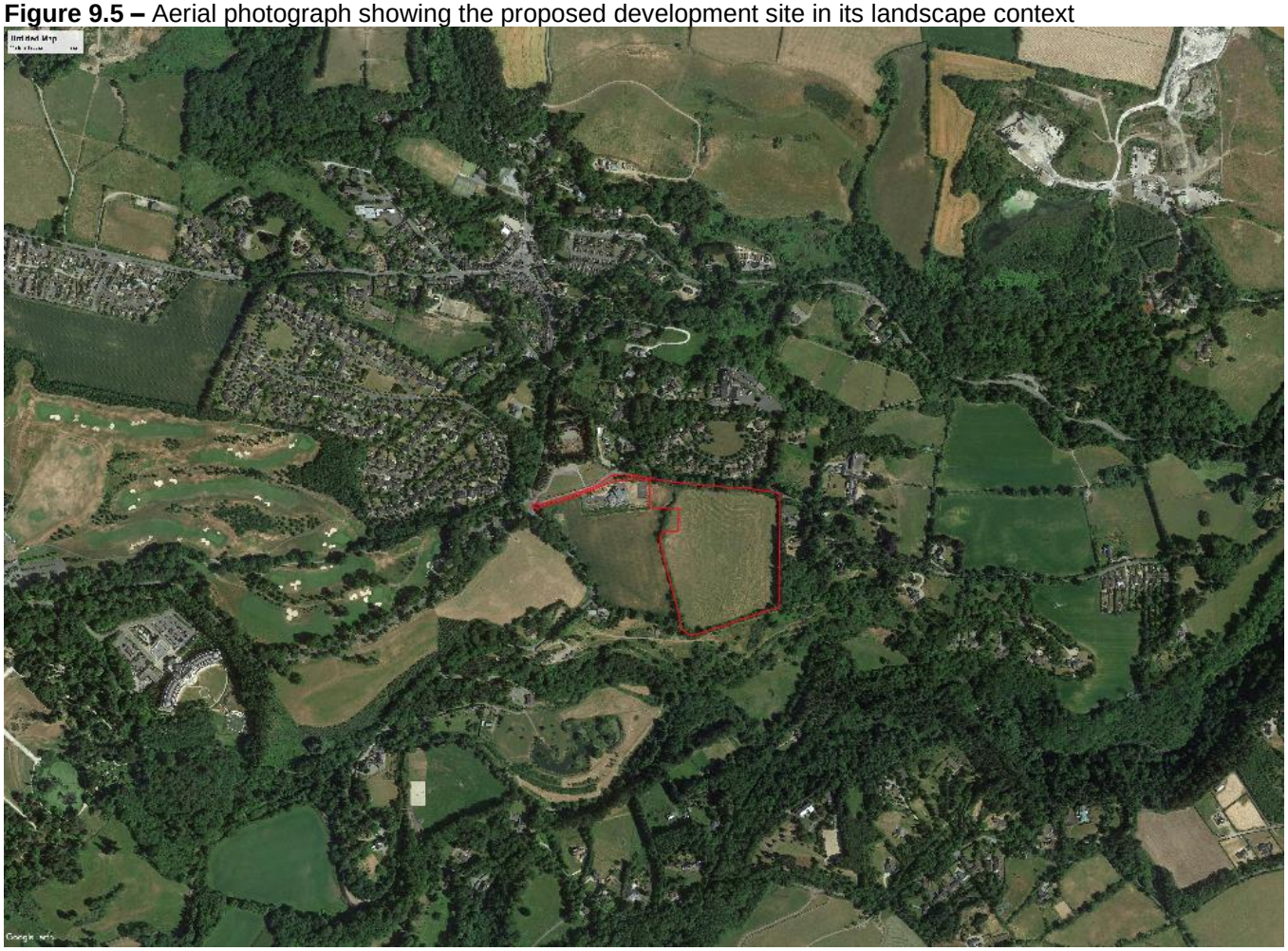
Objective No. (WCDP)	Description
NH52	To protect listed views and prospects from development that would either obstruct the view / prospect from the identified vantage point or form an obtrusive or incongruous feature in that view / prospect. Due regard will be paid in assessing development applications to the span and scope of the view / prospect and the location of the development within that view / prospect.

9.3.8 Landscape Baseline: Description of the Proposal Site and Environs

9.3.8.1 Site Description and Context

The subject site is an agricultural field which lies on the southern side of Cookstown Road, in the southern rural hinterland of Enniskerry town, Co. Wicklow. Enniskerry is situated within the foothills of the Sugarloafs and the Wicklow-Dublin Mountains and at the head of the wooded Cookstown River Valley between the Glencullen and Dargle Rivers. The site is situated approximately 3.5km to the west of Bray town centre and 1.6km west of the N11 dual carriageway, a major route linking Dublin city to Rosslare. Dublin city centre is situated 22km to the north of the site. The R760, a key route leading south from Enniskerry town centre, runs on a north to south axis to the west of the site. The renowned Powerscourt Estate which consists of Powerscourt House & Gardens and Powerscourt Golf Club is located approximately 1km to the west.

Figure 9.5 – Aerial photograph showing the proposed development site in its landscape context



(Note: Development site outlined in red)

The site is currently used for the purposes of pastoral grazing and is enclosed on all boundaries by a mixture of native hedgerows and trees. Access can be gained via a metal agricultural gate opening on its northern perimeter on Cookstown Road. A large field is situated immediately to the west of the site which has current planning permission for a residential development (Planning Register Ref: 19/871). Powerscourt National School, Summerhill House Hotel and St. Patricks Church are all situated within short-walking distance of the site.

9.3.8.2 Topography and Drainage

The site slopes gently upwards from the northern site boundary towards the southern site boundary. The lowest point on site is situated in the north-east corner and lies at a level of approximately 101.50 OD. The highest point on site is situated in the south-east site corner at a level of 110.71 OD. A plateaued area is located centrally in the southern portion of the site where the level lies at approximately 107.30 OD.

9.3.8.3 Vegetation

Agricultural grassland used for grazing covers the entirety of the site. Tree and shrub vegetation within the site is limited to perimeter locations. The northern site boundary adjoining the Cookstown Road is composed of hedge thicket of predominantly Blackthorn (*Prunus spinosa*) and Bramble (*Rubus fruticosus*). This boundary also comprises a number of trees of Wych Elm (*Ulnus glabra*), Ash (*Fraxinus excelsior*) and Beech (*Fagus sylvatica*) species. One large mature Beech (*Fagus sylvatica)* tree of poor condition is situated near to the eastern end of this boundary. Vegetation cover aligning the eastern site boundary comprises a Cherry Laurel (*Prunus laurocerasus*) and Leyland Cypress (*Cuppressocyparis leylandii*) hedge. A mature conifer tree line of Sitka Spruce (*Picea stitchensis*), Douglas Fir (*Pseudotsuga menziesii*) and Scots Pine (*Pinus sylvestris*) is also present along the eastern boundary. The southern site boundary is devoid of tree planting with the exception of a Sycamore (*Acer pseudoplatanus*) tree at the eastern end and an Ash (*Fraxinus excelsior*) tree towards the western end. Vegetation along this boundary consists

of scrub thicket of predominantly Bramble (*Rubus fruticosus*). Vegetation along the western site boundary comprises Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Ivy (*Hedera helix*) and Bramble (*Rubus fruticosus*) hedging. A small number of trees are also present along this boundary, however many of these are in a poor condition.

9.3.8.4 Contiguous Land Use

The northern site perimeter forms an interface with Cookstown Road, a narrow rural road lined with mature tree and hedgerow planting. On the northern side of the road opposite the subject site lies the small housing estate of Enniskerry Demesne, which comprises large detached houses with large private gardens. At the north-west site corner on the northern side of Cookstown Road lies a farmhouse and outbuildings. To the immediate east of the subject site, four residential properties surrounded by dense woodland tree planting are situated. Agricultural lands are located immediately to the west of the site, with current extant planning permission for a residential development of 27 no. houses. St. Patricks Church and graveyard, Powerscourt National School, and the access road to Summerhill House Hotel and Spa are located to the north-west of the site. Tinnehinch Farm forms the southern site boundary and is surrounded by substantial areas of woodland and hedgerow planting. The Dargle River flows from west to east through the land further to the south of the site.

9.3.8.5 Local Settlements

The subject site is located approximately 0.9km to the south-east of Enniskerry town centre, a picturesque small town which features a village square and a selection of local cafes, restaurants, shops and community services. The town centre is rich in cultural and built heritage and is designated as an Architectural Conservation Area (ACA). It has a strong identity, attributed to its high visual amenity value and good architectural design.

Bray is the largest nearby settlement, a coastal town with its town centre situated a distance of approximately 3.5km to the east. Smaller hamlets and villages in the nearby vicinity include Kilgarron to the west and Little Newtown to the south.

9.3.8.6 Visual Analysis

Views from within the site are open as a result of the undeveloped nature of the land and the agricultural landscape. Views of the Great Sugarloaf Mountain are captured looking south from the site. Woodland vegetation, hedgerows and tree planting along the site boundaries partially screen views to the surrounding landscape. From Cookstown Road, partial views into the site are captured through gaps in perimeter hedgerow planting and through the agricultural entrance gate. A tree line of tall mature tree planting along the eastern site boundary substantially restricts views into the neighbouring properties to the east of the site. Views into the site from the west on the R760 are largely restricted as a result of the topography of the land and intervening hedgerow planting.

Overall, the site has a high aesthetic quality which can be attributed to its rural and semi-woodland setting. The surrounding landscape has a high cultural and natural heritage value; land immediately surrounding the site to the south, east and west is categorised under the Glencree/Glencullen Area of Outstanding Natural Beauty (AONB) within the Wicklow County Development Plan 2016-2022. Mature hedgerows, woodland and trees lining the site and in the contiguous lands give the site a high biodiversity and aesthetic value.

Figure 9.6 – View looking north-east towards St. Patrick's Church of Ireland

Figure 9.7 – View looking south towards the Great Sugar Loaf Mountain

Figure 9.8 – View of the western perimeter hedgerow planting

Figure 9.9 – View of perimeter tree and hedgerows and agricultural elements

Figure 9.10 – View looking west of the northern and western site boundaries

Figure 9.11 – View looking south towards the site from Enniskerry Demesne housing

Figure 9.12 – View looking towards the eastern site boundary

9.3.9 Potential Visual Receptors.

Table 9.12 – Schedule of viewpoints visited

Viewpoint Ref.	Short description of receptor and view	Rationale for selection	Approx. Distance from site	Site visibility
1	View from the grounds of St. Patrick's Church of Ireland. Receptor: Pedestrians	Located adjacent to a nearby protected structure	280m	Not visible
2	View from the grounds of St. Patrick's Church of Ireland	Located adjacent to a nearby protected structure	250m	Not visible
3	View from the car park to the south of St. Patrick's Church of Ireland	Location of vehicular and pedestrian footfall in close proximity to the site.	260m	Partially visible
4	View from the western end of Cookstown Road, south of St. Patrick's Church of Ireland	Regional Road located adjacent to the site	290m	Partially visible
5	View from the Cookstown Road, opposite the entrance to Powerscourt National School	Regional Road located adjacent to the site	200m	Partially visible
6	View from the Cookstown Road, near to the north-west site corner	Regional Road located adjacent to the site	80m	Partially visible

Viewpoint Ref.	Short description of receptor and view	Rationale for selection	Approx. Distance from site	Site visibility
7	View from the Cookstown Road, near to the entrance to Enniskerry Demesne	Viewpoint location is identified as a 'View of Special Amenity Value or Special Interest' within the Wicklow County Development Plan 2016-2022.	5m	Visible
8	View from the Cookstown Road, west of the north-eastern site corner	Regional Road located adjacent to the site	5m	Visible
9	View from the Cookstown Road, to the east of the north-eastern site corner	Regional Road located adjacent to the site	60m	Not visible
10	View from the Cookstown Road, near to the entrance to Ridgewood House residential property	Regional Road located adjacent to the site	280m	Not visible
11	View from the Cookstown Road, near to the access road to a group of houses located to the east of the site	Regional Road located adjacent to the site	500m	Not visible
12	View from the R760 road, to the west of the site	Nearby Regional Road with potential views into the site.	190m	Not visible
13	View from the R760 road, north of the entrance to Tinnehinch Farm	Nearby Regional Road with potential views into the site.	160m	Not visible
14	View from the R760 road, near to the entrance to the National Memorial Cottage	Nearby Regional Road with potential views into the site.	250m	Not visible
15	View from the Eagle Valley Road, near to the entrance to Powerscourt Golf Club	Located within the Powerscourt Estate which is identified as a Natural Heritage Area and therefore a sensitive receptor.	1345m	Not visible
16	View from the Eagle Valley Road, immediately north of Powerscourt Hotel	Located within the Powerscourt Estate which is identified as a Natural Heritage Area and therefore a sensitive receptor.	1000m	Not visible
17	View from the Eagle Valley Road, immediately to the east of Powerscourt Hotel	Located within the Powerscourt Estate which is identified as a Natural Heritage Area and therefore a sensitive receptor.	850m	Not visible

Viewpoint Ref.	Short description of receptor and view	Rationale for selection	Approx. Distance from site	Site visibility
18	View from the Eagle Valley Road, near to the eastern boundary of Powerscourt Golf Course	Located within the Powerscourt Estate which is identified as a Natural Heritage Area and therefore a sensitive receptor.	490m	Not visible
19	View from the Eagle Valley Road, near to the entrance gate lodge to Powerscourt Estate	Located within the Powerscourt Estate which is identified as a Natural Heritage Area and therefore a sensitive receptor.	360m	Not visible
20	View from the Lover's Leap Lane	Public walking route located immediately to the south of the site with some open views into the site.	2m	Visible

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Section Two of the EIAR. The proposed landscape characteristics are defined by:

- Open space along southern boundary of c.0.92 hectares (with pedestrian connections to '*Lover's Leap Lane'* to the south and to boundary to the east and west). Hard and soft landscaping (including lighting) and open space (including boundary treatment), communal open space for duplex apartments; regrading/re-profiling of site where required (including import/export of soil as required) along with single storey bicycle/bin stores and ESB substation.
- A new footpath along the northern site boundary leading to the existing pedestrian crossing at Powerscourt National School. Street lighting columns will be provided along the southern side of Cookstown Road.
- 3 no. temporary (for 3 years) marketing signage structures along the Cookstown Road frontage and single storey marketing suite (c. 81sqm).
- All ancillary site development / construction / landscaping works.

Figure 9.13 – Overall Landscape Plan

9.5 POTENTIAL EFFECTS OF THE PROPOSED DEVELOPMENT

This section identifies potential impacts of the construction and operational phases of the development on the landscape and visual resource study area.

9.5.1 Construction Phase

9.5.1.1 Potential Landscape Impacts

There is the potential for significant and negative temporary impacts on the landscape during the construction stage of the project resulting from the following elements associated with construction and demolition work:

- The removal of a section of hedgerow/tree removal on Cookstown Road to allow for access to the site;
- The removal of small sections of hedgerow at Lovers Leap Lane to the south to form pedestrian connections with the public walking route;
- Soil movement and stock piling of topsoil;
- Any necessary demolition works;
- Erection of physical structures such as site compounds and storage area;
- Erection of site hoarding, signage, security fencing;
- Presence of site machinery and delivery/storage of materials etc.
- Lighting:
    - Temporary security lighting;
    - Lighting at height associated with construction of structures;
    - Lighting in the contractor's compound and car parking areas;
    - Light spill and glare towards surrounding residential receptor areas to the north of the site;
    - Light spill which could impact ecology

9.5.1.2 Potential Impacts on Views

The visual impacts due to construction will be short term, terminating upon completion of the development. There is potential for a significant and negative short-term impact during construction from the following elements associated with construction and demolition work:

- Dust;
- Site huts;
- Building materials;
- Ground disturbance (e.g. topsoil, stockpiles, etc.);
- Site hoarding/security fencing;
- Construction/demolition work.

There is potential for a significant and negative short-term visual impact from the use of temporary buildings, machinery necessary for construction works at proposed works, as well as stockpiling of materials.

There is potential for a significant and negative short-term impact from the transportation of the material to be recycled and the recycled material to and from the site. There is the potential for a significant and negative short-term visual impact on views into the site.

The main stages of the construction phasing will include the following:

- Site preparation works;
- Site establishment and erection of temporary structures;
- Diversion and connection of services and utilities;
- Construction of foundations and structures;
- Mechanical and electrical installation;
- Fit-out and external works.

9.5.2 Operational Phase

9.5.2.1 Potential Landscape Impacts

It is understood that the proposed development of this type results in a permanent change and may fundamentally alter the appearance of the landscape. However, altered appearance does not necessarily equate to long-term/permanent negative impacts to landscape character. Therefore, it is essential that a holistic view is taken with proposals of this nature, that not only assess the potential impact during the construction phase, but critically how the proposal will appear when fully implemented and the new planting/landscaping have matured. The proposed design will feature public open spaces that incorporate a diverse palette of soft landscaping including new woodland tree copses, wildflower meadow planting, bulb planting and ornamental planting. Landscape mitigation measures will also include the retention of existing boundary hedgerows and trees in order to protect the rural agricultural aesthetic of the existing landscape setting and to foster biodiversity.

Without landscape mitigation measures in place, the potential landscape effects resulting from the proposed development during the operational phase are considered to be moderate and adverse.

9.5.2.2 Potential Impacts on Views

Potential impacts will arise from the proposed residential development once it is operational and construction is complete. The patterns of use from day to day will alter as both traffic and pedestrian movement are likely to increase both throughout the site itself and within the adjacent communities and roads on approach to the redevelopment. There is potentially an adverse and moderate visual impact resulting from the replacement of the existing agricultural landscape with a residential development and associated ancillary site infrastructure. These adverse impacts may be mitigated by extensive landscape proposals shown in the landscape masterplan. There is potentially a moderate and positive visual impact from the creation of public open spaces in the north and south of the site, for the use of residents and the wider community.

The proposed design will encompass the following elements:

- A variety of hardscape materials including precast concrete paviours, flag paving, soft fall play safety surfacing and in-situ exposed aggregate concrete footpaths;
- Improved public pedestrian permeability through the site from Cookstown Road to 'Lover's Leap Lane' and adjacent lands to the east, south and west of the site;
- The creation of green links connecting pockets of open space and amenity areas;
- A hierarchy of native and ornamental planting including trees, shrubs, formal clipped hedging, ornamental grasses, herbaceous and perennial planting, wildflower meadow and bulb planting. The retention of existing trees and hedgerows where possible and the planting of native broadleaf tree species for biodiversity protection and enhancement;
- Hard and soft surface open spaces including a central roadside open space with stone pebble stream SuDS system and formal play area, a northern public open space with kickabout lawn and kitchen garden and a southern public open space consisting of woodland planting, an informal play area, kickabout lawn, seating area and wildflower meadow with tree copses;
- The architectural treatments en façade of the proposed development include textured render, natural stone cladding and reconstituted stone, reflecting the architectural character of the surroundings.

9.5.3 Potential Cumulative Impacts

An approved future residential development (Planning Register Ref 19/871 – Powerscourt Residential Development) in the lands adjacent to the western site boundary involves the construction of 27no. detached dwellings. This consists of 1no. single storey 2 bed house, 3no. single storey 3 bed houses, 7no. two storey 3 bed houses, 11no. two storey 4 bed houses and 5no. 2 storey 5 bed houses, all with on-curtilage car parking spaces. The future development will also comprise a public park of 1035sqm., ancillary and associated site development, landscaping, drainage and boundary works. There will be a new vehicular access provided from the R760 regional road. It is considered that the proposed adjacent development will have a moderate adverse impact during construction stage and a slight adverse impact on the landscape character of the site in the medium to long term. The adjacent agricultural landscape will be removed and replaced with a one and two storey residential development. See Figure 9.13 for Landscape Masterplan with the footprint of the approved adjacent development located to the west.

To the north east is an extant permission for 6 no. dwellings (Planning Reg. Ref. 16976). Further to the north west of the town centre, there is a proposal on lands at Kilgarron Hill (on the AA2 lands), which is at consultation stage with An Bord Pleanála (lodged 17th November 2020) for 219 no. dwellings. It is noted the SLO10 lands, permission was granted for 12 no. detached dwellings on the 18/4/2020 by An Bord Pleanála (PL27.248914 WCC Ref. 17/15). The Powerscourt Demesne landbank has an extant permission for 47 no. dwellings. In addition, it is noted the Bray MD LAP includes the development of the Fassaroe lands which is located c. 750m to the north east of the proposed development site, which is identified as an area for development of c. 4,000 dwellings along with supporting retail, commercial and areas of open space.

The potential cumulative impacts without landscape mitigation measures in place are considered to be very significant and adverse during the construction stage of the project, reducing to moderate and adverse in the medium to long term during the operational phase of the project. The residual cumulative visual impacts are described in Section 9.7 and 9.8.

9.5.4 'Do Nothing' Impact

In a '*do – nothing'* scenario, the site would remain in private ownership and remain as pastoral grassland or other agricultural use.

9.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

9.6.1 Construction Phase

The following mitigation measures will be implemented:

- Height of temporary stockpiles to be restricted to a practicable minimum to avoid impact on local sensitive receptors;

- Hoarding will be erected around site boundaries to reduce visual impact of construction works;
- Plant will be held in designated compound on site;
- Protective fencing will be installed around the RPA's existing boundary trees.

Visual impacts during the construction phase will be mitigated somewhat by appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish. Appropriate site hoardings will be put in place around the perimeter of the site where required to minimise the landscape and visual impact.

9.6.2 Operational Phase

The major visual remediation of the project will be accomplished through the following mitigation measures which have been incorporated into the design:

- Through the positioning of the various elements of the development on site in order to enhance the appearance of the residential blocks as a whole through the design of the site layout and built form.
- The creation of high-quality public and semi-public spaces for the use and amenity of the users of the development and the wider community; the creation of two public parks in the north and south of the site, a central roadside space with stream feature and apartment/duplex units communal open space.
- Through the creation of a universally accessible green public pedestrian route through the development in order to provide safe pedestrian access between Cookstown Road and 'Lover's Leap Lane'.
- The provision of a new vehicular access point from Cookstown Road.
- The retention of existing trees and perimeter hedgerows where feasible. Existing planting will be enhanced and strengthened by additional planting of native broadleaf species and dense woodland and understory planting. The retention of existing trees and hedgerows is important for the protection of local foraging and commuting bat populations.

9.6.3 'Worst-case' Scenario

The *'worst-case'* scenario describes the effects that arise from a development in the case where mitigation measures substantially fail.

9.7 PREDICTED LANDSCAPE EFFECTS (RESIDUAL IMPACTS)

This section describes the residual effects on the landscape resources arising from the proposed scheme. The effects are residual in that they cannot be mitigated in the same way as those measures described above. The cumulative impact on the landscape of the permitted adjacent Powerscourt Residential Development (Planning Reg. Ref 19/871**)** is also considered. No cumulative impacts on the landscape are predicted over and above the impacts from the proposed development.

The landscape resource is the physical pattern of components and features that in combination characterize the surrounding physical area. The effects of the proposed scheme on this resource are those that will directly alter the physical pattern, and so the character will change in an adverse, neutral or beneficial way.

The extent of the proposed development site is shown in Section 9.3.8.1 The baseline assessment of the site revealed agricultural land used for the purposes of pastoral grazing.

Assessments are made during the construction stage of the project and at operation. Effects are considered under the following headings:

- temporary effects (construction phase up to five years);
- short-term effects (operation phase up to seven years);
- medium-term effects (operation phase, seven to fifteen years) and
- long-term effects (operation phase, fifteen years and beyond).

9.7.1 Landscape Sensitivity Assessments

Landscape sensitivity is assessed as medium based on the following determinations:

Value
The site is located within the '*Urban Area'* landscape category and is zoned for residential, Open Space and Community uses under the Bray Municipal District LAP. The site also lies within the agreed (with Wicklow County Council) 'Action Area 3' in the *Bray Municipal District Local Area Plan 2018 (LAP),* which identifies the land for use for residential development and open space uses.

Susceptibility to Change
The site has positive characteristics including perimeter hedgerow and tree planting which enhance biodiversity. The site also possesses scenic value that can be attributed to the landscape setting.

9.7.2 Magnitude of Change Assessments

The overall magnitude of change to the existing landscape is considered as being medium based on the following determinations:

Scale
The development consists of a total of 165no. dwellings comprising a combination of two-storey housing units, duplex units and apartment units. The apartments/duplexes are arranged across 6no. three-storey buildings whilst 4no. Maisonette dwellings are arranged across a two-storey building. A part two-storey and single storey creche also features within the development. The surrounding context to the south, east and west consists of agricultural land. Two-storey residential properties exist in small clusters of housing to the north and east of the site. The permitted development to the west of the site consists of the construction of 27no. detached dwellings. The scale of the proposed development will be greater than that of existing and permitted development in the immediate surroundings and the proposed three storey apartment blocks will be higher than neighbouring residential properties in close proximity to the site.

Duration and Reversibility of Landscape Effects

The effect generated by the proposed development on the landscape resource is permanent and irreversible.

9.7.3 Significance of Effect

The direct effect of the proposed development on the landscape resource is considered to be moderate, based on a combination of a medium magnitude of change and a medium landscape sensitivity.

9.7.4 Nature of Effects on the Landscape

It is considered that the proposed development in cumulation with other permitted and proposed developments in the area will have a neutral effect on the landscape. Once construction works are complete and the proposed development is operational, the existing rural and rolling agricultural field-scape will be predominantly removed and replaced by a low-rise residential development, creche facility and associated infrastructure. The change in the perception of the landscape will be from a rural aesthetic to one of a suburban housing development, with associated movement of people by foot, bike, and car. The site and its associated road and pathway infrastructure will be lit at night-time. Substantial landscape mitigation will be in the form of the retention of a substantial number of boundary trees and hedgerows where feasible, to maintain the rural agricultural aesthetic to the existing landscape setting and to enhance and protect biodiversity. This will be combined with extensive high quality communal open space, a network of pedestrian connections to the north and south of the site as well as a diverse palette and layering of soft landscape treatments that will develop over time to add to the visual amenity of the site itself.

9.8 PREDICTED VISUAL EFFECTS (RESIDUAL IMPACTS)

Twenty viewpoints were chosen for the purposes of this visual assessment. The views assess the potential visual effects of the proposed residential development, as well as the cumulative visual effects of a future potential residential development in the lands immediately to the west of the development site (Planning Reg. Ref. 19/871). The views were chosen as being representative of the key views in terms of effects on local sensitive receptors and are taken from the public domain. (**Please see 3D Design Bureau Document for Verified Views in A3 format).**

Figure 9.14 – Short Range Viewpoints Map

Figure 9.15 – Long Range Viewpoints Map

Table 9.13 – Schedule of assessed visual receptors

Viewpoint	Description
1	The grounds of St. Patrick's Church of Ireland
2	The grounds of St. Patrick's Church of Ireland
3	The car park to the south of St. Patrick's Church of Ireland
4	The western end of Cookstown Road, south of St. Patrick's Church of Ireland
5	Cookstown Road, opposite the entrance to Powerscourt National School
6	Cookstown Road, near to the north-west site corner
7	Cookstown Road, near to the entrance to Enniskerry Demense
8	Cookstown Road, west of the north-eastern site corner
9	Cookstown Road, to the east of the north-eastern site corner
10	Cookstown Road, near to the entrance to Ridgewood House residential property
11	Cookstown Road, near to the access road to a group of houses located to the east of the site
12	R760 road, to the west of the site
13	R760 road, north of the entrance to Tinnehinch Farm
14	R760 road, near to the entrance to the National Memorial Cottage
15	Eagle Valley Road, near to the entrance to Powerscourt Golf Club
16	Eagle Valley Road, immediately north of Powerscourt Hotel
17	Eagle Valley Road, immediately to the east of Powerscourt Hotel
18	Eagle Valley Road, near to the eastern boundary of Powerscourt Golf Course
19	Eagle Valley Road, near to the entrance gate lodge to Powerscourt Estate
20	Lover's Leap Lane

9.8.1 Construction Impacts and Effects on Visual Receptors

Table 9.14 – Summary of Visual Effects – Construction Stage

Viewpoint	Description	Sensitivity	Magnitude of Chang	Significance & Quality
1	The grounds of St. Patrick's Church of Ireland	High	Negligible	Imperceptible and Neutral
2	The grounds of St. Patrick's Church of Ireland	High	Negligible	Imperceptible and Neutral
3	The car park to the south of St. Patrick's Church of Ireland	Medium	Low	Slight and Adverse
4	The western end of Cookstown Road, south of St. Patrick's Church of Ireland	Medium	Low	Slight and Adverse
5	Cookstown Road, opposite the entrance to Powerscourt National School	Low	Negligible	Imperceptible and Adverse
6	Cookstown Road, near to the north-west site corner	Medium	Medium	Moderate and Adverse
7	Cookstown Road, near to the entrance to Enniskerry Demesne	Very High	High Medium	Very significant to significant and Adverse
8	Cookstown Road, west of the north-eastern site corner	Medium	Medium	Moderate and Adverse
9	Cookstown Road, to the east of the north-eastern site corner	Low	Negligible	Imperceptible and Neutral
10	Cookstown Road, near to the entrance to Ridgewood House residential property	Low	Negligible	Imperceptible and Neutral

Viewpoint	Description	Sensitivity	Magnitude of Chang	Significance & Quality
11	Cookstown Road, near to the access road to a group of houses located to the east of the site	Low	Negligible	Imperceptible and Neutral
12	R760 road, to the west of the site	Low	Negligible	Imperceptible and Neutral
13	R760 road, north of the entrance to Tinnehinch Farm	Medium	Medi Low	Slight and Adverse
14	R760 road, near to the entrance to the National Memorial Cottage	Low	Negligible	Imperceptible and Neutral
15	Eagle Valley Road, near to the entrance to Powerscourt Golf Club	High	Negligible	Imperceptible and Neutral
16	Eagle Valley Road, immediately north of Powerscourt Hotel	High	Negligible	Imperceptible and Neutral
17	Eagle Valley Road, immediately to the east of Powerscourt Hotel	High	Negligible	Imperceptible and Neutral
18	Eagle Valley Road, near to the eastern boundary of Powerscourt Golf Course	High	Negligible	Imperceptible and Neutral
19	Eagle Valley Road, near to the entrance gate lodge to Powerscourt Estate	High	Negligible	Imperceptible and Neutral
20	Lover's Leap Lane	Medium	Medium	Moderate and Adverse

9.8.2 Operational Impacts and Effects on Visual Receptors

9.8.2.1 Viewpoint 1:

Location: The grounds of St. Patricks Church of Ireland
Distance from the site: 280m (approx.)

Existing View 1

This viewpoint is taken from outside of the western elevation of St. Patrick's Church of Ireland, looking south-east towards the site. The view captures the front entrance door and the western elevation of the church prominently within the left foreground of the view. A gravel surface surrounds the perimeter of the church building. The adjacent graveyard and a line of mature *pinus* spp. tree planting to the southern boundary of the church grounds is visible in the middle ground of the view. Partial views of the built fabric of Powerscourt National School are visible in the background of the view through the intervening tree canopy.

Proposed View 1

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development present behind the built fabric of Powerscourt National School. All elements of the proposed development will be screened from view by the intervening built fabric and lower tree canopy of mature tree planting in the grounds of St. Patrick's Church. Therefore, the magnitude of change of this view is considered to be negligible.

A view of the protected structure of St. Patrick's Church of Ireland and graveyard is captured within this viewpoint, offering a high visual amenity to pedestrians visiting the church. The sensitivity of this viewpoint is considered to be high for pedestrians.

A high viewpoint sensitivity and a negligible magnitude of change results in a viewpoint significance that is slight-not significant. However, given the impact cannot be seen from this viewpoint location, the significance is reduced to imperceptible. The quality of the effect is considered to be neutral in the short to long term.

Cumulative Impact – Planning Reg. Ref 19/871 View 1

The solid blue line presented on the image represents the extent of the permitted future development of Powerscourt Residential Development in the background of the view. The magnitude of change of the view is considered to be negligible. The cumulative visual effect of the presence of the approved adjacent residential development in this viewpoint is therefore considered slight to not significant and neutral.

9.8.2.2 Viewpoint 2

Location: The grounds of St. Patricks Church of Ireland
Distance from the site: 250m (approx.)

Existing View 2

This viewpoint is taken from the grounds of St. Patricks Church of Ireland, looking south-east towards the site. The view captures the adjacent graveyard within the middle-ground of the view. The foreground of the view captures an expanse of gravel surfacing to the southern side of the church building. A line of mature *pinus* spp. trees surrounding the perimeter of the church grounds is prominent within the view. Partial glimpses of the built fabric of Powerscourt National School and nearby residential properties are visible beyond the intervening tree canopy and graveyard headstones. A partial glimpse view of the Great Sugarloaf Mountain is also captured in the far distance in the right of the view beyond the intervening tree canopy.

Proposed View 2

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development present behind the built fabric of Powerscourt National School. All elements of the proposed development will be screened from view by the intervening built fabric and the lower tree canopy of mature tree planting in the grounds of St. Patrick's Church. The partial view of the Great Sugarloaf Mountain is retained in the view. Therefore, the magnitude of change of this view is considered to be negligible.

The viewpoint captures the graveyard associated with the church and mature tree planting to its perimeter, thereby offering a view that is highly valued by pedestrians and visitors to the church. The sensitivity of this viewpoint is deemed to be high at this viewpoint location.

A high viewpoint sensitivity and a negligible magnitude of change results in a viewpoint significance that is slight-not significant. However, given the impact cannot be seen from this viewpoint location, the significance is reduced to imperceptible. The quality of the effect is considered to be neutral in the short to long term.

Cumulative Impact – Planning Reg. Ref 19/871 View 2

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. A portion of the lower levels of the Great Sugarloaf Mountain will be screened by the future Powerscourt Residential Development. The magnitude of change of the view is considered to be low. The cumulative visual effect of the presence of the approved adjacent residential development in this viewpoint is considered moderate. The quality of the effect is considered to be neutral.

9.8.2.3 Viewpoint 3

Location: The car park to the south of St. Patrick's Church of Ireland
Distance from the site: 260m (approx.)

Existing View 3

This viewpoint is taken from a tarmac pathway located to the south of St. Patrick's Church of Ireland, looking south-east towards the site. In the foreground of the view, a gravel car-park surrounded by low timber fencing is depicted. The southern portion of the graveyard associated with St. Patrick's Church of Ireland and an overhanging tree canopy is visible in the left of the view. In the background of the view, the built fabric of Powerscourt National School and the surrounding agricultural landscape is visible. The summit of the Great Sugarloaf Mountain is visible in the far distance of the view.

Proposed View 3

The proposed development is partially visible in the background from this viewpoint location. The western elevation of the proposed residential development is visible beyond the built fabric of Powerscourt National School. Existing intervening vegetation and topography screen the rest of the development from view. A small portion of the background tree canopy will be removed and replaced with the built fabric of a high-quality residential development. The magnitude of change of this view is therefore considered to be low.

The view is primarily experienced by users of the car park and pedestrians and displays views of some scenic quality of the adjacent agricultural landscape and the summit of the Great Sugarloaf Mountain. The visual sensitivity is therefore considered to be medium.

A medium viewpoint sensitivity and a low magnitude of change results in a viewpoint significance that is slight. The quality of the effect is considered to be adverse in the construction stage of the project, reducing to neutral in the medium to long term during the operational phase of the project when construction works are complete.

Cumulative Impact – Planning Reg. Ref 19/871 View 3

The solid blue line presented on the image represents the extent of the permitted future development of Powerscourt Residential Development in the background of the view. Partial views of the Great Sugarloaf Mountain will be screened by the approved future Powerscourt Residential Development. The magnitude of change of the view is considered to be medium. The significance of the cumulative visual effect of the presence of the approved adjacent residential development in this viewpoint is considered moderate. The quality of the effect is considered to be adverse.

9.8.2.4 Viewpoint 4

Location: The western end of Cookstown Road, south of St. Patrick's Church of Ireland
Distance from the site: 290m (approx.)

Existing View 4

This viewpoint is taken from the northern footpath at the western end of Cookstown Road, looking east towards the site. The view depicts a two-way carriageway with open outlooks to the surrounding landscape. A tarmacked footpath with road signage is present on the northern side of the road, whilst the southern side of the road features a sloped grass verge and low timber fenced boundary. The built fabric of Powerscourt National School and the surrounding rolling farmland is visible in the background of the view. The summit of the Great Sugarloaf Mountain is visible in the far distance. A tree canopy of mature tree planting can be seen in the background in the left of the view.

Proposed View 4

The proposed development is partially visible in the background from this viewpoint location. The rooftops of the proposed residential development are partially visible beyond the existing topography of the landscape. Proposed street lighting columns located on the grass verge on the southern side of the Cookstown Road are visible lining roadside. The built fabric of Powerscourt National School and intervening topography screen the rest of the development from view. Views of a small portion of the lower levels of the Great Sugarloaf Mountain and the skyline will be removed and replaced with the rooftops of the proposed residential development. The magnitude of change of this view is therefore considered to be low.

The view is primarily experienced by pedestrians journeying from one location to the other and by motorists. The view offers some elements of scenic value of the surrounding agricultural setting and the summit of the Great Sugarloaf Mountain in the background of the view. The viewpoint sensitivity is considered to be medium.

The medium sensitivity combined with the low magnitude of change results in viewpoint significance that is slight. The quality of the effect is considered to be adverse in the short term during the construction stage of the project, reducing to neutral in the medium to long term during the operational phase of the project when construction works are complete.

Cumulative Impact – Planning Reg. Ref 19/871 View 4

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. Views of the Great Sugarloaf Mountain and the skyline will be removed and replaced with the approved Powerscourt Residential Development. The magnitude of change of the view is considered to be medium. The significance and quality of the cumulative visual effect of the presence of the future adjacent residential development in this viewpoint is moderate and neutral in the short to long term during the operational phase of the project.

9.8.2.5 Viewpoint 5

Location: The northern footpath on Cookstown Road opposite the entrance to Powerscourt National School
Distance from the site: 200m (approx.)

Existing View 5

This viewpoint is located on the northern footpath of Cookstown Road, opposite the vehicular entrance to Powerscourt National School, looking east towards the site. The foreground of the view presents a two-way carriageway with pavement on the northern side of the road. The built fabric of the Powerscourt National School, the vehicular entrance onto Cookstown Road and perimeter planting are visible centrally within the view. Lighting columns within the school grounds are also present in the viewpoint. In the background, an agricultural field adjacent to the school is visible. The topographic incline of the landscape restricts views further afield to the surrounding lands. In the left background of the view, hedgerow and mature tree planting to the subject site boundary are visible.

Proposed View 5

A substantial proportion of the proposed development will not be visible from this viewpoint location. The proposed new footpath and street lighting to the southern side of the Cookstown Road is partially visible in the middle distance of the view. The solid red line presented on the image indicates the extent of the proposed development present in the background of the view. The built fabric of the proposed development will be screened from view by the intervening built fabric of Powerscourt National School and by intervening topography. The magnitude of change of the viewpoint is considered to be negligible.

The view is primarily experienced by pedestrians and users of the school and by motorists. The view offers small elements of scenic value of the surrounding agricultural setting. The viewpoint sensitivity is considered to be low in this instance.

A low viewpoint sensitivity and a negligible magnitude of change results in a viewpoint significance that is imperceptible. The quality of the effect is considered to be adverse in the short term during the construction stage of the project, reducing to neutral in the medium to long term during the operational phase of the project when construction works are complete.

Cumulative Impact – Planning Reg. Ref 19/871 View 5

The solid blue line presented on the image represents the extent of the approved future development of Powerscourt Residential Development in the background of the view. Views of the adjacent agricultural lands and the skyline will be removed and replaced with the approved Powerscourt Residential Development. The magnitude of change of the view is considered to be medium. The significance and quality of the cumulative effect of the presence of the future adjacent residential development in this viewpoint is considered slight and neutral in the short to long term during the operational phase of the project.

9.8.2.6 Viewpoint 6

Location: Cookstown Road, near to the north-west site corner
Distance from the site: 80m (approx.)

Existing View 6

This viewpoint is taken on the northern edge of the Cookstown Road, just west of the north-western site corner. The view presents a rural road enclosed on both sides by tree and hedgerow planting. On the southern side of the road, a steep embankment which has been cleared of vegetation cover is visible. At the top of the embankment, a hedgerow is present with a small number of trees dispersed along the boundary. In the left of the view, a 2m high timber panelled fence to the boundary of a residential property on Enniskerry Demesne is visible.

Proposed View 6

The proposed development will be partially visible from this viewpoint location. The duplex block located in the north-western portion of the site will be partially visible beyond the intervening tree canopy and hedgerow planting. Proposed street lighting columns are visible on the planted verge on the southern side of the Cookstown Road. A new public pedestrian footpath which provides access to the proposed development from the west is also visible on the southern side of the road. A proposed 2-3m high retaining wall and hedgerow planting to the northern site boundary is evident in the left of the view. A portion of the skyline and roadside tree planting will be removed and replaced with the upper floors of apartment and duplex units. The magnitude of change of this view is therefore considered to be low.

This view will be experienced by motorists travelling along the Cookstown Road and displays natural elements of the landscape of a moderate scenic quality. The sensitivity of the viewpoint is therefore considered to be medium.

A medium viewpoint sensitivity and a low magnitude of change results in a viewpoint significance that is slight. The quality of the effect is considered adverse in the short term during the construction stage of the project, reducing to neutral in the medium to long term during the operational phase of the project when construction works are complete.

Cumulative Impact – Planning Reg. Ref 19/871 View 6

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development. There will be no cumulative visual effect of the presence of the future approved adjacent residential development in this instance.

9.8.2.7 Viewpoint 7

Location: Cookstown Road, near to the entrance to Enniskerry Demesne
Distance from the site: 5m (approx.)

Existing View 7

This viewpoint is taken on the pedestrian path on the northern edge of Cookstown Road, near to the entrance to Enniskerry Demesne. The view looks south towards the site. This viewpoint represents the location of a '*View of Special Amenity Value or Special Interest No. 7'* as identified within the *'Wicklow County Development Plan 2016-2022',* which captures a view towards the Great Sugarloaf Mountain from the Cookstown Road. In the foreground of the view, leaf litter can be seen on the roadside verge. A low hedgerow and thicket planting are visible in the middle ground of the view, forming the boundary between the Cookstown Road and the proposed development site. Partial glimpses of the site and the adjacent agricultural landscape in the background are visible beyond the roadside hedgerow. A view of the Great Sugarloaf Mountain is captured in the background of the view.

Proposed View 7

The proposed development is visible from this viewpoint location. A substantial portion of the duplex and apartment units located in the north-western portion of the site are visible from this viewpoint. The view captures the proposed new access road to the development centrally within the view. Soft and hard landscaping to the northern public open space within the development including grass lawn, tree planting and clipped hedgerow planting are also visible. An entrance sign to the development is located within a planted area on the eastern side of the proposed new access road. The agricultural grassland landscape will be replaced with a high-quality residential development comprising houses, duplex and apartment units. Views of the existing skyline and background tree planting will be removed and replaced with the upper floors of the built fabric of the proposed development. Views of the Great Sugarloaf Mountain, the iconic summit, will be retained from this viewpoint. The magnitude of change of the view resulting from the proposed development is considered to be medium.

This viewpoint will be primarily experienced by pedestrians and residents of the adjacent area of housing. The view is identified as a protected view looking towards the Great Sugarloaf Mountain, and therefore the sensitivity of the viewpoint is considered to be very high.

The very high sensitivity of the view coupled with the medium magnitude of change results in an effect that is very significant to significant and of adverse quality in the construction stage of the project. This will reduce to moderate and neutral in the medium term during the operational phase when construction works are complete and all planting has established.

Cumulative Impact – Planning Reg. Ref 19/871 View 7
There will be no cumulative visual effect of the presence of the adjacent permitted future Powerscourt Residential Development at this viewpoint location.

9.8.2.8 Viewpoint 8

Location: Cookstown Road, west of the north-eastern site corner
Distance from the site: 5m (approx.)

Existing View 8

This viewpoint is taken on the pedestrian path on the northern edge of Cookstown Road, to the west of the north-eastern site corner, looking south towards the site. In the foreground of the view, groundcover planting including ivy and bramble is visible lining the northern edge of the road. Woodland edge planting, segments of field hedgerows and a line of mature tree planting are visible on the southern side of the road. Partial glimpses of agricultural grassland and boundary hedgerow planting within the subject site are visible through gaps in the intervening tree canopy. A line of tall mature conifer tree planting to the eastern site boundary can be partially seen beyond the trunks and lower branches of roadside tree planting.

Proposed View 8

The proposed development will be visible from this viewpoint. All floors of the duplex units and houses located in the eastern portion of site are visible beyond the intervening roadside tree canopy. Partial views of soft landscaping to the northern public open space within the development will also be captured. Proposed street lighting columns are visible lining the southern side of the Cookstown Road. The agricultural grassland landscape will be replaced with a high-quality residential development comprising houses, duplex and apartment units. Views of the existing skyline and mature background tree planting will be removed and replaced the built fabric of the proposed development. The magnitude of change of the view is considered to be medium.

This view will be primarily experienced by pedestrians journeying from one location to another and by motorists. The view captures some natural elements of the landscape including tree and hedgerow planting and agricultural grassland that may be considered to be of scenic value. The sensitivity of the view is therefore considered to be medium.

The medium sensitivity of the view combined with the medium magnitude of change results in an effect that is of moderate significance. The quality of the impact is considered to be adverse in the short to long term during the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 8

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative impact of the presence of the approved future adjacent residential development in this instance.

9.8.2.9 Viewpoint 9

Location: Cookstown Road, to the east of the north-eastern site corner
Distance from the site: 60m (approx.)

Existing View 9

This viewpoint is taken on the northern edge of Cookstown Road, to the east of the north-eastern site corner. The view looks west towards the site and depicts a narrow rural road with woodland edge groundcover and tree planting on its northern side. Tall hedgerow planting to detached residential properties on the southern side of Cookstown Road is dominant in the middle-ground of the view. In the background of the view, hedgerow and tree planting lining the Cookstown Road is visible. Views to the adjacent landscape are restricted as a result of the boundary planting to the roadside.

Proposed View 9

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development. All elements of the proposed development will be screened from view by tree and hedge planting on Cookstown Road and as a result of distance from the site. Therefore, the magnitude of change of the view will be negligible.

The viewpoint will be primarily experienced by motorists as part of a journey from one place to another. The view is therefore momentary and the sensitivity of the view is considered to be low.

The low sensitivity of the view combined with the negligible magnitude of change results in a viewpoint of imperceptible significance. The quality of the view is considered to be neutral.

Cumulative Impact – Planning Reg. Ref 19/871 View 9

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative visual effect of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.10 Viewpoint 10

Location: Cookstown Road, near to the entrance to Ridgewood House residential property
Distance from the site: 280m (approx.)

Existing View 10

This viewpoint is taken on the northern edge of Cookstown Road near the entrance to Ridgewood House residential property. The view looks west towards the site. In the right of the view, a low natural stone boundary wall to the private residential property is visible, beyond which partial views of private gardens can be seen. Mature tree planting within the grounds of the property is also evident. In the left of the view, dense woodland edge tree and groundcover planting lines the southern roadside. Views to the surrounding landscape are restricted from this viewpoint location as a result of roadside vegetation cover.

Proposed View 10

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development. All elements of the proposed development will be screened from view by roadside hedgerows, the topography of the landscape and as a result of distance from the site. Therefore the magnitude of change to the view is considered to be negligible.

The viewpoint will be primarily experienced by motorists as part of a journey from one place to another and will be momentary. The sensitivity of the view is therefore considered to be low.

The low sensitivity of the view combined with the negligible magnitude of change results in a viewpoint of imperceptible significance. The quality of the view is considered to be neutral.

Cumulative Impact – Planning Reg. Ref 19/871 View 10

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative visual effect of the presence of the approved future adjacent residential development in this instance.

9.8.2.11 Viewpoint 11

Location: Cookstown Road, near to the access road to a small group of houses to the east of the site
Distance from the site: 500m

Existing View 11

This viewpoint is taken from the northern edge of Cookstown Road, opposite the local access road to a small group of a private residential properties located approximately 500m to the east of the site. The view depicts a narrow rural road, lined on both sides by woodland edge tree and hedgerow planting. In the right of the view, green palisade fencing surrounding council infrastructure is visible. Dense woodland edge planting enclosing the road results in views to the surrounding lands being restricted.

Proposed View 11

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development in the background of the view. Intervening vegetation cover acts to screen all elements of the proposed development from view. Therefore, the magnitude of change to the view is considered to be negligible.

The viewpoint will be primarily experienced by motorists as part of a journey from one place to another and will be momentary. The sensitivity of the view is therefore considered to be low.

The low sensitivity of the view combined with the negligible magnitude of change results in a viewpoint of imperceptible significance. The quality of the view is considered to be neutral in both the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 11

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative visual effect of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.12 Viewpoint 12

Location: The western edge of the R760 road, located west of the site
Distance from the site: 190m (approx.)

Existing View 12

This viewpoint is taken from the western edge of the R760 road, opposite a field entrance gate. The view looks east towards the site. A two-way carriageway with public footpath dominates the foreground of the view. Hedgerow planting, scattered tree planting and a metal field access gate to agricultural lands adjacent to the west of the subject site are visible in the middle ground of the view. Overhead cables are visible within the view, reducing the visual quality of the landscape. In the background of the view, tree and hedgerow planting to the western site boundary are present.

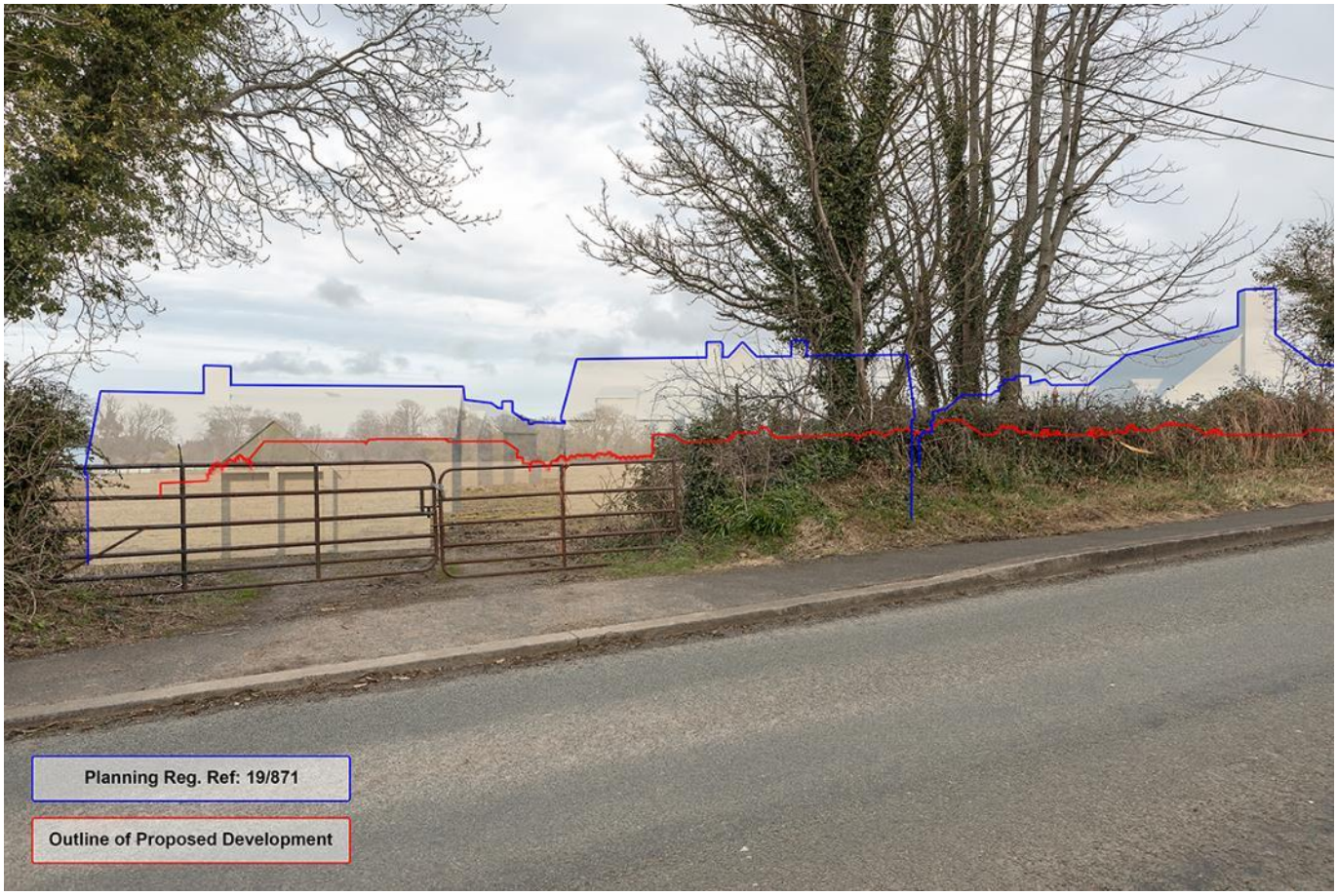
Proposed View 12

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development in the background of the view. The mature tree canopy to field boundaries and roadside hedgerows act to screen the proposed development from view. The magnitude of change to the view is considered to be negligible.

The viewpoint will be primarily experienced by motorists and pedestrians as part of a journey from one place to another and will be momentary. The agricultural landscape depicted in the view displays some elements of scenic value. The sensitivity of the view is therefore considered to be medium.

The medium sensitivity of the view combined with the negligible magnitude of change results in a view that is not significant. Given the impact cannot be seen from this viewpoint location, the significance of the view is reduced to imperceptible. The quality of the effect is considered to be neutral in the short to long term during the construction and operational phases of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 12



The solid blue line presented on the image represents the extent of the permitted future development of Powerscourt Residential Development in the middle ground of the view. The magnitude of change to the view is considered to be high. The significance of the cumulative visual effect of the presence of the approved future adjacent residential development in this viewpoint is considered significant. The quality of the effect is considered to be adverse in the temporary term during the construction stage of the project. This will reduce to moderate and neutral in the medium term once construction works have been completed and landscape plantings have established. The existing agricultural landscape setting will be replaced by a residential landscape setting.

9.8.2.13 Viewpoint 13

Location: The R760 road, north of the entrance to Tinnehinch Farm
Distance from the site: 160m (approx.)

Existing View 13

This viewpoint is taken from the western edge of the R760, north of the entrance to Tinnehinch Farm and looking east towards the site. In the foreground of the view, a two-way carriageway is evident, with a narrow, tarmacked footpath on its eastern side. Road signage indicating a bend in the road is visible on the footpath edge. Expansive views are visible from this location to the surrounding agricultural landscape. In the background of the view, the western site boundary hedgerow and tree planting and glimpses of higher ground are visible. Overhead cables are visible within the view, reducing the visual quality of the landscape setting.

Proposed View 13

The proposed development will be partially visible in the background from this viewpoint location. The western elevation of the proposed built fabric will be visible through the existing field boundary hedgerow planting. Views of the agricultural landscape and the distant tree canopy will be removed and replaced with the built fabric of a high-quality residential development. The magnitude of change to the view is considered to be low.

This view will be experienced by motorists and pedestrians transiting from one place to another. The view displays elements of the agricultural landscape that have some scenic quality. The visual sensitivity of the view is therefore considered to be medium.

The medium sensitivity of the view combined with the low magnitude of change to the view results in a visual effect with a significance classified as slight. The quality of the view is considered to be adverse in the construction stage of the project, reducing to neutral in the medium to long term during the operational phase of the project when construction works are complete, and all planting has established.

Cumulative Impact – Planning Reg. Ref 19/871 View 13

The solid blue line presented on the image represents the extent of the permitted future development of Powerscourt Residential Development in the middle distance of the view. The magnitude of change to the view is considered to be high. The significance of the cumulative visual effect of the presence of the future approved adjacent residential development in this viewpoint is considered significant. The quality of the effect is considered to be adverse in the temporary term during the construction stage of the project. This will reduce to moderate and neutral in the medium term once construction works have been completed and landscape plantings have established. The existing agricultural landscape setting will be replaced by a residential landscape setting.

9.8.2.14 Viewpoint 14

Location: The R760 road, near to the entrance to the National Memorial Cottage
Distance from the site: 250m (approx.)

Existing View 14

This viewpoint is taken from the northern edge of the R760 road, near to the entrance to the National Memorial Cottage. The view depicts a rural road with a natural stone boundary wall trained with ivy and moss present on both sides of the road. A line of mature tree planting is visible on the southern side of the road. Partial glimpses of the built fabric of residential properties and farm buildings can be seen through the tree canopy.

Proposed View 14

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development. All elements of the proposed development will be screened from view by intervening vegetation and boundary treatments and as a result of distance from the site. The magnitude of change to the view is therefore considered to be negligible.

The viewpoint will be primarily experienced by motorists as part of a journey from one place to another and will be momentary. The sensitivity of the view is therefore considered to be low.

A low viewpoint sensitivity and a negligible magnitude of change results in a viewpoint significance that is imperceptible. The quality of the effect is considered to be neutral.

Cumulative Impact – Planning Reg. Ref 19/871 View 14

The solid blue line presented on the image represents the extent of the permitted future development of Powerscourt Residential Development in the background of the view. The magnitude of change to the view is considered to be negligible. There will be no cumulative visual impact of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.15 Viewpoint 15

Location: Eagle Valley Road, near to the entrance to Powerscourt Golf Club
Distance from the site: 1345m (approx.)

Existing View 15

This viewpoint is located within Powerscourt Estate on the Eagle Valley Road and near to the entrance road to Powerscourt Golf Club. The view looks east towards the site. The view depicts a mature woodland setting with a high aesthetic value; mature tree and large shrubs are located within a maintained lawn area to either side of the carriageway. Views of perimeter hedgerow planting can be partially seen in the background through the lower tree canopy. A wide tarmacked footpath runs along the southern side of the carriageway.

Proposed View 15

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development in the far distance. Intervening vegetation will screen all elements of the proposed development from view. The magnitude of change to the view is therefore considered to be negligible.

The view will be primarily experienced by users of and visitors to the Powerscourt Estate. This includes both pedestrians and motorists. The woodland setting of the view displays elements of high visual amenity. The sensitivity of the view is therefore considered to be high.

The high sensitivity of the view combined with the negligible magnitude of change results in a significance of visual effect that is classified as slight-not significant. However, given that the impact is not visible within the viewpoint, the significance of the effect is reduced to imperceptible. The quality of the effect is considered to be neutral in both the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 15

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative impact of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.16 Viewpoint 16

Location: Eagle Valley Road, immediately north of Powerscourt Hotel
Distance from the site: 1000m (approx.)

Existing View 16

This viewpoint is located from within Powerscourt Estate on the Eagle Valley Road and immediately to the north of the Powerscourt Hotel building. The view looks east towards the site and depicts a two way carriageway within a mature parkland setting with a high aesthetic and landscape value. Some younger tree planting is also visible within lawned areas. Powerscourt Golf Course and its associated tree planting are visible in the left of the view, beyond which glimpses of the surrounding mountain landscape can be seen. Partial views of the Little Sugarloaf Mountain are visible in the background of the view beyond the tree canopy.

Proposed View 16

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development. All elements of the proposed development will be screened from view by intervening vegetation and as a result of distance from the site. The magnitude of change to the view is therefore considered to be negligible.

The view will be primarily experienced by users of and visitors to the Powerscourt Estate, including both pedestrians and motorists. The woodland setting of the view displays elements of high visual amenity. The sensitivity of the view is therefore considered to be high.

The high sensitivity of the view combined with the negligible magnitude of change results in a significance of visual effect that is classified as slight-not significant. However, given that the impact is not visible within the viewpoint, the significance of the effect is reduced to imperceptible. The quality of the effect is considered to be neutral in both the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 16

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative impact of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.17 Viewpoint 17

Location: Eagle Valley Road, immediately to the east of Powerscourt Hotel
Distance from the site: 850m (approx.)

Existing View 17

This viewpoint is located on the Eagle Valley Road within Powerscourt Estate, immediately to the east of the Powerscourt Hotel building. The view looks east towards the site and depicts a mature woodland setting with a high aesthetic and landscape value. An estate road with wide tarmac footpath on one side of the road is evident within the view. Powerscourt Golf Course is visible in the left of the view, surrounded by a low metal rail fence. In the background of the view, a tree canopy in the Dargle River Valley lying on lower ground is visible. Mountains and hilltops can be seen above the tree canopy in the far distance of the view.

Proposed View 17

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development. All elements of the proposed development will be screened from view by intervening vegetation and as a result of distance from the site. The magnitude of change to the view is therefore considered to be negligible.

The view will be primarily experienced by users of and visitors to the Powerscourt Estate, including both pedestrians and motorists. Elements of high visual amenity are present within the view including mature trees and views to the surrounding agricultural landscape. The sensitivity of the view is therefore considered to be high.

The high sensitivity of the view coupled with the negligible magnitude of change results in a significance of visual effect that is classified as slight-not significant. However, given that the proposed development is not visible in the viewpoint, the significance of the effect is reduced to imperceptible. The quality of the effect is considered to be neutral during both the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 17

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative impact of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.18 Viewpoint 18

Location: Eagle Valley Road, near the eastern boundary of Powerscourt Golf Course
Distance from the site: 490m (approx.)

Existing View 18

This viewpoint is located on the Eagle Valley Road near to the eastern boundary of Powerscourt Golf Course. The view looks east towards the site. The carriageway and southern footpath of the Eagle Valley Road is located in the left of the view. In the right of the view, a maintained grass verge with a row of tree planting slopes at a downward gradient towards the adjacent agricultural farmland. Woodland tree planting in the Dargle River Valley can be seen in the background of the view on lower ground. Bray Head is visible in the far distance of the view.

Proposed View 18

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development. All elements of the proposed development will be screened from view by intervening vegetation and topography, and as a result of distance from the site. The magnitude of change to the view is therefore considered to be negligible.

The view will be primarily experienced by users of and visitors to the Powerscourt Estate, including both pedestrians and motorists. Tree planting and the surrounding agricultural and woodland landscape represent elements with a high visual amenity value. The sensitivity of the view is therefore considered to be high.

The high sensitivity of the view together with the negligible magnitude of change results in a significance of visual effect that is classified as slight-not significant. However, given that the proposed development is not visible in the viewpoint, the significance of the effect is reduced to imperceptible. The quality of the effect is considered to be neutral during both the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 18

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative impact of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.19 Viewpoint 19

Location: Eagle Valley Road, near to the entrance gate lodge to Powerscourt Estate
Distance from the site: 360m

Existing View 19

This viewpoint is located near to the entrance gate lodge to Powerscourt Estate on the Eagle Valley Road, looking east towards the site. The arched gateway entrance to the Powerscourt Estate and the gate lodge are prominent within the foreground of the view. A formal landscaped area and hedging to the surrounds of the gate house and roadside are visible. Mature and semi-mature tree planting to the lands immediately beyond the entrance gate are visible in the middle ground of the view. A partial glimpse of the surrounding agricultural land is visible in the background in the left of the view.

Proposed View 19

The proposed development will not be visible from this viewpoint location. The solid red line presented on the image indicates the extent of the proposed development in the background of the view. All elements of the proposed development will be screened from view by intervening vegetation and boundary treatments, and as a result of distance from the site. The magnitude of change to the view is therefore considered to be negligible.

The view will be primarily experienced by users of and visitors to the Powerscourt Estate, including both pedestrians and motorists. The view displays elements of both natural and built heritage with a high visual quality. The sensitivity of the view is therefore considered to be high.

The high sensitivity of the view together with the negligible magnitude of change results in a significance of visual effect that is classified as slight-not significant. However, given that the proposed development is not visible in the viewpoint, the significance of the effect is reduced to imperceptible. The quality of the effect is considered to be neutral during both the construction and operational phase of the project.

Cumulative Impact – Planning Reg. Ref 19/871 View 19

The solid blue line presented on the image represents the extent of the permitted future Powerscourt Residential Development in the background of the view. There will be no cumulative impact of the presence of the approved future adjacent residential development in this viewpoint.

9.8.2.20 Viewpoint 20

Location: Lover's Leap Lane
Distance from the site: 2m

Existing View 20

This viewpoint is located on Lover's Leap Lane, immediately adjacent to the south-western site corner. The view looks north towards the site. The pastoral grassland present within the site is prominent within the view, with cattle visible feeding in the left of the view. Overhanging branches of the hedgerow located along the southern site boundary are visible in the top foreground of the view. Perimeter hedgerows and tree planting to the northern and eastern site boundary are visible in the background of the view.

Proposed View 20

The proposed development is visible from this viewpoint location. Housing units located in the southern portion of the site are partially visible from this viewpoint. Lawn, groundcover, shrub and tree planting and a network of paths to the southern open space located within the development are visible within the foreground of the view. Natural timber play pieces and a bespoke seat will also be visible in the view. Proposed soft landscape mitigation measures including tree planting screen portions of the proposed built fabric from view. Views of the existing agricultural grassland, boundary tree and hedgerow planting and portions of the skyline will be removed and replaced with a high-quality residential development and associated high-quality public open space. The magnitude of change of the view resulting from the proposed development is therefore considered to be medium.

This view will be experienced by walkers using the Lovers Leap Lane public walking route and by residents of the proposed development. Landscape elements of high visual quality including boundary hedgerows and tree planting are visible within the view. The sensitivity of the view is therefore considered to be medium.

The medium sensitivity of the view combined with a medium magnitude of change results in a significance of visual effects considered to be moderate. The quality of the visual effect is considered to be adverse in the construction stage of the project and will reduce to neutral during the operational phase of the project when all planting has established.

Cumulative Impact – Planning Reg. Ref 19/871 View 20

There will be no cumulative impact of the presence of the permitted adjacent future Powerscourt Residential Development at this viewpoint location.

9.8.3 Summary of Visual Effects

Table 9.15 – Summary of Visual Assessment

No.	Location	Sensitivity	Magnitude of Change	Significance, Term and Quality		
				Short	Medium	Long
1	Grounds of St. Patrick's Church of Ireland	High	Negligible	Imperceptible and Neutral		
2	Grounds of St. Patrick's Church of Ireland	High	Negligible	Imperceptible and Neutral		
3	The car park to the south of St. Patrick's Church of Ireland	Medium	Low	Slight and Adverse	Slight and Neutral	
4	The western end of Cookstown Road, south of St. Patrick's Church of Ireland	Medium	Low	Slight and Adverse	Slight and Neutral	
5	Cookstown Road, opposite the entrance to Powerscourt National School	Low	Negligible	Imperceptible and Adverse	Imperceptible and Neutral	
6	Cookstown Road, near to the north-west site corner	Medium	Low	Moderate and Adverse	Slight and Neutral	
7	Cookstown Road, near to the entrance to Enniskerry Demesne	Very High	Medium	Very significant to significant and Adverse	Moderate and Neutral	
8	Cookstown Road, west of the north-eastern site corner	Medium	Medium	Moderate and Adverse		
9	Cookstown Road, to the east of the north-eastern site corner	Low	Negligible	Imperceptible and Neutral		
10	Cookstown Road, near to the entrance to Ridgewood House residential property	Low	Negligible	Imperceptible and Neutral		
11	Cookstown Road, near to the access road to a group of houses located to the east of the site	Low	Negligible	Imperceptible and Neutral		

No.	Location	Sensitivity	Magnitude of Change	Significance, Term and Quality		
				Short	Medium	Long
12	R760 road, to the west of the site	Medium	Negligible	Imperceptible and Neutral		
13	R760 road, north of the entrance to Tinnehinch Farm	Medium	Low	Slight and Adverse	Slight and Neutral	
14	R760 road, near to the entrance to the National Memorial Cottage	Low	Negligible	Imperceptible and Neutral		
15	Eagle Valley Road, near to the entrance to Powerscourt Golf Club	High	Negligible	Imperceptible and Neutral		
16	Eagle Valley Road, immediately north of Powerscourt Hotel	High	Negligible	Imperceptible and Neutral		
17	Eagle Valley Road, immediately to the east of Powerscourt Hotel	High	Negligible	Imperceptible and Neutral		
18	Eagle Valley Road, near to the eastern boundary of Powerscourt Golf Course	High	Negligible	Imperceptible and Neutral		
19	Eagle Valley Road, near to the entrance gate lodge to Powerscourt Estate	High	Negligible	Imperceptible and Neutral		
20	Lover's Leap Lane	Medium	Medium	Moderate and Adverse	Moderate and Neutral	

9.9 MONITORING

9.9.1 Construction Phase

Monitoring of avoidance, remedial and mitigation measures is not required during the construction phase in the case of the subject application.

9.9.2 Operational Phase

Monitoring of avoidance, remedial and mitigation measures is not required during operational phase in the case of the subject application.

9.10 REINSTATEMENT

Reinstatement is not relevant to the assessment of visual impacts on the built environment during construction or operational phase in the case of the subject application. It is intended that the proposed development will be permanent.

9.11 DIFFICULTIES ENCOUNTERED IN COMPILING

As is the case in any rural area, it was neither possible nor practical to gain unfettered access to every parcel of private property or land within the study area surrounding the application site in order to carry out visibility analysis and take photography for the purposes of preparing photomontages. Intervening vegetation and topography acted as a restriction on access.

9.12 CONCLUSION

The current scenario at the subject site presents an agricultural field located on the outer fringe of the town of Enniskerry, Co. Wicklow. The site is located on the southern side of the Cookstown Road, within the foothills of the Sugarloafs and the Wicklow-Dublin Mountains. Enniskerry town centre is situated 0.9km to the north-west of the site and is partially designated as an Architectural Conservation Area. A number of protected structures can also be found within a short walking distance of the site including Powerscourt Enniskerry Entrance gates, St. Patrick's Church of Ireland and Powerscourt County House. The renowned Powerscourt Estate which consists of Powerscourt House & Gardens and Powerscourt Golf Club is located approximately 1km to the west.

The site consists of open grassland and is currently used for the purposes of pastoral grazing. It is enclosed on all boundaries by a mixture of native hedgerows and trees. Access can be gained via a metal agricultural gate opening on its northern perimeter on Cookstown Road. Overall, the site has a high aesthetic quality which can be attributed to its rural and semi-woodland setting. The site is located within the 'Urban Area' landscape category type as per 'Wicklow County Development Plan 2016-2022'. The surrounding landscape has a high cultural and natural heritage value; land immediately surrounding the site to the south, east and west is categorised under the Glencree/Glencullen Area of Outstanding Natural Beauty (AONB) within the Wicklow County Development Plan 2016-2022. Lover's Leap Lane, a public pedestrian route, runs along the southern site boundary and forms linkages to the Dargle River valley. Hedgerow boundary planting along the southern site boundary forms a visual and physical barrier between the site and the pedestrian routeway. Mature hedgerows, woodland and trees lining the site and in the contiguous lands give the site a high biodiversity and aesthetic value. Views from within the site to the wider landscape are relatively open as a result of the undeveloped nature of the land and the agricultural landscape. Views of the Great Sugarloaf Mountain are captured looking south from the site; one 'View of Special Amenity Value or Special Interest' identified with the Wicklow County Development Plan 2016-2022 which is of relevance to the site is located on Cookstown Road, facing south towards the Great Sugarloaf Mountain.

The proposed development, as discussed in this report, consists of the construction of 165no. dwellings and associated ancillary infrastructure. The development includes 105no. 2 storey houses, 56no. apartments/duplex apartments arranged across 6no. 3 storey buildings, 4no. Maisonette dwellings in a 2-storey building and a creche facility. A combination of hard and soft landscape interventions to open spaces including a linear roadside space with stream feature and public open spaces in the north and south of the site with pedestrian connections provided to '*Lover's Leap Lane*', will offer high-quality amenity spaces for users of the development and the wider community. Vehicular access from the Cookstown Road from a new junction as well as 313 no. car parking spaces and 104 bicycle spaces will be provided. A new footpath will be provided along the northern site boundary leading to the

existing pedestrian crossing at Powerscourt National School. Street lighting columns along the southern side of the Cookstown Road and a new pedestrian crossing located to the west of the main access road are also proposed.

In order to evaluate the overall landscape and visual impacts of the proposed development, twenty verified views were assessed from points in the local domain where there is a potential for impact on key sensitive local receptors. Both short and long range views were considered for the purpose of the assessment. Viewpoints 6,7, 8 and 20 represent locations from where the proposed development will be most visible. A substantial portion of the proposed built fabric of the development will be visible from these locations. From Viewpoint 8 the visual impact in the medium to long term will be moderate and adverse. This is as a result of the high aesthetic and ecological value attributed to the landscape setting. From Viewpoint 7 which represents the location of a 'View of Special Amenity Value of Special Interest', a large portion of soft landscaping to the northern public open space is visible. The visual impact during the construction stage will be very significant to significant and adverse but will reduce to moderate and neutral in the medium to long term when all planting has established. Viewpoint 20 represents a view taken from the public walk on Lovers Leap Lane. The visual effect is considered to be moderate and adverse during the construction stage of the project. Substantial mitigation measures are in place to ameliorate the visual effect in the form of prudent site planning in terms of the placement of the built elements on site and the substantial buffer zone given to soft landscape plantings. The plantings include a new native woodland area and wildflower meadow with tree copses, which will form a robust visual boundary along the southern boundary of the site. Visual screening will be greatest from late spring through to early Autumn when the trees and hedgerows are in leaf. The visual effect from Viewpoint 20 will therefore reduce to moderate and neutral in the medium to long term.

The visual impact from Viewpoint 3, 4 and 13 is considered to be moderate and adverse during the construction stage of the project, reducing to slight and neutral in the medium to long term. Other viewpoints representing views taken from the Cookstown Road and the R760 road include viewpoints 9, 10, 11, 12 and 14. It has been assessed that the visual effect from these viewpoint locations will be imperceptible and neutral as a result of intervening vegetation and boundary treatments acting to screen the proposed development from site. Viewpoints 15-19 represent views taken from within the nearby Powerscourt Estate. From each of these viewpoints the proposed development is not visible and therefore the visual effect will be imperceptible and neutral.

The overall visual impact of the proposed development is considered to be neutral in the medium to long term. The proposed development will result in a change which does not affect the quality of the environment and will allow for consolidation of the subject lands which are located within the 'Urban Area' landscape category. It is considered that the impact will alter the character of the environment in a manner that is consistent with existing and emerging trends. As shown in Verified Viewpoint 7, views of the Great Sugarloaf Mountain, the iconic summit, will be retained from the protected view listed within the Wicklow County Development Plan 2016-2022.

The cumulative impact of the separate approved residential development (Planning Reg. Ref. 19/871 – Powerscourt Residential Development) on agricultural lands located immediately adjacent to the west of the site has also been assessed. From viewpoints 1 and 2 located within the grounds of St. Patrick's Church of Ireland, the cumulative impact has been assessed to be slight to not significant and neutral, and moderate and neutral respectively. From viewpoint 3 it has been assessed that the cumulative impact will be moderate and adverse as a result of partial views of the Great Sugarloaf Mountain being screened. From viewpoints 4,5,12 and 13 which are located on key arterial routes surrounding the site, the cumulative impact is considered to be significant and adverse during the construction phase. This will reduce to moderate and neutral in the medium to long term during the operational phase and when all planting has established. From the remainder of the viewpoint locations, it has been assessed that there will be no cumulative visual impact over and above the impacts arising from the proposed development described above

10.0 TRAFFIC AND TRANSPORTATION

10.1 INTRODUCTION

This chapter of the EIAR assesses the likely effects of the proposed development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the proposed development.

This chapter of the EIAR has been prepared by John Considine, BE, MIStructE, MIEI, CEng, FConsEIM, Chartered Engineer of Barrett Mahony Consulting Engineers.

Information within this chapter has been extracted from the proposed development's Traffic and Transport Assessment Report (TTA), prepared by Barrett Mahony Consulting Engineers.

10.2 METHODOLOGY

The approach to this assessment accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. The following guidance documents were reviewed:

- Environmental Protection Agency (EPA) Guidelines on the information to be contained in the EIAR (Draft, 2017).
- Transport Infrastructure Ireland (TII) (Formerly National Roads Authority) Traffic and Transportation Assessment Guidelines.
- Traffic and Transport Assessment Guidelines' (May 2014) National Road Authority.
- 'Guidelines for Traffic Impact Assessments' - The Institution of Highways and Transportation.
- Wicklow County Development Plan 2016-2022.

The chapter is also based on the following.

- Consultations with Wicklow County Council (WCC) Roads Department to agree the site access arrangements and determine the scope of the traffic analysis required to accompany a planning application.
- A desktop study to review any relevant available information including (where available) Development Plans, existing traffic information, planning applications and other relevant studies.

Further to the guidance documents, a site traffic analysis was performed with the steps listed below:

- Audit of Existing Network: To establish the existing level of accessibility at present pertaining to the subject site in terms of the level of access available by walking, cycling and public transport.
- Completion of Traffic Counts: The report details Junction traffic counts undertaken at the locations relevant to the proposed development and analysed to assess existing operating efficiencies in the vicinity of the proposed development. A traffic survey of chosen junctions was carried out on Thursday 16th May 2019.
- Estimation of Trip Generation Volumes: A trip generation exercise has been carried out to establish an estimate for the level of vehicle trips generated by the proposed residential development.
- Distribution of Generated Trips: Based upon both the existing observed flow patterns in the local road network at the identified relevant junctions, the trips predicted to be generated by the proposed development are distributed / assigned onto the local road network.
- Network Analysis detailing Impact of Generated Volumes: Junction analysis models are utilised to analyse the impact of the estimated trip generation volumes on the operational efficiency of the junctions selected for detailed analysis.
- A Traffic & Transport Assessment Report (TTA) was prepared on foot of the above by Barrett Mahony Consulting Engineers for submission with the planning application for the site.

This chapter should also be read in conjunction with the drawings listed below, prepared by Barrett Mahony Consulting Engineers, submitted with the SHD application:

- 18.243 – BMD – 00 – ZZ – DR – C – 1000
- 18.243 – BMD – 00 – ZZ – DR – C – 1010
- 18.243 – BMD – 00 – ZZ – DR – C – 1011

- 18.243 – BMD – 00 – ZZ – DR – C – 1012
- 18.243 – BMD – 00 – ZZ – DR – C – 1013
- 18.243 – BMD – 00 – ZZ – DR – C – 1014

10.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The subject site is located on lands within the townland of Cookstown, and Powerscourt Demesne, Enniskerry, Co. Wicklow including footpath upgrades, lighting upgrades and works associated with the foul rising main and water main along Cookstown Road.

The main site is currently a grass pasture field for the grazing of livestock. The site boundaries and adjacent land uses are as follows:

- Northside: The site is generally bounded by the Cookstown Road L1020. The field is separate from the road by a hedgerow just inside the site. This hedgerow includes a number of mature trees. There is a field gate in the hedge accessing onto the road, which is close to the entrance to the Enniskerry Demesne housing estate on the other side of the road.
- Eastside: Mature hedge along the boundary. 2 no. private residences behind with access off the Cookstown Road.
- Southside: Hedge along the boundary. Public footpath behind. Ground falls towards the River Dargle.
- Westside: Hedge along most of this boundary. Adjoining field, currently pasture but with planning for a housing development by others, with access off the R760. The north corner of this field, abutting the primary school site alongside the Cookstown Road, is part of the subject site.

Figure 10.1 – Site Location

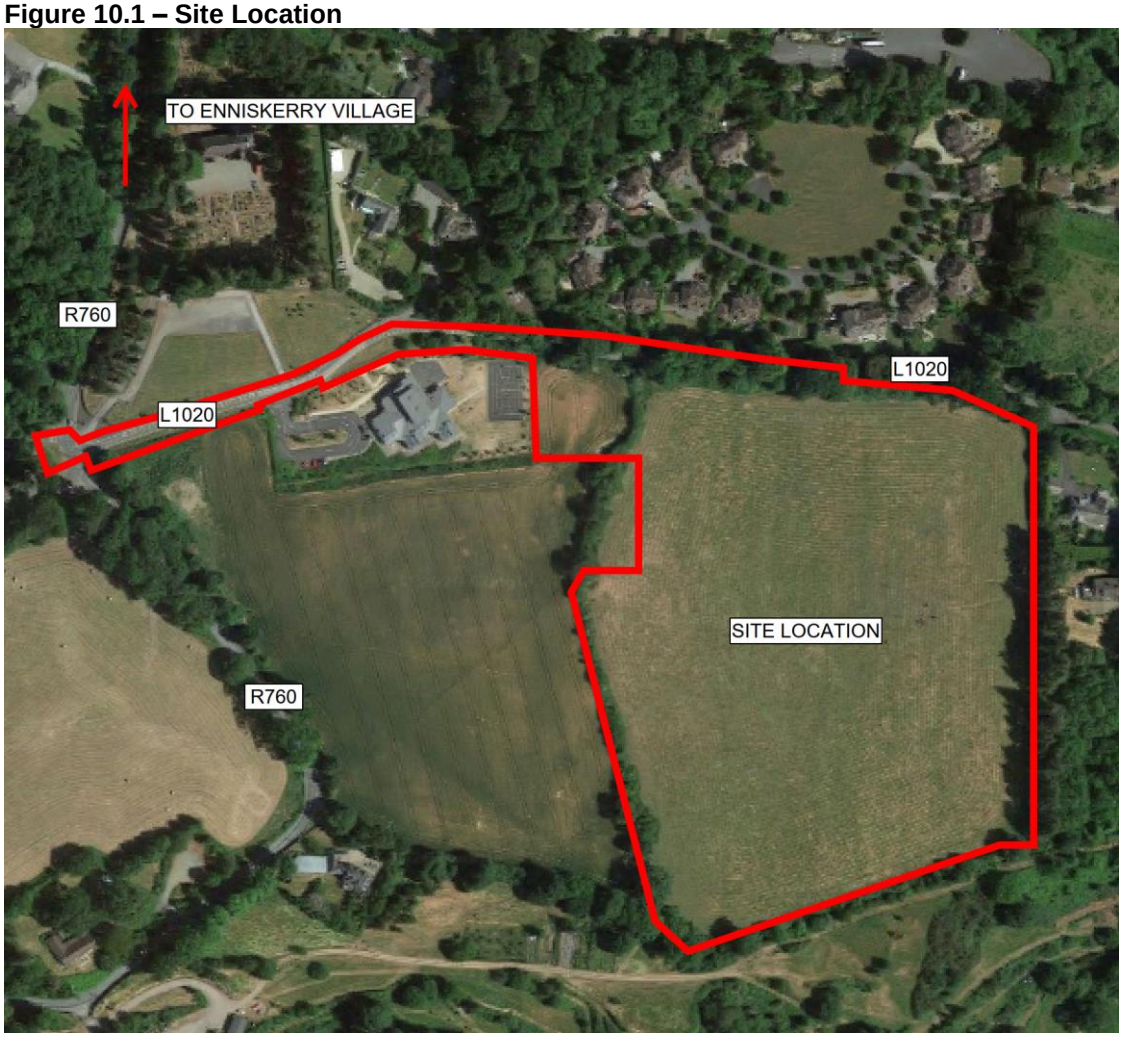


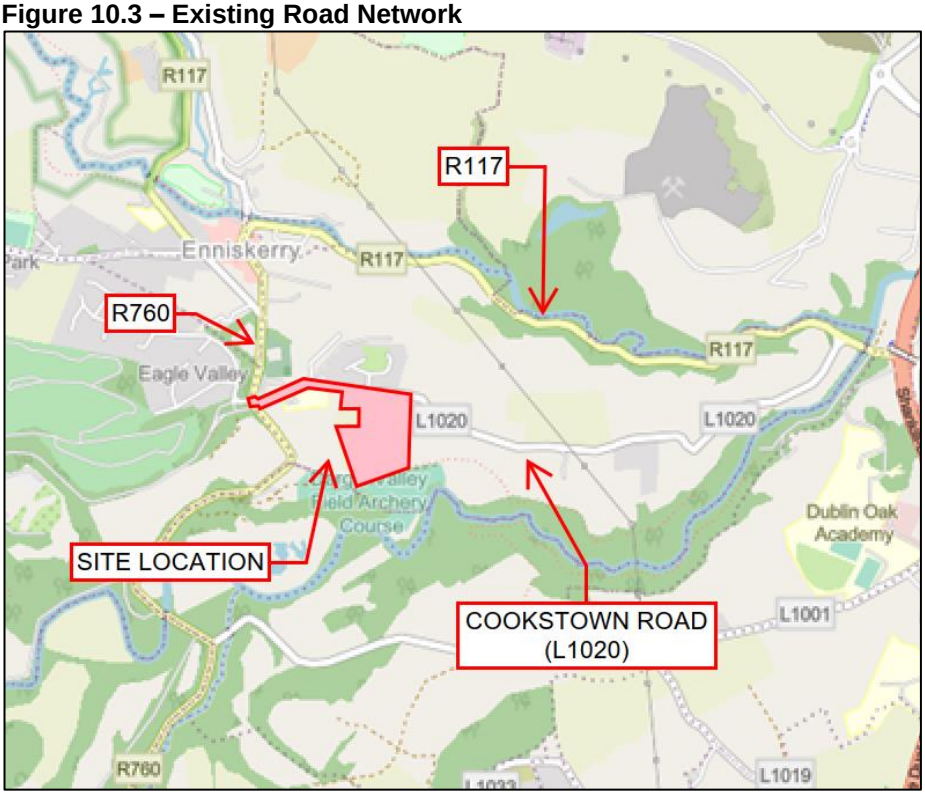
Figure 10.2 – Proposed Site Layout

Barrett Mahony Consulting Engineers drawing C1011

10.3.1 Local road network

In the westbound direction, Cookstown Road accesses directly onto the R760 (Church Hill), which is a two-way regional road. In the eastbound direction, Cookstown Road accesses directly onto the R117 (Bray Road), which is a 2-way regional road, which then accesses 200m directly onto the northbound carriageway of the N11, refer to 3. Access to the site is proposed along the Cookstown Road with an excerpt from the Barrett Mahony Consulting Engineers drawing C1011 shown 2.

Figure 10.3 – Existing Road Network



10.3.2 Pedestrian Facilities

There is an existing footpath on the northern side of the Cookstown Road (L1020), which connects the existing Enniskerry Demesne residential development with Enniskerry Village to the west. The pedestrian footpath terminates at the eastern edge of the estate. There are no pedestrian facilities on the southern (site-side) of the Cookstown Road.

10.3.3 Cycling Facilities

There are no existing cycling facilities in the vicinity of the site, with cyclists needing to use the Cookstown Road (L1020) and share the road with vehicular traffic. The footpath, which serves the residential estate opposite the site, is dedicated for pedestrian use only and is approx. 1.2m wide.

10.3.4 Public transport accessibility

The closest public transport facilities are in Enniskerry village, which is a 15-min walk away. The village is served by the 44no. and 185no. buses, which have a peak a.m. frequency of 1no. per hour.

Table 10.1 – Existing Bus Route Frequency

Route	Origin	Destination	Frequency
44	Enniskerry	DCU via O'Connell Station	1 per hour
185	Enniskerry	Bray Station	1 per hour

10.3.5 Car Parking

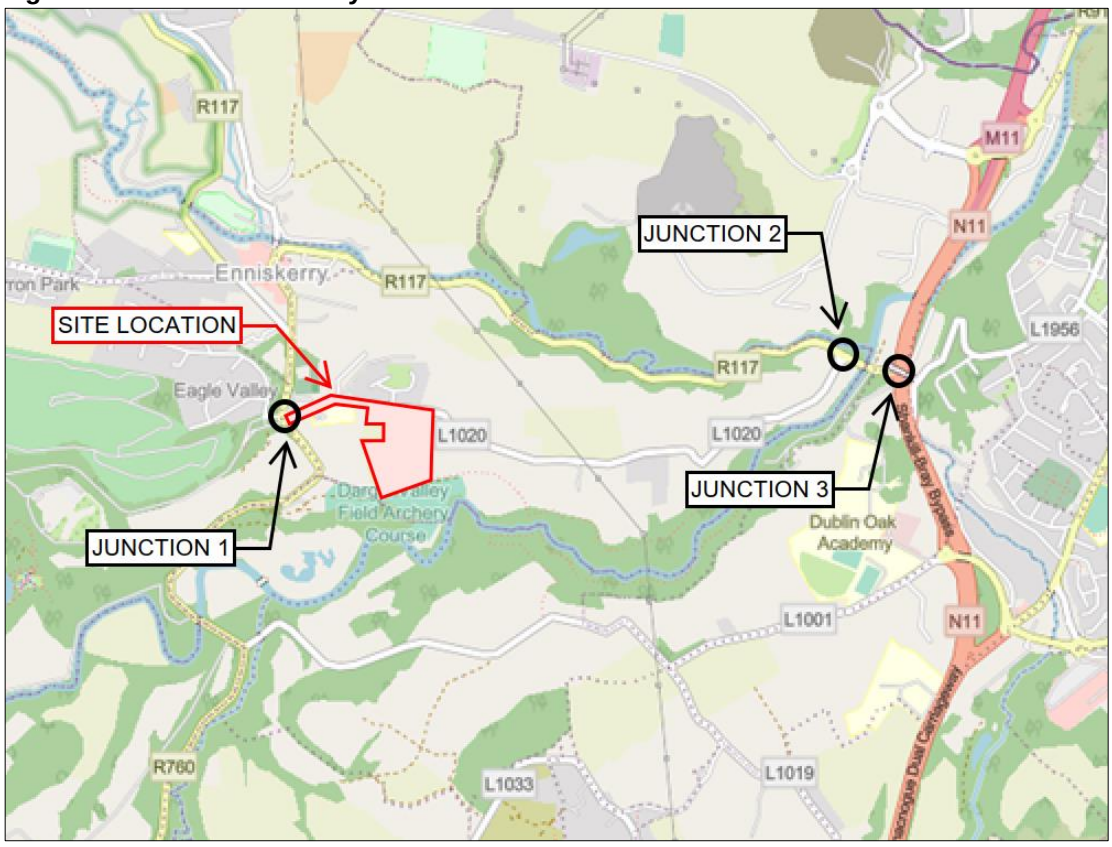
The existing site is a greenfield site used primarily for livestock grazing, and therefore has no parking.

10.3.6 Baseline traffic data

A traffic survey was carried out in May 2019 on 3no. junctions, shown in Figure 10.4 and listed below.

- **Junction 1:** L1020 / R760
- **Junction 2:** L1020 / R117
- **Junction 3:** N11 / R117

Figure 10.4 – Junction Analysis Locations



10.3.7 Existing Traffic Status

A Traffic and Transport Assessment has been prepared by Barrett Mahony as part of this SHD planning application, on foot of the comprehensive analysis in that report, it was deemed that due to the capacity of Junction 3 (N11 / R117), and the negligible increase in cars from the development on the subject site, no further analysis was required at this junction.

The remaining 2no. junctions (L1020 / R760) and (L1020 / R117) have been analysed. The existing traffic status of these junctions is measured using the 'RFC' (ratio of flow to capacity) method. This provides a percentage usage of the junction, by comparing the capacity of the junction against the flow of cars through the junction.

The Design Manual for Roads and Bridges document *'TA 79/99 – Traffic Capacity of Urban Roads'* provides information on the capacity of urban roads based on classification and road width.

The traffic counts, undertaken on Thursday the 16th of May 2019, provide the flows.

Table 10.2 – Junction 1 (L1020 / R760) Existing Traffic Status

	AM PEAK FLOWS			PM PEAK FLOWS		
Lane	Flow	Capacity	RFC (%)	Flow	Capacity	RFC (%)
Cookstown Rd exit left/right (B-ACD)	39	113	35%	8	99	8%
R760 from the North right-turning (A-BCD)	37	154	24%	46	210	22%
Powerscourt exit left/right (D-ABC)	27	130	21%	64	131	49%
R760 from the South right-turning (C-ABD)	9	165	5%	4	131	3%

Table 10.3 – Junction 2 (L1020 / R117) Existing Traffic Status

	AM PEAK FLOWS			PM PEAK FLOWS		
Lane	Flow	Capacity	RFC (%)	Flow	Capacity	RFC (%)
Cookstown Road exit left/right onto R117 (B-AC)	26	116	22%	25	113	22%
R117 eastbound entering right into Cookstown Road (C-AB)	13	161	8%	3	182	2%

It can be seen from the tables that the 2no. junctions are operating well within capacity, with the worst-case scenario (the Powerscourt exit) still operating with 51% spare capacity.

10.4 CHARACTERISTICS OF THE PROPOSAL

Consideration of the Characteristics of the Proposed Development allows for a projection of the 'level of impact' on any particular aspect of the proposed environment that could arise. For this chapter the potential impact on traffic and transportation is discussed.

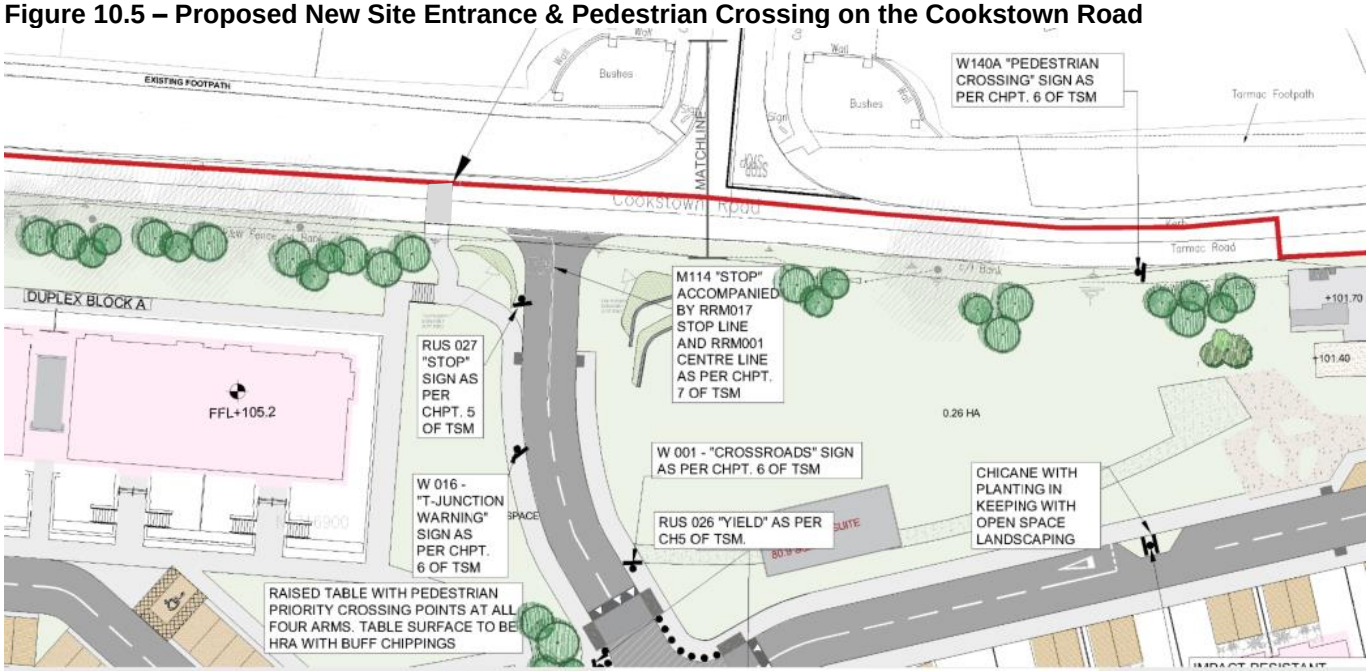
The proposed development is a residential development of consisting of 165no. dwellings, comprised of 105no. houses, 56no. duplex apartments, 4no. maisonette dwellings, a creche and public open space as well as supporting infrastructure.

10.4.1 Proposed roads

There is a new site entrance proposed to the Cookstown Road (L1020) from the development. As part of these works, there will be minimal reinstatement works required for the Cookstown Road (L1020). To preserve existing mature trees, there are no road widening works to the Cookstown Road (L1020) proposed as part of the new development There is already an existing road network which provides good connection to the nearby recreational, retail, and educational services in the area.

The internal estate roads have been designed to comply with DMURS as required by the Wicklow County Development Plan. The internal roads are generally 5.5m wide. The homezone / shared surface cul-de-sacs are 7.2m wide overall and consist of a 4.8m roadway and 2no. 1.2m pedestrianized zones.

Figure 10.5 – Proposed New Site Entrance & Pedestrian Crossing on the Cookstown Road



10.4.2 Car parking

One of the key principles of a residential development such as this, is the sufficient provision of car parking spaces within the development so as to avoid the need for excessive on-street parking in the vicinity of the site. A balanced approach is required which provides a compromise between a sufficient number of spaces and the need to promote greater usage of public transport and to encourage walking and cycling trips.

Table 10.4 – Car Parking Provided

Development Type	Area / No. Units	Standard Requirements (WCC Development Plan)	Parking Required	Parking Provided
House – 4 Bed	56 No.	2.0 per unit	112	112
House – 3 Bed	49 No.	2.0 per unit	98	98
House – 1 Bed	4 No.	1.0 per unit (if less than 5 units)	4	4
Duplex – 3 Bed	28 No.	2.0 per unit	56	56
Duplex – 2 Bed	28 No.	1.2 per unit	28 (plus 6 for visitors)	28 (plus 4 for visitors)
Crèche	510 m2 GFA	0.5 spaces per staff member plus 1 space per 10 children	11	11
Overall Total	-	-	315	313

It is proposed to provide 313 no. car parking spaces for the development. This comprises of 2 no. parking spaces for each of the 3 and 4 bed houses and the 3 bed duplex units, a total of 266 no. parking spaces. A further 49 no. parking spaces are provided for the 1 and 2 bed units, as well as the crèche.

10.4.3 Pedestrian Upgrade

As part of the proposed development works, a new pedestrian footpath is proposed along the southern side of the Cookstown Road which will extend west along Cookstown Road to the existing uncontrolled crossing at the adjacent national school. There will also be a new pedestrian crossing at the site entrance which will connect to the existing footpath on the northside of the Cookstown Road (L1020). Public lighting will also be installed along Cookstown Road (L1020) from the site to the junction of R760 to improve pedestrian access form the site to Enniskerry Village.

Figure 10.6 – Cookstown Road Upgraded Pedestrian Link and Lighting

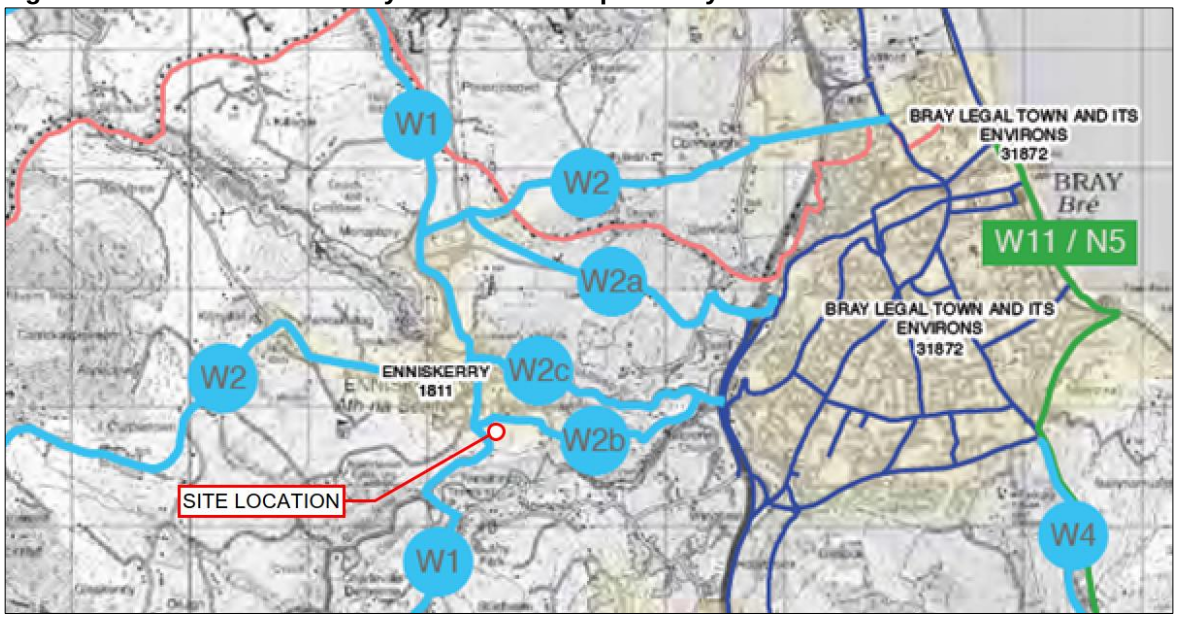
Source: BMCE 18243-BMD-00-ZZ-DR-C-1010

10.4.4 Cycling Facilities

Internally in the development, there are no separate cycle lanes proposed as the traffic volumes will be small and speeds will be low.

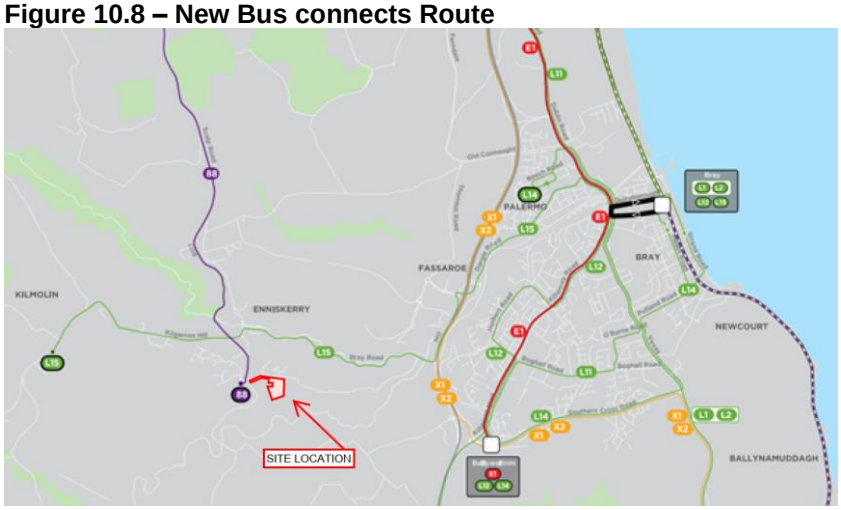
As part of the Greater Dublin Cycle Network Plan, there are new proposed cycle routes close to the subject site, Figure 10.7. The W1 route runs from Dublin to Kilternan, the Scalp, Enniskerry and Djouce. It is the main access route from Dublin to the Wicklow Mountains for recreational cyclists. The W2 route runs from Bray to Enniskerry, Glencree and Military Road. When it reaches Enniskerry it is divided into the 3no. routes, the W2a route which runs from Bray to Enniskerry via Berryfield Lane to the south (partly private road) connecting to Fassaroe, the W2b route which runs from Bray to Enniskerry via local road at Cookstown, passing the site of the proposed development and the W2c route which runs along the R117.

Figure 10.7 – Greater Dublin Cycle Network Proposed Cycle Routes



10.4.5 Public transport accessibility

Figure 10.8 – New Bus connects Route



As part of the new "*Bus Connects"* initiative, 2no. new routes are proposed in the vicinity of the site, **Error! Reference s ource not found.**. The new route 88 will replace the existing route 44, and the L15 will replace the 185. The new frequencies are not confirmed; however, it is proposed the that the L15 route will be 1 bus every 40 minutes.

10.5 POTENTIAL IMPACT OF THE PROPOSAL

10.5.1 Construction Phase

The current intention (subject to commercial considerations) is that the proposed residential housing development will be built in one stage and is expected to take approximately 24 months to complete.

Based on typical sites of this size and nature, it is anticipated that there will be approximately 5-10 truck movements per day. During the earthworks phase to a total of circa 900 truck movements will be required over 120 days, equating to approximately 8no. truck movements per day.

The total no. of site workers will vary during the course of the construction; however, it is not anticipated to exceed **150 no.** workers at any one time.

With the majority of construction traffic to site occurring outside of the peak hours, the potential construction phase impacts will have a negligible, negative, short-term impact on the surrounding road network.

With reference to the works (construction of foul rising main, road crossing, and water mains) along the Cookstown Road, there is the potential for a negative, temporary, and slight local short-term inconvenience and disturbance to local residents and businesses in the vicinity of the works, including the adjacent Primary School.

10.5.2 Operational Phase

As part of this planning application, a full Traffic and Transport Assessment Report (TTA) produced by Barrett Mahony Consulting Engineers will be submitted, which provides an assessment of the operational phase of the proposed development in greater detail.

Due to the development, there will be an increase in private cars on the road, which will result in an overall increase in traffic. This increase in traffic is small, in comparison to the carrying capacity of the surrounding road network and junctions as outlined in the TTA.

There is a potential for increased accidents due to additional traffic. However, a Roads and Quality Safety Audit has been prepared by ILTP Traffic Consultants covering motor vehicles, bicycles & pedestrians and the recommendations within those audits have been followed. Those audits are included separately with the planning pack.

10.5.3 Trip Generation

The trips generated from the proposed development are calculated using TRICS data. On the basis of 165 No. units, the typical TRICS trip rates give rise to the weekday morning peak, evening peak and all-day trip rates for the proposed residential development, refer to **Error! Reference source not found.**

Table 10.5 – Trips Generated at the proposed access onto Cookstown Road

		Weekday AM		Weekday PM	
		IN	OUT	IN	OUT
TRICS Multiple		0.149	0.466	0.507	0.277
No. of Houses	165	25	77	84	46

The above flows are light, with exiting vehicles in the morning peak hour and entering vehicles during the evening peak hour at approximately 1.3 No. vehicles per minute, with flows in the non-peak direction 32% to 54% of their peak direction values, respectively.

10.5.4 Impact on junctions

A full analysis of the junctions has been carried in the TTA, which was included as part of the planning application. The TTA carried out a range of assessments for the existing situation, within the year of opening in 2023, and within the year of opening plus 5 (2028) and the year of opening plus 15 (2038).

The report concluded the existing critical junctions in the vicinity of the proposed development presently work within capacity, as mentioned in 10.3.7, and will continue to do so in 2023, 2028 and 2038 with the development constructed.

10.6 *"DO-NOTHING"* SCENARIO

Should the proposed development not take place, the access roads and infrastructure will remain in their current state and there will be no change. Background traffic would be expected to grow over time. Given the location and zoning of the subject site, it is reasonable to assume that a similar development, with a potentially similar or more intensive requirement for vehicular trips would be built on this site at some stage in the future.

10.7 MITIGATION OR REDUCTIVE MEASURES

10.7.1 Construction phase

As part of this planning application, a Construction & Environmental Management Plan **(**CEMP**)** will be submitted which will includes information on construction traffic management and routes, including traffic management for the construction of the works along Cookstown Road. On foot of this, the contractor will be required to provide a Construction Traffic Management Plan (CTMP) prior to works commencing on site, either separately or as part of a further developed Construction & Environmental Management Plan report. The purpose of the CTMP is to minimize the potential effects from any construction related traffic generated by the proposed development.

The Construction & Environment Management Plan (CEMP) submitted with the planning application incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- Prior to the works being undertaken, advance notification information signage and/or VMS signage will be erected on the surrounding roads to notify frequent road users of upcoming works.
- Due to the location of the proposed road works and the proximity to the local school, works will be undertaken during the periods when the school will not be in use (summer holidays or school midterm).
- There will be a dedicated traffic control system in place throughout the works along the road to ensure safety to traffic users on the Cookstown Road.
- Method statements will be provided and agreed with the Council and Local Area Engineer in advance of any works being undertaken in the public road.
- A dedicated 'construction' site access / egress junction will be provided during all construction phases. This will be controlled by a flagman/flag men as necessary to ensure safety to traffic users on the Cookstown Road.
- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities on-site.
- Truck wheel washes will be installed at construction entrances if deemed necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff.

- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

Due to the nature of the site, and the proximity of the site to the Primary School (adjacent to the site), HGV movements during the construction period will be coordinated to avoid peak rush hours and will avoid the "school run" rush hour of the adjacent school, and as such will not significantly impact the peak traffic periods. This will reduce the potential impact on traffic in the surrounding area and will also ensure that the attendees of the school will not suffer any secondary potential harm in the form of pollution or aggressive, heavy, road traffic in the form of HGV's.

10.7.2 Operational phase

The surrounding road network has been analysed and will have the capacity for the proposed volume of traffic from the new development. In an effort to reduce the private vehicular use, new pedestrian pathways, cycle parking and road crossings have been included in the design of the development. This will allow residents of the development to access Enniskerry Village, with its recreational facilities, without the use of private vehicular transport.

As mentioned in section 10.4.4, the Greater Dublin Cycle Network has 2no. new routes in close proximity to the site. The provision of cycle parking in each of the new residential units, will encourage the residents to use bicycles instead of private vehicles.

10.8 MONITORING

10.8.1 Construction Stage

The contractors Construction Traffic Management Plan will be a live document, which will be updated during the construction process of the development to take account of any changes in the local road network.

10.9 REINSTATEMENT

Minor reinstatement along the Cookstown Road edge.

10.10 POTENTIAL CUMULATIVE IMPACTS

10.10.1 Construction stage

Cumulative phase looks at the increased overall implications the proposed development may have on the environment in cumulation with existing and permitted development in the area, in particular the adjacent possible residential development of 27 no. units on a site abutting the west side of the subject site (a permitted development under Planning Reg. Ref. 18/971) as well as 16/976 (6 no. houses site adjacent to Enniskerry Demesne on east side) It is noted wider proposals at Kilgarron will also have the potential to cause short term slight negative impacts on traffic in the environs of the proposed development.

The vehicular access to the adjacent development will be via the R760 during both the construction stage & the operational stage. The cumulative construction stage impact of this & the development of the subject site on the local road network will be small given the size of the developments as well as the separate location of the Killgarron proposal to the west of Enniskerry, and also the mitigation measure to keep construction traffic on the subject site off the public roads during peak hours as noted above in section 10.7.

10.10.2 Operational Stage

There is a permitted development of 27 no. units as noted in 10.10.1 which will generate traffic onto the road network. Waterman Moylan produced a TTA for the adjacent development. Within this document, they highlight that the majority of generated traffic from the development will enter and exit via Enniskerry village rather than exiting towards / entering from the Cookstown Road direction. Thus, the potential cumulative impacts from the generated flows of the adjacent site were found to be negative, permanent and slight.

10.11 PREDICTED IMPACT OF THE POPOSED DEVELOPMENT (RESIDUAL) IMPACTS

10.11.1 Construction Phase

The level of traffic generated by construction activities during the construction of the development will be imperceptible and will have no material impact on the operation of the nearby junctions. Provided the above mitigation measures and management procedures are incorporated during the construction phase, the residual impact upon the local receiving environment is predicted to be slight, negative, and temporary.

10.11.2 Operational Phase

The transport assessment of the operational development indicates that there is sufficient capacity at the junctions in the local area to accommodate the proposed development. There will be a residual impact from the increased number of private vehicles due to the new development. This impact will negative, permanent and slight.

10.12 RISKS TO HUMAN HEALTH

10.12.1 Construction Stage

During the construction stage, the risk of accidents associated with the proposed development are not considered to be significant if the guidance in the Construction Environmental Management Plan is adhered to. It is not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering that standard construction practices and machinery will be used.

A number of temporary risks to human health may occur during construction phase related to noise, dust, air quality and visual impacts, along with an increased risk of accidents. These are addressed in other sections of this EIAR. Traffic impacts are considered to be negligible due to the implementation of mitigation measures identified.

10.12.2 Operational Stage

There will be a slight increase in traffic on the local road network. The Cookstown Road (L1020) is a 50kph road, and as part of the overall works new signage will be constructed to highlight the roads speed limit. Refer to BMCE drawings 18243-BMD-00-ZZ-DR-C-1010 for further details. The proposal also includes a footpath and crossing which will link the proposed development to the town centre to the north.

Roads Safety and Quality Safety Audits have also been prepared by ILTP and the recommendations have been followed. These reports have been included separately with the planning pack.

10.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered in undertaking this traffic and transport assessment.

11.0 MATERIAL ASSETS – WASTE MANAGEMENT

11.1 INTRODUCTION

This chapter was prepared by Ian Byrne MSc, MIOA, Dip Environmental & Planning Law and presents the Waste Management Impact Assessment for the control and management and monitoring of waste associated with a proposed residential development at Cookstown Road, Enniskerry, County Wicklow during both the Construction and Operational Phases of the development.

11.2 STUDY METHODOLOGY

The proposed Construction Waste Management Impact Assessment has been prepared to demonstrate how the Construction Phase will comply with the following relevant legislation and relevant Best Practice Guidelines:

- *Waste Management Acts 1996;*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).*

- *Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006.*
- *EPA "Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019*

The proposed Operational Waste Management Impact Assessment has been prepared to demonstrate how the Operational Phase will comply with the following relevant regulations and Wicklow County Council's design standards for waste management in residential developments.

- *Waste Management Acts 1996.*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).*
- *Eastern-Midlands Region Waste Management Plan 2015-2021.*
- *Section's 4.8 and 4.9 Refuse Storage* of *The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2018.*
- *Wicklow County Development Plan 2016 – 2022 Section 9.3*

The Wicklow County Development Plan 2016 – 2022 has a Waste Management Strategy, the purpose of which is to promote and facilitate best practice in prevention, re-use, recovery, recycling and disposal of all waste and environmental emissions produced in the County. There are existing waste recycling and waste management services provided by Wicklow County Council in the general area.

It is the policy of Wicklow County Council, as set out in the Eastern-Midlands Region Waste Management Plan 2015-2021, to:

- 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.

Wicklow County Council's Solid Waste Management Objectives are as follows:

- *WE1 To require all developments likely to give rise to significant quantities of waste, either by virtue of the scale of the development or the nature of the development (e.g. one that involves demolition) to submit a construction management plan, which will outline, amongst other things, the plan for the safe and efficient disposal of waste from the site.*
- *WE2 To require all new developments, whether residential, community, agricultural or commercial to make provision for storage and recycling facilities (in accordance with the standards set out in Development & Design Standards of this plan).*
- *WE3 To facilitate the development of existing and new waste recovery facilities and in particular, to facilitate the development of 'green waste' recovery sites.*
- *WE4 To facilitate the development of waste-to-energy facilities, particularly the use of landfill gas and biological waste.*
- *WE5To have regard to the Council's duty under the 1996 Waste Management Act (as amended), to provide and operate, or arrange for the provision and operation of, such facilities as may be necessary for the recovery and disposal of household waste arising within its functional area.*
- *WE6 To facilitate the development of sites, services and facilities necessary to achieve implementation of the objectives of the Regional Waste Management Plan.*

Section 9 Waste & Emissions of the Wicklow County Development Plan 2016 – 2022 – Development & Design Standards details how solid waste shall be managed in residential developments.

Construction and demolition management

All construction sites shall be appropriately managed to ensure that environmental emissions are strictly controlled. This will be enforced by requiring (by planning condition) the agreement and implementation a 'construction and demolition management plan', which will set out detailed measures to manage waste arising from the construction activity. In drawing up such plans, developers should have regard to DoEHLG guidance publication 'Best Practice

Guidelines on the preparation of Waste Management Plans for Construction and Demolition projects' (2006) as may be amended and revised

"Residential Developments
The design and layout of all individual and multi house developments shall provide for on site waste storage (including recyclables) and composting facilities.

For traditional housing layouts, this will normally require the inclusion of sufficient space to the side or rear of a dwelling for the storage of waste, including up to 4 wheelie bins (recyclables, glass, organic and residual waste).

For terraced houses or courtyard type developments (i.e. those developments that include houses with either no / limited private gardens) and apartment developments, communal bin storage and composting areas shall be provided.

Waste storage areas shall be designed and screened so as not to cause any adverse visual impact on the proposed complex and located so as not cause noise impact."

Each section of the Waste Management Impact Assessment presents the potential environmental impacts, proposed monitoring methodologies, limit values where applicable, based on the concept of Best Practice and the proposed mitigation measures to be implemented at the development site. Reference to National and International Standards are also included where relevant.

The projection of material assets of human origin was conducted and resource use and management of wastes generated were assessed for both the constructional and operational phases of the proposed development and their associated impacts assessed. Mitigation and best practice waste management are proposed where appropriate.

11.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The construction and operation of the proposed residential development will introduce new volumes of waste into the local area in terms of the short-term generation of construction waste and the longer-term generation of domestic waste when the development is occupied.

There are a number of recycling centres in the local Wicklow area at Enniskerry and Bray with bring banks located in Enniskerry village and in the town centre. Currently Oxygen and Thorntons and AES provide domestic and commercial waste collection services in the Enniskerry area.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the proposed development is set out in Chapter 2 of this EIAR. The development will consist of the construction of 165 no. dwellings and associated ancillary infrastructure as follows:

105 no. 2 storey houses (49 no. 3 bedroom houses [House Types B, B1, & B2], 56 no. 4 bedroom houses [House Types A, D, E & E1];
56 no. apartments/duplex apartments in 6 no. 3 storey buildings – (28 no. 2 bedroom apartments and 28 no. 3 bedroom duplex apartments) all with terrace;
4 no. 1 bedroom Maisonette dwellings in a 2 storey building;
Part 2-storey and single storey creche (c. 510 sq. m - including storage).

Table 11.1 – Dwelling Types

Dwelling Type	1 bedroom	2 bedroom	3 bedroom	4 bedroom	5 bedroom	Overall
Maisonettes	4					4
Duplex Apartments			28			28
Apartments		28				28
Houses			49	56		105

Dwelling Type	1 bedroom	2 bedroom	3 bedroom	4 bedroom	5 bedroom	Overall
Totals		***28***	***77***	***56***		***165***

The Waste Management Impact Assessment shall be implemented throughout the construction phase and operational stage of the development to ensure the following:

- That all site activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.

- To ensure that all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.

- The Operational Phase Waste Management Plan, a copy of which accompanies this application, for the development which will ensure that users of the development are provided with sufficient facilities to store, segregate and recycle waste.

11.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

11.5.1 Construction Phase

The development of the subject site will initially require the stripping of top and subsoils and the excavation of ground to foundation level. The range of works required for the Construction Phases are summarised in Table 11.2. The expected construction wastes that will be generated throughout the course of the development are described in Table 11.3.

Construction wastes if not managed and segregated on-site will have the potential to be difficult to separate into different waste streams to allow for further processing, recovery, re-use or to be recycled.

11.5.2 Description of Proposed Development Site Activities

The range of development works to which the Waste Management Plan will be integrated into during the design phase, construction phase and operation phase of the site are summarised as follows:

- Ground preparation works;
- Development of site infrastructure;
- Construction of buildings and hard standing areas;
- Landscaping of entire site including open soft landscaped areas;
-

An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany the SHD application.

Table 11.2 – Sequence of Construction Works

Activity Sequence	General Description
Identification of Existing Utility Services	Set up bunting, mark location of live services, including E.S.B., Gas etc.
Removal of ground surfaces	Removal of vegetation
Infrastructure	Installation of drainage, ducting, cabling
Site preparation	Excavation and stockpiling of soils
Substructure	Foundations
Superstructure	Frames and Roof
External Envelope	Place façade to superstructure
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

Table 11.3 – Typical Construction Waste Composition

Description of Waste	%
Mixed Construction & Demolition Waste	33
Wood	28
Plasterboard (Gypsum materials)	10
Ferrous Metals	8
Concrete Mixed other wastes *Total*	6 15 *100*

Table 11.4 – Predicted Construction Waste Generation

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Mixed C&D	1,250	125	10	1000	80	125	10
Timber	1,000	400	40	550	55	50	5
Plasterboard	500	150	30	300	60	50	10
Metals	250	12.5	5	225	90	12.5	5
Concrete	200	60	30	130	65	10	5
Mixed waste	800	160	20	480	60	160	20
Total	4,000	907.5		2685		407.5	
Soils	13,720	13720	100	0	0	0	0

11.5.3 Soil Excavation

It is estimated that c. 7,720m^3 of top soils will be stripped and 6,000m_3 of sub soils will be excavated to facilitate the development. All soils shall be re-used on site as there is a requirement to import soils to the site to facilitate development.

11.5.4 Operational Phase

11.5.5 Waste Types & Quantities Operational Phase

The operational phase of the development will consist of:

- 165 residential units comprised of houses, duplex units and apartments
- 510 sq. m. Creche

The 2014 EPA Publication, National Waste Prevention Programme, 2013 Annual Report, states:

“The household waste per person in Ireland has been decreasing over the period 2006 to 2012 from 470 kg/person in 2006 to 344 kg/person in 2012. This indicates success in national campaigns and awareness as regards waste minimisation – though effects of reduced consumption are also likely to have contributed. In addition, it suggests an economy and society that are improving the efficiency of consumption patterns with respect to waste generation.”

A value of 0.942Kg of waste generated per person per day has been therefore assumed for the purposes of this report to estimate the volume of waste to be generated at the development as detailed below in Tables 11.5 – 11.6.

Table 11.5 – Calculated domestic waste composition Residential Development

Waste Type	% Waste	Kg/week	Kg/day
Organic waste	30.6	1689	241
Paper	12.5	690	99
Cardboard	3.6	199	28
Composites	1	55	8
Textiles	15.5	855	122
Plastics	13.6	751	107
Glass	3.4	188	27
Metals	3.1	171	24
Wood	1.2	66	9
Hazardous municipal waste	0.9	50	7
Unclassified combustibles	1.4	77	11
Unclassified incombustibles	1.2	66	9
Fines	11.7	646	92
Bulky Waste & WEEE	0.3	17	2
Totals	***100***	***5519***	***788***

Table 11.6 – Calculated domestic waste generation

House Type	# Units	Occupants	Waste/Day	Waste/week
	No.	No.	Kg	Kg
Residential Units	165	841	792	5546
Creche 510 sq.m	1	50	100	500
Total for development	n/a	891	892	6046

If waste infrastructure and appropriate waste management systems are not integrated into the design and the operation of the proposed development, domestic waste will not be segregated at source or appropriately managed on-site and the operation of the development will not function in accordance with the waste management policies of Fingal County Council or comply with the waste reduction and recycling and re-use targets defined in the *Eastern-Midlands Region Waste Management Plan 2015-2021.*

11.5.6 Do Nothing' Scenario

Should the site not be developed for residential use it will continue not to have any impact or demand on local waste services or on the receiving environment. A vacant site may however be subject to unauthorised illegal dumping or fly-tipping.

11.6 MITIGATION MEASURES

11.6.1 Construction Phase Waste Management Plan

The Construction Phase Waste Management Plan prepared by Byrne Environmental (included with the SHD application) specifically addresses the following aspects:

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

- Analysis of waste arisings / material surpluses
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase.

- Methods proposed for Prevention, Reuse and Recycling
- Waste Handling Procedures
- Waste Storage Procedures
- Waste Disposal Procedures
- Record Keeping

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

- Materials will be ordered on an *"as needed"* basis to prevent over supply
- Materials shall be correctly stored and handled to minimise the generation of damaged materials
- Materials shall be ordered in appropriate sequence to minimise materials stored on site
- Sub-contractors will be responsible for similarly managing their wastes

11.6.1.1 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

11.6.1.2 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licenced or permitted waste facility in compliance with the following relevant Regulations:

- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)*
- *Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.*

Prior to the commencement of the Project, the Construction / Project Manager shall identify a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Construction / Project Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the *EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

11.6.1.3 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries
- Reduction in energy required to extract, process and transport virgin aggregates
- Reduced HGV movements associated with the delivery of imported aggregates to the site
- Reduced noise levels associated with reduced HGV movements
- Reduction in the amount of landfill space required to accept C&D waste
- Reduction in the volume of soils to be exported off-site

11.6.1.4 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

- Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips
- Waste oils / containers shall be placed in dedicated mobile bunds units.
- Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers.
- Spill kits with instructions shall be located in the waste storage compound.

11.6.1.5 Inert Soils

As the subject development site is currently greenfield and in agricultural use with no evidence of historic dumping or industrial use, it is predicted that the top and subsoils will be characterised as being inert in accordance with *Landfill Directive (2003/33/EC).*

There is no requirement to export sub-soils or top-soils from the site shall and soils be re-used on-site.

In the event that imported soils are required, they shall be tested at source to determine their classification as inert in accordance with EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27* of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that the material classified not as a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA.

11.6.1.6 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the *2002 Landfill Directive (2003/33/EC)* for contamination, and pending the results of laboratory WAC testing, will be excavated

11.6.1.7 Record Keeping

It is the responsibility of the Project Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site during the construction phase are maintained in a Waste File at the site project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description
- Volume of waste collected
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number
- Destination of waste load including Waste Permit / Licence number of facility
- Description of how waste at facility shall be treated: disposal / recovery / export
- The waste records shall be issued to Fingal County Council as required / requested.

11.6.1.8 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Phase Waste Management Plan.

11.6.2 Operational Phase Waste Management Plan

An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany the SHD application. The OWMP has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with *The Eastern-Midlands Region Waste Management Plan* 2015-2021 which defines the following Waste Targets:

- *1% reduction per annum in the quantity of household waste generated per capita over the period of the plan.*
- *Achieve a recycling rate of 50% of managed municipal waste by 2020.*
- *Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.*

The Operational Waste Management Plan has been prepared with regard to the strategy, policy and objectives and design standards of the *Wicklow County Development Plan 2016 – 2022*.
Key Aspects of the OWMP to achieve Waste Targets:

- All residential units shall be provided with information on the segregation of waste at source and how to reduce the generation of waste by the Facilities Management Company.
- All waste handling and storage activities shall occur in the dedicated communal apartment waste storage areas.
- The development's Facility Management Company shall appoint a dedicated Waste Services Manager to ensure that waste is correctly and efficiently managed throughout the development.

The Operational Phase of the Waste Management Plan is defined by the following stages of waste management for both the residential and commercial aspects of the development:

- Stage 1 Occupier Source Segregation
- Stage 2 Occupier Deposit and Storage
- Stage 3 Bulk Storage and On-Site Management
- Stage 4 On-site treatment and Off-Site Removal
- Stage 5 End Destination of wastes

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice* which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

The apartments, duplex units and maisonettes which will include a 3 - bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2020.*

The proposed residential development shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.

The **Objective** of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.

The **Goal** of the OWMP is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Regional Waste Management Plans).

All apartments, duplex units and houses will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.

Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.

House residents shall engage private waste collection contractors who provide a 3-bin waste collection service.

The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

11.7 PREDICTED RESIDUAL IMPACTS

11.7.1 Construction and Operational Phases

The management of wastes generated during the construction of the proposed development will be in accordance with a Construction Phase Waste Management Plan (CWMP). Provided the construction is completed in accordance with the CWMP it is envisaged that the impact of the construction (excavation and construction waste) phase will be neutral, short-term and not significant.

With regard to how it has been demonstrated how domestic wastes during the operational phase will be managed through design, management and waste reduction and recycling initiatives, it is predicted that the impact of the development on the receiving environment, existing material assets and local waste management services will be neutral, long-term and not significant.

It is predicted that there will be significant available capacity within existing the Regional waste management infrastructure to manage construction and operational wastes associated with the proposed development.

11.7.2 'Worst-case' Impacts

There are no worst-case impacts associated with the proposed development as sufficient capacity and waste storage space will be provided for both the construction and operational phases.

11.8 CUMULATIVE IMPACTS

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

The cumulative waste impact of the proposed residential development, existing development and an adjoining proposed residential development (Planning Ref 19/871) and a residential development comprising 6 No. detached dwellings on a site to the north east (Planning Ref.16/976) should they be developed in the future will place a greater demand on local waste management services however with regard to the requirements of all new developments to integrate waste segregation and recycling infrastructure into the design of residential units, the impact on regional waste management infrastructure will be minor.

Other new residential developments in the area will be similarly required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management.

The legislative and best practice mitigation measures set out in this chapter would also be applicable to these projects and the implementation of these measures will ensure that there are no negative cumulative impacts on the

environment from the management of waste materials from these projects with the proposed development, should all projects proceed.

The site specific Construction and Operational Waste Management Plans for the development have been designed to ensure that the construction and operational phases of the proposed development will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the development will operate in a sustainable manner in terms of waste management and contribute to the achievement of the Regions compliance with the waste reduction targets specified in *The Eastern-Midlands Region Waste Management Plan 2015-2021* (and any subsequent future revisions).

The Construction and Operational Waste Management Plans that have been designed for the proposed development will provide the designers the information to ensure that the potential impact of the construction and operational phases of the development will have a negligible impact on the receiving environment.

The compliance requirements and mitigation measures set out in this chapter would be applicable to the subject development and together with the implementation of the mitigation measures set out in this chapter in respect of the proposed development will ensure that there are no negative cumulative impacts on the environment from the management of waste materials, during the operational phase.

11.9 MONITORING

The Facility Management Company shall prepare an annual report for the Local Authority and residents of the development on the quantities of waste generated within the development to demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in *The Eastern-Midlands Region Waste Management Plan 2015-2021.*

11.10 INTERACTIONS

The specified mitigation measures will reduce the impact that construction and operational wastes have on existing waste management resources in the region and will assist in the achievement of waste recycling and reduction targets of the "*Eastern-Midlands Region Waste Management Plan 2015-2021"* (and any subsequent future revisions).

11.11 REINSTATEMENT

No reinstatement is required.

12.0 MATERIAL ASSETS - UTILITIES

12.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) considers & assesses the potential impacts on local utilities in regard, to the proposed scheme. Measures to mitigate any likely significant adverse impacts of the proposed scheme are reviewed and analysed.

This chapter has been prepared by John Considine, BE, MIStructE, MIEI, CEng, FConsEIM, Chartered Engineer of Barrett Mahony Consulting Engineers and Margaret Dolan, Tech Cert, BSc (Hons), CEng, MIEI, Chartered Engineer of Waterman Moylan Consulting Engineers.

12.2 METHODOLOGY

The following section outlines the legislation and guidelines considered, and the adopted methodology for preparing this chapter.

12.2.1 Guidelines

The methodology followed for this section is in accordance with the EPA *"Revised Guidelines on the Information to be contained in Environmental Impact Statements, Draft September 2015"* and "Advice Notes for Preparing Environmental Impact Statements Draft September 2015".

The following legislation, standards and guidelines were consulted to inform the assessment:

- Guidelines on the information to be contained in Environmental Impact Statements, 2002, EPA;
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements), 2003, EPA;
- EPA: Draft Revised Guidelines on The Information to be Contained in Environmental Impact Assessment Reports, August 2017;
- EPA: Advice Notes for Preparing Environmental Impact Statements, Draft, September 2015;
- Irish Waters Code of Practice for Water Infrastructure;
- Irish Waters Code of Practice for Wastewater Infrastructure;
- Greater Dublin Strategic Drainage Study, (DCC 2005);
- Regional Code of Practice for Drainage Works, (DCC 2005);
- The Planning System & Flood Risk Management – Guidelines for Planning Authorities, Dept. of Environment, Heritage & Local Government. (Government of Ireland 2009).
- The ESB Network Utility Existing Services maps.
- The Telecommunications exiting network maps.

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS);
- IS EN752, "Drain and Sewer Systems Outside Buildings";
- Irish Water's Pre-Connection Enquiry Application (water demand and foul water loading);

12.2.2 Study Area

The study is confined to the client's lands for the submitted application, refer to the planning drawings. The subject lands cover an area of 6.57 Ha.

12.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The subject site is located on lands within the townland of Cookstown, and Powerscourt Demesne, Enniskerry, Co. Wicklow including footpath upgrades, lighting upgrades and works associated with the foul rising main and water main along Cookstown Road.

The main site is currently a grass pasture field for the grazing of livestock. The site boundaries and adjacent land uses are as follows:

- Northside: The site is generally bounded by the Cookstown Road L1020. The field is separate from the road by a hedgerow just inside the site. This hedgerow includes a number of mature trees. There is a field gate in the hedge accessing onto the road, which is close to the entrance to the Enniskerry Demesne housing estate on the other side of the road.
- Eastside: Mature hedge along the boundary. 2 no. private residences behind with access off the Cookstown Road.
- Southside: Hedge along the boundary. Public footpath behind. Ground falls towards the River Dargle.
- Westside: Hedge along most of this boundary. Adjoining field, currently pasture but with planning for a housing development by others, with access off the R760. The north corner of this field, abutting the primary school site alongside the Cookstown Road, is part of the subject site.

12.3.1 Existing Storm Water Infrastructure

Irish Water maps indicate that there is an existing 450mm diameter surface water pipe running beneath the Enniskerry Road (R760) to the west of the site, approximately 500m from the nearest site boundary. It is at a higher level than the north end of the subject site and cannot be reached by a gravity drain from the site. There are no other potential connections within the area.

The existing site is greenfield site, used for agricultural purposes. As such there is no existing surface water network within the site area, with rainfall discharging directly to the ground. There are no watercourses in the vicinity of the site that can be reached by gravity, due to the site topography with the site sloping c. 6m downwards towards the north, down to the Cookstown Road (L1020) and away from the River Dargle south of the site.

12.3.2 Existing Foul Water Infrastructure

In front of the site, there is an existing 225mm diameter foul drain that runs from Powerscourt National School to the foul sewer on the Enniskerry Road (R760) at its junction with the Cookstown Road. The existing Enniskerry Demesne housing estate opposite the development is served by a foul pumping station. This station pumps up to the foul sewer on the R760 at its junction with the Cookstown Road.

12.3.3 Existing Potable Water Infrastructure

There is an existing 180mm HDPE running beneath the northern side of the Cookstown Road, and a 100mm uPVC watermain beneath the south side. Both mains are relatively new, having been installed in 2005 and 2004, respectively.

12.3.4 Existing ESB Infrastructure

ESB Networks have been contacted and an existing ESB network map for the area surrounding the proposed development has been obtained, refer to Appendix D 12.4 (Volume III of the EIAR). There is an existing ESB Networks (ESBN) infrastructure at the north east corner of the site beside the main road in the form of Low Voltage (400V/230V) overhead power lines.

The existing overhead services at the north east corner of the site will be undergrounded and will be diverted as required.

12.3.5 Existing Broadband Infrastructure

Openeir have been contacted and the existing network maps for the area surrounding the proposed development have been obtained, refer to Appendix D - 12.5 (Volume III of the EIAR). There is an existing Openeir Network in the foot path on other side of the main road at the north of the site, which includes ducted service with access chambers.

Virgin Media have been contacted and they have advised that they do not have any services in the vicinity of this new development site. However, they recommend that an additional comms duct be installed as part of the infrastructure for future services / connectivity as this area may be part of a Virgin Media new development programme in the future.

12.3.6 Existing Gas Infrastructure

Gas Networks Ireland (GNI) have been contacted and they have advised that they do not have any services in the vicinity of this new development site.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Consideration of the Characteristics of the Proposed Development allows for a projection of the 'level of impact' on any particular aspect of the proposed environment that could arise. For this chapter, the potential impact on utilities is discussed.

The proposed development is a residential development of consisting of 165no. dwellings, comprised of 105no. houses, 56no. duplex apartments and 4no. maisonette dwellings.

12.4.1 Surface Water Drainage

The proposed development will be served by a new separate gravity surface water drainage network falling towards the north boundary of the site alongside the Cookstown Road, where it is proposed to install a soakaway designed in accordance with Ciria 756 guidelines. Site investigation works were carried out by Site Investigations Ltd. in 2014 and 2019, with soakaway testing performed at the intended site of the soakaway in 2014. This found that the existing ground conditions consist of 1-2m of sandy/silty gravel overlying deep beds of gravel. The infiltration rate determined on site at the soakaway location was 0.148m/hr, which is sufficient to allow for a soakaway design. The 2019 soakaway test, carried out in a different location to the south, determined a similar infiltration rate of 0.128m/hr. Refer to Appendix D 12.1 (Volume III of the EIAR) for the soakaway test reports.

A Stormtech soakaway/infiltration system is proposed. Substantial measures are proposed to minimise the risk of silt build-up within the soakaway, such as the use of safety factors on the infiltration rate, an isolator row, catchpit manholes on incoming pipes, and infiltration trenches/permeable paving upstream of the tank. These measures, in conjunction with a suitable maintenance schedule will ensure the soakaway operates efficiently throughout its design life.

Wicklow County Council had requested that a surface water connection to the Dargle River to the south of the site be explored. However, as this river is approximately 300m to the south, through lands with multiple owners this option could not be feasibly pursued in this case. Also, as noted above, the natural topography of the site allows drainage to run by gravity to the north, and not naturally towards the river to the south.

All surface water drainage shall be constructed in accordance with Greater Dublin Regional Code of Practice for Drainage Works and Wicklow County Council Requirements.

As part of the development, a number of different SuDS measures are proposed to minimise the impact on run-off water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The SuDS design for the proposed development is based on dividing the site into several smaller catchment areas in order to provide source control.

It is proposed to provide the following SuDS measures:

- Stormtech Soakaway,
- Infiltration trenches,
- Permeable Paving,
- Swales,
- Petrol Interceptor.

Permeable paving will be provided for car parking spaces and driveways within the site. It is proposed to provide storage beneath the permeable paving areas to attenuate any surface water runoff from these areas. These storage areas will have a depth of 300mm and will have a voids ratio of 30%.

12.4.2 Foul Drainage

It is proposed for the gravity foul drainage network on site to drain to the northeast corner of the site, which is the lowest point of the development. From here it is to be pumped to the existing 225mm foul sewer at the R760 sewer junction. Wicklow County Council stated that the proposed development should accommodate future connections from neighbouring sites, allowing for the existing Enniskerry Demesne Foul pumping station to be decommissioned in future. The additional Sites contributing to the foul pumping station are set out in the calculations (in Appendix D - 12.2 Volume III of the EIAR), they are as follows:

4. Adjoining site future development 27 no. houses (Planning Reg. Ref. 18/971)
5. Existing Enniskerry Demesne 14 no. houses
6. Permitted development WCC Reg Ref 16/976 6 no. houses (site adjacent to Enniskerry Demesne on east side)

The new below ground foul pumping station for the development is proposed to accommodate an average flow of 1.045l/s and has a 24hr dry weather flow emergency overflow storage requirement of that equates to 92m³, which will be met through the provision of a 73m^3 concrete storage tank, and the remaining volume within the pumping station wet well. The pumping station will be built to the specifications outlined in Irish Waters Code of Practice and standard details.

The foul water is then pumped from the new below ground foul pumping station via a 100mm diameter HDPE foul rising main that connects to a new foul standoff/discharge manhole and then by a short gravity connection to the existing foul sewer on the main Enniskerry Road (R760) at its junction with the Cookstown road (L1020). The peak foul flow breakdown is laid out in the calculations contained in Appendix D - 12.2 Volume III of the EIAR.

The proposed foul network within the site consists of 225mm diameter pipes with a capacity of at least 21 l/s (at 1:200). The proposed connection to the public sewer is a 100mm rising main, as described above. The capacities of these pipes more than adequate to accommodate the estimated flows.

As required by Irish Water, who since 2014 are in control of foul drainage services, a Pre-Connection Enquiry, PCE, is required to be submitted for all SHD applications. A Confirmation of Feasibility was received on the 20th of May 2019. In addition, a Statement of Design Acceptance was received on the 7$^{th\ of}$ August 2020 for the proposed development and is included with the planning application.

All foul drainage will be constructed in accordance with the latest Irish Water Code of Practice.

12.4.3 Water Supply

The site connection will be via a 150mm diameter (internal bore) connection into the existing 180mm HDPE public watermain in the Cookstown Road in front of the site. Twenty-four-hour storage will be provided in each house via an attic tank to cater for possible shut-downs in the system. Refer to Appendix D - 12.3 (Volume III of the EIAR) for water demand calculations.

Hydrants will be provided on the ring main, subject to fire cert requirements. Sluice valves will be provided at junctions and appropriate locations to facilitate isolation and purging of the system. Air valves will be provided at high points for system verting. All watermains infrastructure is to be to Irish Waters Code of Practice and standard details. A bulk water meter will be provided inside the site on the connection to the public watermain.

As required by Irish Water, who since 2014 are in control of foul drainage services, a Pre-Connection Enquiry, PCE, is required to be submitted for all SHD applications. A Confirmation of Feasibility was received on the 20th of May 2019. In addition, a Statement of Design Acceptance was received on the 7$^{th\ of}$ August 2020 for the proposed development and is included with the planning application.

Refer to BM Drawing nos. C1030 & C1220 for further information on the proposed site watermain layout and the proposed location of the connection to the existing network.

All watermains will be constructed in accordance with the latest Irish Water Code of Practice.

12.4.4 ESB Power

The existing ESB Networks (ESBN) infrastructure at the north east corner of the site beside the main road in the form of Low Voltage (400V/230V) overhead power lines.

The existing overhead services at the north east corner of the site will be undergrounded and will be diverted as required.

A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure at Powerscourt School. Initial discussions and engagement with the ESB have been ongoing and the metering strategy has been determined in accordance with the ESB requirements. Up to two new *"unit sub-stations"* will be provided throughout the site to meet the electrical demands associated with the new development.

The exact extent and location of the connections will be agreed with ESB Networks during the design stage of the project.

Electrical services will be assessed and designed in accordance with prevailing standards and guidance documents comprising but not limited to the following:

- ETCI Regulations ET101
- Building regulation technical guidance documents
- IS3217
- IS3218
- IS EN 60439;
- IS EN 60947;
- IS EN 60529
- BS 604:2000 (2006).
- Health & safety requirements.
- Fire authority requirements.

12.4.5 Gas

Gas Networks Ireland (GNI) have been contacted and they have advised that they do not have any services in the vicinity of this new development site.

An air source heat pump is the choice for the heating systems in this scheme as an alternative to a gas boiler and therefore, no gas infrastructure will be required for this new development.

12.4.6 Telecommunications – Eir

The existing Openeir Network in the foot path on other side of the main road at the north of the site, includes ducted service with access chambers.

New connections will be made to the existing Openeir networks at the boundary of the site and services will be distributed throughout the site as required.

The exact extent and location of these connections will be agreed with Opener during the design stage of the project.

12.4.7 Telecommunications – Virgin Media

Virgin Media have been contacted and they have advised that they do not have any services in the vicinity of this new development site.

However, as part of this new development an additional comms duct will be installed as part of the infrastructure for future services / connectivity as this area may be part of a Virgin Media new development programme in the future.

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

12.5.1 Construction Phase

Power and water would be required during construction activities and servicing of the temporary site compound. The development site would be connected to the local electricity grid network system and mains water supply. Given the scale and transient nature of construction works, the power and water demand on the local electricity and mains water systems would not be considered significant and would not be anticipated to impact upon local power or water supply.

Telecommunications requirements during the construction phase would be provided using mobile phones / broadband. There would be no anticipated impacts to the local telecommunications system.

Foul water from staff welfare facilities generated during the construction phase would be collected on site in designated waste holding containers / port-a-loo units and emptied on a regular basis by a licenced waste contractor.

The construction works contractor would liaise with the relevant utilities provider prior to works commencing, with ongoing consultation throughout the proposed development. Where new services are required, the construction works contractor would apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

Power and Telecommunications

The installation of the utilities for the development will be conducted in parallel with the other services. This will mainly involve excavation of trenches to lay ducting, construction/installation of access chambers and backfilling of trenching. The trenching and backfilling works will be carried out in conjunction with the construction of the roads and footpaths throughout the scheme.

The relocation or diversions of the existing overhead ESB lines may lead to loss of connectivity to and / or interruption of the supply from the electrical grid to the surrounding areas. Any loss of supply will be managed by ESB Networks to minimise impact on neighbouring properties.

The Potential loss of connection to the Telecommunications infrastructure while carrying out works to provide service connections. This likely adverse impact may be characterised as a temporary, regionally short term, moderate impact.

The site compound will require a power and telecommunications connection. This likely adverse impact will be temporary and negligible.

12.5.2 Operational Impacts

Potential operational phase impacts on the infrastructure are noted below:

12.5.2.1 Surface Water

During the operational phase of the works, the surface water drainage has been designed to maintain the groundwater flows from the site at the greenfield run-off rates.

12.5.2.2 Foul Water

The impact of the operational phase of the proposed development on the foul drainage network would be the increased flows to the foul network. Irish Water have confirmed in the Confirmation of Feasibility Letter response to the Pre-Connection Enquiry to them and in their Design Acceptance Letter that the network has capacity for the proposed development.

12.5.2.3 Watermains

The impact of the operational phase of the proposed development on the water supply network would be the increased demand on the local system. Irish Water have confirmed in the Confirmation of Feasibility Letter response to the Pre-Connection Enquiry to them and in their Design Acceptance Letter that the network has capacity for the proposed development.

12.5.3 Power & Telecommunications

The impact of the operational phase of the proposed development on the power supply network would be the requirement for an Electrical Diversified Load of 1.5MW which will be split over up to two substations located throughout the housing scheme.

The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.

12.5.4 'Do-nothing' scenario

There are no predicted impacts on these material assets should the proposed development not proceed.

12.6 MITIGATION MEASURES

12.6.1 Construction Mitigation

The construction works contractor shall liaise with the relevant utilities provider prior to works commencing, with ongoing consultation throughout the proposed development. Where new services are required, the construction works contractor shall apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider.

All works in the vicinity of utilities apparatus will be carried out in ongoing consultation with the relevant utility company or local authority and will be in compliance with any requirements or guidelines they may have.

Where new services or diversions to existing services are proposed, the Contractor will apply to the relevant utility company for a connection permit where appropriate and will adhere to their requirements.

Mitigation measures proposed in relation to the drainage and water infrastructure comprise the following:

A Construction and Environmental Management Plan (CEMP) (prepared by BMCE) is included in the SHD application material. This report will be developed by the contractor as necessary and will be submitted to the local authority prior to commencement on site.

Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

In the event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping to an appropriate treatment facility prior to discharge. Other measures would include excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e., highly vulnerable groundwater areas.

In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with Irish Water standards, pressure tested, and CCTV surveyed to ascertain any possible defects.

The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established.

The construction compound's potable water supply shall be protected from contamination by any construction activities or materials.

Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.

Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

Road sweeping and/or wheel wash facilities will be provided as required.

12.6.2 Stormwater Infrastructure

In accordance with the Greater Dublin Regional Code of Practice for Drainage Works, all sites are required to develop a drainage system which separates storm & foul water on site.

In addition to improving overall storm water quality following sustainable urban drainage systems, SuDs protocols, there is also a requirement to reduce storm water runoff rates to pre-development levels. On the subject site all rainwater will be collected and discharged to soakaway within the site, i.e., no runoff. The soakaway proposed for this development is designed to infiltrate all run-off generated from all hard standing surfaces on site, up and including the 1 in 100-year storm event, +20% climate change allowance.

12.6.3 Foul Infrastructure

Irish Water have confirmed in the Confirmation of Feasibility Letter response to the Pre-Connection Enquiry to them and in their Design Acceptance Letter that the network has capacity for the proposed development. The proposed development will be serviced by a new separate internal foul network, draining by gravity to a new foul water pumping station on site. This station will have a pumped rising main to the nearest Irish Water sewer located on the nearby R760.

As required by the SHD process, Irish Water are required to review the schemes foul drainage proposal & to issue a Confirmation of Feasibility letter and letter of Design Acceptance. These have been received by the design team and is included as an appendix in the Barrett Mahony Civil Engineering Infrastructure Report and Flood Risk Assessment accompanying this submission.

A requirement from the Irish Water review for the development is to up-grade part of the local foul drainage network, as these works are located outside of the subject lands these works will be carried out by Irish Waters regional contractor, and agreement for same will form part of the Applicants connection agreement post planning.

12.6.4 Potable Water Infrastructure

All potable water infrastructure is under the control of Irish Water. The proposed development will be serviced by a new separate internal water network for the proposed development. The proposed development will have 1no. watermain connection from the development to the existing Ø180mm public watermain along the adjacent L1020 Cookstown Road.

As required by the SHD process Irish Water are required to review the schemes potable water proposal & to issue a Confirmation of Feasibility letter and a letter of Design Acceptance. These have been received by the design team and is included as an appendix in the Barrett Mahony Civil Engineering Infrastructure Report and Flood Risk Assessment accompanying this submission.

12.6.5 Operational Mitigation

Please refer to Chapter 6 of the EIAR – 'Water', for mitigation measures associated with the surface water drainage. All new drainage lines (foul and surface water) will be pressure tested and will be subject to a CCTV survey to identify any possible defects prior to being made operational. SuDS measures are proposed to minimise the impact on water quality and reduce the quantity of the runoff and maximise the amenity and biodiversity opportunities within the site. The system incorporates soakaways throughout the development, therefore there will be no operational groundwater runoff from the site, reducing the impact on the existing surface water drainage network. The proposed techniques will offer a high level of treatment processes and nutrient removal of the turnoff, particularly during the "first flush".

Water conservation methods such as the use of low flush toilets and low flow taps should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development.

Similarly, water conservation methods would reduce the demand on the public water supply network and the loading on the foul sewer network.

For the operational phase, no mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

The proposed development is located within an area designated for the type of development proposed. As such the services pertaining to the development are required to facilitate the proposed scheme. It is not possible to not provide the services required. Notwithstanding this, the potable water, foul & stormwater services have all been designed in accordance with the requirements of the various stake holders, notably Irish Water for the foul & potable water utilities and Wicklow County Council for the surface water services.

12.6.6 ESB Infrastructure

ESB have been engaged at an early stage to ensure that any potential issues with utility connections are reviewed and mitigated as early in the process as possible. ESB will not formally engage in the design process until such time as planning has been approved and scheme name and numbering are approved. However, initial discussions and proposal have been positive.

The proximity to the existing ESB sub-station at the Powerscourt School ensures access to the MV network which avoids the need for extensive network upgrades and infrastructure.

12.7 CUMULATIVE IMPACTS

12.7.1 Stormwater Infrastructure

No impact on the surface water sewer system as there is no connection from the site.

12.7.2 Foul Infrastructure

The potential impacts on the local and regional foul drainage system are that the proposed development in addition to others in the area, would reduce capacity in the sewer connected to and the capacity in the local Wastewater Treatment Plant (WWTP) in Enniskerry. Notwithstanding same, the lands are zoned for residential development and up-grades have been carried out to the Enniskerry WWTP. Irish Water have provided a Confirmation of Feasibility Letter in response to the Pre-Connection Enquiry to them for the site.

It is proposed that the gravity foul drainage network on site will drain to the northeast corner of the site, which is the lowest point of the development. At this location, there will be a wastewater pumping station in accordance with Irish Water details and from here it is to be pumped to the existing 225mm foul sewer at the R760 sewer junction. Wicklow County Council stated that the proposed development should accommodate future connections from neighbouring sites, allowing for the existing Enniskerry Demesne Foul pumping station to be decommissioned in future. The additional sites contributing to the foul pumping station are set out in the calculations in Appendix C - 6.2 (Volume III of the EIAR), and the sites are as follows:

1. Adjoining site future development 27 no. houses (Planning Reg. Ref. 19/871)
2. Existing Enniskerry Demesne 14 no. houses
3. Permitted development WCC Reg Ref 16/976 6 no. houses (site adjacent to Enniskerry Demesne on east side)

The new below ground foul pumping station for the development is proposed to accommodate an average flow of 1.064l/s and has a 24hr dry weather flow emergency overflow storage requirement of that equates to 92m³, which will be met through the provision of a 73m^3 concrete storage tank, and the remaining volume within the pumping station wet well. The pumping station will be built to the specifications outlined in Irish Waters Code of Practice and standard details.

The foul water is then pumped from the new below ground foul pumping station via a 100mm diameter HDPE foul rising main that connects to a new foul standoff/discharge manhole and then by a short gravity connection to the existing foul sewer on the main Enniskerry Road (R760) at its junction with the Cookstown road (L1020). The peak foul flow breakdown is laid out in the calculations contained in Appendix C - 6.2 (Volume III of the EIAR).

12.7.3 Potable Water Infrastructure

The potential impacts for the local public potable water are that the proposed development will reduce the capacity in the public main. Irish Water have provided a Confirmation of Feasibility Letter in response to the Pre-Connection Enquiry to them for the site.

12.7.4 ESB Infrastructure

Potential impacts for ESB on existing network capacity and potential issues with current harmonics as heat pumps are proposed as the heating energy source for this development.

12.7.5 Broadband & I.T. Infrastructure

Potential impacts for Openeir on its existing network capacity.

12.8 'Do NOTHING' Impact

In the "do-nothing" scenario the proposed site would not be redeveloped and therefore there would be no adverse impacts to the foul, stormwater & potable water system.

12.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

12.9.1 Stormwater Infrastructure

No impact on the surface water sewer system as there is no connection from the site.

12.9.2 Foul Infrastructure

The potential impacts on the local and regional foul drainage system are that the proposed development would reduce capacity in the sewer connected to and the capacity in the local Wastewater Treatment Plant (WWTP) in Enniskerry. Notwithstanding same, the lands are zoned for residential development and up-grades have been carried out to the Enniskerry WWTP. Irish Water have provided a Confirmation of Feasibility Letter in response to the Pre-Connection Enquiry to them for the site.

12.9.3 Potable Water

The potential impacts for the local public potable water are that the proposed development will reduce the capacity in the public main. Irish Water have provided a Confirmation of Feasibility Letter in response to the Pre-Connection Enquiry to them for the site.

12.10 RESIDUAL IMPACTS

12.10.1 Construction Phase

Implementation of the measures outlined in Section 12.6 will ensure that the potential impacts of the proposed development on the site's material assets do not occur during the construction phase and that any residual impacts will be negative, slight, and short term.

12.10.2 Operational Phase

The demand on power supply and telecommunications supply will all increase due to the development of the lands. The total increase in the capacity of the local electrical infrastructure as a result of the proposed development will be approximately 1.5MW. The development of the lands will be constructed in phases, with the final phase being due for completion circa 2023. The ESB infrastructure networks in the immediate vicinity of the site is adequate to meet these anticipated demands and there will be no adverse effect on the ability of the ESB network to meet the existing demands in the areas surrounding the site.

12.11 MONITORING

All internal potable water & drainage services within the proposed building will be (monitored by the management firm / taken in charge) & their maintenance personnel will routinely inspect and carry out maintenance as required.

The external potable water and foul effluent (and the combined outfall including restricted storm water flows) connections to the public system will be maintained by Irish Water.

12.12 REINSTATEMENT

As the proposed development will be a *'new build'* there will be no reinstatement within the site boundary required. The external connections into the potable water and combined sewer will be carried out by Irish Waters regional contactor and the road / verge will be reinstated to I.W. / Wicklow County Councils requirements.

12.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered while compiling this chapter.

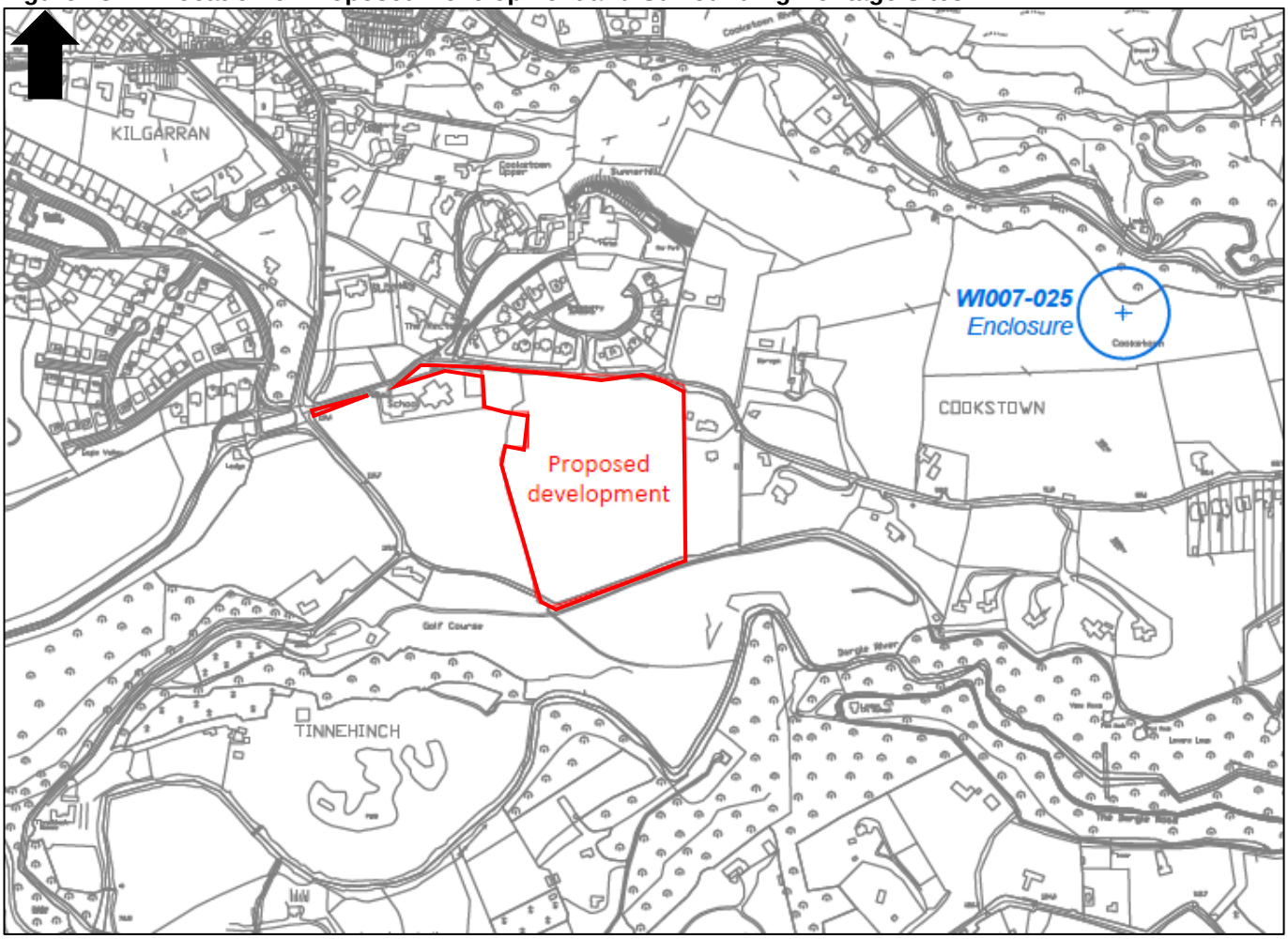
13.0 ARCHAEOLOGY, ARCHITECTURE, AND CULTURAL HERITAGE

13.1 INTRODUCTION

13.1.1 General

IAC Archaeology has prepared this chapter on behalf of Cairn Home Properties Ltd to assess the impact, if any, on the archaeological, architectural, and cultural heritage resource of a proposed development at Cookstown Road, Enniskerry, County Wicklow (ITM 722593/716779; Figure 13.1). The assessment was undertaken by Faith Bailey (MA, BA (Hons), MIAI, MCIfA) and Rob Goodbody (BA (MOD), DIP ENV P, DIPABRC, MUBC, MA) of IAC Archaeology and was informed by a programme of archaeological testing undertaken by Muireann Ní Cheallacháin (BA, MA, DIP) of IAC Archaeology. The proposed development area is contained within the townlands of Cookstown, to the east of Enniskerry, County Wicklow.

Figure 13.1 – Location of Proposed Development and Surrounding Heritage Sites



This study determines, as far as reasonably possible from existing records, the nature of the archaeological, architectural and cultural heritage resource in and within the vicinity of the application area using appropriate methods of study. Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (CIfA 2014). This leads to the following:

- Determining the presence of known archaeological and built heritage sites that may be affected by the proposed development;

- Assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;

- Determining the impact upon the setting of known cultural heritage sites in the surrounding area;

- Suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological, historical, and architectural background of the development area. This included information from the Record of Monuments and Places of County Wicklow, the Wicklow County Development Plan, the National Inventory of Architectural Heritage, the topographical files of the National Museum of Ireland, and cartographic and documentary records. Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey, Bing Maps, and Google Earth has also been carried out. A field inspection has been carried out in an attempt to identify any known archaeological, architectural and cultural heritage sites and previously unrecorded features, structures and portable finds within the proposed development area. A geophysical survey and archaeological testing have been undertaken in order to identify areas of archaeological heritage and assess potential impacts.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid, reduce or offset such adverse impacts.

13.1.2 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:

'*Cultural Heritage'* where used generically, is an over-arching term applied to describe any combination of archaeological, architectural, and cultural heritage features, where –

- the term '*archaeological heritage'* is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places)

- the term '*architectural heritage'* is applied to structures, buildings, their contents and settings of an (assumed) age typically younger than AD 1700

- the term '*cultural heritage'*, where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations.

13.1.3 Impact Definitions

Impact definitions as per the most recent EPA (draft) guidelines (2017):

Imperceptible
An effect capable of measurement but without noticeable consequences
Not significant
An effect which causes noticeable changes in the character of the environment but without noticeable consequences
Slight
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 or emerging 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 alters the majority of a sensitive aspect of the environment.
Profound
An effect that obliterates sensitive characteristics.
Significance of Effects as defined by the Environmental Protection Agency (2017) Draft Guidelines (pg. 23).

13.1.4 Consultations

Following the initial research, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the background environment, receiving environment and study area, as follows:

- Department of Housing, Local Government, and Heritage – the Heritage Service, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders; Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- National Inventory of Architectural Heritage: County Wicklow; and
- Wicklow County Council: Planning Section.

13.1.5 Guidance and Legislation

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Acts, 1930-2014;
- The Planning and Development (Strategic Infrastructure) Bill, 2006;
- Planning and Development Act, 2000 (as amended);
- Heritage Act, 1995;
- Environmental Protection Agency (EPA) 2015 Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (Draft Sept. 2015). Dublin, Government Publications Office;
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR) (EPA 2017). Dublin: Government Publications Office;
- Guidelines on the Information to be Contained in Environmental Impact Statements, (EPA, 2002);
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements, (EPA, 2003);
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands; and
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act.
- Architectural Heritage Protection Guidelines for Planning Authorities (2011);

13.2 ASSESSMENT METHODOLOGY

Research has been undertaken in four phases. The first phase comprised a paper survey of all available archaeological, architectural, historical, and cartographic sources. The second phase involved a field inspection of the proposed development area. The third and fourth phases comprised a geophysical survey following by a programme of archaeological testing.

13.2.1 Paper Survey

The following sources were examined and a list of areas of archaeological, architectural, and cultural heritage potential was compiled:

- Record of Monuments and Places for County Wicklow;
- Sites and Monuments Record for County Dublin;
- Monuments in State Care Database;
- Preservation Orders;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Wicklow County Development Plan 2017–2023;
- Enniskerry Town Plan, 2016–2022 (which has been superseded by the Bray Municipal District Local Area Plan 2018-2024);
- Bray Municipal District Local Area Plan 2018-2024;
- National Inventory of Architectural Heritage;
- Place name analysis;
- Aerial photographs; and
- Excavations Bulletin (1970-2020).

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. All recorded archaeological sites are also listed on a website maintained by the Department of Housing, Local Government, and Heritage (DoHLGH) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoHLGH may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

- Sir William Petty, Down Survey, Half Barony of Rathdown, c. 1655
- John Rocque, Map of the City and County of Dublin, 1760
- Jacob Nevill, Actual Survey of the County of Wicklow, 1760
- A R Neville, Survey of the County of Wicklow, 1798
- John Taylor, Map of the Environs of Dublin, 1816
- William Duncan's Map of the County of Dublin, 1821
- First Edition Ordnance Survey Map, 1838, scale 1:10,560
- Ordnance Survey Map, 1909, scale 1:2,500

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey, Bing Maps, and Google Earth.

Place Names are an important part in understanding both the archaeology and history of an area. Place names can be used for generations and in some cases have been found to have their root deep in the historical past.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Wicklow County Development Plan 2016–2022 and Bray Municipal Area Local Area Plan 2018-2024 (which supersedes the Enniskerry Town Plan) were consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

The National Inventory of Architectural Heritage (NIAH) is a government-based organisation tasked with making a nationwide record of locally, regionally, nationally and internationally significant structures, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures. The NIAH have also carried out a nationwide desk-based survey of historic gardens, including demesnes that surround large houses.

Excavations Bulletin is a summary publication that has been produced every year since 1970. The hard copy publication summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. The information is also available online and includes years from 2011 to the present (www.excavations.ie).

13.2.2 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological, architectural, and historical remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The field inspection entailed:

- Inspecting the proposed development area and its immediate environs.
- Noting and recording the terrain type and land usage.
- Noting and recording the presence of features of archaeological, architectural, or cultural heritage significance.
- Verifying the extent and condition of any recorded sites.
- Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.

13.2.3 Geophysical Survey

Geophysical survey is used to create ‘maps’ of subsurface archaeological features. Features are the non-portable part of the archaeological record, whether standing structures or traces of human activities left in the soil. Geophysical instruments can detect buried features when their electrical or magnetic properties contrast measurably with their surroundings. In some cases, individual artefacts, especially metal, may be detected as well. Readings, which are taken in a systematic pattern, become a dataset that can be rendered as image maps. Survey results can be used to guide excavation and to give archaeologists insight into the pattern of non-excavated parts of the site. Unlike other archaeological methods, the geophysical survey is not invasive or destructive.

A geophysical survey was undertaken to inform this assessment in 2019 within the proposed development area (Leigh 2019, licence 19R0234). A summary of the geophysical report is presented in this assessment and within Appendix B - 13.1 of the EIAR.

13.2.4 Archaeological Testing

Archaeological Test Trenching can be defined as ‘a limited programme... of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land or underwater. If such archaeological remains are present test trenching defines their character and extent and relative quality’ (CIfA 2014a, 4). A programme of archaeological testing was carried out within the proposed development area in 2020. This was undertaken by Muireann Ní Cheallacháin of IAC Archaeology under licence 20E0027. The full report is included in Appendix B - 13.1 of Volume III of the EIAR.

13.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

13.3.1 Results and Analysis - Archaeology

13.3.1.1 Historical Background

The proposed development area consists of two arable fields, located immediately east of the former demesne lands associated with Powerscourt House, in the townland of Cookstown (Figure 13.1). It is situated c. 1 km southeast of the centre of Enniskerry. The site is located within lands that are zoned for residential development within the Wicklow County Development Plan (2017-2023). There are no recorded monuments located within 200m of the proposed development area. The closest recorded monument is an enclosure (WI007-025) located 585m to the east-northeast (Figure 13.1). A number of post-medieval finds have been found in Cookstown townland (although not within the site boundary), including a copper alloy half penny dating to c. 1806 (NMI Ref: 1995:1979), a copper alloy plated lead mount (NMI Ref: 2003:83) and a silver token (NMI Ref: 1995:1991).

Prehistoric Period

Mesolithic Period (8000-4000 BC)

The Mesolithic period is the earliest time for which there is clear evidence for prehistoric human activity in Ireland. During this period people hunted, foraged and gathered food and appear to have had a mobile lifestyle. The most common evidence found consists of scatters of worked flint material, a by-product from the production of flint implements. Flints of this date have been recorded at St. Bride's Head close to Wicklow Town and Brittas Bay to the southeast (Grogan and Kilfeather, 1997, 1) and possibly indicate small-scale transient settlement along the riverbanks and seashores. There are no known sites of this period located within the vicinity of the proposed development area.

Neolithic Period (4000–2500 BC)

During this period communities became less mobile and their economy became based on the rearing of stock and cereal cultivation. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape. Forests were cleared and field boundaries constructed. There was a greater concern for territory, which saw the construction of large communal ritual monuments called megalithic tombs, which are characteristic of the period. The main focus of Neolithic tomb building in Wicklow is located in the north of the county, close to the Dublin border. There are 20 passage tombs located within this area and most of these are situated above the 240m contour.

The closest recorded megalithic tomb is located c. 1.25km northwest of the proposed development area (WI007-021). The tomb consists of a small chamber formed by two parallel slabs supporting a split boulder capstone. The chamber is open at its western side and it stands in the centre of a roughly circular cairn. This site is further protected with a Preservation Order, meaning it is deemed to be of national importance.

Bronze Age (2500–800 BC)

This period was characterised by the introduction of metalworking technology to Ireland and coincided with many changes in the archaeological record, both in terms of material culture as well as the nature of the sites and monuments themselves. Although this activity has markedly different characteristics to that of the preceding Neolithic period, including new structural forms and new artefacts (such as Beaker pottery), it also reflects a degree of continuity.

In addition to changes in material culture, there were changes in burial rite from communal megalithic tombs to single burial (either inhumed or cremated) in stone cists. A cist is a stone-lined grave, usually built of slabs set upright to form a box-like construction and capped by a large slab or several smaller lintels (Buckley and Sweetman 1991, 63). Circular ditched features known as ring-barrows are another site type synonymous with the Bronze Age period. These sites typically consist of a single ditch surrounding one or more internal pits, usually containing cremated human remains. The remains of a probable ring barrow were located c. 1.35km northwest of the proposed development area (WI007-086) during archaeological investigations carried out as part of a development proposal (Lynch & Kavanagh, 2018). Subsequent excavation (Ní Cheallacháin 2019) revealed a large tri-vallate ring barrow with five pits and two charcoal rich spreads. The tri-vallate ring barrow consisted of an inner circular ditch, a middle penannular ditch with a smaller opposing ditch and a large outer penannular ditch. Four deposits of non-cremated human remains and

some prehistoric pottery sherds were located within the possible re-cuts and may suggest later discrete re-use of the site.

Iron Age (800 BC–AD 500)

There is increasing evidence for Iron Age settlement and activity in recent years as a result of development-led excavations as well as projects such as LIARI (Late Iron Age and Roman Ireland). Yet this period is distinguishable from the rather rich remains of the preceding Bronze Age and subsequent early medieval period, by a relative paucity within the current archaeological record. However, the Iron Age in Ireland is problematic for archaeologists as few artefacts dating exclusively to this period have been found and without extensive excavation it cannot be determined whether several monument types, such as ring-barrows or standing stones, date to the late Bronze Age or Iron Age. There are no known monuments in the vicinity of the proposed development area that would suggest an active presence of Iron Age communities in this area, although it is likely that there was a degree of continuity in settlement patterns through this period.

Early Medieval Period (AD 500–1100)

During the medieval period, Ireland was depicted in the surviving historical sources as entirely rural. The ringfort or ráth is considered to be the most common indicator of settlement during the early medieval period. A recent study of the ringfort (Stout, 1997) has suggested that there is a total of 47,000 potential ringforts or enclosure sites throughout Ireland. Ringforts are strongly associated with agricultural land and, as such, are rarely situated at higher altitudes. Ringforts and potential ringforts—often recorded as enclosures—are the most common archaeological sites recorded across the Irish landscape. Ringforts include crannógs, cashels and ráths which are largely defined as circular enclosures surrounded by banks and ditches comprised of timber as well as stone (cashels), earth (ráths) or manmade islands (crannógs). There are 185 ringforts and ringfort sites known in County Wicklow. The closest such site is WI007-025, located c. 585m to the east-northeast.

The impact of Christianity in Wicklow is indicated by the number of important early church foundations established here, including the great monastic complex at Glendalough, established by St Kevin in the 6th Century. The earliest churches were wooden structures none of which survive above ground; however, these were replaced by stone churches, which have a better survival rate. The earliest stone churches in Wicklow were likely built in the 9th or 10th centuries AD and were well constructed with large un-mortared stones with the entrance usually set within the western gable.

In general, the organisation of the Irish church was primarily monastic. It was not until the beginning of the 12th century that it was gradually reorganised into dioceses, and abbots were replaced by bishops. However, in the Rathdown area it is possible that changes took place at an earlier stage. For example, the holy well within Powerscourt Demesne (WI007-016), located c. 1.9km northwest of the proposed development area was dedicated to St. Moling, Bishop of Ferns, who died in AD 624. Abbots do not appear to be connected with this area, either historically or within place names (Corlett, 1999, 42). The townland of Monastery may contradict this argument, but it is likely that the monastery site (WI003-031001; WI003-032002), located c. 1.3km to the northwest of the proposed development area, was medieval (post 12th century) rather than an early medieval foundation.

Medieval Period (AD 1100–1600)

The piecemeal conquest by the Anglo-Normans of Ireland, which commenced in AD 1169, had a fundamental impact on the Irish landscape. The introduction of the large motte and bailey castles by the Anglo-Normans was novel to the Irish landscape. A motte is a flat-topped mound of earth, usually artificially raised with a fosse around its base. These structures were usually accompanied by a bailey, which was an outer enclosure in which outbuildings such as stables and kitchens were located. There is some evidence to suggest that the Normans may, in some cases, have constructed their mottes on top of earlier ringforts. These sites are predominantly found in Ulster and Leinster.

A motte (WI007-018001) is recorded c. 1.4km west–northwest of the proposed development area. Today the site is very overgrown but the SMR file notes that it may have been associated with the medieval borough of Mulsoe's Court (WI007-018, centred on WI007-018001). However, it is not clear whether one was ever actually established as Mulso died in 1463 and no archaeological evidence to date has been identified to suggest its presence. Despite this, the Bray Municipal Area Local Area Plan (2018-2024) identifies the area surrounding the motte as an Area of Archaeological Potential and Significance, citing the presence of the deserted borough.

A stone castle was also built at Powerscourt in 1316 (WI007-019), c. 1.2km to the southwest of the proposed development area. 'Balyteny Castle', as it was then known, was in the possession of Eustace le Poer, from whom Powerscourt takes its name. Powerscourt was transformed after 1731 when the mansion was constructed around the shell of the castle. The existing house incorporates fragmentary remains of the 16th century Fitzgerald castle (late medieval fabric was identified during the course of restoration work on the house after a devastating fire of 1974). A number of medieval coins have been recorded from within Powerscourt Demesne (NMI Topographic Files).

13.3.1.2 Results of Geophysical Survey

A geophysical survey was carried out across the proposed development area under licence 19R0234. The probable remains of a sub-circular enclosure were recorded (Figure 13.2), which most likely represent a ditched feature such as a barrow measuring c. 14.5m in diameter. Areas of magnetic disturbance were also identified, possibly representing spreads of burnt material. Several faint curvilinear and linear trends were identified and considered to be of archaeological interest. Several isolated responses of possible archaeological interest were also recorded. However, these had no clear pattern and were considered to possibly represent natural variations in the subsoil.

13.3.1.3 Results of Archaeological Testing

Archaeological testing was carried out within the proposed development area by Muireann Ní Cheallacháin under Licence 20E0027. This identified six areas of archaeological potential across the eastern field of the proposed development area (Appendix B - Figure 13.2, Appendix 13.1).

Archaeological Area 1: This comprises the area containing the circular ditch identified in the geophysical survey (Licence 19R0234, Leigh 2019); along with an isolated pit. Trench 32 confirmed the presence of a ring-ditch (C3) of c. 14.5m diameter. No internal features were identified within the trench. Trench 31 identified an isolated pit (C4) of unknown function c. 20m to the southeast of the circular ditch.

Archaeological Area 2: This area comprises nine charcoal rich pits. Trench 22 identified a cluster of seven charcoal rich pits (C5–C11) and Trench 24 identified two isolated charcoal rich pits (C12 and C13) c. 20m to the south. The presence of heat affected stone within the fills of these nine pits suggests that they may be associated with unidentified or ploughed out burnt mound activity in the area.

Archaeological Area 3: This area comprises three isolated pits. Trench 18 identified an isolated pit (C14) of unknown function. Trench 10 identified an isolated charcoal rich pit (C15), c. 35m to the north of C14. The presence of occasional heat affected stone within the pit suggests it may be associated with unidentified or ploughed out burnt mound activity in the area. Trench 8 identified an isolated pit (C16) c. 50m to the northwest of C15 (Plate 13.1). The large amount of ex-situ oxidised soil and charcoal inclusions within the pit suggests that it may be a waste pit associated with burnt mound activity to the south. No evidence for the remains of stone pillars, as marked, roughly in this area, on the historic mapping, was identified

Archaeological Area 4: This area comprises a cluster of possible postholes (Plate 13.2). Trench 5 identified a cluster of possible postholes containing charcoal rich fills.

Archaeological Area 5: This area comprises three charcoal rich pits. Trench 7 identified a cluster of three pits (C17–C19). The charcoal-rich nature of the pits suggest that they are waste pits with associated with unidentified burning activity in the area or possibly the burnt mound activity to the south.

Archaeological Area 6: This area comprised two pits and three possible postholes associated with probable Neolithic settlement activity. Trench 11 confirmed the presence of two charcoal rich pits (C26 and C27) where the geophysical survey identified two possible circular archaeological features. Pit C26 contained multiple sherds of early Neolithic carinated bowl pottery (Plate 13.3). Three possible postholes (C28–C30) were also identified adjacent to the pits and are therefore probably also associated with Neolithic activity.

The archaeological features identified within AA1–6 appear to be prehistoric in date. The pottery recovered from AA6 dates to the Neolithic period while the material contained within some of the pits in AA2–5 is representative of burnt mound activity, which generally dates to the Bronze Age although Neolithic burnt mound sites have also been recorded. The circular enclosure in AA1 may represent a ring-barrow, which generally date to the Bronze Age but may also be Iron Age in date.

Plate 13.1 – Pit C16 in AA3, facing southwest

Plate 13.2 – Group of postholes in AA4, facing north

Figure 13.2 – Results of Geophysical Survey and Archaeological Testing

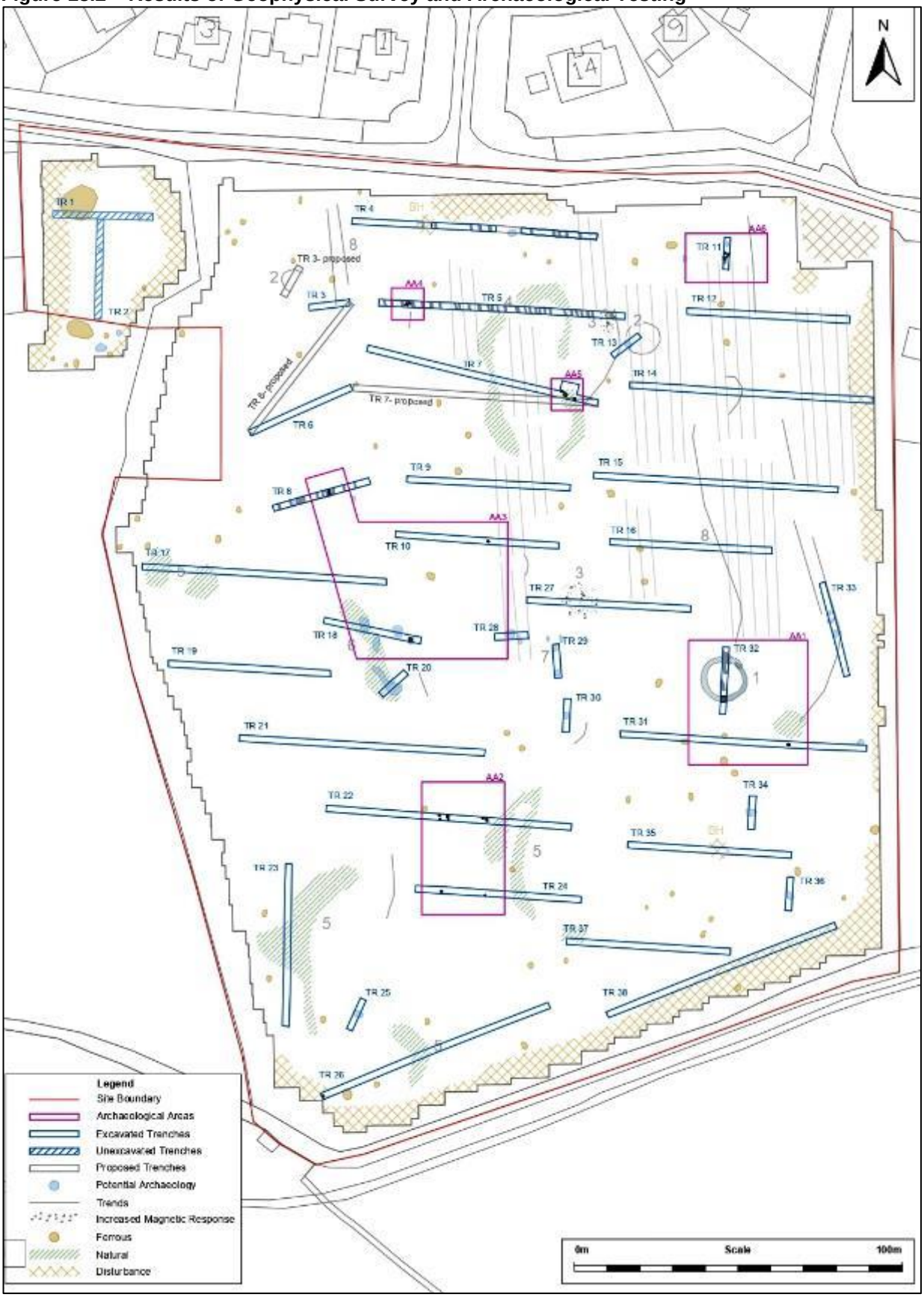


Plate 13.3 – Neolithic pottery recovered from AA6

13.3.1.4 Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970–2020) has shown that with the exception of the investigations carried out as part of this development, no archaeological excavations have taken place within the proposed development area.

The closest recorded excavation took place c. 1.35km northwest in Powerscourt Demesne. In 2018, test trenching in advance of a housing development, revealed the presence of a ring-barrow, c. 25m in diameter, with three enclosing ditches (Licence 18E0045, Bennett 2018:183). Subsequent excavation (Licence 18E0045, Ní Cheallacháin 2019) revealed a large tri-vallate ring barrow with five pits and two charcoal rich spreads. The tri-vallate ring barrow consisted of an inner circular ditch, a middle penannular ditch with a smaller opposing ditch and a large outer penannular ditch. Four non-cremated deposits of human remains and some prehistoric pottery sherds were located within the possible re-cuts and may suggest later discrete re-use of the site.

13.3.1.5 Cartographic Analysis

Sir William Petty, Down Survey, Half Barony of Rathdown, c. 1655
The proposed development area is included within the Barony of Rathdown in Wicklow County. The site of proposed development does not appear on this map in any detail as the lands were not forfeited.

John Rocque, Map of the City and County of Dublin, 1760
This map covers the county of Dublin but also includes Powerscourt House in Wicklow, due to the significance of the estate. The house and its immediate gardens are portrayed in great detail, along with the village of Enniskerry, but to a lesser degree. The Dargle River is depicted as is the road that forms the north-western boundary of the proposed development area. The lands that form the proposed development area are not depicted.

Jacob Nevill, Actual Survey of the County of Wicklow, 1760
This map includes the site of the proposed development, though scale of the map is small. Cookstown Road is visible and the Cookstown and Dargle Rivers to the north and south respectively. No structures are depicted to the south of Cookstown Road and none to the north in the vicinity of the site.

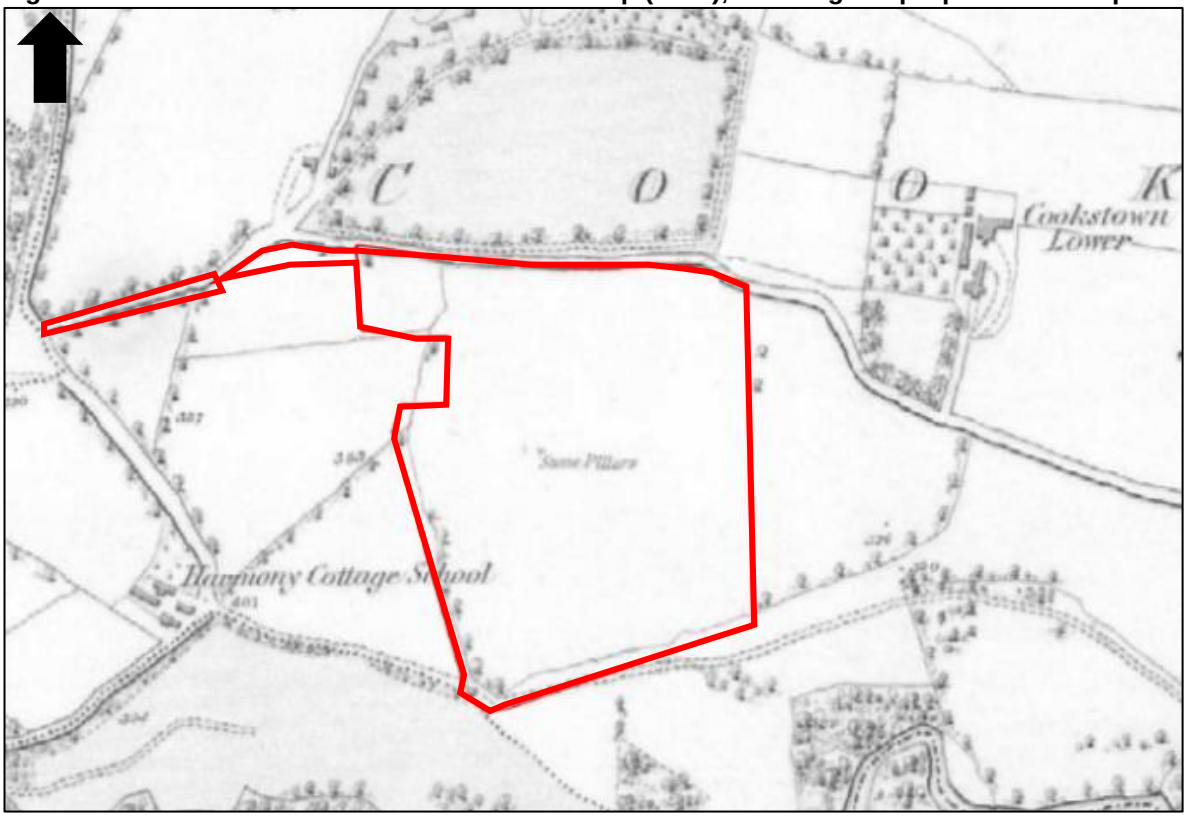
A R Neville, Actual Survey of the County of Wicklow, 1798
A R Neville's map is based on Jacob Nevill's earlier map, but updated to include new roads, buildings etc. The map shows Tinnehinch House, to the south-west of the application site, which was not on the earlier map. It also shows a greater cover of trees on the lands to the south of Cookstown Road.

John Taylor, Map of the Environs of Dublin, 1816
The proposed development is depicted on this map within an area bordered to the north by the modern Cookstown Road and to the south by a laneway. This area is mostly depicted as wooded though a small portion of it has been cleared of vegetation. A group of houses are depicted to the north of the site and annotated as Cookstown.

William Duncan's Map of the County of Dublin, 1821
The only significant change to the proposed development on this map from Taylor's is that more of the trees have been cleared away.

First Edition Ordnance Survey Map, 1838, scale 1:10,560 (Figure 13.3)
This is the first accurate historic mapping coverage of the area containing the proposed development. The proposed development site is characterized by open fields and is bounded to the west by a road. At the southwestern edge of the proposed development site and on the western side of a road is located the Harmony Cottage School, which is comprised of four buildings and an associated garden. The southern extent of the site is marked by a small laneway, a portion of which marks the boundary between Cookstown and Tinnehinch townlands. The eastern part of the proposed development site comprises a single, large field within which the words 'Stone Pillars' are marked. It is possible that this refers to scratching pillars for livestock rather than prehistoric standing stones, although this is not a definitive interpretation. The northern side of the site is defined by a road travelling east–west. Two houses and their respective gardens border this road to the north, Cookstown Upper and Summerhill.

Figure 13.3 – Extract from the first edition OS map (1838), showing the proposed development area



The proposed development area remains relatively unchanged within this mapping, except for the removal of the Stone Pillars. The laneway to the south has become a road, the Harmony Cottage School to the southwest has been removed and replaced by the demesne of Powerscourt House, and Powerscourt Rectory borders the site to the east.

13.3.1.6 County Development Plan

The Wicklow County Development Plan 2017–2023, Bray Municipal District Plan 2018-2024 and Enniskerry Town Plan (2016–2022) recognise the statutory protection afforded to archaeological sites included within the RMP. They seek to protect all sites and features of archaeological and historic interest discovered subsequent to the publication

of the RMP and seeks their preservation in-situ (or at a minimum, preservation by record) through the planning process. Wicklow County Council recognises the value and significance of the county's archaeological heritage, and the importance of fostering a greater public appreciation of this heritage.

There are no sites included within the RMP located within 200m of the proposed development area.

13.3.1.7 Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995-2013), Google Earth (2005–2018), and Bing Maps revealed no previously unrecorded archaeological sites in or within the immediate vicinity of the proposed development. Google Earth coverage dating to 2005 shows a small quarry pit in the north-western corner of the site, which was subsequently back filled in later coverage.

13.3.1.8 Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography and whether any areas or sites of archaeological potential were present. The field inspection was carried out prior to the geophysical survey and programme of archaeological testing.

The site contains two open fields divided by a north-south boundary comprising a mature hedgerow and bank. The east field of the site consists of an open field currently in use for grazing and is bound by mature vegetation. The field rises up to the east and west and slopes down to the south and north (Plate 13.4). There is a slight irregular rise in the western limit of the east field. No evidence for the remains of stone pillars, as marked within the historic mapping, was identified during the course of the survey.

The west field was under crop at the time of the inspection and is bounded by mature vegetation with gentle undulations (Plate 13.5). The townland boundary between Cookstown and Tinnehinch is still extant in the southern portion of the west field.

Plate 13.4 – East field, facing southeast

Plate 13.5 – West field, facing northwest

No specific sites or areas of archaeological potential were noted during the course of the field inspection, although it was noted that the surrounding landscape and topography lent archaeological potential to the site. This was proven during the course of the geophysical survey and programme of archaeological testing.

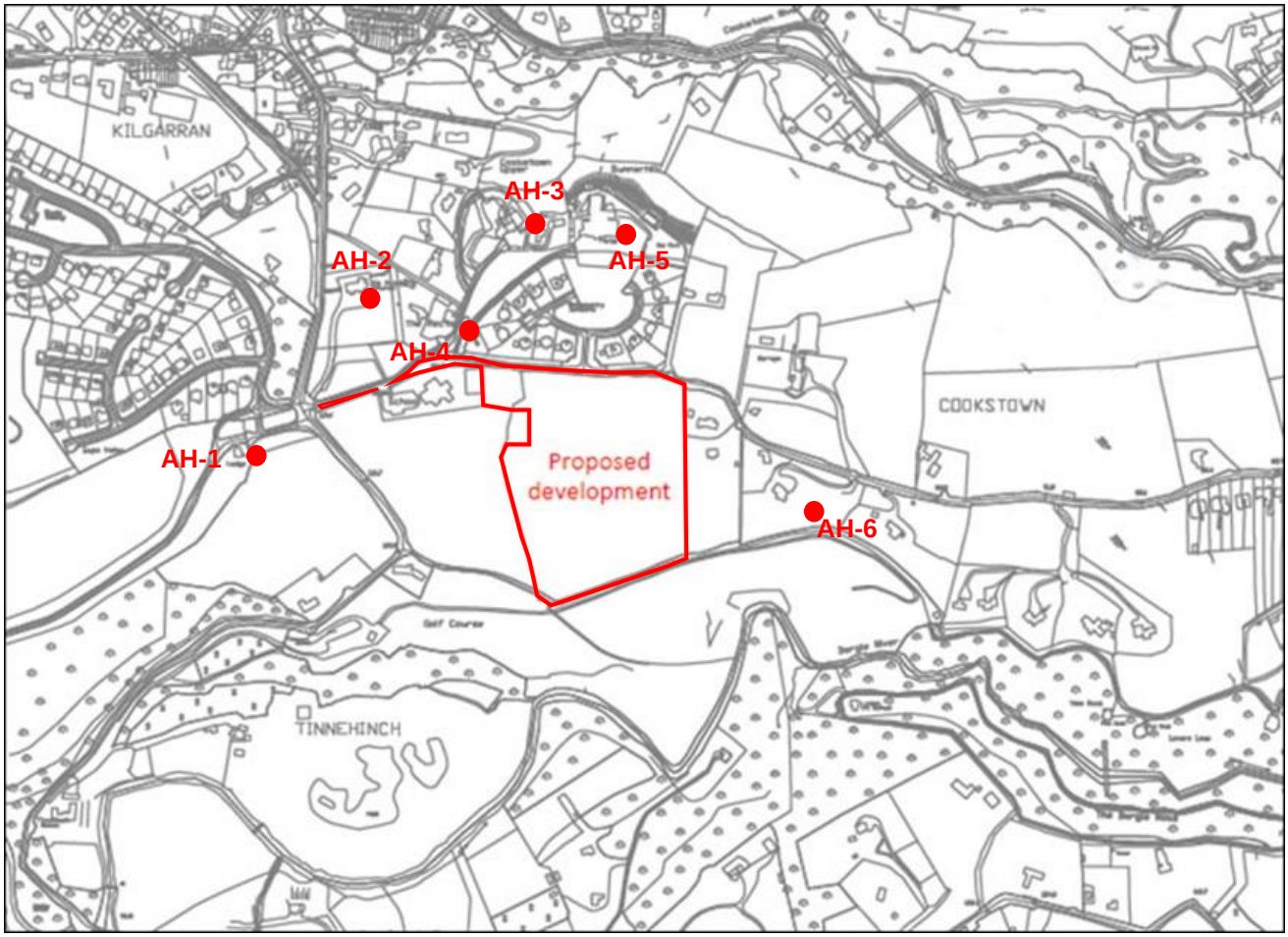
13.3.2 Results and Analysis - Architecture

13.3.2.1 Built Heritage Background

General

The built heritage of the surrounding area was identified from a number of sources including the County Development Plan, Local Area Plans, the National Inventory of Architectural Heritage survey, and a field inspection. Within this chapter sites of architectural heritage significance are referenced as AH (architectural heritage) sites.

Figure 13.4 – Location of structures of architectural heritage significance



Post-Medieval Period (AD 1600-1900)

The ending of the Williamite Wars saw the beginning of a comparative politically calm era, which allowed the country's landowners the security to experiment with the latest styles of architecture without the need to refer to defensive matters.

Palladianism dominated Irish and British architecture during the mid-18th century. County Wicklow possesses two of the finest examples of large Palladian mansions in the form of Powerscourt House (1731-40) and Russborough House (1741-48). Both structures are attributed to the German-born architect, Richard Castle (1690-1751).

An important element of an 18th or early 19th century country house was its setting. The earlier geometric landscapes favoured by continental Europe were replaced during the 18th and 19th centuries by designed parkland settings, which were intended to create a ‘natural’ backdrop for the country houses. These demesnes involved a great deal of landscaping, as earth was moved, field boundaries disappeared, streams were diverted to form lakes and quite often roads were completely diverted to avoid travelling anywhere near the main house or across the demesne. The proposed development area is located to the immediate east of the demesne landscape that was established in association with Powerscourt House.

Enniskerry Village was redeveloped by the Wingfields of Powerscourt after 1815 into an estate village. Here the more exuberant architectural styles that were characteristic of the county’s mansions were adapted for more modest structures. The village schoolhouse (1818), constabulary barracks (c.1840), inn (c.1835), alms house (c.1840), hall (c.1850), and a large proportion of dwelling houses within the settlement, exhibit mock Tudor style elements such as gables, steeply-pitched roofs, tall chimneystacks and mullioned and transom windows. Purely decorative elements such as overhanging eaves with elaborate bargeboards and finials were also used in the development of the village.

In the early years following the enlargement of the village of Enniskerry the Roman Catholic inhabitants attended mass in a chapel at Curtlestown, west of the village, while members of the Church of Ireland worshipped in a church

in the demesne of Powerscourt. In 1857, Viscount Powerscourt donated a site at Knocksink, to the north of the village, for the building of a Roman Catholic church and in the same year work commenced on the construction of a Church of Ireland church at Cookstown. The latter church opened for worship in 1863 and in 1876 a new rectory was built on land to the east of the present site.

13.3.2.2 County Development Plan – Record of Protected Structures (RPS)

Three buildings in the general vicinity of the application site are included in the record of protected structures (RPS) and are noted as such in the county development plan and the Bray Municipal District Local Area Plan 2018-2024. These structures are labelled AH-01, AH-02 and AH-03 in the list below.

AH-01: The main entrance to the demesne of Powerscourt is via a substantial stone arch that carries the gates to the demesne. This arch is a protected structure (RPS reference 03-29). It stands at a distance of more than 350m from the application site and is concealed from it by dense belts of trees. There would be no impact on the character or setting of this protected structure arising from the proposed development.

AH-02: The Church of Ireland church of St Patrick lies 270m to the northwest of the application site and is a protected structure (RPS reference 03-06). The church is surrounded by a dense belt of trees, many of which are evergreen, and this provides an effective screening such that the site is not visible from the church and vice versa. Furthermore, the steep gradient of the land opposite the church ensures that most of the application site is concealed from the church. There would be no significant impact on the character or setting of the church arising from the proposed development.

AH-03: Blundell Hill is a former hotel and is now divided into three houses. This group of houses is included in the record of protected structures under reference 03-31. The houses are set well back from Cookstown Road at a minimum distance of 180 metres from the application site. In the space between the houses and the application site there is a large and dense group of trees to the front of the houses, beyond which is a housing development, while on both sides of the road there are belts of mature trees. As a result of this distance and the screening there would be no potential impact on the character of the protected structure arising from the proposed development.

There are no Architectural Conservation Areas (ACA) within the study area of the proposed development. The closest is an ACA located in the village core of Enniskerry, c. 1km to the north of the proposed development.

13.3.2.3 National Inventory of Architectural Heritage (NIAH) – Building Survey

Three buildings in the vicinity of the application site that are not protected structures are included in the survey carried out for the National Inventory of Architectural Heritage (NIAH) and these are labelled AH-04, AH-05 and AH-06 in the assessment below.

AH-04: A small house to the east of St Patrick's Church and to the north of the application site is included in the NIAH under reference 16302053. The survey states that it was a gate lodge and is now the rectory for the church. The house is no longer used as the rectory. The house is set back from the road, from which it is barely visible. Given the further screening afforded by the trees along the roadside the proposed development will not be readily visible from the house and will not have any adverse impact on its character or setting.

AH-05: The Summerhill House Hotel occupies a former house to the north of Cookstown Road, and it is included in the NIAH under reference 16302055. The minimum separation between the house and the application site is 180m, in which space there is a dense belt of trees to the south of the house, to the south of which is a housing estate, while on either side of Cookstown Road there are belts of trees. The house is well screened from the application site and the proposed development will have no impact on its character or setting.

AH-06: The former rectory attached to St Patrick's Church stands to the east of the application site at a distance of 130m. The house is included in the NIAH under reference 16302056. The greater part of the distance between the house and the application site to the west and south-west is under dense woodland, while to the north-west there are three houses in the intervening space, each with a belt of trees around the perimeter of its grounds. As a result, the former rectory is well screened from the application site and the proposed development will have no impact on its character or setting.

13.3.2.4 National Inventory of Architectural Heritage – Garden Survey

Three demesnes or former demesnes that are included in the NIAH garden survey are located in the vicinity of the application site – Powerscourt, Tinnehinch and Summerhill. It is noted that this was a desktop survey only, based on early Ordnance Survey maps and on aerial photographs, without visiting the landscape.

Powerscourt is included in the NIAH garden survey under reference ID 4274. It a substantial demesne of great importance and, being publicly accessible, has a high profile and is of national significance. The closest part of the demesne to the application site is some 280m to the west where the demesne meets the public road. This small part of the demesne is barely visible and through its distance and the limited area within sight the proposed development would have little or no impact on the character of the demesne.

Tinnehinch: The demesne of Tinnehinch lies to the south of the application site and the south-western corner of the site almost touches the northern tip of the demesne. This demesne is included in the NIAH garden survey under reference ID 4277. This part of the demesne is now Tinnehinch Farm and appears to be separated from the main house, which is further to the southwest. The proposed development includes a landscaped area along the southern boundary which will screen the proposed development from the demesne to the south. Given the loss of original quality of this demesne and the separation of the proposed houses by a belt of landscaping it is not anticipated that there will be any significant impact on the demesne of Tinnehinch arising from the proposal.

Summerhill: The former grounds of the house that is now the Summerhill House Hotel are included in the NIAH garden survey as a demesne, with the reference ID 4280. As has been noted above, the former grounds of the house and between the house and Cookstown Road have been developed to provide a housing estate. The majority of the trees survive. Given the change in the nature of this demesne it is not anticipated that there will be any adverse impact arising from the proposed development.

13.3.2.5 Cartographic Analysis

The analysis of the various maps that have shown this area over time, from Rocque and Nevill in 1760 to the early 20th century Ordnance Survey maps have shown that the application site has been in agricultural use throughout the period and no buildings have been indicated on the maps. The maps also show the arrival of buildings and other structures or their enlargement, including Tinnehinch in the mid-18th century, Blundell Hill and Summerhill in the early-19th century and St Patrick's Church and its rectory in the mid-19th century.

13.3.2.6 Field Inspection

A field inspection was carried out on 8th January 2021 to examine the site and its vicinity and to ascertain the nature of the architectural heritage and how it relates to the application site.

The site is a field at present and rises up from Cookstown Road towards the west and south. The boundaries are marked by trees on all sides, including a dense belt of trees along the road margin and woodland beyond the eastern boundary. On the northern side of Cookstown Road there is another belt of trees beyond which is a footpath running alongside the front boundaries of the houses in Enniskerry Demesne, which is a late-20th century housing development.

There are many houses and other buildings of architectural heritage significance in this district, although the mature landscape with large numbers of trees ensures that these are not generally visible from adjacent lands. The protected structures and the other buildings that are included in the NIAH are not visible from the application site, other than the topmost section of the spire of St Patrick's Church, which is visible from parts of the site.

13.3.2.7 Conclusions

The assessment of architectural heritage in the vicinity of the application site has shown that any structure of architectural heritage significance in the vicinity of the site is well screened from any view of or from the site such that there would be no significant adverse impact on any element of architectural heritage arising from the proposed development, including Enniskerry ACA. The screening is such that no mitigation measures are required in relation to architectural heritage.

13.3.3 Results and Analysis - Cultural Heritage

13.3.3.1 Cultural Heritage Sites

It is an objective of the Wicklow Development Plan (2017-2023) to support the implementation of the Wicklow Heritage Plan in relation to the promotion and protection of Wicklow's Cultural Heritage.

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural features. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. Settlements or industrial features such as mills, millraces, kilns and bridges which are visible on historic mapping but have disappeared from the modern landscape can also be considered as sites with cultural heritage value. No specific cultural heritage sites have been identified during the course of this assessment that relate to the proposed development area, however the archaeological and architectural sites within the study area identified within this assessment can be considered as cultural heritage.

13.3.3.2 Placename Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830s and 1840s, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main references used for the place name analysis are Irish Local Names Explained by P.W Joyce (1870) and The Place-Names of County Wicklow, volume V, by Liam Price (1957). A description and possible explanation of each townland name in the environs of the proposed route are provided in the below table (Table 13.3).

Table 13.1 – Placenames within the study area

Name	Derivation	Possible Meaning
Cookstown	*Cokestowne (1482), Cokiston (1541-2), Cookestown (1611)*	Town of the Cooks (a family name)
Fassaroe	*An Fásach Rua*	The red waste land
Kilgarran	*Coill Gharráin*	Garran's Wood
Knocksink	*Cnoc Sinche*	'Cnoc' is a hill, the meaning of 'Sinche' is uncertain
Monastery	*Mainistir*	A monastery
Newtown	*Newtown*	A new town (usually meaning a newly built settlement, likely dating to after the 13th century)
Powerscourt	*Powers Court (previously Thehugonaill, Stagonil, possibly Teach Uí gConaill)*	Power is a family name, the previous name appears to be the House of the Uí Conaill.
Tinnehinch	*Tigh na hInse*	The house of the island

13.3.3.3 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word '*town*' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton 1999, 174).

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid*. 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully *'laid downe'* on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid*.). Larger tracts of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as

Beg and More (small and large) and north, east, south and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

Although not usually recorded as archaeological monuments in their own right, townland boundaries are important as cultural heritage features as they have indicated the extents of the smallest land division unit in the country—the townland—which have been mapped since the 19th century. It remains unclear how old these land units actually are, though it has been convincingly argued that they date to at least the medieval period and may be significantly older than this (McErlean 1983; MacCotter 2008).

The proposed development area is located within the townland of Cookstown. The townland boundary between Cookstown forms the south-western limit of the south site with the adjoining townland of Tinnehinch for 10-20 m. This boundary appears as a field boundary and a laneway on various maps with the townland boundary on the southern side of the laneway just beyond the limits of the proposed development. The townland boundary is likely to represent a land division of considerable antiquity.

13.3.4 Conclusions

The proposed development area is located within the townland of Cookstown within the parish of Powerscourt and half barony of Rathdown. The site is located within lands that are zoned for residential development within the Bray Municipal District Local Area Plan 2018-2024. There are no recorded monuments located within 200m of the proposed development area.

There are six recorded built heritage located within the wider landscape surrounding the proposed development and the site is not situated within an Architectural Conservation Area. The nearest structure listed on the Record of Protected Structures for Wicklow is a former hotel now occupied as three houses and which is some 180m from the nearest point of the site. St Patrick's Church and the gateway to Powerscourt have also been considered in this assessment in view of their importance, though they are at distances of 350m and 270m respectively. Three houses in the vicinity of the site that are not protected structures are included in the NIAH survey and the potential impact on these houses has been assessed. In all of these cases the structures are well screened by trees, and in some cases by topography, such that there will be no adverse impact on their character or setting arising from the proposed development.

Three demesnes or former demesnes have also been assessed to determine whether the proposed development would have any impact on their character and it has been concluded that there would be no adverse impact.

In 2019 geophysical survey was carried out across the proposed development area under licence 19R0234. The possible remains of a sub-circular enclosure were identified, which most likely represent a ditched feature such as a barrow measuring c. 14.5m in diameter. Areas of magnetic disturbance were also identified, possibly representing spreads of burnt material. Several faint curvilinear and linear trends were identified as likely to be of archaeological interest.

Subsequent archaeological testing (under license 20E0027) identified six areas of archaeological potential across the eastern field of the proposed development area, which appear to be prehistoric in date (AA1-6). The pottery recovered from AA6 dates to the Neolithic period while the material contained within some of the pits in AA2–5 is representative of burnt mound activity, which generally dates to the Bronze Age although Neolithic burnt mound sites have also been recorded. The circular enclosure in AA1 may represent a ring-barrow, which generally date to the Bronze Age but may also be Iron Age in date.

An inspection of the cartographic sources revealed that the proposed development area occupied a rural landscape throughout the post-medieval period. Analysis of the aerial photographic coverage of the site failed to identify any previously unrecorded sites. A field inspection has been carried out as part of this assessment. No previously unrecorded areas of archaeological potential were noted during the course of the inspection.

The archaeological and architectural features discussed above also constitute as cultural heritage features. The townland boundary between Cookstown and Tinnehinch forms a short section of the south-western limit of the site and has been extant since Rocque's map of 1760. There are no other cultural heritage sites within the study area.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development (Figure 13.5) will consist of the construction of 165 no. dwellings and associated ancillary infrastructure as follows:

A) 105 no. 2 storey houses (49 no. 3 bedroom houses [House Types B, B1, & B2], 56 no. 4 bedroom houses [House Types A, D, E & E1];
B) 56 no. apartments/duplex apartments in 6 no. 3 storey buildings – (28 no. 2 bedroom apartments and 28 no. 3 bedroom duplex apartments) all with terrace;
C) 4 no. 1 bedroom Maisonette dwellings in a 2 storey building;
D) Part 2-storey and single storey creche (c. 510 sq. m - including storage);
E) Open space along southern boundary of c. 0.93 hectares [with pedestrian connections to boundary to 'Lover's Leap Lane' to the south and to boundary to the east and west], hard and soft landscaping (including public lighting) and open space (including boundary treatment), communal open space for duplex apartments; regrading/re-profiling of site where required [including import/export of soil as required] along with single storey bicycle/bin stores and ESB substation;
F) Vehicular access (including construction access) from the Cookstown Road from a new junction as well as 313 no. car parking spaces and 150 bicycle spaces;
G) Surface water attenuation measures and underground attenuation systems as well as connection to water supply, drainage and provision of underground local pumping station to Irish Water specifications;
H) 3 no. temporary (for 3 years) marketing signage structures [2 no. at the proposed entrance and 1 no. at the junction of the R760 and the Cookstown Road] and a single storey marketing suite (c. 81 sq.m) within site;
I) All ancillary site development/construction/landscaping works along with footpath/public lighting to Powerscourt National School pedestrian entrance and lighting from Powerscourt National School entrance to the junction of the R760 along southern side of Cookstown Road.

Figure 13.5 – Plan of proposed development

13.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

13.5.1 Construction Phase

13.5.1.1 Archaeology

Prior to the application of mitigation, ground disturbances associated with the proposed construction of 165 no. dwellings (and associated site works) will have a direct, very significant negative impact on the six archaeological areas that have been identified. Whilst it is acknowledged that preservation in-situ is the best practise method of conserving the archaeological resource, the design and density requirements for the housing means that the areas of archaeological significance cannot be avoided.

A detailed response from the planners for the project (John Spain and Associates) regarding reasons why the archaeological remains cannot be preserved in-situ is included in Appendix B Appendix 13.1.

Prior to the application of mitigation there may be direct, negative significant impact on isolated and/or small scale unrecorded archaeological feature or deposits that have the potential to survive beneath the current ground level and outside of the footprint of the excavated trenches. This will be caused by ground disturbances associated with the proposed development.

13.5.1.2 Architecture

All of the structures and demesnes of architectural heritage significance that have been identified in the vicinity of the proposed development area are set back away from the site and as a result no potential negative impacts upon the architectural resource are predicted as a result of the construction of the proposed development.

13.5.1.3 Cultural Heritage

No potential negative impacts upon the cultural heritage resource (with the exception of those detailed above) are predicted as a result of the construction of the proposed development.

13.5.2 Operational Phase

13.5.2.1 Archaeology

No potential negative impacts upon the archaeological resource are predicted as a result of the operation of the proposed development.

13.5.2.2 Architecture

All of the structures and demesnes of architectural heritage significance that have been identified in the vicinity of the proposed development area are set back away from the site and as a result no potential negative impacts upon the architectural resource are predicted as a result of the operation of the proposed development.

13.5.2.3 Cultural Heritage

No potential negative impacts upon the cultural heritage resource are predicted as a result of the operation of the proposed development.

13.6 'DO-NOTHING' IMPACT

If the proposed development were not to proceed there would be no negative impact on the archaeological, architectural, or cultural heritage resource of the subject lands or cumulatively with other development.

13.7 AVOIDANCE, REMEDIAL, AND MITIGATION MEASURES

13.7.1 Construction Phase

13.7.1.1 Archaeology

As it is not possible to achieve the preservation in-situ of Archaeological Areas 1–6 within the proposed development, AA1–6 will be preserved by record (archaeological excavation) prior to any construction going ahead. This will be carried out under the direction of a licenced archaeological director along with an appropriate team of archaeologists. Full provision will be made available for the full excavation and analysis of the site, both during the course of the fieldwork and the post-excavation process. The work will be carried out under licence and in full consultation with the National Monuments Service of the DoHLGH and the National Museum of Ireland.

All ground disturbances associated with the proposed development will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.

13.7.1.2 Architectural

As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary.

13.7.1.3 Cultural Heritage

As there are no predicted impacts on the cultural heritage resource, no mitigation is deemed necessary.

13.7.2 Operational Phase

13.7.2.1 Archaeology

As there are no predicted impacts on the archaeological resource, no mitigation is deemed necessary.

13.7.2.2 Architectural

As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary.

13.7.2.3 Cultural Heritage

As there are no predicted impacts on the cultural heritage resource, no mitigation is deemed necessary.

13.7.3 *'Worst-Case'* Scenario

Under a worst-case scenario, the proposed development would disturb previously unrecorded and unidentified archaeological deposits and artefacts without proper excavation and recording being undertaken.

13.8 PREDICTED IMPACT OF THE PROPOSAL

13.8.1 Construction Phase

13.8.1.1 Archaeology

Following implementation of mitigation measures, no impacts are predicted upon the archaeological resource.

13.8.1.2 Architecture

No impacts are predicted upon the architectural resource.

13.8.1.3 Cultural Heritage

Following implementation of mitigation measures, there are no impacts predicted upon the cultural heritage resource as a result of the construction of the proposed development.

13.8.2 Operational Phase

There are no impacts predicted upon the archaeological, architectural or cultural heritage resource as a result of the operation of the proposed development.

Should the mitigation measures, recommended above, be carried out fully and successfully there will be no predicted residual impact to the archaeological, architectural, and cultural heritage resource by the proposed development.

13.9 MONITORING

The mitigation measures recommended above would also function as a monitoring system, allowing the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

13.10 REINSTATEMENT

Reinstatement will not be required.

13.11 POTENTIAL CUMULATIVE IMPACTS

No cumulative impacts are predicted upon the archaeological, architectural, or cultural heritage resource as all archaeological remains will be preserved by record.

There will be no cumulative impacts on the archaeological, architectural and cultural heritage resource as a result of the development going ahead.

13.12 INTERACTIONS

No interactions with other disciplines have been identified during the compilation of this assessment.

13.13 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the compilation of this chapter.

14.0 RISK MANAGEMEMT

14.1 INTRODUCTION

This chapter has been prepared by John Considine, BE, MIStructE, MIEI, CEng, FConsEIM, Chartered Engineer for Barrett Mahony Consulting Engineers.

The 2014 EIA Directive (2014/52/EU) has updated the list of topics to be addressed in an EIAR and has included *'Risk Management'* as a new chapter to be addressed. Article 3 of the new EIA Directive requires that the EIA shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage, and landscape deriving from (amongst other things) the *"vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

The Planning and Development Regulations 2001, as amended, Schedule 6 paragraph 2(h) indicate that it may be appropriate to furnish additional information in relation to the following:

"*(h) a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment 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, emergencies arising from such events*."

The chapter identifies and assesses the likelihood and potential significant adverse impacts on the environment arising from the vulnerability of the proposed development to risks of major accidents and / or natural disasters. It considers whether the proposed development is likely to cause accidents and / or disasters and its vulnerability to them.

The purpose of the chapter is to ensure that the safety and precautionary measures necessary to protect the proposed development in the event of a major accident and / or natural disaster are identified and that appropriate mitigation measures are provided that would protect the environment in the event of such occurrences.

This chapter will identify the types of major accidents / natural disasters that the project is vulnerable to; whether major accidents or natural disasters and the responses to these give rise to significant adverse environmental impacts; the nature of these impacts and the measures needed to prevent or mitigate the likely adverse impact of such events on the environment.

14.2 STUDY METHODOLOGY

The starting point for the scope and methodology of this assessment is that the proposed development has been designed and will be constructed in line with best practice and, as such, major accidents and / or natural disasters will be very unlikely. The identification, control, and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle. For example, a Flood Risk Assessment was carried out by Barrett Mahony Consulting Engineering (BMCE) and accompanies the planning application under separate cover. Measures to control risks associated with the Construction Phase activities are incorporated into the Construction & Environmental Management Plan.

The following sections set out the requirements as stated in the new EIA Directive and in the EPA draft Guidelines on the information to be contained in an Environmental Impact Assessment Report (EIAR). The scope and methodology presented is based on the EIA Directive, on the draft EPA *Guidelines on the Information to be contained in Environmental Impact Assessments Reports*, the European Commission Guidance on the preparation of the Environmental Impact Assessment Report (2017) and on other published risk assessment and on professional judgement of the consultants with this responsibility in the construction and operation of the proposed development. A risk analysis-based approach methodology which covers the identification, likelihood, and consequence of major accidents and / or natural disasters has been used for the assessment. This type of risk assessment approach is an accepted methodology.

Recital 15 of the EIA Directive states that:

"*In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU*."

The intent of the directive is that a major accident and/or natural disaster assessment should be mainly applied to COMAH (Control of Major Accident Hazards involving Dangerous Substances) sites or nuclear installations. The proposed development in this instance is a residential development on a greenfield site which when completed, will not give rise to ongoing significant risks in its operating environment.

The 2017 EPA Draft Guidelines on the information to be contained in an EIAR refer to major accidents and/or disasters in a number of sections:

Characteristics of the Project – the draft guidelines state that the project characteristics should *"a description of the Risk of Accidents – having regard to substances or technologies used*."

Impact assessment - the draft guidelines state that the impact assessment should include "*the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*".

Likelihood of Impacts - the draft guidelines state the following:

"*To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and / or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk). This may be supported by general risk assessment methods or by systematic risk assessments required under other regulations e.g. a COMAH assessment*."

There are also several mechanisms which currently manage accidents outside of the EIA process. These would include the Construction & Environmental Management Plan, which would deal with pollution risks during construction (See Chapters 5, 6 and 7 on Land & Soils, Water and Air & Climate) and risk of accidents during construction, including traffic accidents. The risk of flooding is dealt with in Chapter 6; Water. There is no risk of flooding within the site. Separately, the risk of fire is managed through the Fire Safety Certification process, which is an integral part of the design of the proposed development.

14.2.1 Site Specific Risk Assessment Methodology

This section identifies the potential of unplanned, possible events that could occur during construction and operation of the proposed development.

Risks are set out according to the classification of risk, taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010), as follows:

Table 14.1 – Risk Classification

Table 2 - Classification of Likelihood

Ranking	Classification	Likelihood
1	Extremely Unlikely	May occur only in exceptional circumstances; Once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur; May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

14.2.2 Hazard identification

The site is not in an area prone to natural disasters. Risks were reviewed through the identification of plausible risks in consultation with relevant specialists. Therefore, the risks set out below are considered the most relevant potential risks, with the likelihood identified from extremely unlikely (1) to very likely (5).

A risk matrix can be prepared against which the proposed development can be tested.

Table 14.2 – Risk Matrix

Likelihood Rating							
	Very Likely	5					
	Likely	4					
	Unlikely	3					
	Very Unlikely	2					
	Extremely Unlikely	1					
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

Table 14.3 – Risk Likelihood

Category	Risk Factor Type	Likelihood
Weather	Storms, snow	3
Hydrological	Risk from flooding	1
Excavation work	Collapse	2
Road	Traffic accident	2
Industrial accident	General housebuilding construction	1
Explosion	General Construction materials no explosive products used.	1
Fire	Hot works close to timber frame structures.	3
Building Collapse	Structural failure during construction. There are no existing buildings and no demolition works.	1
Hazardous substance escape	General housebuilding construction products.	2
Pollution	Construction	3

The risks are then tested in terms of consequences. It should be noted that when categorising the Consequence Rating, the rating assigned assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster. In addition, Wicklow County Council have in place a *'Major Emergency Plan'* released in February 2017, which, if implemented as intended, will work to reduce the effect of any major accident or disaster.

The impact ratings are taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010).

14.3 RECEIVING ENVIRONMENT

The surrounding land usage consists of a mix of residential and agricultural. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

Article 3 of the Environmental Impact Assessment (EIA) Directive 2014/52/EU requires the assessment of expected effects of major accidents and/or disasters within an EIA. Article 3(2) of the Directive states that *"The effects referred to in paragraph 1 on the factors set out there in shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

14.4 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

14.4.1 Health & Safety/ Risks of Major Accidents and/or Disasters

14.4.1.1 Construction Phase

It is considered that the main risks associated with the proposed development will arise during the construction phase.

The construction phase of the proposed development may give rise to short-term impacts associated with construction traffic, migration of surface contaminants, dust, noise, and littering. Secondary impacts may include resulting increased traffic arising from hauling building materials to and from the proposed development site which are likely to affect population and human health distant from the proposed development site, including adjacent to aggregate sources and landfill sites. Potential spillage (diesel and petrol) has the potential to occur. Potential impacts may also result from the works on the public road and laying of underground pipes.

Construction impacts are likely to be short term and are dealt with separately in the relevant chapters of this EIAR document and will be subject to control through the Construction & Environmental Management Plan. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts. The development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact on the construction phase will be reduced.

14.4.2 Operational Phase

The proposed development is a residential development of consisting of 165no. dwellings, comprised of 105no. houses, 56no. duplex apartments and 4no. maisonette dwellings.

The main risk identified during operation is the risk of fire. It should be noted that the proposed uses are considered normal hazard fire risks as would be encountered in most residential dev7elopments and do not include any hazards which would be regarded as presenting an exceptional environmental fire hazard.

The fire risk mitigation for the project will comprise all fire safety measures necessary to comply with the requirements of Part B (Fire) of the Second Schedule to the Building Regulations 1997-2017. It is noted that these measures will be validated under the Building Control Act 1990-2007 through the obtaining, in due course, of statutory Fire Safety Certificates under Part III of the Building Control Regulations 1997-2018 from Wicklow County Council.

The measures will include inter alia:

- Provision of fire-rated walls and floors to restrict the spread of fire within and between buildings in accordance with relevant design guidance. These measures will serve to control/limit the size of conflagrations.
- Provision of early warning fire detection systems to ensure the earliest possible intervention in the event of fire occurrence.
- Use of materials which do not support fire spread with reference, inter alia, to internal wall and ceiling linings and external wall cladding.
- Facilities to assist the fire service including fire tender access proximate to all units, dry rising mains, and external fire hydrants.
- Public lighting has been designed and incorporated as part of the scheme to ensure areas are well light for public use minimising risks to pedestrians and road users. A road safety and quality audit has also been undertaken to ensure potential risks to pedestrians and road users are designed out.

14.4.3 'Do Nothing' Scenario

In the do-nothing scenario, the potential risk of the proposed development causing, or being affected by a disaster and / or accident would be low, given that the site is currently an undeveloped greenfield site.

14.5 MITIGATION MEASURES

The Construction & Environmental Management Plan and the Health and Safety Plan, in addition to good housekeeping practices, will limit the risk of accidents during construction. Fire safety will be dealt with under the Fire Safety Code at design and construction stage.

The proposed development will involve the ground works to facilitate the proposed development. A site investigation has been carried out and has not identified any hazardous material. Further testing will be carried out prior to construction to inform the detailed design. In the event that any hazardous material is identified the appropriate measures will be taken in accordance with the requirements of the EPA. The excavation and movement of soil from the site will be undertaken by a registered specialist contractor and removed to a licensed facility.

The following steps will be implemented:

- Hazardous materials used during construction will be appropriately stored so as not to give rise to a risk of pollution.

- In the event of storms or snow, construction activity can be halted and the site secured. The construction activity will involve several potential risks including fire.

- During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant, or adverse effects to the existing public road network. Apart from the works on the public road, most of the works are away from the public road in a controlled environment. The objective of the Construction & Environmental Plan is to minimise the short-term disruption to local residents and reduce the potential for accidents.

- Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

- With reference to natural disasters (e.g., flooding), the proposed development has undergone a Site-Specific Flood Risk Assessment, prepared by Barrett Mahony Consulting Engineers. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater flooding. Local knowledge suggests that pluvial flooding may impact the lowest points of the site along the northern boundary with the Cookstown Road. This localised flooding has occurred in the past and is minor. Drainage measures have been included in the design to eliminate this flooding.

- A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

- Safety on site will be of paramount importance. Only contractors with the highest safety standards will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

- Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

- Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

- All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

- Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

Table 14.4 – Strategy for Tackling Potential Risks

1. BASIC RISK INFORMATION			2.RISK ASSESSMENT INFORMATION		3. RISK RESPONSE INFORMATION
Risk Number	Risk Description / Risk Event Statement	Responsible	Impact H / M / L	Probability H / M / L	Actions
Provide a unique identifier for risk	A risk event statement states (i) what might happen in the future and (ii) its possible impact on the project.	Name or title of team member responsible for risk	Enter H (High); M (Medium); or L (Low) according to impact definitions	Enter H (High), M (Medium) or L (Low) according to probability definitions	List, by date, all actions taken to respond to the risk. This does not include assessing the risk
C01	Logistics (i) Construction Traffic Accident (ii) Potential loss of life, traffic congestion for local residents,	Project Supervisor Construction Stage	M	M	PSCS to develop Traffic Management Plan. All material is within the site boundary. All parking is within the site boundary to limit any interaction with local areas or estates. This will avoid back up of traffic on approach, consideration of allocation of holding area. The road access to the site is mainly off secondary roads and as such a booking system should be considered whereby contractor deliveries and collections can be managed to avoid traffic delays. The PSCS to provide an internal traffic management plan. The plan to include segregation of vehicles from staff and visitors that will be present on the site.
C02	Scaffolding (i) Construction Accident (ii) Potential loss of life	PSCS	H	M	Working at height required throughout the project. Installation of scaffolding for all working at height activities to be subject to a full temporary works design submission. In order to fully Co-Ordinate any temporary works submission the Project Supervisor for the Design Process must receive the following items before reviewing any submission; A full design submission, Calculations for the design, Design Risk Assessment, Copy of designer's PI insurances, Designers CV. This submission can then be reviewed by the Permanent Works Engineer to ensure the

1. BASIC RISK INFORMATION			2.RISK ASSESSMENT INFORMATION		3. RISK RESPONSE INFORMATION
					design will not impact on the permanent structure.
C03	Fire (i) Fire During Construction (ii) Potential loss of life, loss of material	PSCS/ PSDP / Fire SC.	H	M	Fire strategy must be put in place in advance of start on site which must take into consideration the requirement for hot works and the provision of Hot Works Permit systems to manage Hot works when needed. A fire marshal will be required - full co-operation from site supervisors and contractors will be required.
C04	Lifting Operations (i) Collapse of crane (ii) Potential loss of life	PSCS / PSDP	H	M	Lifting operations using cranes will be a requirement during the project. The PSDP must identify this as a risk factor ensuring the ground conditions are tested and appropriate to point loading from mobile cranes. The PSCS must ensure there is a fully risk assessed lift plan to manage all lifting operations on site.
C05	Existing Utilities (i) Striking of utilities during construction (ii) Potential loss of life	PSCS / PSDP	H	M	The PSDP must highlight the existence of live overhead ESB cables on site. The sequence of work to be planned to avoid working in close proximity to the lines. The PSCS to arrange for the relocation of the lines prior to working around them. The PSCS must follow the ESB code of practice and provide a risk assessed RAMS document to manage this hazard.

14.6 PREDICTED IMPACTS - RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

A Risk Register has been developed which contains the main risks identified with the construction and operation of the Proposed Project. These have been identified as follows:

Table 14.5 – Risk Register

Risk No.	Risk Event	Possible Cause
1	Accidents during construction	Traffic accident Interaction with moving plant. Working at height /scaffolding Risk of fire Groundwater pollution Noise Dust
2	Fire during Construction	Work with timber frame construction. Hot works requirements for gas installation, balconies and roof work.
3	Lifting Operations	High winds Poor ground conditions Untrained personnel. Failures in lifting gear.
4	Fire following occupation	Inappropriate use of electrical devices / cooking etc.
5	Falls	Window cleaning

14.6.1 Risk Analysis

Following identification of risks, the next stage is to analyse how likely this is to occur and the consequences, should the risk arise. This will provide a risk score, i.e., the consequences versus the likelihood of the event taking place.

Table 14.6 – Risk Analysis

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score
1a	Accidents during construction	Movement of vehicles	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1b		Manual handling	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1c		Slips or falls	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1d		Ground water pollution	Impact on aquatic life, illness	1	Lack of direct pathways, controls of run-off during construction	3	Could result in environmental pollution	3
2a	Fire during Construction	Hot Works	Fire Loss of life	3	Type of construction	3	Fire could result in loss of life	3
3a	Lifting Operations	Poor planning	Loss of life	3	Construction Statistics.	3	Poor planning could result in failure of lifting gear or cranes.	9

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score
4	Fire following occupation	Electrical equipment / cooking	Injury or loss of life	1	Causes of fire statistics	3	Could result in loss of life	3
5	Falls	Loss of balance	Injury or loss of life	1	CSO statistics	3	Could result in loss of life	3

14.6.2 Risk Evaluation

Taking the above table, and applying it below, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.'

Table 14.7 – Risk Evaluation

Likelihood Rating							
	Very Likely	5					
	Likely	4					
	Unlikely	3			1a – 9, 1b – 9 1c – 9, 1d – 3 4 – 3, 5 - 3		
	Very Unlikely	2					
	Extremely Unlikely	1				2a - 3	
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

14.6.3 Main risks

The main risks arise during the construction period. Consequences may be limited but severe for the individuals concerned. Geographical widespread environmental consequences are not anticipated.

14.7 RESIDUAL IMPACTS

As illustrated in Table 13.8 the risks identified are unlikely or highly unlikely. Through the implementation of mitigation measures, there are no identified incidents or examples of major accidents and or natural disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects.

14.8 CUMULATIVE IMPACTS

The proposed development, in tandem with other potential residential developments in the Enniskerry area will create risks associated with cumulative impacts in relation to the areas covered in this EIAR i.e., Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport, Landscape and Visual, and Cultural Heritage. However, subject to the implementation of mitigation measures, following good working practices and following recommended codes of practice, as set out in the other EIAR chapters, the risks from the development on the subject site will be small as outlined in this chapter and the addition to the cumulative risks of development in the Enniskerry area is consequently also small.

15.0 INTERACTIONS OF THE FORGOING AND CUMULATIVE IMPACTS

15.1 INTRODUCTION

The purpose of this chapter of the EIAR is to draw attention to significant interaction and interdependencies in the existing environment. In preparing the EIAR each of the specialist consultants have and will continue to liaise with each other and will consider the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject site and this ensures that mitigation measures are incorporated into the design process.

This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000 and Part 10, and schedules 5, 6 and 7 of the Planning and Development Regulations 2001 as amended.

All environmental factors are interlinked to a degree such that interrelationships exist on numerous levels. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions which can be influenced by the proposed development. As this EIAR document has been prepared by a number of specialist consultants an important aspect of the EIA process is to ensure that interactions between the various disciplines have been taken into consideration. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

Having regard to the above, this chapter sets out the anticipated interaction for the interactions and environmental topics which are considered to potentially be of a significant nature. This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000, as amended, and Part 10, and Schedules 5, 6 and 7 of the Planning and Development Regulations 2001-2018.

Having regard to the approach taken, the aspects of the environment likely to be significantly affected by the proposed development, during both the construction and operational phases, have been considered in detail in the relevant Chapters of this EIAR document.

The relevant consultants liaised with each other and the project architects, engineers and landscape architects where necessary to review the proposed scheme and incorporate suitable mitigation measures where necessary. As demonstrated throughout this EIAR, most inter-relationships are neutral in impact when the mitigation measures proposed are incorporated into the design, construction or operation of the proposed development.

Table 15.1 – Matrix of interactions between the environmental factors

Interaction	Population & Human Health	Biodiversity	Land and Soils	Water	Air Quality/Climate	Noise/Vibration	Landscape and Visual	MA-Traffic	MA-Waste/Utilities	Cultural Heritage	Risk Mgmt
Population & Human Health		✗	✗	✗	✓	✓	✓	✗	✓	✗	✗
Biodiversity	✗		✓	✓	✗	✗	✗	✗	✓	✗	✗
Land and Soils	✗	✓		✓	✓	✗	✗	✗	✗	✓	✗
Water	✗	✗	✓		✗	✗	✗	✗	✓	✗	✗
Air Quality/Climate	✓	✓	✗	✓		✗	✗	✓	✗	✗	✗
Noise/Vibration	✓	✓	✗	✗	✗		✗	✗	✗	✗	✗
Landscape and Visual	✓	✓	✗	✗	✗	✓		✗	✗	✗	✗
MA-Traffic	✓	✗	✓	✗	✓	✓	✗		✗	✗	✗
MA-Waste/Utilities	✓	✓	✓	✓	✓	✓	✗	✓		✗	✗
Cultural Heritage	✗	✗	✗	✗	✗	✗	✗	✗	✗		✗
Risk Mgmt	✓	✗	✓	✓	✓	✓	✗	✓	✗	✗	

15.2 INTERACTIONS

The following provides the interactions anticipated from the proposed development:

15.2.1 Population and Human Health

The potential significant impacts on population and human health arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.1.1 Population and Human Health - Air Quality/Climate

The completed development will generate additional emissions to the atmosphere due to associated with the development, and due to plant equipment within the development. However, air quality in the region of the site is expected to be within the limits set by the air quality standard.

During construction there may be potential for slight dust nuisance in the immediate vicinity of the site. However, dust control measures, as set out in the *Dust Control Management Programme* which include a range of measures such as wheel washes and covering of fine materials will minimise the impact on air quality.

The effect of construction on air quality will not be significant following the implementation of the proposed mitigation measures. It is proposed to adhere to good working practices and dust mitigation measures to ensure that the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. There is no significant impact from dust once the development is completed. Overall, it is envisaged that the proposed development will not have a significant impact on air quality. This is dealt with in Chapter 7.

15.2.1.2 Population and Human Health - Noise/Vibration

The greatest potential for noise and vibration impact arising from the proposed development will be in the construction phase. However, following the implementation of the proposed mitigation measures in relation to noise, the impact associated with the construction phase of the proposed development is predicted to be moderate, transient and temporary. No significant impacts on the local noise and vibration climate are predicted during the operational phase of the proposed development. This is dealt with in Chapter 8.

15.2.1.3 Population and Human Health - Landscape and visual

The proposal has the potential to impact on the landscape and visual environment perceived by Human Beings. The view from the Cookstown Road will change reflective of the designation of the lands for development in the LAP, however the protected view of the Great Sugarloaf from the Cookstown Road will be retained. The high-quality landscape proposals including the retention of a significant element of the existing trees will mitigate the perceived impacts. This is dealt with in Chapter 9.

15.2.1.4 Population and Human Health - Material Assets – Utilities

The operational stage increased population will create greater demand on built services, placing greater demand on water requirements and the public sewer. Irish Water have confirmed capacity. This is dealt with in Chapter 12.

15.2.2 Biodiversity

The potential significant impacts on biodiversity arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation, there are expected to be no residual negative effects to biodiversity which can be considered to be significant.

15.2.2.1 Biodiversity – Land and Soils

Excavation and soil works (site clearance and re-profiling) during the construction phase has the potential to cause impacts on the biodiversity of the site. Mitigation has been incorporated to reduce impacts. This is dealt with in Chapter 4.

15.2.2.2 Biodiversity – Water & Hydrology

Any negative impact on water quality arising from accidental spillages etc. may impact biodiversity. Mitigation has been incorporated to reduce impacts. This is dealt with in Chapter 4. No residual, negative effects are predicted during the operational phase.

15.2.2.3 Biodiversity – Utilities

In the absence of mitigation the proposed development is considered to have an overall potential moderate negative impact on local bat populations, primarily due to the public lighting scheme and removal of trees and linear habitats on bat species such as brown long-eared bats. Extensive lighting plans have been incorporated to reduce the potential impact of public lighting of the proposed development on local bat populations.

The implementation of the mitigation measures results in a potential residual impact of the proposed development (other than the public lighting along Cookstown Road) on local bat populations will be reduced to Minor-Moderate in relation to lighting sensitive bat species and Minor-Moderate, overall, for all other bat species.

15.2.3 Land and Soils

15.2.3.1 Land and Soils – Biodiversity

Excavation and soil works (i.e. through site clearance, re-profiling etc.) during the demolition and construction stage have the potential to cause impact on the biodiversity of the site, for example through disturbance of the available habitats, dust and noise. Mitigation has been incorporated to reduce impacts. This is dealt with in Chapter 5.

15.2.3.2 Land and Soils – Water

There are interactions between land and soils and water, with changes in depth and type of overburden impacting the protection provided to aquifers. The likely impact will be neutral, permanent and slight. This is dealt with in chapters 5 and 6.

There are interactions between land and soils and water, with some surface water conveyed and stored in SuDS features such as soakaways and discharging to the ground where possible, replicating the existing greenfield site drainage as closely as possible. The likely impact will be permanent, slight and neutral.

The potential significant impacts on land and soils arising from these interactions in the construction and operational phases have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.3.3 Land and Soils – Air Quality

Excavation works and exposure of soil during the construction phase can influence the microclimate in an area. The construction phase may result in the spread of dust onto surrounding land uses and public roads. The air quality assessment indicates that there is no significant impact associated with these matters. The implementation of the dust management and dust control measures will ensure that the proposed development will not give rise to the generation of any significant quantities of dust. This is dealt with in Chapter 7.

The potential significant impacts on land and soils arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.3.4 Land and Soils – Material Assets

There are interactions between lands and soils and material assets, with the construction of drainage and utilities impacting the soil and subsoil as these materials will be removed to facilitate construction. The likely impact will be permanent slight, permanent and negative.

There are interactions between lands and soils and material assets, with the delivery of stone fill under buildings and roads and footpaths resulting in additional construction vehicles on roads adjacent to the site. The likely impact will be negative, temporary and slight.

15.2.4 Water, Surface Water / Groundwater

15.2.4.1 Water, Surface Water / Groundwater - Material Assets/Waste Management

There is an interaction between the water environment and waste management as there may be the requirement for removal of contaminated soil off site to a suitable licensed facility to prevent contamination of water. This is dealt with in Chapter 11 Waste Management.

15.2.4.2 Water, Surface Water / Groundwater - Soils/geology/Waste Management

Impacts on the geological environment will also affect the agricultural environment. The removal of agricultural soils during the proposed construction project is inevitable.

Waste Management and dust management is also considered in interactions as soil removal will be required for this development. Interactions between soils/geology will be mainly limited to the construction phase due to material excavation. This is dealt with in Chapter 6.

There are interactions between water and land and soils, with changes in depth and type of overburden impacting the protection provided to aquifers. The likely impact will be neutral, permanent and slight.

There are interactions between water and land and soils, with some surface water conveyed and stored in SuDS features such as soakaway's and discharging to the ground where possible, replicating the existing greenfield site drainage as closely as possible. The likely impact will be permanent, slight and neutral.

The potential significant impacts on water and hydrology arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.5 Air Quality & Climate

15.2.5.1 Air Quality & Climate - Population and Human Health

An adverse impact on air quality has the potential to impact upon human health, cause dust nuisance and cause disturbance to fauna. However, the risk to air quality as a result of the proposed development would not be considered significant, both at the local community level and on a broader national / global scale.

The interactions between Air & Climate impacts and Population and Human Health have been addressed in Chapter 7. Section 7.6 describes in detail the mitigation measures that shall be implemented to ensure that human health, residential amenity and livestock welfare are not adversely impacted by any aspect of the construction or operational phases of the development. Residual impacts are considered in Section 7.7.

The potential impact of dust would be temporary, given the transient nature of construction works. Dust control will be an integral part of construction management, with mitigation measures implemented where required, including sweeping of roads and hardstand areas, appropriate storage and transport of material and dust suppression measures where required. This is dealt with in Chapter 7.

During the operational phase, there is potential for impact on human health from a deterioration in air quality associated with emissions from vehicle emissions from traffic associated with future occupants may impact local air quality. However, it is considered there will be a negligible impact on local air quality generated by increased traffic movements associated with the development.

15.2.5.2 Air Quality & Climate - Traffic

The interactions between Traffic and Air & Climate have been considered in chapter 7 and the traffic data used was obtained from the traffic and transport consultant, for the proposed development which is set out in Chapter 12 of this EIAR and the accompanying Traffic and Transportation Assessment Report.

15.2.5.3 Air Quality & Climate - Biodiversity

There is also the potential for interactions with Biodiversity in terms of flora and fauna. similarly, the mitigation measures have also been designed to minimise the potential impact that the construction and operational phases of the development may have on the receiving environment which includes flora and fauna.

During construction there are potential issues for biodiversity if the trees were to be covered in dust during construction. However, this will be mitigated by the implementation of a proposed dust minimisation plan and then there should be no significant impacts on nearby trees is anticipated.

The concept of control and attenuation at source of potential emission sources that may impact the receiving environment is the principle that has been adapted in the design, construction and operational phases of the development. The potential significant impacts on air quality and climate arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

However, given the transient nature of construction works, and given that standard dust control measures will be implemented, no significant impact is anticipated. This is dealt within Chapter 7.

15.2.5.4 Air Quality & Climate - Surface Water / Groundwater

The interactions between Air & Climate and surface water and groundwater will be mainly limited to the construction phase and are mitigated by the drainage design and proposed mitigation measures. This is dealt with in chapter 7.

15.2.6 Noise/Vibration

15.2.6.1 Noise/Vibration - Population and Human Health/Biodiversity

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this chapter. The mitigation measures described shall be implemented to ensure that human health and residential amenity are not adversely impacted by any aspect of the construction or operational phases of the development.

Increased noise levels during the construction phase will be temporary only and are not expected to have a long-term significant adverse effect upon Population and Human Health in the general area. Furthermore, the application of binding noise limits and hours of operation, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. There will be no significant increase in ambient noise levels arising during the operational phase of the proposed development.

Noise generated during the construction and operational phases of the proposed development has the potential to impact upon Population and Human Health and fauna within the vicinity of the site.

During the construction phase, noise may be generated due to increased vehicle movements and the operation of construction plant. It is anticipated that there would be a moderate impact, for limited periods of time, on the nearest local residences and fauna within the vicinity of the development. Control and mitigation measures detailed in Chapter 8 will be implemented to reduce noise and vibration, including measures relating to equipment operation and timing of activities. Given the transient nature of construction works, and provided mitigation measures are implemented, noise from construction would not be considered to pose a significant impact upon human beings or Biodiversity. During the operational phase the noise impact generated by additional traffic movements associated with the development is predicted to be of a long-term not-significant to slight impact on existing ambient noise levels at receptors along the local road network.

The potential significant impacts on noise and vibration arising from these interactions have been considered within Chapter 8 and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.7 Landscape and Visual

The potential significant impacts on landscape and visual arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

The effects described are typically interactive and arise from the combined action of several environmental factors. There are a number of topic areas where interaction can occur with the Landscape and Visual Effects. These are as follows:

15.2.7.1 Landscape and Visual - Population and Human Health

Changes to the landscape character of the site itself will include the development of new buildings and associated landscape works. The landscape and visual impact associated with Population and Human Health focuses on the effects to dwellings. The settlement pattern comprises residential development to the north in Enniskerry Demesne with the town centre located further to the north. The proposed development generates visual effects, and the effects and associated amelioration of these effects is discussed in chapter 9.

15.2.7.2 Landscape and Visual - Biodiversity

The existing biodiversity value of the site is associated with the existing field boundary hedgerows, the majority of which are to be retained. The proposed landscape plan provides opportunities to improve biodiversity through the creation of woodland copses and areas of wildflower meadow, which will aid in habitat creation in the proposed open spaces. The potential interactive impacts will be slight and neutral.

15.2.7.3 Landscape and Visual - Noise and Vibration / Air and Climate

Potential impacts from noise and air quality are typically most prevalent during the construction phase. Whilst these would have no visual impacts, they can alter people's perception of the area's landscape character. Mitigation measures to minimise the impacts of noise and air quality will reduce the perceived landscape character impacts. Potential noise impacts during the operational phase of the project will be limited to traffic movement and day to day human occupation typical of a residential development. During the construction stage of the project, the potential interactive impacts with air and climatic factors will be adverse and slight, reducing to neutral and slight in the operational phase. The potential interactive impacts with noise and vibration are considered adverse and moderate in the construction phase, reducing to slight and neutral in the medium to long term.

15.2.8 Material Assets – Traffic and Transportation

The potential significant impacts on traffic and transport arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.8.1 Material Assets – Traffic and Transportation & Noise (vibration)/Air Quality Climate

The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods, however, implementation of the mitigation measures described in the Noise and Air Quality Section of this Environmental Impact Assessment Report will prevent and minimize the potential impacts of this interaction.

The Air Quality and Climate Chapter of this EIAR states that the impact of the proposed development on air quality and climate is considered Long-term and slight for the Operational Stage of the proposed development.

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

15.2.8.2 Material Assets – Traffic and Transportation & Land and Soils

There is the interaction between Land and Soils Chapter where the import and export of construction materials is considered. It is noted that the designs have been developed to achieve a near balance of the cut and fill materials

on site, which minimise construction related traffic. The associated construction traffic has been considered in the construction stage impacts and, in the Construction, & Environment Management Plan included with the application.

15.2.8.3 Material Assets – Population and Human Health

Temporary negative impacts to population and human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The construction traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified. During construction there may be potential for slight dust nuisance in the immediate vicinity of the site. However, dust control measures, as set out in the *Dust Control Management Programme* which include a range of measures such as wheel washes and covering of fine materials will minimise the impact on air quality.

During the operational phase, emissions from traffic associated with future occupants may impact local air quality and climate in terms of increased emissions of greenhouse gases from vehicles.

15.2.9 Material Assets – Waste Management

The potential significant impacts on Material Assets – Waste Management arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.9.1 Material Assets – Waste Management/Traffic and Transportation/Soils and Geology

Waste management interacts with traffic and transportation, soils and geology. The direct and indirect effects of waste-related transport are considered in Chapter 10, Traffic and Transportation and the geotechnical characterisation of the scheme is considered in Chapter 5, Soils and Geology.

15.2.9.2 Material Assets – Waste Management & Water

Should waste be incorrectly handled or stored at the development site during construction works, it has the potential to cause an adverse impact upon water quality in the area through leaching of materials to groundwater or surface water. However, as mentioned above, waste will be segregated and stored in suitably contained waste receptacles at the site compound, considerably reducing the potential risk of pollution to water. It is not considered that there would be any significant risk to water quality as a result of waste management during the operational phase, given that waste will be collected by private, licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard. This is dealt with in Chapter 11.

15.2.9.3 Material Assets – Waste Management & Biodiversity/Land and Soils/Water

Waste has the potential to impact upon biodiversity during the construction phase, by causing pollution to soils and water and by potentially attracting pests / vermin to the site. However wastes will be stored in suitably contained waste receptacles at the site compound, reducing the potential of pollution to soils and water. Furthermore, the majority of wastes generated during the construction phase would be inert materials, which would reduce the potential for issues regarding pests / vermin. It is not considered that there would be any significant impact upon biodiversity due to waste management during the operational phase, given that waste will be collected by licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard. This is dealt with in Chapter 11.

15.2.9.4 Material Assets – Waste Management & Population and Human Health

Should waste be incorrectly handled or stored at the development site, it has the potential to cause an adverse impact upon human beings through nuisance, including visual, odour and pests, and pollution to soils and water.

It should also be noted that given the inert nature of the majority of C&D waste types, it is unlikely that issues regarding odour or pests would arise. During the operational phase, suitably contained wheelie bins / waste receptacles will be provided to the residential area and childcare facility by private waste contractors, thus there would be no significant risk of pollution to soils. Waste will be collected on a regular basis, typically on a two-weekly basis alternating between

recyclables and municipal waste. Therefore, waste would not be envisaged to accumulate to high enough volumes to cause nuisance. This is dealt with in Chapter 11.

15.2.9.5 Material Assets – Waste Management & Landscape and Visual

Waste and litter have the potential to adversely affect the appearance of the landscape. However, as waste management measures will be implemented as part of the proposed development, it is considered that there would be no significant adverse impact upon the landscape. This is dealt with in Chapter 11.

15.2.10 Material Assets – Utilities

The potential significant impacts on Material Assets – Utilities arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.10.1 Material Assets – Utilities & Land and Soils

There are interactions between utilities and lands and soils, with the construction of drainage and utilities impacting the quantity of soil and subsoil as these materials will be removed to facilitate construction. The likely impact will be permanent slight, permanent and adverse.

15.2.11 Risk Management

There are interactions with Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport. However, subject to implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

The potential significant impacts on risk management arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.3 CUMULATIVE IMPACTS

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic which in many instances are often difficult to quantify due to complex inter-relationships. As outlined in Chapter 2 of this EIAR where relevant the EIAR also takes account of other development within the area. Cumulative, secondary and indirect impacts have been addressed in the content of this EIAR document. The EC EIA Guidance (2017) document states: Annex IV, point 5 (e) of the EIA Directive requires that the cumulation of effects with other existing and/or approved Projects are described in the EIA Report. Each Chapter of the EIAR includes a cumulative impact assessment of the proposed development with other existing and/or approved projects in the area.

With regard to permitted and future developments, the adjoining site to the west (located in the AA3 lands) has an extant permission for 27 no. dwellings (Planning Reg. Ref. 19/871). To the north east is an extant permission for 6 no. dwellings (Planning Reg. Ref. 16976). Further to the north west of the town centre, there is a proposal on lands at Kilgarron Hill (on the AA2 lands), which received a reasonable basis opinion from An Bord Pleanála (on the 21st January 2021 – ABP Ref. 308676-20) for 219 no. dwellings. It is noted the SLO10 lands, permission was granted for 12 no. detached dwellings on the 18/4/2020 by An Bord Pleanála (PL27.248914 WCC Ref. 17/15). The Powerscourt Demesne landbank has an extant permission for 47 no. dwellings. In addition, it is noted the Bray MD LAP includes the development of the Fassaroe lands which is located c. 750m to the north east of the proposed development site, which is identified as an area for future development of c. 4,000 dwellings along with supporting retail, commercial and areas of open space. The relevant applications have been taken into account in the chapters. Existing developments have also been considered in the relevant chapters.

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

The foul and water pipe works will entail works to the public road and would be subject to a road opening licence under Section 254 of the Planning and Development Acts 2000 (as amended) from Wicklow County Council. As part of the road opening licence, it is anticipated that a Construction Traffic Management Plan would be agreed with Wicklow County Council, by the contractor. The objective of which is to minimise the short-term disruption to local residents and reduce the potential for accidents. This may cause local short-term inconvenience and disturbance to residents and business in the vicinity of the works, and in particular the adjacent Primary School. However, the works would normally be undertaken in sections on a phased/rolling programme so that the number of persons experiencing local inconveniences at any one time is kept to a minimum. As such, with the necessary mitigation for each environmental aspect, it is anticipated that the potential cumulative impact of the proposed development in conjunction with the other planned developments will be minimal.

Furthermore, it is anticipated that the crossing will be undertaken in agreement with Wicklow County Council which would also be subject to appropriate mitigation by the appointed contractor to ensure disturbance is mitigated and kept to a minimum to the local sensitive receptors (local residents and Primary school). The cumulative impact is considered to be temporary, and slight.

For example, to determine traffic impacts in Chapter 10 the traffic generated by the proposed development is combined with the baseline traffic generated by the traffic on the road network in the area. The potential traffic impacts from other developments were also considered in the assessment. The Noise and Air Quality chapters of the EIAR take into account the AADT figures provided by BMCE, which include the relevant cumulative impacts.

With reference to the LVIA, the adjoining permitted development for 27 no. units located immediately to the west has been taken into account in the cumulative assessment.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments. While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant. In terms of the operational phase, the residual cumulative impact is not considered to be significant.

16.0 SUMMARY OF EIA MITIGATION AND MONITORING MEASURES

16.1 INTRODUCTION

The central purpose of EIA is to identify potentially significant adverse impacts at the pre-consent stage and to propose measures to mitigate or ameliorate such impacts. This chapter of the EIAR document has been prepared by John Spain Associates and sets out a summary of the range of methods described within the individual chapters of this EIAR document which are proposed as mitigation and for monitoring. It is intended that this chapter of the EIAR document will provide a useful and convenient summary to the competent/consent authority of the range of mitigation and monitoring measures proposed. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

EIA related conditions are normally imposed by the competent/consent authority as part of conditions of planning consent and form a key part of the Impact Anticipation and Avoidance strategy. Conditions are principally used to ensure that undertakings to mitigate are secured by explicitly stating the location, quality, character, duration and timing of the measures to be implemented. A secondary role of EIA related conditions is to ensure that resources e.g. bonds / insurances will be available and properly directed for mitigation, monitoring or remedial action, in the event that the impacts exceed the predicted levels.

Monitoring of the effectiveness of mitigation measures put forward in the EIAR document, both by the competent authorities and the developer, is also an integral part of the process. Monitoring of environmental media and indicators arise either from undertakings or from conditions.

In the case of mitigation and monitoring measures it is important for all parties to be aware of the administrative, technical, legal and financial burdens that can accompany the measures proposed. It is also important to ensure that, where monitoring is provided for, it is clearly related to thresholds, which if exceeded cause a clearly defined set of actions to be implemented.

16.2 MITIGATION STRATEGIES

16.2.1 Introduction

There are three established strategies for impact mitigation - avoidance, reduction and remedy. The efficacy of each is directly dependent on the stage in the design process at which environmental considerations are taken into account (i.e. impact avoidance can only be considered at the earliest stage, while remedy may be the only option available to fully designed projects).

16.2.2 Mitigation by Avoidance

Avoidance is generally the fastest, cheapest and most effective form of impact mitigation. Environmental effects and consideration of alternatives have been taken into account at the earliest stage in the project design processes. The consideration of alternatives with respect to the development of the subject lands has been described in Chapter 2.

16.2.3 Mitigation by Reduction

This is a common strategy for dealing with effects which cannot be avoided. It concentrates on the emissions and effects and seeks to limit the exposure of the receptor. It is generally regarded as the "end of pipe" approach because it does not seek to affect the source of the problems (as do avoidance strategies above). As such this is regarded as a less sustainable, though still effective, approach.

16.2.4 Reducing the Effect

This strategy seeks to intercept emissions, effects and wastes before they enter the environment. It monitors and controls them so that acceptable standards are not exceeded. Examples include wastewater treatment, filtration of air emissions and noise attenuation measures.

16.2.5 Reducing Exposure to the Impact

This strategy is used for impacts which occur over an extensive and undefined area. Such impacts may include noise, visual impacts or exposure to hazard. The mitigation is effected by installing barriers between the location(s) of likely receptors and source of the impact (e.g. sound barriers, tree screens or security fences).

16.2.6 Mitigation by Remedy

This is a strategy used for dealing with residual impacts which cannot be prevented from entering the environment and causing adverse effects. Remedy serves to improve adverse conditions which exist by carrying out further works which seek to restore the environment to an approximation of its previous condition or a new equilibrium.

16.2.7 Mitigation and Monitoring Measures

The following provides a list, for ease of reference, of the mitigation and monitoring measures recommended in each chapter of the EIAR.

16.3 PROJECT DESCRIPTION & ALTERNATIVES EXAMINED

16.3.1 Construction Management Strategy

It is envisaged that the development of the lands subject of the proposed development will occur over a 48-54 week period. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. A Construction Environment Plan has been prepared by BM Consulting Engineers, has been reviewed by the relevant EIAR consultants and is included in the SHD application.

Construction Traffic Management Plan
A Construction Traffic Management Plan (CTMP) will be prepared by the main contractor and agreed with the Planning Authority prior to commencement of development in the event of a grant of permission.

16.4 POPULATION AND HUMAN HEALTH

POP & HH CONST 1:

In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction Environment Management Plan shall be submitted by the contractor and implemented during the construction phase.

With reference to the construction phase of the proposed development, the objectives of the Construction Waste By Products Management Plan prepared by Byrne Environmental Consulting Ltd (and also Chapter 11 of the EIAR) is to ensure that waste generated during the proposed construction and operation phases will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts 1996 - 2013 are complied with.

16.4.1 Operational Phase

The operational phase is considered to have likely positive impacts on population in relation to the provision of additional residential units, open space, childcare provision, to cater for the demands of a growing population in accordance with the residential zoning objectives pertaining to the site.

During the operational phase of the development the design of the scheme has undergone a Road Safety Audit and has had regard to Design Manual for Urban Roads and Streets (DMURS) during its design. This will promote a pedestrian friendly environment, promoting sustainable development and reducing the influence of cars. This has the potential to reduce accidents within the proposed development.

No further specific mitigation is required having regard to the mitigation included within the other chapters of this EIAR.

In relation to the impact of the development on population and human health it is considered that the monitoring measures outlined in this EIAR in regard to the other environmental topics such as water, air quality and climate and noise and vibration sufficiently address monitoring requirements.

16.5 BIODIVERSITY

16.5.1 Construction Phase

Recommendation 1 – Mitigation by reduction and offset

Landscape planting will include new trees including Scots Pine, Beech, Sweet Chestnut, Silver Birch, Oak and Lime, as well as and other native and non-native planting which provides ornamental as well as biodiversity value. This planting scheme as sufficient degree that long-term, negative effects from habitat loss do not occur.

The following will also be followed:

- Any semi-natural habitats will be protected from potential damage construction phase and post-construction.
- The use of chemicals (weed killers, etc.) will be kept to a minimum within the development zone and will not be used in boundaries.

Landscaping measures will result in the development of the southern boundary as a Linear Parkland which will provide foraging areas for local bat populations. However, consideration is needed to ensure that external boundaries of the proposed development site (eastern and northern boundary) and boundary of the adjacent field is retained and enhanced to ensure that there is commuting routes to the park.

Landscaping has been designed to preserve connectivity and food sources for bats and this will have a wider benefit for other wildlife including birds, flora and invertebrates.

The following mitigation measures are included in the bat survey report and will be implemented:

"*Removal of trees*
a) Minimise the removal of mature trees, where possible.
b) Approximately 10 trees, deemed as PBRs, are proposed to be removed. If the trees are to be removed, planting will be undertaken to mitigate for tree removal and landscaping plans will planted "like for like" in relation to tree and shrub species removed. Consideration will be given towards hawthorn, blackthorn mix with individual ash, alder and birch to form a native tree hedge) and deciduous trees (native tree species include ash, oak, alder, birch).
c) A 2nd assessment of the trees proposed to be removed will be undertaken prior to tree removal to determine total number of trees to be felled and the tree felling procedure to be undertaken. This will be undertaken in consultation with the tree surgeons.
Where possible, trees, which are to be removed, should be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active).
An assessment of trees according to their PBR value determines the methodology of felling. Trees with PBR Category 1 are highly suitable for roosting bats and require more intensive procedures prior to felling. The trees identified within the survey area are PBR Category 1 and 2. The procedure to fell these is as follows:

> *Category 1: Trees with roosting features (dead wood, tree holes etc.) should be checked prior to felling. It is recommended that they are physically checked (using an endoscope and high power torch) or a dusk/dawn surveys are completed to determine if bats are roosting within. A tree felling plan will be required in consultation with the tree surgeons. A bat box scheme will need to be erected prior to felling and in consultation with the bat specialist. Any trees showing crevices, hollows, etc., should be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.*
>
> • *Category 2: Any ivy covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape.*
>
> • *A bat box scheme is required to be erected prior to any tree felling. The number of bat boxes will be determined by the category and number of trees proposed to be felled. In principle this will follow the following:*
>
> *For every Category 1 trees to be felled – one bat box is required*
>
> *For every three Category 2 trees to be felled – one bat box is required*

A minimum of 5 IFF Schwegler Woodcrete bats boxes (or equivalent flat open ended bat box) will be erected prior to tree felling to mitigate for tree felling. These will be erected within the Linear Park under supervision by the bat specialist.

Bat boxes scheme will be provided and to ensure that bats use the bat boxes, they will be sited carefully and this will be undertaken by a bat specialist. Bat boxes will be erected prior to tree felling. Some general points that will be follow include:

• Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box.

• Diameter of tree should be wide and strong enough to hold the required number of boxes.

• Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.

• Bat boxes should be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.

• It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensures a range of temperatures are available all day. If the South facing boxes become warm, bats can safely remove to the cooler North facing box.

• Locations for bat boxes should be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

Construction Phase

During the construction phase the following will be undertaken:

- All construction lighting will be turned off each evening and at the weekend once day-time works are completed.

- All mature trees and habitats should be protection from construction works throughout the construction period.

- Bat mitigation measures implemented during construction (e.g. erection of bat boxes) will be protected during construction works.

Recommendation 2 – Mitigation by avoidance

The removal of hedgerows or scrub will not take place from March to August unless this is unavoidable and then vegetation subject to removal must first be inspected for signs of breeding birds. It is an offence to destroy or interfere with a bird's nest or eggs. If no nesting is occurring then vegetation can be removed within 48 hours. If nesting is found then vegetation can only be destroyed under licence from the NPWS.

Recommendation 3 – mitigation by avoidance

Construction will follow guidance from Inland Fisheries Ireland on the prevention of pollution during construction projects (2016). This will include the storage of dangerous substances in bunded areas and ensuring the silt-laden water does not run-off the site. Water will only be permitted to leave the site after passing thorough suitably-sized silt-traps. Pollution prevention measures will be maintained for the full duration of the construction project. The site manager will be responsible for the prevention of pollution. The following specific measures are included in the Construction and Environmental Management Plan (CEMP) prepared for this planning application by Barrett Mahony Construction Engineers:

Prior to the commencement of construction, the appointed contractor will be required to obtain formal agreement from the Local Authority on pollution prevention measures as well as the overall approach and emergency procedures for all construction stages.

- Contractors will have regard to the following best practice guidelines to ensure that water bodies are adequately protected from construction work: Construction Industry Research and Information Association (CIRIA) C649: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006)
- CIRIA C649: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006)

Notwithstanding this, a method statement is to be prepared by the contractor and if necessary agreed with Wicklow County Council prior to commencement of the works, detailing the measures to be taken to ensure that no water run-off from the site occurs during the construction period. It is noted that the site falls towards the Cookstown Road which already has localised winter flooding issues in the vicinity of the site. Any run-off should be intercepted on site. This will be achieved with open drains or French drains and collected to a soakaway. Run-off control measures to include the following:

- Dewatering measures should only be employed where necessary.

For groundwater encountered during construction phase, mitigation measures will include;

- Dewatering by pumping to a soakaway.
- Excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas.

- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface.
- Existing surface drainage channels within the site that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts.
- Any surface water sewer connections should be made under the supervision of the Local Authority/Irish Water and checked prior to commissioning.
- New onsite surface water drains should be tested and surveyed prior to commissioning to prevent any possibility of ingress of ground water.
- All surface water manholes and drains will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur.
- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.

Areas surrounding the site are to be protected as necessary from sedimentation and erosion due to direct surface water runoff generated onsite during construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works, as noted in the points above, until the permanently surface water drainage system of the proposed site is complete.

- Regular inspections of de-watering settlement tanks, if used, are to be carried out and additional treatment used if settlement is not adequate.
- Bunded areas will be created for the storage or use of any fuels, oils, greases, cement, etc.
- Emergency spill kits will be kept close to the works.

16.5.2 Operational phase

Recommendation 4 – mitigation by reduction
In consultation with the arborist, root protection zones will be established around hedgerows and treelines to be retained. These will be maintained for the full duration of the construction phase.

Recommendation 5 – mitigation by reduction
The following mitigation measures are included in the bat survey report and will be implemented:

"*Nocturnal mammals are impacted by lighting. Therefore it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. The principal areas of concern are the treelines/hedgerows remaining within the proposed development area, greenway, woodlands, roosting areas (buildings and bat boxes) and treelined avenues. The following principles will be followed especially in relation to the general residential area and will also be implemented for the greenway and the active open area: - Artificial lights shining on bat roosts, their access points and the flight paths away from the roost must always be avoided. This includes alternative roosting sites such as bat boxes. This is important in relation to the brown long-eared maternity roost in St. Patrick's Church.*
- Lighting design should be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas.
- Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This should be used for habitat features noted as foraging areas for bats.
- Buffer zones can be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected.
- Luminaire design is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2018).
o All luminaires used will lack UV/IR elements to reduce impact.
o LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
o A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Ballard lighting should be considered for pedestrian and greenway areas, if deemed necessary.
o Only luminaires with an upward light ratio of 0% and with good optical control will be used.
o Luminaires will be mounted on the horizontal, i.e. no upward tilt.
o Any external security lighting will be set on motion-sensors and short (1min) timers.
o As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.
Planting of screening will also be effectively used to prevent lighting spillage areas where bat foraging is recorded. In particular, lighting will not shine onto important commuting and foraging areas identified for local bat populations. Specific areas that need to be dark zones include crossing point No. 2 (Figure 10), the proposed Linear Parkland (southern boundary) and north-eastern corner of the proposed development site (See Section 4.5).
5.3.3 Landscaping plan
It is important to ensure that as much treelines / hedgerows are retained within the survey area, particularly on the boundary and in connection with the woodlands along the southern boundary.
In general, the following will also be followed:
- Any semi-natural habitats will be protected from potential damage construction phase and post-construction.
- The use of chemicals (weed killers, etc.) will be kept to a minimum within the development zone and will not be used in boundaries.

16.6 LAND AND SOILS

16.6.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through a Klargester Bypass Interceptor (or similar approved) prior to out-falling into the proposed soakaway system.

16.6.2 Construction Phase Mitigation

A Construction and Environmental Management Plan (CEMP) (prepared by BMCE) is included in the planning application material. This report will be developed by the Contractor and will be submitted to the local authority prior to commencement on site.

In order to reduce the impacts on the soils, geology and hydrogeological environment a number of mitigation measures will be adopted as part of the construction works on site, as set out in the CEMP. The measures will address the main activities of potential impact which include:

- Control of soil excavation and export from site.
- Sources of fill and aggregates for the project.
- Fuel and Chemical handling, transport, and storage; and
- Control of Water during Construction.

The Construction and Environmental Management Plan (CEMP) sets out how the construction of the project will be managed in a safe and organised manner by the Contractor. The CEMP sets out requirements and standards which must be met during the construction stage and includes the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project.

Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall groundwater quality.

Potential issues can be mitigated against by ensuring that CEMP is adhered to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks.

Soil stripping, earthworks and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction as set out in the CEMP Report. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads as set out in the CEMP report.

The following mitigation measures as set out in the CEMP Report will be taken at the construction site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of bunded refuelling areas on the site (if required).
- Provision of spill kit facilities across the site.
- Where mobile fuel bowsers are used the following measures will be taken.
- Any flexible pipe, pump, tap or valve will be fitted with a lock and will be secured when not in use.
- All bowsers to carry a spill kit and operatives must have spill response training; and
- Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they should be done so secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

16.6.3 Operational Phase

During the operational phase of the proposed development there is limited potential for site activities to impact on the geological environment of the area.

Following best practice, as noted above, the potential for the ground water to become polluted via oil spills will be reduced as far as is practical using an oil separator to take run off from carparking areas and passing through same prior to disposal.

The proposed foul drainage & potable water network will be vested to Irish Water, and as the statutory agency will have responsibility for the maintenance of the foul drainage & potable water network once completed. The stormwater system will be taken in charge by Wicklow County Council who will carry out maintenance on the system if required.

16.6.4 Monitoring measures – construction

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

- Adherence to the "*Construction & Environmental Management Plan (CEMP)*". The developer will be responsible for ensuring adherence with this report. If construction works are not in accordance with the plan, then the developer will ensure that this is remedied.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas. If these are found to be sub-standard then the developer will ensure that they are made fit for purpose.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities. If these measures are found to be inadequate and the adjacent road network is negatively impacted, the developer will ensure that this is remedied and will ensure that dust suppression measures are implemented more regularly and all vehicles exiting the site use vehicle wheel wash facilities provided.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.). The developer is responsible for ensuring that these measures are fit for purpose. If they are found to be inadequate, then the development will ensure that they are made good and fully utilised.
- Soil removed during the construction phase will be monitored to maximise potential for re-use on site.
- The quantities of topsoil, subsoil and rock removed off site will be recorded.

16.6.5 Monitoring measures – operational phase

Monitoring of the *"taken in charge*", public open space area to the south of the site by Wicklow County Council will be on-going. The soakaway and other SuDS features are located in areas that will remain in the charge of the management company who will ensure that are adequately maintained.

16.7 WATER

16.7.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through a Klargester Bypass Interceptor (or similar approved) prior to discharging into the proposed storm water soakaway system.

Mitigation measures follow the principles of avoidance, reduction and remedy. The most effective measure of avoidance is dealt with during the site selection and design stage, by ensuring that the development does not traverse or come in close proximity to sensitive hydrological attributes.

Where avoidance of the feature has not been possible, consideration has been given to locally modify the proposed development so as to reduce / minimise the extent of the impact. If any modifications are proposed to reduce hydrological impacts, it is necessary to also consider any associated impacts to the hydrological and ecological regimes.

16.7.2 Construction Phase Mitigation

The following mitigation measures will be implemented for the construction phase of the development:

- Any excess surface water on site to be discharged to the ground via soakaways.

- Designated impermeable cement washout areas must be provided.
- Any *in-situ* concrete work to be lined and areas bunded (where possible) to stop any accidental spillage.
- Any spoil or waste material generated from the construction process is to be temporarily stored at an approved location on site, before being removed to an accepting licensed waste disposal facility.
- All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines.
- All surface water infrastructure is to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with Local Authority Requirements.
- Connections to the public network are be carried out to the approval and / or under the supervision of the Local Authority prior to commissioning.
- All new drains are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase. All new water mains to be tested and sterilised in accordance with Irish Water requirements.
- Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall surface water quality.
- The construction of the development will be carried out in accordance with the Construction and Environmental Management Plan in order to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks. A Construction & Environmental Management Plan (CEMP) is submitted with this planning application.
- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater.
- The Construction and Environment Management Plan, incorporating the measures in the CEMP, will be developed, and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction and Environmental Management Plan.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and filter sediment laden runoff prior to discharge to a temporary soakaway.
- Weather conditions and seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced.
- Concrete batching will take place off site or in a designated area with an impermeable surface.
- Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds/soakaways.
- Oil and fuel stored on site for construction will be stored in designated areas. These areas shall be bunded and should be located away from surface water drainage and features.
- Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater.
- Spill kits will be kept in designated areas for re-fuelling of construction machinery.
- Dewatering measures should only be employed where necessary.

16.7.3 Operational Phase

Sustainable Urban Drainage Systems (SuDS) will be incorporated fully into the development, in order to improve the quality of the surface water discharging from site and reduce the runoff volume and rate. The surface water drainage design, for this development, was designed in accordance with the Local Authority requirements. All SuDS measures will be provided in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS systems are established by the Construction Industry Research and Information Association's publication CIRIA C753 – The SuDS Manual.

Following best practice, the potential for the storm water to become polluted via oil spills will be reduced as far as is practical using a Klargester Bypass Interceptor) or similar approved to take run off from carparking areas and passing through same prior to disposal to the on-site soakaway.

Irish Water will maintain the foul & potable water systems while Wicklow County Council will maintain the storm water network.

As such this type of development would not increase the risk to surface water or downstream flooding. All surface water discharges to soakaway's in close approximation of the existing greenfield drainage regime. All surface waters are to pass through an oil separator prior to out falling into the proposed new storm sewer.

The following measures will be employed:

- Surface water runoff from the development will be collected by an appropriately designed system with contaminants removed prior to discharge i.e., petrol interceptor.
- Foul water will be drained to a fully separate system.
- A regular maintenance and inspection programme of the flow control devices, soakaway storage facilities, gullies and petrol interceptor will be implemented during the Operational Phase to ensure the proper working of the development's networks and discharges.
- Operational refuse will be removed from site using licenced waste management contractors.

16.7.4 Monitoring

16.7.4.1 Construction phase

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

- Adherence to the 'Construction and Environmental Management Plan'. If construction works are found to be not in accordance with the plan, then the developer will ensure that measures are put in place to ensure compliance.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of run-off from the site including pumping / dewatering. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.) If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content). If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- A dust management programme will be implemented during the construction phase of the development. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.

16.7.4.2 Operational phase

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

- A management company on site will ensure the system is regularly inspected and maintained. Areas of the site with significant SuDS features will remain in the charge of this company as set out on the Taking-In-Charge drawing to be submitted as part of the planning application.
- The performance of all SuDS features will be monitored by the management company during the life of the development.
- Monitoring of the installed gullies will be required to prevent contamination and increased runoff from the site.

As noted, once the development is complete the foul drainage system & potable water system will be vested to Irish Water who will then operate and maintain the network. The storm water system will be maintained by the management company.

16.8 AIR QUALITY AND CLIMATE

16.8.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AQ CONST 1: Air Quality Mitigation Measures

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the north, south, east and western site boundaries to minimise fugitive windblown dust emissions falling on third party lands and existing residential areas.

16.8.2 Operational Phase

The Operational Phase of the Cookstown development site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

The elements of the development designed to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AQ OP1: Climate Impact Mitigation Measures

- Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.

- All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.
- In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:
  - Passive solar design including the orientation, location and sizing of windows
  - The use of green building materials: low embodied energy & recycled materials
  - Energy efficient window units and frames with certified thermal and acoustic insulation properties
  - Building envelope air tightness
  - Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
  - Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating in all units
- Inclusion of electric car charging points to encourage electric vehicle ownership
- Proximity of Bus Eireann and private bus operator's commuter services
- Provision of open landscaped areas, to encourage residents to avail of active lifestyle options

16.8.3 Monitoring

16.8.3.1 Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust, particulates and construction vehicle exhaust emissions as NO_2 generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

7.11.2 Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

Figure 16.1 – Dust Monitoring (D1 – D4), NO_2 Monitoring (A1) PM10 & 2.5 Monitoring (PM) Locations

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during the construction phase. The proposed monitoring locations (D1 – D4) are presented below in Figure 7.3.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per *German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic)* is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

PM10 & PM2.5 Monitoring Methodology

Fine particulate matter as PM_{10} and $PM_{2.5}$ shall be monitored using continuous data logging air quality monitoring instrumentation during site preparation and soil stripping works. The monitoring system shall be located in proximity to Powerscourt National School.

NO_2 Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1 year period at the baseline air quality locations, A1. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO_2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone C areas over a similar period. NO_2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m^3, for the protection of human health, over a calendar year.

16.8.3.2 Operational Phase Monitoring

Monitoring will not be required during the operational phase of the development.

16.9 NOISE AND VIBRATION

Construction Phase

General Construction Site Management

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:

NV CONST 1 Noise Mitigation Measures

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

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

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

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

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

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

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

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

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

Construction Phase Noise Control & Mitigation

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

NV CONST 2 Construction Works Noise Mitigation Measures

- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.
- The Developer shall appoint an acoustic consultant independent of the Contractor to conduct routine noise audit surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Section 8.2.3 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.
- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section.
- Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.
- Where reasonable, practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.
- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order
- Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable.
- Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.
- Selected use of rubber-tyred equipment over steel track equipment where practicable.
- The use of inherently quiet plant is required where appropriate – all compressors and generators will be “sound reduced” or “super silent” models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.
- All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.
- Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
- Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.

- Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.
- Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.
- Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.
- All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions.
- Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.
- Excessive reviving of all vehicles shall be avoided.
- Unnecessary dropping of heavy items onto ground surfaces shall be banned.
- The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted.
- The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.
- The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary.
- Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events.
- In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, Wicklow County Council shall be immediately notified prior to the works commencing.
- A nominated person from the Project Management team will be appointed to liaise with and inform local residents and Wicklow County Council regarding out of hours works.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

The images below describe the use of localised noise screens that shall be used during construction activities.

Double height acoustic blanket enclosure

Acoustic blankets screening excavations

3 sided Acoustic enclosure for surrounding breaking, cutting works

Construction Phase Vibration Control & Mitigation

The following specific vibration mitigation and control measures shall be implemented during the construction phase:

NV CONST 3 Vibration Mitigation Measures

- Breaking out concrete elements using low vibration tools
- Choosing alternative, lower-impact equipment or methods wherever possible
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day
- Routing, operating or locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.
- Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest

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

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

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

As detailed in Section 8.2.2 the transient vibration guide values for cosmetic damage as specified in British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz. This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels.

The following mitigation is proposed:

N V CONST 4

In order to protect the amenities enjoyed by nearby residents and premises a full Construction and Environmental Management Plan (CEMP) (including traffic management) shall be included in the application documentation The CEMP will include the mitigation measures set out in this section.

8.7.2 Operational Phase Noise Mitigation

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focussed on this building element to ensure that their insulation is adequate. All apartments shall have external windows shall have acoustically rated windows to prevent breakthrough of external noise. In addition, Heat Recovery and Mechanical Ventilation systems will be incorporated into the design thus there will be no requirement for passive air vents.

All houses shall have acoustically rated double glazed windows.

Acoustic Design requirements for residential buildings

Windows
In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (R_W):

40dB R_W for Living rooms & Bedrooms
37dB R_W for Kitchen – Dining Rooms.

The acoustic performance specifications detailed are the minimum requirements which shall apply to the overall glazing system when installed on site. 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. All exterior wall and door frames will be sealed tight to the exterior wall construction.

Ventilation Systems
The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Wall Constructions

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

Roof Construction
The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 40dB Rw to be used for roof spaces.
At the earliest stage during the construction phase, residential test units shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.14 above provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoining residential units and to assess compliance with external noise intrusion criteria as defined in *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.*

As set out in Section 8.5.1 the operational phase of the development is predicted not to have an adverse noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

N&V OPERA 2

8.7.3 Internal Noise Control – Residential Units

At the earliest stage during the construction phase, test apartments and houses shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 7 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin residential units.

Table 16.1 – Recommended sound insulation values for internal party walls / floors

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

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.* This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as detailed in Table 8.15. All residential units shall be designed to achieve the specified ambient noise design range.

Table 16.2 – Recommended Indoor Ambient Noise Levels from BS 8233:2014

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

16.9.1 Monitoring

16.9.1.1 Construction Phase

Proposed Noise Monitoring Programme During Site Construction

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

On commencement of the site construction activities, routine noise monitoring shall be conducted in the vicinity of the site to assess the impact that site activities may have on ambient noise levels at local receptors.

It is proposed to conduct continuous noise monitoring surveys to establish the noise impacts of site activities at the closest receptors to the site, to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017*: *Acoustics – Description, measurement and assessment of environmental noise* and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4*). The measurement parameters to be recorded include wind speed, temperature, L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , 1/3 Octave Frequency analysis and impact noise analysis.

Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at noise sensitive receptors N1 (school) to No4 (residential house) as per Figure 8.3 above adjacent to the site boundaries and as identified in the baseline noise assessment.

Proposed Vibration Monitoring Programme During Site Construction

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase if and as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries and at properties up to 50m from the site as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in British Standard *BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings* and *Part 2 1993 Guide to damage levels arising from groundborne vibration.*

16.9.1.2 Operational Phase

No monitoring required during the operational phase of the development.

16.10 LANDSCAPE AND VISUAL

16.10.1 Construction Phase

The following mitigation measures will be implemented:

- Height of temporary stockpiles to be restricted to a practicable minimum to avoid impact on local sensitive receptors;
- Hoarding will be erected around site boundaries to reduce visual impact of construction works;
- Plant will be held in designated compound on site;
- Protective fencing will be installed around the RPA's existing boundary trees.

Visual impacts during the construction phase will be mitigated somewhat by appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish. Appropriate site hoardings will be put in place around the perimeter of the site where required to minimise the landscape and visual impact.

16.10.2 Operational Phase

The major visual remediation of the project will be accomplished through the following mitigation measures which have been incorporated into the design:

- Through the positioning of the various elements of the development on site in order to enhance the appearance of the residential blocks as a whole through the design of the site layout and built form.
- The creation of high-quality public and semi-public spaces for the use and amenity of the users of the development and the wider community; the creation of two public parks in the north and south of the site, a central roadside space with stream feature and apartment/duplex units communal open space.
- Through the creation of a universally accessible green public pedestrian route through the development in order to provide safe pedestrian access between Cookstown Road and 'Lover's Leap Lane'.
- The provision of a new vehicular access point from Cookstown Road.
- The retention of existing trees and perimeter hedgerows where feasible. Existing planting will be enhanced and strengthened by additional planting of native broadleaf species and dense woodland and understory planting. The retention of existing trees and hedgerows is important for the protection of local foraging and commuting bat populations.

16.11 MATERIAL ASSETS – TRAFFIC

16.11.1 Construction phase

As part of this planning application, a Construction & Environmental Management Plan **(**CEMP**)** will be submitted which will includes information on construction traffic management and routes, including traffic management for the construction of the works along Cookstown Road. On foot of this, the contractor will be required to provide a Construction Traffic Management Plan (CTMP) prior to works commencing on site, either separately or as part of a further developed Construction & Environmental Management Plan report. The purpose of the CTMP is to minimize the potential effects from any construction related traffic generated by the proposed development.

The Construction & Environment Management Plan (CEMP) submitted with the planning application incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- Prior to the works being undertaken, advance notification information signage and/or VMS signage will be erected on the surrounding roads to notify frequent road users of upcoming works.
- Due to the location of the proposed road works and the proximity to the local school, works will be undertaken during the periods when the school will not be in use (summer holidays or school midterm).
- There will be a dedicated traffic control system in place throughout the works along the road to ensure safety to traffic users on the Cookstown Road.
- Method statements will be provided and agreed with the Council and Local Area Engineer in advance of any works being undertaken in the public road.
- A dedicated 'construction' site access / egress junction will be provided during all construction phases. This will be controlled by a flagman/flag men as necessary to ensure safety to traffic users on the Cookstown Road.
- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.

- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities on-site.
- Truck wheel washes will be installed at construction entrances if deemed necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff.
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

Due to the nature of the site, and the proximity of the site to the Primary School (adjacent to the site), HGV movements during the construction period will be coordinated to avoid peak rush hours and will avoid the "school run" rush hour of the adjacent school, and as such will not significantly impact the peak traffic periods. This will reduce the potential impact on traffic in the surrounding area and will also ensure that the attendees of the school will not suffer any secondary potential harm in the form of pollution or aggressive, heavy, road traffic in the form of HGV's.

16.11.2 Operational phase

The surrounding road network has been analysed and will have the capacity for the proposed volume of traffic from the new development. In an effort to reduce the private vehicular use, new pedestrian pathways, cycle parking and road crossings have been included in the design of the development. This will allow residents of the development to access Enniskerry Village, with its recreational facilities, without the use of private vehicular transport.

As mentioned in section 10.4.4, the Greater Dublin Cycle Network has 2no. new routes in close proximity to the site. The provision of cycle parking in each of the new residential units, will encourage the residents to use bicycles instead of private vehicles.

16.11.3 Monitoring

16.11.3.1 Construction Stage

The contractors Construction Traffic Management Plan will be a live document, which will be updated during the construction process of the development to take account of any changes in the local road network.

16.12 MATERIAL ASSETS – WASTE MANAGEMENT

16.12.1 Construction Phase Waste Management Plan

The Construction Phase Waste Management Plan prepared by Byrne Environmental (included with the SHD application) specifically addresses the following aspects:

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

- Analysis of waste arisings / material surpluses
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase.
- Methods proposed for Prevention, Reuse and Recycling
- Waste Handling Procedures
- Waste Storage Procedures
- Waste Disposal Procedures
- Record Keeping

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

- Materials will be ordered on an *"as needed"* basis to prevent over supply
- Materials shall be correctly stored and handled to minimise the generation of damaged materials
- Materials shall be ordered in appropriate sequence to minimise materials stored on site
- Sub-contractors will be responsible for similarly managing their wastes

16.12.1.1 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

16.12.1.2 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licenced or permitted waste facility in compliance with the following relevant Regulations:

- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)*
- *Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.*

Prior to the commencement of the Project, the Construction / Project Manager shall identify a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Construction / Project Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the *EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

16.12.1.3 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries
- Reduction in energy required to extract, process and transport virgin aggregates
- Reduced HGV movements associated with the delivery of imported aggregates to the site
- Reduced noise levels associated with reduced HGV movements
- Reduction in the amount of landfill space required to accept C&D waste

- Reduction in the volume of soils to be exported off-site

16.12.1.4 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

- Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips
- Waste oils / containers shall be placed in dedicated mobile bunds units.
- Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers.
- Spill kits with instructions shall be located in the waste storage compound.

16.12.1.5 Inert Soils

As the subject development site is currently greenfield and in agricultural use with no evidence of historic dumping or industrial use, it is predicted that the top and subsoils will be characterised as being inert in accordance with *Landfill Directive (2003/33/EC).*

There is no requirement to export sub-soils or top-soils from the site shall and soils be re-used on-site.

In the event that imported soils are required, they shall be tested at source to determine their classification as inert in accordance with EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27* of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that the material classified not as a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA.

16.12.1.6 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the *2002 Landfill Directive (2003/33/EC)* for contamination, and pending the results of laboratory WAC testing, will be excavated

16.12.1.7 Record Keeping

It is the responsibility of the Project Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site during the construction phase are maintained in a Waste File at the site project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description
- Volume of waste collected
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number
- Destination of waste load including Waste Permit / Licence number of facility
- Description of how waste at facility shall be treated: disposal / recovery / export
- The waste records shall be issued to Fingal County Council as required / requested.

16.12.1.8 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Phase Waste Management Plan.

16.12.2 Operational Phase Waste Management Plan

An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany the SHD application. The OWMP has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with *The Eastern-Midlands Region Waste Management Plan* 2015-2021 which defines the following Waste Targets:

- *1% reduction per annum in the quantity of household waste generated per capita over the period of the plan.*
- *Achieve a recycling rate of 50% of managed municipal waste by 2020.*
- *Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.*

The Operational Waste Management Plan has been prepared with regard to the strategy, policy and objectives and design standards of the *Wicklow County Development Plan 2016 – 2022*.
Key Aspects of the OWMP to achieve Waste Targets:

- All residential units shall be provided with information on the segregation of waste at source and how to reduce the generation of waste by the Facilities Management Company.
- All waste handling and storage activities shall occur in the dedicated communal apartment waste storage areas.
- The development's Facility Management Company shall appoint a dedicated Waste Services Manager to ensure that waste is correctly and efficiently managed throughout the development.

The Operational Phase of the Waste Management Plan is defined by the following stages of waste management for both the residential and commercial aspects of the development:

- Stage 1 Occupier Source Segregation
- Stage 2 Occupier Deposit and Storage
- Stage 3 Bulk Storage and On-Site Management
- Stage 4 On-site treatment and Off-Site Removal
- Stage 5 End Destination of wastes

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice* which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

The apartments, duplex units and maisonettes which will include a 3 - bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2020.*

The proposed residential development shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.

The **Objective** of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.

The **Goal** of the OWMP is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Regional Waste Management Plans).

All apartments, duplex units and houses will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.

Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.

House residents shall engage private waste collection contractors who provide a 3-bin waste collection service.

The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

16.13 MATERIAL ASSETS – UTILITIES

16.13.1 Construction Mitigation

The construction works contractor shall liaise with the relevant utilities provider prior to works commencing, with on-going consultation throughout the proposed development. Where new services are required, the construction works contractor shall apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider.

All works in the vicinity of utilities apparatus will be carried out in ongoing consultation with the relevant utility company or local authority and will be in compliance with any requirements or guidelines they may have.

Where new services or diversions to existing services are proposed, the Contractor will apply to the relevant utility company for a connection permit where appropriate and will adhere to their requirements.

Mitigation measures proposed in relation to the drainage and water infrastructure comprise the following:

A Construction and Environmental Management Plan (CEMP) (prepared by BMCE) is included in the SHD application material. This report will be developed by the contractor as necessary and will be submitted to the local authority prior to commencement on site.

Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

In the event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping to an appropriate treatment facility prior to discharge. Other measures would include excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e., highly vulnerable groundwater areas.

In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with Irish Water standards, pressure tested, and CCTV surveyed to ascertain any possible defects.

The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established.

The construction compound's potable water supply shall be protected from contamination by any construction activities or materials.

Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.

Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

Road sweeping and/or wheel wash facilities will be provided as required.

16.13.2 Stormwater Infrastructure

In accordance with the Greater Dublin Regional Code of Practice for Drainage Works, all sites are required to develop a drainage system which separates storm & foul water on site.

In addition to improving overall storm water quality following sustainable urban drainage systems, SuDs protocols, there is also a requirement to reduce storm water runoff rates to pre-development levels. On the subject site all rainwater will be collected and discharged to soakaway within the site, i.e., no runoff. The soakaway proposed for this development is designed to infiltrate all run-off generated from all hard standing surfaces on site, up and including the 1 in 100-year storm event, +20% climate change allowance.

16.13.3 Foul Infrastructure

Irish Water have confirmed in the Confirmation of Feasibility Letter response to the Pre-Connection Enquiry to them and in their Design Acceptance Letter that the network has capacity for the proposed development. The proposed development will be serviced by a new separate internal foul network, draining by gravity to a new foul water pumping station on site. This station will have a pumped rising main to the nearest Irish Water sewer located on the nearby R760.

As required by the SHD process, Irish Water are required to review the schemes foul drainage proposal & to issue a Confirmation of Feasibility letter and letter of Design Acceptance. These have been received by the design team and is included as an appendix in the Barrett Mahony Civil Engineering Infrastructure Report and Flood Risk Assessment accompanying this submission.

A requirement from the Irish Water review for the development is to up-grade part of the local foul drainage network, as these works are located outside of the subject lands these works will be carried out by Irish Waters regional contractor, and agreement for same will form part of the Applicants connection agreement post planning.

16.13.4 Potable Water Infrastructure

All potable water infrastructure is under the control of Irish Water. The proposed development will be serviced by a new separate internal water network for the proposed development. The proposed development will have 1no. watermain connection from the development to the existing Ø180mm public watermain along the adjacent L1020 Cookstown Road.

As required by the SHD process Irish Water are required to review the schemes potable water proposal & to issue a Confirmation of Feasibility letter and a letter of Design Acceptance. These have been received by the design team and is included as an appendix in the Barrett Mahony Civil Engineering Infrastructure Report and Flood Risk Assessment accompanying this submission.

16.13.5 Operational Mitigation

Please refer to Chapter 6 of the EIAR – ‘Water’, for mitigation measures associated with the surface water drainage. All new drainage lines (foul and surface water) will be pressure tested and will be subject to a CCTV survey to identify any possible defects prior to being made operational. SuDS measures are proposed to minimise the impact on water quality and reduce the quantity of the runoff and maximise the amenity and biodiversity opportunities within the site. The system incorporates soakaways throughout the development, therefore there will be no operational groundwater runoff from the site, reducing the impact on the existing surface water drainage network. The proposed techniques will offer a high level of treatment processes and nutrient removal of the turnoff, particularly during the “first flush”.

Water conservation methods such as the use of low flush toilets and low flow taps should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development.

Similarly, water conservation methods would reduce the demand on the public water supply network and the loading on the foul sewer network.

For the operational phase, no mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

The proposed development is located within an area designated for the type of development proposed. As such the services pertaining to the development are required to facilitate the proposed scheme. It is not possible to not provide the services required. Notwithstanding this, the potable water, foul & stormwater services have all been designed in accordance with the requirements of the various stake holders, notably Irish Water for the foul & potable water utilities and Wicklow County Council for the surface water services.

16.13.6 ESB Infrastructure

ESB have been engaged at an early stage to ensure that any potential issues with utility connections are reviewed and mitigated as early in the process as possible. ESB will not formally engage in the design process until such time as planning has been approved and scheme name and numbering are approved. However, initial discussions and proposal have been positive.

The proximity to the existing ESB sub-station at the Powerscourt School ensures access to the MV network which avoids the need for extensive network upgrades and infrastructure.

16.13.7 Monitoring

All internal potable water & drainage services within the proposed building will be (monitored by the management firm / taken in charge) & their maintenance personnel will routinely inspect and carry out maintenance as required. The external potable water and foul effluent (and the combined outfall including restricted storm water flows) connections to the public system will be maintained by Irish Water.

16.14 ARCHAEOLOGY, ARCHITECTURE, AND CULTURAL HERITAGE

16.14.1 Construction Phase

16.14.1.1 Archaeology

As it is not possible to achieve the preservation in-situ of Archaeological Areas 1–6 within the proposed development, AA1–6 will be preserved by record (archaeological excavation) prior to any construction going ahead. This will be carried out under the direction of a licenced archaeological director along with an appropriate team of archaeologists. Full provision will be made available for the full excavation and analysis of the site, both during the course of the fieldwork and the post-excavation process. The work will be carried out under licence and in full consultation with the National Monuments Service of the DoHLGH and the National Museum of Ireland.

All ground disturbances associated with the proposed development will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.

16.14.2 Monitoring

The mitigation measures recommended above would also function as a monitoring system, allowing the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

16.15 RISK MANAGEMENT

The Construction & Environmental Management Plan and the Health and Safety Plan, in addition to good housekeeping practices, will limit the risk of accidents during construction. Fire safety will be dealt with under the Fire Safety Code at design and construction stage.

The proposed development will involve the ground works to facilitate the proposed development. A site investigation has been carried out and has not identified any hazardous material. Further testing will be carried out prior to construction to inform the detailed design. In the event that any hazardous material is identified the appropriate measures will be taken in accordance with the requirements of the EPA. The excavation and movement of soil from the site will be undertaken by a registered specialist contractor and removed to a licensed facility.

The following steps will be implemented:

- Hazardous materials used during construction will be appropriately stored so as not to give rise to a risk of pollution.

- In the event of storms or snow, construction activity can be halted and the site secured. The construction activity will involve several potential risks including fire.

- During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant, or adverse effects to the existing public road network. Apart from the works on the public road, most of the works are away from the public road in a controlled environment. The objective of the Construction & Environmental Plan is to minimise the short-term disruption to local residents and reduce the potential for accidents.

- Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

- With reference to natural disasters (e.g., flooding), the proposed development has undergone a Site-Specific Flood Risk Assessment, prepared by Barrett Mahony Consulting Engineers. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater flooding. Local knowledge suggests that pluvial flooding may impact the lowest points of the site along the northern boundary with the Cookstown Road. This localised flooding has occurred in the past and is minor. Drainage measures have been included in the design to eliminate this flooding.

- A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

- Safety on site will be of paramount importance. Only contractors with the highest safety standards will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

- Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

- Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

- All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

- Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

17.0 REFERENCE LIST

17.1 INTRODUCTION

Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, August 2017

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018

Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems - Key Issues Consultation Paper, Department of Housing, Planning, Community and Local Government, 2017.

Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017).

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoECLG, March 2013).

Development Management Guidelines (DoEHLG, 2007).

Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).

Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).

Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).

European Union (Planning and Development) (Environmental Impact Assessment) Regulation 2018

European Union (in addition to Directives referenced above)

Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017

EU Guidance on EIA Screening (DG Environment 2001).

Guidance on EIA Scoping (DG Environment 2001).

EIA Review Checklist (DG Environment 2001).

Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002).

17.2 POPULATION AND HUMAN HEALTH

National Planning Framework 2018

Regional Spatial and Economic Strategy for the EMRA, 2019

Wicklow County Development Plan 2016-2022

Bray Municipal District Local Area Plan 2018-2024

2020 Labour Force Survey Q3 – www.cso.ie

2020 Labour Force Survey Q2– www.cso.ie

2020 Labour Force Survey Q1 – www.cso.ie

2019 Labour Force Survey Q4 – www.cso.ie

ESRI Quarterly Economic Commentary, Autumn 2020 & Winter 2020

Central Statistics Office www.cso.ie

Central Bank of Ireland - Population Change and Housing Demand in Ireland 10 December 2019

Central Statistics Office www.cso.ie

Pobal.ie

17.1 BIODIVERSITY

17.2 LAND AND SOILS

Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environment Impact Statements (Institute of Geologists of Ireland (IGI) 2013);

Draft Guidelines on the Information to be contained in Environmental Impact Assessments Reports (EPA 2017)

Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017

Revised Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2015a);

Advice Notes for Preparing Environmental Impact Statements (EPA 2015b);

17.3 WATER

Historical Flood Data, obtained from the national hazard Mapping Website, (www.opw.ie);

CIRIA C753 – The SuDs Manual.

Revised Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2015a);

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