ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME II

PROPOSED RESIDENTIAL DEVELOPMENT

AT

Farrankelly, Greystones, Co. Wicklow

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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

1.0 INTRODUCTION AND METHODOLOGY

1.1 INTRODUCTION & TERMS OF REFERENCE

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. 21.2 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, and approved by John Spain, John Spain, BBS, MRUP, MRTPI, MIPI, Managing Director, John Spain Associates.

The subject lands are located within the built-up area of Greystones - Delgany and are bounded by Glenbrook Park and Eden Gate to the south and Glenheron to the east. Further to the north, on the opposite side of the Three Trouts stream, is Delgany Park.

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 relates to a residential development of 426 no. dwellings in a mix of houses, apartments and duplex units along with a creche of c. 599 sq. m, Active Open Space of 4.5 hectares, a greenway of c. 2.4 hectares along “Three Trouts” stream, a 2 storey split level residential amenity building of c. 325 sq. m, a 2 storey creche, as well as the provision of upgrades to the road frontage along the site boundary at Kilcoole Road and Priory Road. The proposal includes the provision of a link street between the Kilcoole Road and Priory Road and associated junctions and a pedestrian/cycle link to the boundary of Eden Gate.

The proposed development comprises Phases 1-3 of the Farrankelly Action Plan. Phase 4 (under separate ownership) may be subject to a separate future planning application. This EIAR includes a cumulative assessment of the relevant environmental impacts associated with the potential redevelopment provided for in the overall Phases 1-3 and Phase 4 lands, and the relevant baseline surveys undertaken by the EIAR consultants cover the entire Action Plan lands.

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*’), and Part 10 of the Planning and Development Regulations 2001, as amended, (most recently by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018). A description of the methodological approach to the preparation of this EIAR is provided in the following sections of this chapter.

1.2 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 new 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:

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

"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 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.

1.3 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.

The Department is in the process of updating the March 2013 *'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment'* to provide practical guidance on legal and procedural issues arising from the requirement to undertake EIA in accordance with Directive 2014/52/EU. The Draft Guidelines prepared by the EPA (August 2017) have also informed this EIAR.

1.4 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 most recent guidelines are the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports published by the EPA. The key issues consultation paper published by the Department also provides useful guidance.

The new EPA draft guidelines 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 Schedule 6, Article 94 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

1.5 EIA PROCESS OVERVIEW

One of the main purposes 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;
- Preparation of EIA Report;
- The examination by the CA of the information presented in the environmental impact assessment report;

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. Where relevant, scoping requests were issued and the responses received have been considered as part of the compilation of the EIAR. The content of the EIAR has been informed by national guidelines, guidelines issued by the European Commission and other policy documents which are set out at Section 1.4 of the EIAR. In addition, pre-planning meetings with the various departments of Wicklow County Council and also with An Bord Pleanàla (at SHD pre-application stage) all informed the EIAR.

Preparation of EIAR Report: The main elements in the preparation of an EIA Report relate to the consideration of alternatives, project description, description of the receiving environment, identification and assessment of impacts, monitoring and mitigation proposals.

The examination by the CA of the information presented in the environmental impact assessment report. The planning authority and An Bord Pleanála must consider each application for development consent on its own merits, taking into account all material considerations, including the reasoned conclusion in respect of EIA, before making its decision to grant, with or without conditions, or to refuse consent

As noted above, the proposed development comprises Phases 1-3 of the Farrankelly Action Plan. Phase 4 (under separate ownership) will be subject to a separate future planning application (for c. 110 no. dwellings). This EIAR includes a cumulative assessment of the relevant environmental impacts associated with the potential redevelopment provided for in the overall Phases 1-3 and Phase 4 lands.

1.6 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 the type of development under 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'. The proposal is for 426 no. dwellings and is therefore below the 500 dwelling threshold and a mandatory EIA is not required.

Category 10(b)(iv) refers to '*Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built up area and 20 hectares elsewhere.'*

The overall SHD application site is 21.2 hectares which includes the Active Open Space of 4.5 hectares, a Greenway of 2.4 hectares along with the residential areas and open space. Having regard to the overall size of the site and to category 10(b)(iv) of Part 2 of Schedule 5 of the Planning and Development Regulations 2001 as amended mandatory EIAR is required.

1.7 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 guidance2 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 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 173(2) (a) of the Planning and Development Act 2000, as amended, provides that a request for scoping may be submitted to the planning authority, 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 the consultation paper from the Department indicates that it is not intended to introduce mandatory scoping.

The EIAR prepared for the scheme has endeavoured to be as thorough as possible and therefore 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. ROD have prepared a Traffic and Transport Assessment Report; a Site Specific Flood Risk Assessment for the site; and a Construction Management Plan. Openfield has prepared an AA screening report. 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.

[2] Guidance on EIA Scoping, EC, 2001

1.8 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, shortterm, 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.

1.9 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 CA'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.

1.10 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 development at Farrankelly, Delgany, Greystones, Co. Wicklow.

The EIA process was based on the following four key objectives:

- Pursuing Preventative Action;
- Maintaining Environmental Focus and Scope;
- Informing the Decision; and
- Public & Stakeholder Participation.

1.10.1 Pursuing Preventative Action

Pursuing preventative action is the most effective means by which potential negative environmental impacts can be avoided. A consideration of anticipated likely and significant impacts was undertaken during the screening, informal scoping and the considerations of alternatives stages of the EIAR process. This involved forming a preliminary opinion, in the absence of complete data, with respect to the approximate magnitude and character of the likely environmental impacts. This assessment was based on the knowledge, experience and expertise of the EIA and project design team with reference to the amended EIA Directive, EIA guidance material and local precedents.

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.

1.10.2 Maintain Environmental Scope and Focus

It is important that the EIAR remains tightly focussed. This minimises expenses, delays and the potential for a confusing mass of data to obscure relevant facts. The EIA process has been project managed and steered, so as to ensure that the EIAR documentation and analysis are confined to those topics and issues which are explicitly described in the legislation, and where environmental impacts may arise. Evaluation and analysis has been limited to topics where the indirect, secondary or cumulative impacts are either wholly or dominantly due to the project or development under consideration and remain focused on issues that:

- Are environmentally based;
- Are likely to occur; and,
- Have significant and adverse effects.

1.10.3 Informing the Decision

The EIAR document enables the competent/consent authorities 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.

1.10.4 Public & Stakeholder Participation

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 is 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.

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. A 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. Direct and formal public participation in the EIA process will be through the statutory planning application process. A summary of the pre-application discussions are contained in Volume III of this EIAR.

1.11 FORMAT AND STRUCTURE OF THIS EIAR

1.11.1 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 (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. 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 Air (Noise and Vibration);
Chapter 9 Landscape & Visual;
Chapter 10 Material Assets – Traffic and Transportation;
Chapter 11 Material Assets - Waste Management;
Chapter 12 Material Assets – Utilities;
Chapter 13 Cultural Heritage (Local History, Archaeology & Architectural Heritage);
Chapter 14 Risk Management for Major Accidents and / Or disasters;
Chapter 15 Interactions;
Chapter 16 Summary of Mitigation Measures;
Chapter 17 References;

- Volume III: Technical Appendices (Volume III contains specialists' technical data and other related reports).

1.11.2 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 1.2 below.

Table 1.2 – 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.
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

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

Chapter	Title	Content
		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 for Major Accidents and / Or disasters	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
15	Interactions of the Foregoing	Describes the potential interactions and interrelationships between the various environmental factors
16	Summary of Mitigation and Monitoring Measures	Sets out the key mitigation and monitoring measures included in the EIAR 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, reliable 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 1.3 – 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.

1.12 EIAR PROJECT TEAM

1.12.1 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.

1.12.2 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 1.4 below.

Table 1.4 – EIAR List of Competent Experts

Organisation	EIAR Specialist Topics / Inputs
John Spain Associates & EIAR Team Planning & Development Consultants, 39 Fitzwilliam Place, Dublin 2, D02 ND61 T: 01 662 5803 E: rkunz@johnspainassociates.com Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt	Introduction and Methodology Project Description and Alternatives Examined (JSA & EIAR team) Population and Human Health (JSA & EIAR team) Interactions of the Foregoing (JSA & EIAR team) Principal Mitigation and Monitoring Measures (JSA & EIAR team) Non-Technical Summary (JSA & EIAR team)
Rory Kunz, BA (MOD), MSc Environmental Resource Management, MAT&CP, Diploma in Environmental Impact Assessment (EIA) Management Brian Greenan, MRIAI Senior Associate, Metropolitan Workshop Architects	Project Description and Alternatives Examined
Openfield Padraic Fogarty 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)	Biodiversity

Organisation	EIAR Specialist Topics / Inputs
Dr. Tina Aughney Bat Eco Services Licenced Bat Specialist - Honours degree in Environmental Science from NUI Galway and Ph.D.	Biodiversity (Bats)
Dr. Andrew Thomson Principal Engineer ROD Consulting Engineers (B.A., B.A.I., Trinity College Dublin, PhD., Trinity College Dublin, C.Eng. M.I.E.I., Chartered Engineer, R.Cons.E.I.)	Land and Soils
Dr. Andrew Thomson Principal Engineer ROD Consulting Engineers (B.A., B.A.I., Trinity College Dublin, PhD., Trinity College Dublin, C.Eng. M.I.E.I., Chartered Engineer, R.Cons.E.I.)	Water
John Bell Principal Engineer ROD Consulting Engineers B.Eng. Civil Engineering, University of Abertay Dundee, Scotland M.I.E.I., Institute of Engineers of Ireland C.Eng. Chartered Engineer Professional Certificate in Road Safety Audits	Material Assets-Traffic
Ian Byrne MSc MIOA Dip Environmental & Planning Law	Material Assets (Waste Management)
Dr. Andrew Thomson Principal Engineer (B.A., B.A.I., Trinity College Dublin, PhD., Trinity College Dublin, C.Eng. M.I.E.I., Chartered Engineer, R.Cons.E.I.) Niall Coughlan, BAI; CEng. MIEI, RConsEI Associate Waterman Moylan Consulting Engineers	Material Assets (Utilities)
Ian Byrne MSc MIOA Dip Environmental & Planning Law	Air Quality and Climate (Population and Human Health)
Ian Byrne MSc MIOA Dip Environmental & Planning Law	Noise and Vibration (Population and Human Health)
Declan O'Leary, B.Agr.Sc. (Land Hort) UCD; Post Grad Dip in Landscape Architecture (University of Central England); MILI	Landscape and Visual Impacts
Faith Bailey MA, BA (Hons), MCIfA Associate Director	Archaeology, Architectural and Cultural Heritage

Organisation	EIAR Specialist Topics / Inputs
Senior Archaeologist & Cultural Heritage Consultant IAC Archaeology	
Derek Roche Diploma in Occupational Health & Safety from UCD, Chartered member of IOSH (Institute of Occupational Safety & Health)	Risk Management for Major Accidents and or disasters
John Spain, BBS, MRUP, MRTPI, MIPI, Managing Director, John Spain Associates	Review of EIAR

1.13 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.

1.14 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 Panther Environmental Solutions Ltd 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.

1.15 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.farrankellyshdplanning.com set up by the applicant.

1.16 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.

1.17 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.

1.18 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], both 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.

1.19 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 PROJECT 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 PROJECT

The subject lands of. 21.2 hectares are located in the townlands of Farrankelly and Killincarraig, Delgany, Greystones, Co. Wicklow bounded by the “Three Trouts” stream to the north, existing residential development (Eden Gate & Glenbrook Park) to the south, the Kilcoole Road (R761), to the east, and Priory Road to the west.

The development will consist of the construction of a residential development of 426 no. dwellings, a creche (c. 599 sq. m), residential amenity building (c. 325 sq. m), active open space of 4.5 hectares, greenway of c. 2.4 hectares as follows:

A) 245 no. houses comprising; 148 no. 3 bedroom houses, 93 no. 4 bedroom houses, and 4 no. 5 bedroom houses [houses are provided with two car parking spaces and solar panels] – House Type E, 3 storey to front – 2 storey to rear; House Types G1,G2,G3, and H dormer house types, all other house types 2 storey;
B) 93 no. apartments with balconies in 3 no. 4 storey apartment buildings (Blocks 1 and 2 over part basement/podium) comprising 36 no. 1 bedroom apartments, 53 no. 2 bedroom apartments and 4 no. 3 bedroom apartments;
C) 44 no. 2 bedroom duplex apartments and 44 no. 3 bedroom duplex apartments in 11 no. 3 storey duplex buildings;
D) Provision of a 2 storey split level residential amenity building of c. 325 sq. m (3 no. car parking spaces and 12 no. bicycle spaces). Temporary use of the residential amenity building as a marketing suite for a period of 3 years.
E) Provision of a 2 storey creche of c. 599 sq. m (10 no. car parking & 12 no. cycle spaces), 1 no. ESB substation (beside creche) and ESB kiosks, associated single storey bicycle storage and refuse storage buildings.
F) Active Open Space of c. 4.5 hectares comprising: 1 no. playing pitch, 1 no. multi-purpose pitch (with all weather surface), tennis courts, children’s play area, trim trail and parking (30 no. car parking spaces & 20 no. bicycle spaces),
G) Approximately 4.2 hectares of open space comprising; a pedestrian and cycle route or ‘greenway’ (and associated paths, stream crossing and lighting) at the “Three Trouts” stream (c. 2.4 hectares); c. 1.8 hectares of open space within the development (including playground areas); all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths.
H) Access to the subject site will be from a new priority junction (including upgraded frontage), located on the Kilcoole Road (R761). The proposal includes for the construction of a vehicular/pedestrian access from Priory Road as well as 3 no. independent vehicular access points from Priory Road to serve 9 no. dwellings, construction of cyclist and pedestrian link to boundary of Eden Gate development located to the south, 762 no. car parking spaces and 225 no. cycle spaces.
I) Surface water and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as to drainage services (including underground pumping station), all on a site of c. 21.2 hectares.
J) Temporary marketing signage for a period of 3 years (located beside Priory Road and Kilcoole Road).
K) All associated site development and landscape works.

Figure 2.1 – Site Layout

Source: Metropolitan Workshop Architects

2.3 DESCRIPTION OF THE PHYSICAL CHARACTERISTICS OF THE PROJECT

2.3.1 Demolition

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

2.3.2 Summary

In summary, the proposed development comprises the construction of 426 no. dwellings consisting of 245 no. houses, 93 no. apartments and 88 no. duplex units. A wide variety of dwelling typologies are included in the proposal, comprising 93 no. apartments in 1, 2 and 3 no. bedroom apartments in 3 no. apartment buildings along with 88 no. duplex units, in a series of buildings located centrally within the proposed development, which comprise c. 42% of the overall mix of units. In addition it is proposed to provide 245 no. 3, 4 and 5 bedroom dwellings in a range of typologies comprising terraces, semi-detached and detached configurations.

The design intent is to provide a range of housing typologies of different heights, which include dormer dwellings (on the Priory Road, 2 storey dwellings (in a back to back arrangement) with Eden Gate located to the south, along with duplex dwelling buildings of 3 storeys and 3 no. apartment buildings of 4-storeys located centrally with the scheme layout. In addition, variety is provided with the inclusion of 3 storey dwellings along the Kilcoole Road.

Table 2.1 – Overall Residential Development Mix

	1 bedroom	2 bedroom	3 bedroom	4 bedroom	5 bedroom	Overall	% Breakdown
Houses			148	93	4	245	57.3%
Apartments	36	53	4			93	21.8%
Duplex Units		44	44			88	20.7%
	36	97	196	93	4	426	
Overall Mix	8.5%	22.8%	45.9%	21.8%	0.9%		

Source: Metropolitan Workshop Schedule of Areas

2.3.3 Houses

The houses are designed as dormer, two and three storey family dwellings, in detached, semi-detached or terraced 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.

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.

2.3.4 Apartments

The apartments will be located in 3 no. 4 storey apartment buildings located centrally within the scheme. Overall there will be 93 no. apartments with balconies comprising 36 no. 1 bedroom apartments, 53 no. 2 bedroom apartments and 4 no. 3 bedroom apartments.

Apartment Building nos. 1 and 2 will overlook the area of open space located to the east, while apartment building no. 1 will overlook the communal open space (of. C. 0.2 hectares) located within the apartment buildings.

Figure 2.2 – Apartment Block Elevation

Source: Metropolitan Workshop Architects

2.3.5 Duplex Units

It is proposed to provide 88 no. duplex units (44 no. 2-bed units and 44 no. 3 bed units) contained in 11 no. 3 storey duplex buildings located centrally within the scheme, to the south, west and north of the apartments.

Figure 2.3 – Duplex Block Elevation

Source: Metropolitan Workshop Architects

2.3.6 Creche

It is proposed to provide a two-storey creche of c. 599 sq. m along with an external play area of c. 253 sq. m. The creche is located to the south of Apartment Buildings 2 and 3 and to the west of Apartment Building 1. The creche will provide drop-off spaces along with bicycle parking of 12 no. spaces and 10 no. car parking spaces. A single storey bicycle store and bin store will be located on the western side of the external play area associated with the creche.

Figure 2.4 – Proposed Creche

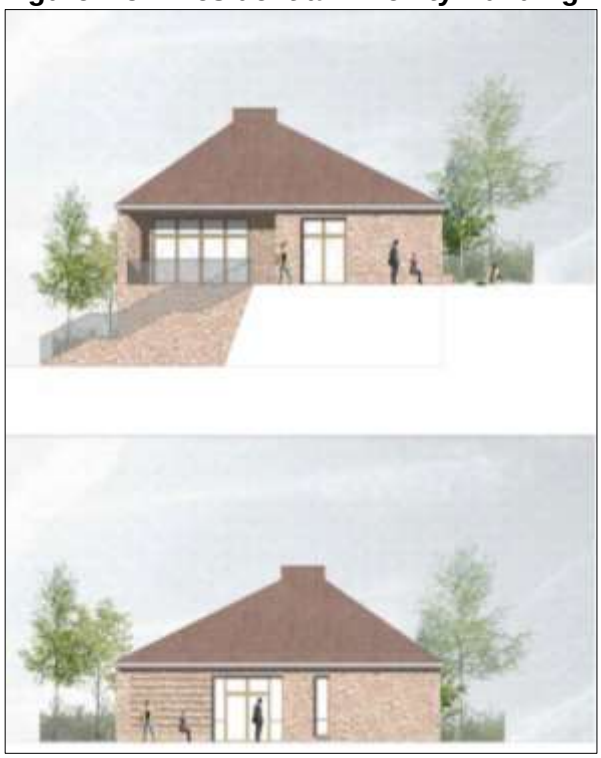
Source: Metropolitan Workshop Architects

2.3.7 Residential Amenity Building

The proposed development includes a two storey split level residential amenity building, which will include floorspace for a gym and will be located on the eastern side of open space no. 1. The building will be accessed from the internal link road, with a reception area and multi-purpose space at upper ground floor level, with the Gym as well as a management office for the overall development located at lower ground floor level. The building will provide an important amenity asset for the new residential community and will also provide passive surveillance to the open space area.

Bicycle parking (12 no. spaces) and car parking (3 no. spaces) will be provided.

Figure 2.5 – Residential Amenity Building

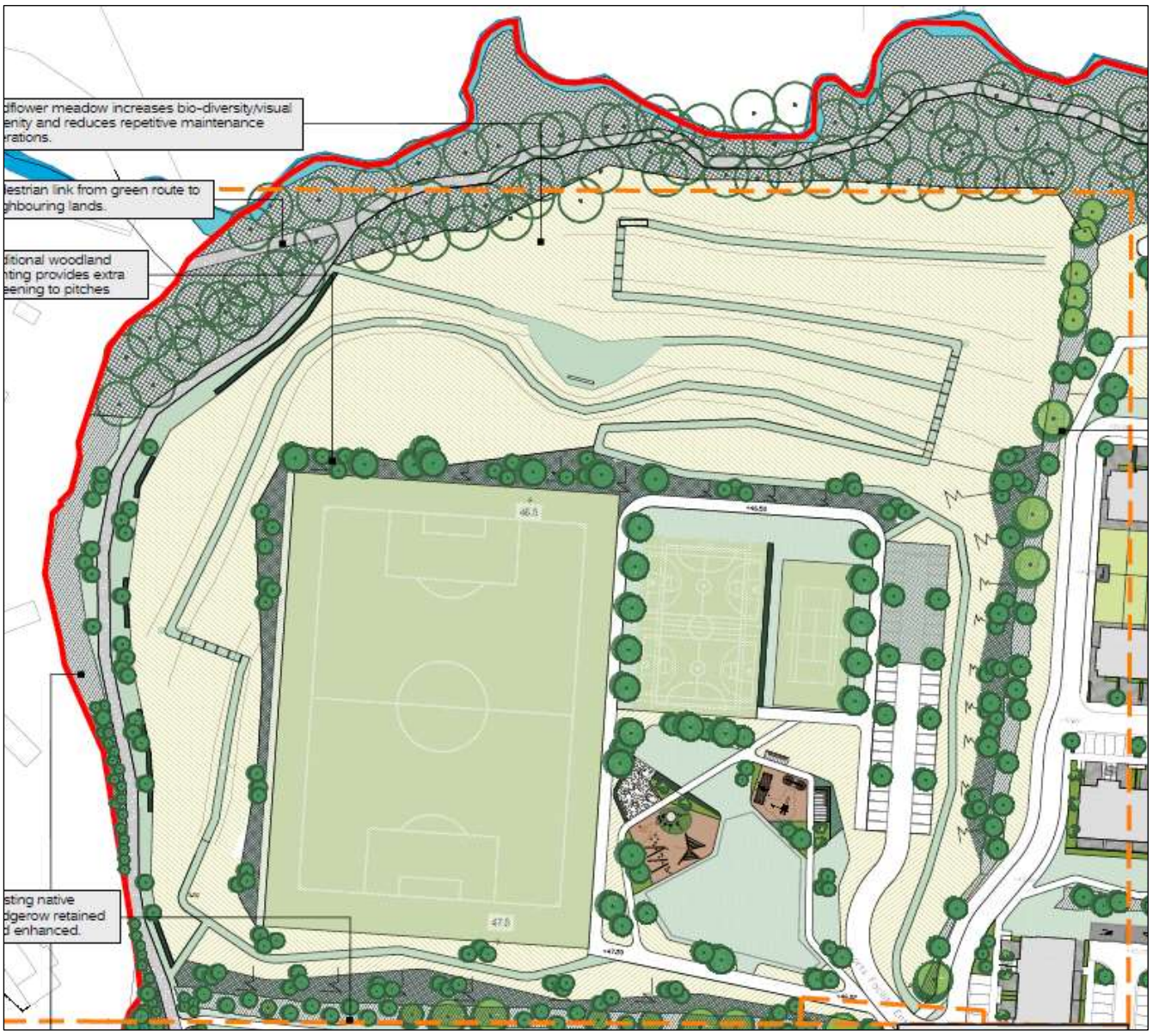


Source: Metropolitan Workshop Architects

2.3.8 Active Open Space

The subject lands include Active Open Space of 4.5 hectares. As part of the SHD application, it is proposed to deliver Active Open Space early in the build out of the overall lands (to commence in phase 1) in tandem with the general earthworks relating to the housing element of the scheme.

Figure 2.6 – Active Open Space (4.5 hectares)



Source: KFLA Architects

The Active Open Space will include a football pitch as well as a tennis court and multi-use pitch. In addition, it is proposed to provide a play area and an informal kickabout area to the front of the proposal. Some parking is also provided (c. 30 car parking spaces and 20 no. cycle spaces), with an additional overspill (grassed) area provided, if required.

The northern portion of the proposal includes for running/training areas, which will use the contours of the land where possible.

2.3.9 Three Trouts Riverwalk (Greenway)

The '*Three Trouts Stream'* and associated woodland is also of high priority. Similar to the treatment of the existing hedgerows, this linear space will become an integral linking feature in the wider green route strategy, while the dense belt of woodland would remain as part of a greenbelt buffer zone. In terms of amenity use, the proposed walkway through the space would become a recreational asset to the wider local community, as well as future residents.

The green route proposed meanders through the existing woodland, utilising existing tracks and topographical features, and provides an alternative circulation route for users, which connects to footpaths and existing tracks located outside of the site boundary. The proposed green route will function as a recreational route and will be defined by a change in surface material. The route will begin at the south-west corner of the site and work its way around the site boundary up to the north-east corner. A small footbridge will cross the Three Trouts stream.

Figure 2.7 – Three Trouts "Greenway"

Source: KFLA Architects

A pedestrian/cycle link will join on to the green route from the main part of the site, through open space no. 1 and past the apartments to the north. Additional woodland planting will be planted at certain sections along the site boundary to create the atmosphere of a continuous woodland walk.

2.4 ACCESS AND PARKING

2.4.1 Access

Kilcoole Road

On the Kilcoole Road, the proposed development will be accessed via a simple Priority T Junction to be provided at the R761 entrance. Traffic exiting the site via the R761 will be required to give way to traffic already on the regional road. The proposed residential development will provide a boundary setback for modest improvement of the R761 Kilcoole Road along the site frontage to accommodate a cycle track on the western side.

The R761 Kilcoole Road entrance junction is located at the start on the inside of a curve and will provided with suitable visibility splays with the setting back of the site boundary to include the provision of a footpath and a widened verge to accommodate the future Kilcoole Road upgrade.

The proposed development will provide a setback boundary to allow for the future upgrade of the R761 Kilcoole Road along the site frontage. The entrance of the proposed development has been designed to cater not only for the subject site, but also to be able to accommodate this future general road improvement. The entrance layout proposed is capable of accommodating the entire development from Kilcoole Road. It is neither dependent on the future road upgrade on the Kilcoole Road or the secondary access to the west on Priory Road or to the south to Eden Gate.

It is expected that Wicklow County Council will undertake the overall road improvements as part of a future public works scheme, which will include provision of a cycle track on the western side of the road at Glenbrook Park, and

will also extend northward to avail of other boundary setbacks as provided for in other planning permissions as well as an upgrade to the Three Trouts Bridge, including a realignment of the road within the space provided.

Figure 2.8 – Frontage onto Kilcoole Road

This future upgrade is to include the localised road realignment to the west into the subject site and the provision of footpaths and cycle tracks on both side. The localised realignment of the Kilcoole Road into the subject site will make space for these upgrade works so that the properties on the opposite side of the road are not affected. It is expected that Wicklow County Council will undertake the overall road improvements as part of a future public works scheme, which will include provision of a cycle track on the western side of the road at Glenbrook Park, and will also extend northward to avail of other boundary setbacks as provided for in other planning permissions.

Priory Road

The proposed Priory Road entrance junction is on a slight curve in the road and will be provided with suitable visibility splays with the setting back of the property boundary and the provision of a footpath. In addition, it is proposed to provide 3 independent access points to serve the 9 no. dwellings located to the north of the entrance to the development.

A second access will be provided from Priory Road. The provision of this access will be dependent on the general upgrade of the road section of Priory Road to include a footpath along the western frontage of the site The proposed development is capable of being served from the single access point onto the Kilcoole Road, in advance of the opening of the Priory Road entrance and is not dependent on the Priory Road entrance. The Priory Road access is not required for the proposed development.

The existing road has quite a rural character. A 2m wide footpath will be provided along full road frontage (as per the LAP Road Objective 11) which was agreed with Wicklow County Council who require a footpath along the southern boundary of Cairn Homes lands along Priory Road to connect to Eden Gate. This path is provided in the scheme layout. The provision of a footpath between the subject site and the Eden Gate roundabout, will be undertaken by Wicklow County Council, in the future. However, it is important to note that the footpath between the southern boundary of the site isn't required for the proposed development, in respect of any meaningful linking function. It is further noted that pedestrian access can be provided to the southern boundary to Eden Gate, which would allow for easy access to the amenities in the Eden Gate Neighbourhood Centre.

Eden Gate Pedestrian/cyclist Access

The proposed development allows for a pedestrian and cycle connection to the Eden Gate boundary to the south which would allow for easy access to the amenities in the Eden Gate Neighbourhood Centre.

Figure 2.9 –Pedestrian Link to Eden Gate

2.4.2 Parking

It is proposed to provide 757 no. car parking spaces and 235 no. cycle spaces within the scheme. The houses will be provided with 2 no. spaces per unit, 132 spaces will be provided for duplex units along with 88 cycle spaces, while the apartments will be provided with 97 no. car parking spaces (with a mixture of basement and surface spaces) and 93 no. cycle spaces. The apartments and duplex units will have one space per unit, within the bicycle stores.

Table 2.2 – Car Parking

	Car Parking	Bicycle Parking
Houses	490	
Apartments	97	93
Duplex Units	132	88
Creche	10	12
Active Open Space	30	20
Residential Amenity Building	3	12
Overall	**762**	**225**

Source: Metropolitan Workshop Architects

2.5 LANDSCAPING

2.5.1 Introduction

The overall landscape strategy is to provide a series of three main open space areas, connected by further linear green links (3 no. areas comprising c. 1.22 hectares) which are based on existing landscape features, to provide an overall integrated green infrastructure strategy, which is linked to the additional Active Open Space area of 4.5 hectares and the Greenway area (2.4 hectares). These existing features form part of the existing green infrastructure links within the site and surrounding area. The three primary open spaces are located centrally within the overall site and each space is easily accessible from the surrounding properties.

Central to the landscape strategy is the proposed walking and cycling route along the existing '*Three Trouts Stream'*, which is located just inside of the northern site boundary. Both the stream itself and the dense woodland planting are prominent landscape features within the site.

The main method used to enhance green infrastructure links is the retention and strengthening of existing hedgerows and woodland areas. Existing hedgerows provide the opportunity to create green routes through the site, which serve both a recreational and ecological function.

Particular attention was given to the retention of Scots Pine trees which was identified as per the Greystones/Delgany Local Area Plan (Protection Objective T06).

2.5.2 Landscape Layout and Design

In all of the open spaces the levels have been carefully considered to accommodate a large flat area for passive recreation, formal play and ball games. Overlooking each of the lawn and play spaces, a seating space is located including benches, ornamental planting, flowering trees and feature paving.

2.5.3 Open Space Area no. 1

Open space area no. 1 is located in the eastern portion of the overall subject site and comprises c. 0.72 hectares and includes the Residential Amenity Building, located on the eastern portion of the open space.

A central landscape element within the space is the existing native hedgerow which runs on a north-south axis through the space, this hedgerow will be enhanced and strengthened, and the old lane way associated with the hedgerow will be reinstated as a gravel path. This hedgerow also defines the two main parts of the overall space. The eastern portion has more accommodating levels and will provide for a range of active uses. Within this area, there is a central lawn area provided for passive recreation and active play, which is defined by formal clipped hedges and shrub planting.

To the west of the central hedgerow is the western area. The levels have also been reprofiled to accommodate a flat lawn area. Along the western side of this space is a buffer zone which runs alongside the apartments fronting onto the open space. The buffer zone is composed of sections of native understory planting and copses of native trees strategically located to maintain a visual connection between the semi-private apartments and the open space. This zone acts as a visual screen while also providing amenity and habitat value to the proposed development. A walkway/cycle track through the buffer zone provides a secondary circulation route.

Figure 2.10 –Open Space no. 1

Source: KFLA

2.5.4 Open Space Area no. 2

Figure 2.11 – Open Space Area no. 2

Source: KFLA

The design of the space is focused around a central lawn which is overlooked by a seating area. The main seating area is defined by ornamental planting, feature paving and a central raised planter. The raised planter also provides a seating option and it's central positioning allows movement through and around the space. Stepping stones, timber stilts and balance beams, tree copses and other features provide opportunities for natural and creative play.

2.5.5 Open Space no. 3

The spatial design of this space is focused on a formal children's playground at the northern end of the space. A seating space is provided adjacent to this which is designed to provide inward and outward orientated seating options surrounded by planting with a specific planting mix to attract insects and birds. From this seating area views are provided of the open space and of the playground. The planting design has been carefully considered to define all of the sub-spaces within the overall space. Shrub planting around the edges of the open space helps to define it, while also providing screening.

Figure 2.12 –Open Space no. 3

Source: KFLA

Communal Open Space

Within the apartment blocks there is an allowance of semi-private communal open space for use by the residents of the block comprising c. 0.2 hectares. The quantum of space for each apartment is above the DoHPLG Planning Guidelines for Design Standards for New Apartments 2018, which requires c. 0.12 hectares.

Materials and Site Furniture

A number of 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.

2.5.6 Planting Strategy

The planting palette has a limited number of species chosen for their appropriateness and with a preference for native planting where possible. 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. Throughout the public open spaces, a mix of broadleaf deciduous trees will be planted that will increase the woodland cover while facilitating safe use of the spaces.

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.

2.6 SERVICES

2.6.1 Foul Sewer

It is proposed to divert the existing 300mm foul sewer traversing the site from the Eden Gate residential estate to north-east of the site to construct a new foul network that will serve the proposed development. Existing manholes will be use for the connection and discharge of the new diverted foul drainage network.

An underground pumping station will also be required to pump sewage from the northern part of the site to connect into the new layout which will then be discharged by gravity sewer. The underground pumping station will be constructed to Irish Water specifications.

2.6.2 Surface Water Drainage

It is proposed to divert the existing 600mm concrete sewer traversing the site to construct a new surface drainage system that will collect runoff from roads and roofs together with any additional runoff from landscape areas which does not percolate to ground. Existing manholes will be use for the connection and discharge of the new diverted surface water network.

The surface water drainage system will be designed to ensure adequate capacity is achieved with minimum self-cleansing velocity in the pipes of 1.0 m/s when flowing half full.

2.6.3 Attenuation

Given the size of the development, the site has been divided in eight areas for surface water collection purposes. It is proposed to provide a network of 225mm diameter pipes for each of these areas and to connect them to separate attenuation tanks.

The tanks have been sized to provide storage for 1 in 100-year rainfall event including a 10% increase for a climate change for the entire development with the discharge rate limited from 2.85 l/s/ha to 3.28 l/s/ha depending on the zone that the attenuation tank is located in. It is proposed to discharge to the existing stream to the north of the site in some cases and to the existing 600mm surface water sewer to the north east of the site in other cases.

As part of the development, a number of different SuDS measures are proposed to minimise the impact on water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

2.6.4 Water Supply

It is proposed to provide water to the development through a new connection to the existing 150mm uPVC watermain on the Kilcoole Road. The new connection will require the extension of the existing water network by approximately 310m. These works will be undertaken under a road opening licence and do not form part of the application, but do form part of the cumulative assessment, in respect of the EIAR.

A pre-connection enquiry has been submitted to Irish Water to determine the suitability of the proposed water supply to the site.

2.6.5 ESB Supply

There is extensive ESB Networks infrastructure in the vicinity of the site including existing overhead cables and a short length of existing below ground ducts. The overhead cables include extensive Medium Voltage Lines (10kV/20kV) which are concentrated at the southern end of the site but also traverse the entire site in the north-south direction. There is also a less extensive Low Voltage (400V) network of overhead lines near the northern boundary.

Waterman Moylan, acting on behalf of Cairn Homes, have met with the ESB Networks engineers on site to review the existing infrastructure and have agreed a strategy for undergrounding and diverting the overhead lines. A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure at the southern end of the site.

2.6.6 Telecommunications

Telecommunications supply, and the requirement for any alterations to the existing telecommunications network for the proposed development, will be agreed in advance of construction with the relevant telecommunications providers. All telecommunications related works will be carried out in accordance with relevant guidelines.

2.7 CONSTRUCTION MANAGEMENT STRATEGY

It is envisaged that the development of the lands will occur for up to approximately 2 years, but could extend, up to a standard 5 year permission period. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. A Construction Management Plan which has been prepared by Cairn Homes, has been reviewed by the relevant EIAR consultants and is included in the SHD application; a refined plan will be put in place by the Contractor to implement the mitigation measures in the CMP submitted with the application.

2.7.1 Construction Phase Mitigation

A Construction Management Plan has been prepared and is submitted with this SHD planning application. The EIAR chapters contain a range of mitigation measures which will reduce the potential impacts of the proposed development. These mitigation measures are summarised in Chapter 16 of the EIAR.

The Construction Management Plan outlines the procedures to be followed to ensure the minimal impact of the construction activities on the surrounding residential community and the general public. The plan considers the safety of personnel carrying out the work, visitors to site and any unauthorized persons obtaining access to site.

With reference to the construction phase of the proposed development, the objective of the Construction Waste Management Plan (CWMP) 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.

Cairn Homes appoints a specialist Pest Control Contractor to manage potential infestations around the site and around the site compounds. Good housekeeping and high hygiene standards are essential to maintaining high levels of pest control on the site.

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.

2.7.2 Site Construction Compound

A site compound, visitor & contractor parking area will be established within Cairn Homes boundary on the proposed Phase 2 section of the site. This site access point is accessible via Priory Road and will be used by cars and light vans. Other construction traffic will be required to access the site directly off Kilcoole Road.

The compound may be used as material staging areas, temporary car parking for construction workers, site offices and huts, welfare facilities for workers (including changing rooms & lockers), storage of plant and equipment, etc. The location of the temporary compound is indicated on the site layout. It is noted that the location is indicative, and may change as the scheme is built out.

Designated parking area is provided in the site car park. It is proposed to cater for up to 100 cars /vans in this area to minimise the disruption to the local amenities and parking facilities. There is a designated pedestrian walkway from the car park to the site compound and from the compound the construction works areas located away from the live construction site.

Parking is not permitted in the following areas.

- any other area of the site
- on the public roads
- Within local housing estates.

Local roads will be well maintained by managing the site traffic on hard surfaces inside the site boundary. In addition a road sweeper is available to the site to ensure the local roads are maintained free from mud and other debris from vehicles exiting the site.

Restrictions on Noise

Site Management will ensure all noise levels in the working area are assessed around the site perimeter and within the site, with the relevant appropriate action to reduce the noise emissions, implemented once the noise levels are known.

2.7.3 Scope of the Proposed Construction Works

An indicative construction sequence is outlined below to show the buildability of the project. The actual construction sequence will be confirmed when a contractor is appointed. The main stages of construction will proceed in a general sequence as follows:-

- Enabling Works including demolition, set-up of site construction facilities service diversion works and tree removal.
- Site clearance will include cut and fill of existing ground profiles and formation of key site features.
- Construction of drainage, water supply and utility service distribution network within the site.
- Construction of buildings.
- Landscaping.
- Building fit-out and commissioning.

The proposed development also includes off-site roads and infrastructure upgrade works to waste water drainage, storm water drainage and water supply services.

2.7.4 Main Stages/phases of Construction

The expected construction staging provides for 2 phases over approximately 2 years, and potentially extending to 5 years. While the pace and timing of this phasing is highly dependent on unpredictable market conditions, the overall site design and phasing strategy takes account of the infrastructure and open space provisions associated with each phase, together with the proportional provision of Part V dwellings. However, it is feasible that market conditions would require alterations to any programme which is specified at this time and it is likely that it will be reviewed in the course of construction, if required.

Archaeological monitoring of earthmoving works for site preparation will be undertaken to ensure that any features of an archaeological nature that may be revealed are identified, recorded and fully resolved.

Chapter 5, Land and Soils provides detailed information on excavation material and mineralogy. Chapter 11, Waste Management contains more detailed information on Resource and Waste Management associated with the project. Mitigation measures to minimise environmental impacts are described in the relevant sections of the EIAR.

2.7.5 Construction of Services

Following on from completion of site clearance, 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.

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.

The site will be secured with hoarding on all open sides and accessible approaches.

Hoarding and Site Segregation

Construction site hoardings are used to provide a secure site boundary to what can be a dangerous environment for people who have not received the proper training and are unfamiliar with construction operations. Site hoarding also performs an important function in relation to minimising some of the potential environmental impacts associated with construction, namely noise, visual impact, and dust deposition.

Hoarding will be established around the site construction area (where required) before any significant construction activity takes place. Hoardings works will be of the same nature as that carried out for similar operations at most construction and building sites.

Contractors must erect hoarding to a minimum of a 2.4m high in either close-sheeted hoarding as appropriate to the works and as per the contractor's approved site plan. Hoarding must be maintained in a presentable condition to ensure safe passage.

2.7.6 Hours of Working

Working hours will be strictly in accordance with the granted planning conditions with no works on Sundays or Bank Holidays. If work is required outside of these hours, written approval will be sought by the contractor from the Local Authority.

It is anticipated that normal working hours may be 7am to 7pm Monday to Friday and 8am to 5pm on a Saturday. However, it may be necessary to work outside of these hours at night and at weekends during certain activities and stages of the development (e.g. concrete pouring) which will be subject to agreement with the Local Authority.

Deliveries of material to site will be planned to avoid high volume periods. There may be occasions where it is necessary to have deliveries within these times and Contractor will agree with Wicklow County Council as appropriate.

2.7.7 Construction Traffic

The main construction access route will be from the Kilcoole Road (with some construction traffic from Priory Road). The CMP provides details of intended construction practice for the development, including:-

- Location of the site and materials compound(s) including area(s) identified for the storage of construction refuse.
- Location of areas for construction site offices and staff facilities.
- Details of site security fencing and hoardings.
- Details of on-site car parking facilities for site workers during the course of construction
- Details of the timing and routing of construction traffic to and from the construction site and associated directional signage, to include proposals to facilitate the delivery of abnormal loads to the site.
- Measures to obviate queuing of construction traffic on the adjoining road network.
- Measures to prevent the spillage or deposit of clay, rubble or other debris on the public road network.
- Alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public road or footpath during the course of site development works.
- Details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels.
- No parking on access routes. No unloading or blockages of access routes. Such vehicles will be immediately requested to move to avoid impeding works;
- The contractor must appoint a Traffic Management Coordinator responsible for the management of traffic management related activities;
- On site contractors must adhere to the overall traffic management measures for the internal road network from the preferred construction traffic entrance road to their site.

2.7.8 Construction Phasing

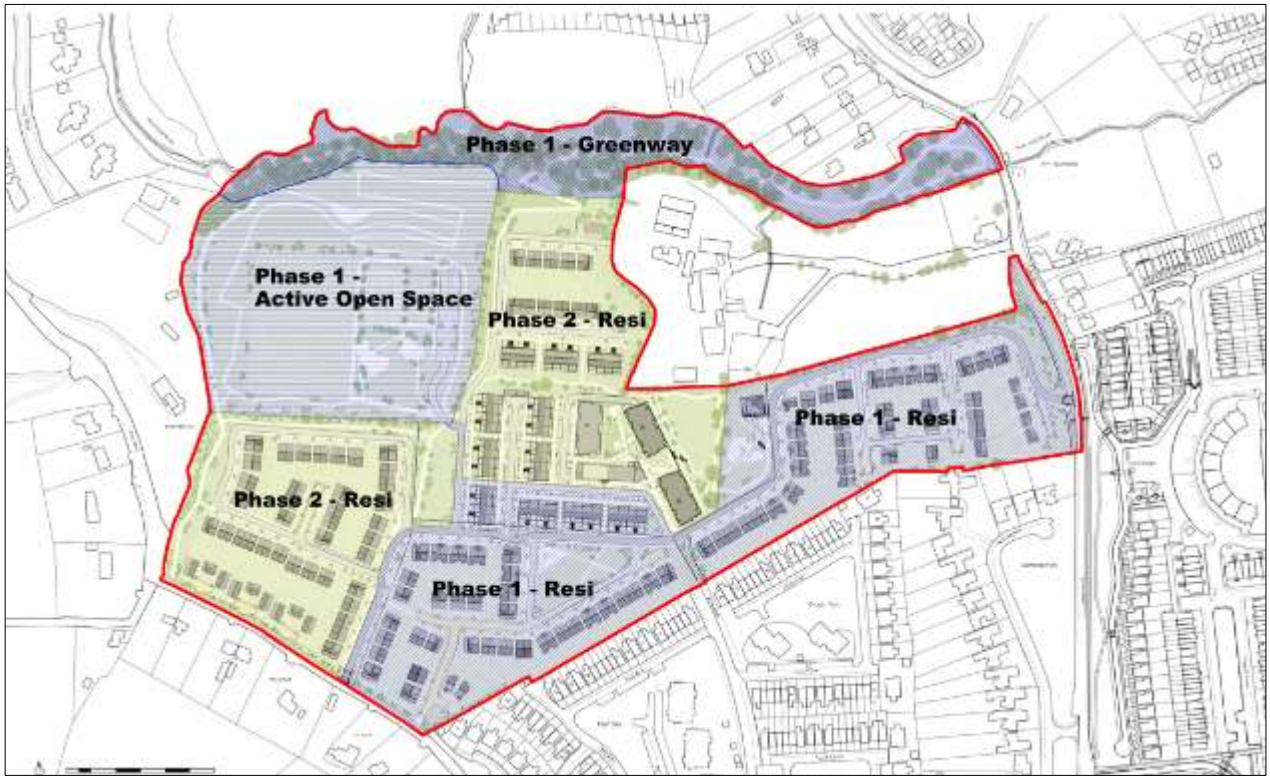
Drawing 1609-101-121 prepared by Metropolitan Architects illustrates the indicative construction staging sequence. It is envisaged that there would be 2 no. main phases of development over approximately 2 years, which could extend to 5 years depending on market conditions.

Phase 1 will comprise the construction of the Active Open Space (4.5 hectares) and the provision of the Greenway (2.4 hectares), the construction of the Road Objective R07 between the Kilcoole Road (R761) and Priory Road (with associated pedestrian/cycle link to boundary of Eden Gate to the south), the residential amenity building of c. 325 sq. m (located in the eastern portion of Public Open Space no. 1) along with Public Open Space no. 2. In addition it is proposed to construct 173 no. dwellings in Phase 1 as follows:

- 11 no. detached houses;
- 110 no. semi-detached;
- 20 no terraced terrace houses;
- 32 duplex units.

It has been agreed with the Roads Department of Wicklow County Council that the RO7 objective will be built in the first phase of development and the access from Priory Road will be opened subsequently, when Wicklow County Council have provided upgrades to the Priory Road. The R07 Objective has been designed to facilitate the proposed full quantum of development and the entrance onto the Kilcoole Road can accommodate the entire proposal. The future access from Priory Road is not required to facilitate the development and the Kilcoole (R761) entrance has been designed to accommodate the full scheme, and that the proposal can operate without the Priory Road access in place. In accordance with the RO7 objective, the proposed layout includes a potential link to the Eden Gate development to the south, with a minimum width of 10m, in order to facilitate the development of a possible traffic route, should the need arise in the future. Cycle/pedestrian access link to the boundary is to be provided.

Figure 2.13 –The proposed phasing plan



Source: Metropolitan Workshop Architects

Phase 2 will provide the remainder of the dwellings (253 no.), public open spaces and the creche of c. 599 sq. m. as follows:

- 9 no. detached houses;
- 68 no. semi-detached houses;
- 27 no. terraced houses;
- 56 duplex units;
- 93 no. apartments.

It is anticipated that the proposed creche could accommodate in the region of 123 no. childcare spaces and it is intended that the creche is delivered in phase 2 of the development having regard to the existing and committed provision of creche places in the area, which is set out in the Social Infrastructure Assessment prepared by John Spain Associates.

2.8 ENERGY STATEMENT

The SHD application includes an Energy Statement prepared by Waterman Moylan. The following is an extract from same. The dwellings will be required to minimise overall energy use and to incorporate an adequate proportion of renewable energy in accordance with Building Regulations Part L 2019, Conservation of Energy & Fuel (hereinafter referred to as Part L) and anticipated future revisions.

The Creche and the Residential Amenity Building will be designed to meet the requirements of Building Regulations Part L 2017 (Buildings Other than Dwellings).

The Department of Environment has recently issued revisions to Part L of the Building Regulations which have been published as “Part L 2019”. This standard introduces the “Near Zero Energy Buildings” (NZEB) concept for dwellings. NZEB targets will require that the energy consumption of new dwellings be reduced by 25% from the previously compliant level.

The new standard comes into effect for buildings for which planning permission is applied for after November 2019 or which are commenced after this date and which are not substantially complete before November 2020. As such, it is expected that the new standard will apply to this scheme.

Equally, Part L 2017 for Buildings Other Than Dwellings came into effect for building for which planning permission is applied for after 1st January 2019 and which are not substantially complete before 1st January 2020. As such it is expected that this new standard will also apply to the creche and residential amenity building.

2.8.1 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).

2.9 EMISSIONS AND WASTE

2.9.1 Effluents

Details of the impacts and remedial and reductive measures for surface water and foul drainage are recorded at Chapter 7 of this Environmental Impact Assessment Report. 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.

2.9.2 Municipal Waste/Waste Management

An operational waste management plan is included in the SHD application (prepared by Byrne Environmental).

The proposed Waste Management Plan 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*

Each section of the Waste Management Plan 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.

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.*

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

1. Materials will be ordered on an *"as needed"* basis to prevent over supply;
2. Materials shall be correctly stored and handled to minimise the generation of damaged materials;
3. Materials shall be ordered in appropriate sequence to minimise materials stored on site;

4. Sub-contractors will be responsible for similarly managing their wastes.

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.

Contaminated Soil

The soils chapter provides detail in respect of land and soils. 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.

Domestic Waste Management

It shall be the responsibility of the Management Company to ensure that all domestic waste generated by apartment residents is managed to ensure correct storage prior to collection by an appropriately waste permitted waste collection company on a weekly basis.

Sufficient domestic waste storage areas shall be provided throughout the proposed residential development. It shall be the responsibility of the Facilities Management Company to ensure that appropriate signage is provided in each area notifying apartment residents of the importance to recycle domestic waste items in accordance with the requirements of the contracted Waste Collection contractor.

The proposed development shall be constructed and developed to minimise the generation of construction waste. During the construction phase, construction waste shall be stored and segregated in dedicated waste storage areas which shall optimise the potential for off-site reuse and recycling. All construction waste materials shall be exported off-site by an appropriately permitted waste contractor.

The development shall be designed to provide adequate domestic waste storage areas for common residential areas (apartments) and individual houses. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct waste disposal and recycling is available for residents.

2.10 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'*.

2.11 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'*.

2.12 FORECASTING METHODS USED FOR ENVIRONMENTAL EFFECTS

The methods/methodologies employed to forecast and the evidence used to identify the significant effects on the various aspects of the environment are set out in 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.

2.13 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 Greystones, within the administrative area of County Wicklow, transboundary impacts on the environment are not considered relevant, in this regard.

2.13 ALTERNATIVES CONSIDERED AND COMPARISON OF ENVIRONMENTAL EFFECTS

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.

2.13.1 Alternative Locations

Do-nothing Alternative

The site is zoned for residential, active open space and open space development under the Greystones-Delgany-Kilcoole Local Area Plan, 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 Greystones. 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 strategically located residential zoned lands, which are located within the metropolitan area of Dublin (as confirmed in the Regional Spatial and Economic Strategy for the region.) The suitability of the lands for development, within an established development area of the County and the sites location, in the Dublin Metropolitan Area, close to public transport and road infrastructure were also key considerations.

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."

This is of relevance to the proposed development of the lands at Farrankelly. On the strategic or *'higher'* matters of already determined policy, we refer to the Wicklow County Development Plan 2016-2022 and the Greystones-Delgany-Kilcoole LAP which make reference in support of the development of specific sites within Greystones. The subject lands are located within the Farrankelly Action Plan 6 area and as such are identified for development. The LAP includes a clear policy framework which was subject to a Strategic Environmental Assessment.

2.13.2 Alternative Uses

In addition to residential use, there are other land uses which are permitted in principle on these lands. The proposal includes for Active Open Space as well as a creche and a residential amenity building. It is not considered that an alternative comprising one of the alternative uses would result in the best use of these lands, particularly having regard to 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.

2.13.3 Description of Alternative Processes

This is not considered relevant to this EIAR having regard to the nature of the proposed (residential) development.

2.13.4 Alternative Designs

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 Urban Heights 2018, the Apartment Guidelines 2018 and the Sustainable Residential Development in Urban Areas (2009) as well as where relevant the Wicklow County Development Plan 2016 and the Greystones-Delgany-Kilcoole LAP 2013 and has been the subject of a number of pre-application meetings with the Planning Authority prior to lodgement of the SHD application with An Bord Pleanála. The key structuring principles of the LAP in respect of the Farrankelly AP6 area, within which the proposed development is located was also taken into account.

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 Guidelines for Planning Authorities 2009 having regard to the location of the site within the development envelope of Greystones.
- 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 an appropriate level of housing provision on the residential zoned lands.
- Alternatives in relation to permeability.
- Alternative road junction design
- The need to deliver good quality open space in appropriate locations and to link the open space to as much of the existing green network (hedgerows) and the greenway along the northern boundary of the site.
- 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, in particular the Tree Protection Objective T06, relating to the line of Scots Pine trees within the subject lands.
- The provision of 10% social housing on site.

Alternative site layouts and siting progressed throughout the design process in order to minimise the impact on the receiving environment at the earliest opportunity. The initial stage involved a constraints analysis of the land within the proposed development site to identify all high-level constraints and aggregate them against the site to allow a suitable layout to be developed.

The following analyses alternatives development options considered for the subject site, and then describing design options and changes which were incorporated into the scheme as the proposals progressed through pre-application discussions with the Planning Authority and with An Bord Pleanála. We summarise the key design changes arising following the lodgement of the SHD pre-application to ABP and then provide an overview of the scheme submitted for approval. The principal considerations and amendments to the design of the scheme, having regard to and comparing the key environmental issues, are set out and discussed.

2.13.4.1 Alternative no. 1 – Indicative uses location within LAP for AP6 - Farrankelly

This alternative relates to the indicative location of zoning objectives as they are set out in the Greystones LAP within the Action Plan Area 6 (Farrankelly). The overall subject lands are zoned, Residential, Active Open Space and Open Space. It is noted Section 10.1 of the LAP states that:-

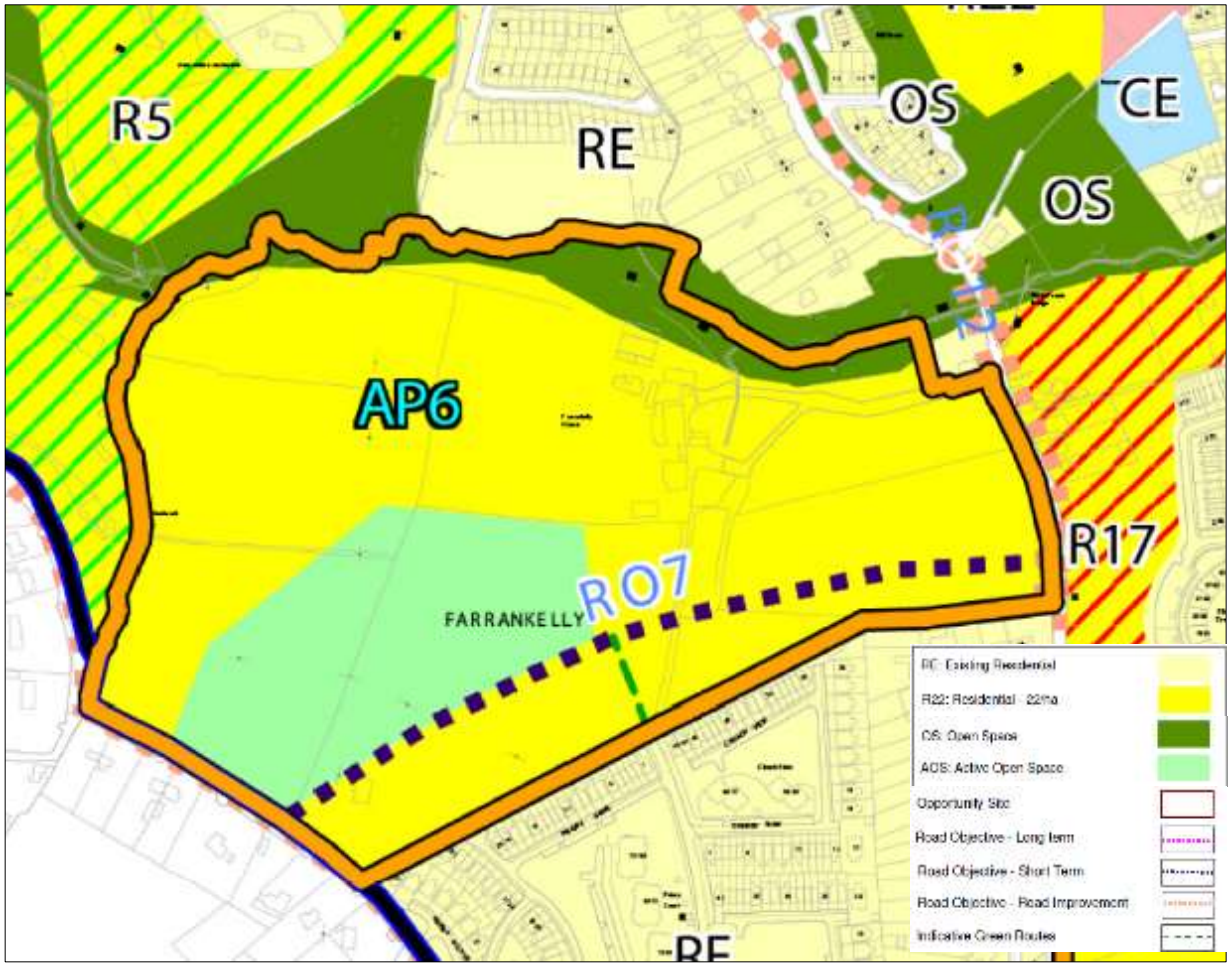
"The position, location and size of the land use zonings shown on Map A within the action plan areas are indicative only and may be altered in light of eventual road and service layouts, detailed design and topography, subject to compliance with the criteria set out below."

The site comprises the majority of the Farrankelly Action Plan area. A Draft Action Plan for AP6 was prepared by the applicant and was submitted to Wicklow County Council during the SHD pre-application consultation. On the 9th of April 2019, correspondence from Wicklow County Council confirmed that the Action Plan was agreed and that any application must take cognisance of the Action Plan (see letter dated 9th April enclosed with SHD application).

The Draft Action Plan (agreed by WCC and included with this SHD application – Manager's Order CE97/2019) has revised the location of the uses on site to provide better accessibility and overall layout of the Action Area Plan area, having regard to the sloped nature of the subject lands, and reflects the ownership of the Action Plan lands, since

the adoption of the LAP in 2013. The revised location of uses is set out in Figure 2.15. The acceptability of the approach has been confirmed by Wicklow County Council during the pre-application stage as well as in a previous SHD applications elsewhere.

Figure 2.14 – AP6 Lands Map A



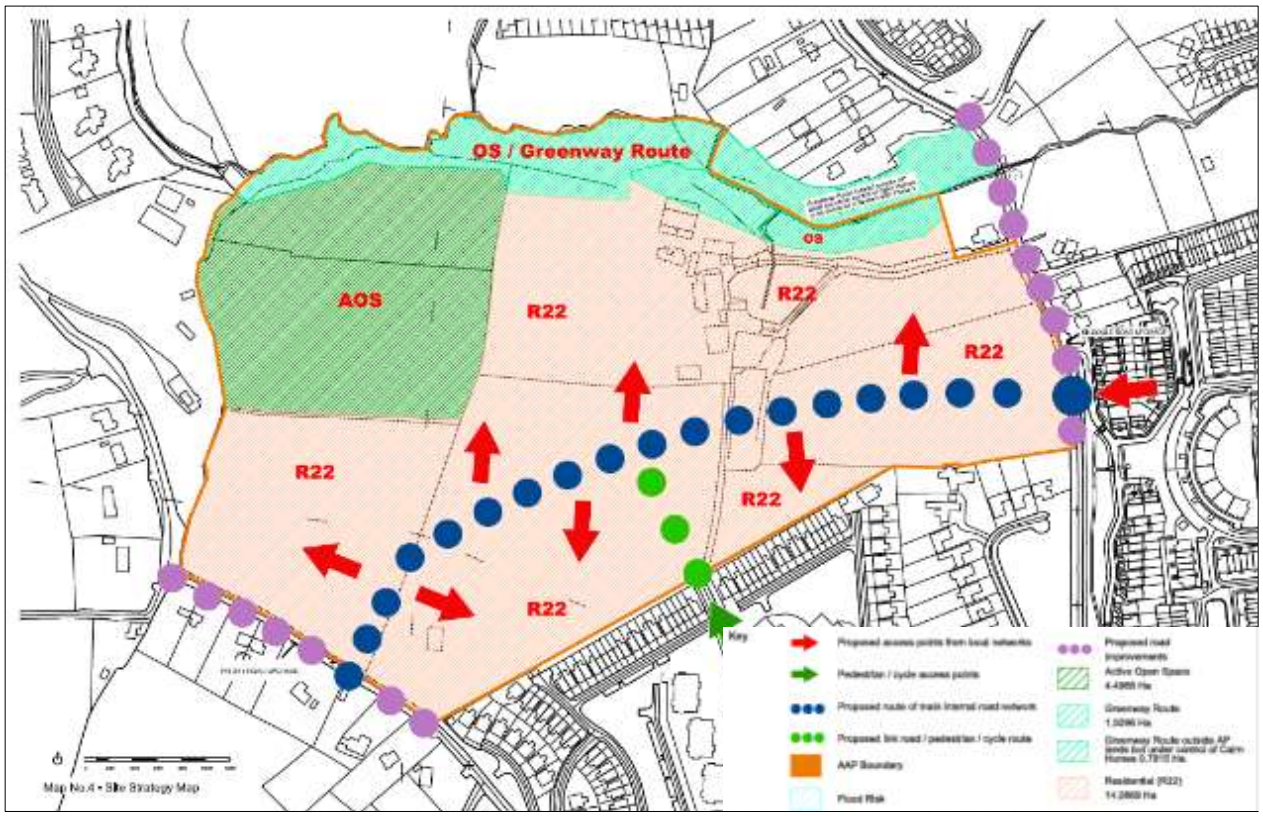
Source: Map 10.1 Greystones-Delgany-Kilcoole LAP 2013

Alternative 1 - Comparison of Environmental Effects

The revised location of the Active Open Space of 4.5 hectares provides the opportunity for a more compact form of development and better integration and connectivity with the proposed greenway which is included within the subject lands along the northern boundary. This positive integration will provide greater permeability and encourage more sustainable modes of transport such as cycling and walking. It is noted the archaeology features, found during the archaeological investigations, located in the southern portion of the site would be impacted upon in all development alternatives and a preservation by record mitigation strategy has been agreed in principle with the Department of Culture, Heritage and Gaeltacht.

The proposal allows for a more integrated form of development between the phases of development and between ownership of lands (which is set out in the agreed Action Plan 6) for Farrankelly and the adjoining future separate phase 4 development. The location of the Active Open Space to the northern portion of the site also provided an appropriate buffer to the “Three Trouts” stream, and adjoining lands (including a protected structure) located to the west. This is shown in Figure 2.15 below.

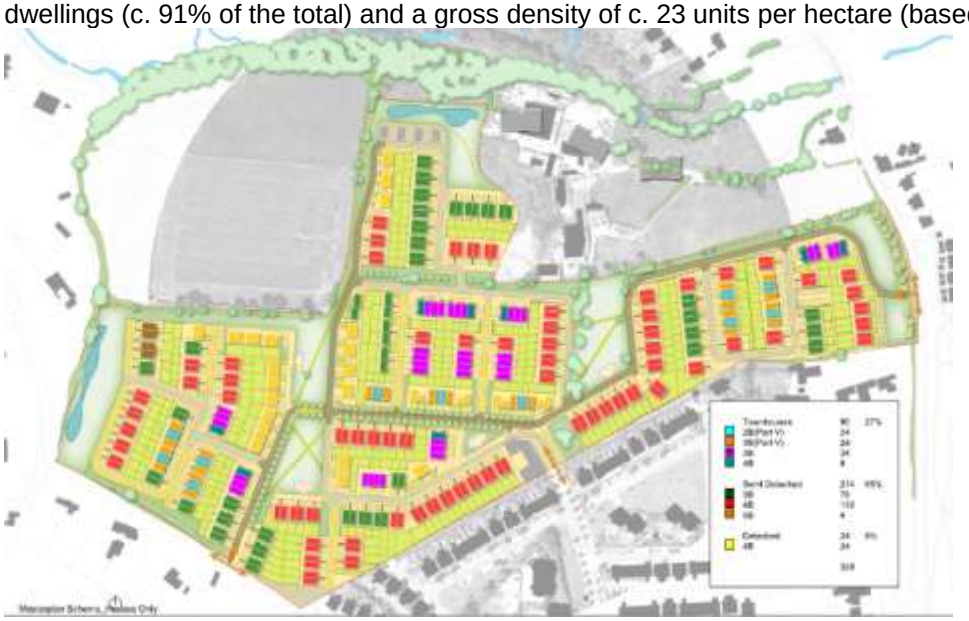
Figure 2.15 – Map 4 of Agreed Action Plan 6



Source: Map 4 Agreed Action Plan 6

2.13.4.2 Alternative no. 2 Q1 - 2017

This alternative was a proposal for c. 328 no. dwellings comprising 90 no. townhouses, 214 semi-detached and 24 no. detached dwellings, with an overall mix of 24 no. 2 bed dwellings, 136 no. 3 bedroom dwellings, 164 no. 4 bedroom dwellings and 4 no. 5 bedroom dwellings. The proposal would result in a predominance of 3 and 4 bedroom dwellings (c. 91% of the total) and a gross density of c. 23 units per hectare (based on 14 hectares).



Alternative 2 – Comparison of Environmental Effects

The density of 23 units per hectare is below the range of 35-50 units per hectare set out in the Sustainable Residential Development in Urban Areas, and required in Specific Planning Policy Requirement 4 (SPPR4) of the Building Height Guidelines 2018. A density of 23 units per hectare is contrary to strategic guidance and would not achieve a compact urban form, making the best use of residential zoned land.

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 2018 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 6 as it relates to the subject lands.

2.13.4.3 Alternative 3 December 2018

The scheme which was presented to An Bord Pleanála at pre-application stage, re-examined the mix of units and provided for apartments dispersed throughout the development, located on the corners of the blocks. There was a revision to the number of units and typologies.

The ABP pre- application proposal comprised a residential development of 429 no. dwellings in a mix of houses, apartments and duplex apartments along with a creche of c. 599 sq. m, Active Open Space of c. 4.46 hectares (in the form of a hockey pitch and a multi-use pitch [with a single storey changing facility of c. 787 sq. m], a greenway of c. 2.36 hectares along Three Trouts stream.

Alternative 3 - December 2018 - Comparison of Environmental Effects

The layout of the Active Open Space has been amended since pre-application stage. The Active Open Space will not comprise a grass pitch, a multi-use all-weather pitch, and trim trails, within the 4.5 hectare boundary. Wicklow County Council were consulted in respect of the revised arrangement and the 4.5 hectare Active Open Space will be taken in charge. Floodlighting was omitted from the playing pitches, which was positive from a bat impact perspective.

In summary, the design of the proposed development takes into account all environmental effects raised with respect to previous design alternatives and within the Board's Opinion, and provides for a development that has been optimised to amplify positive environmental effects whilst reducing negative environmental impacts wherever possible.

Table 2.3 – Summary Table of Comparison of Main Environmental Effects

Criteria	Alternative 1 AP6	Alternative 2 Q1 - 2017	Alternative 3 December 2018	Final Layout (Preferred Alternative)
Population and Human Health	Neutral	Negative	Positive	Positive
Biodiversity	Negative	Neutral	Negative	Positive
Land and Soils	Negative	Neutral	Negative	Positive
Water	Neutral	Neutral	Negative	Neutral
Air and Noise	Neutral	Neutral	Neutral	Neutral
Air Quality and Climate	Neutral	Neutral	Neutral	Neutral
Landscape and Visual	Negative	Neutral	Neutral	Positive
Material Assets Transportation	Neutral	Negative	Positive	Positive
Material Assets Utilities	Neutral	Neutral	Negative	Negative
Material Assets Waste Management	Neutral	Neutral	Neutral	Neutral
Archaeology	Neutral	Neutral	Neutral	Neutral

With reference to Population and Human health, the potential impacts are broadly similar – the inclusion of 4.5 hectares of Active Open Space within the subject lands and the 2.4 hectare greenway along the northern boundary of the site is considered a long term and positive impact. The relocation of the Active Open Space to the northern part of the site provides a better integration with the Open Space associated with the greenway, resulting a substantial area of open space. The re-location of the residential use away from the Three Trouts stream is considered positive and will promote a more sustainable compact form of development and reduced impact on biodiversity. It will also result in a reduced landscape and visual impact.

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 greenway, which will link to the existing Mill Lane, is a positive aspect of the proposal, compared to alternative no. 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.

2.13.5 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 pre-application meetings 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 and access arrangements up to the submission of the current scheme as a Strategic Housing Development application to An Bord Pleanála.

This alternative was reviewed following the pre-application discussions with An Bord Pleanála and the subsequent opinion from the Board.

The key changes proposed related to:

- (Item no. 1 of ABP Opinion) - Review of the frontage along Priory Road through the omission of the shared local street, (located behind Priory Road) and its replacement with 3 no. direct access points to serve the 9 no. dwellings, reconfiguration of the southern element of the site adjoining Priory Road and Eden Gate, through the omission of unit no. 106. The reconfiguration made it possible to omit the internal pumping (foul) chambers. The two storey dwellings located at the southern end respond to the levels of the site which drop at this location and is considered more appropriate than a continuation of the dormer arrangement to the north of the link street.
- (Item no. 2 of ABP Opinion) – Further consideration of levels and impact on co-ordinating development. The proposed development allows for a future vehicular link to the AP6 Phase 4 lands (under separate ownership), which is located in the northern portion of the subject site. It is noted the AP6 Phase 4 lands would also have their own access point to the south of Three Trouts bridge. It is also proposed to allow for a (pedestrian link) accessed from the internal link street.
- (Item no. 3 of ABP Opinion) – Relationship provided between the curtilage of duplex buildings and the adjoining land on all sides. In this regard clear delineation is provided between the private open space and public realm.

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.

2.14 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, potential significant cumulative secondary and indirect impacts where appropriate, have been addressed in the relevant chapters of this EIAR document.

2.14.1 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 Greystones/Delgany/Kilcoole Local Area Plan 2013-2019. 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.

2.14.2 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 works, which are required to facilitate this development. These works are assessed within this Environmental Impact Assessment Report.

2.14.3 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".*

Chapter 14 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.

3.0 POPULATION AND HUMAN HEALTH

3.1 INTRODUCTION

The 2014 Environmental Impact Assessment (EIA) Directive (2014/52/EU) has updated the list of topics to be addressed in an Environmental Impact Assessment Report (EIAR) and has replaced *'Human Beings'* with *'Population and Human Health'*. This chapter also meets the requirement for assessment of *'Human Beings'* as per Schedule 6 of the Planning and Development Regulations 2001-2018. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

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 landscape and visual impact, biodiversity, archaeology, architectural and cultural heritage, air quality and climate, noise and vibration, water, land and soils, material assets including traffic and transport impacts, which are of intrinsic direct and indirect consequence to human health. For detailed reference to particular environmental topics please refer to the relevant corresponding chapter of the EIAR.

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 document concentrates on those topics which are manifested in the environment, such as new land uses, more buildings or greater emissions.

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*". This is examined in Chapter 14.

3.2 STUDY METHODOLOGY

European Commission guidance relating to the implementation of the 2014 Directive, in reference to "human health" states "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 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[7]".

This chapter of the EIAR document has been prepared with reference to recent national publications which provide guidance on the 2014 EIA Directive including Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in August 2017 and the Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and Environmental Protection Agency (EPA) Licencing Systems, published by the Department of Environment, Community and Local Government in May 2017.

A site visit was undertaken to appraise the location and likely and significant potential impact upon population and human health receptors. Desk-based study of published reference documents such as Central Statistics Office Census data, the Economic and Social Research Institute (ESRI) Quarterly Economic Commentary, the Greystones, Delgany and Kilcoole Local Area Plan and the Wicklow County Development Plan was also carried out.

The Department of Environment, Community and Local Government set out an appropriate approach to reflect the requirements of the 2014 EIA Directive in relation to Population and Human Health in their Key Issues Consultation Paper. Firstly, the paper states that 'it is considered that the change from "human beings" to "population and human health" in relation to EIA is primarily clarificatory and to ensure consistency with, in particular, the Strategic Environmental Assessment (SEA) Directive'. Secondly, in terms of practical implications as regards the assessment

[7] *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report,* European Commission, 2017 http://ec.europa.eu/environment/eia/eia-support.htm

of effects the paper states that 'it is intended that the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters, and not requiring a wider consideration of human health effects which do not relate to the factors identified in the Directive'.

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'.

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 EPA and the Department, 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.

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

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

3.3.2 Economic & Employment Activity

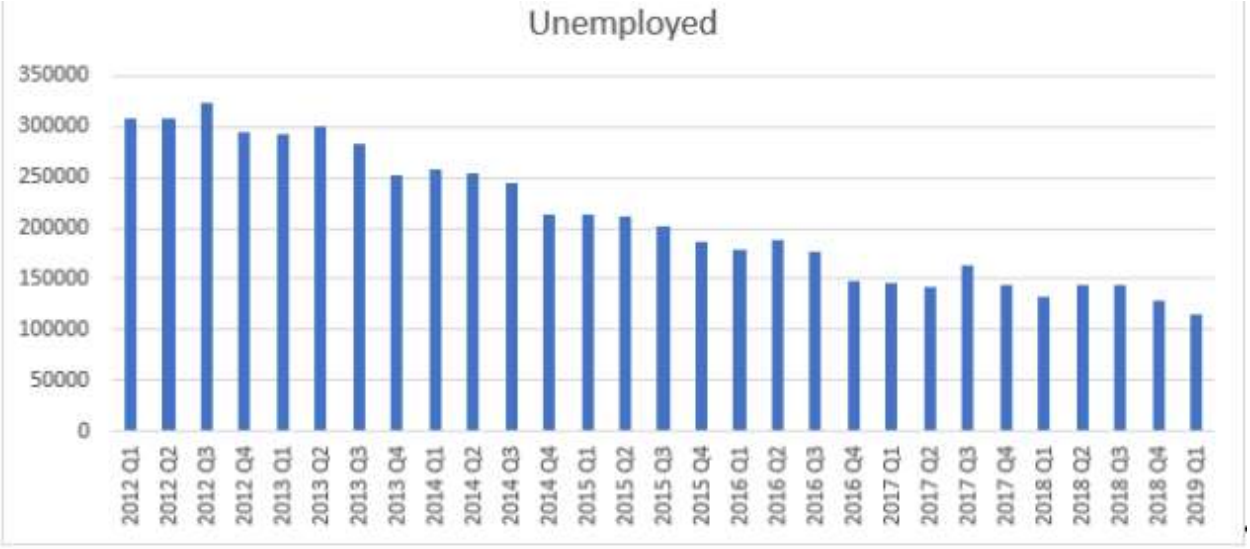
The Central Statistics Office (CSO)'s Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q1 2019, indicated that there was an annual increase in employment of 3.7% or 81,200 in the year to the first quarter of 2019, bringing total employment to 2,301,900. This compares to an annual increase of 2.3% or 50,500 in employment in the previous quarter and an increase of 2.9% or 62,100 in the year to Q1 2018. The increase in total employment of 81,200 in the year to Q1 2019 was represented by an increase in full-time employment of 62,600 (+3.5%) and an increase in part-time employment of 18,600 (+4.1%), representing an improvement in the quality and quantity of employment in the economy. The ESRI Quarterly Economic Commentary for Spring 2019 states that while headline Gross Domestic Product (GDP) suggests a growth rate of over 6.7% for the economy, underlying economic activity grew somewhere in the region of 6% - 6.8%.

According to the ESRI, a relatively benign UK exit from the European Union (EU) (such as the establishment of a European Economic Area agreement) would see the Irish economy grow by 3.8% in 2019, compared to a 1.2% growth where the UK exists under a no-deal Brexit.

According to the CSO's Quarterly Labour Force Survey, Unemployment decreased by 18,600 (-14%) in the year (2019) to Q1 resulting in the total number of persons to 114,400 (5.6%), which is the 27th quarter in succession where the overall number of persons unemployed declined on an annual basis, to 2019.

The above sources demonstrate that the national economy and employment levels were expected to improve further into 2019, with the Government faced with the challenge of sustaining economic activity and competitiveness during a period of likely full employment. This in turn results in increased demand for residential dwellings.

Figure 3.1 – The number of Unemployed in Ireland by month to Q1 2019 *CSO Labour Force Survey*



3.3.3 Social Patterns

The census 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 persons. The rate of growth between 2011 and 2016 slowed from 8.1% compared to the previous census, attributable to the slower economic activity in the early part of the census period resulting in a reduced level of immigration, albeit offset to a degree by strong natural increase. The economy has recovered in recent years with consequent population growth predominantly attributed to natural increase, greater economic activity, increased job opportunities and continued immigration.

Growth within the County was slightly higher than the national average with a growth rate of 4.2%. Growth within the Greystones area matched that of the State at 3.8%.

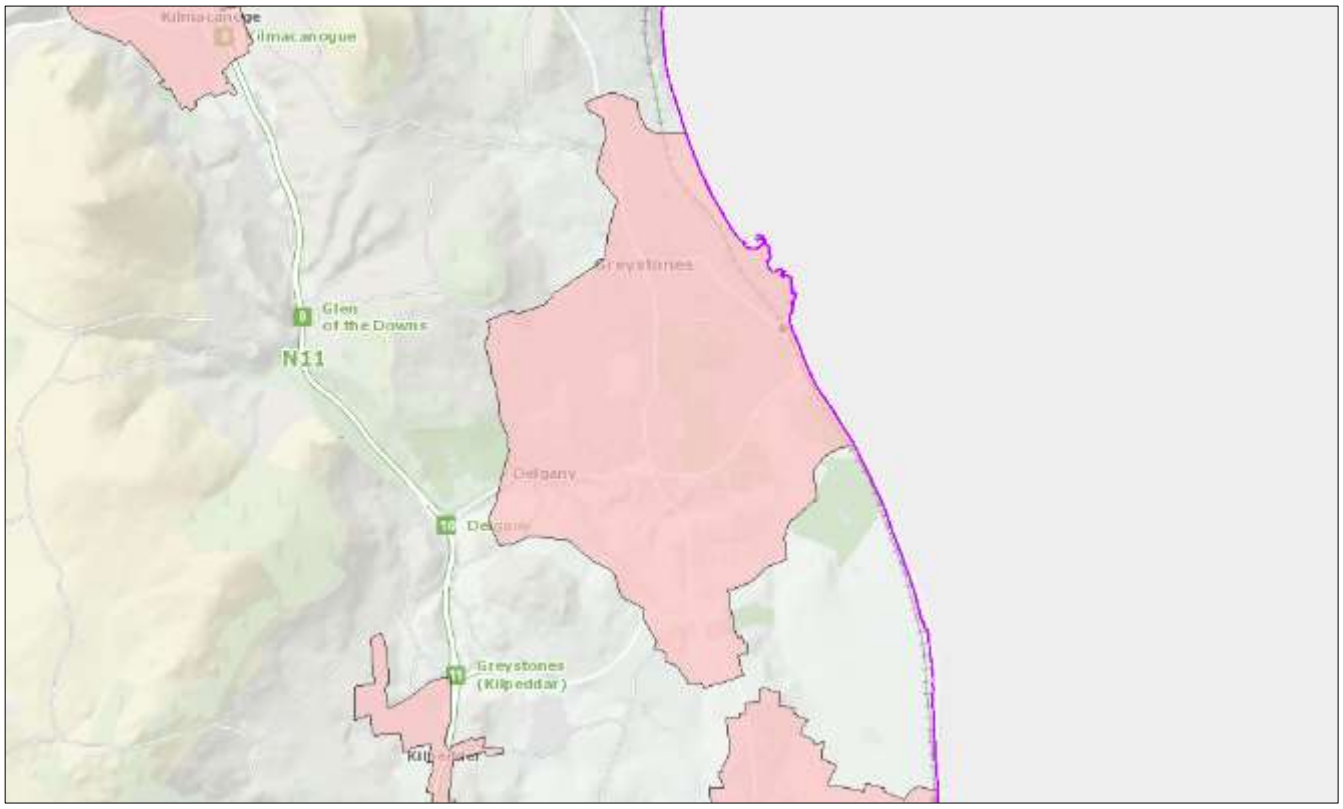
The Central Statistics Office (CSO) provides information on population and socio-economic aspects of the population residing within the Settlement of Greystones-Delgany, which the subject lands are located within the administrative area of Wicklow County Council. The most recent census of population 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 Greystones-Delgany 2011 - 2016 (Source: CSO)

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
Greystones-Delgany	17,468	18,140	3.8

Source: Central Statistics Office 2011 and 2016

Figure 3.2 – Greystones - Delgany



3.3.4 Land Use & Settlement Patterns

The site is located within the administrative area of Wicklow County Council. As Greystones has a population of in excess of 5,000, a Local Area Plan is in place for the area. In this respect, the policies and objectives found within the existing Wicklow County Development Plan 2016-2022 in combination with the Greystones, Delgany and Kilcoole Local Area Plan (LAP) 2013-2019 form the relevant plan for the area. The subject site is zoned for Residential, Active Open Space and Open Space. It is noted Section 10.1 of the LAP states that:- *"The position, location and size of the land use zonings shown on Map A within the action plan areas are indicative only and may be altered in light of eventual road and service layouts, detailed design and topography, subject to compliance with the criteria set out below."* An agreed action plan is included within the SHD application.

The predominant land use immediately surrounding the subject site consists of a mix of existing residential lands to the south, north and east. Town Centre zoned lands are located to the north east of the subject site. The site occupies a substantial portion of undeveloped lands in the southern part of the settlement of Greystones.

The residential development in this area comprises a mix of single storey, 2 storey, and apartment development (of 4 storeys). The scope of the housing varies from detached bungalows, to 4 storey apartments buildings. These varieties are not localised and are spread throughout the area surrounding the subject site. To the west of the subject site there is Priory road, which is primary 2-storey detached one off houses in a ribbon development, and Glenair Manor, which is a more recent development of detached 2-storey houses.

To the north of the subject site, Delgany park is an older residential development of detached bungalows Mill Grove is also to the north and is a mixture of semi-detached, detached and terraced houses of both 2-storeys and bungalows. Charleswood is located to the east of the subject site. It is a large-scale modern development, including large open space and retail units. The overall mix of units includes apartments, duplexes and houses, ranging from 2-3 storeys in height. Glenheron is also located to the east. This development comprises 2 storey houses, both detached and semi-detached. Glenbrook Park and Eden Gate are located to the south. Glenbrook Park comprises detached single and dormer houses. Eden Gate is a higher density development, ranging in height from 2-4 storeys. This development includes detached, semi-detached and terraced houses as well as apartments.

The Greystones, Delgany and Kilcoole LAP aims to develop in a sustainable sequential manner at a suitable scale in accordance with its role as a county significant 'growth' town, sequentially on an infill site.

The development will create high quality residential scheme, providing appropriate development within an existing residential area, while providing substantial residential amenities such as open space, creche, active open space to include pitches and a playground and fitness trails, within an accessible distance to the town centre. The Planning Report which accompanies this application addresses land use zoning in more detail.

3.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

This section considers the '*level of impact'* on the environment of any particular aspect of the proposed development. For this chapter the potential impact on Population and Human Health is discussed. A full description of the proposed development is provided in Section 2 of this EIAR document. In summary the proposal is for a residential development of 426 no. dwellings in a mix of houses, apartments and duplex apartments along with a two storey creche of c. 599 sq. m, Active Open Space of 4.5 hectares, a residential amenity building of 325 sq. m, a greenway of c. 2.4 hectares along "*Three Trouts"* stream, as well as the provision of upgrades to the road frontage along the site boundary at Kilcoole Road and Priory Road.

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 phased construction of the proposed residential units, active open space, residential amenity building, and a childcare facility, alongside associated physical infrastructure will result in a construction period over an approximate 24-month period 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 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.

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 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.

Operational Phase

The operational phase of the proposed development will result in the provision of 426 residential units and a creche. This will provide accommodation for approximately of a range of 1,022 to 1,235 persons, based upon the existing average occupancy rate of between 2.4 and 2.9 persons per household (based on CSO 2016 Census figures for Greystones, for the higher range, while the lower range reflects the mix of apartments and duplexes which will have lower occupancies). 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. Provide much needed residential accommodation within the town of Greystones 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 to the area will improve the vibrancy and vitality of the area and the future population of the development, will help to support existing community and social infrastructure. The cumulative development of the lands offer a range of facilities which are beneficial to the wider community, including 4.5 hectares of Active Open Space (which includes sports pitches), as well as a greenway of 2.4 hectares. The implementation of the linear park / green corridor will attract pedestrians and cyclists into the area and promote healthy living through social activities. The development includes the provision sports pitches as well as a residential amenity building. This will help create sustainable and active communities and is considered to be a permanent positive and long term impact.

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 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 are assessed in greater detail in Chapter 9.

The land take of the proposed development from agricultural use to residential use is approximately 14 hectares, while the Active Open Space of 4.5 hectares will entail landtake from agricultural land use. The greenway of 2.4 hectares will include a path, but the riparian corridor will remain. Some areas will be retained as buffer areas, (steep slopes), and will be integrated into the open space within the overall subject lands.

Secondary indirect land use impacts include off-site quarry activity and appropriate disposal sites for removed spoil. Construction works are likely to take place on a phased basis, which will moderate the potential impacts on adjoining land use. The Construction Management Plan addresses these issues in more detail.

The construction 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 residential accommodation land use to the subject site which will provide much needed housing for the growing population of the immediate area. Furthermore, a significant quantity of open space consisting of recreational and amenity space is also provided, promoting healthy communities.

3.5.5 Employment

The impact of the proposed development in relation to employment during the construction phase has been discussed under economic activity. In the operational phase, the proposed development will give rise to direct employment in the creche and the residential amenity building as well as maintenance of the open space areas (including Active Open Space).

3.5.6 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, particularly the adjacent residential development outside the red line boundary to the north and east with a potential capacity of 110 units (within the remainder of the Farrankelly Action Plan lands). The potential cumulative impacts have been assessed in Chapters 4-15 of this EIAR.

3.5.7 *'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, particularly considering the location of the infill lands and adjacent development to the east and south.

The lands are considered a logical infill site and extension to Greystones in the context of the sequential approach promoted by the development plan and will enable the sustainable and more compact growth of the settlement whilst improving permeability and west-east connectivity through the proposed greenway and creating links to the proposed sports pitches in the active open space.

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. A CMP prepared by Cairn Homes, is included with the SHD application material.

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 15 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIA.

POP & HH CONST 1:

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

With reference to the construction phase of the proposed development, the objective of the Construction Waste Management Plan prepared by Byrne Environmental Consulting Ltd 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 significant positive impacts on human beings 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.

3.7 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. It should be noted that in addition to remedial and mitigation measures, impact avoidance measures have also been built in to the EIA and project design processes through the assessment of alternatives described in Chapter 2 of this EIAR document.

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.

3.7.1 Construction Phase

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works, which are likely to take place over 2 main phases, 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. It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document any adverse likely and significant environmental impacts will be avoided. Positive impacts are likely to arise out of an increase in employment and economic activity. The overall predicted likely and significant impact of the construction phase will be short-term, temporary and likely to be neutral.

The construction of the sewerage connection to facilitate the proposed development will require works to the public road will likely entail some localised impacts to residents. The Construction Management Plan will ensure that disruption and nuisances will be kept to a minimum.

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 and the Greystones/Delgany/Kilcoole LAP. 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.

3.8 CUMULATIVE ASPECTS

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 lands, under a separate outstanding 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 will be a further increase in the population of Greystones and the completion of this residential zoned land by resulting in range of 1,022 to 1,235 persons (2.4-2.9 persons per household). The increase in population has been taken into account in the Strategic Environmental Assessment of the Greystones, Delgany and Kilcoole LAP 2013-2019. The long term impact is considered to be positive having regard to the zoning objectives relating to the subject lands as well as the promotion of sustainability.

With regard to human health, the cumulative impact of the proposed development will include the provision of a new high quality and sizeable new neighbourhood which will include a large quantum of high quality green space in the form of a greenway along the norther boundary linking to the east, as well as the provision of 4.5 hectares of active open space as well as a residential amenity building. These are long-term and permanent positive impacts.

3.9 MONITORING

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

3.10 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.

3.11 INTERACTIONS

As noted above, there are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to human health. This chapter of the EIAR has been instructed by updated guidance documents reflecting the changes within the 2014 EIA Directive. These documents are the Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in August 2017 and the Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems, published by the Department of Environment, Community and Local Government in May 2017. In line with the guidance documents referred, this chapter of the EIAR focuses primarily on the potential likely and significant impact on Population and Human Health in relation to health effects/issues and environmental hazards from the other environmental factors and interactions that potentially may occur.

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. However, the reader is directed to the relevant environmental topic chapter of this EIAR document for a more detailed assessment.

3.12 DIFFICULTIES ENCOUNTERED IN COMPILING

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

4.0 BIODIVERSITY

The Biodiversity assessment was prepared by Padraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for 20 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 May 4th and 5th 2017, September 2018 and again in June 2019.

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) and 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (IEEM, 2016).

Site visits were carried out on the 28th of November 2013, the 26th of May 2015 and the 28th of April 2017 and again on September 25th 2018 and June 28th 2019. On each occasion 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). A species list for each habitat was compiled and these are presented in Appendix 1 of this report. Species abundance was determined using the DAFOR scale (D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare). This is a subjective form of habitat description commonly used in conjunction with habitat classifications. Sample digital photos were also taken. Data were then uploaded to the ArcView 9.2 GIS software suite.

Surveys took place in November, April, May, June and September and so data have been gathered within the optimal survey period for general habitat, mammals and breeding bird/amphibian surveys (Smith et al., 2010). A dedicated bat survey was carried out for this development by Dr Tina Aughney during the optimal period. It was possible to classify all habitats on the site to Fossitt level 3. A full species list is presented as an appendix to this report.

4.2 GREYSTONES-DELGANY & KILCOOLE LOCAL AREA PLAN 2013-2019

This plan was subjected to Strategic Environmental Assessment and Appropriate Assessment prior to its final adaptation by Wicklow County Council and its publication. The AA Screening Report of the LAP concluded that *"the possibility of any significant effects on any European Sites arising from the proposed development, whether considered on its own or in combination with the effects of other plans or projects, can be excluded beyond a reasonable scientific doubt."*

A heritage map attached to the plan highlights the river valley of the Three-trout Stream as subject to '*tree protection objectives'*.

Eastern River Basin District Management Plan:

Under the Water Framework Directive (Directive 2000/60/EC) all Irish waters must achieve 'good ecological status' by 2015. The Eastern River Basin District encompasses all of County Dublin and in 2010 a River Basin Management Plan was published (ERBD, 2010). The EPA website has not assessed the status of the Three Trouts Stream.

4.3 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 – Approximate 2km radius 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, Wildfowl Sanctuary, 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. Within 15km of the subject site there are a number of such areas.

4.3.1 The Murrough Wetlands SAC and pNHA (site code: 2162)

This coastal wetland complex stretches for 15km from Ballygannon to the north of Wicklow town and inland to up to 1km in places. It is bounded to the east by the main Dublin to Wexford rail line and a stony beach forms the littoral zone throughout. Some of these maritime influenced habitats are of importance for EU designated habitats and rare plants. The landward wetlands are a complex mosaic of habitats that vary depending on the local hydrology and influence of seawater. While this area has been greatly modified over the years through human activities there remain areas of high biodiversity value in a European context (NPWS, 2014).

The reasons why the Murrough Wetlands is an SAC are set out in the site's 'qualifying interests' and these are given in table 4.1. Whether the integrity of the SAC is likely to be significantly affected must be measured against its conservation objectives. However there is no management plan for the area and site specific conservation objectives have not been set. Draft, generic objectives have been published and these are given in table 4.1.

Table 4.1 – Qualifying interests of the Murrough SAC

Aspect	Level of Protection	NPWS Assessment
Cladium fens (code: 7210)	Priority Habitat Habitats Directive Annex I	Bad
Atlantic salt meadows (code: 1330)	Habitats Directive Annex I	Inadequate
Mediterranean salt meadows (code: 1410)		Inadequate
Annual vegetation of drift lines (code: 1210)		Inadequate
Perennial vegetation of stony banks (code: 1220)		Inadequate
Alkaline Fens (code: 7230)		Bad

- **Annual vegetation of drift lines (1210)** This habitat of the upper shore is characterised by raised banks of pebbles and stones. They are inhabited by a sparse but unique assemblage of plants, some of which are very rare. The principle pressures are listed as gravel extraction, the building of pipelines and coastal defences.
- **Perennial vegetation of stony banks (1220)** is a habitat of the high tide line characterised by loose stones and shingle. It is a highly dynamic feature, being continually reshaped by tides and waves. It can be home to very rare plants and a number of coastal nesting birds
- **Atlantic and Mediterranean salt meadows (1330 & 1410)**: these are intertidal habitats that differ somewhat in their vegetation composition. They are dynamic habitats that depend upon processes of erosion, sedimentation and colonisation by a typical suite of salt-tolerant organisms. The main pressures are invasion by the non-native *Spartina anglica* and overgrazing by cattle and sheep.
- **Cladium Fens (7210 – priority habitat).** This priority habitat is found in base-rich, groundwater fed fens or around the fringes of lakes or turloughs with similar water chemistry. The characteristic features is the Great Fen-sedge *Cladium mariscus.* The habitat is threatened from drainage and wetland infilling and lack of site management.
- **Alkaline Fens (7230)**: Threats of 'high importance' are groundwater abstractions, land reclamation, diffuse groundwater pollution, land abandonment/under-grazing. These fen systems are often a complex mosaic of habitats, with tall sedge beds, reedbeds, wet grasslands, springs and open-water often co-occurring at a given fen site. Their integrity is reliant upon a stable, high water table; calcareous/low-nutrient water supply; and controlled mowing and/or grazing.

The NPWS The NPWS assessment refers to the status of protected habitats and species that was carried out for the European Commission in 2013 (NPWS, 2013). This gives the status of the feature at a national level and does not necessarily refer to the status of a habitat or within the Murrough SAC. South of Kilcoole the area is also a SPA (site code: 4186). The coastal lands at Ballygannon are within the pNHA only.

4.3.2 Glen of the Downs SAC and pNHA (site code: 0719)

This glacial valley is dissected by the N11 Dublin to Wexford road but the valley on either side is clothed in semi-natural woodland. This is the subject of the SAC's sole qualifying interest and priority habitat: old oak woodland (code: 91A0). This is a very rare habitat type in Ireland and at a national level is assessed as being in 'bad' status. The forest is also home to rare or notable fungi and invertebrates (NPWS, 2013).

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 Farrankelly site is located within the square O21 and five protected plant species are recorded. It must be noted that this list cannot be seen as exhaustive as

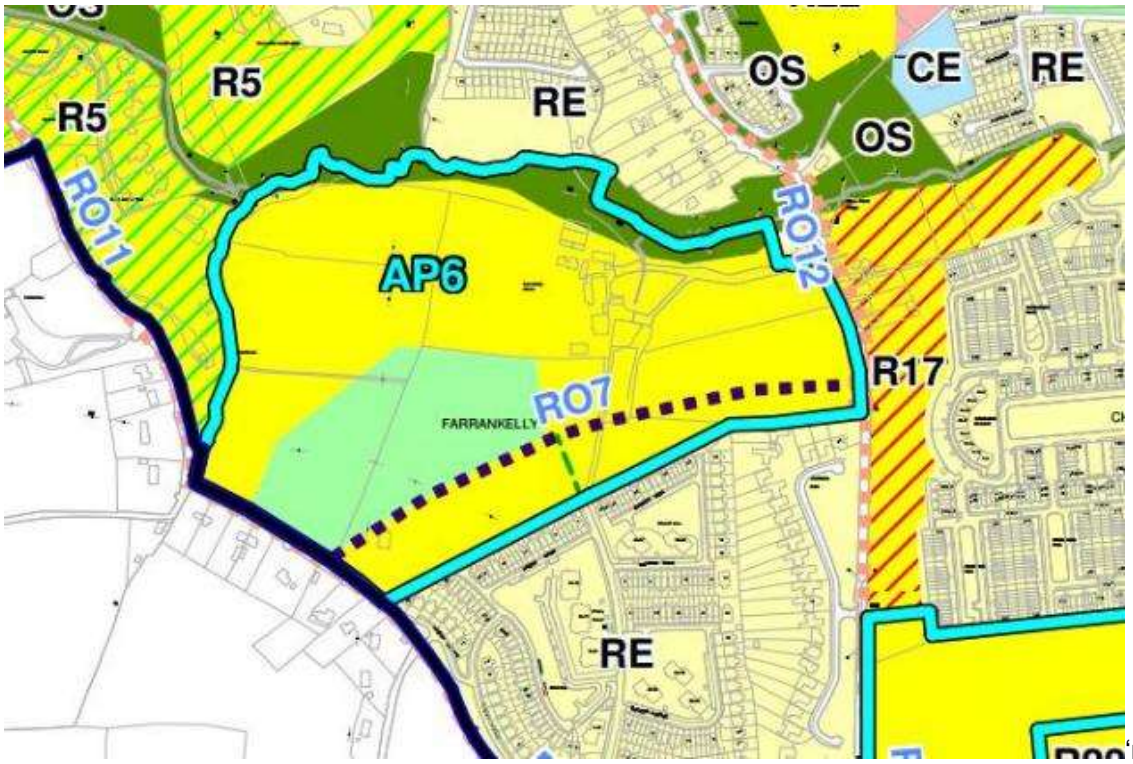
suitable habitat may be available for other important and protected species. Table 2 lists these and their known current status. Of the five species none is considered current (i.e. there are no records of any since 1986).

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

The site is within the Greystones-Delgany and Kilcoole Local Area Plan 2013-2019 and the subject lands are primarily zoned for residential development, along with Active Open Space and Open Space.

Figure 4.2 – Land use zoning of the subject lands at Farrankelly



'residential' (yellow), 'active open space' (mint green), and 'open space' (dark green).

[8] Parnell et al., 2012

Water quality in rivers 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 = pristine quality and Q5 = grossly polluted (Toner et al., 2005). The Farrankelly site is within the catchment of the Three-Trouts Stream, which drains a small portion of County Wicklow, particularly around Greystones-Delgany and drains into the Irish Sea. It rises a short distance to the east and flows across the northern boundary of the Farrankelly lands. This sub-catchment is not identified on the www.wfdireland.net website is not assessed for the Water Framework Directive (WFD). This is not unusual for small coastal water courses that drain directly to the sea. As such there are no EPA monitoring points along this stream. The status of the coastal waters of this part of Wicklow was assessed as 'high' under the 2010-2015 EPA reporting period (the most up-to-date available).

4.3.3 Stakeholder Consultation

The Development Applications Unit (DAU) of the Department of the Culture, Heritage and the Gaeltacht was contacted for nature conservation observations. Details were also sent to Inland Fisheries Ireland a response was received by email on August 8th 2019, stating:

"The Three Trout's River is an important salmonid system. This system supports both Sea trout (downstream of the N11) and Brown trout (among other fish species) and has been identified in the Local Area Plan as the key local biodiversity resource. Thus, it is vital to note that salmonid waters constraints will apply to any development in this area and there can be no deterioration in aquatic habitat or water quality as a result of this proposal.

The development of a Greenway along the river is welcomed by IFI ,in the event that this will necessitate river crossings please refer to our Guideline Document attached."

4.3.4 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 2011 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 second national biodiversity action plan (Dept. of Arts, Heritage and the Gaeltacht, 2011).

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 partnership approach to help our species and habitats. As such it does not contain measures that relate directly to development control. Appendix 7 consists of a list of species of county importance.

Greystones-Delgany & Kilcoole Local Area Plan 2013-2019

This plan was subjected to Strategic Environmental Assessment and Appropriate Assessment prior to its final adaptation by Wicklow County Council and its publication. The AA study found that significant effects were not likely to occur to Natura 2000 areas arising from the plan's implementation.

A heritage map attached to the plan highlights the river valley of the Three-trout Stream as subject to 'tree protection objectives'. This area is subject to the following objectives:

Objectives for natural areas

- NU4 To protect non-designated natural sites from inappropriate development, where it is considered that such development would unduly impact on locally important natural habitats or wildlife corridors.
- NU5 To facilitate, in co-operation with the relevant statutory authorities and other groups, the identification, public awareness and protection of valuable or vulnerable habitats of local or regional importance, not

otherwise protected by legislation, and in this regard, to have regard to the Wicklow Urban Habitat Study 2008 in the protection of habitats.

- NU6 To promote the protection of trees / groups of trees listed in Tables 11.7 and 11.8 below, and to consider the making of further TPOs to protect trees of high value, where it appears that they are in danger of being felled.
- NU6 Development that requires the felling of mature trees of conservation and/or amenity value, even though they may not be listed in the Development Plan, will be discouraged.
- NU7 To encourage the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development control process, and require the planting of native, fruit, nut and appropriate local characteristic species, in all new developments

Appendix C of the plan highlights 'local biodiversity areas' (LBA) which were subjected to survey work in 2006. The entire length of the Three Trout Stream, from its source to its mouth, was assigned LBA status. Extracts from this report state:

"The Three Trout Stream flows for 4km approximately within the Greystones/Delgany area and forms one of, if not the most important wildlife area in the Greystones/Delgany LAP area. It forms a natural and important wildlife corridor/refuge from Glen of the Downs SAC to the sea and is recognised as important for the migration of sea trout to the point where it reaches the N11. It is predominantly clear, fast flowing, shallow in nature with a significant gravel bed along most of its length."

It identifies areas near Farrankelly House as a combination of marsh, wet grassland and scrub. The findings and recommendations of the report are reflected in Chapter 9 of the Plan (Built & Natural Heritage)and specifically the following objectives:

HER3: To protect, wherever possible, wildlife habitats that are located outside protected and designated areas, including the coast, cliffs, dunes, trees, hedgerows, drainage ditches, scrub, woodland, rock outcrops, watercourses, stone walls and other features of the natural landscape that provide wildlife corridors and which contribute to the biodiversity of the area. In the assessment of planning applications, the Council may require that such features are retained and incorporated into future development. In considering proposals for development, regard shall be paid to the Greystones-Delgany Local Biodiversity Area Study (2006). Recommendations set out in this study shall be implemented, as deemed appropriate, by the planning authority.

HER5: To protect the biodiversity value and associated habitats of water bodies within the plan area in accordance with the objectives as set out in the Wicklow County Development Plan and Eastern River Basin District Management Plan. In considering proposals for development, regard shall be paid to the recommendations set out in Greystones-Delgany Local Biodiversity Area Study (2006). In particular, recommendations relating to the Three Trouts Stream shall be implemented, as deemed appropriate, by the planning authority.

Among the aforementioned recommendations, the following are considered to be of special relevance to this study:

"It is strongly recommended that a minimum of a 20m buffer zone of native vegetation, from each bank, is maintained along the bank of the stream and its main tributary, which would be extended where relevant to incorporate additional wooded/scrub/marsh areas"

"It is also suggested where possible that an additional 3m of grassland/amenity area is maintained outside the buffer zone providing a "fly zone" for bats and Owl species. In areas where dense scrub (nor briar dominated) and tall trees have already been established that these are retained. Flushes of particulates due to construction, as observed during field work, should be avoided as it can cause fish mortality/irritations on fish gills and block gravel beds.

Eastern River Basin District Management Plan: Under the Water Framework Directive (Directive 2000/60/EC) all Irish waters must achieve 'good ecological status' by 2015. The Eastern River Basin District encompasses all of County Dublin and in 2010 a River Basin Management Plan was published (ERBD, 2010). The EPA website has not assessed the status of the Three Trouts Stream.

4.3.5 Site Survey

Aerial photography and historic mapping from the OSI shows that these lands have remained in agricultural use since historic times. Aerial photography from 1995 shows the fields in question to have been under crops along with associated buildings. Since this time there has been some change of land use in the wider area from agricultural to suburban style residential development and new roads. The subject lands appear to have changed little, however.

4.4 FLORA

The site consists of a series of agricultural fields, bounded to the north by the Three Trouts Stream. These fields are either **arable crops – BC1 or improved agricultural grassland – GA1**. In either case they are considered to be habitats of negligible biodiversity value as few species of plant or animal are supported. A cluster of **buildings and artificial surfaces – BL3** (outside the site boundary) are of little biodiversity value however old buildings can be used as roosting locations for bats (see fauna section below).
Boundary features consist of either **treelines – WL2 or hedgerows – WL1**. These are frequently associated with earth banks and can be of some antiquity. While the species can be similar in both habitats treelines are dominated by trees over 5m in height.

Species composition is typical of the region and includes Brambles *Rubus fruticosus agg*., Hawthorn *Crataegus monogyna*, Bracken *Pteridium aquilinum* and Ash *Fraxinus excelsior*. These hedgerows have few emerging or tall trees although there are a number of tall Scot's Pine *Pinus sylvestris*. These are distinctive in themselves. Field boundaries are divided into higher significance and lower significance based on evaluation criteria from the Heritage Council (Foulkes et al., 2013). Higher significance hedgerows have a larger proportion of trees with more developed structure and diversity of species. Additional species include Holly *Ilex aquifolium* and Elder *Sambucus nigra*. Lower significance hedgerows have poor structure with low species diversity, albeit individual trees are of value. Treelines meanwhile have dominant areas of mature Sycamore *Acer pseudoplatanus* or Beech *Fagus sylvatica* with smaller numbers of Ash and Elm *Ulmus sp.* The treeline along the stream also has Alder *Alnus glutinosa* and Goat Willow *Salix caprea*. Boundary features such as these are recognised for their importance in providing habitat for a wide range of plants and animals at a landscape scale.

The Three Trouts Stream is an example of an **eroding stream – FW1** and is known from previous studies published by Wicklow County Council as being of salmonid status. In particular it has a population of Brown Trout *Salmo trutta*. Along this stretch it varies from narrow and shallow with a substrate of silt and small stones in the west, broadening as it moves eastward and the substrate developing to cleaner, larger stones. This is recognised as suitable trout spawning habitat. There is no obvious evidence of pollution from nutrient sources (i.e. excessive growths of green alga *Cladophora sp*. or in-stream macrophytes) although bank erosion is obvious on the north bank in places. Associated river plants include Pendulous Sedge *Carex pendula*, Common Figwort *Scrophularia nodosa* and Hemlock Water-dropwort *Oenanthe crocata.* There is a single stand of the alien invasive Giant Rhubarb *Gunnera tinctoria* to the east of the site. It is not currently affecting the natural vegetation in this area however it may present a threat in the future. These features are outside the site boundary.

The stream is associated with a number of riparian habitats and particularly is banded by **broadleaved woodland – WD1** and **scrub – WS1** as far as the cluster of buildings in the east. These are broad-scale classifications and mask considerable variations in the habitats and species to be found in this area. On sloping ground the woodland floor is dry and species include Beech, Holly, Ash and occasional Elm. Ramsons *Allium ursinum*, Bluebells *Hyacinthoides non-scripta* and Wood Anemone *Anemone nemorosa* are to be found on the woodland floor. As the ground levels off the influence of seasonal flooding becomes apparent and the ground is wet. Here there are River Horsetails *Equisetum fluviatile*, Enchanter's Nightshade *Circaea lutetiana*, Opposite-leaved Golden Saxifrage *Chrysosplenium oppositifolium*, Creeping Buttercup *Ranunculus repens* and Water Mint *Mentha aquatica*. There is a good diversity of ferns and bryophtyes including Soft-shield Fern *Polystichum setiferum*, Black Spleenwort *Asplenium adiantum-nigrum*, Broad Buckler-fern *Dryopteris dilatata* and Male Fern D. *felix-mas*. The canopy also changes in character and, moving eastward, becomes increasingly dominated by scrub, especially Brambles but also Gorse *Ulex europaeus* and, on drier ground, Blackthorn *Prunus spinosa*. Some of these areas were inaccessible for detailed survey. This is not a native, or semi-natural woodland type as it does not conform to any of the species assemblages described in Fossitt, the EU Habitats Directive or other relevant publications (i.e. Cross et al., 2010). However, given the very low cover of native woodland remaining in Ireland, any naturalised, broadleaved woodland can be considered to be of high biodiversity value. To the east of the site the woodland thins out and the stream's floodplain is replaced with **wet grassland – GS4**. There is a sward of Creeping Buttercup, Meadow Buttercup R. acris, Cow Parsley *Anthriscus sylvestris*, Angelica *Angelica sylvestris* and Yellow Iris *Iris pseudacorus*. This is an important area in maintaining the function and structure of the stream, as well as preventing flooding downstream.

Other habitats on the site include a small stretch of drainage **ditch – FW4** which is mostly associated with a treeline. Where it emerges from the shade there are dense growths of Fool's Water-cress *Apium nodiflorum*. Dense scrub is mostly associated with the exposed boundary of the woodland as previously described. However, there are other areas of dense Gorse and/or Brambles that also fall into this classification. Scrub provides cover and food for nesting birds and other species.

To the west of the buildings there is an area of formerly bare ground, but which has been overgrown by Bramble **scrub – WS1**. There are a range of plants, predominantly annual species, including Thistles *Cirsium sp*., Willowherbs *Epilobium sp*., Buttercups, Clovers *Trifolium sp* and others. These are reducing in extent as Brambles increase in extent. It is a habitat of low biodiversity value.

Figure 4.3 – Habitat map of the Farrankelly site

4.5 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.

A dedicated bat survey was carried out by Dr Tina Aughney and included surveys on September 2nd and 4th 2017. Additional surveys were carried out in September 2018 and again over a number of days/nights in late June 2019. Bats species which were recorded include Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Brown Long-eared Bat and Natterer's Bat. No bat roosts were identified within the development red line boundary. Suitable roosting is provided in mature trees and 53 trees were identified as potential 'medium value' bat roosts. Although outside the site boundary, adjacent buildings were considered likely roosting locations for bats. Treelines, hedgerows, scrub etc. provide essential foraging and commuting habitat for these species.

There was no evidence of Badger activity from the treeline or woodland habitats and no other distinctive signs of these animals, e.g. hair, scat. However, there is a roadkill record from east of the site from 2013 so it is likely they are in the vicinity. Trails in the woodland were indistinct and may be in use by a Fox *Vulpes vulpes*. During the April 2017 an active Fox earth was recorded in a treeline on the northern half of the site, slightly outside of the site boundary.

The Three-trouts Stream was surveyed for signs of Otter activity during all survey visits. No direct evidence of their presence was found on any occasion. Nevertheless, the habitat is suitable for them and their presence must be assumed.

No evidence of Irish Hare was found on the site although they are recorded from this area and avail of a variety of habitats (Reid et al., 2007).

While limited data are available on the distribution of Hedgehog, Pygmy Shrew and Irish Stoat, they are considered ubiquitous in the Irish countryside and suitable habitat is available for them (Hayden & Harrington, 2001). All three are protected under the Wildlife Act. Sika deer are increasingly recorded from the lowlands of Wicklow however there was no evidence of their activity on these lands. While the woodland is, in theory, suitable habitat for Red Squirrel they have not be recorded in this area since the 1960s[9]. In 2016 a Red Squirrel was trapped by vets on lands at Charlestown and this may indicate that this species is recolonising the area. The invasive Grey Squirrel *Sciurus carolinensis* is not recorded from this square but is know from locations nearby and was spotted during the June 2019 survey. Pine Martens were recorded from nearby Glen-of-the-Downs in 2012 and are believed to be expanding their range in this region. Other, non-protected, mammals that are likely to be present include Brown Rat *Rattus norvegicus*, House Mouse *Mus domesticus* and Wood Mouse *Apodemus sylvatica*.

The following bird species were recorded during the site surveys of November 2013 and May 2015: Swallow *Hirundo rustica,* Blackbird *Turdus merula,* Goldfinch *Carduelis carduelis,* Wood Pigeon *Columba palumbus,* Pheasant *Phasianus colchicus,* Blue Tit *Parus caeruleus,* Snipe *Gallinago gallinago,* Rook *Corvus frugilegus,* Robin *Erithacus rubecula,* Coal Tit *P. ater,* Magpie *Pica pica,* and Jay *Garrulus glandarius*. None of these species is listed by BirdWatch Ireland as being of high conservation concern (red list) (Colhoun & Cummins, 2013). Swallow and Snipe are both listed as being of medium concern (amber list) while the remainder are of low concern (green list).
Of those species listed by BirdWatch Ireland as being of high conservation concern (Colhoun & Cummins, 2013) Quail *Coturnix coturnix,,* Barn Owl *Tyto alba,* Grey Wagtail *Motacilla cinerea* and Yellowhammer *Emberiza citrinella* were recorded as breeding in East Wicklow during the 2007-11 Bird Atlas project (Balmer et al., 2013). The buildings are not suitable for roosting Barn Owl. A record from the NBDC for this 10km square dates from pre-1991. There are no records on the subject lands for Quail and this is now a very rare breeding bird, confined to areas which are stocked for gun clubs. Arable farmland with treeline or hedgerow is ideal Yellowhammer habitat however it was not recorded during any of the field surveys.

In April 2017 a breeding bird survey was undertaken and these results are given in table 4.4 and figure 4.4.

[9] Records referred to in this section are from www.biodiversityireland.ie

Common Frog *Rana temporaria* and Common Lizard *Lacerta vivipara* are protected under the Wildlife Act 1976 and may be present on this site. There is suitable habitat for spawning Frogs in the drainage ditch and wet areas near the stream. Smooth Newts *Lissotriton vulgaris* are to be found in Wicklow but there are no permanent ponds on this site in which they are likely to be breeding.

The Three Trouts Stream is known to support a population of Brown Trout. Data from the NPWS suggests it is not within the range of protected fish species such as Lampreys, *Petromyzon planeri* or *Lampetra sp.* but may be in the range of Atlantic Salmon *S. salar* (NPWS, 2013). These fish are listed under Annex II of the Habitats Directive. Inland Fisheries Ireland maintain no fish monitoring stations along this river.

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia,* and this is not to be found on farmland or scrub habitats of the type present here. Other protected invertebrates are not recorded from this square (NPWS, 2013).

Table 4.3 – Breeding birds of the Farrankelly site.

Species		BoCCI Status	CBS Code[10]	Birds Directive
April 2017				
Aegithalos caudatus	Long-tailed tit	Green	LT	-
Carduelis carduelis	Goldfinch	Green	GO	
Columba palumbus	Wood pigeon	Green	WP	-
Corvus corone	Hooded Crow	Green	HC	
Corvus frugilegus	Rook	Green	RO	
Corvus monedula	Jackdaw	Green	JD	-
Erithacus rubecula	Robin	Green	R.	-
Fringilla coelobs	Chaffinch	Green	CH	-
Parus caeruleus	Blue tit	Green	BT	-
Parus major	Great tit	Green	GT	
Pica pica	Magpie	Green	MG	-
Prunella modularis	Dunnock	Green	D.	-
Sylvia atricapilla	Blackcap	Green	BC	-
Turdus merula	Blackbird	Green	B.	-
Turdus philomelos	Song thrush	Green	ST	-
June 2019				
Carduelis carduelis	Goldfinch	Green	GO	
Corvus corone	Hooded Crow	Green	HC	
Columba palumbus	Wood pigeon	Green	WP	
Erithacus rubecula	Robin	Green	R.	
Parus caeruleus	Blue tit	Green	BT	
Passer domesticus	House Sparrow	Green	HS	
Phasianus cholchicus	Pheasant	Green	PH	
Phylloscopus collybita	*Chifffchaff*	Green	CC	
Pica pica	Magpie	Green	MG	
Prunella modularis	Dunnock	Green	D.	
Turdus merula	Blackbird	Green	B.	

Common Frog *Rana temporaria* and Common Lizard *Lacerta vivipara* are protected under the Wildlife Act 1976 and are likely to be present on this site. Suitable habitat for spawning Frogs is present in the drainage ditches. Smooth

[10] Countryside bird survey, RSPB, BirdWatch Ireland

Newts *Lissotriton vulgaris* are to be found in Kildare but there are no permanent ponds on this site in which they are likely to be breeding.

Inland Fisheries Ireland maintain no fish monitoring stations along the Three-trouts Stream. The water course is known to be of salmonid status however and may contain other fish of conservation interest (e.g. European Eel *Anguilla anguilla* or Lamprey *Lampretra. sp.)*

There are no records of rare or protected aquatic invertebrates from the Three-trouts Stream and such species are not likely to be present. In Ireland only one insect is protected – the Marsh Fritillary butterfly *Euphrydras aurinia* – and its preferred habitats (peatlands or flower rich meadows with the Devil's-bit Scabious *Sucisa pratensis*) are not present on this site or in this vicinity.

Figure 4.4 – Breeding birds at Farrankelly (April 2017)

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

In summary it has been seen that the application site is not within, or adjacent to, any area that has been designated for nature conservation at a national or international level. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There is one species listed as alien invasive under S.I. 477 of 2011, Giant Rhubarb, but is very limited in extent. There are features however that are of biodiversity significance at a local or county level.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). 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 Farrankelly site

Habitat	Significance
Eroding stream – FW1 and associated wet grassland – GS4 and scrub – WS1 Broadleaved woodland – WD1	County Importance – listed by Wicklow County Council as a 'local biodiversity area'
Treelines – WL2 Hedgerows (higher significance) – WL1	Local Importance (Higher Value). Semi-natural habitats types with high biodiversity in a local context with likely or potential breeding populations of protected species (Bats, Irish Stoat, Pygmy Shrew, Hedgehog.)
Scrub – WS1 Hedgerow (lower significance) – WL1 Drainage Ditch – FW4 Gorse and bramble scrub not associated with the stream – WS1	Local Importance (lower value) Available breeding habitat for birds and small mammals
Arable Crops – BC1 Improved agricultural grassland – GA1 Recolonising bare ground – ED3	Negligible ecological value

4.6 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The subject proposal is for the construction and subsequent use of a residential housing development of c. 426 dwellings along with playing pitches of c. 4.5 hectares (including tennis court, playground and parking) and a greenway along the northern boundary, which follows the Three Trouts stream. The proposal will include all access roads, surface and foul drainage infrastructure as well as open, amenity space. Post-construction the site will be landscaped while the operation phase will see the homes occupied. Additional noise, human activity and artificial lighting will therefore be a feature.

Site clearance will require the removal of low value agricultural habitats as well as selected trees, areas of scrub and field boundaries. The development does not infringe upon the river corridor to the north or the associated woodland/scrub vegetation.

4.7 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 flora & fauna in the absence of mitigation. Methodology for determining the significance of an impact has been published by the NRA (NRA, 2009).

4.7.1 Construction Phase

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

1. The removal of habitats including arable crops, hedgerows, treeline and scrub. It is calculated that the length of lower significance hedgerow to be removed is 520m (out of a total of 1,349m) and higher significance hedgerow/treeline to be removed is 160m (out of a total of 797m). In certain cases individual trees are to be

retained within field boundaries to be removed. Nine individual trees are to be removed which were assessed as being 'potential bat roosts'.

2. An area of Bramble scrub, approximately 4,600m2 in extent, is also to be removed.

The construction of a greenway along the river corridor has the potential to impact negatively upon the broadleaved woodland. It is likely to require the removal of trees and disturbance of soil, with the attendant potential for pollution of the Three Trouts Stream. Mitigation will be required to reduce the severity of this impact.

According to the bat survey report "Five linear habitats are proposed to be removed or partially which will result in 13 trees identified as a PBR [potential bat roost] to be removed. One of these hedgerows was deemed to have Medium important for commuting and foraging bats (hedgerow 7, but this will only be partially removed). All other linear habitats deemed important for local bat populations are marked to be retained on the landscape plan."

A drainage ditch running along the western boundary of the subject lands originates from the lands to the north (traversing underneath Priory Road). Works will be undertaken to ensure that unnecessary debris/vegetation is removed within the ditch along the western boundary within the subject site so as to ensure that its functionality as a ditch is maintained.

The significance of this habitat loss is dependent upon the value it has been assigned in table 4.4. For habitats of negligible or low local value, this effect is neutral or not significant respectively as it cannot affect the conservation status of species which are widespread and/or common. For habitats of high local value this effect is considered to be significant particularly as features (e.g. broadleaved woodland) are rare at a local level and are not easily replicated (e.g. due to the age of mature trees to be removed).

Figure 4.5 – Trees to be removed (in red) and trees to be retained (in green)

3. The direct disturbance of species during land clearance. This can affect nesting birds as well as small mammals but is dependent upon the timing of works. Under the Wildlife Act the removal of vegetation is prohibited between March and August. The felling of trees may also affect roosting bats. This is a moderate effect.
4. Pollution of water courses through the ingress of silt, oils and other toxic substances. The Three Trout Stream is of salmonid status. Silt in particular can clog spawning gravels and, at high concentrations, directly affect the gills of fish. This project will include extensive land clearance works which is likely to result in sediment runoff. No works however, are to be undertaken within 30m of the river (where works are at their closest point). This is a potentially significant effect.
5. Damage to habitats to be retained. The storage of materials or the movement of machinery can result in soil compaction, which can in turn damage the roots zones of trees, leading to poor growth or disease. Without mitigation, this could affect the lengths of hedgerow to be retained.

4.7.2 Operational Phase

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

6. Impacts to species through the disruption of ecological corridors: bats may be impacted through the loss of foraging routes (hedgerows). While certain corridors are to be lost in the short-term, there is to be compensatory planting. There will be a short-term impact from these works. This effect is not significant.

7. Pollution of water from surface water run-off. The Greater Dublin Strategic Drainage Study (2005) identified issues of urban expansion leading to an increased risk of flooding in the city and a deterioration of water quality. This arises where soil and natural vegetation, which is permeable to rainwater and slows its flow, is replaced with impermeable hard surfaces. The current design includes a range of mitigation measures to reduce the impact of the proposed development. This effect is neutral.

8. Pollution of water from foul wastewater arising from the development. Wastewater will be sent to the municipal treatment plant at Greystones. This Waste Water Treatment Plant, has a capacity to treat effluent with a population equivalent (P.E.) of 40,000. It is operated by Irish Water and is licenced to discharge treated effluent to the Irish Sea by the EPA (licence no.: D0010-01). According to the Annual Environmental Report for 2016, the most recent available, there were no compliance issues at this plant. This report also stated that the discharge was not having a perceptible impact upon the quality of the receiving waters

9. Disturbance to species from increased human activity (lighting, pets etc.). The species/habitats present on this site are not considered sensitive to disturbance from noise or general human activity. Bats may be sensitive to the additional artificial lighting that may arise from this development. However, given the already built up nature of the surrounds, it is likely that species present are tolerant of some degree of disturbance. This effect may also occur along the route of the greenway, were this to be artificially lit. The following extract is taken from the bat survey report:

   "Proposed lighting of the proposed development post works may 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) are lighting sensitive bat species.
   Lighting on relation to the Greenway and Active Open Space are of particular importance in relation to local bat populations. Therefore, ensuring that such a directional and that there are buffer zones to reduce light spillage onto the nearby wooded river valley will be important. The lighting of the greenway in a bat friendly manner will

also be important as well as a monitoring programme to determine if proposed lighting is suitable to allow local bat populations to continue to move through the landscape."

The potential effect of artificial lighting is considered to be moderate negative.

10. Alien invasive species. The presence of Giant Rhubarb is not considered to be a significant threat to local biodiversity in this setting (west Galway and Mayo are the areas of major impact in Ireland, where the plant can cover large areas of degraded peat bog). The stand of Giant Rhubarb which had been noted in previous studies was no longer present during the June 2019 survey. No other alien invasive species are present on the site.

Impacts to protected areas.

The nearest area designated for nature conservation is the Glen of the Downs SAC and pNHA however there are no pathways leading to this area. There is a very weak pathway to The Murrough Wetlands SAC and The Murrough SPA. A separate screening report for Appropriate Assessment has been presented and this concludes:

"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."

No other protected areas lie within the zone of influence of this project.

Table 4.5 – Significance level of likely impacts in the absence of mitigation

Impact		**Significance**
Construction phase		
1a	Habitat loss of features of negligible value	Neutral
1b	Habitat loss of features of low local value	Not significant (732m of lower significance hedgerow), 4,600m2 of Bramble scrub
1c	Habitat loss of features of high local value Broadleaved woodland	Not significant (40m of higher treeline) Moderate effect
2	Disturbance to animals during construction	Moderate effect
3	Pollution of water during construction phase	Significant
4	Damage to habitats to be retained	Significant
5	Disruption of ecological corridors	Not significant – effects are unlikely to impact upon the integrity of wildlife populations
6	Surface water pollution during operation	Neutral
7	Wastewater during operation	Neutral
8	Disturbance to species (except for bats) from human disturbance (lighting)	Neutral

Impact		Significance
	Disturbance to bats from artificial lighting	Moderate effect
9	Alien Invasive Species	No impacts
10	Impacts to protected areas	No impacts

Overall it can be seen that three potential moderate negative impacts are predicted to occur as a result of this project in the absence of mitigation.

4.7.3 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.

Considering the nature of the proposed development and the adjacent residential developments, it is considered that the main potential cumulative impact would be 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.

It is noted the adjoining lands form part of the Farrankelly Action Plan and are indicated for residential use (on separate ownership). The lands may be able to accommodate c. 110 dwellings (under a separate future application). The presence of Giant Rhubarb in this vicinity is not considered a threat to local biodiversity and had been removed by the time of the 2019 survey. A cumulative loss of wildlife value however will be experienced as land use changes in this area from open agricultural to suburban. This is offset somewhat as open green spaces and private gardens mature over time. It is considered that the species which are already present in this area will not suffer long term consequences arising from this land use change.

4.7.4 *'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.

4.8 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This report has identified five impacts that were assessed as '*moderate negative'*. 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.

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 both flora and fauna.

4.8.1 Construction Phase

- 1:Mortality to animals during construction – mitigation by avoidance.

- 1a.The removal of hedgerow, treeline or scrub vegetation should not take place from March to August inclusive as per the Wildlife Act.

- 1b.The following mitigation is taken directly from the bat survey report:

  "Removal of trees

  a) Minimise the removal of mature trees, where possible. As many of the PBRs will be retained, where possible.

  b) A total of 9 trees, deemed as PBRs, are proposed to be removed (Additional 4 PBR trees may be removed for Health & Safety). 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).

- 1c. Loss of Broadleaved Woodland. The detailed design of the greenway should ensure that the loss of trees be minimised, and the loss of high-value trees (very old or specimen) should be avoided entirely. The greenway must be set back from the stream by a minimum of 10m to ensure the continued integrity of the riparian zone. The width of the trackway should be minimised and the surfacing used should be rough/permeable (and so eliminate run-off).

  The landscaping plan has been developed as part of the project design process. This process has retained a significant portion of the semi-natural habitat on the site. In addition, new native planting is proposed to reconnect the features being retained to the woodland along the Three Trouts Stream. Additional landscaping of open spaces will also increase connectivity and potential foraging areas for bats. The landscaping plan will incorporate:

  Retention and enhancement of the majority of internal existing treelines / hedgerows, particularly those connected in the landscape to the wooded valley of the Three Trouts Stream.
  - - Retention and enhancement of boundary habitats.
  - - Retention of woodland along the Three Trouts Stream
  - - Retention of a number of mature trees in linear habitats proposed to be retained.
  - - Planting of new native hedgerow around the playing pitches
  - - Planting of new native hedgerow along two sections of the site boundary
  - In addition, the Landscape Plan proposes:
  - - Three open spaces with additional planting are proposed. This will potentially provide additional foraging areas for local bat populations.

- 2: Pollution during construction – mitigation by reduction

A Construction Management Plan has been prepared, and which includes pollution prevention measures in accordance with best practice guidelines from Inland Fisheries Ireland (2016). This identifies the location of the site compounds, storage areas for potentially polluting substances, and specific measures to prevent the loss of silt-laden water to any water course. This also takes into account the potential for pollution of the river during construction of the greenway.

Good site management in relation to sediment control during the construction phase will prevent this from occurring and mitigation measures are outlined below. Other measures to be implemented on site include briefing of all site contractors regarding the sensitivity of the watercourses within the site and the need for strict site management in relation to potential run off.

4.8.2 Operational phase

3. Tree damage – mitigation by avoidance

Protective fencing will be erected in advance of any construction works commencing outside the drip-line of the canopy of retained trees within and along the site boundaries in order to prevent damage by machinery, compaction of soil, etc. in accordance with BS 5837:2012. This will be signed off on by a qualified arborist or ecologist to ensure it has been erected properly before any machinery is allowed on site. No ground clearance, earth moving, stock-piling or machinery movement will occur within these protected areas.

4. Lighting.

The bat report makes a number of specific recommendations which should be followed as follows:

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 is the wooded river valley and treelines/hedgerows remaining within the propose development area. 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.
- 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).
  - All luminaires used will lack UV/IR elements to reduce impact.
  - LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
  - A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
  - 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.
  - Only luminaires with an upward light ratio of 0% and with good optical control will be used.
  - Luminaires will be mounted on the horizontal, i.e. no upward tilt.
  - Any external security lighting will be set on motion-sensors and short (1min) timers.

  - 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.

The current operational greenway lighting, located to the east (on the opposite side of the R761) is bat friendly lighting on a sensor mechanism. This form of bat friendly lighting will be replicated within the greenway proposal for this development. The lighting plan will ensure that horizontal illuminance is at a 0.47 lux at the outer edges of the lighting spillage and this light spillage will be kept to a minimum due to directional luminaries.

The lighting plan will also ensure that minimal lighting spillage will occur in the active zone and throughout the development.

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.

4.8.3 'Worst-case' scenario

In a worst case scenario temporary negative impacts could be expected to occur to water quality, and the fish spawning habitat of the Three Trouts Stream. Permanent damage to trees and hedgerows could occur from compaction of soil within the root zones.

4.9 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.

4.9.1 Construction Phase

There will be some temporary residual impacts to flora and fauna 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 minor negative.

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

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

4.9.2 Operational Phase

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

Table 4.6 – Significance level of likely impacts in after mitigation

Impact		**Significance**
Construction phase		
1a	Habitat loss of features of negligible value	Neutral
1b	Habitat loss of features of low local value	Not significant
1c	Habitat loss of features of high local value Broadleaved woodland	Not significant Not significant
2	Disturbance to animals during construction	Not significant
3	Pollution of water during construction phase	Not significant
4	Damage to habitats to be retained	Not significant
5	Disruption of ecological corridors	Not significant

Impact		Significance
6	Surface water pollution during operation	Neutral
7	Wastewater during operation	Neutral
8	Disturbance to species (except for bats) from human disturbance (lighting) Disturbance to bats from artificial lighting	Neutral Not significant
9	Alien Invasive Species	No impacts
10	Impacts to protected areas	No impacts

Enhancement measures

- A bat box scheme is to be implemented which will increase the availability of roosting locations for bats.

The landscaping scheme includes native wildlife-friendly planting. The landscaping proposals for the development (including the planting of trees and shrubs) were developed in conjunction with the project ecologist and include the use of native and local plant species such as hawthorn, blackthorn, spindle, Wych elm, holly, hazel, mountain ash, alder, willows, oak, ash, elder and gorse. The species used will be native and of local origin, certified stock is available from nurseries who supply stock for the Native Woodland Scheme. Additional planting was recommended to strengthen areas within the site for wildlife and biodiversity and to reinstate green infrastructure across the site where feasible. Further details are provided in the accompanying landscaping drawings prepared by Kevin Fitzpatrick Landscape Architects.

4.10 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.

4.10.1 Construction phase

Monitoring during the construction phase should be carried out to ensure that measures to prevent pollution prevention and protect the root zones of trees are fully implemented. These monitoring measures are highlighted in the Outline CMP.

4.10.2 Operational 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.

4.11 INTERACTIONS

There are interactions between biodiversity and water (chapter 6) and landscaping (chapter 9).

4.12 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 of the Environmental Impact Assessment Report (EIAR) assesses the geological and hydrogeological impacts of the proposed construction and operational activities of the proposed residential development. The chapter sets out the methodology used in the assessment (Section 5.2), describes the existing geological and hydrogeological environment (Section 5.3), details the likely significant geological and hydrogeological impacts associated with the construction and operational phase of the proposed development (Section 5.5), describes mitigation measures (Section 5.6) and details residual impacts post mitigation and proposed monitoring (Section 5.8).

This chapter was reviewed by Dr Andrew Thomson, PhD, BA, HDip (PrjMgt), CEng MIEI, RConsEI, a principal engineer with Roughan & O'Donovan Consulting Engineers. Andrew is a highly qualified Chartered Engineer with over 17 years practical experience, who has demonstrated a high level of competence on all of his projects at all stages from feasibility study, through preliminary design to construction stage. Andrew currently leads the Site Development team in the Buildings Group in Roughan & O'Donovan and has significant experienced of both private and social housing throughout Ireland.

The site location of the proposed development will be in Farrankelly, Co. Wicklow, as shown below.

The site is approximately 21 ha in area and is bounded by the R761 Kilcoole Road to the East, Eden Gate to the south, Priory Road to the west and the remainder of the Action Plans located to the north (which are in a mix of (commercial uses).

Figure 5.1 – Site Location Map

5.2 STUDY METHODOLOGY

The assessment of the potential impact of the activity of water services was carried out according to best practice and the methodology specified in the following guidance documents.

- Environmental Protection Agency Guidelines on the Information to be contained in Environmental Impact Statements (2002);

- Environmental Protection Agency Advice Notes on Current Practice (in the Preparation of EIS) (2003);
- Draft Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Statements, Draft (2015); and
- Draft Environmental Protection Agency Advice Notes on Current Practice in the preparation of Environmental Impact Statements, Draft (2015).
- Institute of Geologists of Ireland (IGI) 2013 Guidelines for the Preparation of Soils, Geology and hydrogeology Chapters of Environmental Impact Statements;
- Institute of Geologists of Ireland (2003) Geology in Environmental Impact Statements, a Guide;
- DG Environment (2002) Guidelines on the Assessment of Indirect & Cumulative Impacts as well as Impact Interactions.

The following sources of information were also consulted:

- Acquisition and compilation of all available regional information on the geology and hydrogeology aspects of the study area, including:

- Interrogation of the Geological Survey of Ireland's (GSI) online mapping service, including;
    - GSI Teagasc Soils mapping;
    - GSI Teagasc Subsoils mapping;
    - GSI Bedrock Geology mapping;
    - GSI Landslide Events;
    - GSI Mineral Localities;
    - GSI Mineral Active Quarries;
- Acquisition and examination of the Ordnance Survey of Ireland's (OSI) mapping and aerial photography;

- Examination of topographical survey of the site;

- Findings of ground investigation carried out by Ground Investigation Ireland at the proposed site;

The Ground Investigation for the proposed development was undertaken by Ground Investigations Ireland with visual inspections carried out by ROD on the 29th November 2018. The investigation was required to determine the soil, bedrock and groundwater conditions at the site. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions;
- Carry out 3 No. Soakaways to determine a soil infiltration value to BRE digest 365;
- Carry out 18 No. Cable Percussion boreholes to a maximum depth of 8.00m BGL;
- Installation of 5 No. Groundwater monitoring wells;
- Geotechnical & Environmental Laboratory testing;
- Report with recommendations

The Ground Investigations is contained in Appendix D Volume III of the EIAR.

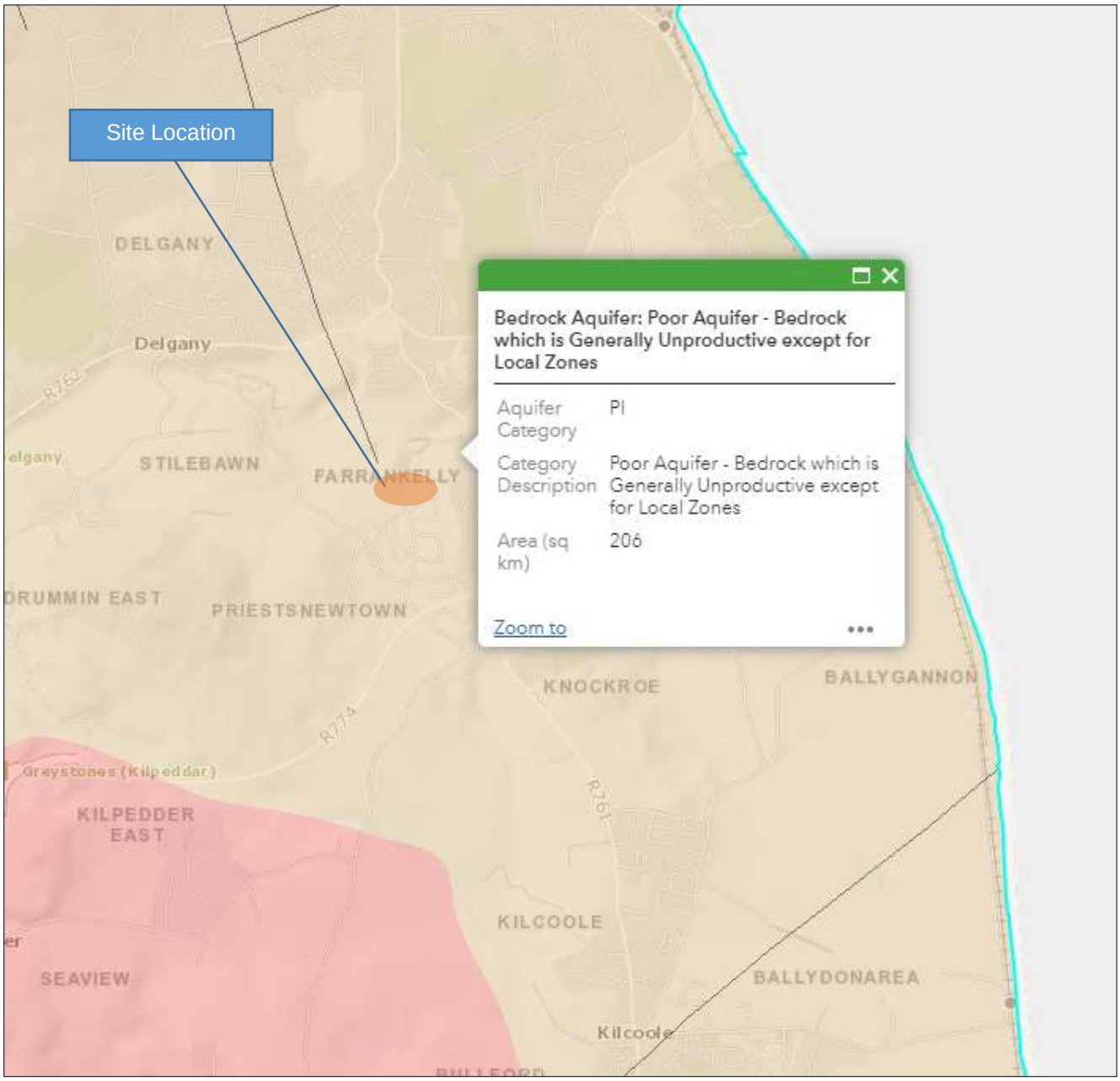
5.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

A detailed description of the site is provided in Chapter 2. This section provides information on the existing local and regional geological and hydrogeological environments, with details of available site investigation data including subsoil information and bedrock geology. Based on this information, the potential impacts of the proposed development are identified, as are the measures required to mitigate any identified negative impacts on the soils and geology environment.

5.3.1 Hydrogeological Setting

According to the bedrock aquifer mapping compiled by the GSI, the bedrock formation is classified as a poor aquifer which is generally unproductive except for Local Zones (Pl).

Figure 5.2 – Bedrock Aquifer



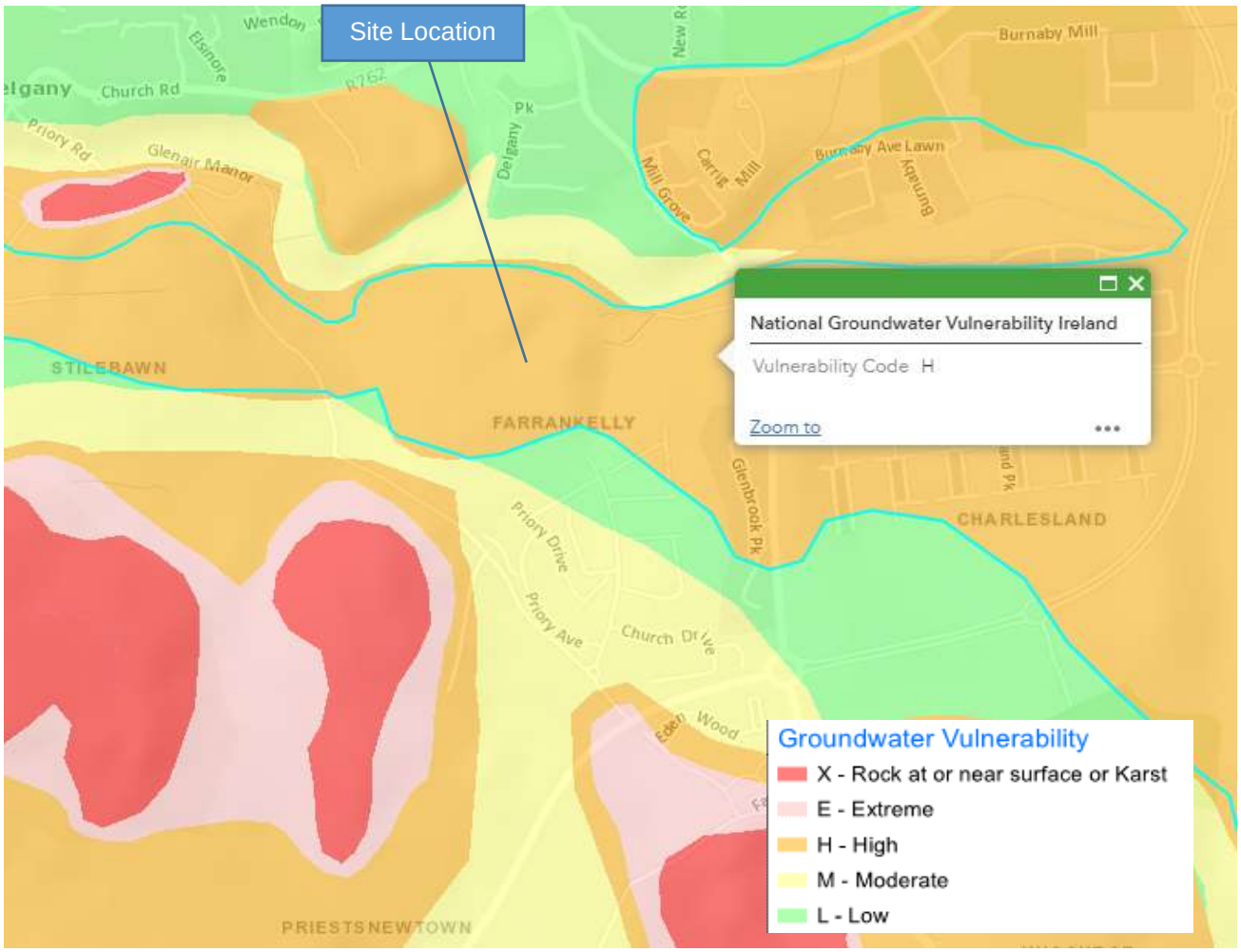
In Farrankelly, the main aquifer lithology of the hilly areas of this Groundwater Body (GWB) is alluvium where the river passes through and gravel derived from limestone for the most part of the subject site. Also there are some

smaller areas consisting Irish Sea Till derived from Cambrian sandstones and shales. The majority of groundwater will seep into the existing soil and then flow down towards rivers and springs. The area is expected to have a high permeability.

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The vulnerability of groundwater depends on the connectivity between the land surface and the aquifer; therefore it is a function of subsoil permeability, subsoil depth and recharge type, i.e. diffuse or point recharge.

According to the interim aquifer vulnerability mapping compiled by the GSI, the underlying Groundwter Vulnerability is classified at the location of the proposed development as "'H' with High vulnerability" and "'M' with moderate vulnerability as shown in Figure 5.3 and Figure 5.4.

Figure 5.3 – GSI Groundwater Vulnerability – Farrankelly site

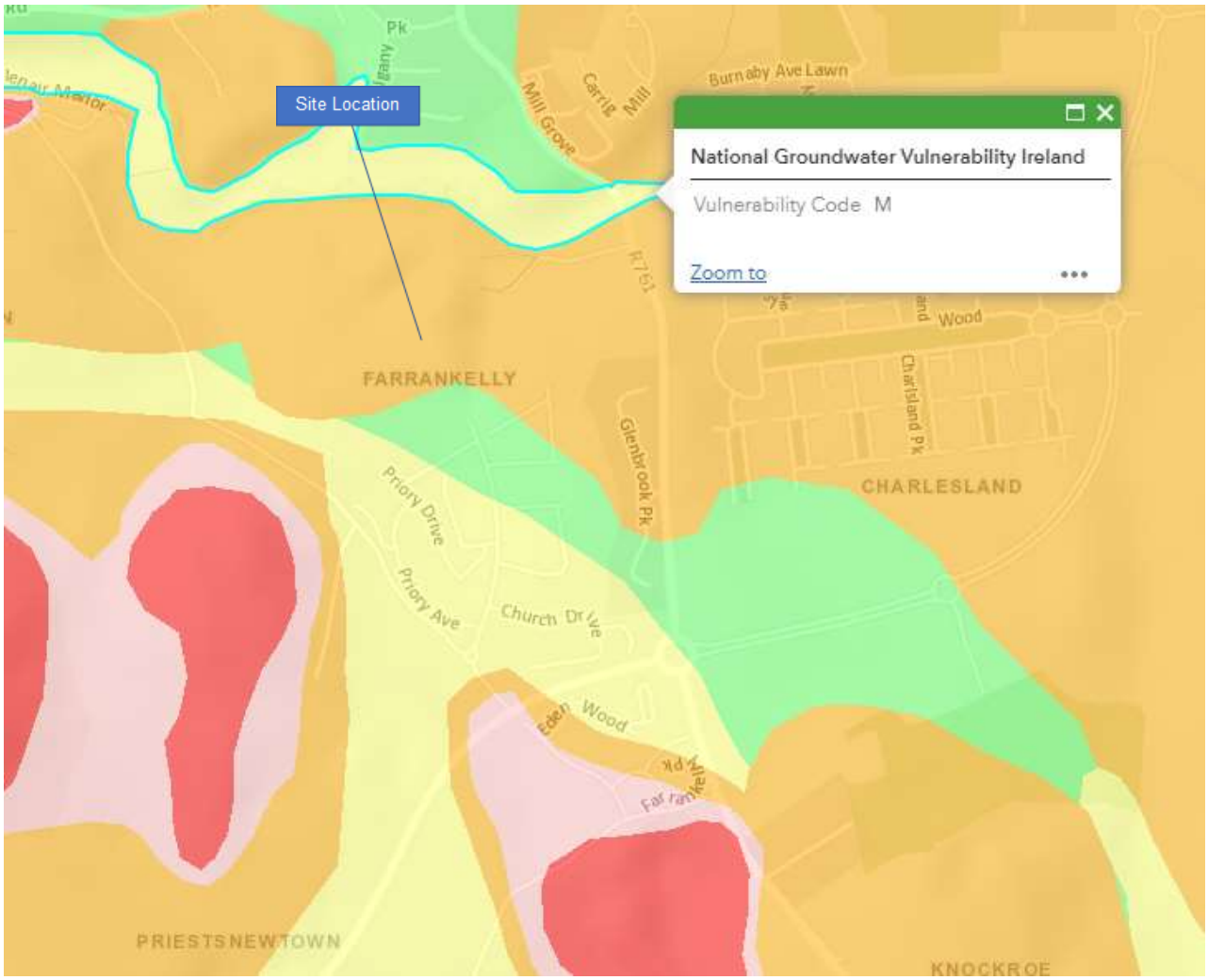


The dominant recharge process will be diffuse recharge from water percolating through the overlying tills and into the aquifer. High rates of potential recharge are expected in the hilly areas where there are very thin subsoils and high rainfall. A large portion of this potential recharge will be rejected because the rocks in this area are considered to be poor aquifers with low storability as shown in Figure 5.2.

There are no historic wells identified within the national well database compiled by the GSI.

The site is not located within a zone of contribution and/or groundwater source protection area for any public groundwater supply source.

Figure 5.4 – GSI Groundwater Vulnerability – Three Trout River



5.3.2 Geological setting

Ground conditions encountered during the preliminary ground investigation can be summarised as follows:

- Topsoil;
- Cohesive Deposits
- Granular Deposits;
- Groundwater

Topsoil: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.3m BGL.

Cohesive Deposits: Cohesive deposits were encountered beneath the Topsoil and were described typically as brown sandy gravelly Clay with occasional cobbles and boulders. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 1.5m BGL in the majority of the exploratory holes. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

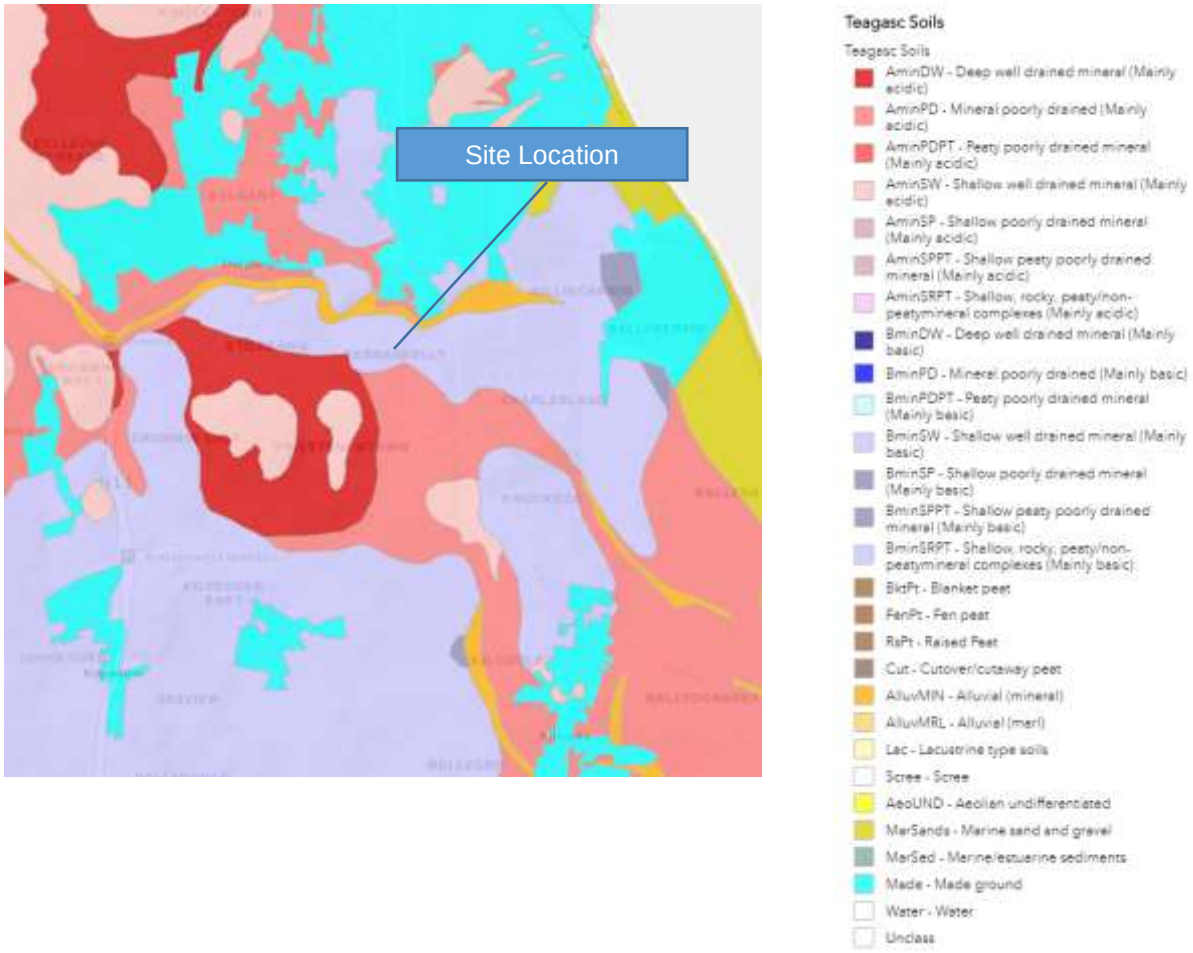
Granular deposits: The granular deposits were encountered within the cohesive deposits and were typically described as brown Clayey sandy subrounded to subangular fine to coarse Gravel with occasional cobbles and rare boulders or grey brown clayey gravelly sand. The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs. Based on the SPT N values the deposits are typically medium dense and become dense with depth.

Ground Water: No groundwater was noted during the investigation however we would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors.

5.3.3 Site Specific Information on Soils/Subsoils

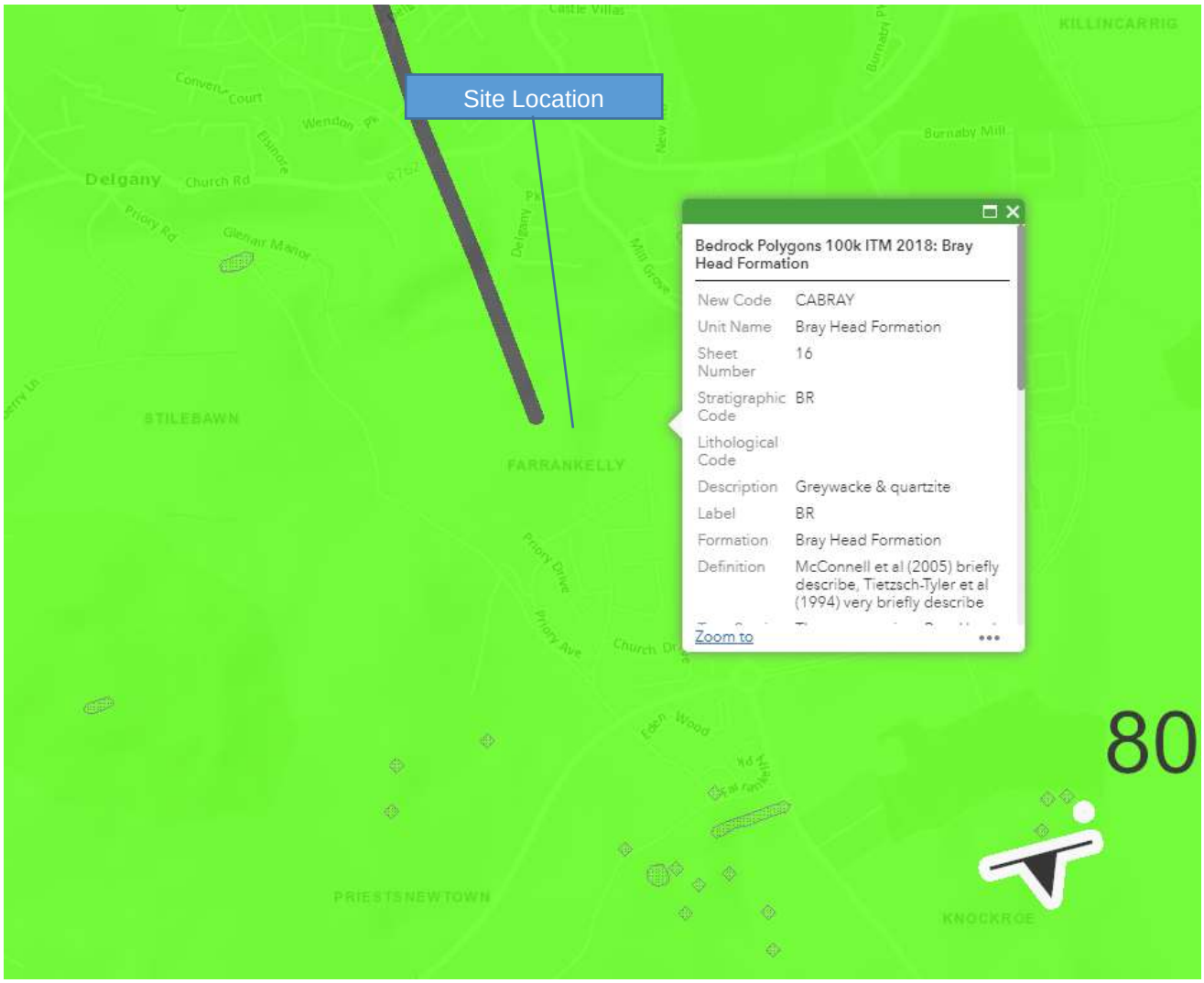
The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediateplasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 19% and 55.1% generally with fines contents of 9.70 to 57.5%. Three samples, BH10 at 1.50m, BH12 at 0.50m and BH18 at 1.50m graded as clayey sandy Gravel with Clay/Silt content ranging between 9.7% to 17.20%, Sand of 19% to 27% and Gravel of 55% to 62.7%. The pH and sulphate testing carried out indicate that pH results are near neutral and that the water-soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1. The results of the Waste Acceptance Criterial Test Suite are presented with the individual parameter limits for “Inert” “Non Hazardous” and “Hazardous” as outlined within European Council Directive 1999 131/EC Article 16 Annex II, “Criteria and procedures for the acceptance of waste at landfills”. The intended disposal site should be consulted to ensure compliance with their specific requirements. The results indicate that the samples tested are below the inert landfill waste acceptance criteria, all spoil disposed of off-site should be sent to a suitably licenced facility. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. A waste classification report is recommended to be completed in accordance with the EPA guidelines on the classification of waste (2015) if material is to be disposed of off-site to identify the appropriate type of facility.

Figure 5.5 – GSI Teagasc Soils



The soils distribution across the site is provided on the Teagasc Soils Map. The site of proposed development is indicated to have predominantly shallow, rocky, peaty/non-peatymineral complexes (mainly basic). (Figure 5.5).

Figure 5.6 – GSI Bedrock Geology



The GSI Bedrock Geology Map shows that the rock underlying the site and vicinity is Cabray, which is a type of greywacke & quartzite. This is part of the formation known as the Bray Head Formation. This may be described slump deformation is widespread with slumped zones from 10m to 200mm thick alternating with coherent undeformed sediments. The formation is dominant by greywacke and by the distinctive quartzite units which range in thickness from 10m to over 100m quartz. (Figure 5.6).

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Chapter 2 of the EIAR contains a full description of the proposed development. This section provides information on the characteristics of the proposed development with regard to soil, geology and hydrogeology activities.

At the site, ground levels slope gradually downwards from south-west to north-east across the site. For the purposes of the proposed development there will be fills and cuts carried out throughout the site in order to achieve the proposed levels of the new development. The construction of 426 residential units, sports pitches, roads and parking areas will result in excavations of the lands.

Material will be excavated for the construction of the proposed foundations for the proposed buildings and ground will be levelled for the sports pitches. The proposed foundations will be founded on lean mix concrete placed onto the suitable bearing stratum. The levels for the building and car parks have been set to minimise excavation and in particular breaking of rock on the site. Material will also be excavated to allow for the construction of the new roadways, parking facilities, footways and the foul water drainage and watermain systems. Foundations for the roads

and parking will be founded on a stone granular fill material placed into the rock bearing stratum. Foundations for the drainage will be founded on lean mix concrete placed into a suitable bearing stratum. Where feasible, excavated material will be re-used for landscaping purposes.

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

- Removal of topsoil, topsoil mounding, soil and subsoil to allow road construction, foundation excavation and services installation to the proposed levels. It is not envisaged that excavation of bedrock will be required but local excavation to seat the western bridge abutment may be required.
- It is estimated that approximately 71,340.086 m^3 of cut and 61,461.643 m^3 of fill will be required across the development leaving an approximate net volume of 9,878.443 m^3 of cut material.
- Construction of the internal roads.
- Installation of main underground services and utilities to serve the site.
- Construction of the open space including attenuation tanks. Significant earthworks will be required to construct the attenuation tanks.

5.4.1 Excavation Recommendations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry. Excavations in the or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are may require dewatering due to the groundwater seepages.

The groundwater and stability trial pits should be consulted when determining the most appropriate construction methods for excavations. Generally, where significant excavations are required in water bearing granular deposits a cut-off wall may be more cost effective than extensive dewatering. An assessment by a specialist dewatering contractor is recommended to determine the most cost-effective approach to the proposed excavation.

Cut and fill modelling was carried out during the design stage of the project and the required amount of cuts and fills required in the proposed development can be found in (Table 5.1)

Table 5.1 – Cut/Fill Required for Subject Site

Total of Cuts and Fill required for the subject site				
	2D Area (m^2)	Cut (m^3)	Fill (m^3)	Net (m^3)
Totals	132,536.963	71,340.086	61,461.643	9,878.443

5.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

An analysis of the potential impacts of the proposed development on the soils and geology environment during the construction and operation phases is outlined in this section.

5.5.1 Construction Phase

The proposed development will involve the excavation of material for foundations, disturbance of topsoil and subsoil to enable the levelling of the site, deliveries of imported engineering fill, crushed stone, concrete, reinforcement and other construction materials.

Topsoil shall be excavated from the existing ground level in order to form building platforms for the development. This will result in the exposure of the subsoil to various elements including weather and construction traffic. Topsoil will be stockpiles and retained for future use with any surplus material being taken off site to a suitably licensed facility. 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.

Excavation of subsoil layers would be required to facilitate site development works, in particular the construction of foul and surface water sewers and underground surface water storage structures (attenuation).

It is anticipated that the development site works and excavation proposals will not be deep enough to impact the underlying bedrock geology during the construction phase. It is therefore considered that the greatest impact of the construction will arise from the extensive stripping and wide scale excavation of soils and sub-soils to prepare and construct the development.

During the construction period, large machinery and associated fuel and fuel storage will be present on site on a daily basis. 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. As such, the impact may be characterised as a likely, temporary, regionally short term, moderate adverse impact on subsoil and ground water and other watercourses within the area.

Increased traffic associated with the construction works would have the effect of compacting existing subsoil layers within the site. The regular movement of heavy machinery and plant to and from the site would also result in an increased risk to the integrity of the surrounding road network, as well as facilitating the unwelcome transfer of mud and dust to surrounding access routes.

It will be necessary to import materials to site; in particular large volumes of stone will be required for construction of the roads, foundations and services. Also, large quantities of concrete, bricks, steel, tar etc. will all be delivered to site by lorry. Road levels have been designed in accordance with TII Design Manual for Roads and Bridges (DMRB) as well as the Design Manual for Urban Roads and Streets (DMURS), with an aim to balance cut and fill earthworks throughout the site.

Landscaping for the developments will reduce the initial impact from the construction phase and will protect the soils again from weathering and erosion. The impacts on the underlying bedrock geology arising from the construction phase will be imperceptible. The greatest impact will be to the soils from the construction activity as soil levels will be greatly altered throughout. However final landscaping should reduce and address these impacts. It is anticipated that the impact on soils arising from the construction phase will be short term and moderate.

Removal of hedgerows will be required due to the proposed street alignment and position of junctions. The impact may be characterised as a likely, permanent, slight, adverse impact on hedgerows resulting in a small increase to existing groundwater that would have previously been stored within the hedgerow roots.

During construction of the development, there is a potential risk of accidental pollution incidences from spillage or leakage of oils from construction machinery. Accidental spillages may result in contamination of soils and groundwater underlying the site should contaminants migrate through the subsoils and impact underlying groundwater. Concrete is highly alkaline and any spillage which migrates though the subsoil would be detrimental to groundwater quality.

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). However, based on simple best practice in the construction industry in Ireland, the risk of this is considered extremely low.

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

The magnitude of these potential contaminants is dependent on the site management practices during the works. The Developer has prepared and submitted a Construction Management Plan with this application detailing surface water management strategy during the works.

As the site is going to be subject under strict routine inspections and going to be built by competent contractor, there are no predicted significant impacts arising from the proposed development.

The aquifer in the surrounding area is classed as a 'poor aquifer', which indicated that the construction stage would not cause any major disturbances to the aquifer in this area. But as the aquifer vulnerability of the proposed development is classed as "High" to "Moderate", competent contractor would have to take maximum precaution and enforce mitigation measures where possible in order to not cause any disturbances to the aquifer in the surrounding area.

5.5.2 Operational Phase

During the operational phase of the development the following potential risks to soils and groundwater have been identified:

- Accidental spillage of hydrocarbons from the car parking at Active Open Space and residential units;
- Foul waste and surface water discharging to ground through leakage in the drainage systems;
- It is anticipated that the development will create additional impermeable surface areas. There are no direct discharges to the ground during the operation of the development although due to the gravelly clay nature of the subsoil, a small quantity of local infiltration will likely occur via attenuation storage structures and other SuDS features such as filter drains and 'stormtech' attenuation systems. It must be noted that in the Surface water strategy, no infiltration has been considered in the calculations as infiltration tests undertaken as part of the site investigation suggest that infiltration techniques would not be suitable for the development. This will result in a likely, slight, positive, long term impact on soils and geology.
- The day-to-day activities of the completed development would be unlikely to have any direct impact on the groundwater environment. Minor impacts may include reduced infiltration and therefore reduced recharge volumes entering the groundwater. This is directly related to the creation of impermeable development areas which pending their arrangement could increase run-off volumes and reduce existing "greenfield" infiltration potential. The risk of spills or leaks of fuels and oils from residential vehicles may impact if the surface water system is not designed to address this.
- On completion of the construction phase, it is not envisaged that there would be a further direct impact on the soil or geology structure. Ensuring appropriately designed and constructed site services will protect the soils and geology from future contamination arising from operation of the developments.
- The impacts on soils and geology arising from the operational phase will be temporary and imperceptible.
- In an event of electricity supply fail or pump failure in the pumping station, there could be an overflow of sewage in the system which would lead to leakages that would contaminate the soil and the water in the surrounding area.

5.5.3 *'Do Nothing'* Scenario

If the proposed development does not proceed, there will be no additional impacts to the existing hydrogeological or geological aspects of the site. If the proposed development did not proceed there would be no impact on the existing land, soils or geology of the site. It is envisaged that the land use would remain unchanged as mainly agricultural. This will have no impact on the surrounding developments and any possible future developments in the area.

5.6 REMEDIAL AND MITIGATION MEASURES

5.6.1 Construction Phase

Avoidance and reduction of the volume of excavated material and backfill material has been a key consideration throughout the design process. Some of the residential units have been designed as a split level buildings in order to suit the topography of the site. The foul/surface drainage and watermain lines are located new proposed roads or footpaths in most of the proposed scheme so they do not require separate excavations.

All excavated materials will be assessed for signs of possible contamination such as staining or strong odours. While no such contamination was found during the Ground Investigation Report, best practice requires that this is

continually assessed during the works.. Should it be determined that any of the soil excavated is contaminated, this will be managed according to best practice and disposed of accordingly by a licensed waste disposal contractor.

Construction operation will be required to take cognisance of the following guidance documents for construction work on, over or near water. CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.

The Construction Management Plan covers the design, construction, operation and maintenance phases of each project component. The Construction management plan will identify the key environmental issues across the project and provides strategies and plans for managing them effectively. It also defines the legal requirements for the project and identifies the regulatory permits and licences required for construction activities.

The project specific Construction Management Plan (CMP) has been prepared and submitted to the planning authority with this application and will be maintained by the contractor during the construction phase. The CMP is included in the SHD application material. The CMP includes a range of site specific measures which also include the following mitigation measures:-

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter watercourses.
- Topsoil stockpiles will also be located on site so as not to necessitate double handling.
- Topsoil will be re-used where possible in gardens and landscaping areas around the subject site.
- The design of road levels and finished floor levels has been carried out to minimise cut/fill type earthworks operations.
- Disturbed subsoil layers will be stabilised as soon as practicable. Therefore, backfilling of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping), will all be carried out promptly to minimise the duration that subsoil layers are exposed to the effects of weather.
- Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles.
- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).
- Where feasible, excavated material will be reused as part of the site development works (e.g. for landscaping works and for backfill in trenches under non-trafficked areas).
- Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site.
- Construction site mitigation such as wheel wash and dust suppression measures will be implemented as part of the construction process and will be detailed in the appointed contractor's construction management plan.
- All oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstanding area, remote from surface water inlets (when it is not possible to carry out such activities off-site).
- The results of the Site Investigations indicate that bedrock is between 3.6mBGL and 6.7mBGL. Therefore, it is unlikely that bedrock will be exposed during construction works accept in localised areas such as bridge abutment construction. Deep drainage works will be avoided where possible to reduce the possibility of impacting on bedrock. Should bedrock be encountered, the extent of exposed bedrock will be limited to the immediate vicinity of active work areas. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works to reduce the volume of material required to leave site. This will also reduce the volume of material to be imported to the site.
- Good housekeeping (site clean-ups, use of disposal bins, etc.) on the site project.
- In order to prevent the accidental release of hazardous materials (fuels, paints, cleaning agents, etc.) during construction site activity, all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project.

During construction works, all excavated materials including existing stockpiles will be visually assessed for signs of contamination. Should material appear to be contaminated, soil samples will be analysed by an appropriate testing laboratory. All potentially contaminated material will be either left in situ and characterised through laboratory testing; or segregated and stockpiled in a contained manner and characterised through laboratory testing. Any contaminated material will be appropriately disposed of or treated using a licensed waste contractor and in accordance with the Waste Management Regulations, 1998.

5.6.2 Operation Phase

All new drainage on site will be pressure tested and have a CCTV survey carried out prior to being made operational. Petrol interceptors will be used to capture any pollutants arising from any impermeable paving and car park spaces.

Oil interceptors will be provided in order to prevent runoff of pollutants to the soils and sub soils. The use of interceptors will be in compliance with Pollution Prevention Guidelines (PPG) 3. No detergents will be discharged to interceptors as this practice renders the interceptor useless.

All surface water drainage is passed through fuel interceptors and passed into stormwater attenuation tanks, then the drainage is washed down into existing stream or passed down to an existing surface water drainage system. All new drainage systems will require pressure testing by the contractor and a CCTV survey to discover any possible defects.

All residential car park areas will have permeable paving. It will reduce surface runoff, trap suspended solids therefore filtering pollutants from stormwater which will improve water quality by filtering pollutants in the substrata layers.

No significant long-term impact on the soil resulting from the proposed operational phase of the development is predicted. Once the development is completed, risks to the land and soils will be from pollutants deriving from the use of the dwellings and/or from contaminated surface water run-off.

The only mitigating measures envisaged during the operational phase are to ensure regular maintenance of SuDS features.

Ensuring appropriately designed, constructed and maintained site services will protect the soils and geology from future contamination arising from operation of the developments.

- The surface water run-off from the development should be collected by an appropriately designed system. This system should ensure that contaminants are removed prior to discharge e.g. via a light liquids separator or by an appropriate treatment train of Sustainable Urban Drainage Systems as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Any separators and drainage systems should be maintained and operated by the facilities management company (prior to taking in charge by the Local Authority) in accordance with the manufacturers recommendations.
- Foul effluent should be collected and discharged from the site via properly constructed sewers to the Public Foul Sewer

A pumping station will be constructed to pump sewage from the northern part of the site that will accommodate 43 dwelling sewage and pump it where it is going to be connected into the proposed sewer which will then be discharged by gravity sewer. The pumping station would also have enough storage to store up to 24 hours of sewage for the proposed 43 dwellings that it will serve. This timeframe would allow Irish Water to mitigate and implement remedial action to have the pumping station operational again in case of any malfunctions.

5.6.3 'Do Nothing' Scenario

As there will be no impact on soils and geology if the development does not proceed, no measures are proposed.

5.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

This section describes the predicted impact of the proposed development following the implementation of the mitigation measures.

5.7.1 Construction Phase

The proposed development will alter the current land use from agricultural to a residential development and associated 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 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.

The principal residual impact from the construction phase is the removal of soil and minor rock volumes from the proposed development site and along the route of the foul water pipeline. This impact is unavoidable given the nature, requirement and design of the proposed development.

During the construction stage, there is the possibility of aspergillus being created by the excavation works. However, it is noted that there are no nearby vulnerable sites such as hospitals and due to the distance to the nearest developments, this is not considered a significant risk. However, as per the submitted Construction Management Plan, the Contractor shall adhere to best practice in terms of dust suppression on the site.

5.7.2 Operational Phase

There are no predicted significant impacts for soils and geology arising from the proposed operation of the new development.

5.7.3 '*Worst Case'* scenario

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

The contractor must adhere to the Construction Management Plan submitted with this application, to ensure that all containment is kept in working order should result in this scenario is considered to be unlikely.

5.8 CUMULATIVE IMPACTS

Should any other developments arise in the vicinity of the proposed development, such as the future separate development of the remainder of the Farrankelly Action Plan, located to the east of the proposed development, significant impacts are not anticipated as long as appropriate mitigation measures are implemented. It is assumed that any such mitigation measures will adhere to best practice within the industry for any possible future developments.

Significant impacts are not anticipated for the construction of the water upgrade works along the Kilcoole Road as long as the appropriate mitigation measures are implemented.

Some works will require 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.

There will be some short term impacts during the construction phase as the pipes are laid, particularly in respect of traffic management with regards to sensitive receptors. This may cause local short term inconvenience and disturbance to residents and business in the vicinity of the works. 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.

5.9 MONITORING

5.9.1 Construction and Operational Phase

Construction phase monitoring relates to the good maintenance of mitigation measures outlined above in section 5.6 including the measures set out in the Construction Management Plan (CMP) submitted. Soil removed during the construction phase is to be monitored to maximise potential for re-use on site. Monitoring of any hazardous material stored on-site will form part of the proposed Construction & Waste Management Plan. A dust management/monitoring programme will be implemented during the construction phase of the development. The quantities of topsoil, subsoil and rock removed off site will be recorded.

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

- Adherence to the appointed contractors "Construction and Demolition Waste Management Plan".
- 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.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site)
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)
- 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.

No ongoing monitoring will be required during the operational phase. An ongoing monitoring will be carried out by Irish Water on the proposed pumping station that will have a telemetry and wet kiosk that will monitor the inflows and outflows in the pumping station with an alert system that sends out a signal to Irish Water monitoring systems in case the pumping station fails.

5.10 REINSTATEMENT

5.10.1 Construction Phase

The proposed development will incorporate landscaping where required.

5.11 INTERACTIONS

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.

5.12 DIFFICULTIES ENCOUNTERED IN COMPILING

No significant difficulties were encountered in the preparation of this assessment of the impact on the water environment.

6.0 WATER

6.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the hydrological impacts of the proposed construction and operational activities of the proposed residential development. The chapter sets out the methodology used in the assessment (Section 6.2), describes the existing hydrological environment (Section 6.3), describes the proposed development (Section 6.5), details the likely significant hydrological impacts associated with the construction and operational phase of the proposed development (Section 6.6), describes remedial and mitigation measures (Section 6.7) and details residual impacts post mitigation and proposed monitoring (Section 6.9).

This chapter was reviewed by Dr Andrew Thomson, PhD, BA, HDip (PrjMgt), CEng MIEI, RConsEI, a principal engineer with Roughan & O'Donovan Consulting Engineers. Andrew is a highly qualified Chartered Engineer with over 17 years practical experience, who has demonstrated a high level of competence on all of his projects at all stages from feasibility study, through preliminary design to construction stage. Andrew currently leads the Site Development team in the Buildings Group in Roughan & O'Donovan and has significant experienced of both private and social housing throughout Ireland.

The site location of the proposed development will be in Farrankelly, Co. Wicklow, as shown below in Figure 6.1. The site is approximately 21.2 ha in area and is bounded by the R761 Kilcoole Road to the East, Eden Gate Housing Development to the south, Priory Road to the west and industry to the north.

Figure 6.1 –Site Location Map

6.2 STUDY METHODOLOGY

The assessment of the potential hydrological impacts of the proposed construction and operational activities was carried out according to best practice and the methodology specified in the following guidance documents.

- Environmental Protection Agency Guidelines on the Information to be contained in Environmental Impact Statements (2002);
- Environmental Protection Agency Advice Notes on Current Practice in the Preparation of EIS (2003);

- Draft Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Statements, Draft (2015); and
- Draft Environmental Protection Agency Advice Notes on Current Practice in the preparation of Environmental Impact Statements, Draft (2015).
- DoHPLG Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018)
- DoEHLG (Nov 2009) Flood Risk Management and the Planning System Guidance document.

Additional sources of information were also consulted. Acquisition and compilation of all available regional information on the hydrology aspects of the study area, including:

- Interrogation of the Geological Survey of Ireland's (GSI) online mapping service, national well databases and groundwater body descriptions;
- Examination of the Office of Public Works (OPW) online flood and hydrometric mapping service;
- Examination of the Water Framework Directive River Basin Management Plans;
- Examination of the Environmental Protection Agency's online hydrological and land use mapping service;
- Identification of possible karst features on OSI 1:50,000 and 1:10,560 scale maps and aerial photography.
- A walkover survey of the entire site; and
- Consultation with statutory bodies.

6.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

This section provides information on the existing local and regional hydrological environment.

6.3.1 Topography

The topography on the site is at its highest point to the south west at 59.00m OD (Malin Head), which gradually goes down towards Farrankelly House to the North East approximately 33.50m OD (Malin Head). Then it drops steeply down towards Three Trout stream that runs from the west to the east going past Three Trout Bridge thereafter. Three Trout's stream valley forms a green corridor that links the Glen of the Downs to the coast. It should be noted that this stream is important from a fisheries perspective as it contains populations of sea trout. It should be noted that their catchments are small, which means they are very sensitive to anthropogenic impacts.

There is an existing farm ditch to the west of the site also which will be maintained during the Works. No changes are proposed to this ditch or its function during any phase (construction or operational) of the scheme and it will always continue as intended.

6.3.2 Hydrology Setting

The site falls into the Avoca Vartry catchment area and Newcastle sub catchment area under the EU water Framework Directive. Three Trout Stream (IE_EA_10T030580) is on the northern part of the subject site. Under the EU Water Framework Directive, each of the river basin districts prepared a review of the status of the waterways and a risk assessment of potential pressures on the water body.

The EPA mapping tool shows that the Water Framework Directive has a River Waterbody Approved Score of 'Not at risk' for the Three Trout stream waterbody.

The study area is not serviced by a mains water supply. There are no historic wells identified within the national well database compiled by the GSI.

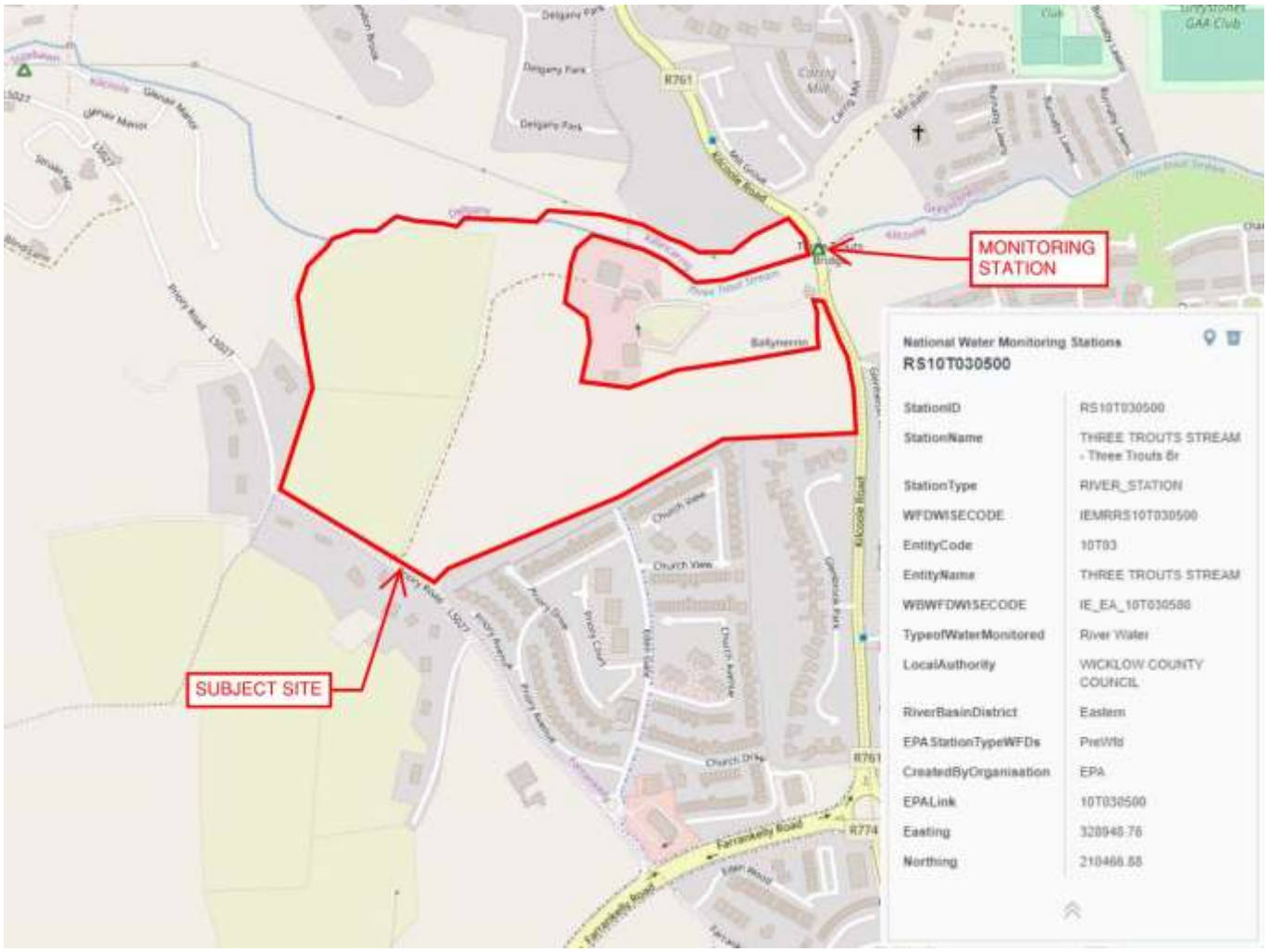
The site is not located within a zone of contribution and/or groundwater source protection area for any public groundwater supply source.

River water quality in Ireland has traditionally been assessed on the basis of macroinvertebrate community composition in association with aquatic plants (macrophytes and algae) and water chemistry. The EPA carries out

quality assessments on rivers and streams under the Q-rating system (Q-values). Q-ratings range from 1 – 5 with good quality indicated by Q5, Q4-5 and Q4 and poor quality Q1.

Figure 6.2 – Three Trout Waterbody Risk

Figure 6.3 – National Water Monitoring Station



There are a number of EPA monitoring stations within the Three Trout Stream, one of them is adjacent to the site as shown in Figure 3 however, there is no sampling on record from the National Water Monitoring stations on the Three Trouts stream as shown in Figure 6.4.

Figure 6.4 – Water Quality Status Table

The water quality status of river and lake waterbodies in the subcatchment is as follows.

Code	Name	Type	2007-09	2010-12	2010-15
IE_EA_10B080500	Ballyronan Stream_010	River	Unassigned	Unassigned	Moderate
IE_EA_10K010580	Kilcoole Stream_010	River	Unassigned	Unassigned	Moderate
IE_EA_10K520710	KILRUDDERY_DEERPARK_010	River	Unassigned	Unassigned	Unassigned
IE_EA_10N010600	NEWCASTLE (WICKLOW)_010	River	Moderate	Good	Good
IE_EA_10N020150	NEWTOWNMOUNTKENNEDY_010	River	Good	Good	High
IE_EA_10N020600	NEWTOWNMOUNTKENNEDY_020	River	Poor	Moderate	Poor
IE_EA_10T030580	THREE TROUTS STREAM_010	River	Unassigned	Unassigned	Unassigned

6.3.3 Flood Risk

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and are split into three categories in the Guidelines:

Flood Zone A
Flood Zone A where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);

Flood Zone B
Flood Zone B where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 or 0.5% or 1 in 200 for coastal flooding);

Flood Zone C
Flood Zone C where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding. Flood Zone C covers all plan areas which are not in zones A or B.

PFRA study flooding maps show that the subject site in where all of the proposed development is going to be built is within Flood Zone C. Also taking into account that CFRAM study flooding mapping cases show a more accurate flooding scenario than PFRA flood mapping cases, therefore the subject site is deemed to be in within Flood Zone C and is very unlikely that the proposed site would flood. Three Trout Stream would have certain degree of flooding in the zone as it is a floodplain, but as there are no dwelling proposed in the area the extents of the floods would not reach the proposed development from the studies carried out in PFRA's and CFRAM's.

6.3.4 6.3.4 Groundwater

During ground investigation study, groundwater monitoring installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. Groundwater recharge for the subject site is found to be at an average recharge of 42-100 mm/year, with a high permeability subsoil, sand and gravels overlain by well-drained soil. Groundwater recharge coefficient is 85% with an effective rainfall of 566 mm/year.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A detailed description of the site is provided in Chapter 2 of this EIAR.

The proposed development involves the construction of 426 no. of housing units. The proposed development has a gross site area of approximately 21 hectares.

Surface water run-off from the development will be collected and stored on site prior to being discharged to an open stream to the east of the site. Attenuation tanks and streams will be used to reduce flow from the impermeable areas and to store the runoff. Permeable paving is proposed for areas of new car parking for storage and filtration only prior to discharge to the surface water system.

Water is proposed to be supplied from a new mains system and no surface water harvesting is proposed for the development.

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

This section identifies potential impacts of the construction and operational phases of the development on the surrounding hydrology in the study area.

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, which will discharge to the new foul drainage system via a temporary connection. At no time during construction will foul sewerage be allowed to discharge to surface water.

Construction of the proposed development will require the removal of a large part of the topsoil and extensive 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, to the Three Trouts Stream has the potential to cause pollution. Accidental oil or fuel spillages or leaks from construction activities also have the potential to find their way into the adjacent water courses. Both increased silt and contaminant levels have the risk of reducing water quality in the adjoining water courses.

Excavation of soil and sub-soil layers will reduce the ability of the lands to recharge groundwater. The majority of surface water runoff will therefore be collected and positively discharged from the development to the Three Trout Stream. It is likely that this activity will have a slight, adverse, permanent, residual, impact on groundwater.

There are a number of potential impacts to surface water from the construction stage of the project. These include:

- Ground excavation solids
- Accidental spillage of hydrocarbons from the construction plant,
- Foul waste from contractor's welfare facilities if not properly contained on site,
- Waste from cementitious products and other construction debris,
- Ground water from surface excavations,
- Vehicle wheel wash water,
- Inappropriate handling and storage of materials and waste.

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 has the potential to result in increased silt and pollutant levels into existing nearby watercourses. In the absence of mitigation it is likely that this activity would have a slight, adverse, temporary, residual impact on the watercourses.

Heavy rain fall or a high level of ground water could produce ponding in open trenches. Discharge of this rainwater pumped from excavations to existing streams could compromise the capacity or the stream and as such cause flooding. This impact may be characterised as a likely, moderate, temporary, adverse impact. The consequence of this will increase the flow within the existing stream and hence potentially cause flooding.

Discharge of wash water from concrete trucks and discharge of vehicle wheel wash water will contaminate the groundwater. This impact may be characterised as a temporary, regionally short term moderate impact. It is likely that this activity would have a temporary, adverse, slight, adverse, impact on groundwater and local watercourses within the area.

The magnitude of these potential contaminants is dependent on the site management practices during the works.

During the construction of the development there will be an increase area of impermeable land. This may affect the permeability of the site and will result in additional surface water runoff in the 1 in 100 year event to the subject site.

There is a risk to Human Health should the ground water or the existing water supply become contaminated during the construction or operational stages, and if the water is consumed. In order to mitigate these risks the measures outlined below will be adopted. It is also noted the water supply in the area is not from the groundwater. Overall the risk is considered unlikely.

6.5.2 Operational Phase

During the operational phase of the development the following potential risks to surface water have been identified:

- Accidental spillage of hydrocarbons from the car parking at sport centre facility and residential units;
- Foul waste and surface water discharging to ground through leakage in the drainage systems.
- Increased impermeable surface area will reduce local groundwater recharge and potentially increase surface water runoff and flooding downstream. It is likely that this activity would have a slight, permanent, adverse, impact on groundwater and the local watercourses.
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas). The likely impact may be characterised as imperceptible, temporary and adverse.
- Contamination risks arising from development use / leaking pipes / contaminated surface water runoff. The likely adverse impact arising from this activity may be characterised as imperceptible and temporary.

6.5.3 Potential Cumulative Impacts

Given the scale of the proposed residential development along with future potential development of the adjoining lands to the east in the Farrankelly Action Plan, the surrounding existing residential developments and the capacity of the surrounding environment to accommodate a development of this nature, it is considered that the overall cumulative development in the area will have a *negative slight long-term impact* on the water environment of the area, through the additional buildings, infrastructure and hardstanding required for the development on the subject lands. The construction of the water supply infrastructure for approximately a 315m section along the Kilcoole Road, will also be subject of works, and will be subject to a road opening licence along with mitigation measures.

6.5.4 'Do Nothing' Impact

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.

If the proposed development does not proceed, there will be no impacts to the existing hydrology aspects of the site. If the proposed development does not proceed there would be no additional impact on the local water systems. The current rate of surface water run-off would continue to operate in its natural state. The only existing risk that would exist would arise from existing agricultural practices which may influence the run-off water quality and therefore the water quality within the Three Trouts stream.

Fluvial flooding events would continue as they have historically in this area with the existing floodplains.

Groundwater status would also remain unchanged if the existing agricultural land use continued.

6.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

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.

6.6.1 Construction Phase

A new surface water drainage system has been designed to cater for the all impermeable paving throughout the site with a number of attenuation tanks proposed due to the additional surface water runoff due to the sheer scale of the site. Runoff will be stored on site with an allowable outflow of 2 l/s/ha, southern and eastern part of the site will be drained into existing drainage system and northern and western side of the site is going to be drained into Three Trout River stream.

- Construction activities will take cognisance of the following guidance documents for construction work on, over or near water.
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.
- IRIA C648 Control of Water Pollution from Constructional Sites. Guidelines for the Crossing of Watercourses during the Construction
- Adherence to the contractor's Construction Management Plan
- Adherence to the Operational Construction and Construction Management Plan that is submitted separately as part of the Planning process

The Construction Management Plan manual for the Proposed Project site has been formulated in consideration of the standard best practice. This Construction Management Plan encompasses a range of site-specific measures which include:

- Existing topsoil will be retained on site to be used for the proposed development. Topsoil will be stored in an appropriate manner on site for the duration of the construction works and protected for re-use on completion of

the main site works. Stockpiles of topsoil/soils will be covered/dampened during dry weather to prevent spreading of sediment/dust;

- The Greenway along the stream will be constructed using a no dig method to prevent entry of sediment laden run-off to the Three Trout stream;
- Excavations would be backfilled as soon as is possible to reduce any infiltration of potentially polluting compounds to the subsurface and the aquifer;
- Top-soiling and landscaping of the works will take place as soon as finished levels are achieved, in order to reduce weathering and soil erosion and limit the generation of sediment laden run-off;
- A temporary site drainage system will be established for the duration of the construction works. All run-off from the site will be directed to settlement ponds and oil interceptors prior to discharge to existing site drain. This temporary system will throttle run-off and allowed suspended solids to settle out prior to entry to the site drain. The discharge to the site drain will be designed to prevent erosion and scour in the vicinity of the discharge. The discharge will be visually inspected regularly for any signs of contamination. Where any suspected contamination is observed, the discharge will cease immediately and will be treated and disposed of appropriately.
- Any minor volumes of groundwater required to be pumped during excavations will be passed through the temporary drainage system settlement prior to discharge to the existing site drain.
- Handling, transport and storage of fuel and chemicals will be controlled e.g. oil and fuel stored on site will be stored in designated areas. These areas will be bunded and located away from any surface water drainage.
- Refuelling of construction machinery will be undertaken in designated areas located away from surface water drainage.
- All machinery will be inspected at the start of each work shift for signs of leaking hydrocarbons. Parking areas will be inspected on a daily basis for evidence of hydrocarbons leaking from machinery.
- All potentially polluting materials will be stored in bunded areas, the capacity of which will be 110% the volume of the largest volume of material or 25% of the total volume of liquid to be stored, whichever is greater. The site manager will be responsible for ensuring that a copy of all relevant material safety data sheet for each product is available at storage locations as well as the site office.
- The washing of any plant equipment will be carried out in designated areas constructed to prevent potentially polluting material from entering surface or groundwater.
- Spill kits shall be kept in the machinery refuelling areas and any chemical/fuel storage areas in the event of spillages. The spill-kits will comprise suitable absorbent material, refuse bags etc. to allow for the appropriate clean-up and storage of contaminated material in the event of a spillage or leak occurring.
- Wheel wash facilities to prevent soil and mud being tracked onto the adjoining roads. In addition to this road washing machinery will be employed where possible;
- There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment;
- If concrete mixing is carried out on site, the mixing plant will be sited in a designate area with impervious surface. Washwaters from cement mixing equipment will not be disposed of the surface
- The Contractor will be obliged to ensure no deleterious discharges are released from the site to surrounding watercourses during the construction stage. Throughout the works the Contractor will also take account of relevant legislation and best practice guidance including but not limited to the following:
- C532 Control of water pollution from construction sites: guidance for consultants and contractors.
- C648 Control of water pollution from linear construction projects
- SP156 Control of water pollution from construction sites – guide to good practice

Mitigation during the construction phase will include implementing best practice during excavation works to avoid sediment running into the drainage system which discharges to the Three Trout stream

6.6.2 Operational Phase

All new drainage on site will be pressure tested and have a CCTV survey carried out prior to being made operational. All fuel tanks will be required to be double bunded and leak detection measures to be put in place to prevent any accidental discharge. The site is attenuated to 2.85-3.28 l/s/ha which is less than the greenfield site. It reduces the runoff from the subject site in terms of surface water, while allowing the surface water to be stored and released then gradually thereafter. A petrol interceptor will be used to capture any pollutants arising from vehicles on any of the roads.

The provision of a pumping station will pump sewage from the northern part of the site that will accommodate 43 dwelling sewage and pump it to the middle of the site where it is going to be connected into the proposed sewer

which will then be discharged by gravity sewer. The pumping station will be built in accordance with Irish Water code of practice and Wastewater Infrastructure Standard Details. An ongoing monitoring will be carried out by Irish Water on the proposed pumping station that will have a telemetry and wet kiosk that will monitor the inflows and outflows in the pumping station with an alert system that sends out a signal to Irish Water monitoring systems in case the pumping station fails. The pumping station would also have enough storage to store up to 24 hours of sewage for the proposed dwellings that it will serve. This timeframe would allow Irish Water to mitigate and implement remedial action to have the pumping station operational again in case of any malfunctions.

Water conservation measures such as the use of low flush toilets and low flow taps will be incorporated into dwellings to reduce volumes and associated abstraction and treatment costs for the proposed development.

Proposed stormwater management system designed in accordance with relevant standards and incorporates two attenuation tanks and hydrobrake flow controls to limit run-off from the site to the greenfield run-off rate to prevent increased flood risk. Hydrobrakes will be inspected and maintained to ensure they are working to prevent increased run-off from the site.

Run-off will pass through two Class I By-pass Interceptors prior to entry to the attenuation tanks and discharge to Three Trout Stream. Oil interceptors will be inspected and maintained to ensure they are working to prevent contamination from the site.

Surface water sewage will be treated and will reduce peak run-off rates and volume by implementation of Permeable paving. It will also retain pollutants prior to discharge and also it will treat vehicle oil spillages in situ.

6.6.3 *'Worst-case'* Scenario

If the proposed development proceeds and if the surface drainage system fails the subject site, the site could flood the surrounding dwellings. If the foul drainage system fails, the groundwater would get contaminated with sewage which could have a major impact on the hydrology and geology of the site. If the petrol interceptors would fail the water would get polluted and would be discharged into Three Trout stream without being treated. If the pumping station failed the site would overflow with sewage.

However, with the mitigation measures put in place for the proposed site and the implementation of SuDs, such as attenuation tanks and permeable pavement will prevent any overflow and discharge into the Three Trout Stream. The pumping station would also have enough storage to store up to 24 hours of sewage for the proposed 43 dwellings that it will serve. This timeframe would allow Irish Water to fix the pumping station in order to have it operational again. Therefore due to the robustness of mitigation measures undertaken the "*Worst-case*" scenario is very unlikely.

6.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT (RESIDUAL IMPACTS)

A wide range of mitigation measures have been specified in the Construction Management Plan for the construction and operational phases of the project. These mitigation methods seek to ensure that construction and operational discharges are controlled to prevent potential pollution impacts to all receiving surface water systems and their downstream catchment areas. Consequently, the mitigation measures detailed will also prevent potential impacts to the downstream ecosystems.

The provision of flow control and storm-water attenuation will ensure the rate of discharge of surface water is limited to *'greenfield'* run-off rates. The 1 in 100 year storm event will be stored in the green areas on site.

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

6.8 MONITORING

6.8.1 Construction Phase

Construction phase monitoring relates to the good maintenance of mitigation measures outlined above including the measures set out in the Construction Management Plan (CMP) submitted.

It is proposed that the construction of the development will be carried out in multiple phases. The primary access will be from Kilcoole Road where the proposed entrance will be constructed at the commencement of the project and the completion of the spine road that will eventually link between Kilcoole Road and Priory Road will be completed within the first phase. Priory Road may also be used for construction traffic, but this will be limited to access for the initial site setup and light vehicles only. The subject site has more than sufficient space that the construction compound and car parking for staff and operations can be accommodated entirely within the site. During the Construction Phase of the works, the Construction Management Plan requires the Contractor to put in place measures for monitoring the quality of run-off from the site into the Three Trouts river. These results are to be submitted to Wicklow County Council on an ongoing basis.

6.8.2 Operational Phase

There are no predicted significant impacts to water and hydrology arising from the proposed operation of the new development. During the operation phase, there will be ongoing maintenance to the petrol interceptors and the attenuation tanks. The Developer has confirmed that there will be a management company in place for the development and this will be required to be carried out on a regular basis.

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 development in Farrankelly, Greystones, Co. 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 a residential development of 426 no. dwellings, a creche (c. 599 sq. m), residential amenity building (c. 325 sq. m), active open space of 4.5 hectares, greenway of c. 2.4 hectares as follows:

A) 245 no. houses comprising; 148 no. 3 bedroom houses, 93 no. 4 bedroom houses, and 4 no. 5 bedroom houses [houses are provided with two car parking spaces and solar panels] – House Type E, 3 storey to front – 2 storey to rear; House Types G1,G2,G3, and H dormer house types, all other house types 2 storey;

B) 93 no. apartments with balconies in 3 no. 4 storey apartment buildings (Blocks 1 and 2 over part basement/podium) comprising 36 no. 1 bedroom apartments, 53 no. 2 bedroom apartments and 4 no. 3 bedroom apartments;

C) 44 no. 2 bedroom duplex apartments and 44 no. 3 bedroom duplex apartments in 11 no. 3 storey duplex buildings;

D) Provision of a 2 storey split level residential amenity building of c. 325 sq. m (3 no. car parking spaces and 12 no. bicycle spaces). Temporary use of the residential amenity building as a marketing suite for a period of 3 years.

E) Provision of a 2 storey creche of c. 599 sq. m (10 no. car parking & 12 no. cycle spaces), 1 no. ESB substation (beside creche) and ESB kiosks, associated single storey bicycle storage and refuse storage buildings.

F) Active Open Space of c. 4.5 hectares comprising: 1 no. playing pitch, 1 no. multi-purpose pitch (with all weather surface), tennis courts, children's play area, trim trail and parking (30 no. car parking spaces & 20 no. bicycle spaces),

G) Approximately 4.2 hectares of open space comprising; a pedestrian and cycle route or 'greenway' (and associated paths, stream crossing and lighting) at the "Three Trouts" stream (c. 2.4 hectares); c. 1.8 hectares of open space within the development (including playground areas); all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths.

H) Access to the subject site will be from a new priority junction (including upgraded frontage), located on the Kilcoole Road (R761). The proposal includes for the construction of a vehicular/pedestrian access from Priory Road as well as 3 no. independent vehicular access points from Priory Road to serve 9 no. dwellings, construction of cyclist and pedestrian link to boundary of Eden Gate development located to the south, 762 no. car parking spaces and 225 no. cycle spaces.

I) Surface water and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as to drainage services (including underground pumping station), all on a site of c. 21.2 hectares.

J) Temporary marketing signage for a period of 3 years (located beside Priory Road and Kilcoole Road).

K) All associated site development and landscape works.

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 23 years-experience in the monitoring and assessment of 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 air quality and climate 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.
- 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

7.3 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 2018 Report;
- Site specific air quality monitoring surveys at site boundaries;

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.

7.3.1 Impact Assessment Methodology

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 incorporate 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 combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to $PM_{2.5.}$

The European 2008/50/EC Clean Air For Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2017 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 Farrankelly, Greystones, 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 2018 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 2017 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	50% 20%	50 µg/m3 40 µg/m3

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
		exceeded more than 35 times/year Annual limit for the protection of human health		
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 2017 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

Pollutant	EPA 2016 Assessment Classification
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

7.3.2 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 assessment criteria, reproduced from the TII (formerly NRA) 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 (NRA 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 NRA 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.

7.3.3 Operational Impact Assessment Criteria

Once operational, the proposed Farrankelly residential development may impact on air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.3.4 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 CO2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The most recent Conference of the Parties to the Convention (COP23) occurred in November 2017 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.

7.4 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

7.4.1 Description of the baseline environment

The subject site is located in Farrankelly, Greystones, Co. Wicklow and borders Priory Road and the R761 Regional Road. The site is bordered to the south by the Eden Gate Housing development which is walled and fenced at the interface with the site, further east along this boundary the Glenbrook residential forms the site boundary. To the north the site meets an industrial premises – Millbrook Paving Centre (Formerly Farrankelly House) – bounded by a hedgerow, and further west, meets lands zoned for future amenity use as part of the Action Plan for the wider Farrankelly site. To the north west where Priory Road swings away from the site lies Glenbrook House. The boundary of the house with the site is well vegetated with mixed native hedgerow, evergreen shrubs and trees.

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 N11 road which is located c 1.4km west of the Farrankelly site and the R774 Regional Road located c. 500m south of the site are the closest principal sources of transport generated air emissions.

7.4.2 Description of Existing Climate

The nearest representative synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 33km north of the Farrankelly site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall

Precipitation data from the Dublin Airport meteorological station for the period 2011-2018 indicates a mean annual total of about 762 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature

The annual mean temperature at Dublin Airport (2011-2018) 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 2011-2018.

Table 7.4 – Meteorological Data for Dublin Airport 2011-2018

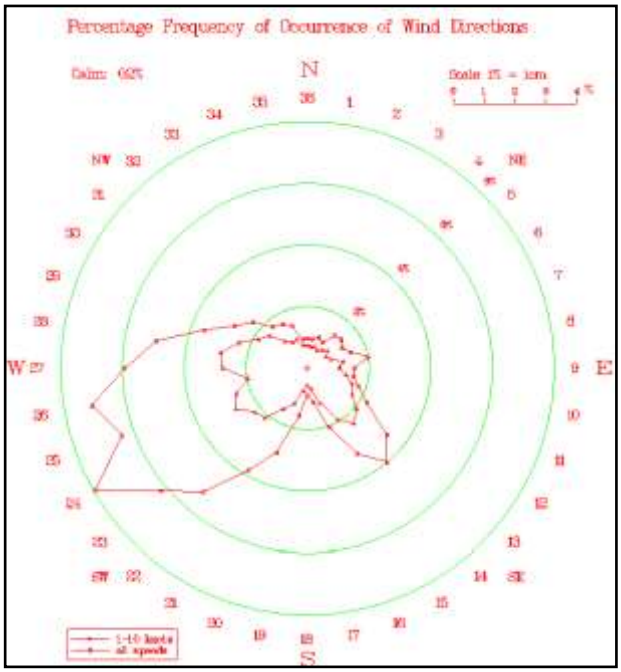
Year	Period	Rainfall (mm)	Maximum mean Temperature (^{0}C)	Minimum mean Temperature (^{0}C)	Mean Temperature (^{0}C)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	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
Mean		762	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 - 2018 is 5.7 m/s.

Figure 7.1 – Windrose for Dublin Airport



7.4.3 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.

Trends in air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland 2018– Key Indicators of Ambient Air Quality" details the range and scope of monitoring undertaken throughout Ireland. Farrankelly can be catagorised as Zone D.

The most recent 2017 EPA publication includes a number of Zone D monitoring locations which would be broadly comparable to the expected air quality at the subject site at Farrankelly. 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 2018. The NO_2 annual mean in 2018 for these sites ranged from 2.3 -7.4 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 two Zone D locations in 2018. The daily SO_2 daily means in 2018 for these sites ranged from 2.7 – 4.1 µg/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 one Zone D locations in 2018 (Not conducted in Zone D locations in 2017). The 8-hour CO concentrations was 4mg/m^3 in 2016 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 three Zone D locations in 2018. The PM_{10} average in 2018 for these sites ranged from 7.8 – 11.2 µg/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 two Zone D locations in 2017. The $PM_{2.5}$ average in 2018 for these sites ranged from 5.6 – 9.2 µg/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 Zone A & C locations only in 2018 and not at any Zone D locations. The benzene average in 2017 for Zone C was <0.18 µg/m^3. Therefore, long term averages were below the limit value 5 µg/m^3. It would therefore be expected that Zone D locations would be lower than the reported Zone C levels.

Table 7.5 below presents a summary of the 2018 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 2018 Air Quality data obtained from Zone D areas

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2017
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	2 - 7 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	3 - 4 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	1.500 µg/m^3
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	8 - 11 µg/m^3
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3	6 - 9 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3	< 0.20 µg/m^3 (Zone C)

7.4.4 Baseline air quality monitoring

A site specific short-term monitoring study was conducted for Nitrogen oxides, Sulphur dioxide and BTEX (Benzene, Toluene, Ethylbenzene and Xylene). All pollutants were measured at two locations (AQM1, AQM2) using passive diffusion tubes over a two week period. Figures 7.2 & 7.3 identifies the monitoring locations. The baseline survey was conducted during October 2017 when the potential for higher ambient levels of fossil fuel generated pollutants would be present as a result of the colder winter period.

These locations were 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.

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 NO_2, SO_2 ,BTEX 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 passive diffusion tube monitoring at Farrankelly development site

Pollutant	Sampling period	Concentration A1 Southern Site Boundary	Concentration A2 Northern site boundary	Assessment criteria
Nitrogen dioxide	October 2017	<2.1 µg/m^3	<2.1 µg/m^3	40 µg/m^3 (as annual average)
Sulphur dioxide	October 2017	<1.4 µg/m^3	<1.4 µg/m^3	125 µg/m^3 (as annual average)
Benzene	October 2017	<2.0 µg/m^3	<2.0 µg/m^3	10 mg/m^3 (as annual average)
Ethylbenzene	October 2017	<1.0 µg/m^3	<1.0 µg/m^3	N/A
Toluene	October 2017	<1.0µg/m^3	<1.0 µg/m^3	N/A
m/p-Xylene	October 2017	<1.0 µg/m^3	<1.0 µg/m^3	N/A
o-Xylene	October 2017	<1.0 µg/m^3	<1.0 µg/m^3	N/A
Dust	Sept-Oct 2017	<52 mg/m^2-day	<52mg/m^2-day	350 mg/m^2-day

Note 1: Annual limit

Note 2 < value indicates below Laboratory limit of detection

7.4.5 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. 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.

7.4.6 Sensitivity

The subject site shall be developed by ground clearance and site preparation works and the subsequent construction of residential buildings, a creche, playing pitches, a residential amenity building, a greenway of 2.4 hectares and open space. The principal local receptors that may be impacted by the development are existing residential developments to the north, east, south and west of the site.

Figure 7.2 – Baseline Air Quality Locations A1 & A2

7.5 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 (1-5 years) and medium term (6-9 years) impact of the construction phase and the longer term impact of the operational phase. The construction phase will be undertaken over a 3-5 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. Details of the indicative phased delivery of the proposed development set out in Chapter 2 of the EIAR.

7.5.1 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 high structures (maximum 4 story height) 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".*

7.5.2 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.

7.5.3 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, houses, apartments commercial 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 4 (No.) x 20 tonne tipper truck movements per hour or an average of 32 movements per day associated with site clearance works for each phase of development. This relatively small volume of truck movements will have a negligible impact on local ambient air quality. In general, site clearance works would 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 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 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 fuelled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts.

The construction phase activities will result in a minor 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 significant impacts on microclimate.

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. 5 years) which will not result in an adverse impact on the local micro or the broader macro climate.

7.5.4 Operational Phase Impacts

Air quality

The operational phase of the proposed development will result in a slight impact 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 movements associated with the development have been evaluated and assessed as part of the Traffic & Transport Assessment by ROD Consulting Engineers for the development which includes parking for vehicles which will enter and exit the site via the R761. The split in am and pm peak traffic movements will not result in an adverse impact on local air quality at any of the junctions and it is predicted that the impact of car engine exhaust emissions will have a negligible impact on local ambient air quality. It is expected that a proportion of the commuting residents will avail of the Bus Eireann and private bus operators commuter services and the local Iarnrod Eireann DART service in Greystones located c. 2.8km from the site. The availability of public transport will significantly reduce the number of private vehicles exiting and entering the development during am and pm peak times.

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 slight 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 shall consider a number of sustainable heating and energy saving features.

Climate

The site area of the development lands is c. 21.2 hectares which 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 not have

an adverse impact on the local micro-climate or on the local receiving environment and therefore human health in the vicinity of the development site.

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 unacceptable 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.

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.

Risks to Human Health

Construction Phase

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

Operational 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 set for the protection of human health and therefore, will not result in a significant impact on human health.

7.5.5 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, including Phase 4 of the Farrankelly Action Plan (located to the east), which could potentially accommodate c. 110 no. dwellings. The relevant traffic figures have been incorporated into the cumulative assessment.

The European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

The cumulative air quality impact of the proposed residential development, other local currently under construction residential developments and existing local transport infrastructure is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient *"atmospheric budget*" to facilitate the proposed development.

It is predicted that the cumulative impact of the construction and operational phases of the subject development and the currently under construction residential developments to the east of the site will not have an adverse long term impact on the receiving environment.

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 on ambient air quality and climate primarily as a result of the use of diesel to fuel construction plant and equipment.

7.5.6 *'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 on existing ambient air quality or on the local micro-climate.

Based on the projected increase in traffic up to the reference year of 2035, 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.

7.6 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 Farrankelly 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 operational phase includes mitigation measures relating to the design of the development 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 on the R761 Kilcoole Road to the east of the development to provide public transport to residents
- Proximity of Iarnrod Eireann's Greystones DART Service c. 2.8km from the site
- Provision of open landscaped areas, multi-use pitches and facilities, and a green-way to encourage residents to avail of active lifestyle options

7.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

7.8 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 there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health or local livestock welfare.

7.9 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 Farrankelly 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.

7.10 MONITORING

7.10.1 Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust 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.

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:

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 periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities and on a quarterly basis thereafter. 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.

The results of all dust deposition surveys shall be maintained by the Project Manager and shall be made available to Wicklow County Council.

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 & A2. 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 NO2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone D areas over a similar period. NO2 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.

7.10.2 Operational Phase

Not required.

7.11 REINSTATEMENT

Reinstatement issued are not relevant to this Chapter of the EIAR, with regard to the construction and operational phases.

7.12 INTERACTIONS

The traffic data used in the assessment of air quality impact was obtained from the traffic and transport consultant, ROD Consulting Engineers, for the proposed development.

The principal interactions between Air & Climate impacts and Population and Human Health have been addressed in Section 7.8 of this report which 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.

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.

7.13 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 a proposed Strategic Housing Development at Farrankelly, Greystones, Co. 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 22 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).*

8.2 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 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 May 2018 at site boundaries adjacent to existing residential development. 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 Morning	07:00hrs – 08:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Monday to Friday Daytime	08:00hrs – 18:00hrs	75dB(A), $L_{Aeq, 10hr}$
All Receptors Monday to Friday Early Evening	18:00 – 19:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Monday to Friday Late Evening	19:00hrs – 22:00hrs	65 dB(A), $L_{Aeq, 3hr}$
All Receptors		

Monday to Friday Nightime	22:00hrs – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Morning	07:00hrs – 08:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Daytime	08:00hrs – 13:00hrs	75dB(A), $L_{Aeq, 5hr}$
All Receptors Saturday Midday	13:00 – 14:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Afternoon-Evening	14:00 – 22:00hrs	65 dB(A), $L_{Aeq, 3hr}$
All Receptors Monday to Friday Nightime	22:00 – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Daytime	07:00hrs – 21:00hrs	65 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Nightime	21:00 – 07:00hrs	55 dB(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.*

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 Farrankelly, Greystones, Co. Wicklow and borders Priory Road and the R761 Regional Road. The site is bordered to the south by the Eden Gate Housing development which is walled and fenced at the interface with the site, further east along this boundary the Glenbrook residential forms the site boundary. To the north the site meets an industrial premises – Millbrook Paving Centre (Formerly Farrankelly House) – bounded by a hedgerow, and further west, meets lands zoned for future amenity use as part of the Action Plan for the wider Farrankelly site. To the north west where Priory Road swings away from the site lies Glenbrook House. The boundary of the house with the site is well vegetated with mixed native hedgerow, evergreen shrubs and trees.

The proposed development is located in an area with a relatively low ambient noise climate with the dominant identified sources being road traffic on the local road network. It is noted that the only commercial noise source in proximity to the site is the Millbrook paving centre located north of the site. This lands in which the facility occupy are in the AAP area and are likely to be redeveloped in the future to accommodate a separate residential development.

The N11 road which is located c 1.4km west of the Farrankelly site and the R774 Regional Road located c. 500m south of the site are the closest principal sources of transport generated noise. Road traffic noise from the N11 can be faintly observed as a distant noise but is not considered to be intrusive or dominant at the Farrankelly site.

Construction related noises (including the movement of site vehicles and manual works) from a construction site opposite the eastern site boundary was occasionally audible during the baseline noise survey, however this noise was not dominant and is short-term source and will be completed in late 2019.

8.3.2 Baseline environmental noise survey

Baseline noise data in the vicinity of the closest residential receptors to the proposed development site boundaries has been obtained from noise monitoring surveys conducted by Byrne Environmental Consulting Ltd during May 2018. 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 measurements were conducted at five locations as shown in Figure 8.1 below and as described in Table 8.5 below. Noise monitoring 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 72 hours (3 days) at each 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	Residential houses opposite the western site boundary
Location N2	Residential houses opposite the eastern site boundary
Location N3	Residential houses along the southern site boundary
Location N4	A residential house opposite the northwestern site boundary
Location N5	Residential houses along the northeastern site boundary

Figure 8.1 – Baseline Noise Monitoring Locations N1 – N5

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.

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.

8.3.4 Baseline noise measurement results

Table 8.6 – Location N1 Residential Houses opposite western site boundary

Period 5th – 8th May 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	56	59	51	81
Nightime period 23:00 – 07:00hrs	52	56	42	77

During the daytime, evening and nightime periods the noise climate at N1 is primarily influenced by occasional passing road traffic noise.

Vibration was not perceptible during the survey period at Location N1.

Table 8.7 – Location N2 Residential Houses opposite eastern site boundary

Period 5th – 8th May 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	58	61	50	82
Nightime period 23:00 – 07:00hrs	53	56	45	74

During the daytime, evening and nightime periods the noise climate at N2 is primarily influenced by passing road traffic noise. Noise primarily vehicle movements at the paving centre are audible in the distance.

Vibration was not perceptible during the survey period at Location N2.

Table 8.8 – Location N3 Residential Houses opposite southern site boundary

Period 5th – 8th May 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	52	56	40	76
Nightime period 23:00 – 07:00hrs	41	44	38	67

During the daytime, evening and nightime periods the noise climate at N3 is primarily influenced by occasional passing road traffic noise within the existing residential estate.

Vibration was not perceptible during the survey period at Location N3.

Table 8.9 – Location N4 Residential Houses opposite north western site boundary

Period 8th - 11th May 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	54	56	49	70
Nightime period 23:00 – 07:00hrs	45	49	37	65

During the daytime, evening and nightime periods the noise climate at N4 is primarily influenced by occasional passing road traffic noise.

Vibration was not perceptible during the survey period at Location N4.

Table 8.10 – Location N5 Residential Houses opposite northeastern site boundary

Period 8th - 11th May 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	57	60	55	76
Nightime period 23:00 – 07:00hrs	50	52	39	64

During the daytime, evening and nightime periods the noise climate at N5 is primarily by road traffic noise. Noise primarily vehicle movements at the paving centre are audible at this location. Occasional vehicles entering and exiting the Millbrook Paving Centre were audible. Occasional impulsive banging sounds were also audible but not intrusive.

Vibration was not perceptible during the survey period at Location N5.

8.3.5 Significance

Based on the recorded baseline noise surveys conducted in the vicinity of the proposed development site it may be concluded that the existing ambient noise levels are low to moderate at the closest existing and proposed residential receptors.

The impact of local road traffic noise has a slight impact at locations N1, N2 and N5 and a negligible impact at N3 and N4.

The paving centre to the north of the site has an infrequent slight noise impact on the proposed development site.

Local road traffic noise has an influence on the ambient noise climate at site boundaries and at local existing residential receptors noise source throughout the day, but traffic noise recede during the evening and nightime periods.

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of a residential development of 426 no. dwellings, a creche (c. 599 sq. m), residential amenity building (c. 325 sq. m), active open space of 4.5 hectares, greenway of c. 2.4 hectares as follows:

A) 245 no. houses comprising; 148 no. 3 bedroom houses, 93 no. 4 bedroom houses, and 4 no. 5 bedroom houses [houses are provided with two car parking spaces and solar panels] – House Type E, 3 storey to front – 2 storey to rear; House Types G1,G2,G3, and H dormer house types, all other house types 2 storey;

B) 93 no. apartments with balconies in 3 no. 4 storey apartment buildings (Blocks 1 and 2 over part basement/podium) comprising 36 no. 1 bedroom apartments, 53 no. 2 bedroom apartments and 4 no. 3 bedroom apartments;

C) 44 no. 2 bedroom duplex apartments and 44 no. 3 bedroom duplex apartments in 11 no. 3 storey duplex buildings;

D) Provision of a 2 storey split level residential amenity building of c. 325 sq. m (3 no. car parking spaces and 12 no. bicycle spaces). Temporary use of the residential amenity building as a marketing suite for a period of 3 years.

E) Provision of a 2 storey creche of c. 599 sq. m (10 no. car parking & 12 no. cycle spaces), 1 no. ESB substation (beside creche) and ESB kiosks, associated single storey bicycle storage and refuse storage buildings.

F) Active Open Space of c. 4.5 hectares comprising: 1 no. playing pitch, 1 no. multi-purpose pitch (with all weather surface), tennis courts, children's play area, trim trail and parking (30 no. car parking spaces & 20 no. bicycle spaces),

G) Approximately 4.2 hectares of open space comprising; a pedestrian and cycle route or 'greenway' (and associated paths, stream crossing and lighting) at the "Three Trouts" stream (c. 2.4 hectares); c. 1.8 hectares of open space within the development (including playground areas); all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths.

H) Access to the subject site will be from a new priority junction (including upgraded frontage), located on the Kilcoole Road (R761). The proposal includes for the construction of a vehicular/pedestrian access from Priory Road as well as 3 no. independent vehicular access points from Priory Road to serve 9 no. dwellings, construction of cyclist and pedestrian link to boundary of Eden Gate development located to the south, 762 no. car parking spaces and 225 no. cycle spaces.

I) Surface water and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as to drainage services (including underground pumping station), all on a site of c. 21.2 hectares.

J) Temporary marketing signage for a period of 3 years (located beside Priory Road and Kilcoole Road).

K) All associated site development and landscape works.

When considering a development of this nature, the potential impacts of noise and vibration must be considered for each distinct stage: the medium term (3-10 years) impact of the construction phase and the ongoing long term impact of the operational phase. It is important that there is no unacceptable increase in ambient noise levels during the construction phases and during the operational phase.

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. These normal residential activities are not considered "noise" as they are part of everyday living.

It is also important that adequate sound insulation is provided within the proposed residential units to mitigate the internal impact of future noise sources within the development from the proposed Active Open Space, which includes playing pitches, and a car-parking area.

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. The mitigation measures are described in Section 8.7 and the predicted impacts with the development in place and the mitigation measures incorporated in Section 8.9.

8.5.1 Construction Impacts

The development of the site will be conducted in the following phased stages:

- Archaeological site investigations (completed in 2018)
- 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 absorbant noise barrier.

Construction Works

The proposed development consists of a strategic housing development comprising of 426 no. residential units in a mix of houses, apartments and duplex apartments, two all-weather playing pitches and facilities, 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 10 year period, there will be slight to moderate impacts on the existing residential estates and houses 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 residential 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.

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 8.11 – Indicative 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		**83**	**70**
Combined $L_{Aeq,period}$ with mitigation		**63**	**50**

Table 8.12 – Indicative 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		**86**	**72**
Combined $L_{Aeq,period}$ with mitigation		**66**	**52**

The results of the assessment has indicated that, in general, at distances of greater than 10m from the works site provided all mitigation measures including site hoarding are implemented, the construction day time noise limit of 75dB $L_{Aeq, 11hr}$ can typically be complied with during both enabling and 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 without noise mitigation measures in place.

The proposed construction phase noise mitigation measures as detailed in Section 8.9 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.

Where works are occurring at distances of less than or at 10m from existing residential receptors, enhanced noise mitigation measures including the use of acoustic screens between the activities and the receptors will be required to reduce the impact of works. These measures are detailed in Section 8.9.

Construction Traffic Noise

Based on the assumption of up to 40 HGV movements per day on the haul routes to and from the site along public roads, 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 (40);
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 4 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 51 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.

Vibration

The most significant potential sources of ground borne vibrations that may be generated during the construction phase of the development will be generated by the following practices:

- Ground preparation excavation activities that require the use of pneumatic rock breakers
- Movement of site vehicles bulldozers, tracked excavators and dump trucks on ground surfaces
- Hard core surfaces and haul road compaction with vibro-rolling vehicles
- Road construction surface vibro-rolling

Vibration impacts have been considered from any particular plant items that have the potential to generate perceptible levels of vibration.

The nearest off-site residential receptors will be c. 10m from construction works. 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 temporary and intermittent.

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 within <20m of site activities as detailed in Section 8.9 below.

8.5.2 Operational Phase

The noise aspects to be considered for the completed development can be divided into two categories:

- Noise impacts on neighbouring residential receptors during construction works
- Inward noise impacts on the development and other existing receptors from traffic and amenity (sports pitches) activities

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 the playing pitches and facilities associated with the development.

The Traffic and Transportation Assessment Report prepared by Roughan & O'Donovan 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 and the proposed R761 Kilcoole Road and R762 Priory Road Entrances for the "No development" and the "With development" scenarios.

The percentage traffic increase associated with the development has considered 3 no Scenarios for the R761 Kilcoole Road and R762 Priory Roads.

The maximum predicted traffic increase on the R761 Kilcoole Road will be 7.2% for the AM Peak and 7.1% for the PM Peak

The maximum predicted traffic increase on the R762 Priory Road will be 3.3% for the AM Peak and 3.3% for the PM Peak

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 an negligible increase in existing ambient noise levels at existing residential receptors along the Kilcoole and Priory Road and an imperceptible impact.

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, 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.

Playing Pitches Noise

The proposed sports pitches and facilities will be located in the north-western area of the site as shown below in Figure 8.2.

The acoustic screening of the sports pitches will be necessary to control and minimise the noise impact that their use will have on both the existing residential receptors located opposite the western site boundary and the residential developments located to the south and east within the proposed development. Noise mitigation measures for this aspect of the development are provided in Section 8.9.

Pump Station Noise

The development will include an underground foul water pump station located in the north-eastern area of the site c. 50m from the closest residential receptors. All plant associated with its operation shall be located underground and its operation is not predicted to be audible at the closest residential receptors. A typical well maintained underground pump station of this nature would generate sound pressure levels between 60 – 65dB(A). With regard to the sound attenuation provided by its subterranean location and the distance between the pump station and the closest residential units, it is predicted that the noise level experienced at the residential units would be <15 dB(A) which would have a negligible impact.

Figure 8.2 – Proposed site layout showing location of sports pitches in northwest of site

Potential 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

The main potential noise impact associated with the proposed development relates to additional traffic flows associated with the proposed development on the surrounding road network. Given that traffic from the development will make use of existing and new road infrastructure, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development using the L_{A10} parameter which is typically used to describe traffic noise.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 8.13 offers guidance as to the likely impact associated with any particular change in traffic noise level.

Table 8.13 – Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level dB L_{A10}	Subjective Reaction	Impact
<3	Inaudible	Imperceptible
3 - 5	Perceptible	Slight
6 - 10	Up to a doubling of loudness	Moderate
11 - 15	Up to a doubling of loudness	Significant
>15	Up to a doubling of loudness	Profound

A traffic impact assessment relating to the proposed development has been prepared as part of this SHD application. Information from the traffic report has been used to determine the predicted change in noise levels in the vicinity of the area surrounding the proposed development, for the 2034 design year.

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing internal roads and internal site junctions with and without the development. Traffic data has been assessed and the calculated change in noise levels associated with the development is predicted to have an imperceptible noise impact at existing residential receptors located along the local road network.

8.5.3 Vibration

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.

8.5.4 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.

8.5.5 '*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 up to the design year of 2034 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 imperceptible 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 European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

The potential and predicted impacts of the operational phases of the proposed development including the residential and sport pitch facility have been individually assessed.

It is understood that the existing Millbrook Paving Centre site located to the north of the subject site is likely to be redeveloped for residential housing and will be able to accommodate c. 100 residential units. The noise impacts associated with this future adjacent residential will be similar to the noise generated by the subject residential component, in that the operational phase will be comprised of residential and neighbourhood noise which will not have an adverse operational phase noise impact on the receiving environment either on their own or combined as a cumulative impact.

It is considered that there will be short to medium term moderate negative cumulative impacts associated with the construction phase of the project over all phases of the development. However, it is predicted that there will be a 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 development is completed and operational, there will be no residual adverse noise impact on the receiving environment as a result of the proposed development or in conjunction with other local residential developments that are currently under construction or proposed.

8.6.1 Inward Noise Impact Assessment

The principal aspect of the development which has the potential to have an inward noise impact on the proposed residential units is that of the operation of the proposed sports pitches and the associated facilities.

Noise associated with a sports pitch is generally comprised of the following sources/activities:

Raised voice (Adult Male)	89dB(A) at 1m

Noise from ball impacts	80dB(A) at 1m
Noise from car	72dB(A) at 1m

The maximum noise associated with the use of the proposed playing pitches that will be experienced at an on-site residential receptor at a distance of 50m from the pitches has been determined to be 55dB(A) by the acoustic formula below:
The maximum noise associated with the use of the proposed playing pitches that will be experienced at an off-site residential receptor located west of the site at a distance of c.60m from the pitches has been determined to be 53dB(A) by the acoustic formula below:

Lp(R2) = Lp(R1)-20 log10 (R2/R1)
Where

Lp(R1) = Sound Pressure Level at source
Lp(R2) = Sound Pressure Level at receptor
R1 = Distance at which noise source relates (
R2 = Distance from noise source to receptor

Generally, Local Authorities require that noise levels from commercial or retail activities should not exceed 55dB(A) at a residential receptor so as to minimise the potential for disturbance or nuisance, thus it is predicted that noise from the playing pitches will cause an adverse impact on either on-site or off-site residential receptors.

Section 8.9 includes specific noise control and mitigation measures that will be implemented to further reduce the noise generated by the playing pitches and the associated facilities.

External noise can enter rooms within dwellings through windows, passive ventilators, walls, roof and doors. In most cases, however, windows and unattenuated passive wall and window vents provide the main path and therefore, mitigation by design has focused on these building elements to ensure that their acoustic insulation is adequate.

All residential units with a façade facing towards the sports pitches shall have acoustically rated windows to prevent the breakthrough of external noise from the pitches and car-park area. There shall be no passive air vents on any external walls to reduce the breakthrough of external noise into the units. Only acoustically attenuated vents shall be included in these residential units.

Internal Noise Control – Apartments and Semi-detached houses

At the earliest stage during the construction phase, test apartment units and semi-detached 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 8.14 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin apartment units.

Table 8.14 – 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

The main potential noise impact on existing receptors associated with the proposed development relates to additional traffic flows on the surrounding road network. Given that traffic from the development will make use of existing and new road infrastructure, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development using the L_{A10} parameter which is typically used to describe traffic noise.

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.

Table 8.15 – Recommended Indoor Ambient Noise Levels from BS 8233: 2014

Typical situations	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 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 Meath 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.

The hours of operation for the site shall be limited to the following hours (or where otherwise agreed with the Planning Authority):

07:00hrs – 19:00hrs Monday to Friday
08:00hrs – 14:00hrs Saturday
Closed on Sundays and Bank/Public Holidays

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 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 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 liase 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 noise screens for construction activities.

It is recommended that high performing acoustic barriers are utilised such as Echo Barrier products or Ventac products.

Double height acoustic blanket enclosure

Acoustic blankets screening piling and 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 considered 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 if required.

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, 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.

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.

Having regard to the above we suggest the inclusion of the following mitigation measure for ease of reference:

N V CONST 4

In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 8.9 of the EIA Report.

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 should 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. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment.

All residential units with a façade facing towards the playing pitches and facilities shall have acoustically rated passive wall ventilation systems.

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 should 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 10.12 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: Playing Pitches
The acoustic screening of the sports pitches or alternative measures as agreed with Wicklow County Council will be necessary to control and minimise the noise impact that their use will have on both the existing residential receptors located opposite the western site boundary and the residential developments located to the south and east within the proposed development.

8.7.3 '*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 phase

Outward Noise Impact

During the construction phase there is the potential for minor impacts on nearby noise sensitive properties due to noise generated by construction site activities. The implementation of the construction phase noise and vibration

mitigation measures and a routine noise monitoring programme as detailed in Section 8.9 above and Section 8.11 below, will minimise the potential noise and vibration impact on the receiving environment including existing residential receptors. It is predicted that construction noise and vibration best practice limit values will not be exceeded at any receptor provided all mitigation and control techniques are implemented.

8.8.2 Operational Phase

Inward Noise Impact
The noise impact generated by additional traffic movements associated with the development is predicted to be of an imperceptible impact on existing ambient noise levels at receptors along the local road network.

It may be concluded that during daytime and night-time periods, acceptable internal noise levels can be achieved in all residential units as defined in *BS 8233* with windows closed, using the measures detailed above in Section 8.9 above.

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.

8.9 MONITORING

8.9.1 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 quarterly 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 residential noise sensitive receptors 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 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.*

8.9.2 Operational Phase

No monitoring required.

8.10 REINSTATEMENT

Reinstatement issues are not relevant to this Chapter of the EIAR, with reference to the construction and operational phase.

8.11 INTERACTIONS

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this report which describes in detail the mitigation measures that 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.

8.12 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 was prepared by Declan O'Leary, B.Agr.Sc. (Land Hort) UCD; Post Grad Dip in Landscape Architecture (University of Central England); MILI; of Cunnane Stratton Reynolds. Declan has over 30 years' experience in development, landscape design, urban and environmental renewal. This includes masterplanning, landscape and visual impact assessment and design to implementation of a broad range of strategic environmental improvement schemes to industrial, highway and urban regeneration sites as well as reclamation, amenity, rural/countryside, educational and housing projects. He is experienced in working closely with developers, community organisations and statutory agencies to deliver local environmental, social and economic development.

The Landscape and Visual Impact Assessment (LVIA) was informed by a desktop study and a survey of the site and receiving environment in September 2017. The report identifies and discusses the landscape and visual constraints and opportunities in relation to the proposed Development of Lands at Farrankelly, Greystones, County Wicklow.

9.2 METHODOLOGY FOR LANDSCAPE ASSESSMENT

9.2.1 Definition of Landscape

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as *'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'*. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

9.2.2 Forces for Landscape Change

Landscape is not unchanging. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

9.2.3 Guidance

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is informed by the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).

- Guidelines on the Information to be Contained in Environmental Impact Statements, 2002, published by the Environmental Protection Agency (and the Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Draft 2017)

Key Principles of the GLVIA

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 proposal, the impact would include the construction of the residential and student accommodation, along with gym, café and retail space, as well as supporting road and utility infrastructure and public open space. In addition, there is also the localised change on the approximately 21 ha 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.

9.2.4 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.

9.2.5 Methodology for Landscape Assessment

In Section 9.5 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.

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. The nature and scale of the proposed development are also taken into account. For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment.

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.
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.

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.

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.

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. 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.

9.2.6 Methodology for Visual Assessment

In Section 9.5 of this report the visual effects of the development are assessed. 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.

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 focussed on the landscape). This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes. 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	Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. 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	Viewers at 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, etc. The view may present an attractive backdrop to these activities but there is no evidence that the view is valued, and not regarded as an important element of these activities. Viewers travelling at high speeds (e.g. motorways) may also be generally considered of low susceptibility.
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.

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 to a view:

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.

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 above.

9.2.7 Quality and Timescale

The predicted impacts are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes and response to development, and 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 guidelines for LVIA, assists in the assessment of the appropriateness of the proposed development based on an objective assessment of its likely landscape and visual impacts. The Landscape and Visual Effects are identified in terms of the above definitions and the relevant parts of those definitions highlighted in italic after the relevant score.

9.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

9.3.1 Relevant Planning Policy

9.3.1.1 Wicklow County Development Plan 2016-2022

The Wicklow County Development Plan (WCDP) contains a range of policies relevant to establishing the landscape and visual values and sensitivities for the site and site environs.

Figure 9.1 – Wicklow County Development Plan 2016-2022 (Natural Heritage Map 10.08)

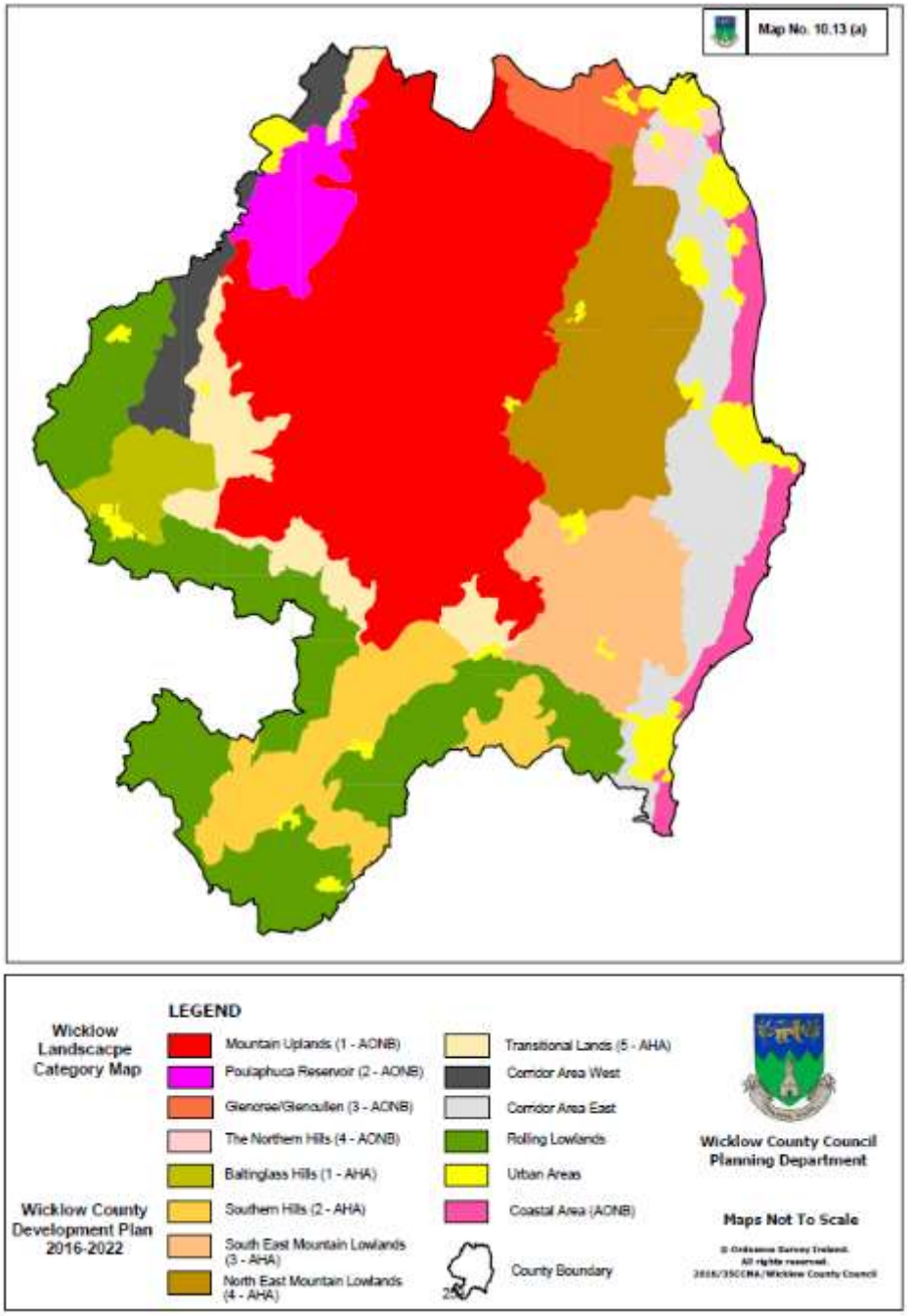
The above extract from the WCDP identifies no tree preservation orders in relation to the site at Farrankelly.

Section 10.3.9 relates to Wicklow's Landscapes. A landscape assessment has been prepared for Wicklow County. The assessment categories and describes the counties landscape types and identifies a hierarchy of Mountain and Lakeshore Areas of Outstanding Natural Beauty (AONB); Areas of High Amenity; Corridor; Lowland and Urban Areas.

Greystones / Delgany and the proposed site is located in a designated Urban Area landscape. These settlement areas:

"…have already been deemed suitable for development (of the type allowed by the settlement strategy and the development standards of this plan) and the impacts on the wider landscape of such development has already been deemed acceptable. Therefore it will not be necessary for developments in urban areas to have regard to the surrounding landscape classification or to carry out landscape or visual impact assessment."

Figure 9.2 – Wicklow County Landscape Category map 2016-2022



(Source: Wicklow County Council)

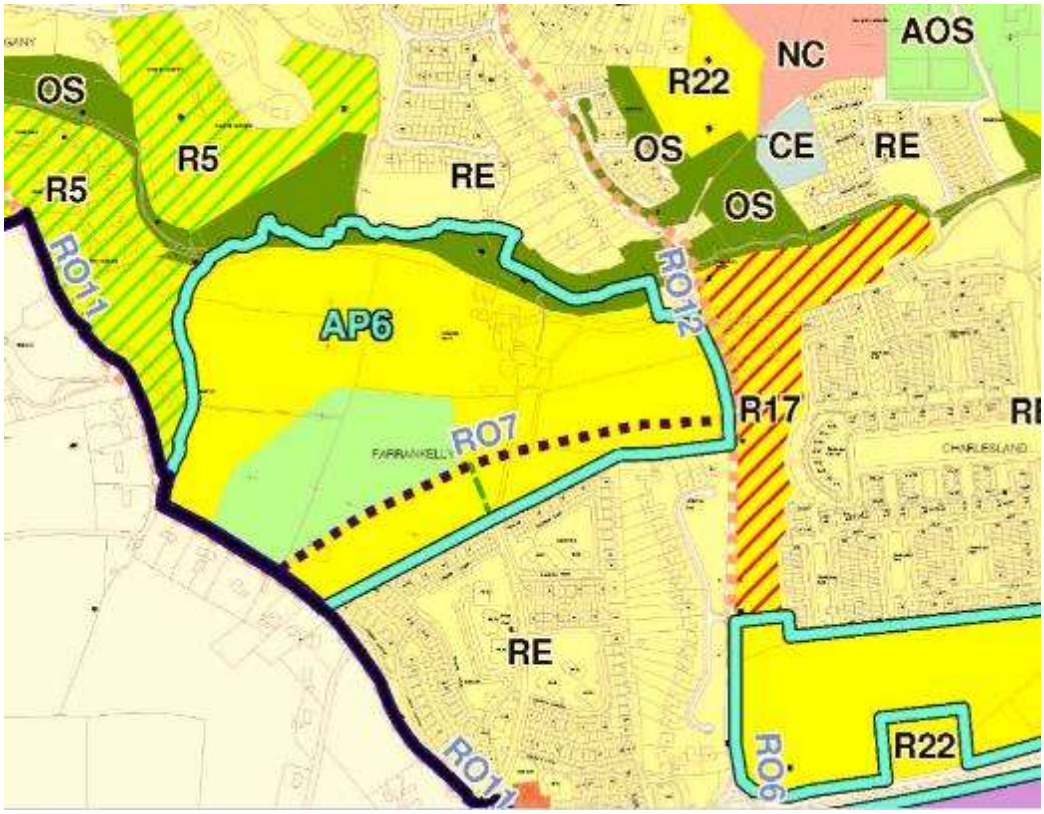
Views and Prospects:

The nearest protected view or prospect in the WCDP relates to the Glen of the Downs which is an enclosed corridor / wooded valley with no visual relationship with the proposed site.

9.3.1.2 Greystones-Delgany and Kilcoole Local Area Plan 2013–2019

Land zonings for the lands at Farrankelly include Residential, Open Space, Active Open Space and a road objective.

Figure 9.3 – Zoning Map Greystones-Delgany and Kilcoole Local Area Plan 2013–2019



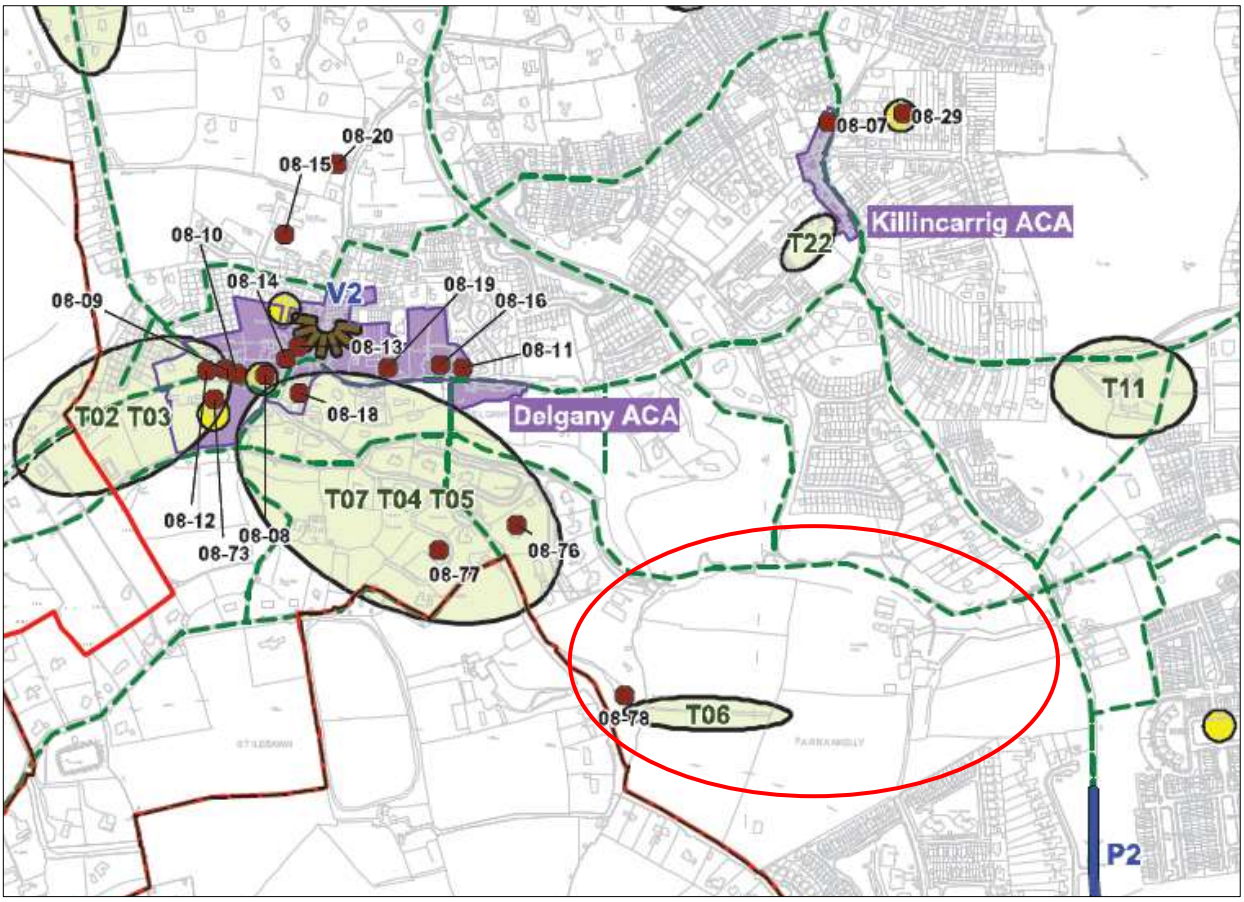
The Local Area Plan also sets out more specific and relevant requirements for Views and Tree Protection.

View V2 – Southwards at the “Horse and Hound” in Delgany Village towards Drummin Hill.

T06 – Line of Scots Pine at Farrankelly.

Delgany Village itself is designated an Architectural Conservation Area. The ACA comprises the larger part of the existing village core, from the old water pump on the western end to Christchurch on the eastern end. The village of Delgany predates Greystones as an urban centre. The tight clustering of late 18th and early 19th century buildings within Delgany, radiating from a much earlier monastic core, explains the S-shaped street pattern that remains today and lends a distinct and strong village character.

Figure 9.4 – Natural and Cultural Heritage -Delgany and Kilcoole Local Area Plan 2013–2019



The ACA area and character of Delgany village is described in detail in the Local Area Plan (Appendix B). Key characteristics include:

- Lack of formal geometric layout.
- Steep slopes overlooking Three Trout's Valley.
- Buildings to north of main street looking south over the valley.
- Large plots in the village.
- Numerous historic buildings and monuments
- Diverse but harmonious typology – rubble walls and rendered two storey buildings.
- Victorian style shopfronts
- Two distinct churches in cut stone.
- Tall rubble walls in places.

As well as View V2 described above it is noted that:

"The views from the village southwards are intrinsic to the character and heritage of Delgany Village and should be protected".

9.3.2 The Site of the Proposed Development

The site is described below in terms of:

- Location and overview;
- Site boundaries;
- Topography and drainage;
- Access;
- Vegetation and natural heritage;

- Built and cultural heritage;
- Character;
- Landscape and visual amenity.

9.3.3 Location and Overview

The site is located to the south west of Delgany Village between the R761 to the east and Priory Road to the west.

The total area of the site is 21 ha. The site consists of four large fields in agricultural use and associated woodland corridors and the Three Trouts Stream.

Site boundaries

The boundaries with Priory Road and the R761 are predominantly rural consisting of hedgerows and occasional trees. Directly to the south the site is bounded by the Eden Gate Housing development which is walled and fenced at the interface with the site, further east along this boundary a more established estate – Glenbrook – forms the site boundary. To the north the site meets an industrial premises – Millbrook Paving Centre (Formerly Farrankelly House) – bounded by a hedgerow, and further west, meets lands zoned for future amenity use as part of the Action Plan for the wider Farrankelly site. To the north west where Priory Road swings away from the site lies Glenbrook House. The boundary of the house with the site is well vegetated with mixed native hedgerow, evergreen shrubs and trees.

Eden gate Housing Development to the southern boundary of the site

Existing hedgerow boundary to R761

Topography & Drainage

The site and lands slope gently from south west to north east, from around 55m OD along Priory Road to around 40m OD close to the Millbrook Paving Centre boundary and the R761. Hedgerows are generally accompanied by drainage ditches taking water along the gradient and ultimately to the Three Trouts stream north of Millbrook Paving Centre.

Access

As the site has historically been largely in private agricultural use, there is currently public access to it from the R761. Fields abutting adjacent Priory Road have gates for access for agricultural vehicles and animals. Similar gates interconnect the fields internally. The site does not have direct access to the R761 although the internal gates create a track from Priory Road to the Millbrook Paving Centre, leading from there to the R761.

Entrance to Millbrook Paving from R761 – site lies above hill and behind hedge to the left

Vegetation and natural heritage

The fields are predominantly ploughed and sown with grass for silage and fodder. Hedgerows bound these fields, some significant in stature and containing tree rows others, e.g. to Priory Road, low and offering views across the fields. The northern boundary of the field adjacent Glenbrook House contains a distinctive row of pines which are listed for protection in the Local Area Plan. A wider belt of trees / hedgerow runs from south to north from Eden Gate to the Millbrook Paving Centre. This reflects a historic lane to Farrankelly House shown on 19th Century maps.

Mature well vegetated boundary to Glenbrook House

Protected Scots Pine viewed from outside Stylebawn Farm on Priory Road

Built and cultural heritage

Within the site there are no listed or protected structures. Immediately west of the site at Priory Road Glenbrook House is listed as a protected structure (See Chapter 13). The house dates from around 1800 and is regarded as being in excellent condition. It was once home of the Irish politician John Redmond – leader of the Irish Parliamentary Party. North of the site Farrankelly House is now part of the Millbrook Paving Centre. A remnant tree line runs south from this to the Eden Gate housing development.

Character

The site is open, gently rolling and agricultural in character. The site is slightly elevated in relation to its immediate environs, particularly to the east, as it forms part of one of the many shallow domed hills in the wider landscape.

Landscape and visual amenity

The landscape of the site is typical of the surrounding fields and rural areas south of Delgany village – open fields and hedgerows with occasional trees lines and clusters overlaying a rolling / domed hill. Visual amenity is formed by the current rural character. This is increasingly eroded by the adjacent housing developments and the residential zoning status of the site itself.

The Environs of the Proposed Development

The environs are described below in terms of:

- Contextual overview;
- Geology, topography & drainage;
- Landcover, field patterns and vegetation;
- Built and cultural heritage;
- Visual amenity.

Figure 9.5 – Site Location and Context

Contextual overview

The site lies south east of the village of Delgany - a historic village with a unique character, now designated as an Architectural Conservation Area in the Local Area Plan. The LAP contains a detailed description of the village and this is summarised above.

Geology, topography & drainage

Farrankelly and its environs are found on the eastern slopes of Drummin Hill to the west which rises to 130m. The eastern slopes of the hill fall gently eastwards to the coast with Farrankelly lying between the 50 and 30m contour midway between the hill and the coast. North of the site lies Delgany village which has developed along the glen created by the Three Trouts stream. The stream originates near the Sugar Loaf, flows through the Glen of the Downs before carving a glen through Delgany east to the sea. The corridor of the historic village lies along the northern edge of this glen – The Glen Road and Church Road (R762). The land rises north of this glen, to the north west towards Bellevue and to the north east to a low peak near Kindlestown before falling towards Greystones and the sea. Lands directly south of the site are at a similar level to the site itself, with a gentle gradient falling eastwards.

Geologically the rock consists of Marine Greywacke and Shale with some Quartzite. Topography reflects its outlying character relative to the Wicklow Mountains further west.

Landcover, field patterns and vegetation

Traditional landcover in the receiving environment has been agricultural fields. Much of this land has been zoned for development in recent years with a new road – R774 - from the N11 skirting the south of the development area and linking north to Greystones itself. The net effect of this is an almost continuous built or zoned urban area between Delgany and Greystones to the north east and Eden Gate and Charlesland on the R774 to the south. The nature of these developments in scale and style significantly changes the character of the area as it changes from rural village to a growing town.

New housing off Mill Road

Thorndale development in Delgany Village

To the north west of the site, from Glenbrook House and Priory road to the Glen Road and Three Trouts Stream a more wooded landscape can be found often accommodating individual houses on large plots. The historic old village enjoys views south over these lands and the wooded backdrop frames views further south.

Built and cultural heritage

Built and cultural heritage is provided by the historic village of Delgany to the north-west, including key buildings and structures – these are listed in the descriptions above from the LAP.

View south from Church Road – new housing in the foreground, Christchurch visible to the left

View south from Christchurch

Village centre in Delgany

As well as the historic village and local vernacular architecture, a number of country houses and demesnes are in the environs of the site – Farrankelly House itself which is heavily compromised to the north of the site, Glenbrook House adjacent the western boundary and Priory Road and the remains of the Bellevue Demesne to the north west of Delgany Village on elevated grounds.

Other built and cultural elements of significance are the numerous vernacular and local stone walls present.

High stone wall- Delgany Village

Low stone wall to field near Bellevue

Visual amenity

While the lands may offer an attractive pastoral backdrop to the town, encroaching urban development on three sides and their zoning status effectively negates this value. This is acknowledged by the Landscape Character Assessment. The visual amenity of the village is increasingly being eroded and the rural / rustic views replaced by housing and residential development with younger landscapes.

9.3.4 Summary of Landscape Characteristics and Values

The conservation and enhancement values of Farrankelly and its Environs are set out in this section.

Conservation values

These include:

- Distinct identity and character of Delgany
- Protection and enhancement of Biodiversity
- 4.5ha of the site to be public open space

- Requirement for a Greenroute
- Protected View Southwards at the “Horse and Hound” in Delgany Village towards Drummin Hill. And more general views southwards from the village
- Protected tree line – Scots Pine
- Trees/treelines and hedgerows across the site;
- Requirements for Green Infrastructure consideration and a strategy in new developments.
- Local materials, stone walls and vernacular structures.

Enhancement values

These include:

- Local Area Plan objectives for the lands
- Objectives for Greystones / Delgany as a Growth Town
- Population growth for the Greystones/Delgany area forecast to grow from 17,208 in 2011 to 24,000 in 2028
- Designated Urban Area Landscape – deemed suitable for development
- Development to be guided by Farrankelly Action Plan
- Zoning of lands for residential development.
- Landscape in transition.

The conservation values indicate those aspects of the receiving environment which are sensitive and could be negatively impacted on by the proposed development. These values whilst generally of local significance form the potential landscape and visual constraints to the proposed development.

The enhancement values reflect change that is already occurring in the landscape and reflects local policy.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development is described in detail in Section 2 of this EIAR. Those elements that are relevant to landscape and visual impacts include:

- Construction of a new link street from the Kilcoole Road (R761) to the Priory Road;
- Construction of new residential neighbourhoods of predominantly 2-3 storey housing and duplex units with apartment buildings rising to predominantly 4 storeys;
- Associated roads, parking, cycleways, public open spaces and play facilities.
- Trees to be removed to facilitate the development and which need to be removed due to poor condition in accordance with good arboricultural practice and/or facilitate landscape, ecological or habitat renewal.
- Retained tree lines and hedgerows, including the Three Trouts Stream corridor and new tree and shrub planting throughout the development.
- Loss of extensive open agricultural land in pasture.
- Overall general retention of tree lines and hedgerows, maintaining much of the existing landscape structure on the site
- Creation of Active Open Space of 4.5 hectares as well as Greenway along northern boundary

9.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT WITHOUT MITIGATION

9.5.1 Introduction

The potential impacts are the effects that the development could have without consideration of landscape mitigation or amelioration – i.e. without landscape works. For the sake of clarity these shall be considered under the following headings: Landscape Impacts and Visual Impacts.

These impacts are considered under the following headings:

- temporary effects (construction phase up to one year);
- short-term impacts (construction phase up to two years);
- short-term impacts (operation phase up to seven years);

- medium-term impacts (operation phase, seven to fifteen years) and
- long-term impacts (operation phase up to fifteen years and beyond).

These effects have been compiled to identify any areas where the proposed development may be injurious to the scenic and visual character of the area and represent the potential impact rather than the eventual long-term effect. For this section, it is assumed that no specific landscape works are carried out with the construction of the development and that the open spaces are simply grass areas. This enables recognition of potential, rather than actual, effects which facilitates the identification of suitable landscape mitigation measures.

The proposed development is likely to visually impact on the existing environment and its surroundings. This will be due to the need for vegetation removal in places, the potential impacts from construction works and the operational use of the proposed development as well as the proposed landscape works. These effects are examined in detail under the below headings.

9.5.2 Construction Phase – Potential Landscape and Visual Impact

9.5.2.1 Temporary & Short-Term effects

During this process the site will undergo a change from that of an area of agricultural land to a large construction site, which will be undertaken in 2 main phases. Any impacts generated at this stage will be short term in duration, save for some landscape effects which will be permanent.

Landscape impacts will occur over the majority of the site due to the excavation required into the existing slope, extending the length and width of the site, giving a moderately negative effect on the existing landscape.

Visual impacts will be more acute than in the operational phase, but short term in duration. This is due to the construction traffic, site hoarding, cranes, etc. Cranes will be taller than the proposed buildings and therefore more visible in the landscape. There will also be vehicular and crane movement and changes to the configuration of the site, typical of building sites, resulting in visual impacts to local viewpoints.

The most substantive effects during construction will be experienced by the adjacent residential receptors, located to the south in Eden Gate and Glenbrook Park, and to the north in Delgany Park and Millgrove as well as along the Kilcoole Road, and Prior Road.

9.5.3 Operational Phase - Potential Landscape Impact

9.5.3.1 Short-term landscape impacts after the construction works (up to seven years)

Following construction, the main landscape effects of the proposed development are associated with the change in land use from agricultural lands of low sensitivity to a more intensified, residential use, as well as active open space of 4.5 hectares, as specified in the Action Plan for the lands. This will result in a moderately negative effect on the landscape.

9.5.3.2 Medium-term landscape impacts (seven to fifteen years)

As the existing planting matures on site there will be a slight positive impact upon the subject site. However, the cumulative effect of future development of the adjacent to the east (on the Farrankelly Action Plan lands) by others, in line with the permitted zoned development would result in further residential development, albeit on existing brownfield/commercial land. This could result in a slightly negative impact, due to the potential loss of trees and associated hedgerows and their associated landscape value.

9.5.4 *'Do Nothing'* Impact

The '*do-nothing'* impact refers to the non-implementation of the proposed development. The primary effect of this would be that the impacts and effects identified would not directly occur. In this regard the following issues are relevant.

The current agricultural land use of the subject site is not a land use which is likely to persist in the longer term due to the current zoning.

If the site is left in its current state, as agricultural land use, the management of the fields and hedgerows will be likely to continue in its current manner and hence a neutral impact will persist on the existing landscape.

9.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

The following recommendations are put forward to mitigate against the negative impacts mentioned above and to reinforce the positive impacts of the proposed development. Mitigation measures are proposed and considered only on the lands of the subject site.

9.6.1 Construction Phase

The remedial measures proposed revolve around the implementation of appropriate site management procedures – such as the control of site lighting, storage of materials, placement of compounds, delivery of materials, car parking, etc. Visual impact during the construction phase will be mitigated somewhat through 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.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. The visual impact of the site compound and scaffolding visible during the construction phase are of a temporary nature only and therefore require no remedial action other than as stated above.

A number of existing trees are to be retained and these are shown in the Arboricultural Reports. Existing trees to be retained are particularly sensitive to negative impacts during the construction phase if proper protection measures are not adhered to. With regard to the protection of the retained trees on site during proposed construction works, reference should be made to BS5837: Trees in relation Design, Demolition and Construction – Recommendations (BSI, 2012). Tree protection details will be included with the application to the Board.

9.6.2 Operational Phase

The primary proposed mitigation measures can be seen on the Landscape Masterplan prepared by Kevin Fitzpatrick Landscape Architects and include as follows:

- Incorporation of a series of open space areas within the residential development.
- Provision of 4.5 hectares of Active Open Space.
- Integration of Greenway along northern boundary into the design.
- Inclusion of linkages between the different hierarchies of open space.

The mitigation measures that have been adopted in the proposed scheme are as follows:

- The retention of much of the existing landscape structure of field boundaries linear woodlands and trees and the layout / design of the site to incorporate these features into the development.
- The architectural layout aims to address visual impacts by proposing variety in scale and massing of buildings and by design and materiality of high quality buildings.
- The extensive planting of additional trees and shrubs throughout the site where possible will reduce the visual mass of the buildings, soften and partially screen the development over time from various viewpoints, as identified in the assessment, thereby minimising the visual impacts.
- Native and appropriate planting for biodiversity has been incorporated into the scheme in accordance with the advice of the Project Ecologist.
- Public open spaces have been designed as part of an overall design strategy that focuses on creating a '*sense of place'* and individual character for the development area.
- Introduce a '*Green Streets'* approach that includes for a sufficient quantum of street trees and planting that form a sufficient barrier between pedestrians and traffic. This approach will also focus the creation of vegetative buffers for privacy and shading to adjoining residences, and for more distant viewers the creation of a green landscape structure within which the development nestles.
- Enhanced treatment of the streams and integration into the open spaces.

- Design of public open space that forms part of a network of spaces that includes areas for passive and active recreation, social / community interaction and play facilities catering for all ages.
- Application of best practice horticultural methods to ensure that mitigation measures establish and grow appropriately.

The scheme design incorporates significant consideration and mitigation in respect of potential impacts. The quality of the public realm scheme is of a high standard and the quality of materials proposed is similarly high and robust.

Landscape works are proposed to reduce and offset any impacts generated due to the proposed development, where possible. The planting of substantial numbers of new trees and other planting in the open spaces the site boundaries and internal roads, both native and ornamental varieties, will enhance the overall appearance of the new development and compensate for the removal of hedgerows and trees where needed for the construction works and increase the overall landscape capacity of the site to accommodate development.

9.6.3 *'Worst Case'* Scenario

The '*worst-case'* scenario would be if the proposed development is approved, but proceeded without landscape capacity and integration works to accommodate the proposal in the landscape, and if the positive attributes of the design and mitigation measures were not carried through in full or enforced by the Local Authority.

An example of this would be if trees were felled as per the application, but no replacement tree planting was carried out.

9.7 PREDICTED LANDSCAPE IMPACTS

9.7.1 Construction Stage

The construction stage will be programmed over a period of approximately 2 years resulting in ongoing infrastructure, building and related works for some period of time. These are generally temporary and visually adverse in nature.

The landscape sensitivity, magnitude of change are described below (see 9.7.2) and the change is Significant – Very Significant. Qualitatively this change would be Adverse … *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.* - in the Construction Stage or Short Term.

With the completion of works and establishment of mitigation planting, new landscape structure and enhanced landscape capacity, this would revert to Neutral - *restore / maintain landscape quality*….in the Medium Term and ongoing (see 9.8 below).

9.7.2 Operational Stage

The sites Enhancement Values reflect a significant body of policy that is supportive of major landscape change at this location to form a new residential community. Despite its attractive rural qualities the site is currently surrounded by landscape change and the rapid urbanisation of its setting – it is becoming an anomaly in this context. Nonetheless it offers attractive characteristics to contribute to this new environment.

The sites Conservation Values predominantly reflect its character of trees, fields and hedgerows and as a rural or agricultural landscape with patterns of tree lines and hedgerows.

The impact of the development is the change of the site from open agricultural landscape to a new residential area. Locally some trees and hedgerows will be affected, however the new development has been laid out to incorporate many of these existing landscape '*green infrastructure'* features within its landscape structure of open spaces and networks. The proposed development has been prepared in accordance with best practice national guidelines local guidance in the Wicklow County Development Plan, the Delgany and Kilcoole Local Area Plan and National Guidance – Urban Design Guide 2009 by the Department of Environment, Heritage and Local Government and the Design Manual for Urban Roads and Streets by the Department of Transport,

Tourism and Sport. The site layout has been sensitive to the landscape elements of value on the site, incorporating them into the development, adding value to them and enhancing their role.

The Significance of this in terms of the effects on landscape character are assessed below:

Landscape sensitivity is 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.*

The Magnitude of Change is 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.*

The Change is Significant – Very Significant

Qualitatively the landscape effect is Adverse to Neutral - *The materiality of parts of the scheme particularly the roofscape and the use of red tiles is at variance with the local and common materials. In the medium term with the growth of trees and vegetation associated with the development, and the weathering of the tiles this will subside to neutral.*

This Significance would be Permanent and the quality gradually mitigate over time.

9.8 PREDICTED VISUAL IMPACTS

9.8.1 Construction Stage

The construction phase is expected to be phased over a number of years, which will limit the extent of impact at any given time which is associated with construction.

There will be moderate negative impacts associated with the construction works over a phased basis for this development. This will be due to the substantial site clearance and building processes required to construct the proposed development. Impacts to visual receptors are described in the representative viewpoints below, but by their nature are predominantly adverse in nature, varying in magnitude and significance.

9.8.2 Operational Phase

Based on the assessment of the landscape characteristics, values and sensitivities, 19 representative viewpoints were selected to assess visual impact and effects. These are scheduled below and existing photographs and proposed photomontages are provided by Chris Shackleton Consulting.

Table 9.6 – Viewpoints

Viewpoint	Description
Immediate Environs	
PM01	Priory Road at Entrance to Glenbrook House
PM02	Priory Road at Stylebawn Farm
PM03	Priory Road near access to new development.
PM04	Priory Drive, Eden Gate
PM05	Eden Gate
PM06	R761 adjacent Glenheron Development
PM07	R761 adjacent Glenheron Development entrance, looking south towards site access.
PM08	Carrig Mill looking south

PM09	R761 (Kilcoole Road) at Mill Grove
PM10	Delgany Park
Wider Context / Middle Distance	
MD01	Local Road north west of Delgany village
MD02	Delgany Village Centre – junction of Church Road and Convent Road
MD03	Grounds of Christ Church Delgany
MD04	Junction of Eden Gate and Priory Road
MD05	Junction of R774 and Kilcoole Road (R761)
MD06	R774 to north east of site
MD07	Mill Road at Greystones Tennis Club
MD08	R761 just north of Mill Road :Church Road roundabout

Immediate Environs

Viewpoint PM01 Priory Road at Entrance to Glenbrook House

Existing View

This view is from Priory Road, south of Delgany Village, at the gated entrance to Glenbrook House. The direction of the view is south east towards the site 390m away.

In the foreground can be seen the roadside timber post and rail leading to the painted iron railings and gateway of the house. Mature coniferous and broadleaved trees generally block views further to the south east with partial glimpses through gaps in the tree cover. To the right (west) Priory Road can be seen travelling south.

Overall the view is of the trees clustered at the gated entrance to a country house, on the fringes of the expanding urban area of Delgany. It is a pleasant and mature rural view with a elements of cultural and built heritage referenced by the gateway.

Visual Effects

The viewpoint sensitivity is classified as Medium-High – *representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape although the landscape having some value, and a heritage component.*

The proposed development would not be visible from this location. There would be no change to the view.

Viewpoint PM02 Priory Road at Stylebawn Farm

Existing View

This view is from a rural cottage/house on Priory Road, south of Delgany Village, and to the west of the site. The direction of the view is east along the boundary of the site with Priory Road. The site is only 11m away from the viewpoint.

In the foreground can be seen Priory Road as it turns the bend at this location. A relatively open post and write field boundary marks the edge of the field and development site. Further east along Priory Road a more traditional hedge with mature trees is visible. West of Priory road can be seen the more neatly maintained boundaries of the string of one-off cottages and houses along this road. Over the fenceline can be seen the filed, recently ploughed and in the middle distance the roofscape of the nearby Eden Gate development. The sea can be seen in the distance.

Overall the view is of a pleasant rural working landscape with only limited intrusion of recent urbanisation in the area. The view and road retains a pleasant rural character.

Visual Effects

In the absence of mitigation, the proposed development would be highly visible at this location. The open field would be occupied fully by new housing and associated roads and infrastructure. Housing facing Priory road would seek to create a new urban character along the road. Clusters of houses would be accessed directly off

Priory Road, however, proposed new planting along the roadside would over time partly screen and soften views of the new housing changing the undeveloped rural road into a more village-like street with a new character.

The overall new character in the view would be urban but soft and green reflecting a design responding to the local context and character. Priory Road would become a village street, and the interface to the north of the road would be similar to that to the south created by the linear development here. Distant view to the sea would be lost.

The viewpoint sensitivity is classified as Medium-High – *representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape although the landscape having some value, but also the houses here.*

The magnitude of change is classified as High *(Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features*.),

The change is regarded as Significant to Very Significant and Permanent in the Operational Phase.

This level of Significance would also be the case for the Construction Phase.

The quality of change is Adverse - *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting* - in the Construction Stage and Short Term, In the Medium to Long Term as the new landscape of the development matures and establishes a new but appropriate character along Priory Road this would become Neutral - *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*.

Viewpoint PM03 Priory Road Priory Road near access to new development.

Existing View

This view is also from a rural cottage/house on Priory Road, to the west of the site. The direction of the view is north west along the boundary of the site with Priory Road. The site is only 30m away.

In the foreground can be seen Priory Road travelling west from this location. The field boundary to the development site has a mix of scrub vegetation, rather than hedgerow with a small cluster of more mature trees in the middle distance. To the right of the view is a field gate into the development site. In the distance can be seen the domed hill of Kindlestown Woods north of Delgany village.

Overall the view is of a pleasant and intimate rural road. There is no visible intrusion of recent urbanisation in the view. The filed behind the boundary vegetation is not visible.

Visual Effects

The proposed development would be visible at this location. A new junction accessing the development site would be visible to the right of the view linking north into the site. The field would be occupied fully by new housing and associated roads and infrastructure. Housing facing Priory road would seek to create a new urban character along the road. Clusters of houses would be accessed directly off Priory Road, however, proposed new planting along the roadside would over time partly screen and soften views of the new housing changing the undeveloped rural road into a more village-like street with a new character.

The overall new character in the view would be urban but soft and green reflecting a design responding to the local context and character. Priory Road would become a village street, and the interface to the north of the road would be similar to that to the south created by the linear development here. Distant views to Kindlestown Woods would be lost.

The viewpoint sensitivity is classified as Medium-High – *representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape although the landscape having some value, but also the houses here.*

The magnitude of change is classified as High *(Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features.*),

The change is regarded as Significant to Very Significant and Permanent in the Operational Phase.

This level of Significance would also be the case for the Construction Phase.

The quality of change is Adverse - *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting* - in the Construction Stage and Short to Medium Term, In the Long Term as the new landscape of the development matures and establishes a new but appropriate character along Priory Road this would become Neutral - *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*.

Viewpoint PM04 Priory Drive, Eden Gate

Existing View

This view is from the adjacent contemporary housing development of Eden Gate to the south of the site. The view looks north east towards the site boundary with Eden Gate which is marked by a brick and rendered wall and garage belonging to one of the houses. The site is 60m away.

In the foreground can be seen Priory Drive flanked on either side by the gardens of adjacent dwellings. In the middle distance beyond the boundary wall can be seen the site carrying a grassy cover. Beyond, the field is bounded by hedgerows and the feature line of Pine trees is also prominent. In the distance can be seen the domed hill of Kindlestown Woods north of Delgany village.

Overall the view is of a pleasant residential street with a rural backdrop. However the landscape is clearly in transition and the housing area of Eden gate backing on to an open field is clearly incomplete as part of this process.

Visual Effects

The proposed development would be highly visible at this location. A new street parallel to the site boundary would accommodate a range of house types with rear gardens backing on to the boundary here. Views beyond the boundary to the distant rural landscape would be lost and replaced by a residential character. The houses themselves would be prominent and appear elevated and overlooking relative to Priory Drive.

The overall new character in the view would be urban/residential which in time may be softened by rear garden planting in the new houses. The rural backdrop would be lost. The rear gardens of the houses and boundary fences intrude on the public realm of Priory Drive

The viewpoint sensitivity is classified as -High – *views from houses.*

The magnitude of change is classified as High *(Extensive intrusion of the development in the view.*),

The change is regarded as Very Significant and Permanent in the Operational Phase.

This level of Significance would also be the case for the Construction Phase.

In the Construction Stage the quality of change is Adverse - *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting*.

This would continue into the Short and Medium, In the long term the character of the area would become more enclosed and domestic and loose its negative aspects. Rear garden vegetation would establish and soften and shorten the views to the houses and the change decline to Neutral.

Viewpoint PM05 Eden Gate

Existing View

This view, as PM04, is from the adjacent contemporary housing development of Eden Gate to the south of the site. The view looks north east towards the site boundary with Eden Gate which is marked by a temporary barrier. This road has been designed to link into the adjacent new development. The site is 70m away.

In the foreground can be seen the residential street flanked on either side by the gardens of adjacent dwellings. In the middle distance beyond the boundary can be seen the site carrying a grassy cover. Further north to the

left (north-west) the landscape disappears into woodland that rises to the domed hill of Kindlestown Woods north of Delgany village. The village of Delgany itself actually lies in a valley within this tree cover.

Overall the view is of a pleasant residential street with a rural backdrop. The temporary barrier and fence detracts from this. As PM04, the landscape is clearly in transition and the layout clearly suggests that the housing area of Eden gate should connect into new development adjacent, as part of this process.

Visual Effects

The proposed development would be visible at this location. A new street parallel to the site boundary would accommodate a range of house types with rear gardens backing on to the boundary here. The existing road from Eden Gate would connect through to this new street and onwards into the new development. New 2 storey houses, from gardens and street trees would be visible as well as the proposed apartments centrally located within the new development. Views beyond the boundary to the distant rural landscape would be partly lost and replaced by a residential character, reflecting the context of Eden Gate and the changing environs.

The overall new character in the view would be urban/residential softened by new streetscapes, and gardens. Although the rural backdrop would be lost the change would reflect the completion of the ongoing transition from rural to urban in accordance with the local plans.

The viewpoint sensitivity is classified as -High – *views from houses.*

The magnitude of change is classified as High *(Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features*.),

The change is regarded as Very Significant and Permanent in the Operational Phase.

This level of Significance would also be the case for the Construction Phase.

In the Construction Stage the quality of change is Adverse - *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting*.

However post construction the rural outlook would be replaced by a pleasant residential outlook. Although features of the landscape will be lost, other benefits will arise in the Short, Medium and Long Term as the new landscape of the development matures and establishes. Post Construction this would become Neutral - *Scheme ….. maintains landscape quality*.

Viewpoint PM06 R761 adjacent Glenheron Development

Existing View

This view, is from the R761 looking north towards where the site meets this road and a new access will be formed. The viewpoint is located opposite a bus-stop adjacent the entrance to the existing established Glenbrook Park estate to the west and the newly developed Glenheron development 220m to the east.

The R761 can be seen travelling north centrally in the view. A new concrete path and local granite stone wall bounds the eastern site of the road as part of the Glenheron Development. The west side of the road is predominantly soft and green consisting of a more formal hedge to the bus stop area and then a native hedgerow running the full length of the visible road in the view. In the middle of the view stands a large broadleaved tree. In the distance can be seen some housing immersed in trees.

The new street lights, footpath and boundary wall clearly indicate a landscape in transition from semi-rural to urban.

Visual Effects

The proposed development would not be visible at this location. The mature vegetation to the west of the road would preclude views to that part of the new development that would extend to the R761 further north.

The viewpoint sensitivity is classified as - Medium – *viewers travelling at slow or moderate speeds.*

The proposed development would not be visible from this location. There would be no change to the view.

Viewpoint PM07 R761 adjacent Glenheron Development further north.

Existing View

This view, as PM06, is from the R761 looking north towards where the site meets this road and a new access will be formed. The viewpoint is located midway along the newly developed Glenheron development to the east 50m from the site.

The R761 can be seen travelling north and downhill centrally in the view. An existing tarmac path and grass verge, and new concrete path and local granite stone wall bounds the eastern site of the road as part of the Glenheron Development. The west side of the road is predominantly soft and green consisting of native shrubs and a number of large mature trees. Just past the last mature tree right of centre in the view, the proposed development site meets with the R761. In the distance can be seen some housing immersed in trees and above that can be seen distinctive form of Bray Head.

The new street lights, footpath and boundary wall, as well as nearby housing, clearly indicate a landscape in transition from semi-rural to urban.

Visual Effects

The proposed development would only be partially visible at this location. The mature vegetation and topography to the west of the road would preclude views to much of the proposed development, however, its new frontage with the R761 – access road and boundary elements – would be visible.

The viewpoint sensitivity is classified as - Medium – *viewers travelling at slow or moderate speeds.*

The magnitude of change is classified as 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.*

This Significance would be Slight and adverse in the Construction Phase, and Slight and Neutral - *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality* - in the Short, Medium and Long term.

Viewpoint PM08 Carrig Mill looking south

Existing View

This view looks south towards from a nearby recent residential development. The viewpoint is located at the southern boundary of the Carrig Mill estate 270m to the north of the site. Most of the houses in this estate are orientated in an approximate east west direction.

In the foreground can be seen a gentle valley falling away from the viewpoint towards the Three Trouts Stream. In the middle of the view to the west a stone wall and entrance with a gatehouse marks the access to the former Farrankelly House – now a cluster of industrial units further to the west. Beyond this the landscape rises steeply to a distinctive hedgerow lined with mature sculptural Scots Pine. These rise gently in a westerly direction.

The golden field beyond this hedgerow is the eastern part of the site, falling gently till it meets with the R761 marked by the hedgerow visible here. East of the R761 can be seen residential housing and further south beyond the proposed site the gables and roofs of Glenbrook Park.

The view is an attractive mix of rural and urban – an increasingly urbanised landscape structured by distinctive landscape elements – the stream, topography, and tree lines.

Visual Effects

The proposed development would see most of the field behind the line of trees, replaced by new housing which, given the topography, would be elevated. The houses including red tiled roofs would be quite different to the other housing visible although laid out with a strong village / town house character. The key structuring landscape elements would remain and help integrate the prominent new built elements. New landscape, open space and street trees would also soften this change and ensure the new urban character.

The viewpoint sensitivity is classified as - Medium – *viewers are partly but not entirely focused on the landscape, or where the landscape has some valued views.* Although residential this is a side or oblique view from the estate.

The magnitude of change is classified as High - *Extensive intrusion of the development in the view 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*

This change would be Significant and adverse in the Construction Phase

In the Operational Phase the change would also be Significant. This would remain Adverse - *Scheme would degrade, diminish or destroy the integrity of valued features, elements or their setting* - in the Short and Medium Term. In the Long Term as the new landscape of the development matures and establishes a new urban character and the materials weather and tone down this would become Neutral - *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*.–The scheme would result in the loss of some of the rural elements of the view and its replacement with a well-considered urban character, reflecting existing ongoing change and in accordance with policy.–In the long terms the landscape elements of this change would establish and mature recreating the soft characteristics that currently exist.

Viewpoint PM9 R761 (Kilcoole Road) at Mill Grove

Existing View

This view looks south towards from the R761 at Mill Grove. The viewpoint is located at the access junction to this small housing development 370m from the site.

In the foreground can be seen the Kilcoole Road itself. It is well enclosed with trees and vegetation to the east. To the west a low hedge and fence can be seen around adjacent gardens. IN the centre of the view trees, tree lines and groups criss-cross the long distance view towards the site which can be partly seen beyond the Scots Pine marking the northern site boundary. The view is an established mature semi-rural / residential landscape and is attractive for this distinctive lived-in character.

Visual Effects

The proposed development would only be partly visible beyond the Scots Pine line in the distance. In general the view, made up predominantly of local elements – trees etc would remain unchanged.

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The magnitude of change is classified as 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.*

This change would be of Slight Significance and adverse in the Construction Phase

In the Operational Phase the change would also be of Slight Significance. In the Short, Medium and Long Term as the new landscape of the development matures and establishes this significance would become Neutral - *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*.

Viewpoint PM10 Delgany Park

Existing View

This view looks south towards from the Delgany Park estate sitting north of the Three Trouts Stream and looking directly at the site. The viewpoint is located on the western periphery of the estate c. 240m from the site although many of the houses are orientated in a north to south alignment.

In the foreground can be seen the linear green space at the western edge of the estate. To the left (east) some of the bungalows which are typical of houses in the estate. The ground falls gently towards the edge of the estate and beyond to the Three Trouts Stream, before rising quickly to the proposed development site. The fields that form the development site are defined by their current condition as open fields in grass and their boundary hedgerows and distinctive Sots Pine lines. In the view, much of the field structure is visible centrally forms the proposed development site. Further south the land rises to an open grassed hill with more upland character overlooking the site.

As PM10 the view is an established mature semi-rural / residential landscape and is attractive for this distinctive lived-in character and open countryside areas.

Visual Effects

The proposed development would occupy much of the open field network described above. Clusters of red roofed house would contrast with the existing built character and exacerbate this change

The viewpoint sensitivity is classified as - High – *views from houses.*

The magnitude of change is classified as High - *Extensive intrusion of the development.*

This change would be Very Significant and Adverse in the Construction Phase

In the Operational Phase the change would also be Very Significant. In the Short and Medium This would remain 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;* In the Long Term as the new landscape of the development matures and establishes and materials weather this change would become Neutral - *Scheme complements the scale, landform and pattern of the landscape(townscape)/view*.

Wider Environs / Middle Distance

MD01 Local Road north-west of Delgany Village

Existing View

This view looks south towards Delgany village and the site, 1.1km away, from an elevated local road leading to Kindlestown Upper overlooking the area from the north west. The foreground is occupied by a local stone wall and field in pasture gently falling to development and the central part of Delgany village nestling in its valley out of sight.

In the middle distance, centrally in the view can be seen some the site, part of the fields with the distinctive pine lines. Around and beyond that can be seen adjacent residential development areas at Eden Gate to the south and Charlesland to the east. The landscape continues to fall from hills in the west (Drummin East) to the open sea in the east.

The view is of an established mature semi-rural / residential landscape or village and is attractive for this distinctive lived-in character and scale, and associated rural areas, and the maritime outlook.

Visual Effects

The proposed development would occupy the partly visible field network that is part of the site. The change would see the extension of the urban areas visible around the site, across the site and the consolidation of the urban area centrally in the view. Most of the other elements in the view would remain unchanged.

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The magnitude of change is classified as Low - *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..* This would reduce in the Medium and Long Term to Low as planting and landscape within the development established and softened / greened the view.

This significance would be Slight and Neutral in the Construction Phase.

In the Operational Phase the significance would also be Slight and Neutral in the Short, Medium and Long Term this would be Slight and Adverse declining to Neutral as landscape within the development softens the contrast with the surrounding vernacular roofscapes -

MD02 Delgany Village Centre – junction of Church Road and Convent Road

Existing View

This view looks south east from Delgany village centre towards the site 700m away. The foreground is occupied by local roads and the view completely foreshortened by a 2.5m high historic stone wall and extensive trees beyond this.

The view is typical of the narrow streets of old Delgany Village, nestling in the valley and enclosed by built elements and vegetation. The site is not visible from this location.

Visual Effects

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The proposed development would not be visible from this location. There would be no change to the view.

MD03 Grounds of Christ Church Delgany

Existing View

This view looks south east towards the site, c. 500m away, from an elevated corner of Christ Church in Delgany village. The foreground is occupied by the roofscape of adjacent low buildings which are typical of the vernacular buildings of the central village area. The site can be partially glimpsed in the distance through a gap in these roofs. Part of a field and some of the Pines can be seen.

As MD02 the constrained view is typical of old Delgany Village, nestling in the valley and enclosed by built elements and vegetation.

Visual Effects

The proposed development would occupy the partly visible field network that is part of the site. The change would see the extension of the urban area across the site. The new development has a mix of contrasting red and grey or slate roofs locally common. The red roofs are not locally common and exacerbate the change. The other elements in the view would remain unchanged.

The viewpoint sensitivity is classified as Medium – *viewers not focused on the landscape.*

The magnitude of change is classified as Medium - *Partial intrusion of the development in the view.* This would reduce in the Medium and Long Term to Low as planting and landscape within the development established and softened / greened the view.

This significance would be Moderate and Adverse in the Construction Phase.

In the Operational Phase the significance would also be Moderate and Adverse in the Short Term - *Scheme at variance with landform, scale, pattern.* In the Medium and Long Term this would be Slight and Adverse declining to Neutral as landscape within the development and weathering softens the contrast with the surrounding vernacular developments.

MD04 Junction of Eden Gate and Priory Road

Existing View

This view looks north towards the site, 300m away, from the junction of Eden Gate and Priory Road to the south of the site. The foreground is occupied by the footpath / cycleway and the junction itself. Contemporary landscape planting associated with the new roads and Eden Gate development can be seen in the middle of the view. Beyond this the brick houses of the Eden Gate development can be seen.

Beyond the houses can be seen the distant domed shape of the hill at Kindelstown Upper. To the left of the view the attractive rural character of Priory Road can be seen travelling north towards the sites western boundary. The site is not visible from this location.

Visual Effects

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The proposed development is not visible from this location. There would be no change to the view.

MD05 Junction of R774 and Kilcoole Road (R761)

Existing View

This view looks north from the junction of R774 and Kilcoole Road (R761) just at the southern end of the new Glenheron housing development, 500mfrom the site. The foreground dominates the view and is formed by the junction roundabout, surrounding roads and boundary hedgerows to the Kilcoole Road and new stone wall boundary to the Glenheron development.

In the distance can be seen the domed hill at Kindlestown Upper, to the left (west) and the distinct form of Bray Head to the right (east).

The site is not visible from this location.

Visual Effects

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The proposed development would not be visible from this location. There would be no change to the view.

MD06 R774 to north east of site

Existing View

This view, located 900m away from the site, looks south west from the junction of R774 with an adjacent new industrial area to the east occupied by '*Unitedcaps*' Ireland. The foreground dominates the view and is formed by the junction traffic management features – footpath, cycleway roundabout and dual carriageway road heading south. Beyond the road corridor the relatively flat land and is well stocked with planted trees and self-sown vegetation effectively screening all views to the west to several metres in height. Beyond this vegetation can be seen the distant elevated hill of Drummin East – west of the site.

The site is not visible from this location.

Visual Effects

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The proposed development would not be visible from this location. There would be no change to the view.

MD07 Mill Road at Greystones Tennis Club

Existing View

This view looks south west from a lay-by / picnic area on Mill Road at Greystones Tennis Club, c. 500m from the site. In the foreground can be seen the picnic rea and boundary wall. Beyond this Mill Road traverses the view from west to east. Across the road can be seen, to the left (east) the boundary fence and internal infrastructure of the tennis club. An entrance driveway and green fencing separates this from the red brick building housing an Aldi store, to the right (west). Some houses (roofs) are visible further south and trees screening views.

The site is not visible from this location.

Visual Effects

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The proposed development would not be visible from this location. There would be no change to the view.

MD08 R761 just north of Mill Road :Church Road roundabout

Existing View

This view looks directly south from a partly elevated R761 at the Church Road Roundabout, 500m from the site. The two roads and roundabout form the central part of the view. The R761 itself is enclosed by adjacent gardens and mature vegetation. On a low mound south of the roundabout / junction a long house and associated vegetation closes the view south.

The site is not visible from this location.

Visual Effects

The viewpoint sensitivity is classified as Medium – *viewers travelling at slow or moderate speeds*

The proposed development would not be visible from this location. There would be no change to the view.

9.8.3 Visual Assessment Summary

The table below summarises the assessment described in Section 9.8.2. Despite the extensive footprint and relatively elevated location of the proposed development its visibility is constrained by topography, trees/ hedgerows and other built development. Where visible the change is often neutral or over time becomes neutral. The development represents ongoing consolidation and extension of the urban form this is, in places, significant change and where the change is particularly high this is adverse whilst planting and integration evolves over time, restoring lost characteristics of the landscape. The retention of significant tree belts (including protected tree line) will also reduce the visual impact of the proposed development.

No.	Location	Sensitivity	Degree of Change	Significance, Term and Quality		
				Short	Medium	Long
Immediate Environs						
PM01	Priory Road at entrance to Glenbrook House	Medium-High	None - No visibility	None - No visibility		
PM02	Priory Road at Stylbawn Farm)	Medium-High	High	Significant-Very Significant.		
				Adverse	Neutral	
PM03	Priory Road near access to new development	Medium-High	High	Significant-Very Significant.		
				Adverse	Neutral	
PM04	Priory Drive, Eden Gate	High	High	Very Significant		
				Adverse		Neutral
PM05	Eden Gate	High	High	Very Significant and Neutral		
PM06	R761 adjacent Glenheron Development	Medium	None - No visibility	None - No visibility		
PM07	R761 Glenheron Development entrance looking south	Medium	Low	Slight and Neutral		
PM08	Carrig Mill looking south	Medium	High	Significant		
				Adverse		Neutral
PM09	R761 Kilcoole Rd. at Mill Grove	Medium	Low	Slight and Neutral		
		High		Very Significant		

PM10	Delgany Park		High	Adverse	Neutral
Wider Context / Middle Distance					
MD01	Local Road northwest of Delgany village	Medium	Low	Slight -Neutral	
MD02	Delgany Village Centre – junction of Church Rd. and Convent Rd.	Medium	None - No visibility	None - No visibility	
MD03	Grounds of Christ Church, Delgany	Medium	Medium	Moderate, Adverse	Slight, Adverse-Neutral
MD04	Junction of Eden Gate and Priory Road	Medium	None - No visibility	None - No visibility	
MD05	Junction of R774 and Kilcoole Rd (R761)	Medium	None - No visibility	None - No visibility	
MD06	R774 to north east of site	Medium	None - No visibility	None - No visibility	
MD07	Mill Rd at Greystones Tennis Club	Medium	None - No visibility	None - No visibility	
MD08	R761 just north of Mill Rd : Church Road Roundabout	Medium	None - No visibility	None - No visibility	

9.9 MONITORING

9.9.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the next available planting season after completion of the main civil engineering and building work.

All tree protection requirements will be installed on commencement of the development and removed on a phased basis as stages of the development are completed.

9.9.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. The company responsible for site management of the scheme will be responsible for the ongoing maintenance of the site after this three-year period is complete. The Active Open Space, greenway and some roads will be taken in charge by Wicklow County Council.

All works will be monitored on an ongoing basis to ensure the quality of the development is maintained as later phases are developed and on completion overall.

9.10 REINSTATEMENT

The proposed landscape development works in the form of tree and shrub planting will be used to re-instate the site, post-construction. These works will be carried out by an appointed landscape contractor and will be supervised by a suitably qualified landscape architect or manager.

9.11 POTENTIAL CUMULATIVE IMPACTS

The Greystones-Delgany-Kilcoole LAP has indicated an Action Plan for the lands at Farrankelly to include a range of uses, which include residential, open space and active open space. The proposed development comprises the majority of the Farrankelly Action Plan. Lands to the east, currently operating as various commercial uses, under separate ownership may be developed in the future, in line with the Action Plan which indicates residential and open space uses, on those lands.

The proposed development is part of the wider expansion and consolidation of Greystones town in this area. For some views this will mean further development occurring adjacent to the proposed development expanding the urban area. Cumulatively this is a moderate change, but the new scheme design and masterplan is also in accordance with local and national policy on the proper planning and sustainable development in urban areas. The proposed new development provides green infrastructure networks, landscape structure – trees and woods – and an appropriate material, all of which can be integrated into the future development of the adjoining lands in time.

Cumulatively the magnitude of change is moderate but overtime the quality of change from rural/brownfield to urban retaining key landscape structural elements can be neutral. Any further development within the vicinity of the proposed lands could have the potential of impacting on the same sensitive receptors as identified above. This could lead to potential impacts of a slightly higher level of significance on the identified receptors when assessed cumulatively. However, with good design and integration, the proposed cumulative development of the lands could be considered to be neutral.

9.12 DIFFICULTIES ENCOUNTERED IN COMPILING

There have been no difficulties encountered while compiling this LVIA.

10.0 MATERIAL ASSETS – TRAFFIC AND TRANSPORTATION

10.1 INTRODUCTION

Roughan & O'Donovan (ROD) was commissioned by Cairn Homes Properties Ltd. to undertake a Traffic and Transport Assessment for a proposed residential development, located off the R761 Kilcoole Road and north of the Eden Gate Housing Development.

10.2 STUDY METHODOLOGY

This Traffic and Transport Assessment (TTA) has been prepared to assess the traffic and transportation impacts of the proposed residential development. It has been carried out in line with the 'Traffic and Transport Assessment Guidelines' published by TII (NRA) and 'Guidelines for Transport Impact Assessment' published by the Institution of Highways and Transportation (IHT).

In addition, the following documents were consulted:

- 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.
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017

10.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

10.3.1 Site location

The site location of the proposed development will be in Farrankelly, Co. Wicklow, as shown below in Figure 10.1 Site Location Map. The site is approximately 15.6 ha in area and is bounded by the R761 Kilcoole Road to the East, Eden Gate housing estate to the south, Priory Road to the west and Delgany Glen housing estate and undeveloped lands to the north.

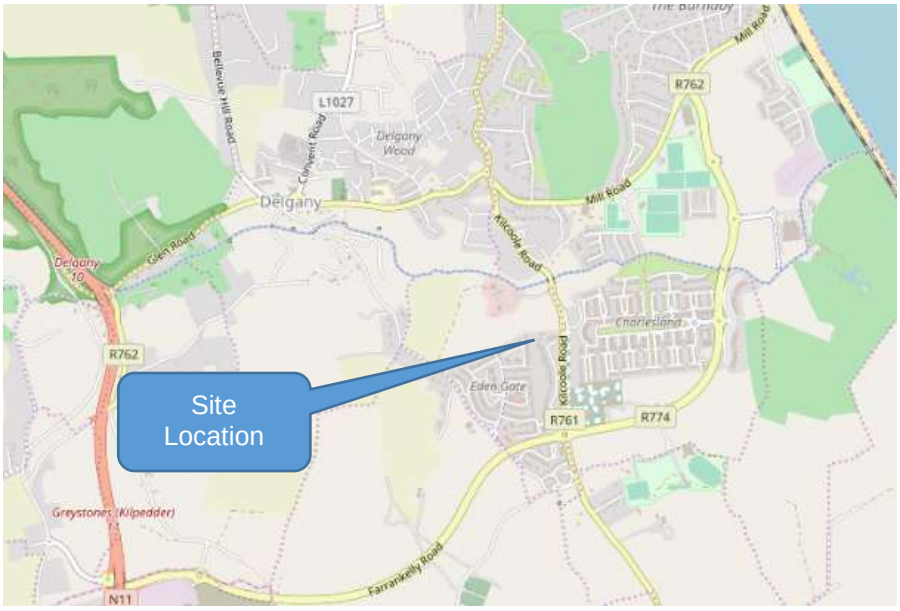
Figure 10.1 – Site Location Map

10.3.2 Surrounding Road Network

R761 Kilcoole Road

The R761 Kilcoole Road is a regional road that extends approximately 23.5 km linking Bray to Rathnew. In the vicinity of the site Kilcoole Road extends between the roundabout at the R774 Farrankelly Road and the roundabout at the R762 Mill Road, over a total length of approximately 1.3 km, see Figure 10.2.

Figure 10.2 – Location Map Surrounding Road Network



© OpenStreetMaps

The section of Kilcoole Road is a two-lane regional road with a posted speed limit of 50 km/h. The carriageway road has a variable width between 6.2m and 7.2. There is a continuous footpath on the east side of the road but there is no footpath on the west side past the site, see Figure 10.3.

Figure 10.3 – Kilcoole Road - end of the footpath provision on the western side of the road approaching Three Trouts Bridge

A signalised pedestrian crossing is provided on the R761 approximately 150m north of the roundabout junction with the R774 Farrankelly Road dual carriageway to the west of the site. This facility accommodates pedestrian access to Glenbrook Park and Eden Gate and provides a link between bus stops on each side of the road.

A cycle track has been constructed on the eastern side of the road, along the boundary of the Glenheron development, which connects to the Farrankelly Road. There are no facilities for cyclists along the Kilcoole Road to the north of the site entrance.

On the opposite side of the road to the site there are a number of properties accesses and the entrance to Glenheron the recently completed residential development. To the north on the same side of the road is the entrance to Farrankelly House which includes a number of commercial operations.

Priory Road

Priory Road is a single carriageway road of approximately 1.6km linking between the R744 Farrankelly Road at Eden Gate and the R762 in Delgany. The road has a variable width along the frontage of the site between 4.8m and 5m and there is no footpath in the vicinity of the site.

Along the frontage of the site there are no hard shoulders or footpaths. There are a number of accesses to properties on the opposite side of the road to the site.

10.3.3 Existing Traffic

Extensive traffic surveys were carried out in April 2016 by Abacus at several locations as part of a study that include the adjacent Glenheron residential developments by Cairn Homes, as shown in Volume III Appendix C – [Appendix A]. Due to the close proximity of the site, have been considered the 8 survey locations and the majority of the traffic that will access the site is expected to do so through these junctions.

The surveys were carried out on Thursday 28th April 2016. Upon examining the survey results, it was determined that the following peak hours occurred;

- Weekday am peak: 08:00 – 09:00
- Weekday pm peak: 17:00 – 18:00

The turning movement diagrams are included in Volume III Appendix C – [Appendix A] and a full set of the Traffic Survey results for the different sites have been enclosed in Volume III Appendix C – [Appendix B].

10.3.4 Relevant Planning Policies & Objectives

10.3.4.1 Greystones - Delgany & Kilcoole Local Area Plan 2013 – 2019

Some road and transport objectives from the Greystones - Delgany & Kilcoole Local Area Plan of particular note and relevance to the proposed developments include:

- RO6: *Improvement of the R761* (Kilcoole Road) *from Burnaby Heights to Kilcoole, as appropriate*.
- RO7: *To provide for a local access road to facilitate development of zoned lands and to provide for the development of a through road from Priory Road to the R761* (Kilcoole Road).
- RO11: *Upgrading of Priory Road, including the development of a footpath*.
- TS11: *To provide for the development of sustainable modes of transportation within the Plan area including public transport, walking and cycling, in particular to provide high quality pedestrian and bicycle lines between residential areas and retail, recreation and education facilities*.
- TS12: *To develop the 'greenroute' network for pedestrian and/or cycling facilities. The proposed indicative 'greenroute' network is indicated on Map B. Greenroutes should be developed with a common scheme of signage and/or markings. Where feasible, proposals for development should provide for the development of these greenroutes*…

The potential future upgrade proposal of the Kilcoole Road, in accordance with objective RO6 as above, was developed in consultation with the Wicklow County Council Municipal District Engineer, as part of a number of adjacent housing developments including the Glenheron developments on the east side of Kilcoole Road. This has established the following requirements for the improved road layout along the Kilcoole Road:

- minimum 6.5m wide carriageway, in accordance with a Link Street function and the Design Manual for Urban Roads and Streets (DMURS);
- 2.0m cycle tracks on each side (inclusive of 0.5m separator strip from the kerb);
- 2.0m wide footpaths (DMURS).

This designed includes for the localised realignment of the road carriageway along the proposed development frontage, and encroaching into the subject site, to make space for the provision of a cycle track on the east side of the carriageway so that the properties on the east side of the road are not impacted by this future road upgrade. The proposed site boundary with the Kilcoole Road will be set-back and the lands will be ceded to Wicklow County Council to allow for this future road upgrade.

The proposed development site is identified as an Action Plan, "AP6: Farrankelly Action Plan" in the Local Area Plan. The entire Action Plan area is approximately 24ha as shown in Figure 10.4. The area is zoned for a mix of uses including residential and active open space.

Figure 10.4 – Extract from Greystones Local Area Plan Zoning and Objectives Map

10.3.4.2 Wicklow County Development Plan 2016 – 2022

Some transport objectives from the Wicklow County Development Plan 2016 - 2022 of particular note and relevance to the proposed developments:

- *TR9: To improve existing or provide new foot and cycleways on existing public roads, as funding allows.*
- *TR10: To require all new regional and local roads to include foot and cycleways, except in cases where shared road space is provided.*
- *TR11: To facilitate the development of foot and cycleways off road (e.g. through open spaces, along established rights-of-way etc.), in order to achieve the most direct route to the principal destinations (be that town centre, schools, community facilities or transport nodes), while ensuring that personal safety, particularly at night time, is of upmost priority.*
- *TR13: To facilitate the development of cycling and walking amenity routes throughout the County*.

Appendix 1 of the Development Plan sets out Design and Development Standards including the provision of car and cycle parking.

10.3.5 Accessibility for Cyclists and Pedestrians

A good network of footpaths and cycle facilities are provided in the Greystones, but there are some missing links that will need to be addressed in conjunction with frontage development where appropriate. The road works associated with Glenheron development on the opposite side of the Kilcoole Road has provided a cycle track that connects to Farrankelly Road, which then provides good quality cycle facilities connecting into the Town Centre.

Footpaths will be provided throughout the proposed development and these will link with existing footpaths and facilities.

It is proposed to construction a 650m section of the Three Trouts Stream Greenway at the north end of the site, and this will form part of the overall greenway set out in objective TS12 to link from Delgany through to the coast at the southern edge of Greystones. This greenway will include a connection to the Kilcoole Road at Three Trouts Bridge, where a toucan crossing will be provided (to be constructed in agreement with Wicklow County Council) to connect with the existing Mill Lane, which continues northeast to Mill Road leading towards the Town Centre. The proposed greenway connection and toucan crossing is shown on Drawing Number FK-ROD-ZO-XX-DR-C-009 included with the application and as described in Volume III Appendix C – [Appendix D] DMURS Compliance Document.

A greenway link connecting from Eden Gate to the proposed development Spine Road is provided in accordance with Local Objective AP6. This greenway then continues through the proposed development to connect to the proposed Three Trouts Stream Greenway.

The proposed development will have a high level of permeability for pedestrians across the site, and numerous access points for connectivity to the surrounding area so that walking will be direct and convenient for local trips. This will include two connection points to the greenway describe above. In this respect the proposed development will facilitate the residents of adjoining neighbourhoods by opening up walking routes throughout.

The nearest local shops are at the Eden Gate Centre which would be accessible, (through Eden Gate link to the boundary to the south of the site), and the Charlesland Centre which is a c. 15 minute walk. Aldi would be accessible from the Greenway via Mill Lane, while Kilincarraig village is located to the north of the development.

The nearest existing primary school is in Delgany at a distance of 1.6 km, which is a 19 minute walk from the site, or a 7 minute cycle. A new primary school is under construction at the eastern end of the Charlesland, which is a 15 minute walk or a 5 minute cycle.

There are currently two secondary schools in Greystones. St. David's is in the town centre, which is 3.5 km from the subject site, a 14-minute cycle. Temple Carrig is a secondary school at Blacklion on the northern edge of Greystones, which is a 11-minute cycle. These schools are well connected to the site with the local bus services.

A third secondary school is planned on the southern side of the R744 Farrankelly Road at Charlesland, which is much closer at just less than 1km from the subject site. Many local children in Greystones currently travel considerably further to secondary school, especially to schools located along the DART railway line. With improved capacity in local schools there should be a reduction in external school trips in the future.

Overall, it will be safe and convenient for children living in the proposed residential development on the to walk and cycle to local schools for both primary and secondary level at appropriate distances for the relevant ages.

10.3.6 Public Transport Accessibility

Dublin Bus Route No.84 (Figure 10.5), with a 1-hour frequency, operates along the Kilcoole Road along the eastern frontage of the site. This service extends from Newcastle through Kilcoole, passing the subject site to Killincarrig and then continues via Mill Road to the Town Centre before proceeding to Bray and on to Blackrock in Dublin.

Route 184 from Newtown Mount Kennedy to Bray via Greystones passes through Killincarrig Crossroads along Mill Road which is about 750 m to the north of the subject site. This route has a 30 minute frequency.

The combined frequency of the 84 and 184 bus routes is every 20 minutes, which is a mid-range service quality. It combines with the DART railway at 30 minute frequency for access to Dublin.

Route 84X provides a high quality express service that connects between Kilcoole and Dublin City Centre, with 5 services in the morning peak towards Dublin accessed from the bus stop on Kilcoole Road immediately adjacent the site.

The current Greystones – Delgany & Kilcoole Local Area Plan 2013 – 2019 states that new housing developments should be located within 450m of bus routes. There are 4 Dublin Bus stops located within a 300m radius of the proposed development site.

Figure 10.5 – No. 84 Bus on the R761 Kilcoole Road

The DART railway service from Greystones is the main public transport link to Dublin for commuters from the Greystones area, with trains at 30 minute intervals. In addition, there are 3 train services each morning from Wicklow that also serve Greystones.

The station is located at a distance of 2.8km from the subject site, which is approximately 36-minute walk or a 10-minute cycle. Good quality cycle parking is provided at the station (Figure 10.6). A set down area is also provided along the front of the station.

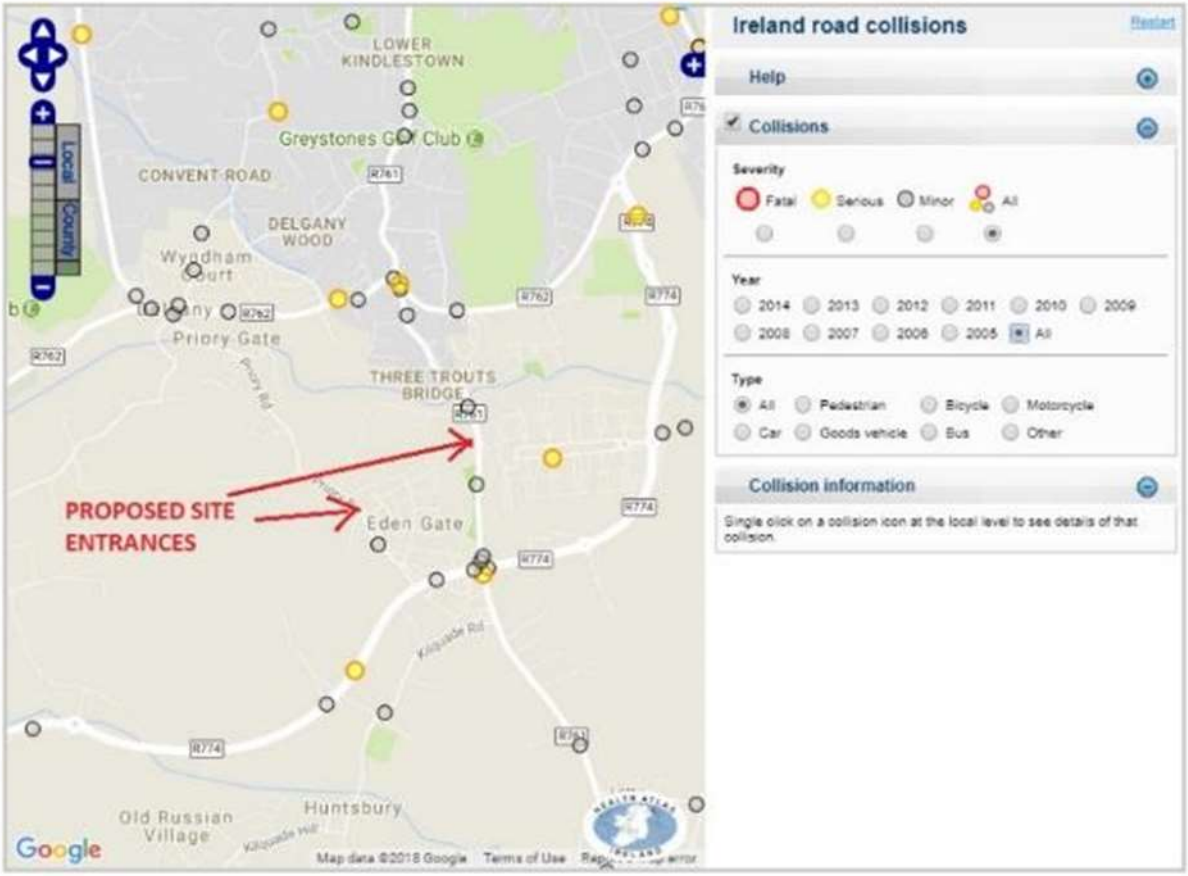
There is a free Park & Ride facility with 462 spaces located 500m south of the railway station. Demand for the car park is high, and post morning peak, spaces can be difficult to find, which demonstrates the strength of demand for the commuter service. Additional paid parking is provided at the South Beach.

Figure 10.6 – Cycle Parking at Greystones Railway Station

10.3.7 Road Safety

Data relating to any collisions on the R761 Kilcoole Road and roads in the vicinity of the proposed development site, during the 9 year period between 2005 and 2014, was collected from the Road Safety Authority online mapping tool and analysed. The Road Safety Authority online mapping tool provides details and locations of road collisions in Ireland where personal injury was involved. Details regarding the date, severity level, circumstances of each collision are provided, along with the type of vehicle involved. The locations of collisions on the road networks in the vicinity of the development site are shown in Figure 10.7 below.

Figure 10.7 – Road Collisions data from RSA



Between 2005 and 2014, there were five minor collisions on R761 Kilcoole Road between the R744 Farrankelly Road Roundabout, and the R762 Killincarrig Crossroads. There were two serious collisions occurring on the same stretch of road, one at each of the roundabouts described above. In the same timeframe, there were two minor collisions on Priory Road. There were no recorded fatalities in the vicinity of the proposed development.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

10.4.1 Development Details

The development will consist of the construction of a residential development of 426 no. dwellings, a creche (c. 599 sq. m), residential amenity building (c. 325 sq. m), active open space of c. 4.5 hectares, greenway of c. 2.4 hectares and open space

Access to the subject site will be from a priority junction, located on the Kilcoole Road (R761). The proposal includes for vehicular/pedestrian access from Priory Road. Provision for cyclist and pedestrian access to be provided to boundary of Eden Gate development located to the south (3 no. independent vehicular access points from Priory Road to serve 9 no. dwellings), 762 no. car parking spaces and 235 no. cycle spaces.

10.4.2 Internal Pedestrian Environment

Cairn Homes have a general policy for their footpaths to have a width of 2m, which is slightly larger than the requirement of the DMURS of 1.8m. There will be at least one footpath on each road throughout the development. The layout and geometry of the internal roads are arranged in such a way that will restrict vehicle speeds and so provide safety for cyclists to share the road space within the site, and to protect children playing in the estate. As

required by Design Manual for Urban Roads and Streets (DMURS), the internal roads are typically restricted to between 5 and 5.5m width to slow traffic.

Long straights have been avoided on the internal road layout, which is arranged in a number of reasonably small blocks for appropriate scale and natural sense of a low-speed environment in each. Several short cul-de-sac roads are arranged as shared surfaces home-zones without formal division into road carriageway and footpath.

While there are various cul-de-sac roads for traffic, there will be a full network of footpaths to allow short walking routes in all directions that cut across most of the gaps between internal roads where level differences permit.

10.4.3 Proposed R761 Kilcoole Road Access

The proposed development entrance junction with Kilcoole Road will be located on the opposite side and to the south of the Glenheron housing development entrance so as to avoid forming a cross-road. Figure 10.8 is a view taken from immediately north of the proposed entrance. This will ensure the most efficient traffic operation and greatest traffic capacity in the long-term. The proposed junction is a simple priority junction. The junction layout and visibility splays are designed in accordance with the DMURS as shown on Drawing Number FK-ROD-ZO-XX-DR-C-0095 included with the application and as described in Volume III Appendix C – [Appendix D] DMURS Compliance Document. The proposed entrance on the Kilcoole Road has been designed to serve the entire development.

A footpath will be provided along the entire site frontage and a toucan crossing will be provided across Kilcoole Road located immediately to the south of the proposed access. The access is designed with an entry treatment where the road ramps up to footpath level to provide maximum priority and comfort for pedestrians. This is becoming a more common detail throughout the Country and it is consistent with the entrances to the Glenheron developments across the road.

From the proposed entrance into the site there is a step in levels from Kilcoole Road at 35mOD and just inside the side with a level of 38mOD. This requires the design access road alignment to wind its way up into the site. The horizontal and vertical alignment of the access road has been designed in accordance with the DMURS.

Figure 10.8 – View south towards the proposed Kilcoole Road access

10.4.4 Proposed Future Kilcoole Road Improvements

The proposed development will provide a setback boundary to allow for the future upgrade of the R761 Kilcoole Road along the site frontage. The entrance of the proposed development has been designed to cater not only for the subject site, but also to be able to accommodate this future general road improvement. The entrance layout proposed is capable of accommodating the entire development from Kilcoole Road. It is neither dependent on the future road upgrade on the Kilcoole Road or the secondary access to the west on Priory Road or to the south to Eden Gate. This future upgrade is to include the localised road realignment to the west into the subject site and the provision of footpaths and cycle tracks on both sides. The localised realignment of the Kilcoole Road into the subject site will make space for these upgrade works so that the properties on the opposite side of the road are not affected. It is expected that Wicklow County Council will undertake the overall road improvements as part of a future public works scheme, which will include provision of a cycle track on the western side of the road at Glenbrook Park, and will also extend northward to avail of other boundary setbacks as provided for in other planning permissions.

10.4.5 Proposed Priory Road Entrance

Provision for a future second access on Priory Road is made in the proposed development. As agreed with Wicklow County Council, the provision of this access will coincide with the general upgrade of the road section of Priory Road to include a footpath along the western frontage of the site. Three further direct accesses are proposed creating frontage development along the site boundary are proposed onto Priory Road. The proposed access junction layouts and visibility splays are designed in accordance with the DMURS as shown on Drawing Number FK-ROD-ZO-XX-DR-C-0094 included with the application and as described in Volume III Appendix C – [Appendix D] DMURS Compliance Document. The proposed development is capable of being served from the single access point onto the Kilcoole Road and is not dependent on the Priory Road entrance. The Priory Road access is not required for the proposed development.

Figure 10.9 – View of Priory Road west of the proposed development © Google Earth

The current situation of Priory Road at the proposed future site entrance is shown in Figure 10.9. The existing road has quite a rural character. A 2m wide footpath will be provided along full road frontage (as per the LAP Road

Objective 11), which was agreed with Wicklow County Council who require a footpath along the southern boundary of Cairn Homes lands along Priory Road. This path along Cairn Homes lands is provided in the scheme layout. The provision of a footpath between the subject site and the Eden Gate roundabout, will be undertaken by Wicklow County Council, in the future. However, it is important to note that the footpath between the southern boundary of the site is not required for the proposed development, in respect of any meaningful linking function. It is further noted that pedestrian access is being provided to the southern boundary to Eden Gate.

10.4.6 Access Proposals

It was considered in consultation with Wicklow County Council that the design of the proposed access onto Kilcoole Road should cater for the overall proposed development (in advance of the upgrade of the Priory Road), and that the proposed development should be entirely accessed from Kilcoole Road until such a time that the Priory Road is upgraded which comprises a footpath link from the proposed footpath (along Cairn Homes' site boundary to the Eden Gate Roundabout (c. 350m to the west).

The development has been assessed for a potential phased implementation of the accesses as follows:

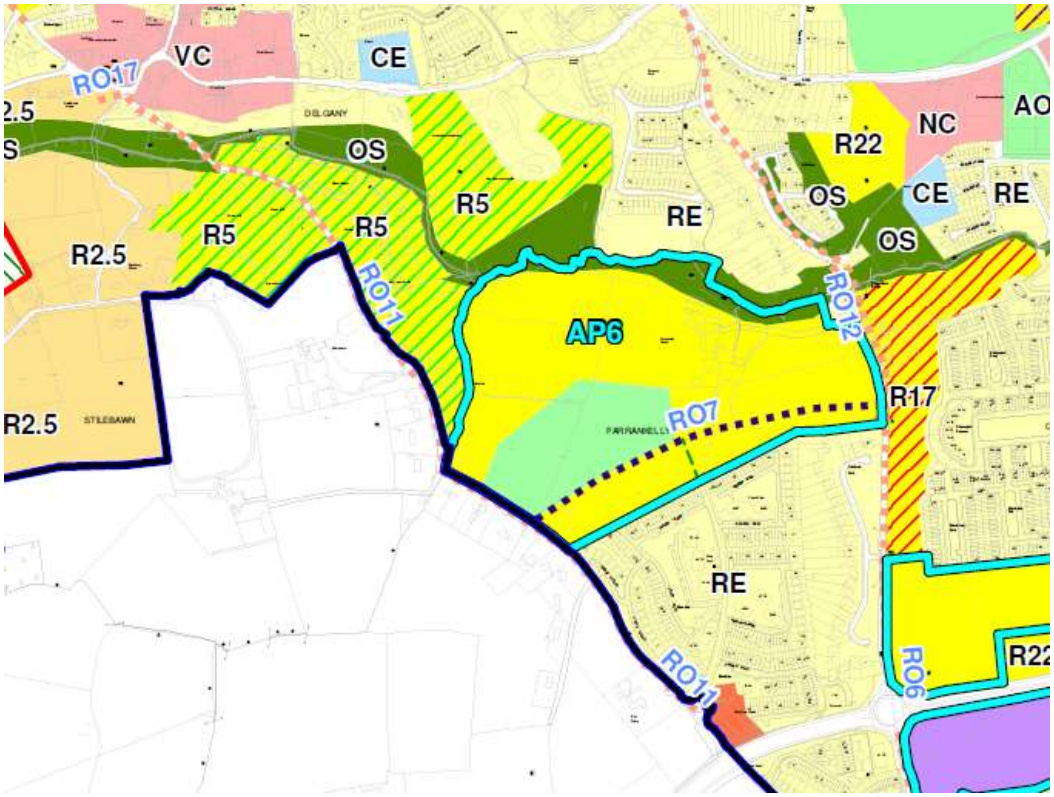
- *SCENARIO 1* - Only the Eastern access on R761 Kilcoole Road is provided.
- *SCENARIO 2 - Both the accesses, on R761 Kilcoole Road and on Priory Road, are provided.*

10.4.7 Cumulative Development

Within the assessment, an allowance for the future development of the remaining AP6 zoned lands, a primary school, post primary school, employment area and residential housing in close proximity to the junctions was made, based on information obtained from the current Greystones – Delgany & Kilcoole Local Area Plan 2013 – 2019, an extract of which is included in Figure 10.10 below.

The additional future developments included in the assessment are outlined in cyan in the following map, yellow indicates residential zoning, light blue indicates zoning for schools and purple indicates zoning for employment uses.

Figure 10.10 – Greystones–Delaney & Kilcoole Local Area Plan (2013 – 2019) map



The traffic analysis performed for the proposed development has been assessed to include the additional traffic associated with these other developments above mentioned.

10.4.8 Parking

The proposed car parking provision complies with the Wicklow County Development Plan car parking standards as follows:

- 2 off street spaces per dwelling over 2 bedrooms;
- 1 space per 1 or 2 bedroom dwellings, plus 1 per 5 dwellings for visitors.
- Standard parking spaces to be 2.5m x 5m.
- 5% of spaces to be accessible bays 2.5m x 5m plus 0.9m between bays.

It is proposed to provide private parking on the curtilage of each house, rather than to rely upon on-street parking for the residents. The proposed duplex apartments are provided with 1.5 space per dwelling and the apartments are provided with 1 space per unit. The proposed street widths and the provision of numerous driveways and dedicated parking bays which will generally preclude on-street parking on most of the roads within the development. However, some provision is be made for visitor parking informally at street sections that do not have frontage access, such as on gable ends of houses at the end of a row, or on certain streets adjoining green spaces.

At the apartment blocks cycle parking provision will be 1 space per unit and these will be covered and secure. This is considered adequate to accommodate the anticipated demand and the is scope to provide if and when the need arises. Cycle parking for the houses and duplexes can be accommodate with the curtilage of the properties.

10.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

10.5.1 Construction Phase

The construction stage of the project is anticipated to last for approximately 24 months. The project is to be completed on a phased basis as detailed in the Construction Management Plan and the initial sequence of works will include:

- The development of the compound and the site enabling works, including the new site entrances off Kilcoole Road and Priory Road;
- Commence the construction of roads and services, and
- Start to prepared footings for house construction on a phased basis.

The initial site entrance will be located off Priory Road to facilitate the site set up and to commence access to the site to form the permanent access off the Kilcoole Road. As the Project develops the access gate on Priory Road will be used for vans, cars and light traffic accessing the car park and site compound. The Kilcoole Road entrance will be used for the delivery of construction materials and heavy vehicles throughout the phase 1 construction, however this construction access point will likely be closed to construction traffic once there is occupancy in the estate (to minimise interaction between the construction traffic and public).

The main construction traffic will be routed from the N11 onto the R774. Light vehicles will exit the R774 onto Priory Road and turn off Priory Road into the site car park. Heavy construction traffic will turn left off the R774 onto the Kilcoole Road and access the site into the permanent access point once it is constructed. The traffic management plan for the development will be reviewed continuously throughout the project.

The surrounding road network is suitable to accommodate the construction traffic and there is sufficient traffic capacity to accommodate the relatively modest volume of construction traffic. A Construction Traffic Management Plan has been prepared (by Cairn) that includes a range of mitigation measures to ensure the safety of the workforce on site and accessing the site, and the public on the surround roads, and to minimise construction traffic generation and disruption on the surrounding road network.

10.5.2 Operational Phase

10.5.2.1 Transport Demand Generation

Traffic generated by the proposed residential development have been determined using the TRICS data base. The crèche and residential amenity building will service the proposed development and will not generate any significant external traffic movements. The proposed active open space including sports pitches will primarily service the residents of the proposed development, however, an allowance for external traffic based on the assumption that the pitches could be used by local sports clubs.

As mentioned in the previous sections, other developments have been included in the traffic analysis and specifically:

- Remainder of the AP6 zoned lands.
- Three residential developments (Glenheron Developments currently being completed)
- A Primary School (under construction)
- An Employment Area (zoned)
- A Post Primary School (zoned)

Full details of the traffic generation of these developments are detailed in the Table 10.1 below. The table includes Trip Rates and Traffic Generated for all the new developments. The methodology used is based on the evaluation of the Trip rates in the TRICS database and the estimation of the generated traffic dimensioned by the development scale.

The arrivals and departures generated from the developments have been distributed onto the surrounding roads considering the baseline traffic turning movements.

It is noted the Active Open Space is included in the assessment. The potential traffic generation is considered to be an over-estimation of the potential trips, and that the assessment is robust in this regard, as many of the trips could potentially occur outside of the AM and PM peak periods. This traffic estimate for the active open space is considered a worst case scenario and it is only likely to occur on an occasional basis.

Table 10.1 – TRICS Trip Rates and Traffic Generated by the developments

Development type	Zoning	Site Area (ha)	Development Scale		Trip Rate				Traffic Generated			
			Value	Units	AM IN	AM OUT	PM IN	PM OUT	AM IN	AM OUT	PM IN	PM OUT
Glenheron Site A-1	Residential	2.92	51	houses	0.142	0.439	0.396	0.222	7	22	20	11
Glenheron Site B-1	Residential	8.19	110	houses	0.142	0.439	0.396	0.222	16	48	44	24
Glenheron Site B-2	Residential		80	houses	0.142	0.439	0.396	0.222	11	35	32	18
Farrankelly Site	Residential	15.46	429	houses	0.142	0.439	0.396	0.222	61	188	170	95
Remaining AAP6 Lands	Residential		100	Houses	0.142	0.439	0.396	0.222	14	44	40	22
Primary School	Community and Enterprise	1.6	480	pupils								
Post Primary School	Community and Enterprise	2.43	450	pupils	0.256	0.179	0.048	0.053	115	81	22	24
Employment Area	Employment	6.86	660	employees	0.257	0.051	0.055	0.267	170	34	36	176
Active Open Space / Pitches	Sports		50	Parking spaces					34	30	30	34

Note: 30 plus 20 overspill places, if required.

10.5.2.2 Traffic Predictions for the Site

The traffic generated by the full development of the subject lands, was the same in all the analysed scenarios, different only in the distribution onto the surrounding road network from the various accesses. The traffic generated in and out the property can be considered conveyed through one access only in the SCENARIO 1, two entrances in SCENARIO 2. Full details of the development traffic distribution is included in Volume III Appendix C – [Appendix B].

SCENARIO 1

All development traffic is conveyed through the access to be provided at R761 Kilcoole Road. Based on the trip generation rates obtained from the TRICS database summarised in Table 10.2, the following results have been obtained for R761 Entrance.

Table 10.2 – R761 Kilcoole Road Entrance – Scenario 1

	R761 Entrance		
	Housing Units + Active Open Space / Pitches		
	Arrivals	Departures	Two Way
AM	95	218	313
PM	199	129	328

SCENARIO 2

The traffic distribution between the two entrances has been carried out considering the traffic survey information as summarised in Table 10.3 and 10.4. Analysing in fact the existing traffic flowing through the road have been obtained the following factors:

- R761(Kilcoole Road) 77% AM – 85% PM
- Priory Road – 23% AM- 15% PM

Table 10.3 – R761 Kilcoole Road Entrance – Scenario 2

	R761 Entrance		
	Housing Units + Active Open Space / Pitches		
	Arrivals	Departures	Two Way
AM	74	169	243
PM	169	110	279

Table 10.4 – Priory Road Entrance – Scenario 2

	Priory Road Entrance		
	Housing Units + Active Open Space / Pitches		
	Arrivals	Departures	Two Way
AM	21	49	70
PM	30	19	49

Scenario 2, where both accesses are open, allows for better distribution of the proposed development traffic onto the surrounding road network. Detailed analysis is undertaken in the following sections to determine the capacity of the proposed entrance and the surrounding road network.

10.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

10.6.1 Construction Phase

It is proposed that the construction of the development will be carried out in a number of phases. The primary access will be from R 761 Kilcoole Road where the proposed entrance will be constructed at the commencement of the project. The completion of the spine road through the development that will eventually link between Kilcoole Road and Priory Road will be completed within the first phase. The Priory Road Access may also be used for construction traffic, but this will be limited to access for the initial site setup and for light vehicles only. The subject site has more than sufficient space that the construction compound and car parking for staff and operations can be accommodated entirely within the site.

A Construction Management Plan has been prepared by Cairn and is included in the SHD application, for the proposed development to account for all works associated with the construction of the proposed development. These documents will address likely human health risks and ensure construction practices and measures are put in place to minimise any effects on road users. This Plan will inform a Contractor, when appointed, of the relevant guidance documentation which will need to be followed during construction phase. . A more detailed Construction Management Plan will be submitted by the works contractor, expanding on the CMP, and it will be submitted for approval to Wicklow County Council Road prior to the commencement of any construction works. This plan will ensure that temporary traffic works and road safety measures will be put in place during the construction of the proposed development. The plan will ensure that any required traffic management measures are put in place to minimise the impact on local road users.

It is considered that the construction traffic, with primary access from the Regional Roads of the R761 Kilcoole Road and the R744 Farrankelly Road, will not impact significantly on the existing traffic situation on the surrounding road network.

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.
- A dedicated ‘construction’ site access / egress junction will be provided with manned security during all construction phases.
- 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 deem necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

10.6.2 Operational Phase

To encourage sustainable travel patterns and to help reduce the potential traffic impact of the proposed development it is proposed to promote sustainable travel to the future occupants of the development. This will involve the preparation of a Travel Plan (form of Mobility Management Plan) that will include providing each property with an Travel Welcome Brochure that will include maps of all pedestrian and cycle routes in the area, highlighting the location of the main community facilities, amenities, retail centres, bus stops and the train station, and providing details of bus and train routes and timetables.

Up to date maps and public transport timetables will be put on display in proposed crèche and residential amenity buildings.

The proposed development will deliver the road objective RO7 from the Greystones - Delgany & Kilcoole Local Area Plan, which is *'To provide for a local access road to facilitate development of zoned lands and to provide for the development of a through road from Priory Road to the R761* (Kilcoole Road). This proposed road link will improve accessibility for the immediate local area including people living along Priory Road and Eden Gate.

The proposed development includes the completion of a 650m section of the proposed Three Trouts Stream Greenway, which is an object of the Greystones - Delgany & Kilcoole Local Area Plan (TS12). A toucan crossing is to be provided across the Kilcoole Road to connect to Mill Lane, which continues northeast to Mill Road leading towards the Town Centre. A greenway link connecting from Eden Gate to the proposed development Spine Road is provided in accordance with Local Objective AP6. This greenway then continues through the proposed development to connect to the proposed Three Trouts Stream Greenway. Footpaths will be provided throughout the proposed development and these will link with existing footpaths and facilities. These measures provide a very high level of permeability for pedestrians and cyclists to and through the site, which will help encourage walking and cycling by both residents and visitors of the proposed development and also the adjacent residential areas.

10.7 PREDICTED IMPACT OF THE PROPOSED DEVELOPMENT

10.7.1 Construction Phase

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 temporary in nature and slight in terms of effect.

10.7.2 Operational Phase

10.7.2.1 Transport Impact Analysis

An assessment of the proposed two accesses to the development site via the Proposed Kilcoole Road Access and Priory Road Access was carried. The junction analyses have been based on the traffic data recorded by Abacus Surveys on 28th of April 2016 in combination with the generated traffic calculated for proposed development and future traffic conditions. The time frame analysed were:

- 2020 Base Year
- 2035 Design Year

The base year consists of the 2016 Traffic Survey Data combined with the traffic generated by the proposed nearby developments, as described above. The design year, as prescribed in the Traffic and Transport Assessment Guidelines, represents the Opening Year plus 15 Year Forecast.

Growth rates zone specific have been applied to the base network traffic flows, allowing for a reflective analysis of the future year scenarios. These have been extracted from the TII Publications Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections. The factors used as shown in Table 10.5 below.

Table 10.5 – Growth rates zone (Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections)

	Low Sensitivity Growth			
	2013-2030		**2030-2050**	
	LV	HV	LV	HV
Mid-East *Wicklow*	1.0109	1.0221	1.0018	1.0135

The choice of the Low Sensitivity Growth category has been taken on the basis that the traffic associated with the immediate surrounding developments has also be estimated and added to the base year traffic and this represents an element of double counting or worst case scenario.

The accesses have been analysed respectively in their worst scenarios:

- Kilcoole Road Entrance - SCENARIO 1 – in this scenario all traffic to and from the full development will access via this entrance junction.

- SCENARIO 2 – Priory Road. Priory Road access is considered open and functioning in the second scenario.

PICADY software was used to assess the proposed accesses. The capacity of a junction is assessed based on the Ratio of Flow to Capacity (RFC). The RFC is a measure of the proportion of the capacity of an approach arm of the junction being availed of by traffic. It is considered good practice to ensure the RFC on any arm should not exceed 0.85 (that is to say that the junction should not operate above 85% of its theoretical capacity) as turbulent factors above that threshold may inhibit the optimal performance of the junction. PICADY also estimates the maximum number of vehicles queuing.

10.7.2.2 Proposed Kilcoole Road Access Junction Analysis

The proposed access to the site to be located at Kilcoole Road has been analysed in four conditions:

- Base Year – AM & PM
- Design Year – AM & PM

A summary of the PICADY analysis results for the worst-case scenario, Scenario 1, is included below and further details are included in Volume III Appendix C – [Appendix C].

SCENARIO 1 - SUMMARY RESULTS – Kilcoole Road Junction

Base Year - 2016

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
Scenario 1 - Post Dev - Base Year - Scenario 1										
Stream B-AC	1.36	20.94	0.58	C		0.69	17.64	0.41	C	
Stream C-A	-	-	-	-		-	-	-	-	
Stream C-B	0.09	8.53	0.08	A	C	0.35	10.09	0.26	B	B
Stream A-B	-	-	-	-		-	-	-	-	
Stream A-C	-	-	-	-		-	-	-	-	

Design Year - 2034

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
Scenario 1 - Post Dev - Des Year - Scenario 1										
Stream B-AC	1.53	23.52	0.61	C		0.77	19.83	0.44	C	
Stream C-A	-	-	-	-		-	-	-	-	
Stream C-B	0.09	8.84	0.08	A	C	0.37	10.67	0.27	B	C
Stream A-B	-	-	-	-		-	-	-	-	
Stream A-C	-	-	-	-		-	-	-	-	

The above results indicate that in the Design Year the Proposed Kilcoole Road Access Junction will operate at only 61% of its theoretical capacity and will be able to easily cater for the level of traffic expected to use the proposed residential development during AM and PM peak hours. That is the entire development (Scenario 1) can access through the proposed simple priority development with no queuing or delays. This analysis confirms that the Kilcoole Road is the only vehicular access required to serve the entire site and that the Priory Road access is not required.

10.7.2.3 Proposed Priory Road Access Junction Analysis

The proposed future access to the site to be located at Priory Road has been analysed in four conditions:

- Base Year – AM & PM
- Design Year – AM & PM

A summary of the PICADY analysis results is included in the table below and further details are included in Volume III Appendix C – [Appendix C].

SCENARIO 2 - SUMMARY RESULTS – Kilcoole Road Junction

Base Year - 2016

Summary Results

Mode ▾ Columns ▾

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
Scenario 2 - Post Dev - Base Year - Scenario 2										
Stream B-AC	0.12	8.07	0.11	A		0.04	6.80	0.04	A	
Stream C-A	-	-	-	-		-	-	-	-	
Stream C-B	0.03	6.39	0.03	A	A	0.04	6.60	0.04	A	A
Stream A-B	-	-	-	-		-	-	-	-	
Stream A-C	-	-	-	-		-	-	-	-	

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

Design Year – 2034

Summary Results

Mode ▾ Columns ▾

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
Scenaio 2 - Post Dev - Des Year - Scenario 2										
Stream B-AC	0.12	8.11	0.11	A		0.04	6.86	0.04	A	
Stream C-A	-	-	-	-		-	-	-	-	
Stream C-B	0.01	6.33	0.01	A	A	0.04	6.65	0.04	A	A
Stream A-B	-	-	-	-		-	-	-	-	
Stream A-C	-	-	-	-		-	-	-	-	

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

The above results indicate that the proposed Priority Road Access junction will operate at only 11% of its theoretical capacity and will be able to easily cater for the very low level of traffic expected to use the proposed residential development during AM and PM peak hours.

10.7.2.4 Wider Network Traffic Impact

The traffic survey data, obtained to assess the road network surrounding the proposed development, has been derived from eight sites as shown in Figure 10.11.

The traffic increase due to the proposed development has been calculated for each junction for the two development access scenarios as detailed in Table 10.6.

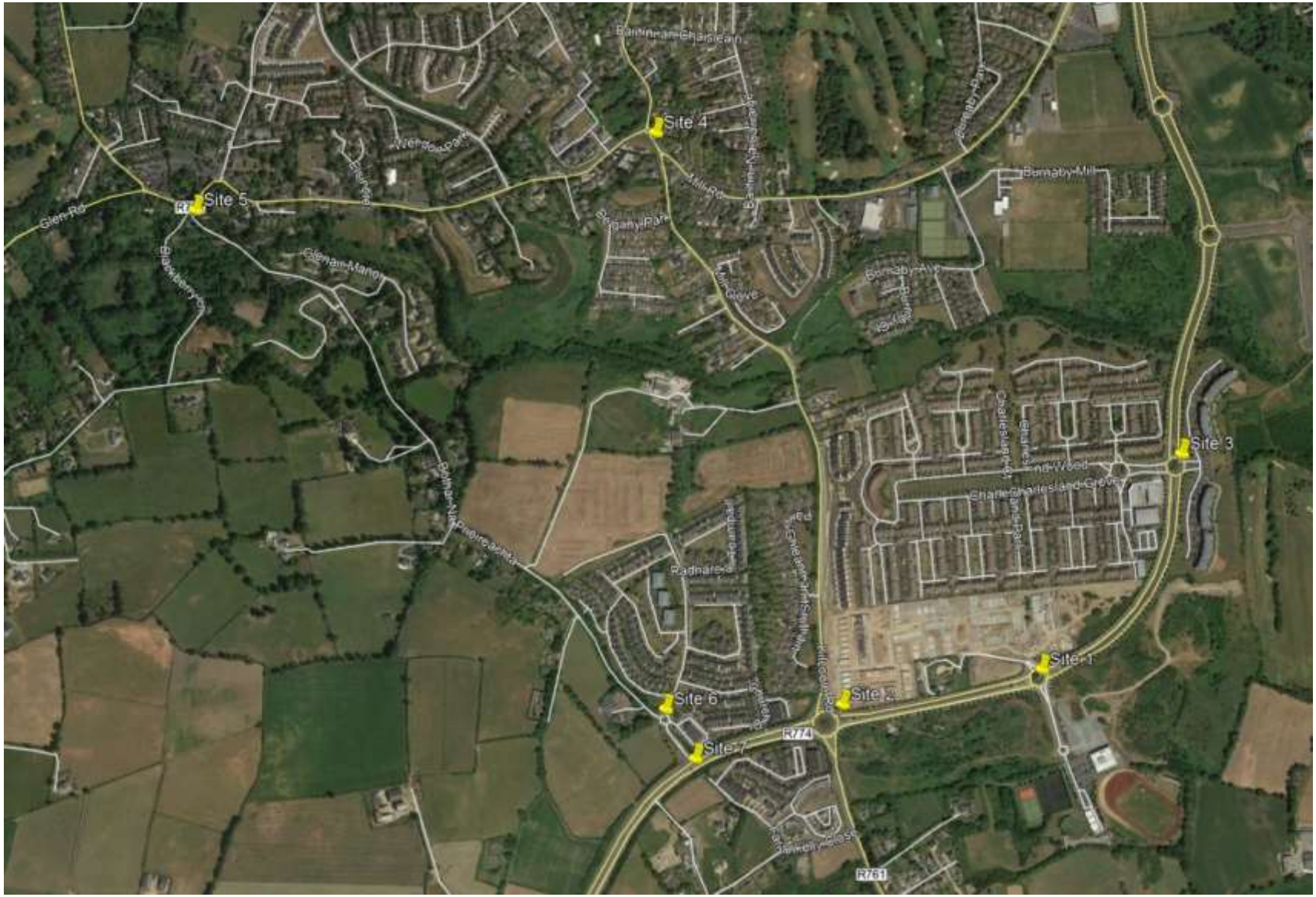


Figure 10.11 – Traffic Survey Sites Map © Google Earth

Table 10.6 – Percentage of Traffic Increase due to the Proposed Development

Junction		Scenario 1		Scenario 2	
		AM peak	PM peak	AM peak	PM peak
Site 1	Charlesland Sports Centre Roundabout	3.1%	2.9%	2.4%	2.4%
Site 2	Kilcoole / Farrankelly Roundabout	7.2%	7.1%	5.6%	6.1%
Site 3	Charlesland Roundabout	0.7%	0.8%	0.5%	0.6%
Site 4	Killincarrig Crossroads	12.2%	11.6%	9.4%	9.8%
Site 5	R762 / Priory Road Junction	0.3%	0.6%	4.0%	1.9%
Site 6	Eden Gate Roundabout	2.6%	3.9%	10.0%	9.6%
Site 7	Priory Road/ Farrankelly Road (left in/ left out) Junction	3.3%	3.3%	2.9%	3.2%
Site 8	Killpedder Interchange East Roundabout	2.8%	1.5%	2.8%	1.7%

The percentages calculated in Scenario 1 are on average the highest compared to Scenario 2, apart from the junctions directly influenced by the opening of Proposed Priory Road Access.

The TII Traffic and Transport Assessment Guidelines (PE-PDV-02045) indicates that a full traffic assessment is required where '*traffic to and from the development may be expected to exceed 10% of the existing traffic movements, or 5% in congested or other sensitive locations'.* It is considered that the surrounding road network is not particularly congested or sensitive, with the exception of Kilcoole Farrankelly Road Roundabout and Killincarrig Crossroads.

The calculated percentages for Site 2 Kilcoole / Farrankelly Roundabout and Site 4 Killincarrig Crossroads are in excess of 5% in both scenarios, both AM and PM peak, and therefore detail analysis has been undertaken. The analysis suggested that a more detailed analysis was also appropriate at Site 6 Eden Gate Roundabout in Scenario 2.

This analysis shows that the proposed development will not have a significant impact on Sites 1, 3, 5, 7 and 8 and therefore no further or detailed analysis has been carried out on these junctions.

10.7.2.5 Site 2 – Kilcoole / Farrankelly Roundabout

Kilcoole / Farrankelly Roundabout is a high capacity roundabout located along the R761 and the R774 and bordered predominantly by housing developments, as shown on Figure 10.12 below.

Figure 10.12 – Aerial Image of Kilcoole / Farrankelly Roundabout

As quantified in Table 10.6 the worst-case scenario for Site 2 Kilcoole / Farrankelly Roundabout is Scenario 1. The junction has been assessed using ARCADY software for Scenario 1, which relates to the entire development using the Kilcoole Road access only.

ARCADY software was used to assess the roundabout junctions. The capacity of a roundabout junction is assessed based on the Ratio of Flow to Capacity (RFC). The RFC is a measure of the proportion of the capacity of an approach arm of the junction being availed of by traffic. It is considered good practice to ensure the RFC on any arm should not exceed 0.85 (that is to say that the junction should not operate above 85% of its theoretical capacity) as turbulent factors above that threshold may inhibit the optimal performance of the junction. ARCADY also estimates the maximum number of vehicles queuing.

The results obtained through the ARCADY software are summarised in the table below and further details are included in Volume III Appendix C – [Appendix C].

	SCENARIO 1 - SUMMARY RESULTS – Site 2 – Kilcoole / Farrankelly roundabout
Base Year – Post Development - 2016	

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
	Scenaio 1 - Post Dev - Base Year - Scenario 1									
Arm 1	0.32	2.31	0.24	A	A	0.57	2.91	0.36	A	A
Arm 2	0.83	4.09	0.46	A		0.65	3.90	0.40	A	
Arm 3	0.64	2.86	0.39	A		0.86	3.22	0.46	A	
Arm 4	0.44	3.93	0.31	A		0.77	5.41	0.44	A	

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
	Scenaio 1 - Post Dev - Base Year - Scenario 1									
Arm 1	0.38	2.44	0.28	A	A	0.72	3.26	0.42	A	A
Arm 2	1.09	4.78	0.52	A		0.88	4.57	0.47	A	
Arm 3	0.77	3.15	0.44	A		1.19	3.89	0.55	A	
Arm 4	0.51	4.27	0.34	A		0.95	6.36	0.49	A	

Design Year – Post Development - 2034

The outcome of Site 2 Kilcoole / Farrankelly Roundabout detailed analysis highlights that the proposed development will only contribute a relatively small traffic increase and that it has more than enough capacity to cope with the additional development traffic. The evaluated Level of Service for the junction is A both in Base and Design Year which can be associated with a maximum RFC of 55% and virtually no queuing. Therefore, the junction can be considered insignificantly impacted by the proposed development.

10.7.2.6 Site 4 – Killincarrig Crossroads

Site 4 - Killincarrig Crossroads is composed by two linked roundabouts located along the R761 and the R762, as shown in Figure 10.13 below.

Figure 10.13 – Aerial Image of Killincarrig Crossroads

The most critical scenario for Site 4 is *Scenario 1 where* a higher portion of the traffic generated by the proposed development will access via Kilcoole Road and it will distribute according to the surveyed traffic, which reveals a substantial proportion of traffic accessing Site 4 Killincarrig Crossroads. The junction analysis has been carried out using ARCADY software. The results of the analysis are summarised in the table below and further details are included in Volume III Appendix C – [Appendix C].

SCENARIO 1 - SUMMARY RESULTS – Site 4 – Killincarrig Cross Roads

Base Year – Post Development - 2016

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
	Scenario 1 - Post Dev - Base Scenaio 1 - Post Dev - Base Year - Scenario 1									
Junction 1 - Arm 1	0.79	9.22	0.45	A	C	1.00	8.32	0.50	A	A
Junction 1 - Arm 2	1.03	8.20	0.51	A		1.69	11.32	0.63	B	
Junction 1 - Arm 3	7.11	28.52	0.89	D		0.25	4.10	0.20	A	
Junction 2 - Arm 1	0.75	5.00	0.43	A	B	0.21	3.51	0.18	A	A
Junction 2 - Arm 2	0.98	10.28	0.50	B		1.47	11.85	0.60	B	
Junction 2 - Arm 3	3.47	18.07	0.78	C		0.92	7.59	0.48	A	

Design Year – Post Development - 2034

	AM					PM				
	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS	Queue (PCU)	Delay (s)	RFC	LOS	Junction LOS
	Scenario 1 - Post Dev - Base Scenaio 1 - Post Dev - Base Year - Scenario 1									
Junction 1 - Arm 1	1.05	10.81	0.52	B	E	1.19	9.12	0.55	A	B
Junction 1 - Arm 2	1.39	9.84	0.59	A		2.27	13.97	0.70	B	
Junction 1 - Arm 3	20.64	70.79	1.00	F		0.25	4.13	0.20	A	
Junction 2 - Arm 1	0.94	5.55	0.49	A	C	0.22	3.53	0.18	A	A
Junction 2 - Arm 2	1.31	12.27	0.57	B		1.80	13.45	0.65	B	
Junction 2 - Arm 3	6.38	31.21	0.88	D		1.32	9.46	0.57	A	

As shown by the results reported above Site 4 is already a busy junction and it slightly exceeds its optimum operation capacity in the design year for Scenario 1 with an RFC of 1.0, when some queuing may start to appear. For Scenario 2, when the Priory Road entrance is opened, the junction performs marginally better. Should queuing and congestion start to build at Killincarrig Crossroads, traffic for the proposed development and the other surrounding development would likely divert onto other routes that have plenty of capacity, such as the Farrankelly Road, which leads to the town centre. This will ensure that any queuing and congestion does not become excessive at this junction.

10.7.2.7 Site 6 – Eden Gate Roundabout

Site 6 represents the Eden Gate Roundabout, the current only access to the Eden Gate development. The roundabout is linked to Priory Road, Farrankelly Road, the Eden Gate Centre and the Eden Gate residential estate as shown in Figure 10.14 below.

Figure 10.14 – Aerial Image of Eden Gate Roundabout

The junction analysis has been carried out using ARCADY software. The results of the analysis are summarised in the table below and further details are included in Volume III Appendix C – [Appendix C].

<table>
<tr><th></th><th>SCENARIO 2 - SUMMARY RESULTS - Site 6 – Eden Gate Roundabout</th></tr>
<tr><td>Base Year – Post Development - 2016</td><td>
<table>
<tr><th></th><th colspan="5">AM</th><th colspan="5">PM</th></tr>
<tr><th></th><th>Queue (PCU)</th><th>Delay (s)</th><th>RFC</th><th>LOS</th><th>Junction LOS</th><th>Queue (PCU)</th><th>Delay (s)</th><th>RFC</th><th>LOS</th><th>Junction LOS</th></tr>
<tr><th colspan="11">Scenario 2 - Post Dev - Base Year - Scenario 2</th></tr>
<tr><td>Arm 1</td><td>0.07</td><td>3.99</td><td>0.07</td><td>A</td><td rowspan="4">A</td><td>0.11</td><td>3.84</td><td>0.10</td><td>A</td><td rowspan="4">A</td></tr>
<tr><td>Arm 2</td><td>0.10</td><td>4.46</td><td>0.09</td><td>A</td><td>0.19</td><td>4.60</td><td>0.16</td><td>A</td></tr>
<tr><td>Arm 3</td><td>0.13</td><td>4.58</td><td>0.11</td><td>A</td><td>0.15</td><td>4.87</td><td>0.13</td><td>A</td></tr>
<tr><td>Arm 4</td><td>0.25</td><td>3.72</td><td>0.20</td><td>A</td><td>0.08</td><td>3.22</td><td>0.07</td><td>A</td></tr>
</table>
</td></tr>
<tr><td>Design Year – Post Development - 2034</td><td>
<table>
<tr><th></th><th colspan="5">AM</th><th colspan="5">PM</th></tr>
<tr><th></th><th>Queue (PCU)</th><th>Delay (s)</th><th>RFC</th><th>LOS</th><th>Junction LOS</th><th>Queue (PCU)</th><th>Delay (s)</th><th>RFC</th><th>LOS</th><th>Junction LOS</th></tr>
<tr><th colspan="11">Scenario 2 - Post Dev - Base Year - Scenario 2</th></tr>
<tr><td>Arm 1</td><td>0.08</td><td>4.09</td><td>0.08</td><td>A</td><td rowspan="4">A</td><td>0.12</td><td>3.92</td><td>0.11</td><td>A</td><td rowspan="4">A</td></tr>
<tr><td>Arm 2</td><td>0.12</td><td>4.58</td><td>0.11</td><td>A</td><td>0.22</td><td>4.74</td><td>0.18</td><td>A</td></tr>
<tr><td>Arm 3</td><td>0.15</td><td>4.68</td><td>0.13</td><td>A</td><td>0.18</td><td>5.04</td><td>0.15</td><td>A</td></tr>
<tr><td>Arm 4</td><td>0.29</td><td>3.86</td><td>0.22</td><td>A</td><td>0.10</td><td>3.31</td><td>0.09</td><td>A</td></tr>
</table>
</td></tr>
</table>

The evaluated Level of Service for the junction is A both in Base and Design Year which can be associated with a maximum RFC of 0.22 and virtually no queuing. Therefore, the junction can be considered insignificantly impacted by the proposed development.

Network Impact

The Institution of Highways and Transportation document 'Guidelines for Traffic Impact Assessments' states that the impact of a proposed development upon the local road network is considered material when the level of traffic it generates surpasses 10% and 5% on normal and congested networks respectively. When such levels of impact are generated a more detailed assessment should be undertaken to ascertain the specific impact upon the network's operational performance. These same thresholds are reproduced in the TII document entitled Traffic and Transport Assessment Guidelines (2014).

In accordance with the IHT and TII guidelines we have undertaken an assessment to establish the potential level of impact upon the key junctions of the local road network. The results show that the proposed development will not result in any significant traffic impacts on the surrounding road network.

10.7.3 'Do-nothing' scenario

In the absence of the proposed development, the operational performance of the existing junctions on the surrounding road network will be affected by the impact caused by the identified committed development schemes and the forecast background network traffic growth.

10.8 MONITORING

10.8.1 Construction Phase

During the construction stage the following monitoring exercises will be carried out. The specific compliance exercises to be undertaken in regard to the range of measures detailed in the final construction management plan will be agreed with the planning authority.

- Compliance with construction vehicle routing practices;
- Compliance with construction vehicle parking practices;
- Internal and external road conditions, and
- Timings of construction activities.

10.8.2 Operational Phase

No operation phased traffic and transportation monitoring measures are considered necessary.

10.9 REINSTATEMENT

No reinstatement measures are required for the roads, traffic and transportation.

10.10 INTERACTIONS

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.

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 Construction Management Plan included with the application.

Temporary negative impacts to 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 traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified

10.10.1 Accidents

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. The vast majority of the works are away from the public road in a controlled environment. Measures will be put in place to access and risk of road traffic accidents during the construction phase. Furthermore, 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 and no unusual substance or underground tunnelling works required or predicted.

10.11 DIFFICULTIES ENCOUNTERED

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 Plan for the control and management and monitoring of waste associated with the proposed residential development at Farrankelly, Delgany, Greystones, Co. Wicklow during both the Construction and Operational Phases of the development.

11.2 STUDY METHODOLOGY

The proposed Construction Waste Management Plan 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.*

The proposed Operational Waste Management Plan has been prepared to demonstrate how the Operational Phase will comply with the following relevant guidance and Wicklow County Councils Solid Waste Management Objectives.

- *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.*

Each section of the Waste Management Plan 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 aspects of waste to 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.

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;*
- *endeavor 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.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development relates to a residential development of 426 no. dwellings in a mix of houses, apartments and duplex units along with a creche of c. 599 sq. m, Active Open Space of c. 4.5 hectares, a greenway of c. 2.4 hectares along Three Trouts stream, a 2 storey split level residential amenity building of c. 325 sq. m as well as the provision of upgrades to the road frontage along the site boundary at Kilcoole Road and Priory Road. The proposal includes the provision of a link street between the Kilcoole Road and Priory Road and associated junctions and a pedestrian/cycle link to the boundary of Eden Gate.

Construction waste likely to arise during the excavation, demolition and construction phases. Waste generation will comprise domestic waste from the houses and waste from the creche, and the residential amenity building.

The Waste Management Plan 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 Waste Management Plan for the Operational Phase of 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 basement level. The range of works required for the Construction Phases are summarised in Table 11.1. The expected construction wastes that will be generated throughout the course of the development are described in Table 11.2.

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 this 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 hardstanding areas;
- Landscaping of entire site including open soft landscaped areas;
- Waste Management for the Operational Phase of the development

Table 11.1 – 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 Vegetation	e.g. Trees and vegetation
Site stripping	Removal and stockpiling of top and sub soils
Transport of material off site	Segregation of materials on site
Substructure	Rebar, Formwork and Pour
Superstructure	Rebar, Formwork and Pour
Roof	Rebar, Formwork and Pour and Waterproof
External Envelope	Place façade to superstructure
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

Table 11.2 – 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*

11.5.3 Excavation

It is estimated that 69,062 tonnes of excavation material will be generated from the proposed development. An estimated 70% of this excavation material, or 48,343 tonnes, may be suitable for reuse within the proposed development subject to testing to ensure it is suitable for its proposed end use. Therefore an estimated 20,719 tonnes excavation material may require removal from site.

It is estimated that approximately 71,340.086 m^3 of cut and 61,461.643 m^3 of fill will be required across the development leaving an approximate net volume of 9,878.443 m^3 of cut material.

Where feasible non-hazardous excavation material may be re-used within the proposed scheme as engineering fill or in landscaping. This will be investigated by the contractor and is subject to appropriate testing to ensure material is suitable for its proposed end use. Where excavation material may not be re-used within the proposed scheme the Contractor will endeavour to send material for authorised recovery or recycling so far as is reasonably practicable. All wastes generated from the proposed development will be delivered to authorised waste facilities granted a Waste Licence, Waste Facility Permit or Certificate of Registration.

11.5.4 Operational Phase

11.5.5 Waste Types & Quantities Operational Phase

The development consists of:

- 426 residential units comprised of houses, duplex units and apartments
- Creche 599 sq. m & residential amenity building c. 325 sq. m.

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 Farrankelly residential development as detailed below in Tables 11.2 – 11.4.

Table 11.3 – Calculated daily domestic waste generation

House Type	# Units	Occupants	Waste/Day	Waste/week
	No.	No.	Kg	Kg
Residential Units	426	2,281	1,826	12,779
Creche	1	100	94	659
Residential Amenity building	1	50	47	330
Total for development	n/a	2,734	2,576	13,768

Table 11.4 – Calculated domestic waste composition Residential Development

Waste Type	% Waste	Kg/day	m3/day	kg/week
Organic waste	30.6	559	0.93	3,910
Paper	12.5	228	1.04	1,597
Cardboard	3.6	66	0.31	460
Composites	1	18	0.07	128
Textiles	15.5	283	2.63	1,981
Plastics	13.6	248	6.18	1,738
Glass	3.4	62	0.08	434
Metals	3.1	57	0.64	396
Wood	1.2	22	0.25	153
Hazardous municipal waste	0.9	16	0.06	115

Unclassified combustables	1.4	26	0.10	179
Unclassified incombustables	1.2	22	0.08	153
Fines	11.7	214	0.80	1,495
Bulky Waste & WEEE	0.3	5	0.02	38
Totals	100	1826	13	12,779

Table 11.5 – Calculated domestic waste composition (creche, residential amenity building, and residential amenity building)

Waste Type	% Waste	Kg/day	m3/day	kg/week
Organic waste	30.6	52	0.09	363
Paper	12.5	21	0.10	148
Cardboard	3.6	6	0.03	43
Composites	1	2	0.01	12
Textiles	15.5	26	0.24	184
Plastics	13.6	23	0.57	161
Glass	3.4	6	0.01	40
Metals	3.1	5	0.06	37
Wood	1.2	2	0.02	14
Hazardous municipal waste	0.9	2	0.01	11
Unclassified combustables	1.4	2	0.01	17
Unclassified incombustables	1.2	2	0.01	14
Fines	11.7	20	0.07	139
Bulky Waste & WEEE	0.3	1	0.00	4
Totals	100	170	1	1,187

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 Wicklow 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 and remain in agricultural use, it will continue not to have any impact or demand on local waste services or on the receiving environment.

11.6 POTENTIAL CUMULATIVE IMPACTS

With regard to other existing, under construction and proposed residential developments in the general Farrankelly and Greystones area, including the future adjoining Phase 4 lands for c. 110 dwellings there will be a greater demand on existing local waste management services and on waste acceptance facilities. It is necessary that the subject development in addition to others are operated in a sustainable manner that reduces the generation and disposal of un-segregated domestic mixed waste and that provide the infrastructure and management services to assist residents to segregate domestic waste at source.

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.

11.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

The Construction and Operational Waste Management Plans 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 general principles and key aspects of the Construction and Operational Waste Management Plans are detailed as follows:

11.7.1 Construction Phase Waste Management Plan

The Construction Phase Waste Management Plan prepared by Byrne Environmental (included with the SHD application) specifically addresses the following points:

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
- 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

11.7.1.1 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.

11.7.1.2 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.

11.7.1.3 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

11.7.1.4 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.

11.7.1.5 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).*

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils shall be exported to an appropriately waste permitted/licenced facility.

The project manager shall inform Wicklow County Council of the volume of excess soils generated and the permitted / licenced waste facility they shall be exported to.

Excess soils shall be removed off-site throughout the duration of the construction phase. Prior to being removed off-site the excess soils shall be characterised as being inert, non-hazardous or hazardous in accordance with *Landfill Directive (2003/33/EC).* The classification of the soils shall be established by WAC testing which shall occur throughout the construction phase.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous 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 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.

11.7.1.6 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

11.7.1.7 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).*

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11.7.1.8 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

11.7.1.9 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 and Article 27 declarations during the project are maintained in a Waste File at the 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 Wicklow County Council as required / requested.

11.7.1.10 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.

11.7.2 Operational Phase Waste Management Plan

An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany this planning 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 in accordance with strategy, policy and objectives 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 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. 2018.*

The proposed residential development at Farrankelly 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 this Waste Management Plan 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 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.

A bottle and aluminium can bank shall be located within the development to encourage residents to recycle glass and aluminium cans and divert waste glass from domestic waste bins.

11.8 PREDICTED IMPACTS

11.8.1 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 Plase (which is included with the SHD application). As long as the construction is completed in accordance with the plan it is envisaged that the impact of the construction (excavation and construction waste) phase will be temporary and slight.

With regard to how it has been demonstrated how construction and domestic wastes will be managed through design, management and waste reduction and recycling initiatives at the proposed development, it is predicted that the impact of the development on the receiving environment, existing material assets and local waste management services will be minor.

With the implementation of the proposed mitigation measures:-

The predicted impact of operational waste will be long term, moderate and negative.

There is likely to be significant available capacity within existing Irish waste management infrastructure to manage operational phase wastes from the proposed development.

The development shall be designed to provide adequate domestic waste storage areas for common residential areas (apartments) and individual houses. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development.

11.8.2 *'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.

11.9 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 REINSTATEMENT

No reinstatement is required.

12.0 MATERIAL ASSETS – UTILITIES

12.1 INTRODUCTION

ROD Consulting Engineers and Waterman Moylan Consulting Engineers examined the material assets serving the subject lands relating to foul sewerage, surface water drainage, water supply, gas, electricity, and broadband.

12.2 ASSESSMENT METHODOLOGY

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". Information on built assets in the vicinity of the development lands was assembled from the following sources:

- A desktop review of Irish Water Utility Plans, ESB Networks Utility Plans, Gas Networks Ireland Service Plans, Eir E-Maps and Virgin Media Maps;
- Consultation with Irish Water and Wicklow County Council;
- Submission of a Pre-Connection Enquiry Application to Irish Water;
- Review of ESB Network Utility Plans & Site meetings with ESB Network
- Review of Gas Networks Ireland exiting network maps;
- Review of EIR Telecommunications exiting network maps;
- Review of Virgin Media Telecommunications exiting network maps;
- Site Inspection / Walkover;

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS);
- IS EN752, "Drain and Sewer Systems Outside Buildings";
- Irish Water's Pre-Connection Enquiry Application (water demand and foul water loading);

12.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

12.3.1 Surface Water Drainage

12.3.2 The site drains from south-west to north-east and rainfall currently percolates through the subsoil to underwater. The runoff from the adjacent Eden Gate is collected into the existing storm water system which crosses the proposed site parallel to the foul sewer

12.3.3 Foul Water Drainage

The site is not currently served by public foul drainage infrastructure. Nevertheless, the Eden Gate development is well served by a 300mm diameter foul sewer, which crosses the proposed site.

12.3.4 Water Supply

The site is greenfield and is not currently served by a public watermain. The Eden Gate development to the south of the site are well supplied with 100 mm watermain according to Irish Water Records.

There is also an existing watermain approximately 0.5km to the south on the Kilcoole Road which serves the Glenbrook and Glenheron Estates. Irish Water have confirmed in the pre-connection enquiry that the watermain on the Kilcoole Road has capacity to serve the proposed development.

12.3.5 ESB Supply

ESB Networks have been contacted and an existing ESB network map for the area surrounding the proposed development has been obtained, refer to Volume III (Appendix B).

There is extensive ESB Networks infrastructure in the vicinity of the site including existing overhead cables and a short length of existing below ground ducts. The overhead cables include extensive Medium Voltage Lines (10kV/20kV) which are concentrated at the southern end of the site but also traverse the entire site in the north-south direction. There is also a less extensive Low Voltage (400V) network of overhead lines near the northern boundary. All of these lines will need to be undergrounded and/or diverted to facilitate the development of the site.

There is also an extensive ESB infrastructure within the roads surrounding the site and in neighbouring developments including a 38kV below ground service running past the entrance to the site on Kilcoole Road and extensive 10kV/20kV below ground network serving the Eden Gate scheme to the South of the proposed development.

12.3.6 Gas

Gas Networks Ireland have been contacted and an existing gas network map for the area surrounding the proposed development has been obtained, refer to Volume III (Appendix B).

There is an existing 180mm medium-pressure gas main (4 bar) in the Kilcoole Road and an existing medium pressure (4 bar) network in the adjoining Eden Gate development. The existing networks maps indicate that there is a 125mm spur connection from the Eden Gate site serving the proposed development site.

12.3.7 Telecommunications - Eir

Eir have been contacted and an existing Eir network map for the area surrounding the proposed development has been obtained, refer to Volume III (Appendix B).

There are existing Eir services the Kilcoole Road and an adjoining Eden Gate development.

12.3.8 Telecommunications – Virgin Media

Virgin Media have been contacted and an existing Virgin Media network map for the area surrounding the proposed development has been obtained, refer to Volume III (Appendix B).

There is no Virgin Media network in the Kilcoole Road at the proposed entrance to the site. The existing houses on Priory Lane are shown as having an Virgin Media service which is likely provided by an above ground overhead cable service. Virgin Media services have recently been provided at the nearby Glenheron site which is also accessed from the Kilcoole Road.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of a residential development of 426 no. dwellings, a creche (c. 599 sq. m), residential amenity building (c. 325 sq. m, including gym), Active open space of c. 4.5 hectares, greenway of 2.6 hectares and open space.

Refer to Chapter 2.0 (Description of Development and alternatives) for a detailed site and development description.

12.4.1 Surface Water Drainage

It is proposed to divert the existing 600mm concrete sewer traversing the site from Eden gate in the south to the north of private lands by constructing a new surface drainage system that will collect runoff from roads and roofs together with any additional runoff from landscape areas which does not percolate to ground. Existing manholes will be use for the connection and discharge of the new diverted surface water network.

The surface water drainage system will be designed to ensure adequate capacity is achieved with minimum self-cleansing velocity in the pipes of 1.0 m/s when flowing half full.

Given the size of the development, the site has been divided in eight areas for surface water collection purposes. It is proposed to provide a network of 225mm diameter pipes for each of these areas and to connect them to separate attenuation tanks.

The tanks have been sized to provide storage for 1 in 100-year rainfall event including a 10% increase for a climate change for the entire development with the discharge rate limited from 2.85 l/s/ha to 3.28 l/s/ha depending on the zone that the attenuation tank is located in. Surface water drainage will discharge from Attenuation Tanks E and F to the Three Trout Stream to the north of the site, Attenuation Tank A will be discharged through a gravity surface water sewer just to the north of the site entrance at Kilcoole Road (R761) and Attenuation Tanks B,C,D will be discharged through the diverted surface water sewer that runs from Eden Gate to the south towards private lands to the north.

Proposed attenuation tanks have the following volumes:

Table 12.1 – Attenuation Tank Volumes

Attenuation Tank ID.	Location	Contributing Area (m2)	Impermeability Factor	Vol. required (m3)	Vol. provided (m3)
A	See drawing FK-ROD-Z0-XX-DR-C-0035	13,772	0.35	449.63	453
B	See drawing FK-ROD-Z0-XX-DR-C-0035	24,500	0.35	821.53	825
C	See drawing FK-ROD-Z0-XX-DR-C-0036	30,000	0.40	1224.13	1227
D	See drawing FK-ROD-Z0-XX-DR-C-0036	10,000	0.34	309.04	310
E	See drawing FK-ROD-Z0-XX-DR-C-0038	29,533	0.40	1201.23	1204
F	See drawing FK-ROD-Z0-XX-DR-C-0037	35,000	0.39	1387.25	1141

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 water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The Ground Investigation Report indicates variable permeability across the site, which makes the use of groundwater recharge difficult to determine. Therefore the measures detailed below have been designed to take account of potential percolation, but have not been incorporated into any storage calculations. This will result in additional storage being available in extreme events.

The proposed SuDS measures will include a combination of Source Control, Site Control and Regional Control measures as part of a Management Train whereby the surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment. The combination of the SuDS measures outlined below will maximise the potential for surface water infiltration to the subsoil, 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”.

The SuDS design for the proposed development is based on dividing the site into several smaller catchment areas in order to provide source control. In this way the surface water is attenuated and treated close to the site of its runoff. It is proposed to provide the following SuDS measures:

- Attenuation Tank
- Permeable Paving

The attenuation tanks have been sized to provide storage for runoff from the roofs, footpaths and any runoff from the green areas which does not percolate to the ground. The volumes of the attenuation tanks include a 10% increase in rainfall depth to allow for climate change.

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 will have a voids ratio of 30%.

12.4.2 Foul Drainage

It is proposed to divert the existing 300mm foul sewer traversing the site from the Eden Gate residential estate to north-east of the site to construct a new foul network that will serve the proposed development. Existing manholes will be use for the connection and discharge of the new diverted foul drainage network. New foul drainage system will be in place prior to the diversion of the foul sewer.

A pumping station will also be required to pump sewage from the northern part of the site that will accommodate 46 dwellings. The foul sewerage will then connect to the new gravity system where it will make its way to the public foul sewer and hence into the Irish Water system.

A pre-connection enquiry was submitted to Irish Water to determine the suitability of the proposed foul drainage capacity for the site. Irish Water has confirmed that the existing systems currently have capacity. In addition a Statement of Design Acceptance has been issued for the proposed development and is included with the planning application.

All foul drainage shall be constructed in accordance with Greater Dublin Regional Code of Practice for Drainage Works and Irish Water requirements.

12.4.3 Water Supply

It is proposed to provide water to the development through a new connection to the existing 150mm uPVC watermain on Kilcoole Road (R701), adjacent to the proposed development the new connection will require the extension of the existing water network by approximately 315m.

A pre-connection enquiry was submitted to Irish Water to determine the suitability of the proposed water supply to the site. Irish Water has confirmed that the existing systems currently have capacity. In addition a Statement of Design Acceptance has been issued for the proposed development and is included with the planning application.
The daily demand has been calculated as 190.8 m3/day as per the Engineering Report.

All watermains will be constructed in accordance with Irish Water requirements following consultation with Irish Water New Connections at construction stage.

12.4.4 ESB Power

Waterman Moylan, acting on behalf of Cairn Homes, have met with the ESB Networks engineers on site to review the existing infrastructure and have agreed a strategy for undergrounding and diverting the overhead lines. The number and approximate locations of substations for providing new power supply to the dwellings on site has also been agreed as indicated on the Architects site plan.

A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure at the southern end of the site. Up to 4 new *"unit sub-stations"* will be provided throughout the site to meet the electrical demands associated with the new houses, apartments, residential amenity building and creche.

The exact extent and location of the connections will be agreed with ESB Networks during the design stage of the project.

12.4.5 Gas

If gas is adopted as the fuel source of choice for the heating systems in the scheme, a new gas connections be made at the eastern boundary of the site at the Kilcoole Road entrance and possibly also at the Priory Road boundary.

The exact extent and location of these connections will be agreed with Gas Networks Ireland during the design stage of the project.

All works on the gas supply infrastructure will be carried out in accordance with Gas Networks Ireland relevant guidelines. All gas infrastructure will be below ground with the possible exception of a gas pressure reduction station if required by Gas Networks Ireland.

12.4.6 Telecommunications - Eir

A new connection will be made to the existing Eir network at the eastern boundary of the site at the Kilcoole Road entrance. The exact extent and location of these connections will be agreed with Eir during the design stage of the project.

All works on the Eir supply infrastructure will be carried out in accordance with Eir's relevant guidelines. All Eir infrastructure will be below ground with the possible exception of a Fibre Cabinet if required by Eir.

12.4.7 Telecommunications – Virgin Media

A new connection will be made to the existing Virgin Media network at the eastern boundary of the site at the Kilcoole Road entrance. The exact extent and location of these connections will be agreed with Virgin Media during the design stage of the project.

All works on the Virgin Media supply infrastructure will be carried out in accordance with Virgin Media's relevant guidelines. All Virgin Media infrastructure will be below ground with the possible exception of a Fibre Cabinet if required by Virgin Media.

12.5 POTENTIAL IMPACTS 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 would be required, the construction works contractor would apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

Power, Gas & 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.

Potential loss of connection to the Gas Networks Ireland infrastructure while carrying out works to provide service connections. This likely adverse impact may be characterised as a temporary, regionally short term, moderate impact. 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 *'Do-nothing'* scenario

There are no predicted impacts on these material assets should the proposed development not proceed.

12.5.3 Operational Impacts

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

Surface Water

During the operational phase of the works, the surface water drainage has been designed to maintain the flows from the site at the greenfield run-off rates. In addition, filtration has been provided for the run-off from the site so there will be no impact on the existing surface water networks.

Foul Water

The impact of the operational phase of the proposed development on the foul drainage network would be the increased flows to the existing Greystones treatment works. Irish Water have confirmed in the pre-connection response that there is adequate capacity at present in the system.

There will also be ongoing maintenance for the pumping station to the north of the site as well as potential overflowing in the event that the pumping station fails.

The impact of the operational phase of the proposed development on the foul drainage network would be to increase the demand on the existing network.

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 pre-connection response that there is adequate capacity at present in the system.

Power, Gas & 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 2.0MW which will be split over one substation located near the apartments and a further 3 free standing "unit sub-stations" located through-out the housing scheme.

The impact of the operational phase of the proposed development on the gas supply would be the requirement for a Gas diversified load of 5.5MW to accommodate the development of the lands.

The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.

12.6 MITIGATION MEASURES

12.6.1 Construction Mitigation

The construction works contractor should liaise with the relevant utilities provider prior to works commencing, with on-going consultation throughout the proposed development. Where new services would be required, the construction works contractor should 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 include the following:

A detailed *"Construction Management Plan"* will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the "Construction Management Plan".

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.

12.6.2 Operational Mitigation

Please refer to Chapter 6 of the EIAR – Water for mitigation measures associated with the surface water treatment. 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.

Chapter 6 includes the mitigation measures associated with the surface water system for the development.

It is envisaged that the development would take place and be occupied over a reasonable time period, and therefore the downstream foul sewerage system (foul sewer network and wastewater treatment facility) would be gradually loaded.

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 loading on the foul sewer network and the treatment works at Greystones. As part of the development, a number of different SuDS measures are proposed to minimise the impact on water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The Ground Investigation Report indicates variable permeability across the site, which makes the use of groundwater recharge difficult to determine. Therefore the measures detailed below have been designed to take account of potential percolation, but have not been incorporated into any storage calculations. This will result in additional storage being available in extreme events.

The proposed SuDS measures will include a combination of Source Control, Site Control and Regional Control measures as part of a Management Train whereby the surface water is managed locally in small sub-catchments

rather than being conveyed to and managed in large systems further down the catchment. The combination of the SuDS measures outlined below will maximise the potential for surface water infiltration to the subsoil, 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”.

On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

12.7 MONITORING

No utilities monitoring needed in relation to power, gas and telecommunication services

12.8 RESIDUAL IMPACTS

12.8.1 Construction Phase

Implementation of the measures outlined in Section 12.6 will ensure that the potential impacts of the proposed development on the sites material assets do not occur during the construction phase and that any residual impacts will be short term.

12.8.2 Operational Phase

The demand on power supply, gas 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 2MW and the increased in the required capacity of the gas network will be approximately 1.5MW. The infrastructure of both networks in the 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 respective network to meet the existing demands in the areas surrounding the site. The development of the lands will be constructed in phases, with the final phase being due for completion circa 2023.

12.9 CUMULATIVE IMPACTS

The future development of the adjoining lands has the potential to deliver c. 110 dwellings. However, there are no negative predicted cumulative impacts arising from the construction or operational phase. Related to the provision of power, gas and telecommunication services. Further phases and capacity will be subject to an Irish water connection agreement post planning (such as adjoining lands under separate ownership).

13.0 ARCHAEOLOGY, ARCHITECTURE AND CULTURAL HERITAGE

13.1 INTRODUCTION

13.1.1 General

Irish Archaeological Consultancy Ltd. [Faith Bailey MA, BA (Hons), MCIfA ,Associate Director Senior Archaeologist & Cultural Heritage Consultant] prepared this chapter on behalf of Carin Homes Properties Ltd., to assess the impact, if any, on the archaeological, architectural and cultural heritage resource of a proposed development at Farrankelly, Co. Wicklow (ITM 728454, 710312). The proposed development area is contained within the Farrankelly townland, to the south of Delgany village (Figure 13.1 in Appendix A). It is noted all plates and figures are contained in Appendix A, Volume III of the EIAR.

This study determines, as far as reasonably possible from existing records, the nature of the 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 (Figure 13.2 in Appendix A), the County Development Plan, the topographical files of the National Museum of Ireland and cartographic and documentary records. Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey and Google Earth has also been carried out. A field inspection has been carried out in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the proposed development area.

A geophysical survey and archaeological test trenching has also been carried out at the site to aid in the assessment of impacts and formulation of a suitable mitigation strategy.

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. This designation can also accompany an archaeological or architectural designation.

For the purposes of this report the terms ‘architectural heritage’ and ‘built heritage’ have the same intended meaning and are used interchangeably.

Impact Definitions

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 (draft 2017) Guidelines (pg 42).

13.1.3 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 Culture, Heritage and the Gaeltacht – 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
- Wicklow County Council: Planning Section;
- Trinity College Dublin, Map Library: Historical and Ordnance Survey Maps

13.2 STUDY 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 involved a geophysical survey and test trenching excavation respectively.

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 Wicklow;
- 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 2016-2022;
- Greystones-Delgany and Kilcoole Local Area Plan 2013-2019;
- National Inventory of Architectural Heritage;
- Place name analysis;
- Aerial photographs;
- Excavations Bulletin (1970-2017)

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result these are omitted from the Record of Monuments and Places. SMR sites are also listed on the recently launched website created by the Department of Culture, Heritage and the Gaeltacht (DoCHG) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Topographical files of the National Museum of Ireland is 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.

Petty's Down Survey Map, 1654-56, Barony of Newcastle
Jacob Nevill's An Actual Survey of the County of Wicklow 1760

Ordnance Survey maps of County Wicklow 1839 and 1906-07

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 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 Greystones-Delgany and Kilcoole Local Area Plan (2013-2019) were consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970-2017.

13.2.2 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological and architectural remains, and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological and architectural field walking inspection entailed:

- Walking 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 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 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 patterning of non-excavated parts of the site. Unlike other archaeological methods, geophysical survey is not invasive or destructive.

A geophysical survey of the proposed development area was carried out by JM Leigh Surveys for IAC Ltd in November 2015 under licence 15R0124. A number of potential archaeological anomalies were identified during the course of the survey. The report is included as Appendix 13.1 within this EIAR.

13.2.4 Archaeological test trenching

Archaeological test trenching is 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, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate’ (CIfA 2014).

Archaeological testing was carried out across the proposed development area following on from the above geophysical survey. This was undertaken by IAC Ltd under licence 17E0292. Test trenches targeted geophysical anomalies and a total of 2,850 linear metres of trenches were opened across the site. A total of three Archaeological Areas (AA 1–3) were identified during testing, which appear to represent the remains of ring ditches of potential Bronze Age date, as well as other dispersed features. The full testing report is included as Appendix 13.2 within this EIAR.

13.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENEARIO)

13.3.1 Results and Analysis - Archaeology

Historical Background General

A total of 13 sites are recorded in the Sites and Monuments Record (SMR) within a 500m radius of the proposed development area (Figure 13.2 in Appendix A). These sites, largely discovered during construction works at Charlesland to the east, comprise a significant Bronze Age ritual landscape including two ring-ditches (WI013-077and WI013-105), an urn burial (WI013-112) and a cremation pit (WI013-113). Three structures dating from broadly the same period have also been excavated in the vicinity of the proposed development area (WI013-076, WI013-114 and WI013-114). Pits, spreads and a kiln of medieval date have also been excavated within 500m of the proposed development area (WI013-111 and WI013-097). All but one of the sites are listed in the SMR only and as such have been excavated and are not subject to statutory protection. The only site listed within the Record of Monuments and Places (RMP) is a ring-ditch (WI013-104), located c. 450m to the south.

Table 13.1 – Recorded Archaeological Sites (RMP sites) within 500m of the proposed development

RMP No.	Townland:	Classification	Distance from proposed development:
WI013-076	Charlesland	Habitation site	c. 190m east
WI013-097	Charlesland	Excavation - miscellaneous	c. 290m east
WI013-112	Charlesland	Urn burial	c. 360m south-east
WI013-098	Charlesland	Kiln - corn-drying	c. 380m east
WI013-111	Charlesland	Excavation - miscellaneous	c. 400m east
WI013-104	Farrankelly	Excavation - miscellaneous	c. 460m south
WI013-105	Priestsnewtown	Ring-ditch	c. 450m south
WI013-110	Charlesland	Fulacht Fiadh	c. 470m east-southeast
WI013-113	Charlesland	Cremation pit	c. 490m south
WI013-114	Charlesland	Structure	c. 490m south
WI013-115	Charlesland	Structure	c. 490m south
WI013-077	Charlesland	Ring-ditch	c. 490m south
WI013-073	Farrankelly	Habitation site	c. 500m south

Mesolithic Period (c. 7000–4000BC)

The Mesolithic period is the earliest time for which there is clear evidence for prehistoric 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 to show the presence of Mesolithic communities at a site consists of scatters of worked flint material, a by-product from the production of flint implements. The current archaeological evidence suggests that the environs of the proposed development area were first inhabited towards the later part of the Mesolithic period. At this time people made crude flint tools known as Larnian (or Bann) Flakes. Small numbers of these flakes have been found at Dalkey Island, Dun Laoghaire, Rathfarnham and Loughlinstown to the north and at St. Bride's Head close to Wicklow Town and Brittas Bay to the south. These sites may indicate small-scale transient settlement along the riverbanks and seashores (Stout 1994). There is, however, no direct evidence for Mesolithic activity within the site or receiving environment.

Neolithic Period (c. 4000–2500BC)

During the Neolithic 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.

A number of pits containing early Neolithic pottery and saddle quern stones were found during excavation in Charlesland (WI013-076) c. 190m east of the proposed development area. Early Neolithic activity, in the form of two structures, was identified in Killincarrig townland during recent excavations c. 950m east of the proposed development area (Whitty, 2011; Licence Ref.: 10E025). Further Neolithic activity in the wider landscape includes early Neolithic habitation sites at Sea Road, Kilcoole, c. 2.5km to the south southeast (Bennett 2008:1318, Licence Ref.: 06E0670 ext.) and on the shores of the Poulaphuca Reservoir (Corlett 2009).

Bronze Age Period (c. 2500–800BC)

The Bronze Age (c. 2400-800BC) in Ireland was marked by the use of metal for the first time. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. Megaliths were replaced in favour of individual, subterranean cist or pit burials that were either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often, but not always, accompanied by a pottery vessel. Different forms of burial barrows were also being constructed during this period, as well as ceremonial monuments such as henges. Unenclosed cemeteries are also known from this period and are termed 'flat cemeteries'.

Activity during this period is well attested in the archaeological record within the immediate vicinity of the proposed development area. A significant Bronze Age ritual landscape including two ring-ditches (WI013-077and WI013-105), an urn burial (WI013-112) and a cremation pit (WI013-113) were excavated within 500m of the proposed development area, to the east and south. Three structures, dating from broadly the same period, have also been excavated in the vicinity of the proposed development area (WI013-076, WI013-114 and WI013-114). A substantial early Bronze Age burnt mound was also excavated c. 650m east of site, at Farrankelly. This was associated with four troughs and numerous pits and postholes (WI013-079). A set of possible music pipes carved from yew wood were found at the base of the one of the wicker-lined troughs (Molloy, 2004).

Occupation in the Charlesland area continued into the late Bronze Age with several excavated sites dating to this period. A late Bronze Age socketed looped axe and Beaker pottery were retrieved from site WI013-075 c. 670m east south east of the proposed development site.

Iron Age Period (c. 800BC – AD400)

Compared to the rest of Irish prehistory, there is very little evidence in Ireland, as a whole, representing the Iron Age. As in Europe, there are two phases of the Iron Age in Ireland; the Hallstatt and the La Tène. The Hallstatt period generally dates from 700BC onwards and spread rapidly from Austria, across Europe, and then into Ireland. The later Iron Age or La Tène also originated in Europe during the middle of the 5th century BC. For several centuries the La Tène Celts were the dominant people in Europe, until they were finally overcome by the Roman Empire. While

many ring-ditches may have continued in use into the Iron Age, there are no confirmed Iron Age sites within the vicinity of the proposed development area.

Early Medieval Period (AD400–1100)

The early medieval period is depicted in the surviving sources as entirely rural, characterised by the basic territorial unit known as *túath*. Byrne (1973) estimates that there were probably at least 150 kings in Ireland at any given time during this period, each ruling over his own *túath*. During this sometimes violent period, roughly circular defensive enclosures known as ringforts were constructed to protect farmsteads. Although most of the ringforts that have been excavated are shown to date to this period, some have earlier origins and may have been originally constructed during the Iron Age, or even earlier. During this period the area surrounding Greystones was located within the territories of the *Uí Dúnchada*, the ruling branch of which was the *Mac Gilla Mo Cholmóc* (Simpson 1994). At the time of the Anglo-Norman invasion the ruler *Domhnall* sided with the Anglo-Normans and as such managed to retain much of his land (Molloy 2009, 149).

The ringfort or rath is considered to be the most common indicator of settlement during the early medieval period. The most recent study of the ringfort (Stout 1997) has suggested that there is a total of 45,119 potential ringforts or enclosure sites throughout Ireland. They are typically enclosed by an earthen bank and exterior ditch and range from 25m to 50m in diameter. The smaller sized and single banked type (univallate) were more likely to be home to the lower ranks of society while larger examples with more than one bank (bivallate/trivallate) housed the more powerful kings and lords. When the radiocarbon and dendro-chronological dates from ringfort excavations are compared (Stout 1997, 22-31), not only is the ringfort clearly an early medieval phenomenon, but a strong case emerges for dating the phase of ringfort construction to a period between the 7th and 9th centuries AD. The most common structures found within ringforts, usually through excavation, are the remains of buildings, generally houses, either circular or rectangular.

Although there are no definite recorded ringforts within the landscape surrounding the proposed development, there are two enclosures located 1.35 km to the east-northeast (WI013-010) and c. 1.4 km northeast (WI013-009). Enclosure sites belong to a classification of monument whose precise nature is unclear. Often they may in fact represent ringforts, which have either been damaged to a point where they cannot be positively recognised, or which are smaller or more irregular in plan than the accepted range for a ringfort. An early medieval date is generally likely, though not a certainty. A previously unrecorded enclosure has also been identified through aerial photograph analysis within the south-west quarter of the proposed development area.

This period was also characterised by the foundation of a large number of ecclesiastical sites throughout Ireland, in the centuries following the introduction of Christianity in the 5th century AD. These early churches tended to be constructed of wood or post-and-wattle. Between the late 8th and 10th centuries, mortared stone churches gradually replaced the earlier structures. Many of the sites, some of which were monastic foundations, were probably originally defined by an enclosing wall or bank similar to that found at the coeval secular sites. This enclosing feature was probably built more to define the sacred character of the area of the church than as a defence against aggression. An inner and outer enclosure can be seen at some of the more important sites; the inner enclosure surrounding the sacred area of church and burial ground and the outer enclosure providing a boundary around living quarters and craft areas. Where remains of an enclosure survive, it is often the only evidence that the site was an early Christian foundation.

The number of important early church foundations in Wicklow reflects the impact of Christianity on the area. In addition to the great monastic complex at Glendalough, established by St Kevin in the 6th century, there are several small ecclesiastical sites. Associated with these sites are stone crosses, graveslabs and especially ‘bullauns’, which are blocks of uncut natural stone into which circular or oval basins have been carved. Their function is uncertain - they may have been used as holy water or baptismal fonts or for the grinding of corn - but they are concentrated at or near monastic sites of the early historic period, of which Wicklow has a considerable number. The site of a church with a potential early medieval foundation date is located within the townland of Ballynerrin (WI013-011) c. 1.4km east of the proposed development area.

The first known Viking raids on Ireland were carried out along the east and southeast coast in the late 8th century. A Viking presence is known at Arklow (c. 40km south of the area of proposed development) and Wicklow Town (c. 16km south of the site of proposed development) where trading stations, which developed into more extensive settlements, were established. Arklow town is situated at the mouth of the Avoca River and has the suffix ‘-lo’ which is of Scandinavian origin (meaning ‘meadow’) and a 9th century Viking burial in the vicinity indicate an early

settlement (Bradley and King 1989, 1). Wicklow town's name could be derived from either '*Vikingalo*' meaning *'meadow of the Vikings'* or '*Vik-lo*' meaning 'meadow of the bay'.

Medieval Period (1100AD-1600AD)

The beginning of the medieval period is characterised by political unrest that originated from the death of Brian Borumha in 1014. *Diarmait MacMurchadha*, deposed King of Leinster, sought the support of mercenaries from England, Wales and Flanders to assist him in his challenge for kingship. Norman involvement in Ireland began in 1169, when Richard de Clare and his followers landed in Wexford to support *MacMurchadha*. Two years later de Clare (Strongbow) inherited the Kingdom of Leinster and by the end of the 12th century the Normans had succeeded in conquering much of the country (Stout & Stout 1997, 53). The local tribe that controlled much of the land surrounding Greystones sided with the Anglo-Normans and as such managed to retain much of their land. In 1207, the son of the leader *Díarmait Mac Gilla Mo Cholmóc* was granted these lands from King John in fee for the service of one knight. As such, the invasion passed this area by relatively peacefully as few people moved and Irish tenants stayed on their land. It was not until the end of the 13th century that the political situation became uneasy in the area due to pressure from the native Irish, the O'Byrnes and O'Tooles in the Leinster Mountains (*ibid.* 150).

There are a number of recorded medieval sites within the wider area surrounding the proposed development area. In the 19th century, the Ordnance Survey recorded a possible Anglo-Norman motte or earthwork castle close to the church of Ballynerrin (WI013-011). It is possible that one of the enclosure sites listed to the east-northeast of the development area (WI013-009 and 010) may represent the site of a former castle (Molly 2009, 150). A number of medieval sites have also recently been excavated (2002-2004) in the wider landscape, within 500m to the southeast of the development area. These include field systems, kilns, the truncated remains of an animal enclosure and a moated medieval farmstead (WI013-111).

Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970–2017) has revealed that a substantial number of archaeological excavations have been undertaken in the townlands surrounding Farrankelly, although no previous investigations have been carried out within the proposed development area. The majority of excavations were carried out in advance of the construction of the Greystones southern access route (GSAR) to the south and the development of residential housing in Charlesland, to the east. Archaeological investigations within 500m of the proposed development area are summarised below.

Five test-trenches were excavated in 2001, c. 160m to the east of the proposed development area in advance of the construction of extensive housing units. Trenches 1, 3 and 4 revealed curving linear features, one of which contained fragments of prehistoric pottery. Trench 2 revealed burnt mound material. Trench 5 revealed a wide curving ditch over 17m in diameter. It was not possible to correlate exactly the features located during testing with those visible on aerial photographs, but testing revealed two definite circular enclosures (Bennett 2001:1350, Licence Ref.: 01E1132). Further testing in this area in 2001 and 2002 encountered nothing of archaeological significance (Bennett 2001:1351, Licence Ref.: 01E1133 and Bennett 2002:1963, Licence Ref.: 01E1133).

Two structures with a series of associated pits and postholes were excavated c. 160m to the east of the proposed development area in 2003. These proved to be Bronze Age in date (Bennett 2003:2076, Licence Ref.: 03E0146).

A series of pits, post holes, stake holes, hearths, troughs and burnt spreads were uncovered during topsoil stripping in 2004 c. 300m east of the proposed development area as part of the construction work associated with Charlesland Residential Development (Bennett 2003:2081, Licence Ref.: 03E1188).

The remains of an isolated Bronze Age urn was excavated c. 350m south-east of the proposed development area as part of the construction work associated with Charlesland Residential Development (Licence Ref: 04E0387). Several features of medieval date were also excavated although nothing of a structural nature was found.

A ring-ditch, a large cremation pit, two structures and a cluster of pits and postholes were excavated c. 460m to the south-southeast of the proposed development area in 2003 (Bennett 2003:2077, Licence number: 03E0147).

A total of 12 prehistoric pits dispersed over a large area were excavated c. 460m south-southeast of the proposed development area as part of the construction work associated with the GSAR. Six of the pits contained burnt stones suggesting that hearths where stones were heated must have been located in this general vicinity. The excavated

pits were not utilised for *in situ* burning but appear to represent negative features where material derived from adjacent hearths was dumped (Bennett 2004:1864, Licence Ref.: 04E0466).

A curving arc of a ditch, two slot-trenches and a number of pits and postholes were excavated c. 480m south-southeast of the proposed development area, prior to the construction of the GSAR. One of the slot-trenches contained a barbed and tanged arrow head and prehistoric pottery and one of the pits contained a fragment of prehistoric pottery (Bennett 2003:2082, Licence Ref.: 03E1550).

Monitoring of road construction work for the GSAR took place between February and March 2004. The GSAR is located c. 490m south of the proposed development area. The roadway traversed the townlands of Farrankelly, Priestsnewtown and Kilpedder East, crossing 12 fields. Four sites were identified and investigated, all of which were located in the townland of Priestsnewtown. The sites included two burnt spreads and several clusters of pits and postholes predominantly prehistoric in date (Bennett 2004:1863, Licence Ref.: 04E0128).

The southern half of a circular ditch (diam. c. 12m) was excavated c. 500m south of the proposed development area. No internal features or finds were uncovered. The remaining half is preserved outside of the road-take. A stone lined hearth was excavated c. 22m to the east (Bennett 2004:1884, Licence Ref.: 04E0467).

Cartographic Analysis

Petty's Down Survey Map, 1654-56, Barony of Newcastle

The lands to be developed in Farrankelly are located to the immediate south of the northern barony boundary for Newcastle. The lands are located within an area annotated as 'Newtonne, Part of Deleny'. There are no structures or features of interest illustrated within proximity to the proposed development area.

Jacob Nevill's1760 map of Wicklow (Figure 13.8 in Appendix A)

The scale of this map does not show any particular detail of the proposed development area. The townlands of Farrankelly, Stilebawn and Charsland (sic), are annotated and the Three Trouts River and the road to Delgany are visible.

First edition Ordnance Survey map, 1839, scale 1:10560 (Figure 13.9 in Appendix A)

The proposed development area is depicted within a rural landscape with field boundaries corresponding, for the most part, with the modern layout of the field system. The area is dominated by Farrankelly House, which is depicted as a long narrow structure with outbuildings to the north and to the south. A large, irregular shaped pond is situated immediately to the east of the outbuildings. This is most likely an artificial pond that may have been constructed to store water running downhill from the south via a small stream that is visible in the modern landscape but not marked on the mapping. The feature may therefore represent a mill pond for a mill that had gone out of use by the mid-19th century. There are clear similarities between this pond and a mill pond with associated millrace in Killincarrig c.315m to the northeast. A tree-lined field boundary runs downslope from this pond in the direction of the Three Trouts Bridge and River. This feature may represent the remains of a millrace.

Despite the fact that the lands surrounding the house are not shaded as demesne, the landscape possesses many features consistent with a demesne landscape, namely, a principal residence; a formal, tree-lined entranceway and what appears to be a walled orchard and several belts of mature planting.

A long track leads south from the principal residence and traverses an unusual long narrow field and terminates in a field to the south. What appears to be a smaller short section of track way can be seen branching off this main track way at approximately half way along. This smaller track leads to a circular feature which appears to be a small pond. In a field in the south-west corner of the proposed development area, a lime kiln is shown.

To the immediate west of the proposed development area, Glenbrook House is marked with a small triangular demesne landscape. Glenair House is marked to the immediate north of the Glenbrook demesne.

Ordnance Survey map, 1907–9, scale 1:2500 (Figure 13.10 in Appendix A)

The landscape depicted in this mapping is largely unchanged with the only significant difference being the removal of a field boundary in the central south portion of the proposed development area to create the large field which retains this form in the modern landscape. Several features visible on the first edition mapping are no longer depicted.

These include the lime kiln; the large pond to the east of the principal residence and the small pond upslope of the farmyard. The layout of the principal residence and the outbuildings has altered slightly. A gate lodge is now visible at the entranceway in the eastern side of the proposed development area and a well is visible to the south of this building.

County Development Plan

The Wicklow County Development Plan (2016-2022) and the Greystones-Delgany and Kilcoole Local Area Plan (2013–2019) were reviewed as part of this assessment.

A total of 13 archaeological sites are recorded in the Sites and Monuments Record for the county within c. 500m of the proposed development lands in Farrankelly (see Table 13.1, Appendix 13.3). With the exception of one site, all sites have been subject to full archaeological excavation in 2003 and 2004 as part of the Charlesland Residential Development Scheme and the Greystones Southern Access Route. The remaining site, ring-ditch (WI013-105), was partially excavated as part of the latter scheme, with the northern half of the site preserved *in situ*. The County Development Plan contains the following objectives with regard to archaeological heritage:

BH1: No development in the vicinity of a feature included in the Record of Monuments & Places (RMP) will be permitted which seriously detracts from the setting of the feature or which is seriously injurious to its cultural or educational value.

BH2: Any development that may, due to its size, location or nature, have implications for archaeological heritage shall be subject to an archaeological assessment. When dealing with proposals for development that would impact upon archaeological sites and/or features, there will be presumption in favour of the 'preservation in situ' of archaeological remains and settings, in accordance with Government policy. Where permission for such proposals is granted, the Planning Authority will require the developer to have the site works supervised by a competent archaeologist.

BH3: To protect previously unknown archaeological sites and features, including underwater sites, where they are discovered during development works.

BH4: To facilitate public access to National Monuments in State or Local Authority care.

BH5: To protect the Hillforts in west Wicklow and to engage with the relevant central Government department to seek to undertake a detailed study of their importance.

BH6: To facilitate the designation of the Glendalough Monastic Settlement as a UNESCO World Heritage Site.

Local Area Plan

The Greystones-Delgany and Kilcoole Local Area Plan (2013–2019) contains one objective relating directly to archaeological features:

HER1: Protect and enhance the character, setting and environmental quality of natural, architectural and archaeological heritage, and in particular those features of the natural landscape and built structures that contribute to its special interest. The natural, architectural and archaeological heritage of the area shall be protected in accordance with the objectives set out in the Wicklow County Development Plan.

Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995, 2000 and 2005) and Google Earth (2008, 2013, 2015 and 2017) has revealed that the receiving landscape has been cultivated for cereal production from at least 1995, with some areas of pasture fringing the northern boundary of the site. A series of semi-circular cropmarks are visible in the southwest portion of the proposed development area. Theses appear in a cluster on the 2013 Google Earth images (Plate 13.1, Appendix A [13.10]). A clear semi-circular shape can be seen (c. 12m diameter) while a larger arcing semi-circular cropmark (c. 55m diameter) partially encloses the smaller one (Figure 13.7 – Appendix A). The crop marks appear to represent the remains of Bronze Age activity, which is common within the surrounding environs.

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. During the course of the field investigation the proposed development area and its surrounding environs were inspected for known or previously unknown archaeological sites. The initial inspection was carried out during June 2015 in warm, overcast conditions (Figure 13.7 in Appendix A). All plates are included in Appendix A [13.10].

The proposed development site covers an area of sloping greenfield, the majority of which is currently in use for cereal cultivation. The ground slopes from south to north becoming increasingly steep before giving way to the near vertical faces of eroded hillside, which form the sides of the Three Trout River valley along the northern boundary of the proposed development area. The field scape within the proposed development area has changed little from that depicted in 1839 on the first edition Ordnance Survey mapping. The field boundaries are populated with numerous, mature Scots Pine of significant age.

Field 1 in the centre north of the site (Plate 13.2 in Appendix A [13.10]) slopes steeply from south to north with a gravelled track leading from the yard uphill to Fields 2 and 3. The grass has been allowed to grow and was being cut, presumably for silage at the time of inspection.

Field 2 is a large field in the centre south of the site currently in use for cereal cultivation (Plate 13.3 in Appendix A [13.10]). A summer cereal crop approximately 40cm high obscured the ground surface. This field is on high ground upslope from Farrankelly House. The ground surface is undulating with a general south to north slope. The location of the pond feature visible on the first edition Ordnance Survey map was visited (ITM 728570, 710229) but there was no surface expression visible (Plate 13.4 in Appendix A [13.10]).

Field 3 occupies the south-west portion of the proposed development area. It is located on a relatively flat plateau of land with a slope rising to a hilltop to the south and descending southwards towards the Three Trout River valley. As with Field 2, the field is currently in use for cereal cultivation. Several cropmarks are visible on the 2013 Google Earth images in the southwest of the field. The location of the cropmarks visible from aerial photography were visited (ITM 728233, 710182) but no surface expression was visible (Plate 13.5 in Appendix A [13.10]). The site however presents a panoramic view to the north and east. Similarly, the location of the lime kiln visible on the first edition mapping was visited (ITM 728280, 710196). No surface expression was visible. The topography of the field means that it would be an ideal spot for settlement.

Field 4 is located in the north-west corner of the proposed development area. An internal division within the field, marked by a wire fence, cordoned off the flat, higher ground. To the north and west of this fence, the ground falls away steeply towards the Three Trout River and a small tributary to the west (Plate 13.6 in Appendix A [13.10]). Along the eastern border of this field, the suggestion of a bank was perceptible although this was covered by heavy undergrowth. Beyond this bank, a narrow watercourse was observed. This watercourse marks the boundary between the townlands of Farrankelly and Stilebawn. Along the southern border of the field, the ground falls away steeply towards a mature hedgerow. Beyond this hedgerow, the slope becomes steeper, even sheer in places where the earth of the hillside has been cut away by the Three Trout River (Plate 13.7 in Appendix A [13.10]), which runs along the base of the small valley immediately north. Along the break of slope of the steepest part of the earthen cutaway, as a large amount of medium sized stones have been deposited (Plate 13.8 in Appendix A [13.10]). This may be explained as field clearance but the stones appeared to be well sorted and generally smaller than those usually associated with field clearance. It is possible that these stones were deposited along the top of the eroding bank in an attempt to slow the erosion process.

Field 5 is located in the south-east of the proposed development area. This field occupies an area of high ground, which slopes from south to north and commands views of the surrounding landscape towards the north and east (Plate 13.9 in Appendix A [13.10]). This field also overlooks the location of Farrankelly House.

Field 6 is located immediately to the north of Field 5 and comprises an area of very steeply sloping ground which runs down to the access road (Plate 13.10 in Appendix A [13.10]).

Field 7 is located to the east of Farrankelly House and comprises a low-lying strip of land running parallel to and forming the southern floodplain for the Three Trouts River (Plate 13.11 in Appendix A [13.10]).

Field 8 is a small, unusual enclosed area immediately to the south of Farrankelly House. This field is visible on the historic mapping and may represent a relict field that was once in use for the purpose of livestock management – possibly a sheep run (Plate 13.12 in Appendix A [13.10]).

Geophysical Survey

Gradiometer scanning identified an area of increased background response in the southwest of the proposed development area, correlating with the location of several curving crop marks identified in the aerial photography (Figures 13.4-13.5 in Appendix A). Detailed gradiometer survey in this area identified two clear circular ditch-type responses, measuring c.11.25m and 12.25m in diameter and several other responses of potential interest. The circular ditches appeared to be contained within a larger ill-defined circular feature (possible enclosure). Increased magnetic response to the south-east of this may represent a spread of burnt material indicative of activity, although natural broad striations in the data are also evident here. To the north-east of the possible circular enclosure there are a cluster of magnetically strong responses. Although no clear archaeological pattern is evident they correlate with the location of a former lime kiln, marked on historic mapping. It is possible that the remains of this feature are represented here. Scanning and detailed survey throughout the remainder of the proposed development site identified large areas of modern magnetic disturbance and broad natural responses. No further clear responses indicative of archaeological activity were recorded. The full report is included as Appendix A [13.1].

Archaeological Test Trenching

A total of 64 trenches were mechanically investigated across the proposed development site (Figure 13.6 in Appendix A). Testing followed on from a geophysical survey of the site, which was carried out as part of an earlier phase of works by Joanna Leigh in 2015 (Licence Ref.: 15R0124).

Prior to testing crop marks had been identified within the southwest corner of the proposed development. Detailed gradiometer survey in this area identified two clear circular ditch-type responses, measuring c.11.25m and 12.25m in diameter and several other responses of potential interest. The circular ditches appeared to be contained within a larger ill-defined circular feature (possible enclosure).

Three areas of archaeology were identified in the testing assessment (Archaeological Areas 1–3). The remains are likely to be Bronze Age in date and are similar to other sites that have been recorded within the surrounding landscape.

The full testing report is included as Appendix 13.2, but the results are summarised below:

Archaeological Area 1

The core of Archaeological Area 1 comprised the two circular anomalies, an outer enclosure and associated features as identified in the geophysical survey and aerial photography in the southwestern portion of the site.

A ring ditch, c. 15m in diameter, was identified and was defined by a ditch measuring 0.95m–1.2m wide. It corresponded to the western circular response (1) as identified in the geophysical survey. An east–west extension to Trench 12 was excavated to investigate the ring ditch further as the northern return of the feature was not identified within the trench. At this location an excavated section revealed concave sides and base with a depth of 0.3m. The fill of this ditch comprises sands/clays with charcoal and burnt bone.

A faint circular negative response (2), possibly representing a banked feature or alternatively variations in the natural subsoil, was identified in the geophysical survey to the north of this ring ditch. This area was not tested as it lay within the exclusion zone of overhead power lines.

A second ring ditch measuring c. 12.5m in diameter was defined by a ditch measuring 1.4m–1.6m in width. It corresponds to the eastern circular geophysical response (1). Its fill were similar to that of the first ring ditch, comprising of sandy clays with concentrations of charcoal and burnt bone. Three small pits were identified in the interior of this ring-ditch. Each contained charcoal-rich soils and measured 0.24m–0.31m in diameter. These may represent the remains of a truncated structure within the ring-ditch or alternatively they could represent truncated cremation pits.

Both ring-ditches were surrounded by an enclosure as identified in Trenches 18, X2, X3 and X4 as a large ditch. This partially respects the large enclosing geophysical anomaly (3) which was highlighted by geophysical survey as a potential ditched and banked circular feature. This also corresponds to crop marks identified in aerial photography.

A section through this ditch in Trench 18 revealed it to be 3.6m wide and 1.2m deep. Its fills comprise of pale to mid-brown clays with charcoal inclusions. The eastern component of this enclosure is in line with the geophysical results however the southern and western components are unclear. It is projected that the overall diameter of the enclosure is 50m while it was recorded for c. 26m during testing.

To the southwest of the enclosing ditch a wide curving ditch was identified in Trenches 14, 15, 16 and X1 and turned clockwise west-northwest direction for c. 18m. It is 2.4m wide and filled with pale to mid brown clays which contained some concentrations of charcoal. A section through this ditch in Trench C15 revealed that the ditch had concave sides and a flattish base with a slight stepping noted along the top of the northern side.

A narrow linear feature and two large pit features were recorded immediately to the north of the ditch within Trench 15. They measured c. 1m in diameter and may represent internal features of the large enclosure.

To the northwest of the curving ditch, a 2m wide ditch was recorded for c. 20m within Trench 12. While it was not recorded on geophysical survey it appeared to truncate the first ring ditch and may also be the continuation of the curving ditch. Both of which may indicate a multi-phase use of the site.

To the southeast of the enclosure groups of isolated pits and linear features were identified in Trenches 21–26. These potentially represent peripheral, but associated, archaeological activity associated with the ring-ditches/enclosure. Charcoal-rich pits and the linear ditch were also identified to the north in Trenches 5, 6, 7 and 8. To the southwest of the enclosure two pits and a linear feature were also identified.

Archaeological Area 2

Archaeological Area 2 comprised a spread of charcoal-rich material identified in Trench 44 and a distinct group of archaeological pits in Trenches 33 and 46. The spread measures c. 10m length and 8m in width while an exploratory slot showed its depth as 0.28m. In addition to these a possible kiln measuring c. 1.3m in diameter was identified in the northern end of Trench 45. Finally, a large pit measuring 3m in length by 2.4m in width by 0.3m in depth was recorded in Trench 46.

Archaeological Area 3

Archaeological Area 3 comprised two charcoal-rich isolated pits and a shallow ditch. The pits identified ranged in size from c. 0.65m-1m in diameter. A ditch was recorded in Trench 50 and likely represents the remains of a post-medieval field boundary.

Conclusions

The proposed development area is located within the undulating coastal plain of northeast County Wicklow in an area defined by low hills bordering the Three Trout River. The proposed development area is predominantly a greenfield site, the majority of which is currently in use for cereal production. Whilst the area has been significantly altered due to generations of farming and landscape management, the potential for discovery of *in situ* archaeological remains still exists.

A total of 12 SMR sites and one RMP site are located within 500m of the proposed development area. All of these sites were identified during archaeological investigations in advance of the construction of the GSAR and adjacent residential developments and were previously unknown sites with no surface expression. The overall picture gleaned from these investigations is that the area immediately south and east of the proposed development area was part of an extensive Bronze Age landscape which had both ritual and secular elements in close proximity. Activity in this area continued in the early medieval and later medieval periods.

Aerial photographic analysis identified one site of archaeological significance within the proposed development area. This area is located in the southwest corner of Field 3, which itself forms the south-western portion of the proposed development area. A series of semi-circular cropmarks are visible in the southwest of the proposed development area. These appear in a cluster on the 2013 Google Earth images. The possible enclosures were not visible within the historic mapping coverage of the proposed development area. However, a lime kiln is shown within Field 3 on the first edition OS map.

The field inspection confirmed that much of the proposed development area would have provided an attractive settlement location for past communities. The south facing, raised ground located to the immediate south of the

Three Trouts River possesses high archaeological potential. However, no previously unrecorded upstanding features of archaeological interest were identified.

The geophysical survey and test trench investigation have both shown that sub-surface archaeological remains survive at the site. Testing has identified three areas of archaeology across the proposed development area, the most extensive of which is Archaeological Area 1 in Field 3. This area is defined by two ring-ditches and outer enclosure with associated pits and other archaeological features as previously identified in aerial photography and geophysical survey. It is possible that the ring-ditches are prehistoric (possibly Bronze Age) in date and as the outer enclosure respects these it is suggested that this is contemporary.

Archaeological Areas 2 and 3 represent dispersed archaeological activity across the development area some of which may be contemporary with the ring-ditches and enclosure while some features—notably the kiln in Trench 45—are likely to date to the early medieval or medieval period.

The archaeology discovered in this testing assessment is similar in nature to, and possibly an extension of, the recently discovered archaeological sites in the immediate area at Charlesland. At Charlesland a significant Bronze Age ritual landscape including two ring-ditches, an urn burial, a cremation pit, structures, and burnt mounds have been excavated in advance of residential and road development.

13.3.2 Results and Analysis - Architecture

Built Heritage Background

With the ending of the Williamite Wars, County Wicklow, like the rest of Ireland, entered an era of comparative political calm. Consequently, the county's landowners, now secure in their positions, commenced the building of new mansions. They were now in a position to experiment with the latest styles of architecture without the need to address defensive concerns. At the outset many landowners were constrained by a lack of resources and therefore the first-generation mansions were of relatively modest scale and relatively plain in appearance. However, as the sense of security of the Irish aristocracy grew over the following decades, their greater access to wealth helped foster a shift towards more ostentatious buildings.

Palladianism was to dominate architecture in both Ireland and Britain in the half century after 1714. County Wicklow possesses two of the finest examples of large Palladian mansions to be seen anywhere in the country. Powerscourt House (1731-40) and Russborough House (1741-48) were both the work of the German-born architect, Richard Castle (1690-1751). Although few landowners could aspire to the exuberant grandeur of a Powerscourt or a Russborough, many of the succeeding generations of landowners were affluent enough to make important architectural statements. The trend is noticeable in the landscape surrounding the proposed development area. The first edition OS map shows a large house, named as Farrankelly House, located adjacent to the proposed development area. The house is surrounded by outbuildings, areas of formal garden and a large pond to the east.

The lands surrounding the house are not marked as a demesne landscape on the first edition OS map, although they possess attributes often associated with a designed parkland or demesne. It is likely that Farrankelly House was constructed as the home of a reasonably well-heeled landholder and is substantially larger that the adjacent Glenbrook House, which does possess a small shaded demesne landscape. Graham and Proudfoot (1993) define a demesne as ‘that part of his [a landlord’s] land reserved for his exclusive use and which might include agricultural as well as recreational land’. The demesne has also been defined as the area of land reserved by the landlord for his own uses and not leased out to tenants (Aalen *et al* 1997). In this context, the land surrounding Farrankelly House may not have been deemed ‘demesne land’ if it was being leased out. A demesne map of 1859, based on the first edition OS map shows that the townlands of Farrankelly, Killincarrig, Priestsnewtown and Drummin belonged to the estate of Admiral Sir James Hawkins-Whitehead. A Francis McDonnell is listed as the occupier of Farrankelly House and the surrounding lands. This arrangement possibly explains why the lands of Farrankelly were not identified as a formal demesne.

Regardless of this fact, the landscape possesses many features consistent with a demesne landscape, namely, a principal residence, a formal, tree-lined entranceway and what appears to be a walled orchard and several belts of mature planting. Farrankelly House may have been a demesne landscape in the 18th/ early 19th century.

The built heritage of the surrounding area was identified from a number of sources including the County Development Plan, Local Area Plan, the National Inventory of Architectural Heritage Survey and field inspection. Within this chapter

these sites are referenced with their RPS/ NIAH numbers if present or by a Built Heritage designation (i.e. BH 1) if they were identified during field inspection.

The built heritage within the wider area is typified by formal architecture, such as the grand estate houses of the gentry, churches and public buildings, which were often designed by architects or engineers. In addition to Farrankelly House itself, three estate houses are located within 500m of the proposed development area. These are Glenbrook House (RPS 08-78), Glenair House (RPS 08-76) and Sruan House (RPS 08-77). Also belonging to this tradition is the gate lodge to Elsinore House (NIAH 16305028) and the public buildings comprising Delgany School (NIAH 16305027) and Christ Church (NIAH 16305023) (Figure 13.2 in Appendix A).

Vernacular architecture is also well represented in the surrounding area with many vernacular cottages and associated outbuildings shown on the first edition OS map. Vernacular architecture is defined in James Steven Curl's Encyclopaedia of Architectural Terms as 'a term used to describe the local regional traditional building forms and types using indigenous materials, and without grand architectural pretensions', i.e. the homes and workplaces of the ordinary people built by local people using local materials. Building techniques include stone walling, sod-walling and cob-walling. The majority of vernacular buildings are domestic dwellings. Examples of other structures that may fall into this category include shops, outbuildings, mills, lime kilns, farmsteads, forges, gates and gate piers.

The lack of suitable timber for building purposes due to the destruction of the Irish forests in the 16th and 17th centuries meant that stone or clay have predominated as building materials for walls in vernacular house construction. Clay walling required a base of stone and the eaves had to project beyond the facade to protect the walls from water run-off from the roof. Clay houses were found mainly in the drier east and south-east of Ireland. The nearest to Farrankelly was a house in Delgany that has since disappeared (Corlett *pers comm*). Extensive cob walled houses are known to have stood at Rathnew, c. 14km to the south. Ó Danachair records the method of construction for the Rathnew houses as follows:

"Yellow clay was mixed with rushes, and the walls were built of this by men with pitch forks. As the rock is almost at the surface of the ground, a stone foundation was not necessary, and work began by marking out the plan of the house on the ground. The walls were then built.

Each man passed round the house placing successive pitch forks of the material in position. The completed wall was about eight feet high and the gables fifteen feet. Rafters of rough sticks were then erected, resting on a rough roof beam lying across the gables. Some of the houses had a thatched gable on the end opposite the chimney. In this case the roof-beam was supported by two beams resting on the corners of the walls. Smaller sticks were laid horizontally on the rafters, about one foot apart, and the first layer of straw or rush thatch was "sewn." on with twine or straw rope. Further layers of straw rushes, or river reeds were "scolloped " on to the first layer." (1935).

Slate quarries in the county meant that slated vernacular roofs are more typical in Wicklow than elsewhere (Corlett 2015).

Typically, the single storied thatched cottage would be considered to represent the real vernacular style in Ireland. A single vernacular structure is recorded within 500m of the proposed development area. This is a thatched house to the north in Delgany (NIAH 16304102). Following c. AD1700, settlement clusters were likely to have consisted primarily of single-storey thatched cottages with associated farm buildings.

Whilst there are no structures recorded within the RPS or NIAH within the proposed development area, a number of vernacular structures were noted adjacent to the site (surrounding Farrankelly House) during the field inspection. These are discussed below.

County Development Plan

Six buildings are listed in the Record of Protected Structures (RPS) within a 500m radius of the proposed development lands at Farrankelly. These are shown in Table 13.2 below and detailed in Appendix 13.4:

Table 13.2 – Protected Structures within 500m of the proposed development

RPS No.	Townland:	Name	Distance from proposed development site boundary:
RPS 08-78	Stilebawn	Glenbrook House	c. 10m west
RPS 08-76	Stilebawn	Glenair House	c. 220m north-west
RPS 08-77	Stilebawn	Struan Hill House	c. 320m north-west
RPS 08-17	Delgany	Thatched cottage	c. 360m north
RPS 08-11	Delgany	Delgany School	c. 400m north-west
RPS 08-16	Delgany	Christ Church	c. 460m north-west

The thatched cottage (RPS 08-17), was recorded in Delgany townland c. 360m to the north; however this was removed from the RPS in April 2013 due to its state of disrepair.

All of these structures are also recorded in the National Inventory of Architectural Heritage (see section 13.3.2.4). The development plan also outlines an Architectural Conservation Area for Delgany and Killincarrig villages. The southeast corner of the Delgany ACA is located 400m northwest of the proposed development lands and the Killincarrig ACA is located c. 510m to the north. The development plan contains the following objectives regarding Protected Structures:

BH7: To support the work of the National Inventory of Architectural Heritage (NIAH) in collecting data relating to the architectural heritage, including the historic gardens and designed landscapes, of the County, and in the making of this information widely accessible to the public, and property owners.

BH8: To have regard to 'Architectural Heritage Protection: Guidelines for Planning Authorities' (Department of Culture, Heritage and the Gaeltacht, 2011) in the assessment of proposals affecting architectural heritage.

BH9: To ensure the protection of all structures (or parts of structures) contained in the Record of Protected Structures.

BH10: To positively consider proposals to improve, alter, extend or change the use of protected structures so as to render them viable for modern use, subject to consultation with suitably qualified Conservation Architects and / or other relevant experts, suitable design, materials and construction methods.

BH11: All development works on or at the sites of protected structures, including any site works necessary, shall be carried out using best heritage practice for the protection and preservation of those aspects or features of the structures / site that render it worthy of protection.

BH12: To support the re-introduction of traditional features on protected structures where there is evidence that such features (e.g. window styles, finishes etc) previously existed.

BH13: To strongly resist the demolition of protected structures, unless it can be demonstrated that exceptional circumstances exist. In cases where demolition or partial demolition is permitted or where permission is given for the removal of feature(s), the proper recording of the building / feature will be required before works are undertaken and where possible the reuse of such features should be considered in any replacement buildings.

BH14: The Planning Authority shall consider the change of use of Protected Structures, provided that it can be shown that the structure, character, appearance and setting will not be adversely affected or where it can be shown it is necessary to have an economic use to enable its upkeep.

BH15: To seek (through the development management process), the retention, conservation, appropriate repair and reuse of vernacular buildings and features such as milestones, stonewalls, traditional & historic shopfronts and pub fronts, thatched roofs and other historic elements. The demolition of vernacular buildings will be discouraged.

BH16: Development proposals affecting vernacular buildings and structures will be required to submit a detailed, true measured survey, photographic records and written analysis as part of the planning application process.

Local Area Plan

The Greystones – Delgany and Kilcoole Local Area Plan 2013-2019 contains a Heritage Strategy, which makes provision for the protection of built heritage as follows:

"Promote the conservation of heritage for current and future generations.

Protect the built heritage of the area, including Architectural Conservation Areas (ACAs), protected structures and recorded monuments and places."

In section 9.2 the local area plan contains the following objective relevant to Built Heritage:

HER1: Protect and enhance the character, setting and environmental quality of natural, architectural and archaeological heritage, and in particular those features of the natural landscape and built structures that contribute to its special interest. The natural, architectural and archaeological heritage of the area shall be protected in accordance with the objectives set out in the Wicklow County Development Plan.

The local area plan also outlines Architectural Conservation Areas for Delgany and Killincarrig villages as per the county development plan. The south-east corner of the Delgany ACA is located. 450m northwest of the proposed development lands and the Killincarrig ACA is located c. 510m to the north. The following plan objective is made in relation to ACAs:

HER12: To preserve the character of Architectural Conservation Areas (ACAs), in accordance with Appendix B. The following objectives shall apply to ACAs: Development will be controlled in order to protect, safeguard and enhance the special character and environmental quality of ACAs. The buildings, spaces, archaeological sites, trees, views and other aspects of the environment that form an essential part of the character of an ACA will be protected. Proposals involving the demolition of buildings and other structures that contribute to the Special Interest of ACAs will not be permitted. The original structure of the La Touche Hotel contributes to the Special Interest of this ACA. The design of any development in an ACA, including any changes of use of an existing building, shall preserve and/or enhance the character and appearance of the ACA as a whole. Schemes for the conservation and enhancement of the character and appearance of an ACA will be promoted. The character and appearance of the urban public domain within an ACA shall be protected and enhanced. The Council will seek to work in partnership with local community and business groups to implement environmental improvements within ACAs. Within the Church Road ACA, alterations to the front boundaries to accommodate off-street car parking will not normally be permitted. Historic items of street furniture and paving within ACAs shall be retained, restored and repaired. All electricity, telephone and television cables within ACAs shall be placed underground where possible. The placing of satellite dishes, television aerials, solar panels, telecommunications antennae and alarm boxes on front elevations or above the ridge lines of buildings or structures will generally be discouraged within Architectural Conservation Areas, except where the character of the ACA is not compromised.

National Inventory of Architectural Heritage (NIAH)

A review of the NIAH survey results for County Wicklow has revealed nine buildings located within a 500m radius of the proposed development area. Of these, six are also listed in the RPS (see section 13.3.2.2). The NIAH structures are listed in Table 13.3 below and detailed in Appendix 13.4:

Table 13.3 – NIAH Structures within 500m of the proposed development

NIAH No.	Townland:	Name	Distance from proposed development site boundary:
16305023	Stilebawn	Glenbrook House	c. 10m west
16305021	Stilebawn	Glenair House	c. 220m north-west
16305022	Stilebawn	Struan Hill House	c. 280m north-west

NIAH No.	Townland:	Name	Distance from proposed development site boundary:
16401315	Delgany	House	c. 310m north
16401316	Delgany	House	c. 330m north
16304102	Delgany	Thatched cottage	c. 360m north
16305027	Delgany	Delgany School	c. 400m north-west
16305023	Delgany	Christ Church	c. 460m north-west
16305028	Delgany	Elsinore Gate Lodge	c. 440m north-west

Garden Survey

A review of the NIAH garden survey results for County Wicklow has revealed a single designed landscape within the receiving environment of the proposed development. This is at Killincarrig House c. 1km to the north of the proposed development area. The first edition OS map shows a substantial principal residence surrounded by formal gardens and parkland. The garden survey records that virtually no recognisable features survive.

Several smaller demesnes surrounding the proposed development area are not included in the survey. These include Glenbrook immediately to the west of the proposed development area. Glenbrook demesne as depicted on the first edition OS map is a modest sized principal residence surrounded by an area of open parkland with some planting around the house. The estate survives in the modern landscape and retains much of its original character. The house is listed as a protected structure.

The 25-inch OS map shows a larger demesne west of Glenbrook and c. 80m west of the proposed development area. The principal structure is labelled Ennismore. An entrance drive is shown within the southern portion of the demesne and a number of small outbuildings are shown. Today the house survives within a relatively intact and mature demesne landscape.

Glenair Demesne c. 180m northwest of the proposed development area appears on the first edition OS map as a principal residence surrounded by mature planting on all sides. To the north, an open area of parkland extends to the Three Trout River. The house survives in the modern landscape and is listed as a protected structure; however, the area of parkland to the north has seen significant disturbance due to modern development.

To the west of Glenair and c. 240m northwest of the proposed development area, a small demesne containing a structure named as Mount Pleasant is shown on the first edition OS map. Despite its relatively small size, a gate lodge is marked at the entrance to the demesne. By the time of the 25-inch map, the house has been renamed Struan Hill and the demesne and the principal structure have been extended. Today the principal structure survives and is a protected structure. However, the demesne has been impacted upon by the construction of an access road and modern residential development.

A small demesne named East Priory is depicted on the first edition OS mapping c. 300m to the south of the proposed development area. This demesne is depicted as a principal residence surrounded by a square plot, which is partially planted with small trees. A driveway runs south-west from the road to the residence. No gate lodge is present. The house survives within a mature landscape today.

Cartographic Analysis

First edition Ordnance Survey map, 1839, scale 1:10560 (Figure 13.9 in Appendix A)

Farrankelly House is depicted as a long narrow structure with four outbuildings arranged to enclose an area of farmyard to the north of the house. These buildings form the west, north and east of the farmyard and to the south, the yard is defined by a wall which runs east from the gable of Farrankelly House. To the south, a T-shaped building

is located at the corner of the orchard. A second building is also visible on the edge of the possible mill pond. No other structures are shown within the proposed development area.

Ordnance Survey map, 1907–9, scale 1:2500 (Figure 13.10 in Appendix A))

The layout of the principal residence and the outbuildings has altered slightly and the main building now covers a slightly larger footprint. A gate lodge is now visible at the entranceway immediately to the east of the proposed development area. A new building has been constructed against the wall which was seen defining the southern boundary of the courtyard in the first edition mapping. The other buildings, visible in the first edition mapping are upstanding in this area. To the south of Farrankelly House, the building at the corner of what was the orchard is still visible, although it has lost is southern annex and is, as a consequence, no longer T-shaped, but rectangular. The building at the edge of the possible mill pond has disappeared, as has the pond itself.

Field Inspection

The area of proposed development was inspected for evidence of built heritage. Plates are included in Appendix A [13.10]. A total of five structures with built heritage merit were noted directly adjacent to the proposed development area (see table below). These five structures were identified in proximity to Farrankelly House with one of the buildings located immediately southeast of the upstanding house (BH 1) and the remaining four buildings forming the area of farmyard to the north of the house (Figure 13.7 in Appendix A). The fifth structure is located to the southeast of the house (BH 2-5). It was not possible to fully assess the significance of the six bay, two storey Farrankelly House without entering the structure. Although the house appears to be constructed in the same location as the house shown on the OS mapping and shares a similar plan to the house visible on the 1907-09 mapping, there are some minor discrepancies. It is possible that the building has been totally renovated as the exterior is covered in modern render, the windows are pvc, as is the facia and guttering (Plate 13.13 in Appendix A [13.10]). The visible part of the chimney breast appears to be constructed of modern blocks and the roof has been replaced. There are two single storey modern extensions, one to the north and one to the south of the building. The house is currently in use as a residence.

The outbuildings retain most of their original fabric and can also be matched with the outbuildings represented on the OS mapping. BH 1, 50m east of the proposed development, is visible on the first edition OS map but it has a significantly different shape in plan. On the first edition map, the building is depicted as T-shaped while on later mapping it exhibits its current rectangular plan. BH 1 is a stone built, two storey outbuilding - most likely a barn - built of random granite rubble and limestone with 19th century redbrick detail around the window opes and doorways. The corners of the building are rounded, which is a feature not encountered on any of the other outbuildings (Plate 13.14 in Appendix A [13.10]) and the building has a pitched slate roof (Plate 13.15 in Appendix A [13.10]).

BH 2, 35m east of the proposed development, is not visible on the first edition OS map but appears on the 1907-09 map. This structure is a stable block that has been built against an earlier stone wall which is shown as connecting to the gable of Farrankelly House on the first edition map. This building forms the southern side of the farmyard (Plate 13.16 in Appendix A [13.10]). The building material was not visible due to the external and internal render and paint/whitewash but it is likely that this is a stone-built structure, possible including machine-made late 19th century brick. The building is roofed in sheets of corrugated metal.

Three of the structures visible on the first edition map are still extant and therefore predate 1839. These are BH 3, BH 4 and BH 5. BH 3, 30m east of the proposed development, is a long single storey, outbuilding with a croft level, roofed with sheets of corrugated iron and comprising the western side of the farmyard. This building was originally cob-walled but has been repaired and patched with a range of material including stone cobbles, brick and modern concrete block. This is evident at the northern gable (Plate 13.17 in Appendix A [13.10]). The eastern wall has been entirely replaced with a stone-built wall and only small sections of cob survive in the western wall (Plate 13.18 in Appendix A [13.10]). The thickness of the cob walling can be seen where the western wall meets the northern gable (Plate 13.19 in Appendix A [13.10]).

BH 4, 50m east of the proposed development, is a substantial two storey cob walled barn that has been repaired with brick in places and extended northwards with brick and stone annexes (Plate 13.20 in Appendix A [13.10]). The original structure is visible on the first edition OS map while the extensions are visible on the 1907-09 mapping. The entire height of both gables has survived as cob wall with little repair visible (Plate 13.21 in Appendix A [13.10]). What are presumably the original croft windows survive in both gables, each with a timber lintel and the thickness of the

cob walling is visible (Plate 13.22 in Appendix A [13.10]). BH 4 has a slate roof, which may be an original feature (Plate 13.23 in Appendix A [13.10]).

BH 5, 50m east of the proposed development, is a small, stone-built shed built against the larger cob walled two storey barn directly to the north (BH 4). This structure is visible on the first edition mapping. With the exception of the western wall which is a rubble coursed stone-built wall with some brick repairs (Plate 13.24 in Appendix A [13.10]), the entire structure has been rebuilt with concrete block (Plate 13.25 in Appendix A [13.10]).

Table 13.4 – Vernacular Structures identified during the field inspection

BH No.	Type	Location	Distance from the proposed development	Description:
BH 1	Barn	To the southeast of Farrankelly House	50m east	Stone built, two storey outbuilding - most likely a barn- built of uncoursed granite rubble and limestone with 19th century redbrick detail around the window opes and doorways. The corners of the building are rounded. Represented with a T-shape plan on the first edition OS map.
BH 2	Stables	Immediately north of Farrankelly House	35m east	Built against an earlier wall which connects to the gable of Farrankelly House. Not visible on the first edition maps. Visible on the 1907-09 mapping. Comprises the southern side of the farmyard.
BH 3	Outbuilding	Eastern side of farmyard north of Farrankelly House	30m east	Long single storey outbuilding comprising the western side of the farmyard. This building was originally cob-walled but has been repaired and patched with a range of material including stone cobbles, brick and modern concrete block.
BH 4	Barn	Northern side of farmyard north of Farrankelly House	50m east	Two storey cob-walled barn that has been repaired with brick in places and extended northwards with brick and stone annexes. The original structure is visible on the first edition OS map while the extensions are visible on the 1907-09 mapping.
BH 5	Shed	Eastern side of farmyard north of Farrankelly House	50m east	Small, stone built shed built against the larger cob walled two storey barn directly to the north (BH 4). Visible on the first edition mapping. With the exception of the western wall, the entire structure has been rebuilt with concrete block.

Conclusions

A total of nine structures located within c. 500m of the proposed development area are recorded in the NIAH survey. Of these structures six are also listed on the Record of Protected Structures for County Wicklow. None of these structures are located within the proposed development area. However, Glenbrook House (RPS 08-78) is located c. 10m to the west of the proposed development area. This house is also the closest NIAH structure (Ref.: 16305023) and its original demesne landscape abuts the western boundary to the proposed development area. The closest Architectural Conservation Area is located at Delgany village c. 450m to the northwest.

A total of five buildings of local built heritage significance were identified adjacent to proposed development area during the field inspection. All five of these buildings are located within close proximity to the site of Farrankelly House and constitute outbuildings associated with former farming activity. Portions of four of these structures (BH 1, 3, 4 and 5) pre-date the first edition OS map of 1839. Aalen states that mud construction technique was relatively common

in the eastern lowlands of Wicklow in the 18th and 19th centuries but that it was a method generally conserved for humble structures such as cabins and sheds (1994). The structures have been modified over the years and do not survive in good condition.

It is presently unclear whether the current Farrankelly House contains any historic fabric or whether it represents a rebuilt structure. The roof, chimney, facia, windows and the extensions are all modern. However, the fabric of the walls, covered with modern render, may contain some original fabric dating to the construction visible on the first edition OS map.

13.3.3 Results and Analysis - Cultural Heritage

Cultural heritage Sites

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.

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 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main reference used for the place name analysis is Irish Local Names Explained by P.W Joyce (1870). A description and possible explanation of each townland name in the environs of the proposed route are provided in the below table.

These townland names in proximity to the proposed development area largely refer to topographical features in the Irish language, suggesting that they are of some antiquity.

Table 13.5 – Townland place names within 500m of the proposed development

Name	Derivation	Possible Meaning
Farrankelly	*Fearann caladh*	The Riverside Meadow
Delgany	*Deilgne*	The Thorny Place
Killincarraig	*Coillín na Carraige*	The Little Wood on the Rock
Charlesland	*Acra na mBodach*	Churls Acre
Stilebawn	Knockbawn - *Cnoc bán*	The White Hill
Priestsnewtown	First appears on Jacob Nevill's1760 map of Wicklow	An area of land in ecclesiastical ownership

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. As discussed above, the lands of Farrankelly were not afforded demesne status, likely due to the fact that by mid-century, the lands were being rented out as opposed to forming the private demesne of a resident landlord as is once likely to have been the case.

The proposed development area is located within the townland of Farrankelly. The northern extent of the proposed development area forms the townland boundary between Farrankelly and Delgany to the northwest and Killincarrig to the northeast. This is also the parish boundary between Delgany to the north and Kilcoole to the south. The eastern border of the proposed development area is also the townland boundary between Farrankelly and Charlesland while the western border runs along the townland boundary between Farrankelly and Stilebawn. The townland names Farrankelly (Riverside Meadow), Delgany (The Thorny Place), Killincarrig (Little Wood on the Rock) and Charlesland (Churls' Acre) and Stilesbawn (The White Hill) are likely to relate to the Gaelic period (Price 1938). The townland boundaries abutting the proposed development area follow watercourses to the north and west. The townland boundary with Charlesland to the east follows the course of a road which seems to be of some antiquity.

Cultural Heritage Sites

There are two features of cultural heritage (and archaeological) significance depicted on the historic mapping. These are i) a limekiln shown in a field in the southwest of the proposed development area and ii) the townland and parish boundaries that border the proposed development area to the west, north and east of the proposed development area.

The lime kiln is shown at a far remove from Farrankelly House, in the southwest of the proposed development area. It was common to locate lime kilns close to buildings under construction or close to sources of lime (i.e. limestone). This could indicate that the limekiln at Farrankelly may be close to a source of naturally occurring limestone not far below the surface, alternatively, this might suggest that there is a building in the vicinity of the kiln that was levelled prior to the first edition mapping in 1839.

The proposed development area is bordered to the east, west and north by townland/parish boundaries which are likely to represent land divisions of considerable antiquity. Considering the place name analysis and the fact that these boundaries follow topographical features, a date in the early medieval period for the establishment of these boundaries is likely.

County Development Plan

The development plan contains the following objectives regarding Cultural Heritage:

BH22: To protect and facilitate the conservation of structures, sites and objects which are part of the County's distinct local historical and cultural heritage, whether or not such structures, sites and objects are included on the RPS.

BH23: To facilitate access to and appreciation of areas of historical and cultural heritage, through the development of appropriate trails and heritage interpretation, in association with local stakeholders and site landowners, having regard to the public safety issues associated with such sites.

BH24: To facilitate future community initiatives to increase access to and appreciation of railway heritage, through preserving the routes of former lines free from development.

BH25: Any road or bridge improvement works along the Military Road shall be designed and constructed with due regard to the history and notable features of the road (in particular its original support structures, route and alignment), insofar as is possible and reasonable given the existing transport function of the road.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development on an overall site of c. 21.2 hectares will comprise a residential development of 426 no. dwellings in a mix of houses, apartments and duplex apartments along with a two storey creche of c. 599 sq. m, Active Open Space of 4.5 hectares, a greenway of c. 2.4 hectares along Three Trouts stream, as well as the provision of upgrades to the road frontage along the site boundary at Kilcoole Road and Priory Road. The proposal includes the provision of a link street between the Kilcoole Road and Priory Road and associated junctions and a pedestrian/cycle link to the boundary of Eden Gate. A full description is set out in Chapter 2 of the EIAR.

13.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

13.5.1 Construction Phase

Archaeology

Archaeological Area 1 represents the site of two ring-ditches, an enclosure and various other archaeological features within the southwest portion of the development area. Construction of proposed residential units within this area would result in a direct, profound negative impact on these remains. The remains have been identified through aerial photographic analysis, geophysical survey and test trenching.

Archaeological Areas 2 and 3 represent dispersed archaeological activity across the development area some of which may be contemporary with the ring-ditches and enclosure while some features—notably the kiln in Trench 45—may date to the early medieval or medieval period. Construction of proposed residential units within this area would result in a direct, profound negative impact on these remains.

The site of a limekiln is located in the southwest portion of the development area, though this was not identified during the test trenching. It remains possible that features or deposits associated with this site survive in the area outside of the footprint of the test trenches. Construction of proposed residential units within this area would result in a direct, significant negative impact on this site.

The proposed development area as a whole possesses archaeological potential. As such, construction activities have the potential to directly and negatively impact on previously unrecorded archaeological sites or deposits that may survive beneath the current ground surface. These potential impacts could be direct and negative and range in nature from significant to profound.

Architectural Heritage

Farrankelly House and outbuildings (BH 1-5) are located outside of the proposed development area, therefore there will be no direct impact on these structures. The structures are located in an area that has been impacted upon by the construction of modern commercial units and are situated within a valley with proposed development located on higher ground to the west, southwest and southeast.

13.5.2 Operational Phase

Archaeology

None predicted.

Architecture

No indirect negative impacts upon the setting of BH 1-5 are predicted as a result of the development going ahead. Glenbrook House is a protected structure that is located c. 10m to the west of the proposed development area. The building and demesne are located downslope and are screened from the proposed development area by an existing mature boundary. As such, no adverse indirect impacts are predicted as a result of the proposed development, as the boundary and screening will be maintained.

13.5.3 Cultural Heritage

With the exception of those impacts mentioned above no other impacts are anticipated upon the cultural heritage resource as part of the proposed development during the construction or operational phase.

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

Archaeology

A full programme of archaeological excavation (preservation by record) will be carried out at Archaeological Areas 1-3, as identified in the testing report, prior to the commencement of the development. This will be carried out by an archaeologist under licence to the DoCHG. Full provision will be made available for the resolution of the archaeological remains, both during fieldwork and the post-excavation process.

At the time of previous archaeological testing, Field 4 was not included within the proposed development area. It is now proposed to install playing pitches and car parking in this area. Additional archaeological testing will be carried out within Field 4 prior to the commencement of the development. This will be carried out by an archaeologist under licence to the DoCHG. Full provision will be made available for the resolution of the archaeological remains, both during fieldwork and the post-excavation process.

All topsoil stripping associated with the proposed development will be monitored by a suitably qualified archaeologist. Full provision will be made available for the resolution of any archaeological remains that may be identified, both during fieldwork and the post-excavation process.

Architecture

No mitigation is deemed to be necessary.

13.7.2 Operational Phase

Archaeology and Architectural Heritage

No potential impacts with respect to historical, archaeological or architectural heritage matters are anticipated during the operational phase of the development. Consequently, no remedial or reductive measures are considered 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. However this is considered unlikely as extensive testing has been undertaken across the subject lands.

13.8 PREDICTED IMPACT OF THE PROPOSAL

The development will result in the removal of a previously unrecorded features within the subject lands. However, without the archaeological measures undertaken to date with respect to the development, the existence of this feature was unknown. The location of the sites will now be added to the Sites and Monuments Record of the Archaeological Survey of Ireland and its excavation will greatly add to the archaeological and historical knowledge base to the general area and region as a whole. Consequently, it is considered that if this feature is subjected to a '*preservation by record'* process as a reductive/remedial measure, then the predicted impact is considered to be beneficial rather than adverse.

13.9 MONITORING

The mitigation measures recommended above would also function as a monitoring system to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

During the operational phase, post-construction monitoring issues with respect to historical or architectural heritage are not considered a requirement with respect to the subject development.

13.10 REINSTATEMENT

It is not envisaged that reinstatement measures are required with respect to matters pertaining to Cultural Heritage.

13.11 POTENTIAL CUMULATIVE IMPACTS

The future separate development of the adjoining Action Area lands (under separate ownership) will entail similar potential impacts to previously unrecorded features. Similar mitigation measures would also most likely be required in respect of Archaeology, Architecture and Cultural Heritage.

13.12 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No specific difficulties were encountered. The mitigation measures outlined will ensure the appropriate management of any sub-surface archaeological features, if discovered.

14.0 RISK MANAGEMENT FOR MAJOR ACCIDENTS AND/OR DISASTERS

14.1 INTRODUCTION

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. Measures to control risks associated with Construction Phase activities are incorporated into the Outline Construction 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 new EIA Directive, the draft EPA guidelines, 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 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 a number of mechanisms which currently manage accidents outside of the EIA process. These would include the Outline Construction Management Plan, which would deal with pollution risks during construction (See Chapters 5, 6 and 8 on Land, Soils, Air and Water) and risk of accidents during construction, including traffic accidents. The risk of flooding is dealt with in Chapter 8; Water. There is no risk of flooding. 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 but potential 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' 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 context 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.

The surrounding context 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 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".*

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) have the potential to occur.

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 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 426 units, entailing 245 houses, 88 duplex units and 93 apartments, and which includes provision of a creche, residential amenity building, active open space and a greenway.

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 developments 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 e.g. Technical Guidance Document B, BS9991, and BS9999. These measures will, in conjunction with the provision of automatic fire suppression in the taller blocks, 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 particular 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
- A bespoke Fire Emergency Evacuation Plan [FEEP] will be prepared for the apartment and duplex blocks in advance of occupation.
- The cleaning of windows in the buildings will be undertaken by a specialist contractor on behalf of the owners management company. Window cleaning infrastructure has been designed into the scheme.
- 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 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 Management Plan and the Health and Safety Plan, as well as 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 estate management company will have responsibility for fire safety during operations. In relation to falls these have been dealt with during design.

The proposed development will involve the ground works to facilitate the proposed development. Site investigations have been carried out and have 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 licenced facility. The following are outlined:

- 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 a number of potential risks, as set out below. The risks identified include traffic management, and fire strategy.

- 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. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

- Furthermore, 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 ROD Consulting Engineers. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater 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 - Farrankelly

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	A risk event statement states (I) what might happen	Name or title of team member	Enter H (High); M (Medium);	Enter H (High), M (Medium)	List, by date, all actions taken to respond to the risk. This

1. BASIC RISK INFORMATION			2. RISK ASSESSMENT INFORMATION		3. RISK RESPONSE INFORMATION
identifier for risk	in the future and (ii) its possible impact on the project.	responsible for risk	or L (Low) according to impact definitions	or L (Low) according to probability definitions	does not include assessing the risk
C01	Logistics - Traffic Management Plan to be developed.	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	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 design will not impact on the permanent structure.

1. BASIC RISK INFORMATION			2. RISK ASSESSMENT INFORMATION		3. RISK RESPONSE INFORMATION
C03	Fire Strategy	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.
CO4	Lifting Operations	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	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	Falling from communal gardens Window cleaning Falls on water feature during cold weather events

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

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score
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
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
4	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		
	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 man 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 INTERACTIONS

There are interactions with 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 implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

14.8 RESIDUAL IMPACTS

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.

14.9 CUMULATIVE IMPACTS

The cumulative interactions with 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 implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

The Phase 4 lands to the east, (under separate ownership), when developed would be subject to a separate Construction Management Plan so as to reduce the risk of accidents etc.

Works on the public road, such as the construction of the Toucan crossings and the laying of underground pipes would be carried out on behalf of the relevant statutory undertakers, and would be subject to separate construction management plans.

15.0 INTERACTIONS OF THE FORGOING AND CUMULATIVE IMPACTS

15.1 INTRODUCTION

The purpose of this section 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 as well as the European Union (Planning And Development) (Environmental Impact Assessment) Regulations 2018. The detail in relation to interactions between environmental factors will be covered in each chapter of the EIAR.

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 and collated by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates. The interactions were provided by the relevant EIAR specialists.

The purpose of this requirement of an EIAR is to draw attention to significant interaction and interrelationships in the existing environment. John Spain Associates, Planning & Development Consultants, in preparing and co-ordinating this EIAR ensured that each of the specialist consultants liaised with each other and dealt with the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject and ensuring that appropriate mitigation measures are incorporated into the design process.

Having regard to the above, JSA require that a specific section on Interactions is included in each of the environmental topic chapters of the EIAR. 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. In addition, likely interactions between one topic and another have been discussed under each topic Chapter by the relevant specialist consultant.

The primary interactions can be summarised as follows:

- Engineering bridge design with biodiversity and archaeology;
- Landscape design, engineering services with biodiversity and archaeology;
- Visual impact with biodiversity;
- Biodiversity with water and soils;
- Noise and vibration and traffic; and
- Air quality and climate and traffic.

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.

15.2 SUMMARY OF PRINCIPAL INTERACTIONS

The following are the interactions anticipated from the proposed development:-

Table 15.1 – Summary of Potential Interactions / Inter-relationships

Subject	Interaction With-	Interactions / Inter-Relationships
Population and Human Health	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.
Air Quality	Soils	Exposed soil during the construction phase of the proposed development may give rise to increased dust emissions. However, 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.
Material Assets	Air Quality	The proposed development is located in a semi-rural area, with agricultural activities to the north. The production of dust during construction has a nuisance value and livestock may be at risk to eye irritation from high levels of wind blowing dust particles. Given the proposed mitigation measures for dust control and dust suppression, the potential for dust to impact upon livestock would be considered very low.
Population and Human Health	Noise	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.
Population and Human Health	Visual	The extent of interaction in this regard depends on the extent to which the proposed development is visible and, if visible, the extent to which it is considered appropriate or otherwise. The development has been designed in careful reference to the existing development in the area and presents an attractive appearance externally.

Subject	Interaction With-	Interactions / Inter-Relationships
Population and Human Health	Biodiversity	The proposed development would result in an increase of human activity in the area, which may impact upon fauna through disturbance, including noise and traffic. However, given the site's proximity to adjacent housing developments within Greystones, it would be considered that fauna would be somewhat accustomed to the urban environment. Therefore, it is not considered that human activity would result in a significant impact upon biodiversity at the development site. The provision of additional planting and trees associated with the proposed development, together with associated landscape improvements is expected to have a positive beneficial impact upon Population and Human Health including residents in the general locality and the future residents of the proposed development.
	Material Assets	There will be unavoidable localised temporary impacts on the community during the construction phase of the proposed development including increased traffic associated with the construction process. Construction (traffic) Management Plan will be developed to minimise disruption and to accommodate local traffic flows.
Population and Human Health	Land and Soils	There is an interaction between the potential of the underlying bedrock to emit radon and human health and this is dealt with in Chapter 3 Population and Human Health
Water	Biodiversity	A deterioration in water quality in nearby watercourses, which would adversely impact aquatic biodiversity, could occur during the construction phase of the proposed development due to rainwater run-off containing sediments, concrete and hydrocarbon spillages, and during the operational phase due to the discharge of domestic wastewater. During the construction phase, surface water quality would be protected through the implementation of mitigation measures, which include the regular maintenance and inspection of construction plant, the appropriate storage of potentially polluting substances, the supervision of all concrete works and use of appropriate silt control features where required. Therefore, no potential significant impacts upon water quality is anticipated during the construction phase. There would be no potential impacts to water quality during the operational phase of the development, as all domestic wastewater would be directed to the Greystones Waste Water Treatment Plant for treatment prior to discharge.

Subject	Interaction With-	Interactions / Inter-Relationships
Material Assets Waste	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 would 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 would 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.
Material Assets Waste	Biodiversity	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, as discussed in the sections above, wastes would 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 would 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.
Water	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.

Subject	Interaction With-	Interactions / Inter-Relationships
Material Assets - Waste	Human Beings	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. Water pollution is discussed in Section 6 &11. During the construction phase, wastes would be segregated and stored in suitably contained waste receptacles at the site compound. This would considerably reduce the potential risk of pollution to soils and water. Waste would be removed from the development on a regular basis, to avoid the accumulation of high waste volumes, which could cause nuisance. 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 would 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 would 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.
Material Assets – Waste	Landscape	Waste and litter have the potential to adversely affect the appearance of the landscape. However, as waste management measures would be implemented as part of the proposed development, it is considered that there would be no significant adverse impact upon the landscape.
Air, Population and Human Health	Biodiversity	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. During the construction phase of the development, there would be potential for dust emissions, which could impact upon the communities and residents on the roads to the site and fauna in the surrounding area. The potential impact of dust would be temporary, given the transient nature of construction works. Dust control would be an integral part of construction management practices, 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. It should be noted that an important interaction exists between air quality and flora, whereby vegetation can play an important role in acting as an air purifier by absorbing carbon dioxide and giving out oxygen. It would therefore be anticipated that potential carbon dioxide emissions generated by home heating systems and discharged from vehicle exhausts would be somewhat mitigated by vegetation in the environs of the site and large area of forestry to the east/north-east of the site.

Subject	Interaction With-	Interactions / Inter-Relationships
Air & 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.
Air Quality	Biodiversity	An increase in dust emissions during the construction phase has the potential to adversely impact upon flora by blocking leaf stomata, interfering with photosynthesis, respiration and transpiration processes. However, given the transient nature of construction works, and given that standard dust control measures would be implemented, no significant impact would be anticipated.
Air & Climate	Biodiversity	During construction there are potential issues for biodiversity if the adjoining 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 impacts on nearby trees.
Noise	Population and Human Health/Biodiversity	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 would 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.
Landscape	Population and Human Health	Changes to the landscape character of the site itself will include the development of new buildings and associated landscape. 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 west and south, with the town centre located to the south east. The proposed development generates visual effects, and the effects and associated amelioration of these effects is discussed in the impact section of the chapter.

Subject	Interaction With-	Interactions / Inter-Relationships
Landscape	Biodiversity	The long-term effects of the proposed development will have a positive effect on the tree cover associated with the development. The long-term effects of the retention and enhancement of existing hedgerows and the planting of new native trees will have a slightly positive effect. Further consultation with the Ecological Consultant will take place at detailed design, implementation and monitoring stages to ensure adherence to best practice and sound ecological principles.
Surface Water / Groundwater	Soils/geology/Waste Management	There is an interaction between the lands, soil and water as the development of the site and particular the linear park. Suds features and finished road levels will manage and control flooding in the vicinity of the lands. There is a close link between soils & geology and water (hydrogeology and hydrology). For example, the erosion of sediments during the construction phase can, if not mitigated result in additional siltation in nearby surface watercourses. Due to this inter-relationship, the impacts discussed in this section will be considered applicable to both the geological water and ecological environment. 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.
Material Assets	Biodiversity	The proposed development would alter flora cover and the species of fauna supported due to land take and soil disturbance works. This impact would be slight, given that the majority of the existing habitats are modified and of low ecological value.
Material Assets - Utilities	Material Assets - Waste management, and Water (hydrogeology)	The proposed works result in an increase in surface water runoff, if not catered for adequately this may have an effect on the hydrogeology.
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.
Material Assets – Traffic	Population and Human Health	Temporary negative impacts to 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 traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified in section 10.6.1.

Subject	Interaction With-	Interactions / Inter-Relationships
Land and Soils	Material Assets – Waste Management	There is an interaction between soil and waste management as there may be the requirement for removal of contaminated soil off site to a suitable licensed facility. This is dealt with in Chapter 11 Waste Management.
Land and Soils	Water and Groundwater	There is an interaction between land/soils on the site and groundwater, where removal of soil/subsoils can increase groundwater vulnerability and result in sediment run-off. This is dealt with in Chapter 5 Land & Soils.

15.3 CUMULATIVE IMPACTS

15.4 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. However, 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.

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. The vast majority of the works are away from the public road in a controlled environment. The route of the water connection, would be subject to a road open 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. 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 Toucan Crossings will be undertaken in agreement with Wicklow County Council to link the proposed Greenway to the existing greenway located on the eastern side of the Kilcoole Road. A second Toucan Crossing will be provided to connect the scheme to the eastern side of the Kilcoole Road at Glenheron.

As outlined in Chapter 2 this EIAR where relevant the EIAR also takes account of other development within the area. These impacts have been addressed in the relevant chapters of the EIAR.

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. adjacent to the east) relating to the future potential phase of the Farrankelly Action Plan (under separate ownership).

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.

The proposed development will provide a setback boundary to allow for the future upgrade of the R761 Kilcoole Road along the site frontage. The entrance of the proposed development has been designed to cater not only for the subject site, but also to be able to accommodate this future general road improvement.

The entrance layout proposed is capable of accommodating the entire development from Kilcoole Road. It is neither dependent on the future road upgrade on the Kilcoole Road or the secondary access to the west on Priory Road or to the south to Eden Gate.

It is expected that Wicklow County Council will undertake the overall road improvements as part of a future public works scheme, which will include provision of a cycle track on the western side of the road at Glenbrook Park, and will also extend northward to avail of other boundary setbacks as provided for in other planning permissions as well as an upgrade to the Three Trouts Bridge, including a realignment of the road within the space provided.

This future upgrade is to include the localised road realignment to the west into the subject site and the provision of footpaths and cycle tracks on both side. The localised realignment of the Kilcoole Road into the subject site will make space for these upgrade works so that the properties on the opposite side of the road are not affected. It is expected that Wicklow County Council will undertake the overall road improvements as part of a future separate public works scheme, which will include provision of a cycle track on the western side of the road at Glenbrook Park, and will also extend northward to avail of other boundary setbacks as provided for in other planning permissions.

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 collated by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates, using the mitigation measures provided by the relevant EIAR specialists in their respective chapters.

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.

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 2-5 year period. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. A CMP has been prepared by Cairn Homes, has been reviewed by the relevant EIAR consultants and is included in the SHD application.

16.4 POPULATION AND HUMAN HEALTH

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.

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. A CMP prepared by Cairn Homes, is included with the SHD application material.

16.4.1 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 15 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIA.

POP & HH CONST 1:

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

With reference to the construction phase of the proposed development, the objective of the Construction Waste Management Plan prepared by Byrne Environmental Consulting Ltd 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.

16.4.2 Operational Phase

The operational phase is considered to have likely significant positive impacts on human beings 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.

16.5 BIODIVERSITY

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 both flora and fauna.

16.5.1 Construction Phase

- 1:Mortality to animals during construction – mitigation by avoidance.

- 1a.The removal of hedgerow, treeline or scrub vegetation should not take place from March to August inclusive as per the Wildlife Act.

- 1b.The following mitigation is taken directly from the bat survey report:

  "Removal of trees

  a) Minimise the removal of mature trees, where possible. As many of the PBRs will be retained, where possible.

  b) A total of 9 trees, deemed as PBRs, are proposed to be removed (Additional 4 PBR trees may be removed for Health & Safety). 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).

- 1c. Loss of Broadleaved Woodland. The detailed design of the greenway should ensure that the loss of trees be minimised, and the loss of high-value trees (very old or specimen) should be avoided entirely. The greenway must be set back from the stream by a minimum of 10m to ensure the continued integrity of the riparian zone. The width of the trackway should be minimised and the surfacing used should be rough/permeable (and so eliminate run-off).

  The landscaping plan has been developed as part of the project design process. This process has retained a significant portion of the semi-natural habitat on the site. In addition, new native planting is proposed to reconnect the features being retained to the woodland along the Three Trouts Stream. Additional landscaping of open spaces will also increase connectivity and potential foraging areas for bats. The landscaping plan will incorporate:

  Retention and enhancement of the majority of internal existing treelines / hedgerows, particularly those connected in the landscape to the wooded valley of the Three Trouts Stream.
  - - Retention and enhancement of boundary habitats.
  - - Retention of woodland along the Three Trouts Stream
  - - Retention of a number of mature trees in linear habitats proposed to be retained.
  - - Planting of new native hedgerow around the playing pitches
  - - Planting of new native hedgerow along two sections of the site boundary
  - In addition, the Landscape Plan proposes:

- - Three open spaces with additional planting are proposed. This will potentially provide additional foraging areas for local bat populations.

- 2: Pollution during construction – mitigation by reduction

A Construction Management Plan has been prepared, and which includes pollution prevention measures in accordance with best practice guidelines from Inland Fisheries Ireland (2016). This identifies the location of the site compounds, storage areas for potentially polluting substances, and specific measures to prevent the loss of silt-laden water to any water course. This also takes into account the potential for pollution of the river during construction of the greenway.

Good site management in relation to sediment control during the construction phase will prevent this from occurring and mitigation measures are outlined below. Other measures to be implemented on site include briefing of all site contractors regarding the sensitivity of the watercourses within the site and the need for strict site management in relation to potential run off.

16.5.2 Operational phase

3. Tree damage – mitigation by avoidance

Protective fencing will be erected in advance of any construction works commencing outside the drip-line of the canopy of retained trees within and along the site boundaries in order to prevent damage by machinery, compaction of soil, etc. in accordance with BS 5837:2012. This will be signed off on by a qualified arborist or ecologist to ensure it has been erected properly before any machinery is allowed on site. No ground clearance, earth moving, stock-piling or machinery movement will occur within these protected areas.

4. Lighting.

The bat report makes a number of specific recommendations which should be followed as follows:

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 is the wooded river valley and treelines/hedgerows remaining within the propose development area. 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.
- 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).
  - All luminaires used will lack UV/IR elements to reduce impact.
  - LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
  - A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
  - 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.
  - Only luminaires with an upward light ratio of 0% and with good optical control will be used.
  - 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.

The current operational greenway lighting, located to the east (on the opposite side of the R761) is bat friendly lighting on a sensor mechanism. This form of bat friendly lighting will be replicated within the greenway proposal for this development. The lighting plan will ensure that horizontal illuminance is at a 0.47 lux at the outer edges of the lighting spillage and this light spillage will be kept to a minimum due to directional luminaries.

The lighting plan will also ensure that minimal lighting spillage will occur in the active zone and throughout the development.

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.

16.6 LAND AND SOILS

16.6.1 Construction Phase

Avoidance and reduction of the volume of excavated material and backfill material has been a key consideration throughout the design process. Some of the residential units have been designed as a split level buildings in order to suit the topography of the site. The foul/surface drainage and watermain lines are located new proposed roads or footpaths in most of the proposed scheme so they do not require separate excavations.

All excavated materials will be assessed for signs of possible contamination such as staining or strong odours. While no such contamination was found during the Ground Investigation Report, best practice requires that this is continually assessed during the works.. Should it be determined that any of the soil excavated is contaminated, this will be managed according to best practice and disposed of accordingly by a licensed waste disposal contractor.

Construction operation will be required to take cognisance of the following guidance documents for construction work on, over or near water. CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.

The Construction Management Plan covers the design, construction, operation and maintenance phases of each project component. The Construction management plan will identify the key environmental issues across the project and provides strategies and plans for managing them effectively. It also defines the legal requirements for the project and identifies the regulatory permits and licences required for construction activities.

The project specific Construction Management Plan (CMP) has been prepared and submitted to the planning authority with this application and will be maintained by the contractor during the construction phase. The CMP is included in the SHD application material. The CMP includes a range of site specific measures which also include the following mitigation measures:-

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter watercourses.
- Topsoil stockpiles will also be located on site so as not to necessitate double handling.
- Topsoil will be re-used where possible in gardens and landscaping areas around the subject site.
- The design of road levels and finished floor levels has been carried out to minimise cut/fill type earthworks operations.

- Disturbed subsoil layers will be stabilised as soon as practicable. Therefore, backfilling of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping), will all be carried out promptly to minimise the duration that subsoil layers are exposed to the effects of weather.
- Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles.
- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).
- Where feasible, excavated material will be reused as part of the site development works (e.g. for landscaping works and for backfill in trenches under non-trafficked areas).
- Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site.
- Construction site mitigation such as wheel wash and dust suppression measures will be implemented as part of the construction process and will be detailed in the appointed contractor's construction management plan.
- All oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstanding area, remote from surface water inlets (when it is not possible to carry out such activities off-site).
- The results of the Site Investigations indicate that bedrock is between 3.6mBGL and 6.7mBGL. Therefore, it is unlikely that bedrock will be exposed during construction works accept in localised areas such as bridge abutment construction. Deep drainage works will be avoided where possible to reduce the possibility of impacting on bedrock. Should bedrock be encountered, the extent of exposed bedrock will be limited to the immediate vicinity of active work areas. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works to reduce the volume of material required to leave site. This will also reduce the volume of material to be imported to the site.
- Good housekeeping (site clean-ups, use of disposal bins, etc.) on the site project.
- In order to prevent the accidental release of hazardous materials (fuels, paints, cleaning agents, etc.) during construction site activity, all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project.

During construction works, all excavated materials including existing stockpiles will be visually assessed for signs of contamination. Should material appear to be contaminated, soil samples will be analysed by an appropriate testing laboratory. All potentially contaminated material will be either left in situ and characterised through laboratory testing; or segregated and stockpiled in a contained manner and characterised through laboratory testing. Any contaminated material will be appropriately disposed of or treated using a licensed waste contractor and in accordance with the Waste Management Regulations, 1998.

16.6.2 Operation Phase

All new drainage on site will be pressure tested and have a CCTV survey carried out prior to being made operational. Petrol interceptors will be used to capture any pollutants arising from any impermeable paving and car park spaces.

Oil interceptors will be provided in order to prevent runoff of pollutants to the soils and sub soils. The use of interceptors will be in compliance with Pollution Prevention Guidelines (PPG) 3. No detergents will be discharged to interceptors as this practice renders the interceptor useless.

All surface water drainage is passed through fuel interceptors and passed into stormwater attenuation tanks, then the drainage is washed down into existing stream or passed down to an existing surface water drainage system. All new drainage systems will require pressure testing by the contractor and a CCTV survey to discover any possible defects.

All residential car park areas will have permeable paving. It will reduce surface runoff, trap suspended solids therefore filtering pollutants from stormwater which will improve water quality by filtering pollutants in the substrata layers.

No significant long-term impact on the soil resulting from the proposed operational phase of the development is predicted. Once the development is completed, risks to the land and soils will be from pollutants deriving from the use of the dwellings and/or from contaminated surface water run-off.

The only mitigating measures envisaged during the operational phase are to ensure regular maintenance of SuDS features.

Ensuring appropriately designed, constructed and maintained site services will protect the soils and geology from future contamination arising from operation of the developments.

- The surface water run-off from the development should be collected by an appropriately designed system. This system should ensure that contaminants are removed prior to discharge e.g. via a light liquids separator or by an appropriate treatment train of Sustainable Urban Drainage Systems as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Any separators and drainage systems should be maintained and operated by the facilities management company (prior to taking in charge by the Local Authority) in accordance with the manufacturers recommendations.
- Foul effluent should be collected and discharged from the site via properly constructed sewers to the Public Foul Sewer

16.6.3 Monitoring

A pumping station will be constructed to pump sewage from the northern part of the site that will accommodate 43 dwelling sewage and pump it where it is going to be connected into the proposed sewer which will then be discharged by gravity sewer. The pumping station would also have enough storage to store up to 24 hours of sewage for the proposed 43 dwellings that it will serve. This timeframe would allow Irish Water to mitigate and implement remedial action to have the pumping station operational again in case of any malfunctions.

Construction phase monitoring relates to the good maintenance of mitigation measures outlined above in section 5.6 including the measures set out in the Construction Management Plan (CMP) submitted. Soil removed during the construction phase is to be monitored to maximise potential for re-use on site. Monitoring of any hazardous material stored on-site will form part of the proposed Construction & Waste Management Plan. A dust management/monitoring programme will be implemented during the construction phase of the development. The quantities of topsoil, subsoil and rock removed off site will be recorded.

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

- Adherence to the appointed contractors “Construction and Demolition Waste Management Plan”.
- 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.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities.
- Monitoring of contractor’s stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site)
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)
- 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.

No ongoing monitoring will be required during the operational phase. An ongoing monitoring will be carried out by Irish Water on the proposed pumping station that will have a telemetry and wet kiosk that will monitor the inflows and outflows in the pumping station with an alert system that sends out a signal to Irish Water monitoring systems in case the pumping station fails.

16.7 WATER

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.

16.7.1 Construction Phase

A new surface water drainage system has been designed to cater for the all impermeable paving throughout the site with a number of attenuation tanks proposed due to the additional surface water runoff due to the sheer scale of the site. Runoff will be stored on site with an allowable outflow of 2 l/s/ha, southern and eastern part of the site will be drained into existing drainage system and northern and western side of the site is going to be drained into Three Trout River stream.

- Construction activities will take cognisance of the following guidance documents for construction work on, over or near water.
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.
- IRIA C648 Control of Water Pollution from Constructional Sites. Guidelines for the Crossing of Watercourses during the Construction
- Adherence to the contractor's Construction Management Plan
- Adherence to the Operational Construction and Construction Management Plan that is submitted separately as part of the Planning process

The Construction Management Plan manual for the Proposed Project site has been formulated in consideration of the standard best practice. This Construction Management Plan encompasses a range of site-specific measures which include:

- Existing topsoil will be retained on site to be used for the proposed development. Topsoil will be stored in an appropriate manner on site for the duration of the construction works and protected for re-use on completion of the main site works. Stockpiles of topsoil/soils will be covered/dampened during dry weather to prevent spreading of sediment/dust;
- The Greenway along the stream will be constructed using a no dig method to prevent entry of sediment laden run-off to the Three Trout stream;
- Excavations would be backfilled as soon as is possible to reduce any infiltration of potentially polluting compounds to the subsurface and the aquifer;
- Top-soiling and landscaping of the works will take place as soon as finished levels are achieved, in order to reduce weathering and soil erosion and limit the generation of sediment laden run-off;
- A temporary site drainage system will be established for the duration of the construction works. All run-off from the site will be directed to settlement ponds and oil interceptors prior to discharge to existing site drain. This temporary system will throttle run-off and allowed suspended solids to settle out prior to entry to the site drain. The discharge to the site drain will be designed to prevent erosion and scour in the vicinity of the discharge. The discharge will be visually inspected regularly for any signs of contamination. Where any suspected contamination is observed, the discharge will cease immediately and will be treated and disposed of appropriately.
- Any minor volumes of groundwater required to be pumped during excavations will be passed through the temporary drainage system settlement prior to discharge to the existing site drain.
- Handling, transport and storage of fuel and chemicals will be controlled e.g. oil and fuel stored on site will be stored in designated areas. These areas will be bunded and located away from any surface water drainage.
- Refuelling of construction machinery will be undertaken in designated areas located away from surface water drainage.
- All machinery will be inspected at the start of each work shift for signs of leaking hydrocarbons. Parking areas will be inspected on a daily basis for evidence of hydrocarbons leaking from machinery.
- All potentially polluting materials will be stored in bunded areas, the capacity of which will be 110% the volume of the largest volume of material or 25% of the total volume of liquid to be stored, whichever is greater. The site manager will be responsible for ensuring that a copy of all relevant material safety data sheet for each product is available at storage locations as well as the site office.
- The washing of any plant equipment will be carried out in designated areas constructed to prevent potentially polluting material from entering surface or groundwater.
- Spill kits shall be kept in the machinery refuelling areas and any chemical/fuel storage areas in the event of spillages. The spill-kits will comprise suitable absorbent material, refuse bags etc. to allow for the appropriate clean-up and storage of contaminated material in the event of a spillage or leak occurring.
- Wheel wash facilities to prevent soil and mud being tracked onto the adjoining roads. In addition to this road washing machinery will be employed where possible;

- There will be no discharge of effluent to groundwater during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment;
- If concrete mixing is carried out on site, the mixing plant will be sited in a designate area with impervious surface. Washwaters from cement mixing equipment will not be disposed of the surface
- The Contractor will be obliged to ensure no deleterious discharges are released from the site to surrounding watercourses during the construction stage. Throughout the works the Contractor will also take account of relevant legislation and best practice guidance including but not limited to the following:
- C532 Control of water pollution from construction sites: guidance for consultants and contractors.
- C648 Control of water pollution from linear construction projects
- SP156 Control of water pollution from construction sites – guide to good practice

Mitigation during the construction phase will include implementing best practice during excavation works to avoid sediment running into the drainage system which discharges to the Three Trout stream

16.7.2 Operational Phase

All new drainage on site will be pressure tested and have a CCTV survey carried out prior to being made operational. All fuel tanks will be required to be double bunded and leak detection measures to be put in place to prevent any accidental discharge. The site is attenuated to 2.85-3.28 l/s/ha which is less than the greenfield site. It reduces the runoff from the subject site in terms of surface water, while allowing the surface water to be stored and released then gradually thereafter. A petrol interceptor will be used to capture any pollutants arising from vehicles on any of the roads.

The provision of a pumping station will pump sewage from the northern part of the site that will accommodate 43 dwelling sewage and pump it to the middle of the site where it is going to be connected into the proposed sewer which will then be discharged by gravity sewer. The pumping station will be built in accordance with Irish Water code of practice and Wastewater Infrastructure Standard Details. An ongoing monitoring will be carried out by Irish Water on the proposed pumping station that will have a telemetry and wet kiosk that will monitor the inflows and outflows in the pumping station with an alert system that sends out a signal to Irish Water monitoring systems in case the pumping station fails. The pumping station would also have enough storage to store up to 24 hours of sewage for the proposed dwellings that it will serve. This timeframe would allow Irish Water to mitigate and implement remedial action to have the pumping station operational again in case of any malfunctions.

Water conservation measures such as the use of low flush toilets and low flow taps will be incorporated into dwellings to reduce volumes and associated abstraction and treatment costs for the proposed development.

Proposed stormwater management system designed in accordance with relevant standards and incorporates two attenuation tanks and hydrobrake flow controls to limit run-off from the site to the greenfield run-off rate to prevent increased flood risk. Hydrobrakes will be inspected and maintained to ensure they are working to prevent increased run-off from the site.

Run-off will pass through two Class I By-pass Interceptors prior to entry to the attenuation tanks and discharge to Three Trout Stream. Oil interceptors will be inspected and maintained to ensure they are working to prevent contamination from the site.

Surface water sewage will be treated and will reduce peak run-off rates and volume by implementation of Permeable paving. It will also retain pollutants prior to discharge and also it will treat vehicle oil spillages in situ.

16.7.3 Monitoring

Construction phase monitoring relates to the good maintenance of mitigation measures outlined above including the measures set out in the Construction Management Plan (CMP) submitted.

It is proposed that the construction of the development will be carried out in multiple phases. The primary access will be from Kilcoole Road where the proposed entrance will be constructed at the commencement of the project and the completion of the spine road that will eventually link between Kilcoole Road and Priory Road will be completed within the first phase. Priory Road may also be used for construction traffic, but this will be limited to access for the initial site setup and light vehicles only. The subject site has more than sufficient space that the construction compound and car parking for staff and operations can be accommodated entirely within the site. During the Construction Phase of the works, the Construction Management Plan requires the Contractor to put in place

measures for monitoring the quality of run-off from the site into the Three Trouts river. These results are to be submitted to Wicklow County Council on an ongoing basis.

16.7.4 Operational Phase

There are no predicted significant impacts to water and hydrology arising from the proposed operation of the new development. During the operation phase, there will be ongoing maintenance to the petrol interceptors and the attenuation tanks. The Developer has confirmed that there will be a management company in place for the development and this will be required to be carried out on a regular basis.

16.8 AIR QUALITY AND CLIMATE

This section provides the measures that shall be implemented during the construction and operational phase and into the design of the development to miminise the impacts on the receiving environment, local population and human health, livestock and agricultural lands, local flora and fauna, local businesses and on 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 Farrankelly 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 operational phase includes mitigation measures relating to the design of the development 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 on the R761 Kilcoole Road to the east of the development to provide public transport to residents
- Proximity of Iarnrod Eireann's Greystones DART Service c. 2.8km from the site
- Provision of open landscaped areas, multi-use pitches and facilities, and a green-way 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 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.

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:

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

periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities and on a quarterly basis thereafter.

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.

The results of all dust deposition surveys shall be maintained by the Project Manager and shall be made available to Wicklow County Council.

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 & A2. 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 NO2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone D areas over a similar period. NO2 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

Not required.

16.9 NOISE AND VIBRATION

16.9.1 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 Meath 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.

The hours of operation for the site shall be limited to the following hours (or where otherwise agreed with the Planning Authority):

07:00hrs – 19:00hrs Monday to Friday
08:00hrs – 14:00hrs Saturday
Closed on Sundays and Bank/Public Holidays

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 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 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 liase 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 noise screens for construction activities.

It is recommended that high performing acoustic barriers are utilised such as Echo Barrier products or Ventac products.

Double height acoustic blanket enclosure

Acoustic blankets screening piling and 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 considered 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 if required.

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, 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.

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.

Having regard to the above we suggest the inclusion of the following mitigation measure for ease of reference:

N V CONST 4

In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 8.9 of the EIA Report.

16.9.2 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 should 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. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment.

All residential units with a façade facing towards the playing pitches and facilities shall have acoustically rated passive wall ventilation systems.

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 should 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 10.12 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: Playing Pitches
The acoustic screening of the sports pitches or alternative measures as agreed with Wicklow County Council will be necessary to control and minimise the noise impact that their use will have on both the existing residential receptors located opposite the western site boundary and the residential developments located to the south and east within the proposed development.

16.10 LANDSCAPE AND VISUAL

16.10.1 Construction Phase

The remedial measures proposed revolve around the implementation of appropriate site management procedures – such as the control of site lighting, storage of materials, placement of compounds, delivery of materials, car parking, etc. Visual impact during the construction phase will be mitigated somewhat through 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.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. The visual impact of the site compound and scaffolding visible during the construction phase are of a temporary nature only and therefore require no remedial action other than as stated above.

A number of existing trees are to be retained and these are shown in the Arboricultural Reports. Existing trees to be retained are particularly sensitive to negative impacts during the construction phase if proper protection measures are not adhered to. With regard to the protection of the retained trees on site during proposed construction works, reference should be made to BS5837: Trees in relation Design, Demolition and Construction – Recommendations (BSI, 2012). Tree protection details will be included with the application to the Board.

16.10.2 Operational Phase

The primary proposed mitigation measures can be seen on the Landscape Masterplan prepared by Kevin Fitzpatrick Landscape Architects and include as follows:

- Incorporation of a series of open space areas within the residential development.
- Provision of 4.5 hectares of Active Open Space.
- Integration of Greenway along northern boundary into the design.
- Inclusion of linkages between the different hierarchies of open space.

The mitigation measures that have been adopted in the proposed scheme are as follows:

- The retention of much of the existing landscape structure of field boundaries linear woodlands and trees and the layout / design of the site to incorporate these features into the development.
- The architectural layout aims to address visual impacts by proposing variety in scale and massing of buildings and by design and materiality of high quality buildings.
- The extensive planting of additional trees and shrubs throughout the site where possible will reduce the visual mass of the buildings, soften and partially screen the development over time from various viewpoints, as identified in the assessment, thereby minimising the visual impacts.
- Native and appropriate planting for biodiversity has been incorporated into the scheme in accordance with the advice of the Project Ecologist.
- Public open spaces have been designed as part of an overall design strategy that focuses on creating a '*sense of place'* and individual character for the development area.
- Introduce a '*Green Streets'* approach that includes for a sufficient quantum of street trees and planting that form a sufficient barrier between pedestrians and traffic. This approach will also focus the creation of vegetative buffers for privacy and shading to adjoining residences, and for more distant viewers the creation of a green landscape structure within which the development nestles.
- Enhanced treatment of the streams and integration into the open spaces.
- Design of public open space that forms part of a network of spaces that includes areas for passive and active recreation, social / community interaction and play facilities catering for all ages.
- Application of best practice horticultural methods to ensure that mitigation measures establish and grow appropriately.

The scheme design incorporates significant consideration and mitigation in respect of potential impacts. The quality of the public realm scheme is of a high standard and the quality of materials proposed is similarly high and robust.

Landscape works are proposed to reduce and offset any impacts generated due to the proposed development, where possible. The planting of substantial numbers of new trees and other planting in the open spaces the site boundaries and internal roads, both native and ornamental varieties, will enhance the overall appearance of the new development and compensate for the removal of hedgerows and trees where needed for the construction works and increase the overall landscape capacity of the site to accommodate development.

16.11 MATERIAL ASSETS – TRAFFIC

16.11.1 Construction Phase

It is proposed that the construction of the development will be carried out in a number of phases. The primary access will be from R 761 Kilcoole Road where the proposed entrance will be constructed at the commencement of the project. The completion of the spine road through the development that will eventually link between Kilcoole Road and Priory Road will be completed within the first phase. The Priory Road Access may also be used for construction traffic, but this will be limited to access for the initial site setup and for light vehicles only. The subject site has more than sufficient space that the construction compound and car parking for staff and operations can be accommodated entirely within the site.

A Construction Management Plan has been prepared by Cairn and is included in the SHD application, for the proposed development to account for all works associated with the construction of the proposed development. These documents will address likely human health risks and ensure construction practices and measures are put in place to minimise any effects on road users. This Plan will inform a Contractor, when appointed, of the relevant guidance documentation which will need to be followed during construction phase. . A more detailed Construction Management Plan will be submitted by the works contractor, expanding on the CMP, and it will be submitted for approval to Wicklow County Council Road prior to the commencement of any construction works. This plan will ensure that temporary traffic works and road safety measures will be put in place during the construction of the proposed development. The plan will ensure that any required traffic management measures are put in place to minimise the impact on local road users.

It is considered that the construction traffic, with primary access from the Regional Roads of the R761 Kilcoole Road and the R744 Farrankelly Road, will not impact significantly on the existing traffic situation on the surrounding road network.

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.
- A dedicated ‘construction’ site access / egress junction will be provided with manned security during all construction phases.
- 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 deem necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

16.11.2 Operational Phase

To encourage sustainable travel patterns and to help reduce the potential traffic impact of the proposed development it is proposed to promote sustainable travel to the future occupants of the development. This will involve the preparation of a Travel Plan (form of Mobility Management Plan) that will include providing each property with an Travel Welcome Brochure that will include maps of all pedestrian and cycle routes in the area, highlighting the location of the main community facilities, amenities, retail centres, bus stops and the train station, and providing details of bus and train routes and timetables.

Up to date maps and public transport timetables will be put on display in proposed crèche and residential amenity buildings.

The proposed development will deliver the road objective RO7 from the Greystones - Delgany & Kilcoole Local Area Plan, which is *'To provide for a local access road to facilitate development of zoned lands and to provide for the development of a through road from Priory Road to the R761* (Kilcoole Road). This proposed road link will improve accessibility for the immediate local area including people living along Priory Road and Eden Gate.

The proposed development includes the completion of a 650m section of the proposed Three Trouts Stream Greenway, which is an object of the Greystones - Delgany & Kilcoole Local Area Plan (TS12). A toucan crossing is to be provided across the Kilcoole Road to connect to Mill Lane, which continues northeast to Mill Road leading towards the Town Centre. A greenway link connecting from Eden Gate to the proposed development Spine Road is provided in accordance with Local Objective AP6. This greenway then continues through the proposed development to connect to the proposed Three Trouts Stream Greenway. Footpaths will be provided throughout the proposed development and these will link with existing footpaths and facilities. These measures provide a very high level of permeability for pedestrians and cyclists to and through the site, which will help encourage walking and cycling by both residents and visitors of the proposed development and also the adjacent residential areas.

16.12 MATERIAL ASSETS – WASTE MANAGEMENT

The Construction and Operational Waste Management Plans 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 general principles and key aspects of the Construction and Operational Waste Management Plans are detailed as follows:

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 points:

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
- 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 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).*

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils shall be exported to an appropriately waste permitted/licenced facility.

The project manager shall inform Wicklow County Council of the volume of excess soils generated and the permitted / licenced waste facility they shall be exported to.

Excess soils shall be removed off-site throughout the duration of the construction phase. Prior to being removed off-site the excess soils shall be characterised as being inert, non-hazardous or hazardous in accordance with *Landfill Directive (2003/33/EC).* The classification of the soils shall be established by WAC testing which shall occur throughout the construction phase.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous 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 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 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).*

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils shall be exported to an appropriately waste permitted/licenced facility.

The project manager shall inform Wicklow County Council of the volume of excess soils generated and the permitted / licenced waste facility they shall be exported to.

Excess soils shall be removed off-site throughout the duration of the construction phase. Prior to being removed off-site the excess soils shall be characterised as being inert, non-hazardous or hazardous in accordance with *Landfill Directive (2003/33/EC).* The classification of the soils shall be established by WAC testing which shall occur throughout the construction phase.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous 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 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.

16.12.1.8 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

16.12.1.9 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 and Article 27 declarations during the project are maintained in a Waste File at the 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 Wicklow County Council as required / requested.

16.12.1.10 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 this planning 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 in accordance with strategy, policy and objectives 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 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. 2018.*

The proposed residential development at Farrankelly 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 this Waste Management Plan 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 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 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.

A bottle and aluminium can bank shall be located within the development to encourage residents to recycle glass and aluminium cans and divert waste glass from domestic waste bins.

16.13 MATERIAL ASSETS – UTILITIES

16.13.1 Construction Mitigation

The construction works contractor should liaise with the relevant utilities provider prior to works commencing, with on-going consultation throughout the proposed development. Where new services would be required, the construction works contractor should 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 include the following:

A detailed *"Construction Management Plan"* will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the "Construction Management Plan".

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.

16.13.2 Operational Mitigation

Please refer to Chapter 6 of the EIAR – Water for mitigation measures associated with the surface water treatment. 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.

Chapter 6 includes the mitigation measures associated with the surface water system for the development.

It is envisaged that the development would take place and be occupied over a reasonable time period, and therefore the downstream foul sewerage system (foul sewer network and wastewater treatment facility) would be gradually loaded.

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 loading on the foul sewer network and the treatment works at Greystones. As part of the development, a number of different SuDS measures are proposed to minimise the impact on water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The Ground Investigation Report indicates variable permeability across the site, which makes the use of groundwater recharge difficult to determine. Therefore the measures detailed below have been designed to take account of potential percolation, but have not been incorporated into any storage calculations. This will result in additional storage being available in extreme events.

The proposed SuDS measures will include a combination of Source Control, Site Control and Regional Control measures as part of a Management Train whereby the surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment. The combination of the SuDS measures outlined below will maximise the potential for surface water infiltration to the subsoil, 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”.

On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

16.14 ARCHAEOLOGY, ARCHITECTURE AND CULTURAL HERITAGE

Archaeology

A full programme of archaeological excavation (preservation by record) will be carried out at Archaeological Areas 1-3, as identified in the testing report, prior to the commencement of the development. This will be carried out by an archaeologist under licence to the DoCHG. Full provision will be made available for the resolution of the archaeological remains, both during fieldwork and the post-excavation process.

At the time of previous archaeological testing, Field 4 was not included within the proposed development area. It is now proposed to install playing pitches and car parking in this area. Additional archaeological testing will be carried out within Field 4 prior to the commencement of the development. This will be carried out by an archaeologist under licence to the DoCHG. Full provision will be made available for the resolution of the archaeological remains, both during fieldwork and the post-excavation process.

All topsoil stripping associated with the proposed development will be monitored by a suitably qualified archaeologist. Full provision will be made available for the resolution of any archaeological remains that may be identified, both during fieldwork and the post-excavation process.

Architecture

No mitigation is deemed to be necessary.

16.14.1 Operational Phase

Archaeology and Architectural Heritage

No potential impacts with respect to historical, archaeological or architectural heritage matters are anticipated during the operational phase of the development. Consequently, no remedial or reductive measures are considered necessary.

16.15 RISK MANAGEMENT

The Construction Management Plan and the Health and Safety Plan, as well as 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 estate management company will have responsibility for fire safety during operations. In relation to falls these have been dealt with during design.

The proposed development will involve the ground works to facilitate the proposed development. Site investigations have been carried out and have 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 licenced facility. The following are outlined:

- 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 a number of potential risks, as set out below. The risks identified include traffic management, and fire strategy.

- 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. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

- Furthermore, 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 ROD Consulting Engineers. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater 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.

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