Coolagad, Greystones SHD
Environmental Impact Assessment Report

Volume II – Main Report

March 2022

Prepared on behalf of

Cairn Homes Properties Ltd.

MacCabe Durney Barnes
Planning Environment Economics

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1 Introduction

1.1 Introduction

MacCabe Durney Barnes, planning consultants, have been commissioned by Cairn Homes Properties Limited, to prepare an Environmental Impact Assessment Report (EIAR) for a proposed development on a site of c. 26.03 hectares at Coolagad, Greystones, Co. Wicklow. This chapter was prepared by Richard Hamilton, BA, MSc, PGDip EMAE, MIPI, MRTPI Director for MacCabe Durney Barnes. Richard is Chartered Town Planner with over 25 years experience in environmental impact assessment projects in Ireland. He holds a Post Graduate Diploma in Environmental Monitoring and Assessment Engineering.

The application site is a greenfield site located to northern edge of Greystones. The site is bounded to the east and south by built-up areas of Greystones and by agricultural lands to the north and west.

The overall aim of this EIAR is to identify and appraise the likely and significant impacts on the environment arising from the proposed development. This exercise is carried out concurrently with the project design process and is documented in this report. It will accompany the application to An Bord Pleanála with a view to assessing the likely significant effects of the project on the environment. This assessment will inform the decision as to whether planning permission should be granted.

Chapter 2 of this EIAR report includes a detailed description of the proposed development.

The proposed development consists of a strategic housing development (SHD) to include:

586 residential units (351 houses; 203 apartments and 32 duplex units). The development will also include the provision of a community building (392 sqm), a creche (700 sqm), a sport field and a MUGA. A new vehicular entrance, with signalised junction and pedestrian crossings, will be provided off the R761 (Rathdown Road). The new junction will be linked to the existing signalised junction at Blacklion Manor Road / Redford Park which has a planned upgrade by Wicklow County Council. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

This EIAR was prepared in accordance with the European Union Directive 2011/92/EU, as amended by Directive 2014/52/EU, on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) and with the transposing legislation, namely Part X of the Planning and Development Acts 2000- 2021, as amended (the Act), and Part 10 of the Planning and Development Regulations 2001, as amended (the Regulations). It has also due regard to the EPA EIA draft Guidelines of 2017.

1.2 EIA Guidance and Guidelines

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

- Draft EPA revised Guidelines on information to be contained in Environmental Impact Statements (2017) (the Draft EPA Guidelines)
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out environment impact assessment (Department of Housing, Planning and Local Government [DHPLG], 2018) (the 2018 Guidelines).
- Circular Letter PL 8/2017 (DHPLG), as revised by Circular Letter 05/2018 – Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (the EIA Directive) – Advice on Electronic Notification Requirements (Circular Letter PL 8/2017).
- Guidance on the preparation of Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017) (the EU EIAR Guidance).

1.3 Aim of EIA and of the EIAR

The preparation of the EIAR forms part of the EIA process. Article 1(2)(g) of the 2011 Directive, as amended by the 2014 Directive defines Environmental Impact Assessment (EIA) as a process which consists of:

- the preparation by a developer of an EIAR;
- consultations with the environmental authorities;
- the examination by a competent authority of the information presented in the EIAR and any supplementary information provided by the developer or through consultations;
- followed by a reasoned conclusion by the competent authority on the significant effects of the project on the environment, based on the examination discussed above; and
- the integration of this conclusion into any decision.

While the EIA Directive does not specifically define EIAR, the draft EPA Guidelines considers that an EIAR consists of '*a statement of the effects, if any, which proposed development, if carried out, would have on the environment'*. Developers prepare the EIAR for submission to the Competent Authority, in the case of Strategic Housing Development, An Bord Pleanála.

Article 3 of the EIA Directive identifies a prescribed range of environmental factors as follows:

a) 'Population and human health.
b) Biodiversity, with particular attention to species and habitats protected under Directive 92/42/EEC and Directives 2009/147/EC.
c) Land, soil, water, air and climate.
d) Material assets, cultural heritage and landscape.
e) The interaction between the factors referred to in points (a) and (d).'

Information requirements are set out by the Sixth Schedule of the Regulations. In addition, the directive requires that environmental impact assessments should take account of the impact of the project as a whole, including subsurface and underground where relevant, and during construction.

Recitals 31 – 33 of Directive 2014/52/EU also requires that:

- An EIAR should include a description of reasonable alternatives, and an outline of the likely evolution of the current state of the environment without implementation of the project;
- A complete data and information of sufficiently high quality; and

- The experts involved in the assessment be qualified and competent, with sufficient expertise in the relevant field concerned.

Annex II A of the EIA Directive requires that the following information be provided:

1. *'A description of the project, including in particular:*
    a. *A description of the physical characteristic of the whole project and, where relevant of demolition works;and*
    b. *A description of the location of the project, with particular regard to the environmental sensitivity of geographical areas likely to be affected.*
2. *A description of the aspects of the environment likely to be affected by the project.*
3. *A description of any likely significant effects, to the extent of the information available on such effects, of the project on the environment resulting from:*
    a. *The expected residues and emissions and the production of waste, where relevant*
    b. *The use of natural resources, in particular soil, land, water and biodiversity.'*

The criteria of Annex III shall be taken into account, where relevant, when compiling the information in accordance with points 1 to 3.'

The key objective of the EIA process is the identification of the likely significant impacts on the environment and to determine how those effects can be eliminated, minimised, or offset. The EIAR presents the information collected during the impact assessment of the proposed development.

1.4 Screening Requirement for EIA

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

Annex I of the EIA Directive requires as mandatory the preparation of an EIA for all development projects listed therein. Schedule 5 (Part 1) of the Planning & Development Regulations 2001-2018 transposed Annex 1 of the EIA Directive directly into Irish planning legislation. The Directive prescribes mandatory thresholds in respect of Annex 1 projects. The EIA Directive provides EU Member States with a 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 2001-2021. Category 10(b)(i) refers to 'Construction of more than 500 dwellings'.

Category 10(b)(iv) refers to '*Urban development which would involve an area greater than 2 hectares in the case of a 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 26.03 ha and includes 586 residential units. 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 (the Regulations), mandatory EIAR is required.

1.5 Scoping

The draft EPA Guidelines define scoping as *'a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information'*.

As scoping is not a mandatory step in the process, a preliminary environmental scoping report was prepared and submitted to An Bord Pleanála as part of the pre-application submission made in December 2020.

The provisions included in the EIA Directive as amended, the issues listed in Schedule 6, Sections 1,2 and 3 of the Regulations and guidance documents cited at section 1.2, have been addressed in this EIAR. The topics addressed in the context of the proposed development are presented in Section 1.8 – Table 1. These are addressed in the report. They are accompanied by standalone reports and / or appendices, the latter can be found in Volume 3 of the EIAR.

1.6 Information to be Contained in an EIAR

Article 5 of the EIA Directive sets out the following requirements on information for inclusion in an EIAR:

1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. 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.

Where an opinion is issued pursuant to paragraph 2, the environmental impact assessment report shall be based on that opinion, and include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the project on the environment, taking into account current knowledge and methods of assessment. The developer shall, with a view to avoiding duplication of assessments, take into account the available results of other relevant assessments under Union or national legislation, in preparing the environmental impact assessment report

The information in Annex IV forms one of a number of information requirements under Article 5. Annex IV is "additional information" that must be included where such additional information is "relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected." Annex IV of the EIA Directive set out the, as follows:

1. *'Description of the project, including in particular:*
    a. *A description of the location of the project;*
    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;*
    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; and*
    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; and*
    g. *the technologies and the substances used.*
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 (on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC), or Council Directive. 2009/71/Euratom (establishing a community framework for the nuclear safety of nuclear installations),or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.*
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.'*

Likely significant effects investigated should be described as follows:

- Direct and indirect;
- Secondary, cumulative, transboundary
- Short-term, medium-term and long-term
- Permanent and temporary
- Positive and negative

The assessment should be carried out having regard to the prevailing environmental objectives of relevance to the project.

The EIAR should also include a description of the forecasting methods or evidence used to identify and assess significant effects on the environment and if difficulties arose during the collation of the information and whether there were any uncertainties.

1.6.1 Basis for Assessment

The impact assessment examines the existing environmental conditions within the study area for each element of assessment and then determines the potential impacts associated with the Proposed Project during its construction and operational phases.

The study area considered within this EIAR differed for each environmental aspect and extended to incorporate all areas where there was potential for significant impact (i.e. any sensitive areas which could be affected by this development were included in the study area). Further information on the extent of the study area considered for each topic is addressed in the relevant corresponding EIAR chapter.

1.6.2 Impact Assessment and Mitigation

The preparation of the EIAR was an iterative process, linking into the design development process. The approach adopted in the impact assessment and preparation of the EIAR was based

on the recommendations in the Draft Guidelines on information to be contained in Environmental Impact Assessment Reports (EPA, 2017).

The proposed design was developed and the potential impacts of the proposal on the receiving environment were identified. Mitigation measures have been considered where necessary and will be implemented as required.

1.6.3 Significance of Environmental Issues

The glossaries contained in the Draft Guidelines on the information to be contained in EIAR (EPA, 2017) describes an impact as 'change resulting from the implementation of project.' The following factors were considered when determining the significance of the impact (both positive and negative) of the Proposed Project on the receiving environment:

- The quality and sensitivity of the existing/baseline receiving environment;
- The relative importance of the environment in terms of national, regional, county, or local importance;
- The degree to which the quality of the environment is enhanced or impaired;
- The scale of change in terms of land area, number of people impacted, number and population of species affected, including the scale of change resulting from cumulative impacts;
- The consequence of that impact/change occurring;
- The certainty/risk of the impact/change occurring;
- Whether the impact is temporary or permanent; and
- The degree of mitigation that can be achieved.

The criteria outlined in the Draft EPA Guidelines have also been followed when quantifying the duration and magnitude of impacts. The quality of the impact is described as 'negative', 'neutral' or 'positive'. Particular consideration is also given to whether significant impacts are 'Direct' or 'Indirect'. Further information on the specific methodologies utilised for the assessment of each environmental aspect are included in the relevant EIAR chapters.

Where no impact or a positive impact was predicted to occur, the design of the Proposed Project remained unchanged. Where significant adverse impacts are predicted, mitigation measures are proposed to avoid or minimise impacts. Where feasible, these measures were then incorporated into the design of the Proposed Project.

Table 1-1: Assessment of Potential Impacts Terminology and Methodology

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**Definition**

Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

1.7 Format and Structure of the EIA

The format used in this EIAR document is referred to as the 'grouped format' in that it seeks to enable the reader to access the issues of interest to them as easily as possible. The EIAR is divided into three Volumes as follows:

- Volume 1: Non-Technical Summary;
- Volume II: Main Environmental Impact Assessment Report; and
- Volume III: Appendices to the Main Environmental Impact Assessment Report.

The EIAR has been divided into the following chapters:

- Chapter 1: Introduction
- Chapter 2: Description of Development

2 Description of Proposed Development

2.1 Introduction

The EIA Directive requires that an EIAR includes a description of the project comprising information on the site design, size and other relevant features of the project. Recital 22 of the Directive 2014/52/EU requires that

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

This chapter satisfies the requirements of the EIA Directive, providing detail on the location, size and characteristics of the proposed project.

This chapter was written by Richard Hamilton, BA MSc, PG Dip EMAE MIPI MRTPI, Director at MacCabe Durney Barnes. He is a Chartered Town Planner with over 25 years experience in planning and environmental assessment.

2.2 Site Location and Surrounding Area

2.2.1 Site Location

The application site consists of a site c. 26.03 ha in Coolagad, Greystones Co. Wicklow. Greystones is c. 8km south of Bray and 27 km south of Dublin and is connected to Dublin and Wexford with rail and bus connections and direct access to the N11 motorway.

Coolagad is approximately 2.1 km from the Dart station which is located at the western edge of the town centre. A bus stop is located on the R761 close to the site and school. The townland of Coolagad is in the Electoral Division of Delgany.

The site consists of green fields measuring c.26.03 hectares located at the north-western edge of Greystones town as part of a new emerging district consisting of new residential, retail and educational development.

The site is located immediately to the west of the new Waverly and Sea Green residential neighbourhoods on sloped land in Coolagad with Kindlestown Hill and Woods to the west.

The development will tie in with these new neighbourhoods as well as facilitating future connections to the three new schools serving these new communities, namely Greystones Educate Together National School, Gaelscoil na gCloch Liath, and Temple Carrig Secondary School.

Access is to be provided via a new access road also forming part of this application running westwards from a junction at the R761 Rathdown Road opposite Redford Cemetery from which a new crèche and community building shall be accessed in turn serving active public open space at the rear.

The Greystones-Delgany & Kilcoole Local Area Plan 2013-2019 (the LAP) envisaged that this road will ultimately form part of an overall route westwards that will create a northerly gateway from the N11 to Greystones.

Figure 2-1: Location map (Source EPA mapping)

Figure 2-2: Site location context (Source: MCORM Architects)

2.2.2 Site Context

The site is located within the administrative area of Wicklow County Council. The policies and objectives found within the 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, Open Space, Active Open Space and includes a Community and Education block in the open space area.

The LAP includes objectives for;

- The provision of a community building located within lands zoned AOS, to the north of AP1 lands.
- A short term road objective is designated to the north of the lands zoned OS and AOS. This new distributor road will be accessed from the R761 to the east.

The LAP seeks that development of the AP1 Coolagad Action Plan should provide pedestrian connections by green routes linking the residential areas with community facilities, existing schools, public transportation, adjoining housing developments and Blacklion Neighbourhood Centre. It also seeks that a community centre/facility or facilities shall be provided within lands zoned AOS as part of a planning application. The LAP sets out a phasing plan for the AP1 Coolagad Action Plan lands which seeks the timely delivery of the utilities and social infrastructure. An action plan was agreed with the planning authority in 2016 by a previous owner, which is addressed in the Planning Report.

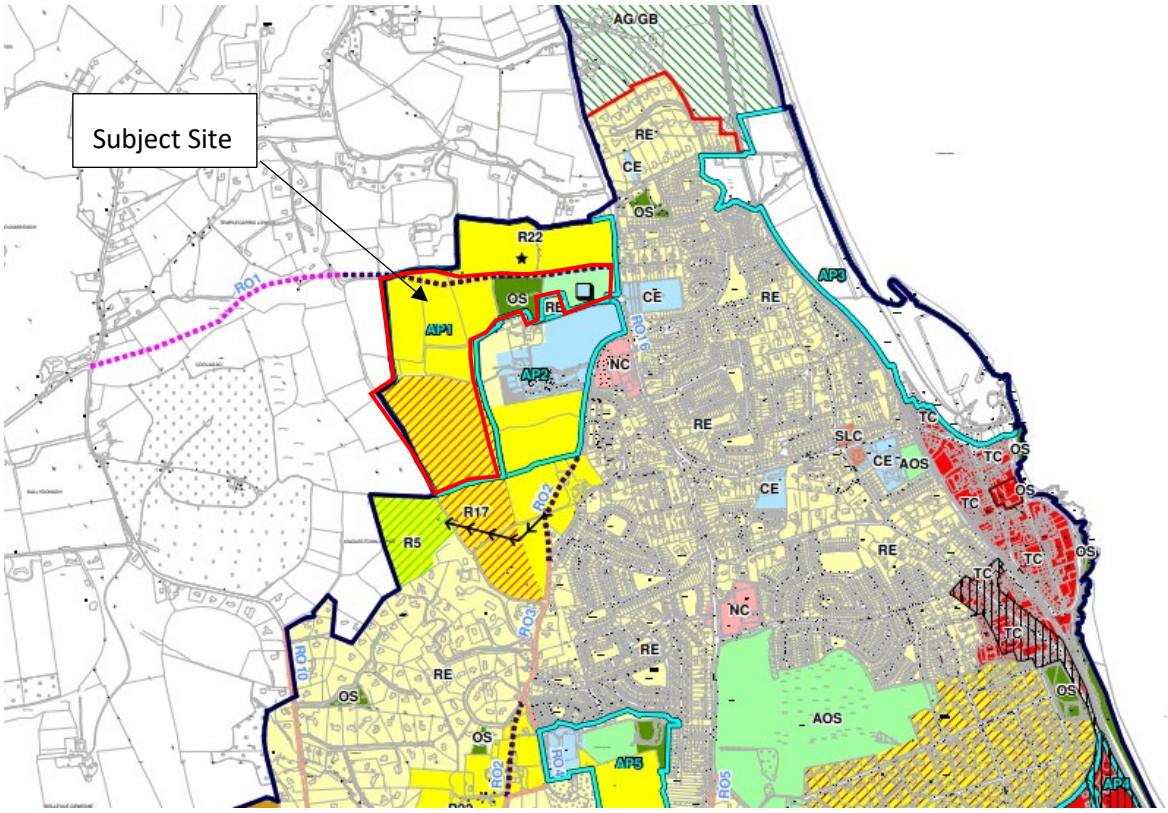

Figure 2-3: Site location indicated on Greystones-Delgany & Kilcoole LAP 2013-2019 Zoning Map

The subject site is in agricultural use, comprising fields of arable land used for grazing. The southern side of this northern portion of the site is bound by a lane that is accessed from the

Rathdown Road (R761). This lane provides vehicular and pedestrian access to a large single private dwelling that is located to the south west of this easternmost field within the development site, and to the Coolagad estate. The laneway shares its southern boundary with Temple Carrig School and accompanying floodlit, all-weather sports pitch. Another laneway that provides private access from the west side of Coolagad estate to fields to the west, bisecting the development site in an east-west direction.

Figure 2-4 Overview of existing land use on site to the north west of Greystones

2.2.3 Contiguous Land Use Site Context

The eastern boundary of the northern portion of the site is bound by the Rathdown Road (R761) which connects Greystones to the town of Bray to the north and Kilcoole to the south. The R761 links Wicklow to Greystones town further to the south. Immediately across Rathdown Road from the development site there is a cemetery, Redford Cemetery, which is located on the western edge of a large residential suburban zone comprising multiple housing estates, namely, Redford, Rathdown, La Touche, Fairfield, Mount Haven, St. Crispin's, The Grove and North Shore to the north. The total combined area of this residential zone measures approximately 68ha.

To the south of the northern portion of the site, a group of three schools, Temple Carrig School, Gaelscoil na gCloch Liath, and Greystones Educate Together National School are located with their associated facilities. The accompanying school facilities include a floodlit, all-weather sports pitch, a grass football pitch, car parks, playgrounds, and several smaller hard-paved sports pitches.

The contiguous land to west of the development site comprises several agricultural fields located on the eastern slopes of Kindlestown Hill.

2.2.4 Topography and Drainage

The topography of the site can generally be described as sloping from its highest points in the west to its lowest points in the east with a moderate to gentle gradient. The highest point in the development site is 93.5m O.D. and is located on the eastern slopes of Kindlestown Hill along the western boundary of largest field in the southern portion of the site. The lowest point in the development site, is 39.5 O.D. and is located on the eastern boundary of field in the northern eastern portion of the site that borders the Rathdown Road (R761).

2.3 Detailed Description and Physical Characteristics of the Proposed Development

We, Cairn Homes Properties Ltd, intend to apply to An Bord Pleanála for permission for a 7 year planning permission for a strategic housing development at this site of c.26.03ha at 'Coolagad', Greystones, Co. Wicklow. The application site is generally located to the west of the R761 Rathdown Road, north of Gate Lodge; north and west of Coolagad House, Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School. The lands are bounded by Waverly Avenue and Seagreen Park residential areas to the east. Templecarrig Lower is located to the north of the lands and Kindlestown Upper to the west.

The proposed development will consist of:

- 586 residential units including:
  - 351 two storey houses (207 no. 3 bed, 140 no. 4 bed, 4 no. 5 bed) comprising detached, semi-detached and terraced units
  - 203 no. apartments (65 no. 1 bed, 123 no. 2 bed, 15 no. 3 bed) provided within 6 no. blocks ranging from three to four-storey (over basement) with residential amenity facilities .
  - 32 no. duplex units within 2 no. three-storey blocks (16 no. 2 bed and 16 no. 3 bed units)
- c. 5,192 sqm of communal open space is provided to serve the proposed apartment/duplex units.
- Community building (single storey) of 392 sq.m. with 29 car parking spaces, including changing rooms and a multipurpose room.
- Creche building of 734 sq.m. with 21 car parking spaces.
- A new vehicular entrance, with signalised junction and pedestrian crossings, will be provided off the R761 (Rathdown Road). The new junction will be linked to the existing signalised junction at Blacklion Manor Road / Redford Park which has a planned upgrade by Wicklow County Council. Cycle lanes will be provided along this section of the R761 on both sides. A footpath will also be provided on its western side. Car parking will be provided to the east of the R761, in the front of Redford Cemetery.
- The new access will provide a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11.
- Car and bicycle parking spaces are provided as follows:
  - 702 on curtilage car parking spaces for the houses; 206 car parking spaces at basement level and 5 at surface level for the apartments; and 32 spaces for the duplex units and 10 visitor spaces at surface level;
  - 22 motorbike parking spaces;

- 436 resident and 118 visitor bicycle parking spaces are proposed in a mix of basement and surface levels for the apartment blocks and duplex units; 12 bicycle spaces are proposed for the creche, 12 for the community centre and 10 at the sport field.

- The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the construction of a new public foul sewer along the R761/R762 from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.
- c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces incorporating an existing stream, formal and informal play areas, and new boundary treatments.
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

2.3.1 Design Rationale

The design rationale for the proposed development is illustrated in the Design Statement and the iterative process has evolved having regard to the Urban Design Manual – a Best Practice Guide (2009) (DEHLG, 2009). The manual establishes 12 criteria that residential development should be assessed against. Additionally, the design layout has been informed by the following:

- Location;
- Critical demand for housing;
- Zoned for residential use;
- The challenging topography and the irregular shape of the site;
- The proximity to Kindlestown Hill;
- The pattern of development in the area;
- Transport Accessibility;
- The development plan, local area plan and national planning guidance;
- Urban Development and Building Height Guidelines (DHLGH, 2018);
- Design Standards for new Apartments- Guidelines for Planning Authorities (DHLGH 2018);
- Sustainable Residential Developments in Urban Areas-Guidelines for Planning Authorities (DHLGH, 2009);
- The Design Manual for Urban Roads and Streets (Dept. of Transport, 2019);
- Feedback from the Planning Authority;
- The Opinion of An Bord Pleanála;
- The Environmental Impact Assessment Report; and
- The pattern of decisions from the Board on SHD applications in Wicklow and generally.

The SHD Planning application is accompanied by a Design Statement prepared by McCrossan O'Rourke Manning Architects which addresses the criteria in the Urban Manual – a Best Practice Guide (DEHLG, 2009). This highlights the following design approach to the site.

2.3.2 Topography and Nature Integration

Topography is one of the major subject site traits to be addressed and integrated within the overall scheme in order to deliver a neighbourhood with an accessible public realm and an adequate integration within its environs, avoiding a negative visual impact to the landscape in this area and maximising the preservation of existing mature and valuable nature.

The overall layout has been enhanced in terms of topography integration shaping an urban structure of organic cells that generally follow the existing contours. In this regard, the site strategy endeavours an attentive consideration to section design, developing a careful arrangement of houses and multi-unit blocks with full regard to the existing ground levels at each location.

The site shows a clear relationship between topography, water courses and nature. The northern portion of the site presents three hedgerows with mature trees traversing the site from north to south and the most western turns to the east towards at two central locations, following existing water courses that flow descending perpendicularly to the contours. Both these and the tree cluster located in the south-eastern site corner are mostly integrated in the site masterplan by envisaging landscaped public open spaces that have full consideration to this natural assets.

The existing steep topography has been considered as an opportunity for the urban design concept and development, with varying site ground levels used to achieve a terraced neighbourhood with its own character.

2.3.3 Urban Design

The MCORM Architects Design Statement sets out a number of urban design principles are applied in the design development process to reinforce thiscontext integration approach, as follows:

1. **An efficient urban structure** that enables a viable arrangement of traditional housing cells while also merging well within the existing topography, as the site elevates from east to west and presents an overall undulated landscape. Adapting to the site contours, the urban pattern envisaged also explores density opportunity at north-western and southern edges proposing apartment and duplex blocks.
2. **A varied and legible overall urban form** throughout the site by means of terraced, semi-detached houses and detached houses, with a general deep-plan arrangement, except from wide-frontage typologies, and rear gardens. In addition, the apartments and duplexes will contribute to a stronger neighbourhood masterplan in terms of variety and legibility, enhancing way- finding and passive surveillance throughout the scheme and, particularly, at their adjacent public realm proposed.
3. **An inclusive residential community**, which is achieved by the typological dwelling variety previously exposed and envisions a new neighbourhood with a wide variety of households including houses, duplexes and apartments.

3 key principles results on the following place-making items:

- **An interconnected network of landscaped open spaces** integrated within an overall public realm, conceived as an extension of the private residential amenity for residents to meet and enjoy.
- **A permeable and hierarchical street network** to promote sustainable and safe movement throughout the site and to proximate amenities. Permeability highlights the opportunities to provide easy connections between all site locations and provision of future connections adjacent educational and retail facilities in the east, along with the adjacent residential neighbourhoods located to the east and south. The street hierarchy established aims to boost pedestrian and cycling journeys throughout a traffic-calmed network of primary and secondary access streets, along with two vehicular-free links, crossing the site from east

to west, which are strategically located in the north-western and southern portions of the site.

- **An overall accessible and active public realm** which is designed as an integration of soft (parkland and greenways) and hard (streets) landscaped spaces. The area of apartment buildings presents a greater park, in keeping with the scale of the adjacent built fabric, whilst the southern portion of the site will enjoy a more domestic central green space surrounded by 2-storey housing, ensuring in all cases active housing and apartment buildings' frontages overlooking public open spaces and streetscapes.

Figure 2-5 Site Context and integration (Source MCORM Architects)

The site strategy aims to achieve permeable movement within the scheme and to proximate community facilities and residential neighbourhoods. For that purpose, a network of pedestrian routes throughout the site is created to provide vehicle-free future connections to the adjoining residential, educational, community and retail amenities as well as the town centre and future residential neighbourhoods that will be developed in the northern and southern lands that adjoin the subject site of this application.

Figure 2-6: Site Layout Plan (Source: MCORM Architects)

The combination of typologies delivers a net density of c.35.88 units per hectare which is considered appropriate for this location under section 14.3.12 the Sustainable Residential Developments in Urban Areas-Guidelines for Planning Authorities (May 09) (DHLGH, 2009) indicate that the appropriate density is c 35-50 dwellings per ha. National Planning Objective 35 (NPO 35) of the National Planning Framework (DHPLG, 2018) seeks to increase residential density in settlements.

A series of landscaped spaces vary in configuration and use and are contained by the surrounding houses/buildings to create distinctive landscaped areas that assist way- finding and

strengthen the legibility of the scheme. Housing and multi-unit dwelling arrangements configure 4 distinct built environments that will respond to a strong character area strategy.

Active frontages define and overlook open areas and green ways. In particular, the north-western cell of 4-storey apartments presents the scheme as it creates an external prominent corner overlooking to the new road planned, which will bound the scheme along its northern edge and strong frontage to the adjacent public open space to the south. 3-storey duplexes will also contribute to a similar function at the south-eastern corner, presenting the scheme at one of the secondary links to adjacent future residential developments. Traditional 2-storey housing typologies will also contribute to the varied urban form proposed as they combine deep-plan units with wide-frontage types, presenting aesthetic detailed solutions such as gable entrances and pitched roofs at selected locations and most prominent frontages to landscaped public areas and greenways.

2.3.4 Landscaping

A Landscape Strategy Report accompanies the planning application prepared by Kevin Fitzpatrick Landscape Architecture. The landscape strategy aims to integrate the proposed residential development with the existing landscape and create a network of attractive and useable open spaces while contributing to local biodiversity. The public green areas are designed as landscape spaces that offer the opportunity for meeting, walking, interaction with nature and formal and informal play.

Open space proposals include active open space and public open space to accommodate a range of activities to include:

- 6,800 sqm playing field;
- 715 sqm multi-use game area (MUGA);
- 1000 sqm kickabout area;
- 1,375 sqm of mix natural and equipped play; and
  - 888 sqm standard equipped playground.

The character of the proposed landscape is one of parkland, native woodlands, native hedgerows, large trees, copses of native trees, wetlands, formal clipped hedges, and meadow areas. The protection and enhancement of existing landscape features, notably large trees, the stream, wetland marsh and native hedgerows is an important aspect of the overall strategy, providing a structure for circulation and the connection of proposed open spaces, while continuing to develop green infrastructure links in the area. The long-term development and maintenance of the landscape is an integral part of the design strategy.

The overall landscape strategy is to provide usable public open space for future residents. A series of open spaces and parkland are connected by linear green links which are based on existing landscape features. These existing features form part of the existing green infrastructure links within the site and surrounding area. The open spaces are distributed throughout the site and each space is easily accessible from the surrounding residences. In the primary open spaces, the levels have been carefully considered to accommodate a large flat area for passive recreation, formal and informal 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.

Figure 2-7: Landscape Masterplan (Source: Kevin Fitzpatrick Landscape Architecture)

The landscape is divided into several open space and transitional areas, each with a different character and range of uses. The largest area is the Active Open Space which measures 3.05 hectares. This is designed as a public park with playing fields, games court, playgrounds, cycleways, seating spaces and a wetland habitat. The central open space is created around the stream and primarily focused of protection of the existing vegetation and underground archaeology and creation of new native habitats. Linear parkland is to be provided on most perimeters of the site providing a range of habitats and spatial uses. Further to this green infrastructure links are provided through out the site, linking the various landscape spaces, and creating ecological corridors linking to other landscape elements outside of the site boundary. connectivity is central to the design strategy.

Five landscape typologies are proposed for the site, with various functions and landscape characteristics:

- **The Park –** Main parkland space with playing field, MUGA, playground and amenities

- **Linear Park-** Significant areas of public open space along the full western boundary and the eastern boundary of the southern section of site. This linear parkland retains and enhances the existing hedgerow where it exists and creates new perimeter hedgerow
- **Greenlinks –** Integrates the proposed residential development with the existing landscape and create a network of attractive and useable open spaces while contributing to local biodiversity.
- **The Stream –** Central space that integrates with stream, hedgerows and archaeological features
- **The Pines -** Central open space designed as an active landscape area with the aim of strengthening local biodiversity while offering a range of uses to residents of the local area.
- **Courtyard Gardens** – Passive residential amenity space

Figure 2-8: Proposed Landscape Typologies (Source: Kevin Fitzpatrick Landscape Architecture)

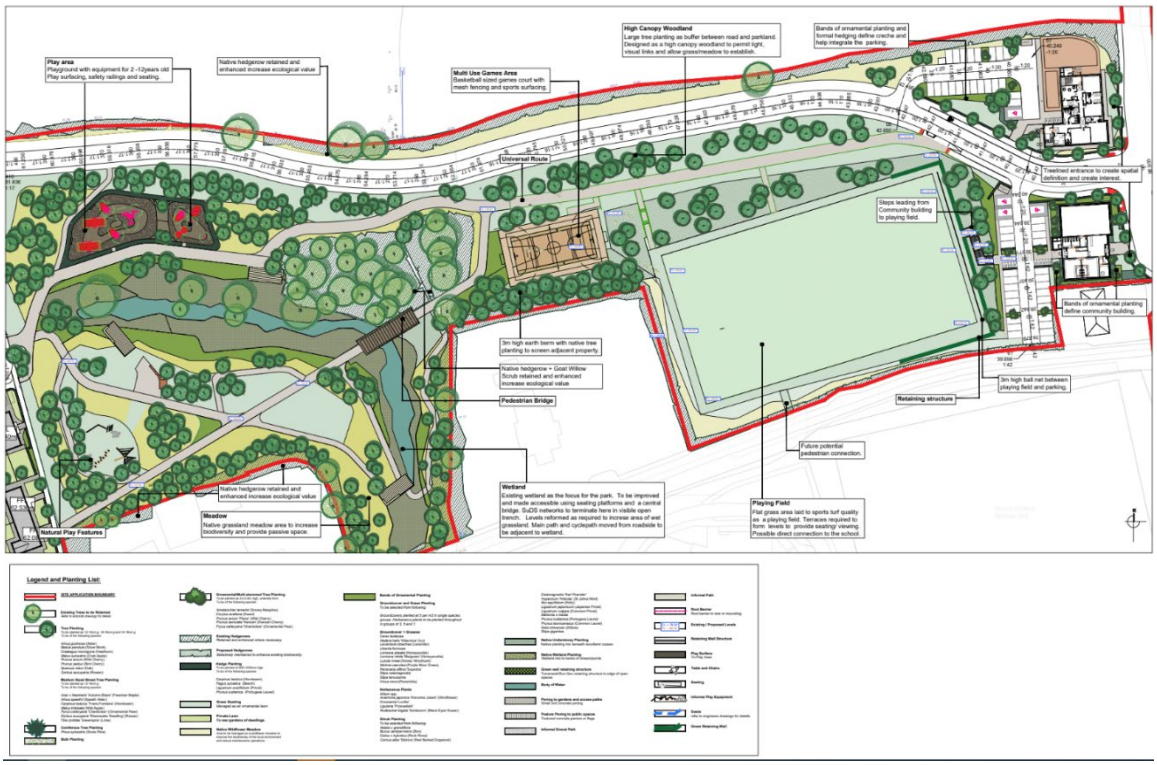

Figure 2-9 **Proposed Parkland Space at the 'The Park' (Source: Kevin Fitzpatrick Landscape Architecture)**

The desire lines through the landscape spaces are reflected in the path layout and will integrate with the general street layout to provide a high level of pedestrian permeability. The pedestrian circulation network is designed to accommodate movement through the space at a gradient of less than 1:20 w here this is achievable. The layout of the paths and planting allows smaller areas of lawn suitable for passive uses by smaller children and other alternative uses to the large kickabout space. Pedestrian permeability throughout the site and to adjoining sites has been provided linking with the existing and future proposed footpath network and passive surveillance has been considered throughout all the open spaces.

The enhancement and strengthening of existing landscape features throughout the site is a fundamental aspect of the overall landscape approach. The green infrastructure strategy serves to link and integrate all of the spaces within the site together using existing and new landscape elements, while also contributing to green infrastructure in a wider context by creating opportunities to connect to green infrastructure beyond the site boundary.

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. Hedgerows increase local biodiversity and create habitats, thus becoming biodiversity corridors which link to other green infrastructure features in the surrounding areas. In addition to this, retaining hedgerows and ditches also allows the prospect of implementing a SuDS network through the site which can integrate into the circulation routes and become a part of the wider green infrastructure strategy.

The stream and associated vegetation are 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 infrastructure strategy. The existing riparian corridor will be enhanced and significantly widened

to form the focus on one of the main spaces. The existing wetland marsh will also be increased in size and enhanced to create an important wetland habitat of significant biodiversity value. The stream and wetland form the basis for a SuDS system, with all proposed channels eventually running into the stream. This is expanded upon with ditches and swales that will be created as bioswlaes adding to the green infrastructure network.

2.3.5 Planting Strategy

The plant species are chosen to respect and enhance the local environment while providing suitable vegetation that is harmonious with a residential area and will be successful through all stages of its maturity. Therefore, the planting palette has a limited number of species chosen for their appropriateness and with a preference for native planting where possible.

Large native Oaks and native Pines are the dominant tree species proposed throughout the main open space areas and will be complimented by, Alder, Birch, Wild Cherry and Rowan trees. When the trees mature, they will have a very strong visual impact and will define the character of the development.

Trees have specifically located outside of proposed attenuation areas to avoid any interference with future services. The street trees are chosen due to their more compact habit. Each street is to be planted using a single variety of tree and hedge giving a specific landscape character to each part of the development.

The existing trees that are retained within the scheme are to be enhanced and strengthened by additional planting of native 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. Formal evergreen hedges are used throughout the development to define spaces and create boundaries. These hedges will complement the estate landscape character of the site. Evergreen shrub mixes are also used as robust structural planting to define the streetscape and spatial uses. Ornamental and groundcover planting will be used to frame seating areas and cover the existing embankments in the open spaces, which will increase the aesthetic qualities of the space.

The main structure planting around the site will be native hedgerow shrubs and tree planting, along with dense woodland and understory planting to create visual screening and improve biodiversity. Native plants such as Blackthorn, Hawthorn, Hazel and Holly are all used in the hedgerow mix and tree-planting in the hedgerows consists of Common Birch, Native Oak, Scots Pine, Wild Cherry and Common Alder.

2.4 Archaeology

Another key factor was the discovery an archaeological feature at the centre of the site. It is also located at the confluence of the existing laneway, tree groupings and the stream and the area was therefore ecologically sensitive. On foot of consultation with the National Monument Service, an Archaeological feature has been integrated into ‘the Stream’ Open Space. The proposed development provides for the preservation in-situ of c. 60% of the double-ditched enclosure. The southern 40% will be preserved by record (archaeological excavation) in advance of construction activity. Preservation by record will be undertaken under licence to the National Monuments Service of the Department of Housing, Local Government and Heritage (DoHLGH), with work being undertaken in accordance with a pre-agreed methodology that would include

detailed finds retrieval and environmental remains strategies. A justification for the partial removal of the is assessed in the EIAR in the archaeology chapter 11.

Table 2-1: Key Statistics

Development Parameter	Summary
Parameter Site Proposal	26.03 ha gross; 16.33 ha net
No. of residential units	586
No. of **houses: 351 units** comprising:	207 no. 3-bed 140 no. 4-bed 4 no. 5-bed
No. of **apartments: 235** units comprising: (this includes 32 duplex type apartments and 203 apartments)	65 no. 1 bed 139 no. 2 bed 31 no. 3 bed
Ancillary storage bike / bin	Basement: 915 sqm (bin & plant for apartment basement, LV meter upper/lower ground floor and include external cycle store on ground floor)
Non-residential uses:	Creche (734 sqm) Community (393 sqm) 6 no. ESB substations at surface (105 sqm in total) Residential amenity: 492 sqm
Density	35.88 units per ha net site
Plot Ratio	0.43
Site Coverage	18.8%
Dual Aspect apartments	100 % Duplex 50% in Blocks A1, B1, C1, A2 and C2 52% in Block B2
Car Parking overall	A total of 1,005 car parking spaces broken down as follows: • 702 surface car parking spaces for the houses; • 206 car parking spaces at basement level and 5 at surface level for the apartments; • 32 spaces with 10 visitor spaces for the duplex dwellings; • 29 spaces for the community facility • 21 spaces for the creche.
Bicycle parking	554
Height	2 to 4 storeys
Public Open Space zoned	C. 2ha
Open Space (residential public open space)	3.36 ha (c20% of net / 13% of gross)
Communal Open Space	5,192 sqm
Active Open Space	c2.35 ha

Table 2-2: Overall Breakdown of Units

Unit Type	1-bed Apt	2-bed Apt	3-bed Apt	3-bed House	4-bed House	5 bed House	Total
No. of units	65	139	31	207	140	4	586
% of overall development	11	24	5	35	24	1	1
% apartments /houses	40			60			100

Table 2-3: Breakdown of Apartments

Unit Type	1 bed Apt	2 bed Apt	3 bed Apt	Total
No. of units	65	139	31	235
% of apartments	28	59	13	100%

2.4.1 Residential Use

The proposed development includes a mix of houses, duplex apartments and apartments. The residential layout is divided into character areas as discussed in the Architecture and Urban Design Statement.

2.4.2 Community Use

A community building (392 sqm) is also proposed as part of the proposed development. It is proposed to be located immediately south of the site entrance. Proposals have been formulated on foot of consultation with the Community and Enterprise Section of the Council. The Council had indicated that there are demands for community facilities such as changing rooms, youth and community support spaces. In this regard and allowing for flexibility for the Council community requirements, the applicant has designed the space flexibly so that it can be occupied and adapted as the Council deems appropriate. 29 no. parking spaces are proposed to serve the community facility.

A creche (734 sqm) is proposed as part of the proposed development. It is proposed to be located immediately to the north of the site entrance. The creche will serve the proposed development and wider area. It is adjacent to the zoned active open space and public open space, providing close outdoor play areas in addition to the provided creche open space area. 21 no. parking spaces are proposed to serve the creche.

2.4.3 Active Open Space

The open space proposals include active open space and open space. The lands zoned active open space are proposed to accommodate a range of activities to include:

- 6,800 sqm playing field
- 715 sqm MUGA
- 1000 sqm kickabout area
- 1,375 sqm of mix natural and equipped play; and
- 888 sqm standard equipped playground.

The proposed playing field would be taken in charge by Wicklow County Council and under their stewardship is likely to be available to local schools, clubs for training and matches during the evening and weekends.

The active open space has the potential to be used day and evening, seven days a week and therefore be a valuable asset to the community.

The active open space proposals would be set on landscaped grounds, which included wooded areas and a stream, which are already on site.

In addition, the residential areas include further play and open space areas.

A large area of open space is proposed centrally to the site. It includes archaeological remains which were identified during surveys of the site.

2.4.4 Access and Parking

A new junction is proposed at the regional road providing a single new access into the site. It will be a signalised junction.

The main entrance to the site had been designed to align with the long term road objective in the Greystones Delgany Kilcoole Local Area Plan (LAP) 2013-2019. The LAP envisages that a distributor road would traverse the lands in an east west manner to connect in the future Greystones to the N11.

A number of roads and pathways are proposed to be built up right up to the boundaries of the site to allow for future potential road, pedestrian and cycle connections to adjacent landholdings.

A total of 1,005 car parking spaces are proposed on the site. It includes 702 surface car parking spaces for the houses; 206 car parking spaces at basement level and 5 at surface level for the apartments; 32 spaces with 10 visitor spaces for the duplex dwellings; 29 spaces for the community facility and 21 spaces for the creche.

2.5 Services

2.5.1 Water Supply

An existing 100mm watermain has been identified along the R761 fronting the proposed site entrance. This watermain transitions to a 200mm HDPE watermain further south along the R761, at the Blacklion Manor Road junction.

It is proposed to supply the development via a new watermain network that connects to the existing network along the R761. As part of the proposal approximately 200m of the existing 4 inches watermain section is required to be upgraded up to 200mm in diameter, in line with the recommendations issued as part of the Irish Water Confirmation of Feasibility: To connect this development to Irish Water's water network approx. 200m of existing 4 Inch watermain must be upsized to 200mm.

2.5.2 Foul Water Drainage

No foul water drainage has been identified within the boundary of the subject site. There is an existing 300mm uPVC foul sewer located in Redford Park flowing eastwards (distance approximately 200m from the subject site); there is an existing 150mm foul sewer located in Rathdown Park flowing eastwards (distance approximately 340m from the subject site; there is an existing 225mm foul sewer located in Chapel Road flowing southwards (distance approximately 500m from the subject site). Further south, this 225mm foul sewer flows eastwards along the Rathdown Road and transitions to an existing 375mm combined sewer in

Victoria Road (distance approximately 900m from the subject site). It is noted that the existing foul water network is currently flowing towards the existing pumping station in Victoria Road.

An existing 225mm foul water network has recently been constructed to serve the Waverly development, located to the east of the proposed development.

In terms of the Proposed Foul Water Drainage, AECOM have reviewed the existing foul water network in the area and have identified a new connection location into the existing 375mm combined sewer that flows eastwards in Victoria Road, which is currently flowing towards the existing pumping station. Refer to Figure 3 for the location of the proposed foul water connection. The proposed foul sewers have been designed in accordance with Irish Water's code of Practice for Wastewater Infrastructure (2020) and will fall by gravity into the existing 375mm combined sewer via a new 300mm pipe to be laid along the R761 and Victoria Road roadways.

2.5.3 Surface Water Drainage

Several springs are located within the subject site and a stream drains across the centre of the subject site in an easterly direction. Regarding surface water drainage infrastructure, a 750mm diameter culvert, approximately 6.1m long, has been identified along the existing stream that flows through the site. The culvert appears to facilitate access between the existing fields either side of the stream and is located approximately 9.9m from the eastern boundary of the subject site.

A surface water pipe with an unknown diameter has been identified draining from, what appears to be, a natural depression located in the south eastern corner of the subject site. The pipe drains in a northerly direction discharging into the existing stream, east of the abovementioned 750mm culvert section.

There are also 2 no. culverts located in the eastern portion of the site. It is understood that one of the culverts drains from within the subject site, at the north eastern corner of the Evans property, and drains in a south easterly direction, traversing the Evans property and back into the subject site, before it exits the subject site again.

It is understood that the second culvert drains from the site boundary at the north eastern corner of the subject site and drains in a southerly direction, before it exits the subject site approximately 75m east of where the other culvert exits the site. It is unknown as to whether these 2 no. culverts link up further downstream, however it is worth noting that an existing 450mm diameter surface water pipe has been identified approximately 65m south of this location which may be the outfall.

With no formal existing surface water networks identified within the site area or along the R761 roadway, it is proposed to maintain the current flow paths from the site and drain surface water runoff from the proposed development to either the existing stream within the site, a proposed wetland area or the existing underground pipe identified in the Enviroguide survey. Reference AECOM drawing no. 60641912-ACM-XX-00-DR-CE-10-0501 to 0506 for the proposed on-site drainage and discharge locations. AECOM have modelled the proposed on-site surface water drainage network in order to ensure that the discharge will be restricted to the associated greenfield runoff rate and that sufficient attenuation storage will be provided to achieve this. Proposed drainage design measures include:

- On-site Attenuation Storage; and
- SuDS (Sustainable urban Drainage Systems).

2.5.4 Telecommunications

A 6 x 100mm ducts has been identified along the R761 and 3No. substation are located at the junction between the R761 and Redford Park.

2.5.5 Natural Gas

A 250mm 4 Bar natural gas main has been identified along the R761 fronting the proposed site entrance.

2.5.6 Electricity Supply

The existing ESBN infrastructure consists of the following assets which currently supply areas outside of the proposed development:

- An overhead (OH) 38kN line which traverse the north western quadrant of the subject site. A total of 2 no. timber pole sets for this asset are sited within the subject site while 2 no. poles sets are sited immediately outside the subject site's boundary line, at the eastern and northern boundary.
- An OH 10kV line which run along the north of the site immediately south of the northern boundary. A total of 8 no. poles for this asset are sited within the subject site while 3no. poles are sited immediately outside the subject site's boundary line, 2 no. at the northern boundary and 1 no. at the eastern boundary.
- An OH low volage line traverses the subject site marginally at the eastern boundary of the site, near the site entrance.

2.6 Construction Management

It is envisaged that the development of the lands will occur for up to approximately 3 years, but could extend, up to a 7 year permission period. Given the nature of the project and the need for flexibility to respond to market demand, and global social, economic and political disruptions (i.e. potential impacts associated with Covid 19 pandemic and war in Ukraine for example) the development phases are indicative. A Construction and Environmental Management Plan which has been prepared by AECOM for 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 Outline Construction and Demolition Waste Management Plan (CDWMP) submitted with the application.

2.6.1 Construction Phase Mitigation

An outline Construction and Demolition Waste Management Plan (CDWMP) 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 CDWMP 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 CDWMP 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 – 1996-2011, as amended, are complied with.

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.

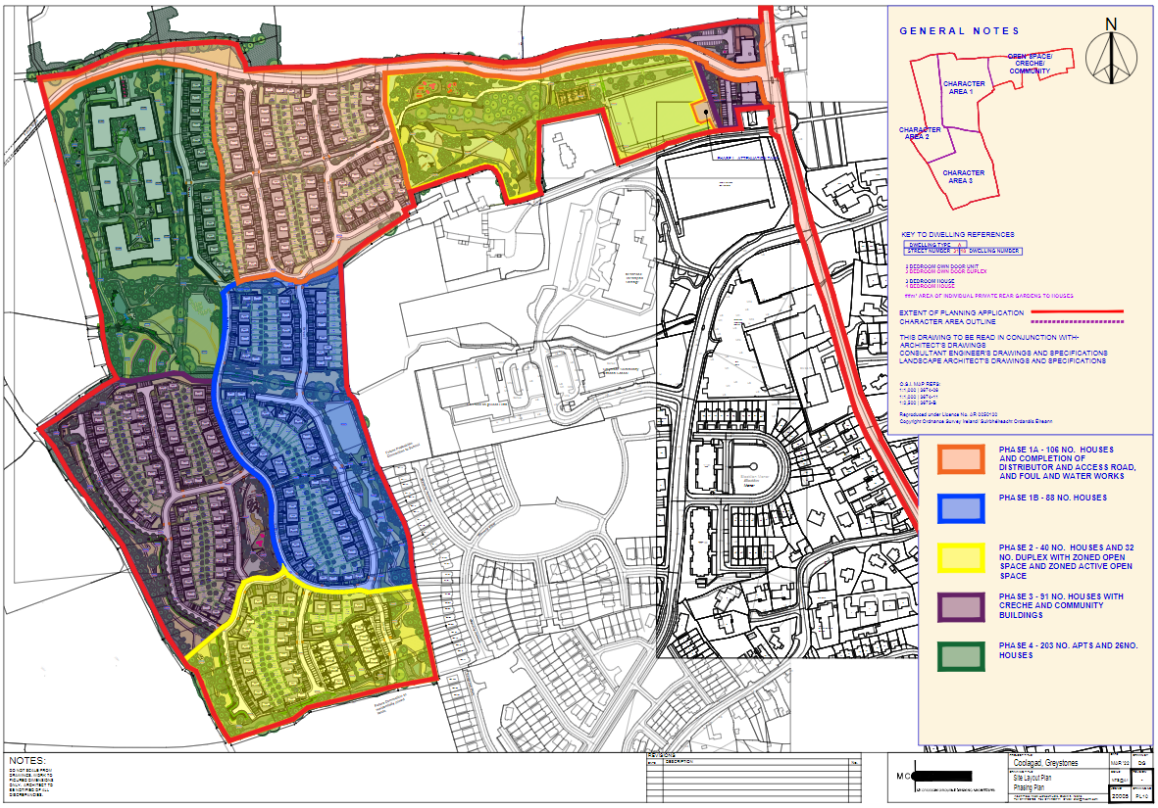

Figure 2-10 Development Phasing Strategy

Figure 2-10 above outlines the main development phases as follows:

- Phase 1A – 106 Houses and completion of Distributor Road and Access Road and Foul and Water Works - October 2022- November 2023
- Phase 1B - 88 Houses -August 2023 - November 2024
- Phase 2 - 40 Houses and 32 Duplex with zoned open space and zoned active open space - November 2023 to November 2024
- Phase 3 - 91 Houses with creche and community buildings - August 2024 to November 2025
- Phase 4 - 203 Apartments and 26 Houses January 2024 to November 2025

2.6.2 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 will be accessed via the proposed

distributor road off the R761. It is proposed to separate construction traffic and movement from occupied phases of the development as construction progresses.

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.

2.6.3 Storage of Waste Policy

In the event of material being temporarily stockpiled on-site for reuse in the proposed development or in the event of material excavated pending waste classification for removal off-site, the material will be temporarily stockpiled in a designated area on-site. Stockpiles of different waste material will be located, maintained, and separated by a sufficient distance to prevent any inadvertent mixing of excavated material. All stockpiles will be clearly identified (e.g., signage) and recorded on a site map. Additional details on the management of stockpilesand procedures to prevent environmental and nuisance issues will be documented in the Construction and Environmental Management Plan (CEMP) which will be developed by the appointed Contractor in advance of construction works commencing on-site.

Any heavily contaminated material/soil that may be encountered will need to be segregated in accordance with the measures outlined in the CEMP for appropriate sampling, waste classification and authorised removal off-site.

The Construction Environmental Site Manager will ensure that site personnel involved in the excavation and removal of waste soil materials at the site are informed of and can identify the different waste types and categories of waste soil materials encountered on-site.

Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting the underlying soils and groundwater. Waste will be stored on-site, including non-hazardous soil and stone and inert C&D wastes, in such a manner as to:

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

2.6.4 Restriction 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.

2.6.5 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.

2.6.6 Main Stages/ phases of Construction

The expected construction staging provides for 5 phases over approximately 3 years, and potentially extending to 7 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, creche and community facility. However, it is feasible that market conditions (and international socio, economic and political events) 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 in accordance with measures detailed in Chapter 11 of this EIAR.

Chapter 5, Land and Soils provides detailed information on excavation material and mineralogy. Chapter 13, 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 and summarised in Chapter 16.

2.6.7 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.

2.6.8 Hoarding and Site Segregation

The development site is a greenfield site without through traffic or movement. Therefore, while the site boundary is extensive in length it does not readily interact or interfere with adjoining landuses and area residential areas.

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.

2.6.9 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 6pm 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.

2.6.10Construction Traffic

The main construction access route will be from the R761 Road. The CEMP 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
- 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 Energy Statement

This SHD application is accompanied by an Energy Statement prepared by Waterman Moylan. The report identifies the energy standards with which the proposed development will have to comply and also sets out the overall strategy that will be adopted to achieve these energy efficiency targets.

The dwellings will be required to minimise overall energy use and to incorporate an adequate proportion of renewable energy in accordance with Part L (Conservation of Fuel and Energy) of the Building Regulations 1997, as amended, the European Union (Energy Performance of Buildings) Regulations 2021, and Technical Guidance Document L 2021 (DHLGH, 2021). The creche / amenity space will be designed to meet the requirements of Part L (Conservation of Fuel and Energy) of the Building Regulations 1997, as amended, the European Union (Energy Performance of Buildings) Regulations 2021, and Technical Guidance Document L 2021 (DHLGH, 2021).

2.8 Emissions and Waste

2.8.1 Municipal Waste/ Waste Management

Enviroguide Consulting has prepared a CDWMP for the Construction Phase of the Proposed Development and an Operational Waste Management Plan (OWMP) to address waste during operational of the development.

The purpose of this outline CDWMP is to provide the information necessary to ensure that the management of surplus material including construction and demolition (C&D) waste at the siteis undertaken in accordance with relevant EU, National and Local Waste Management Policies, Waste Legislation, and Best Practice Guidelines

The outline CDWMP relates to the Pre-Construction Phase of the Proposed Development andwill be updated by the appointed Contractor in advance of construction works commencing on-site.

The exact materials and quantities construction waste that will be generated from the proposed works will be audited throughout the project roll-out phase toprevent waste arising in the first place, and to re-use, recycle or recover waste materials wherepossible.

2.8.2 Waste Officer

A member of the construction team will be appointed as the project “Waste Officer” to ensure commitment, operational efficiency and accountability during the Construction Phase of the Proposed Development.

The appointed Waste Officer will have overall responsibility to oversee and record everyday waste management at the Proposed Development Site.

The Waste Officer will have the authority to select a waste team, if required (i.e., members of the site crew that will aid him/her in the organisation, operation and recording of the waste management system implemented on-site).

The Waste Officer will maintain the record keeping system for waste management on-site including maintaining a log of each load of waste materials being transported off-site and maintain a record of all necessary documentation including waste transfer documents and landfill gate receipts in the waste management file.

Authority will be given to the Waste Officer to delegate responsibility to subcontractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

2.8.3 Environmental Consultant

Guidance and support will be provided to the Waste Officer by the appointed Environmental Consultant to ensure the waste management targets and deliverables are maintained to a high standard.

If required, the Environmental Consultant will also be responsible for completing waste classification of surplus soil and stone materials that may require off-site disposal in compliance with all relevant waste management legislation.

2.8.4 Non-Hazardous C&D Waste

The Proposed Development Site is on greenfield lands and there will be no demolition works. During the Construction Phase of the Proposed Development, it is anticipated that there will some surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals, and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and supply of materials will also be generated.

2.8.5 Insert and Non-Hazardous Soil and Stone

The Proposed Development will involve excavation of soil during the Construction Phase to depths of up to 8-9mbGL to achieve the proposed Site levels.

Soil analytical data for samples collected from across the Site are provided in the site investigation report (GII, 2018) and verify that there are no hazardous compounds in the soil sampled at the Site. This will be verified during the groundworks in accordance with the procedures outlined in Section 6.

In order to minimise the requirement for imported aggregates excavated materials will be re-used on Site where fill is required to achieve proposed Site levels and for landscaping.

The overall net volume of 101,904 m^3 of soil will require removal from the Site. The final volume of material removed from Site may vary (typically +/- 20%) where bulking of soils on excavation occurs.

2.8.6 Other Non-Hazardous Wastes

Waste will also be generated from construction workers (e.g., organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on-site during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

2.8.7 Hazardous Wastes

The Site is greenfield and has not been previously developed and therefore asbestoscontaining materials (ACMs) will not be generated during the Construction Phase of the proposed Development.

2.9 Methods used for forecasting 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.

2.10 Transboundary Effects

It is not expected that the development of residential units along with community uses and active open space in Coolagad, Greystones Co. Wicklow would result in likely significant effects on another Member State.

2.11 Consultations

The application site was the subject of consultation with the Planning Authority in 2016 and 2017 in relation to a non SHD proposal but was not proceeded with. The following consultation record relates to the SHD process as initiated in 2019. A consultation record is also attached as a separate document as part of the application. The table below summarises the key issues and the response to the points discussed.

Table 2-4: Consultations details

22nd September 2020 – 9.30 – 10.30 (Online)
For the Applicants: Cairn Homes Properties Ltd (Applicants): John Grace, Emma Flanagan, Aidan McLernon, Christophe Teevan, Daibhi Mac Domnhnaill, Lianna Slowey, Stephen Manning *McCrossan O'Rourke Architects* Cormac O'Brien and Matteo Iannucci *Aecom* Jerry Barnes and Rosie McLaughlin *MDB Planning Consultants*
LAP AND COUNTY DEVELOPMENT PLAN LAP has specific objectives regarding topography of site and visual impact. Proposed development does not include all of the Action Plan area as includes land to north. Wicklow County Development Plan review should be available by the end of 2020 and will indicate direction of strategy. LAP will be reviewed after. Greystones is in a key area (Metropolitan Area Strategic Plan)
DENSITY c35 units per hectare is above density set out in LAP and up to applicant to justify.

Challenge to get sustainable density on lands given the topography. Possibly will change in the area indicated as lower density in LAP or softer density owing to sections and vehicular access to the streets.
STREAM Stream going through site that needs to be picked up and detailed. WCC keen on keeping open/ exposing streams.
OPEN SPACE WCC welcome the delivery of open space in Phase 1. Open space is included in Phase 2 of action plan. School has active open space zoned to front. Community building to be located here –applicant keen that this can be utilised by entire area and not one specific use. Open space to be connected via green lung through site. Given topography of site, if cut and fill is required the aim is to minimise/keep it within central open area. Pocket parks proposed to soften overall site layout. Specific quantum of open space required in Action Plan area and will be provided. Queried if scope for flexibility in the other areas to reflect this. WCC said they would consider this.
TIME FRAME Full quantum as SHD to ABP 10 year application discussed. WCC have no view on timeframe, to be addressed at pre application stage.
ACCESS, ROADS DMURS Long roads and DMURS to be addressed. Site is difficult owing to topography. DMURS to be addressed. Justify the proposal if the topography causing certain approaches. appreciate layout may have to align somewhat with topography WCC note objective through Glen of the Downs (N11) subject to future plans. WCC note the LAP contains a road objective through site (R01). Initial discussion suggested priority junction at entrance, to be decided if signalled junction or roundabout. A roundabout at R761 would not be popular. Cycle way objective along R761 between Bray and Greystones. A roundabout would be an issue for cyclists. WCC advise access to houses will have to be set out linearly having regard to the topography. <u>Connections</u> Waverly to be taken in charge next year. Connections to neighbouring properties -for pedestrians/cyclists, not vehicular.
DRAINAGE Propose to split site into 2 main catchments. One discharging to ditch to south of site with boundary of school/Lidl. The remaining part to discharge to ditch at north of site. Open space to feature SUDS measures/swales. Homezones to feature permeable paving.

2 streams in vicinity. Applicant to be mindful of flooding from Coolagad Hill. Flood risk assessment to address Redford Housing estate. Pumping stations will not be taken in charge. No watermains issues are foreseen. WCC requirement to keep all streams open channel as much as possible.
CRECHE/COMMUNITY BUILDING Advised to contact Wicklow County Childcare Committee regarding creche. Advised to contact WCC Community and Enterprise section regarding community building.
PART V 1, 2 and 3 beds required. Housing Department will be contacted.

The submitted SHD applications addresses the comments noted above.

Other consultations were held as follows:

The tri-partite meeting, which took place on the 23rd February 2021 via Microsoft Teams. Response to the opinion of the Board is addressed in the separate document bearing the same name.

A meeting was held on the 29th June 2021 and on the 17th February 2022 via Microsoft Teams with representatives of the Wicklow planning department and community and enterprise section to discuss the community building and open space and active open space proposals.

The team also engaged with the National Monument Service to discuss the proposed development.

The team engaged with the Wicklow Childcare Committee to discuss the creche (by email and by phone). The Committee noted demand for a creche in north Wicklow and noted the delivery timeframe.

The applicants have also engaged with adjoining landowners, including the residents of the Waverly estate.

2.12 References

Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, 2017.

Guidance on the preparation of Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017) (the EU EIAR Guidance).

Greystones-Delgany & Kilcoole Local Area Plan 2013-2019 , Wicklow County Council (2013)

National Planning Framework (DHPLG, 2018).

Sustainable Residential Developments in Urban Areas-Guidelines for Planning Authorities (DHLGH, 2009)

Urban Design Manual – a Best Practice Guide (2009) (DEHL, 2009)

3 Alternatives Considered and Comparison of Environmental Effects

3.1 Introduction

This chapter of the EIAR was prepared by MacCabe Durney Barnes, planning consultants and drafted by Richard Hamilton, BA, MSc, PGDip EMAE, MIPI, MRTPI, Director. Richard is a Chartered Town Planner with 25 years experience in planning practice and Environmental Impact Assessments (EIAs) and has a Postgraduate Diploma in Environmental Monitoring and Assessment Engineering from Trinity College Dublin. He has undertaken a range of EIA for strategic infrastructure, commercial and residential developments and Strategic Impact Assessments in association with the plan preparation process.

Under the EIA Directive, developers are required to consider reasonable alternatives, in terms of project design, technology, location, size and scale. The Directive requires that

> *'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.'*

The draft EPA Guidelines further note that a representative range of 'practical' alternatives should be considered. It also refers to the Strategic Environmental Assessment (SEA) exercise which accompanies the plan setting out the policy parameters. In this particular instance, reference is made to:

- The SEA of the Wicklow County Development Plan 2016-2022; and
- The SEA of the Greystones-Delgany and Kilcoole Local Area Plan 2013-2019

The SEA for the LAP considered higher level alternatives regarding the location of development for the town. The above SEA was given due consideration during the preparation of this EIAR.

The Draft EPA Guidelines also note that different types of alternatives may be considered, namely

- 'Do-Nothing' alternative.
- Alternative locations.
- Alternative processes.
- Alternative mitigation measures.
- Alternative layouts and designs.

The EU EIAR Guidance [1] highlights:

> *Identifying and considering Alternatives can provide a concrete opportunity to adjust the Project's design in order to minimise environmental impacts and, thus, to minimise the Project's significant effects on the environment. Additionally, the proper identification and consideration of Alternatives from the outset can reduce unnecessary delays in the EIA process, the adoption of the EIA decision, or the implementation of the Project.*

In this sense the consideration of Alternatives can be understood as an iterative process where Environmental characteristics, constraints and opportunities actively provide feedback to the

[1] European Commission (2017) Environmental Impact Assessment of Projects, Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU)

design process (in light of effects of the project on the environment) which is able to evolve and improve as a result.

The EU Guidelines clarify the Developer needs to provide:

- A description of the reasonable Alternatives studied; and
- An indication of the main reasons for selecting the chosen option with regards to their environmental impacts.

The EU Guidelines advise the following in respect of assessing Alternatives (p.54):

> *"The number of alternatives to be assessed has to be considered together with the type of alternatives, i.e. the 'Reasonable Alternatives' referred to by the Directive. 'Reasonable Alternatives' must be relevant to the proposed Project and its specific characteristics, and resources should only be spent assessing these Alternatives. In addition, the selection of Alternatives is limited in terms of feasibility. On the one hand, an Alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an Alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible Alternative.*
>
> *…Ultimately, Alternatives have to be able to accomplish the objectives of the Project in a satisfactory manner, and should also be feasible in terms of technical, economic, political and other relevant criteria."*

In this context, 'Alternative Locations' is set in the context of a comprehensive SEA integrated with the LAP preparation process (having regard to the SEA). The location of development proposed is predicated on strategic plan preparation and environmental analysis of appropriate locations for development. This is also the case with land 'uses'; the plan preparation process deemed the subject lands at Coolagad as appropriate for residential, amenity open space /recreation, childcare and community uses. Uses and location are not considered as standalone alternatives as this has been considered and assessed at a strategic level.

Different alternatives can also be considered at different stages of the process. Decisions have been informed by feasibility and environmental considerations, consultations with Wicklow County Council, the Opinion of An Bord Pleanála and the feedback of the EIAR team. The main alternatives are presented in the sections hereafter.

The EPA Guidelines state that there is no requirement for a 'mini EIAR' of all alternatives considered. This section therefore presents the main reasons for selecting the chosen alternative taking into account environmental impacts effect of the project on the environment.

3.2 Alternative Uses

The use or development of the subject lands is subject to a range of regulatory controls that influence *inter alia* future potential function, design and access to the area. The statutory planning framework for this area is the Wicklow County Development Plan 2016-2022 and the Greystones – Delgany and Kilcoole Local Area Plan 2013-2019. The LAP considers a number of 'permissible in principle' uses that could be developed on the subject lands. The proposed residential development includes active open space in the form of a sports field, a creche and a community facility.

Having considered the identified need for housing in the Development Plan , the site's zoning, the patterns of development in the surrounding area of the application site, it is considered that

the proposed development puts forward an appropriate balance of development and amenity uses for the site.

3.3 Alternative Processes

The EPA Guidelines considers that with each design solution, there can be several options as to how an activity can be carried out. Under this alternative, different processes pertaining to the construction phase and the operational phase would be considered.

It is not considered to be a relevant consideration for the development of residential units, active open space and open space. The construction and operation of residential units, active open space and open space comprise generally standard building construction processes. There is also no new, unusual or technically challenging operational techniques required for the operation of the development. As such, there is no specific alternative process, which may be considered.

3.4 Alternative Mitigation Measures

Measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment are described in the EIAR Report. These measures are commonly referred to as 'Mitigation Measures', with the exception of the last action, offsetting, which can be considered to be a Compensation Measure.

When considering Alternatives, such Mitigation Measures might influence how Alternatives are assessed. For example, an Alternative might be considered unfeasible until a Developer factors in a Mitigation or Compensation Measure that reduces the impact of the Alternative. In addition, by considering Mitigation Measures when considering all Alternatives, even feasible Alternatives may benefit from a more environmentally sound Project design, ultimately ensuring a high level of environmental protection.

This EIAR outlines mitigation measures under the topics assessed. These are considered to be appropriate to the location, nature and extent of the proposed development and to its potential impacts. Therefore, no alternative mitigation measures have been considered.

3.5 Alternative 1: Do-Nothing' Alternative

3.5.1 Description

This alternative considers that no development occurs of the application lands, meaning they remain used as pasture and agricultural fields (in the short-term). This alternative is considered as '**Alternative 1**' in the summary table comparing environmental effects.

3.5.2 Environmental Effects

The site is zoned for residential development, active open space and open space under the Greystones-Delgany and Kilcoole LAP 2013-2019. It is therefore an important consideration that the uses proposed are aligned with those considered by the LAP and its SEA.

Greystones is designated as a Large Growth Town II within the Dublin Metropolitan Area under the Local Area Plan. The do-nothing scenario is therefore considered to be an inappropriate, unsustainable and constitutes an inefficient use of residentially zoned lands.

The zoning of the lands as active open space and the proposals to develop a community facility, creche and sports field would not likely occur should the do-nothing alternative be selected. It is noted that there are existing deficiencies in respect of the provision of playing pitches. The location of the schools in Blacklion, i.e. in the vicinity of the application site, make the site a suitable location for the development of pitches to alleviate existing gaps. In the absence of development, users will continue to travel to alternative and less sustainable locations**.**

In addition, the proposed alignment of the relief road falls within the lands subject of this planning application. The road connecting the R761 would, in the long term, provide a route toward the N11, located west of Greystones. It is therefore considered likely that without the delivery of the relief road, traffic congestion would remain at existing levels.

The do-nothing alternative would obviate any potential short term construction impacts with associated potential disturbance on local populations. It would have a neutral impact on receiving environment with the maintenance of pasture fields and hedgerows in their current condition. In terms of air, climate, water the potential impact is therefore likely to be neutral.

In the long-term, a 'Do-nothing' Scenario is not considered realistic or reasonable as the statutory planning objectives to support development in this location remain and if feasible, alternative development proposals for residential development would likely be brought forward in due course. In context of delivering housing for the Dublin Region and north Wicklow there would be a failure to address an urgent need for housing as expressed in the Government initiative, Housing for All – a New Housing Plan for Ireland (DHLGH, 2021) and the Ireland 2040 National Planning Framework (DHLGH, 2018) (the NPF)

It is considered in this instance that the do-nothing scenario constitutes the baseline against which alternatives, including the chosen alternative are being assessed.

3.6 Alternative Designs

The proposed development is cognisant of and complies with the policies and objectives of (the NPF), the Eastern and Midland Regional Spatial and Economic Strategy (EMRA 2019), the relevant ministerial planning guidelines made under section 28 of the Act, the Wicklow County Development Plan 2016-2022 and the Greystones – Delgany and Kilcoole Local Area Plan 2013-2019 (save for the material contravention proposed).

Alternative layouts and associated distribution of uses have been developed throughout the design process, with a view to minimise impacts on the receiving environment. The alternatives are presented in the following sections.

3.6.1 Alternative no. 2: Indicative uses location within the AAP 1 – Coolagad

This alternative presents the indicative location of zoning objectives as set out in the AAP 1 Coolagad. Four zonings apply to the application site:

- R22 (22 units per ha) *"To provide for the development of sustainable residential communities up to a maximum density of 22 units per hectare and to preserve and protect residential amenity".*
- R17 (17 units per ha) *"To provide for the development of sustainable residential communities up to a maximum density of 17 units per hectare and to preserve and protect residential amenity".*
- AOS A minimum of 4ha of land shall be provided for active open space. *"To provide for active recreational open space".*

- OS (Open Space) *"To preserve, provide for and improve public and private open space for recreational amenity and passive open space."*

Section 10.1 of the LAP states that the position and location of zonings shown on Map A – Land Use Zoning Objectives of the LAP is indicative and may be altered under certain circumstances, including detailed design, topography, roads and service layouts (Fig. 3.1)

An AAP was agreed with Wicklow County Council in 2016 (Figure 3.2). This AAP pre-dates substantial policy changes at national and regional levels, notably the adoption of the NPF and the making of the RSES. Both policy documents place greater emphasis on the achievement of compact growth and require higher densities to be achieved. The publication of the NPF in 2018 and the achievement of its objectives is supported by a set of Section 28 Ministerial Guidelines, namely the Urban Development and Building Height Guidelines (DHLGH, 2018) and the Design Standards for New Apartments (DHLGH, 2020) which support a greater mix of dwelling typologies, with a view to make better, more sustainable use of the residentially zoned lands.

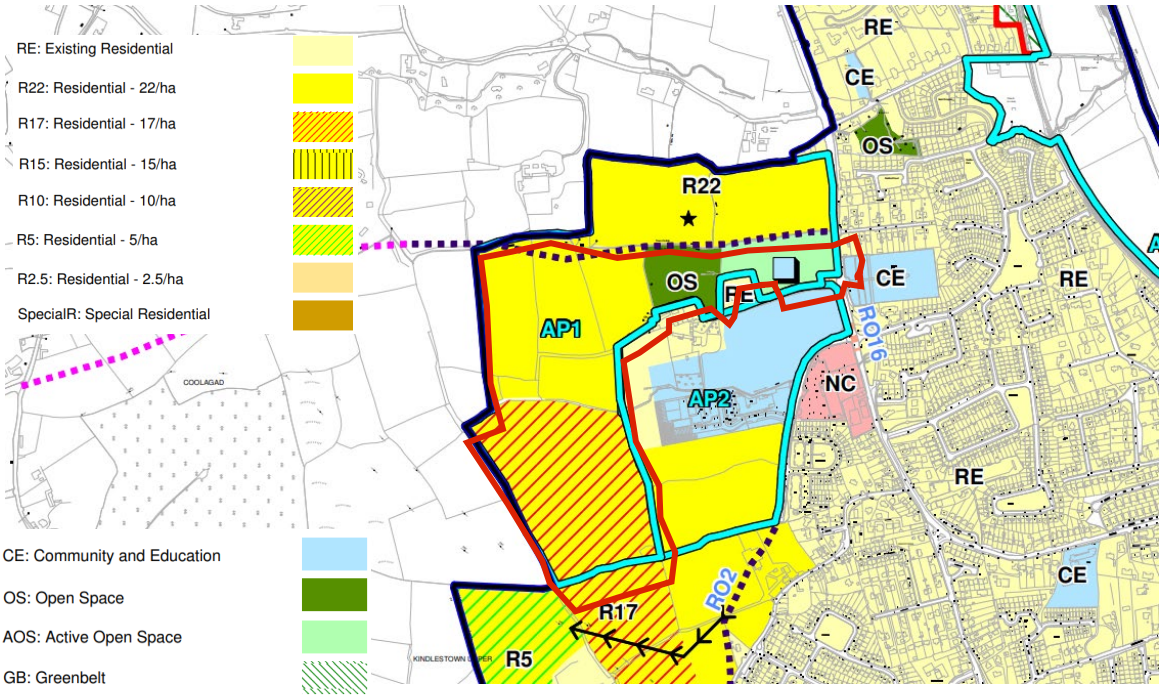

Figure 3-1 AP1 Lands Map A

Environmental Effects

The EIA Directive requires that the use of materials and natural resources, including land be considered as part of the assessment process and should consider the sustainable available of these resources. The EPA guidelines provide some clarity in relation to what can be considered under the 'land and soils' topic. It considers the land take to be a consideration for EIA.

The densities considered under AAP 1 Coolagad are relatively low and do not put forward the best use of land, a finite resource. The site is located close to an established neighbourhood centre with a number of key community facilities located within close proximity. The densities considered under the AAP 1, namely 22 units per hectare under R22 and 17 units per hectare under R17 do not constitute the best use of lands and resources. This relatively low density framework would be contrary to minimum densities set out under Ministerial Guidelines.

It is noted the archaeology features, found during the archaeological investigations, are located near the boundary of the R22/R17 at the Greystones Stream. The site would be impacted upon in all development alternatives and a blend of preservation by in situ and preservation by record mitigation strategy has been agreed in principle with the Department of Culture, Heritage and Gaeltacht.

The LAP/AP1 indicates the community facility at the centre of an open space area where the Sports ground is now proposed to be located. It does not allow an efficient use of the lands in the location indicated in the LAP and Action Plan.

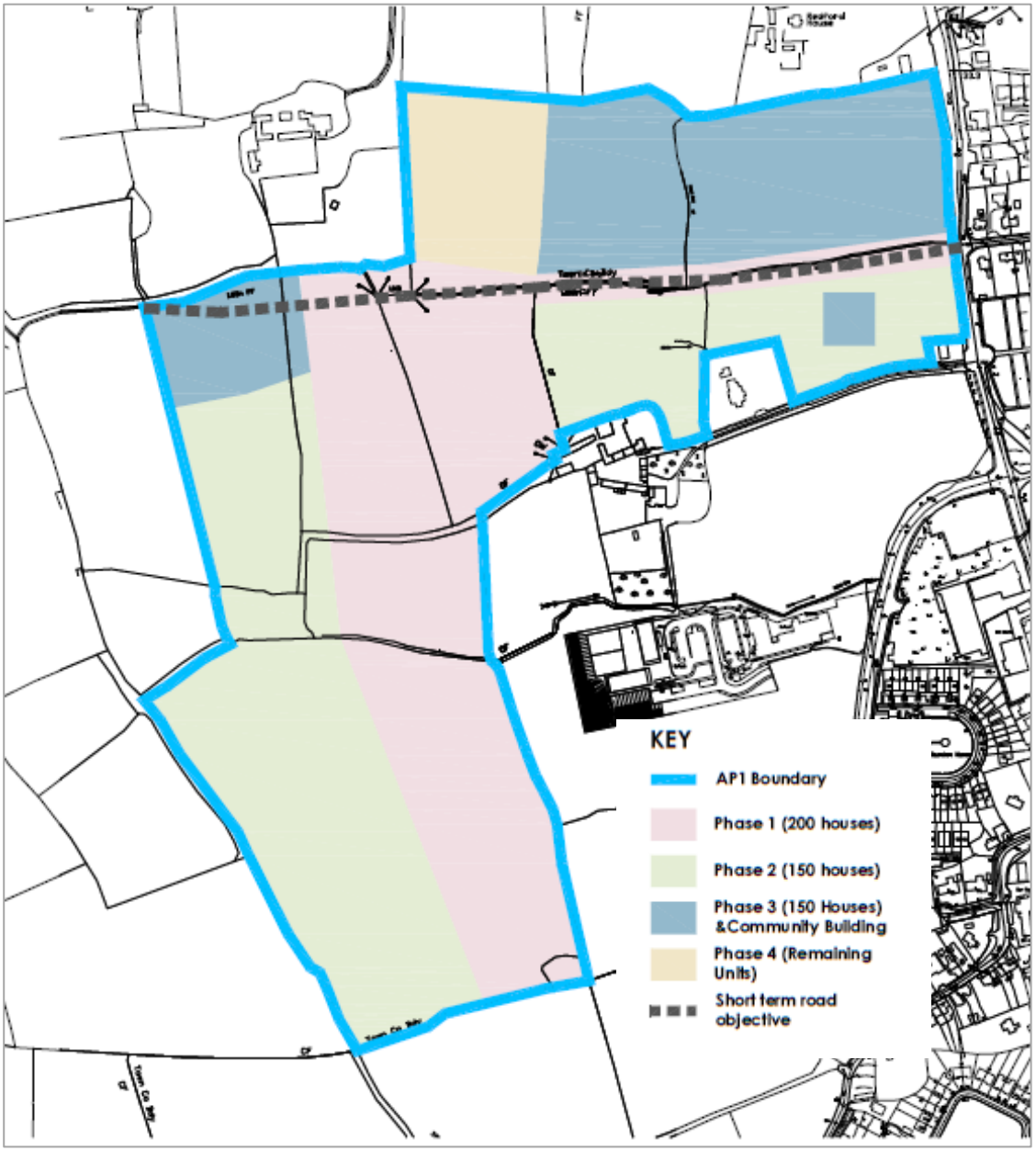

Figure 3-2 Map 6 of Agreed Action Plan

The LAP/Action Plan does not support an ecological corridor around the Greystones Stream or recognise it as an important natural amenity. The AAP also does not provide for any setback

from the existing residential area of Waverly along the eastern boundary. The phasing plan shown in the Action Plan does not have regard to the topography of the southern portion of the lands and the necessity to develop the R17 lands in a more rationale manner having regard to its natural boundaries as a coherent landholding. The phasing of these lands between east and west does not appear to reflect any environmental rationale.

Overall, this is considered this alternative is slightly positive in the long term, in that while it does support population growth and community facilities, it does not provide for a sustainable level of density in the long term.

3.6.2 Alternative no. 3: Layout submitted as part of the pre-application process to An Bord Pleanála

The following proposed development was submitted to An Bord Pleanála as part of the pre-application in December 2020:

- 607 residential units including:
  - 405 houses (300 no. 3-bed; 105 no. 4-bed;) two-storey
  - 202 apartment units which include duplex (20 no. 1-bed; 116 no. 2-bed; 66 no. 3-bed) in two apartment blocks up to four-storeys and 6 no. of duplex blocks up to 3 storeys
- A creche of 733 sqm.
- A community facility 258 sqm.
- A total of 1085 car parking spaces and a total of 563 cycle parking spaces.
- A new vehicular access onto the Regional Road R761.
- Pedestrian/cycle access connections to adjoining lands.
- New roads, footpaths and cycle paths and connections within the site
- c 2.35 ha of active open Space.
- c 1.85 ha zoned public open space.

The development also included landscaped private and public open space, boundary treatment, lighting, play area, an ESB substation, site drainage works and all ancillary site development works above and below ground.

Figure 3-3 Development layout submitted to An Bord Pleanála at Pre Application Consultation, December 2020 (Source: MCORM Architects)

This submission to the Board was made subsequent to a pre-application submission to Wicklow County Council in August 2020 for 576 residential units, creche, community building, public and active open space, new road, creche and associated infrastructure on lands c 17.58 ha.

Figure 3-4 Development layout submitted for Wicklow County Council s.247 Pre-application submission August 2020 (Source: MCORM Architects)

As evidenced from the evolution of the designs from August 2020 to December 2020 the scheme underwent considerable evolution in response to WCC's feedback. While the initial proposal had design merits in presenting an medium-density scheme based around an attractive street layout, it is clear the proposal evolved to present a more nuanced response to the environmental characteristics of the site (topography, hedgerows, tree stands and water courses), with distinctive residential 'cells' and a more integrated landscape design.

Environmental Effects

A number of key issues from an environmental perspective arose during the pre-planning phase and influenced the current proposal being considered. These are:

- The layout and road network did not sufficiently provide for an attractive open space and amenity layout (Landscape and Visual)
- Watercourses (Greystones Stream and Ground Water) were insufficiently addressed and protected (Biodiversity and Water)
- Topography and soil profile of the southern lands gave rise to the need to undertake extensive excavation and removal of soil off site (lands and soils)
- Proximity of the proposed houses at boundary with Waverly residential area with impacts on residential amenity (Population and Human Health)

- The layout did not take account of an Archaeological site surveyed at as part of Receiving Environment surveys (Archaeology and Cultural Heritage)
- The layout did not support future connections to adjoining land holdings
- The topography of the southern area of the site gave rise to a need to pump Foul Drainage northwards (Material Assets-Utilities)

3.6.3 Alternative no. 4: The proposed development

This alternative is in effect the development proposal as described in Chapter 2 of the EIAR. The evolution of the preferred alternative was informed by consultations with the Board and WCC, ABP, further detailed analysis of the characteristics of subject site by the EIAR team and interaction with the design team having regard to the potential environmental impacts of the project.

In summary, the scheme consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha. The development will also include the provision of a community building , a creche, a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

Figure 3-5 illustrates the layout design response prepared by the design team led by MCRORM Architects from August 2021. It displays notable changes from the final scheme illustrated in Figure 3-6 which illustrates the overall site plan of the Alternative layout as proposed. Most notable in the final scheme is the introduction of a linear park adjoining the eastern boundary with the Waverly residential neighbourhood. In response to environmental baseline analysis of the evolving design, it was found the significant rise in levels along this boundary led to unacceptable impacts on residential amenity of the existing residential area. Also, the topography of the site proved challenging to reconcile with site levels and slopes for the southern site giving rise to significant cut/fill soil mitigations which were considered unfeasible, both environmentally and financially.

Figure 3-5 Development layout evolution – (630 units August 2021) (Source: MCORM Architects)

The design of the layout also evolved to address the An Pleanála Opinion (ABP Ref. ABP-308945-20, March 2021), which included *inter alia* the following pertinent matters for the environmental assessment:

1. Further consideration / amendment or justification of the design and layout of the proposed scheme having regard to the following: -

- *the linear approach to the scheme, in particular the internal road network and the central area of public open space.*
- *the potential negative impact on residential amenities, in terms of overlooking, overshadowing or overbearing impact, due to the topography of the site and the potential requirement for retaining features.*
- *Roads Objective RO1 of the Local Area Plan to provide a new road from the R761 to the N11, through the northern portion of the site.*
- *the dominance of the road network within the scheme and consideration of the provision of homezones and a reduction in the number of cul-de-sacs.*

- *the location of existing watercourses on the site which currently run off to a culvert with limited capacity.*
- *future connectivity to adjoining lands and the impact of the proposed scheme on the development potential of adjoining landholdings.*

Figure 3-6 Development layout submitted to An Bord Pleanála (Source: MCORM Architects)

Environmental Effects

Chapter 4 onwards of this EIAR details and assesses the likely significant effects of the selected alternative. Figure 3-6 illustrates that the scheme has significantly evolved to address the environmental issues outlined above.

The layout provides for a strong hierarchy of Open Spaces and Amenities. The development alternative provides a new central open space on the eastern side of the lands that support a strong west-east corridor around the Greystones stream, utilises the existing biodiversity (hedgerows) of the site and is reorientated around an archaeological site in this area in accordance with a detailed Archaeological study and consultation with National Monuments Section. The relationship of the proposed scheme is also highly sensitive to adjoining land uses

and populations as well providing for a more sustainable approach to scheme construction, soil management and drainage.

3.7 Comparison of Main Environmental Effects

Table 3-1 Summary Comparison of the Main Environmental Effects

Topic	Alternative 1 – Do Nothing	Alternative 2 – AAP 1	Alternative 3 – Pre-Application Layout	Alternative 4 – Selected Alternative (Proposed Development)
Population and Human Health	Negative	Neutral	Positive	Positive
Biodiversity	Neutral	Negative	Neutral	Neutral
Land and Soils	Neutral	Negative	Negative	Neutral
Water	Neutral	Negative	Negative	Neutral
Air and Noise	Neutral	Negative	Negative	Neutral
Air Quality and Climate	Neutral	Neutral	Neutral	Neutral
Noise and Vibration	Neutral	Neutral	Neutral	Neutral
Landscape and Visual	Neutral	Negative	Neutral	Neutral
Material Assets – Traffic and Transportation	Negative	Neutral	Neutral	Positive
Material Assets - Utilities	Neutral	Neutral	Negative	Positive
Material Assets - Waste	Neutral	Neutral	Neutral	Neutral
Archaeology and Cultural Heritage	Neutral	Negative	Negative	Positive

With reference to Population and Human health, the potential impacts are broadly similar – the proposed scheme supports the provision of an important new residential population for Greystones with the inclusion of Active Open Space, a hierarchy of amenity spaces and community and creche facilities. It is considered that Alternatives 1 and 2 do not support a sustainable density of development on greenfield lands.

The redesign of Open Space to provide an ecological corridor around the stream is a notable feature of Alternative 4 over Alternatives 2 and 3 with a reduced impact on biodiversity. It will also result in a greatly improved landscape and visual impact.

The inclusion of an improved layout in Alternative 4 supports pedestrian links through the site, and future access to adjoining lands. The potential impacts relating to archaeology are

considered to be significantly improved in Alternative 4. Whereas Alternatives 2 and 3 provide no recognition of the archaeological site, Alternative 4 is completely re-configured to celebrate this feature and the stream/hedgerow ecological corridor that runs through the site.

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.

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. Alternative 4 provides for a more sustainable drainage approach without the need for pumping. The approach to managing levels for the southern site area, supports a much more sustainable in the long term which is significant and positive relative to other alternatives.

3.8 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 soil, ecology, archaeology, water, layout 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.

In respect of other items it is noted that a sustainable level of density is proposed having regard to Government Guidance in the Sustainable Residential Development in Urban Areas (2009).

Pre-application stage proposals have been revised so that two separate, individual buildings to accommodate the creche and community facility are now provided at the entrance to the lands adjoining the R761.

This EIAR describes an iterative process where the environmental assets and sensitivities of the subject lands are considered and assessed as the scheme evolves over time. The EIA process and consultation with Statutory bodies has allowed the creation of greatly improved residential development with reduced environmental impact and a more integrated relationship with the area.

3.9 References

European Commission (2017) Environmental Impact Assessment of Projects, Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU)

Eastern and Midland Regional Spatial and Economic Strategy (EMRA, 2019)

Government initiative, Housing for All – a New Housing Plan for Ireland (DHLGH, 2021)

Ireland 2040 National Planning Framework (DHLGH, 2018)

The SEA of the Wicklow County Development Plan 2016-2022 (Wicklow County Council)

SEA of the Greystones-Delgany and Kilcoole Local Area Plan 2013-2019 (Wicklow County Council)

4 Population and Human Health

4.1 Introduction

This chapter of the EIAR addresses the likely direct and indirect effects positively or negatively on Population and Human Health of the proposed strategic housing development at Coolagad, Greystones, Co. Wicklow. It was prepared by Richard Hamilton, BA, MSc, PGDip EMAE (Environmental Monitoring Assessment and Engineering), MIPI, MRTPI, Director for MacCabe Durney Barnes. He is a Chartered Town Planner with over 25 years experience in Ireland. His experience also includes EIA Screening, EIA Management and SEA preparation. Richard has prepare Population Chapters for a number of EIAR Projects including Greater Dublin Drainage Scheme, Glenamuck Distributor Road and Metrolink. Prior to MacCabe Durney Barnes, his roles include Director with KPMG Future Analytics, a Director of Planning at RPS and an Associate with Colin Buchanan and Partners.

4.2 Assessment Methodology

The methodology is based on established best practice with cognisance given to all relevant guidelines and legislation and, in particular,

- The draft Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA. 2017)
- European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment (2017)

The assessment of population is primarily based on a desk-based assessment. It seeks to determine the existing background environment (in terms of population), including the existing population, future population projections, existing and future economic activity in the area, employment, community infrastructure and recreation amenities in the subject areas. It is important that the Population analysis is highly aware of local sensitivities and issues at a very micro level, taking account of factors such as geographic proximity, established movements patterns or usage experiences of places that may potentially be affected.

4.2.1 Desktop Research – Principal Data Sources

The assessment involved desk-based research and analysis of existing documentation to build up profiles of the communities that would likely be affected by the Proposed Project. This desk-based assessment has been undertaken based on information from the following principal data sources:

- Central Statistics Office (CSO) Census of Population, including Census 2016;
- Pobal Maps;
- Geodirectory data sourced from www.myplan.ie
- Ordnance Survey of Ireland aerial photography;
- Planning search of recently submitted and granted planning applications for development in the area;
- Tusla; and
- Department of Education and Skills.

A range of strategic planning guidance documents and technical reports were reviewed as part of the assessment process. The following presents a list of the key documents reviewed as part of this study:

- Project Ireland 2040 – National Planning Framework (DEHLG 2017);
- Regional Spatial and Economic Strategy (RSES) (EMRA 2019);
- Wicklow County Development Plan 2016-2022;
- Draft Wicklow County Development Plan 2021-27; and
- Greystones, Delgany and Kilcoole Local Area Plan (LAP) 2013-2019.

4.2.2 Human Health

The Human Health assessment of the EIAR focuses on identifying the areas where human health impacts have been assessed, drawing on their assessments to ensure that all relevant human health impacts (particularly local community health) have been appropriately considered to reduce/avoid adverse impacts.

Relevant Guidelines

- In addition to the general EIA Guidance documentation set out above, this assessment has been prepared having regard to the following guidelines:
- The Health Impact Assessment (HIA) Resource and Tool Compilation (United States EPA 2016);
- Health in Environmental Impact Assessment – A Primer for a Proportionate Approach (Institute of Environmental Management and Assessment (IEMA) 2017); and
- Health Impact Assessment Guidance (Institute of Public Health in Ireland 2009).

The 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'.*

The Human Health chapter of the EIAR focuses on identifying the areas where human health impacts have been assessed, drawing on their assessments to ensure that all relevant human health impacts (particularly local community health) have been appropriately assessed to reduce/avoid adverse impacts.

The 2017 draft EPA guidelines also note 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.', and that, 'assessment of other health & safety issues are carried out under other EU Directives, as relevant. These may include reports prepared under the Integrated Pollution Prevention and Control, Industrial Emissions, Waste Framework, Landfill, Strategic Environmental Assessment [SEA], Seveso III, Floods or Nuclear Safety Directives. In keeping with the requirement of the amended Directive, an EIAR should take account of the results of such assessments without duplicating them'*

Potential impacts of the Proposed project on population and human health arise from traffic and transportation, air quality and climate, noise and vibration, townscape and visual, material assets: utilities and the risk of major accidents and/or disasters. These aspects are dealt with in the specific chapters in this EIAR dedicated to those topics. This chapter refers to the findings of those assessments included elsewhere in this EIAR which human health effects might occur.

In order to establish the existing receiving environment and compile a robust baseline for the application site, the methodology includes site visits in September 2021 and March 2022. The purpose of the site visits was to review and record the land use and property types located within the study area in order to inform the baseline assessment and to determine the location of potentially sensitive receptors (residential properties/developments, businesses, community infrastructure and recreational amenities). GeoDirectory, a complete database of all buildings in the Republic of Ireland and their geolocation, was also used to inform and validate the baseline assessment.

Varying catchment areas around the site were used in accordance with good practice or where available guidelines. No formal national guidance is available on the appropriate study area to focus the assessment of population and human health: population impacts arising from SHD development. As such, professional judgement was applied in determining the appropriate study areas A general local catchment of 2km from the subject site set the context of the site adjoining the settlement of Greystones (to include the town centre at c. 2km). A broader area of 3km was considered suitable for assessment of relevant social infrastructure in the town. Census information used in this chapter include State, County, Town and Electoral Divisions. While the primary focus of the EIAR is the lands located within the immediate vicinity of the development proposal, it considers the broader context of Greystones settlement (relevant population characteristics and trends).

4.2.3 Consultation

The Population and Human Health section has regard to the evolution of the scheme's design, and provision of community facilities and amenities as part of the pre-application process. The Chapter reflects this process and details responses to issues raised during consultation noted in Chapter 2 which are of relevance from a population and human heath perspective. As part of the Schools Demand Concentration Report accompanying the planning application, MacCabe Durney Barnes contacted the schools identified within the relevant Greystones catchment area with regard to their available capacity.

4.3 Characteristics of the Proposed Development

The proposed development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building, a creche, a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

The proposed development will introduce a new residential population on a greenfield site in a suburban area of north Greystones. Based on the average household size for Greystones settlement (2016 Census) of 2.89, the development would create a new population of the order of 1,694 persons upon completion and operation.

4.4 Baseline Description

A description of the receiving environment relevant to the proposed development in relation to population and human health is given in this section. Specific sections of this EIAR provide the baseline scenario relevant to the environmental effect being assessed. The reason is so as not to duplicate baseline scenarios in this EIAR section. However, the assessment of effects on population and human health refers to those environmental topics under which human health effects may occur (e.g. noise, water quality, air quality, etc.).

The EPA Guidelines (2002) and (2017) and the EPA Advice Notes (2003) and (2015) identify sensitive receptors as neighbouring landowners, local communities and other parties likely to be impacted by the proposal. Surrounding developments including homes, schools have been identified. Consideration has also been given to the potential temporary populations such as tourists and the cultural heritage/historical and natural heritage sites they may visit as walkers, cyclists, and drivers.

The following provides a description of the receiving environment, with focus on demography, land use and local amenity.

The findings of the 2016 census have been used to determine the current population characteristics of the study area with a comparison to Wicklow as a whole to benchmark the data. Through understanding the characteristics of the existing population residing in the study area, it is possible to assess the potential impacts that the proposed development will have upon the population.

It should be noted that the description of the baseline environment of those factors under which human health effects might occur has also been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, air quality and climate, noise and vibration and material assets.

4.4.1 Land Use & Settlement Patterns

The Proposed Project is located in the administrative area of Wicklow County Council in County Dublin, within the townland of Coolagad and the Electoral Division (ED) of Delgany. The subject site is undeveloped and sits on the edge of the Greystones Town as defined in the Census. This settlement area captures the census information data on Greystones and presents benchmark information on the town and profile of the population.

The subject lands are currently in agricultural uses and are in close proximity (within 1km) to residential (Waverly, Seagreen and Blacklion) and education receptors (Greystones Educate Together National School, Gaelscoil na gCloch and Temple Carrig Secondary School) located to the south east of the site. The subject site is situated in close proximity (within 1km) to the neighbourhood centre at Blacklion.

Figure 4- 1 below illustrates this proposed development area, relative to the defined EDs and Town Census areas, with a 2km catchment illustrated Figure 4-2 shows the location of the subject site relative to the Townlands, Electoral Divisions and Settlement Boundary for Greystones.

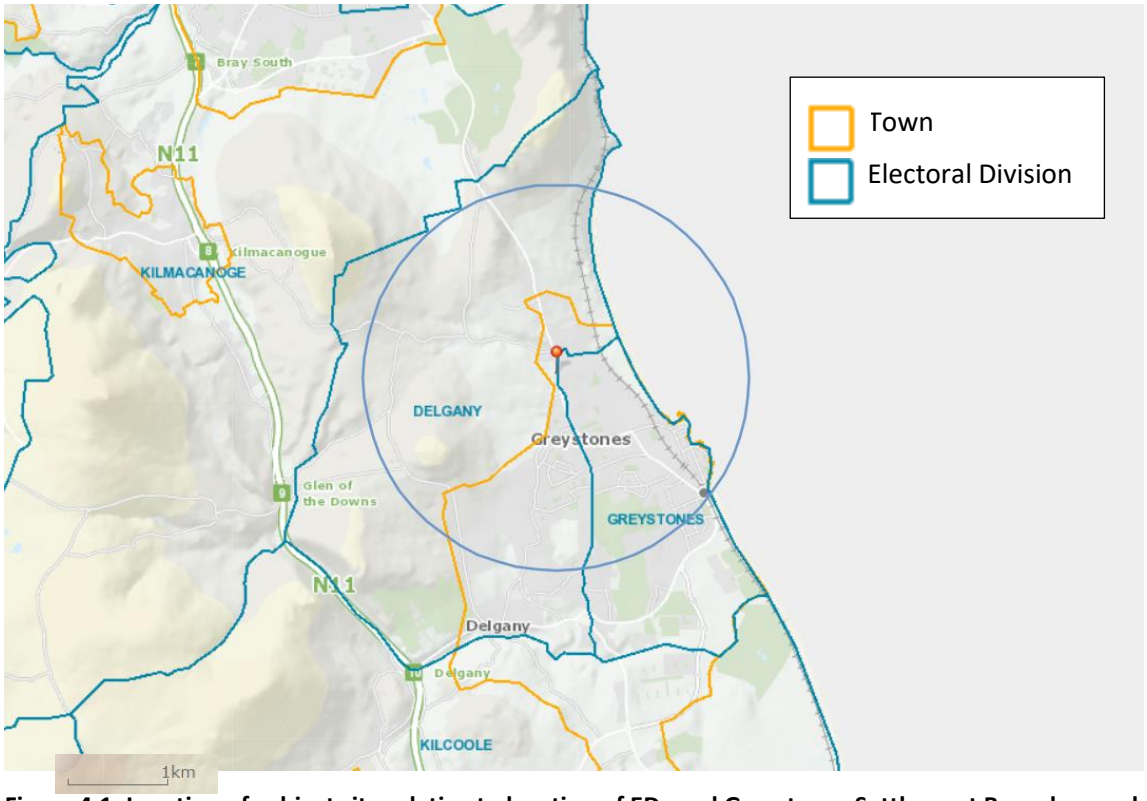

Figure 4.1: Location of subject site relative to location of EDs and Greystones Settlement Boundary and 2km catchment for illustrative purposes (source: CSO)

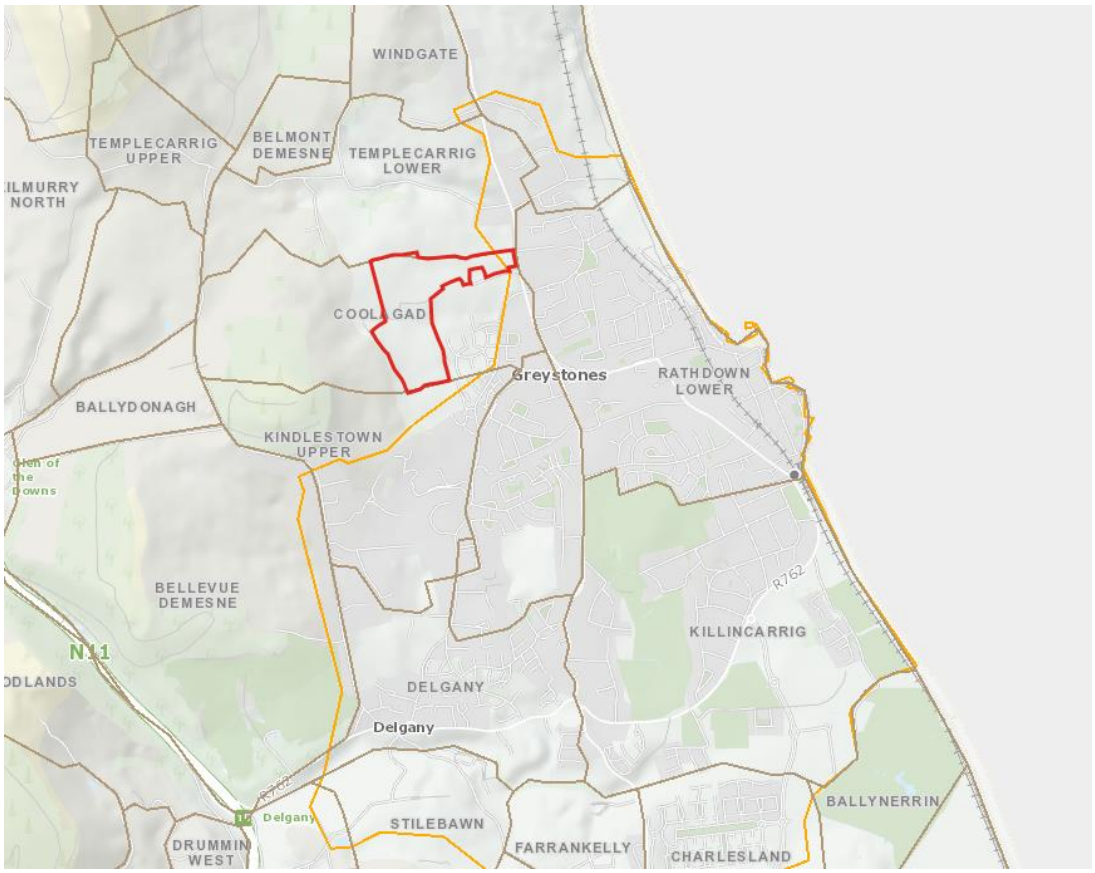

Figure 4.2: Subject site relative to location of Townlands, EDs and Greystones Settlement Boundary (source: CSO)

The site is located within the administrative area of Wicklow County Council. The policies and objectives found within the Wicklow County Development Plan 2016-2022 in combination with the Greystones, Delgany and Kilcoole Local Area Plan 2013-2019 (the LAP) form the relevant planning context for the area, zoning for Residential, Open Space, Active Open Space and Community Services.

The LAP includes objectives for;

- The Provision of a community building located within lands zoned AOS, to the north of AP1 lands.
- A short term road objective is designated to the north of the lands zoned OS and AOS. This new distributor road will be accessed from the R761 to the east.

Objective SOC16 of the LAP, requires a minimum of 4ha shall be provided for active open space to include a public park, multi-use game area (MUGA) and playground. The size and configuration of which will be determined by the requirements of the Community and Enterprise Section of the Council.

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 objective for the AAP1 Action Plan also seeks the provision of pedestrian connections by green routes linking the residential areas with community facilities, existing schools, public transportation, adjoining housing developments and Blacklion Neighbourhood Centre.

It also seeks that a community centre/facility or facilities shall be provided within lands zoned AOS as part of a planning application. The AAP sets out a phasing plan for the lands which seeks the timely delivery of the utilities and social infrastructure.

4.4.2 Demography

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 4.1 below.

Table 4.1: Population Change 2011-2016 (Source: CSO)

Area	2011	2016	% change 2011-16
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
Delgany ED	5652	5980	5.8

It is notable that population growth in the EDs on the edge of Greystones grew at a slightly stronger rate (over 5%) that the traditional town area.

Comparing findings for Greystones to Wicklow as a whole, can also provide insight into the performance of an area in facilitating future population growth. According to the 2016 census the Greystones had a population of 18,116 people in a catchment of 6,256 households.

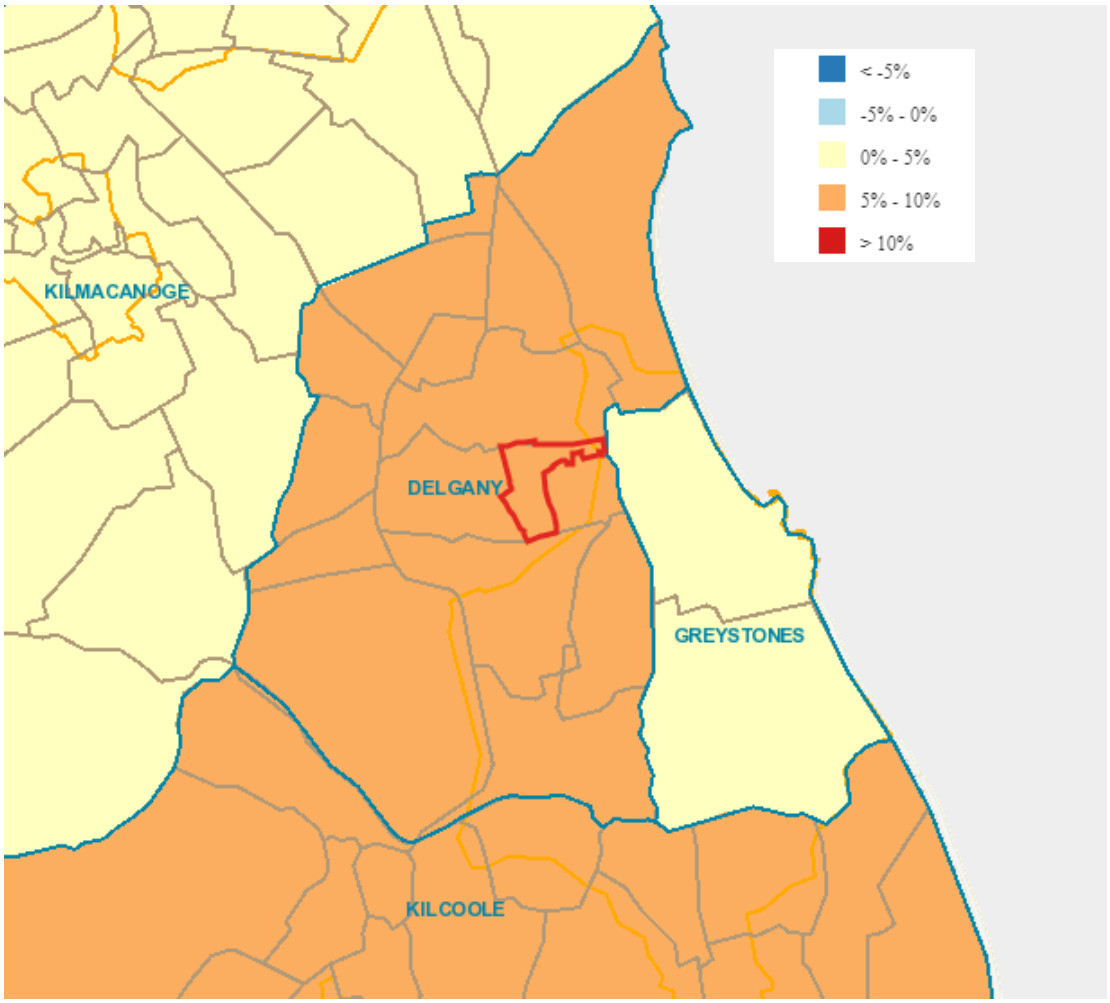

Figure 4.3: Population Change 2011-2016 (Source: Myplan.ie, CSO)

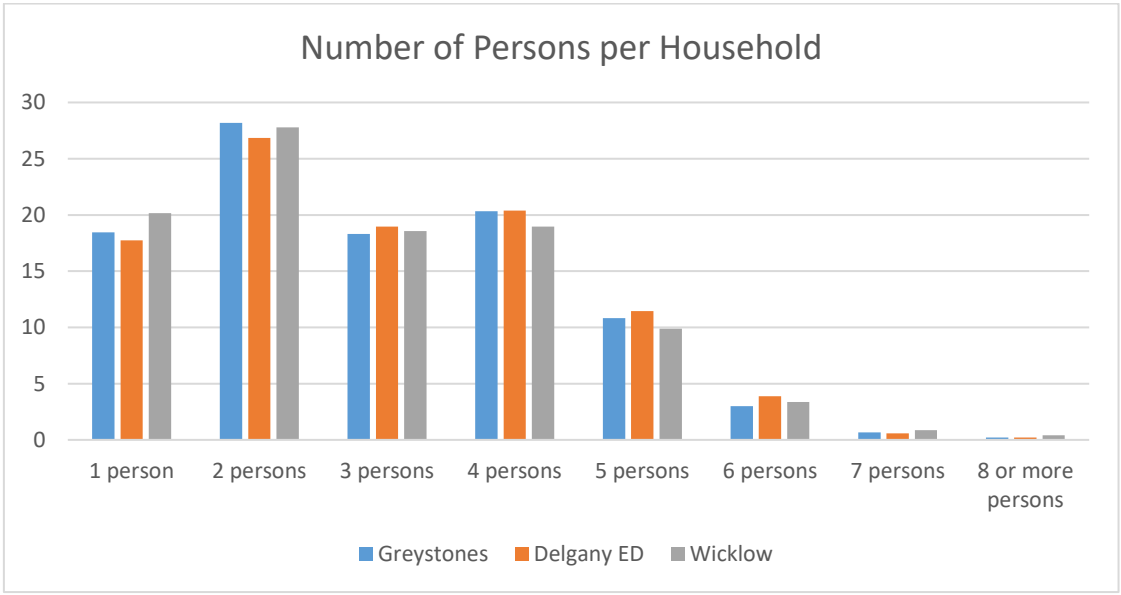

Figure 4.4: Persons per Household 2016 (Source: Myplan.ie, CSO)

The household composition for the study area is broadly in keeping with Wicklow as a whole. The average household size in Greystones is 2.89, which is similar to the Delgany ED at 2.96 and Wicklow at 2.86. As outlined in Figure 4.4 the number of Persons per household is similar in Greystones (18% one person) compared to 20% for county. Two persons households are 28% for Greystones compared to 27% for County. 3 and 4 person households each comprise 18% to 20%

This reflects the slightly younger age of the population overall than in the study area, evidenced by the number of persons 0-14 years at 24.3% in Greystones compared to 22.7% in the County. This will impact the types of services and facilities more frequently accessed by the population

In terms of nationality, the population of Greystones-Delgany is 89% Irish with UK the next largest cohort at 3%.

4.4.3 Greystones-Delgany Population and Growth Target

The Wicklow County Development Plan 2016-2022 (CDP) Core strategy set a population target for Greystones/Delgany (Table 2.4 of the County Development Plan) of 21,603 in 2022 rising to 24,000 in 2028.

Table 4.2 Population targets for County Wicklow (Extract from Table 2.4 of CDP)

Table 2.4 Population targets for County Wicklow 2022, 2025, 2028

Designation	Town	2011	2022	2025	2028
Consolidation Town	Bray	29,339	36,237	38,119	40,000
Large Growth Town I	Wicklow / Rathnew	13,468	20,283	22,141	24,000
Large Growth Town II	Arklow	13,066	19,494	21,247	23,000
Large Growth Town II	Greystones/ Delgany	17,208	21,603	22,801	24,000

The housing growth distribution is provided in Table 2.7 in the County Plan.

Table 4.3 Household Growth Distribution – (Extract from Table 2.7 of CDP)

Table 2.7 County Wicklow housing growth distribution 2022, 2028

	2011 Existing Housing Stock	2022 Target Housing Stock	2028 Target Housing Stock	Target Housing Stock Growth 2011-2028	% of total Housing Stock Growth 2011-2028
Bray	11,518	13,958	16,896	5,378	17.22%
Wicklow / Rathnew	5,399	7,813	10,138	4,739	15.17%
Arklow	5,459	7,509	9,715	4,256	13.62%
Greystones/ Delgany	6,637	8,321	10,138	3,501	11.21%

The 2022 housing stock target is 8,321 and the 2028 housing stock target is 10,138 (+1,817). The Planning Report accompanying the SHD Planning Application by MacCabe Durney Barnes notes that the planning authority have indicated previously the extant permissions are c8,600 therefore available residential units equates to c.1,538 or 39% of the 2028 target. The proposed development is located in an area designated as a landbank in the LAP. It is also noted that extant permissions are not delivered development. The applicants are seeking a 7 year permission which would accord with the target housing growth.

Greystones - Delgany is designated a Level 3 Self-Sustaining Growth Town within the Metropolitan Area. It is a strong town, served by high quality transport links to Dublin and the surrounding towns. The town is located on the DART/rail line, has good quality bus links and

easy access onto the M/N11 (Transportation and Traffic are addressed in Chapter 12 of this EIAR). According to the Draft County Plan, as a 'self-sustaining growth town', the settlement should provide housing for people from across the County and region.

According to the Draft Wicklow County Development Plan 2021-27, the population of the settlement is targeted to increase from 18,021 in 2016 to 21,632 in 2031. Housing stock is targeted to grow from 6,766 by 1952 (of which 875 completed post 2016). Table 3.9 of the Draft County Development Plan provides data on housing pipeline planning permissions and construction. The housing target for Greystones up to 2031 is 1078. It notes that 650 houses have been complete post 2016, 1050 were under construction and 688 had extant planning permissions.

4.4.4 Economic Activities and Employment

In Greystones the working population (15-64 years) accounts for 63% of the total population. This broadly compares to Wicklow as a whole at 64%.

The Draft Wicklow County Development Plan 2021-27 highlights Greystones' strategic location on the coast and within easy reach of Dublin's employment markets makes it a desirable place to live. Access to coastal facilities, an attractive town centre and a broad range of social and recreational facilities including the Shoreline Sports Park and Leisure Centre enhance its overall appeal. The town has managed to retain its 'village' character owing in part to its attractive built environment with a Victorian and Edwardian core. Within the settlement, Delgany has a distinct identity that functions as a local service centre for its local community.

Notwithstanding its strategic location and 'liveability' factor, the town has very much developed as a commuter town. The 2016 Census revealed that the town had 2,514 jobs and a ratio of jobs: resident workers of 0.321. This is notwithstanding the availability of a large amount of vacant zoned and serviced employment land in close proximity to the town centre and DART station. Addressing the employment deficit is a priority for the future.

The Regional Spatial and Economic Strategy (RSES) and Metropolitan Area Spatial Strategy (MASP) supports employment generation at strategic locations within the metropolitan area to strengthen the local employment base and reduce pressure on the metropolitan transport network. The RSES identifies the redevelopment of the IDA 'strategic site' at Greystones as an objective in order to strengthen the employment base for North Wicklow. The recent granting of planning permission by Wicklow County Council for the Greystones Media Centre is a welcome development for this long time vacant strategic site.

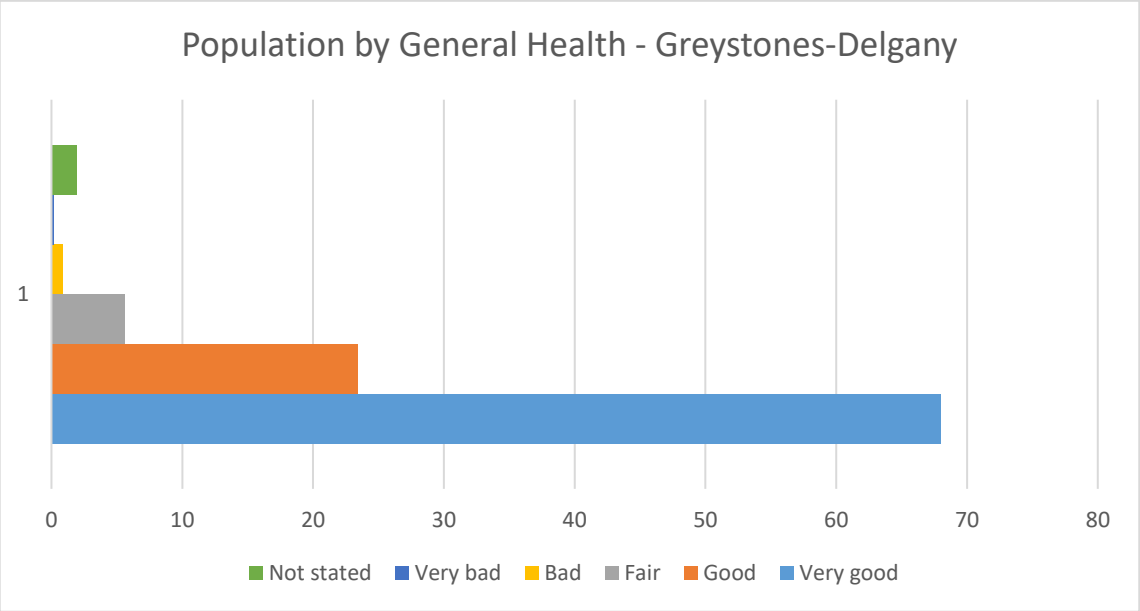

Figure 4.5: Health status of population 2016 (Source: CSO)

4.4.5 Health Demographics

67.9% of the population in the Greystones-Delgany settlement area reported themselves to be in good health according to the 2016 census, whilst conversely 0.2% reported themselves to be in bad health. This compares favourably to a County wide figure of 62.5% in good health and 0.2% in bad health. A breakdown of the findings for general health in the study area is illustrated in Figure 4-5 above.

4.4.6 Social Infrastructure

This section presents the findings of an audit of community infrastructure situated within 3km of the subject site. Community infrastructure includes a wide range of services and facilities that contribute to quality of life. The purpose of reviewing current provision of community infrastructure is to ascertain the likely future need for facilities and services in the area.

MacCabe Durney Barnes undertook an audit of existing social and community infrastructure in the vicinity of the site (February and March 2022).

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

The National Planning Framework outlines the broad national objectives for residential development in the State. This high-level objective is filtered downwards to be integrated into the RSES for the Eastern and Midland Region.

The Regional and Economic Spatial Strategy 2019-2031 (RSES) prepared for the Eastern & Midland Regional Assembly (EMRA) seeks to support the implementation of Project Ireland 2040 and the economic policies and objectives of the Government by providing a long-term strategic planning and economic framework for the development of the region. RPO 9.13, states *"to ensure that new social infrastructure facilities are accessible and inclusive for a range of users"* is a regional policy objective (RPO) within the RSES which supports the provision of, and access to social infrastructure in a town setting. The RSES also states that *"Local authorities and relevant*

agencies shall ensure that new social infrastructure developments are accessible and inclusive for a range of users by adopting a universal design approach and provide for an age friendly society in which people of all ages can live full, active, valued and healthy lives".

The Wicklow County Development Plan states where *"new significant or mixed-use development proposals mat be required to provide a social and community facility/ facilities as part of the proposed development or the developer may be required to carry out a social infrastructure audit, to determine if social and community facilities in the area are sufficient to provide for the needs of the future residents. Where deficiencies are identified, proposals will be required to either rectify the deficiency, or suitably restrict or phase the development in accordance with the capacity of existing or planned services".*

The Greystones, Delgany and Kilcoole Local Area Plan 2013-2019 includes objective SOC16 requiring a *"new community building/facility to be provided within AP1: Coolagad Action Plan*" and the plan further emphasises the need "*to provide for the development of active open space to meet the needs of the current and future population of the plan area*", and provide for a range of community facilities *"particularly, playgrounds, multi-use games areas (MUGA) for teenagers, sports and recreation facilities and multi-purpose community buildings".*

Key themes that constitute community facilities as outlined below.

- Open Space, Sport and Leisure
- Education
- Childcare Facilities
- Health Facilities and Social Services
- Community Facilities
- Religious & Worship Facilities
- Arts Facilities
- Retail & Entertainment

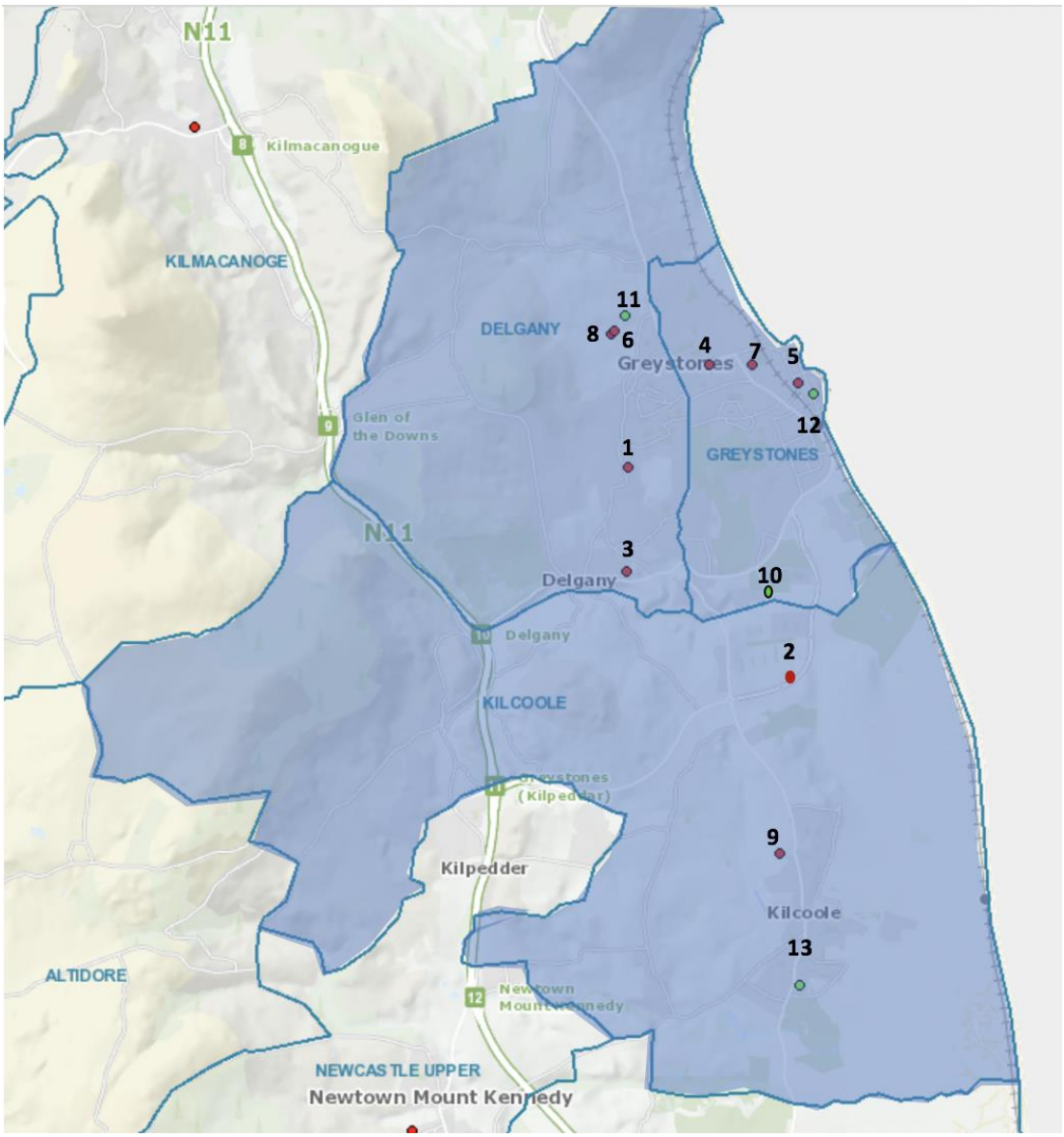

Figure 4.6: Map of Existing Primary and Secondary Schools in the Study Area (Source: Department of Education and Skills)

4.4.7 Education

Every year, the Department of Education and Skills release details on enrolment figures for all primary schools. Currently there are 9 no. primary schools across the catchment area of the subject site. The total number of primary school level students in the study area is 3,869 no. pupils. This information was acquired by accessing school lists on the Department of Education's website. A phone survey was carried out by MacCabe Durney Barnes (February to March 2022) to determine the spare capacity within the area.

Given the urban location of Coolagad, the catchment area for the proposed development has been determined by utilising the entire Greystones, Delgany and Kilcoole Electoral Division (ED).

In terms of secondary schools in the study area, according to the Department of Education and Skills enrolment records there being four school facilities. The total number of secondary level students in the study area is 2,510 no. pupils.

Table 4.4: Summary of information on existing primary schools within LAP area including distance from site (Source: Department of Education and Skills)

Map ID	School name	Address	Distance site km	2019 enrolled	2020 enrolled	2021 enrolled	3 -Year Change	Available Capacity
1	St Laurence National School 19573F	Kindlestown Lower, Delgany, Co. Wicklow	1.5	684	688	661	-23	3
2	Greystones Community National School 20473I	Charlesland, Greystones, Co. Wicklow.	2.8	216	264	315	99	No response
3	Delgany National School 13679O	Delgany, Co. Wicklow	2.6	227	231	222	-5	0
4	St Kevin's National School Scoil Naomh Caoimhghin 17720F	Rathdown Rd, Rathdown Lower, Greystones, Co. Wicklow	0.9	507	501	498	-9	0
5	St Brigid's National School 16573N	Trafalgar Rd, Rathdown Lower, Greystones, Co. Wicklow	2	493	468	455	-38	5
6	Greystones Educate Together NS 20300A	Blacklion, Greystones, Co. Wicklow	0.5	465	467	469	4	0
7	St Patrick's National School 12554M	Church Rd, Rathdown Lower, Greystones, Co. Wicklow	1.4	273	287	303	30	0
8	Gaelscoil na Gloch Liath 20301C	Blacklion, Greystones, Co. Wicklow	0.5	435	385	354	-81	10
9	Kilcoole Primary School 20346B	Main Street Kilcoole. Co Wicklow	4.3	610	612	592	-18	8
	Total			3910	3903	3869	- 41	26

Table 4.5: Summary of information on existing secondary schools within LAP area including distance from site. (Source: Department of Education and Skills)

Map ID	Secondary School	Address	Distance Site km	2019 Enrolled	2020 Enrolled	2021 Enrolled	3-Year Change	Available Capacity
10	Greystones Community College 76596P	Greystones Tennis Club, Mill Road, Greystones, Co Wicklow	2.0	Established 2020	64	172	N/A	4
11	Temple Carrig Secondary School 68081J	Blacklion, Greystones, Co. Wicklow	0.5	812	830	857	45	0
12	Saint David's Holy Faith 61830M	Kimberley Rd, Rathdown Lower, Greystones, Co. Wicklow	2.1	579	632	671	92	No response
13	Colaiste Chraobh Abhann 76076M	Creowen, Kilcoole, Co. Wicklow	5.1	750	777	810	60	0
	Total			2,141	2,239	2,510	369	4

Table 4-2 demonstrates that 6 out of the 9 primary schools identified in the study area experienced a decrease in enrolment in the 2021/2022 school year in comparison to enrolments from 2019/2020. Overall, the number of children attending primary school in the study area decreased by 41 pupils between 2019 and 2021. It can be seen from the above table there is spare capacity for **383** pupils.

The phone survey indicated that secondary schools within the study area are at capacity with little additional places available for children. Between 2019 and 2021 an increase of 369 pupils attending secondary school in the area was recorded.

The Department of Education provide details on planned construction projects for new school facilities. The following projects are listed in the most up-to-date version of this project list (dated 1st February 2022) located in the study area. It is notable that the Department of Education have acquired a site at Charlesland for Greystones Community College. A planning application has been lodged for a secondary school of 37 no. general classrooms and 20 no. specialist classrooms 10,808 sqm and capacity of accommodating up to 1,000 students. Upon completion there will be capacity for **828** additional pupils.

Table 4.6: Department of Education construction projects under the school building programme (Source: Department of Education and Skills, Wicklow County Council Planning Register)

Roll Number	School	Level	Status	Additional Capacity with Planned Upgrades
61830M	St. David's Holy Faith	Secondary School	Greystones on Site[1]	(750 – 671 = 79)
76076M	Coláiste Chraobh Abhann	Secondary School	Stage 2a (Developed Sketch Scheme)	To be determined
76596P	Greystones Community College School	Secondary School	Opened in September 2020 in interim start-up accommodation. Stage 2a (Developed Sketch Scheme). Planning Application submitted by Cairn Homes Properties Limited for the construction of 37 no. general classrooms, 20 no. specialist classrooms, PE hall, a special needs unit, 6 no. hard play courts with a total internal floor area of c. 10,808 sqm.[2]	(1,000 – 172 = 828)

4.4.8 School Demand

In 2016, there were 23,969 people living in the study area, which is a 5.9% increase compared with 2011 census data. The proposed development is located within the Delgany ED with a population of 5,890 persons in 2016. This equates to an increase of 328 persons (5.8%) from 2011. Greystones population, the nearest ED within which the subject site is located increased by 1.5% in the intercensal period. Kilcoole ED's population experienced a significant higher growth rate (9.1%) which raised the average across the overall study area (5.9%).

4.4.9 Primary School Demand

Based on 2016 CSO data, there was a total primary school-attending population of 3,368 within the catchment area, which represents 14% of the total population of the study area. This percentage is slightly higher than Wicklow County, which stands at 14.2%. The number of primary school age pupils in Greystones ED was 832, this represents 3.5% of the study area in 2016. Overall, the number of children of primary school age children in the study area grew by 719 pupils in the intercensal period.

[1] Planning Application Re: PL27.247362 An Bord Pleanála
[2] Planning Application Ref: 22168 Wicklow County Council

In terms of the proposed development, excluding the 1-bedroom apartment units, this leaves a total of 521 no. units that can be considered to accommodate families and thus may generate demand for school places. When the 2016, 5-12 age band population percentage of 14% is applied to the total number of potential residents in 351 houses, 138 two and three bed apartments and 32 duplex units, it is estimated that up to **211** children will be in the 5-12 age cohort.

As can be seen above, there is a capacity for **383** additional pupils. As highlighted above the Department of Education have indicated there will be adequate capacity in the existing facilities and the school building programme to cater for the school demand generated in Greystones as a whole.

4.4.10 Secondary School Enrolment Projections

In terms of secondary school requirements, the post-primary attending population of 1,844 children amounts to 7.7% of the total study area population in 2016. Furthermore, there were 623 people in the 13-18 cohort living in the Greystones ED, which represents a decline of 2.6% from 2011.

Furthermore, there were 489 people in the 13-18 cohort living in the Delgany ED, which represents an increase of 59 pupils. While Greystone's ED experiences a decline of minus 18 in the number of people of post-primary age people living within the area.

Across the study area's population in 2016, 7.7% were in the 13-18 post-primary population age cohort. Applying this methodology to the 13-18 age cohort, it is estimated that **116** children of secondary school age would reside within the scheme.

As can be seen above, there is a capacity for **911** additional pupil which will be adequate to cater for the demand for school places generated by the development and the general area.

4.4.11. Open Space, Sports and Leisure

Given Greystones coastal location there are various recreational and amenity facilities associated with the area including Greystones cliff walk, the Sugar Loaf Mountain and Greystones Harbour Marina all located within 3km of the subject site. In addition, there are a wide variety of playing fields and leisure facilities established in the Greystones area. Several specific clubs and organisations were identified operating in the Greystones area, providing a range of cubs to cater for a wide range of interests.

The below table identifies a range of open space, sports and leisure facilities available in Greystones and outlines the distance from the subject site.

Table 4.7: List of Open Spaces, Sports and Leisure Facilities in Greystones and surrounding area (Source: Geodirectory)

Map Ref	Name of Facility	Description of Facility	Address	Distance from Site (km)
1	Yoga Mums	Yoga Studio	Zen Garden, 7 Mill Bank, Killincarrig, Greystones, Co. Wicklow	2.5
2	Delagny Golf Club	18 hole golf course and club house	Stylebawn, Stilebawn, Delgany, Co. Wicklow	2.2
3	Greystones Golf Centre	Golf course and club house	Charlesland Rd, Killincarrig, Greystones, Co. Wicklow.	3.0
4	Greystones United AFC	All weather playing fields, playing fields and club house.	Woodlands, Killincarrig, Greystones, Co. Wicklow	2.6
5	Sporting Greystones FC	All weather pitch, playing field and changing rooms.	Chapel Rd, Kindlestown Lower, Greystones, Co. Wicklow	1.2
6	Greystones Golf Club	18 hole golf course and clubhouse	Burnaby Estate, Whitshed Rd, Killincarrig, Greystones, Co. Wicklow	1.9
7	Greystones Tennis Club	Tennis Court and club house	Mill Rd, Greystones, Co. Wicklow	2.6
8	Greystones Rugby Club	Clubhouse and playing piteches	Mill Rd, Greystones, Co. Wicklow	2.6
9	Greystones Sailing Club	Facilities located at Greystones Harbour	The Harbour, Rathdown Lower, Greystones, Co. Wicklow	2.0
10	Greystones Ridge Angling Club	300 sqm clubhouse with meeting and changing facilities and 600 sqm boat storage.	Beach Road, Rathdown Lower Greystones Co. Wicklow A63 DX45	1.7
11	Go Gym	Gym	Charlesland, Greystones, Co. Wicklow	3.9
12	Greystones Yoga Studios	Yoga studio	Church Rd, Killincarrig, Greystones, Co. Wicklow	2.2
13	Boogie Bounce Greystones	Gym and physical fitness centre	Greystones Lawn Tennis Club, Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.7
14	Greystones Bowling Club	Lawn bowling course	Killincarrig, Greystones, Co. Wicklow	2.4
15	Burnaby Park	Public park	Killincarrig, Greystones, Co. Wicklow	2.5
16	South Beach	Open space	Killincarrig, Greystones, Co. Wicklow	2.7
17	Wendon Park	Public Park	Wendon Park, Delgany, County Wicklow	2.2
18	RTF Park	Public Park	Charlesland Wood, Charlesland, Greystones, Co. Wicklow	3.0
19	Eire Og GAA Club	Club house and two playing fields	Killincarrig, Greystones, Co. Wicklow	2.8
20	Ignite Fitness Greystones	Gym	Unit 3 Blacklion Business Center, Rathdown Lower, Greystones, Co. Wicklow	0.1

Map Ref	Name of Facility	Description of Facility	Address	Distance from Site (km)
21	Shoreline Leisure Greystones	Gym and 25 metre deck-level swimming pool, sauna, steam rooms, astro pitches.	69 Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.5
22	Shoreline Sports Park	4 Astro pitches, baseball field, outdoor gym, tennis and basketball courts, running track and skate park	Knockroe, Charlesland, Greystones, Co. Wicklow	3.7
23	Pura Vida Fitness Greystones	Gym	Knightpark Pura Vida Fitness Studio, Charlesland, Greystones, Co. Wicklow, A63 C714	3.2
24	Ríonach Yoga	Yoga studio	Delgany Wood, Delgany, Co. Wicklow	2.1
25	Yoga with Angelika	Yoga studio	St Patricks Church, Church Road, Greystones, Co. Wicklow	1.6
26	GPS Greystones Pilates Studio	Pilates studio	Trafalgar Rd, Rathdown Lower, Greystones, Co. Wicklow	1.9
27	Power Rowing	Gym	Greystones Scouts Den, 1st Wicklow, Church Rd, Greystones, Co. Wicklow, A63 H278	1.4
28	Glen of the Downs	59 ha nature reserve	Drummin West, Co. Wicklow	2.5
29	Kindlestown Woods	35 ha mixed woodland and trails.	Kindlestown Upper, Co. Wicklow	1.2
30	St. Killian's Badminton Club	Badminton Court	Rathdown Lower, Greystones, Co. Wicklow	0.5
31	St. Patrick's Badminton Club	Badminton Court	Rathdown Lower, Greystones, Co. Wicklow	1.5
32	Great Sugar Loaf	Highest peak of Wicklow Mountains	Glencap Commons South, Co. Wicklow	2.8
33	Cliff Walk	7.1 km coastal trail from Bray Head to Greystones Cliff Walk	Rathdown Lower, Greystones, Co. Wicklow	1.4
34	Redford Park	Public Space	Rathdown Lower, Greystones, Co. Wicklow	0.65
35	Yinstict Yoga	Yoga studio	Rathdown Lower, Greystones, Co. Wicklow	0.65
36	Greystones Harbour Marina	Public Space	Harbour Marina, Greystones, Co. Wicklow, A63 YD62	1.7
37	Greystones Taekwon-Do	Material arts studio	St. Kilian Family Centre, Kimberly Road, Rathdown Lower, Greystones, Co. Wicklow	2.2
38	Greystones Shotokan Karate Club	Martial arts studio	69 Mill Rd, Killincarrig, Greystones, Co. Wicklow, A63 HD25	2.6
39	The Yoga Process	Yoga studio	104 Rathdown Park, Rathdown Lower, Greystones, Co. Wicklow, A63 TK33	0.4
40	Greystones Yoga	Yoga studio	Church Rd, Delgany, Co. Wicklow	2.1

Map Ref	Name of Facility	Description of Facility	Address	Distance from Site (km)
41	Greystones Gymnastics Academy	Gymnastics centre	69 Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.7
42	Glenview Health Club	Gym, fitness studio, sauna, jacuzzi and 18-meter deck-level swimming pool.	Bellevue Demesne, Delgany, Co. Wicklow, A63 DC95	2.2
43	Greystones Playground	Children's playground	Killincarrig, Greystones, Co. Wicklow	2.1
44	Charlesland Playground	Children's playground	Charlesland, Co. Wicklow	2.9
45	Keska	Hiking Area	Coolagad, Co. Wicklow	0.5
46	The Boat Yard Market	Food Market on Sunday's	2 Trafalgar Rd, Rathdown Lower, Greystones, Co. Wicklow, A63 CY60	1.9
47	Delgany Heritage Trail	Walking trail	Kindlestown Heights, Kindlestown Lower, Delgany, Co. Wicklow	1.4
48	Delgany/ Greystones Cycling Club	Cycling club for all abilities	No operational location	n/a
49	Blacklion Shotokan Karate Club	Martial arts studio	Rathdown Lower, Greystones, Co. Wicklow	0.7
50	Greystones Dog Park	Park for dogs	Rathdown Lower, Greystones, Co. Wicklow	0.9

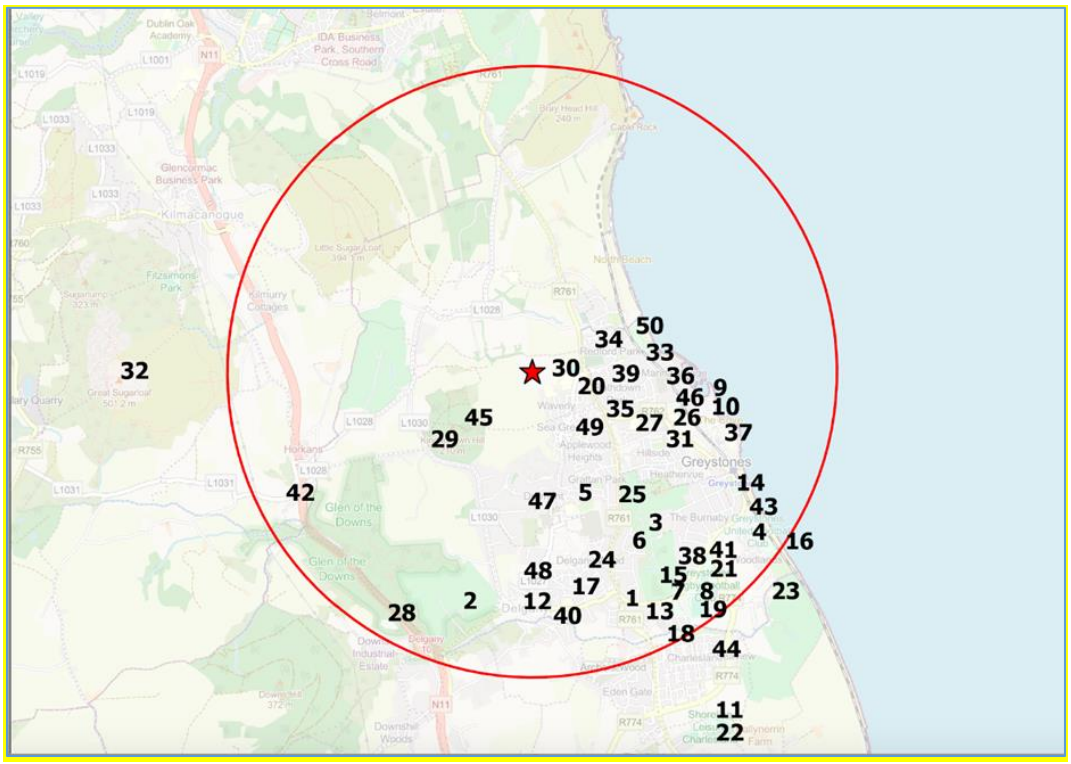

Figure 4.7 Map of Sports and Leisure Facilities in Greystones and surrounding area (Source: Geodirectory)

4.4.12 Childcare Facilities

A Childcare Demand Report accompanies this SHD application under separate cover. TUSLA is the State agency that oversees the provision of childcare and other family support services. A list of childcare facilities were obtained from the Tusla early years services registration list showing enrolment figures and capacity available in childcare facilities located within a 3km radius of the subject site in Greystones, as can be seen in the following table.

Table 4.8: Childcare Facilities Identified within 3km of the subject site (Source: Tusla)

Map Ref	Name of Facility	Address	Distance from Site (km)	Service Type	Tusla Enrolment	Capacity Available
62	Footprint Montessori	8 Carrig Villas, Killincarrig, Greystones, Co. Wicklow	3	Sessional	42	No information provided
63	Naionra An Lana	Theatre Lane, Killincarrig, Greystones, Co. Wicklow, A63 P7V0	1.8	Part Time Sessional	61	42
64	Knockeevin Montessori	Knockeevin Montessori School Delgany, El Pinar, Kindlestown Heights, Kindlestown Upper, Delgany, Co. Wicklow	2.8	Part Time	31	No availability
65	Knockeevin Montessori	Knockeevin Montessori, Knockeevin, Church Rd, Rathdown Lower, Greystones, Co. Wicklow	1.5	Part Time Sessional	44	No availability
66	Global Garden Pre-School	La Touché Road, Greystones, Co. Wicklow	1.8	Sessional	17	No availability
67	Greystones Montessori	St Patrick's WRC, Church Rd, Greystones, Co. Wicklow	1.2	Sessional	22	No information provided
68	Bellevue Montessori	Groom's House, Bellevue Demesne, Delgany, Co. Wicklow	1.3	Part Time	17	No information provided
69	Woodlands Montessori	162 Heatherview, Killincarrig, Greystones, Co. Wicklow, A63 R292	2.0	Sessional	22	No information provided
70	Naionra na Gcloch Liath	Gaelscoil Na gCloch Liath, Blacklion, Greystones, Co. Wicklow, A63 AN22	0.3	Part Time	16	16
71	Smiley Sunflowers Pre-School	Church Rd, Rathdown Lower, Greystones, Co. Wicklow	1.3	Part Time Sessional	20	No information provided
72	The Nest	The Nest School, Waverly Hill, Blacklion, Greystones, Co. Wicklow	0.6	Part Time Sessional	61	No response
73	Naionra Ná Clocha Beaga	Unit 5 Theatre Lane, Hillside Road, Greystones, Wicklow	1.8	Part Time	18	No information provided

Map Ref	Name of Facility	Address	Distance from Site (km)	Service Type	Tusla Enrolment	Capacity Available
74	Acorns Playschool	Eire Og, Greystones, GAA Club, Mill Road	2.8	Sessional	22	No response
75	Orahova Montessori School	Shoreline Leisure Centre, Killincarrig, Greystones, Co. Wicklow	2.6	Sessional	33	No information provided
76	The Convent Montessori	Unit 3, Marina Village, The Harbour.	1.8	Part time/ Sessional	20 sessional, 8 part time	No response
	Total				454	58

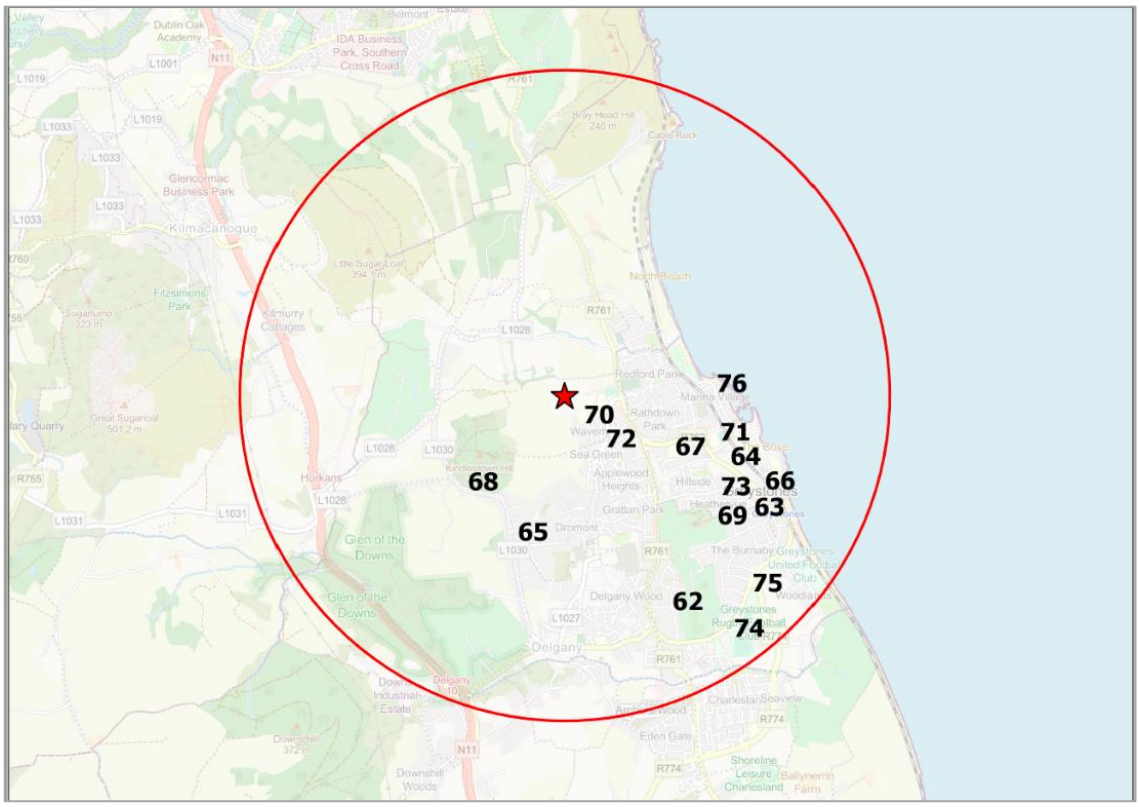

Figure 4.8 Map of Childcare Facilities within 3km of subject site (Source: Tusla)

The Guidelines for Planning Authorities on Childcare Facilities (2001) indicate that Development Plans should facilitate the provision of childcare facilities in appropriate locations. These include larger new housing estates where planning authorities should require the provision of a minimum of one childcare facility with 20 places for each 75 dwellings.

The *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* nuances the childcare requirement by stating that: '*Notwithstanding the Planning Guidelines for Childcare Facilities (2001), in respect of which a review is to be progressed, and which recommend the provision of one child-care facility (equivalent to a minimum of 20 child places) for every 75 dwelling units, the threshold for provision of any such facilities in apartment*

schemes should be established having regard to the scale and unit mix of the proposed development'. One-bedroom units are excluded for the purposes of calculating requirements.

Based off the methodology applied in the Childcare Demand report, the proposed development will generate demand for **135** pre-school places.

4.4.13 Health Facilities and Social Services

Primary Care services are broadly defined as the health or social care services that a person can use and find in a community, outside of a hospital setting. Primary Care includes GPs, Public Health Nurses and a range of other services provided through your Local Health Office, by the HSE (Health Service Executive).

General service hospitals would have to be accessed in either Newcastle Hospital, Co. Wicklow or St Columcille's Hospital, Loughlinstown, Co. Dublin, both hospitals are located off the N11, which can be easily accessed from the subject site.

A large health centre Greystones Medical Centre serves the town which is operated by the HSE and located approximately 3.6km from the subject site. There is also several pharmacies, dentists and optometrists operating in the catchment area, concentrated in Greystones town that serves the residents of Greystones and its hinterland.

Table 4.9: List of Health Facilities and Social Services within 3km of the site (Source: Geodirectory)

Map Ref	Name of Facility	Type of Facility	Address	Distance from Site (km)
77	Charlesland Medical Centre	Medical Centre	The Charlesland Centre, Charlesland, Greystones, Co. Wicklow	3.6
78	ANAM Child and Adolescent Psychiatry	Mental Health	The Healing Rooms, Watson & Johnson Centre, Mill Road, Greystones, Co. Wicklow	2.6
79	Carrig Clinic	Medical Centre	96 Heatherview, Rathdown Lower, Greystones, Co. Wicklow, A63 X659	2.0
80	Smiles Solutions	Dentist	The Charlesland Centre, Charlesland, Greystones, Co. Wicklow	3.6
81	Jean Andrews Physiotherapy	Physiotherapy	Greystones Medical Centre, Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.8
82	Opticians Greystones	Optometrist	2-4 Killincarrick Road, Killincarrig, Greystones, Co. Wicklow.	2.3
83	Greystones Eye Centre	Optometrist	18b Church Rd, Rathdown Lower, Greystones, Co. Wicklow	2.3
84	Greystones Medical Centre	Medical Centre	Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.6
85	Mental Health Solution	Mental Health	19 Cherry Rise, Delgany, Co. Wicklow, A63 K840	2.1
86	Mindfully Well Greystones	Mental Health	22 Church Rd, Killincarrig, Greystones, Co. Wicklow	2.4
87	Greystones Dental Centre	Dentist	Unit 3, Tesco Shopping Centre, Rathdown Lower, Greystones, Co. Wicklow	1.6

Map Ref	Name of Facility	Type of Facility	Address	Distance from Site (km)
88	Lucey Dental	Dentist	Meridian Point, Church Rd, Killincarrig, Greystones, Co. Wicklow	2.4
89	Roseair Dental Practice	Dentist	5 Eden Rd, Rathdown Lower, Gresytones, Co. Wicklow	2.1
90	Dental Care Ireland Greystones	Dentist	Bow Ln, Church Rd, Killincarrig, Greystones, Co. Wicklow	2. 5
91	Podiatric Treatment	Podiatric	Mill Rd, Greystones, Co. Wicklow	2.9
92	Greystones Family Doctor	Medical Centre	Unit 1, Blacklion Business Centre, Rathdown Road, Greystones, Co. Wicklow	0.3
93	Greystones Health Centre	Medical Centre	Victoria Rd, Rathdown Lower, Greystones, Co. Wicklow	1.6
94	Eyrefield Manor Nursing Home	Nursing Home	Church Ln, Rathdown Lower, Greystones, Co. Wicklow	1.5
95	Greystones Nursing Home	Nursing Home	Church Rd, Rathdown Lower, Greystones, Co. Wicklow	1.6
96	Peace Heaven Trust	Retirement Home	1&2 Hillside Estate, Rathdown Lower, Greystones, Co. Wicklow	1.4
97	Hands on Therapy	Physical Therapy Clinic	Shoreline Leisure Centre, Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.2
98	Greystones Harbour Family Practice	Medical Centre	Trafalgar House, Trafalgar Rd, Rathdown Lower, Greystones, Co. Wicklow, A63 AY71	1.9
99	The Dental Studio	Dentist	Blacklion Retail Centre, Rathdown Rd, Rathdown Lower, Greystones, Co. Wicklow	0.3
100	Applewood Physio	Physiotherapy	Roches Clinic, Blacklion, Greystones, Co. Wicklow, A63 N996	0.7
101	Greystones Physiotherapy Clinic	Physiotherapy	Westgate, Delgany, Greystones, Co. Wicklow, A63 AK85	2.2
102	McCauley Health and Beauty	Pharmacy	Church Road, Greystones, Co. Wicklow, A63 NA47	1.8
103	David Dodd Pharmacy Greystones Limited	Pharmacy	Greystones Medical Centre, Mill Road, Greystones, Co. Wicklow, A63 YE86	2.3
104	Roches Allcare Pharmacy	Pharmacy	Blacklion Retail Centre, Unit 7, Greystones, Co. Wicklow	0.3
105	Lloyds Pharmacy	Pharmacy	Tesco, Rathdown Lower, Greystones, Co. Wicklow	1.2
106	McGleenans Pharmacy	Pharmacy	Church Rd, Killincarrig, Greystones, Co. Wicklow	1.9
107	Boots the Chemist	Pharmacy	18 Church Rd, Rathdown Lower, Greystones, Co. Wicklow, A63 T9K3	1.8

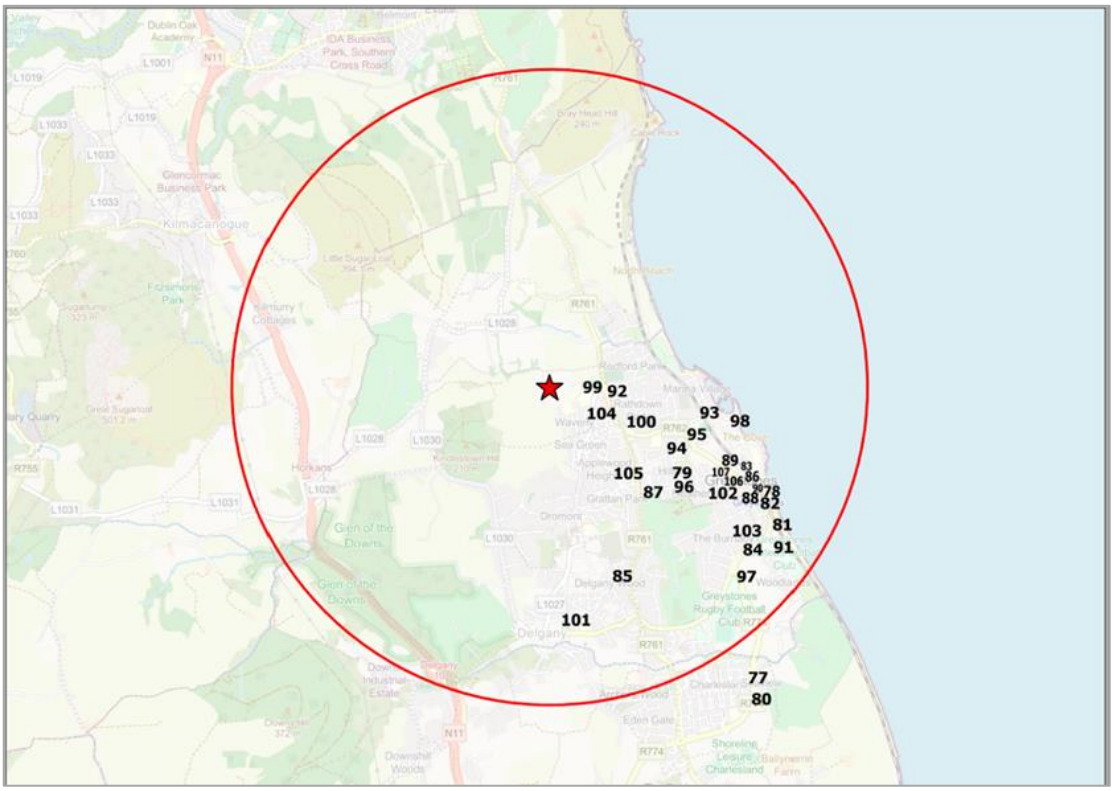

Figure 4.9 Map of Health Facilities and Social Services within 3km of the subject site (Source: Geodirectory)

4.4.14 Community Facilities

Social and Community facilities are varied in nature and can include general civic services and services targeted to specific section of the community. There is a dedicated Family Resource Centre in Greystones, operated by Tusla. It offers an extensive range of services including but not limited to counselling services, family support, training schemes, youth support and senior services. The facility is located south of the town centre of Greystones, 2.6km from the subject site. The below table identifies a range of community facilities available in Greystones and outlines the distance from the subject site.

Table 4.10: List of Community Facilities within 3km of the site (Source: Geodirectory)

Ref	Name of Facility	Description	Address	Distance from Site (km)
108	Dr Ryan's Community Centre	Community Centre	146 Kenmare Heights, Kindlestown Lower, Greystones, Co. Wicklow, A63 YA21	1.5
109	Greystones Family Resource Centre	Family service centre	28 Burnaby Ct, Charlesland, Greystones, Co. Wicklow, A63 KX59	2.6
110	Greystones Library	Library	Mill Rd, Killincarrig, Greystones, Co. Wicklow	2.6
111	Greystones Harbour Sea Scouts	Youth group	Beach Rd, Rathdown Lower, Greystones, Co. Wicklow	2.2
112	Sugarloaf Bridge Club	Community Group	2-6 Victoria Rd, Rathdown Lower, Greystones, Co. Wicklow	1.8

Ref	Name of Facility	Description	Address	Distance from Site (km)
113	Glenheron Community and Enterprise Centre	Community Room	Permitted at St. Saviour's, Rathdrum, Co. Wicklow.	2.7
114	Charlesland Community Centre	Community Centre	Charlesland Community Centre, Charlesland Grove, Greystones, Co. Wicklow	3.3
115	Killian House Family Centre	Community Centre	La Touche Road, Greystones, Co. Wicklow	1.7

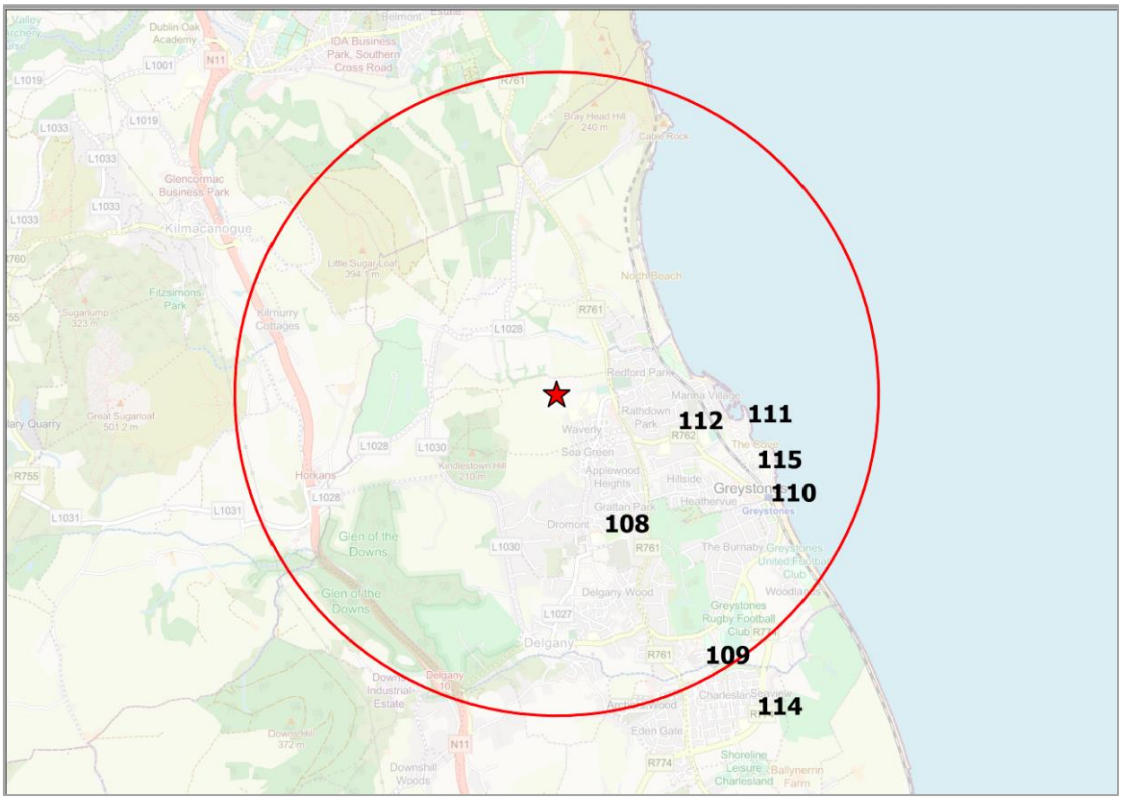

Figure 4.10 Map of Community Facilities located within 3km of the subject site (Source: Geodirectory)

4.4.15 Arts Facilities

The below table identifies a range of Arts facilities available in Greystones and outlines the distance from the subject site.

Table 9: List of Arts Facilities within 3km of the site (Source: Geodirctory)

Map Ref	Name of Facility	Description of Organisation	Address	Distance from site (km)
116	DoMiSo Musical School	Music School	The Stables, Christ Church, Delgany, Co. Wicklow	2.1
117	The Bradly Theatre School	Acting School	Theatre Lane, Killincarrig, Greystones, Co. Wicklow	2
118	Pitch Perfect Singing	Music School	81 Charlesland Park, Charlesland, Greystones, Co. Wicklow, A63 Y242	3.4
119	The Whale Theatre	Theatre	Theatre Lane, Adjacent Meridian Point, Greystones, Co. Wicklow, A63 V1F8	2
120	Sunshine Stage School	Drama School	St. Patricks Recreation Centre, Church Lane, Greystones, Co. Wicklow	1.7

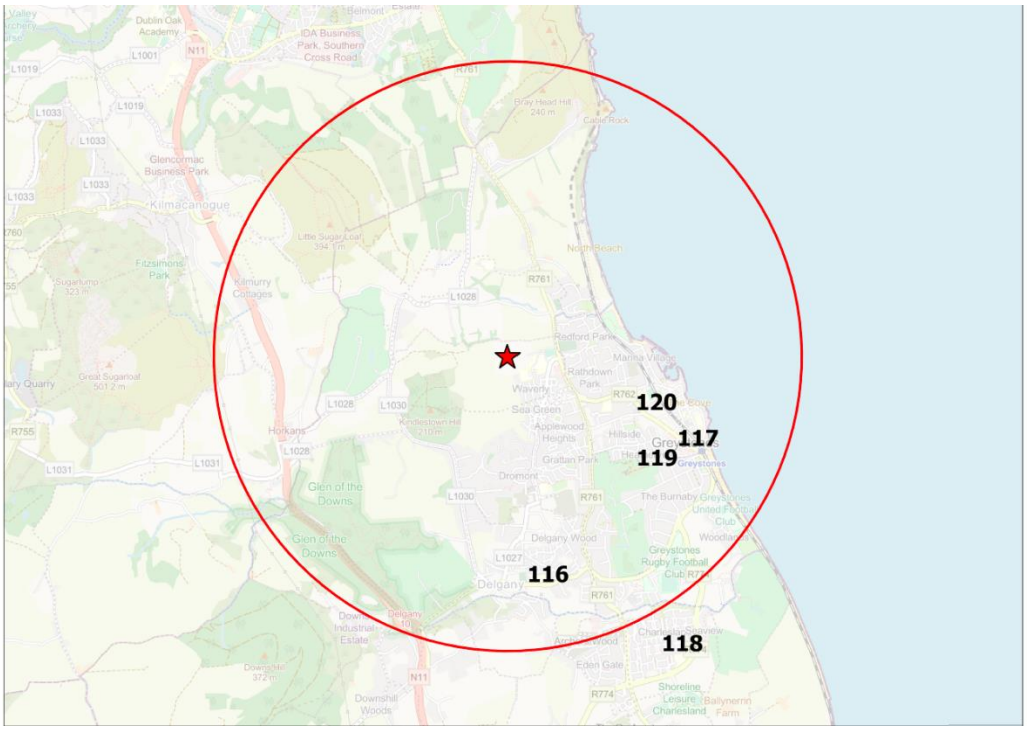

Figure 4.11 Map of Arts Facilities within 3km of the site (Source: Geodirectory)

4.4.16 Religious & Workshop Facilities

There are several churches and religious buildings serving a variety of different faiths in Greystones. The majority of these places of worship are located within the core of the town. The table below lists relevant facilities.

Table 4.11: List of Religious and Places of Worship Facilities in Greystones, Co. Wicklow

Map ID	Name of Facility	Address	Distance from Site (km)
121	St Patrick's Church	Church Rd, Rathdown Lower, Greystones, Co. Wicklow	1.4
122	Nazarene Community Church	Greystones, 10 Burnaby Ave, Killincarrig, Greystones, Co. Wicklow, A63 NW82	2.5
123	Hillside Evangelical Church	Hillside Rd, Rathdown Lower, Greystones, Co. Wicklow	1.8
124	Greystones Presbyterian Church	Trafalgar Road, Rathdown Lower, Greystones, Co. Wicklow.	1.7
125	Christ Church	R762, Delgany, Co. Wicklow	2.1
126	Saint Mochonog's Church	Kilmacanoge North, Co. Wicklow	3.6
127	Holy Rosary Church	La Touche Rd, Rathdown Lower, Greystones, Co. Wicklow	2

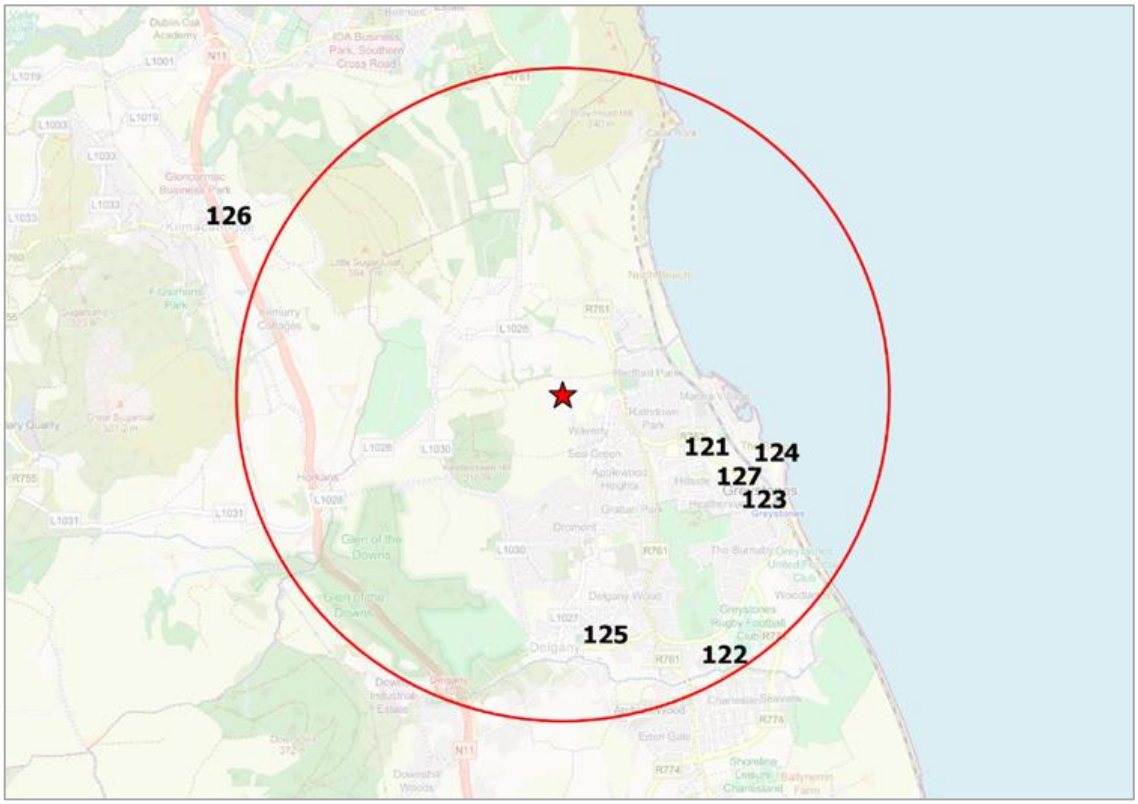

Figure 4.12 Places of Worship within 3km of the site (Source: Geodirectory)

4.4.17 Retail & Entertainment

The Greystones area is well supplied in terms of retail services and facilities. The town includes commercial, shops, cafes and restaurants. The entertainment possibilities are also well

provided for. The location of Lidl with 300m of the site and neighbourhood centre shops and local services will meet all of the required retail needs of residents.

4.5 Impact Assessment

This section provides assessment of all the potential direct and indirect significant effects impacts of the Proposed Project on population and human health. In accordance with the draft EPA guidelines, the assessment of impacts on population and human health refer to the assessment of those factors under which human health effects might occur, this is also as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc.

The analysis comprises a study of the key assessment themes as well as consideration of the construction phase, with a conclusion reached in relation to the proposed development on the baseline characteristics as described above. The characteristics of this impact assessment are defined below, as per the draft Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA. 2017) and European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment (2017)

Population

4.5.1 Construction Phase

Generally, the potential impacts arising during the construction phase relate to quality of life including visual impact / amenity, noise, air quality and transport. Where relevant, these impacts have been considered in the relevant chapters of the EIAR and will be minimised or mitigated where appropriate. It is unlikely that these impacts will be of a scale to either give rise to significant short-term negative disturbance to the existing population.

The construction phase will generate increased employment and capital spend on materials and services, which will benefit the local economy. It is estimated that the number of workers employed during the construction phase (as described in Chapter 2) will average between 190 and 200 people, up to a maximum of 250.

In addition to direct employment, there will be substantial off-site employment and economic activity associated with the supply of construction materials and the provision of services such as professional firms supplying professional services to the project.

The effect on Population will be moderate, positive and short-term in terms of socio-economic impact and moderate and negative, slight and temporary in terms of disturbance to daily activities the local population may experience from construction activity at the subject site.

4.5.2 Operational Phase

The operational phase is considered to have likely significant positive long-term impacts on human beings in relation to the provision of additional residential units, open space, community facilities, active open space (sports field) childcare provision, to cater for the demands of a growing population in accordance with the residential zoning objectives pertaining to the site. The proposed development will introduce a new residential population on a greenfield site in a suburban area of north Greystones.

The provision of 586 quality homes within the proposed development will have a significant permanent positive impact on the population in the area, contributing to the settlement's growth in a compact manner and accommodating a substantial portion of the planned

population growth of Greystones. Based on the average household size for Greystones settlement (2016 Census) of 2.89, the development would accommodate a new population of approx. 1,694 persons upon completion. This population will also generate additional spending within the area, which will likely have a permanent moderate positive impact on economic activity in the EIAR study area (catchments assessed in this Chapter). the locality (Blacklion neighbourhood centre) and Greystones town centre.

The proposed development incorporates a creche with a floor space of c.734 sq.m. with significant capacity to service the childcare needs of the proposed development. The scheme incorporates a Community building of 392 sq.m. including changing rooms and a multipurpose room which will be transferred to Wicklow County Council.

Based on the existing schools capacity identified coupled with the proposed development of Greystones Community College at Charlesland to accommodate 1,000 post-primary pupils and the potential capacity of Greystones National School at Charlesland to accommodate 672 primary school students it can be considered that there is sufficient capacity in the study area to cater for the demand generated by the proposed development.

In terms of Population, any impact on of social infrastructure in Greystones would be imperceptible and there would be a neutral to slight positive long-term impact on the Population in terms of addressing education (pre-school) and community needs.

4.6 Cumulative Impacts

The proposed development will introduce a new residential population on a greenfield site in a suburban area of north Greystones. Based on the average household size for Greystones settlement (2016 Census) of 2.89, the development would create a new population of the order of 1,694 persons upon completion. The proposed layout provides for linkages to designated zoned residential lands north of the distributor road as well as lands to south facilitating future development. There are no current proposals for adjoining sites. The provision of social infrastructure is integral to the scheme with the provision of amenities, childcare, community and sports facilities.

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. Data sources included the following:

- Wicklow County Council (planning and roads section);
- An Bord Pleanála website;
- Wicklow County County Development Plan 2016-2022;
- Greystones – Delgany and Kilcoole Local Area Plan (LAP), 2013-2019;
- Coolagad Action Plan; and
- EIAR Portal.

Relevant development proposals and decisions are outlined as follows:

4.6.1 Relevant Planning History - Application Site

There is no relevant history on the application site.

4.6.2 Relevant Planning History - Surrounding Areas

Relevant Planning History - Estate

The Waverly estate is located generally east of the site.

Figure 4.13: Relevant Applications at Waverly

Reference	Status	Decision Date	Summary
072799/ ABP 230050	Expired	ABP Grant 03/06/2009	159 residential units
114336/ABP 239380	Incomplete	22/12/11	Amendments to 072799
141952	Parent permission	01/04/2015	130 houses and creche
16783	Grant	07/09/2016	Temporary access gates
17461	Grant	19/06/2017	Extension of duration

Relevant Planning History - Seagreen Estate

The Seagreen Estate is located generally south east of the site.

Figure 4.14: Relevant Applications at Seagreen

Reference	Status	Decision Date	Summary
141031	Grant	01/10/2014	Parent permission 187 houses
151152	Grant	16/01/2016	Amendments
16420	Grant	15/06/2016	Amendments
16971	Grant	26/10/2016	Amendments
161066	Withdrawn	n/a	Amendments
1722	Grant	08/03/2017	Amendments
17880	Grant	02/11/2017	Amendments
18111	Grant	02/04/2018	Alter 38 kv
18627	Grant	01/08/2018	Amendments
191089	Grant	01/12/2019	Extend appropriate period – substantial completion

Relevant Planning History - Schools

A number of schools are located adjacent to the site to its east.

Figure 4.15: Relevant Applications at Adjacent Schools

Reference	Status	Decision Date	Summary
126589	Permitted	04/01/2013	Three storey school, access to ET school
138103	Permitted	17/04/2013	New school (Temple Carrig)
15608	Permitted	09/08/2015	New Irish school

15814	Permitted	01/10/2015	Sports lights for hockey pitch

4.6.3 *Relevant SHD Applications in the Wider Area*

Figure 4.16: Relevant SHD Applications

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

This Chapter has had regard to the policies and objectives of;

- Wicklow County Development Plan 2016-2022
- Draft Wicklow County Development Plan 2021-27
- Greystones, Delgany and Kilcoole Local Area Plan (LAP) 2013-2019

This assessment has had regard to the development proposal to provide a public park, multi-use game area (MUGA), playground, sports field, community centre and child care facility in fulfilling strategic planning objectives for the proposed development (new population) as well as facilitating the local population.

This assessment has considered the impact on social infrastructure capacity (including schools) having regard to the overall needs and trends in the population for the settlement.

Overall, the development supports the sustainable long-term development of Greystones in accordance with strategic plans for the area. The cumulative impact on Population and Human Health is considered to be moderate, long-term and positive.

4.7 Ameliorative, Remedial or Reductive Measures

Mitigation measures relating to those factors under which human health effects might occur have been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, air quality and climate, noise and vibration, townscape and visual and material assets: utilities

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 CEMP prepared by AECOM on behalf of the applicant Cairn Homes, is included with the SHD application material.

4.7.1 *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 during the construction phases being avoided.

In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction Environmental Management Plan (including traffic management) shall be submitted by the contractor and implemented during the construction phase. This will mitigate potential local disturbance or severance to local populations that may arise from construction activity.

With reference to the construction phase of the proposed development, the objective of the Construction Waste Management Plan prepared by Enviroguide 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. An Outline Construction and Environmental Management Plan prepared by AECOM also accompanies the SHD planning application to support the management of construction activities within appropriate environmental operational standards.

4.7.2 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, community facilities, active open space (sports field) 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.

4.8 Human Health Impacts

Human health may be impacted on in a variety of ways and by several environmental receptors including water, biodiversity, climate, noise, flooding, air, and major accidents, etc. Exposure to contaminants or pollutants can have serious implications for human health. Potential impacts on population and human health include inadequate water and wastewater infrastructure, contamination of soils, excessive noise, flooding due to non-control of surface water, poor air quality in areas where there are large volumes of traffic and the health impacts associated with the storage of hazardous materials during the construction stage. These issues are addressed within the relevant discipline of the EIAR.

4.8.1 Construction Phase

The proposed development is predominantly residential in character and it is considered that the greatest health and safety risks will be posed during the construction phase of the proposed development. As with any construction site, there will be potential risks to the health and safety in terms of injury or death of construction personnel on-site due to the usage of large, mobile machinery as well as heavy equipment and materials. An Outline Construction Demolition and Waste Management Plan (CDWMP) has been prepared by Enviroguide. This outline plan will be further updated by the contractor and agreed with Wicklow County Council prior to commencement to any construction works on site.

The construction activities will occur in the context of a green-field site, and there are no existing residents at this location that may be disrupted by these works..

Potential impacts on pedestrians, cyclists and on traffic flow were assessed and the potential impacts were found to be negative, but short term and not significant.

Chapter 8 (Air Quality and Climate) identifies that the greatest potential impact on air quality during the demolition and construction phase of the proposed development is from soil excavation and construction dust emissions and the potential for nuisance dust. The Air Quality Assessment considers the potential likelihood and magnitude of dust generation during demolition, earthworks, construction and movement of heavy vehicles, and concluded that there is a low risk of significant dust soiling or human health impacts occurring as a result of the proposed development. Prior to mitigation the impact to air quality will be negative, short-term and imperceptible.

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. In terms of noise, the threshold or limit values for the site development and construction phases will not be exceeded on the basis of the assessments undertaken in Section 9.5.1. Therefore, the impact of construction of the proposed development with mitigation measures in place is likely to be indirect, short-term, negative and slight with respect to human health.

AECOM will prepare an CEMP which is a preliminary plan outlining the description of the proposed works and how these works will be managed for the duration of the construction on site. The CEMP presents the potential environmental impacts, the proposed management and monitoring methodologies based on the concept of Best Practice and the proposed mitigation measures to be implemented on site, having regard to assessment in this EIAR.

The CEMP will include the following:

- Description of the proposed works;
- Roles and responsibilities as they related to the CEMP;
- Site logistics outlining details on programme and phasing, working hours/periods, and site housekeeping;
- Traffic management;
- Environmental impacts and mitigation requirements for the control of the following:
- Surface water quality;
- Waste management;
- Air quality; and
- Noise and vibration.

The plan shall be updated by the contractor and agreed with Wicklow City Council (WCC) by the appointed Contractor in advance of the construction phase.

4.8.2 Operational Phase

The proposed development is in line with the site-specific zoning objective and will consist of 586 residential units, community centre, creche and amenity area. Due to the nature of the development, there will be few hazards associated with the operational phase of the development and therefore no potential significant negative impact in terms of health and safety. The potential impacts on cycling and pedestrians will be positive, given the permeable

layout, additional open and recreational space included in the development and proximity to local facilities.

A lack of adequate recreation or amenity facilities has the potential to negatively impact human mental and / or physical health. The proposed layout provides for excellent public amenity and recreational facilities, including communal amenity space, public open space.

The provision of these amenity facilities within the proposed development will be of benefit to future residents and existing residents in the local environs. The operational phase of the proposed development, in terms of recreation and amenity facilities will, therefore, have a permanent significant **positive impact** on Human Health.

The air quality assessment (Chapter 8) determined that the Operational Phase air quality impact is negligible and therefore no site-specific mitigation measures are required. For the operational phase, the impact to air quality from traffic emissions during the operational stage would be negative, local, long-term and imperceptible.

The Noise Assessment (Chapter 9) considers it is unlikely that individual Nosie Sensitive Repeptors (NSRs) in Seagreen and Waverly will be affected at levels exceeding the noise criteria for short term site development and construction activities. Although the limits are not expected to be exceeded based on above predictions in Section 9.5.1.4, mitigation measures to minimise the impact of site development and construction noise on the nearest NSRs and to ensure compliance with construction noise criteria are set out in Section 9.8 - Ameliorative, Remedial and Reductive Measures.

As a result of these measures it is considered that there will be no significant negative impacts on the health of future site users, and any effects would be negligible.

4.9 Residual Impacts (including worst case scenario)

Following implementation of the mitigation measures outlined in relevant sections of this EIAR, the residual impact on population and human health is considered to be positive moderate longterm in delivering the residential population for Greystones consistent to the Council's development objectives in the County Plan, Local Area Plan and Action Area Plan for the locality.

The proposed mitigation measures will avoid, prevent, or reduce impacts on the human environment during the construction and operational phases of the proposed development. Residual impacts are those which remain following the implementation of the proposed mitigation measures, however no significant adverse residual impacts have been identified.

The land will have a suburban character. However, this change is in context with the specific zoning of the site and AAP for residential / mixed use/ public green space development and the impact is considered acceptable when balanced with the other positive impacts on amenity, such as the provision of active public amenity spaces, much needed housing in the city regional wide context, employment and local services.

4.10 Do Nothing Scenario

Under a do-nothing scenario the lands would remain in agricultural use. This represents a negative moderate medium to long-term impact for Greystones and north County Wicklow arising from the loss of population and material assets due to the increase in the housing stock and social infrastructure that would be available in the area. In terms of Human Health, a do-nothing scenario is considered slight negative impact in the medium term as the recreation and

community facilities associated with the development would not be delivered for the population.

4.11 Monitoring

Measures to avoid negative impacts on Population and Human Health have been integrated into the design and layout of the proposed development. Compliance with the proposed design and layout in accordance with the terms and conditions of a permission will be a condition of any permitted development. Monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission. Monitoring of compliance with Waste and Environmental controls requirements will be in accordance with the CEMP and CDWMP.

Table 4.12: Summary of Effects, Impact, Mitigation and Monitoring

Nature of Effect	Impact	Mitigation	Monitoring
Residential population growth	Positive longterm impact on housing stock and population	Proximity to local facilities, service and infrastructure	Housing completion statistics and Census
Local amenity	Demand for Community and Recreation facilities	Provision of on-site and community centre, playing field and amenity open space	Compliance with planning permission and development phasing
Social Infrastructure	Demand for Community and Recreation facilities	Provision of creche and proximity to local schools	Creche and school enrolment
Environmental Impacts during construction process	Possible short term impacts due to disturbance	Compliance with CEMP and CDWMP	CEMP / CDWMP will be responsibility of construction personnel in liaison with local authority and statutory bodies

4.12 Difficulties Encountered

There were no significant difficulties encountered in compiling the information contained in the Population and Human Health Chapter; however, census data (2016) is now six years old. It is not anticipated that any future revision of figures/data would result in a significant impact upon the findings of this assessment or the conclusions reached.

4.13 References

Environmental Protection Agency, 2017, Draft Guidelines on the Information to Be Contained in Environmental Impact Assessment Reports

European Commission (2017), Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment

Health in Environmental Impact Assessment – A Primer for a Proportionate Approach (2017) Institute of Environmental Management and Assessment (IEMA)

Health Impact Assessment Guidance (2021) Institute of Public Health in Ireland;

Wicklow County Development Plan 2016-2022

Greystones/Delgany/Kilcoole Local Area Plan 2013-2019

Draft Wicklow County Council Development Plan 2021-2027

ESRI Quarterly Economic Commentary, Winter 2021

Central Statistics Office www.cso.ie

Pobal.ie

Central Statistics Office (2011) Census 2011 Report.

Central Statistics Office (2016) Census 2016 Report.

Department of Education and Skills data

Tusla data

5 Biodiversity

5.1 Introduction

This Chapter of the EIAR was prepared by Altemar Ltd and assesses the biodiversity of the proposed project area and the potential impacts of the proposed Project on the ecology of the surrounding area within the potential Zone of Influence (ZOI). The proposed residential development (referred to as '*the proposed Project*'), is located at Coolagad, Greystones, Co. Wicklow.

This Chapter also outlines, the potential impact of the proposed development (in the absence of mitigation), the standard construction, operational and monitoring measures that are proposed to minimise potential impacts and to improve the biodiversity potential of the Site of the proposed Project. The residual impacts (post mitigation) and cumulative impacts are also assessed.

Desk studies were carried out to obtain relevant existing biodiversity information within the Zone of Influence (ZOI). As outlined in CIEEM (2018) The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.' Best Practice In line with best practice guidance an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, there is a watercourse within the proposed development site and it is proposed to carry out instream works and reprofiling works in the vicinity of the watercourse. In addition, works are proposed to connect a new foul connection towards Greystones. As a result, the potential ZOI extends beyond the site, with the potential for downstream impacts to extend the ZOI beyond the site outline via the watercourse and surface water drainage networks respectively. In relation to the ZOI as a result of the works, this was extended to within the marine environment. Details of the proposed development are seen in Chapter 2 of the report. The proposed layout, drainage strategy and landscape design were reviewed to inform this assessment. Further, the EIAR was reviewed including, the Development Description, Land Soil and Geology (Chapter 6), Water (Chapter 7), and the Air and Climate (Chapter 8) of the EIAR in addition to the CEMP. The assessment extends beyond the immediate proposed Project Site to include those species and habitats that are likely to be impacted upon by the proposed Project.

The programme of work in relation to biodiversity aspects of the EIAR have been designed to identify and describe the existing ecology of the area and detail sites, habitats or species of conservation interest. It also assesses the significance of the likely impacts of the proposed Project on the biodiversity elements and outlines measures to alleviate identified impacts. The residual impacts (post mitigation) and cumulative impacts are also assessed. A bat assessment report has also been prepared and included at Appendix 5.1.

Background to Altemar

Altemar Ltd. is an established environmental consultancy that is based in Greystones and has been in operating in Ireland since 2001. This chapter of the EIAR has been prepared by Bryan Deegan of Altemar Limited. Bryan Deegan MCIEEM is the Managing Director of Altemar Ltd. and holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and a National Diploma in Applied Aquatic Science. He has over 27 years' experience as an environmental consultant in Ireland and was the ecologist for all aspects of this project. Previous projects where Altemar were the lead project ecologists include the Lidl Ireland GmbH regional distribution centres in Newbridge and Mullingar, 18 airside projects for the Dublin Airport Authority (DAA)

at Dublin Airport and 7 fibre optic cable landfalls in Ireland including the New York to Killala cable project in 2015. He is a competent expert in accordance with the EIA Directive 2014/52/EU.

Appropriate Assessment

A Natura Impact Statement (NIS), in accordance with the requirements of Article 6(3) of the EU Habitats Directive, has been produced by Altemar Limited. It was determined that:

> *"Following the implementation of the mitigation measures outlined, the construction and presence of this development would not be deemed to have an impact on the integrity of Bray Head SAC. No impacts are likely on Bray Head SAC, alone in combination with other plans and projects based on the implementation of standard construction phase mitigation measures.*
>
> *This report presents a NIS for the proposed development. It outlines the information required for the competent authority to determine whether or not the proposed development, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites' conservation objectives, will adversely affect the integrity of the Bray Head SAC."*

5.2 Assessment Methodology

A pre-survey data search (desktop study) was carried out in September 2020 and updated in January 2022. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), and Environmental Protection Agency (EPA); in addition to aerial, 6-inch maps and satellite imagery. Field surveys were carried out based on the schedule of fieldwork elements outlined in Table 5.1. The assessment was carried out in accordance with the following best practice methodology: Draft EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports , Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EC, 2013) , EU EIAR Guidance and Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland (CIEEM, 2018). The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000).

Table 5-1 : Fieldwork Dates

Survey	Dates
Habitat and Flora Assessment	31st August 2020 & 31st August 2021,
Terrestrial Mammal	6th November 2020, 26th February 2021 & 7th January 2022
Bat Assessment	31st August 2020, 31st August 2021,
Wintering bird Assessment	6th November 2020, 26th February 2021, 27th March 2021, 7th January 2022 and 20th January 2022.

Figure 5-1 Satellite Image of the Site of the Proposed Project

5.3 Characteristics of the Proposed Development

5.3.1 Description of the site

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7 year planning permission for a strategic housing development at this site of c.26.03ha at 'Coolagad', Greystones, Co. Wicklow . The application site is generally located to the west of the R761 Rathdown Road, north of the Gate Lodge; north and west of Coolagad House, Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School. The lands are bounded by Waverly Avenue and Seagreen Park residential areas to the east. Templecarrig Lower is located to the north of the lands and Kindlestown Upper to the west.

5.3.2 Characteristics of the site

The proposed development will consist of:

- 586 residential units including:
  - 351 two storey houses (207 no. 3 bed, 140 no. 4 bed, 4 no. 5 bed) comprising detached, semi-detached and terraced units
  - 203 no. apartments (65 no. 1 bed, 123 no. 2 bed, 15 no. 3 bed) provided within 6 no. blocks ranging from three to four-storey (over basement) with residential amenity facilities.
  - 32 no. duplex units within 2 no. three-storey blocks (16 no. 2 bed and 16 no. 3 bed units)
- c. 5,192 sqm of communal open space is provided to serve the proposed apartment/duplex units.
- Community building (single storey) of 392 sq.m. with 29 car parking spaces, including changing rooms and a multipurpose room.
- Creche building of 734 sq.m. with 21 car parking spaces.
- A new vehicular entrance, with signalised junction and pedestrian crossings, will be provided off the R761 (Rathdown Road). The new junction will be linked to the existing signalised junction at Blacklion Manor Road / Redford Park which has a planned upgrade by Wicklow County Council. Cycle lanes will be provided along this section of the R761 on both sides. A footpath will also be provided on its western side. Car parking will be provided to the east of the R761, in the front of Redford Cemetery.
- The new access will provide a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11.
- Car and bicycle parking spaces are provided as follows:
  - 702 on curtilage car parking spaces for the houses; 206 car parking spaces at basement level and 5 at surface level for the apartments; and 32 spaces for the duplex units and 10 visitor spaces at surface level;
  - 22 motorbike parking spaces;
  - 436 resident and 118 visitor bicycle parking spaces are proposed in a mix of basement and surface levels for the apartment blocks and duplex units; 12 bicycle spaces are proposed for the creche, 12 for the community centre and 10 at the sport field.
- The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the construction of a new public foul sewer along the R761/R762 from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

- c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces incorporating an existing stream, formal and informal play areas, and new boundary treatments.
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

5.4 Baseline Description

5.4.1 Designated Conservation Sites

Designated sites are presented in Figures 5.2 (SAC within 15 km), 5.3 (SPA within 15 km), 5.4 (NHA and pNHA within 15 km), 5.5 (watercourses in proximity to the Site), 5.6 (watercourses and SAC within 1 km), 5.7 (watercourses and SPA within 1 km) and 5.8 (watercourses and pNHA within 1 km).

It should be noted that the Site of the proposed Project is not wholly or partly within a designated conservation site. The closest European site is Bray Head SAC, which is 667 m from the proposed Project. The nearest SPA is the Murrough SPA, which is located 5.3 km from the Site. There are no designated NHA within a 15 km radius; however, the nearest pNHA (Bray Head) is 0.68 km from the Site. There are no designated Ramsar sites within a 15 km radius of the proposed development. The distance and details of the conservation sites within 15 km of the proposed Project are presented in Table 5.3. There is potential for a direct hydrological pathway from the proposed Project to the Bray Head SAC via the watercourses proximate to the proposed development. The Greystones Stream flows directly through the proposed development site and the Kilruddery/Deerpark Stream (offsite) to the north of the site (Figure 5.5) are both susceptible to potential impact. Both the Greystones Stream and the Kilruddery/Deerpark Stream ultimately outfall to the marine environment approximately 452 m and 188 m respectively, from the Bray Head SAC. Surface water along the R762 and R762 also ultimately discharge to the marine environment via Greystones Stream, the Kilruddery/Deerpark Stream and the public surface water network. As a result there are direct and indirect pathways to the marine environment. As a result of the proximity of Bray Head SAC to the pathways outlined above it is also considered that there is an indirect pathway to Bray Head SAC vis surface water networks.

Table 5-2: Distances to Designated Conservation Sites within 15 km

Name	Distance (km)	Type
SAC		
Bray Head SAC	0.67	SAC (indirect pathway)
Glen of the Downs SAC	1.9	SAC
The Murrough Wetlands SAC	4.3	SAC
Ballyman Glen SAC	6.1	SAC
Carrigower Bog SAC	6.3	SAC
Knocksink Wood SAC	6.7	SAC
Wicklow Mountains SAC	7.8	SAC
Rockabill to Dalkey Islands SAC	10.2	SAC
SPA		
The Murrough SPA	5.3	SPA
Wicklow Mountains SPA	7.4	SPA
Dalkey Islands SPA	12.5	SPA
NHA/ pNHA/ Ramsar		
Bray Head	0.68	pNHA (indirect pathway)

Name	Distance (km)	Type
Glen of The Downs	1.9	pNHA
Kilmacanoge Marsh	2.5	pNHA
Great Sugar Loaf	2.6	pNHA
The Murrough	3.5	pNHA
Dargle River Valley	4.8	pNHA
Powerscourt Woodland	6.0	pNHA
Ballyman Glen	6.1	pNHA
Knocksink Wood	6.7	pNHA
Powerscourt Waterfall	6.9	pNHA
Glencree Valley	7.8	pNHA
Carriggower Bog	7.1	pNHA
Vartry Reservoir	8.5	pNHA
Ballybetagh Bog	9.7	pNHA
Loughlinstown Woods	9.9	pNHA
Dingle Glen	10.7	pNHA
Dalkey Coastal Zone and Killiney Hill	12.1	pNHA
Devil's Glen	13.5	pNHA

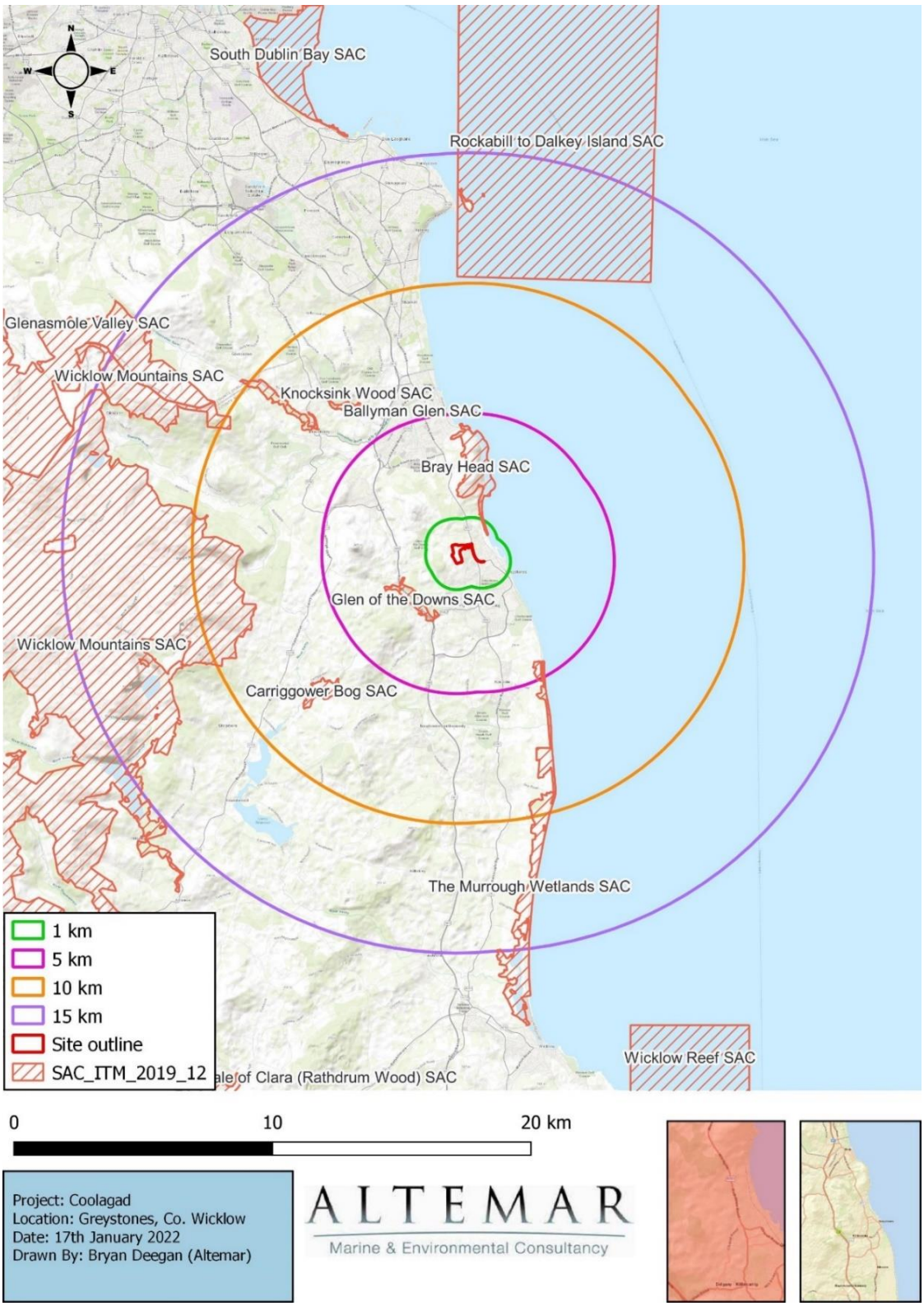

Figure 5-2 SACs within 15 km of the proposed development

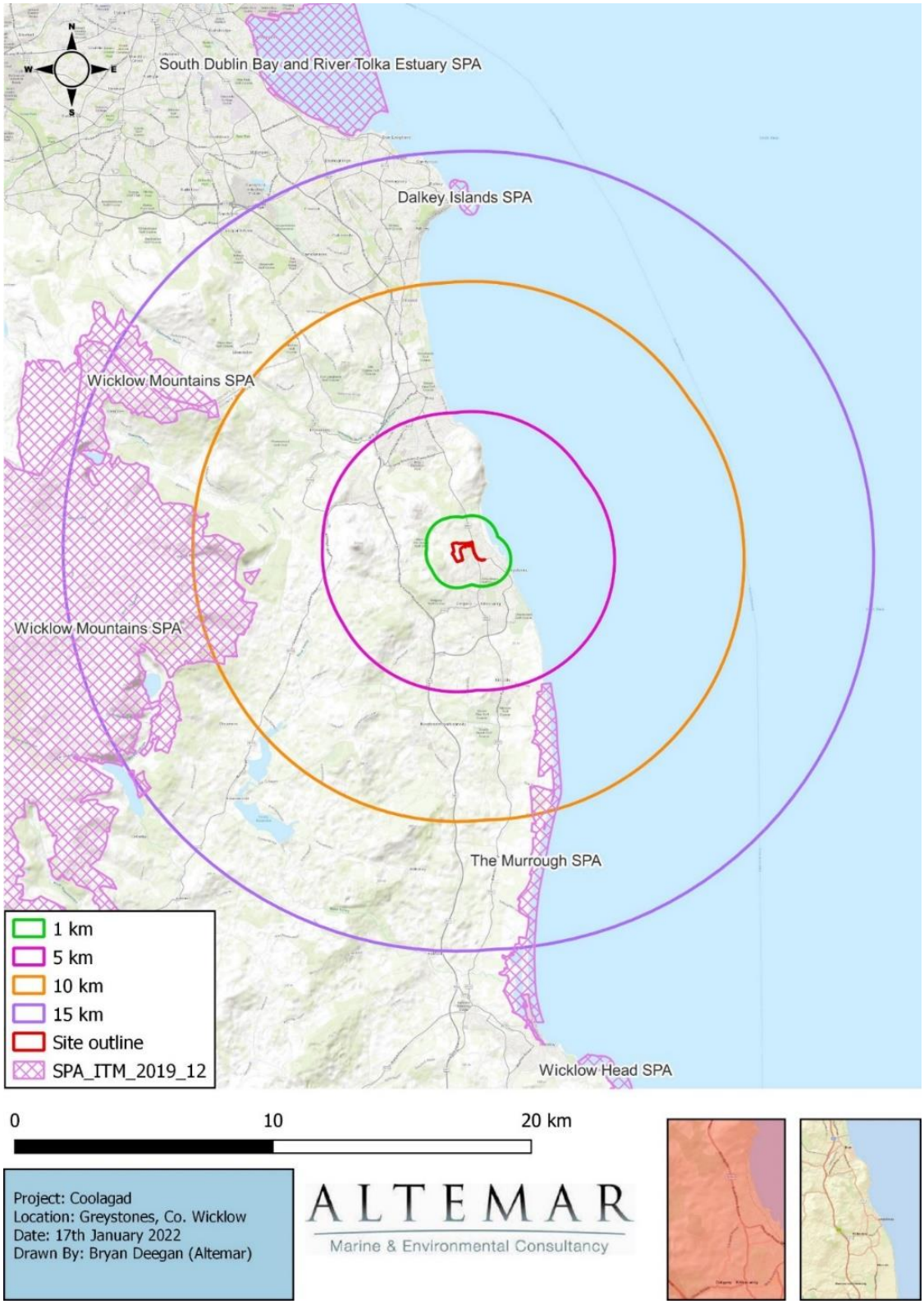

Figure 5-3 SPAs within 15 km of the proposed development

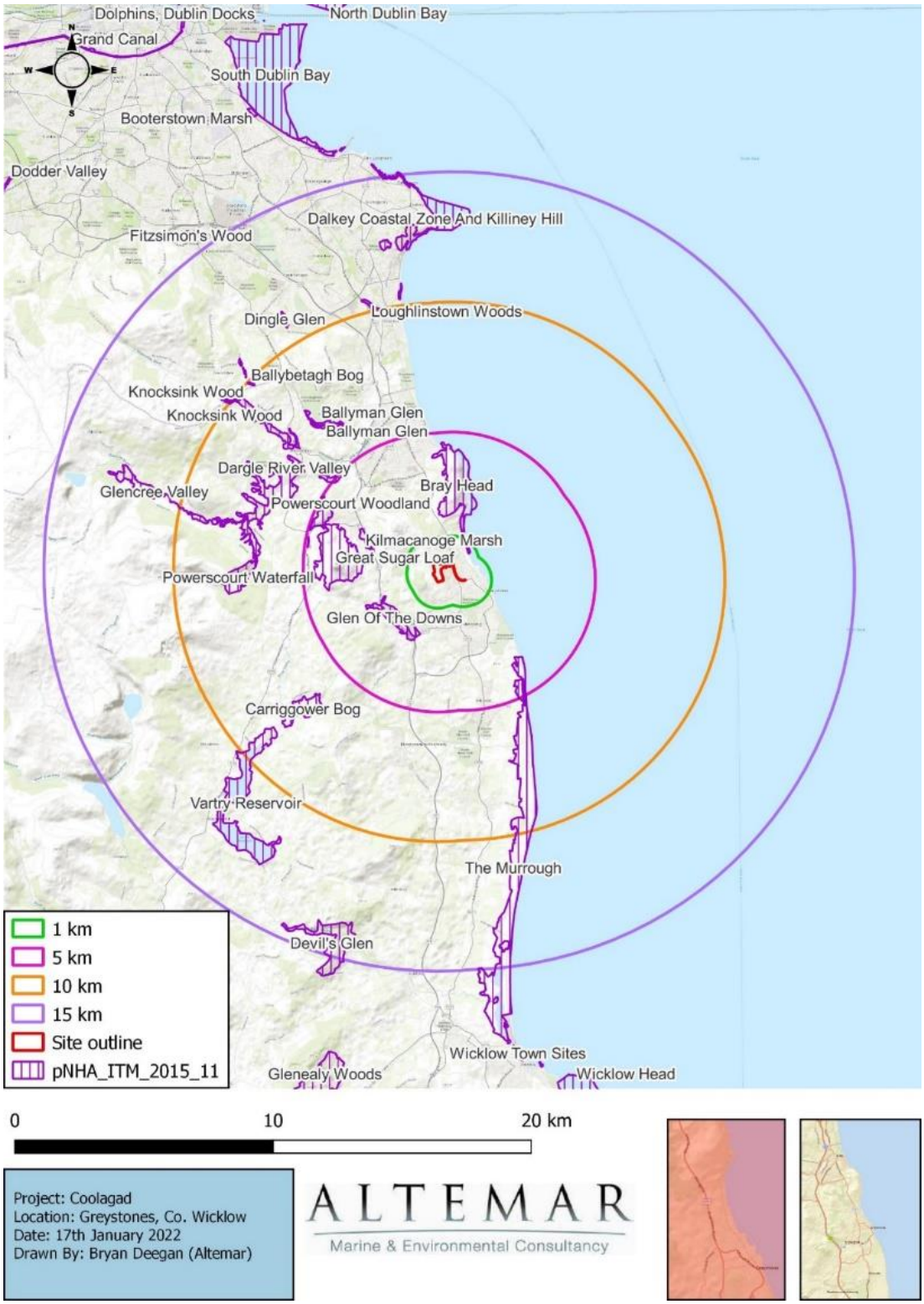

Figure 5-4 : NHAs and pNHAs within 15 km of the proposed development

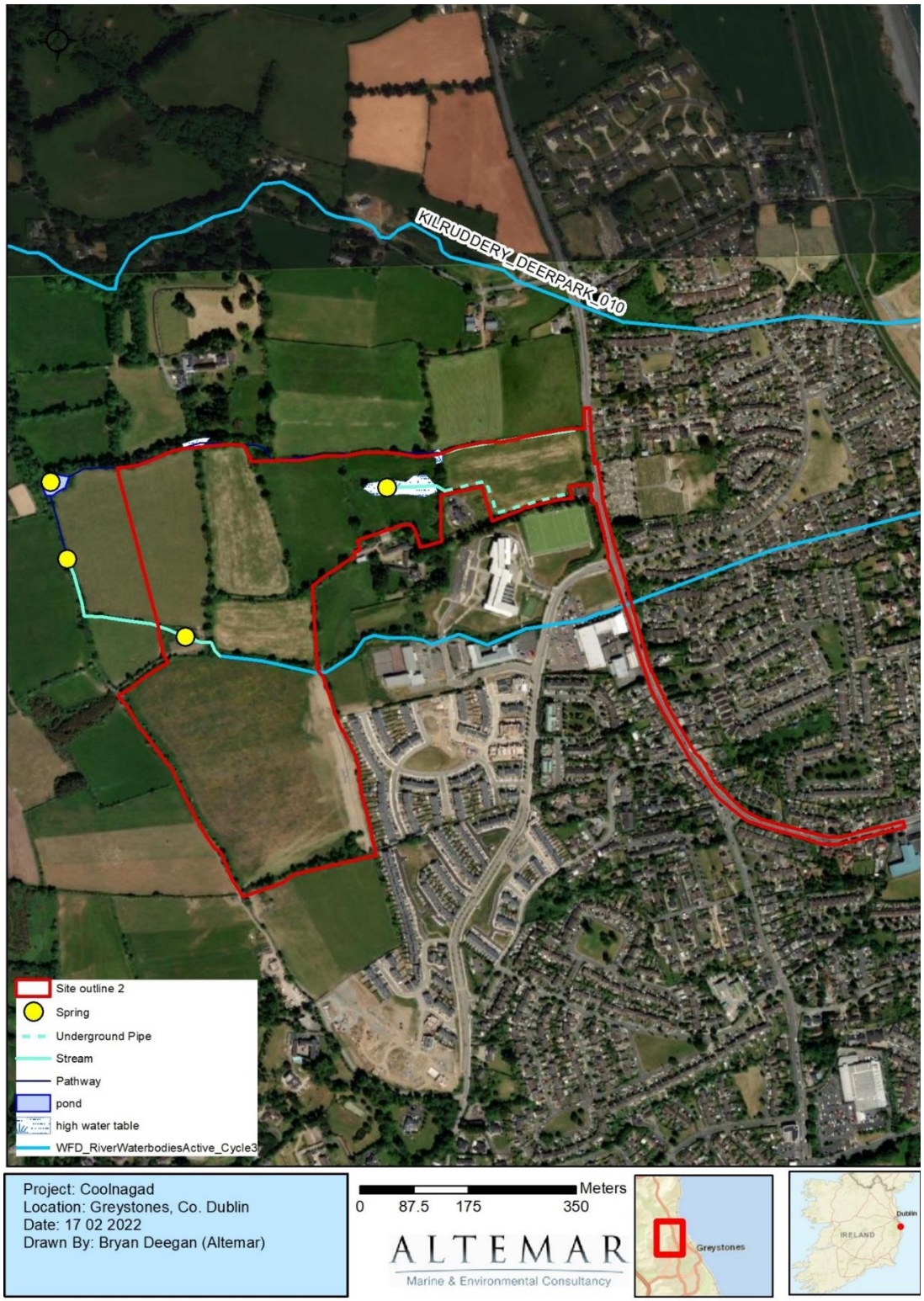

Figure 5-5 Waterbodies and sources proximate to the proposed development

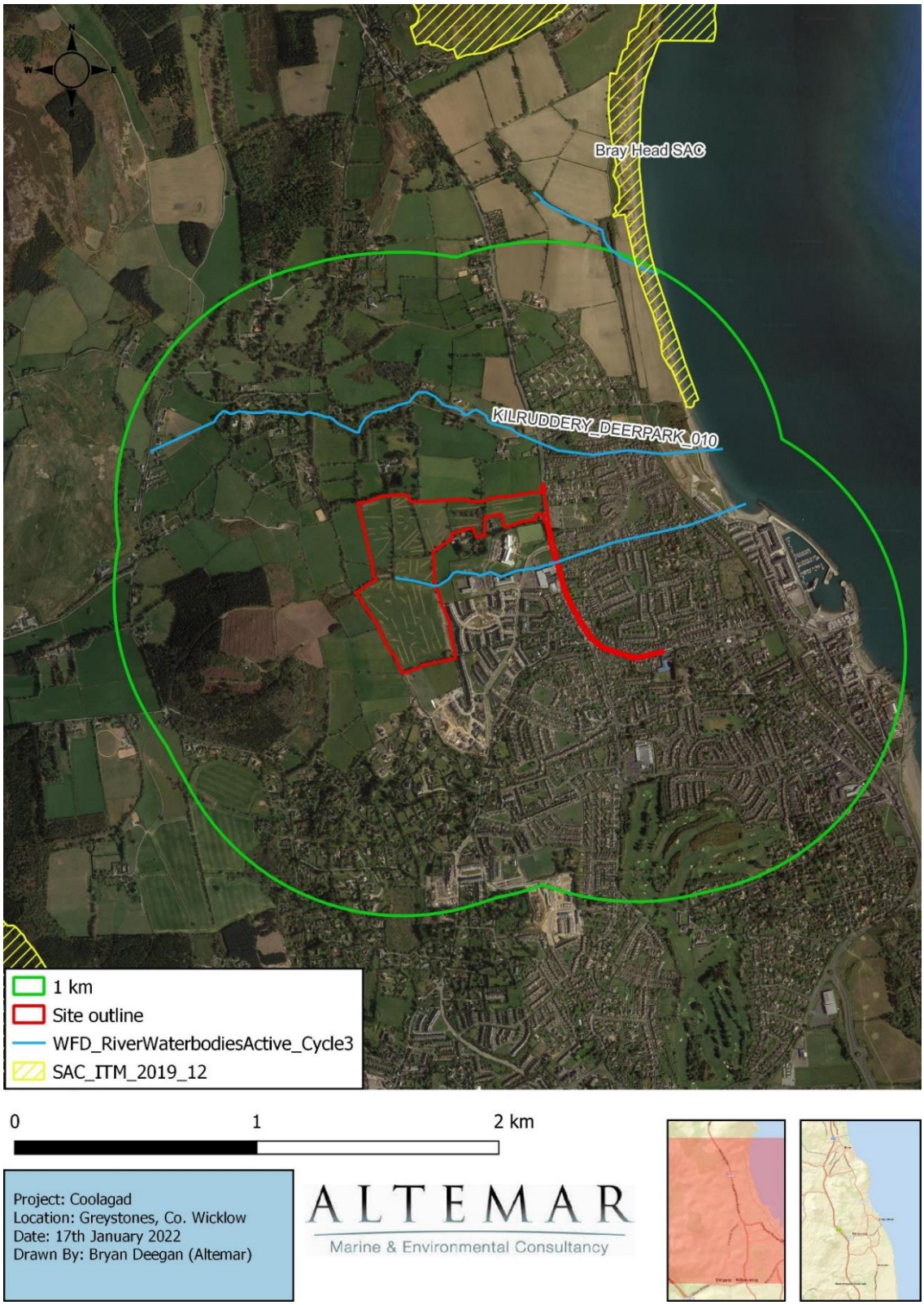

Figure 5-6 Waterbodies and SACs proximate to the proposed development

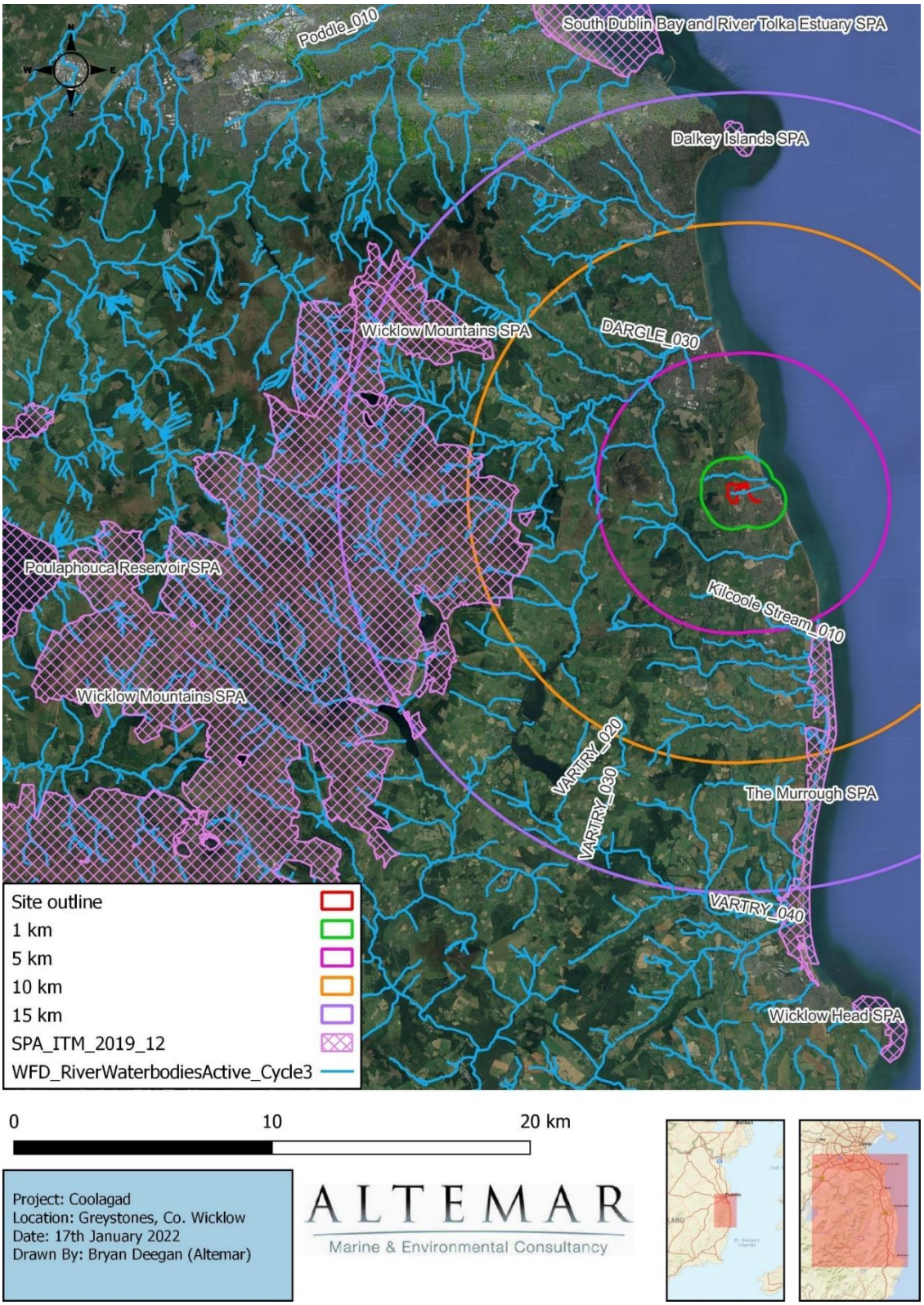

Figure 5-7 Waterbodies and SPAs proximate to the proposed development

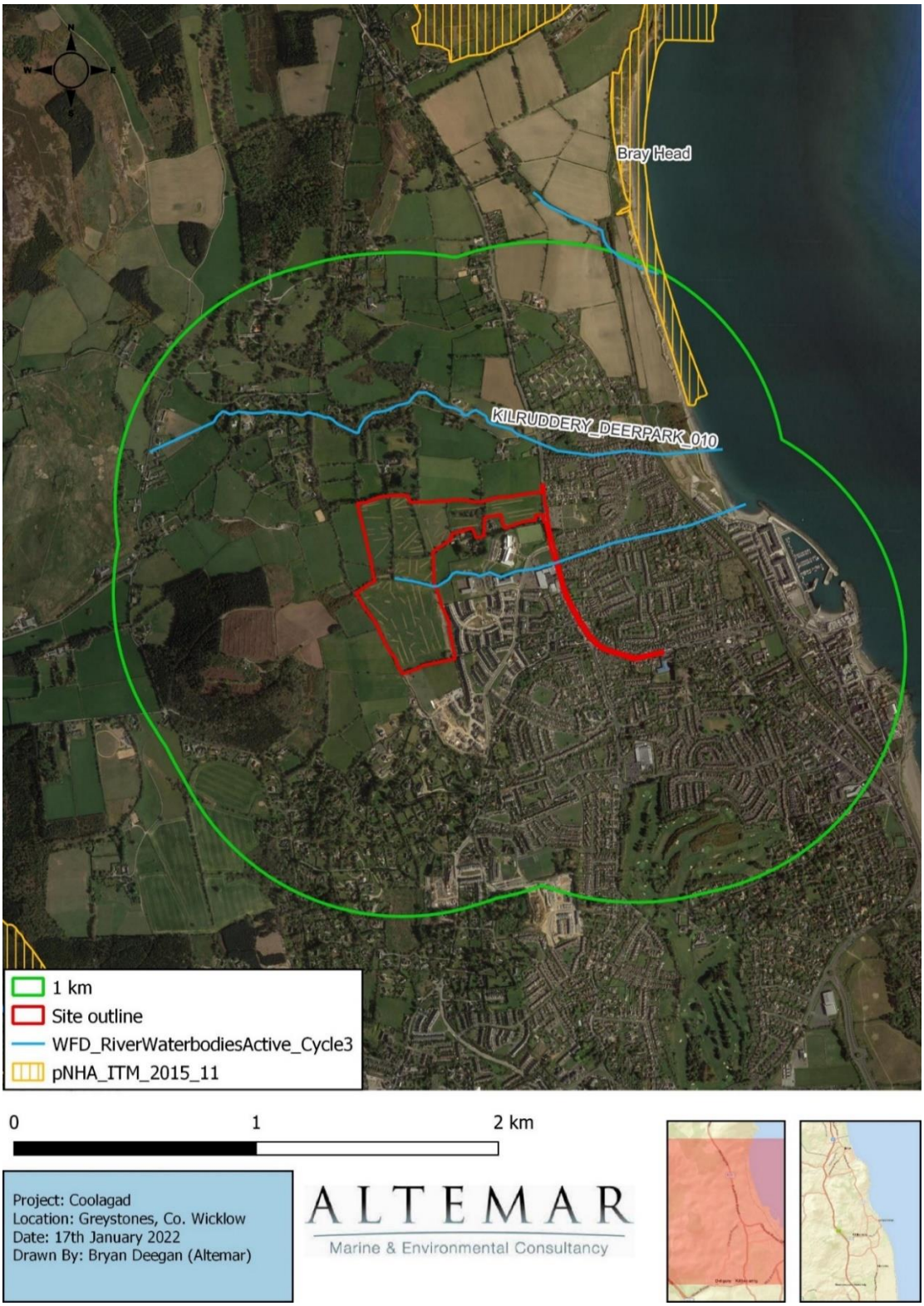

Figure 5-8 Waterbodies and pNHA within 1 km of the site

5.4.2 Biodiversity Records

The NBDC's online viewer was consulted in order to determine the extent of biodiversity and species of interest in the area. An assessment of the Site-specific area was carried out and it recorded no species of interest. To 2 km^2 grids proximate to the proposed development site were assessed (O21W and O21R) as the proposed development site is located in both grids. Table 5.4 provides a list of all species recorded in the 2 km2 grid area.

Table 5-3: NBDC Records of Rare, Protected and Invasive Species within the 2 km^2 grid (O21W)

Species Recorded (O21W)	
Common Frog (*Rana temporaria*) Barn Swallow (*Hirundo rustica*) Black Guillemot (*Cepphus grylle*) Black-headed Gull (*Larus ridibundus*) Black-legged Kittiwake (*Rissa tridactyla*) Brent Goose (*Branta bernicla*) Common Goldeneye (*Bucephala clangula*) Common Guillemot (*Uria aalge*) Common Kestrel (*Falco tinnunculus*) Common Linnet (*Carduelis cannabina*) Common Pheasant (*Phasianus colchicus*) Common Redshank (*Tringa totanus*) Common Starling (*Sturnus vulgaris*) Common Swift (*Apus apus*) Common Wood Pigeon (*Columba palumbus*) Dunlin (*Calidris alpina*) Eurasian Oystercatcher (*Haematopus ostralegus*) Eurasian Woodcock (*Scolopax rusticola*) Eurasian Woodcock (*Scolopax rusticola*) European Shag (*Phalacrocorax aristotelis*) Great Black-backed Gull (*Larus marinus*) Great Cormorant (*Phalacrocorax carbo*) Herring Gull (*Larus argentatus*) House Martin (*Delichon urbicum*) House Sparrow (*Passer domesticus*) Lesser Black-backed Gull (*Larus fuscus*) Little Gull (*Larus minutus*) Mew Gull (*Larus canus*) Mute Swan (*Cygnus olor*) Northern Gannet (*Morus bassanus*) Northern Lapwing (*Vanellus vanellus*) Northern Wheatear (*Oenanthe oenanthe*) Razorbill (*Alca torda*) Red-throated Diver (*Gavia stellata*)	Ringed Plover (*Charadrius hiaticula*) Rock Pigeon (*Columba livia*) Sand Martin (*Riparia riparia*) Sandwich Tern (*Sterna sandvicensis*) Whooper Swan (*Cygnus cygnus*) Yellowhammer (*Emberiza citrinella*) Wall (*Lasiommata megera*) Andrena (*Leucandrena*) barbilabris Andrena (*Melandrena*) nigroaenea Andrena (*Taeniandrena*) wilkella Halictus (*Seladonia*) tumulorum Large Red Tailed Bumble Bee (*Bombus* (*Melanobombus*) *lapidarius*) Lasioglossum (*Lasioglossum*) lativentre Neat Mining Bee (*Lasioglossum* (*Evylaeus*) *nitidiusculum*) Bottle-nosed Dolphin (*Tursiops truncatus*) Common Porpoise (*Phocoena phocoena*) Common Seal (*Phoca vitulina*) Grey Seal (*Halichoerus grypus*) Silky Snail (*Ashfordia granulata*) Common Lizard (*Zootoca vivipara*) Leathery Turtle (*Dermochelys coriacea*) European Otter (*Lutra lutra*) Pine Marten (*Martes martes*) West European Hedgehog (*Erinaceus europaeus*) ***Invasive Species*** Wakame (*Undaria pinnatifida*) Wireweed (*Sargassum muticum*) Butterfly-bush (*Buddleja davidii*) Giant Hogweed (*Heracleum mantegazzianum*) Brown Rat (*Rattus norvegicus*) Eastern Grey Squirrel (*Sciurus carolinensis*)

Species Recorded (O21R)	
Barn Owl (*Tyto alba*) Mute Swan (*Cygnus olor*) Eurasian Badger (*Meles meles*) Eurasian Red Squirrel (*Sciurus vulgaris*)	***Invasive Species*** Three-cornered Garlic (*Allium triquetrum*) Brown Rat (*Rattus norvegicus*) Eastern Grey Squirrel (*Sciurus carolinensis*) European Rabbit (*Oryctolagus cuniculus*)

An assessment of files received from the NPWS (Code No. 2020_185), which contain records of rare and protected species and grid references for sightings of these species, was carried out. Sika Deer (*Cervus nippon*) was recorded proximate to the site boundary in 2004. Outside the site boundary, Common Frog (*Rana temporaria*) was noted 322 m and 467 m to the south-east and 444 m to the south-west of the site. Viviparous Lizard (*Lacerta vivipara*) was recorded 447 m to the east of the site boundary.

No other species of conservation importance were noted at high resolution within 1 km^2 based on NPWS records. However, it should be noted that the Bray Head SAC (0.67 km) is proximate to the proposed development and the outfall point of the Greystones Stream (0.18 km) which traverses the site (Figure 5.6).

5.5 Site Survey

5.5.1 Habitat and flora assessments

Habitat and flora assessments were carried out on the 31st August 2020 and the 31st August 2021 which is within the optimal survey period. No significant differences were noted on site between the two surveys. Habitats within the proposed development site were classified according to Fossitt (2000) (Figure 4.6) based on the 31st August 2021 survey and the flora species noted within each habitat are described.

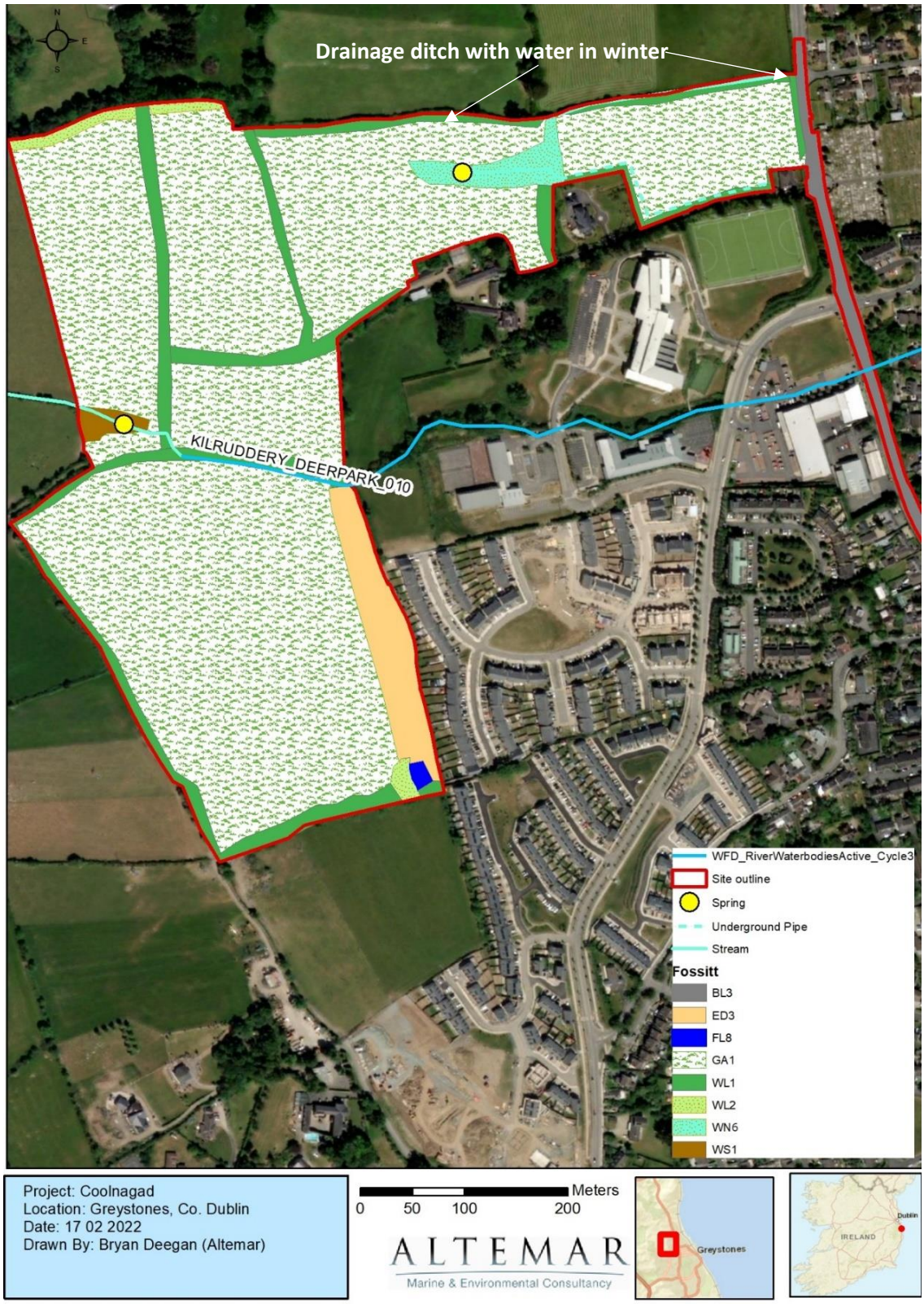

Figure 5-9 Fossitt Habitats on site (See habitat descriptions for Fossitt codes below)

Plate 1. Agricultural grassland.

5.5.2 Habitat and flora assessments GA1-Improved Agricultural Grassland

The vast majority of the proposed development site consists of agricultural grassland which forms part of an active farm. As seen if Figure 4.6 the proposed site comprises of six fields divided by hedgerows. Flora species in GA1 consisted of creeping buttercup (*Ranunculus repens*), lesser stitchwort (*Stellaria graminea*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), dandelion (*Taraxacum spp*.), daisy (*Bellis perennis*), Common Ragwort (Jacobaea vulgaris), plantains (*Plantago spp*.), thistles (*Cirsium vulgare*), docks (*Rumex spp*.) Lesser Centaury (Centaurium pulchellum) and nettle (*Urtica dioica*). At the edges of this habitat Rosebay Willowherb (*Epilobium angustifolium*), gorse (*Ulex europaeus*), bramble (*Rubus fructicosus*) and oxeye Daisy (Leucanthemum vulgare).

Plate 2. Hedgerows.

5.5.3 WLI – Hedgerows

A series of native hedgerows are located within and around the boundary of the site. These appeared to have been un managed for several years and has a bramble scrub at their base. Species including elder (*Sambucus nigra)*, blackthorn (*Prunus spinosa)*, hawthorn *(Crataegus monogyna),* holly *(Ilex aquifolium),* dog-rose *(Rosa canina), Gorse (Ulex europaeus),* bramble *(Rubus fruticosus agg.),* ash *(Fraxinus excelsior),* ivy *(Hedera helix),* hazel (Corylus avellana), goat willow (Salix caprea), sycamore (*Acer pseudoplatanus*), wild cherry (*Prunus avium*), honeysuckle *(Lonicera periclymenum)* and cleavers *(Galium aparine)* were noted. Hedgerows in the proximate to development also included cotoneaster (*Cotoneaster Sp*), bracken (*Pteridium aquilinum*), griselinia (*Griselinia littoralis*) and buddleia (*Buddleia davidii*).

5.5.4 WL2 – Treelines

The north eastern boundary of the site consists of a tall treeline. Tree species in this area included sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*) Scots pine (*Pinus sylvestris*), ash (*Fraxinus excelsior*), silver fir (*Abies alba*), hornbeam (*Carpinus betulus*). In addition to the taller trees were hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), ivy (*hedera helix*) nettle (*Urtica dioica*), dandelion *(Taraxacum spp*.), plantains (Plantago spp.), thistles (*Cirsium arvense & C. vulgare*), docks (Rumex spp.), bramble (*Rubus fructicosus*) and lords and ladies (*Arum maculatum*). During winter months the water table appeared quite high in this area and there is a potential overflow pathway from the pond to the west of the site along the northern boundary of the site to the Greystones Road.

5.5.5 WS1 – (Scrub)

In the central portion of the western boundary of site a small area contained scrub (WS1) (Fossitt, 2000). This area appeared to be an abandoned area of land that is poached by cattle.

This area is dominated by gorse (*Ulex europaeus*). It is important to note that a spring (the official EPA source of the Greystones Stream) is within the scrub area.

Plate 3. Recolonising bare ground.

5.5.6 ED3 Recolonising Bare ground

Areas of the site had begun to recolonise following site recent works in the past. Based upon an examination of recent satellite imagery this area was a hedgerow up to June 2018 and works had been carried out in this area between 2018 and 2020. Species noted included rape (*Brassica napus*), oxeye daisy (*Leucanthemum vulgare*), great willowherb *(Epilobium hirsutum*), thistles (*Cirsium arvense, C. vulgare*), common ragwort (*Senecio jacobaea*), moss (*Spagnum sp*.), docks (*Rumex spp*.), plantains (*Plantago sp*p.), nettle (U*rtica dioica*), cat's-ear (*Hypochaeris radicata*) and common fumitory (*Fumaria officinalis*).

Plate 4. Eroding Upland rivers

5.5.7 FWI – Eroding Upland Rivers

The Greystones Stream travels through the site. The official source (EPA) of the stream is within a scrub area within the proposed development site. However, a spring is noted further uphill (Figure 5.5.) and water flows from the spring at a high elevation to the official source. Even though the sping within the scrub area is considered to be the official source (EPA) it is evident that the spring further uphill is the actual source of the stream. As a result the 10m buffer for biodiversity protection that has been applied to the watercourse will also apply to the flow of water from the spring uphill from the official commencment of the watercourse.

The stream passing through the site is small, fast flowing and is heavily tunneled. The bed of the stream consists of gravel and rocks. No instream biodiversity was noted. It should be noted however, that this stream is of little fisheries value, as it is heavily tunnelled, culverted downstream (under the Lidl shopping centre, sections of Redford Park and proximate roads), and descends a very steep gradient into the marine envieonment just north of Darcy's Field in Greystones where sedimentary cliffs are suffering from erosion. It is possible, as the watercourse is small, spring fed and at the top of its catchment, that the channel may become dry over long extended dry periods. However, this was not observed during the site assessments. Notwithstanding this, the watercourse does provied an important biodiversity corridor through the site, and a minimum of a 10m biodiversity corridor is required under Inland Fisheries Guidance.

Plate 5. Other artificial lakes and ponds.

5.5.8 FL8 – Other Artificial Lakes and Ponds

On the south eastern corner of the site is a small pond area in what appears to be a small disused quarry. The water in this pond appears to fluctuate as no emergent or aquatic vegetation was noted and terrestrial vegetation was submerged on one occasion. No biodiversity was noted in this pond. However, the pond could potentially form a breeding site for frogs.

Plate 6. Wet willow-alder-ash woodland

5.5.9 WN6 – Wet Willow-Alder-Ash Woodlands

Located in the centre of the site is a small area of the habitat Wet willow-alder-ash woodland. This broad category includes woodlands of permanently waterlogged sites that are dominated by willows (Salix spp.). This area is fed by a spring (Figure 4.6). During the summer this area goes dry while in winter (Plate 6) the area is waterlogged. Other species included Yellow Iris (*Iris pseudacorus*) and mosses (sphagnum). This area would be considered to be a locally important wetland area due the potential for the habitat to support frogs and a nesting habitat for breeding birds.

5.5.10 Invasive Species

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

5.5.11 Fauna Assessments

Mammal assessments were carried out on the 6th November 2020, 26th February 2021, and the 7th January 2022. Bat surveys including bat emergent/detector survey were also carried out on the 31st August 2020 and the 31st August 2021. Wintering bird assessments were carried out on 6th November 2020, 26th February 2021, 27th March 2021, 7th January 2022 and 20th January 2022.

5.5.12 Terrestrial Mammals

Three mammal assessments were carried out. No signs of badger activity or an active sett were noted on site. Tracks of sika deer (*Cervus nippon*), rabbit (*Oryctolagus cuniculus*), fox (*Vulpes vulpes*) were noted on site. In addition, sika deer (*Cervus nippon*) were observed in the field nearest to the R761 and have been noted frequently on site by the landowner. Sika deer are considered non-native but are protected under the Wildlife Acts 1976 to 2021 (the Wildlife Act). Sika deer can be hunted under a licence granted by the National Parks and Wildlife Service under section 29 of the Wildlife Act. No mammal species of conservation importance have been noted on site during surveys or by NBDC or NPWS data.

5.5.13 Amphibians and Reptiles

No amphibians or reptiles were noted on site. However, given the fact that there is a watercourse, springs, wet woodland and a pond on site, it is highly likely that frogs are present on site. These habitats would be considered locally important primarily due to the likelihood of the habitats to support frogs.

5.5.14 Birds

The following bird species were noted on site (**Table 5-4**). It should be noted that the qualifying interests of designated sited were not noted on site. It is not considered that the proposed development site is an ex-situ site for designated sites.

Table 5-4: Species of Birds noted during on-site surveys.

Common Name	Scientific Name	Conservation Status[1]
Woodpigeon	*Columba palumbus*	Green
Robin	*Erithacus rubecula*	Green
Great Tit	*Parus major*	Green
Wren	*Troglodytes troglodytes*	Green
Rook	*Corvus frugilegus*	Green
Wren	*Troglodytes troglodytes*	Green
Jackdaw	*Corvus monedula*	Green
Robin	*Erithacus rubecula*	Green
Chaffinch	Fringilla coelebs	Green
Hooded Crow	*Corvus cornix*	Green
Magpie	*Pica pica*	Green
Chiffchaff	*Phylloscopus collybita*	Green
Goldcrest	*Regulus regulus*	Green
Blackbird	Turdus merula	Green
Song Thrush	*Turdus philomelos*	Green
Redwing	*Turdus iliacus*	Green
Blue Tit	*Cyanistes caeruleus*	Green
Coal Tit	*Periparus ater*	Green
Goldfinch	*Carduelis carduelis*	Green
Dunnock	*Prunella modularis*	Green
Buzzard	*Buteo buteo*	Green

5.5.15 Bats

The bat assessment is seen in Appendix I. There were no seasonal or climatic constraints as survey was undertaken within the active bat season in good weather conditions with daytime temperatures of greater than 10oC after dark. Winds were very light and there was no rainfall. Foraging activity of three bat species (soprano pipistrelle (Pipistrellus pygmaeus), Leisler's bat. (Nyctalus leisleri) and common pipistrelle (Pipistrellus pipistrellus), were noted on site. Foraging activity was noted primarily along treelines and hedgerows. Please see Appendix I for further information.

5.5.16 Discussion Species and Habitats

As can be seen from **Figure 5.4** the proposed development site consists primarily of Improved agricultural grassland (GA1) and hedgerows (WL1), scrub (WS1) and treelines (WL2). No flora or habitats of National or international conservation importance were noted on site during the surveys. No invasive flora species were noted on site. No flora species of conservation importance or invasive species were noted on site by the NPWS or NBDC or during site surveys. No amphibians or reptiles were noted on site. However, given the favourable habitats on site

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

for frogs it would be expected that the wetland, riparian, spring and pond habitats would be locally important. Native hedgerows were noted on site. These would also be seen to be locally important to biodiversity. In relation to bird species no bird species on Annex I of the EU Birds Directive were noted on site by NPWS or NBDC. The watercourse (acting as a biodiversity corridor), drainage ditches, springs, wetland, pond, hedgerows and treelines would be seen as the most important habitats on site. These elements form refuges and food sources for local biodiversity and provide biodiversity corridors to the surrounding areas. It should be noted that prior to the commencement of the design stage of this project, the local biodiversity value of these habitats was noted. As a result, the proposed development has been designed around the retention of these habitats and biodiversity corridors where possible.

5.6 Impact Assessment

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation The proposed development will involve the removal of terrestrial habitats on site, re-profiling, excavations and the construction of roads, dwellings and associated services. The project also proposes to cross the Greystones Stream and landscape the riparian corridor.

It should be noted that prior to the design of the proposed project, discussions took place between Cairn Homes and Altemar to retain the hedgerow and sensitive habitat integrity and biodiversity corridors/features on site. This included the retention of the existing hedgerows proximate to the watercourse, perimeter hedgerows and two of the three north south hedgerows on the site, in addition to all springs, the willow woodland area and the pond on site. The layout of the proposed project was designed around the retention of the majority of hedgerows and habitats of importance to local biodiversity on site. The retention of these areas involved numerous iterations of drawings and cross checking of drawings by the arborist and Altemar. The retention of these areas are clearly outlined in the tree constraints plan that accompanies the submission.

5.7 Construction Impacts

The construction of the proposed development, would potentially impact on the existing ecology of the site and the surrounding area. These potential construction impacts would include impacts that may arise during the site clearance, re-profiling of the site and the building phases of the proposed development. Construction phase mitigation measures are required on site particularly as significant reprofiling of the site is proposed which will remove existing terrestrial habitats and can lead to silt laden and contaminated runoff. In addition, the Greystones Stream is located in the centre of the site running downhill from west to east. It is also proposed install road crossings across the course of the existing stream. There is potential for silt laden runoff and contamination to enter the watercourse with potential for downstream impacts.

5.7.1 Designated Natura 2000 sites within 15km

The proposed development is not within a designated conservation site. It should be noted that the proposed development site is on the Greystones Stream and the Killruddery/Deerpark stream is located to the north of the site, downhill from the proposed works. In addition, works are proposed on the road network, the surface water drainage of which leads to the marine environment via public surface water network and the Greystones Stream. Despite the discharging of watercourses and the public surface water network to the marine environment, due to the proximity of Bray Head SAC/pNHA it is considered that there is an indirect hydrological pathway to these conservation sites. However, due to the distance across the marine environment where mixing, settlement and dilution would occur, no other Natura 2000

sites have a direct or indirect hydrological connection or pathway from the proposed development site and no impacts would be foreseen on these sites. The potential impacts on the features of interest of the Bray Head SAC (Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] and European dry heaths [4030]), in the absence of mitigation would be considered to be imperceptible. This is primarily as a result of the Qualifying interests being terrestrial habitats and the indirect pathway being via the marine environment. If the proposed works were to be carried out in the absence of mitigation within storm events where there is potential for seaspray to be transferred to the terrestrial habitats there is potential for fine silt to enter the terrestrial environment and deposit on plant material.

In the absence of mitigation, runoff during site clearance, re-profiling, the construction and operation of project elements could impact on the Greystones Stream, Killruddery/Deerpark stream and surface water network, with water quality or downstream impacts on the marine environment. Impacts on these indirect pathways would be seen as the primary vector for impacts on conservation sites. Ensuring water quality and compliance with Inland Fisheries Ireland procedures/ conditions and the Water Pollution Acts would be seen as the primary method of ensuring no significant impact on designated conservation sites.

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

5.7.2 Terrestrial Ecology

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

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

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

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

5.7.3 Bat Fauna

There is no evidence of a bat roost in the trees on site, therefore no significant negative impacts on the roosting of these animals are expected to result from the proposed development. Foraging activity was noted along hedgerows, the riparian corridor and treelines. The proposed lighting strategy has been discussed and modified to reduce the potential impact on bats. This has included only lighting areas where required and not lighting public open spaces unless necessary. There is potential for bats to enter and roost within trees of bat roosting potential on site that are to be felled, between the time of survey and the commencement of the development. A derogation licence is not required to remove trees of bat roosting potential. However, a pre-construction inspection of trees to be felled will be carried out and a derogation licence acquired if a bat roost is present. Construction lighting has the potential to impact on foraging routes.

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

5.7.4 Avian Ecology

Site clearance will result in a reduction in the vegetation cover and removal of the mature trees and hedgerows would result in a nesting and foraging resource loss for the bird species noted on site. Consultation has been carried out throughout the design process to retain the hey habitats on site including treelines and hedgerows. Based on the Arboricultural Report 200 trees on site, 183 (81.5%) trees will be retained and 37 (18.5%) of the trees will be removed. Clearance works on site during bird nesting season could impact on bird population within the proposed development site. Dust from reprofiling works could potentially impact on vegetation and nesting birds on site within the remaining hedgerows.

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

5.7.5 Aquatic Ecology

The proposed development site is on the Greystones Stream and in stream works are proposed. The Killruddery/Deerpark stream is located to the north of the site, downhill from the proposed works. The proposal also includes the development of a several road crossings across the Greystones Stream. In addition, works are proposed on the road network, the surface water drainage of which leads to the marine environment via public surface water network and the Greystones Stream.

In the absence of mitigation, in stream works, runoff during site clearance, re-profiling, the construction and operation of project elements could impact on the Greystones Stream, Killruddery/Deerpark stream and surface water network, with water quality within these watercourses with potential downstream impacts on the marine environment.

The contamination of watercourses and surfaces water networks could potentially impact negatively on the biodiversity within the watercourses and within the shallow marine environment.

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

5.8 Operational Impacts

Once constructed all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff will comply with SUDS. The biodiversity value of the site would be expected to improve as the landscaping matures. It would be expected that the ecological impacts in the long term would be neutral, once landscaping has established due to the implementation of a reduction in tunnelling which would encourage instream biodiversity.

5.8.1 Designated Conservation sites within 15km

In the absence of standard operational mitigation there is potential silt and petrochemicals to enter the onsite watercourse or surface water networks that lead to the marine environment and potentially the Bray Head SAC. The features of interest of the SAC are Terrestrial habitats and it would be expected that potential impacts would only be seen of the features of interest should the pollution event coincide with significant storm events with pollution/silt entering the terrestrial environment through seaspray.

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

5.8.2 Terrestrial Ecology

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

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

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

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

5.8.3 Bat Fauna

There is potential for bat foraging to be impacted by the artificial lighting on site. The proposed lighting strategy has been discussed and modified to reduce the potential impact on bats. This has included only lighting areas where required and not lighting public open spaces unless necessary. In addition the lighting strategy has included significant planting of trees in openspace areas to encourage bat foraging on site.

Impacts in the absence of mitigation: neutral, site, long term, not significant. Mitigation is required.

5.8.4 Avian Ecology

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

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

5.8.5 Aquatic Ecology

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

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

5.8.6 *Terrestrial Ecology*

As the landscaping elements improve with maturity it would be expected that the biodiversity value of the site to birds and flora would also increase. Mitigation measures should be in place to offset the short term nesting resource.

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

5.9 Cumulative Impacts

There are several development proposals located in the areas surrounding the subject site that have been granted permission. The following is a list of planning application(s) as identified on the Department of Housing, Local Government and Heritage's 'National Planning Application Database' portal:

Table 5-6 Planning proposals located in the areas surrounding the subject site

The figure below shows the location of the estates subject of the planning history detailed in the sections hereafter.

5.9.1 *Relevant Planning History - Estate*

The Waverly estate is located generally east of the site.

Reference	Status	Decision Date	Summary
072799/ ABP 230050	Expired	ABP Grant 03/06/2009	159 residential units
114336/ABP 239380	Incomplete	22/12/11	Amendments to 072799
141952	Parent permission	01/04/2015	130 houses and creche
16783	Grant	07/09/2016	Temporary access gates
17461	Grant	19/06/2017	Extension of duration

5.9.2 *Relevant Planning History - Seagreen Estate*

The Seagreen Estate is located generally south east of the site.

Reference	Status	Decision Date	Summary
141031	Grant	01/10/2014	Parent permission 187 houses
151152	Grant	16/01/2016	Amendments
16420	Grant	15/06/2016	Amendments
16971	Grant	26/10/2016	Amendments
161066	Withdrawn	n/a	Amendments
1722	Grant	08/03/2017	Amendments
17880	Grant	02/11/2017	Amendments
18111	Grant	02/04/2018	Alter 38 kv
18627	Grant	01/08/2018	Amendments

191089	Grant	01/12/2019	Extend appropriate period – substantial completion

5.9.3 Relevant Planning History - Schools

A number of schools are located adjacent to the site to its east.

Relevant Applications at Adjacent Schools

Reference	Status	Decision Date	Summary
126589	Permitted	04/01/2013	Three storey school, access to ET school
138103	Permitted	17/04/2013	New school (Temple Carrig)
15608	Permitted	09/08/2015	New Irish school
15814	Permitted	01/10/2015	Sports lights for hockey pitch

5.9.4 Relevant SHD Applications in the Wider Area

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

The ecology assessments for the above projects have been considered. No projects are proposed or currently under construction that could potentially cause significant cumulative effects on biodiversity.

5.10 Ameliorative, Remedial or Reductive Measures

Mitigation measures will be incorporated into the proposed development project to minimise the potential negative impacts on biodiversity within the ZOI. Mitigation measures are outlined within the Land Soil and Geology (Chapter 6), Water (Chapter 7), and the Air and Climate (Chapter 8) of the EIAR. In addition to these mitigation measures mentioned elsewhere in the EIAR specific mitigation in relation to biodiversity need to be implemented having taken into account the measures outlined elsewhere in the EIAR:

5.11 Construction Phase

In addition to mitigation measures outlined elsewhere in the EIAR, the following measures will be implemented to protect biodiversity:

1. As existing springs, a watercourse and drainage ditches are present on site and substantial reprofiling and instream works are proposed, a project ecologist will be appointed prior to works or site clearance commencing on site. A project ecologist will oversee the project from prior to the commencement to the completion of the project including all landscaping, construction and drainage connections.
2. The retention of existing habitats outlined above including springs, hedgerows and wetland areas will involve significant input from a project ecologist and arborist prior to construction commencing on site. The names, qualifications and experience of the

ecologist, hydrologist and arborist will be provided to WCC prior to any works commencing on site.

3. Tree retention will be carried out as outlined in the arborist report. Additional exclusion zones will be implemented by the project ecologist in order to protect biodiversity on site.
4. A specific site clearance, reprofiling and phasing plan will be provided to the arborist and project ecologist for approval prior to any site clearance or works commencing on site. No site clearance works will commence on site until approval has been provided by the arborist and project ecologist for the works to commence.
5. All site clearance, reprofiling and enabling works will be approved and monitored by the arborist and project ecologist to ensure that the integrity of the remaining habitats on site are maintained.
6. All works in the riparian corridor will be carried out in consultation with and to the satisfaction of Inland Fisheries Ireland and the project ecologist, following the best practice guidelines for construction in the vicinity of watercourses. All works on site and in the riparian corridor will include mitigation measures to prevent silt from runoff during works as set out below.
7. All works in the riparian corridor will be approved by Inland Fisheries Ireland prior to works commencing.
8. Abstraction of water from the watercourse or springs will not be permitted.
9. Relevant legislation (Section 40 of the Wildlife Acts, 1976 to 2012) "*It shall be an offence for a person to cut, grub, burn or otherwise destroy during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated*." Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. If bird nests are present the woody vegetation will not be removed unless a derogation licence has been provided by NPWS and the conditions applied.
10. 50 Nest boxes placed on site during landscaping to compensate for resource loss.
11. Light falling upon any areas of benefit to birds such as hedgerow will not exceed 3 lux to ensure that resting and nesting species are not unnecessarily disrupted.
12. A biodiversity pack will be presented to each registered owner upon moving in. This will outline the importance of biodiversity of the area and additional biodiversity resources to promote and enhance biodiversity within each of the developments.
13. A pre construction survey for invasive species, bats and terrestrial mammals will be carried out. This will include an inspection for resting and breeding places for both terrestrial mammals and bats. Should resting or breeding places be found a derogation licence will be acquired from NPWS and conditions followed prior to works commencing in the vicinity of the resting or breeding place.
14. Lighting at all stages should be done sensitively on site as directed by the project ecologist, with no direct lighting of hedgerows and treelines.
15. Replanting of the riparian corridor will be at the initial phase of the project.

5.12 Operational Phase

The biodiversity value of the site would be expected to improve as the landscaping matures. The retention of habitats on site was a key element of the project design. The proposed development has a sustainable drainage strategy and detailed landscape strategy and mitigation during operation will be carried out as outlined elsewhere in the EIAR. The following operation mitigation measures will be carried out:

1. Post construction an inspection of drainage connections to the watercourse will be carried out by the project ecologist.
2. A Habitat Management Plan will be prepared jointly by the Landscape Architect and Ecologist for the management of biodiversity and landscaping on site.

3. A post construction lighting assessment will be carried out to ensure compliance with the proposed lighting and a bat survey will be carried out to ensure foraging is continuing on site. Should foraging be inhibited in key foraging areas on site the lighting will be locally revised in consultation with a bat ecologist to ensure foraging continues on site.

5.13 Residual Impacts (including worst case scenario)

Based on the implementation of the mitigation measures above and in particular the Biodiversity (Chapter 5), Land Soil and Geology (Chapter 6), Water (Chapter 7), and the Air and Climate (Chapter 8) of the EIAR., there will be no significant impact on biodiversity as a result of the proposed development. The successful implementation of the measures outlined in the EIAR will be essential to the successful mitigation/offsetting of the loss of biodiversity on site.

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

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

The Biodiversity Chapter of the EIAR involved extensive surveys and interactions within the project team being carried out over several years. The flora, fauna and habitats within the proposed development area are outlined in detail and the potential impacts on biodiversity and designated sites were assessed. Detailed mitigation measures have been outlined and will be carried out during the construction and operational phases of the development. In conclusion, the proposed development has satisfactorily addressed the potential impacts on biodiversity on site and within the potential zone of influence. It is considered that the retention of key habitats on site and the robust mitigation and enhancement measures proposed significantly reduces the possible impact of the proposed development on biodiversity. The overall impact on the biodiversity of the proposed development is a long term neutral residual impact on the existing biodiversity. However, the implementation of the proposed landscaping would provide significant on site biodiversity enhancement features and provide long term positive benefits to the biodiversity on site.

5.14 Do Nothing Scenario

Due to the zoning of the subject site, it would be expected that in the absence of this subject proposal a development of similar scale and nature would be progressed. Under this scenario, in the absence of specific development details, it is likely that the effect would be similar to this

proposal as outlined below. However, in the absence of any development on the site it would be expected that the site would continue to be farmed.

5.15 Monitoring

Pre-construction surveys will be carried out for terrestrial mammals, invasive species and bats. During construction an Ecologist will monitor the site from pre-construction surveys, during Construction Phases and Post Construction.

5.16 Difficulties Encountered

No difficulties were encountered in the preparation of the proposed development. Several fieldwork dates were within in the initial stages of the Covid-19 pandemic. The site surveys were carried out on-site by a single outdoor fieldworker with no contact with any other person.

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6 Land, Soil and Geology

6.1 Introduction

Enviroguide Consulting, on behalf of Cairn Homes Properties Limited has carried out an assessment of the likely significant effects of a proposed residential and recreational development at Coolagad near Greystones, Co. Wicklow on land, soils and geology of the receiving environment within the immediate surroundings of the Proposed Development Site. This chapter details the results of an assessment of the potential impacts of the Proposed Development on land, soils and geology and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

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

6.1.1 Quality Assurance and Competence

The chapter was prepared by:

- Claire Clifford BSc. (Geology), MSc.(Environmental Sciences), PGeo., EurGeol
- Fionnuala Joyce BSc. (Geology), MSc. (Hydrogeology)

6.2 Assessment Methodology

6.2.1 Regulations and Guidance

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

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

6.2.2 *Phased Approach*

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

Element 1: An Initial Assessment and Impact Determination stage was carried out in March 2021 to establish the project location, type and scale of the development, the baseline conditions, and the type of land, soil and geological environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and impact determination.

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

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

Site visits to assess the physical conditions of the site were carried out during March 2021 and later in April 2021 to assess the general site condition that include site visit and walkover survey and site inspections during site investigations (Element 2).

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

- Environmental Protection Agency (EPA) webmapping
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping
- Google Earth Mapping and Imagery
- Ordnance Survey Ireland (OSI) webmapping ;
- National Parks and Wildlife Services (NPWS) webmapping; and
- Information provided by the Applicant pertaining to previous site investigations and the design proposals for the Proposed Development.

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

- Intrusive site investigation including borehole drilling and trial pit excavation was undertaken by Site Investigations Ltd. between July 2021 and September 2021. Enviroguide Consulting (Fionnuala Joyce) attended the Site during the intrusive site investigation to observe the general ground conditions encountered.
- Details of the scope and methods for the site investigation and the results are provided in the site investigation report included in Appendix 6A.

The information reviewed for element Element 2 of this assessment included the following:

- Borehole logs and site investigation reports from the 2018 Ground Investigations Ireland Ltd. (GIILL) site investigation (Appendix 6A)

- Borehole and trial pit logs and site investigation reports from the 2021 Site Investigations Ltd. (SIL) site investigation (Appendix 6A).

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

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

6.2.3 Description and Assessment of Potential Impacts

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

Table 6-1: Assessment of Potential Impacts Terminology and Methodology

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**Definition**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

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

6.3 Characteristics of the Proposed Development

The proposed development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building, a creche, a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

- Bulk excavation will be required for the construction of the basement beneath the apartment block in the northwest and to achieve the proposed Site levels. Excavations will also be required for foundations for buildings, roads and paths, infrastructure, ESB substation and drainage. Cut of up to 8-9m will be required in the western portions of the Site and of 4-5m of fill will be required in the southeast and north (refer to AECOM Drawings COO-CCM-00-00-DR-CE-00-0610 through to 0615).
- Site won material arising from the bulk excavation will be used where suitable for fill material and landscaping and the quantities are outlined in Table 6-2. Surplus soil will require offsite removal for reuse or recovery in accordance with appropriate statutory consents and approvals.

- Foundation solutions will be design to suit the ground conditions and will include raft foundations, pad or strip foundation and piled foundations (AECOM, 2022d).
- Ground improvement measures together with appropriate foundation solutions will also be considered to facilitate the retention of excavated soil for reuse on Site.
- Aggregates and other construction materials will be imported for use during the Construction Phase of the Proposed Development.

Table 6-2 Cut and Fill Analysis (Source: AECOM Drawing CE-00-0610)

Area	Cut Required	Fill Required	Net
193100.517 sq.m	204063.517 cu.m	102159.264 cu.m	101904.631 cu.m (cut)

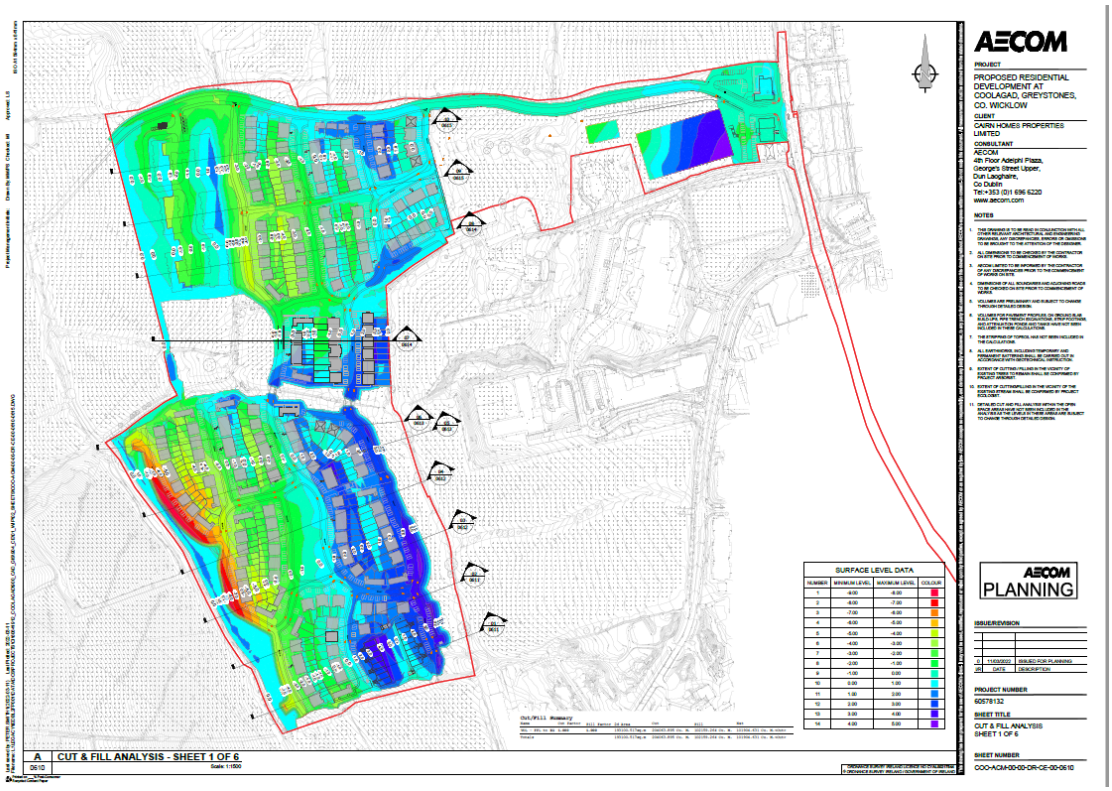

Figure 6-1: Cut and Fill analysis (Source: AECOM, 2022 Drawing: COO-ACM-00-00-DR-CE-00-0610)

6.4 Baseline Description

6.4.1 Site Description and Landuse

The Proposed Development is located at in Coolagad, Greystones, Co. Wicklow. The site location is shown in Figure 6-2.

The Proposed Development Site is 26.03 Hectares (Ha) and is currently greenfield agricultural lands. The Site comprises of a number of fields with hedgerows and streams, there is also a number of springs identified at the Site. The Site is bound to the north, south and west by agricultural lands, to the east by the R761 and to the southeast by the Waverly and Seagreen

residential estates, a school campus and 2 no. detached dwellings with associated agricultural buildings.

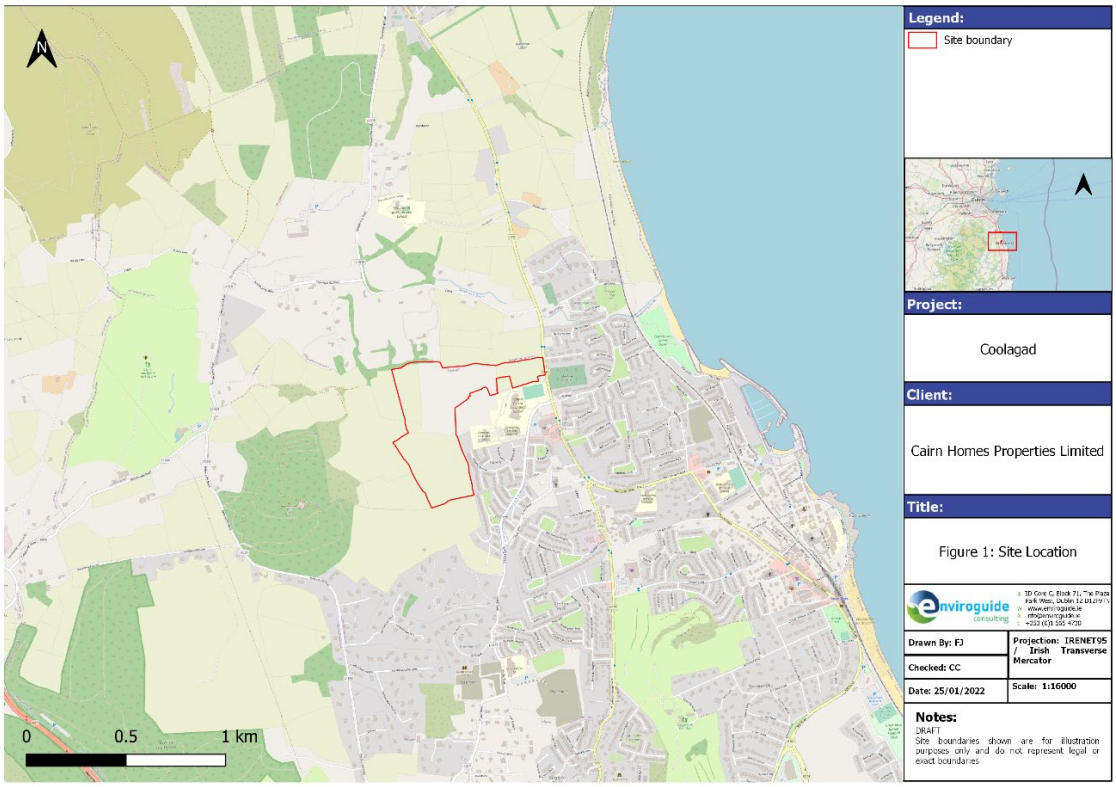

Figure 6-2: Site Location

6.4.2 *Historical Landuse*

Historical mapping and aerial photography available from the Ordnance Survey of Ireland website (OSI, 2022) were reviewed and key observations on-site and off-site are summarised in Table 6-3.

Table 6-3: Historical Landuse

Date	Information Source	Site Description
1837-1872	**OSI map 6 inch**	**On-site:** The majority of the site is shown as agricultural land. A stream is shown crossing through the centre of the site. A settlement pond is shown towards the southern portion of the Proposed Development Site. **Off-site:** The site is shown to be bound by greenfield sites. There are a number of buildings located across the eastern boundary of the Proposed Development Site. A roadway adjoins the eastern site boundary of the Proposed Development Site. Some residential buildings are shown in Redford approx. 0.2km to the east of the Site.

Date	Information Source	Site Description
1888-1913	**OSI map 25 inch**	**On-site:** The onsite stream is shown flowing eastwards across the Site. **Off-site:** A laneway is shown bounding the southern Site boundary. Lands located approx. 1.1km south east of the Site in Greystones has been developed for residential and commercial purposes.
1830-1930	**OSI Cassini map 6 inch**	**On-site:** No significant changes **Off-site:** No significant changes
1995	**OSI Aerial photography**	**On-site:** The Site is free of any structures and appears to be mainly used for agricultural purposes. Some development appears to be underway in the north-eastern portion of the site and adjacent to the buildings across the eastern boundary of the Site. **Off-site:** Much of the lands bounding the east and south of the site has been developed significantly for residential and commercial purposes. Lands located west of the site have remained as agricultural lands.
2000	**OSI Aerial photography**	**On-site:** No significant changes **Off-site:** No significant changes
2005	**OSI Aerial photography**	**On-site:** No significant changes **Off-site:** Lands located approx. 0.15km southeast of the Site is being developed to construct a roadway and residential buildings.
2011-2013	**OSI Aerial photography**	**On-site:** No significant changes. **Off-site:** Development of residential and roadway located 0.15km southeast of the Site has been completed.
2021	**Google Maps photography**	**On-site:** No significant changes. **Off-site:** Lands bounding the eastern boundary of the Site are being developed with extension of residential housing.

6.4.3 Topography

The topography at the Site slopes from the local high point at Kindlestown Hill to the west of the Site towards the Irish Sea located to the east of the Site. The highest elevation at the Site is 93.5maOD in the south-western area the lowest is 39.5maOD along the eastern Site boundary (refer to Figure 6-3).

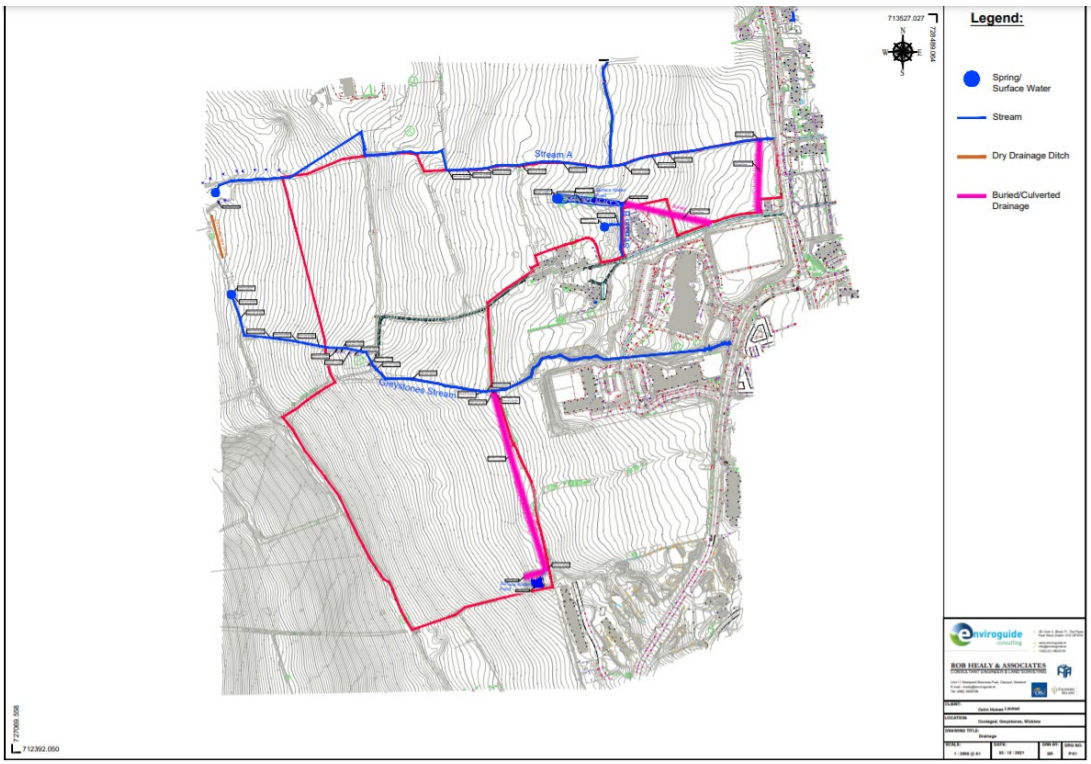

Figure 6-3: Topography and Site Drainage

6.4.4 Soil and Subsoil (Quaternary Deposits)

The soil beneath the majority of the Site has been mapped by the GSI (GSI, 2022) as "Surface water Gleys, Ground water Gleys" and described as "Mineral poorly drained (Mainly acidic)" (AminPD), while a small portion of soil beneath the Site alongside the western site boundary is mapped as "Acid Brown Earths, Brown Podzolics" which is described as "Deep well drained mineral (Mainly acidic)" (AminDW) (GSI, 2022).

The majority of the quaternary sediments beneath the Site are mapped by the GSI (GSI, 2022) as "Irish Sea Till derived from Cambrian sandstones and shales" (IrSTCSsS) and the subsoil along the western site boundary is mapped as "Till derived from Cambrian sandstones and shales" (TCSsS). The GSI mapped quaternary soils are shown in Figure 6-4.

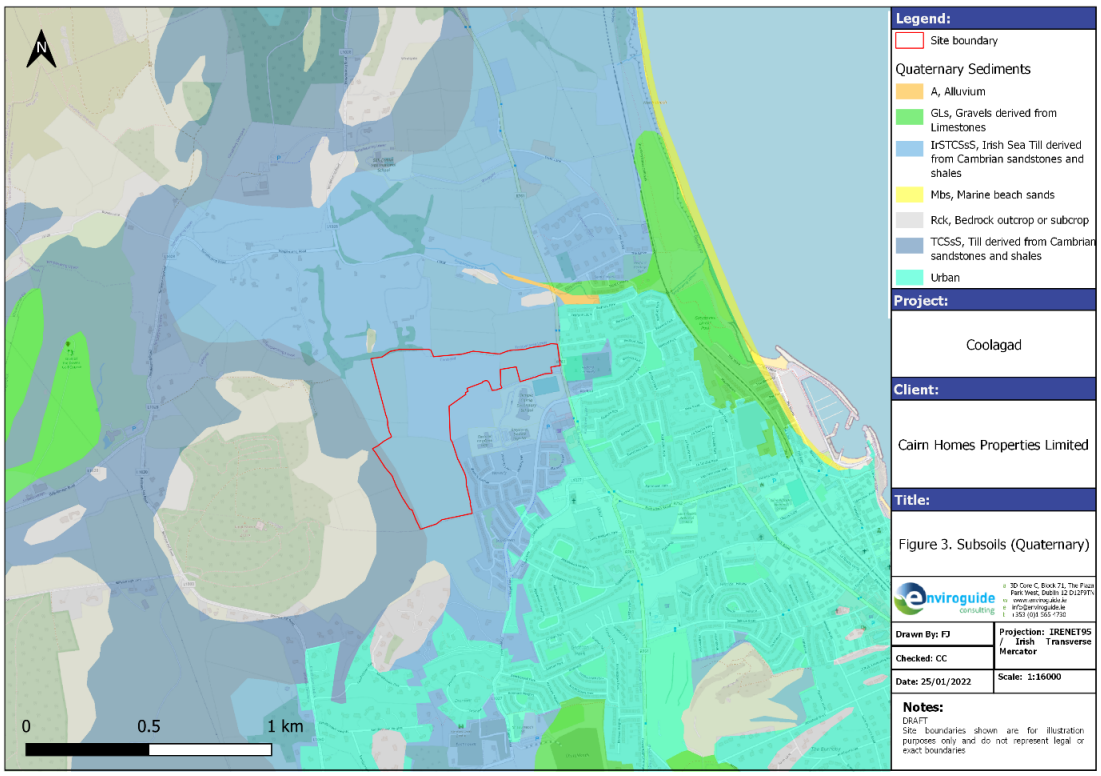

Figure 6-4: Quaternary Geology

6.4.5 *Bedrock geology*

The GSI has mapped (GSI, 2022) the bedrock beneath the majority of the Proposed Development Site as the Cambrian Bray Head Formation (Stratigraphic Code: BR; New Code: CABRAY) which is described as "Greywacke & quartzite" There is an inlier / outlier mapped along the northern boundary of the Site as the Cambrian Devils Glen Formation (Stratigraphic Code: DG; New Code: CADEVG) which is described as "Greywacke & shale" (GSI, 2022). The structural geology mapping indicates that the site is located within an anticline that is displaced by approximately north south trending and faults.

The GSI bedrock geology mapping is presented in Figure 6-5.

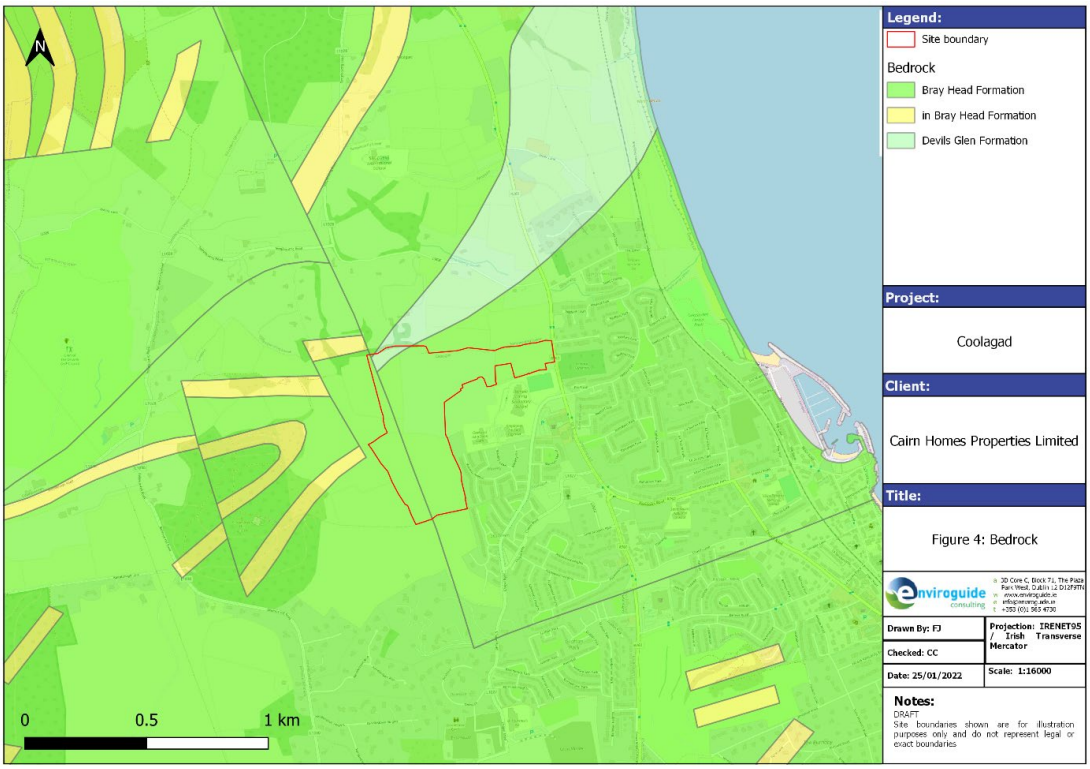

Figure 6-5: Bedrock Geology

6.4.6 Site Investigation Results

6.4.6.1 Subsoil and Geology

The subsoils encountered during the site investigation are summarised in the following sections and detailed logs are provide in the site investigation report (Site Investigations Limited, 2021) included in Appendix 6A and the locations of boreholes (cable tool and air rotary) are shown in Figure 6-6.

The soils encountered the site investigation can be summarised as brown and dark brown silty, slightly gravelly CLAY and was identified to depths ranging between 0.3 and 3mbGL. Orange and red to brown CLAY and SILT with varying gravel and cobble content was encountered to depths of 20mbGL.

Stiff, dark brown to black, sandy, gravelly CLAY with occasional cobbles was encountered at intervals between 1.8 to 5.6mbGL in the northern portion of the site.

Brown, silty SAND and GRAVEL with varying cobble content was also encountered between 4.5mbGL and 8.4mbGL with a thickness of up to 5.5m thick across the centre and eastern portion of the Site. The locations of the thicker sand and gravel strata are shown on Figure 6-7.

The results of site investigation as reported in the Ground Investigation Ireland Ltd (GIL, 2018) report (Refer to Appendix 6A) granular deposits were encountered at TP1, TP2, TP4, TP16, TP22 and TP37 and were typically described as *grey or brown silty/clayey gravelly fine to coarse SAND with occasional/frequent cobbles.*

Laminations of sand were recorded within clays at various locations across the Site, sand arisings were also observed during drilling of boreholes. However, the drilling techniques used, including air rotary and cable percussion, result in some mixing of laminations as the borehole is advanced and for this reason the granular material present as thin lenses or lamination within a clayey matrix may not be observed or recorded at every location where present. Therefore it is considered likely that where drilling arisings were recovered from the boreholes as sandy or gravelly clays, in some instances this may be representative of granular laminations of lenses within clay or silt matrix. It is therefore considered that there are potentially as yet unidentified interbedded sand strata within the overburden cross the entire Site.

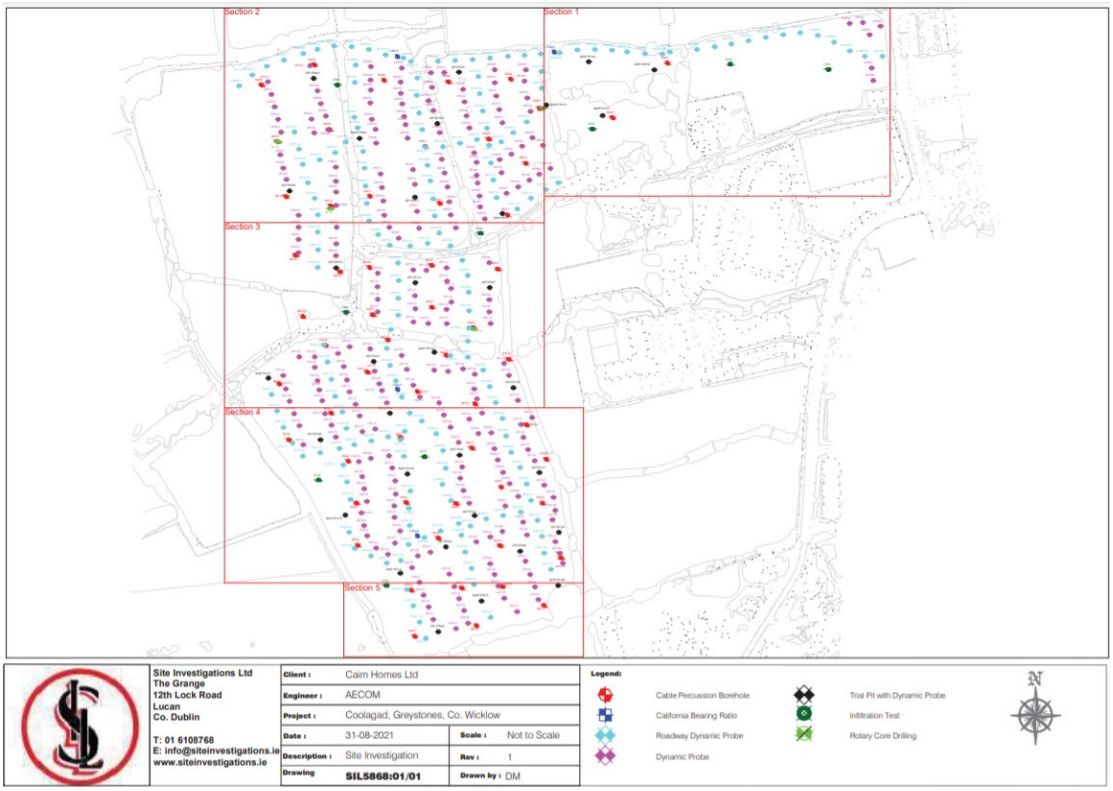

Figure 6-6 –Site Investigation Borehole Locations (Refer to Appendix 6A)

Soil described as made ground (disturbed ground or ground placed without engineering control), -was recorded by SIL (2021) at three borehole locations and three trial pits across the Site at BH01 and BH03 along the northern boundary and at BH36, TP130, TP137 and TP142 along the eastern boundary with the adjoining residential development. The made ground was recorded in shallow soils to a maximum depth of 2.10mbGL at three borehole locations and three trial pits across the north and east of the Site in the 2021 site investigation (SIL, 2021), however with the exception of 'some plastic' the made ground did not include any anthropogenic contamination. The made ground encountered is considered to be reworked soil and consistent with the agricultural use of the Site. There was no made ground encountered in the 2018 site investigation (Refer to Appendix 6A).

The SPT N-values recorded generally range from 3 to 16 at 1.00mbgl which indicates soft to stiff soils at this depth and although the N-values then increase to a maximum of 29, low values of 3 to 8 were recorded at 8 No. locations indicating soft soils. The values at 3.00mbgl are

generally 8 or greater but at BH10 a value of 3 at 3.00mbgl was recorded. Laboratory tests of the shallow cohesive soils recorded CLAY soils with low and intermediate plasticity indices of 11% to 17% recorded. The particle size distribution curves were poorly sorted straight-line curves with 23 to 50% fines content.

Bedrock was not encountered at any of the 57 borehole locations onsite that were drilled to a maximum depth of 20mbGL, borehole logs are provided in the site investigation report in Appendix 6A (SIL, 2021).

6.4.6.2 Groundwater

Groundwater strikes were encountered during borehole drilling at varying depths including the upper 5m below ground. Measured groundwater levels for the period August to October 2021 ranged between 4.81mbTOC (below top of casing) (BH07) and 9.7mbTOC (RC26). Groundwater levels measured in January 2022 at these locations were 2.89mbTOC (BH07) and 5.53mbTOC (RC26). A seasonal variance in groundwater levels between the August to October 2021 period and January 2022 at specific monitoring locations ranging up to 4.955m (BH28) has been recorded at monitoring wells installed at the Site. Based on this data, the hydrogeological assessment undertaken for the Site (Enviroguide Consulting, 2022) identified that:

- Groundwater flow beneath the Site is to the east with lateral and vertical (upwards and downwards) components in a heterogeneous geological formation with persistent and intermittent groundwater emergence as spring flows across the Site.
- The potential for rapid response of groundwater levels to recharge events (including infiltration via soakaways) and intermittent groundwater emergence as springs and shallow sub-surface flow.

Groundwater is assessed in Chapter 7 of this EIAR.

6.4.6.3 Ground Conditions and Contamination

The soil encountered was generally native material or natural in-situ soil with some localised areas of made ground (refer to Section 6.4.6.1) that is considered to be reworked and generally free of any anthropogenic type inclusions with the exception of an isolated occurrence of plastic.

Soil analytical data for samples collected from across the Site are provided in the site investigation report (GIIL, 2018) provided in Appendix 6A. The reported analytical results for key parameters used to determine the presence of anthropogenic contamination in soil were reported as less than laboratory limits of detection or not detected.

These parameters include:

- Asbestos: no asbestos detected (NAD)
- Sum of BTEX (benzene, toluene, ethylbenzene, xylenes): <0.025mg/kg
- Sum of 7 PCBs (Polychlorinated Biphenyl): <0.034mg/kg
- Sum of 17 PAHs (Polycyclic Aromatic Hydrocarbons): <0.64mg/kg
- Petroleum Hydrocarbons (Total aliphatics and aromatics(C5-40)): <52mg/kg

These results verify that the sampled soil was free of anthropogenic chemical contamination.

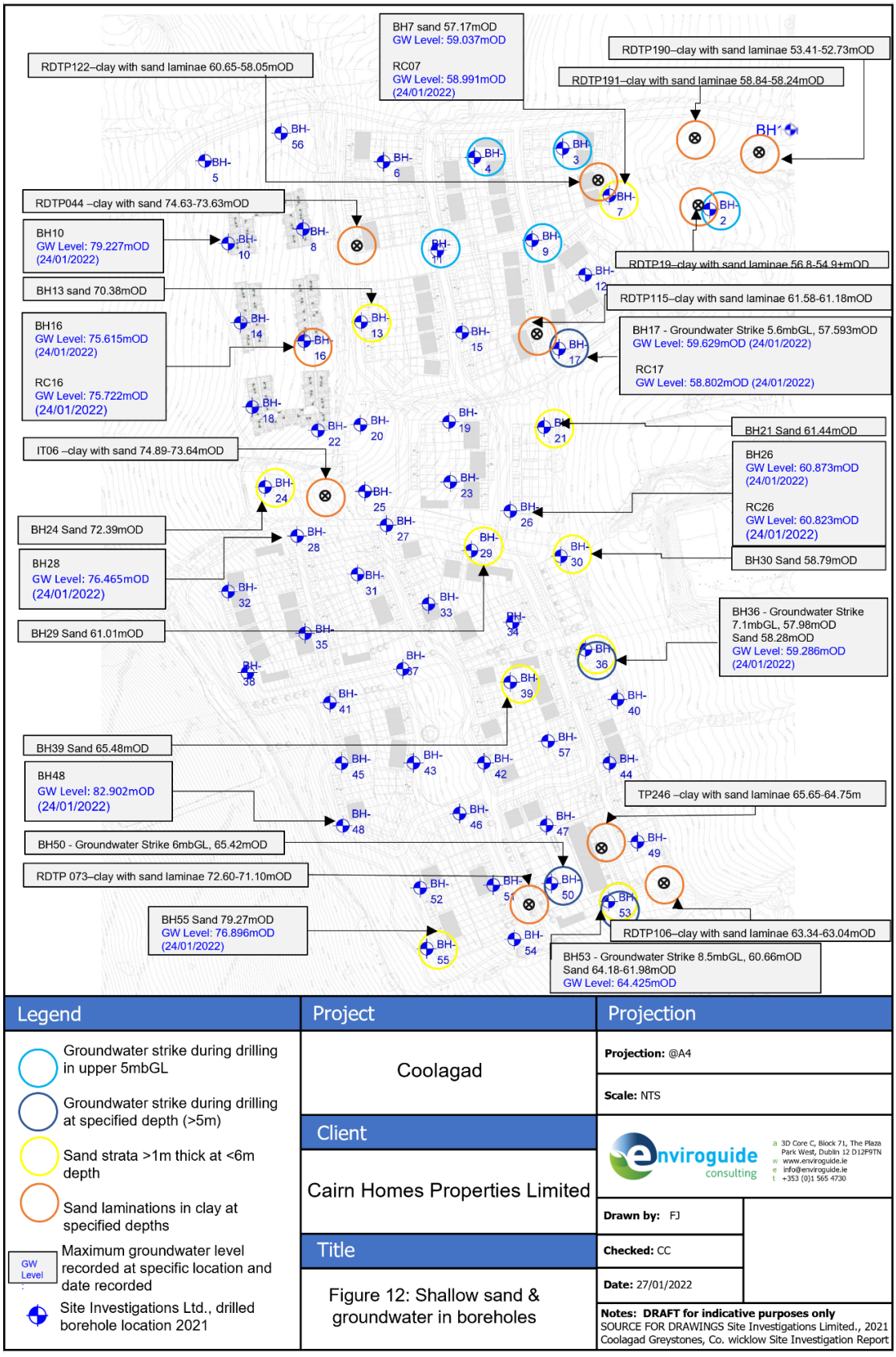

Figure 6-7 Locations of groundwater strikes and sand horizons

The schematic geological cross sections based on information provided in the site investigation report (Site Investigations Limited, 2021) including the sand and gravel strata are provided in Figures 6-8 and 6-9 (refer to Appendix 6A).

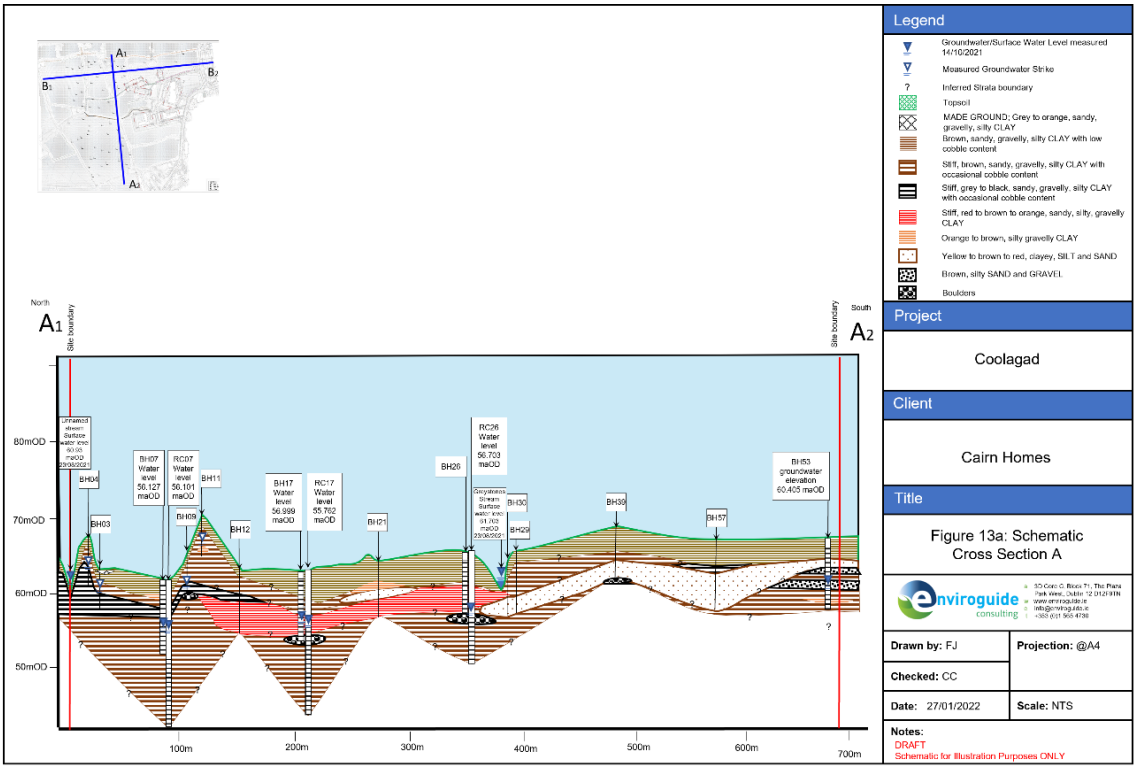

Figure 6-8: Geological Cross- Sections (North to South at the East of Site)

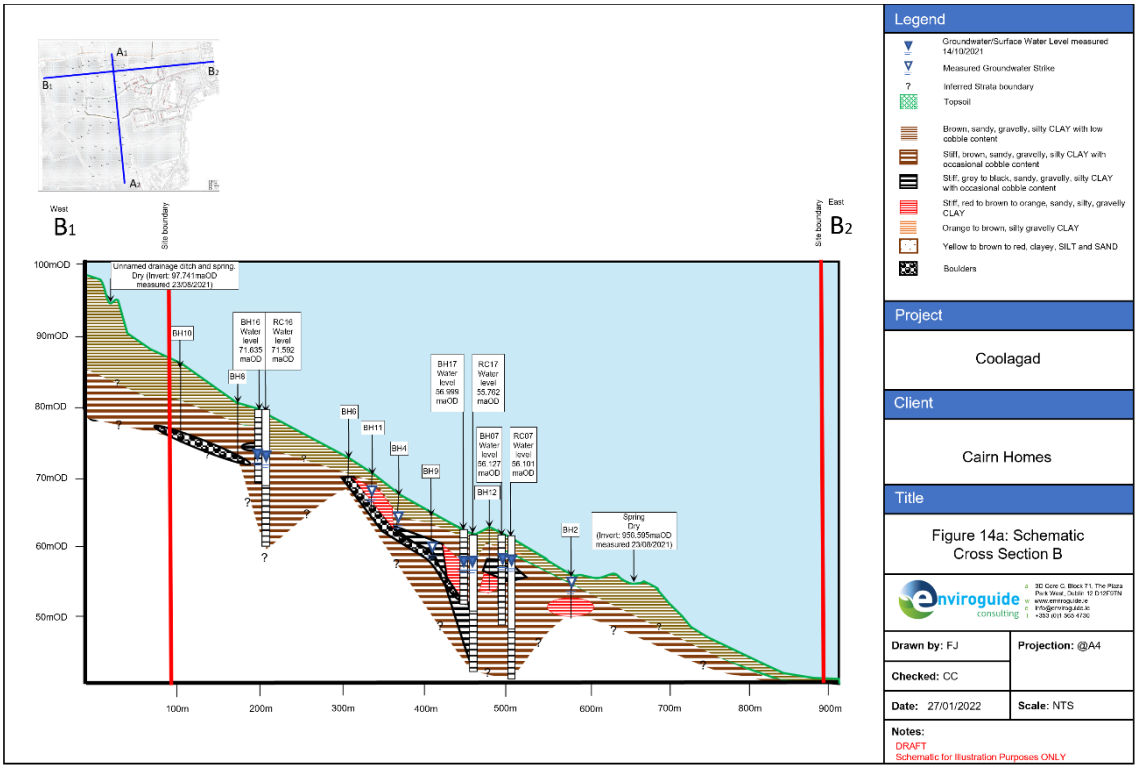

Figure 6-9 Geological Cross- Sections (West to East at the North of Site)

6.4.7 Radon

The site is mapped by the EPA (2022) to be in an area where between five and ten percent of the homes in the mapped 10km grid square are estimated to be above the Reference level. A High Radon Area is any area where it is predicted that 10% or more of homes will exceed the Reference Level of 200 Becquerel per cubic metre (Bq/m3). Therefore, the site is considered to be within a High Radon Area. It is noted that a high radon level can be found in any area, in any part of the country, but are more likely to be located in High Radon Areas.

6.4.8 Geological Heritage

There are no recorded (GSI, 2022) Geological Heritage sites within the Proposed Development Site however there are five sites within 2km radius which are summarised in Table 6-4.

Table 6-4: geological Heritage Sites located within 5km of the Proposed Development Site

Site Name	Site Code	Description	Location	Distance from Site
Bray Head	WW013	Coastal headland with extensive natural exposure and sea cliffs, plus railway cuttings.	North-east	1.99km
Glen of the Downs	WW023	A deep channel that was formed by the meltwater erosion on the northeastern flank of the mountains	South-west	1.95km
Greystones Beach	WW036	A 2km long coastal section exposing several units of glacial till.	East	0.7km
Greystones (Appinite)	WW035	A section of rocky coastline on the scenic and popular Greystones waterfront	East)	1.3km
Wicklow-Greystones Coast	WW060	An uninterrupted shingle beach extending for over 17km long between Greystones and Wicklow	South-east	1.68km

6.4.9 Quaternary Geomorphology

The geomorphology of the surrounding area is characterised mainly by meltwater channels (GSI, 2022). The closest quaternary features to the site are mapped located 0.33km north of the site (GSI, 2022).

6.4.10 Geochemical Domain

The GSI (2020) defined Geochemical Domains maps indicates that the Proposed Development is within Domain 5 which is characterised as “Lower Palaeozoic sandstones, shales and igneous rock”.

A summary of the metals values for Domain 5 are presented below in Table 6-5.

Table 6-5: Geochemically Appropriate Levels for Domain 5

Element	Units	Value
Arsenic	mg/kg	41.5
Cadmium	mg/kg	1.42
Chromium	mg/kg	73.2
Copper	mg/kg	77.6
Mercury	mg/kg	0.302
Nickel	mg/kg	65.7
Lead	mg/kg	109.0
Zinc	mg/kg	224

6.4.11 Geological Hazards

The GSI records verify that that there are no karst features (e.g. cave, enclosed depression, swallow hole, turlough) within 2km of the Proposed Development Site. Karst features in Ireland are generally associated with Carboniferous limestones and as the Site is underlain by Cambrian greywake, quartzite and shale bedrock, karst features and associated landforms are not expected at the Proposed Development Site.

The Proposed Development Site is located within an area with a 'Low' landslide susceptibility classification. A localised area at Kindlestown Hill west of the Site where bedrock is mapped to subcrop or outcrop is assigned a landslide susceptibility classification of Moderate' and 'High' (GSI, 2022), however there are no recorded landslides in that area.

There are no recorded landslides at the Site, and two (2no.) recorded within 2km of the Proposed Development Site recorded on the GSI database (GSI, 2022) as summarised in Table 6-6.

Table 6-6: Recorded landslide events within 2km

GSI Event ID	Location	Event Name, Date and Comment
GSI_LS16-0055	1.8km southwest Glen of the Downs, Nature park	Glen of the downs rockfall 1/1/2016 Large Quartzite rockfall south of the trail path. Landslide mechanism 'rock avalanche'
GSI_LS04-0001	1.7northeast Cliff Walk, North of Greystones	Greystones2002 11/1/2002, Occurred in Winter 2002. Landslide mechanism 'undefined'

In Ireland, seismic activity is recorded by the Irish National Seismic Network operated by Dublin Institute for Advanced Studies (DIAS) which has been recording seismic events in Ireland since 1978. There are six permanent broadband seismic recording stations in Ireland operated by DIAS. Records since 2010 show that the majority of recorded seismic events were associated with quarry blasts and no recent events have been recorded within 2km of the Site or in the greater Wicklow area.

6.4.12 *Economic Geology*

The Site is located within an area mapped as 'Very High Potential' for crushed rock aggregate and the north-eastern portion of the Site adjoining the R761 within an area mapped as 'High Potential' for granular aggregate potential (GSI, 2022). The site-specific proven economic potential of soil and bedrock is not known, however bedrock was not encountered within 20m of the surface during site investigation at the Site.

There are a number of historical 'pits' listed within 2km of the Proposed Development Site (GSI, 2022) the closest located within 1km to the east and southeast identified as mid-early 20th century gravel pits and 'pits'. A number of pits located to the west within 2km of the Site are identified as 'pits' and noted to be within the Glen O' the Downs golf club and private land. The closest active quarry is located at Kilmurry South, 2.5km west of the Proposed Development Site.

6.4.13 *Summary of the Baseline Environment*

The TII criteria for rating of the importance of geological features at the Site as documented in the National Roads Authority Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009), are summarised in Table 6-7.

Table 6-7: Criteria for Rating Site Importance of Geological Features

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource.
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on-site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils.

Importance	Criteria	Typical Example
		Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale.	Contaminated soil on-site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Based on the criteria outlined in Table 6-7 the soils and geology underlying the Site would be rated as an attribute of 'medium' importance. The Site is a greenfield within an area mapped as having high aggregate potential however this has not been proven at the Site and based on depth of overburden is likely to be uneconomical.

6.5 Impact Assessment

6.5.1 Description and assessment of Potential Impacts

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

6.5.2 Construction Phase

6.5.2.1 Land Take and Land Use

There will be a land take of 26.03Ha for the entire Proposed Development with a change of landuse from agricultural lands to residential and amenity landuses that will result in a "negative", "significant", "permanent' impact due to the loss of agricultural lands and removal of soil. A portion of the Proposed Development Site is includes the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones which is required for the sewer upgrade and therefore there is no land take or change in use required for the Proposed Development. The proposed development will include 10.43Ha of public open spaces that will provide amenity for the occupants of the proposed the Development and remain as green areas.

6.5.2.2 Removal of Soil and Bedrock

There will be an unavoidable loss of in-situ soil and subsoil from the Site to achieve the required formation levels for the Proposed Development including the basement, foundations, roads, drainage and other infrastructure. There is no identified requirement to excavate bedrock as the maximum cut level of 9m is required and bedrock was not encountered in boreholes drilled at the Site that extended to 20m depth.

The cut and fill analysis (refer to AECOM Drawings COO-CCM-00-00-DR-CE-00-0610 to 0615) identifies a final cut level of up to 8-9m below existing surface level will be required with maximum cut levels along the southern part of the western Site boundary. It is intended to retain and re-use suitable excavated soil and subsoil at the Site for engineering fill and landscaping and the fill requirement of up to 4-5m above existing site levels in the central and eastern parts of the Site has been identified. There is no design requirement to import soil and subsoil to achieve finished Site levels thereby avoiding the need to import virgin soil from borrow sites. Aggregates will be imported for the construction of the infrastructure and the buildings at the Proposed Development as specified in the detailed design. The overall net volume of 101,904.631 cu.m (m^3) of soil will require removal from the Site. The final volume of material removed from Site may vary (typically +/- 20%) where bulking of soils on excavation occurs. The Proposed Development will result in an unavoidable 'direct', 'negative', 'moderate to significant', 'permanent' loss of soil and subsoil from the Site.

All surplus materials that will require removal offsite will be removed in accordance with the requirements and recommendations outlined in the Outline Construction and Demolition Waste Management Plan (referred to hereafter as CDWMP) (Enviroguide, 2022) the Outline Construction Environmental Management Plan (AECOM, 2022a), and managed in accordance with all statutory obligations. The offsite re-use of material will be prioritised to minimise the potential loss of valuable good quality soil and subsoil to landfill as a waste. The re-use of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27).

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

Accordingly, it is considered that offsite removal of surplus soil will have an 'indirect' 'neutral', 'imperceptible' 'long-term' impact on the receiving sites and facilities.

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

6.5.2.3 Soil Stability

Temporary excavations will be required at the Site for the construction of roads, infrastructure, drainage and foundations.

The ground investigation report (SIL, 2021) identified that '*trial pits indicate that excavations in the cohesive soils should be stable for a short while at least. However, all slopes should be evaluated upon excavation and regular inspections should be completed during construction to ensure that all slopes are stable. Temporary support should be used on any excavation that will be left open for an extended period*.'

As there is a potential risk for instability where non-cohesive sand horizons were identified in the shallow subsurface (<5m below ground surface), there is a potential for instability during excavations and as recommended temporary supports in these ground would also be required.

Excavation of up to 8-9m below current levels are required at the eastern part of the Site and fill of up to 4-5m to achieve the proposed levels. The subsoil encountered at the Site is predominantly cohesive clay, however sand and gravel horizons some of which were water bearing were encountered at shallow (<5m depths) across the Site. Groundwater springs and seepages are also present at the Site with a potential for rapid change in groundwater levels following recharge events (e.g. rainfall events). Based on available groundwater level data groundwater will be encountered during excavation of the deepest cut sections. Therefore, due to the heterogeneous nature of the ground conditions including groundwater and the required depth of excavations and fill requirements there is a high risk of instability during excavations and other groundworks with a potential for a 'negative', 'significant', 'long-term' impact occurring during construction works within the Site. There are limited fill requirements at the eastern portion of the Site where the creche and access routes are proposed.

6.5.2.4 Soil Structure

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 stockpiled in a controlled manner and retained for future re-use in landscaping with a potential for impact on soil structure described as direct', long-term, slight, 'negative' impact on the natural strength of the subsoil and subsequently resulting in deeper foundations being required.

6.5.2.5 Soil Quality and Contamination

The Site is located at greenfield lands and based on the site investigation results there is no identified contaminated soil.

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

Ground improvement measures are proposed to improve bearing capacity in areas where soft materials are present. The specific type of ground improvement measures to be utilised at the

site will be determined as part of the detailed design stage however, this may include soil stabilisation techniques that include the use of cementitious materials.

The use of cementitious materials during piling and construction of the basement and other in-ground works including ground improvement could in the event of an uncontrolled release of cement, result in a potential 'negative', 'slight' and 'medium term' impact on localised areas of the existing soil quality underlying the Site.

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

6.5.2.6 Importation of Aggregates

Aggregates will be required during the Construction Phase of the Proposed Development that will include aggregates to be used temporarily during construction as piling mats, haul roads and set down areas. Aggregates will also be required as construction materials and fill in accordance with the specification design.

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

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

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

6.5.2.7 Geological Hazards

Earthquakes are not likely to occur in the vicinity of the Site at a sufficient intensity to pose a risk for the Proposed Development.

The Site is not located within a karst area due to the nature of the underlying bedrock geology and therefore there are no identified risks associated with karst features for the Proposed Development Site.

The GSI database indicates that the Site is located within an area of 'Low' susceptibility to landslides. The proposed design requires excavation to 8-9m below current site levels that may intersect granular soils and groundwater and the placement of soils in areas with groundwater seepages. These site conditions could result in potential ground stability hazards as outlined in Section 6.5.2.3 where cut and fill is required with potential for a 'negative', 'moderate to significant' impact. However, the appropriate geotechnical design avoidance and

reductive measures will be incorporated the design to prevent any potential impacts and for including during the Construction Phase.

The Site is located within a High Radon Area. However, standard design measures including appropriate radon membranes will be incorporated into the design of buildings in accordance with relevant Building Regulations.

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

6.5.3 *Operational Phase*

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

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

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

There will be no direct impacts associated with the Operational Phase of the Proposed Development and therefore the potential impacts on land, soil and geology associated will be ‘neutral’, ‘imperceptible’ and ‘permanent’.

6.5.4 *Human Health*

No public health issues associated with the land, soil, geology conditions at the Site have been identified for the Construction Phase or Operational Phase of the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers. The necessary measures will also be implemented to address any nuisance issues associated with dust dispersion during construction works including the offsite removal of surplus soil. The potential impacts associated with airborne dust is addressed in Chapter 8 (Air and Climate) of this EIAR.

The design and specification for all buildings will be in accordance with current Building Regulations and therefore any potential issues associated with radon will be addressed and avoided.

Human health is assessed in Chapter 4 of this EIAR.

6.6 Cumulative Impacts

6.6.1 Construction Phase

The cumulative effects of Proposed Development on land, soil and geology have been assessed taking other planned, existing and permitted developments in the surrounding area into account. All planning permission applications that have been granted and developed have been incorporated into the baseline assessment of this application.

A planning search revealed that there have been 2 No. recent (within the last five years) applications for Strategic Housing Developments in the vicinity of the Proposed Development Site which have been granted permission as detailed in Table 6-8 that could potentially be constructed at the same time as the Proposed Development.

Table 6-8 Recent applications granted permission in the vicinity of the Proposed Development

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

Potential cumulative impacts could arise associated with the offsite removal of surplus soil from the Proposed Development Site if directed to the same destination facilities or sites as the other permitted developments. The EIARs for these two developments were reviewed and no significant residual impacts on or residual impacts on land, soil and geology. As only authorised facilities will be used for the Proposed Development, the potential impacts at any authorised receiving facility sites including waste facilities will have been adequately assessed and mitigated as part of the statutory consent procedures.

The impacts associated with removal of surplus material and waste offsite is assessed in detail in Chapter 13 of this EIAR.

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

6.6.2 Operational Phase

There are no cumulative impacts on land, soils and geology anticipated during the Operational Phase of the Proposed Development

6.7 Ameliorative, Remedial or Reductive Measures

6.7.1 Construction Phase

Ameliorative, Remedial or Reductive (Mitigation) measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include:

- Groundworks including excavation and management and control of soil during bulk excavation and export from the Proposed Development;

- Management and control of imported soil and aggregates from off-site sources;
- Fuel and Chemical handling, transport and storage; and
- Accidental release of contaminants .

6.7.1.1 Excavation and Ground Stability

Detailed design will be specified by an appropriately qualified geotechnical Engineer for the soil cut and fill requirements at the Site to ensure that ground stability is engineered and controlled appropriately.

Where appropriate, suitable batters or retained vertical walls will need to be maintained on excavation faces to ensure the stability of adjacent ground, structures and services. The geotechnical site investigation report (SIL, 2021) set out recommendations for the management of temporary sloped sides for excavations of 33º, or 1:1.5 and where excavations extend to stiffer CLAY the temporary slope angle could be increased to 45º, or 1:1. The report also recommends that temporary slope protection measures should also be considered to minimise the risk of spalling.

Temporary measures required during cut and fill groundworks will be determined as part of the detailed design and also in the construction methods that will be specified by the appointed contractor. These measures will include measures to ensure any impacts on ground stability at offsite locations are avoided including the adjoining residential and school sites.

6.7.1.2 Management of Stockpiles (soil and other materials / wastes)

Segregation and storage of soils for re-use onsite or removal offsite and waste for disposal off site will be segregated and temporarily stored on-site (pending removal or for re-use on-site) in accordance with the CEMP (AECOM, 2022a) and the CDWMP(Enviroguide Consulting, 2022).

The reuse of up to 102,159.264cu.m (refer to Table 6-2 and Section 6.5.2) of excavated soil and stone for the Proposed Development (i.e., engineered fill, profiling green areas) will be undertaken in accordance with the engineered design and landscape plan for the Proposed Development. Soil including topsoil and subsoil will be segregated and stored appropriately to prevent deterioration of soil structure and quality to ensure the material will be suitable for re-use onsite. Material surplus to onsite requirements will be segregated and stockpiled appropriately for removal offsite in accordance with the resource and material management plan.

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

- A suitable temporary storage area shall be identified and designated;
- All stockpiles shall be assigned a stockpile number;
- Material identified for reuse on site, off site and waste materials will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings;
- Soil stockpiles will be sealed to prevent run-off from the stockpiled material generation and/or the generation of dust;
- Stockpiles will be placed at an appropriate distance from Site boundaries and not at boundaries adjoining sensitive receptors ;

- Any waste that will be temporarily stored / stockpiled will be stored on impermeable surface high-grade polythene sheeting, hardstand areas or skips to prevent cross-contamination of the soil below or cross contamination with soil;

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

- Stockpiles will not be located adjoining site boundaries with sensitive receptors including public roads and residential areas;
- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

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

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

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

6.7.1.3 Exportation of Soil

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

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

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

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

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

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

Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be deployed to ensure that public roads are kept free of debris.

The wheels of all Lorries will be cleaned prior to leaving the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

6.7.1.4 Importation of Aggregates

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

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

6.7.1.5 Handling of Chemicals, and Fuel

Fuel, oils and other chemicals that could be used during construction can be potentially hazardous to environmental receptors.

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

Storage areas for any fuel, oils and chemicals will be bunded and clearly marked. Fuel will only be stored in the quantities required for emergency use and for re-fuelling as required. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

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

- Bunds will have regard to Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
  - 110% of the capacity of the largest tank or drum within the bunded area; or
  - 25% of the total volume of substance that could be stored within the bunded area.
- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Site;

- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed off-site in accordance with waste management legislation and the procedures outlined in the CDWMP (Enviroguide Consulting, 2022).
- Residual soil remaining onsite will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines including 'Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites' (EPA, 2013);
- Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and
- All staff on-site will be fully trained on the use of equipment to be used on-site.
- Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds.

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

A procedure will be drawn up which will be adhered to during refuelling of on-site vehicles. This will include the following:

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

6.7.1.6 Concrete Works

The cementitious grout used during the construction of the basement drainage channels and connections to the unnamed streams and Greystone Stream in the vicinity of the Site, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

All ready-mixed concrete shall be delivered to the Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container

which will then be emptied into a skip. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

6.7.2 *Operational Phase*

There is no requirement for ameliorative, remedial or reductive measures for the Operational Phase of the Proposed Development.

6.7.3 *Worst Case Scenario*

The potential accidental release of hazardous material including fuels, waste materials being used on-site during the Construction Phase could potentially impact on the receiving land, soil and geology environment would only occur through the failure of secondary containment or a major incident on the Site. However, taking account of the ameliorative, remedial and reductive measures of the Proposed Development to effectively prevent and manage such an incident any environmental harm would be avoided. There would therefore be a 'neutral', 'imperceptible' and 'short-term' impact on the receiving environment.

This worst case scenario is deemed to be unlikely to occur.

6.8 Residual Impacts (including worst case scenario)

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

The predicted impacts of the Construction and Operational Phases are described in Table 6-9 in terms of quality, significance, duration and type. The residual impacts are described taking account of the relevant ameliorative, remedial and reductive measures.

There are no significant residual impacts on land, soils and geology anticipated for the Proposed Development.

Table 6-9. Summary of Residual Impacts

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
Construction of the Proposed Development.	Landuse and Land-take: A land-take of 26.03Ha with change from agricultural to residential landuse.	Negative	Moderate - Significant	Permanent	Direct	Public Open spaces across 10.43Ha of the Site will include green spaces and appropriate management and retention on site of soil	Moderate
Excavation and Removal of Soil	The proposed design will require the unavoidable removal of soil and sub-soil from the Site.	Negative	Moderate - Significant	Long-term	Direct	Soil and subsoil will be retained and re-used within the Proposed Development Site for engineering fill and landscaping. Surplus soil and subsoil, which is clean and inert, will be re-used off site in accordance with appropriate statutory consent procedures	Slight

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
						including Article 27 to prevent the loss of the valuable soil resource to landfill.	
Construction Activities and impact on Soil Structure	Stripping of topsoil could result in exposure of soil to weather, site traffic.	Negative	Slight	Permanent	Direct	Topsoil will be stockpiled in a controlled manner and retained for future re-use in landscaping onsite and surplus material will be directly removed for re-use offsite where appropriate.	Slight
Groundworks and ground stability	Bulk excavations and other groundworks including engineered infill of ground to achieve Site levels could result in the stability issues during construction.	Negative	Significant	Long-term	Direct	Detailed design will be specified by an appropriately qualified geotechnical Engineer for the soil cut and fill requirements at the	Negligible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
						Site to ensure that ground stability is engineered and controlled appropriately.	
Removal of surplus soil to offsite lands (facility or site for re-use)	Soil will be removed to an authorised (facility or under Article 27 Notification for appropriate re-use in accordance with all statutory obligations and consents. Control procedures will be in place to prevent the unauthorised removal of materials to unauthorised offsite lands/sites/facilities.	Neutral	Imperceptible	Long-term	Indirect	None required.	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
Use of cementitious materials.	Potential release of cementitious material during construction works for foundations, pavements and other structures could result in a localised impact to soil quality.	Negative	Slight	Medium-term	Direct	The cementitious materials used during construction will avoid any contamination of soil and geology through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards and the CEMP for the works.	Imperceptible
Accidental release of deleterious materials including fuel and other materials being used on-site.	Potential (albeit low) for uncontrolled release of deleterious materials including fuels and other materials being used on-site, through the failure of secondary and tertiary	Negative	Moderate to significant	Long-term	Direct	All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for use and containment of	Imperceptible

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

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
	authorised sources will be used.						

6.9 Do Nothing Scenario

The use of the Proposed Development Site as a greenfield agricultural Site would continue with no requirement for land take and change from agricultural to residential landuse.

6.10 Monitoring

6.10.1 Construction Phase

During construction phase the following monitoring measures will be considered:

- Inspections and monitoring will be undertaken during excavations, piling and other groundworks to ensure that any geotechnical design measures are implemented and effective to prevent instability of soils during groundworks and piling.
- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Monitoring and site audits will be undertaken daily by the contractor to check for any detectable nuisances such as, noise, dust or other such issues associated with excavation and offsite removal of soil.
- Materials management and waste audits will be carried out at regular intervals to monitor the following:
  - management of surplus soils on site and for removal offsite,
  - record keeping,
  - traceability of all materials, surplus soil and other waste removed from the Site and
  - ensure records are maintained of material acceptance at the end destination.

6.10.2 Operational Phase

There are no monitoring requirements specifically in relation to land, soil and geology.

6.11 Difficulties Encountered

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

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7 Water

7.1 Introduction

Enviroguide Consulting, on behalf of Cairn Homes Properties Limited has carried out an assessment of the likely significant effects of a proposed residential and recreational development at Coolagad near Greystones, Co. Wicklow on hydrology and hydrogeology (water) of the receiving environment within the immediate surroundings of the Proposed Development Site. This chapter details the results of an assessment of the potential impacts of the Proposed Development on hydrology and hydrogeology (water) and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Hydrological and hydrogeological (water) characteristics at the Proposed Development Site;
- Potential impacts that the Proposed Development may have on water including "worst case" scenario assessment;
- Potential constraints that the environmental attributes may place on the Proposed Development;
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development; and
- Evaluate the significance of any residual impacts.

7.1.7 Quality Assurance and Competence

The chapter was prepared by:

- Claire Clifford BSc. (Geology), MSc.(Environmental Sciences), PGeo., EurGeol.
- Fionnuala Joyce BSc. (Geology), MSc. (Hydrogeology).

7.2 Assessment Methodology

7.2.1 Regulations and Guidance

The methodology adopted for the assessment has regard to the relevant guidelines and legislation as listed in the bibliography (refer to Section 7.13).

7.2.2 Phased Approach

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

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

This stage of the assessment included a desk top study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for the Water Chapter of the EIAR, extends beyond the site boundaries and includes potential receptors within a 2.0km radius of the Site. The extent of the wider study area

was based on the IGI, 2013 Guidelines which recommend a minimum distance of 2.0km from the Site.

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

Site visits to assess the physical conditions of the site were carried out during March 2021 and later in April 2021 to assess the general site setting and condition and included site walkover survey and identification of hydrological features at the Site.

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

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

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

- Intrusive site investigation including borehole drilling and trial pit excavation was undertaken by Site Investigations Ltd. between July 2021 and September 2021. Enviroguide Consulting (Fionnuala Joyce) attended the Site during the intrusive site investigation to observe the general ground conditions encountered.
- Details of the scope and methods for the site investigation and the results are provided in the site investigation report included in Appendix 7A (please note that Appendix 7A as referenced in this chapter is the same document as Appendix 6A and is appended to Chapter 6 as Appendix 6A).

The reviewed material for Element 2 of this assessment included the following:

- Borehole logs relating to 2018 Ground Investigations Ireland Ltd. (GII) site investigations (Appendix 7A)
- Borehole and trial pit logs relating to 2021 Site Investigations Ltd. (SIL, 2021) site investigations (Appendix 7A).

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

of the development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

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

7.2.3 Description and Assessment of Potential Impact

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this Chapter is described in Table 7-1.

Table 7-1:Assessment of Potential Impacts Terminology and Methodology

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**Definition**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

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

The National Roads Authority Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009), criteria for estimation of the importance of hydrogeological features at the Site during the Environmental Impact Assessment (EIA) stage, as documented by IGI (IGI, 2013) are summarised in Table 7-2.

Table 7-2: Criteria for Rating Site Importance of Hydrogeological Features

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by European Union (EU) legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local	Regionally Important Aquifer.

	scale.	Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

7.3 Characteristics of the Proposed Development

The proposed development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building, a creche, a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

Bulk excavation will be required for the construction of the basement beneath the apartment block in the northwest and to achieve the proposed Site levels. Excavations will also be required for foundations, roads, infrastructure and drainage. Cut of up to 8-9m will be required in the western portions of the Site and of 4-5m of fill will be required in the southeast and north (refer to AECOM Drawings DR-CE-00-0610 through 0615). Basements will be constructed with levels ranging between 80.5mOD (Apartment Block C) and 82.4mOD (Apartment Block A). Foundation solutions for the Proposed Development will include raft foundations, pad or strip foundations and piled foundations depending on the nature of the ground conditions (AECOM, 2022d). Final foundation design will be determined during the detailed design

The Proposed Development will be served by a foul water network, and due to capacity issues will avoid the existing 300mm foul water sewer located in the R761 and discharge to the Irish Water 375mm combined sewer at Victoria Road and Irish Water confirmed (Irish Water Ref: CD S20005105 issued 7th December 2020) that connection is feasible noting that 'upgrades are required in the area', this is understood to be a new 300mm sewer to be laid along theR761 and Victoria Road roadways (AECOM 2022b;). It is noted in the Wicklow County Council Opinion

(WCC Ref: SHD-20/139) regarding the sewer upgrades 'this will require further investigation' (AECOM, 2022b). The Greystones area is currently serviced by the Greystones Wastewater Treatment Plant (WWTP) at Woodlands, Greystones.

It is proposed to provide water supply to the proposed development via a new watermain network connecting to the existing 100mm watermain on the R761. As part of the proposal approximately 200m of the existing watermain section require upgrading up to 200mm watermain in line with the recommendations issued as part of the Irish Water Confirmation of Feasibility dated 7th December 2020 (AECOM, 2022b;)

A new surface water drainage system for the development will be constructed to collect runoff from all impermeable surfaces, together with any additional runoff from landscaped areas that do not percolate to ground. The proposed surface water drainage has been designed in accordance the Greater Dublin Strategic Drainage Strategy (GDSDS) as specified in the Infrastructure Report (AECOM, 2022b).

The SuDS measures are proposed to minimise the impact of the runoff on water quality and quantity and maximise the amenity and biodiversity opportunities within the Site. It is proposed to provide the following SuDS measures: green roofs, permeable paving, filter drain, swales, bio-retention areas. Attenuation will be provided by under As the Site conditions are not suitable for infiltration to ground, the swales and filter drains will be impermeable. A Class 1 NSBE 010 bypass interceptor is proposed downstream of each of the hydrobrake system.

A cut off ditch along the western boundary is proposed to intercept any over land flows that may be generated from higher up the slope to the west and which could potentially constitute a flood risk to the development. It is proposed to maintain the current flow paths from the site and drain the surface water runoff from the proposed development to either the existing stream within the site, a proposed wetland area or the existing underground pipe. An existing ditch along the southern boundary and the existing drain pipe along the eastern boundary adjoining the Waverly development will be retained. A new filter drain will be installed along eastern boundary of the Site adjoining the Waverly development (refer to AECOM, 2022 Drawings DR-CE-00-0504 and 0505).

The existing Site is greenfield and the Proposed Development will include 10.43Ha of public open space with additional green areas in the gardens at the houses.

Figure 7-1: SuDS Layout (AECOM, 2022 Drawing CE-00-0521)

7.4 The Existing and Receiving Environment (Baseline Situation)

7.4.1 Site Location and Description

The Proposed Development is located in Coolagad, Greystones, Co. Wicklow. The site location is shown in Figure 7-2.

The Proposed Development Site is 26.03 Hectares (Ha) and is currently greenfield agricultural lands, and has historically been greenfield. The Site comprises of a number of fields with hedgerows and streams, there is also a number of springs identified at the Site. The Site is bound to the north, south and west by agricultural lands, to the east by the R761 and to the southeast by the Waverly and Seagreen residential estates, a school campus and 2 no. detached dwellings with associated agricultural buildings.

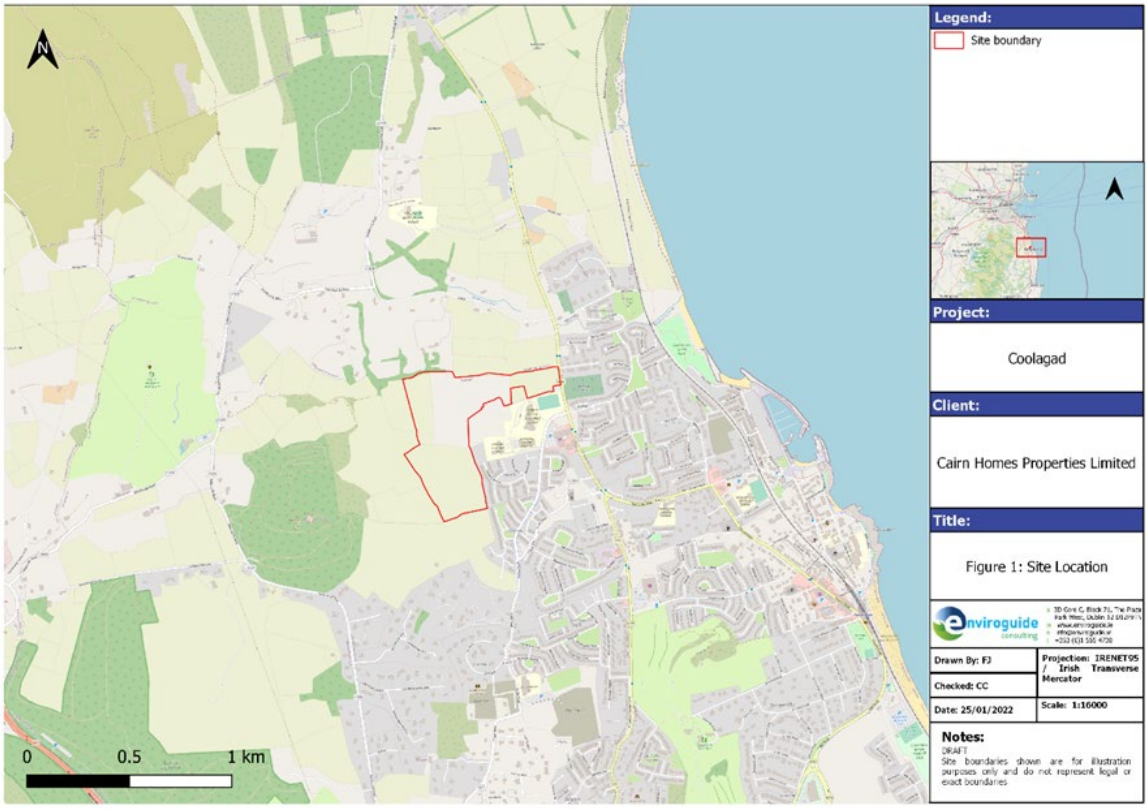

Figure 7-2 Site Location

7.4.2 Topography

The topography at the Site slopes from the local high point at Kindlestown Hill to the west of the Site towards the Irish Sea located to the east of the Site. The highest elevation at the Site is 93.5maOD in the south-western area the lowest is 39.5maOD along the eastern Site boundary (refer to Figure 7-3).

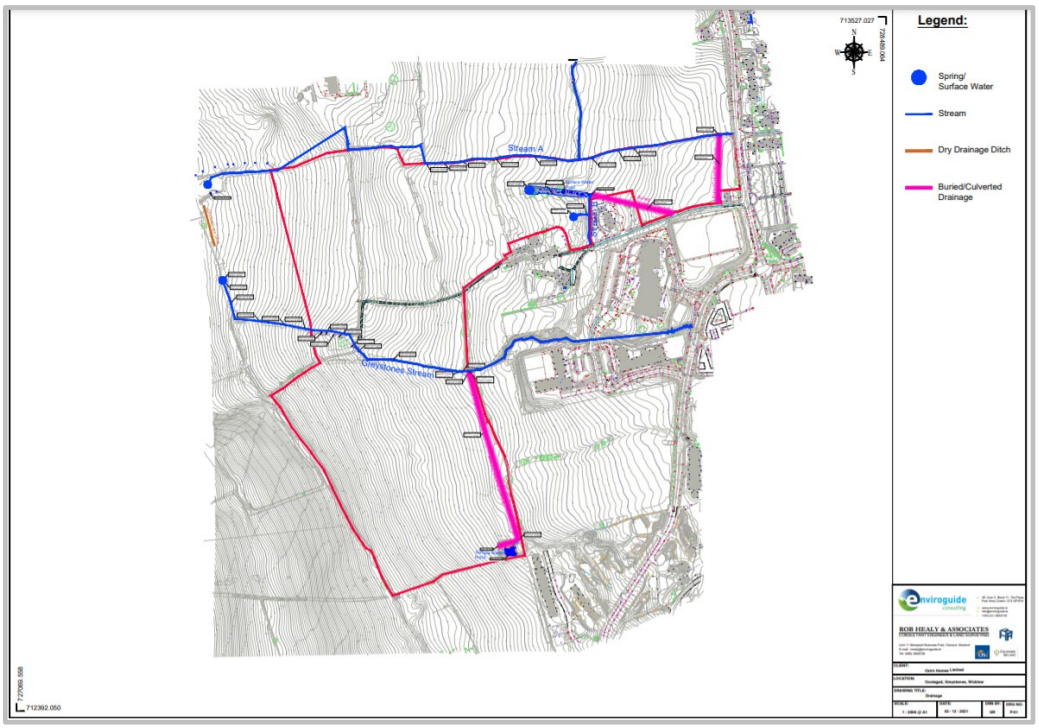

Figure 7-3 Site Topography and Existing Drainage (refer to Appendix 7A)

7.4.3 Rainfall and Evaporation

Monthly rainfall data available for 1km x 1km grids (for the period 1981 to 2010) was sourced from Met Éireann (Walsh, 2012) and is presented in Table 7-3.

Table 7-3: Long Term Mean Monthly Rainfall Data (mm) (Walsh, 2012)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
95	70	73	69	75	70	55	74	73	104	112	100	969
Note: 1km x 1km Irish Grid Coordinates selected for the Site = X (Easting): 320000, Y (Northing): 198000												

The closest the synoptic meteorological station to the Site is at Casement Aerodome, Co Dublin which is located approximately 27.6km northwest of the Site. The average potential evapotranspiration (PE) from the Casement Aerodrome station for the period 2020 to 2021 (Met Éireann, 2022) is presented in Table 7-4.

Table 7-4: Average Potential Evapotranspiration (Met Éireann, 2020)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
16.6	21.8	38.8	62.1	101.8	75.3	76.8	63.8	47.5	28.6	15.2	11.5	559.8

The average annual PE at the Site is 559.8mm/year (Met Éireann, 2022) (refer to Table 7-4). The GSI (GSI, 2022) have calculated an Effective Rainfall (ER) value of 575mm/year for the Site.

7.4.4 Hydrology

Regional Catchment Drainage

The Proposed Development has been mapped by the EPA (EPA, 2022b) as within the Ovoca-Vartry WFD Catchment (ID: 10), the Ovoca-Vartry Hydrometric Area (HA10), the Newcastle [Wicklow]_SC_010 Sub-Catchment, (Subcatchment ID: 10_1) Wicklow Groundwater Body (EU Code: IE_EU_G_076), and the Kilruddery_Deerpark_010 WFD River Sub Basin (EU Code: IE_EA_10K520710).

The Greystones Stream which flows across the central part of the Site is mapped on the EPA database as rising within site and named the Greystones Stream (IE_EA_10K520710; Segment Code: 10_553; EPA Code: 10G26). The following offsite watercourses have been mapped within the immediate vicinity of the Proposed Development Site (Refer to Figure 7-4):

- The Paddock 10 Stream (IE_EA_10K520710; Segment Code: 10_1214; EPA Code: 10P11) - 1.1km northeast of the Site.
- The Kilruddery_Deerpark Stream (IE_EA_10K520710, Segment Code: 10_1242; EPA Code: 10K52) - 0.2km north of the Site and discharges at the coast 0.35km north of where the Greystones Stream discharges.
- The Three Trouts Stream (IE_EA_10T030580; Segment Code: 10_1795; EPA Code: 10T03) - 1.9km south of the Site.

All four water courses are mapped to flow towards the east and discharge to the Irish Sea.

The Greystones Stream and the Kilruddery_Deerpark Stream are both considered to be connected or potentially connected to the Site however the Three Trouts Stream and Paddock 10 Stream are not directly connected with the Site and not considered further in this assessment.

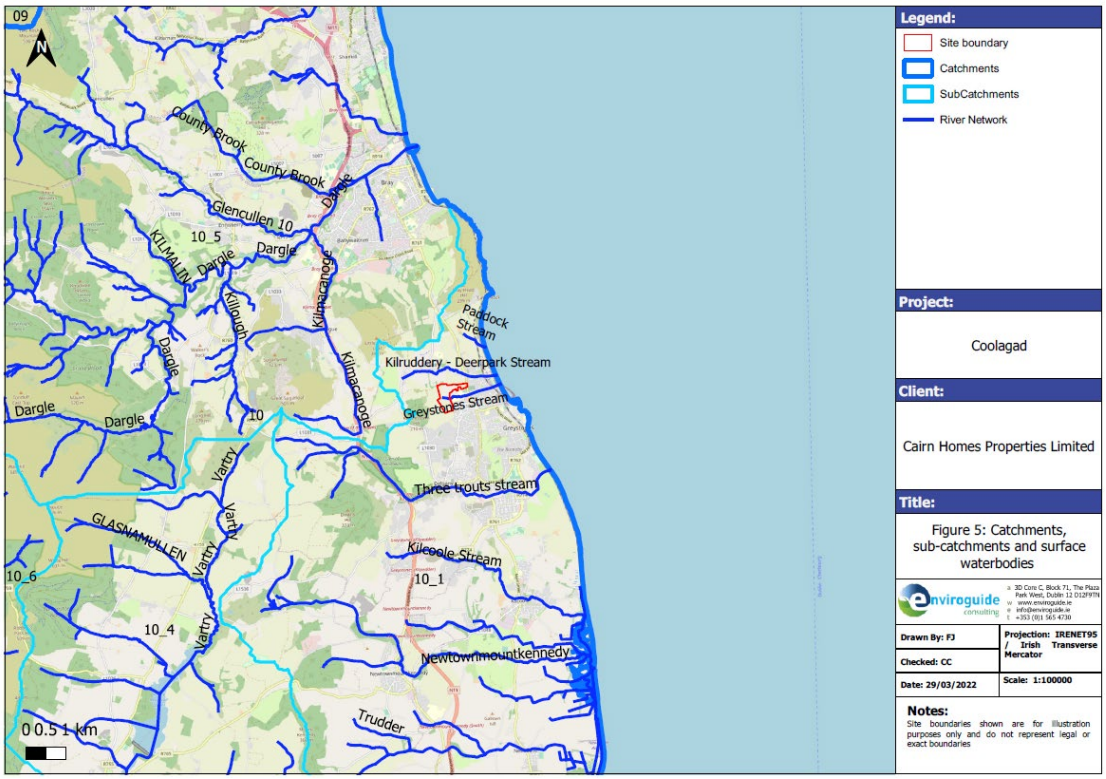

Figure 7-4 Surface Water Catchments and Water Courses

Site Drainage

Enviroguide inspections in March and April 2021 identified a number of open drainage ditches and steams, culverted drains, streams, springs and surface water ponds.

The site drainage is shown on Figure 7-3

A stream flows through the central portion of the Site, identified as the Greystones Stream (EPA, 2022b) that rises from a drainage ditch to the west of the Site that initially flows to the south and then turns to flow to the east through the Site. The Greystones stream is then culverted in a 750mm diameter pipe and from there to offsite.

A water drain or pipe of unknown diameter was identified during the March 2021 survey along the eastern Site boundary with the Waverley development. This pipe is understood to drain a natural depression where water collects in a pond in the southeast corner of the Site with discharge to the existing Greystones Stream east of the 750mm pipe/culvert. The design and intended purpose of this pond and drain are unknown and potentially collects both shallow groundwater and surface runoff. It is noted that this drain does not form part of the Proposed Development and will not be altered or amended.

An unnamed stream (Stream A) that flows east along the northern site boundary was identified to source at a spring located in the northwest of the Site which flows to the east along the northern Site boundary. There is a culvert drain beneath the north-eastern part of the site that flows from north to south exiting the Site and second culvert at the north east of the Evans property that drains in a south-easterly direction beneath the Evans property and back into the Site before it exits the Site.

A spring in the central portion of the north of the Site sources a Stream that joins another unnamed stream (Stream B), identified as rising from an area behind the offsite property to the south of this northern portion of the Site, that flows north-easterly direction before being culverted under a portion of land in the eastern portion of the Site, this culvert drains from northwest to the southeast. It could not be verified during the Enviroguide Consulting surveys where these culverts discharged or if these culverts are connected further downstream to the east. An existing surface water pipe has been identified 65m south of this location and may be the outfall (AECOM, 2022b).

The site inspection identified existing drainage manholes along the south-eastern boundary of the Proposed Development Site. The main foul sewer network was identified in the southern portion of the Site and discharges off site, to the east of the Proposed Development Site. The catchment for the Greystones Stream was calculated to be an area of 20.87Ha to the west of the Site (AECOM, 2022b) (refer to Figure 7-5).

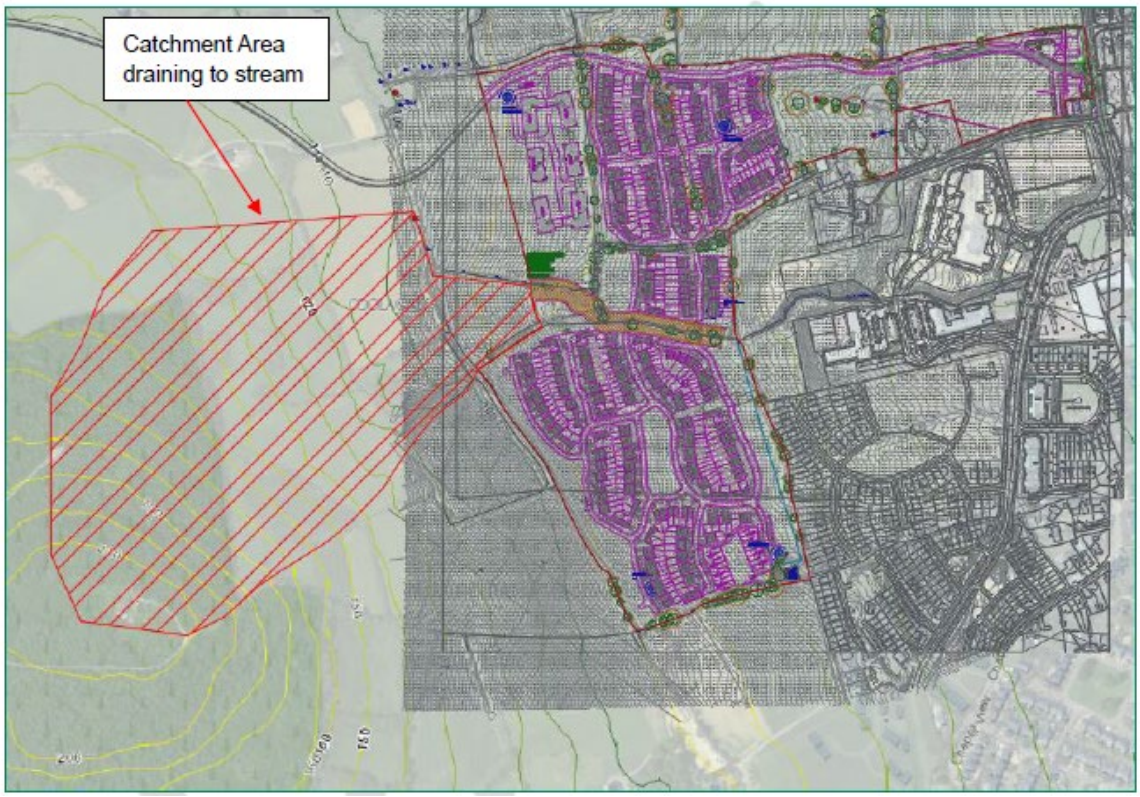

Figure 7-5 Catchment (QBar) draining to the Greystones Stream (AECOM, 2022b)

7.4.5 Soil and Geology

The soil beneath the majority of the Site comprise of Gleys and Podzolics and subsoil is Till. Bedrock beneath the Site comprises of greywacke of the Cambrian Bray Head Formation Devils Glen Formation. Detailed descriptions of the soil and geology beneath the Site is provided in Chapter 6 of this EIAR.

7.4.6 Site Investigation Results

7.4.6.1 Soils and Geology

The subsoils encountered during the site investigation are summarised in the following sections and detailed logs are provide in the site investigation report (Site Investigations Limited, 2021). The locations of boreholes (cable tool and air rotary) are shown on Figure 7-9. The soils encountered the site investigation can be summarised as brown and dark brown silty, slightly gravelly CLAY and was identified to depths ranging between 0.3 and 3mbGL. Orange and red to brown CLAY and SILT with varying gravel and cobble content was encountered to depths of 20mbGL.

Stiff, dark brown to black, sandy, gravelly CLAY with occasional cobbles was encountered at intervals between 1.8 to 5.6mbGL in the northern portion of the site.

Brown, silty SAND and GRAVEL with varying cobble content was also encountered between 4.5mbGL and 8.4mbGL with a thickness of up to 5.5m thick across the centre and eastern portion of the Site. The locations of the thicker sand and gravel strata are shown on Figure 7-6.

The results of site investigation as reported in the Ground Investigation Ireland Ltd (GII, 2018) report (Refer to Appendix 7A) granular deposits were encountered at TP1, TP2, TP4, TP16, TP22 and TP37 and were typically described as grey or brown silty/clayey gravelly fine to coarse SAND with occasional/frequent cobbles.

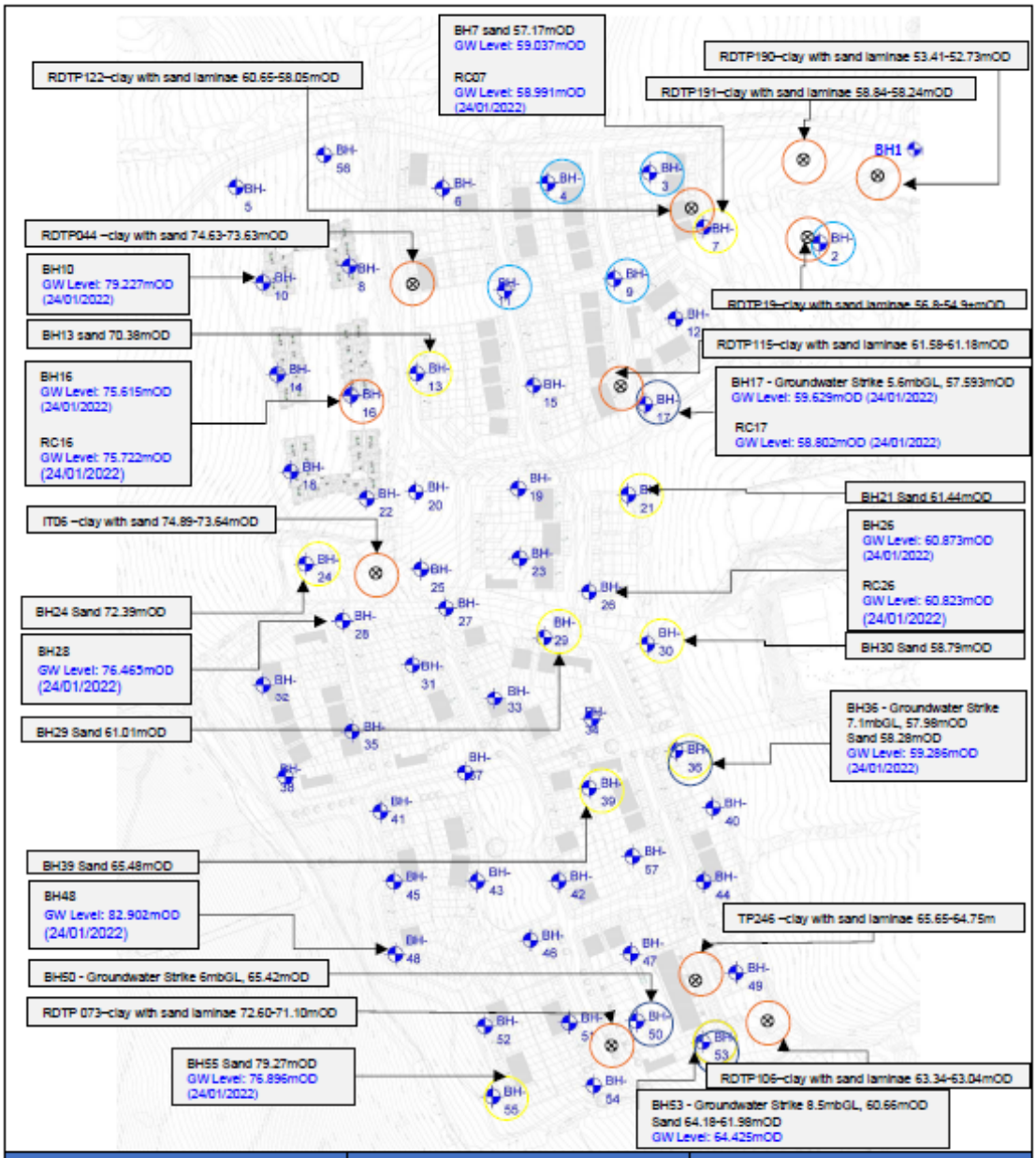

Figure 7-6 Shallow Sand and Groundwater Levels (refer to Appendix 7A)

Laminations of sand were recorded within clays at various locations across the Site. Sand arisings were also observed during drilling of boreholes. However, the drilling techniques used, including air rotary and cable percussion, result in some mixing of laminations as the borehole is advanced and for this reason the granular material present as thin lenses or lamination within a clayey matrix may not be observed or recorded at every location where present. Therefore, it is considered likely that where drilling arisings were recovered from the boreholes as sandy or gravelly clays, in some instances this may be representative of granular laminations of lenses within clay or silt matrix. It is therefore considered that there are potentially as yet unidentified interbedded sand strata within the overburden cross the entire Site.

Soil described as MADE GROUND was recorded at three borehole locations and three trial pits across the Site (BH01, BH03, , BH36, TP130, TP137 and TP142) (SIL, 2021 – Refer to Appendix 7A).

Made ground was not recorded during the 2018 site investigation (GIIL, 2018, Refer to report in Appendix 7A). The referenced made ground was reported in shallow soils to a maximum depth of 2.10mbGL at three borehole locations and three trial pits across the north and east of the Site in the 2021 site investigation (SIL, 2021), however with the exception of 'some plastic' the made ground did not include any anthropogenic contamination. The made ground encountered is not considered consistent with the agricultural use of the Site. There was no made ground encountered in the 2018 site investigation (Refer to Appendix 7A).

Bedrock was not encountered at any of the 57 borehole locations onsite that were drilled to a maximum depth of 20mbGL, borehole logs are provided in the site investigation report in Appendix 7A (SIL, 2021).

A schematic cross-sections depicting the geology and hydrogeology at the Proposed Development Site are presented in Figure 7-7 Figure 7-7 and Figure 7-8 and Appendix 7A (Figure 13-14).

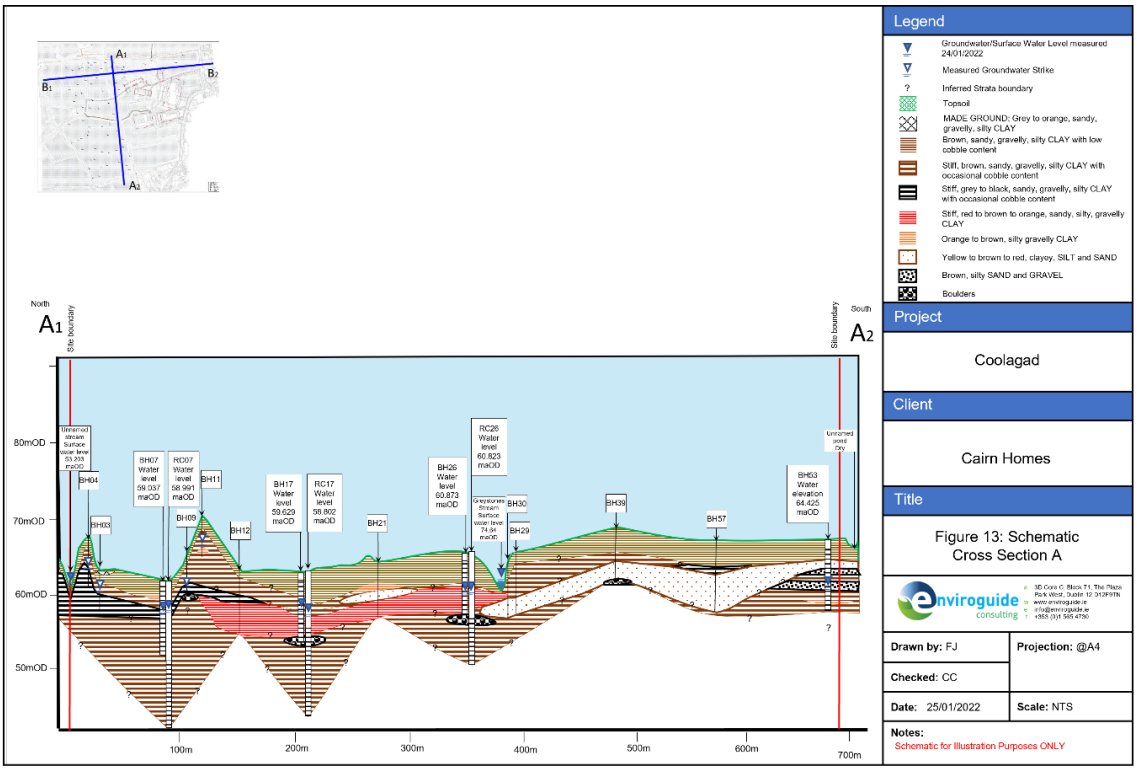

Figure 7-7 Geological Cross- Sections (West to East at the North of Site)

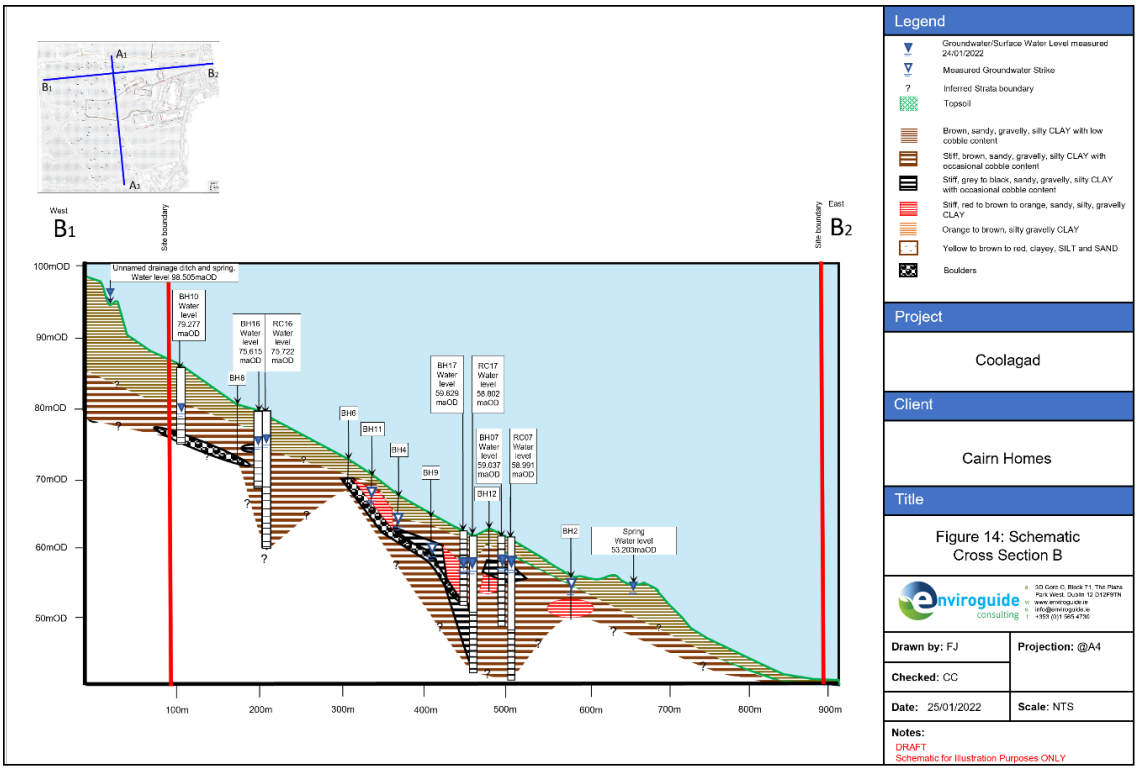

Figure 7-8 Geological Cross- Sections (North to South at the East of Site)

7.4.6.2 Groundwater Levels

Groundwater level data measured at groundwater monitoring wells installed at the Site was used to determine groundwater elevations relative to ordnance datum and the inferred groundwater flow direction. Recorded groundwater levels and elevations for the Site are provided in the tables in the Hydrogeological Assessment Report (Enviroguide, 2022a - refer to Appendix 7A).

Groundwater was encountered at depths of less than 5m below ground level (mbGL)during drilling Measured groundwater levels for the period August to October 2021 ranged between 4.81mbTOC (below top of casing) (BH07) and 9.7mbTOC (RC26). Groundwater levels measured in January 2022 at these locations were 2.89mbTOC (BH07) and 5.53mbTOC (RC26). A seasonal variance in groundwater levels between the August to October 2021 period and January 2022 at specific monitoring locations ranging up to 4.955m (BH28) has been recorded at monitoring wells installed at the Site. The EPA (December 2021) has reported that the groundwater levels recorded for December 2021 are seasonally low particularly in the east of the country. Therefore, it is possible that the January 2022 levels are not indicative of wet season levels.

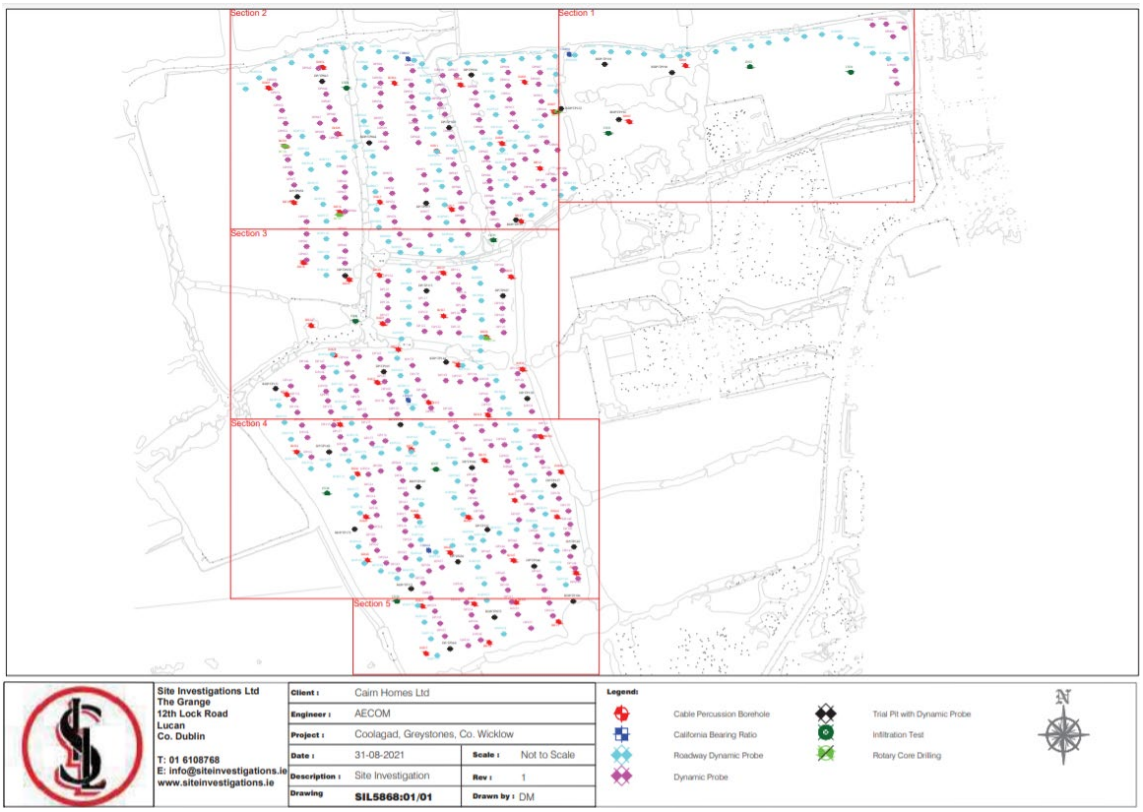

Figure 7-9 Site Investigation Borehole Locations (Refer to Appendix 7A)

7.4.7 Aquifer Classification

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

The bedrock of the Bray Head and Devils Glen Formations beneath the Site is classified as a Poor Aquifer (Pl) (i.e., bedrock which is generally unproductive except for Local Zones) (GSI, 2022).

The bedrock aquifer map is presented in Figure 7-10.

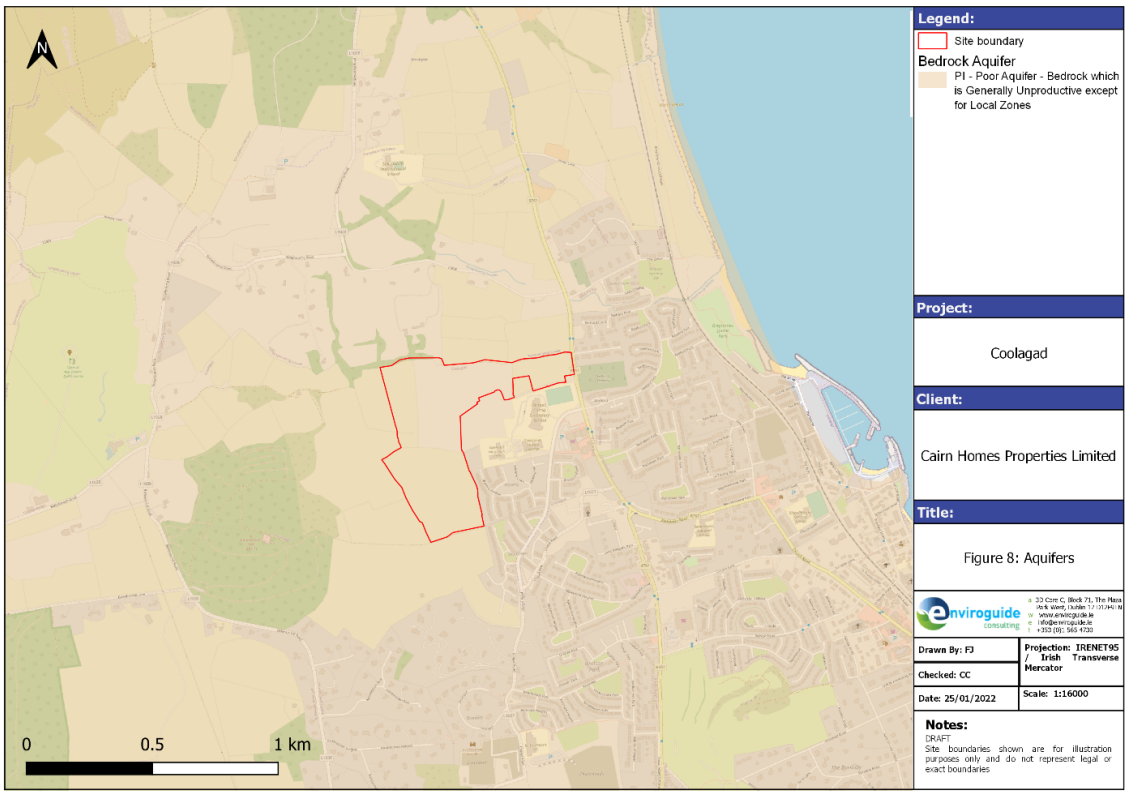

Figure 7-10 Bedrock Aquifer Classification

7.4.8 Aquifer Vulnerability Rating

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

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

The criteria outlined in the Groundwater Protection Schemes document are provided in Table 7-5.

Table 7-5: Vulnerability Mapping Criteria (DoELG; EPA; GSI, 1999)

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability & Type				
	High permeability (sand & gravel)	Moderate permeability (sandy subsoil)	Low permeability (clayey subsoil, clay, peat)	(Swallow holes, losing streams)	(sand & gravel aquifers *only*)
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High
Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.					

The GSI has assigned a groundwater vulnerability rating of "Moderate" (M) for the groundwater beneath the majority of the Proposed Development Site while a portion towards the western site boundary has been assigned a vulnerability rating of "High" (H) (GSI, 202).

Bedrock was not encountered beneath the Site in the 20mbGL where boreholes were drilled. The site investigation identified lower permeability overburden including clay with sand horizons was encountered to 20m and groundwater strikes were encountered within the overburden at depths ranging from 3mbGL (ie 3-5m range) with groundwater levels at depths of less than 3mbGL in January 2022. Therefore, based on Site data the groundwater vulnerability rating could be considered as high to extreme. The GSI Groundwater Vulnerability Map is presented in Figure 7-11.

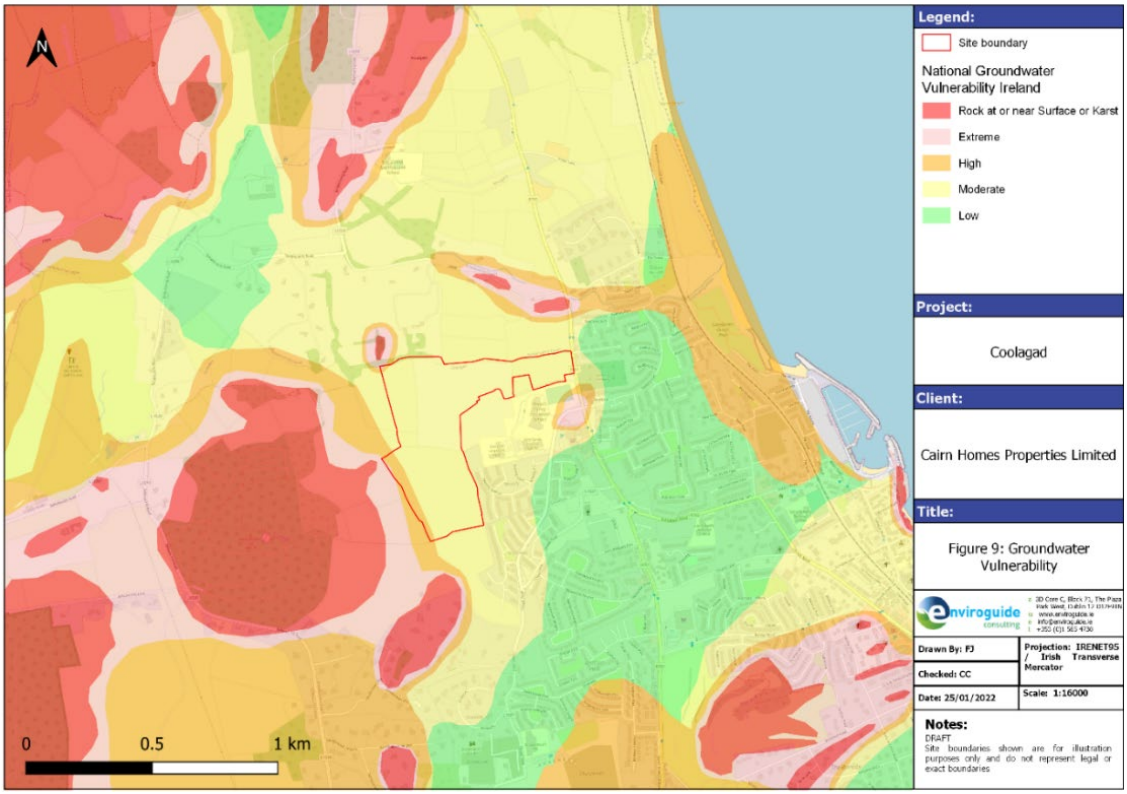

Figure 7-11: Groundwater Vulnerability

7.4.9 Recharge

The GSI groundwater recharge map provides an estimate of the average amount of rainwater that can potentially percolates down through the subsoils to the water table over a year. The map accounts for rainfall that percolates diffusely through soils and subsoils but does not take into account water that enters aquifers at points (e.g. at sinkholes) or along linear features (e.g. along sinking streams/rivers). Groundwater recharge amounts are estimated by considering soil drainage, subsoil permeability, thickness and type, the ability of the aquifer to accept the recharge, and the Met Éireann 30-year average rainfall and actual evapotranspiration for the period 1971-2000.

The GSI (GSI, 2022) has calculated an ER value of 575mm/year and a recharge coefficient of 15% for the area where the Proposed Development Site is located.

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 as the bedrock is considered to be poor aquifers with low storativity. In addition, the steep slopes in the area will increase surface runoff. Therefore the rapid runoff component to streams will be higher.

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

7.4.10 Surface Water Quality

There are a number of EPA monitoring stations located on the water courses in the immediate vicinity of the Proposed Development Site however there are 'not on a published monitoring programme' (EPA, 2022a).

Surface water monitoring was undertaken as part of the site investigation works (SIL, 2021) and samples were collected on the 14th September 2021 from surface water courses onsite and offsite. Sample locations are identified in Figure 7-12 and analytical results are provided in Appendix 7A.

The surface water analytical results were screened against the applicable Environmental Objectives Regulations (refer to tables provided in the Hydrogeological Assessment of the report Appendix 7A) and summarised in Table 7-6.

- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and as amended by S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019 (SW EQS).

Table 7-6 Surface Water Analytical Results (Refer to Appendix 7A)

Parameter	*European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 and amendments*		SW01 (Greystones Stream)	SW03 (Spring, unnamed stream)	SW05 (Kilruddery Deerpark Stream)
	AA-EQS Inland Surface Waters	*MAC-EQS Inland Surface Waters*	14/09/2021	14/09/2021	14/09/2021
			210920-38	210920-38	210920-38
Laboratory measured					
Ammoniacal Nitrogen as N mg/l	High status <= 0.04 (mean)or <=0.090 (95%ile) or Good status <= 0.065 (mean) or <= 0.14 (95%ile)		<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH3 mg/l	--	--	<0.2	<0.2	<0.2
Nitrate as NO3 mg/l	--	--	19.2	16.7	9.45
Ortho-Phosphate as mg/l PO4	--	--	0.156	0.058	0.072
Ortho-Phosphate as P (results by calculation*) mg /l P	High status <= 0.025 (mean) or <= 0.045 (%ile) or Good status <= 0.035 (mean) or <= 0.075 (95%ile)		*0.051*	0.019	0.023

The analytical results for all three samples (SW01, SW03 and SW05) were generally within the respective SW EQS limits including ammonia however, elevated orthophosphate results were reported for all three samples. The highest concentration of ortho-phosphate was reported for SW01 (0.051 mg/l P) that exceeded the located upstream on the Greystones Stream which has a catchment offsite including the eastern slopes of Kindlestown Hill.

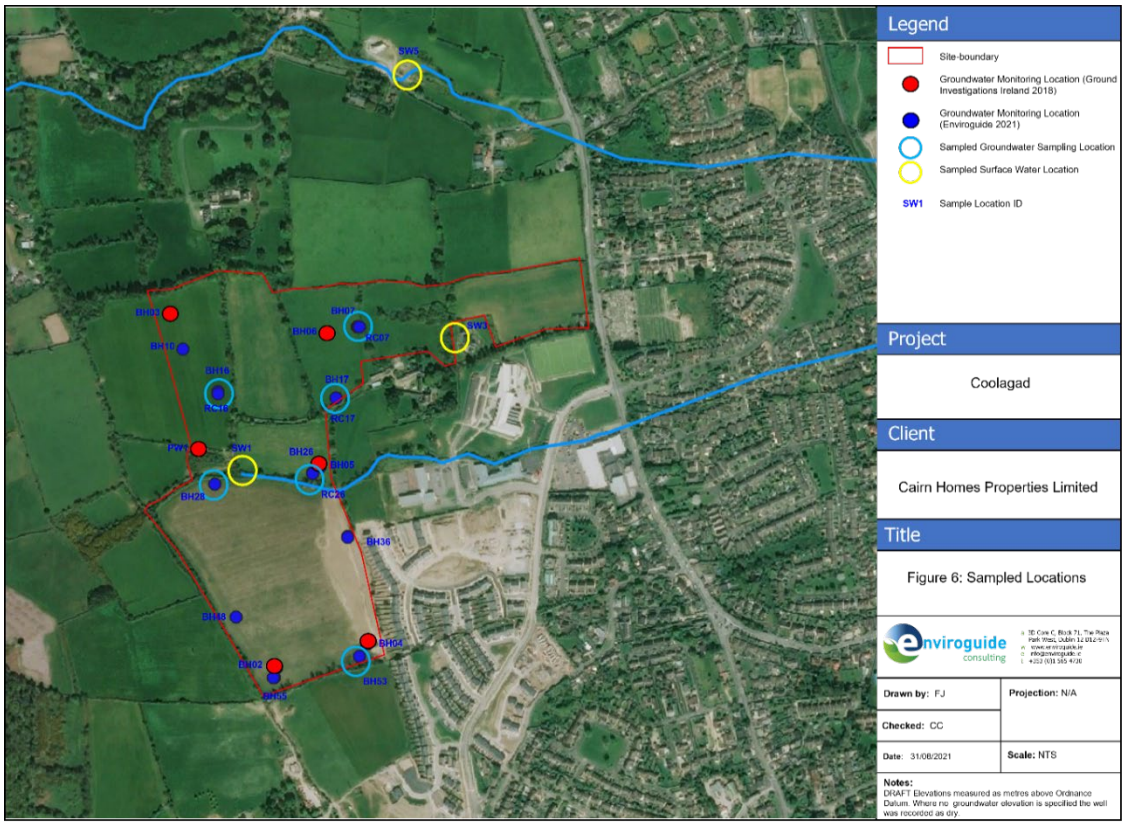

Figure 7-12 Groundwater and Surface Water monitoring Locations

7.4.11 Groundwater Quality

Groundwater monitoring and sampling was undertaken at the Site as part of the site investigation and samples were collected on the 14th September 2021. Sample locations are shown on Figure 7-12. The laboratory analytical results are included in the documents provided in Appendix 7A.

Groundwater quality results were screened against the following assessment criteria and results are summarised in Table 7-7:

- SI. No. 122/2014 - European Union (Drinking Water) Regulations 2014 including amendments S.I. No. 464/2017 (DW PVs);
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and amendment S.I. No.366/2016 (GW GTVs); and
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and as amended by S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019 (SW EQS).

An exceedance of the GW GTV for ammoniacal nitrogen was recorded for the sample collected from BH28, all other analytical result were below relevant criteria set out in the Environmental Objectives Regulations. The identified elevations of orthophosphate in surface water and ammoniacal nitrogen in groundwater are attributed to agricultural landuse in the catchment and considered to be baseline Site conditions

Table 7-7 Groundwater Analytical Results (Refer to Appendix 7A)

Analytical Parameter	Regulations (S.I. No. 9 of 2010 and amendments (GW GTVs)	SI. No. 122/2015 - European Union (Drinking water Regulations 2014 (DW PVs)	BH07	BH16	BH17	BH28	BH53	RC07	RC16	RC17	RC26
Ortho-Phosphate as PO4 mg/l	0.11	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ortho-Phosphate as P mg/l	0.035	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate as NO3 mg/l	50	50	6.55	6.76	0.62	7.01	27.7	16.9	18	15.8	17.6
Ammoniacal Nitrogen as N	0.065-0.175	--	<0.2	<0.2	<0.2	*1.08*	<0.2	<0.2	<0.2	<0.2	<0.2

7.4.12 Groundwater Use and Source Protection

A search of the GSI groundwater well database was conducted to identify registered wells and groundwater sources in the surrounding area. There are a total of twenty-two (22 No.) groundwater sources recorded within a 2km radius of the Site (GSI, 2022) as detailed in Figure 7-13 . There is also a groundwater source (PW1 identified on Figure 7-12) near the western boundary of the Site that is used to supply the existing farm and dwelling located to the east of the Proposed development Site.

There are no groundwater source protection areas identified within 2km of the Site (GSI, 2022). The closest public water supply is the Roundwood Public Water Supply (PWS). This PWS is located approximately 12.8km southwest of the Proposed Development Site (GSI, 2022).

There are no identified groundwater sources located downgradient of the Proposed Development Site.

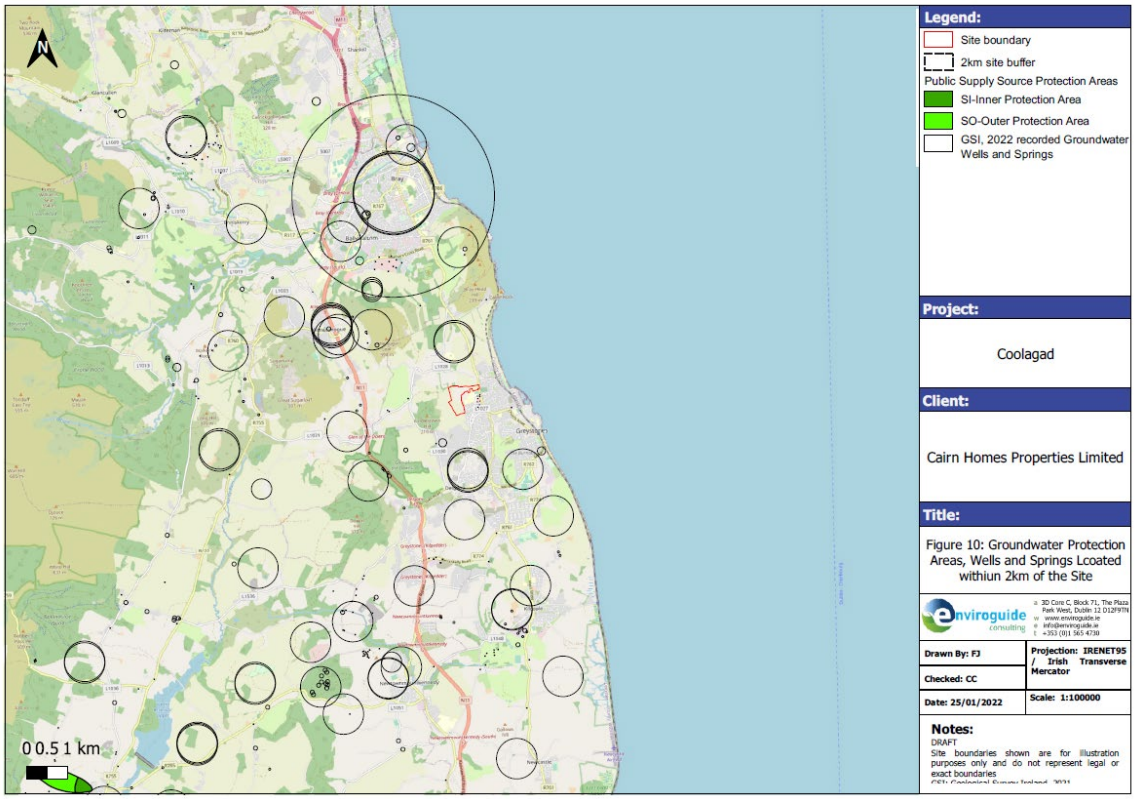

Figure 7-13: Groundwater Wells and Springs and Groundwater SPAs

7.4.13 Designated and Protected Sites

There designated and protected sites are assessed in Chapter 5 of this EIAR and the designated and protected Sites within 15km of the Site are presented Figure 7-14. (EPA, 2022b).

There is a potential hydraulic connection between the Site via Greystones Stream and the closest designated sites within the Irish Sea which are:

- Bray Head SAC located 0.7km northeast of the Site and the Greystones Stream discharges at the coast 0.4km south of the Bray Head SAC.
- Murrough SPA and Murrough Wetlands SAC located approximately 5km southeast.

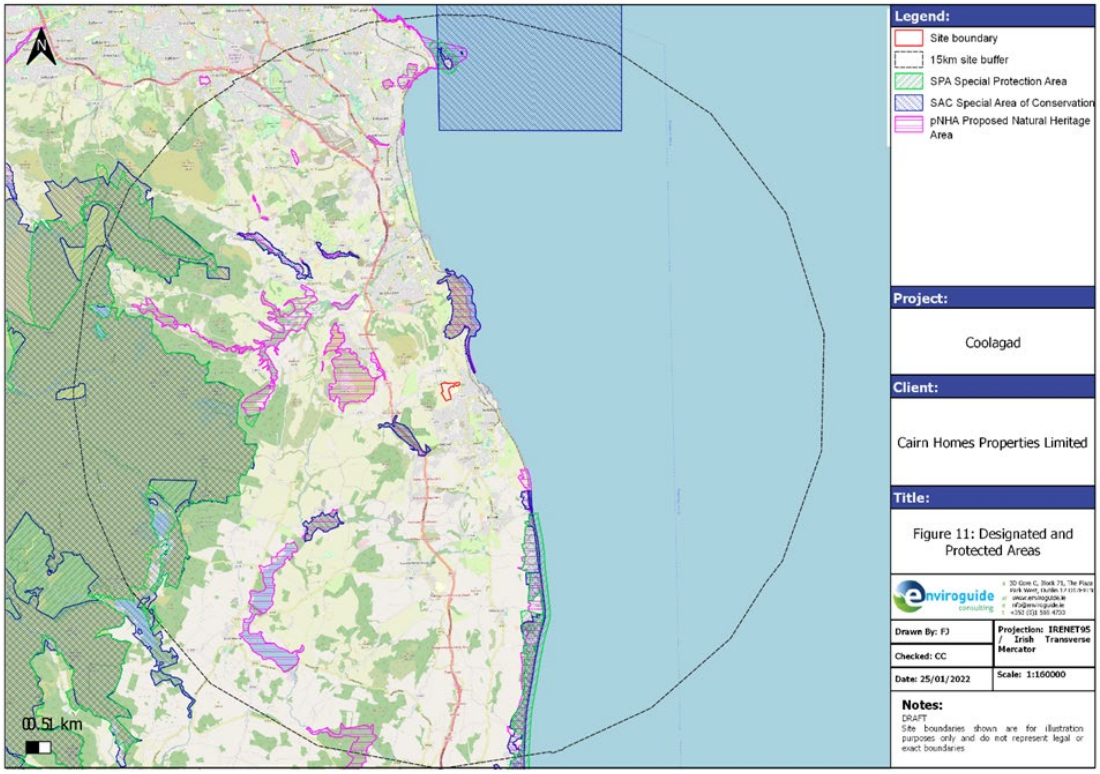

Figure 7-14: Designated and Protected Sites

7.4.14 Water Framework Directive Status

The Waterbody Status as recorded by the EPA (2022c) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) for river, groundwater and coastal water bodies located within a 2km radius and considered to have a potential hydraulic connection to the Proposed Development Site are listed in Table 7-8.

Table 7-8: WFD Risk and Water body Status

Waterbody Name	Water body; EU code	Location from Site	Distance from Site (km)	WFD water body status	Hydraulic Connection to the Site
Surface Water Bodies					
Greystone's Stream	IE_EA_10K52 0710	Within the Site	Within the site	Moderate	Within the Site
Kilruddery_ Deerpark Stream	IE_EA_10K52 0710	0.2 km	North		Downgradient of Site.
Coastal Water Bodies					
Southwestern Irish Sea – Killiney Bay	IE_EA_G_076	0.8 km	East	High	Downstream of the Greystone's Stream
Groundwater Bodies					
Wicklow Groundwater Body	IE_EA_G_076	Within the Site	Within the site	Good	Underlying groundwater-body

7.4.15 Flood Risk Assessment

The OPW national flood hazard mapping (NFHM) data base was consulted (OPW, 2021) and the available data maps the majority of the Proposed Development Site with an annual exceedance probability (AEP) of less than 0.1%., with a small portion of the Site along the Greystone Stream at the Site with an AEP of 0.1%.

A Flood Risk Assessment Report has been produced (AECOM 2022a) for the Proposed Development. The CFRAM Flood Maps include 0.1%AEP fluvial flood levels for the stream within the Site which are 2.10m below lowest Site levels and therefore the Site is considered not at risk of fluvial flooding. The Infrastructure Report (AECOM 2022a) notes that Wicklow Co. Co. identified that surface runoff and spring discharges are conveyed to the culverts piped through Redford Park and Rathdown Park and that the culvert is at limited capacity and poor construction resulting in flooding at Redford Park.

The flood risk assessment prepared by AECOM (AECOM, 2022a) for the Proposed Development concludes that the proposed surface water drainage and SuDS strategy will mitigate any flood potential for the Site and elsewhere. The report identifies the proposed interception drain along the western boundary of the Site will intercept and divert any runoff from the Kindlestown Hill area and will be discharged to the existing water courses at controlled rates to avoid any flooding downstream.

There are no recorded historic groundwater flood events recorded at or within 2km of the Proposed Development Site (GSI, 2022) however it is noted that the groundwater flood historical and predictive maps are only available for limestone regions, the Site is not however within a limestone region.

Groundwater emergence at ground surface has been identified as springs at the Site that discharge to the streams including the ditch at the northern Site boundary and a spring that discharges to the wetland area in the central area of the north of the Site. The Greystones Stream has been identified to capture surface water runoff from the area to the west of the Site. Seasonal groundwater fluctuations of up to 4.955m have been recorded and winter groundwater levels (January 2022) have been reported as 1.17mbTOC (BH06) to 2.02mTOC(BH28).

7.5 Conceptual Hydrogeological Model

7.5.1 Regional Hydrogeology

The bedrock aquifer beneath the Site is within the Wicklow GWB (EU Code: IE_EA_G_076). The Wicklow GWB covers some 1396km2 and occupies an area across Co. Dublin, Co. Wicklow and Co. Wexford (GSI, 2021).

Recharge in the vicinity of the Proposed Development is described as being diffuse through overlying tills into the aquifer. The Proposed Development Site is underlain by a poor aquifer which is generally unproductive except for local zones (Pl) which indicates a lower capacity of the aquifer beneath the Proposed Development Site to accept recharge via infiltration of rainfall.

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

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

7.5.2 Site Hydrogeology

The local watershed is the Kindlestown Hill to the west of the Site and surface water and groundwater flow is towards the east.

The bedrock aquifer in the Wicklow GWB has limited capacity to accept recharge (GSI, 2021) and bedrock was not encountered in boreholes drilled to 20m at the Site (SIL, 2021). Overland flow, infiltration to ground and groundwater flow through more permeable soils rather than bedrock are the dominant mechanisms for transport of water through the Site. The potential for infiltration and groundwater flow are limited where lower permeability soils are present.

Measured groundwater levels for the period August to October 2021 ranged between 4.81mbTOC(below top of casing) (BH07) and 9.7mbTOC (RC26). Groundwater levels measured in January 2022 at these locations were 2.89mbTOC (BH07) and 5.53mbTOC (RC26). A seasonal variance in groundwater levels between the August to October 2021 period and January 2022 at specific monitoring locations ranging up to 4.955m (BH28) has been recorded at monitoring

wells installed at the Site. The EPA (December 2021) has reported that the groundwater levels recorded for December 2021 are seasonally low particularly in the east of the country. Therefore it is possible that the January 2022 levels are not indicative of wet season levels.

Overburden at the Site is laterally and vertically heterogeneous comprising of lower permeability clay with localised sand lamination and more permeable deposits of sand and gravel in the upper 5-7m below ground surface. The potential for infiltration is limited due to the presence of clays and occurs where more permeable sand and gravels are present close at the ground surface. As a result of the heterogenic geology there are multiple groundwater flow paths of within the subsurface at the Site with both lateral flow to the east and vertical upwards and downwards flow. The sand horizons that were dry during site investigation potentially become saturated during wetter periods with resultant shallower groundwater flow and possible spring emergence.

The horizontal groundwater flux has been quantified based on site investigation data as 7.1m^3/day across the Site which represents a significant quantity of water noting that this is considered to be within preferential flow within subsurface sand horizons.

Where permeable soils occur near surface, the upwards flow component results in groundwater emergence at ground surface as springs and seepages including the persistent springs in the northeast and to northwest of the Site which are the sources of the surface water wetland and streams at the northeast and northern boundaries respectively. The source of the Greystones stream is predominantly surface runoff from the Kindlestown Hill catchment to the west of the Site, however, may have a component of groundwater source from intermittent spring seeps.

Groundwater flow paths within the Wicklow GWB are reported to be on a local scale. Groundwater beneath the Site potentially has a shorter residence time in the subsurface and shallow groundwater may respond more quickly to recharge based on the findings of hydrochemical assessment (Enviroguide Consulting, 2022).

Water quality data at the Site indicates influences of the agricultural landuses within catchment with elevated ammoniacal nitrogen in groundwater and orthophosphate in surface water.

It is noted that there were only a limited number of groundwater monitoring wells that were installed in 2018 available for monitoring during wetter seasons and the more extensive network of monitoring wells were installed in 2021. However, within the available timeframe for the assessment the groundwater level measurements were predominantly collected during dry weather with winter water levels measured in January 2022.

7.5.3 Importance of Hydrogeological Features

In accordance with the criteria outlined in Table 7-2 and taking account of the hydrogeological site setting, the attributes are considered to be of 'low' importance based on the classification as a Poor bedrock Aquifer and limited resource potential.

7.5.4 Summary of the Baseline Environment

The sensitivity of the surface water environment receptors was assessed on completion of the desk study and baseline study. Levels of sensitivity which are defined in Table 7-9 were then used to assess the potential effect that the Proposed Development may have on them.

Table 7-9: Sensitivity of surface Water Receptor (Modified after SEPA, EA and EPA)

Sensitivity of Receptor	Details
Not sensitive	Receptor is of low environmental importance (e.g. surface water quality classified by EPA as A3 waters or seriously polluted), fish sporadically present or restricted). Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability "Low" – "Medium" classification and "Poor" aquifer importance.
Sensitive	Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability "High" classification and "Locally" important aquifer.
Very sensitive	Receptor is of high environmental importance or of national or international value i.e. NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water supply. GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer

The GSI has classified the bedrock of the Bray Head Formation and the Devils Glen Formation a Poor Aquifer (PI) which is generally unproductive except for local zones. A vulnerability rating of "Moderate" (M) has been assigned for the groundwater beneath the majority of the Proposed Development Site while a portion towards the western site boundary has been assigned a vulnerability rating of "High" (H). Water quality at the Site is considered to be representative of a greenfield site within an agricultural catchment. The overall hydrogeological attributes at the Site would eb considered to be of 'Low' importance.

7.6 Impact Assessment

The procedure for determination of potential impacts on the receiving hydrological and hydrogeological environment is to identify potential receptors within the Site boundary and surrounding environment and use the information gathered during the desk study and site walkover to assess the degree to which these receptors will be impacted upon in the absence of mitigation. Impacts are described in terms of quality, significance, duration and type.

7.6.1 Construction Phase

7.6.1.1 Dewatering Works and Groundwater Flow

Groundwater may be encountered during the construction works for the cut sections and basement construction along the western parts of the Site (see Figure 7-15; Refer to Figure 6-1 in Appendix7A). Where water must be pumped from the excavations, water will be managed through robust dewatering and water treatment methodologies to be designed by the contractor.

Appropriate construction measures to enable working in the dry for basement construction and bulk excavations may be required, and methods to minimise the volume of dewatering water generated that will require management will be considered in the detailed design and the contractor's construction method. It is considered that there will be a temporary drawdown of local groundwater levels during any required dewatering operations taking account of the proposed levels and measured groundwater levels. A robust dewatering strategy will be developed by the contractor to ensure the zone of influence of any dewatering will be within the work areas to avoid any impact on groundwater flows in the spring fed streams at the Site and for any associated habitats and receptors. Therefore, the potential impact on the groundwater levels and flow regime associated with the works will be 'negative', 'slight' and 'temporary'.

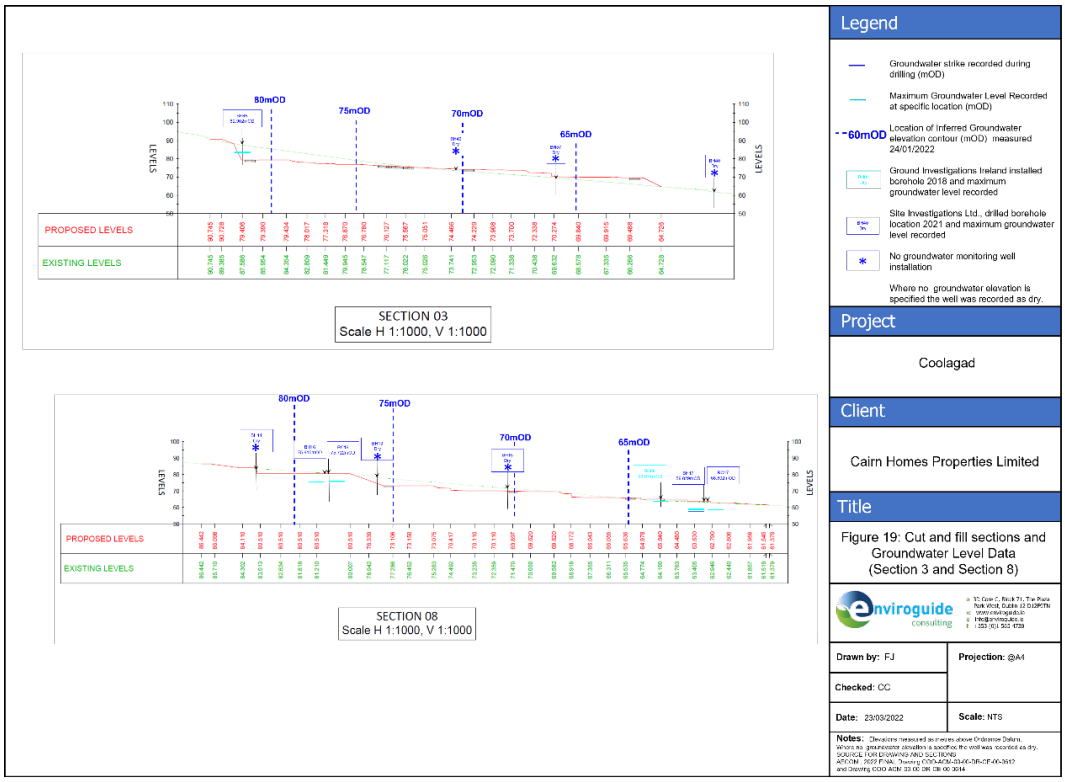

Figure 7-15: Groundwater levels and proposed site levels (refer to Appendix 7A)

7.6.1.2 Excavation and Removal of Soil

All surplus materials that will require removal offsite will be removed in accordance with the requirements and recommendations outlined in the Outline Construction and Demolition Waste Management Plan (referred to hereafter as CDWMP) (Enviroguide Consulting, 2022) the Outline Construction Environmental Management Plan (referred to hereafter as CEMP) (AECOM, 2022), and managed in accordance with all statutory obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27). Any surplus soil not suitable for re-use as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities.

As only authorised destination sites or facilities will be used, the potential impacts on the receiving water environment will have been adequately assessed and mitigated as part of the statutory consent procedures. Accordingly, it is considered that offsite removal of surplus soil will have an 'indirect' 'neutral', 'imperceptible' 'long-term' impact on the receiving sites and facilities. In the unlikely event that surplus soil is directed to an unauthorised disposal site there is potential to impact on the receiving hydrogeology at that location. As the soil at the Site is greenfield soil in the event of such a scenario it is considered that this could result in a 'negative', 'slight to moderate' and 'medium-term' impact on the hydrogeology at any receiving unauthorised sites. Appropriate controls will be in place to prevent this unlikely scenario.

The transport of material offsite, if not appropriately managed, could result in sediment and debris being tracked offsite on trucks and other site vehicles. There is a possibility of impact for water courses at offsite locations in the immediate vicinity of the Site (i.e. Kilruddery Deerpark Stream) that may be impacted in the event that sediment tracked from the Site is entrained in road runoff to water courses. It is considered that this could result in a 'negative', 'slight to moderate' and 'medium-term' impact on the receiving watercourse. Appropriate controls will be in place to prevent this unlikely scenario.

7.6.1.3 Works Near Water Courses

The proposed wetland and stream area and the crossings of the Greystones Stream will require near stream works. There is no requirement for instream works.

The design for stream crossings (bridge) includes the use of pre-fabricated structures thereby reducing the risk of any direct impact to water quality in the streams associated with onsite fabrication and construction in-situ. There may be a requirement for concrete pours and the use of cementitious materials during the installation and construction the footings for these structures and while this will take place on the banks, there is a potential risk to the receiving water quality associated with works near watercourses. The use of cementitious materials is assessed in section 7.6.1.4.

A 10m buffer is to be retained on either side of any watercourses, with the exception of the localised points where works for the construction of crossings of watercourses is necessary. The proposed design for the construction of stream crossing does not require temporary diversions of water courses. There is the potential for some disturbance of the stream banks and increased suspended solids content of the water downstream of the works area. This may result in a 'negative', 'moderate', 'short to medium-term' impact on the quality of the receiving surface water bodies including downstream of the Site and locally at the discharge point to the Irish Sea.

7.6.1.4 Concrete Works and Use of Cementitious Materials

There is a potential risk associated with the cementitious materials used during construction works including piling, foundations, basement construction, stream crossings, pavements and other structures to impact on water quality.

Groundwater may be encountered during works requiring the use of cementitious materials including the construction and basements and other subsurface structures including foundations and piling which may require driven piles, bored piles or other depending on the detailed design requirements and construction method determined by the contractor. As groundwater has been identified to have a high to extreme groundwater vulnerability at the Site and groundwater may be exposed or encountered during groundworks there is a potential risk of impact to groundwater quality.

Concrete works adjoining water courses could also result in the impact of water quality in the event of a spill during concrete pours, however pre-cast and pre-fabricated structures will be used were feasible and considered in the detailed design

Overall, the use of cementitious material at the Proposed Development Site may result in a 'negative', 'significant' and 'medium-term' impact on the receiving water environment including surface water and groundwater quality.

7.6.1.5 Water Management and Water Quality

Groundwater dewatering will be required during the bulk excavation for the basement construction. There will be no direct discharge of dewatering water to water courses. Uncontaminated However, there is a potential risk of accidental release of untreated water containing suspended sediments during dewatering to with potential impacts on the receiving water environment (e.g. a breakdown of the temporary treatment system).

If the accidental release of hazardous material including fuels, chemicals and materials being used on-site, through the failure of secondary containment or a materials handling accident on the Proposed Development Site, were to occur over open ground which will result in a temporary increase in groundwater vulnerability to potential contaminants, then these materials could infiltrate to the underlying groundwater.

Where piling is required, there is a potential to introduce a direct conduit for potential contaminant migration to the subsurface and groundwater. In the worst case scenario drilling fluids used during piling could potentially be introduced to the subsurface and groundwater.

If an accidental release occurred from plant or equipment during the instream works, there would be a worst-case scenario impact on the receiving water quality associated with a direct release to the water course.

In the event of such worst case scenarios occurring it is considered that this could result in a 'negative', 'significant', 'long term' impact on the quality of the receiving water course depending on the nature of the incident.

7.6.1.6 Importation of Soil and Aggregates

Aggregates will be required during the Construction Phase of the Proposed Development that will include aggregates to be used temporarily during construction as piling mats, haul roads and set down areas. Aggregates will also be required as construction materials and fill to in accordance with the specification design.

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

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

7.6.1.7 Water Framework Directive

There are identified potential impacts on water quality identified for the Construction Phase of the in the absence of any ameliorative, remedial and reductive measures that could impact on the Water Framework Directive (WFD) Status of receiving water bodies.

The potential impact on WFD Status for water bodies was assessed taking account of the baseline hydrological and hydrogeological conditions at the Site the WFD Status assigned by the EPA (EPA, 2022a) to the water bodies namely the Greystones Stream and Kilruddery_Deerpark Stream surface water bodies, the Irish Sea coastal water body and the Wicklow Groundwater body.

For the Good and Moderate status water bodies, there could be a potential 'negative', significant', 'long term' impact to the WFD status of the surface water and groundwater bodies. Taking account of the potential for assimilation within the coastal water body and the size of the waterbody, there could be a potential 'negative', slight to moderate', 'short-term' impact to WFD status of the coastal water body.

7.6.2 Operational Phase

7.6.2.1 Water Quality

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

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

There will be no discharges to ground from drainage and only rainfall on public open spaces will infiltrate to ground.

All drainage from paved areas along roads and impermeable roads will be collected and managed within the surface water drainage and SuDS solutions as outlined in the Infrastructure Report (AECOM, 2022b).

The surface water management strategy includes a number of measures that will capture any potentially contaminating compounds (petroleum hydrocarbons, metals, and suspended sediments) in surface water runoff the higher risk areas including roads and the impermeable areas that could potentially otherwise discharge to groundwater or the water courses within the Site and adjoining. The measures incorporated in the SuDS design include, swales, bio-retention, storage pond and filter drains within the drainage and SuDS system. The filter drains, swales and

bio-retention areas will be effective in treating and removal of any contaminants (metals, polycyclic aromatic hydrocarbons (PAHs) and suspended solids) entrained in surface water runoff, the effectiveness of these SuDS measures is documented in TII guidance (TII,2014). The Proposed Development also includes a by-pass interceptor that will be effective in removal of hydrocarbons that may enter the drainage system in particular in the event of worst case scenario spill incident (e.g. collision on the roadway resulting in the loss of fuel form a vehicle).

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

All foul water will be directed to foul sewer mains in accordance with agreement from IW. All below ground drainage infrastructure will be constructed in accordance with Irish Water Code of Practice for Wastewater Infrastructure (Irish Water, 2020) as specified in the Infrastructure Report (AECOM, 2022b). Therefore, preventing any potential leakage of foul effluent to ground. The AECOM report notes that a Confirmation of Feasibility was received from Irish Water (dated 7th December 2020) that the connection was feasible subject to improvements to the network and the details for a new foul line along the R761 are included in the AECOM report. The mains foul sewer is ultimately discharged to the Irish Sea following treatment at Greystones WWTP. The WWTP operates under existing statutory consents and the most recent available data in the 2020 AER verifies that discharges from the WWTP were compliant. Foul water from the Proposed Development will only be discharged to public sewer under agreement from Irish water and other applicable statutory consents verifying capacity at the WWTP for the Proposed Development. Therefore, on the basis that the foul effluent from the Proposed Development will be treated to the required standard in accordance with relevant statutory consents there will be no impacts including cumulative, on the receiving water environment associated with foul effluent discharges from the Proposed Development.

Overall, the foul and surface water drainage incorporating the SuDS proposals for the Proposed Development will result in an overall 'neutral', 'imperceptible' 'long-term' impact on receiving surface water quality and groundwater quality and associated receptors compared to the baseline conditions.

7.6.2.2 Water Framework Directive

There are identified potential impacts on water quality identified for the Construction Phase of the in the absence of any ameliorative, remedial and reductive measures that could impact on the WFD Status of receiving water bodies. The potential impacts for the Operational Phase on WFD Status are for a worst-case scenario the same as those outlined for the Construction Phase.

7.6.2.3 Drainage and Flood Risk

The Flood Risk Assessment Report for the Proposed Development (AECOM 2022a) identified that as Site levels are 2.10m below the CFRAM 0.1%AEP fluvial flood levels for the stream within the Site the Site is considered not at risk of fluvial flooding.

The flood risk assessment prepared by AECOM (AECOM, 2022a) for the Proposed Development Site concluded that the proposed surface water and SuDS strategy including the proposed interception drainage required along the western boundary to intercept water from the Kindlestown Hill of will mitigate flood potential at the Site. The cut off ditch along the western boundary is proposed to intercept any over land flows that may be generated from higher up the slope to the west and which could potentially constitute a flood risk to the development.

The water collected will be discharged to the existing stream at controlled rates to avoid increased discharge rates that could cause flooding downstream.

The Infrastructure Report notes that the proposed surface water drainage network has been designed with particular attention to the flood exceedance routes, with the water being directed away from buildings. Water will follow the fall along the road infrastructure prior to being collected by road gullies or prior to draining to the proposed green open space. Where low points exist along the road infrastructure, double gullies will be provided to minimise the risk of water ponding.

AECOM have modelled the proposed on-site surface water drainage network in order to ensure that the discharge will be restricted to the associated greenfield runoff rate and that sufficient attenuation storage will be provided to achieve this. The proposed attenuation systems' storage capacity and related flow control devices are to ensure no flooding occurs for the 1 in 100-year event plus 20% climate change allowance (AECOM, 2022b).

Groundwater emergence at ground surface has been identified as springs at the Site that discharge to the streams including the ditch along the northern Site boundary and a spring that discharges to the wetland area in the central area of the north of the Site. The Greystones Stream is primarily recharged from surface runoff rather than groundwater. The potential interception of groundwater during construction of the basement and at other cut areas will be managed with appropriate groundwater interception drainage as outlined in the Hydrogeological Assessment Report (Enviroguide Consulting, 2022) and will be determined as part of the detailed design.

The Flood Risk Assessment Report for the Proposed Development (AECOM 2022a) concluded that the subject site is located with Flood Zone C. Accordingly taking account of the design proposals the potential impact of flooding associated with the Proposed Development result in an overall 'neutral', 'imperceptible' 'long-term' on the Proposed Development and elsewhere.

7.6.2.4 Groundwater Flow Regime

There will be no groundwater abstractions for the Operational Phase of the Proposed Development. The existing groundwater supply well to the offsite farm will be decommissioned.

The basement which will be water-tight and impermeable will be constructed with FFL between 80.5mOD – 82.4mOD that will potentially intersection seasonally high groundwater levels (85.896mOD at BH03 in January 2022 – Refer to Figure 7-15). The basement and other subsurface structures could impede groundwater flow in that localised portion of the Site with groundwater mounding occurring locally upgradient of the basement. The potential for piles to impeded groundwater flow is considered to be negligible, however where piled walls may be required there is a potential for local mounding to occur. Given the presence of preferential flow paths associated with sand horizons within the subsoil it considered that groundwater will migrate around the structure. However, localised groundwater mounding would occur and result in issues associated with hydrostatic pressure including potential for buoyancy of structures and undermining due to development of preferential flow paths in the aquifer formation. The detailed design will include appropriate groundwater drainage around the basement or other structures (e.g. piles where required) to prevent impeding groundwater flow across the Site and this will would need to incorporate longer-term groundwater monitoring.

In addition, any groundwater interception drainage identified as necessary as part of the detailed design will be discharged to the surface water drainage network as discharge back to ground is not feasible (AECOM, 2022 and Enviroguide Consulting 2022). Similarly, interception

of groundwater may occur along the western boundary in deeper cut sections and will require diversion around the Site with discharge to the surface water streams. As the baseline conditions are for shallow groundwater beneath the Site to ultimately discharge as springs to local streams at the Site it is considered there will be no net impact on groundwater flow regime and the interaction with surface water downgradient of the Site.

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

7.7 Cumulative Impacts

The cumulative effects of the Proposed development on the hydrological and hydrogeological environment have been assessed taking other planned, existing and permitted developments in the surrounding area into account. All planning applications that have been granted and already developed have been incorporated into the baseline assessment of this application. A planning search revealed that there have been 2 No. recent (within the last five years) applications for Strategic Housing Developments in the vicinity of the Proposed Development Site which have been granted permission as detailed in Table 7-10 that could potentially be constructed at the same time as the Proposed Development.

Table 7-10 Recent applications granted permission in the vicinity of the Proposed Development

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

The potential impacts on water quality and quantity as well as potential impacts on WFD Status are assessed in Section 7.6 and it is considered that there are no other potential significant cumulative impacts associated with the Proposed Development and considered offsite permitted developments.

Any other potential cumulative impacts that may arise associated with permitted developments could occur through the connection to the same mains water supply and foul water network. Potential cumulative impacts on the water supply and foul water networks are assessed in Chapter 14.

It is noted that capacity within the existing foul sewer network serving the area including other permitted developments, to accept foul water from the Proposed Development has been confirmed by Irish Water (Confirmation of Feasibility dated 7th December 2020). The foul network and associated Greystones WWTP operates under existing statutory consents accordingly, there will be no cumulative impacts on the receiving water environment associated with foul discharges from the Proposed Development.

7.8 Ameliorative, Remedial or Reductive Measures

These proposed ameliorative, remedial and reductive measures will ensure that there will be no significant impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework

Directive, S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and as amended by S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019 (SW EQS) and S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and as amended by S.I. No. 149/2012 and S.I. No. 366/2016 (GW GTV).

7.8.1 Construction Phase

7.8.1.1 Control and Management of Water

There will be no direct discharges surface water during the Construction Phase.

Groundwater will be encountered during the construction works in particular the basement excavation and cut sections along the western boundary. All excavations will be encompassed by secant pile wall or other specified by the engineer or contractor around the basement excavation to allow dewatering and dry excavation. Robust dewatering methodologies will be developed as part of the detailed design minimise the potential impact on the local groundwater flow regime within the soil and subsoil associated receptors (e.g. springs, water courses and habitats) at the Site and to prevent any impact for habitats and receptors along Site boundaries and offsite that could arise from dewatering. This could include the requirement for discharge of groundwater downgradient of the dewatering works area to minimise any hydrogeological impact on sensitive receptors.

Surface water or groundwater from dewatering will not be directly discharged to water courses.

Discharge of groundwater to ground may be required as part of the dewatering methodology and will be undertaken in accordance with the EPA (2011) '*Guidance on the Authorisation of Discharges to Groundwater*'.

Where necessary the water will be treated onsite to remove sediment or other potentially contaminating compounds. The treated water will be tankered offsite or discharged to foul sewer only under licence from IW. Straw bales or silt fences will be appropriately located near water courses to help prevent untreated surface and surface water run-off entering any watercourse. A buffer zone of 10m will be maintained between the silt trap and the watercourse with natural vegetation left intact. The Contractor is to ensure that no contaminated water/liquids leave the Proposed Development Site (as surface water and surface water run-off or otherwise), enter the local drainage system or direct discharge drainage ditches or water courses or springs

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

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

Where water must be pumped from the excavations, water will be managed through robust dewatering and water treatment methodologies in accordance with best practice standards (Construction Industry Research and Information Association, 2016: Groundwater control: design and practice (CIRIA – 750)) and regulatory consents. Water will not be discharged to open water courses) and will be disposed via temporary connection to foul sewer or tinkered offsite

There will be no direct discharge of surface runoff or groundwater from the Proposed Development Site to surface water. Water from the works will be discharged into the public

sewer in accordance with the necessary consent from IW. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements.

A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer. The monitoring programme shall be designed by an appropriately qualified Environmental Consultant. Groundwater level monitoring prior to construction as part of the detailed design stage is recommended.

7.8.1.2 Management and Control of Works Adjoining Water Courses and Instream

All open water bodies adjacent to areas of proposed works will be protected by fencing including settlement ponds.

A 10m buffer is to be retained on either side of the Greystones Stream and the other streams, springs and water courses at the Proposed Development Site and construction works and site traffic will only be permitted within this 10m buffer to facilitate instream works to enable construction of the outfalls, culvert road crossing sections of the Greystones Stream.

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

If temporary crossings are to be constructed, they must be constructed to prevent any erosion of sediment of other potential contamination of surface water taking account of the following:

- The approach and departure routes to temporary crossing structures will be designed and installed so that drainage will fall away from the water course being crossed.
- Temporary crossing structures will be covered or fenced with terram or similar material to prevent wind blow carrying dusts and other potentially polluting matter to the water course.
- Side armour will be provided on temporary crossing structures to ensure machinery cannot drive over its edge, or force the discharge of material from the bridge deck to the water course.
- Temporary crossings will not be repositioned where these are not of a clear span.
- The creation of fords on rivers through the introduction of stone is prohibited and will not be undertaken.
- There must be no significant alteration to hydraulic flow within the water course.
- Instream machine works should be minimised, and any machines working in the watercourse must be protected against leakage or spillage of fuels, oils, greases and hydraulic fuels.
- Instream earthworks must be executed so as to minimise the suspension of solids.
- When cofferdams are being kept dry by pumping, the discharge must be routed to an approved settlement facility before return to the river.
- Every care must be taken to insure against spillage of concrete or leakage of cement grout within cofferdams.

7.8.1.3 Concrete Works

The use of cementitious grout used during the construction of the basement, piling, drainage and other infrastructure that could result in potential impacts on water quality will be avoided through appropriate design and construction methods that will be implemented by the appointed contractor. The construction methods used by the contractor in accordance with industry standards to prevent impact on groundwater and surface water quality such as the use of water compatible grout.

If cast-in-place concrete is required, all work must be carried out in dry conditions and be effectively isolated from any water courses or drainage ditches. Pouring of concrete for aprons, sills, and other works should be carried out in dry conditions and allowed cure for 48 hours before re-flooding. Pumped or tremied concrete should be monitored carefully to ensure no accidental discharge into the watercourses. Concrete works for in-stream works must be carried out in accordance with the procedures outlined in Section 7.8.1.2.

The foundation design including the requirement for raft, pad or strip or piled foundations will be determined at detailed design stage. The foundation design and detailed design for other structures (e.g. basement) that may come in contact with water in particular groundwater will include measures as part of the detailed design and contractors method to prevent any potential impact on water quality.

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

7.8.1.4 Importation of Soil and Aggregates

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

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

7.8.1.5 Stockpile Management

Stockpiled soil and stone materials pending removal offsite or reuse onsite will be located in in designated areas only and there will be no storage of materials within 10m of any surface water features/drainage ditches etc. Where necessary, stockpiles will be surrounded with silt fencing to filter out any suspended solids from surface water arising from these materials.

7.8.1.6 Handling of Fuels and Hazardous Materials

There will be no bulk storage of fuels, oils and other chemicals at the Site.

Storage areas for any fuel, oils and chemicals will be bunded and clearly marked. Fuel will only be stored in the quantities required for emergency use. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be

secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

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

- Bunds will have regard to Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
    - 110% of the capacity of the largest tank or drum within the bunded area; or
    - 25% of the total volume of substance that could be stored within the bunded area.
- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines including 'Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites' (EPA, 2013);
- Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and
- All staff on-site will be fully trained on the use of equipment to be used on-site.
- Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds.

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

A procedure will be drawn up which will be adhered to during refuelling of on-site vehicles. This will include the following:

- Fuel will be delivered to plant on-site by dedicated tanker to avoid the requirement for storage onsite;
- All deliveries to on-site vehicles will be supervised and records will be kept of delivery dates and volumes;

- The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
- Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and
- All re-fuelling will take place in a designated impermeable area. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area.

7.8.1.7 Boreholes and Piling

Existing site investigation boreholes/monitoring wells and supply wells (PW1) that are no longer required at the Site will be decommissioned in accordance with the specifications outlined in EPA Advice Noted 14 (EPA, 2013). This will remove any potential direct conduit for contaminants to enter the groundwater directly.

During piling including bored piles or driven, there is a potential to introduce surface contaminants (by pushing down through the strata) or provide a potential conduit to groundwater for contaminations including existing surface materials or drilling fluids used in piling.

The piling method will include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff or other piling/drilling fluids from entering the pile bores. Where there is a requirement to use lubricants, drilling fluids or additives the contractor will be required to use water-based, biodegradable and non-hazardous compounds.

7.8.1.9 Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations through either a temporary connection to mains foul sewer (subject to receipt of the relevant consent from IW) which will be constructed in accordance with IW and WCC guidelines or by 7-42inkering of waste offsite by an appropriately authorised contractor.

7.8.2 Operational Phase

The design for the basements will incorporate appropriate groundwater drainage design to prevent any issues associated with localised groundwater mounding and hydrostatic pressure or potential for groundwater ingress.

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures as specified the Infrastructure Report in accordance with CIRIA SuDS Manual C753 (AECOM, 2022b) which will be incorporated into the overall management strategy for the Proposed Development. This will ensure no impacts on water quality and quantity (flow regime) for the Operational Phase of the Proposed Development.

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

8.8.2.1 Human Health

No public health issues have been identified for the Construction Phase or Operational Phase of the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers in particular associated with the dewatering works and any instream works.

The existing water supply for the Proposed Development will be via connection to the public supply.

The only groundwater source in the vicinity of the Site is the supply well for the adjoining farm and dwelling which will be decommissioned, and an alternative supply provided with connection to the mains. There are no downgradient groundwater sources identified on the GSI database that would be potentially at risk in the unlikely event of any potential contamination arising at the Site receptors and therefore no potential human health issues associated with groundwater quality.

Human health is assessed in Chapter 4 of this EIAR.

7.8.3 Worst Case Scenario

The potential accidental release of hazardous material including fuels, at the Proposed Development Site could the potentially impact on the receiving surface water and groundwater environment and associated receptors (e.g. Natura 2000 site) would only occur through in the absence of any of the proposed design ameliorative, remedial or reductive measures such the failure of secondary containment or a major incident on the Site. However, taking account of the ameliorative, remedial and reductive measures of the Proposed Development to effectively prevent and manage such an incident any environmental harm would be avoided. There would therefore be a 'neutral', 'imperceptible' and 'short-term' impact on the receiving environment.

This worst case scenario is deemed to be unlikely to occur.

7.9 Residual Impacts (including worst case scenario)

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

The predicted impacts of the Construction and Operational Phases are described in Table 7-11 in terms of quality, significance, duration and type. The residual impacts are described taking account of the relevant ameliorative, remedial and reductive measures.

There are no significant residual impacts on water anticipated for the Proposed Development.

Table 7-11. Summary of Residual Impacts

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
Dewatering during basement construction and management of water	Temporary drawdown of local groundwater levels during dewatering required for bulk excavation and basement construction. Dewatering will be carried out following construction of the secant pile walls. However, the extent of the impact is considered to be localised to the immediate area surrounding the basement.	Negative	Slight	Temporary	Direct	Dewatering will be undertaken in accordance with robust dewatering strategy and requirements of the CEMP Discharge to ground that may be required and will be managed in accordance with EPA guidelines.	Imperceptible
Management of water quality including during dewatering	There will be no discharges to water courses. Water may be required to be discharged to ground in accordance with the robust dewatering strategy.	Negative	Moderate to significant	long-term	Direct	All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for handling, use and containment of fuels and other hazardous materials. Robust dewatering strategy will be implemented.	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Excavation and removal of surplus soil and potential impact of moving material to unauthorised destinations	Soil will be removed to an authorised (facility or under Article 27 Notification for appropriate re-use in accordance with all statutory obligations and consents. Control procedures will be in place to prevent the removal of materials to unauthorised offsite lands/sites/facilities.	Negative	Slight to moderate	Medium term	Indirect	Contract and procurement procedures will ensure compliance statutory obligations. All materials will be managed in accordance with the CDWMP for the Proposed Developments	Imperceptible
Excavation and removal of surplus soil and potential impact of transport to offsite water courses	Potential impact on offsite water courses associated with transport of materials from the Site including sediment from the site entrained in road runoff discharging to offsite streams (Kilruddery Deerpark Stream)	Negative	Slight to moderate	Medium term	Indirect	All materials will be managed in accordance with the CDWMP for the Proposed Developments. Transport of materials to and from the Site will be undertaken in accordance with measures set out in the CEMP for the Proposed Development to prevent debris being tracked onto roads.	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Instream works for the construction of crossings	Potential for disturbance of the stream bed and bank sediment resulting in an increased suspended solids content of the water.	Negative	Moderate	Short to medium term	Direct	All instream works or works carried out adjacent to the Greystones Stream will follow relevant guidelines published by Inland Fisheries Ireland (IFI) and The NRA (now Transport Infrastructure Ireland) regarding instream works and river crossings. A 10m buffer will be maintained around water coursed for any works other than necessary in-stream works. Stockpiles will not be stored within this 10m buffer and will be managed to prevent sediment in runoff.	Imperceptible
Use of cementitious materials.	Potential release of cementitious material during construction works for instream works, adjoining water courses and during groundworks (foundations, pavements	Negative	Significant	Medium-term	Direct	The cementitious materials used during construction will avoid any contamination of water through the use of appropriate design and methods implemented by the Contractor and in accordance with industry	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
	) to result in water quality impacts					standards and the CEMP for the works.	
Accidental release of deleterious materials including fuel and other materials being used on-site.	Potential (albeit low) for uncontrolled release of deleterious materials including fuels and other materials being used on-site, through the failure of secondary and tertiary containment or a materials handling accident, piling or other activity to the water environment.	Negative	Moderate to significant	long-term	Direct	All works will be carried out in accordance with a CEMP and in accordance with the detailed design specification that will take cognisance of the requirements for handling, use and containment of fuels and other hazardous materials.	Imperceptible
Import of required aggregates for the construction of the Proposed Development.	The potential impacts may include importation of unsuitable or contaminated materials	Negative	Moderate to significant	Long-term	Direct	Contract and procurement procedures will ensure that all imported aggregates meet with industry conformity/compliance standards and statutory obligations	Imperceptible
Construction Activities	WFD Status	Negative	significant	Long-term	Direct	The Construction Phase will be managed in accordance with a CEMP to be prepared by the contractor taking account to the identified minimum requirements set out in this EIAR chapter for	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
						ameliorative, remedial and reductive measures to prevent or limit any potential impact on water bodies and the associated WFD status	
Operational Phase							
Discharges of foul and surface water from the Site and potential impact on water quality.	There will be no adverse impact on water quality. All foul water will be discharge in accordance with requisite consents from Irish Water. Surface water runoff will be managed in accordance with SuDS and any entrained contaminants will be removed	Neutral	Imperceptible	Long-term	Direct	None Required	Imperceptible
Groundwater Flow Regime and Interaction with Surface Water	There will be no overall impact on the regional groundwater flow regime where basement and other structures intersect groundwater. Any impact will be within a localised	Negative	Slight to moderate	Long-term	Direct	Detailed groundwater drainage design will ensure that local groundwater flow across the site is maintained.	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
	zone immediately around the structure and no associated impact on stream flows where springs discharge to streams. There is no anticipated impact on regional groundwater flows.						
Drainage and SuDS	There is no identified flood risks at the Site or elsewhere taking account of the proposed drainage design and SUDS measures for the Site.	Neutral	Imperceptible	Long-term	Direct	None Required	Imperceptible

7.10 Do Nothing Scenario

In the 'Do Nothing' scenario it is considered that the Proposed Development did not proceed and the potential impact on the receiving hydrological and hydrogeological environment is considered.

If the Proposed Development did not proceed the Site would continue to be used as agricultural lands and current runoff to surface water courses and infiltration to ground would continue.

7.11 Monitoring

7.11.1 Construction Phase

During construction phase the following monitoring measures will be considered:

- Inspections and monitoring will be undertaken during excavations, piling and other groundworks to ensure that measure that are protective of water quality are fully implemented and effective.
- Discharges to sewers will be monitoring where required in accordance with statutory consents (discharge licence).
- Monitoring and inspection of water courses will be undertaken routinely.
- Monitoring of the in-stream works by an appropriately quality Environmental Clerk of Works will be undertaken and key stages of the works. Monitoring of water courses will be undertaken during the works.
- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Materials management and waste audits will be carried out at regular intervals to monitor the following:
  - management of soils on site and for removal offsite,
  - record keeping,
  - traceability of all materials, surplus soil and other waste removed from the Site and
  - ensure records are maintained of material acceptance at the end destination.

7.11.2 Operational Phase

Ongoing regular operational monitoring and maintenance of drainage and the SuDS will be carried as outlined in Section 7.8.2.

7.12 Difficulties Encountered

There were no difficulties encountered in compiling this hydrology and hydrogeology assessment.

7.13 References

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8 Air and Climate

8.1 Introduction

This Chapter will describe and assess the potential impacts on air quality and climate associated with the Proposed Development at Coolagad, Greystones, Co. Wicklow.

Taking into account Ambient Air Quality Standards, the baseline air quality will be examined along with the potential for release of emissions to the atmosphere and associated effects prior to and following mitigation measures. This Chapter will also describe and assess the potential impacts on micro and macro-climate as a result of the Proposed Development. Attention will be focused on Ireland's obligations under the Kyoto Protocol and the Paris Agreement in the context of the overall climatic impact of the presence and absence of the Proposed Development.

8.1.1 Quality Assurance and Competence

This Chapter was completed by Aoife Grogan, an Environmental Consultant at Enviroguide Consulting who specialises in the area of Air Quality and Climate assessment and has provided technical input to a diverse range of EIAR projects in this context. Aoife holds an MSc. in Climate Change from Maynooth University and has an expert knowledge of the social and scientific aspects of this subject. She has also recently completed two additional Professional and Advanced Diplomas in the areas of Geographic Information Science (TU Dublin) and Planning and Environmental Law (Kings Inns). She is also proficient in various modelling software programmes for the assessment of air quality, including the U.S. EPA approved AERMOD dispersion modelling software and the UK Design Manual for Roads and Bridges Screening Model (DMRB, UK Highways Agency 2007) (Version 1.03c).

8.1.2 Ambient Air Quality Standards

For the protection of health and ecosystems, EU directives apply air quality standards in Ireland and other EU member states for a range of pollutants. These rules include requirements for monitoring, assessment and management of ambient air quality. The first major instrument in tackling air pollution was the Air Quality Framework Directive 96/62/EC and its four daughter Directives. Each of these instruments was repealed with the introduction of Directive 2008/50/EC on ambient air quality and cleaner air for Europe in 2008 (as amended by Decision 2011/850/EU and Directive 2015/1480/EC) (the CAFE Directive), save for the "Fourth Daughter Directive" (Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air).

The CAFE Directive lays down measures aimed at:

1) defining and establishing objectives for ambient air quality designed to avoid, prevent or reduce harmful effects on human health and the environment as a whole;
2) assessing the ambient air quality in Member States on the basis of common methods and criteria and, in particular, assessing concentrations in ambient air of certain pollutants;

3) providing information on ambient air quality in order to help combat pollution and nuisance and to monitor long-term trends and improvements resulting from national and Community measures;
4) ensuring that such information on ambient air quality is made available to the public;
5) maintaining air quality where it is good and improve it in other cases; and
6) promoting increased cooperation between the Member States in reducing air pollution.

Ambient air quality monitoring and assessment in Ireland is carried out in accordance with the requirements of the CAFE Directive. The CAFE Directive has been transposed into Irish legislation by the Air Quality Standards Regulations (S.I. No. 180 of 2011). The CAFE Directive requires EU member states to designate 'Zones' reflective of population density for the purpose of managing air quality. Four zones were defined in the Air Quality Standards Regulations (2011) and subsequently amended in 2013 to account for 2011 census population counts and to align with coal restricted areas in the Air Pollution Act (Marketing, Sale, Distribution and Burning of Specified Fuels) Regulations 2012. (S.I. No. 326 of 2012) (the 2012 Regulations).

The main areas defined in each zone are:

- **Zone A:** Dublin Conurbation
- **Zone B:** Cork Conurbation
- **Zone C:** Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- **Zone D:** Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

The Site of the Proposed Development is located in Coolagad, Greystones, Co. Wicklow and falls under the 'Zone C' category based on the Environmental Protection Agency's (EPA) designation under the CAFE Directive.

The CAFE Directive outlines certain limit or target values specified by the five published directives that apply limits to specific air pollutants. These limits, outlined in Table 8-1, will be referred to as part of the Proposed Development assessment with respect to air quality.

Table 8-1: Limit Values of Cleaner Air for Europe (CAFE) Directive 2008/50/EC (Source: EPA, 2020)

Pollutant	Limit Value Objective	Averaging Period	Limit Value µg/m3	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
SO_2	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1 Jan 2005
SO_2		24 hours	125	47	Not to be exceeded more than 3 times in a	1 Jan 2005

					calendar year	
SO_2	Protection of vegetation	Calendar year	20	7.5	Annual mean	19 July 2001
SO_2		1 Oct to 31 Mar	20	7.5	Winter mean	19 July 2001
NO_2	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
O_2		Calendar year	40	21	Annual mean	1 Jan 2010
NO + NO_2	Protection of ecosystems	Calendar year	30	16	Annual mean	19 July 2001
PM10	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1 Jan 2005
PM10		Calendar year	40	-	Annual mean	1 Jan 2005
PM2.5 - Stage 1		Calendar year	25	-	Annual mean	1 Jan 2015
PM2.5 - Stage 2		Calendar year	20	-	Annual mean	1 Jan 2020
Lead		Calendar year	0.5	-	Annual mean	1 Jan 2005
Carbon Monoxide		8 hours	10,000	8,620	Not to be exceeded	1 Jan 2005
Benzene		Calendar year	5	1.5	Annual mean	1 Jan 2010

The EPA is the competent authority for the purpose of the CAFE Directive and is required to send an annual report to the Minister for Environment and the European Commission. The regulations further provide for the distribution of public information. This includes information on any exceedances of target values, the reasons for exceedances, the area(s) in which they occurred, and the relevant information regarding effects on human health and environmental impacts.

8.1.3 Climate Agreements

Climate change is recognised as one of the most serious global environmental problems and arguably the greatest challenge facing humanity today. While natural variations in climate over time are normal, anthropogenic activities have interfered greatly with the global atmospheric

system by emitting substantial amounts of greenhouse gases (GHGs). This has caused a discernible effect on our global climate system, with continued change expected due to current and predicted trends of GHG emissions. In Ireland this is demonstrated by rising sea levels, changes in the ecosystem, and extreme weather events.

In March 1994, the United Nations Framework Convention on Climate Change (UNFCCC) was established as an intergovernmental effort to tackle the challenges posed by climate change. The Convention membership is almost universal, with 197 countries having ratified. Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices. This information is then utilised to launch national strategies and international agreements to address GHG emissions. Following the formation of the UNFCCC, two major international climate change agreements were adopted: The Kyoto Protocol, and the Paris Agreement.

In April 1994, Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) and subsequently signed the Kyoto Protocol in 1997. The Kyoto Protocol is an international agreement linked to the UNFCCC which commits its parties to legally binding emission reduction targets. In order to ensure compliance with the protocol, the Intergovernmental Panel on Climate Change (IPCC) has outlined detailed guidelines on compiling National Greenhouse Gas Inventories. These are designed to estimate and report on national inventories of anthropogenic GHG emissions and removals. Under Article 4 of the Kyoto Protocol, Ireland agreed to limit the net anthropogenic growth of the six named GHGs to 13% above the 1990 level, during the period 2008 to 2012.

The second commitment period of the Kyoto Protocol was established by the Doha amendment which was adopted *in extremis* on the 8th of December 2012, to impose quantified emission limitation and reduction commitments (QELRCs) to Annex I (developed country) Parties during a commitment period from 2013 to 2020. 38 developed countries, inclusive of the EU and its 28 member states, are participating. Under the Doha amendment, participating countries have committed to an 18% reduction in emissions from 1990 levels. The EU has committed to reducing emissions in this period to 20% below 1990 levels. Ireland's QELRCs for the period 2013 to 2020 is 80% of its base year emissions. Ireland's compliance with the Doha amendment will be assessed based on the GHG inventory submission in 2022 for 1990-2020 data. As of October 2020, the Doha Amendment has received the required number of ratifications to enter into force. Once in force, the emission reduction commitments of participating developed countries and economies in transition (EITs) become legally binding.

In December 2015, the Paris Climate Change Conference (COP21) took place and was an important milestone in terms of international climate change agreements. The Paris Agreement sets out a global action plan to put the world on track to mitigate dangerous climate change by setting a global warming limit not to exceed 2°C above pre-industrial levels, with efforts to limit this to 1.5°C. As a contribution to the objectives of the agreement, countries have submitted comprehensive national climate action plans (nationally determined contributions, NDCs). Under this agreement, governments agreed to come together every 5 years to assess the collective progress towards the long-term goals and inform Parties in updating and enhancing their nationally determined contributions. Ireland will contribute to the Agreement through the NDC tabled by the EU on behalf of Member States in 2020, which commits to a 55% reduction in EU-wide emissions by 2030 compared to 1990. This is considered to be the current NDC maintained by the EU and its Member States under Article 4 of the Paris Agreement.

The EU has set itself targets for reducing its GHG emissions progressively up to 2050, these are outlined in the 2020 climate and energy package and the 2030 climate and energy policy framework. These targets are defined to assist the EU in transitioning to a low-carbon economy, as detailed in the 2050 low carbon roadmap. The 2020 package is a set of binding legislation to ensure that the EU meets its climate and energy targets for the year 2020. There are three key targets outlined in the package which were set by the EU in 2007 and enacted in legislation in 2009:

- 20% reduction in GHG emissions from 1990 levels;
- 20% of EU energy to be from renewable sources;
- 20% improvement in energy efficiency.

The 2030 climate and energy framework builds on the 2020 climate energy package and was adopted by EU leaders in October 2014. The framework sets three key targets for the year 2030:

- At least 40% cuts in GHG emissions from 1990 levels;
- At least 32% share for renewable energy;
- At least 32.5% improvement in energy efficiency.

The EU has acted in several areas in order to meet these targets, including the introduction of the Emissions Trading System (ETS). The ETS is the key tool used by the EU in cutting GHG emissions from large-scale facilities in the power, industrial, and aviation sectors. Around 45% of the EU's GHG emissions are covered by the ETS.

As part of the European Green Deal, the Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990. The European Climate Law came into force in July 2021 and writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

8.1.4 National Policy Position and GHG Emissions in Ireland

National climate policy in Ireland recognises the threat of climate change to humanity and supports mobilisation of a comprehensive international response to climate change, and global transition to a low-carbon future.

The Climate Action and Low Carbon Development (Amendment) Act 2021 was enacted in 2021 and sets Ireland on a legally binding path to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade. The Act provides the framework for Ireland to meet its international and EU climate commitments and to become a leader in addressing climate change.

The Irish Government recently published its Climate Action Plan (2021) which provides a detailed framework for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting Ireland on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and as required by the Climate Act 2021. The Plan lists the actions needed to deliver on national climate targets and sets indicative ranges of emissions reductions for each sector of the economy. It will be updated annually, next in 2022, to ensure alignment with Ireland's legally binding economy-wide carbon budgets and sectoral ceilings.

Ireland's latest greenhouse gas (GHG) emissions 1990-2020 are provisional figures based on the SEAI's final energy balance released in September 2021 (EPA, 2021). In 2020, Ireland's GHG emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO2eq), which is 3.6% lower (or 2.14 Mt CO2 eq) than emissions in 2019 (59.84 Mt CO2 eq). There was a decrease of 4.0% in emissions reported for 2019 compared to 2018. Emissions reductions have been recorded in six of the last ten years of inventory data (2010-2020). In 2020, national total emissions decreased by 3.6%, emissions in the stationary ETS sector decreased by 6.4% and emissions under the ESD (Effort Sharing Decision) decreased by 2.7%. In 2020, the energy industries, transport and agriculture sectors accounted for 70.1% of total GHG emissions. Agriculture is the single largest contributor to the overall emissions, at 37.1%. Transport, energy industries and the residential sector are the next largest contributors, at 17.9%, 15.0% and 12.3%, respectively (EPA, 2021).

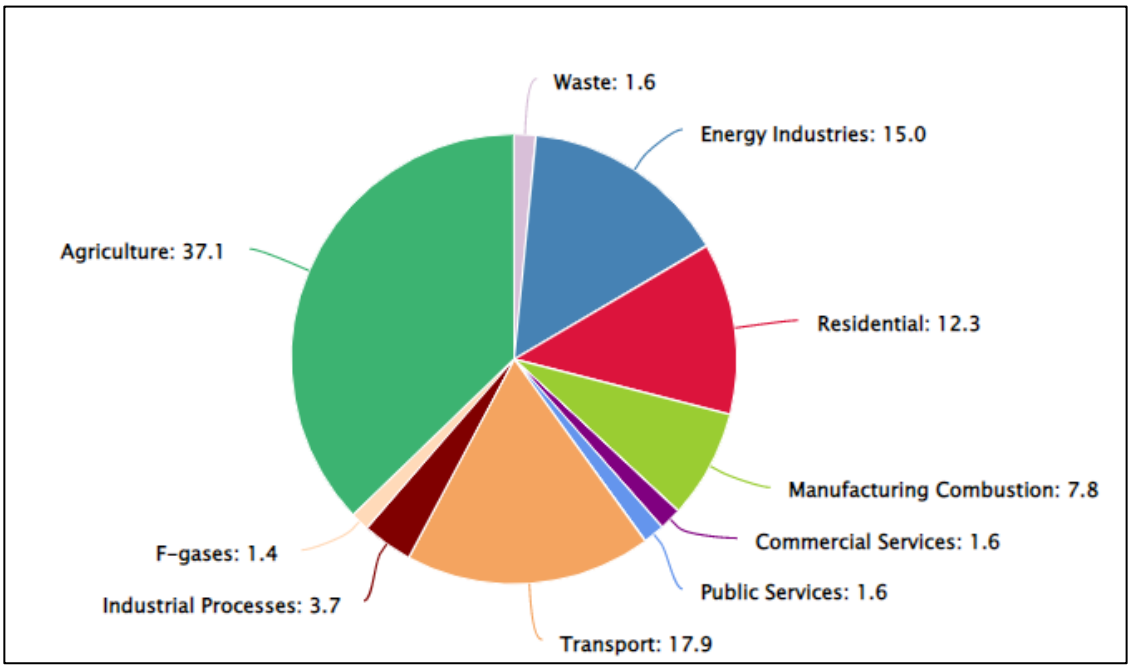

Figure 8-1: Ireland's Greenhouse Gas Emissions by Sector for 2020 (Source: EPA, 2021)

8.2 Assessment Methodology

This chapter has been prepared in accordance with the EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2017).

Taking into account Ambient Air Quality Standards, the baseline air quality of the Site will be examined using EPA monitoring data. Air quality impacts from the Proposed Development will then be determined by a qualitative assessment of the nature and scale of dust generating activities associated with the construction phase of the project in accordance with relevant guidance (Transport Infrastructure Ireland (TII) 2011 Appendix 8; Institute of Air Quality Management (IAQM) 2014).

Construction and Operational Phase traffic impact assessment will involve air dispersion modelling using the UK Design Manual for Roads and Bridges Screening Model (DMRB, UK Highways Agency 2007) (Version 1.03c), the NO_x to NO_2 Conversion Spreadsheet (UK

Department for Environment, Food and Rural Affairs, 2017), and following all relevant guidance (TII, 2011; HA, 2007; EPA; UK DEFRA; IAQM). It is noted that Highways England has recently updated the DMRB Screening Model, however it is not currently on public release. According to Highways England, whilst the previous Screening Model v1.03c has been withdrawn by the Highways Agency, v1.03c can still provide for a useful way to screen road traffic emissions to decide whether more detailed dispersion modelling needs to be undertaken. Results should however be treated with caution; particularly where predicted concentrations are close to the relevant Air Quality Objectives. In the current assessment, all predicted concentrations are well within the relevant Air Quality Objectives; therefore, it is considered that the use of the DMRB screening model is a suitable approach and would be considered current best practice in determining air quality impacts and whether more detailed dispersion modelling is required.

A desktop study involving various national and international documents on climate change and analysis of synoptic meteorological data from the nearest Met Eireann station (Dublin Airport) was also carried out in order to compile this chapter. Attention will be focused on Ireland's obligations under the Kyoto Protocol (including the Doha Amendment) and the Paris Agreement in the context of the overall climatic impact of the presence and absence of the Proposed Development.

8.3 Characteristics of the Proposed Development

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7-year planning permission for a Strategic Housing Development at a 26.03ha Site at 'Coolagad', Greystones, Co. Wicklow.

The proposed development will consist of:

- 586 residential units including:
  - 351 two storey houses (207 no. 3 bed, 140 no. 4 bed, 4 no. 5 bed) comprising detached, semi-detached and terraced units
  - 203 no. apartments (65 no. 1 bed, 123 no. 2 bed, 15 no. 3 bed) provided within 6 no. blocks ranging from three to four-storey (over basement) with residential amenity facilities .
  - 32 no. duplex units within 2 no. three-storey blocks (16 no. 2 bed and 16 no. 3 bed units)
- c. 5,192 sqm of communal open space is provided to serve the proposed apartment/duplex units.
- Community building (single storey) of 392 sq.m. with 29 car parking spaces, including changing rooms and a multipurpose room.
- Creche building of 734 sq.m. with 21 car parking spaces.
- A new vehicular entrance, with signalised junction and pedestrian crossings, will be provided off the R761 (Rathdown Road). The new junction will be linked to the existing signalised junction at Blacklion Manor Road / Redford Park which has a planned upgrade by Wicklow County Council. Cycle lanes will be provided along this section of the R761 on both sides. A footpath will also be provided on its western side. Car parking will be provided to the east of the R761, in the front of Redford Cemetery.
- The new access will provide a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11.
- Car and bicycle parking spaces are provided as follows:

- 702 on curtilage car parking spaces for the houses; 206 car parking spaces at basement level and 5 at surface level for the apartments; and 32 spaces for the duplex units and 10 visitor spaces at surface level;
- 22 motorbike parking spaces;
- 436 resident and 118 visitor bicycle parking spaces are proposed in a mix of basement and surface levels for the apartment blocks and duplex units; 12 bicycle spaces are proposed for the creche, 12 for the community centre and 10 at the sport field.

- The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the construction of a new public foul sewer along the R761/R762 from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.
- c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces incorporating an existing stream, formal and informal play areas, and new boundary treatments.
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

8.4 Baseline Description

8.4.1 Air Quality

According to the 2012 Regulations (S.I. No. 326 of 2012) the proposed Site falls into 'Zone C' of Ireland due to its location adjacent to the town of Greystones which is described by the EPA as 'Other cities and large towns'. It is expected that existing ambient air quality in the vicinity of the site is characteristic of a suburban location with the primary source of air emissions such as particulate matter, NO_2, and hydrocarbons likely to be of traffic, combustion and agriculture, and domestic fuel burning.

In conjunction with individual local authorities, the EPA undertakes ambient air quality monitoring at specific locations throughout the country in the urban and rural environment; an Air Quality Report based on data from 30 monitoring stations and a number of mobile air quality units is developed on an annual basis. The EPA's most recent publication 'Air Quality in Ireland, 2020' reports the quality of the air in Ireland based on the data from the National Ambient Air Quality Monitoring Network throughout the year 2020.

Bray monitoring station is in closest proximity to the Site (ca. 4km). This station is located in the grounds of Bray Town Council yard and continuous monitoring is carried out here for concentrations of ozone (O_3) and particulate matter ($PM_{2.5}$).

Annual mean concentrations of O_3 and $PM_{2.5}$ for the years 2018 to 2020 are presented in Table 8-2 for the automatic station in Bray. In the period 2018 to 2020, concentrations of O_3 at Bray ranged from 54– 57 ug/m^3. In terms of $PM_{2.5}$, annual mean concentrations ranged from 5– 7 ug/m^3 in the years 2018 to 2020. For both parameters, annual limits are well below the threshold limits contained within the regulations. Based on this data provided by the EPA, a conservative estimate of current background $PM_{2.5}$ concentrations in the vicinity of the Site is 4 ug/m^3.

Table 8-2: Mean Concentrations of $PM_{2.5}$ and O_3 at Bray Monitoring Station

Objective	Averaging Period	Limit or Threshold Value (ug/m³)	Annual Mean (µg/m³)	No. of Allowed Exceedances (AQS, 2011)	Number of exceedances
2018					
$PM_{2.5}$	Calendar year	20	6	N/A	N/A
O_3	Max. daily 8-hour mean	120	57	120µg/m³ not to be exceeded more than 25 days per calendar year averaged over 3 years	3
2019					
$PM_{2.5}$	Calendar year	20	7	N/A	N/A
O_3	Max. daily 8-hour mean	120	57	No of days above 1800µg/m³	0
2020					
$PM_{2.5}$	Calendar year	20	5	N/A	N/A
O_3	Max. daily 8-hour mean	120	54	No of days above 1800µg/m³	0

When assessing air quality, the EPA focuses on two main pollutants: particulate matter and nitrogen oxides. Measured concentrations of NO_2 for the years 2018 to 2020 are presented in Table 8-3 for Zone C monitoring stations. These results show that current levels of NO_2 are well below the annual mean and 1-hour maximum limit values. In the year 2020, annual mean concentrations of NO_2 ranged from 4 – 19 ug/m³ across all Zone C stations, with one exceedance of the maximum hourly limit recorded at Dundalk station.

Table 8-3: Concentrations of NO_2 at Zone C Monitoring Stations

Station	Objective	Concentration (µg/m³)			Limit or Threshold Value (ug/m³)	Number of values >200µg/m³
		2018	2019	2020		
Portlaoise	Annual Mean NO_2	11	11	11	40	N/A
	Hourly Max NO_2	119	77	69.3	200	0
Kilkenny Seville Lodge	Annual Mean NO_2	6	5	4	40	N/A
	Hourly Max NO_2	71	59	52.1	200	0
Dundalk	Annual Mean NO_2	14	12	10	40	N/A
	Hourly Max NO_2	91	144	204	200	1
Limerick Peoples Park	Annual Mean NO_2	-	13	10	40	N/A
	Hourly Max NO_2	-	91	84.8	200	0
Waterford Brownes Road	Annual Mean NO_2	-	8	7	40	N/A
	Hourly Max NO_2	-	83	77.4	200	0
Meath Navan	Annual Mean NO_2	-	23	19	40	N/A
	Hourly Max NO_2	-	102	102.9	200	0

Though the Proposed Development is within 'Zone C', the Dun Laoghaire monitoring station is the closest station to the Site (ca. 14km) which continuously monitors for concentrations of nitrogen oxides (NO_2) and particulate matter (PM_{10}). Similar to Greystones, Dun Laoghaire is considered a suburban coastal town and air quality monitoring carried out at this location is likely to be broadly representative of conditions that may be experienced at the Site. Measured concentrations of NO_2 for the years 2018 to 2020 are presented in Table 8-4 for Dun Laoghaire monitoring station. Concentrations of NO_2 are also well below the threshold limits contained within the regulations at Dun Laoghaire monitoring station, with an annual mean of 14 ug/m^3 measured in 2020 (EPA, 2020).

Table 8-4: Mean Concentrations of PM_{10} and NO_2 at Dun Laoghaire Monitoring Station

Objective	Averaging Period	Limit or Threshold Value (ug/m^3)	Annual Mean ($\mu g/m^3$)	No. of Allowed Exceedances (AQS, 2011)	Number of Short-term exceedances
2018					
PM_{10}	Calendar year	40	13	50 $\mu g/m^3$ not to be exceeded on more than 35 days per year	2
NO_2	Calendar year	40	19	1-hour >200$\mu g/m^3$ not to be exceeded more than 18 times in a calendar year	0
2019					
PM_{10}	Calendar year	40	12	50 $\mu g/m^3$ not to be exceeded on more than 35 days per year	2
NO_2	Calendar year	40	15	1-hour >200$\mu g/m^3$ not to be exceeded more than 18 times in a calendar year	0
2020					
PM_{10}	Calendar year	40	12	50 $\mu g/m^3$ not to be exceeded on more than 35 days per year	0
NO_2	Calendar year	40	14	1-hour >200$\mu g/m^3$ not to be exceeded more than 18 times in a calendar year	0

Based on the aforementioned data provided by the EPA and taking account of the Site's environs and surrounding land-use, which is predominantly agricultural and residential, a conservative estimate of current background NO_2 concentrations in the vicinity of the Site is 11 ug/m^3.

Measured concentrations of PM_{10} for the years 2018 to 2020 are presented in Table 8-5 for Zone C monitoring stations. As is evident from these results, current levels of PM_{10} are well below the annual mean limit value. In the year 2020, annual mean concentrations of PM_{10} ranged from 11 – 20 ug/m^3 across all Zone C stations, with exceedances of short-term limit values recorded at a number of stations. As per Table 8-4, concentrations of PM_{10} at Dun Laoghaire monitoring

station are well below their respective limit values in 2020, with an annual mean of 12 ug/m^3 measured in this year, and no exceedance of short-term limit values (EPA, 2021).

Based on the EPA monitoring data and taking account of the Site's environs and surrounding land-use, a conservative estimate of current background PM_{10} concentrations in the vicinity of the Site is 15 ug/m^3.

Table 8-5: Concentrations of PM_{10} at Zone C Monitoring Stations

Station	Objective	Concentration (µg/m^3)			Limit or Threshold Value
		2018	2019	2020	
Portlaoise	Annual Mean PM_{10}	11	15	12	40 µg/m^3
	Days >50µg/m^3	1	0	0	35 days
Ennis	Annual Mean PM_{10}	16	18	20	40 µg/m^3
	Days >50µg/m^3	4	12	19	35 days
Galway Rahoon	Annual Mean PM_{10}	15	13	13	40 µg/m^3
	Days >50µg/m^3	0	0	1	35 days
Dundalk	Annual Mean PM_{10}	15	14	13	40 µg/m^3
	Days >50µg/m^3	0	2	2	35 days
Carlow Town	Annual Mean PM_{10}	12	11	11	40 µg/m^3
	Days >50µg/m^3	0	0	1	35 days
Waterford Brownes Road	Annual Mean PM_{10}	15	15	14	40 µg/m^3
	Days >50µg/m^3	0	3	3	35 days
Tralee	Annual Mean PM_{10}	-	28	16	40 µg/m^3
	Days >50µg/m^3	-	2	7	35 days
Athlone	Annual Mean PM_{10}	-	17	16	40 µg/m^3

Station	Objective	Concentration (µg/m³)			Limit or Threshold Value
		2018	2019	2020	
	Days >50µg/m³	-	0	3	35 days
Limerick People's Park	Annual Mean PM_{10}	-	13	13	40 µg/m³
	Days >50µg/m³	-	4	1	35 days
Letterkenny	Annual Mean PM_{10}	-	17	15	40 µg/m³
	Days >50µg/m³	-	9	9	35 days
Kilkenny Seville Lodge	Annual Mean PM_{10}	-	18	19	40 µg/m³
	Days >50µg/m³	-	7	1	35 days

8.4.2 Macroclimate

Ireland has a typical maritime climate, largely due to its proximity to the Atlantic Ocean and the presence of the Gulf Stream. Due to the moderating effects of the Gulf Stream, Ireland does not suffer the temperature extremes that are experienced by many other countries at a similar latitude. Mean annual temperatures generally range between 9°C and 10°C. Winters tend to be cool and windy while summers are mostly mild and less windy. The prevailing wind direction is between the south and west with average annual wind speeds ranging between 6 knots in parts of south Leinster to over 15 knots in the extreme north. Rainfall in Ireland occurs throughout the year with reasonable frequency. The highest rainfall occurs in the western half of the country and on high ground, and generally decreases towards the northeast. As the prevailing winds are from the west-southwest, the west of Ireland experiences the largest number of wet days. The area of least precipitation is along the eastern seaboard of the country.

8.4.3 Microclimate

The synoptic meteorological station at Dublin Airport is located approximately 30km northwest of the Proposed Development; and for the purposes of this chapter, weather data collected here may be considered similar to that which is experienced in the area of the subject Site. The synoptic station at Casement Aerodrome is located approximately 28km to the northwest, however, as this station is further inland, it is considered that Dublin Airport station would be more representative of the actual weather conditions experienced onsite due to its proximity to the Irish Sea.

The weather in the area of the subject site is generally dominated by cool oceanic air masses, with cool winters, mild humid summers, and a lack of temperature extremes. Based on meteorological data at Dublin Airport over the last 3 years, the mean January temperature is 5.3°C, while the mean July temperature is 15.4°C. The prevailing wind direction is from a quadrant centred on the southwest. These are moderately warm winds from the Atlantic and

they habitually bring rain. The expected annual rainfall for the eastern half of the country ranges between 750 and 1000mm. Easterly winds are less frequent, weaker, and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

8.4.4 Rainfall

Rainfall is a key indicator of changes in climate, as measurements of rainfall are fundamental to assessing the effects of climate change on the water cycle and water balance. Table 8-5 illustrates the monthly and annual rainfall data collected over a 3-year period (2018-2020) at Dublin Airport Weather Station. The annual rates of precipitation ranged from 709.4mm in 2018 to 886.1mm in 2019 with distribution of the highest monthly rainfall values falling mainly in the autumn and winter months. This is broadly within the expected range of the eastern half of the country.

Table 8-6: Monthly Rainfall Values (mm) for Dublin Airport Weather Station from January 2018 to December 2020 (Source: Met Eireann)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2020	36.0	130.4	31.8	12.8	9.3	69.6	98.9	87.3	60.9	80.6	48.1	83.1	**748.8**
2019	26.8	30.5	92.5	74.6	33.4	82.9	41.0	91.9	104.6	77.2	173.0	57.7	**886.1**
2018	93.1	36.9	100.0	68.9	19.1	4.8	40.0	48.0	43.8	42.6	131.2	81.0	**709.4**
LTA[1]	62.6	48.8	52.6	54.1	59.5	66.7	56.2	73.3	59.5	79.0	72.9	72.7	**757.9**

8.4.5 Wind

Wind at a particular location can be influenced by a number of factors, such as obstructions by trees or buildings, the nature of the terrain, and deflection by nearby mountains or hills. Wind blows most frequently from the south and west for open sites while winds from the northeast and north occur less often. The analysis of hourly weather data from Dublin Airport synoptic weather station over a period of 5 years (2016-2020) suggests that the predominant wind direction blows from the southwest, with windspeeds of between 7 and 10 knots occurring most frequently.

Figure 8-2 provides a wind speed frequency distribution which represents wind speed classes and the frequency at which they occur (% of time) at Dublin Airport weather station over a period of 5 years. Wind speeds of 8 knots have the highest frequency, occurring approximately 8.6% of the time.

[1] The 'LTA' is average for the climatological long-term-average (LTA) reference period 1981-2010

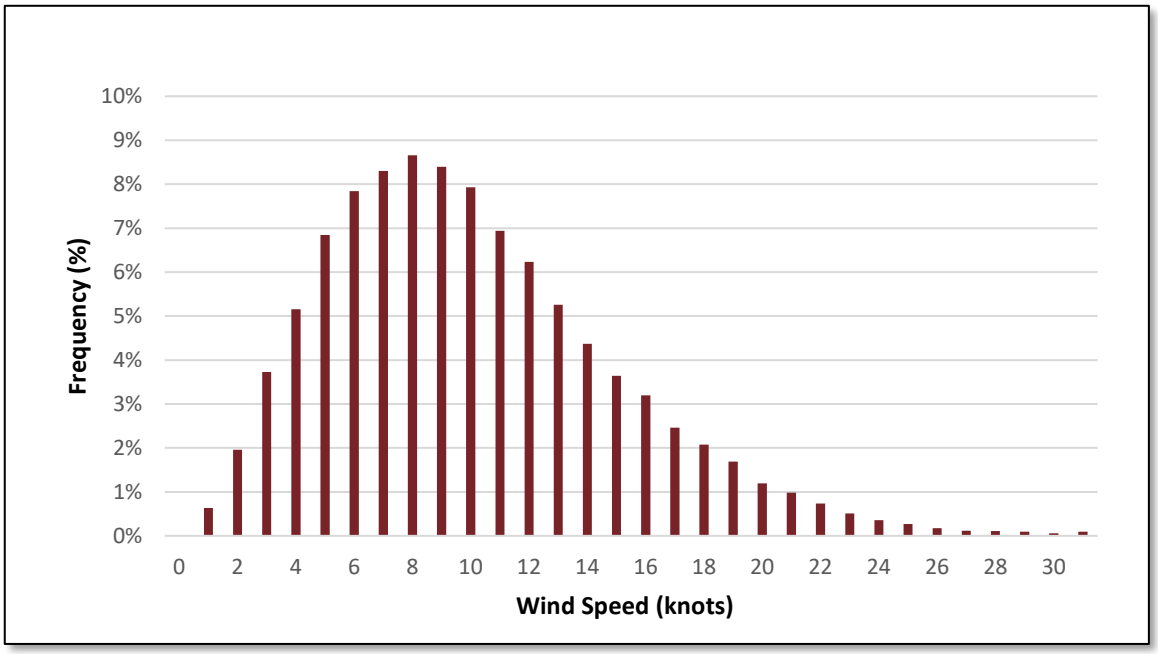

Figure 8-2: Wind Speed Frequency Distribution at Dublin Airport Synoptic Weather Station over 5 years (2016-2020)

Figure 8-3 provides a wind rose of the predominant wind directions and associated wind speeds at Dublin Airport. As is visible from Figure 8-3, the prevailing wind is from a south-westerly direction with an annual incidence of 33% for winds between 200 and 250 degrees. The most frequent wind speed associated with this wind direction is between 11 and 16 knots which is considered a 'moderate breeze' in terms of the Beaufort scale, this wind direction and wind speed occurs in combination approximately 11.39% of the time. The overall most common windspeed is between 7 and 10 knots, occurring in 33.28% of incidences, and wind speeds of between 11 and 16 knots occurring in 29.63% of incidences.

The lowest frequency is for winds blowing from the northern quadrant at approximately 2.81% of the time. The incidence of wind between 1 and 6 knots is about 26.16% of the year with wind speeds of above 17 knots (8.7 m/s) occurring in just 10.92% of incidences. The influence of topography can be seen in the low frequency of winds from a southerly direction at Dublin Airport, which occur at 4.24% of the year; this is due to the sheltering effect of the mountains to the south. This windrose is broadly representative of the prevailing conditions experienced at the subject Site.

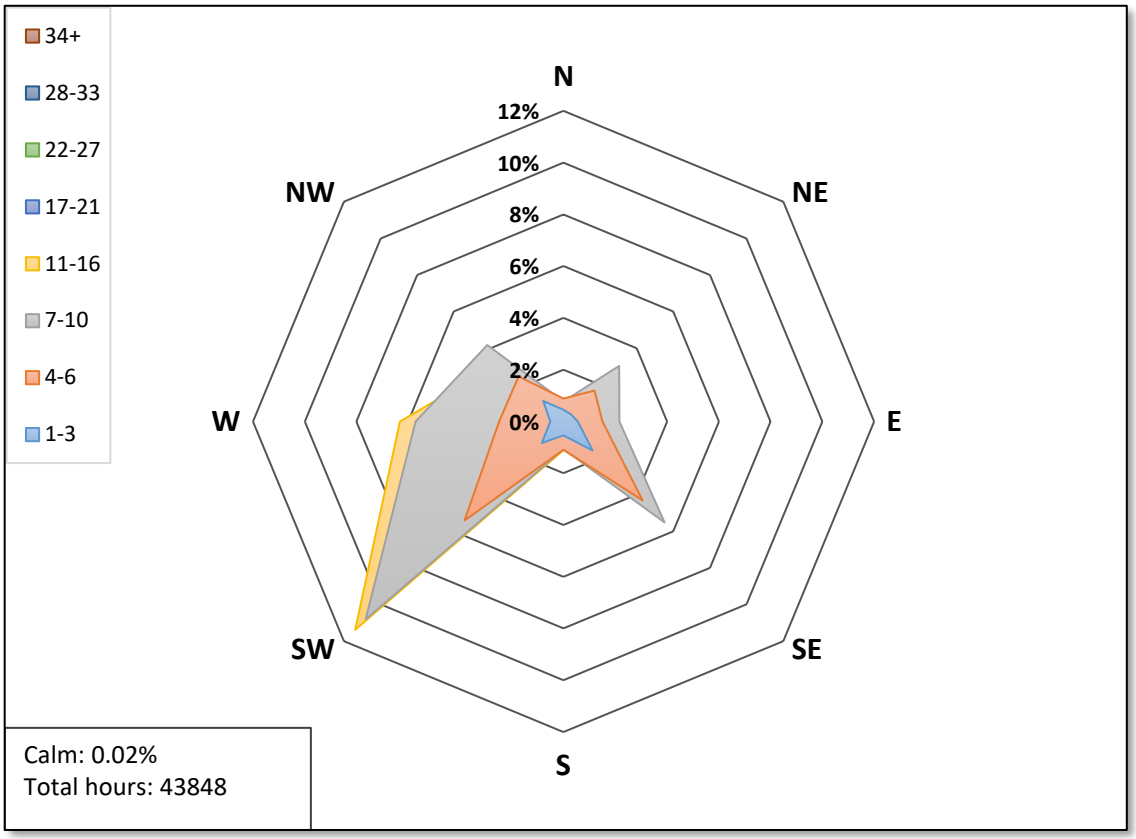

Figure 8-3: 5-year Windrose at Dublin Airport Synoptic Weather Station 2016-2020 (Developed using Met Eireann Hourly Data

8.5 Impact Assessment

8.5.1 Potential Impacts on Air Quality

8.5.1.1 Construction Phase

The construction works include excavation and ground preparation works, drainage works, construction of buildings and hardstanding areas, landscaping of the site including provision of active and public open space, and all related development works above and below ground.

There is potential for construction related air emissions to impact on local air quality as a result of the Proposed Development. The estimated duration of the Construction Phase is 4 years; therefore, potential impacts are expected to be short-term and of a temporary nature. The main air quality impacts that may arise during construction activities are:

- Dust deposition;
- Elevated particulate matter concentrations (PM_{10} and $PM_{2.5}$) as a result of dust generating activities on site; and
- An increase in concentrations of airborne particles, volatile organic compounds, nitrogen oxides, and sulphur oxides due to exhaust emissions from diesel powered vehicles and equipment on site (non-road mobile machinery) and vehicles accessing the site.

The greatest potential impact on air quality during this phase is from construction dust emissions and the potential for nuisance dust. The dust emissions from a construction site that may result in air quality impacts generally depend on:

- Site activities and duration;
- The size of the site;
- The meteorological conditions;
- The proximity of receptors to the activities;
- The adequacy of applied mitigation measures; and
- The sensitivity of receptors to dust.

The primary sources of dust identified include soil excavation works, bulk material transportation, loading and unloading, stockpiling materials, cutting and filling, and vehicular movements (HGVs and on-site machinery).

According to Transport Infrastructure Ireland guidelines (TII, 2011), it is difficult to accurately quantify dust emissions arising from construction activities. Therefore, it is not possible to easily predict changes to dust soiling rates or PM_{10} concentrations. TII recommend a semi-quantitative approach to determine the likelihood of significant impact which should also be combined with an assessment of the proposed mitigation measures. The following Table 8-7 outlines the distance criteria which is recommended for use in assisting a semi-quantitative assessment:

Table 8-5: Assessment Criteria for the Impact of Dust Emissions from Construction Activities, with Standard Mitigation in Place

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

In order to account for a worst-case scenario, the Proposed Development can be considered major in scale due to the size of the Site and the duration of construction activities. Therefore, it can be assumed that there is potential for significant dust soiling 100m from the Site.

There are a number of high-sensitivity receptors such as residential dwellings and schools located within 100m of the Site boundary, these are mainly situated to the southeast and east of the Proposed Development. Therefore, in the absence of mitigation, it is considered that there is potential for dust impacts to occur at these locations. Sensitive receptors within 100m of the Proposed Development are identified in Table 8-8:

Table 8-6: Sensitive Receptors

Name	Type	ITM Coordinates		Orientation Relative to Site Boundary
		X	Y	
Waverly Avenue	Residential	727908	712770	East
Seagreen Park	Residential	727919	712645	Southeast
Sea View	Residential	728267	713317	East
Single Dwelling	Residential	728035	713193	South
Single Dwelling	Residential	728232	713233	Southeast
Gaelscoil na gCloch Liath	School	728116	712974	Southeast
Temple Carrig Secondary School	School	728112	713093	Southeast

According to IAQM Guidance (2016), the primary factor influencing the Pathway is the distance between the sensitive receptor and the dust sources. However, other factors can cause a higher or a lower category to be assigned than would be the case based on distance alone. These factors include:

- Orientation of receptors relative to the prevailing wind direction; and
- Topography, terrain and physical features.

Meteorological conditions greatly affect the level of dust emissions and subsequent deposition downwind of the source; the most predominant being rainfall and wind speed. Adverse impacts can occur in any direction from a site; however, they are more likely to occur downwind of the prevailing wind direction and/or close to the site. Relatively high levels of moisture in the surrounding air, soils, and precipitation helps to suppress dust due to the cohesive properties of water between dust particles. The least favourable meteorological conditions for dust generation would typically be warm days with strong winds and low precipitation. Due to the variability of weather, it is impossible to predict the conditions that will occur during the Construction Phase of the development. However, wind direction is most likely to prevail from the southwest.

Table 8-9 outlines the hourly percentage distribution of wind speed and direction at Dublin Airport synoptic weather station over a 5-year period (2016-2020). This data is consistent with Figure 8-3 of this chapter and shows that the most frequent wind direction prevails from the southwest (33.89% frequency). The corresponding most frequent wind speed is between 7 and 10 knots which is considered a 'gentle breeze' in terms of the Beaufort scale; this wind direction and wind speed occur in combination approximately 12.28% of the time.

Table 8-7: Percentage Distribution of Wind Speeds and Direction at Dublin Airport (2016-2020)

Wind speed (Knots)		<1	1 - 3	4 - 6	7 - 10	11-16	17-21	22-27	28-33	34+	% Dry Days
Wind Direction	Degrees										
North	350 - 10	0.03	0.54	0.91	0.61	0.61	0.11	0.01	0.00	0.00	40%
North-east	20 - 70		0.54	2.15	3.89	2.78	0.98	0.05	0.00	0.00	
East	80 - 100		0.94	1.92	2.22	1.2	0.23	0.00	0.00	0.00	
South-east	110 - 150		1.48	3.01	4.87	2.31	0.54	0.06	0.00	0.00	
South	170 - 190		0.64	0.98	1.35	1.33	0.36	0.07	0.00	0.00	
South-west	200 - 250		0.98	5.89	12.28	12.14	2.29	0.32	0.00	0.00	
West	260 - 280		0.59	2.69	5.57	5.73	1.79	0.3	0.00	0.00	
North-west	290 - 340		1.13	2.37	4.38	3.61	1.09	0.15	0.00	0.00	

Dry days with moderate to high windspeeds (above 5m/s (7-10 knots)) are the conditions which are most likely to result in fugitive dust emissions. The majority of sensitive receptors are located to the east and southeast of the Site. Receptors located to the east of the Site would require prevailing winds from the west to be potentially impacted by fugitive dust emissions. At these receptors, the frequency of winds (>5m/s) occurring from the direction of the dust source on dry days is 5.35%. Receptors located to the southeast of the Site would require prevailing winds from the northwest to be potentially impacted by fugitive dust emissions. At these receptors, the frequency of winds (>5m/s) occurring from the direction of the dust source on dry days is 3.7%. Receptors located to the south of the Site would require prevailing winds from the north to be potentially impacted by fugitive dust emissions. At these receptors, the frequency of winds (>5m/s) occurring from the direction of the dust source on dry days is 0.54%.

Therefore, appropriate conditions for fugitive dust emissions at these receptors are highly infrequent and, due to the temporary nature of the Construction Phase, it is expected that adequate mitigation measures, as outlined in Section 8.7.1.1, will prevent nuisance dust from resulting in any significant effects. Furthermore, the trees and hedgerows which are currently present on the boundary of the Proposed Development will act as a natural buffer for dust deposition in some cases.

Appropriate mitigation measures have been recommended and will be implemented at the Site in order to minimise the risk of dust emissions arising during the Construction Phase. These mitigation measures have been outlined in the Construction Environmental Management Plan (CEMP) for the Site and will be adhered to for the entire duration of the Construction Phase; therefore, it is not considered that significant effects on air quality will occur.

Construction vehicles and machinery during this phase will temporarily and intermittently generate exhaust fumes and consequently potential emissions of volatile organic compounds, nitrogen oxides, sulphur oxides, and particulate matter (dust). Dust emissions associated with vehicular movements are largely due to the resuspension of particulate materials from ground

disturbance. According to the IAQM (2014), experience from the assessment of exhaust emissions from on-site machinery and Site traffic suggests that they are unlikely to cause a significant effect on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. Air pollutants may increase marginally due to construction-related traffic and machinery from the Proposed Development. However, any such increase in air pollutants is not considered significant and will be well within relevant ambient air quality standards. According to TII (2011), the significance of impacts due to vehicle emissions during the Construction Phase will be dependent on the number of additional vehicle movements, the proportion of HGVs and the proximity of sensitive receptors to Site access routes. If construction traffic would lead to a significant change (> 10%) in Annual Average Daily Traffic (AADT) flows near to sensitive receptors, then concentrations of nitrogen dioxide and PM_{10} should be predicted in line with the methodology as outlined within TII guidance. The assessment of potential traffic impacts has been completed within Chapter 12, *Traffic*. Construction traffic is expected to exceed 10% of the traffic flow on the adjoining roads; therefore, concentrations of NO_2 and PM_{10} have been predicted in the Opening Year (2023) in the following section 8.5.1.2.

8.5.1.2 Operational Phase

The greatest potential effect on air quality during the Operational Phase of the Proposed Development is from traffic-related air emissions.

Operational traffic will use regional and local roads to access the facility with potential increases of traffic flow on some roads and subsequent associated emissions of VOCs, nitrogen oxides, sulphur dioxides and increased particulate matter concentrations.

In terms of associated impacts on air quality, Table 8-10 outlines the criteria that are prerequisite for an air quality assessment:

Table 8-8: Indicative Criteria for Requiring an Air Quality Assessment (Source: IAQM, 2017)

Potential Change resulting from Proposed Development	Indicative Criteria to Proceed to an Air Quality Assessment
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors	A change of LDV flows of more than 1000 Annual Average Daily Traffic (AADT)
Cause a significant change in Heavy Duty Vehicle (HGV) flows on local roads with relevant receptors	A change of HGV flows of more than 100 Annual Average Daily Traffic (AADT)
Realign roads, i.e., changing the proximity of receptors to traffic lanes	Where the change is 5m or more
Cause a change in Daily Average Speed (DAS)	Where the DAS will change by 10 km/h or more
Cause a change in peak hour speed	Where the peak hour speed will change by 20km/h or more.

The UK Highways Agency Design Manual for Roads and Bridges (DMRB) air quality guidance (LA 105) provides a framework for assessing, mitigating, and reporting the effects of road schemes on air quality; however, this can be adapted to any development which results in a change in traffic.

The criteria as set out in Table 8-11 have been used to determine the project's risk potential to the receiving environment, and whether a simple or detailed air quality assessment is required:

Table 8-9: Receiving Environment Sensitivity (Source: DMRB LA 105)

Sensitivity	Features of receiving environment
High	1) Large number of receptors (human and / or ecological) within 50m of roads triggering traffic screening criteria; 2) Baseline monitoring data indicates concentrations above the AQS Objective / EU limit value; 3) Monitoring indicates exceedances of short term AQS Objectives / EU limit value; 4) Projecting forward monitored concentrations to the opening year, indicates exceedances of AQS Objectives / EU limit value; 5) AQMAs or reported EU limit value exceedances within project's study area.
Medium	1) Receptors (human or ecological) within 50m of roads triggering traffic change criteria; 2) Baseline monitoring data illustrates annual mean NO2 concentrations >36µg/m³; 3) Projections indicate annual mean NO2 concentrations>36µg/m³ in opening year; 4) AQMAs or EU limit value exceedances within project's study area.
Low	1) Few receptors located close to roads triggering traffic change criteria; 2) Baseline monitoring data illustrates concentrations in base year below an annual mean of 36µg/m³; 3) No AQMAs or EU limit value exceedances within project's study area.

As outlined in the following sections, there are a number of high-sensitivity receptors located within 200m of the affected road network. However, baseline pollutant concentrations are well below an annual mean of 36 µg/m³ and there are no exceedances of EU limit values within the

study area. Therefore, in accordance with Table 8-11, it is considered that the receiving environment of the Proposed Development is of a 'Low Sensitivity' and the inclusion of the Proposed Development can be considered low risk. Therefore, in line with DMRB LA 105 guidance, it has been determined that simple air quality assessment is required in this case.

8.5.1.3 UK Design Manual for Roads and Bridges Screening Model (V. 1.03c 2007)

The impact of the Operational Phase of the Proposed Development has been assessed by use of the UK DMRB screening model (Version 1.03c 2007). The DMRB screening model provides a simple and straightforward means of predicting pollutant concentrations associated with road traffic emissions from the Proposed Development. According to Transport Infrastructure Ireland Guidelines (TII, 2011), this method is a suitable approach in circumstances where the predicted environmental concentrations (i.e., ambient background + predicted concentration) lie sufficiently below the air quality standards (<90% of the standard). Where predicted concentrations approach or exceed the air quality standards/limit values, a detailed air quality assessment must be carried out.

The DMRB modelling tool requires the following inputs to complete the assessment: road types, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles (%HGV), annual traffic speeds and background pollutant concentrations. This input data is utilised by the model in predicting the Proposed Development's road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptor. The DMRB modelling tool predicts annual mean concentrations of NO_x and PM_{10}. The road NO_x concentration is then converted to NO_2 using the latest-available version of the UK Department for Environment, Food and Rural Affairs (DEFRA) NO_x to NO_2 conversion spreadsheet (version 8.1). Concentrations of carbon monoxide (CO) and benzene (Bz) are consistently and significantly below their air quality limit values, even in urban centres, therefore modelling of these pollutants is no longer necessary (EPA Annual Air Quality Reports).

As the tool does not account for electric or hybrid vehicle use, vehicle emissions applied in this study are likely to overestimate the actual vehicle emissions experienced from the Proposed Development. The worst-case contributions predicted by the tool are added to the existing background concentration to provide a worst-case predicted ambient concentration. The compliance of the Proposed Development with the relevant ambient air quality standards is subsequently assessed by comparison with the worst-case ambient concentrations.

8.5.1.4 Sensitive Receptors

TII (2011) define sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres, and shopping areas, i.e., locations where members of the public are likely to be regularly present. According to the DMRB LA 105 guidance, sensitive receptors shall be chosen within 200m of the Affected Road Network (ARN) and include residential properties, schools and hospitals for the assessment of annual mean air quality thresholds. Where there is a risk of the short-term air quality thresholds being exceeded, then sensitive receptor locations including gardens and playing fields shall be assessed. In the current assessment, a number of high-sensitivity receptors such as residential properties and schools were identified within 200m of the ARN.

According to the DMRB LA 105 guidance, it is not necessary to model all receptors within 200m or an excessive number of receptors in the same area to determine whether there is likely to be any exceedances in the do nothing or do something scenarios.

For the purpose of determining local air quality impacts, eight (8 No.) receptors were included in this modelling assessment, and these have been identified in the following Table 8-12. The receptors modelled will represent the worst-case locations in close proximity to the Proposed Development and were chosen based on proximity (within 200m) to the road links affected by the Proposed Development:

Table 8-10: Sensitive Receptors

Name	Type	ITM Coordinates	
		X	Y
R1	Residential	728195	713501
R2	Residential	728267	713317
R3	Residential	728309	713161
R4	Residential	728344	713100
R5	Residential	728404	712859
R6	Residential	728175	712922
R7	School	728116	712974
R8	School	728112	713093

Designated sites of ecological conservation importance within 200m of the ARN are required to be included in the air quality assessment. This includes Special Protection Areas, Special Areas of Conservation, Natural Heritage Areas, and nature reserves. Only sites that are sensitive to nitrogen deposition should be included in the assessment, it is not necessary to include sites such as those which have been designated as a geological feature or water course. No Sites of ecological conservation importance have been identified within 200m of the ARN; therefore, this analysis has been excluded in the current assessment.

8.5.1.5 Traffic Data

The traffic data used in this assessment has been provided by AECOM and is shown in the following Table 8-13:

Table 8-11: Traffic Data Applied to the DMRB Model

Link Number	Road Name	Base Year (2019)	Opening Year (2023)		Design Year (2038)		Speed (Km/h)	% HGV
			Do Nothing	Do Something	Do Nothing	Do Something		
		AADT	AADT	AADT	AADT	AADT		
1	R761 Southern Arm (Northbound)	13142	14441	16520	16392	18471	50	1.72
2	R761 Northern Arm (Southbound)	13142	14441	17273	16392	19224	50	1.27

3	Coolagad Link Road	0	0	4911	0	4911	50	0
4	Blacklion Manor Road	5555	5092	6382	6667	6953	50	0.42
5	Redford Park	3592	3811	4017	4309	4337	30	1.78

8.5.1.6 Pollutants and Background Concentrations

The DMRB modelling tool predicts annual mean concentrations of NO_x and PM_{10}. The road NO_x concentration has then been converted to NO_2 using the latest published version of DEFRA's NO_x to NO_2 conversion spreadsheet (version 8.1). Concentrations of carbon monoxide (CO), and benzene (Bz) are consistently and significantly below their air quality limit values, even in urban centres, therefore modelling of these pollutants is no longer necessary (EPA Annual Air Quality Reports). According to the DMRB LA 105 guidance, it is only necessary to model PM_{10} for the base year to demonstrate that there is no impact on achievements of the PM_{10} air quality thresholds as a result of the project. Where air quality monitoring indicates exceedances of the PM_{10} air quality thresholds in the base year, PM_{10} should then be included in the model for both the 'do nothing' and 'do something' scenarios. As Ireland currently meets its legal requirements for the achievement of the $PM_{2.5}$ air quality thresholds, there is no requirement to model this parameter. Additionally, the modelling of PM_{10} can be used to demonstrate that the project does not impact on the $PM_{2.5}$ air quality threshold.

Annual mean of NO_2 and PM_{10} for the years 2018-2020 have been obtained from the automatic station in Dun Laoghaire (see Table 8-4). For both parameters, annual limits are well below the threshold limits contained within the regulations.

Background concentrations for the Opening Year (2023) and Design Year (2038) have been predicted for the air quality assessment. Baseline year (2019) background concentrations have been used in combination with correction factors to estimate annual average NO_2 concentrations in future years. These factors have been adapted from both TII (2011) and DEFRA roadside NO_2 projection factors.

Adjustments to the verified modelled NO_2 concentrations are required to be made in order to account for future roadside NO_2 concentrations. An additional scenario known as the projected base year is to be included in the air quality modelling to enable a gap analysis to be completed. The gap analysis is the application of adjustment factors which take into consideration the assumed roadside rates of reduction in NO_x and NO_2 by DEFRA's modelling tools compared to observed roadside monitoring trend i.e., the gap between the predicted reductions and those observed (DMRB LA 105 guidance). This methodology has been applied to the current assessment in order to predict future NO_2 concentrations as a result of the Proposed Development and ensure that these concentrations are not under-estimated.

8.5.1.7 Determining the Impact

The TII guidance document 'Guidelines for the Treatment of Air Quality during the Planning and Construction of Road Schemes (2011)' outlines a clear methodology for determining the

magnitude and significance of air quality impacts associated with road schemes; however, this remains applicable to any project which results in a change to traffic volumes. The TII significance criteria have been applied to the Proposed Development and adapted as necessary within tables 8-14 to 8-17.

Tables 8-14 to 8-17 have been designed to assist in describing the air quality impacts at each receptor. They are applicable to the pollutants which are relevant to the Proposed Development and the standards or limit values against which they are being assessed (TII, 2011). The criteria focus on NO_2 and PM_{10} as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3).

The definition of 'impact magnitude' is exclusively related to the degree of change in pollutant concentrations, expressed as micrograms per cubic metre (µg/m^3). 'Impact description' takes account of the impact magnitude and of the absolute concentrations and how they are linked to the air quality standards or limit values. The descriptors for the magnitude of change due to the Proposed Development are set out in Table 8-14.

Table 8-12: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations (Source: Adapted from TII, 2011)

Magnitude of Change	Annual Mean NO_2/PM_{10}	No. days with PM10 concentration greater than 50 µg/m^3
Large	Increase/decrease ≥4 µg/m^3	Increase/decrease >4 days
Medium	Increase/decrease 2 - <4 µg/m^3	Increase/decrease 3 or 4 days
Small	Increase/decrease 0.4 - <2 µg/m^3	Increase/decrease 1 or 2 days
Imperceptible	Increase/decrease <0.4 µg/m^3	Increase/decrease <1 day

The subsequent impact descriptors are set out in Table 8-15 and Table 8-16:

Table 8-13: Air Quality Impact Descriptors for Changes to Annual Mean NO_2 and PM_{10} Concentrations at Receptor (Source: Adapted from TII, 2011)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration[2]		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥40 µg/m^3 of NO_2 or PM_{10})	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (36-<40 µg/m^3 of NO_2 or PM_{10})	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (30-<36 µg/m^3 of NO_2 or PM_{10})	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<30 µg/m^3 of NO_2 or PM_{10})	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme (≥40 µg/m^3 of NO_2 or PM_{10})	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with Scheme (36-<40 µg/m^3 of NO_2 or PM_{10})	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme (30-<36 µg/m^3 of NO_2 or PM_{10})	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with Scheme (<30 µg/m^3 of NO_2 or PM_{10})	Negligible	Negligible	Slight Beneficial

[2] Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible.

Table 8-14: Air Quality Impact Descriptors for Changes to Number of Days with PM10 Concentration Greater than 50 µg/m³ at a Receptor (Source: TII, 2011)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration[3]		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (32-<35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (26-<32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value	Slight Beneficial	Moderate Beneficial	Moderate Beneficial

[3] Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible.

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration[3]		
	Small	Medium	Large
with Scheme (32-<35 days)			
Below Objective/Limit Value with Scheme (26-<32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

In terms of 'significance of effects', professional judgment has been applied in making this determination. The TII Guidance (2011) outlines that the overall air quality impact of the Proposed Development should be described as either 'insignificant', 'minor', 'moderate', or 'major'; and a number of factors, as listed in Table 8-17, are set out which should be taken into account:

Table 8-15: Factors to Consider when Determining Air Quality Significance (Source: Adapted from TII, 2011)

Factors
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.
The number of people exposed to levels above the objective or limit value, where new exposure is being introduced.
The magnitude of the changes and the descriptions of the impacts at the receptors i.e., using the findings based on Boxes Tables 8-14 to 8-16.
Whether or not an exceedance of a standard or limit value is predicted to arise in the study area where none existed before or an exceedance area is substantially increased.
Whether or not the study area exceeds a standard or limit value and this exceedance is removed, or the exceedance area is reduced.

Uncertainty, including the extent to which worst-case assumptions have been made
The extent to which a standard or limit value is exceeded, e.g., an annual mean NO_2 of 41 µg/m^3 should attract less significance than an annual mean of 51 µg/m^3

8.5.2 Modelling Results

The impact of the Proposed Development has been determined by modelling traffic-related air emissions resulting from the presence or absence of Proposed Development.

Concentrations of NO_2 and PM_{10} were modelled for the baseline year of 2019. As is evident from Table 8-18, the model has indicated that concentrations for all pollutants were in compliance with the annual limit of 40 µg/m^3. Therefore, in line with DMRB LA 105 guidance, further modelling of PM_{10} for the Opening and Design Years is not required. The highest road increment of PM_{10} experienced at receptors was 0.59 µg/m^3. When this is assessed in combination with the 2019 background concentration of 12 µg/m^3, an overall impact of 31.5% of the annual limit is experienced at the worst-case receptor.

The impact of NO_2 was predicted for the Opening and Design Years at the nearest receptors to the affected road network (ARN). The degree of impact has been determined based on both the absolute and relative impact of the Proposed Development. A 'Do-Nothing Scenario', which assumes that the Proposed Development does not exist in future years, has also been assessed within the model and results have been compared in order to determine the degree of impact.

Table 8-16: Modelled Baseline NO_2 and PM_{10} Concentrations (2019)

Receptor	Receptor Type	Parameter	Total (µg/m³)	Road Traffic Component
R1	Residential	PM_{10}	12.35	0.35
		NO_2	16.54	1.54
R2	Residential	PM_{10}	12.59	0.59
		NO_2	17.61	2.61
R3	Residential	PM_{10}	12.27	0.27
		NO_2	16.06	1.06
R4	Residential	PM_{10}	12.52	0.52
		NO_2	17.19	2.19
R5	Residential	PM_{10}	12.59	0.59
		NO_2	17.67	2.67
R6	Residential	PM_{10}	12.30	0.30
		NO_2	16.28	1.28
R7	School	PM_{10}	12.12	0.12
		NO_2	15.53	0.53
R8	School	PM_{10}	12.08	0.08
		NO_2	15.33	0.33

The impact of the Proposed Development on annual mean NO_2 concentrations in the Opening Year (2023) and Design Year (2038) has been assessed relative to the 'Do Nothing' levels. The results shown in Table 8-19 and 8-20 determine that there may be some 'imperceptible' or 'small' increases in concentrations of NO_2 at worst-case receptors assessed when compared with 'Do Nothing' levels; with the highest predicted increase of 0.79 µg/m³ and 0.7 µg/m³ measured at R2 in the Opening Year and Design Year 'Do Something' scenarios, respectively.

Having regard to the assessment criteria set out in Section 8.5.1.2.1.4 and the modelling results outlined in Table 8-19 and Table 8-20, the impact of the Proposed Development on NO_2 concentrations in the locality is likely to be 'long-term', 'negative' and 'imperceptible'. The overall effect of the Proposed Development is insignificant in terms of ambient air quality standards.

Table 8-17: Predicted Annual Mean Concentrations of NO_2 (Opening Year 2023)

Receptor	Parameter	Background (µg/m³)	Opening Year 2023				
			Do Nothing	Do Something	Proposed Development Contribution	Magnitude	Impact description
R1	NO_2	12.04	13.72	13.91	0.19	Imperceptible	Negligible Increase
R2	NO_2		14.88	15.67	0.79	Small	Negligible Increase
R3	NO_2		13.11	13.28	0.17	Imperceptible	Negligible Increase
R4	NO_2		14.35	14.56	0.21	Imperceptible	Negligible Increase
R5	NO_2		14.94	15.17	0.23	Imperceptible	Negligible Increase
R6	NO_2		13.23	13.51	0.28	Imperceptible	Negligible Increase
R7	NO_2		12.54	12.65	0.11	Imperceptible	Negligible Increase
R8	NO_2		12.36	12.43	0.07	Imperceptible	Negligible Increase

Table 8-18: Predicted Annual Mean Concentrations of NO_2 (Design Year 2038)

Receptor	Parameter	Background (µg/m³)	Design Year 2038				
			Do Nothing	Do Something	Proposed Development Contribution	Magnitude	Impact description
R1	NO_2	8.7	10.49	10.63	0.14	Imperceptible	Negligible Increase
R2	NO_2		11.72	12.42	0.7	Small	Negligible Increase
R3	NO_2		9.95	10.02	0.07	Imperceptible	Negligible Increase
R4	NO_2		11.25	11.34	0.09	Imperceptible	Negligible Increase
R5	NO_2		11.78	11.93	0.15	Imperceptible	Negligible Increase
R6	NO_2		10.21	10.28	0.07	Imperceptible	Negligible Increase
R7	NO_2		9.33	9.35	0.02	Imperceptible	Negligible Increase
R8	NO_2		9.08	9.12	0.04	Imperceptible	Negligible Increase

In identifying sensitive receptors, consideration has been given to the averaging periods of the air quality standards. The receptors that have been subject to assessment in this study are areas where the public might reasonably be expected to be present for an hour or more. In this case, the short-term standard of the 1-hour mean for NO_2 has been considered. Analysis has shown that statistically, on the basis of a dataset presented by DEFRA (2008), the chance of measuring an hourly NO2 objective exceedance whilst reporting an annual mean NO2 of less than 60 µg/m3 is very low. Therefore, having regard to the results outlined in Table 8-19 and Table 8-20, it is considered that the hourly limit criteria for NO2 concentrations is highly unlikely be exceeded at any receptors in the vicinity of the ARN as a result of the Proposed Development.

8.5.3 Potential Impacts on Climate

8.5.3.1 Construction Phase

There is the potential for combustion emissions from onsite machinery and traffic derived pollutants of CO_2 and N_2O to be emitted during the construction phase of the development. However, due to the size and duration of the construction phase (approximately 4 years in duration), and the mitigation measures proposed, the effect on national GHG emissions will be insignificant in terms of Ireland's obligations under the Kyoto Protocol and the Paris Agreement and therefore will have no significant effect on climate. Overall, effects on climate are considered to be short-term and imperceptible.

8.5.3.2 Operational Phase

GHG Emissions

Traffic

Increased LDV traffic flow as a result of the Proposed Development is likely to contribute to increases in GHG emissions such as CO_2 and N_2O. However, these contributions are likely to be marginal in terms of overall national GHG emission estimates and Ireland's obligations under the Kyoto Protocol and the Paris Agreement, and therefore unlikely to have a significant effect on climate. Furthermore, it is widely anticipated that CO_2 emissions for the passenger car fleet will reduce substantially in future years due to the increasing prevalence of electric or hybrid vehicle use.

Flood Risk

There is growing scientific consensus that the warming of the climate is expected to increase the risk of floods. Rising sea levels and more frequent and severe coastal storms will increase the risk of coastal and estuarial flooding as well as coastal erosion. According to the Planning System and Flood Risk Management (DECLG & OPW, 2009), where the floodplain or coastal plain is well defined, climate change is expected to change the probability of flooding and the depth for a particular event with little change in spatial extent. Only where extensive areas of land rise gently from the river or the sea is climate change expected to significantly increase the area affected by flooding.

There is a great deal of uncertainty in relation to the potential effects of climate change; therefore, a precautionary approach should be adopted, where necessary, to reflect uncertainties in flooding datasets and the ability to predict the future climate. Development should be designed with careful consideration to possible future changes in flood risk, including the effects of climate change so that future occupants are not subject to unacceptable risk (OPW, 2009).

According to Chapter 7, *Hydrology*, The OPW national flood hazard mapping (NFHM) data base was consulted (OPW, 2021) and the available data maps the majority of the Proposed Development Site with an annual exceedance probability (AEP) of less than 0.1%., with a small portion of the Site along the Greystone Stream at the Site with an AEP of 0.1%.

A Flood Risk Assessment Report has been produced by AECOM for the Proposed Development. The CFRAM Flood Maps include 0.1%AEP fluvial flood levels for the stream within the Site which are 2.10m below lowest Site levels and therefore the Site is considered not at risk of fluvial flooding. The Infrastructure Report (AECOM) notes that Wicklow County Council identified that surface runoff and spring discharges are conveyed to the culverts piped through Redford Park and Rathdown Park and that the culvert is at limited capacity and poor construction resulting in flooding at Redford Park.

The flood risk assessment prepared by AECOM for the Proposed Development concludes that the proposed surface water drainage and SuDS strategy will mitigate any flood potential for the Site and elsewhere. The report identifies the proposed interception drain along the western boundary of the Site will intercept and divert any runoff from the Kindlestown Hill area and will be discharged to the existing water courses at controlled rates to avoid any flooding downstream.

There are no recorded historic groundwater flood events recorded at or within 2km of the Proposed Development Site (GSI, 2022) however it is noted that the groundwater flood historical and predictive maps are only available for limestone regions, the Site is not however within a limestone region.

Microclimate

IES Consulting have been commissioned on behalf of Cairn Homes Properties Limited to study the impact of wind around the Proposed Development. The site consists of 6 apartment blocks (to include 203 units), 32 duplexes and 351 houses. The analysis has been performed to study the effect from the building layout on pedestrian comfort as well as safety for people using the public and various amenity spaces around the site. The analysis has looked at the air movement around the buildings for eight wind directions (SW, W, NW, N, NE, E, SE and S) with the wind velocity set to the mean value obtained from the weather file.

The Lawson's Normal Pedestrian safety criteria states that the local air speed at designated locations should not exceed 20m/s for more than 0.01% of the duration analysed. The Lawson's Sensitive Pedestrian safety criteria states that the local air speed at designated locations should not exceed 15m/s for more than 0.01% of the duration analysed. The Sensitive pedestrian safety criterion applies to the vulnerable population such as pensioners and children. Note the limit of the criterion is 0.01% and not 5% as with the comfort criterion.

The Lawson's sitting comfort criteria states that the local air speed at designated location should not exceed 4m/s for more than 5% of the duration analysed. The Lawson's standing comfort criteria states that the local air speed at designated locations should not exceed 6m/s for more than 5% of the duration analysed.

The Microclimate Report, which is available in Appendix 8-1, describes the modelling methodology used in the study, including assumptions made and calculations used to determine the boundary conditions and results obtained from the simulations.

To summarise, the site is generally affected by the topology i.e., the hill to the west of the site. It causes the air speed to increase higher than meteorological measurements, as the air moves down the slope of the site. The site is still generally safe for pedestrians, and it meets the Lawsons's Walking criteria requirements. It generally meets requirements of Lawsons's Standing and Sitting criteria in conjunction with each other. Some balconies are seen to experience exceedance of the Lawson's Sitting and Standing criteria. However, the balcony spaces are the private spaces which are used by the people residing in the respective residence. They will be expected to use their own discretion in judging the comfortable weather conditions. It is not a space that can be treated as a public open space where people have to use it frequently. So, no further mitigation measures have been recommended in this regard.

8.6 Cumulative Impacts

Cumulative air quality impacts have the potential to arise locally when construction activities associated with the Proposed Development take place at the same time as other developments in a specific location.

All planning applications which have been granted permission and are already developed have been incorporated into the baseline assessment of this application. A planning search has revealed that there have been 2 No. recent (within the last five years) applications for Strategic Housing Developments in the vicinity of the Proposed Development Site which have been granted permission, as detailed in Table 8-21, that could potentially be constructed at the same time as the Proposed Development.

Table 8-19: Recent applications granted permission in the vicinity of the Proposed Development

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

The cumulative effects on the air quality and climate of the current Proposed Development and other permitted or existing developments have been considered, in particular through the

generation of air pollutants and GHG emissions. The potential impacts on air quality and climate are assessed in Section 8.5 and it is considered that there are no other potential significant cumulative impacts associated with the Proposed Development and considered offsite permitted developments.

In terms of dust, no significant impacts are predicted; good construction practice, which incorporates the implementation of the identified mitigation measures, will be employed at the Proposed Development site. These mitigation measures have been outlined in the Construction Environmental Management Plan (CEMP) for the Site and will be adhered to for the entire duration of the Construction Phase. The applications with potential for cumulative effects, which are outlined in Table 8-21 (ABP.Ref.305476 and ABP.Ref.305773), have committed as part of their respective applications to avoid significant effects on air quality and climate during the construction phase and have implemented a suite of mitigation measures to ensure that no such impacts occur. Due to the implementation of good construction practices at the Site of the Proposed Development and these offsite permitted developments, it is not anticipated that significant cumulative impacts will occur.

Assessment of construction and operational stage impacts on air quality involved traffic data which is inclusive of traffic associated with other existing and permitted developments on the road networks surrounding the Site both in current and future years. Therefore, cumulative impacts have been assessed in this regard and the impact on ambient air quality has been determined as insignificant.

8.7 Ameliorative, Remedial or Reductive Measures

8.7.1 Air Quality

8.7.1.1 Construction Phase

It is not expected that adverse air quality impacts are likely to occur at sensitive receptors as a result of the Proposed Development. However, the following mitigation measures will be implemented in order to further prevent such impacts occurring. These measures have been outlined within the Construction Environmental Management Plan (CEMP) for the Site.

Vehicle and Plant Emissions

Emissions to the atmosphere, in terms of gaseous and particle pollutants from vehicles and plant used on-site, should be controlled and limited, as far as reasonably practicable, using measures and appropriate control techniques as listed below:

- The engines of all vehicles and plant onsite should not be left running unnecessarily (i.e. idling) to minimise exhaust emissions (and noise).
- Vehicles and plant shall adhere to applicable emissions standards.
- Plant, equipment and emission control apparatus shall be selected to minimise the engine exhaust emissions, taking into consideration economic constraints and practicability.
- Enclosed vehicles or tarpaulins shall be used to transport debris, aggregates, and fine materials to and from the site to prevent blow-off of such materials.
- Vehicles and plant shall be in good working order and certified where applicable, with servicing completed in line with manufacturer's recommendations. Records of servicing

shall be maintained and visual checks carried out to ensure that black smoke is not emitted at times other than at ignition.

- Haul routes and plant shall be situated and operated away from sensitive receptors and sensitive core activities associated with operation of other businesses (where possible).
- The use of diesel or petrol-powered generators shall be minimised, with mains electricity of battery powered equipment used as an alternative (where feasible).
- Unnecessary vehicle movement and manoeuvring will be avoided, and speed limits will be in place so as to prevent resuspension of particulate matter.
- Exhaust emissions of volatile organic compounds, nitrogen oxides, and sulphur oxides from vehicles and machinery will be minimised by avoidance of engines running unnecessarily as idle engines shall not be permitted for excessive periods.
- Maximise energy efficiency, which may include using alternative modes of transport, maximising vehicle utilisation by ensuring full loading and efficient routing.

Dust Control

As with most new builds, a significant proportion of pre-made elements will be brought to the site which reduces the potential for dust emissions. Similarly, typical dust generation sources such as batch concreting is not likely to be carried out. Pre-mixed concrete will be brought to site.

The following measures shall be implemented to ensure that dust generation is minimised. The principal objective of measures with regards to dust is to ensure that dust emissions do not cause significant dust soiling on nearby residential receptors:

- Stockpiles of soil and sub-soil and activities potentially giving rise to soil erosion shall be strictly controlled and maintained as low as possible.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind and shorten the length of time for which material will be stockpiled.
- Stockpiled material shall be located away (>10m) from surface water features/drainage ditches.
- The construction compound area shall have hard standing areas to minimise dust generation from wind-blow.
- Hard surfaced areas shall be swept regularly to remove mud and aggregate materials.
- In order to minimise the potential for wind-generated emissions from material storage bays, these bays shall be oriented away from the dominant wind direction (west-southwest) to minimise the effects of wind on release of dust and particulate.
- Fixed and mobile water sprays shall be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather.
- Watering can be utilised to keep unpaved areas moist, preventing dust generation. The required application frequency will vary according to soil type, weather conditions and vehicular use.
- Dust suppression techniques will include employment of water bowsers to dampen the site and haul roads, and temporary ceasing of specific operations during unfavourable weather conditions
- A wheel-wash shall be available to trucks exiting the site where necessary and used to reduce mud deposition on local roads.

- Public roads will be inspected on a daily basis (at a minimum) for cleanliness and cleaned as necessary in order to avoid causing a hazard to road users.
- Daily visual observations will be made on fugitive dust levels; in the event of high dust levels, operations giving rise to such emissions will be ceased or curtailed.
- A daily inspection programme shall be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management. Daily visual observations will be made on fugitive dust levels; in the event of high dust levels, operations giving rise to such emissions will be ceased or curtailed.
- A communication programme with local residents shall be implemented and shall include:
  - Designation of a responsible person for dust management;
  - Signage displaying contact numbers for person responsible for dust management on the Proposed Development Site; and
  - A complaints logbook or record shall be maintained on site detailing nature of complaint, preventative and corrective actions taken and close-out communication with complainant.

8.7.1.2 Operational Phase

It has been determined that the Operational Phase air quality impact is negligible and therefore no site-specific mitigation measures are required.

8.7.2 Climate

As negative climatic impacts associated with the Construction and Operational Phases of the Proposed Development are negligible, no mitigation measures are required. Best practice measures will be implemented to minimise exhaust emissions from construction and operational vehicles and machinery by avoidance of engines running unnecessarily, as idle engines shall not be permitted for excessive periods. Furthermore, the Proposed Development shall seek to achieve the greatest standards of sustainable construction and design and will have regard to sustainable building design criteria.

8.8 Residual Impacts (including worst case scenario)

Residual Impacts are defined *as "effects that are predicted to remain after all assessments and mitigation measures"*. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts. Potential residual impacts from the Proposed Development were considered as part of this environmental assessment.

The Proposed Development is likely to result in a long-term increase in traffic on the roads surrounding the Proposed Development Site; however, this increase in traffic has been determined to have negligible impacts in terms of local air quality. Furthermore, the increase in traffic has been determined as marginal with regard to climatic impacts. Therefore, no significant residual effects are anticipated from the proposed scheme in the context of air quality and climate after the application.

A worst-case scenario has been applied to the Construction Phase air quality assessment in terms of the scale of the source and potential dust nuisances. It is expected that adequate mitigation measures, as outlined in Section 8.7.1.1, will assist in preventing nuisance dust from

resulting in any significant effects. In the event of a failure of such measures, it is not considered that significant dust related effects will occur.

A worst-case scenario has been applied to the Construction and Operational Phase air quality assessment in terms of traffic volumes experienced on the surrounding road network and associated air emissions. As the DMRB modelling tool does not account for electric or hybrid vehicle use, vehicle emissions applied in this study are likely to overestimate the actual vehicle emissions experienced from the Proposed Development. The worst-case contributions predicted by the tool are added to the existing background concentration to provide a worst-case predicted ambient concentration. The compliance of the Proposed Development with the relevant ambient air quality standards is subsequently assessed by comparison with the worst-case ambient concentrations. Associated impacts have been determined as negligible in this case.

8.9 Do Nothing Scenario

The subject site is currently comprised of agricultural lands; if to remain undeveloped, the site will continue to exist in the current environment an have no significant impact on the existing ambient air quality or microclimate.

The Do-Nothing impact has been assessed in terms of air quality in this chapter. It has been determined that there is an overall negligible increase in relevant pollutants as a result of the Proposed Development in both the Opening and Design Years when compared to the Do-Nothing scenario.

Greenhouse gas emissions as a result of the Proposed Development are also likely to be marginal in terms of overall national GHG emission estimates and Ireland's obligations under the Kyoto Protocol and the Paris Agreement when compared to a Do-Nothing scenario.

8.10 Monitoring

The monitoring of construction dust during the Construction Phase of the Proposed Development will be carried out to ensure that impacts are not experienced beyond the Site boundary. Monitoring of dust will be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at a strategic locations along the Site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations will be carried out in consideration of the requirements of *VDI 2119* with respect to the location of the samplers relative to buildings and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges will be removed from the Site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in $mg/m^2/day$ in accordance with the relevant standard.

All monitoring will be carried out in line with the Construction Environmental Management Plan (CEMP) for the Site.

Due to the negligible impact on air quality and climate from the Operational Phase of the Proposed Development, no specific monitoring is recommended during this stage.

8.11 Difficulties Encountered

No difficulties have been encountered while compiling this chapter.

8.12 References

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United Nations Framework Convention on Climate Change (2015) The Paris Agreement.

9 Noise and Vibration

9.1 Introduction

This chapter identifies and assesses the potential noise and vibration impacts and related potential effects arising from both the construction and long-term operational phases of the proposed Development at Coolagad, Greystones, Co. Wicklow.

Key issues to be addressed in this chapter include identification and assessment of potential temporary/short-term construction noise and vibration impacts arising from the construction and development phase and potential long-term noise impact at nearby Noise Sensitive Receptors (NSRs) arising from increased traffic on the surrounding road network. A separate assessment of the exposure of future residents to airborne noise from transportation sources has also been completed. This takes account of the potential for long term noise impact and effects on future residents from existing transportation sources and potential increases in the foreseeable future.

9.1.1 Competent Expertise

This assessment has been prepared by Ms. Siobhan Maher of Redkite Environmental Ltd, whose qualifications include a B.Sc. in Analytical Science, M.Tech. in Environmental Management and a post graduate Diploma in Acoustics and Noise Control Engineering. The author also holds full membership of the Institute of Acoustics (MIOA) since 2003 and is also a member of the Association of Acoustic Consultants Ireland (AACI).

Ms. Siobhan Maher is the Managing Director of Redkite Environmental with over 20 years of experience providing environmental consultancy and environmental assessment services to business, industry and public sectors. She was previously a Technical Director in Malone O' Regan Environmental Services from 2001 – 2013 where she was responsible for management and delivery of over 50 EIARs. Projects ranged from port development, road schemes and flood relief programmes to retail, commercial, industrial, residential and recreation projects. In the area of acoustics, she has experience in a range of areas principally including noise and vibration impact assessment for new and proposed developments, environmental noise monitoring and prediction modelling and development of mitigation measures for noise abatement and control.

9.2 Assessment Methodology

9.2.1 Characterisation of the Receiving Environment

The receiving sound environment has been characterised by both field survey and desk-based study.

A review of the Wicklow County Council Noise Action Plan 2018 – 2023 and transport noise mapping on the EPA website https://gis.epa.ie/EPAMaps/ was undertaken as part of the desk-based study.

Site visits and surveys in accordance with relevant guidance were completed on the 9th – 10th April 2021 and on the 13th – 14th April 2021. The baseline survey was completed when relevant COVID restrictions on school closures in particular were lifted.

Unattended monitoring was conducted over 24 hours at 2 locations (NMP1 and NMP2 on Figure 9.1 below) to capture road traffic noise.

Attended monitoring was also conducted at a further five Noise Monitoring Points (NMPs 3-7 on Figure 9.1 below) during the daytime (07.00 – 19.00hrs) period.

The measurement methodology followed was in accordance with the recommendations of the following best practice and recognised approach:

- International Standards Organisation Document: ISO 1996 Acoustics – Description, Measurement and Assessment of Environmental Noise, Part 1, Basic Quantities and Assessment Procedures (2016) and Part 2 Determination of Environmental Noise Levels (2017), and,
- The EPA Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4), revised January 2016.

Ambient noise monitoring was undertaken at the locations as illustrated in Figure 9-1 below and described in Table 9-1 overleaf. The locations were chosen to be representative of nearest Noise Sensitive Receptors (NSRs) and, also to evaluate the typical existing transportation noise affecting the proposed Development Site for the assessment of future resident's exposure to transportation noise. Photographs of each monitoring location are shown on Plates 9-1 – 9-7.

Figure 9-1: Noise Monitoring Locations (Source: Google Maps)

Table 9-1: Description of Noise Monitoring Points

Location	Grid Ref.	Description
Un-attended 24-hour monitoring (in yellow on Figure 9-1)		
NMP1	327709E; 212965N	Central location in site. Currently in agricultural grass.
NMP2	328299E; 213247N	Adjacent to R761 and existing bungalow/gate lodge.
Attended (in blue on Figure 9-1)		
NMP3	327931E; 212659N	Southern site boundary adjacent to new development Waverly to the east and lands under development to the south.
NMP4	327886E; 212839N	Eastern site boundary adjacent to Waverly.
NMP5	327662E; 213231N	Northern site boundary. Approximately 160m from NSR to the north.
NMP6	327907E; 213200N	Central part of site. Located approximately 100m to the north of existing farmyard and small cottages.
NMP7	328079E; 213246N	Approximately 65m north of farm residence to the south.

Plate 9-1 NMP1

Plate 9-2 NMP2

Plate 9-3 NMP3

Plate 9-4 NMP4

Plate 9-5 NMP5

Plate 9-6 NMP6

Plate 9-7 NMP7

Attended measurements were conducted at NMP3 and NMP5 on 9/4/2021 between 10.15 – 16.00hrs and at NMP4, 6 and 7 on 13/4/2021 between 08.00 – 12.15 hrs.

An unattended meter was set up at NMP1 at 12.30 hrs on 9/4/2021 – 12.30 hrs on 10/4/2021 and at NMP2 at 10.15 hrs on 13/4/2021 – 11.15 hrs on 14/4/2021. The parameters measured included L_{Aeq}, L_{A90}, L_{A10}, L_{Amax} and L_{Amin}.

During the attended measurements and during set-up of the unattended meters, survey personnel noted all primary noise sources contributing to the ambient sound environment. Detailed field notes were recorded during the attended survey.

Overall weather conditions prevailing during both the surveys were suitable for noise monitoring. Occasional showers occurred on the 9/4/2021 at approx. 13.10 – 13.38hrs. Wind speeds were light and < 5m/sec with occasional gusts < 6m/sec during the day on the 9/4/2021. Weather conditions were very calm with no precipitation on the 10th, 13th and 14th April 2021. Wind direction was from the north/northwest.

Sound measurement was carried out using two Type 1 Sound Level Meters and associated auxiliary equipment (calibrators and tripods, outdoor kits etc). The meters were placed in open areas >3.5m from reflecting surfaces and a minimum of 1.2m above ground level. The unattended meter microphone at NMP1 were placed 4m above ground level (refer to Plate 9.1). The meters were calibrated before and after use. The observed drift during measurement was within acceptable limits ≤ 1. dB. The sound levels were measured using the A-weighted network, and a fast-sampling interval. Sample intervals for attended measurements were 15 minutes. Wind speed was measured using a portable anemometer. Further details of the monitoring equipment used are set out in Table 9-2 below.

Table 9-2: Equipment Used

Instrument Type	Manufacturer	Model Number	Serial Number
Sound Level Meter	NTi	XL2	A2A-08898-E0
Acoustic Calibrator	Larson Davis	CAL200	11728
Preamplifier & Microphone	NTi	MA2230	8694 & 5062
Sound Level Meter	NTi	XL2	A2A-16311-E0
Acoustic Calibrator	Larson Davis	CAL200	16757
Preamplifier & Microphone	NTi	MA230	8567&A17383

A Testo 410-1 (Serial No. 38463402/711 with manuf. calibration cert) Digital Wind Speed Scale Gauge Meter Anemometer with a range from 0.4 – 20m/s and a temperature range from -10 – 50°C was used on-site to measure wind speeds and temperature.

9.2.2 Impact Assessment

The following guidance and standards have been used in the setting of suitable noise and vibration criteria and assessment of impacts and effects on human beings:

- BS5228-1:2009 +A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1: Noise and Part 2: Vibration;
- BS8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings;
- Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise & Vibration in National Road Schemes, 2014;
- UK LA111 Noise and Vibration, Standards for Highways, Highways England, Version 2, May 2020;
- Artificial Grass Pitch (AGP) Acoustics, - Planning Implications, New Guidance for 2015, Sport England;
- Siting of Synthetic Grass Pitches – Guidance on Noise and Floodlighting, Planning Guidance 1002, Sportscotland, 2017, and,
- ISO 9613.-2 – 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

The EPA draft document entitled Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017 contains general guidance on the assessing of environmental effects in terms of quality, significance, duration, magnitude and type. This document has also been considered, where appropriate, in defining noise and vibration impacts however the above guidance and standards listed form the main basis of setting of criteria and assessment.

In addition, the UK ProPG: Planning & Noise, New Residential Development, May 2017[1] was used as guidance in completing a separate assessment of exposure of future residential development to airborne noise from transportation sources. This document outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. Stage 1 comprises an initial noise risk assessment of sites proposed for residential development considering either measured and/or predicted noise levels. A site is then given a characterisation ranging from negligible to high risk in terms of exposure to noise of future residents. A full stage 2 assessment including implementing a good acoustic design process is triggered depending on the existing ambient noise environment and findings of the Stage 1 Noise Risk Assessment.

9.2.3 Definitions

The following definitions apply in this chapter:

L_{Aeq} is the A – weighted equivalent continuous sound level – the sound level of a steady sound having the same energy as a fluctuating sound over a specified measurement period.

L_{A10} is the A-weighted noise level which is exceeded for 10% of the specified measurement period. This gives an indication of the upper limit of fluctuating noise such as that from road traffic.

L_{A90} is the A-weighted noise level exceeded for 90% of the measurement period and is useful in providing an indication of the background noise level experienced over the measurement period.

L_{AFmax} is the maximum A-weighted noise level measured during a cycle with a fast time weighting.

L_{AFmin} is the minimum A-weighted noise level measured during a cycle with a fast time weighting.

L_{day} Day equivalent level: A-weighted, Leq. Sound Level, measured over the 12-hour period 07.00 - 19.00 hours

L_{den} Day-evening-night level. It is a descriptor of noise level based on energy equivalent noise level (Leq) over a whole day with a penalty of 10 dB(A) for night-time noise (23.00-07.00) and an additional penalty of 5 dB(A) for evening noise (i.e.19.00-23.00).

$L_{evening}$ Evening equivalent level**:** A-weighted, Leq. Sound Level, measured over the 4-hour period 19.00 - 23.00 hours

L_{night} Night equivalent level**:** Leq. A-weighted, Sound Level, measured overnight 23.00 – 07.00 hours.

$L_{Aeq,16\ hours}$, 16-hour equivalent level: Leq. A-weighted, Sound Level, measured from 07.00 – 23.00 hours.

[1] This document was prepared by a working group comprising members of the UK Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since its adoption, it has been generally considered as a best practice guidance for assessing inward noise risk for new residential development.

Rw – weighted sound reduction index - a single-number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies. (Laboratory measurement). The apparent Rw is the value as measured in the field.

SEL – Single Event Level - the dB(A) level which if it lasted for one second would produce the same A-weighted sound energy as the actual event.

Spectrum Adaptation Terms: C and Ctr -The single number rating method defined in BS EN ISO 717 uses a standard reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation terms C and Ctr may be used to take into account different source spectra as indicated in the standard.

C is an A-weighted Pink Noise spectrum.

Ctr is an A-weighted urban traffic noise spectrum.

Ctr can also be added to DnT,w or Rw to take into account low frequency noise.

The "A" suffix denotes sound levels that have been "A-weighted" in order to account for the non-linear nature of human hearing to sounds of different frequencies.

All sound levels in this report are expressed in terms of A-weighted decibels (dB)

9.3 Characteristics of the Proposed Development

The proposed development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building (392 sqm), a creche (700 sqm), a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

9.3.1 Phasing

The site development and construction phases are expected to last over a 3 - year period from an envisaged start date in October 2022 with final completion in November 2025. The proposed phasing is outlined below in Table 9-3.

Table 9-1: Proposed Programme of Phasing

Phase	No. of Units	Cumulative Units	Proposed Delivery of Units
1A	106 houses and completion of distributor road	106	2023
1B	88 houses	194	2024

Phase	No. of Units	Cumulative Units	Proposed Delivery of Units
2	72 (comprising 40 houses and 32 duplexes) and development of zoned open space and zoned active open space	266	2024
3	91 houses and creche and community buildings	357	2025
4	229 comprising 203 apartments and 26 houses	586	2025

As noted in Table 9-3 above, there will be overlap in the Phasing of development.

9.3.2 Proposed Site Development and Construction Routes

The proposed route to and from the site for construction traffic will be off the M11 at Junction 5 (Bray North) and onto the R761 thorough Bray to the R761 before turning right into the site or left to exit.

An alternative route proposed is off the N11 at Junction 10 onto the R762 into Delgany before turning left onto the R761.

9.4 Baseline Description

9.4.1 Site Context

The subject site is located in an emerging suburban area to the northwest of the centre of Greystones. Currently, the site is mainly grassed and in partial use for agricultural purposes. Lands to the east and southeast have recently been developed for residential and educational uses. Lands to the north and west are in agricultural use. Lands to the more distant south off Chapel Road have been developed for more mature lower density residential development in the past. During the site visit in April 2021, construction activity as part of the new Seagreen Development was noted in the field to the immediate south of the subject site. The nearest Noise Sensitive Receptors (NSRs) to the subject site are Waverly Avenue, the schools complex, the former landowner's dwellings and a bungalow/gate lodge adjacent to the site entrance off the R761. There are further detached dwellings off Lower Windgates to the north. The majority of the site is elevated above the R761 and existing NSRs in Waverly. Road traffic on the local road network, including the R761 and to a lesser extent the Blacklion Manor Road and R762 are the main transportation noise sources currently affecting the subject site. Occasional overhead aircraft and distant trains were also audible. Birdsong was the predominant sound source affecting the majority of the site except the area close to the R761.

The location of NSRs is indicated on Figure 9-2 below.

Figure 9-1: Location of Residential Noise Sensitive Receptors (in yellow) (Source: Google Maps)

9.4.2 Summary Findings of Ambient Sound Survey

The survey was designed to establish the existing baseline noise at existing representative NSRs and to establish the transportation noise exposure risk for future residential.

The results of 24-hour monitoring at NMP1 and NMP2 are presented in Tables 9-4 and 9-5 below and illustrated on Figures 9-3 and 9-4.

Table 9-2:Summary Results of Monitoring at NMP1

Parameter	Results & Comments	
$L_{Aeq,16hr}$, $L_{A90,16hr}$	46, 37	Birdsong, distant road traffic in background. Intermittent trains (muffled and distant) and occasional overhead aircraft also audible.
$L_{night,}$, $L_{A90, night}$	45, 32	Very quiet from 00.00 to 05.42 hrs when dawn chorus started. Birdsong significantly increased L_{Aeq} value. Three trains were clearly audible between 23.29 – 23.53 hrs on the audio recording
L_{day}, $L_{A90, day}$	47, 37	As $L_{Aeq,16hr.}$
$L_{evening}$, $L_{A90, evening}$	42, 34	As $L_{Aeq,16hr.}$
L_{den}	51	-

No. of L_{Amax} values during the night due to transportation noise	2	2 values recorded at NMP1 were due to train horns.

The $L_{A,eq,\,t}$ values listed above, reflect all noise sources measured. Distant road traffic noise, as a continuous noise source, is most suitably represented by the $L_{A90,\,t}$ values recorded and presented above.

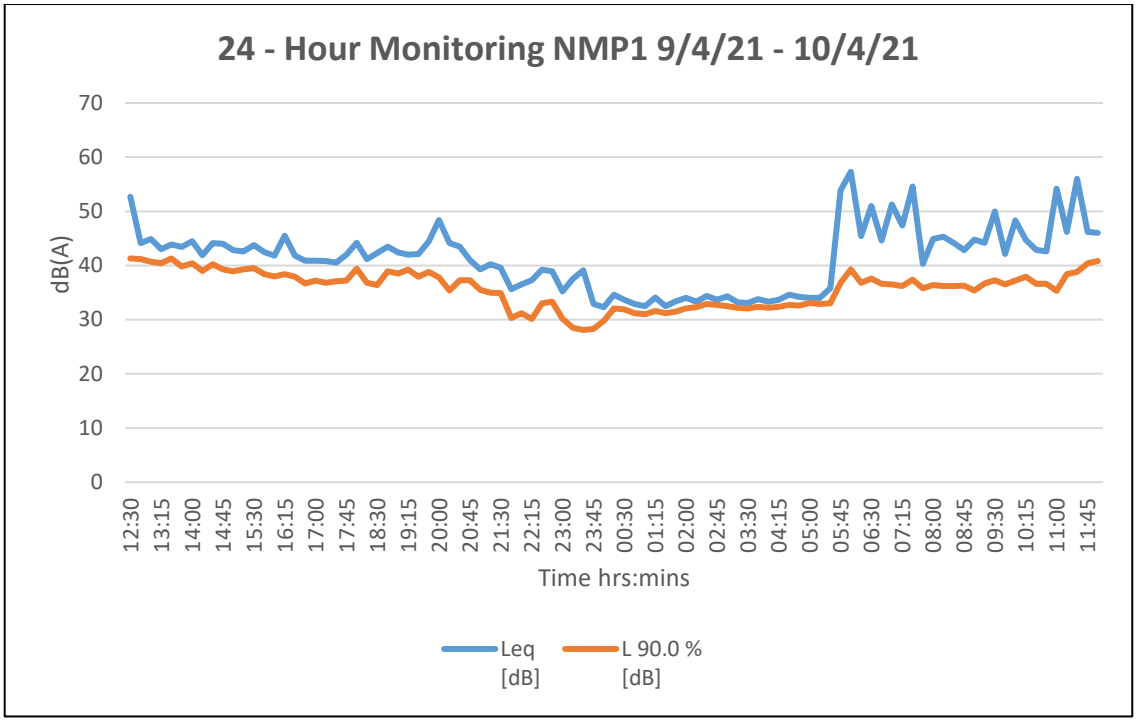


Figure 9-2: Graph Illustrating Change in Sound Levels at NMP1

Table 9-3: Summary Results of Monitoring at NMP2

Parameter	Results & Comments	
$L_{Aeq,16hr}$, $L_{A90,16hr}$	63,49	Road traffic on the R761 predominant.
$L_{night,}$, $L_{A90,\,night}$	56,24	Very quiet from 00.30 - 05.20 hrs. From 06.00hrs traffic noise increased to daytime levels.
L_{day}, $L_{A90,\,day}$	64,52	As $L_{Aeq,16hr.}$
$L_{evening}$, $L_{A90,\,evening}$	61,42	As $L_{Aeq,16hr.}$
L_{den}	65	-
No. of L_{Amax} values during the night due to transportation noise	>10	Intermittent vehicles on the R761 throughout the night-time period.

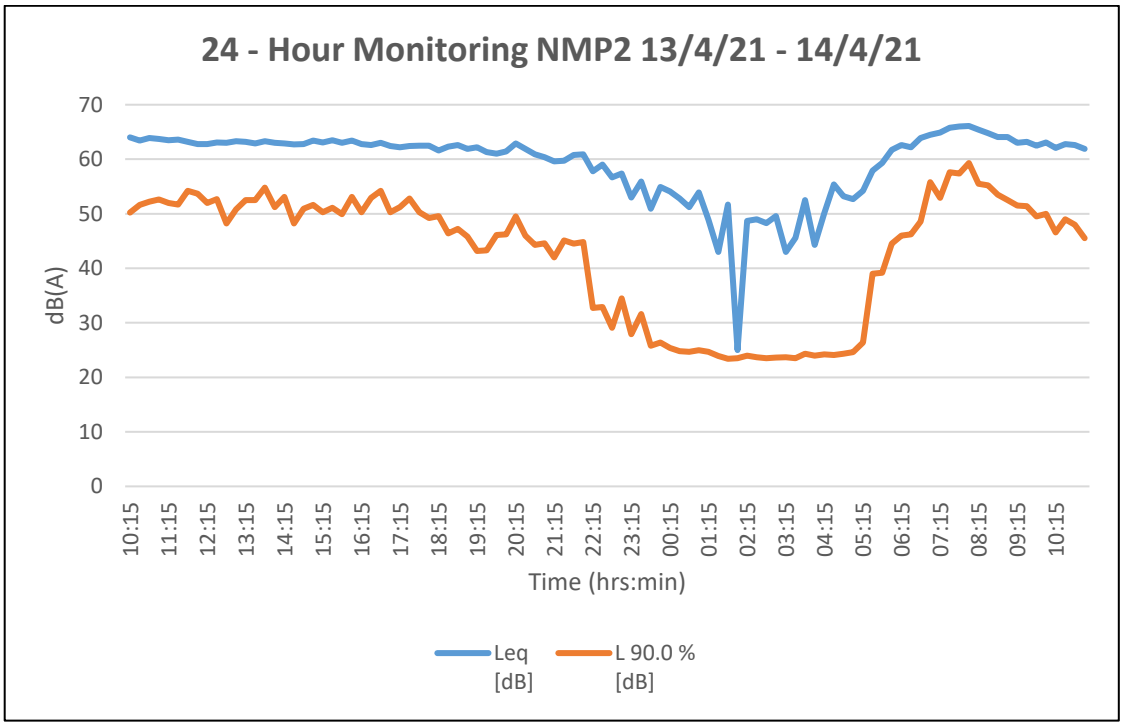


Figure 9-3: Graph Illustrating Change in Sound Levels at NMP2

The summary findings of the attended monitoring at NMPs 3-7 are presented in Table 9-6 overleaf.

Table 9-4: Summary Results of Monitoring at NMP3 – NMP7

Location	Date/Time	Parameter				Description of Ambient Sound Environment
		L_{Aeq}	L_{A10}	L_{A90}	L_{AFmax}	
NMP3 9/4/21	12.56	46	48	41	63	Occasional overhead aircraft affecting each measurement including light aircraft. L_{Amax} during #1 due to large aircraft. Distant traffic noise from east direction is predominant background noise source. Wind direction was from east. Power-washing equipment in use in Waverly during #1 which increased values.
	13.55	42	44	40	56	
	14.12	43	44	40	53	
NMP4 13/4/21	08.24	49	50	41	71	Digger used for trenching elevated $L_{Aeq,t}$ and L_{A10} values in particular. When digger was non-operational both values reduced by approx. 5 decibels. Distant traffic was audible as a continuous background source.
	08.39	48	52	43	71	
	08.58	49	50	41	68	
NMP5 9/4/21	14.55	40	42	37	54	Individual low flying light aircraft overhead during #1 and #2. Distant traffic noise predominant background noise but lower than at NMP3. A train horn was audible in the distance during #1. Birdsong continuous. Dog barking during #3.
	15.11	40	42	36	54	
	15.26	40	42	37	55	
NMP6 13/4/21	10.26	45	47	42	65	Distant road traffic and birdsong predominant.
	10.42	47	50	43	58	
	10.57	45	48	42	59	
NMP7 13/4/21	11.16	52	54	48	70	Traffic noise from R761 predominant with some birdsong.
	11.32	52	54	47	65	
	11.48	51	54	46	63	

9.4.3 *Desk-based Study – Transportation Noise Mapping*

Wicklow County Council has prepared an Environmental Noise Action Plan, 2018 - 2023. Related transportation noise mapping is available on the EPA's website https://gis.epa.ie/EPAMaps/. Figures 9-5 and 9-6 below re-produce the road noise mapping in the vicinity of the site. The mapping indicates road noise contours overlapping the eastern site boundary up to approximately 134m into the site.

Figure 9-4: Latest Round 3 Road Noise Mapping L_{den} (Source: https://gis.epa.ie/EPAMaps/)

Figure 9-5: Latest Round 3 Road Noise Mapping L_{night} (Source: https://gis.epa.ie/EPAMaps/)

The on-site monitoring and modelling prepared as part of the Environmental Noise Action Plan are not directly comparable. The modelling is for strategic noise mapping and is not intended to

replace on-site monitoring, however NMP2 occurs in the L_{den} 65 - 69 and L_{night} 55 - 59 contours which correlates with the site survey findings.

9.4.4 Desk-based Study – Target Values for Road Traffic Noise

In October 2018, the World Health Organisation (WHO) published new Environmental Noise Guidelines for the European Region. The new Guidelines deal with individual types of noise such as road, rail, aircraft, wind turbine and leisure noise. The following Guidelines are set for external road traffic noise:

> *For average noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic below 53 dB L_{den}, as road traffic noise above this level is associated with adverse health effects.*
>
> *For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night-time below 45 dB L_{night}, as night-time road traffic noise above this level is associated with adverse effects on sleep.*
>
> *To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.*

The vast majority of the subject site currently falls within desirable levels as set by the WHO with the exception of a small portion close to the R761.

9.4.5 Existing Soundscape Summary

The site is on the outskirts of Greystones in an emerging suburban area. It is generally quiet and semi-rural in nature. Based on the monitoring undertaken, the site, in general, complies with the WHO Guidelines for road traffic noise with the marginal exception of some land very close to the eastern boundary with the R761. In terms of noise risk assessment for future residents, as defined in the UK Pro-PG: Planning and Noise, 2017, the site is classified as of negligible risk across the majority of the landbank with the risk increasing to low approaching the R761 with a medium risk rating for the lands directly adjoining the R761 (<30m).

9.4.6 Vibration

There are no potential sources of vibration affecting the site.

9.5 Impact Assessment

9.5.1 Site Development and Construction Phases

Site development and construction works can potentially give rise to temporary to short term noise and vibration impacts and effects through the use of mobile and non-mobile heavy machinery and equipment.

9.5.1.1 Applicable Noise Criteria

BS5228:2009 + A1:2014: *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise* describes applicable noise level thresholds not to be exceeded at NSRs during

site development and construction works, depending upon existing ambient levels, as described in Table 9-7 below. This table is based upon report E3.2, Table E.1 of BS5228:2009 + A1:2014 Part 1.

Table 9-5: Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A	Category B	Category C
Night-time (23:00-07:00)	45	50	55
Evening and Weekends	55	60	65
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75
NOTE 1: A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. NOTE 2: If the ambient noise level exceeds the threshold values given, in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3dB due to construction activity. NOTE 3 Applied to residential receptors only.			
A) Cat A: Threshold values to use when ambient noise levels (rounded to nearest 5dB) are less than these values B) Cat B: Threshold values to use when ambient noise levels (rounded to the nearest 5dB) are the same as Cat A values C) Cat C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Cat A values D) 19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday is deemed 'evening and weekend' period.			

Generally, the Category A threshold values can be applied to NSRs 2-5 as indicated on Figure 9-2 i.e. including Waverly, the education complex and the existing landowners house and associated dwellings based on the ambient sound levels recorded during the daytime baseline survey ($L_{Aeq,t}$ < 55 dB).

Category B values apply to NSRs located directly on the R761 such as the Gate Lodge (NSR1, Figure 9-2). The threshold values apply to the sum of both the existing ambient and construction noise levels.

In addition to the above, the following acceptable levels are described in the Transport Infrastructure Ireland (TII) publication Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, March 2014. These limits are applied during the construction of road infrastructure projects at the facades of NSRs.

Table 9-6: TII Acceptable Levels for Construction

Day	Working Hours	Level dB ($L_{Aeq,1hr}$)	Level dB (L_{Amax})
Mon-Fri	07.00 – 19.00	70	80
Mon-Fri	19.00 – 22.00	60*	65*
Saturday	08.00 – 16.30	65	75
Sundays & Bank Holidays	08.00 – 16.30	60*	65*

*Note *: Construction activity at these times, other than emergency works, will normally require specific permission from the local authority.*

In summary, the following limits are proposed for site development and construction works:

- 65 dB $L_{Aeq,1hr,}$ Mon-Fri (07.00 – 19.00hrs) at all existing NSRs with the exception of the gate lodge (NSR1, Figure 9-2) and other NSRs with facades directly facing onto the R761, where a limit of 70 dB $L_{Aeq,1hr,}$ Mon-Fri (07.00 – 19.00hrs) is proposed.

Saturday, Sunday, public holidays, evening (19.00-23.00hrs) and night-time (23.00 - 07.00 hrs) works are not proposed.

The following should also be noted in relation to the assessment of predicted construction noise and to the use of the threshold values or limits:

Prediction of likely noise impact has been completed using data from BS5228:1 and is based on the prediction methodology set out in ISO9613-:1996. However, it is important to note that the construction process is subject to a tendering process. Therefore, with regards to prediction of construction noise at NSRs the following factors are relevant:

- The sound power ratings (or sound pressure levels at known distance) used in the assessment may vary from the ratings for the actual equipment chosen by the contractor and used on site;
- Depending on conditions encountered in real-time, different types of equipment may be chosen and the number of units may vary. Usage may also vary in terms of length of time operating or in terms of intensity, character and location.

As a result, limits or threshold values, are typically applied to control construction noise to ensure no significant effects occur. *BS5228-1 notes that a potentially significant negative effect will occur if the predicted construction noise level at a NSR exceeds the applicable threshold value*. BS5228-1 also notes that factors such as the number of receptors affected, and the duration and character of the impact may need to be considered to determine if there is an actual significant effect.

The recently published UK LA111 similarly notes that the magnitude of impact is major if the construction noise impact is greater than or equal to the threshold value (from BS5228-1) +5dB. A moderate impact magnitude is above or equal to the threshold value and below the threshold value +5 dB. Impacts of major and moderate magnitude are then considered to constitute a significant effect *depending* on duration.

A significant effect is deemed to have occurred where an impact of major or moderate magnitude will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; and
- A total number of days exceeding 40 in any 6 consecutive months.

Therefore, this is a similar approach to that set out in BS5228-1.

9.5.1.2 Applicable Vibration Criteria

Vibration impacts can typically potentially occur during site development and construction works through the use of equipment such as rock breakers or during piling. Vibration can affect both human beings and buildings. Humans are more sensitive to vibration stimuli although the risk of cosmetic or structural damage to buildings is the more usual concern for site development and construction phases.

Guidance relevant to the protection of building structures is contained in the following documents:

- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228: 2009+A1 2014: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Both standards contain similar guidance relating to building damage criteria. Table 9-9 below details the transient vibration guide values for cosmetic damage to buildings as set out in BS5228-2:

Table 9-7:Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 – 15 Hz	15 Hz and above
Reinforced or Framed Structures Industrial and Heavy Commercial Buildings	50mm/sec at 4 Hz and above	50mm/sec at 4 Hz and above
Unreinforced or Light-weight Structures Residential or Light Commercial Buildings	15mm/sec at 4Hz increasing to 20mm/sec at 20Hz	20mm/sec at 15Hz increasing to 50mm/sec at 40Hz

The above values are for transient or intermittent vibrations which do not cause a resonant response in buildings. The criteria should be reduced by 50% for more sustained or continuous vibration which may occur during activities such as continuous piling methods. The values should also be reduced by 50% for listed buildings although they may not be necessarily more vulnerable than new builds.

The following limits therefore apply for continuous vibrations:

- Light Buildings – 7.5mm/sec
- Heavy Buildings – 25mm/sec

BS7385-2 indicates that the probability of damage tends towards zero at a component PPV of 12.5 mm/sec.

BS5228-2 also provides the following range of vibration values and associated potential effects on humans:

Table 9-8: Vibration Criteria – Human Beings

Vibration Level mm/sec PPV	Effect
0.14	Vibration might just be perceptible in the most sensitive in the most sensitive situations for most vibration frequencies.
0.3	Vibration might just be perceptible in residential environments.
1	A vibration level of this magnitude is likely to cause complaint.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

As can be seen from Table 9-10 above, the limits for humans are much lower than for cosmetic damage to buildings.

9.5.1.3 Piling Works

Due to the soft ground conditions on site, piling is likely to be required for the apartment blocks on the western portion of the site and also for some units within the southern portion of the site.

According to BS5228:2, *"piling and ground engineering processes are primarily selected on the basis of the ground conditions to be encountered, the loads to be supported and the economics of the system. Taking these constraints into account, the process should be selected that is least likely to give rise to unacceptable vibrations in particular circumstances."*

The following assessments for piling have been completed as a conservative estimate.

Apartment Blocks

Secant or contiguous piling methods are proposed for the apartments. Secant piles walls are usually augered. Continuous flight augering (CFA) is one method used. Contiguous pile walls are installed using the CFA method also but can also be rotary bored.

According to BS5228:1, the noise characteristics associated with rotary bored piling are normally steady unless it is necessary to insert steel casings for part of the depth which could result in intermittent high peaks which can be more disturbing and result in higher noise levels. In contrast, CFA piling is a means of bored piling that does not need a temporary casing thus

eliminating intermittent high peaks. CFA piling is considered one of the quietest methods of piling available. Bored piling methods are often considered as a reduced noise alternative to driven piles. Therefore, this is a mitigating factor incorporated into the design for the apartment block piling.

BS5228:1:2009+A1:2014 provides a number of examples of noise data for bored piles. A value of L_{Aeq} 83dB @ 10m is provided in Table C.3. for a large rotary bored piling rig cast in situ. Historic data in Table D.4. of the standard ranges from 79 -90 dB(A) at 10m per cycle in relation to boring in clay for different rigs operating over varying times.

Assuming piling will occur for 100% of the time during a one-hour period (although this unlikely), the $L_{Aeq,1hr}$ at NSR3 Figure 9-2, approximately 175m from the proposed piling, is estimated as 58 dB taking account of distance attenuation only. This is below the threshold or limit value (65 dB $L_{Aeq,1hr}$) set for construction noise and is therefore not significant as defined in BS5228-1 and discussed earlier. It is further noted that this element of the works will be short i.e. temporary in duration.

Area in South

The type of piling proposed for this section of the site will be pre-cast driven piling. In this regard, it is noted that pre-cast driven piles generate lower noise and vibration levels than cast in situ piles. Driven piling can be precussion, pressing or vibratory. Each type can have different noise characteristics with more impulsive-type noise from hammers compared to vibration-driven piling. This can therefore be more disturbing and result in higher noise levels.

BS5228:1:2009+A1:2014 provides only one example of noise data for pre-cast concrete driven piling and that relates to using a hydraulic hammer which may not be the final piling method chosen but represents a conservative estimate. As this piling may be more intermittent, an on-time of 30 mins has been assumed during a one-hour period, the $L_{Aeq,1hr}$ at NSR5 the nearest NSR (refer to Figure 9.2 earlier for location) at 115m to the proposed location of piling is estimated at 64 dB. This is below the acceptable levels for construction noise (65 dB $L_{Aeq,1hr}$). BS5228-1 notes that a potentially significant impact occurs when the applicable threshold value is exceeded.

9.5.1.4 Earthworks

Other than piling, the earthworks phase is likely to give rise to the highest increases in noise levels especially when works take place in close proximity to existing NSRs through the use of equipment such as tracked excavators, lorries and dump trucks. There will be no rock-breaking on site.

The site is large, therefore it is possible that a relatively large number of HGVs and corresponding tracked excavators will be in operation moving earth across the site at any given time. However, these are not all likely to be concentrated in one area or at the boundary with a given NSR at any one time.

An example is calculated below for existing NSRs in Waverly (NSR5 on Figure 9-2) as a conservative estimate. Table 9-11 below sets out the likely noise impact at Waverly arising from five individual sets of equipment, each set comprising a tracked excavator and wheeled loader at 50,150, 250, 300 and 400m distant from NSR5.

Table 9-9: Potential Noise Levels Arising from Site Development Close to Boundary

Source	LAeq,t @10m	Predicted LAeq,1hour* (dB)
Site Development		
Tracked Excavator	79	@ façade of ground floor of Waverly NSR4 @ for 5 sets operating at varying distances **60**
Wheeled Loader	76	

**Assume excavators are on for 66% of hour and lorry on for 5 minutes. Conservative attenuation from distance and topographical screening as Waverly ground floor are at a lower level than the subject site.*

Works at 50m distant contribute the majority input to the predicted noise level in Table 9-11. Although the limit (65 dB $L_{Aeq,1hr}$) is not expected to be exceeded based on the above estimate, mitigation measures to minimise the impact of site development and construction noise on the nearest NSRs and to ensure compliance with construction noise criteria are set out in Section 9.8 - Ameliorative, Remedial and Reductive Measures.

9.5.1.5 Construction Phase Traffic – Surrounding Road Network

LA111 offers guidance on construction related traffic noise as follows:

Table 9-10: Magnitude of Impact at Receptors

Magnitude of Impact	Increase in Baseline Noise Level of Closest Public Road Used for Construction Traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

A significant effect is deemed to have occurred where an impact of major or moderate magnitude will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights;
- A total number of days exceeding 40 in any 6 consecutive months.

The route into and out of the site will be off the R761 opposite Redford Cemetery. Daytime noise levels directly off the R761 are indicated on Figure 9-5 earlier and as measured at NMP2 (L_{day} 64 dB). The route is busy with an existing AADT of 26,284. In comparison, construction traffic will be negligible in volume. The magnitude of noise impact arising from construction traffic on the local road network is therefore expected to be less than 1.0 dB and this equates to short term negligible.

9.5.1.6 Construction Phase Vibration

As noted earlier, piling will be completed for the apartment blocks in the western portion of the site and pre-cast driven for a small area to the south. Bored piling, amongst other types of piling such as injected piles etc. is preferable to driven piling in terms of minimising vibration. Notwithstanding this, existing sensitive receptors are considered to be sufficiently distant from the proposed piling works so as to be unaffected by vibrations from piling. However, precautionary vibration monitoring at NSRs is proposed to ensure compliance with the limits or threshold values outlined earlier in Section 9.5.1.2 and will be included in the CEMP as a preventative measure.

9.5.2 Operational Phase

9.5.2.1 Long-term Traffic Changes

Additional traffic, arising from the completed SHD can give rise to potentially increased traffic noise impact at existing NSRs in the long term. Accordingly, the potential long-term effect of additional traffic related noise impact on existing NSRs has been considered.

As a general rule of thumb for a line noise source such as traffic, a doubling of traffic flow will likely result in a 3 decibel increase in traffic noise levels. Table 9-13 below offers guidance as to the likely noise impact and effect to assist with the assessment of the noise impact associated with long term traffic on public roads.

Table 9-11: Likely Impact and Effect Associated with Change in Traffic Noise Level (long term)

Change in Sound Level dB(A)	Subjective Reaction	Magnitude of Impact
0	Inaudible	Neutral
0-2.9	Barely perceptible	Imperceptible
3-4.9	Perceptible	Slight
5-9.9	Up to a doubling of loudness	Moderate
10+	Doubling of loudness and above	Significant

Source: UK Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3 2011[1]

The new UK LA111 refers to the following for assessing magnitude of long-term change due to operational traffic:

Table 9-12: Magnitude of Change Long-term Traffic

Long-term Magnitude	Long-term Noise Change (dB $L_{A10.18hr}$ or L_{night})
Major	Greater than or equal to 10.0
Moderate	5.0 – 9.9
Minor	3.0-4.9
Negligible	Less than 3

The magnitude of change as set out in Table 9-14 is determined on the basis of change between the Do Minimum Opening Year (DMOP) and the Do Something Future Year (DSFY). The use of the above table arguably, gives a more standard approach to determining magnitude of impact

with Major used in lieu of Significant. For the purposes of this assessment, both Tables have been used and give a similar result.

24-hour Annual Average Daily Traffic (AADT) estimated projections have been developed by AECOM for the new link road and existing routes. These have been reviewed as part of this assessment and are summarised below in Table 9-15. Table 9-16 presents the % increase from 'Do Minimum' Opening Year (2023) to 'Do Something' Future Year (2038).

Table 9-13: Summary of % Increases in Traffic Flows above Baseline

Year	R761 North	% Increase from 2019	R761 South	% Increase from 2019	Redford Park	% Increase from 2019	Blacklion Manor Road	% Increase from 2019
2019	13142	-	13142	-	3592	-	5555	-
2023	17273	31.43	16520	25.70	4017	11.83	6382	14.89
2028	18221	38.65	17468	32.92	4242	18.10	6771	21.89
2038	19224	46.28	18471	40.55	4337	20.74	6953	25.17

As indicated in Table 9-15, the highest increase of 46% on the R761 North corresponds to a 0-2.9 dB(A) increase which is imperceptible in terms of magnitude of impact using the Guidance in Table 9-13.

Using the alternative method as indicated in Table 9-16 below the effect is expected to be negligible.

Table 9-14: Summary of % Increase in Traffic Flows from DMOY (2023) to DSFY (2038)

Link	DMOY (2023)	DSFY (2038)	% change
R761 north	14441	19224	33.1
R761 south	14441	18471	27.9
Redford Park	3811	4337	13.8
Blacklion Manor Road	5092	6953	36.5

The new Coolagad Link Road serving the development will however introduce a new road traffic source to existing NSRs currently located at distance from the R761 especially NSR3 as indicated on Figure 9-2. With regards to other receptors in close proximity:

- NSR1 will be partially screened from the new link road by proposed new buildings. Contextually, this receptor is currently impacted by higher traffic noise from the R761.
- NSR2 will not be screened by proposed buildings. The northern façade of this receptor lies approx. 75m south of the new link road. This receptor is also currently influenced by traffic noise from the R761 as measured at NMP7. Based on the flows provided (4,749 18-hour flow, 0% HGV, 50 kph), the cumulative impact of both the new link road and existing traffic noise is expected to be <3 dB increase and therefore long-term imperceptible and negligible.

The effect on NSR3 has been assessed as a worst-case scenario as it is currently distant from the R761 and, based on measurements at NMP5, it is likely to currently experience low traffic noise levels. NSR3 is approx. 115m from the proposed link road. A conservative estimate of the magnitude of increase in traffic noise from the new Coolagad Link Road is long term moderate negative based on existing transportation noise levels measured at NMP5 and NMP1.[2] The assessment does not take account of any topographical screening that may be present and therefore is conservative. However, in terms of actual effect on NSR3, the context of the increase must be considered. A new transport link is likely to be expected as the area is emerging suburban but also because the link road is part of the long-term plan for a link to the N11 motorway. The change will be gradual over a period of 3 years as a result of the proposed development. Therefore, in the long-term, the effect on NSR3 as a result of the proposed development is not expected to be significant.

The predicted L_{den} for NSR3 is 49dB, based on the 18-hour flow provided[3] and is therefore below the recommended design goal (L_{den} 60 dB) for new roads in Ireland above which mitigation would apply.

9.5.2.2 MUGA Related Noise Impact on Existing NSRs

Sport England and Sportscotland have produced guidance on likely noise impact associated with synthetic or artificial grass pitches (AGPs) used primarily for football, rugby and hockey both for training and games. Sportscotland notes in its Guidance that "*MUGAs, which are used for a range of informal sport activity, may also have similar noise impact issues.*"

Based on measured studies Sport England note:

> *"A typical free-field noise level from an AGP (at 10m from the sideline halfway marking) – 58dB $L_{Aeq,1hour.}$"*

Sport scotland provide recommended noise levels for use in assessments of AGPs as indicated in Table 9-17 below. The Guidance further notes that the mean values can be taken as representative of the whole of a daily period of use and can be used to compare with World Health Organisation (WHO) or other criteria without adjustment (to 16-hour values). This assumes that the AGP will be intensively used over a 16-hour period (07.00 – 23.00 hrs) and therefore is conservative in nature. In reality, the MUGA will not be used as intensively as this.

Table 9-15: Noise Levels Associated with AGPs

Scenario	Mean L_{Aeq} @10m
Rugby/Football	61
Hockey	66

Sport England note that the most significant noise source from AGP is voice.

[2] Predicted using 18 hour traffic flows used to calculate $L_{A10,18,hr}$ which is then converted to EU Indices using Method 3 of TRL Document PR/SE/451/02. Conservative estimate as no screening included. Speed assumed as 50km/hr with 0% HGVs, impervious road surface, 5 – 9.1% gradient.

The boundary of NSR2 is located within 10-15m from the MUGA. Hockey playing represents a worst-case scenario with an $L_{Aeq,16hr}$ value 66 dB as the likely noise impact at the boundary of NSR2.

The dwelling is set back a further 40m from the boundary. Therefore, based on distance attenuation only, the expected free-field noise level at the façade of the house will be 54 dB(A). The recommended internal criterium for good daytime resting conditions as set out in BS8233:2014 is $L_{Aeq,16\ hr}$ 35 dB (translating to an $L_{Aeq,16\ hr}$ 50 dB free-field external with partially open windows) will therefore be exceeded, assuming the MUGA is in constant use from 07.00 – 23.00hrs). However, this is unlikely to be the case. Furthermore, hockey will not be the only sport played. Therefore, it is not expected that the criterium for good internal resting conditions with partly open windows will be exceeded over the period 07.00 – 23.00 hrs).

The criterium for external amenity ideally should not be above the range 50 -55 dB $L_{Aeq,16hr}$. This will be exceeded close to the boundary of the property but not throughout the entire grounds of the property (still also assuming hockey in play and an 8-hour period of use).

Contextually, the following is noted:

- NSR2 is located close to an existing sports ground and is currently influenced by traffic noise from the R761. However, existing traffic noise levels are estimated to be > 10 decibels below $L_{Aeq,16hr}$ 66 dB, therefore mitigation is proposed as the effect could potentially be long-term major negative *directly at the boundary.* Mitigation measures will apply as outlined later in Section 9.8.2.

NSR1, the gate lodge/bungalow is at a similar distance from the pitch and has also been considered. This location is currently influenced by relatively high traffic noise levels ($L_{Aeq,16hr}$ 63 dB as measured at NMP2) from the N761 and is approx. 15m from an existing sports ground. There is an existing boundary wall screening ground level windows. Planting will be provided as part of the landscaping plan which will visually screen NSR1. Therefore, taking context into account and existing boundary features, no further mitigation is proposed to this location.

9.6 Cumulative Impacts

9.6.1 Site Development and Construction Phases

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and were nearing completion in March 2022. It is likely that this site will be at a different stage of development compared to the proposed SHD subject to this assessment. Additionally, as the sites are large, it is unlikely that individual NSRs in Seagreen and Waverly will be affected at levels exceeding the noise criteria for short term site development and construction activities.

Although the limits are not expected to be exceeded based on above predictions in Section 9.5.1.4, mitigation measures to minimise the impact of site development and construction noise on the nearest NSRs and to ensure compliance with construction noise criteria are set out in Section 9.8 - Ameliorative, Remedial and Reductive Measures.

9.6.2 *Operational Phase*

The potential long term cumulative impact of traffic related noise has been addressed above in the assessment of traffic related noise emissions arising from the proposed SHD. Refer to Section 9.5.2.1 earlier.

9.7 Future Residential Noise Exposure Considerations

The UK ProPG: Planning & Noise, New Residential Development, May 2017[3] outlines a systematic risk based 2 stage approach for evaluating noise exposure risk on prospective sites for residential development. Stage 1 comprises an initial noise risk assessment of sites proposed for residential development considering either measured and/or predicted noise levels. A site is then characterised as negligible to high risk in terms of noise exposure of future residents.

As noted earlier in Section 9.4.5, the site is classified as of negligible risk across the majority of the landbank, low risk approaching the R761 with a medium risk rating for the lands directly adjoining the R761 (<30m). No residential units are planned within the lands directly adjoining the R761 or within the low noise risk areas which demonstrates good acoustic design.

However, the existing soundscape will be altered by the addition of the Coolagad Link Road along the northern boundary of the site. Therefore, the current baseline is not fully representative of future transportation noise potentially affecting residents in this portion of the site.

A review of the traffic flows for the Cooloagad Link Road has been completed. The 18-hour AWDT (from 06.00 -24.00hrs) for 2038 is 4,749. The road gradient varies between 5 and 9.1%. The surface shall be impervious asphalt. The speed limit shall be 50kph, 0% HGV has been assumed. These figures have been used to estimate the likely $L_{Aeq,16\ hour}$ and L_{night} values[4] for future residential units and public space facing directly onto the Coolagad Link Road.

9.7.1 *External Amenity Areas*

BS8233:2014 states that "*the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 -55 dB* $L_{Aeq,16hr.}$*"*

ProPG goes further to extend the advice contained within BS8233:2014 to include:

[3] This document was prepared by a working group comprising members of the UK Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since its adoption, it has been generally considered as a best practice guidance for assessing inward noise risk for new residential development.

[4] 18 hour traffic flows used to calculate $L_{A10,18,hr}$ which is then converted to EU Indices using Method 3 of TRL Document PR/SE/451/02. Conservative estimate as no screening include, view of the road not obscured.

"Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process."

Based on the traffic flows provided for the Coolagad Link Road for Year 2038, the vast majority of the proposed public and private amenity areas will be below the range 50 – 55 dB $L_{Aeq,16hr}$.therefore the proposed development complies with the requirements of Pro-PG to provide access to a quiet or relatively quiet external amenity space.

Some amenity areas < 20m of the roadside will be above the upper limit and includes four private gardens. These gardens will be screened by a proposed 2.0m high blockwork wall over retaining reinforced concrete walls. Accordingly, these gardens will not be above the range 50 -55 dB $L_{Aeq,16\ hr}$.

Balconies and terraces on the northern façade of the apartment blocks are likely to be below the upper limit of the range. In addition, the following is noted with regards to the provision of good acoustic design:

- The public space will be enhanced with tree planting. Water features will form part of the green and blue space. Softer as opposed to hard surfaces, however minor, may help reduce the impact of any reflected noise from traffic in a green space.
- The provision of planted areas in urban or suburban settings can *qualitatively* improve the soundscape for local residents and enjoyment of the proposed amenity areas. Natural features have been shown to improve perceived tranquillity and are provided in the landscape strategy.[5]
- Access to the public spaces provide additional optional external amenity to residents.

9.7.2 Internal Areas

Best practice in relation to noise intrusion in residential and other buildings is also contained within BS8233:2014 – *Guidance on Sound Insulation and Noise Reduction for Buildings.* This British standard sets out recommended noise limits for indoor ambient noise levels and takes account of guidelines issued by bodies such as the WHO. Details taken from the standard are presented in Table 9-18 below.

Table 9-16: Recommended Indoor Ambient Noise Levels

Criteria	Typical Situation	Design Range $L_{Aeq,T}$	
		07.00-23.00	23.00 -07.00
Resting	Living Room	35 $L_{Aeq,16hr}$	-
Dining	Dining Room	40 $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 $L_{Aeq,16hr}$	30 $L_{Aeq,8hr}$ 45 $L_{Amax,f*}$

Source: BS8233:2014 and Pro-PG

[5] Tranquillity and Soundscapes in Urban Green Spaces, Predicted and Actual Assessments from a Questionnaire Survey, Environment and Planning B: Planning and Design, 2013, Vol 40.

Pro-PG notes the following with regard to achieving internal target levels:

Note 5:

Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible, demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the open position, and, in this scenario, the internal L_{Aeq} target values subject to the further advice in Note 7.

Note 7:

Where development is considered necessary or desirable, despite external noise levels above WHO Guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

As the need for housing is well documented, the criteria may be relaxed as follows:

Table 9-17: Recommended Indoor Ambient Noise Levels 782327

Criteria	Typical Situation	Design Range $L_{Aeq,T}$	
		07.00-23.00	23.00 - 07.00
Resting	Living Room	40 $L_{Aeq,16hr}$	-
Dining	Dining Room	45 $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	40 $L_{Aeq,16hr}$	35 $L_{Aeq,8hr}$

Taking account of a 10 -15 decibel reduction of external noise levels to internal across a partially open window, the following external noise levels apply:

Table 9-18: External Noise Levels to Achieve Internal Criteria with Partially Open Windows

Internal Condition	$L_{Aeq,16hr}$ (dB)	$L_{Aeq,8hr}$ (dB)
Good	50 - 55	45
Reasonable	55 - 60	50

It is predicted that the vast majority of the proposed development will achieve good internal conditions with partially open windows thus demonstrating good acoustic design. Units with facades 10m from the Coolagad Link Road roadside will still achieve reasonable internal conditions with partially open windows. Units with facades closer than 10m will not achieve reasonable internal conditions with partially open windows. There are an estimated 5 housing

units (<1% of the proposed development) within this category located in Phase 1A. Furthermore, only the facades facing the link road of these 5 units will be affected.

9.8 Ameliorative, Remedial or Reductive Measures

9.8.1 Construction Phase

The threshold or limit values for the site development and construction phases will not be exceeded on the basis of the assessments undertaken in Section 9.5.1. Nevertheless, the following noise and vibration management measures shall apply to the proposed project to fully ensure the threshold values are complied with:

- A Site Representative shall be appointed for matters related to noise and vibration.
- Any complaints received shall be thoroughly investigated and corrective or preventative action taken where validated.
- A written complaints log shall be maintained by the Site Representative. This shall, at a minimum, record complainant's details (where agreed) the date and time of the complaint, details of the complaint including where the effect was observed, corrective and preventative actions taken and any close-out communications. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the site.
- Noise monitoring with capability for real-time review both on-site and remotely shall be conducted at nearby NSRs throughout the site development and construction phases. The equipment shall be moved as appropriate depending on location of works and proximity to nearby NSRs.
- In the event of exceedance of the limits at NSRs, works shall be ceased and measures implemented immediately to ensure that the limits are complied with.
- Temporary acoustic screening shall be placed along the boundaries with NSRs at Waverly, the gate lodge and the existing landowners residential dwellings where works take place close to the boundary. It is recommended that temporary screening break the "line of sight" from the sources to the ground floor windows of the nearest NSRs where possible.
- The operation of certain pieces of equipment, where substitution etc cannot be carried out shall be managed through monitoring and timing of use to ensure that the threshold values/criteria specified are complied with.
- During the construction phase all equipment shall be required to comply with noise limits set out in EC Directive 2000/14/EC and the 2005/88/EC amendment on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. The directive covers equipment such as compressors, welding generators, excavators, dozers, loaders and dump trucks.
- A conservative approach to assessing piling noise was undertaken. However, the final piling method chosen shall include a consideration of low noise and vibration methods as described earlier in Section 9.5.1.3.

As a precautionary measure, vibration monitoring shall be carried out where works are in close proximity to NSRs especially during piling. In this regard, test monitoring will be conducted with the equipment on at low levels before increasing incrementally to operational levels if deemed necessary. Works will be ceased and mitigation measures implemented where monitoring

detects vibration levels associated with the works above the relevant guidance values set out in Section 9.5.1.2

The outline CEMP submitted with this application shall include the noise and vibration management measures listed above.

9.8.2 Operational Phase

9.8.2.1 Existing NSRs

A 2-3m berm is proposed along the boundary with NSR2 to mitigate the effects of MUGA related noise. The berm will, at a minimum, *"break the line of sight"* from the boundary of the property to the MUGA, assuming a height of 1.5m above ground level in the garden. This will ensure that external private amenity areas will not be above the range 50 – 55 dB $L_{Aeq,16hr}$ and therefore no significant effect will occur.

Additionally, the landscaping plan will provide planted screening to NSRs 1 and 2 (including the cottages in the farmyard). This will not quantitatively mitigate noise but will qualitatively improve perceived tranquility for existing residents.

A management plan will be developed for the MUGA which ensures that issues such as the use of offensive language are avoided.

9.8.2.2 Future Residents

Based on 2038 traffic flows for the Coolagad Link Road and corresponding estimated external noise levels, moderate sound insulation performance glazing and acoustically attenuated ventilation openings will ensure that the criteria for good resting, dining and sleeping conditions will be met in units where internal criteria with partially open windows cannot be met ie. units with facades < 10m of the Coolagad Link Road.

It is however noted that a long objective for the Coolagad Link Road is to extend it to the N11. As a result, traffic flows and traffic noise may potentially significantly increase in the future, (notwithstanding that a portion of cars will be electric). Therefore, in order to future proof the development, it is recommended that high performance glazing be considered for facades of units facing towards the Coolagad Link Road.

The final specifications for glazing and ventilation grilles shall be approved by an acoustic specialist at detailed design stage.

Glazing suppliers shall be required to provide laboratory tests confirming the sound insulation performance to BSEN ISO 140 Part 3 1995 and BS EN ISO 717, 1997.

Screening, in the form of blockwork walls, will be provided to gardens with boundaries within 10-20m of the roadside to mitigate the effects of traffic noise on these private spaces and ensure traffic noise is not above the range 50 -55 dB $L_{Aeq,16hr.}$

9.9 Residual Effects (including worst case scenario)

9.9.1 Site Development and Construction Phase

Construction noise arising from the proposed development will cause a temporary elevation of ambient sound levels in the vicinity of the existing NSRs especially at times when works are *close to the boundary*, but this will be controlled to comply with standard criteria or limit values for construction works. (To reiterate, a significant effect is deemed to occur where the criteria are exceeded and depending on duration of works). The criteria, by necessity, are higher than existing ambient levels as construction works are short term in nature. The mitigation measures, as part of best practice, will ensure that the limits, at a minimum, are not exceeded. As works move away from existing NSRs and/or as new buildings provide screening, construction noise levels will reduce to well below standard limit values for the majority of the duration of the total works.

Construction traffic accessing the proposed works will have a negligible short-term impact on NSRs off the existing local road network.

9.9.2 Operational Phase

9.9.2.1 Existing NSRs

An assessment of the long-term additional traffic noise impact associated with the proposed project has been completed. The % increase above 2019 baseline traffic flows on the R761 is 46% for the Year 2038 which corresponds to a 0-2.9 dB(A) increase which is imperceptible in terms of magnitude of impact. Assessed with the UK LA111, the magnitude of impact will be long term negligible.

It is noted that higher road traffic noise levels will occur as a result of the development of the Coolagad Link Road at 2-3 existing NSRs to the north which are currently distant from the R761. Based on measured existing traffic noise from the R761, the highest predicted conservative increase will be long term moderate in terms of impact magnitude at NSR3 (the closest NSR to the north). However, in terms of actual effect on residents, the context of the increase must be considered. A new transport link is likely to be expected as the area is emerging suburban but also because the link road is part of the long-term plan for a link to the N11 motorway. The change will be gradual over a period of 3 years. Therefore, in the long-term, the effect on NSR3, as a result of the proposed development, is not expected to be significant.

Following mitigation to NSR2, with regard to MUGA related noise, the criterium for external amenity, i.e. not above the range 50 – 55 dB $L_{Aeq,16hr}$ will be complied with as the noise will be screened.

9.9.2.2 Future Residents

The site of the proposed development in Coolagad is currently a quiet location with distant road traffic noise audible for the most part except in close proximity to the R761 where higher noise levels from local traffic noise predominates. In terms of noise risk assessment, as defined in the UK Pro-PG: Planning and Noise, 2017, the site is classified as of negligible risk across the majority of the landbank with a low risk rating approaching the R761 and a medium risk rating for the lands directly adjoining the R761 (<30m). Accordingly, the site generally falls within desirable noise levels as specified by the WHO. The new Coolagad Link Road will introduce a new

transportation noise source to the site. Based on the predicted traffic flows for 2038, the following is noted:

- The vast majority of public and all private external amenity space will be below the range 50 -55 dB $L_{Aeq,16hr.}$ The landscape strategy for the proposed development provides areas with natural features that qualitatively enhance the soundscape especially in proximity to the link road. Accordingly, the requirements of Pro-PG are complied with.
- All units will achieve good to reasonable internal noise criteria based on the assessment undertaken with open/partially open windows with the exception of facades within <10m of the new roadside. This equates to 5 units or <1% of the whole development. At a minimum, moderate sound insulation glazing and acoustic attenuation of ventilation grilles shall be provided with high performance sound insulation glazing for units facing the Coolagad Link Road to future proof the development in the event that the long-term objective of linking this route to the N11 is achieved.

9.10 Do Nothing Scenario

It is envisaged that the soundscape, in the absence of the proposed development will largely remain unchanged at the nearest NSRs, notwithstanding the long-term objective to provide a link to the N11 whereby traffic noise levels will increase in the future.

9.11 Monitoring

Real-time and continuous construction noise monitoring at locations representative of the closest NSRs shall be conducted throughout all development stages to ensure that the relevant criteria are not exceeded. Test vibration monitoring shall be conducted as a precautionary measure where equipment is operated close to the boundaries with receptors (<50m) to ensure that limits are not exceeded at the nearest sensitive receptors.

9.12 Difficulties Encountered

None.

9.13 References

Artificial Grass Pitch (AGP) Acoustics, - Planning Implications, New Guidance for 2015, Sport England.

BS5228:2009 +A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1: Noise and Part 2: Vibration.

BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.

BS6472-1:2008: Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.

BS8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.

Calculation of Road Traffic Noise, Department of Transport and the Welsh Office, 1988.

Converting the UK Traffic Noise Index $L_{A1018hr}$ to EU Noise Indices for Noise Mapping, TRL Ltd. 2005.

Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, March 2014.

Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) as published by the Environmental Protection Agency in January 2016.

Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management and Assessment, Version 1.2, Nov 2014.

ISO 1996 Acoustics – Description, Measurement and Assessment of Environmental Noise, Part 1, Basic Quantities and Assessment Procedures (2016) and Part 2 Determination of Environmental Noise Levels (2017).

ISO 9613.-2 – 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

Environmental Noise Guidelines for the European Region, World Health Organisation, Oct 2018.

Siting of Synthetic Grass Pitches – Guidance on Noise and Floodlighting, Planning Guidance 1002, Sportscotland, 2017.

Tranquillity and Soundscapes in Urban Green Spaces, Predicted and Actual Assessments from a Questionnaire Survey, Environment and Planning B: Planning and Design, 2013, Vol 40.

10 Landscape and Visual Assessment

10.1 Introduction

This Landscape and Visual Impact Assessment has been undertaken by Áit Urbanism + Landscape to assess the significant and likely effects, both direct, indirect, positive, and negative, arising from the landscape and visual impact of the proposed SHD development at the site in Coolagad, Greystones, Co. Wicklow.

The assessment within this chapter of the EIAR has been led by Margaret Egan (Director and Landscape Architect) who has specialist skills in Landscape and Visual Impact Assessment and Landscape Character Assessment and who has over twenty years' experience in these fields. Margaret holds a degree in Environmental Resources Management from the Technical University Dublin, a bachelor's degree in Landscape Horticulture from University College Dublin, Diploma in Environmental Impact Assessment Management also from University College Dublin; Margaret is also a member of the Irish Landscape Institute. Margaret has worked on large number of LVIAs throughout her career including amongst many others the Royal Canal Greenway, Dublin (Fingal County Council), Charlemont Street, Dublin (Dublin City Council), Afforestation Project, Cork (Cork County Council), Ceannt Station Redevelopment, Galway (Galway City Council), and Athlone Town Centre, Westmeath/Roscommon (Westmeath County Council, Roscommon County Council).

Margaret was supported by Luke Meehan (Senior Landscape Architect) who has eight years' experience in the field of landscape architecture and holds a BSc (Hons) in Landscape Architecture from University College Dublin and a Post Graduate Diploma in Environmental Monitoring, Assessment and Engineering from Trinity College Dublin. Luke Meehan has worked on a variety of LVIAs in the past, including assessments for developments in Edmondstown, Dublin (South Dublin County Council, Dun Laoghaire Rathdown County Council), Northwood, Dublin, (Fingal County Council), and Greystones, Wicklow (Wicklow County Council).

Áit Urbanism + Landscape have liaised with 3D Design Bureau on the baseline photography locations for the verified views and photomontages of the proposed development within the Visual Impact Assessment (VIA) of this Landscape and Visual Impact Assessment (LVIA). The existing views and proposed views are presented in the visual impact section of this chapter. The existing and proposed views are also included within a separate document prepared by 3D Design Bureau; they have been included in an appendix for this chapter. This process has informed the overall design of the site plan and assisted in mitigating any potential impacts on the landscape at an early stage during the design process and also any short-term impacts that are to be expected during the construction phase.

This Landscape and Visual Impact Assessment describes the existing receiving environment and contiguous landscape and the methodology utilised to assess the impacts according with best scientific guidance. It assesses the visual extent of the proposed development and the proposal's visual effects on key views throughout the study area. It describes the landscape character of the subject site and hinterland, together with the visibility of the site from significant viewpoints in the locality. The report details the impact of the proposed development on the visual and landscape amenity of the subject site and contiguous area.

The following visual receptors are addressed in this assessment in accordance with best scientific guidance:

- Protected Views and Prospects / Views of Special Amenity Value & Special Interest
- Local Amenity and Heritage Feature
- Local community views to assess the landscape and visual impact of the proposals on those who live and work in proximity to the proposed development as well as those utilising local amenities
- Relevant local settlement nodes
- Major routes adjacent to the site

While our visual sense is generally acknowledged to represent the dominant contribution to our perception of place and its context, other factors also contribute. Hearing/sound, smell and a variety of social/cultural factors relating to the land-use, function or business conducted on the land (or indeed, memory) can sometimes over-rule or outweigh the visual aspects and lead to individual perceptions which could be described as relatively subjective. The relevance of these non-visual aspects to our perception of our environment and the impact made by proposed changes is considered in other sections of this assessment document in accordance with best scientific guidance. The purpose of this section is to objectively examine and assess the nature and extent of the visual impact created as a result of the development proposal.

10.2 Assessment Methodology

10.2.1 Methodology Overview

Landscape and visual impact assessments are separate but closely related topics. The assessment of visual impact focuses on the extent to which new developments can be seen. Visual analysis forms one part of a Visual Impact Assessment (VIA), the process by which the potential significant effects of a proposed development on the visual resource of an area are methodically assessed. In turn, VIA forms just one part of a Landscape and Visual Impact Assessment (LVIA) and the wider process of the EIA. Landscape assessment focuses on the character of the landscape, examining responses which are felt towards the combined effects of the new development. The assessment has regard to the proposals and mitigation measures outlines in Section 2.0 (Landscape Strategy) of the Landscape Report which has been prepared by Kevin Fitzpatrick Landscape Architects for the purposes of this planning application.

This chapter of the EIAR describes landscape and visual impacts and has been prepared utilising the following guidance documents:

- Environmental Protection Agency, 2002, Guidelines on the Information to be Contained in Environmental Impact Statements
- Environmental Protection Agency, 2017, Guidelines on the Information to be Contained in Environmental Impact Reports (Draft)
- Environmental Protection Agency, 2003, Advice notes on current practices (in the preparation of an Environmental Impact Statement)
- Environmental Protection Agency, 2015, Advice notes for Preparing Environmental Impact Statements (Draft)
- European Commission, 2017, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)
- Department of the Environment and Local Government (DEHLG), 2000, Landscape and Landscape Assessment Draft Guidelines
- The Landscape Institute & I.E.M.A., UK, 2013, Guidelines for Landscape and Visual Impact Assessment

- Scottish Natural Heritage (SNH), 2013, A Handbook on Environmental Impact Assessment – Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland
- Scottish Natural Heritage (SNH), 2018, Environmental Impact Assessment Handbook
- Landscape Institute and Institute of Environmental Management & Assessment, 2013, Guidelines for Landscape and Visual Impact Assessment

10.2.2 Desktop Study

Desktop studies were undertaken by Áit Urbanism + Landscape to evaluate the existing site conditions such as topography, vegetation, settlement patterns, contiguous land use, drainage, landscape character as well as overall visibility of the site from surrounding areas. Information on protected views, scenic routes, special and protected landscapes etc. was taken from the both the Wicklow County Development Plan 2016-2022 and Draft Wicklow County Development Plan 2022-2028, as well as from the most recently published Greystones-Delgany & Kilcoole Local Area Plan (2013-2019). Following initial desktop studies, preliminary viewpoints were selected and an on-site assessment was undertaken on 17th November 2020 by Áit Urbanism + Landscape to gather further information, verify the information gathered for the desktop studies, and also to verify the preliminary viewpoints in person.

The following documents and web resources were consulted for the desktop study:

- Wicklow County Development Plan 2016-2022 https://www.wicklow.ie
- Wicklow County Council, 2013, Greystones-Delgany and Kilcoole Local Area Plan 2013-2019 https://www.wicklow.ie
- Wicklow County Council, 2021, Draft Wicklow County Development Plan 2022-2028
- National Parks and Wildlife Service – Interactive Mapping and Aerial Photography - www.npws.ie
- Ordnance Survey Ireland - Interactive Mapping and Aerial Photography - www.osi.ie
- GeoHive - geohive.maps.arcgis.com/apps/webappviewer
- Google Earth - https://earth.google.com

10.2.3 Glossary of Impacts

The **Glossary of Impacts** used in the assessment of impacts are as per the *GUIDELINES ON THE INFORMATION TO BE CONTAINED IN ENVIRONMENTAL IMPACT ASSESSMENT REPORTS – DRAFT - AUGUST 2017* and are outlined below:

10.2.3.1 Quality of Impacts

Positive Impact:

A change which improves the quality of the environment (for example, by increasing species

diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities).

Neutral Impact:

A change which does not affect the quality of the environment.

Negative Impact:

A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

10.2.3.2 Significance of Impacts

Imperceptible Impact:

An impact capable of measurement but without noticeable consequences.

Slight Impact:

An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Impact:

An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends.

Significant Impact:

An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Profound Impact:

An impact which obliterates sensitive characteristics.

10.2.3.3 Duration of Impacts

Short-term Impact:

Impact lasting one to seven years.

Medium-term Impact:

Impact lasting seven to fifteen years.

Long-term Impact:

Impact lasting fifteen to sixty years.

Permanent Impact:

Impact lasting over sixty years.

Temporary Impact:

Impact lasting for one year or less.

10.2.3.4 Types of Impacts

Cumulative Impact:

The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.

'Do Nothing Impact':

The environment as it would be in the future should no development of any kind be carried out.

Indeterminable Impact:

When the full consequences of a change in the environment cannot be described.

Irreversible Impact:

When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Residual Impact:

The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

`Worst case' Impact:

The impacts arising from a development in the case where mitigation measures substantially fail.

10.2.4 Terminology for Visual Impacts

The following terminology, used in this visual assessment, is defined as follows:

Visual Intrusion:

Where a proposed development will feature in an existing view but without obstructing the view.

Visual Obstruction:

Where a proposed development will partly or completely obscure an existing view.

Sensitivity and Significance:

The significance of impacts on the perceived environment will depend partly on the number of people affected, but also on value judgments about how much the changes will matter. In this respect it is important to identify actual visual and physical connections between the site, its adjacent occupiers/land owners and those who interact with it from further afield, in the context of the existing and the proposed situations.

10.2.5 Verified View Methodology

The following methodology has been supplied by 3D Design Bureau who have produced the verified view montages for the purposes of the visual impact assessment:

Verified View Montages Methodology Overview

1. Overview

This summarised methodology has been prepared by 3D Design Bureau to explain the production of Verified View Montages (VVM). The preparation and presentation of reliable verifiable visual information is a key component to the writing of Landscape Visual Impact Assessment reports. It should be noted that VVMs are technical images and should be produced and used in a technically appropriate manner.

2. What is a Verified View Montage?

Verified View Montages work by using the correct geospatial insertion of accurate 3D models in the existing landscape (photo) allowing for a photorealistic view of the planned model in its intended location.

3. Methodology

3.1 Project Planning:

Following appointment a full list of suggested views is drawn up for review prior to visiting site. This is carried out between 3D Design Bureau, the landscape architect, the client, and the planning consultant.

Note: If a LVIA report is being written by a third party planning consultant, the medium to long range views will be guided by them. After obtaining a full list of viewpoint locations, it is reviewed and a plan for the taking of baseline photographs is put in place.

3.2 High resolution Baseline Photography:

Every baseline photograph is captured in raw settings using a high-resolution digital SLR camera. This allows for the maximum possible information to be retained in the digital file. It also avoids the file being altered by any internal camera processing definitions, which retains the maximum control and fidelity on the end results.

The focal lengths used depend on the surrounding context and proximity to the desired area. 3D Design Bureau use high quality lenses with focal lengths that allow for capturing enough surrounding context without compromising quality and fidelity, by avoiding excessive barrelling, distortion, or aberrations. All shots are taken horizontally with the use of a 50mm lens (where possible).

Note: Although the 50mm focal length represents the perceived scale of the human eye, it does not represent the human field of view and therefore should not necessarily be used to show the proposed development in its context.

On site and back in the studio, each photo location is correctly recorded and marked as follows

On-Site:

- *The tripod location on site is paint marked and photographed in relation to existing elements.*
- *The location of each photo is manually marked on a printed map while on site.*
- *The camera height is recorded.*

Upon completion of the baseline photo site visit all photographs go through post processing back in the studio. The full set of photos along with a viewpoint location map are issued to the client for review and to choose the best shots that will demonstrate the visual impact that the proposed scheme may/may not have.

3.3 Baseline Photo Surveying:

When all baseline photos are chosen for the VVMs, each one is marked up in studio. Fixed reference points within each photo, such as parapet heights, kerbing, lamp posts etc are coloured coded on the baseline photos. All 'marked up' baseline photos are then issued to our qualified topographical surveyor for surveying purposes.

The survey team records the camera/tripod position using GPS and Total Station to an accuracy of +/-1cm Northing and Easting and to an accuracy of +/- 2cm Elevation. The 'marked up' fixed reference points identified in each photo are then surveyed to establish exact orientation of the view and to verify the photomontage process.

3.4 3D Modelling & Visualisation:

3D Modelling

An accurate digital 3D model of the 'proposed' development is produced using 3D software of choice. All of 3D Design Bureau's 3D modelling is carried out within AutoDesk's Revit. The digital 3D model is created from a combination of the third party architectural, engineering and landscape drawings. All proposed model information is contained in the one file and it is always positioned relative to the existing site survey information.

The 'marked up' fixed reference points which have been surveyed, are also modelled along with any other relevant survey information from the supplied top survey drawings. As stated above, the proposed 3D model and survey 3D model information are geospatially positioned relative to one another. This is imperative to ensure the accurate positioning and camera matching of the proposed digital 3D model within each chosen photo.

3D Visualisation

Once the digital 3D Revit model is complete, it is handed over to the 3D visualisation team for production. This production involves the matching of textures, lighting conditions and asset population for the proposed scheme. This ensures that the digital 3D model is visually represented as close as possible to the intended future 'As Built' development.

There is various 3D visualisation software's that are widely used for this stage of the project. 3D Design Bureau use 3D Studio Max for the visualisation process. This is accepted as the industry standard for architectural visualisation work and production of VVMs.

3.5 Camera Matching - Rendering – Post Production

Following the completion the 3D visualisation process (but in some instances prior to this) the following methodology is applied for views to be verifiable.

Camera Matching

All of the information recorded at the time of the baseline photographic site visit, that is, camera co-ordinates, angle of view, and direction of view, is programmed into the virtual camera within the 3D software package of choice - 3D Studio Max. Insertion of digital cameras within the software with matching attributes of the physical camera is carried out. This careful method ensures that the size, position, and height, of the proposed development in each VVM is correct to an accuracy of 0.33% i.e. +/- 1mm on an A3 print.

Rendering

Following the camera matching and 3D visualisation process the view is 'rendered' at high resolution and is placed onto its matching baseline photograph using Adobe Photoshop software. The mathematical accuracy is then double checked and verified by ensuring that existing 'marked up' fixed reference point features which were also rendered line up exactly in the photo.

Post Production

Next, the VVM specialist establishes, which existing features, such as buildings, landscape and trees, are in the foreground of the proposed development and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. When it is found that the development is not visible due to foreground features, its extremities will be indicated with a red outline.

4. Results

The resulting VVM, having gone through this extensive procedure, is classed as an accurate and verifiable representation of the proposed development as viewed from the selected photo locations. This shows, as closely as possible, any future impact a proposed development may have on the surrounding environment and existing buildings, presenting a truly valuable tool for planning purposes. It should be noted that the foundation of any LVIA are accurate verified view montages. High quality and technically accurate VVMs can be instrumental in helping to secure planning permission.

10.2.6 Choice of Views

The viewpoint locations were decided following desktop studies involving topographical analysis of the subject site and surrounding context, analysis of sensitive receptors within the area, and professional judgement informed by best scientific guidance. Each viewpoint was then verified in person on during a site visit conducted on the 17th November 2020; the site visit included the foothills of the Sugar Loaf, Bray Head, Greystones town, Greystones Harbour area, The Cliff Walk, Kindlestown Hill, all approach roads, as well as visiting the site itself. Following the desktop studies and viewpoint selection, a preliminary viewpoint map was circulated to the design team and based on feedback and comments; additional views were added to form the existing viewpoint maps depicted below. The views were chosen to accurately represent the likely visual impact from all directions. Views from the public domain were given priority, particularly those from main roads and access routes as well as the relevant views of special amenity value or interest and protected views and prospects as highlighted in the Wicklow County Development Plan 2016-2022 and Draft Wicklow County Development Plan 2022-2028. The neighbouring group of schools (Temple Carrig School, Gaelscoil na gCloch Liath, and Greystones Educate Together National School) and neighbouring residential developments (Waverly and Seagreen) were also considered sensitive receptors and so were given priority with regard to the choice of viewpoint locations. The views submitted are considered to be the most important and representative, having regard to the requirement to examine the significant likely effects of the proposed development on the baseline environment. The basis of this conclusion has been formed from detailed desktop studies, a site visit to verify sourced information and viewpoint locations, collaboration and discussion with other consultants involved in the production of this EIAR, and professional judgment which has been informed by best scientific guidance.

10.3 Characteristics of the Proposed Development

10.3.1 Development Description

The proposed development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building (392 sqm), a creche, a sport field and a multi-use games area. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

Figure 10-1: Overall Site Layout (source: McCrossan O'Rourke Manning Architects Architects)

10.3.2 Landscape Strategy

The following text has been taken from the Section 2.0 Landscape Strategy of the Landscape Report which has been prepared by Kevin Fitzpatrick Landscape Architects for the purposes of this planning application. The text below provides a description of the proposed landscape strategy which includes descriptions of measures to be implemented to mitigate against effects on the receiving environment as landscape and visual resource.

2.0 Landscape Strategy

2.1 General Aims

The character of the landscape proposed is one of parkland, native woodlands, native hedgerows, large trees, copses of native trees, wetlands, formal clipped hedges, and meadow areas. The landscape strategy aims to integrate the proposed residential development with the existing landscape and create a network of attractive and useable open spaces while contributing to local biodiversity. The public green areas are designed as landscape spaces that offer the opportunity for meeting, walking, interaction with nature and formal and informal play. The protection and enhancement of existing landscape features, notably large trees, the stream, wetland marsh and native hedgerows is an important aspect of the overall strategy, providing a structure for circulation and the connection of proposed open spaces, while continuing to develop green infrastructure links in the area. The long-term development and maintenance of the landscape is an integral part of the design strategy. The landscape is divided into several open space and transitional areas, each with a different character and range of uses. The largest area is the Active Open Space which measures 3.05 hectares. This is designed as a public park with playing fields, games court, playgrounds, cycleways, seating spaces and a wetland habitat. The

central open space is created around the stream and primarily focused of protection of the existing vegetation and underground archaeology and creation of new native habitats. Linear parkland is to be provided on most perimeters of the site providing a range of habitats and spatial uses. Further to this green infrastructure links are provided through out the site, linking the various landscape spaces, and creating ecological corridors linking to other landscape elements outside of the site boundary. connectivity is central to the design strategy.

2.2 Spatial Uses

The overall landscape strategy is to provide usable public open space for future residents. A series of open spaces and parkland are connected by linear green links which are based on existing landscape features. These existing features form part of the existing green infrastructure links within the site and surrounding area. The open spaces are distributed throughout the site and each space is easily accessible from the surrounding residences. In the primary open spaces, the levels have been carefully considered to accommodate a large flat area for passive recreation, formal and informal 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.

The desire lines through the landscape spaces are reflected in the path layout and will integrate with the general street layout to provide a high level of pedestrian permeability. The pedestrian circulation network is designed to accommodate movement through the space at a gradient of less than 1:20 where this is achievable. The layout of the paths and planting allows smaller areas of lawn suitable for passive uses by smaller children and other alternative uses to the large kickabout space. Pedestrian permeability throughout the site and to adjoining sites has been provided linking with the existing and future proposed footpath network and passive surveillance has been considered throughout all the open spaces.

2.3 The Park

This is the largest of the open spaces and composes a series of sub-spaces providing a range of amenity uses for the residents of the proposed development and the surrounding community.

A central element within the space is the active uses provided for within the park. At the lower levels on the eastern edge the levels have been manipulated to provide a flat playing field. The area is suitable for a range of sports activities, group training and ball sports. The playing field is not marked out to any specific sporting code and instead is a flexible space suitable for a range of activities. The playing field has a direct link to the changing rooms within the community building and the car park. The levels have been carefully considered to provide the maximum area for the playing field while reflecting the constraints of the existing hedgerows and trees, the proposed road, and a universal access point.

Embankments created by the change in levels will be planted with native woodland planting to add to the general habitat creation objectives of the scheme. A multi-use games court (MUGA) is provided in the center of the scheme and this can also be accessed from the universally accessible pathway. Within the western side of the park a large play area is provided with an area focused on toddler play and a section for older children. Age-appropriate play equipment, safety surfacing and seating will be included in the play area. Other natural and informal play activities are included in the southwest path of the park. These play elements are distributed through the space integrated into the general landscape design.

The central feature of the western side of the park is the native wetland habitat. The existing wetland marsh, that has been partially filled in by the previous landowners, will be expanded into a larger feature.

The marsh is to be retained in part and remodelled in part to create a naturalised pond and wetland that acts as a large attractive feature and focal point within the landscape. The wetland will be designed to accommodate a gradual embankment allowing native flora and fauna habitats to be established. This wetland will improve the local habitat diversity and create a very attractive landscape feature. The main landscape scheme engages with the wetland by perimeter paths, a footbridge and three seating spaces protruding into the wetland edge.

A range of habitats will be created within the park building upon the existing hedgerow and wetland marsh area. The hedgerow on the southern perimeter will be maintained and expanded with additional woodland with a dense understory. Copses of native trees will be distributed through the area with meadow or mown grass understory. A belt of high canopy woodland is proposed as a buffer between the parks areas and the access road. This type of woodland will permit light to penetrate allowing visual links and a grassland meadow to establish. The expanded and improved wetland march and pond is a high value biodiversity habitat and will be complemented by the woodland, scrub and meadow habitats that are to surround it

2.4 The Stream

The spatial design of this space is focused on two of the existing landscape features and a historical feature. The stream runs across this space from west to east and crosses and existing laneway that was used by previous landowners when farming the land. The Stream has retained a narrow corridor of hedgerow vegetation and the occasional tree. The stream will be retained on its current course and all areas of suitable vegetation retained and protected. The corridor of the stream will be expanded and some interventions to improve the riparian corridor, such as invasive plant removal, removal of dense gorse scrub and removal of any debris. A cut off ditch is proposed on the western boundary of this space and this will be planted with native hedgerow species to create a bioswale. This swale will discharge into a new pond and native wetland that will act as a detention basin. This in turn will discharge into a smaller pond before entering the stream at a low rate. All these features expand the stream habitat and contribute to the local biodiversity value of the area. A seating space is created at the point where the ponds discharge to take advantage of these elements as attractive landscape features. The laneway and the hedgerows and trees on each side will be incorporated into the landscape scheme. The lane will form part of the circulation network and the existing stream crossing will be utilised. Additional woodland and hedgerow habitats are proposed to link the existing hedgerows with those in the wider landscape. The majority of the below ground archaeological feature will be retained in this space. The lines of the historic enclosure will be marked on the surface by mown grass paths through the meadow. Woodland plating with the archaeological feature is to be located on mounds with root protection to control any root spread. This approach has been agreed in discussions with the National Monuments Service and the Consultant Archaeologist. In the eastern side of the space, the levels have been carefully considered to accommodate a flat area of lawn for passive recreation, formal and informal play and ball games. Overlooking the lawn, a seating space is located including benches, ornamental planting, flowering trees and feature paving. Further up the hill towards the pond a large woodland area is proposed with a path winding through it. A clearing is proposed in the middle of this new woodland where some natural play features are located.

2.6 Linear Park Areas

The scheme includes significant areas of public open space along the full western boundary and the eastern boundary of the southern section of site. This linear parkland retains and enhances the existing hedgerow where it exists and creates new perimeter hedgerow where there is none at present.

The section of linear parkland on the northwest edge of the site links the stream area open space to the courtyard gardens at the apartments. A new hedgerow, incorporating a swale, is to be created that will link the existing and proposed green infrastructure around the stream to the ecological corridors to the north. The hedgerow is complemented by copses of native trees and native grassland meadow. A continuous pedestrian path is proposed and playgrounds are integrated into this space.

The section of linear parkland on the southwest edge of the site links the stream area open space to green infrastructure in the southern section of the site and to within the wider landscape. In this area a combination of soil nailing and green wall engineering is proposed to retain as much of the native ground levels as possible while accommodating the level changes required for the construction of the housing and roads. The hedgerow on the western perimeter will be maintained and expanded with additional woodland with a dense understory. The cut off ditch will be incorporated into the new belt of woodland as a bio swale further enhancing the biodiversity value of this landscape. A pedestrian route is to be provided through this space with seating areas located to take advantage of the expansive views offered towards the coast. The path is integrated into the main pedestrian network at three locations.

On the south east side the linear park is wider than in other parts and accommodates a range of sub spaces and uses. The levels have been manipulated to create a series of flat areas that can accommodate natural play elements, an informal kickabout space, seating spaces and an accessible route through the space. Where there is an existing hedgerow this is to be retained and strengthened with additional hedgerow planting. Along the boundary with the Waverley Avenue a new native hedgerow is proposed along the perimeter. The old quarry pit in the south east corner is to be retained and transformed into a pond and native wetland that will act as a stormwater detention basin.

2.7 The Pines

This central open space has been designed as an active landscape area with the aim of strengthening local biodiversity while offering a range of uses to residents of the local area. Central to this open space is a flat mown grass area to act as a informal formal and informal play space with mounds, tunnels and other play elements. A formal play area is also proposed that will provide for toddler play and includes a play surface and seating. A large seating area is located adjacent to the play area. A second smaller seating space is to be created in the north west corner at a raised level overlooking the open space. Along the northern edge of the kickabout space a series of small, secluded spaces are created offering seating.

Circulation is provided through the space linking to the wider path networks and creating links through this central space. The open space is spatially defined by copses of native pine trees, often found in the local landscape, that will give this space a specific character and identity.

2.8 Green Infrastructure and Enhancement of Existing Landscape

The enhancement and strengthening of existing landscape features throughout the site is a fundamental aspect of the overall landscape approach. The green infrastructure strategy serves to link and integrate all of the spaces within the site together using existing and new landscape elements, while also contributing to green infrastructure in a wider context by creating opportunities to connect to green infrastructure beyond the site boundary.

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. Hedgerows increase local biodiversity and create habitats, thus becoming biodiversity corridors which link to other green infrastructure features in the surrounding areas. In addition to this, retaining hedgerows and ditches also allows the prospect of implementing a SuDS network through the site which can integrate into the circulation routes and become a part of the wider green infrastructure strategy.

The stream and associated vegetation 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 infrastructure strategy. The existing riparian corridor will be enhanced and significantly widened to form the focus on one of the main spaces. The existing wetland marsh will also be increased in size and enhanced to create an important wetland habitat of significant biodiversity value. The stream and wetland form the basis for a SuDS system, with all proposed channels eventually running into the stream. This is expanded upon with ditches and swales that will be created as bioswlaes adding to the green infrastructure network.

The proposed woodlands, hedgerows, wetland, copses, meadows and stream will create a high level of habitat complexity.

2.9 Biodiversity Actions

Throughout the design process all opportunities to improve the biodiversity within the scheme have been incorporated into the proposal. As well as retaining and protecting as many of the valuable trees as possible many positive proposals are included in the scheme aimed at enhancing the biodiversity of the site.

Biodiversity Actions:

- *Maintaining existing native groundcover under trees and supplement with bulbs and wildflower seeding*
- *Restoration of the pond habitat using native aquatics and marginal aquatics. The existing pond sediments will be retained and reinstated.*
- *Pollinator friendly perennials, wild grass strips and flowering shrubs are used throughout the scheme.*
- *Logs from felled trees and tree works are to be repurposed as bug hotels, small mammal habitats and for fungi and lichen growth.*
- *Native tree and shrub planting are proposed as infill to the woodland edge and throughout the landscape.*
- *Bird boxes and bat boxes are proposed for installation on the existing large trees.*
- *Green roofs are proposed to the apartment buildings with a pollinator friendly mix of grasses and sedums*

2.10 Planting Strategy

The plant species are chosen to respect and enhance the local environment while providing suitable vegetation that is harmonious with a residential area and will be successful through all stages of its maturity. Therefore, the planting palette has a limited number of species chosen for their appropriateness and with a preference for native planting where possible.

Large native Oaks and native Pines are the dominant tree species proposed throughout the main open space areas and will be complimented by, Alder, Birch, Wild Cherry and Rowan trees. When the trees mature, they will have a very strong visual impact and will define the character of the development as the existing trees go into decline.

Trees have specifically located outside of proposed attenuation areas to avoid any interference with future services. The street trees are chosen due to their more compact habit. These species are appropriate for the scale of the spaces in which they are to be used and are of a variety that will complement other native trees. Each street is to be planted using a single variety of tree and hedge giving a specific landscape character to each part of the development.

The existing trees that are retained within the scheme are to be enhanced and strengthened by additional planting of native 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. Formal evergreen hedges are used throughout the development to define spaces and create boundaries. These hedges will complement the estate landscape character of the site. Evergreen shrub mixes are also used as robust structural planting to define the streetscape and spatial uses. Ornamental and groundcover planting will be used to frame seating areas and cover the existing embankments in the open spaces, which will increase the aesthetic qualities of the space. Some more ornamental trees will be utilized for their visual quality and to provide interest around the seating areas.

The main structure planting around the site will be native hedgerow shrubs and tree planting, along with dense woodland and understory planting to create visual screening and improve biodiversity. Native plants such as Blackthorn, Hawthorn, Hazel and Holly are all used in the hedgerow mix and tree-planting in the hedgerows consists of Common Birch, Native Oak, Scots Pine, Wild Cherry and Common Alder. Particular attention was given to introducing certain pollinator species to various plant mixes in woodland and hedgerow areas as outlined and in referral to the 'Councils: actions to help pollinators; All Ireland Pollinator Plan 2021-2025'.

Figure 10-2: Landscape Master Plan (source: Kevin Fitzpatrick Landscape Architects)

10.4 Baseline Description

10.4.1 Site Description and Context

The subject site is located on the north-western fringes of Greystones, a coastal town situated in the north east of Co. Wicklow. The site is an irregular, doglegged shape, generally sloping moderately from west to east across the subject site (the site is situated on the lower eastern slope of Kindlestown Hill), comprising several fields measuring approximately 23ha in total which are separated by a network of mature hedgerows varying in height and spread from 1m-12m and 1.5m-10m respectively. The proposed development site lies within the townland of Coolagad and the northern portion of the proposed development is located within the former demesne landscape associated with Coolagad House which is illustrated on historic 6-inch Ordnance Survey maps dating from 1829-42. Coolagad House is still present today and is centrally located, adjacent to the south and east of the development site where there is a bend in the shape of the site from the east towards the south. Coolagad House is located approximately 360m from the centre of the site but its grounds share a boundary with the development site; the house itself is located approximately 50m from the nearest boundary with the development site. The townland of Coolagad borders the townland of Templecarrig to the north, Kindlestown to the south, Rathdown to the east, and Coolnaskeagh and Ballydonagh to the west.

In terms of the site's historical context, historical maps depict the lands as subdivided agricultural fields which, with the exception of one residential development, have remained as agricultural fields with the same field boundaries to the present day. In addition, a notable extent of tree lines along these field boundaries are depicted on the historic 6-inch Ordnance Survey maps dating from 1829-4. These historic tree lines are located within dense hedgerows along the boundaries of the fields within the site and are clearly recognised today.

In general terms, the site can be described as agricultural, comprising seven fields of arable land which have been worked regularly to grow crops with some fields being used as pastoral land for sheep and cattle. Six of these fields are of similar size with a mean area of 2.3ha, with the seventh considerably larger field located to the south of the site measuring 9.1ha

Access to the site is currently gained through a gate in the field in north-eastern portion of the site. The eastern side of this field is bound by the Rathdown Road (R761) and is delineated by a mature hedgerow varying in height from between 2-4.25m in height and 5-6m in spread comprising hawthorn, blackthorn, ash, bramble, and ivy. Redford Cemetery is located directly across from this entrance. The south east of this field shares a border with a single storey dwelling and garden with an accumulative area of .065ha. The boundary between this dwelling and the development site consists of a blockwork wall and a metal railing which have become overgrown with vegetation.

The southern side of this northern portion of the site is bound by a lane that is accessed from the Rathdown Road (R761). This lane provides vehicular and pedestrian access to a large single private dwelling that shares a boundary with the development site; this dwelling is located to the south west of this easternmost field within the development site and is approximately 460m from the centre of the proposed development. This lane also provides access to Coolagad House mentioned previously, which is located roughly where the site changes direction to the south from the east. The laneway shares its southern boundary with Temple Carrig School (located approximately 490m from the centre of the proposed development and approximately 25m from the nearest boundary to the development site) and accompanying floodlit, all-weather

sports pitch. The northern side of Coolagad House and grounds shares a boundary with the northern portion of the development site. This boundary is delineated by several highly variable hedgerows some of which are noted as being of particularly poor quality. There are some considerably large gaps within these hedgerows used to provide access for agricultural vehicles to the fields within the development site to the north with large sections of boundary between the grounds at Coolagad House and the development site formed by historic farm buildings and a barn of a more recent concrete block and corrugated metal construction. Another laneway that provides private access from the west side of Coolagad House to fields to the west, bisects the development site in an east-west direction. When the accompanying garden and out building are taken into account, the large single private dwelling mentioned above has an accumulative area of .48ha. These private lands project northward into the development site from the access laneway. The east, north, and west sides of this dwelling share a boundary with the development site. The east and northern boundary consists of a fence and a hedge whereas the western boundary consists of a hedgerow (HL) varying in height and spread of 3-7m in which two semi-mature ash trees (47 and 48) are located; the hedgerow is made up of a variety of species including as hawthorn, holly, blackthorn, ash, bramble, ivy, dog rose, goat willow, and elder.

The northern edge of the site borders several other arable fields being used to grow crops and for pastoral land. The northern boundary is delineated by a mature hedgerow varying in height from between 1-6m in height and 2-5m in spread. The hedgerow along this northern boundary is made up of a variety of species such as hawthorn, blackthorn, ash, bramble, ivy, dog rose, goat willow, hazel, gorse, sycamore, wild cherry, acer, and elder.

The largest field within the development site is located in the southwest and shares a western boundary with other agricultural fields on the eastern slopes of Kindlestown Hill used primarily as pastoral land.

Here, the western boundary is delineated by a mature hedgerow varying in height from between 2-5m in height and 6-10m in spread. The hedgerow along this northern boundary is made up of a variety of species such as hawthorn, blackthorn, bramble, ivy, gorse, bracken, and elder. The boundary along the south of the field is the southernmost boundary within the development site and is delineated by a mature hedgerow varying in height from between 1-6m in height and 2-5m in spread and a mature tree line of 21 trees, all of which are mature and semi-mature ash. The hedgerow along this boundary is made up hawthorn, blackthorn, bramble, bracken, ash, and dog rose. The eastern boundary of this field is delineated by another hedgerow and is shared with an existing residential development (Waverly) and a small field next to the western side of Gaelscoil na gCloch Liath; the school is approximately 340m from the centre of the proposed development and 100m from the nearest boundary to the development site. The hedgerow along this boundary is made up hawthorn, blackthorn, bramble, and dog rose, and ivy. 10 trees are located within this hedgerow, most of which are semi, early, and fully mature ash, with the exception of one early-mature sycamore.

10.4.2 Topography and Drainage

The topography of the site can generally be described as sloping from its highest points in the west to its lowest points in the east with a moderate to gentle gradient. The highest point in the development site is 93.5m O.D. and is located on the eastern slopes of Kindlestown Hill along the western boundary of largest field in the southern portion of the site. The lowest point in the

development site, which is approximately 830m from the highest point, is 39.5m O.D. and is located on the eastern boundary of field in the norther eastern portion of the site that borders the Rathdown Road (R761). Although almost all of the fields within the site conform to the general topographical description of moderately sloping from high points in the west to the lowest points in the east , there is a noticeable change in topography within one of the fields in the northern portion of the site. The field is located centrally within the northern portion of the site and shares a boundary with the Coolagad farmstead to the south and the large private single dwelling to the east. The topography within this field can be described in the most part as almost level with a gentle slope from the west at 61m O.D.at to the east at 52.5m O.D. over approximately 148m. However, on the eastern boundary of this field there is a depression which at its lowest point measures 51.5m O.D. This depression bisects the site on an east-west axis, getting shallower as it moves up the slope from east to west, gradually working itself out to a level plane as it reaches the western boundary of the field. The slope on the banks of this depression varies depending from which side it is measured. The slope to the bottom of the depression measures approximately 1:13 (8%) from if measured from the west, 1:4 (25%) from north, 1:7 (14%) from the south, and a level entry from the eastern boundary. Standing water within this depression is clearly visible from the top of its banks and given the topography on site, it is assumed this depression is acting as a basin for water flow coming from primarily the west, but also for components of flow coming from the north and south. This depression is host to a variety of vegetation and is described in the Tree Survey Report as follows: A broad and spreading thicket like area comprising goat willow in association with what appears to be a notably boggy area. The area supports numerous individual plants though proximity to one another and ongoing growth has seen the development of a closed and continuous canopy.

10.4.3 Vegetation

Given its agricultural context and land use, the majority of the site comprises fields of grass being used for pasture, or fields that were used as arable land or for pasture, which have been left fallow and are now somewhat overgrown. There are hedgerows along each field boundary varying between 1-12m in height and 1.5-10m in spread. Most of the hedgerows are of moderate or limited physical quality and are predominantly made up of hawthorn, blackthorn, bramble, ivy, hazel, elder, and dogrose. The trees on site vary notably with regard to size and age and although many of the hedges support self-seeding species such as ash and sycamore, there are significant quantities of large older trees. There are no Tree Protection Orders (TPOs) on any of the trees within the site boundary but there is one Tree Protection Objective (TPO) T01 in relation the tree lines within the vicinity of the Coolagad House (located approximately 360m from the centre of the and approximately 50m from the nearest boundary with the development site). There is no further information provided on TP01 in the LAP other than what is illustrated on the map and description below:

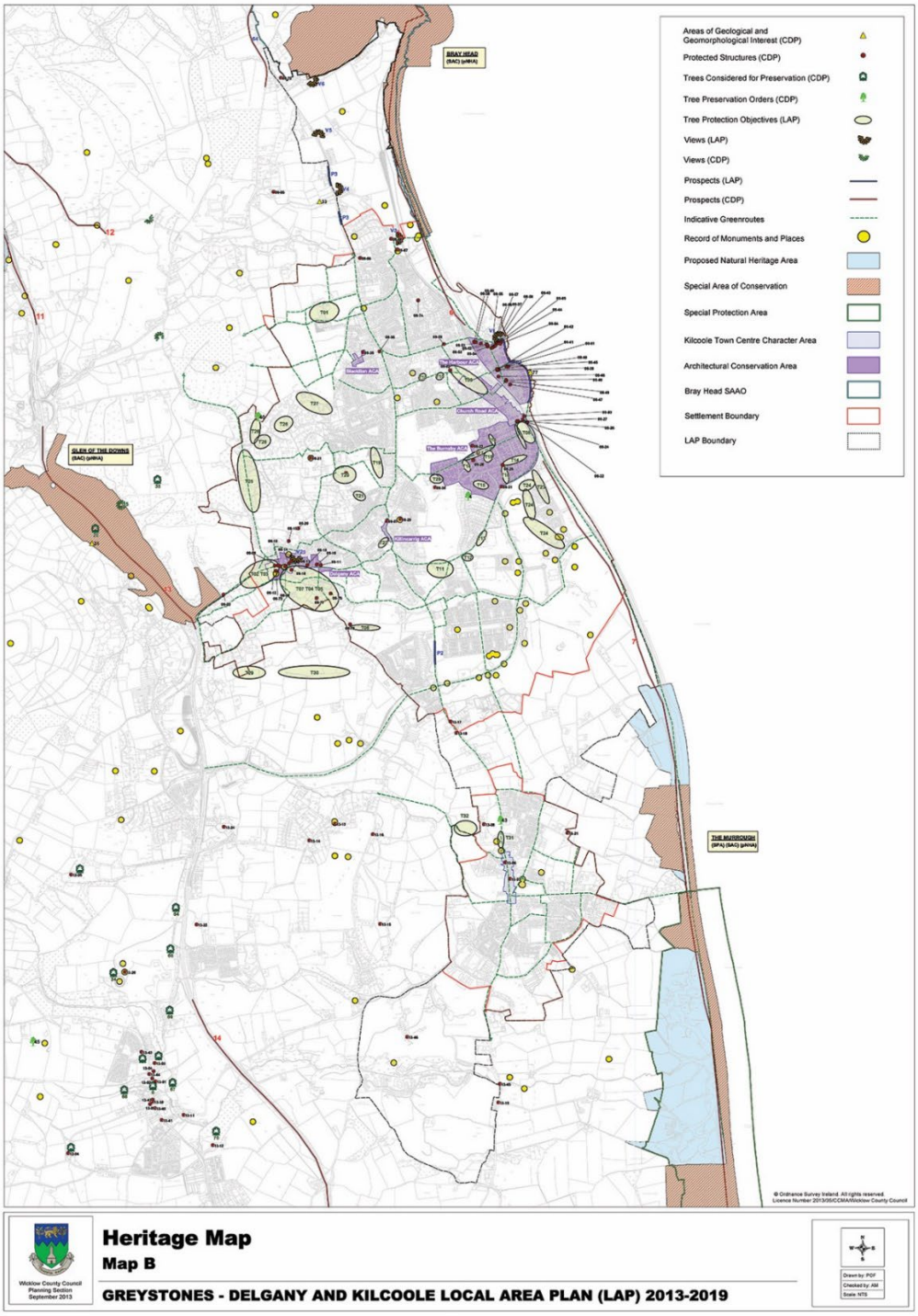


Figure 10-3: The Tree Protection Objectives Greystones (source: Map B Heritage Map Greystone - Delgany and Kilcoole LAP 2013-2019)

Figure 10-4: The Tree Protection Orders Wicklow (Source: Chapter 10 – Heritage Wicklow County Development Plan 2016-2022)

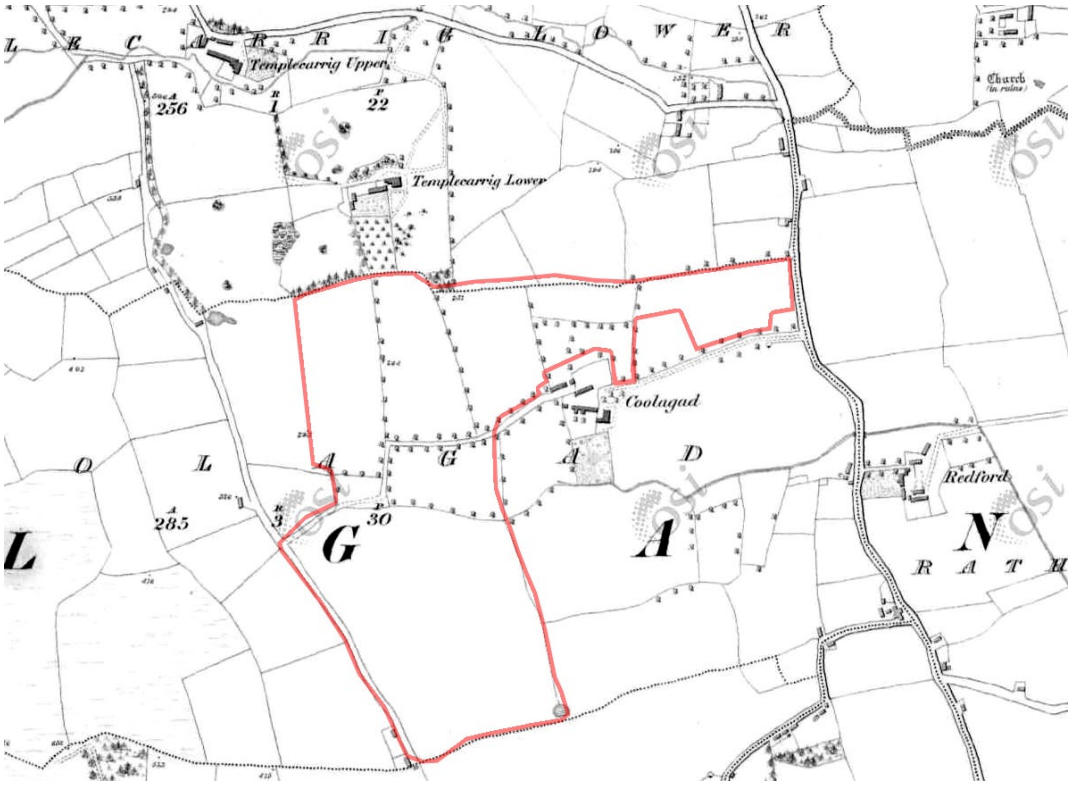


Figure 10-5: Excerpt from Ordnance Survey 6 Inch Map of Greystones 1837-1842 (source: Ordnance Survey Ireland)

A Tree Survey & Report was undertaken between December 2016 and January 2017 and updated in December 2020 by Andy Worsnop of The Tree File Consulting Arborists. A total of 161 individual trees, 26 Hedges, 1 Ash Woodland Area, 1 Tree Line, and 2 Tree Groups were assessed. The trees and hedges that were assessed are broken down and described as per the Survey & Report below:

Trees:

- No trees were graded Category A - A typically a good quality specimen, which is considered to make a substantial arboricultural contribution.
- 39 trees were graded Category B - Typically including trees regarded as being of moderate quality.
- 91 trees were graded Category C - Typically including generally poor-quality trees that may be of only limited value.
- 31 trees were graded Category U - Typically relates to trees that are dead, dying or dangerous. Such trees may present a threat of suffer from a defect or disease that is considered irremediable.

Tree Lines:

- 1 tree line was graded Category B - Typically including trees regarded as being of moderate quality.

Tree Groups:

- 2 tree groups were graded Category C - Typically including generally poor-quality trees that may be of only limited value.

Hedges:

- 24 hedges were graded Category C - Typically including generally poor-quality trees that may be of only limited value.
- 1 hedge was graded Category B - Typically including trees regarded as being of moderate quality.
- 1 hedge was graded Category U - Typically relates to trees that are dead, dying or dangerous. Such trees may present a threat of suffer from a defect or disease that is considered irremediable.

Ash Woodland Area:

The Ash Woodland was not categorised but has been described as per the Tree Survey & Report below:

This area of the site comprises a distinct basin where ground levels drop by circa 5.00 m and more. The upper western and northern edges of the basin support notable vegetation as does the southern boundary. Much of this vegetation is inaccessible but does include, particularly along the southern edge and number of emergent ash. Vigour and vitality appears variable and in keeping with the typical population sample for the site.

10.4.4 Contiguous Land Use

The eastern boundary of the northern portion of the site is bound by the Rathdown Road (R761) which connects the Greystones to the town of Bray to the north and Kilcoole to the south. The R761 links Wicklow to Greystones town further to the south. Immediately across Rathdown Road from the development site there is a cemetery, Redford Cemetery, which is located on the western edge of a large residential suburban zone comprising multiple housing estates, namely, Redford, Rathdown, La Touche, Fairfield, Mount Haven, St. Crispin's, and The Grove and North Shore to the north. The total combined area of this residential zone measures approximately 68ha.

Immediately to the north, the development site shares a boundary with the townland of Templecarrig Lower where the majority of the land comprises arable fields being used to grow crops and for pastoral land. The contiguous land to the north-west has notably denser tree lines along boundaries between fields than the contiguous land to the north-east. In the land to the north-west, there are two farmsteads illustrated on historic 6-inch Ordnance Survey maps dating from 1829-42 labelled as Templecarrig Lower (approximately 470m from the centre of the proposed development) and Templecarrig Upper (approximately 700m from the centre of the proposed development). Both farmsteads have been modified to some degree with the inclusion of structures of more recent construction but many of the buildings illustrated on the historic maps are still present.

To the south of the northern portion of the site, a group of three schools (collectively approximately 380m from the centre of the development site), Temple Carrig School, Gaelscoil na gCloch Liath, and Greystones Educate Together National School are located with their associated facilities; the overall site area measures approximately 7.1ha. The accompanying school facilities include a floodlit, all-weather sports pitch, a grass football pitch, car parks, playgrounds, and several smaller hard-paved sports pitches.

The southernmost portion of the development site shares its boundary with a field approximately measuring 3.5ha which has been worked in the past to grow crops as well as being used as pastoral land.

To the east of the southernmost portion of the site there are two residential housing estates, Waverly and Seagreen, both of which have phases still under construction and are composed of predominantly two storey houses and associated public open spaces; the combined total area of both housing developments measures approximately 12.3ha.

The contiguous land to west of the development site comprises several agricultural fields located on the eastern slopes of Kindlestown Hill. The fields are used to grow crops as well as for pastoral land. Further west, the land transitions from agricultural fields to land where scrub and grassland vegetation appears to have been cleared by means of burning. The western boundary of this land is shared with Kindlestown Wood, a coniferous woodland, which is located on at the top of Kindlestown Hill. Today, much of the wood contains native broadleaves of oak, ash, birch, holly and rowan along with introduced broadleaves such as beech, sycamore and sweet chestnut. There are conifer trees also, including Scots and Corsican pines, noble and Douglas firs and Sitka spruce.

10.4.5 Local Settlements

The proposed development site is located on the north-western fringes of Greystones town. The town centre is located approximately 1.35 km to the south-east of the site. Greystones town comprises a number of townlands which border Coolagad, namely, Ballydonagh to the west, Coolnaskeagh to the west, Kindlestown Upper to the south, Kindlestown Lower to the southeast, Rathdown Lower to the east, and Templecarrig Lower to the north.

10.4.6 Visual Analysis

The site presents as an agricultural landscape on the north western suburban fringes of Greystones town on the eastern slopes of Kindlestown Hill. From outside the site, the seven field compartments present as an open site, sloping moderately from west to east site in an agricultural setting. From within the site, the landscape presents differently as the individual and compartmentalised nature of each field is clearly recognised as tall hedgerows and tree lines along each field boundary create a sense of enclosure. Views towards the site from the east and south are obscured significantly by the built environment of Greystones town. The town is located on a west-east slope that contributes to concealment of the site from the east in particular. Due to the rising topography towards the west, the site is generally more visible when viewed from the west, particular from high vantage points located close by such as Kindlestown Hill. Generally, views into the site from other locations at similar elevations back towards the site are obscured by distance, intervening topography, tall, dense hedgerows and treelines.

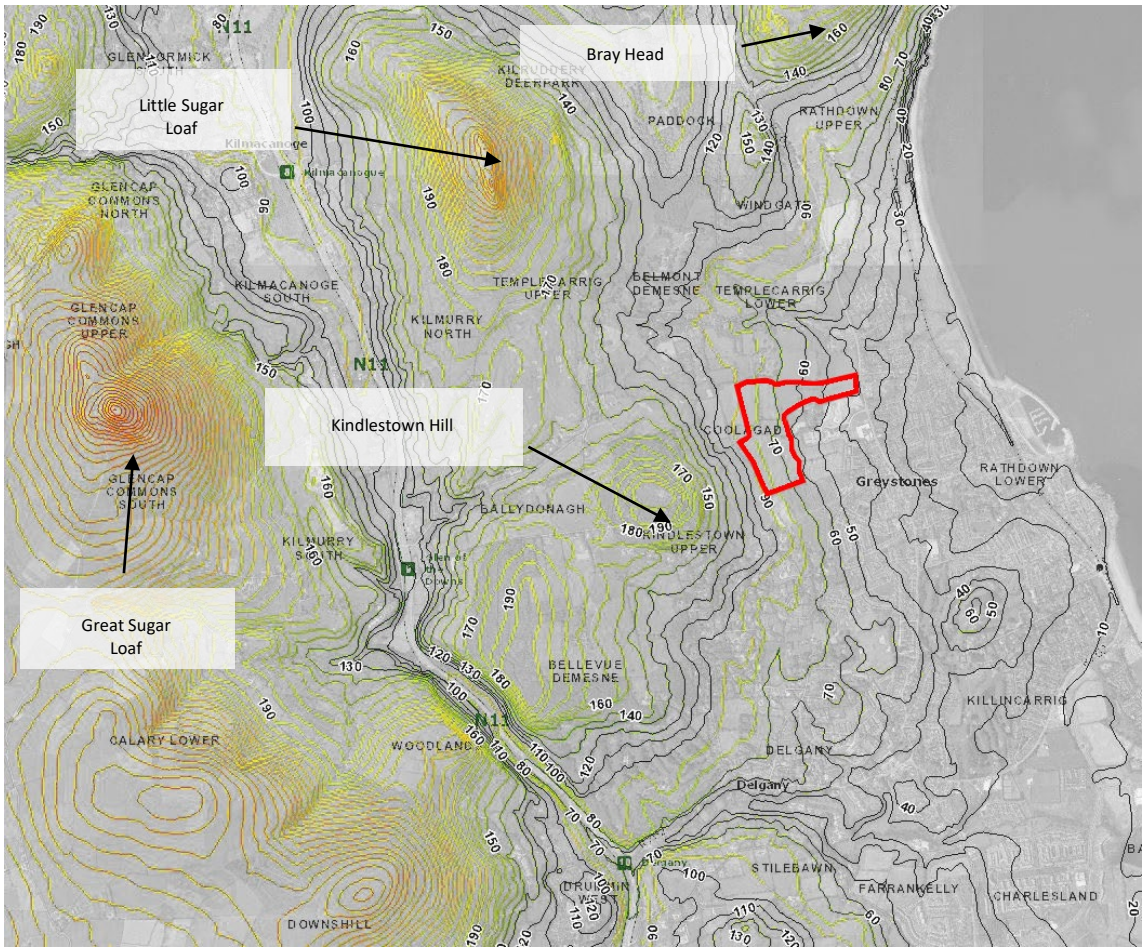


Figure 10-6: Topographical Context of the Site – Derived from Contour Mapping from Ordnance Survey Ireland (source: Ordnance Survey Ireland)

10.4.7 Landscape Quality

The landscape quality of the site is considered moderate given the rural aesthetic of the barley fields with dividing hedgerows, ditches and particularly the high visual quality associated with the mature tree lines, Pines, willow scrubland and remnant woodlands to the east of the site. A moderate visual quality also lies in the pockets of intervening layers of scrub, grasses and wildflowers present throughout the site adding to the seasonal colour within this landscape setting.

Figure 10-7: Photo Location Map for Site Photographs on the Following Pages

Figure 10-8: View (1) - looking west from the site entrance at Rathdown Road (R761) at the west of the site. The woodland on Kindlestown Hill can be seen in the left background, the Little Sugar Loaf in the middle background along with mature Austrian and Scots pines, and Bray Head in the right background

Figure 10-9: View (2) - from the top of the easternmost field looking east. Dublin Bay is clearly seen in the background. Temple Carrig School and floodlit sports pitches can be seen in the right middleground.

Figure 10-10: View (3) - looking west from the centrally located field within the northern portion of the site. The depression can be seen in on the left. Kindlestown Hill is clearly visible in the left background, the peak of the Great Sugar Loaf visible in the centre background and the Little Sugar Loaf in the right background.

Figure 10-11: View (4) - looking west from the upper end of centrally located field within the northern portion of the site. Kindlestown Hill is clearly visible in the background, the peak of the Great Sugar Loaf visible in the right background

Figure 10-12: View (5) - looking east from the centrally located field within the northern portion of the site. The depression can be seen in on the right. Mature Austrian and Scots pines can be seen on the left and Dublin Bay in the background.

Figure 10-13: **View (6)** - looking east from the centrally located field within the northern portion of the site. The depression can be seen in on the left. The large single dwelling can be seen in the right middleground with Dublin Bay in the background.

Figure 10-14: View (7) - looking southeast from the centrally located field within the northern portion of the site. The large single dwelling can be seen in the left middleground and the 'contemporary' agricultural building located on Coolagad farmstead can be seen in the right middleground.

Figure 10-15: View (8) - looking west from the field above the centrally located field. The older agricultural buildings located on Coolagad farmstead can be seen in the left middleground. Kindlestown Hill is clearly visible in the centre/left background, the peak of the Great Sugar Loaf visible in the centre/right background.

Figure 10-16: View (9) - looking east from the field above the centrally located field. The large single dwelling as well as the older agricultural buildings located on Coolagad farmstead can be seen in the right middleground. Bray Head is visible in the left background. The mature Scots and Austrian pines are visible in the centre middleground. Houses located within the neighbouring Waverly development are just visible in the far right middleground.

Figure 10-17: View (10) - looking west from the field above the centrally located field. The older agricultural buildings located on Coolagad farmstead can be seen in the left middleground. Kindlestown Hill is clearly visible in the centre/left background, the peak of the Great Sugar Loaf visible in the centre/right background.

Figure 10-18: View (11) - looking west from the uppermost field in the northern portion of the site. Kindlestown Hill is visible in the centre background. The peak of the Great Sugar Loaf visible in the right background. Houses located within the neighbouring Seagreen development are visible in the left background.

Figure 10-19: View (12) - looking east from uppermost field in the northern portion of the site. Bray Head is only just visible behind the tree line and hedgerow in the left background. Waverly and Seagreen developments are visible in the right middleground. Houses located within the suburbs of Greystones east are just visible in the background behind the hedgerows and tree lines.

Figure 10-20: View (13) - looking east from the field behind of Temple Carrig School and the Waverly residential development. Temple Carrig school can be seen in the left middleground. New apartment complexes at Greystones Harbour are just visible in the left background. Waverly residential development can be seen in the centre middleground. Greystones town can be seen in the centre background. Houses located in the townland of Kindlestown Upper can be seen in the centre/right background.

Figure 10-21: View (14) - looking east from the eastern slopes of Kindlestown Hill above the largest field which is located in the southernmost portion of the site on the. Bray Head is visible in the left background. Temple Carrig School, Gaelscoil na gCloch Liath, and Seagreen development are visible in the centre/right middleground. Greystones town is visible in the right background.

10.4.8 Archaeology

Please refer to Chapter 11 (Cultural Heritage including Archaeology) of this EIAR was prepared by IAC Archaeology Ltd for details on the baseline receiving environment with regard to archaeological and cultural heritage.

10.4.9 Ecology & Biodiversity

Please refer to Chapter 5 (Biodiversity) of this EIAR which was prepared by Altemar Ltd. for details on the baseline receiving environment with regard to ecology and biodiversity.

10.4.10 Planning Context

10.4.10.1 Landscape Planning Policy Context

Landscape Planning policies and objectives relevant to the assessment of the impacts of the proposed development on the site Coolagad, Greystones are laid out in the Wicklow County Development Plan 2016-2022, the Draft Wicklow County Development Plan 2022-2028, and the Greystones – Delgany and Kilcoole LAP 2013-2019.

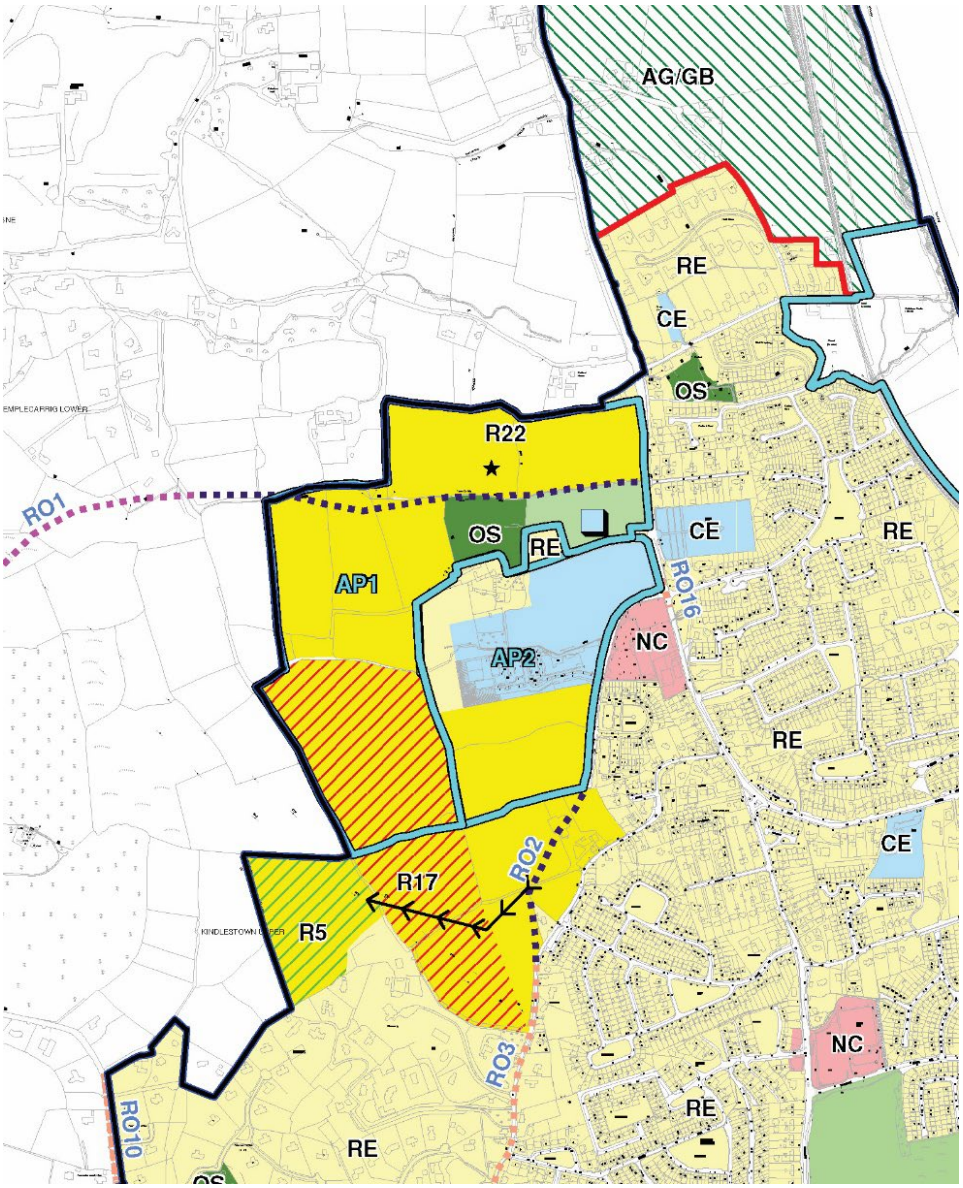


Figure 10-22: Excerpt from Map A - Land Use Zoning Objectives (source: Adopted Greystones – Delgany and Kilcoole LAP 2013-2019)

The proposed development site at Coolagad lies within lands zoned as follows:

AP1: COOLAGAD ACTION PLAN

As described in the Greystones – Delgany and Kilcoole LAP 2013-2019 - Section 10: Action Plans – 10.2 AP1: Coolagad Action Plan:

This Action Area is located at Templecarrig Lower, Coolagad and Kindlestown Upper, on a site approximately 34ha in size. This area shall be developed for a mix of uses including residential, community and open space, in accordance with the following:

- c. 29ha for the development of residential units.
- A minimum of 4ha of land shall be provided for active open space including public park, MUGA and playground, in accordance with the requirements of the Community and Enterprise Section of the Council.
- A community centre and/or other community facility/facilities shall be provided to serve the communities of this area. In determining requirements for community facilities, a community services audit shall be carried out and consultation shall be undertaken with the Community and Enterprise Section of the Council.
- A new road shall be provided for local access to zoned lands and shall be designed to facilitate the achievement of the long-term objective to provide a northern access route from Greystones to the N11, in accordance with roads objective RO1, 'Section 7: Transport and Service Infrastructure' of this plan.
- Green routes shall be provided throughout the area to link residential areas with community infrastructure, schools, adjoining housing lands and the Blacklion neighbourhood centre.
- The residential amenity of existing and future adjoining properties shall be protected.
- Protection of natural and built heritage, including rivers and trees.
- In designing the development of this area attention shall be paid to reducing the visual impact of the development on views towards Kindlestown Hill, from the R761. In particular, development on lands to the west of the Blacklion Action Plan shall be of a design and layout that is appropriate to the topography of the site and the necessity to ensure there is a visual transition between these developed lands and the unzoned agricultural lands / Kindlestown Hill to the rear of the site.
- Regard shall be paid to ensuring appropriate links and transition of scale, design and layout of housing, with lands adjoining the boundary of the Action Plan, including lands within AP2: Blacklion Action Plan and lands zoned for housing to the south at Kindlestown Upper.

Phasing shall be as follows:

- Phase 1: 200 units and completion of road
- Phase 2: 150 units and provision of open space (AOS and OS)
- Phase 3: 150 units and community centre/facility
- Phase 4: remainder of units.

Land Use Zoning Objectives:

As described in Greystones – Delgany and Kilcoole Local Area Plan 2013-2019 (the LAP) - Section 11: Zoning – Table 11.1 Zoning Matrix:

R22: To provide for the development of sustainable residential communities up to a maximum density of 22 units per hectare and to preserve and protect residential amenity.

R17: To provide for the development of sustainable residential communities up to a maximum density of 17 units per hectare and to preserve and protect residential amenity.

AOS: To provide for active recreational open space.

OS: To preserve, provide for and improve public and private open space for recreational amenity and passive open space.

RO1: As described in Greystones – Delgany and Kilcoole LAP 2013-2019 - Section 8: Transport and Service Infrastructure – Table 7.1 Roads Objectives:

RO1: Reserve a land corridor to provide for a new road from the R761 at Sea View to lands within AP1: Coolagad Action Plan. The new road shall provide local access to zoned lands within the lifetime of the plan and shall, subject to feasibility, need and design, in the long term provide a northern access route from Greystones to the N11.

Community Building:

As described in Greystones – Delgany and Kilcoole LAP 2013-2019 - Section 7: Social Infrastructure - 7.2 Social Infrastructure Objectives:

SOC16: A new community building / facility shall be provided within AP1: Coolagad Action

Plan. The size/configuration shall be determined in consultation with the Community and Enterprise Section of the Council.

The following objectives apply to the lands zoned 'R17/R5/R22':

RES7: 'On land zoned R17/R5/R22 in the Kindlestown Upper/Coolagad vicinity, the design and layout of developments shall be appropriate to the topography of sites and the necessity to ensure that there is a visual transition between these developed lands and the unzoned agricultural lands/Kindlestown Hill to the rear of the site. Regard shall be paid to the protection of the visual amenity of the area, including views of Kindlestown Hill and to the objectives of the Blacklion ACA.'

Zonings contiguous to the site include the following:

AP2: Blacklion Action Plan (to the southeast of the site)

RO1: Road Objective Short Term (to the immediate north of the site)

CE: Community & Education (to the east of the site across the R761 and to the south of the northern portion of the site)

RE: Existing Residential (to the east of the site across the R761, to the south of the northern portion of the site between the site and the existing school site, and to the east of the site between the sit and the existing school site)

R22: Residential - 22/ha (to the north, west and southeast of the site)

R17: Residential -10/ha (to the south of the site)

10.4.10.2 Natural Heritage

The Natural Heritage Strategy of the Wicklow County Development Plan 2016-2022 and Draft Wicklow County Development Plan 2022-2028 aim to:

- To conserve and enhance biodiversity in recognition of the many ecosystem services provided to society

- To promote an integrated approach to landscape planning and management in order to protect the County's unique landscape character
- To conserve and enhance the County's geological heritage
- To avoid negative impacts upon the natural environment and promote appropriate enhancement of the natural environment as an integral part of any development
- To support the actions in the County Wicklow Heritage Plan which seek to enhance the understanding, appreciation and protection of Wicklow's biodiversity including the County Wicklow Biodiversity Action Plan.

In terms of biodiversity, the Wicklow County Development Plan 2016-2022 states the following objectives in relation to the protection of wildlife, threatened habitats and species protected by law and recognised as being of local, national and EU importance:

Table 10-1: Relevant Biodiversity Objectives (source: Wicklow County Development Plan 2016-2022)

Objective	
NH1	To ensure that the impact of new developments on biodiversity is minimised and to require measures for the protection and enhancement of biodiversity in all proposals for large developments.
NH2	No projects giving rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this plan (either individually or in combination with other plans or projects)
NH3	To contribute, as appropriate, towards the protection of designated ecological sites including candidate Special Areas of Conservation (SACs) and Special Protection Areas (SPAs): Wildlife Sites (including proposed Natural Heritage Areas); Salmonid Waters; Flora Protection Order sites; Wildfowl Sanctuaries (see S.I. 192 of 1979); Freshwater Pearl Mussel catchments; and Tree Preservation Orders (TPOs). To contribute towards compliance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines, including the following and any updated/superseding documents:EU Directives, including the Habitats Directive (92/43/EEC, as amended), the Birds Directive (2009/147/EC), the Environmental Liability Directive (2004/35/EC), the Environmental Impact Assessment Directive (85/337/EEC, as amended), the Water Framework Directive (2000/60/EC) and the Strategic Environmental Assessment Directive (2001/42/EC). National legislation, including the Wildlife Act 1976, the European Communities (Environmental Impact Assessment) Regulations 1989 (SI No. 349 of 1989) (as amended), the Wildlife (Amendment) Act 2000, the European Union (Water Policy) Regulations 2003 (as amended), the Planning and Development Act 2000 (as amended), the European Communities (Birds and Natural Habitats) Regulations

Objective	
	2011 (SI No. 477 of 2011) and the European Communities (Environmental Liability) Regulations 2008. National policy guidelines (including any clarifying Circulars or superseding versions of same), including the Landscape and Landscape Assessment Draft Guidelines 2000, the Environmental Impact Assessment Sub-Threshold Development Guidelines 2003, Strategic Environmental Assessment Guidelines 2004 and the Appropriate Assessment Guidance 2010. Catchment and water resource management Plans, including Eastern and South Eastern River Basin Management Plan 2009-2015 (including any superseding versions of same). Biodiversity Plans and guidelines, including Actions for Biodiversity 2011-2016: Ireland's 2nd National Biodiversity Plan (including any superseding version of same). Ireland's Environment 2014 (EPA, 2014, including any superseding versions of same), and to make provision where appropriate to address the report's goals and challenges.
NH4	All projects and plans arising from this plan (including any associated improvement works or associated infrastructure) will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. A plan or project will only be authorised after the competent authority has ascertained, based on scientific evidence, Screening for Appropriate Assessment, and a Stage 2 Appropriate Assessment where necessary, that: 1) The Plan or project will not give rise to significant adverse direct, indirect or secondary effects on the integrity of any European site (either individually or in combination with other plans or projects) or 2) The Plan or project will have significant adverse effects on the integrity of any European site (that does not host a priority natural habitat type and / or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000 Or 3) The Plan or project will have a significant adverse effect on the integrity of any European site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons for overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other

Objective	
	imperative reasons of overriding public interest. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000.
NH5	To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs) and to protect other designated ecological sites in Wicklow.
NH6	Ensure ecological impact assessment is carried out for any proposed development likely to have a significant impact on proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Statutory Nature Reserves, Refuges for Fauna, Annex I habitats, or rare and threatened species including those species protected by law and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.
NH7	The Council recognises the natural heritage and amenity value of the Wicklow Mountains National Park and shall consult at all times with National Park management regarding any developments likely to impact upon the conservation value of the park, or on issues regarding visitor areas
NH8	To protect non-designated sites from inappropriate development, ensuring that ecological impact assessment is carried out for any proposed development likely to have a significant impact on locally important natural habitats or wildlife corridors. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.
NH9	To support, as appropriate, relevant public bodies (such as the National Parks and Wildlife Service), efforts to seek to control and manage alien / invasive species within the County.
NH10	To facilitate, in co-operation with the relevant statutory authorities and other groups, the identification of valuable or vulnerable habitats of local or regional importance, not otherwise protected by legislation.
NH11	To support the Department of the Arts, Heritage, Regional, Rural and Gaeltacht Affairs and the National Parks and Wildlife Service in the development of site-specific conservation objectives (SSCOs).
NH12	To support the protection and enhancement of biodiversity and ecological connectivity within the plan area in accordance with Article 10 of the Habitats Directive, including linear landscape features like watercourses(rivers, streams, canals, ponds, drainage channels, etc), woodlands, trees, hedgerows, road and railway margins, semi-natural grasslands, natural springs, wetlands, stonewalls, geological and geo-morphological systems, features which act as stepping stones, such as marshes and woodlands, other landscape features and associated wildlife

Objective	
	where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones that taken as a whole help to improve the coherence of the Natura 2000 network in Wicklow.

Table 10-2: Relevant Woodlands, Trees and Hedgerows Objectives (source: Wicklow County Development Plan 2016-2022)

Objective	
NH14	To promote the preservation of trees, groups of trees or woodlands in particular native tree species, and those trees associated with demesne planting, in the interest of amenity or the environmental, as set out in Schedule 10.08 and Map 10.08 A, B & C of this plan.
NH15	To consider the making of Tree Preservation Orders (TPOs) to protect trees and woodlands of high value, where it appears that they are in danger of being felled.
NH16	Development that requires the felling of mature trees of environmental and/or amenity value, even though they may not have a TPO in place, will be discouraged.
NH17	To discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling where possible.
NH18	To encourage the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development management process, and require the planting of native, and appropriate local characteristic species, in all new developments.
NH19	To encourage the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site (unless otherwise agreed by the Planning Authority).

Table 10-3: Relevant Water Systems Objectives (source: Wicklow County Development Plan 2016-2022)

Objective	
NH20	To facilitate the implementation of the EU Water Framework Directive and associated River Basin and Sub-Basin Management Plans and the EU Groundwater Directive to ensure the protection, improvement and sustainable use of all waters in the County, including rivers, lakes, ground water, coastal and estuarine waters, and to restrict development likely to lead to a deterioration in water quality.

NH21	To resist development that would interfere with the natural water cycle to a degree that would interfere with the survival and stability of natural habitats.
NH22	To prevent development that would pollute water bodies and in particular, to regulate the installation of effluent disposal systems in the vicinity of water bodies that provide drinking water or development that would exacerbate existing underlying water contamination
NH23	To minimise alterations or interference with river / stream beds, banks and channels, except for reasons of overriding public health and safety (e.g. to reduce risk of flooding); a buffer of generally 10m along watercourses should be provided (or other width, as determined by the Planning Authority) free from inappropriate development, with undeveloped riparian vegetation strips, wetlands and floodplains generally being retained in as natural a state as possible. In all cases where works are being carried out, to have regard to Regional Fisheries Board "Requirements for the protection of fisheries habitat during the construction and development works at river sites"

Table 10-4: Relevant green infrastructure objectives (source: Wicklow county development plan 2016-2022)

Objective	
NH31	To recognise the importance and contribution of Green Infrastructure throughout the region for the maintenance of biodiversity and ensuring that the region will be able to, or be ecologically robust enough to, adapt and respond to climate change issues.
NH32	To protect existing green infrastructure resources and to facilitate, in consultation with relevant stakeholders, the development of green infrastructure that recognises the benefits that can be achieved with regard to the following: – Provision of open space amenities – Sustainable management of water – Protection and management of biodiversity – Protection of cultural heritage – Protection of protected landscape sensitivities
NH34	New development and redevelopment proposals, where considered appropriate, are required to contribute towards the protection, management and enhancement of the existing green infrastructure of the local area in terms of the design, layout and landscaping of development proposals.
NH35	To facilitate the development and enhancement of suitable access to and connectivity between areas of interest for residents, wildlife and biodiversity, with focus on promoting river corridors, Natura 2000 sites, nature reserves and other distinctive landscapes as focal features for linkages between natural, semi natural and formalised green spaces where feasible and ensuring that there is no adverse

	impact (directly, indirectly or cumulatively) on the conservation objectives of Natura 2000 sites.
NH37	To promote and facilitate the development of coastal paths linking up with existing recreational paths/strategic walkways/cycleways, creating new linkages between coastal sites and inward linkages to settlements and green spaces in built up areas and extensions to existing facilities where feasible and ensuring that there is no adverse impact (directly, indirectly or cumulatively) on the conservation objectives of Natura 2000 sites.
NH38	To facilitate the development of green bridges / wildlife crossings over existing physical transport barriers to repair fragmentation of the green infrastructure network caused by such grey infrastructure developments.

Table 10-5: Relevant Natural Resources Objectives (source: Wicklow County Development Plan 2016-2022)

Objective	
NH39	To facilitate the use of natural areas for active outdoor pursuits, subject to the highest standards of habitat protection and management and all other normal planning controls.
NH40	The facilitate access to amenity areas in the County for the benefit of all, on the basis of cooperation with landowners, recreational users and other relevant stakeholder groups to promote "agreed access" on public and privately owned land in the County on the basis of sustainability, consultation and consensus.
NH43	To facilitate the development of the coastal walking and cycling route between Bray and Arklow, as well as links between this route and the coast road, in consultation with landowners.

Wicklow's Landscape Classification & Vulnerability

Wicklow County Development Plan 2010-2016 identified and grouped six landscape categories with regard to their vulnerability to development. The 2016-2022 Wicklow County Development Plan endeavoured to improve upon this original assessment by overlaying this Landscape Classification Map with a Landscape Sensitivity Map to create a more robust categorisation of these areas. **In both cases, the development site under assessment for this LVIA lies within what is categorised as an 'Urban Area' that has been designated as 'Low' vulnerability with regard to development pressures.** The evolution of the landscape categorisation process is illustrated through the maps and tables below:

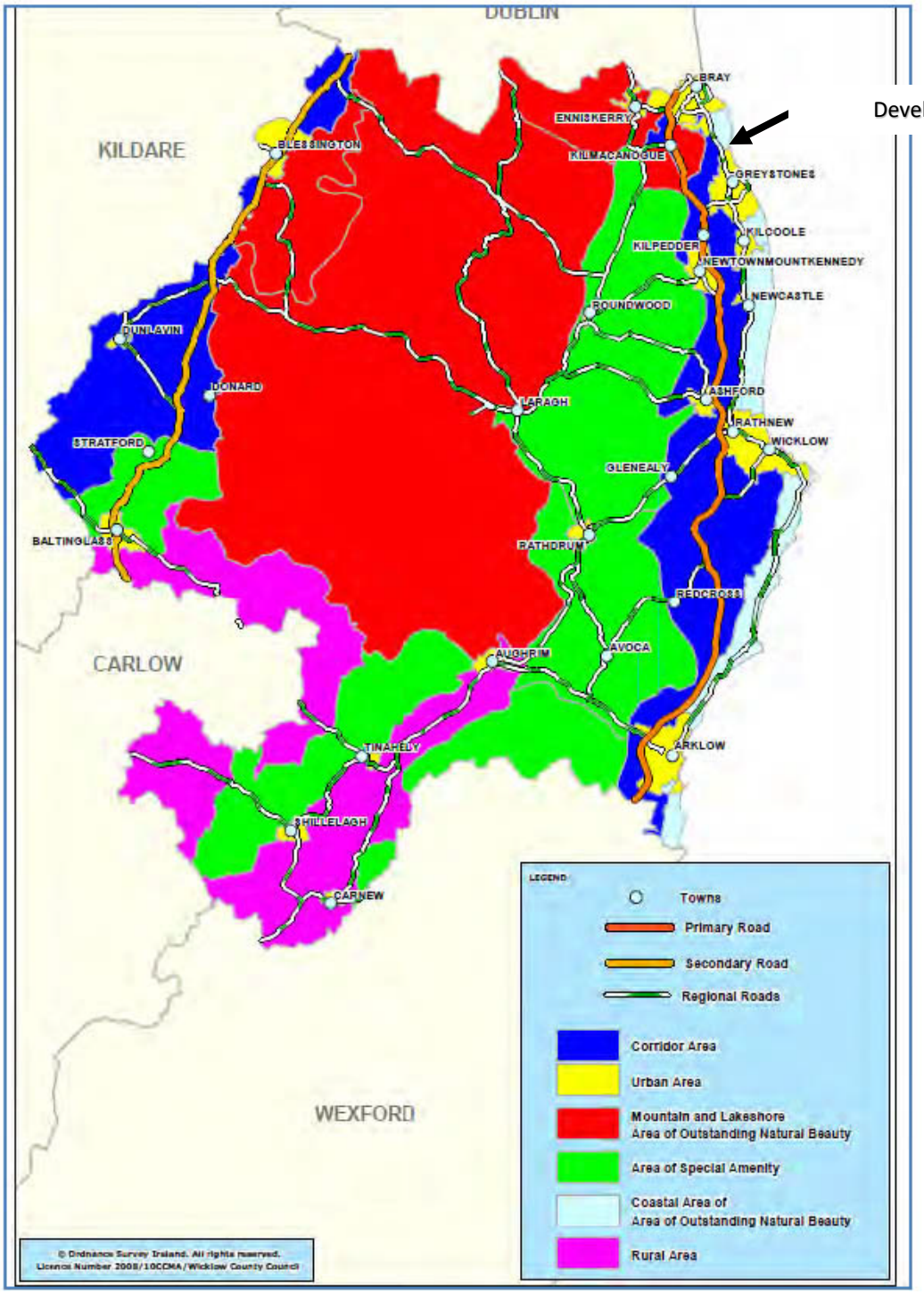
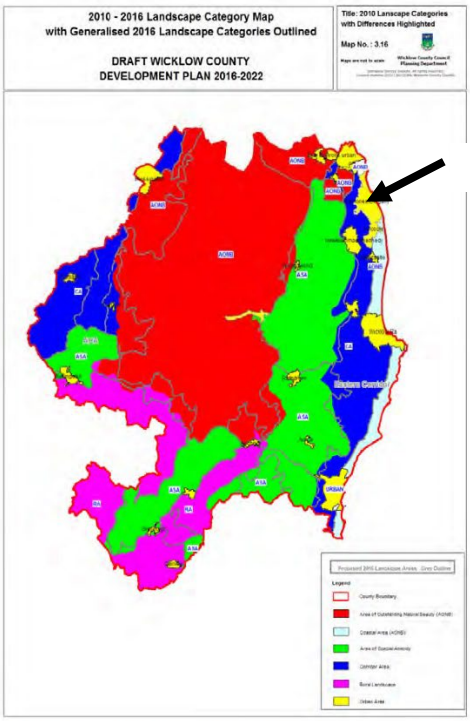


Figure 10-23: Wicklow's Landscape Classification Map (2010-2016) (source: Landscape Assessment - Appendix 5 - Landscape Assessment - Wicklow County Development Plan 2016-2022)

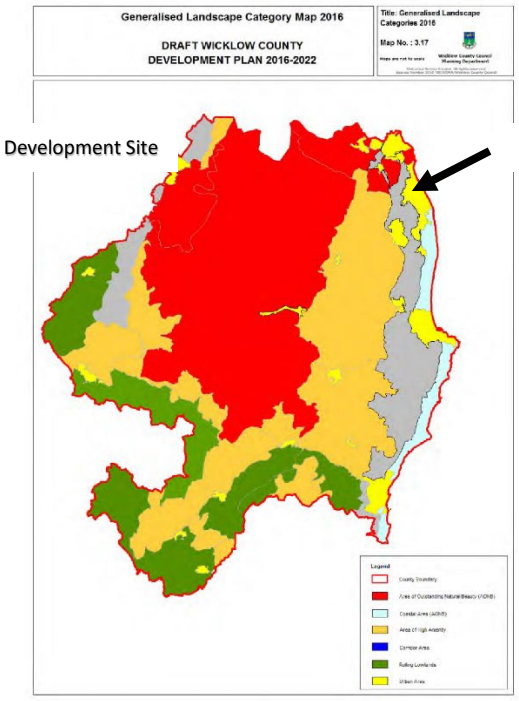
1. Mountain and Lakeshore Areas of Outstanding Natural Beauty (ML-AONB)	
Vulnerability:	**Very high**
2. Coastal Areas of Outstanding Natural Beauty (C - AONB)	
Vulnerability:	**Very high**
3. Areas of Special Amenity (ASA)	
Vulnerability:	**High**
4. Access Corridor Area (ACA)	
Vulnerability:	**Medium**
5. Rural Area (RA)	
Vulnerability:	**Medium**
6. Urban Areas (UA)	
Vulnerability:	**Low**

Table 1.5 – Wicklow's Landscape Categories 2010-2016 County Development Plan

Figure 10-24: Table illustrating the vulnerability to development hierarchy to be used in conjunction with Wicklow's Landscape Classification Map (2010-2016) (source: Landscape Assessment - Appendix 5 - Landscape Assessment - Wicklow County Development Plan 2016-2022)

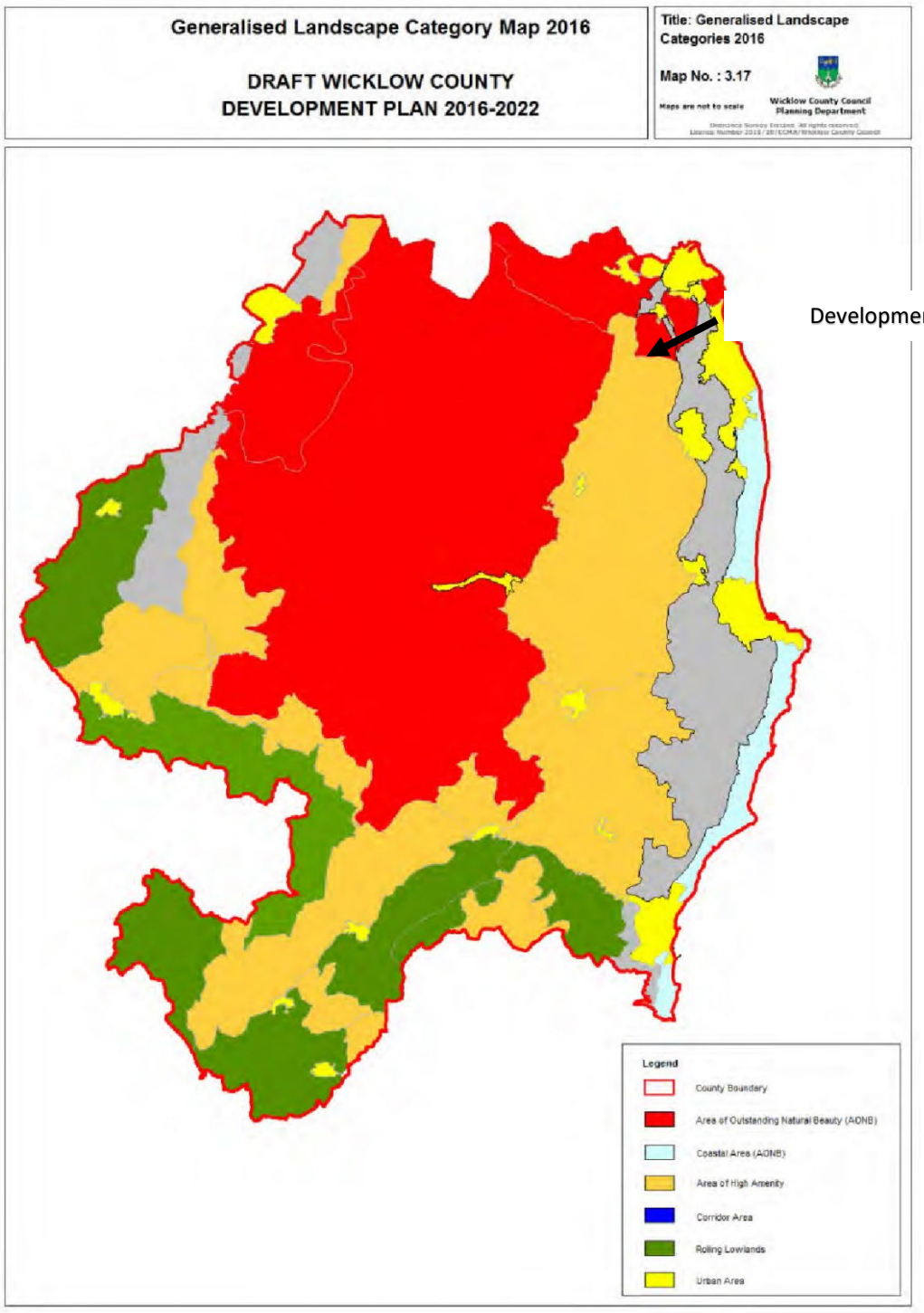


Map 3.16 CDP 2010 – 2016 Landscape Categories with the outline of the proposed Generalised Landscape Categories for draft CDP 2016 - 2022



Map 3.17 Generalised Landscape Categories draft County Development Plan 2016 - 2022

Figure 10-25: The original Landscape Classification Map (left) and the revised Landscape Category Map (right) (source: Landscape Assessment - Appendix 5 - Landscape Assessment - Wicklow County Development Plan 2016-2022)



Map 3.17 Generalised Landscape Categories draft County Development Plan 2016 - 2022

Figure 10-26: The revised Landscape Category Map (source: Landscape Assessment - Appendix 5 - Landscape Assessment - Wicklow County Development Plan 2016-2022)

Sensitivity Mapping

The Landscape Sensitivity Map that was produced for the 2016-2022 Wicklow County Development Plan used GIS software and a weighting system to calculate the overall sensitivity of Wicklow's landscape; the map that was produced can be seen below. The development site sits within an area that is designated as Low to Medium Sensitivity.

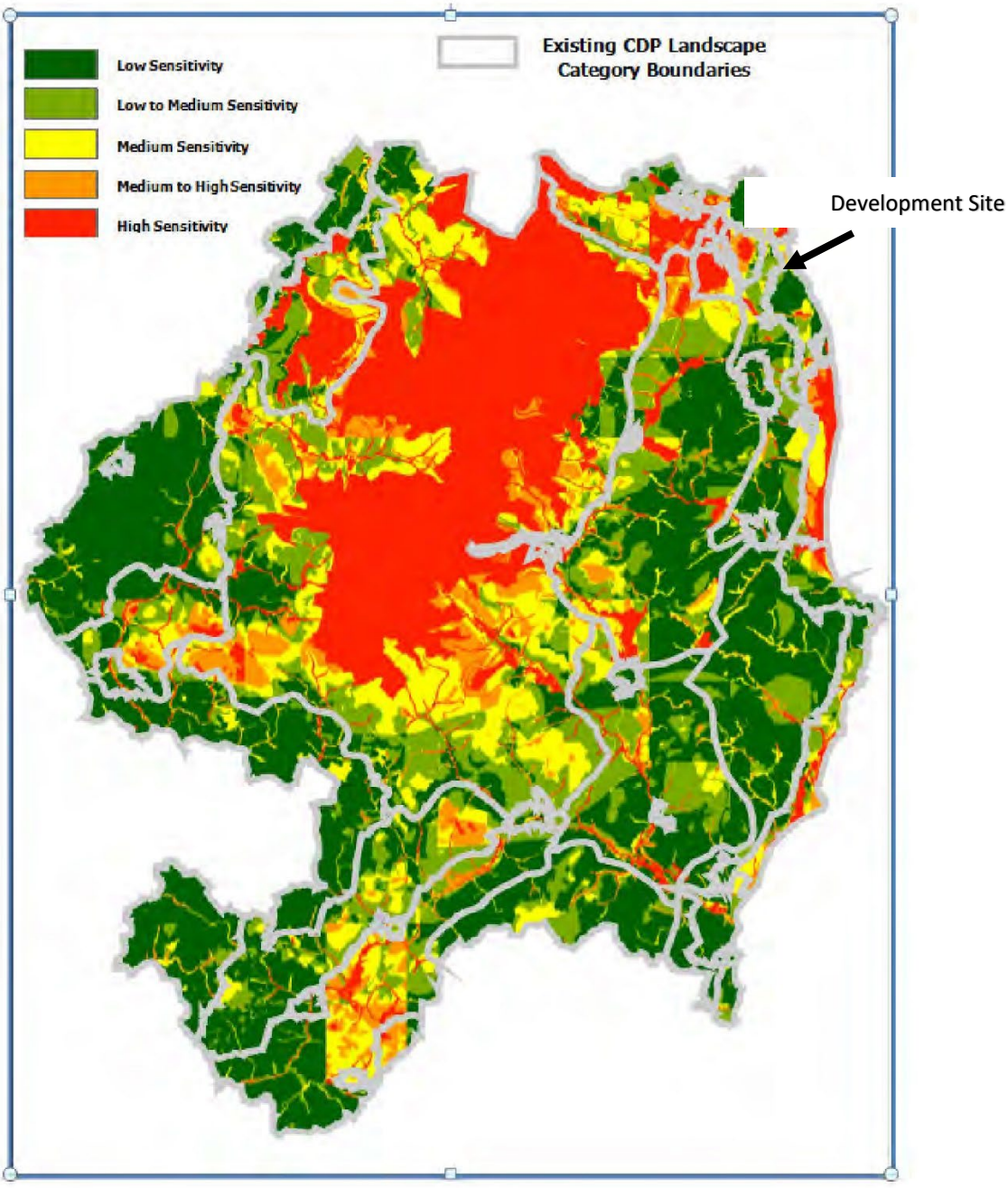


Figure 10-27: Wicklow's Landscape Sensitivity Mapping (source: Landscape Assessment - Appendix 5 - Landscape Assessment - Wicklow County Development Plan 2016-2022)

Hierarchy	Landscape Category	Landscape Area
1	Mountain and Lakeshore AONB	The Mountain Uplands
		The Blessington Lakes Area
		The Bray Mountains Group
		The North Eastern Valley
2	Coastal Areas AONB	Northern Coastal Area
		Southern Coastal Area
3	Areas of High Amenity	North East Mountain Lowlands
		South East Mountain Lowlands
		Southern Hills
		Baltinglass Hills
		Transitional Lands
4	Corridor Area	The N11
		The N81
5	Lowlands	Rolling Lowland Areas 1-6
6	Urban Area	All towns ranging from Levels 1-6 of the Wicklow Settlement Hierarchy

Figure 10-28: Landscape Hierarchy, Category and Area Classification (source: Landscape Assessment - Appendix 5 - Landscape Assessment - Wicklow County Development Plan 2016-2022)

The town of Greystones, within which the development subject to this LVIA is located, is designated as a 'Large Growth Town II' (Level 3) within Chapter 3 – (Settlement Strategy) of the of the Wicklow County Development Plan 2016-2022 and **therefore it would not ordinarily be necessary to carry out a LVIA.**

Figure 10-29: Settlement Hierarchy Map (source: Map 03.01 - Chapter 3 – Settlement Strategy - Wicklow County Development Plan 2016-2022)

Table 10-6: Relevant Landscape Objectives (source: Wicklow County Development Plan 2016-2022)

Objective	
NH49	All development proposals shall have regard to the County landscape classification hierarchy in particular the key landscape features and characteristics identified in the Wicklow Landscape Assessment (set in Volume 3 of this plan) and the 'Key Development Considerations' set out for each landscape area set out in Section 5 of the Wicklow Landscape Assessment
H50	Any application for permission in the AONB which may have the potential to significantly adversely impact the landscape area shall be accompanied by a Landscape / Visual Impact Assessment, which shall include, inter alia, an evaluation of visibility and prominence of the proposed development in its immediate environs and in the wider landscape, a series of photos or photomontages of the site / development from clearly identified vantage points, an evaluation of impacts on any listed views / prospects and an assessment of vegetation / land cover type in the area (with particular regard to commercial forestry plantations which may be felled thus altering character / visibility). The Assessment shall demonstrate that landscape impacts have been anticipated and avoided to a level consistent with the sensitivity of the landscape and the nature of the designation.
NH51	To resist development that would significantly or unnecessarily alter the natural landscape and topography, including land infilling / reclamation projects or projects involving significant landscape remodelling, unless it can be demonstrated that the development would enhance the landscape and / or not give rise to adverse impacts

Protected Views and Prospects

In conjunction with landscape categorisation, Wicklow County Council undertook a landscape assessment of the county (Appendix 5: Landscape Assessment of the Wicklow County Development Plan 2016-2022) to address the importance of landscape and visual amenity and the role of planning. The Wicklow County Development Plan 2016-2022 and Draft Wicklow County Development Plan 2022-2028 include objectives for the preservation of the character of the landscape, including the preservation of views and prospects, landscape amenity and features of natural beauty or interest.

The Development Plan 2016-2022 states that the identified designated protected views and prospects are:

Those views and prospects that are considered to be of the highest amenity value in the County. Some views and prospects will form a cohesive set, such as coastal or lake drives, while some appear suddenly and provide the viewer with a new and interesting angle on a natural feature or place. Some views / prospects are intermittent in nature and appear through gaps in vegetation or buildings.

Table 10-7: Views and Prospects Objectives (source: Wicklow County Development Plan 2016-2022)

Objective	
NH52	To protect listed views and prospects from development that would either obstruct the view / prospect from the identified vantage point or form an obtrusive or incongruous feature in that view / prospect. Due regard will be paid in assessing development applications to the span and scope of the view / prospect and the location of the development within that view / prospect.

Figure 10-30: Relevant section of the Views of Special Amenity Value or Special Interest map - proposed development site indicated in solid red (source: Map no. 10.14A - Chapter 10 – Heritage - Wicklow County Development Plan 2016-2022)

Figure 10-31: Relevant section of the Protected Views and Prospects map - proposed development site indicated in solid red (source: Map no. 10.15 - Chapter 10 – Heritage - Wicklow County Development Plan 2016-2022)

The relevant **Protected Views and Prospects** (Map no. 10.15) that are highlighted above include:

Protected View No. 13 N11 Glen of the Downs:

Prospect of both sides of Glen of the Downs.

Protected View No. 14 N11 at Kilmullin:

Prospect of Kilcoole and the coast.

Due to health and safety issues relating to undertaking photography and survey work on a live traffic route, it was not possible to undertake a visual assessment from these viewpoint locations. However, due to distance from the site and intervening topography and vegetation it

is anticipated that there will not be any impact by the proposed development on these protected views.

The relevant protected **Views of Special Amenity Value or Special Interest** (Map no. 10.14.A) that may be impacted upon are as follows:

Protected View No. 35 Glen of the Downs

View of north, west and south from the Octagon on the east side of the N11 in the Glen of the Downs Nature Reserve over Woodlands, Downs Hill, Downs, Calary and red lane areas, Views to east, south and west over Drummin hill and Stylebawn areas from the upper paths within the Nature Reserve.

Again, due to distance from the site and intervening topography and vegetation it is anticipated that there will not be any impact by the proposed development on this protected view and so it has been ruled out of the assessment process.

Protected View No. 36 L5529 Templecarrig, southern slopes of Little Sugar Loaf

View to the south and southeast of Kindlestown Hill and the coast.

Please refer to 3D Design Bureau document and Baseline Views 20, 21, and 22 as representative views

The map taken from the Greystone - Delgany and Kilcoole LAP below highlights two Protected Views and Prospects that are relevant to the proposed development:

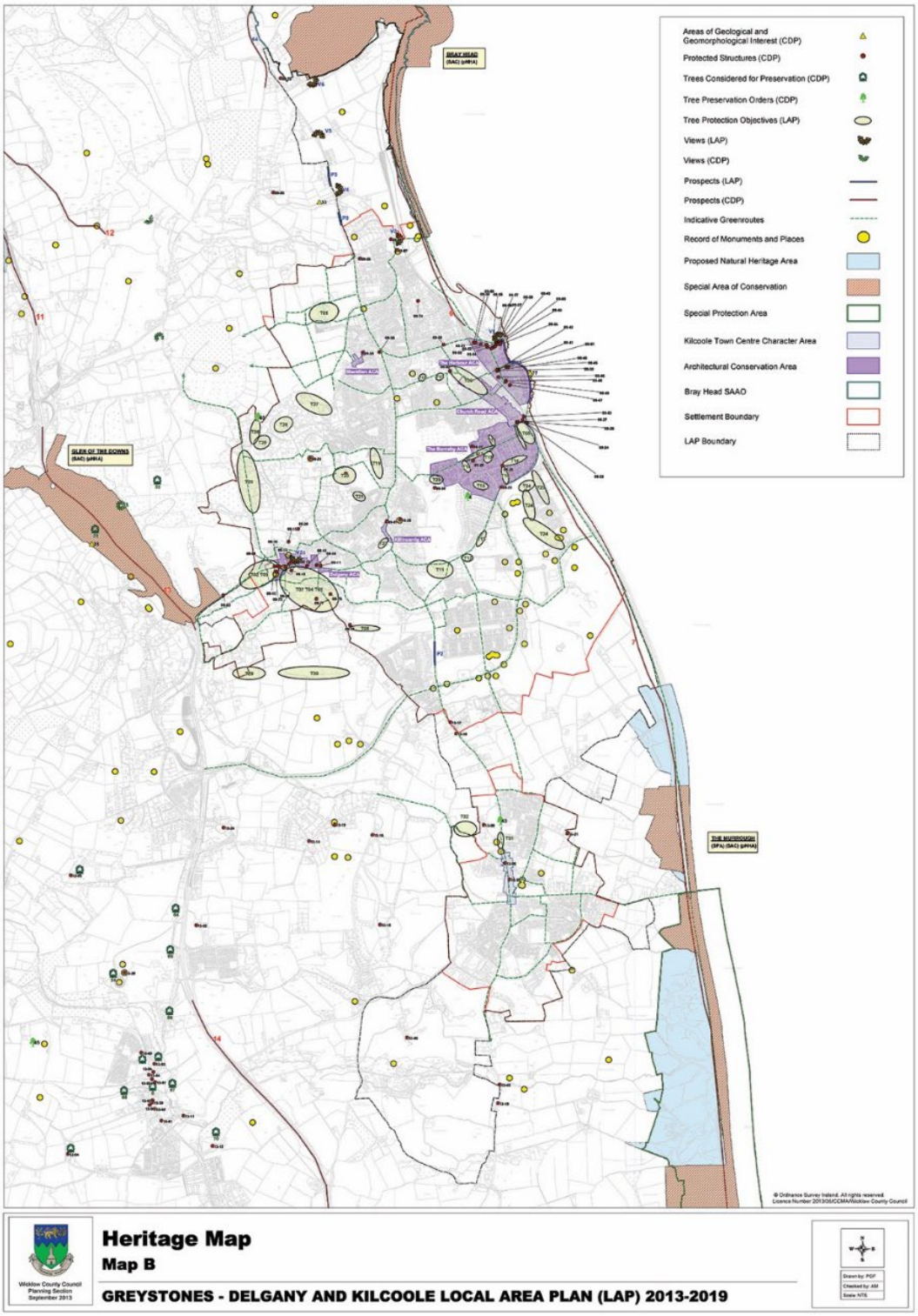


Figure 10-32: Protected Views & Prospects (source: Map B Heritage Map Greystone - Delgany and Kilcoole LAP 2013-2019)

Greystones – Delgany and Kilcoole Local Area Plan 2013-2019

APPENDIX B: LAP HERITAGE FEATURES

1. PROTECTED VIEWS AND PROSPECTS

Table B1.1: Protected Views and Prospects

V1	**The view of Bray Head, Little Sugar Loaf and the higher reaches of the Great Sugar Loaf from the eastern parts of harbour area, i.e. eastern pier and higher lands immediately south of the pier (location of anchor landmark), with the built up part of Greystones in the foreground.**
V2	**Views southwards at the 'Horse and Hound' in Delgany Village towards Drummin Hill.**
V3	**The views seaward from Cliff Road, Rathdown Upper**
V4	**View from R761 north of Greystones - View northwards to Bray Head and view southwards of sea and built up area of Greystones.**
V5	**View from R761 Windgates Coast Road of Bray Head**
V6	**View from Cliff Road Windgates of coast, Greystones and foreground of Bray Head**
P1	**The prospect seaward from Marine Road, Greystones**
P2	**The prospect of the coast and sea from the R761 from the junction with the Southern Access Route northwards to the northern boundary of Glenbrook.**
P3	**The prospect seaward from the R761 north of Redford.**

Figure 10-33: Table B1.1: Protected Views & Prospects (source: Appendix B: LAP Heritage Features Greystone - Delgany and Kilcoole LAP 2013-2019)

V1: From the Harbour Area:

The view of Bray Head, Little Sugar Loaf and the higher reaches of the Great Sugar Loaf from the eastern parts of harbour area, i.e. eastern pier and higher lands immediately south of the pier (location of anchor landmark), with the built up part of Greystones in the foreground.

Please refer to 3D Design Bureau document, Baseline Views V10, V11, and V12 as representative views for protected view V1, from the Harbour Area.

V6: From the R761, Windgates:

View from Cliff Road Windgates of coast, Greystones and foreground of Bray Head.

Please refer to 3D Design Bureau document and Baseline Views 20, 21, and 22 as representative views.

10.4.10.3 Architectural Conservation Areas (ACAs)

There are 6 ACAs in Greystones, one of which, the Blacklion ACA, is located approximately 500m to the southeast of the proposed development site and is describe below by the Greystones – Delgany and Kilcoole LAP 2013-2019:

BLACKLION ACA

The Blacklion ACA consists of a cluster of single storey cottages and the church of St. Killian, located on a bend of the Chapel Lane Road. The cluster of cottages represents an older agrarian hamlet or clachan. The OS map of 1839 indicates similar dwellings/structures. The cottage structures are not of high architectural interest in themselves, having undergone numerous and

significant modifications. The Blacklion cluster is however of local historical significance as a reminder of the pre-urban settlement patterns in Greystones/Delgany.

The church of St Killian (reference number 08-35) is a protected structure. The architectural character of Blacklion is characterised by:

- The Church building and the collection of eleven single storey / single storey with dormer cottages. Slate roofs to cottages
- Seven of the cottages are in a vernacular style, with a low pitch roof and narrow plan.
- Four of the cottages are of a more elaborate style, with ornamental eave overhangs and brick or masonry quoins.
- Walls are masonry with render or dash.
- The church of St. Killian is in the gothic style, ornamentation is minimal, with granite quoins, window frames and gable tops. The walls are masonry with a render.

There are views of Kindlestown Hill and Wood to the north-west from Blacklion. The views of the hill contribute significantly to the character of Blacklion connecting the historic settlement cluster with its wider hinterland.

Condition of Built Fabric

The cottages have undergone many modifications. The majority of the original windows have been replaced with aluminium and uPVC framed windows. Porches have been added to some frontages and dwellings have been extended to the side and rear.

There are 5 remaining ACAs in Greystones are located to the south and to the east of the proposed development site and are listed below as per the Wicklow County Development Plan 2016-2022:

- The Burnaby ACA (Residential Area) (Approximately 2km Southeast of Development Site)
- Church Road ACA (Approximately 1.5km South of Development Site)
- The Harbour ACA (Approximately 1.5km East of Development Site)
- Killincarrig Village ACA (Approximately 2km South of Development Site)
- Delgany ACA (Approximately 2km South of Development Site)

10.5 Potential Impacts

This section identifies potential impacts of the construction and operational phases of the development on the landscape and visual resource study area.

10.5.1 Construction Phase

10.5.1.1 Potential Landscape Impacts

There is the potential for significant and negative temporary impacts on the landscape during the construction stage of the project resulting from the following elements associated with construction and demolition work:

- The removal of small sections of hedgerow to facilitate the construction of the development
- Soil movement and stock piling of topsoil;
- Any necessary demolition works;
- Erection of physical structures such as site compounds and storage area;
- Erection of site hoarding, signage, security fencing;
- Presence of site machinery and delivery/storage of materials etc.

- Lighting:
  Temporary security lighting;
  Lighting at height associated with construction of structures;
  Lighting in the contractor's compound and car parking areas;
  Light spill and glare towards surrounding residential receptor areas to the north of the site; and
  Light spill which could impact ecology.

10.5.1.2 Potential Impacts on Views

The visual impacts due to construction will be short term, terminating upon completion of the development. There is potential for a significant and negative short-term impact during construction from the following elements associated with construction and demolition work:

- Dust;
- Site huts;
- Building materials;
- Ground disturbance (e.g. topsoil, stockpiles, etc.);
- Site hoarding/security fencing;
- Construction/demolition work.

There is potential for a significant and negative short-term visual impact from the use of temporary buildings, machinery necessary for construction works at proposed works, as well as stockpiling of materials.

There is potential for a significant and negative short-term impact from the transportation of the material to be recycled and the recycled material to and from the site. There is the potential for a significant and negative short-term visual impact on views into the site.

The main stages of the construction phasing will include the following:

- Site preparation works;
- Site establishment and erection of temporary structures;
- Diversion and connection of services and utilities;
- Construction of foundations and structures;
- Mechanical and electrical installation;
- Fit-out and external works.

10.5.2 Operational Phase

10.5.2.1 Potential Landscape Impacts

It is understood that the proposed development of this type results in a permanent change and may fundamentally alter the appearance of the landscape. However, altered appearance does not necessarily equate to long-term/permanent negative impacts to landscape character. Therefore, it is essential that a holistic view is taken with proposals of this nature, that not only assess the potential impact during the construction phase, but critically how the proposal will appear when fully implemented and the new planting/landscaping have matured. The proposed design will feature public open spaces that incorporate a diverse palette of soft landscaping including new woodland tree copses, wildflower meadow planting, bulb planting and ornamental planting. Landscape mitigation measures will also include the retention of existing boundary hedgerows and trees in order to protect the rural agricultural aesthetic of the existing landscape setting and to foster biodiversity.

Without landscape mitigation measures in place, the potential landscape effects resulting from the proposed development during the operational phase are considered to be moderate and adverse.

10.5.2.2 Potential Impacts on Views

Potential impacts will arise from the proposed residential development once it is operational and construction is complete. The patterns of use from day to day will alter as both vehicular and pedestrian movement are likely to increase both throughout the site itself and within the adjacent communities and roads on approach to the redevelopment. There is potentially an adverse and moderate visual impact resulting from the replacement of the existing agricultural landscape with a residential development and associated ancillary site infrastructure. These adverse impacts may be mitigated by extensive landscape proposals shown in the landscape masterplan.

10.6 Cumulative Impacts

With regard to cumulative impacts, the development site has been assessed in conjunction with adjacent sites zoned for future development by Wicklow County Council and the planning history within the area of the proposed development; the assessment also has regard to existing development in the vicinity of the proposed development.

The image below shows the location of the areas subject of the planning history detailed in the tables hereafter which have been taken from the Chapter 1 (Population and Human Health) of this EIAR. The schools are sited to the east of the proposed development and are highlighted in yellow. The Waverly residential development lies to the south of the schools and is highlighted in blue. The Seagreen residential development is to the southeast of the development site and is highlighted in green.

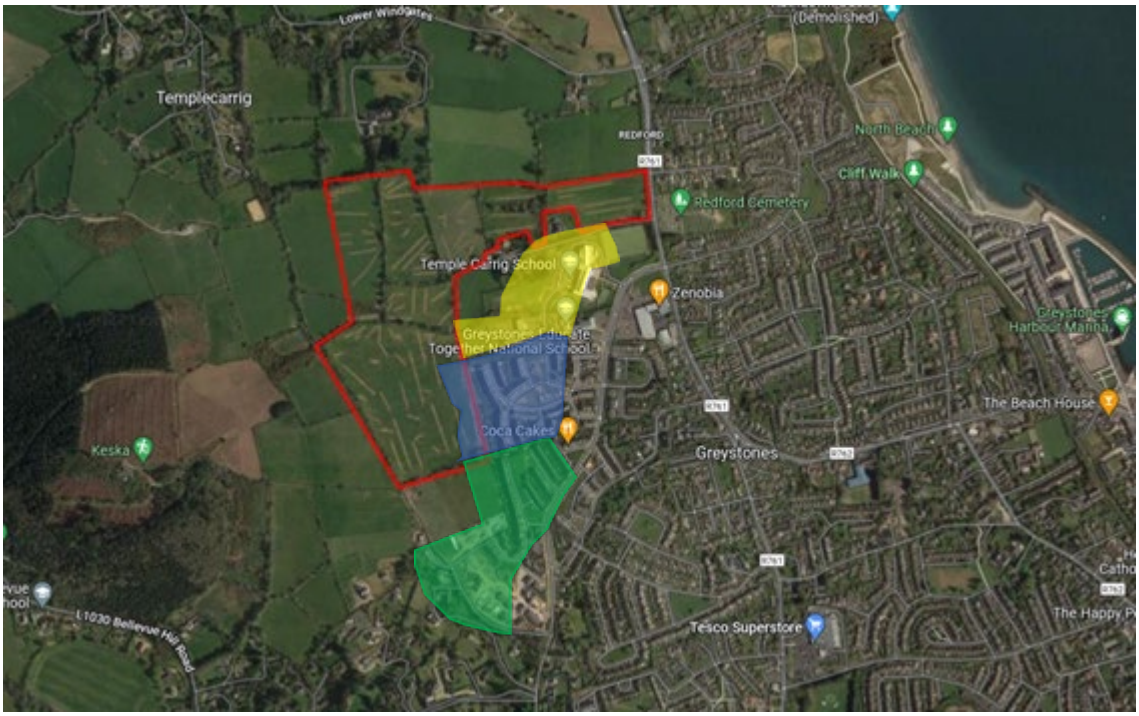


Figure 10-34: Planning History (source: Chapter 1 of this EIAR - Population and Human Health)

Table 10-6-1: Relevant Applications at Waverly (source: Chapter 1 of this EIAR - Population and Human Health)

Reference	Status	Decision Date	Summary
072799/ ABP 230050	Expired	ABP Grant 03/06/2009	159 residential units
114336/ABP 239380	Incomplete	22/12/11	Amendments to 072799
141952	Parent permission	01/04/2015	130 houses and creche
16783	Grant	07/09/2016	Temporary access gates
17461	Grant	19/06/2017	Extension of duration

Table 10-6-2: Relevant Applications at Seagreen (source: Chapter 1 of this EIAR - Population and Human Health)

Reference	Status	Decision Date	Summary
141031	Grant	01/10/2014	Parent permission 187 houses
151152	Grant	16/01/2016	Amendments
16420	Grant	15/06/2016	Amendments
16971	Grant	26/10/2016	Amendments
161066	Withdrawn	n/a	Amendments

Reference	Status	Decision Date	Summary
1722	Grant	08/03/2017	Amendments
17880	Grant	02/11/2017	Amendments
18111	Grant	02/04/2018	Alter 38 kv
18627	Grant	01/08/2018	Amendments
191089	Grant	01/12/2019	Extend appropriate period – substantial completion

Table 10-6-3: Relevant Applications at Adjacent Schools (source: Chapter 1 of this EIAR - Population and Human Health)

Reference	Status	Decision Date	Summary
126589	Permitted	04/01/2013	Three storey school, access to ET school
138103	Permitted	17/04/2013	New school (Temple Carrig)
15608	Permitted	09/08/2015	New Irish school
15814	Permitted	01/10/2015	Sports lights for hockey pitch

Table 10-6-4: Relevant SHD Applications (source: Chapter 1 of this EIAR - Population and Human Health)

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

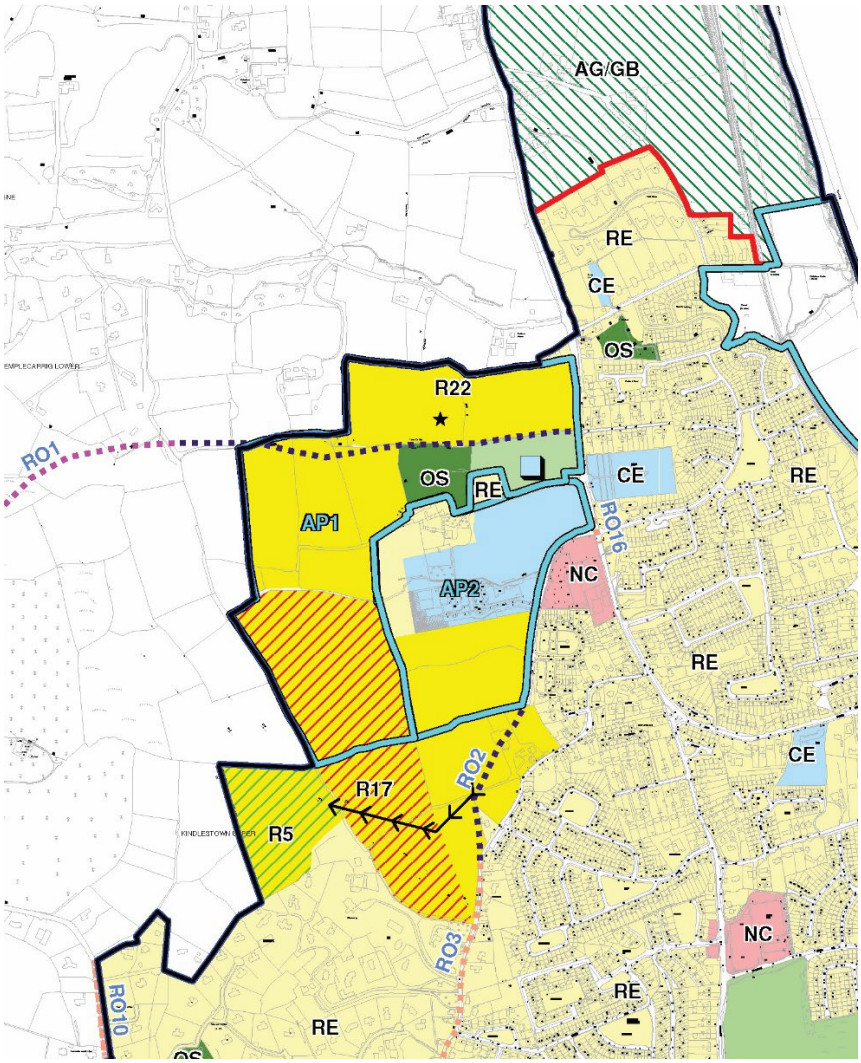


Figure 10-35: Excerpt from Map A - Land Use Zoning Objectives (source: Adopted Greystones – Delgany and Kilcoole LAP 2013-2019)

In addition to the planning history related to the adjacent residential development and schools, the subject site is bordered by a number of parcels of land which are zoned for residential development by Wicklow County Council within the LAP. The parcel to the immediate north of the proposed development is zoned for residential development with a maximum density of 22 units per hectare; as this parcel of land is also zoned as residential, a development of a similar character, but of lower density, may be located here in future. The parcel to the immediate south of the proposed development is zoned for residential development with a maximum density of 17 units per hectare; as this parcel of land is also zoned as residential, a development of a similar character, but of lower density, may also be located here in future. The parcel to the southwest of the proposed development is zoned for residential development with a maximum density of 5 units per hectare; as this parcel of land is also zoned as residential, a development of a similar character, but of considerably lower density, may also be located here in future.

10.6.1 Cumulative Landscape Impacts

Although lands adjacent to the development site which are zoned for residential development within the LAP indicate that there is potential for additional development in the area, the planning application history illustrates that there are no substantial future developments within the immediate vicinity of the proposed development. On this basis no cumulative impacts on the landscape are predicted over and above the impacts from the proposed development.

10.6.2 Cumulative Visual Impacts

Although lands adjacent to the development site which are zoned for residential development within the LAP indicate that there is potential for additional development in the area, the planning application history illustrates that there are no substantial future developments within the immediate vicinity of the proposed development. On this basis, no cumulative visual impacts on the are predicted over and above the impacts from the proposed development.

10.7 Ameliorative, Remedial or Reductive Measures

10.7.1 Construction Phase

10.7.1.1 Landscape

The following mitigation measures will be contractual obligations:

- Plant will be held in designated compound on site
- Protective fencing will be installed around the Root Protection Areas (RPAs) of existing boundary trees and tree lines
- Appropriate site hoardings will be put in place around the perimeter of the site where required to minimise the landscape and visual impact.
- The existing topography, which has informed the design in terms of the overall urban structure, arranging the different housing cells and road alignments according to the ground contours. This principle enables to minimise ground works during construction.

10.7.1.2 Visual

The following mitigation measures will be contractual obligations:

- Height of temporary stockpiles to be restricted to a practicable minimum to avoid impact on local sensitive receptors.
- Hoarding will be erected around site boundaries to reduce visual impact of construction works
- Visual impacts during the construction phase will be mitigated somewhat by appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish.

10.7.2 Operational Phase

10.7.2.1 Landscape

The following mitigation measures are outlined within the Landscape Report prepared by Kevin Fitzpatrick Landscape Architects and provide a summary of the measures to be applied to mitigate impacts on the landscape baseline:

General:

- The landscape strategy aims to integrate the proposed residential development with the existing landscape.
- The protection and enhancement of existing landscape features, notably large trees, the stream, wetland marsh and native hedgerows
- The central open space is created around the stream and primarily focused of protection of the existing vegetation and underground archaeology and creation of new native habitats.
- Linear parkland is to be provided on most perimeters of the site providing a range of habitats and spatial uses.
- Green infrastructure links are provided through out the site, linking the various landscape spaces, and creating ecological corridors linking to other landscape elements outside of the site boundary.

Spatial Uses:

- A series of open spaces and parkland are connected by linear green links which are based on existing landscape features. These existing features form part of the existing green infrastructure links within the site and surrounding area.

The Park:

- The central feature of the western side of the park is the native wetland habitat. The existing wetland marsh, that has been partially filled in by the previous landowners, will be expanded into a larger feature. The marsh is to be retained in part and remodelled in part to create a naturalised pond and wetland that acts as a large attractive feature and focal point within the landscape. The wetland will be designed to accommodate a gradual embankment allowing native flora and fauna habitats to be established. This wetland will improve the local habitat diversity and create a very attractive landscape feature. A range of habitats will be created within the park building upon the existing hedgerow and wetland marsh area. The hedgerow on the southern perimeter will be maintained and expanded with additional woodland with a dense understory. Copses of native trees will be distributed through the area with meadow or mown grass understory. A belt of high canopy woodland is proposed as a buffer between the parks areas and the access road. This type of woodland will permit light to penetrate allowing visual links and a grassland meadow to establish. The expanded and improved wetland marsh and pond is a high value biodiversity habitat and will be complemented by the woodland, scrub and meadow habitats that are to surround it.

The Stream:

- The spatial design of this space is focused on two of the existing landscape features and a historical feature.
- The stream will be retained on its current course and all areas of suitable vegetation retained and protected. The corridor of the stream will be expanded and some interventions to improve the riparian corridor, such as invasive plant removal, removal of dense gorse scrub and removal of any debris.
- A cut off ditch is proposed on the western boundary of this space and this will be planted with native hedgerow species to create a bioswale. This swale will discharge into a new pond and native wetland that will act as a detention basin. This in turn will discharge into a smaller pond before entering the stream at a low rate. All these features expand the stream habitat and contribute to the local biodiversity value of the area.
- The laneway and the hedgerows and trees on each side will be incorporated into the landscape scheme.
- Additional woodland and hedgerow habitats are proposed to link the existing hedgerows with those in the wider landscape.
- The majority of the below ground archaeological feature will be retained in this space.

Linear Park Areas:

- The scheme includes significant areas of public open space along the full western boundary and the eastern boundary of the southern section of site. This linear parkland retains and enhances the existing hedgerow where it exists and creates new perimeter hedgerow where there is none at present.i9d
- The section of linear parkland on the northwest edge of the site links the stream area open space to the courtyard gardens at the apartments. A new hedgerow, incorporating a swale, is to be created that will link the existing and proposed green infrastructure around the stream to the ecological corridors to the north. The hedgerow is complemented by copses of native trees and native grassland meadow.
- The section of linear parkland on the southwest edge of the site links the stream area open space to green infrastructure in the southern section of the site and to within the wider landscape. In this area a combination of soil nailing and green wall engineering is proposed to retain as much of the native ground levels as possible while accommodating the level changes required for the construction of the housing and roads.
- The hedgerow on the western perimeter will be maintained and expanded with additional woodland with a dense understory. The cut off ditch will be incorporated into the new belt of woodland as a bio swale further enhancing the biodiversity value of this landscape.
- Where there is an existing hedgerow this is to be retained and strengthened with additional hedgerow planting. Along the boundary with the Waverley Avenue a new native hedgerow is proposed along the perimeter.
- The old quarry pit in the south east corner is to be retained and transformed into a pond and native wetland that will act as a stormwater detention basin.

The Pines:

- This central open space has been designed as an active landscape area with the aim of strengthening local biodiversity while offering a range of uses to residents of the local area. The open space is spatially defined by copses of native pine trees, often found in the local landscape, that will give this space a specific character and identity.

Green Infrastructure & Enhancement of Existing Landscape:

- The green infrastructure strategy serves to link and integrate all of the spaces within the site together using existing and new landscape elements, while also contributing to green infrastructure in a wider context by creating opportunities to connect to green infrastructure beyond the site boundary.
- 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. Hedgerows increase local biodiversity and create habitats, thus becoming biodiversity corridors which link to other green infrastructure features in the surrounding areas.
- In addition to this, retaining hedgerows and ditches also allows the prospect of implementing a Sustainable Urban Drainage System (SuDS) network through the site which can integrate into the circulation routes and become a part of the wider green infrastructure strategy.
- The stream and associated vegetation 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 infrastructure strategy. The existing riparian corridor will be enhanced and significantly widened to form the focus on one of the main spaces.
- The existing wetland marsh will also be increased in size and enhanced to create an important wetland habitat of significant biodiversity value.
- The stream and wetland form the basis for a sustainable drainage system, with all proposed channels eventually discharged into the stream. This system is expanded upon with additional ditches and swales adding to the green infrastructure network.
- The proposed woodlands, hedgerows, wetland, copses, and meadows will create a high level of habitat complexity and will create a strong ecological network within the proposed development.

Biodiversity Actions:

- Maintaining existing native groundcover under trees and supplement with bulbs and wildflower seeding
- Restoration of the pond habitat using native aquatics and marginal aquatics. The existing pond sediments will be retained and reinstated.
- Pollinator friendly perennials, wild grass strips and flowering shrubs are used throughout the scheme.
- Logs from felled trees and tree works are to be repurposed as bug hotels, small mammal habitats and for fungi and lichen growth.
- Native tree and shrub planting are proposed as infill to the woodland edge and throughout the landscape.
- Bird boxes and bat boxes are proposed for installation on the existing large trees.

- Green roofs are proposed to the apartment buildings with a pollinator friendly mix of grasses and sedums

Planting Strategy:

- Large native Oaks and native Pines are the dominant tree species proposed throughout the main open space areas and will be complimented by, Alder, Birch, Wild Cherry and Rowan trees. When the trees mature, they will have a very strong visual impact and will define the character of the development as the existing trees go into decline.
- The street trees are chosen due to their more compact habit. These species are appropriate for the scale of the spaces in which they are to be used and are of a variety that will complement other native trees. Each street is to be planted using a single variety of tree and hedge giving a specific landscape character to each part of the development.
- The existing trees that are retained within the scheme are to be enhanced and strengthened by additional planting of native tree planting. Throughout the public open spaces, a mix of broadleaf deciduous trees will be planted that will increase woodland cover within the proposed development. Formal evergreen hedges are used throughout the development to define spaces and create boundaries. These hedges will complement the estate landscape character of the site. Evergreen shrub mixes are also used as robust structural planting to define the streetscape and spatial uses. Ornamental and groundcover planting will be used to frame seating areas and cover the existing embankments in the open spaces, which will increase the aesthetic qualities of the space. Some more ornamental trees will be utilized for their visual quality and to provide interest around the seating areas. The main structure planting around the site will be native hedgerow shrubs and tree planting, along with dense woodland and understory planting to create visual screening and improve biodiversity.
- Native plants such as Blackthorn, Hawthorn, Hazel and Holly are all used in the hedgerow mix and tree-planting in the hedgerows consists of Common Birch, Native Oak, Scots Pine, Wild Cherry and Common Alder.
- Particular attention was given to introducing certain pollinator species to various plant mixes in woodland and hedgerow areas as outlined and in referral to the 'Councils: actions to help pollinators; All Ireland Pollinator Plan 2021-2025'.

10.7.2.2 Visual

The major visual remediation of the project will be accomplished through the following mitigation measures which have been incorporated into the design:

- The existing topography has informed the design in terms of the overall urban structure, arranging the buildings and road alignments according to the ground contours. This enables an integrated insertion of the proposed neighbourhood into the overall site landscape, mitigating the visual impact on the receiving environment and maximising the preservation of existing natural assets such as hedgerows, trees, streams, and wetland areas.
- Through the positioning of the various elements of the development on site in order to enhance the appearance of the residential development as a whole through the design of the site layout and built form.

- The creation of high-quality public and semi-public spaces for the use and amenity of the users of development.
- A high-quality and varied palette of materials, consisting mainly in two types, namely buff and red reinforces the distinctiveness and variety throughout the site. The overall scheme is unified by a choice of red roof tile and pale plaster render. This material choice will ensure that the buildings proposed are durable as well as being of high quality visually. High quality materials are proposed throughout the scheme combined with the appropriately located landscaped open space areas.
- Urban context informs the overall site design according to high-quality visual amenity and existing residential pattern. The scheme takes adjacent residential landholdings located south and east by proposing a similar housing fabric at those locations to merge with the existing urban grain in terms of scale - 2-storey terraced, semi-detached and detached housing developed at an appropriate density - and architectural style, including form and materials. Future western residential developments are also considered in terms of urban continuity and connections through the green corridor envisaged at that location.

10.8 Residual Impacts (including worst case scenario)

10.8.1 Residual Landscape Impacts

It is considered that the proposed development in cumulation with other permitted and proposed developments in the area will have a moderate and neutral effect on the landscape. Once construction works are complete and the proposed development is operational, the existing rural and rolling agricultural field-scape will be predominantly removed and replaced by a proposed residential development of 351 houses, 6 three to four storey apartment blocks, 32 duplex units, community building, creche, and sports pitches. The change in the perception of the landscape will be from a rural aesthetic to one of a suburban housing development, with associated movement of people by foot, bike, and car. The site and its associated road and pathway infrastructure will be lit at night-time. Substantial landscape mitigation will be in the form of the retention of a substantial number of internal and boundary trees and hedgerows, as well as woodland, wetland, and a stream to maintain the rural agricultural aesthetic to the existing landscape setting and to enhance and protect biodiversity as well as heritage, and historical assets. This will be combined with extensive high-quality public and communal open space, a network of pedestrian connections, as well as a diverse palette and layering of soft landscape treatments that will develop over time to add to the visual amenity of the site itself.

10.8.2 Visual Impacts

Thirty viewpoints were chosen for the purposes of this visual assessment. The views assess the potential visual impacts of the proposed film strategic housing development and were chosen as being representative of the key views in terms of impacts on local sensitive receptors. Several views are representative of the relevant views of special amenity value or interest and protected views and prospects /panoramas as highlighted in the Wicklow County Development Plan 2016-2022. This section of the report is to be read in conjunction with the verified views (photomontages) prepared by 3D Design Bureau in A3 Landscape format.

Figure 10-36: Short Range Viewpoint Locations (source: 3D Design Bureau)

Figure 10-37: Long Range Viewpoint Locations (source: 3D Design Bureau)

Existing Viewpoint 1

This view is taken from the residential street, Seagreen Park, located within Seagreen residential estate to the southeast of the development site. The view looks northwest towards the southern edge of the proposed development. The centre foreground and middle ground of the view is occupied by the road infrastructure (concrete footpaths and bitumen carriageway) serving the existing residential development. Newly constructed, two storey terraced houses are clearly visible in the right and left middle ground. These terrace houses feature driveways containing parked cars, seven of which are visible in this particular view. Although the right and left background are obstructed by the terrace houses, the centre background is occupied by an agricultural landscape (fields) that slopes from a higher elevation on the left to a lower elevation on the right; a concrete post and timber panel fence separates the Seagreen estate from this agricultural landscape. In the centre background beyond this fence, a tall tree line and hedgerow is clearly visible passing from left to right across the field of view. Beyond this tree line, several other hedgerows forming boundaries between fields can be seen within the landscape. In the left background, the east side of Kindlestown Wood can be seen upon Kindlestown Hill; there is also a small shed building visible below Kindleswood in the left background. The Little Sugar Loaf, located approximately 3km away, is clearly visible in the centre background; this topographical feature is the most prominent feature within the background of this view.

Proposed Viewpoint 1

The southern portion of the proposed development will be visible from this viewpoint location. The light coloured side elevations of the proposed development are most clearly seen against the backdrop of the existing landscape. The roofs of the proposed development can be seen also but are less visible due to the chosen colour and how it contrasts less with the landscape beyond. The topography partially screens the development from the viewer, as does and tree line in the centre background, which helps soften the material character of the development; in full leaf, this tree line will have an even greater screening effect. The view of Kindlestown Hill and the Little Sugar Loaf in the background will not be obscured by the proposed development. The proposed development does not look incongruous within its current setting; this is due to the existing residential development visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being moderate as it will alter the character of the environment in a manner that is consistent with existing and emerging trends.

Existing Viewpoint 2

This view is taken from the east side of Blacklion Manor Road looking northwest towards the junction of Seagreen Park and Blacklion Manor Road and the Seagreen residential estate beyond. The entire foreground and a portion of the middle ground is occupied by the road infrastructure serving Blacklion Manor Road and Seagreen Park. This road infrastructure includes a bitumen vehicular carriageway and cycle tracks, concrete footpaths, and grass verges; there is some tree planting visible within the verges in the right middle ground. The centre middle ground is occupied by a piece of open space which features a number of trees, a winding gravel pathway, and several flagpoles. The right middle ground is occupied by newly constructed two storey houses and dark coloured rooftops of more houses can be seen in the right background also. A terrace of newly constructed two storey residential houses can be seen on the left and centre background; these houses obscure the view of Kindlestown Hill on the left background. The top of Bray Head is visible over the rooftops on the right background and the top of the Little Sugar Loaf is faintly visible above rooftops in the centre background, although this view is obscured considerably by tree planting within the open space. A lighting column features prominently on the right middle ground; several other lighting columns are visible in the left middle ground and right background.

Proposed Viewpoint 2

The proposed development is barely visible from this viewpoint location. Although a glimpse of the roofline of the proposed apartment blocks located in the northwest corner of the development site can be seen in the centre background, they will be screened by the canopies of trees within existing hedgerows to be retained within the development site. The remainder of the proposed development will be screened by the existing Seagreen development as illustrated by the redline in the centre background. The view of Kindlestown Hill, the Little Sugar Loaf, and Bray Head in the background will not be obscured by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 3

This view is taken from Waverly Avenue within the newly constructed Waverly residential estate looking southwest towards the proposed development. The entire foreground and left middle ground are occupied by a bitumen carriageway serving Waverly Court. The centre and right middle ground are occupied by a piece of open space that was being used a construction site storage compound at the time the photograph was taken. The storage compound is surrounded by steel Heras fencing and ducts, pipes, steel containers, skips, plastic road barriers, timber crates, plastic tanks, plywood boxes and structures, portable toilets, and a teleporter. The dark coloured rooftops over several two storey dwellings are visible on the right background and several two storey houses can clearly be seen on the left background. Although partially obscured, the top of Kindlestown Hill is clearly visible on the left background beyond the rooftops of the houses; the top of the hill is partly covered in woodland and partly covered in agricultural field. The top of the Little Sugar Loaf is visible above the canopy of a tree line on the left background.

Proposed Viewpoint 3

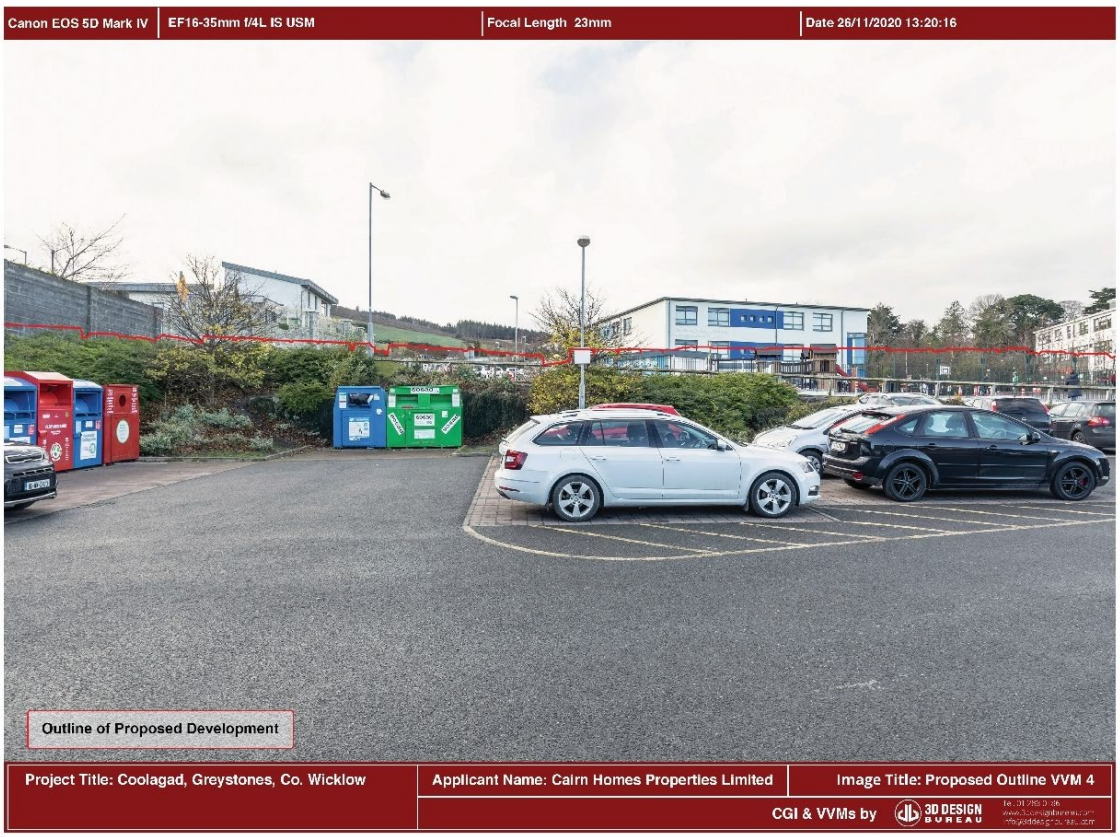
The proposed development is partially visible from this viewpoint location due to the presence of the neighbouring Waverly development. The upper two floors of one block and the roofline of the proposed apartment blocks can be seen in the right background; the top story and roofline of several proposed houses are also visible in the right background. The rooftops of three proposed houses can be seen over the houses in the existing Waverly development can be seen in the left background. The remainder of the proposed development will be screened by the existing Waverly development as illustrated by the redline in the centre middle ground. The view of Kindlestown Hill in the background will not be obscured by the proposed development. A small portion of the Little Sugar Loaf will be obscured by the proposed development, but it will still be visible from this viewpoint location. The proposed development does not look incongruous within the setting it is located; this is due to the existing residential development visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 4

This view is taken from the car park to the west of the Lidl supermarket and looks southwest towards the proposed development. The entire foreground is occupied by the car parking facility which is surfaced in a combination of black bitumen and concrete block paviours. The car park features several parked cars in the centre and right middle ground as well as bottle and/or clothes banks on the left middle ground. The transition area between the middle ground and background is occupied by tall shrubs and hedge planting and features two medium sized trees. Beyond the middle ground, Greystones Educate Together National School and Temple Carrig School are visible on the right; a tall mature tree line can be seen clearly through a gap between these two buildings. On the centre-left background, the north slope of Kindlestown Hill is visible between Greystones Educate Together National School and another building with a light-coloured render finish on the left. Several lighting columns feature on the centre middle ground and background; these lighting columns project vertically into the skyline, interrupting the view of Kindlestown Hill in the background.

Proposed Viewpoint 4



The proposed development is partially visible from this viewpoint location. The bulk ofg the proposals are obscured by the intervening built environment. To the left of Greystones Educate Together National School, the rooftops of several proposed houses can be seen in the left background, however, these are partially obscured by the roof of Gaelscoil na gCloch Liath. The remainder of the proposed development will be screened by the existing built environment as illustrated by the redline across the background. The view of Kindlestown Hill and Kindlestown Woods in the background will not be obscured by the proposed development. The proposed development does not look incongruous within the setting it is located; this is due to the existing built environment visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 5

This view is taken from the car park to the north of the Lidl supermarket and looks southwest towards the proposed development. The majority of the foreground and middle ground is occupied by an expansive area of hardstanding which is paved in what appears to be a natural stone sett. To the right of this area, a line of short clipped hedging forms the boundary to a large lawn area to the north. A large number of cars are visible in the centre middle ground and beyond the car park; Temple Carrig School can be seen on the right middle ground with Greystones Educate Together National School visible on the left background. A large portion of Kindlestown Hill and Kindlestown Wood can be seen beyond Greystones Educate Together National School on the left background and the Little Sugar Loaf is faintly visible on the right background but is screened by a tall mature tree line; the top of this tree line can be seen above the roof of Temple Carrig School. A tall commercial building, accommodating Lidl amongst other retailers, can be seen on the left middle ground; this building is partially screened by a line of semi mature trees on the southern edge of the car park. Several lighting columns, some of which project vertically into the skyline, feature on the centre middle ground and background.

Proposed Viewpoint 5

The proposed development is partially visible from this viewpoint location, although the majority is obscured by the intervening built environment and vegetation. Additionally, due to the existing context of this built environment, the proposed development is hardly noticeable within the view. In the left background, the rooftops of several proposed houses can be seen to the left and right of Greystones Educate Together National School. The remainder of the proposed development will be screened by the existing built environment and vegetation as illustrated by the redline across the background. The view of Kindlestown Hill and the Little Sugar Loaf in the background will not be obscured by the proposed development. The proposed development does not look incongruous within the setting it is located; this is due to the existing built environment visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 6

This view is taken to the east of the proposed development from the footpath on the north side of Redford Park; the view looks southwest towards the proposed development. The view is largely residential in character, featuring back garden boundary walls and glimpses of private driveways. Much of the background is obscured by the canopies of trees, either located within back gardens or on the street, or tall shrubs and hedges located within front gardens. On the left background, the television aerials and rooftops can be faintly seen beyond the foliage within back gardens. Several large mature trees feature on the left middle ground which screen a large portion of the view to Kindlestown Hill in the background. In the centre background, Temple Carrig School is visible; Kindlestown Hill is visible beyond Temple Carrig School in the background of view. A large portion of this view is occupied by the road infrastructure (bitumen carriageway, concrete footpaths, grass verges, and tree planting) serving Redmond Park.

Proposed Viewpoint 6

The redline extending across the middle ground demarcates the location of the proposed development. The proposed development is screened from the northeast by the intervening built environment and vegetation. Temple Carrig School and the canopies of trees located along Redford Park have a notable screening effect on the proposed development at this viewpoint location. The proposed development will not be visible from this viewpoint location and there will be no change to the view. There will be no visual impact at this viewpoint location.

Existing Viewpoint 7

This view is taken to the east of the proposed development from the footpath on the south side of Rathdown Road; the view looks southwest towards the proposed development. The majority of the foreground and middle ground is occupied by the road infrastructure (bitumen carriageway, concrete footpaths) serving Rathdown Road, although a combination of tall shrubs and hedges, as well as tree planting, can be seen within front gardens on the right middle ground and background. In the centre background, the gable end of a large, two-story house is clearly visible; a tall monkey puzzle tree within the back garden of this house features prominently in the centre background also. Overhead wires extending from a utility pole on the left can be seen interrupting the skyline on the centre and right and a tall hedge on the left foreground and middle ground obscures much of the skyline on the left.

Proposed Viewpoint 7

The redline extending across the middle ground demarcates the location of the proposed development. The proposed development is screened from the east by the intervening built environment and vegetation, as well as by the crest in Rathdown Road seen in the centre middle ground. The proposed development will not be visible from this viewpoint location and there will be no change to the view. There will be no visual impact at this viewpoint location.

Existing Viewpoint 8

This view is taken from the junction of Victoria Road and Church Road, outside Circle K Express, to the east of the proposed development; the view looks northwest towards the proposed development. The entire foreground is occupied by an expansive area of carriageway and footpaths which are surfaced in black bitumen; this road infrastructure continues to the left into the middle ground. Overhead wires extending from a utility pole on the left middle ground can be seen interrupting the skyline across the entire view. Several mature deciduous trees located within an adjacent street and retail areas can in the centre and right middle ground. Although it is partially obscured by the utility pole and a deciduous tree on the left middle ground, Kindlestown Hill is a prominent feature and can be seen on the left background; Kindlestown Wood is visible on the top of the hill. A terrace of distinctive single storey houses with pitched roofs are visible in the centre middle ground; this terrace, in combination with the mature trees, gives the view a residential character.

Proposed Viewpoint 8

The proposed development is partially visible from this viewpoint location. Although a glimpse of the rooftops of several proposed houses located in the southern portion of the development site can be seen in the left background, the remainder of the proposed development will be screened by the existing built environment as illustrated by the redline in the centre middle ground. The view of Kindlestown Hill in the background will not be affected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 9

This view is taken from the west side of the railway bridge on Victoria Road, east of the proposed development; the view looks west towards the proposed development. A large expanse of this view, including the entire foreground and portion of the middle ground is occupied by the bitumen road surface. On the far left foreground and middle ground, a front garden boundary wall borders the edge of the view; trees and hedges in these front gardens can be seen above the top of this wall. On the right middle ground, a large mature tree and several smaller trees screen views to houses beyond, although these houses are faintly visible behind the trees. The façade and longitudinal roof elevation of what appears to be and old cinema building is the most prominent building in the centre middle ground. In addition, the rooftops of several single storey cottages are also visible; the chimneys on these rooftops add a residential character to the view. The gables and clock tower of one building is visible in the left middle ground but it is somewhat screened by trees. All of the buildings in the middle ground are softened by a strong line of medium to tall clipped hedge planting which enhance the residential character of the view. Kindlestown Hill features very prominently in the left background and Kindlestown Wood can be clearly seen on its peak. The peak of the Great Sugar Loaf can be seen in the centre background protruding over the northern slope of Kindlestown Hill. Overhead wires extending from a utility pole in the right middle ground can be seen crossing the entire width of the view. These overhead wires interrupt the skyline and are faintly visible across the view of Kindlestown Hill.

Proposed Viewpoint 9

Similarly to Proposed Viewpoint 8, the proposed development is partially visible from this viewpoint location. Although a slight glimpse of the rooftops of several proposed houses located in the southern portion of the development site can be seen in the left background beyond the clock tower, the remainder of the proposed development will be screened by the existing built environment as illustrated by the redline in the centre middle ground. The view of Kindlestown Hill and the Great Sugar Loaf in the background will not be affected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 10

This view is taken from a public plaza on the edge of Victoria Road by Greystones Marina and is east of the proposed development; the view looks west towards the proposed development. A lighting column features prominently within this view in centre-left foreground, projecting vertically into the skyline, bisecting the view. Several other lighting columns and utility poles as well as overhead wires crossing the view can be seen in the centre middle ground, presenting visual clutter. Two of these poles project slightly into the skyline and the overhead wires interrupt a small portion of the skyline. Victoria Road, which is surfaced in a black bitumen and features road markings and traffic signs, is clearly visible on the left foreground and middle ground. The far left middle ground is bordered by a terrace of older, large, two-story buildings. The facades of two pubs that occupy one of these buildings are clearly visible on the left. The centre and right foreground is occupied by the public plaza which is paved in a large paving flags and smaller paving blocks. The plaza features a line of pine trees which are visible on the far right; these trees screen views to the right background. A line of stainless-steel bollards moves across the view from the left foreground to the centre middle ground where a cluster of buildings are visible on the centre right. In the centre middle ground, the railway bridge crossing Victoria Road is clearly visible, as is its planted embankment. Beyond the railway bridge the canopy of several mature trees screen the views the rooftops of buildings. The rooftop of the old cinema building that is visible within Viewpoint 9 can be seen faintly through the canopies of these trees. In the left background, above the rooftops of the terrace of older houses, agricultural fields and their hedgerow boundaries are visible; Kindlestown Wood is also visible above these rooftops. Beyond Kindlestown Wood, the upper portion the peak and northern slope of the Great Sugar Loaf is also clearly visible and is a prominent feature within this view.

Proposed Viewpoint 10

The proposed development is practically imperceptible from this viewpoint location. Through the leafless canopies of mature trees along the railway line embankment, a faint outline of the proposed apartment blocks located within the northwest corner of the development can be seen in the centre background; this faint outline will not be visible when the trees are in full leaf. In addition, a slight glimpse of the rooftop of a proposed house is also visible between the gables of the rooftops in the left background. The remainder of the proposed development will be screened by the existing built environment and vegetation as illustrated by the redline across the background. The view of Kindlestown Wood and the Great Sugar Loaf in the background will not be affected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 11

This view is taken from a small area of open space on a bend in Cliff Road as it comes into the Greystones Harbour Marina area. The viewpoint is located east of the proposed development and looks northwest towards it. Although the foreground is mainly occupied by the bitumen surface and concrete/bitumen footpaths associated with Cliff Road, the corner of a two storey period house is visible on the left foreground. Cliff Road slopes downwards around the bend and off to the left towards the Greystones Marina area. The middle ground is occupied by the view of Greystones Marina, where the masts of sailing boats feature prominently in the centre. On the right middle ground, the rock armour at the harbour wall is visible and the water within the harbour is faintly visible. The view to the harbour and marina is somewhat screened by a metal railing atop a dwarf wall in the centre and right foreground. Beyond the harbour and marina, the middle ground is occupied by the view of the northern area of Greystones Town. This view features the rooftops of many buildings with intermittent sections of tree canopies protruding above them. The canopies of large trees located along the railway line are visible closer to the viewer on the centre and right middle ground; these canopies screen many of the rooftops of buildings beyond in the more northernly portion off Greystones town; Temple Carrig school can be seen in the centre middle ground, although it is partially screened by these tree canopies. In front of these larger canopies, a group of two and three storey buildings form a conspicuous agglomeration from the centre middle ground to the right middle ground. The background of this view is picturesque and depicts a landscape of sloping agricultural fields, hedgerows, and woodland, as well as the peaks of three notable local landmarks, the Great Sugar Loaf and the Little Sugar Loaf and Kindlestown Hill. The peak of Kindlestown Hill, along with Kindlestown

Wood, is visible on the left background; beyond Kindlestown Hill, the peak of the Great Sugar Loaf is visible. Moving from left to right, the landscape slopes to a low point in the centre background before it rises up again to form the peak of the Little Sugar Loaf. A utilities pole on the right foreground projects vertically into the skyline, bisecting the view and interrupting the view of the landscape beyond. Overhead wires extending from this utilities pole cross the view, interrupting a large portion of the skyline. A sign post and sign on the far right foreground interrupts a portion view of the Little Sugar Loaf in the right background.

Proposed Viewpoint 11

The proposed development is visible from this viewpoint location. In the left background, the rooftops of the proposed houses located within the southern portion of development site are visible on the east slopes of Kindlestown Hill, above the rooftops of the existing houses within the Waverly development. Although a small section of field has been obscured by the rooftops of these proposed houses, the majority of the agricultural landscape, accompanying hedgerow field boundaries and mature tree lines are still clearly visible across the landscape beyond the development. In the centre background, the roofline of a terrace of prosed houses and the top four floor of the proposed apartment blocks in the northwest corner of the development site are visible. The roofline of the proposed terrace of houses is only faintly visible within the existing landscape as it is visually interrupted and partially screened by tree canopies; the colour of the roof is also sympathetic to the surrounding environment, allowing it to disguise itself within the landscape. Although the lower floors of the proposed apartment block will be screened behind a mature tree line beyond the Temple Carrig School, it will obscure s small

section of field, mature trees, and hedgerows within the agricultural landscape beyond. This being said, the proposed apartment block does not project into the skyline and interrupt the horizon line and so the uninterrupted view from Kindlestown Hill to the Great Sugar Loaf and the Little Sugar Loaf remains undisturbed. Due to the existing built environment visible from this viewpoint, particularly Temple Carrig School and the Waverly development, the proposed development does not look incongruous within the setting it is located.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being moderate as it will alter the character of the environment by replacing a section of agricultural landscape with an urban residential development and this is consistent with existing and emerging trends; the unbroken high-quality view of the landscape beyond the horizon will not be affected.

Existing Viewpoint 12

This view is taken from the end of the south pier in Greystones Harbour Marina. The viewpoint is located east of the proposed development and looks northwest towards it. The entire foreground is occupied by the concrete surface of the pier. A low wall made of large concrete units is located at the transition between the foreground and middle ground; this wall screens the view to the harbour below. On the right foreground an orange navigation light post projects

into the skyline. The majority of the middle ground is occupied by a contemporary four to five storey apartment building. To the front of this building, the masts of sailing boats can be seen above the concrete wall in the foreground; these masts contribute a distinctly maritime element to the character of the view. The rooftops of buildings within Greystones Town are visible in the right middle ground, although these are somewhat screened by the canopies of large trees located along the railway. In front of these larger canopies, the agglomeration of buildings visible in Viewpoint 11 are once again visible. The apartment building screens the majority of the view to the landscape in the background, although the peaks of Great Sugar Loaf and the Little Sugar Loaf can be seen beyond the building in the centre and right background respectively. The peak of Kindlestown Hill, which features Kindlestown Wood, can be seen clearly on the left background. Agricultural fields, hedgerows, and woodland can be seen in the far left and far right background.

Proposed Viewpoint 12

The proposed development is partially visible from this viewpoint location. Several rooftops of proposed houses located in the southern portion of the development site can be seen in the left background. Although these rooftops will obscure a small section of field, hedgerow field boundary, and two tree canopies, the distance at which the development and receiving landscape is located from the viewer renders this change practically imperceptible. The remainder of the proposed development will be screened by the existing built environment as illustrated by the redline in the centre middle ground. Due to the existing built environment visible from this viewpoint the proposed development does not look incongruous within the

setting it is located. The views of Kindlestown Hill, the Great Sugar Loaf, and the Little Sugar Loaf will be unaffected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 13

This view is taken from the midpoint of the north pier in Greystones Harbour Marina. The viewpoint is located east of the proposed development and looks west towards it. Greystones Harbour Marina occupies the entire foreground and a portion of middle ground where a number of notable features are visible. A group of boats and sailing vessels are visible on the far left foreground; the masts of the sailboats project into the skyline and obscure a portion of the contemporary apartment building which is visible in the middle ground. A large area of open water occupies the centre and right foreground and within this open water; several orange-coloured piles protrude from the surface of the water in the right foreground and middle ground. A number of small to medium sized vessels can be seen across the water below the quay wall in the centre and right middle ground. Beyond the marina, the middleground is almost entirely occupied by the facades of two blocks of four to five storey contemporary apartment buildings. In the centre middle ground, a gap between the two blocks of apartments allows a view beyond to Kindlestown Hill located in the centre background. The lower portion of the hill is obscured by a terrace of three story buildings located behind the apartment blocks.

Proposed Viewpoint 13

The proposed development is partially visible from this viewpoint location. The rooftops of several proposed houses located in the centre of the development site can be seen in the centre background above the three storey buildings behind the two existing apartment blocks in the centre middle ground. The remainder of the proposed development will be screened by the existing built environment as illustrated by the redline in the centre middle ground. Due to the existing built environment visible from this viewpoint, the proposed development does not appear incongruous within the setting it is located and is practically imperceptible. The view of Kindlestown Hill will be unaffected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 14

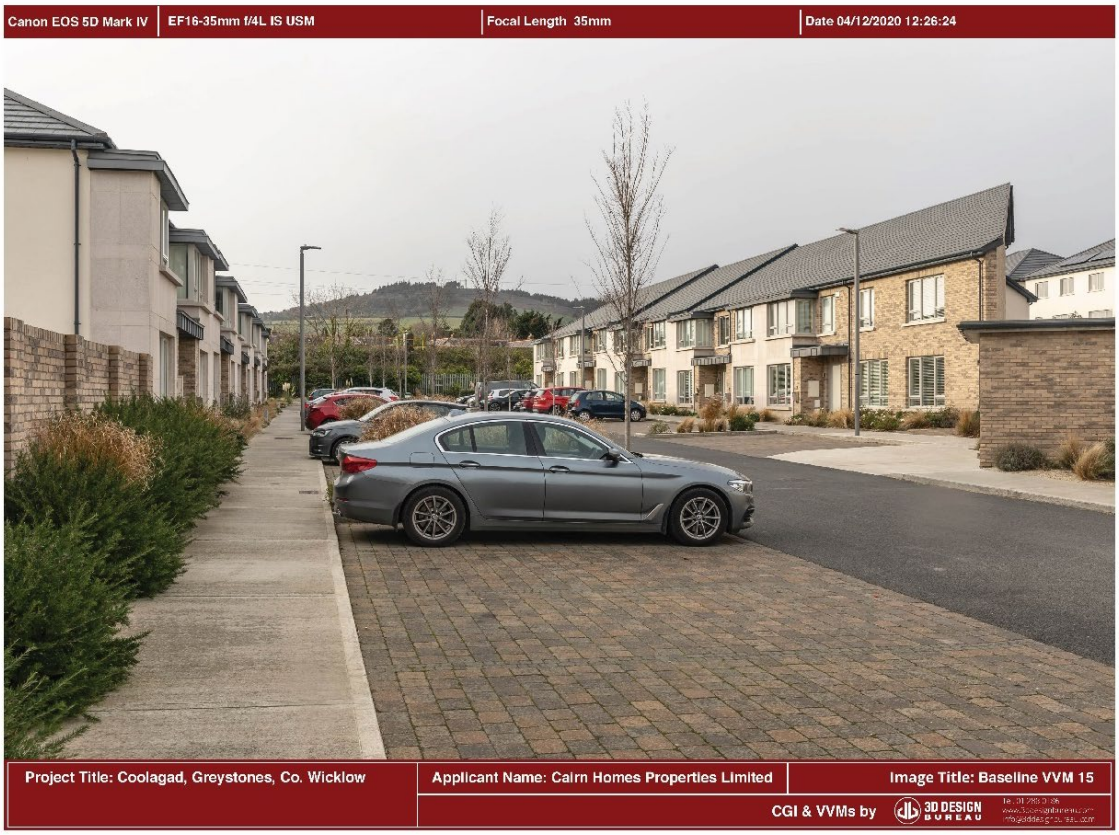
This view is taken from the end of 'The Pier', a cul-de-sac within a residential estate adjacent to the Greystones harbour Marina. The viewpoint is located to the east of the proposed development and the view looks southwest towards it. The entire foreground of this view is occupied by the road infrastructure serving the houses within the cul-de-sac; paving materials consisting of a bitumen carriageway, concrete block paviours within parking bays, and concrete footpaths. The right middle ground is occupied by a terrace of two storey houses with a brick and stone-clad finish to their facades. A line of perpendicular car parking bays to the front of the houses extends into the right foreground; there are ten cars visible within these bays. The top floors of another terrace of two storey houses are visible on the left middle ground, but the lower half of these houses are obscured by a brick faced wall. In front of these houses, several more cars, also parked in perpendicular bays, are visible. The bank of the railway line can be seen in the centre middleground between the two terraces of houses. The bank is covered with vegetation and blends in with the view of the landscape in the background. Overhead wires serving the railway line can be seen crossing the skyline in the centre middle ground. The peak of Kindlestown Hill along with Kindlestown Wood can be seen in the centre background. The left and right background are obscured by houses in the left and right middle ground and foreground. Several lighting columns project into the skyline within the right foreground and left middle ground of the view.

Proposed Viewpoint 14

The proposed development is partially visible from this viewpoint location. The rooftops of several proposed houses located in the southern portion of the development site can be seen in the centre background above vegetation along the railway line embankment. The remainder of the proposed development will be screened by the existing built environment and railway embankment as illustrated by the redline in the centre middle ground. Due to the very limited extent of proposed development visible to the viewer from this location, it is practically imperceptible within the view. The view of Kindlestown Hill will be unaffected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 15



This view is taken from the end of 'The Moorings', a cul-de-sac directly adjacent to 'The Pier' which is mentioned in Existing Viewpoint 14. The viewpoint is located to the east of the proposed development and the view looks southwest towards it. The view is similar to the view that is described in the Existing Viewpoint 14. The foreground of this view is also occupied by the road infrastructure serving the houses within the cul-de-sac, although there is a higher proportion of concrete block paviours visible within this view. To the right foreground, a black bitumen carriage way and concrete footpath are visible. To the left foreground, a concrete footpath can be seen extending into the middle ground and to the end of the cul-de-sac. There is a brick faced boundary wall and shrub planting bordering the view on the far left foreground. A single saloon car occupies one of the perpendicular parking bays in the centre foreground. The middleground comprises two terraces of houses to the left and right and a number of car parking bays and cars within the space between them. The car parking bays are separated by linear planting beds that host a line of trees. In this view these trees have no leaves, and therefore only somewhat screen sections of the background and middle ground; with full foliage these sections would be screened to a far greater extent. As with Existing Viewpoint 14, the bank of the railway line can be seen in the centre middleground between the two terraces of houses. The bank is covered with vegetation and blends in with the view of the landscape in the background. Once again, overhead wires serving the railway line can be seen crossing the skyline in the centre middle ground, but they are only faintly visible. The peak of Kindlestown Hill along with Kindlestown Wood can be seen in the centre background. The left and right background are obscured by the houses in the left and right middle ground and foreground. Several lighting columns project into the skyline in the right and left middle ground of the view.

Proposed Viewpoint 15

The redline extending across the background demarcates the location of the proposed development. The proposed development is screened from the east by the intervening built environment of Greystones Town, tree canopies, the railway line embankment, and the terrace of houses along 'The Moorings'. The proposed development will not be visible from this viewpoint location and there will be no change to the view. Therefore, there will be no visual impact from this viewpoint location.

Existing Viewpoint 16

This view is taken from the centre of Darcy's Field Park, directly adjacent to the North Beach. The viewpoint is located northeast of the proposed development and the view looks southwest towards it. The view of foreground is that of a local park which was under construction at the time the photograph was taken. An area hard standing, paved in stone flags, cans be seen in the right foreground; another area of hardstanding can be seen on top of a small grassed mound in the left foreground. In the centre and right foreground, bitumen footpaths bordered with loose pebble can be seen surrounding the area of hardstanding to the right. One singular leafless tree can be seen projecting into the skyline and bisecting the view on the left foreground. With full foliage, this tree would have more of a screening effect, but due to the fact it is not forming part of a larger tree line, its screening effect overall would be minimal. Just beyond the foreground, a large area of meadow grass occupies the entire width of the view. A dark hedge is visible beyond the meadow grass and also occupies the entire width of the view; this hedge forms a boundary with the railway line to the west. There are significant number of young leafless trees middle ground which will have a more significant screening effect to the view of Greystones Town beyond. In time, these trees will grow larger and are likely to screen views to the background landscape. Beyond the dark hedge in the middle ground, the rooftops and some facades of the northern portion of Greystones can be seen as a single mass. Tree canopies intermittently protrude above the rooftops seen in the middle ground; these trees are likely to have more of a screening effect on these buildings when they are in full leaf. Temple Carrig

School can be seen in the centre right middle ground although a tall and dense tree line screens approximately half of the building to the right. Kindlestown Hill features very prominently in the centre background. Kindlestown Wood is visible on the northern and southern sides of the hill, and aerial masts can be seen faintly on its peak. The hedgerow boundaries between agricultural fields can be clearly made out on the eastern slopes of the hill. In the left background, the peak of Downs Hill, which is approximately 4.8km away from the viewer, is clearly visible.

Proposed Viewpoint 16

The proposed development will be visible from this viewpoint location. The light-coloured elevations and rooftops of the proposed houses located in southern portion of the development site can be seen in the left background. This group of proposed houses obscures a small section of agricultural landscape, including a hedgerow and a section of a mature tree line, beyond. This being said, due to the context of the existing built environment, particularly the rooftops of the houses within the Redford residential area, the proposed development does not look incongruous within this setting. The upper three floors of the proposed apartment block located in the northwest corner of the development site will be partially visible through the canopies of the mature trees in the right background. However, these apartment blocks but they will not interrupt the horizon line and the distance at which they are located from the viewer allows them to be perceived as a building of smaller scale. The proposed development does not look incongruous within the setting it is located; this is due to the existing residential development visible within the middle ground of this view. The remainder of proposed development within

the centre of the development site will be screened by the canopies of matures trees as illustrated by the redline in the right middle ground. The view of Kindlestown Hill and Downs Hill in the background will not be obscured by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being moderate as it will alter the character of the environment in a manner that is consistent with existing and emerging trends.

Existing Viewpoint 17

This view is taken from the end of the Bray-Greystones Cliff Walk as it approaches its terminus at Greystones Harbour. The viewpoint is located northeast of the proposed development and the view looks southwest towards it. The entire foreground comprises a field containing an expansive of unmanaged grass with occasional thickets of bramble. In the right foreground, the earth can be seen as having been worn. Across the entire width of the view in the middle ground, a steel palisade fence forms the boundary between the field in the foreground and the railway line beyond. Beyond this fence in the left middle ground, the roofs and gables of the houses within the Redford residential estate can be seen. In the centre middle ground, the leafless canopies of a group of mature trees screens the view of the landscape in the background. To the right of these trees, the gable end of a ruined stone building known as St. Crispin's Cell can be seen. Beyond this building to the right, a line of trees located along Redford Park are visible. Two

masts supporting the overhead wires serving the trainline can be seen projecting into the skyline in the centre middle ground and the left middle ground. The overhead wires extending between these posts are faintly visible and cross the entire view from right to left. In the left background, the top of a mature tree line can be seen above the rooftops of the houses with the Redford estate. In the right background, Kindlestown Hill and Kindlestown Wood are both clearly visible; the aerial masts on the peak of the hill are faintly visible on the peak of the hill.

Proposed Viewpoint 17

The proposed development will be partially visible from this viewpoint location. The upper three floors of the proposed apartment block located in the northwest corner of the development site will be partially visible through the canopies of the mature trees in the far right background. However, these apartment blocks but they will not interrupt the horizon line and the natural colour and tone of the chosen façade material allows them to blend in with the receiving agricultural landscape. The remainder of proposed development will be screened by the canopies of matures trees within the centre and right middle as illustrated by the redline in the middle ground. The view of Kindlestown Hill in the background will not be obscured by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be

described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 18

This view is taken from the east side of the R761 at junction of the R761 and Lower Windgates. The viewpoint is located northeast of the proposed development and looks southeast towards it. This view is representative of the objective outlined in in the LAP regarding the Coolagad Action Plan (AP1) to ensure that attention is be paid to reducing the visual impact of the development on views towards Kindlestown Hill from the R761; this particular view represents the best possible unobscured view towards the proposed development from the R761. The entire foreground of this view is occupied by the road infrastructure serving the R761 and Lower Windgates. The material composition of the road infrastructure comprises an expanse of black bitumen road surfacing with white road markings and grass verges. The R761 can be seen extending into the left background into Greystones Town. The middle ground of this view is occupied by an agricultural scene. A long length of stone wall forms the boundary between the R761 and a sloping field; this stone wall follows the R761 towards Greystones on the left and follows Lower Windgates to the west on the right. The field beyond the stone wall slopes downwards from the right to the left and contains a number of sheep. At the top of this field, in the right middle ground, several agricultural buildings and a period building can be seen. At the back of the field, in the centre middle ground, a hedgerow in which several mature trees are

located forms the boundary to the neighbouring field and the background beyond. In the left middleground, a group of mature trees and hedge planting screen views to the background; several other trees on the right middle ground do the same. A number of the mature trees that are visible in the centre middle ground are trees that have been noted in the Tree Survey and Tree Survey Report, namely, the Austrian (Tree No. 24) pine and the Scots pine (Tree No. 230); the Austrian pine is the taller of the two trees. In addition to tree lines, a number of utility poles project slightly into the skyline in the centre middle ground; the overhead wires extending between them are barely visible. In the right background, the peak of Kindlestown Hill as well as Kindlestown Wood can be seen. The tops of tall mature trees are visible within the centre background. In the left background, where the R761 extends into Greystones, light columns, utility poles, and an overhead wire interrupt a very small portion of the skyline; a number of trees can be seen in the distance also.

Proposed Viewpoint 18

The redline demarcates the location of the proposed development in the background of view. Views to the proposed development from the R761 are obscured due to topography, the existing built environment, hedgerows and tree lines. This particular view represents the best possible unobscured view towards the proposed development from the R761 and the proposed development will not be visible. This being said, the site design and layout has been considered in such a manner to mitigate visual impact on the receiving environment. The existing topography has informed the design in terms of the overall urban structure, arranging the buildings and road alignments according to the ground contours. This enables an integrated

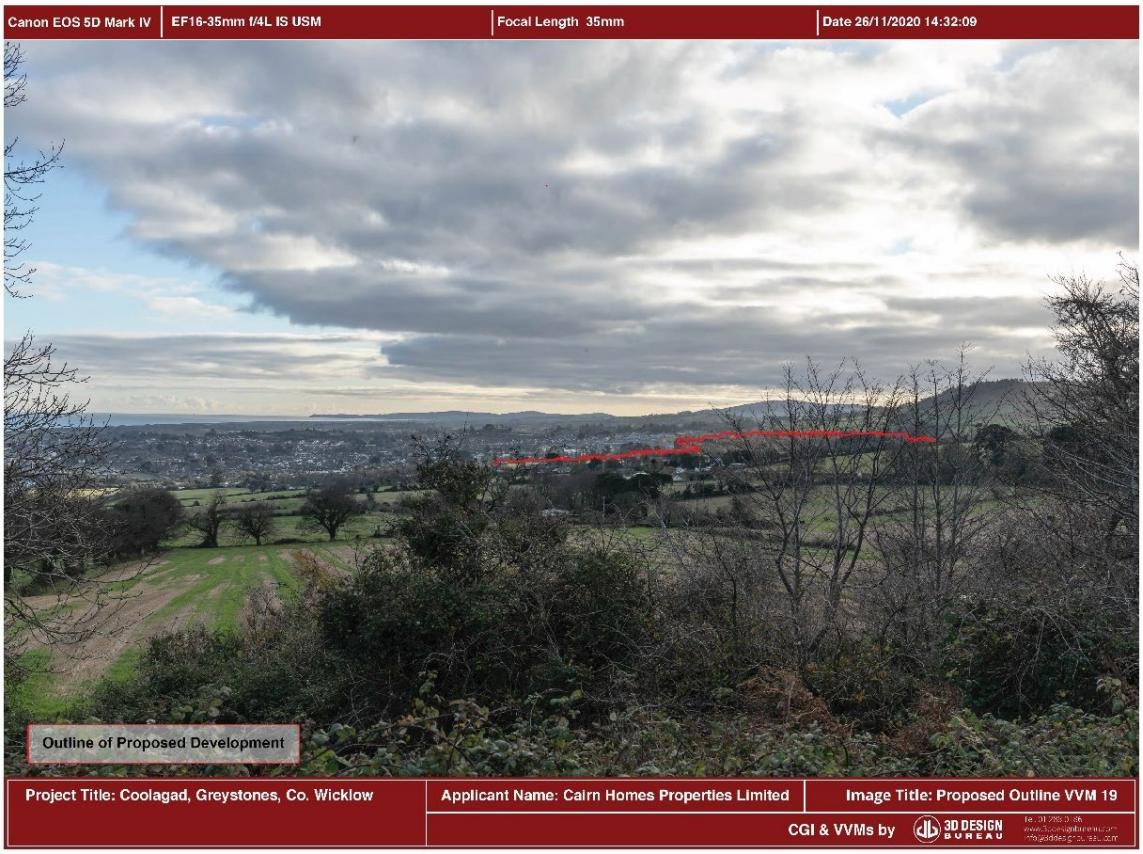
insertion of the proposed neighbourhood into the overall site landscape, mitigating the visual impact on the receiving environment and maximising the preservation of existing natural assets such as hedgerows, trees, streams, and wetland areas. The proposed development will not be visible from this viewpoint location and there will be no change to the view. Therefore, there will be no visual impact from this viewpoint location.

Existing Viewpoint 19

This viewpoint is located on Cliff Road on the southern side of Bray Head; it is approximately 2km northeast from the proposed development. The view looks southwest towards the proposed development from a considerably elevated position. This view is a distant but expansive and it captures a wide range of landscape typologies. In the foreground, a dense hedgerow forms the boundary to sloping agricultural fields which contain a number of hedgerow boundaries and mature tree lines that cross the landscape. In the left and centre middle ground, the substantially low-rise built environment and townscape of Greystones can be seen extending to the east on the far left. In the left and centre middle ground the urban fringes of Greystones Town can be seen against adjacent agricultural lands. On the right middle ground, Kindlestown Hill and Kindlestown Wood can be seen through the bare branches of the hedgerow; this view will be screened to more of an extent when the vegetation is in full leaf. In the left background, the Irish Sea is visible, as is Wicklow Head. From Wicklow Head, the landscape rises to the east to form Carrick Mountain which is visible in the right background. Beyond Greystones in the left and

centre background, a line of mature trees, hedgerows, and fields are visible; further in the distance, a large agglomeration of buildings, possibly a tow, is faintly visible.

Proposed Viewpoint 19



The southern portion of the proposed development will barely be visible from this viewpoint location. The northern potion of the development will be obscured by a combination of the sloping topography from the east and the mature hedgerows and trees lines which are located on this sloping landscape; this is illustrated by the redline in centre middle ground. The southern portion of the proposed development will be partially visible in the right middle ground at the bottom of eastern slope of Kindlestown Hill, however, the context of the existing built environment to the east, the distance from the viewer, and colour and tone of the rooftops of the proposed development makes it very difficult to see. The proposed development will not appear incongruous within the receiving environment due to the built environment of Greystones. The view of the proposed development in this location is screened by the bare hedgerow along Cliff Road in the foreground which will have a much greater screening effect in full leaf; this will render the proposed development as imperceptible during this period. The view of Kindlestown Hill, Carrick Mountain, Wicklow Head, and the Irish Sea in the background will not be obscured by the proposed development. The proposed development does not look incongruous within the setting it is located; this is due to the existing residential built environment visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be

described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 20

This viewpoint is located on Bohilla Lane, approximately 1km northwest, from the proposed development. The view looks southeast towards the proposed development from an elevated position. A narrow lane surfaced in asphalt occupies the left and centre foreground descends into the left middle ground where a hedgerow boundary and field are visible. The right foreground is occupied by a narrow drive track paved in loose stone and a timber post and rail fence that forms the boundary to a garden. Although a portion of the fence is exposed, the portion along Bohilla Lane is covered with a hedgerow. Kindlestown Hill and Kindlestown Wood are visible in the right background as are the agricultural fields and hedgerow boundaries on the hill's northern slopes. In the left background, the Irish Sea is visible beyond the canopy of a mature tree line; the Irish Sea can also be seen faintly beyond the hedgerow in the centre middle ground. Overhead wires cross a large portion of the skyline on the left.

Proposed Viewpoint 20

The redline demarcates the location of the proposed development in the background of view. The proposed development is screened by the tree canopies and hedgerows within the agricultural fields located southeast of the viewer. The proposed development will not be visible from this viewpoint location and there will be no change to the view. Therefore, there will be no visual impact from this viewpoint location.

Existing Viewpoint 21

This viewpoint is located on Bohilla Lane, approximately 1.5km northwest, as the crow flies, from the proposed development. The view looks southeast towards the proposed development from an elevated position. The view looks across a rolling fields which descend towards Greystones Town and the Irish Sea beyond. The foreground is occupied entirely by an open field of grass which is quite long in certain areas and somewhat unkept; in the immediate centre foreground the is a mound of loose cuttings. A mature tree line and hedgerow can be seen across the entire middle ground. A pylon, utility poles, and overhead wires can be faintly seen in the central middle ground. The rooftops and gables of a cluster of light-coloured houses located on Lower Windgates can also be seen in the centre middle ground. Kindlestown Wood can be seen in the right middle ground, as can the northern slope of Kindlestown Hill. Greystones Town can be seen in the centre middle ground beyond the cluster of houses on Lower Windgates. Beyond Greystones, the Irish Sea occupies the entire view of the background bar a small portion on the right where it is obscured by Kindlestown Wood.

Proposed Viewpoint 21

The redline in the centre middle ground demarcates the location of the proposed development in the background of view. The north portion of the proposed development is screened by the tree canopies and hedgerows within the agricultural fields the southeast. The southern portion of the development is screened by the northern slopes of Kindlestown Hill. There will be no visual impact from this viewpoint location.

Existing Viewpoint 22

This viewpoint is located on Lower Windgates, approximately 1km northwest, as the crow flies, from the proposed development. The view looks southeast towards the proposed development from an elevated position. The view looks across a field and a number of tree groups, tree lines and hedgerows towards the Irish Sea. The entire foreground is occupied by an open agricultural field of mown grass. In the right middle ground, a dense group of mature trees within hedgerows obscure views to the background; a pitched slate roof of a small of a building can be seen on the far right. In the left middle ground, a tall hedgerow forms the boundary with the field in the foreground and the neighbouring field. Beyond this hedgerow, more fields and hedgerows can be seen in centre middle ground; two utility poles visible. The utility poles project into the background, interrupting the view of the Irish Sea. Overhead wires extending from these utility poles are visible against the backdrop of the Irish Sea in the centre and left middle ground. The rooftops of several houses, and gable of one light-coloured house, can be seen beyond the hedgerow in the left middle ground; beyond these houses, there is another mature tree line visible. The left background and a portion of the centre background is occupied by the Irish Sea.

Proposed Viewpoint 22

The redline in the right middle ground demarcates the location of the proposed development in the background of view. Beyond the mature trees and hedgerows in the right middle ground, the proposed development is screened from the northwest by the northern slopes of Kindlestown Hill. The proposed development will not be visible. Therefore, there will be no visual impact from this viewpoint location.

Existing Viewpoint 23

This viewpoint has been taken from the east side of Blacklion Manor Road adjacent to the newly constructed Waverly residential estate, at the entrance to Waverly Hill. The viewpoint is located east of the proposed development and looks west towards it. The foreground is occupied entirely by the road infrastructure serving the Blacklion Manor Road which comprises an expanse of the carriageway which is surfaced in black bitumen. A footpath on the opposite side of the road accommodates a grass verge in which three leafless trees and a light column are located. Two of these trees partially screen some of the view to the middleground beyond; the screening effect would be greater if the trees were in full leaf. The light column is located in the centre middle ground and it projects vertically into the skyline, bisecting the view; one other light column to the left of this light column does the same. A stone wall and metal railing form the boundary between the public footpath and the Waverly estate. This wall was under construction at the time the photograph was taken but has since been completed; there is now a pedestrian entrance with stepped access between Waverly Hill and Blacklion Manor Road. On the left and right middle ground, two terraces of houses border the view. The viewer is facing these houses side-on and they are finished in a buff-coloured brick and white render; they have dark slate roofs. There are a number of cars visible to the front of the houses in the middle ground, although they are somewhat obscured by the railing at the boundary. The centre middle ground is occupied by a road, also surfaced in black bitumen, and the gable end of another house which is finished with a buff-coloured brick. A terrace of houses of similar design with dark roofs can be seen in the centre background. Beyond these houses, a section of Kindlestown Hill is visible. Mature trees and hedgerow boundaries are visible between the fields on the east slopes

of the hill. The coniferous trees of Kindlestown Wood are visible beyond the crest of the hill and the rooftops of the houses in the middle ground; two aerial masts are also faintly visible close to the peak.

Proposed Viewpoint 23

The proposed development will be visible from this viewpoint location, although it is unlikely to be perceived as a change within the receiving environment by a sensitive receptor. The roofs of several proposed houses within the southern portion of development site can be seen above the rooftops of existing houses in the centre background but the proposed development does not look incongruous within the setting it is located. This is due to the existing Waverly development which is a prominent visual feature from this viewpoint and because the extent of the proposed development that is visible is very small. The remainder of the proposed development will be screened by the intervening built environment as illustrated by the redline in the left and right middle ground. The view of Kindlestown in the background will not be affected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 24

This viewpoint has been taken from the entrance road to Greystones Educate Together National School and Temple Carrig School; it is adjoined with the Blacklion Manor Road by the Lidl retail outlet. The viewpoint is located east of the proposed development and the view looks west towards it. The foreground is occupied by the road infrastructure serving the entrance road. This road infrastructure includes a two-lane carriageway surfaced in black bitumen, a concrete footpath and narrow grass verge on the left, and a bitumen cycle track and footpath with a narrow verge with shrub planting on the right. On the far left foreground, a timber post and mesh fence forms a boundary between a grass verge with tree planting. On the far right foreground, a rendered concrete wall and metal railing form the boundary between the footpath and a planting bed hosting shrub and tree planting; this planting bed is located in the grounds of the primary school. In the left middle ground, the gable end of a house borders the view and obscures views to the background; it is finished in a light render and has a dark slate roof. The centre middle ground is occupied by the same road infrastructure visible in the foreground; the entrance road arcs to the right and moves out of view in the right middle ground. There is a green coloured gate visible in the centre middle ground; this gate marks the access point to a car park serving Gaelscoil na gCloch Liath. A road surfaced in black bitumen can be seen beyond this gate extending towards the background. The gable end of a light coloured building borders the view in the right middle ground but it is somewhat screened by the canopies of leafless trees within the planting bed on the ground of the primary school; in full leaf, these trees will have a greater screening effect. Kindlestown Hill is visible in the centre background.

Mature trees and hedgerow boundaries are visible between the fields on the east slopes of the hill; livestock can also be faintly made out. Kindlestown Wood is clearly visible on the southeast and north slopes of the hill; several aerial masts are also faintly visible close to the peak. The view of Kindlestown Hill is obscured on the left by the second floors and rooftops of a group of houses within the neighbouring Waverly estate. The northeast slopes of the hill are obscured by the light-coloured facade of Gaelscoil na gCloch Liath. Several light columns project into the skyline in the right middle ground and several other project into the view of Kindlestown Hill in the centre background.

Proposed Viewpoint 24

A section of the southern portion of the proposed development will be visible from this viewpoint location and will obscure a small section of field and several hedgerows within the agricultural landscape beyond. This being said, the proposed development does not look incongruous within the setting it is located; this is due to the existing residential development visible from this viewpoint. The light-coloured side elevations of the proposed development are most clearly seen against the backdrop of the existing landscape. The roofs of the proposed development can be seen also but are less visible due to the chosen colour and how it contrasts less with the landscape beyond. The view of Kindlestown Hill will not be affected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will

not affect the quality of the receiving environment. The significance of the visual impact can be described as being moderate as it will alter the character of the environment by replacing a section of agricultural landscape with an urban residential development and this is consistent with existing and emerging trends.

Existing Viewpoint 25

This viewpoint has been taken from the footpath on the east side of the Blacklion Manor Road beside Temple Carrig School. The viewpoint is located east of the proposed development and looks southwest towards it. The foreground is occupied by the road infrastructure serving the Blacklion Manor Road. This includes an expanse of black bitumen surfacing on a footpath near the viewer and on a two-lane carriageway across the entire foreground, and a concrete footpath and black bitumen cycle lane opposite the viewer on the other side of the road. There are contrasting white road markings clearly visible on the carriageway and traffic lights and a traffic sign visible in the left foreground. A rendered concrete wall and metal railing forms the boundary between the foreground and the middle ground. Beyond the wall and railing, there is a dense group of leafless trees in the left middle ground behind which Greystones Educate Together National School can be seen. In full leaf these trees will have a greater screening effect and it is highly unlikely that the primary school will be visible from this viewpoint. Beyond the wall in the centre and right middle ground, there is a short section of hedge planting and a grass bank which slopes upwards towards Temple Carrig School. Temple Carrig School sits prominently above the viewer in the right middle grounds and obscures a portion of the landscape beyond. The left

background is obscured by Greystones Educate Together National School and dense tree planting. The northeast slope of Kindlestown Hill is visible in the centre background between the dense tree planting on the left and Temple Carrig School on the right. Kindlestown Wood is visible on the crest on the Kindlestown Hill and a small portion of the peak of the Great Sugar Loaf is visible beyond the hill. The peak of the Great Sugar Loaf is partially screened by leafless vegetation in the middle ground which will have a greater screening effect when in full leaf. The rooftop of Gaelscoil na gCloch Liath is visible above the tree canopies in the centre background.

Proposed Viewpoint 25

A small section of the proposed development is visible from this viewpoint location. In the centre background, between Temple Carrig School and Greystones Educate Together National School, the roofline of a proposed terrace of houses can be seen. Although the roofs of the proposed houses are made less visible due to the chosen colour and low contrast with the landscape beyond, they project slightly into the skyline and obscure the peak of the Great Sugar Loaf in the background. This being said, because this particular viewpoint is located on a main thoroughfare, it is likely to be viewed by a receptor while they are in motion and so the sensitivity of the receiving environment can be considered as lower than where the receiving environment might be viewed from a stationary position. It is for this reason, in addition to the fact that the portion of the peak is relatively small and is partially screened by vegetation, that it is unlikely to be perceived as a significant change by a receptor if it were to be obscured from this viewpoint. The view of Kindlestown Hill and Kindlestown Wood in the background will not be affected by

the proposed development. The proposed development does not appear incongruous within the setting it is located; this is due to the existing built environment visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 26

This viewpoint has been taken from the footpath on the north side of Redford Park at the junction of Redford Park, Blacklion Manor Road, and R761. The viewpoint is located east of the proposed development and looks southwest towards it. The entire foreground and centre and right middle ground is a view of the road infrastructure serving the junction between the roads mentioned. The left foreground and centre middle ground is occupied by an expanse of black bitumen with white road markings. The centre foreground features a degraded footpath comprising concrete, black bitumen, and a narrow grass verge; a pedestrian crossing with a traffic light post projecting into the skyline can also be seen here. In the right foreground there is an area of mown lawn in which a light column is located; the light column projects vertically into the skyline bisecting the view. The left middle ground features a section of a large mown grassed area which is surrounded by a low timber post and rail fence. On the edge of this grassed

area there is a tall advertising panel which projects into the skyline interrupting the view of Kindlestown Hill in the background; a lighting column to the right of this advertising panel does the same. Beyond this grassed area on the left, a cluster of buildings, including Greystones Educate Together National School and houses within the Waverly estate, are visible; a car park can be seen between these buildings and the grassed area on the far left. Temple Carrig School sits prominently in the centre middle ground where it obscures a large portion of Kindlestown Hill. Temple Carrig School is partly visible in the right middle ground, although it is somewhat screened by leafless trees; it is unlikely the school will be visible on the far right middle ground when these trees are in full leaf. A large portion of Kindlestown Hill can be seen in the background although as previously mentioned this view is obscured in the centre and right by Temple Carrig School and interrupted on the centre and left by an advertising panel and a light column. Kindlestown wood is visible in the left background and above the roof of Temple Carrig School in the centre background. The individual trees of a mature tree line can be seen extending along the southeast ridge of Kindlestown Hill. The canopies of mature trees can be seen over the roof of Temple Carrig School in the right background.

Proposed Viewpoint 26

The proposed development is visible from this viewpoint location but due to the context of the existing built environment, it is hardly noticeable. In the left background, the roofline of a proposed terrace of houses can be seen above the rooftops of existing houses within the neighbouring Waverly development; the roofs of the proposed houses are made less visible due

to the chosen colour and low contrast with the landscape beyond. In the centre background, to the left of Temple Carrig School, the front facades comprising the gables and rooftops of several proposed houses can be seen; these houses are partially screened by the bare canopies of tree which will have a greater screening effect in full leaf. The view of Kindlestown Hill in the background will not be affected by the proposed development. The proposed development does not look incongruous within the setting it is located; this is due to the existing built environment visible from this viewpoint.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be described as being imperceptible as it is capable of measurement but without noticeable consequences.

Existing Viewpoint 27

This viewpoint has been taken from the east end of Chapel Road approximately 100m from St. Killian's Church and the Blacklion Architectural Conservation Area (ACA). The viewpoint is located east of the proposed development and looks west towards it. The foreground is occupied by an expanse of roadway surfaced in asphalt with concrete and bitumen surfaced footpaths either side of it. Bordering the view on the right and left foreground are tall hedges stooping over a low whitewashed wall; these hedges enclose the view and screen the left and

right background entirely. In the right midground there is an entrance off the main road to a driveway featuring low whitewashed walls. Beyond the walls forming the entrance, there is a bank on which a tall dense hedge can be seen; this hedge screens views to the centre background. Within this hedge there is a tree, the view of which is framed by the hedges in the left and right foreground; its canopy extends into the skyline making it a particularly prominent feature within the overall view. Beyond the tree in the centre background, a utility pole can be seen extending into the skyline also. Overhead wires converging at this utility pole can be seen across the skyline; two of them extend towards the viewer in the foreground. Two gables and the elevation of a dark roof belonging to a single storey light-coloured house can also be seen in the centre background. A low stone wall forms the boundary between this house and Chapel Road.

Proposed Viewpoint 27

The redline in the middle ground demarcates the location of the proposed development. The proposed development is screened by the intervening built environment and vegetation to the west of the viewer. The proposed development will not be visible from this viewpoint location and there will be no change to the view.

Existing Viewpoint 28

This viewpoint has been taken from a car parking area in a bend on Chapel Road, approximately 50m from St. Killian's Church and the Blacklion ACA. The viewpoint is located east of the proposed development and looks northwest towards it. The entire foreground is taken up by an expanse of black bitumen and asphalt on Chapel Road and within the car parking area. There is a footpath across the road from the viewer surfaces in a black bitumen or asphalt; this footpath forms the boundary between the foreground and the middle ground. The elevations of two single storey, light-coloured houses occupy approximately half of the middle ground on the right-hand side; the contiguous elevation of both houses comprises two gables and a smaller rectangular façade. A low stone wall forms the boundary between this house and Chapel Road. There are several windows on this elevation and two doors; there is a flower box on one of the window sills. The rooftops of both houses are visible, the house on the right has reddish coloured slates, the house on the right has dark coloured slates; a single chimney is visible on both rooftops. The canopy of a group of trees is visible above the roofs of these houses. In the centre middle ground, a gated entrance to driveway belonging to the house on the left is visible. In the left middleground, a medium to tall height blockwork wall, with no finish, screens the view to the landscape beyond. The canopies of tree within the private gardens behind this wall can be seen above it; two of these trees are particularly prominent due to their height and how they project into the skyline. In the left and centre background, glimpses of Kindlestown Hill and Kindlestown Wood can be seen through tree canopies and two storey houses. In the centre background, the side elevation of a terrace of two storey houses can be seen. These houses are located on Blacklion Manor Road, they are finished in a buff-coloured render or paint, and they

have dark slate roofs; two chimneys on top of this terrace can be seen projecting slightly into the skyline. The right background is completed obscured by the single storey houses in the right middle ground.

Proposed Viewpoint 28

The redline extending across the middle ground demarcates the location of the proposed development. The proposed development is screened by the intervening built environment and vegetation to the west of the viewer. The rooftops of houses and tree canopies within residential estate east of Blacklion Manor Road have a notable screening effect on the southernmost portion of the proposed development. The operational phase of proposed development will not be visible from this viewpoint location.

Existing Viewpoint 29

This viewpoint has been taken from the footpath in front of St. Killian's Church on Chapel Road; the viewpoint is located within the Blacklion ACA. The viewpoint is located southeast of the proposed development and looks northwest towards it. The entire foreground is taken up by an expanse of asphalt on Chapel Road; there are worn white road markings in the centre of the road. In the right middle ground, an unrendered and unpainted concrete block wall extends towards the centre of the view. Beyond this wall, the canopies of several trees and the rooftop of two houses and a smaller garage can be seen. There is a utility pole in the right middle ground which projects vertically into thew skyline. Overhead wires converging at this pole cross a large section of skyline and extend towards the viewer as well as to the right. In the far right middle ground, the rooftops of one of the single storey houses described in Existing Viewpoint 28 can be seen. Another rooftop of can be seen beyond this single storey house and further in the distance, a very small portion of Bray Head is visible in in the far right background. In the centre middle ground, the road forms a junction between Chapel Road and Willow Bank. Here, a dense clipped hedge screens the view to the private garden beyond. On the same side of the road as the hedge in the centre middle ground, there are a number of tall shrubs and thick hedges within private gardens lining the edge of Willow Bank; these plants screen views to the background, with taller specimens projecting into the skyline. On the left middle ground, the asphalt surface of Willow Bank extends into the background and moves out of view around the corner to the right. There is a road traffic sign and two light columns visible along Willow Bank; one of the light columns projects slightly into the skyline and the other projects slightly into the view to the background. In the far left middle ground, there is a large mature tree overhanging Willow Bank

which screens a portion of the background and a section of the sky. In the left background, at the end of Willow Bank, a single storey, red brick house with a gable roof is visible. There is a low wall and some hedge planting forming the boundary to the front of this house in addition to a driveway. The dark rooftops of several houses can be seen in the background above the single storey house; these houses are located with the Seagreen residential estate by Blacklion Manor Road. Beyond the rooftops of these house, Kindlestown Hill and Kindlestown Wood are visible; mature trees and hedgerow boundaries are visible between the fields on the slopes of the hill. The views to the centre and right background are completely screened by the vegetation and houses within the centre and right middle ground, expect for the small section of background on the right which previously described.

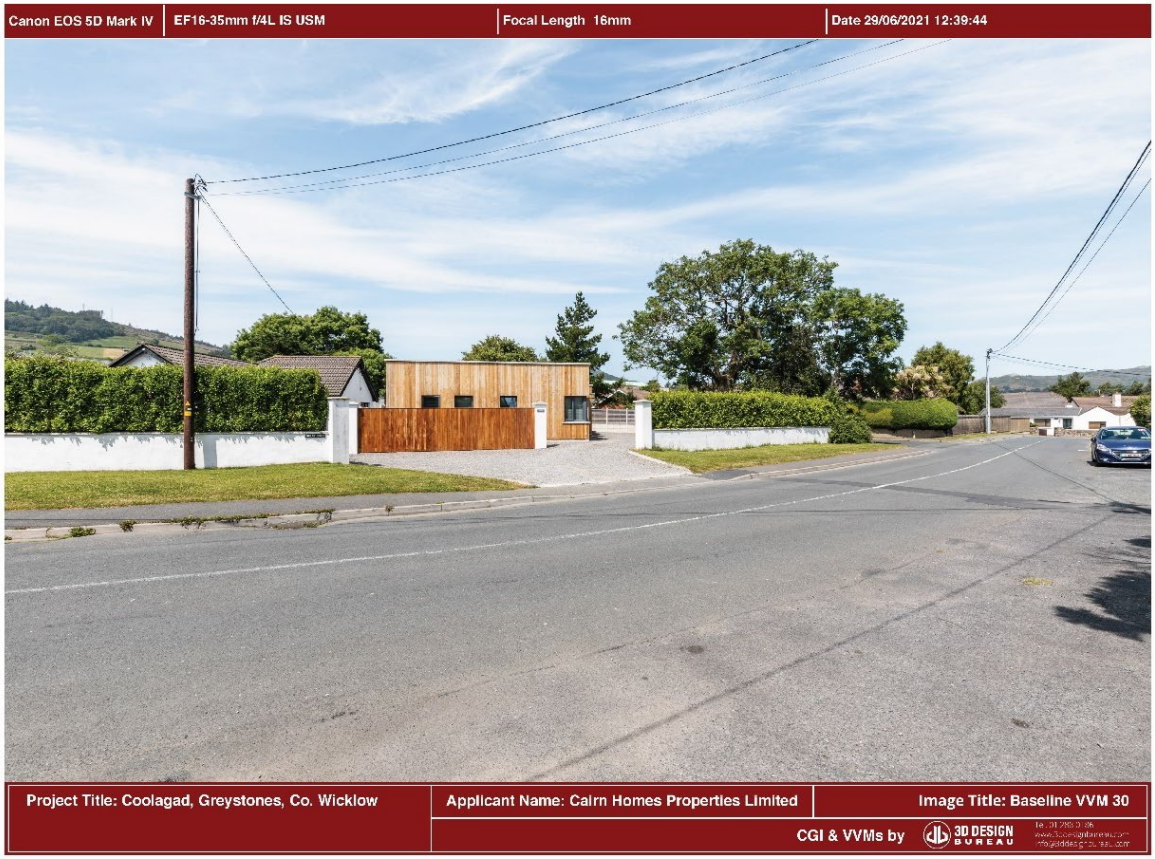
Proposed Viewpoint 29

The proposed development is partially visible from this viewpoint location. Although a small section of roofline belonging to a terrace of proposed houses located in the centre of the development site can be seen in the left background, the remainder of the proposed development will be screened by the existing built environment as illustrated by the redline in the centre middle ground. The view of Kindlestown Hill and Bray Head in the background will not be affected by the proposed development.

The visual impact can be described as being permanent as it will likely last over 60 years. The quality of the visual impact in this instance can be described as being neutral as the impact will not affect the quality of the receiving environment. The significance of the visual impact can be

described as being imperceptible as it is capable of measurement but without noticeable consequences.

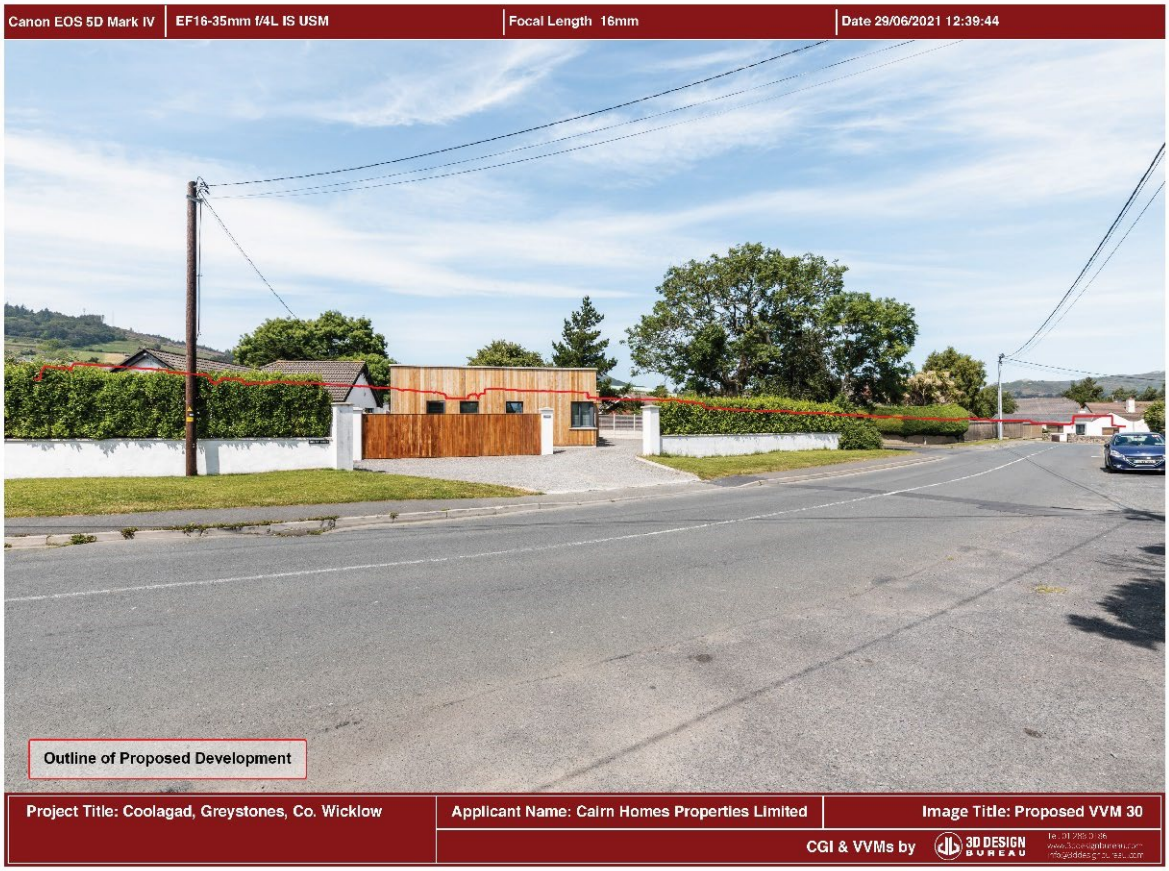
Existing Viewpoint 30



This viewpoint has been taken from the footpath at the south end of St. Killian's Church on Chapel Road; the viewpoint is located within the Blacklion ACA. The viewpoint is located southeast of the proposed development and looks northwest towards it. The entire foreground is occupied by an expanse of asphalt which extends into the right middle ground. In the centre middle ground, a contemporary single storey building finished in a vivid timber cladding has a strong visual presence within the overall view; this building screens the centre background beyond. In the left middle ground, a tall hedge projects above a low whitewashed wall. Behind the hedge, two gables and a dark slate roof of a single storey house can be seen. There is a footpath and grass verge to the front of the whitewashed wall which extends towards the right and into the background. Within the grass verge in the left middle ground, a utilities pole projects into the skyline. The overhead wires converging at the top of this pole extend across the view to the right towards the viewer; they cross a significant portion of the sky. On the right middle ground, another section of whitewashed wall is visible, again with a hedge projecting above it. In the right background, the dense hedge and unrendered concrete block described in Existing View 29 and Existing View 28 are both visible at the junction of Willow Bank and Chapel Road. In the right background, the light-coloured single storey house referenced in Existing View 27, 28, and 29 can be seen. The gable and rectangular elevation of this single storey house can be seen clearly, as well as its dark coloured roof. In the right background behind this house, the rooftops of two other houses can

be seen. The canopies of several trees can be seen beyond these rooftops, and Bray Head is visible beyond these canopies. A utilities pole in the right middle ground projects vertically into a small portion of the skyline and interrupts the view of Bray Head; overhead wires that converge at this pole extend to the right and towards the viewer, crossing a portion of the skyline. In the left background, Kindlestown Hill and Kindlestown Wood can be seen. In the centre background, the canopies of several can be seen beyond the houses located in the centre middle ground. Although these canopies screen views to the landscape beyond, a glimpse of the south eastern slope of the Little Sugar Loaf is visible to the right of the contemporary single storey building in the centre middle ground, between the tree canopies in the background.

Proposed Viewpoint 30



The redline extending across the middle ground demarcates the location of the proposed development. The proposed development is screened by the intervening built environment and vegetation to the northwest of the viewer.

10.8.3 'Worst-case' Scenario

The 'worst-case' scenario describes the effects that arise from a development in the case where mitigation measures substantially fail.

10.9 Do Nothing Scenario

According to the European Commission (2017), the 'do-nothing' scenario is a description of the evolution of the baseline environment should the proposed development not be implemented.

In this case, should the proposed development not be implemented, the development site would likely remain in use as agricultural fields for a period of time, with little or no disturbance to any landscape features present on site and outlined in the baseline scenario of this assessment.

This being said, within the LAP, the subject site has been zoned as land for residential development with maximum densities of 22 units per hectare and 17 units per hectare in addition to being identified as an Action Plan area (AP1) that "provides for the development of a mix of private and social and affordable housing and schools".

Due to this zoning of land by Wicklow County Council, it is difficult to envisage the site not being developed with such provisions in the future. As such, a more realistic 'do-nothing' scenario in this instance will likely see the construction of residential units in addition to educational facilities, and areas of open space at a later date in time.

10.10 Monitoring

In order to ensure the landscape design outlined and illustrated within this planning application is implemented in accordance with best practice, detailed documents for the tender and construction stages (which will be based on and comply with the drawings and details set out in this planning application), including drawings and specifications, will be produced by a suitably qualified landscape architect. These drawings and documents will illustrate details and procedures for the proper implementation and execution of the scheme; these works will also be overseen be a suitably qualified landscape architect.

Before the commencement of construction, the tree protection measures outlined in the Arboricultural Report prepared by The Tree File Ltd. and specifically the measures outlined within Appendix A1 – Arboricultural Method Statement of the report. A project arborist will be appointed to oversee the implementation of these protective measure outlined in this method statement and will supervise any related works at construction stage. The planting scheme will be fully implemented within the first planting season after the main construction works have been completed.

All completed landscape works outside the Taking In Charge areas will be subject to regular maintenance which will be outlined in a landscape management and maintenance plan by an appointed management company. Amongst other measures, this ongoing maintenance will consist of pruning of trees, the control of weeds, and the replacement of planting which has failed. The roads within the proposed development and the large area called 'The Park' on the eastern side of the proposed development will be taken in charge and maintained by Wicklow County Council. Monitoring will be carried out on an ongoing basis to ensure overall quality and that the landscape strategy is implemented at each phase.

Monitoring of avoidance, remedial and mitigation measures is not relevant to the assessment of visual impacts on the built environment during construction or operational phase in the case of the subject application.

10.11 Difficulties Encountered

As is the case in any rural area, it was neither possible nor practical to gain unfettered access to every parcel of private property or land within the study area surrounding the application site in order to carry out visibility analysis and take photography for the purposes of preparing photomontages. Intervening vegetation and topography acted as a restriction on access.

Due to health and safety issues relating to undertaking photography and survey work on a live traffic route, it was not possible to undertake a visual assessment from the viewpoint locations listed below as highlighted in **Schedule 10.14 and shown on Map no. 10.15 - Chapter 10 – Heritage - Wicklow County Development Plan 2010-2016**.

Protected View No. 13 N11 Glen of the Downs:

Prospect of both sides of Glen of the Downs

Protected View No. 14 N11 at Kilmullin:

Prospect of Kilcoole and the coast

However, due to distance from the site and intervening topography and vegetation it is anticipated that there will not be any impact by the proposed development on these protected views.

10.12 Conclusion

The proposed residential development of 351 houses, 6 three to four storey apartment blocks, 32 duplex units, community building, creche, and sports pitches will replace the majority of the existing agricultural lands located at the development site. However, landscape works will protect and incorporate a large number of existing ecological features such as hedgerows, trees, streams, and wetland areas into the proposed development and create a network of attractive and useable open spaces.

The baseline environment presents as an irregular, doglegged shape, sloping moderately from west to east, comprising several agricultural fields measuring approximately 23ha in total which are separated by a network of tall mature hedgerows and tree lines. The majority of the site comprises fields of grass being used for pasture, or fields that were used as arable land or for pasture, which have been left fallow and are now somewhat overgrown. The landscape quality of the site is considered moderate given the rural setting of fields with dividing hedgerows and ditches but with elements of high-quality landscape in locations associated with the mature tree lines, pines, willow scrubland and remnant. A moderate landscape quality also lies in the pockets of intervening layers of scrub, grasses and wildflowers present throughout the site adding to the seasonal colour within this landscape setting.

The existing topography has informed the design, arranging the buildings and road alignments according to the ground contours and mitigating the visual impact on the receiving environment and maximising the preservation of existing natural assets such as hedgerows, trees, streams, and wetland areas. In addition, the existing neighbouring residential development informs the proposed site design, using a similar design in terms of scale and architectural style, including form and materials; this allows the proposed development to blend in within its surrounding context, reducing its overall impact on the landscape. The precedent which has been set by the

construction of these new residential developments, namely Waverly and Seagreen, will reduce the magnitude of the impact the proposed development.

There will likely be some local biodiversity loss that arises from the removal of vegetation to facilitate development, e.g., removal of some trees, hedgerows, and fields. However, this biodiversity loss will be reduced and offset by incorporating existing (stream, wetland, woodland, hedgerows, and trees) and proposed (meadow, woodland, swales) ecological features within the proposed development which has been outlined in the landscape proposals. In addition, although some archaeological features will be disturbed during the construction and operational phase, a large portion of a bi-vallate enclosure and associated archaeology will be preserved in-situ beneath a carefully constructed public greenspace, the ongoing protection of this archaeology will be enacted through a bespoke Monument Management Plan, and all archaeological features outside of this area will be subject to full preservation by record.

Following on from the visual assessment of the thirty photomontages prepared by 3D Design Bureau, the overall visual impact during demolition and construction works will be significant, negative but short-term. Implementation of best practice during constructions works will assist in reducing negative impacts at the construction stage of the project. These negative impacts will cease once construction works are complete and the proposed development is opened and occupied.

It is anticipated that the presence of a high-quality mixed-use development combined with substantial landscape proposals within and around the boundaries of the scheme, will reduce the visual impacts to moderate and neutral in the long term once all landscape works have been implemented and trees and planting have established.

10.13 References

Environmental Protection Agency, 2002, Guidelines on the Information to be Contained in Environmental Impact Statements

Environmental Protection Agency, 2017, Guidelines on the Information to be Contained in Environmental Impact Reports (Draft)

Environmental Protection Agency, 2003, Advice notes on current practices (in the preparation of an Environmental Impact Statement)

Environmental Protection Agency, 2015, Advice notes for Preparing Environmental Impact Statements (Draft)

European Commission, 2017, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)

Department of the Environment and Local Government (DEHLG), 2000, Landscape and Landscape Assessment Draft Guidelines

The Landscape Institute & I.E.M.A., UK, 2013, Guidelines for Landscape and Visual Impact Assessment

Scottish Natural Heritage (SNH), 2013, A Handbook on Environmental Impact Assessment – Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland

Scottish Natural Heritage (SNH), 2018, Environmental Impact Assessment Handbook

Landscape Institute and Institute of Environmental Management & Assessment, 2013, Guidelines for Landscape and Visual Impact Assessment

Wicklow County Council, 2021, Draft Wicklow County Development Plan 2022-2028

Wicklow County Council, 2016, Wicklow County Development Plan 2016-2022

Wicklow County Council, 2010, Wicklow County Development Plan 2010-2016

Wicklow County Council, 2013, Greystones-Delgany and Kilcoole Local Area Plan 2013-2019

11 Cultural Heritage including Archaeology

11.1 Introduction

IAC Archaeology Ltd has prepared this chapter on behalf of Cairn Homes Properties Ltd to assess the impact, if any, on the archaeological and cultural heritage resource of a proposed development at the proposed housing development, located at Coolagad, Greystones, Co. Wicklow (ITM 727697/ 713014). The report was undertaken by Grace Corbett and Paul Duffy.

This assessment has been carried out in a number of stages which include a desk-based assessment, geophysical survey and archaeological test excavations.

The study determines, as far as reasonably possible, the nature of the archaeological and cultural heritage resource in and within the vicinity of the proposed development using appropriate methods of study. This leads to the following:

- Determining the presence of known archaeological assets that may be affected by the proposed development;
- Assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;
- Assessment of the potential direct and indirect impact of the proposed development on the cultural heritage resource,
- Development of a mitigation strategy is designed to avoid, reduce or offset any adverse impacts.

11.2 Assessment Methodology

11.2.1 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 '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. For the purposes of this report, built heritage/architectural heritage has also been considered under this term.

11.2.2 Impact Definitions

Imperceptible Impact

An impact capable of measurement but without noticeable consequences

Not Significant

Effects which cause noticeable changes in the character of the environment but without noticeable consequences

Slight Impact

An impact which causes changes to the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.

Moderate Impact

An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends. A moderate effect arises where a change to the site is proposed, which although noticeable, is not such that the archaeological integrity of the site is compromised, and which is reversible. This arises where an archaeological feature can be incorporated into modern day development without damage and that all procedures used to facilitate this are reversible.

Significant Impact

An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site.

Very Significant

Effects which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.

Profound Impact

Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise when an archaeological site is completely and irreversibly destroyed by a proposed development.

Impacts as defined by the EPA 2017 Draft Guidelines (pg. 23).

11.2.3 Desk-Based Assessment

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).

The study involved detailed interrogation of the archaeological and historical background of the proposed development area. This included information from the Record of Monuments and Places of County Dublin, the City 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, Bing Maps, and Google Earth has also been carried out. The following sources and databases were consulted:

- Record of Monuments and Places for County Wicklow;
- Sites and Monuments Record for County Wicklow;
- National Monuments in State Care Database;
- Preservation Orders List;
- Topographical files of the National Museum of Ireland;
- Cartographic and documentary sources relating to the study area;
- Wicklow County Development Plan 2016–2022;
- Aerial photographs;
- Excavations Bulletin (1970-2022)

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section of the Department of Housing, Local Government and Heritage, which are afforded legal protection under Section 12 of the National Monuments Acts 1930 to 2004, as amended, (the 1930 Act) and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Housing, Local Government and Heritage (DoHLGH) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoHLGH may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the National Monuments Acts 1930 to 2004, as amended, (the 1930 Act). Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the National Monuments Acts 1930 to 2004, as amended, (the 1930 Act). These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

The Topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

- Jacob Neville, Map of County Wicklow, 1760
- Ordnance Survey maps of County Wicklow, 1840, 1909 and 1938

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Wicklow County Development Plan (2016-2022) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey, Bing Maps, and Google Earth.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970-2021.

11.2.3 Geophysical Survey

Geophysical survey is used to create 'maps' of subsurface archaeological features. Features are the non-portable part of the archaeological record, whether standing structures or traces of human activities left in the soil. Geophysical instruments can detect buried features when their electrical or magnetic properties contrast measurably with their surroundings. In some cases, individual artefacts, especially metal, may be detected as well. Readings, which are taken in a systematic pattern, become a dataset that can be rendered as image maps. Survey results can be used to guide excavation and to give archaeologists insight into the pattern of non-excavated parts of the site. Unlike other archaeological methods, the geophysical survey is not invasive or destructive.

A geophysical survey was undertaken to inform this assessment in December 2020 within the proposed development area (Leigh 2020, Licence Ref.: 20R0212; Figure 11.3). A summary of the geophysical report is presented in Section 11.4.6 and the full text included in Appendix 11.A.

11.2.4 Archaeological Test Excavations

Archaeological Test Excavations can be defined as 'a limited programme... of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land or underwater. If such archaeological remains are present test trenching defines their character and extent and relative quality' (CIfA 2014a, 4). A program of archaeological testing was carried out within the proposed development area in April 2021. This was undertaken by Muireann Ni Cheallacháin of IAC Archaeology under licence 21E0133 (Ni Cheallacháin 2021, Figure 11.3). Detailed results of the archaeological testing are included in Section 11.4.7 and the full report is reproduced in Appendix 11.B of this chapter.

11.3 Characteristics of the Proposed Development

The proposed development consists of:

- 586 residential units including:
- 351 two storey houses. 3 bed, 104 no. 4 bed, 4 no. 5 bed) comprising detached, semi detached and terrace units

- 203 no. apartments (65 no. 1 bed, 123 no. 2 bed, 15 no. 3 bed) provided within 6 no. blocks ranging from three to four-storey (over basement) with residential amenity facilities.
- 32 no. duplex units (16 no. 2 bed and 16 no. 3 bed units) c. 5,192 sqm of communal open space is provided to serve the proposed apartment/duplex units;
- Community building (single storey) of 392 sq.m. with 29 car parking spaces, which includes changing rooms and multipurpose room and ancillary facilities.
- Creche building of 734 sq.m. with 21 car parking spaces
- Provision of a new vehicular entrance with signalised junction from the R761 (Rathdown Road), to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road (and future vehicular connection to lands to the west) as part of the long-term objective to provide a northern access route from Greystones to the N11 and provision for future vehicular connection to lands to the south
- Provision of pedestrian and cycle connections to the site boundary with land to the east and south.
- Car parking spaces is provided in a mix of basement level for the apartments and off-street for the houses and duplexes. This includes:
- 702 on curtilage car parking spaces for the houses;
- 206 car parking spaces at basement level and 5 at surface level for the apartments;
- 32 spaces for the duplex unit and 10 visitor spaces at surface level
- 22 motorbike parking spaces and 422 cycle spaces (310 secure spaces and 112 visitor spaces) are also provided.
- The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the construction of a new public sewer along the R761/R762 from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.
- c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces (including enhancement of an existing stream), formal and informal play areas, and new boundary treatments.
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

11.4 Baseline Description

The proposed development area is contained across nine agricultural fields to the west of the R761 and to the north of Greystones, at I.T.M. 727697/ 713014. The fields are located to the north and west of a farm, which is located centrally within the proposed development area. The topography of the site has a dominant east facing aspect. To the southeast is the built-up area of Blacklion. To the north and west are agricultural lands. The site consists of agricultural fields (sandstone and shale till) mainly bordered by hedges and trees apart from the northwest boundary of the site, which bisects a field in a north-south direction. The lands are used as pasture for sheep and cattle. An existing track onsite links the farm buildings located southeast of the site to other farm buildings in Templecarrig to the northwest. A stream flows across the site in an east-west direction within a vegetation-lined ditch along the northern boundary of the largest field to discharge into the sea at Greystones to the east.

A total of twelve sites are recorded in the Sites and Monuments Record within a 500m radius of the area (Figure 11.1). Of these sites, three are scheduled for inclusion in the next revision of

the RMP. These comprise a hillfort (WI008-015), church (WI008-012001), graveyard (WI008-012002), and a ringfort (WI008-073).

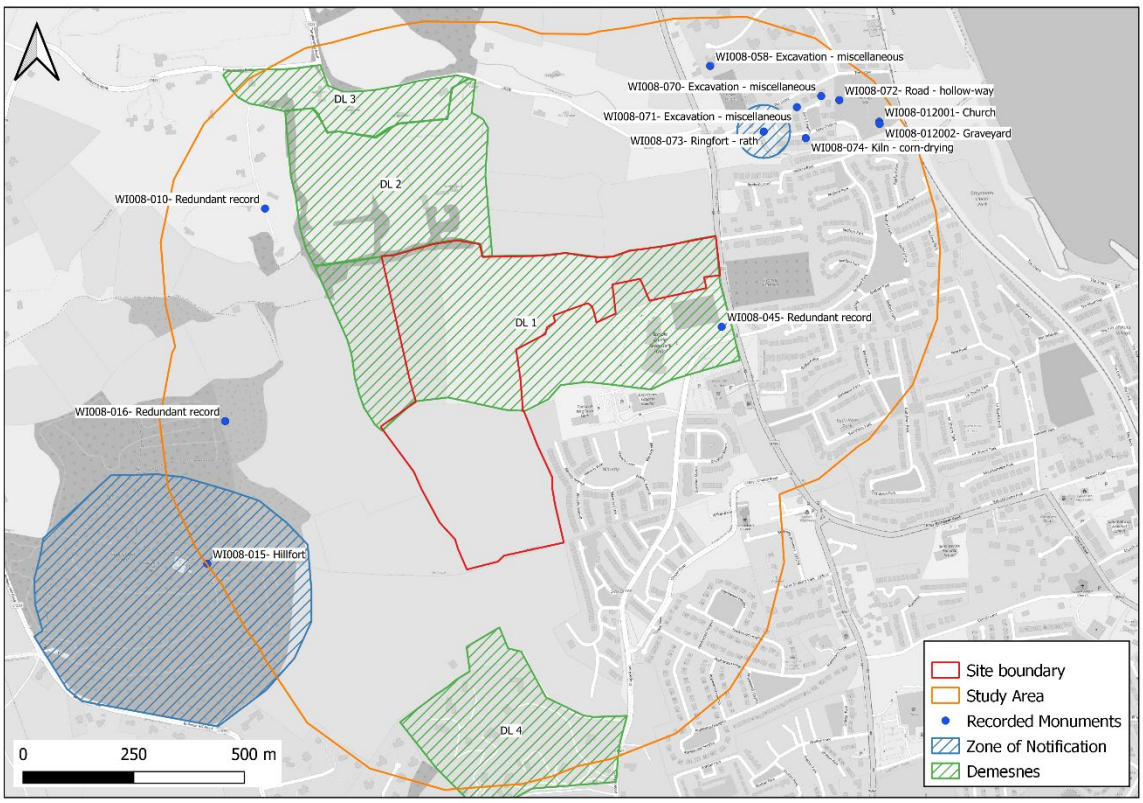


Figure 11-1: Archaeological sites and demesnes within 500m of the proposed development

11.4.1Archaeological and historical background

11.4.1.1 Mesolithic Period (c. 7000–4000BC)

Until recently the Mesolithic period was believed to have been the earliest time for human occupation of the island of Ireland, though recent research now suggests there may have been human activity in the southern half of Ireland as early as the Upper Palaeolithic (Dowd and Carden 2016). However, the Mesolithic period is still accepted as the first time there is evidence for widespread occupation in Ireland, as a large portion of the north of the country would have been beneath extensive glaciation earlier than this. During the Mesolithic period, people lived transient lives, hunting, fishing, and foraging for subsistence. Coastal and riverine resources were of key importance to these communities. As a result of this mobile lifestyle, there is little settlement evidence in the archaeological record from this period. Often the only trace of these groups are lithic scatters and shell middens. There is, however, no direct evidence for Mesolithic activity within the site or receiving environment.

11.4.1.2 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 rapidly 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. There are four types of Neolithic tomb known in Ireland: Court, Portal, Passage and Wedge. The main focus of Neolithic tomb building in Wicklow is located in the north of the county, close to the Dublin border. Twenty passage tombs are located within this area alone, most of which are situated above the 240m contour (Stout 1994, 8).

Excavations carried out in advance of development at Charlesland and Killincarrig, c. 3km south of the proposed development area, have revealed evidence for settlement activity dating to the Neolithic period. A number of pits containing early Neolithic pottery and saddle quern stones were retrieved during excavations in Charlesland (WI013-076), c. 3.1km south-southeast of the proposed development area. Further Neolithic activity in the wider landscape includes early Neolithic habitation sites at Sea Road, Kilcoole, c. 5.5km to the south-southeast (Licence 06E0670 ext., Bennett 2008:1318) and at Newtownmountkennedy c. 7km southeast (WI013-123). Further afield in West Wicklow, much evidence for settlement sites have been identified along the shores of the Poulaphuca Reservoir (Corlett 2009).

11.4.1.3 Bronze Age Period (c. 2500–800BC)

The Bronze Age was marked by the production and use of metals in Ireland for the first time. As with the earlier Mesolithic–Neolithic transition, the Neolithic–Bronze Age transition was accompanied by significant change in material culture and society. The construction of megalithic tombs ceased after the wedge tombs of the early Bronze Age with a focus on individual burials emerging. Bronze Age burials occurred in subterranean cist or pit burials that were either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often accompanied by a pottery vessel.

The most common indicator of Bronze Age activity is the burnt mound or *fulacht fiadh*. These sites consist of a horseshoe-shaped mound of heat-affected stone and charcoal in close proximity to a trough. Often the trough is wood or wicker-lined. The function of these sites was to heat water, possibly for a variety of purposes, such as cooking, dyeing, brewing, tanning, or bathing. A substantial early Bronze Age burnt mound associated with four troughs and numerous pits and postholes was excavated at Charlesland, 3.2km south-southeast of the proposed development area (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. Activity during this period is well attested in the archaeological record within the immediate vicinity of the proposed development area. Two ring ditches as well as multiple funerary urns and cremation pits were excavated at Farrankelly c. 3km south-southeast (WI013-128/129). Another significant Bronze Age ritual landscape, including a ring-ditch, funerary urns, cremation pits, cremation deposits, and animal burials, was excavated as part of the Charlesland development (Licence 03E0018, Bennett 2003:2073; Licence 03E0146, Bennett 2003:2076; Licence 03E0147, Bennett 2003:2077; Licence 04E0153, Bennett 2004:1857).

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 a habitation site (WI013-075) c. 3.5km to the south-southeast of the proposed development area.

The Bronze Age has been established as the main period of hillfort construction in Ireland and excavation confirms these were centres of high-status residence, specialist crafts and trade, used for military purposes and assembly, as well as for ritual and ceremony. Their prominent siting was strategic, connected not only to control of routeways but part of a highly visible display of political and military power in the landscape. (O'Driscoll et al 2019). The Class 1 partial

contour univallate hillfort at Coolagad (WI008-015) lies c. 300m to the west, overlooking the proposed development area.

11.4.1.4 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. It saw the rise and fall of elite hierarchical dynasties that derived their wealth from control of trade with the Mediterranean. It is only represented in Ireland by a small number of bronze swords and other items of Hallstatt type (Raftery 1994, 107). The later Iron Age, or La Tène, also originated in Europe during the middle of the 5th century BC, so called after the site of a significant votive deposit on Lake Neuchâtel in Switzerland. For several centuries, the La Tène Celts were the dominant people in Europe, until they were finally overcome by the might of the Roman Empire. La Tène art is defined by its curvilinear design, which has flowing abstract compositions. 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.

11.4.1.5 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 enclosures known as ringforts were constructed to protect farmsteads or to enclose livestock. 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 possibly 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. The *Mac Gilla Mo Cholmóc* lands extended as far north as the walled town of Dublin and the family name was preserved in some placenames. They were also purportedly the founding patrons of St Mary's Abbey on the north side of the Liffey. Their centre of power however was the site of the castle (WI008-011) and deserted medieval settlement of Rathdown (WI008-011002) 600m to the north-northeast (for discussion of the political makeup of the *Uí Dúnchada* holdings see MacCotter (2008, 164-5).

The ringfort, or *rath*, is considered to be the most common indicator of settlement during this time. Stout (1997) has suggested that there are over 45,000 potential ringforts or enclosure sites throughout Ireland and, more recently, a figure of 60,000 has been suggested on the basis of further findings from archaeological excavations (O'Sullivan et al, 2014). 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. A ringfort (WI008-073) is recorded c. 220m to the northeast of the proposed development area along the same watercourse that leads to the Rathdown Castle site.

The earliest evidence for Viking activity in Wicklow is found in an annalistic entry for 827 AD, which reports the destruction of a Leinstermen camp by 'heathens.' A Viking presence is known at Arklow (c. 38km south of the area of proposed development) and Wicklow Town (c. 18km 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). The name Wicklow is derived from Vikingalo meaning 'Meadow of the Vikings' or Vik-lo meaning 'meadow of the bay'. Possible Hiberno-Norse influence can be detected in the townland name of Coolagad which possibly includes the Norse word gata meaning a path or road (Etchingham 1994). The gata referred to in Coolagad and in nearby Windgate may well be the ancient roadway joining Bray and Delgany (Murphy & Potterton 2010).

11.4.1.6 Medieval Period (AD1100–1600)

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 and 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).

A 'Church' (WI008-012001) and 'Graveyard' (WI008-012002) are situated c. 430m to the northeast of the proposed development area. Known locally as St. Crispin's cell, the present remains consist of a small single cell church that appears to be an 18th century reconstruction using masonry from a medieval church. Stones projecting beneath the present church suggest that the medieval church was located partially beneath St. Crispin's cell. Recent excavations (McIlreavy, 2019) identified a medieval enclosure surrounding the site of the current church. There are references to a graveyard (WI008-012002), which may have occupied the site until the 17th century AD. This graveyard is supposed to have been cleared and the disinterred bodies and gravestones buried elsewhere (O'Flanagan 1928, 39-41). The former site of Rathdown Castle (WI008-011) and deserted medieval settlement (WI008-011002) are located c. 200m to northeast of the church.

11.4.1.7 Post-medieval Period (AD1600-1900)

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 both countries, Powerscourt House (1731-40) and Russborough House (1741-48), 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 boom in country house building, which characterised much of the first half of the 19th century, and indeed, the century before that, tailed off almost completely

by the 20th century. During the post-medieval period, the proposed development area was situated to the immediate north and west of Coolagad House in a rural landscape, the main house is still present today.

11.4.2 Summary of Previous Archaeological Fieldwork

The following section presents the results of archaeological fieldwork undertaken within a 500m radius of the proposed development area. Archaeological investigations undertaken within the site in support of this assessment are described separately in Section 11.4.7 and in Appendix 11.B.

A 'Ringfort - *rath*'(WI008-073), which was revealed by geophysical survey and archaeological test excavations, lies c. 220m to the northeast of the proposed development area. The feature was not subsequently excavated as it lay outside the area for development (Bennett 1993:231, Licences 93E0187, 94E0033).

A possible earthwork (WI008-045), located directly to the south and east of the proposed development area, was subject to archaeological test excavations in 2005 (Bennett 2005:1701, Licence 05E0522) but no features of archaeological significance were identified, and the site was subsequently reclassified on the SMR as a redundant record. Three nodules of flint were recovered from the site but showed no evidence of having been worked. Clay pipe fragments and post-medieval pottery were also recovered, while dumped material was evident across the site to a depth of c. 1m.

Further archaeological test excavations were undertaken in 2013 to the southeast of the development area (Bennett 2013:511, Licence 13E0394) in advance of construction of a post primary school. No features of archaeological potential were identified.

Archaeological test excavations carried out at a proposed dwelling-house in Templecarrig/Rathdown Lower to the southwest of St. Crispin's cell and c. 232m to the northeast of the proposed development identified no features of archaeological significance (Bennett 2000:1093, Licence 00E0152). Archaeological monitoring of the placement of two ESB poles at Redford Park, Rathdown, c. 300m east of the proposed development, also identified nothing of archaeological significance (Bennett 1998:691, Licence 97E0075 ext.).

Several excavations have been undertaken c. 400-500m to the northeast of the proposed development area in the townlands of Templecarrig Lower and Rathdown Upper. Excavation carried out at a residential development at Templecarrig Lower, c. 426m northeast of the proposed development, identified a charcoal spread and pit (Bennett 2002:1990, Licence 02E0227, SMR WI008-058) and six pits, one of which contained prehistoric pottery (Bennett 2003:2095, Licence 03E0886, SMR WI008-068).

Excavation carried out at a residential development at Rathdown Upper (Bennett 1997:612, Licence 97E0075), c. 435m northeast of the proposed development area identified prehistoric occupation in the form of pits, gullies, ditches etc. with the presence of Beaker pottery and early Iron age artefacts (SMR WI008-071), an early Neolithic platform and pits dated from several diagnostic flint artefacts (SMR WI008-070) and a corn drying kiln (SMR WI008-074). A 'Road - hollow-way' (WI008-072) which was identified through geophysical survey and excavation is also recorded in this area, to the east of St Crispin's cell (WI008-012001). Limited excavation in 1993 (Bennett 1993:231, Licence 93E0187) revealed that the primary phase of the feature consisted of a shallow ditch, which when partially backfilled had been re purposed as a route way. Two sherds of glazed medieval pottery and a sherd of medieval cooking ware were recovered from

the upper fills of the ditch, but no diagnostic finds were made in the primary fills, so the date of the feature remains unknown (Eogan and O'Brien 2007).

11.4.3 Cartographic Analysis

Jacob Neville, Map of County Wicklow, 1760

The county of Wicklow is depicted with a road network and topographical features. Coolagad House is annotated and depicted to the west of the Rathdown Road. Redford House is depicted to the east and Kindlestown House is marked to the south. There are no other features depicted within the approximate area of the site at Coolagad House.

First Edition Ordnance Survey Map, 1840, scale 1:10560 (Figure 11.2)

This is the first accurate historic mapping coverage of the area containing the proposed development which is contained within nine open fields to the immediate north and west of Coolagad House. The land surrounding the house forms a demesne (DL 1), with further demesnes associated with Templecarrif Lower (DL 2) and Templecarrig Upper (DL 3) to the north of the proposed development area, and Kindlestown House (DL 4) to the south. These demesnes are described further in Section 11.4.8.

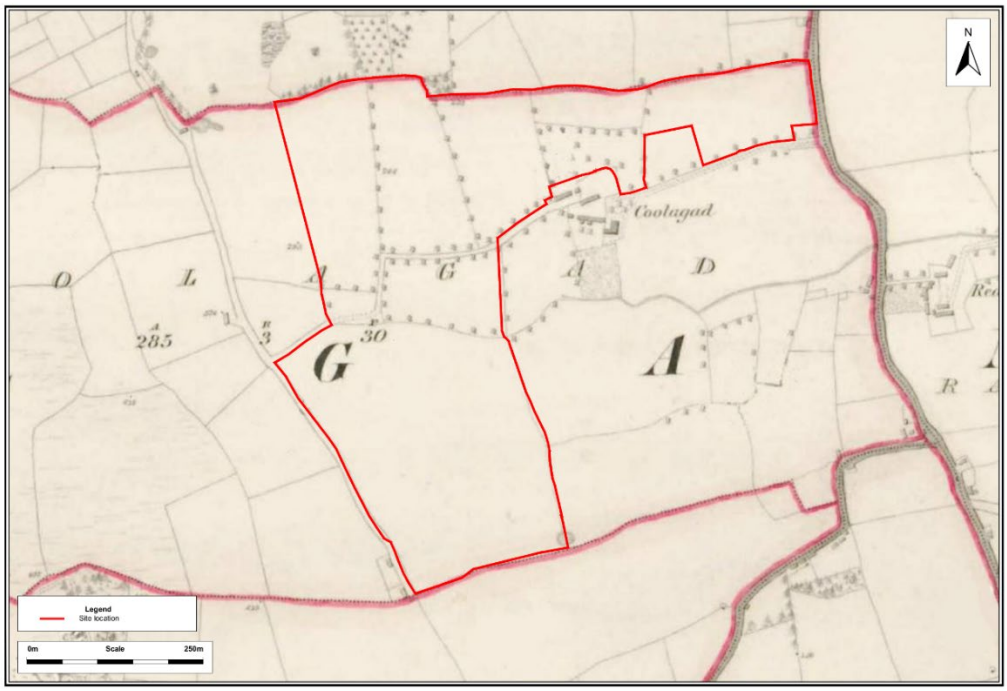


Figure 11-2: First edition Ordnance Survey map, 1840

Ordnance Survey Map, 1909, scale 1:2500

The large agricultural fields, farm buildings and farm laneway located within and surrounding the proposed development area have not changed since the first edition six-inch OS map of 1840.

11.4.4 Aerial Photographic Analysis

A review of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995-2013), Google Earth (2009-2022), and Bing Maps (2022) showed that the location of the large agricultural fields, farm buildings and farm laneway have not changed

which corresponds with the evidence from the historic mapping. No previously unrecorded features of archaeological potential were identified in the aerial photography coverage.

11.4.5 Topographical Files

Information on artefact finds from the study area in Wicklow has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

Three archaeological finds have been recorded within the study area (though outside of the proposed development area), including a bronze axe head from Belmont Demesne (NMI. Ref. 1981:2), a jetton (NMI. Ref. 1977:3) from Rathdown Upper and a silver medieval coin (NMI. Ref. 1977:2) from Templecarrig Lower.

11.4.6 County Development Plan

The Wicklow County Development Plan (2016-2022) recognises the statutory protection afforded to all Record of Monuments and Places (RMP) sites under the National Monuments Legislation (1930–2014). The development plan lists a number of aims and objectives in relation to archaeological heritage (Appendix 11.D).

There are 12 archaeological sites within a 500m radius of the proposed development, (Table 11.1; Figure 11.1; Appendix 11.C). These are summarized in the table below.

Table 11-1: Archaeological sites within 500m of the proposed development area

RMP No	Location	Classification	Distance from the proposed development
WI008-045	Coolagad	Redundant record	c. 95m S
WI008-074	Rathdown Upper	Corn drying kiln	c. 300m NE
WI008-073	Rathdown Upper	Ringfort – rath	c. 260m NE
WI008-072	Rathdown Upper	Road – Holloway	c. 420m NE
WI008-071	Rathdown Upper	Excavation – miscellaneous	c. 345m NE
WI008-070	Rathdown Upper	Excavation – miscellaneous	c. 396m NE
WI008-058	Templecarrig	Excavation – miscellaneous	c. 383m NNE
WI008-016	Coolagad	Redundant record	c. 356m W
WI008-015	Coolagad	Hillfort	c. 300m E
WI008-012002	Rathdown Upper	Graveyard	c. 450m NE
WI008-012001	Rathdown Upper	Church	c. 450m NE

WI008-010	Coolagad	Redundant record	c. 282m NW

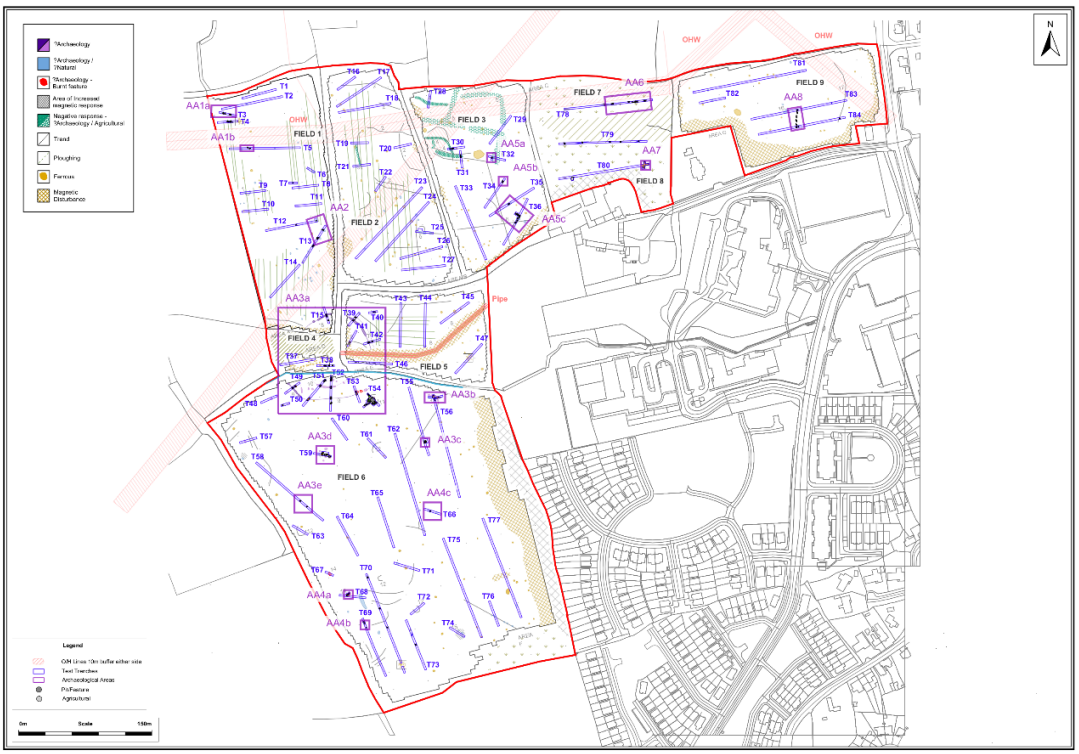


Figure 11-3: Geophysical survey results including location of test trenches and archaeological areas

11.4.7Summary of Geophysical Survey Results

A geophysical survey was carried out within the proposed development area by Joanna Leigh in 2020 (Licence 20R0212). The full geophysical survey report is reproduced in Appendix 11.A. The following represents a summary of the results.

Detailed gradiometer scanning identified responses of clear archaeological interest in seven areas. Responses indicative of an enclosure were identified running through (Areas A, E and F, see Figure 11.3). The probable enclosure is truncated by multiple field boundaries and a farm laneway. Nevertheless, the responses identified suggest a large enclosure (c. 95m diameter) with a further internal circular enclosure. A small circular response and trend to the east of the probable enclosure is indicative of a small (c. 11m diameter) circular enclosure. Isolated responses within it suggest probable pits and a possible hearth feature. Further to the south of the probable enclosure, there are vague trends and an area of increased magnetic response. In addition, two isolated responses have a magnetic signature indicative of burnt features. It is possible that plough damaged archaeological features are represented here. This is speculative as there is no clear archaeological pattern. In the north of the application area (Areas B and C) linear trends and negative responses form an irregular pattern. There is no clear archaeological interpretation, and it is speculated that these may represent agricultural activity. The origin of these responses is unknown. Fields 7 and 8 were not suitable for survey due to the presence of tall overgrown vegetation and magnetic interference from the farm buildings located directly to the south of field 8.

11.4.8Summary of Archaeological Test Excavations

The full archaeological test excavations report is reproduced in Appendix 11.B. The following represents a summary of the results.

Archaeological testing was carried out over the course of nine days from 12th April 2021 under archaeological licence no. 21E0083. A total of 84 trenches targeted geophysical anomalies and open green space to fully investigate the archaeological potential of the proposed development area. Testing revealed eight areas of archaeological significance, which have been designated as Archaeological Areas 1–8, details are given in Table 11-2.

Table 11-2: Archaeological Areas identified during test excavations

AA No.	Description
AA 1	Testing at AA1 confirmed the presence of a partially disturbed, plectrum-shaped enclosure (possible original int. diameter: 95m x 90m). A smaller central, possibly oval enclosure (possible original int. diameter: 55m x 50m; see Figure 11.4) was also identified. Testing also confirmed the presence of internal features including slot trenches, pits, postholes and hearths. External features including hearths, gullies and a concentration of industrial activity probably associated with cereal drying activity were also identified. No diagnostic artefacts were retrieved but the form of the enclosure is suggestive of early medieval date, as with the nearby, though smaller, plectrum-shaped enclosure excavated at Farrankelly. However, an earlier origin cannot yet be ruled out, particularly in light of the nearby hillfort WI008-015 and the evidence for prehistoric activity at the subject site (see Archaeological Areas 2, 3, 5, 6, 7 and 8). Some areas of the enclosure appear to have been heavily disturbed/truncated by the installation of water pipes feeding from the stream at the east and the construction of the farm laneway at the west. The construction of the tree lined field boundaries, visible on the first edition OS mapping, and dividing the four fields will also have had an adverse impact on the enclosure ditches. While the outer enclosure ditch ranges in width from 2.5m to 4m, and the inner enclosure ditch from 2.1 to 3.2m, the relatively shallow nature of the ditches in areas investigated (outer: 0.84m-1m deep, inner: 0.76m), as well as the shallowness of some of the internal and external features (average depth 0.18m-0.3m), suggests the site has been truncated from prolonged agricultural activity.
AA 2a-c	Probable prehistoric activity was identified in this area. Evidence consists of troughs and pits associated with burnt mound activity along with pits and in-situ burning of unknown date
AA 3a-e	A burnt spread of probable prehistoric date was identified in this area. Other features identified included a slot trench windbreak surrounding in-situ burning, a possible kiln and various linear features and pits of unknown date.
AA 4a-b	Archaeological features identified in this area include an irregular pit with burnt bone and charcoal inclusions, a cluster of hearths and a pit of unknown date

AA No.	Description
AA 5a-c	Archaeological features identified in this area include a large pit with prehistoric pottery sherds along with pits, postholes and hearth features of prehistoric date.
AA 6	Archaeological features identified in this area include a potential field system of possible prehistoric date.
AA 7	Archaeological features identified in this area include probable prehistoric activity in the form of a burnt spread and trough.
AA 8	Archaeological features identified in this area include a pit and linear feature of possible prehistoric date.

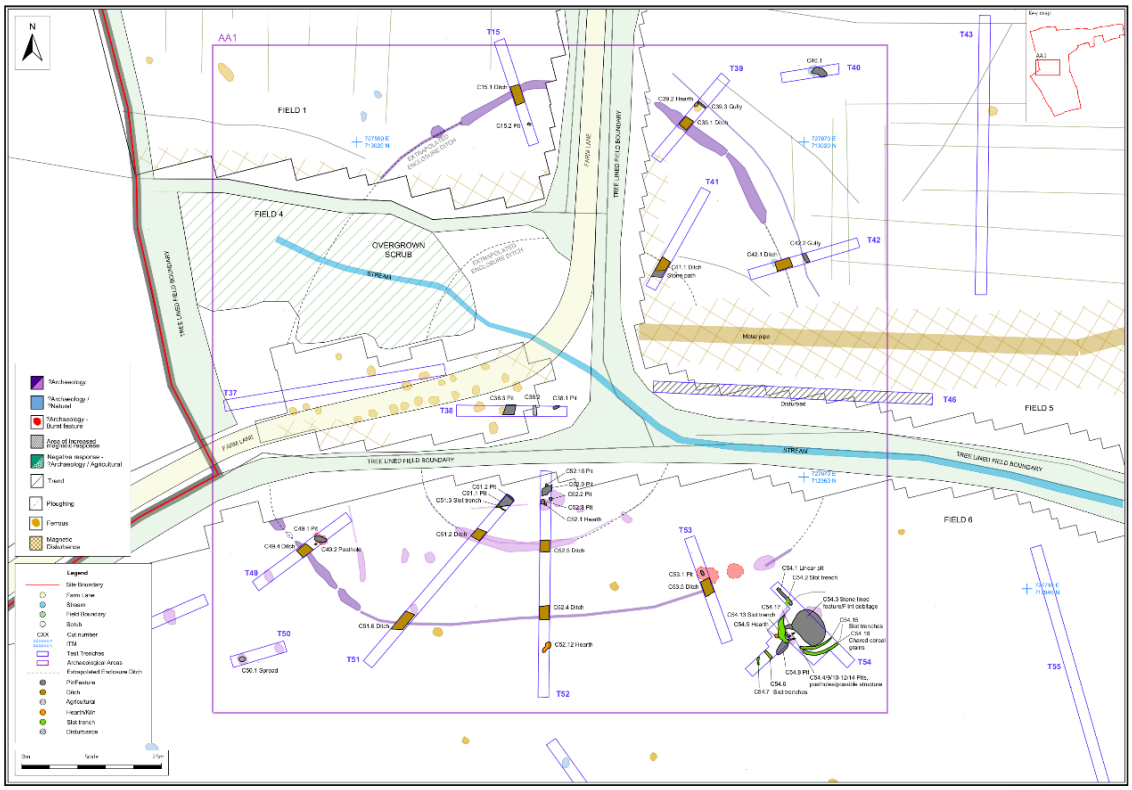


Figure 11-4: Archaeological Area 1

11.4.9Demesne Landscapes

The settled political climate of the 18th century saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of

a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland. Multiple demesne landscapes and large houses were established throughout County Dublin during this period, due to the proximity of the city.

Four demesnes landscape can be seen on the first edition OS map of 1840 (Figure 11.1). The northern half of the proposed development area is located within the former demesne landscape associated with Coolagad House (DL 1). This landscape is not subject to statutory protection. This demesne featured two tree lined avenues, one to the east and one to the west of Coolagad House, as depicted on the first edition OS map (Figure 11.2). The avenue to the west of the house survives as a laneway which passes through the proposed development area. There is a lodge illustrated at the entrance to this laneway on historic 25-inch Ordnance Survey maps dating from 1888-1913, immediately to the southeast of the proposed development area. It is unclear whether the current dwelling sited here is the original which has undergone modification or whether it is an entirely new building. This structure is discussed in Chapter 10.

A walled garden was located to the south of the house, outside of the proposed development boundary. The remainder of the demesne is dominated by agricultural fields, with no landscape or demesne features noted. Modern residential and educational development has impacted the south eastern corner of the demesne, while the remainder of the demesne remains largely unchanged.

To the north of the proposed development area are two further demesnes associated with Templecarrig Lower (DL 2) and Templecarrig Upper (DL 3). The demesne at Templecarrig Lower (DL 2) remains largely unchanged, while that at Templecarrig Upper (DL 3) has been impacted by modern residential development across much of its area.

To the south of the proposed development area is the demesne of Kindlestown House (DL 4). This demesne has been largely lost, with the majority of the area now occupied by modern housing. The development will have no impact upon any of these demesnes.

11.4.10 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions (MacCotter 2008, 45-58). However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word ‘town’ but like the Irish word ‘baile’ refers to a place. It is possible that the word is derived from the Old English tun land and meant ‘the land forming an estate or manor’ (Culleton 1999, 174).

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (ibid. 179). The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully ‘laid downe’ on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (ibid.). Larger tracks of land were divided into several

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.

The proposed development area is located within the townland of Coolagad. The townland boundary between the townlands of Coolagad and Templecarrig Lower forms the northern boundary of the proposed development area and consists of a drainage ditch and hedgerow comprised of hawthorn, ash and bramble. The townland boundary between Coolagad and Kindlestown Upper forms the southern boundary of the proposed development area and consists of a drainage ditch and hedgerow comprised of hawthorn, ash and bramble.

11.4.11 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 references used for the place name analysis is Irish Local Names Explained by P.W Joyce (1870) and www.logainm.ie.

The name Coolagad derives from the Irish '*Chúil an Ghaid'*, meaning 'corner path', whle the name Templecarrig derives from the Irish '*Theampall Carraige'* meaning 'church' and 'rock'.

11.5 Design Rationale informing extent of impact on archaeological features

Before a full impact assessment could be carried out of the proposed development on the archaeology identified on the site, the layout of the proposed development needed to be finalised, taking into consideration all of the site constraints – including topographical, engineering, architectural, unit density, ecological and archaeological concerns. Extensive consultation at Design Team level was carried out and input was also sought from the National Monument Service via a number of meetings and pre-lodgement submission of documents including draft versions of the archaeological testing report and draft Monument Management Plan (see Appendices 11.2 and 11.8).

The resulting layout for the proposed development provides for the preservation in-situ of c. 60% of the double-ditched enclosure at Archaeological Area 1 (northern portion and associated features) while all other Archaeological Areas identified during testing, as well as c. 40% (southern portion) of Archaeological Area 1, will be directly impacted by the proposed development layout.

This layout has been determined by the development strategy which aims to adapt to the dominant characteristics of the landscape while respecting planning imperatives and development objectives. Throughout this process, due regard was given to the archaeological resource of the site and how best to preserve and integrate this, where possible, in the context of the ensemble of (at times conflicting) constraints across the SHD application lands.

11.5.1 Topography and landscape characteristics:

The southern part of the SHD lands, which slope steeply west to east, present highly challenging topography for residential development. The development strategy addressees these site-

specific challenges with a Cut-Fill – rebalancing of the profile which will involve the movement of some 427,000 cubic metres of soil within the site.

The overall development lands have a strong natural division between the northern and southern sites demarcated by the Greystones Stream and east-west orientated hedgerows. The passage of the Greystones Stream and the line of the existing hedgerows cut across the enclosure at AA1. These hedgerows and the riparian zone along the stream will be retained in the proposed development from largely ecological reasons. The proposed housing development along the southern edge of the enclosure at AA1 are set back from this dominant east-west hedgerow (T and Y); the stream and field boundaries, allowing a large portion of the enclosure footprint (c. 60%) to be preserved in-situ.

Figure 11-5: Extract from Arborist Report and Tree Survey

11.5.2 Visual amenity

The levelling up of ground level along the southeastern part of the site – along the boundary with the adjacent Waverly housing estate, increased the potential for negative impact on residential amenities, in terms of overlooking, overshadowing or overbearing impact, due to the topography of the site and the potential requirement for retaining features.

This sensitivity of boundaries with existing residential communities has had a strong influence on the proposed layout. To ensure that new development would not present an overbearing presence, the boundary zones comprise landscaped amenity areas. This necessitated the removal of some 30 houses due to site constraints, further constraining the amount of available internal space within the proposed development.

11.5.3 Road layout

The overall layout includes two parallel north-south roads, based on a strong urban design rationale to provide a coherent and legible street framework and facilitate permeable movement throughout the new residential area. Given the proximity of the western stream road crossing to the enclosure at AA1, the design team considered reducing the vehicular crossings of the Greystones Stream from two crossings to one crossing to further minimise impact upon the archaeology. However, it was found, due to the following reasons, that a second vehicular stream crossing is required for the proposed development:

1. Health and Safety issues during the phasing of the development as construction traffic would need to travel through occupied residential phases. By providing two vehicular stream crossings, construction and residential traffic can be separated for the later stages of the development, for example by limiting construction traffic to Street 1 and Street 6, and using only the western stream crossing.
2. Health and Safety issues from an operational point of view as emergency vehicles would only have one access to the southern portion of the site.

    i. For example, in the event of an accident on the bridge, emergency services would only be able to access an incident from one side and residents in the southern portion would not have an alternative means of exiting the site via car.
    ii. The road levels have been designed to keep as close to existing levels as possible in the vicinity of the existing archaeological site. Please see below the cut and fill plan for the area in the vicinity of the site.

The siting of the road crossings is further dictated by the regulations governing the spatial requirements to be maintained between the houses. The space between the two road crossings needs to accommodate a residential layout maintaining a 22m distance between the back-to-back houses. The western road crossing is therefore as far east as it can be sited while respecting other constraints.

The road layout for the proposed development provides a legible series of housing cells linked along two north-south axis roads. This road network has been carefully designed and placed to address An Bord Pleanala's Opinion of March 2021 that inter alia:

Further consideration / amendment or justification of the design and layout of the proposed scheme having regard to the following:

- the linear approach to the scheme, in particular the internal road network and the central area of public open space.
- the dominance of the road network within the scheme and consideration of the provision of homezones and a reduction in the number of cul-de-sacs.
- the location of existing watercourses on the site which currently run off to a culvert with limited capacity.
- future connectivity to adjoining lands and the impact of the proposed scheme on the development potential of adjoining landholdings.

The development masterplan requires the construction of 2 north-south access roads to provide a satisfactory layout to address the Board's issues.

11.5.4 Planning

The application lands are located in an area designated as Action Area Plan 1 (AP1) in the Greystones and Delgany Local Area Plan 2013-2019 and consist of the majority of the AP1 area. The AP1 lands represent the north west boundary of the LAP area.

Action Plans are a mechanism used by Wicklow County Council to outline a planning 'framework' for development of significant landholdings prior to planning applications being submitted. The general purpose of Action Plans is to ensure that development is undertaken in a sustainable and integrated manner by setting down the framework for the sustainable, phased and managed development of a particular area. The AP1 Coolagad Action Plan within the LAP states that:

> *This Action Area is located at Templecarrig Lower, Coolagad and Kindlestown Upper, on a site approximately 34ha in size. This area shall be developed for a mix of uses including residential, community and open space"*
>
> *Action Plan Requirements include:*
>
> - *The residential amenity of existing and future adjoining properties shall be protected.*
> - *Protection of natural and built heritage, including rivers and trees.*

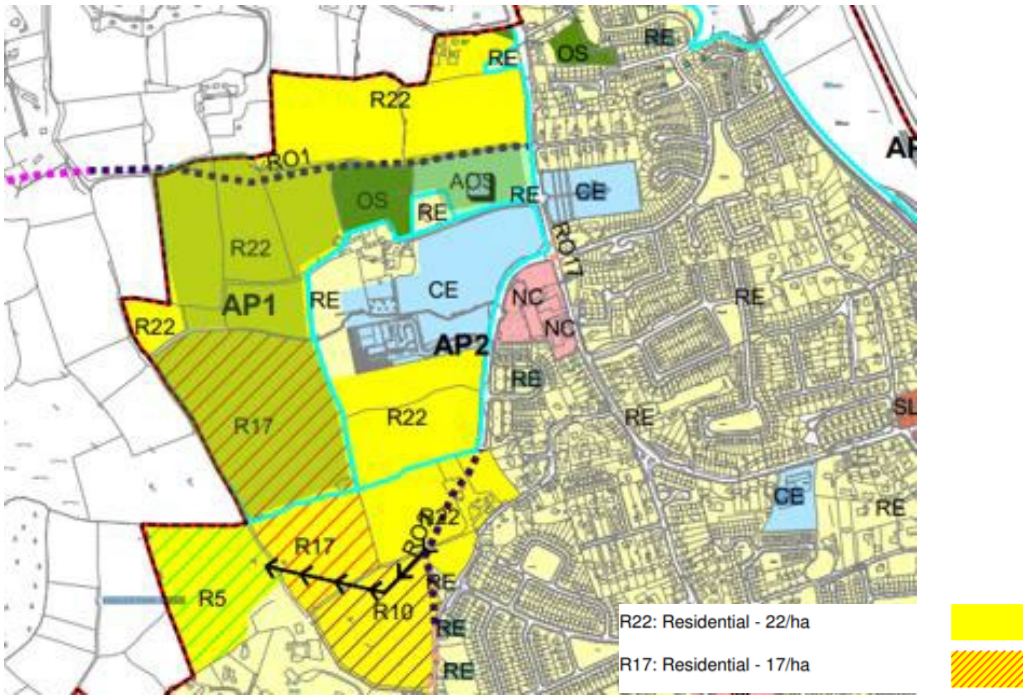


Figure 11-6: Action Area Plan 1 Coolagad outlined on extract from LAP zoning map with application site shaded

The proposed development layout addresses several significant site constraints, but also must balance this with delivering open space and amenity areas in accordance with an acceptable level of density under the Sustainable Residential Development in Urban Areas (2009). As has been outlined above, the siting of the public amenity greenspace has been chosen to also allow for the preservation in-situ of a large portion of the double-ditched enclosure identified at AA1. The ongoing strategy for protection of this monument is outlined in the Monument Management Plan (Appendix 11.H).

The southern SHD land is aligned with the area indicated as R17 on the Action Area Plan map which use the hedgerow and stream system to demarcate a natural boundary (with R22) in the overall AAP expansion area.

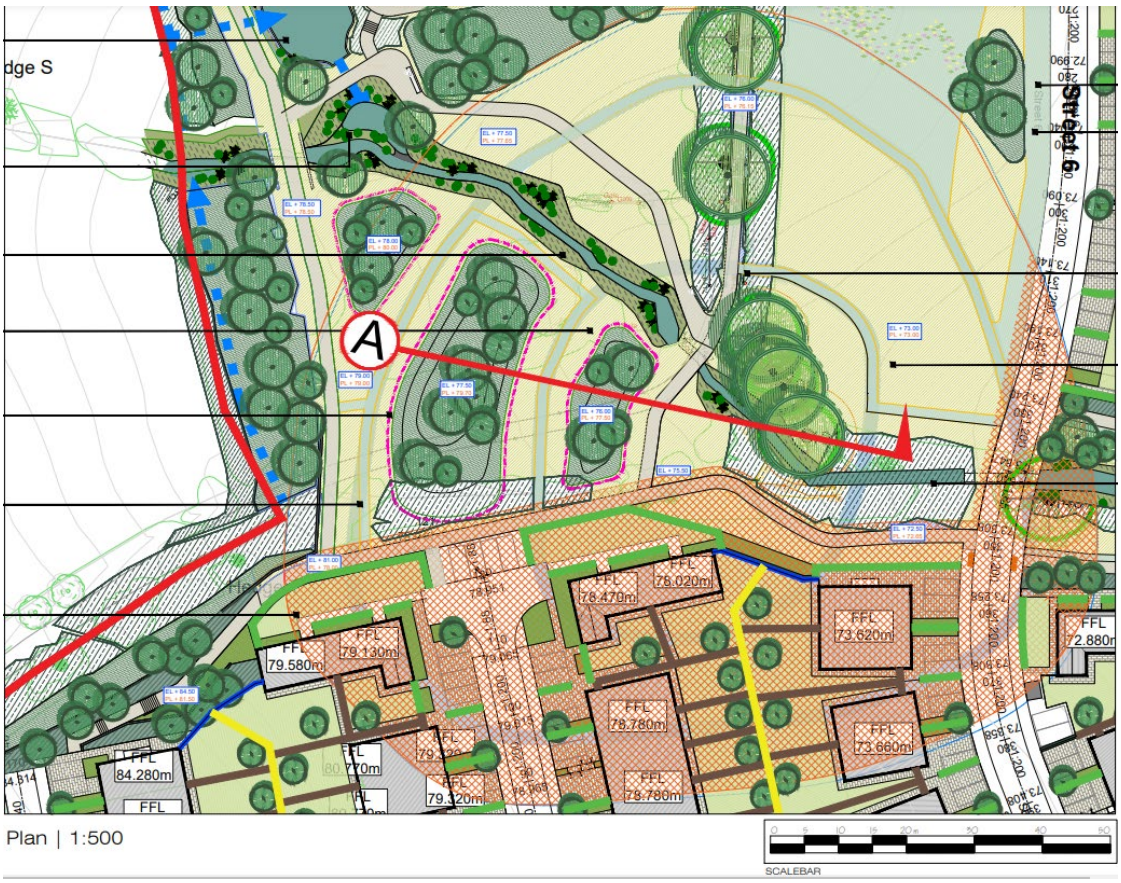


Figure 11-7 – Layout and landscape strategy are designed to utilise the existing landscape features

11.6 Impact Assessment

Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping; disturbance by vehicles working in unsuitable conditions; and burial of sites, limiting access for future archaeological investigation. The proposed development comprises the construction of residential units along with all ancillary site development works above and below ground and includes Cut-Fill actions – rebalancing of the profile which will involve the movement of significant volumes of soil within the site.

As outlined above, the resulting proposal in relation to mitigation of impacts upon the archaeological resource, was a collaborative process and incorporates both preservation in-situ and preservation by record. This process has resulted in a redesign of certain areas of the development and the expansion of un-landscaped ecological zones to allow for the preservation in-situ of the northern portion of AA1.

11.6.1 Construction Phase

Ground disturbances associated with the proposed development will have a direct negative impact upon the majority of Archaeological Areas identified through geophysical survey and archaeological test trenching.

- The southern 40% of the large double-ditched enclosure at Archaeological Area 1 will be directly impacted upon by the construction of residential development, provision of access roads and footpaths along with areas of landscaping. This represents a direct significant negative impact on the archaeological monument.
- Installation of a public amenity greenspace along with landscaping and planting across the northern 60% of the double-ditched enclosure at Archaeological Area 1 has the potential to impact upon subsurface remains that have been shown to survive in this area. These works have the potential to result in a direct moderate or significant negative impact.
- Archaeological Areas 2, 3a-e, 4a, 5a & b, 6, 7 and 8 will be directly impacted upon by the construction of residential and educational development, provision of access roads and footpaths along with areas of landscaping / Cut-Fill. This represents a direct significant negative impact upon the archaeological resource.
- Ground disturbances may also negatively impact on isolated archaeological features or deposits that have the potential to survive outside of the footprint of the excavated test trenches and identified Archaeological Areas. Direct negative impacts may range from moderate to significant in significance, dependant on the nature, extent and significance of remains identified.
- Had the proposed development not proceeded, the previously unknown archaeological remains identified within the site would have remained unrecorded, as none of the remains possess surface remains. The investigations that have taken place have identified the archaeological resource on site and whilst elements of the resource will be directly impacted, the works have resulted in an overall indirect significant positive impact in the content of how the sites will inform the archaeological record and context of this part of the landscape.

11.6.2 Operational Phase

Following the completion of the development and establishment of greenspaces, there is potential for maintenance works, extension / refurbishment of services, future planting regimes etc. to negatively impact upon any archaeological features that are preserved in-situ beneath the public amenity greenspace. A lack of knowledge as to the location, extent and nature of the archaeology may to result in neglect or damage over the long term, during the operational phase of the development. This may result in direct significant negative impacts upon the know archaeological resource.

11.7 Cumulative Impacts

11.7.1 Application Site

There is no relevant history on the application site.

11.7.2 Waverly Estate

The Waverly estate is located generally east of the site.

Table 11-3: Relevant Applications at Waverly

Reference	Status	Summary
072799/ ABP 230050	Expired	159 residential units
114336/ABP 239380	Incomplete	Amendments to 072799
141952	Parent permission	130 houses and creche

16783	Grant	Temporary access gates
17461	Grant	Extension of duration

11.7.3Seagreen Estate

The Seagreen Estate is located generally south east of the site.

Table 11-4: Relevant Applications at Seagreen

Reference	Status	Summary
141031	Grant	Parent permission 187 houses
151152	Grant	Amendments
16420	Grant	Amendments
16971	Grant	Amendments
161066	Grant	Amendments
1722	Grant	Amendments
17880	Grant	Amendments
18111	Grant	Alter 38 kv
18627	Grant	Amendments
191089	Grant	Extend appropriate period – substantial completion

11.7.4Schools

A number of schools are adjacent to the site to its east.

Table 11-5: Relevant Applications at Adjacent Schools

Reference	Status	Summary
126589	Permitted	Three storey school, access to ET school
138103	Permitted	New school (Temple Carrig)
15608	Permitted	New Irish school
15814	Permitted	Sports lights for hockey pitch

11.7.5Relevant SHD Applications in the Wider Area

Table 11-6: Relevant SHD Applications

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)
ABP.Ref.308467	Permitted 15/02/2021	Lands at Convent Road and Bellevue Hill (consisting of the former Carmelite

		Monastery Lands), Delgany, 232, creche, a community facility.

There is no cumulative impact from these developments upon the archaeology of the SHD application lands.

11.8 Ameliorative, Remedial or Reductive Measures

A suite of measures designed to mitigate the impacts of the proposed development have been drafted in consultation with the National Monuments Service (see Appendix 11.I for detail of this correspondence). These measures are detailed below.

11.8.1 Construction Phase

- The northern 60% of Archaeological Area 1, will be preserved in-situ beneath public amenity greenspace within the development. To ensure the integrity of the archaeology, a Construction Exclusion Zone will be established around this area. This will be delineated by a 1m high post and sheep-wire fence at a minimum of 5m distant from the recorded remains. The fence will be removed upon completion of the construction phase of the project. This area will be precluded from use as a compound or stockpile area and no services or drainage runs will be installed within the Construction Exclusion Zone. This public amenity greenspace will be landscaped to ensure that the underlying archaeology is protected (Figure 11.8 and Appendix 11.H). The existing hedgerows will be retained. The existing Greystones Stream will be maintained – ensuring no substantive change to local hydrology (though some gorse thickets will be removed to improve the amenity value of the space). While additional native broadleaf planting will be carried out locally within the public amenity greenspace, a root barrier will first be set down 200mm below current ground level, leaving at least 200mm clearance over the level of the archaeology. This will comprise a water permeable, non-woven geotextile Terram Rootguard Barrier - Water Permeable, of polypropylene/polypropylene fibres with 18.0 tensile strength, 30 elongation and 3250 CBR puncture resistance. Mounds of up to 2m of imported topsoil will then be imported and installed to accommodate the areas of copse woodland. Significant root system won't surpass 2m and the root barrier will protect from any smaller rooting that makes it that deep (Figure 11.9). All pathways installed within this area will be constructed as 'no-dig' features on formation layers of imported subsoil that will be laid over the current ground surface. The importation of topsoil for the tree planting and subsoil for the formation material for the 'no-dig' paths will be carried out using lightweight dump truck (8 tonnes) and lightweight mechanical excavator (5-8 tonnes). This work be carried out during a period when the ground is dry and the use of displacement mats will be considered should there be a requirement to track over any soft ground.

Figure 11-8 – Landscape plan, Archaeological Area 1 (see Appendix 11.8)

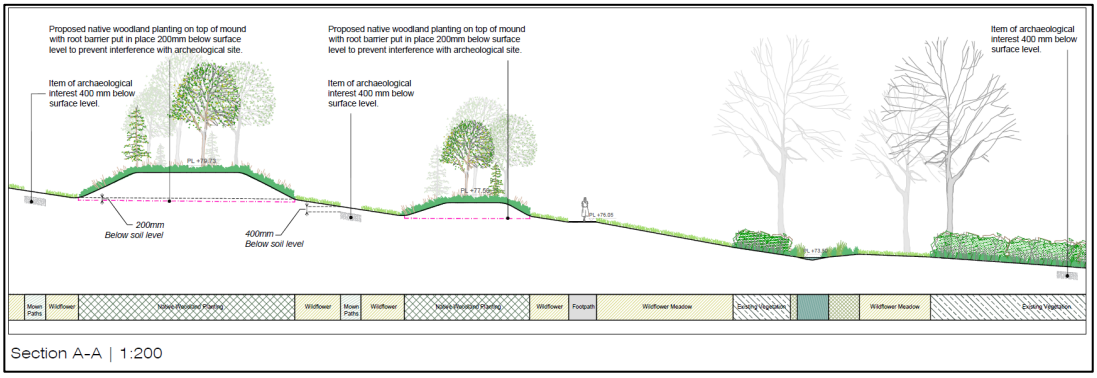


Figure 11-9 – Section across proposed planting showing depth of root barrier and archaeology (see Appendix 11.G)

- The southern40%of Archaeological Area 1 and Archaeological Areas 2, 3a-e, 4a-b, 5a & b, 6, 7 and 8 will be preserved by record (archaeological excavation) in advance of construction activity. Preservation by record will be undertaken under licence to the National Monuments Service of the Department of Housing, Local Government and Heritage (DoHLGH), with work being undertaken in accordance with a pre-agreed methodology that would include detailed finds retrieval and environmental remains strategies.

- Archaeological monitoring of the topsoil stripping across the site will be undertaken in order to identify any archaeological features that have the potential to survive outside of the identified Archaeological Areas. While stockpiled soil may be managed with bulldozers, the removal of the topsoil across the site will be carried out using back acting 360 degree tracked excavators fitted with toothless grading buckets. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.
- A Heritage Induction outlining the nature and significance of the archaeology within the Construction Exclusion Zone at Archaeological Area 1 will be a mandatory pre-start requirement for all contractors throughout the life of the project.
- Signage should be erected in order to identify the Construction Exclusion Zone as having archaeological sensitivity and to notify any personnel that access to the exempt lands is strictly forbidden.
- No construction plant or heavy vehicles with the exception of those detailed above, will be allowed to enter the Construction Exclusion Zone exclusion zone nor may any materials or plant be stored in this area.
- The above mitigation measures will be enshrined in and implemented through a construction management plan (see Outline Construction and Environmental Management Plan – CEMP, prepared by AECOM).

11.8.2 Operational Phase

- A Monument Management Plan has been drafted in consultation with the National Monuments Service to ensure that the archaeology preserved in-situ beneath the public amenity greenspace be protected during the operational phase of the development (Appendix 11.H).
- The mounded areas of imported topsoil will be planted with copses of the following native broadleaf species: *Betula pendula, Corylus avellana, Crataegus monogyna, Malus sylvestris, Sambucus nigra, Sorbus aucuparia*. The area surrounding Archaeological Area 1 will be allowed to grow naturally as meadow. Some initial intervention may be required to seed the area, though this will be restricted to sod level. No cultivation or ground disturbances are required to create this environment.
- Maintenance of the grassland, stream and woodland copses will be low interaction, and will be covered within a 'Taking Charge Strategy' that will be required to be adopted within the contract of the management company that will be appointed to maintain the parks. It is envisaged that maintenance will comprise hay cuts two or three times a year to prevent any large shrubs or trees taking root, pruning of the broadleaf copses and maintaining the stream free of rubbish or detritus.
- Currently there are no plans for additional planting within Archaeological Area 1. However, should this be required in the future, planting within the green space containing the enclosures will be carefully considered to avoid directly impacting on archaeological remains, and will involve plants with shallow roots, which will not exceed the depth of topsoil. Trees will not be planted in the exempt area except upon the mounded areas of topsoil due to the potential impact their root systems will have on the archaeological remains. Furthermore, all proposed planting work should be subject to an archaeological impact assessment of the proposals and be carried out in full consultation with an archaeologist and approved by the National Monuments Service of the DoHLGH.

- Appropriate information signage and wayfinding will be erected within the public amenity greenspace at Archaeological Area 1in order to inform the public of the nature and extent of the enclosure site and its relevance to the surrounding landscape. The form and content of such should be agreed in advance with the National Monuments Service of the DoHLGH. The line of the enclosure ditches will be referenced on the surface by mown grass paths through the meadow. These will be maintained throughout the year.
- Any potential future works involving ground disturbance in Archaeological Area 1 will require an archaeological impact assessment prior to going ahead and may be subject to archaeological conditions.

11.9 Residual Impacts (including worst case scenario)

Following the completion of the construction stage mitigation measures, there will be an indirect slight negative (short term) impact on the preserved remains of the double-ditched enclosure (AA1) and the remaining archaeological resource. Negative Impacts have been reduced due to the preservation by record of all archaeological remains to be impacted upon, the fact a significant portion of AA1 will be preserved in-situ during construction and the fact that the identification and recording of the archaeological resource has resulted from the development taking place, which adds to the archaeological context of the landscape and is considered indirectly positive.

Following the completion of operation stage mitigations, there will be an indirect slight positive (long term) impact on the archaeological resource. This is due to the ongoing preservation of a significant portion of the double-ditched enclosure (AA1) as a green space. This will be managed in order to prevent any inadvertent future impacts and will allow the development to include a interpretive narrative on the archaeological context of the landscape.

11.10 Do Nothing Scenario

If the development were not to proceed, there would be no impact upon the archaeological or cultural heritage resource.

11.11 Monitoring

Archaeological monitoring of the topsoil stripping across the site will be undertaken in order to identify any archaeological features that have the potential to survive outside of the identified Archaeological Areas. Should additional archaeology be identified during monitoring, full consultation will be had with the National Monuments Service to agree appropriate mitigation. While stockpiled soil may be managed with bulldozers, the removal of the topsoil across the site will be carried out using back acting 360 degree tracked excavators fitted with toothless grading buckets.

Archaeological monitoring of the landscaping works at the site of the enclosure at Archaeological Area 1 will be archaeologically monitored to ensure that the installation of root barriers and importation of topsoil into the area is achieved without tracking across archaeologically sensitive areas or disturbing the ground.

A biennial inspection be carried out, modelled on the inspections undertaken by the OPW, as stipulated in the Monument Management Plan. These inspections will be carried out by an

archaeological contractor employed by the management agency and any issues, threats, deterioration or damage will be reported on.

11.12 Difficulties Encountered

No difficulties were encountered during the compilation of this chapter.

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EIAR Style Guide:

Acronyms:

If using acronyms, please state the full name first followed by (acronym). Please note you can use the following acronyms without stating them in full as they have been used in earlier chapters of the EIAR:

Local Area Plan (LAP)

County Development Plan (CDP)

Regional Spatial and Economic Strategy (RSES)

National Planning Framework (NPF)

Strategic Housing Development (SHD)

Environmental Impact Assessment (EIA)

Environmental Impact Assessment Report (EIAR)

Appropriate Assessment (AA)

Environmental Protection Agency (EPA)

Area Action Plan (AAP)

European Union (EU)

Non-Technical Summary (NTS)

Units of measurements:

The following would be preferred:

Use of metric system (no yards or feet)

Sqm instead of sq.m or m^2

12 Traffic and Transportation

12.1 Introduction

This Chapter of the EIAR has been prepared by AECOM Ltd with input from the project team. The chapter describes the transportation impacts of the proposed development in accordance with the requirements of the relevant EIA legislation and guidance on preparation and content of an EIAR. Further information is also available within the Traffic and Transportation Assessment (TTA) to be submitted with this planning proposal.

Staff who have prepared, verified, and authorised this Chapter alongside their relevant qualifications and experience are listed in Table 12-1.

Table 12-1 – Statement of Competency

Quality Information	Qualifications	Experience
Prepared by: **Patrick McGeough** Traffic Planner / Engineer	MEng, MICE	Patrick has been working in the development planning sector for over Four years. His experience is supported by a MEng (Hons) in Civil Engineering. Patrick is involved with all aspects of traffic and transportation projects, including communications with the client and wider design teams, preparation of traffic data (AADT) for use by other disciplines, undertaking detailed junction modelling analysis using Junctions 9 and LinSig software and preparation and checking of final reports to be issued for planning applications. Relevant project experience includes: Two Oaks Scholarstown SHD, Dublin; Clonburris SDZ, Dublin; Capdoo SHD, Kildare.
Verified & Approved by: **Tim Robinson** Regional Director	BSc(Hons), MSc (Engineering), MCIHT	Tim Robinson is a Transport Planner with over 35 years' experience. His experience is supported by a MSc (Engineering) degree in Transport from Imperial College, London. Tim's focus of work has always been in the development planning space, seeking consents for a variety of public and private sector clients. The majority of Tim's work involves transport assessment and traffic & transport input to EIA's. Tim prepares input to numerous such deliverables every year across the island of Ireland. Relevant project experience includes: North South Interconnector, various windfarm projects, as well retail development and mixed use residential development schemes. Tim has lectured to peers on transportation and has been chair of his local branch of CIHT. Tim is an AECOM approved Lead Verifier for Transport Assessment and appraisal projects.

12.2 Assessment Methodology

The methodology adopted for this report can be summarised as follows:

- **Existing Transport Infrastructure** – AECOM have collated information on the public transport, walking and cycling facilities in the surrounding area of the site.
- **Development Proposals** – Description of the proposed development and integration with existing and proposed transport networks, including for assessment against the current Wicklow County Development Plan's Planning Objectives and Development Standards.
- **Existing Traffic Flow Assessment** – Due to the ongoing Covid-19 pandemic traffic flow data for the AM and PM peak conditions was obtained from a previous study by Cairn Homes on the site from 2017.
- **Development Trip Generation** – Based on the quantum of the proposed development, AECOM have reviewed trip rate data for similar uses and developed anticipated traffic flows, by using the industry standard Trip Rate Information Computer System (TRICS) database. These flows were then assigned to the existing network having regard for the observed traffic patterns on the surrounding road network.
- **Impact Analysis** – Traffic modelling was completed where the need for this was identified using the industry standard Linsig software.

12.3 Characteristics of the Proposed Development

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7 year planning permission for a strategic housing development at this site of c.26.03ha at 'Coolagad', Greystones, Co. Wicklow. The application site is generally located to the west of the R761 Rathdown Road, north of the Gate Lodge; north and west of Coolagad House, Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School. The lands are bounded by Waverly Avenue and Seagreen Park residential areas to the east. Templecarrig Lower is located to the north of the lands and Kindlestown Upper to the west.

The proposed development consists of:

- 586 residential units including:
- 351 two storey houses (207 no. 3 bed, 140 no. 4 bed, 4 no. 5 bed) comprising detached, semi-detached and terraced units
- 203 no. apartments (65 no. 1 bed, 123 no. 2 bed, 15 no. 3 bed) provided within 6 no. blocks ranging from three to four-storey (over basement) with residential amenity facilities .
- 32 no. duplex units within 2 no. three-storey blocks (16 no. 2 bed and 16 no. 3 bed units)
- c. 5,192 sqm of communal open space is provided to serve the proposed apartment/duplex units;
- Community building (single storey) of 392 sq.m. with 29 car parking spaces, including changing rooms and a multipurpose room.

- Creche building of 734 sq.m. with 21 car parking spaces
- A new vehicular entrance, with signalised junction and pedestrian crossings, will be provided off the R761 (Rathdown Road). The new junction will be linked to the existing signalised junction at Blacklion Manor Road / Redford Park which has a planned upgrade by Wicklow County Council. Cycle lanes will be provided along this section of the R761 on both sides. A footpath will also be provided on its western side. Car parking will be provided to the east of the R761, in the front of Redford Cemetery.
- The new access will provide a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11.
- Car and bicycle parking spaces are provided as follows:
- 702 on curtilage car parking spaces for the houses; 206 car parking spaces at basement level and 5 at surface level for the apartments; and 32 spaces for the duplex units and 10 visitor spaces at surface level;
- 22 motorbike parking spaces;
- 436 resident and 118 visitor bicycle parking spaces are proposed in a mix of basement and surface levels for the apartment blocks and duplex units; 12 bicycle spaces are proposed for the creche, 12 for the community centre and 10 at the sport field.
- The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the construction of a new public foul sewer along the R761/R762 from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.
- c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces incorporating an existing stream, formal and informal play areas, and new boundary treatments.
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

The application contains a statement setting out how the proposal will be consistent with the objectives of the relevant development plan (Wicklow County Development Plan, 2016-2022) and local area plan (Greystones-Delgany and Kilcoole Local Area Plan, 2013-2019).

The application contains a statement indicating why permission should be granted for the proposed development, having regard to a consideration specified in section 37(2)(b) of the Planning and Development Act, 2000, as amended, notwithstanding that the proposed development materially contravenes a relevant development plan or local area plan other than in relation to the zoning of the land.

Figure 12-1: Proposed Site Plan (source: *McCrossan O'Rourke Manning Architects Drawing reference 20005 PL03*)

12.4 Baseline Description

The development proposed comprises a total of 586 dwellings split between 235 flatted dwellings and 351 houses over a site comprising an area of 26.03Ha. The proposed development schedule of residential accommodation is shown in Table 12-2:

Table 12-2 – Schedule of Residential Accommodation

Land Use	Type	Quantum
Apartments	Standard – 1 Bed	65
	Standard – 2 Bed	123
	Standard – 3 Bed	15
	2 Bedroom Duplex	16
	3 Bedroom Duplex	16
Houses	3 Bedroom	207
	4 Bedroom	140
	5 Bedroom	4
Total		586

In addition to the residential provision, the site would also include a creche and community facility. The proposed site plan (McCrossan O'Rourke Manning Architects Drawing reference 20005 PL02) is provided in Figure 12-1 above.

12.5 Transportation Infrastructure

The local walking and cycling environment are displayed in Figure 12-2 and described in the following paragraphs.

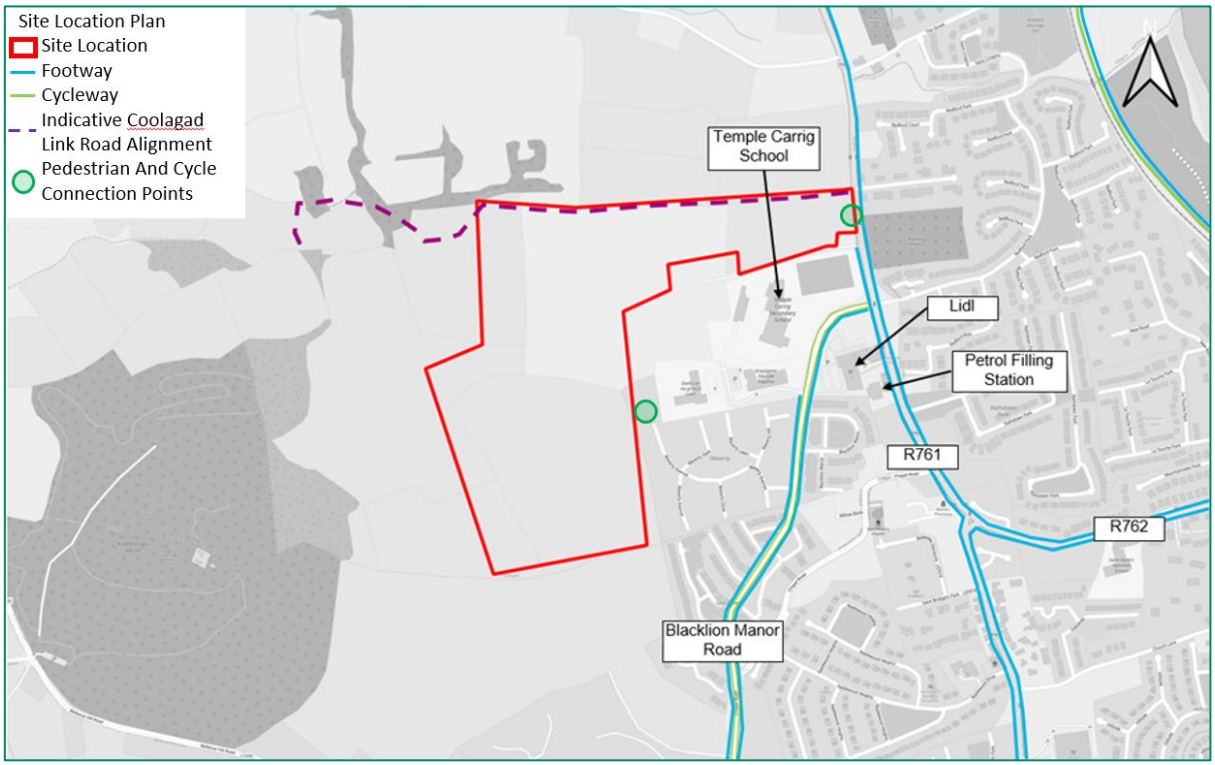

Figure 12-2: Walking and Cycling Environment

R761 Rathdown Road

The R761 is a single carriageway road, of variable width between 6.2m and 7.2m in proximity to the site, with no hard shoulders or dedicated facilities for cyclists. There is a 2m wide footpath on the eastern side of the road for pedestrians running parallel to the site boundary and is continuous along the R761 to the south, connecting to the R761 approximately 700m south of the proposed R761 / Coolagad Link Road junction. An additional footpath approximately 2.0m in width is provided on the western side of the R761, along the frontage of the Templecarrig School and Lidl Store. In proximity to the proposed R761 / Coolagad Link Road junction there is no footpath provided on the western side of the R761.

To account for this, pedestrians and cycle crossing facilities would be proposed as part of the proposed R761 / Coolagad Link Road junction. Any work proposed externally to the red line boundary of the site would require agreement with Wicklow County Council in advance of the planning application. A letter of consent from WCC has been provided by Wicklow County Council to agree to works to be undertaken as part of this planning proposal.

A further signalised crossing point is proposed at the R761 / Black Lion Manor Road / Redford Park junction, which has been subjected to improvements under the R761 Redford Park upgrade scheme by WCC, which also aims to upgrade sections of the R761 North as far as the Redford Cemetery.

Black Lion Manor Road

Black Lion Manor Road was constructed to support adjacent residential development and provide access to Templecarrig School. To the south it connects with Chapel Road and at its northern end connects with the R761 Rathdown Road and Redford Park at a signalised crossroads junction.

The road carriageway itself includes cycle lanes (1.0m width) that are provided on both sides and a footway is provided on the eastern side of the road (2.0m width). Black Lion Manor Road provides convenient access to Templecarrig School, as well as existing amenities fronting Rathdown Road including a Lidl Food Store and a petrol filling station with convenience store.

There are footways on the eastern boundary of the site proposed to allow for future permeability to the surrounding road network if required at a future date but direct access to Waverly Avenue of Blacklion Manor Road will not be provided for within this application.

Walking and cycling facilities on Black Lion Manor Road are particularly well placed and convenient for active travel users travelling to and from the site, which will connect to pedestrian facilities along R761 providing pedestrians with routes to various modes of public transport and local amenities, ensuring residents are well connected. Further to this, the Green Route Delgany Heritage Trail connects between Chapel Road and Bellevue Hill Road providing pedestrian Linkages to the Kindlestown Woods and Kindlestown Hill walking routes.

Cyclists currently have to share the road with vehicles, as the existing cycle facilities within Greystones are sparse and limited, however Wicklow County Council has several proposed upgrades within the Greystones-Delgany & Kilcoole Local Area Plan 2013 – 2019, the most recent Local Area Plan available, to deliver key cycle infrastructure connecting cyclists through key routes to Greystones town and further to the Bray-Greystones Cliff Walk route, providing connectivity further to Bray and towards destinations in County Dublin.

Public Transport - Bus

As graphically illustrated in Figure 12-3, the site benefits from good bus transport connections allowing residents to travel by this sustainable mode.

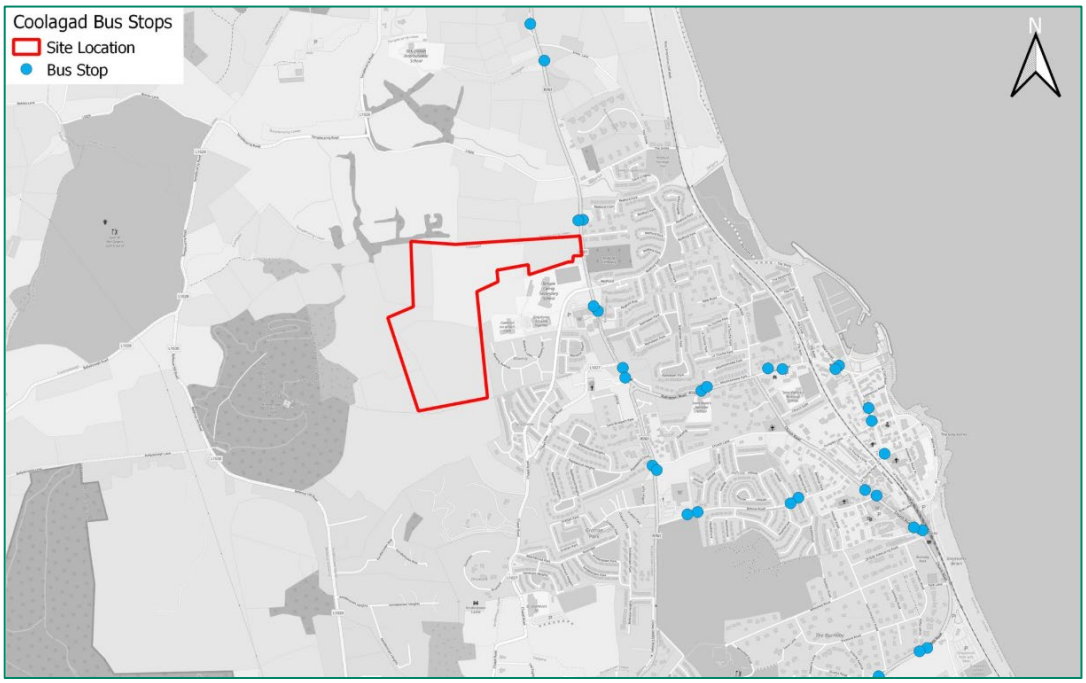

Figure 12-3: Bus Stops in Vicinity of the Site

The closest bus stops are located along the R761 Rathdown Road approximately 800 m distance (6 min walk) from the centre of the site. Two stops are located to the south of the R761 / Black Lion Manor Road / Redford Park junction adjacent to the Lidl store. These bus stops are operated by Dublin Bus, Go Ahead and Aircoach, who provide services to Dublin Airport. A further two bus stops are located approximately 70m north of the proposed R761 / Coolagad Link Road junction, although these are not serviced by the Aircoach service to Dublin Airport illustrates the location of the bus stops in relation to the development.

Further to this, the existing bus network's current occupancy and reserve capacity has been assessed as part of this proposal. The existing network's services were assessed for the assumed peak hours for commuter trips and existing bus occupancy in the vicinity of the subject site. The existing public transport occupancy survey has been shown in the AECOM Technical Note attached as Appendix C of the TTA. This assessment has shown that there is adequate spare capacity within the North Wicklow bus network and further sensitivity tests were carried out to confirm this capacity. The NTA's BusConnects proposals will also further enhance the bus capacity and frequencies available for the proposed development site.

Public Transport - Rail

The closest rail station to the site is Greystones Station, located approximately 2 km from the site to the southeast. The station is the southernmost terminus of the DART electrified rail network and also connects to the Irish Rail network, providing an interchange location for commuters to and from Dublin City Centre. Timetable information for Greystones Station is

provided within the Traffic and Transportation assessment, but commuter DART services operate half hourly services to the station.

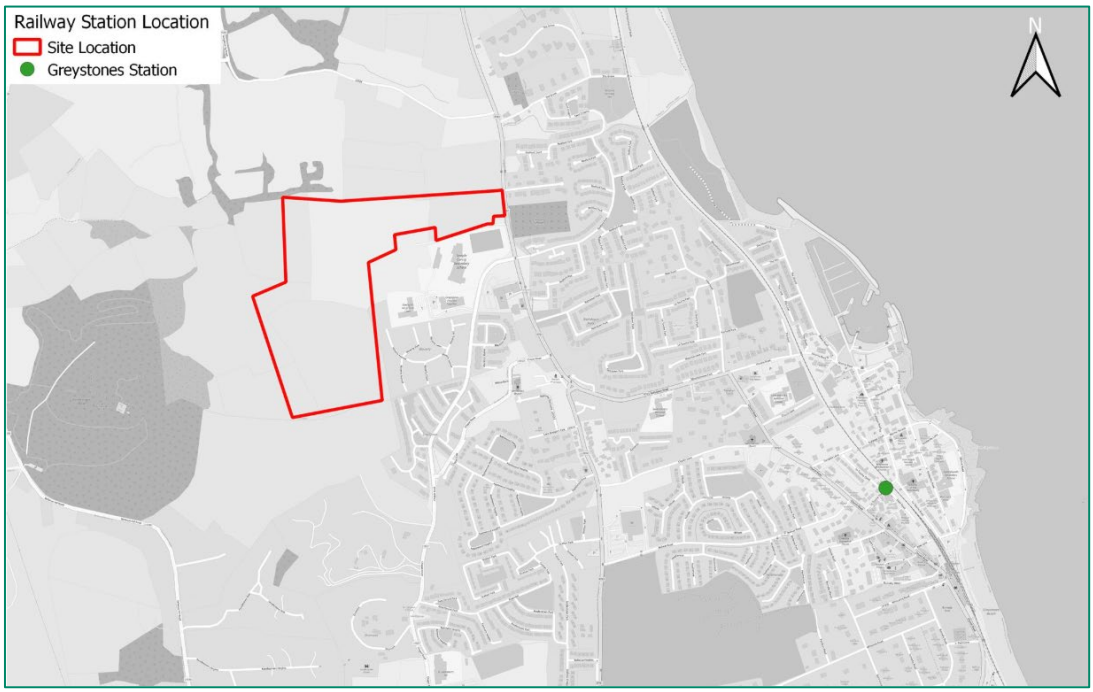

Figure 12-4: Location of Greystones Railway Station

12.6 Impact Assessment

A comparison was made between the pre-development and post-development scenarios, to identify the percentage impact of the development on the R761.

The projected percentage impact of operational traffic on the surrounding road junctions in the year of opening (2023), and the year of completion for any subsequent phases of the proposed development is set out in Table 12-3.

It should be noted that the opening year of the development and each of its phases has been assessed only. Any future year base flows would be greater than the flows presented in Table 12-3, hence a smaller percentage impact in comparison to the development flows would be recorded.

Table 12-3 – Percentage Impact Assessment

Junction		AM Peak	PM Peak
		Opening Year 2023	
J1 – R761 / Coolagad Link Road junction	Base Flows at Junction	1144	1233
	Phased Development 2023	73	65
	% Impact	6.4%	5.3%
		Opening Year 2024	
	Base Flows at Junction	1160	1251

Junction		AM Peak	PM Peak
J1 – R761 / Coolagad Link Road junction Phase 1	Phased Development 2024	206	182
	% Impact	17.8%	14.5%
		Completion Year 2025	
J1 – R761 / Coolagad Link Road junction Phase 2 and Phase 3	Base Flows at Junction	1177	1269
	Full Development	408	361
	% Impact	34.6%	28.4%

On the basis of the TII Traffic and Transport Assessment Guidelines (May 2014), given the impact that the proposed development has on the site access junction modelling is required as it achieves an impact greater than the 10% threshold outlined with the Traffic and Transport Assessment Guidelines.

To provide for a robust assessment of the proposed development, a traffic modelling analysis will be undertaken using the industry standard Linsig v3 to assess the future R761 / Coolagad Link Road with the development in place. This is explored in greater detail within Section 12.7 of this report and Section

It should be noted that the above assessment assumes that the Coolagad Link Road does not connect to the N11 by the opening year of the development and therefore all development traffic enters and exits the site via the R761 Rathdown Road. The Linsig Results confirm that the surrounding road network will operate within capacity for all phases of this proposed residential development.

12.7 Cumulative Impacts

An assessment was undertaken of potential developments that may come on stream and impact on the forecast traffic flows for this development. It was considered that the traffic associated with these would not impact on the assessed network as they were likely to use alternative routes for travel e.g using the N11 to travel north

The operational assessment of the local road network has been undertaken using Linsig v3 for signalised junctions. When considering signalised junctions, a Degree of Saturation (DoS) of greater than 90% would indicate a junction to be approaching capacity, as operation above this DoS value is poor and deteriorates quickly resulting in traffic congestion in the form of longer queues.

An assessment was undertaken of potential developments that may come on stream and impact on the forecast traffic flows for this development. It was considered that the traffic associated with these would not impact on the assessed network as they were likely to use alternative routes for travel e.g using the N11 or travelling towards Greystones via road links outside of the assessed traffic network.

Linsig v3 is an industry standard software to model the capacity and queuing of signalised junctions. The meaning of the acronyms used within the capacity assessment results are discussed below.

- DoS Degree of Saturation
- MMQ Mean Max Queue length

It is generally accepted that DoS values of 90% and less are indicators that a junction is operating within capacity. Junctions are only identified as operating over capacity if these values are exceeded.

12.7.1 R761 / Coolagad Link Road

A model was completed using the traffic surveys from 2019 AM and PM peaks to assess the traffic volumes for the AM and PM peak period and future assessment years with and without the development in place at the R761 / Coolagad Link Road which is proposed to be signalised to benefit active travel users. A summary of the results is shown in Table 12-4 with the full Linsig outputs contained within Appendix G of the TTA.

Table 12-4 – R761 / Coolagad Link Road Junction Model Outputs

Assessment Year	Arm	AM (08:00 – 09:00)		PM (15:00 – 16:00)	
		MMQ	DoS (%)	MMQ	DoS (%)
2023 With Development	R761 Southern Arm	28.8	77.2%	6.9	39.3%
	R761 Northern Arm	9.8	36.5%	22.7	68.5%
	Coolagad Link Road	13.7	76.1%	7.4	68.5%
2028 With Development	R761 Southern Arm	31.8	79.8%	6.9	41.2%
	R761 Northern Arm	9.4	39.1%	26.6	71.9%
	Coolagad Link Road	14.6	79.8%	7.6	70.5%
2038 With Development	R761 Southern Arm	33.8	83.2%	8.5	42.9%
	R761 Northern Arm	11.0	40.9%	26.8	75.1%
	Coolagad Link Road	14.7	82.5%	8.4	74.9%

Based on the analysis of R761 / Coolagad Link Road junction, it is clear that with the inclusion of the junction along the R761 and addition of full development traffic, this would not result in unsatisfactory operation of the local road network. The junction will continue to operate within capacity throughout the 2023 (opening year) to the 2038 (opening year + 15) assessment with the development in place.

12.7.2 R761 / Black Lion Manor Road / Redford Park

In addition to the R761 / Coolagad Link Road junction, the existing signalised R761 / Black Lion Manor Road / Redford Park junction has also been assessed for its proposed updated layout. A summary of the results is shown in Table 12-5 with the full Linsig outputs contained within Appendix G of the TTA.

Table 12-5 – R761 / Black Lion Manor Road / Redford Park Junction Model Outputs

Assessment Year	Arm	AM (08:00 – 09:00)		PM (15:00 – 16:00)	
		MMQ	DoS (%)	MMQ	DoS (%)
2017 Baseline	R761 Southern Arm	22.9	65.4%	15.3	56.9%
	R761 Northern Arm	3.4	33.9%	9.6	40.0%
	Black Lion Manor road	6.4	65.6%	3.9	55.9%
	Redford Park	5.7	64.0%	4.3	55.9%
	R761 Southern Arm	25.9	67.4%	10.7	46.8%
	R761 Northern Arm	5.2	39.9%	20.1	60.5%

Assessment Year	Arm	AM (08:00 – 09:00)		PM (15:00 – 16:00)	
		MMQ	DoS (%)	MMQ	DoS (%)
2023 Without Development	Black Lion Manor road	6.3	69.9%	4.4	59.4%
	Redford Park	5.3	67.7%	4.6	59.8%
2023 With Development	R761 Southern Arm	31.1	74.2%	12.8	49.2%
	R761 Northern Arm	5.0	57.3%	25.1	64.7%
	Black Lion Manor road	6.7	72.2%	4.6	68.4%
	Redford Park	6.2	69.8%	5.1	63.7%
2028 With Development	R761 Southern Arm	5.9	69.1%	14.2	58.3%
	R761 Northern Arm	34.6	78.1%	27.1	68.3%
	Black Lion Manor road	7.8	76.9%	4.9	70.5%
	Redford Park	6.7	74.3%	5.6	70.8%
2038 With Development	R761 Southern Arm	39.2	82.0%	16.1	71.9%
	R761 Northern Arm	7.8	83.3%	32.2	73.0%
	Black Lion Manor road	9.1	82.2%	5.4	73.2%
	Redford Park	8.0	83.9%	6.0	71.5%

Based on the analysis of junction, it is clear that the with the inclusion of the development traffic would not result in unsatisfactory operation. The junction will continue to operate within capacity throughout the 2023 (opening year) to the 2038 (opening year + 15) assessment with the development in place.

As demonstrated in the 2023 assessment year, the proposed site access will result in a maximum DoS value of 74.2% with a corresponding MMQ of 31.1 over two approach lanes during the AM Peak period whilst during the PM Peak it is anticipated that the maximum DoS will be 64.7% with a corresponding MMQ of 25.1. In comparison to the 2023 assessment without development trips this is considered to represent an insignificant impact on the junction.

12.8 Ameliorative, Remedial or Reductive Measures

12.8.1 Construction Phase

The assessment of potential traffic impacts concludes that the construction of the proposed development is not anticipated to impact the operational performance of the local road network therefore no mitigating measures are necessary in this respect. It is however good practice to prepare a CTMP for a project akin to the proposed development which sets out steps to manage construction traffic. The Outline CEMP for the proposed development sets out such measures. A detailed CTMP will subsequently be prepared by the appointed contractor which will be agreed with WCC and which will provide for the implementation of traffic management measures.

12.8.2 Operational Phase

No mitigating or reductive measures are necessary from an operational perspective as the proposed development can accommodate the traffic associated with the SHD and completion of the Coolagad Link Road. The future connection between the N11 and R761 via Coolagad Link Road would further reduce the impacts experienced within the local road network, however,

the Linsig Modelling of the local road network confirms that the junctions analysed operate within capacity for all future design years assessed.

12.9 Residual Impacts (including worst case scenario)

As no traffic impacts are anticipated on the performance of the local road network and with the preparation of a detailed CTMP to manage traffic no residual impacts are anticipated.

12.10 Do Nothing Scenario

If the proposed development does not take place, the surrounding road network will remain in its current conditions. Background traffic growth is however, anticipated on the surrounding road network as indicated with the TII Travel Demand Projections for Wicklow.

Monitoring

As no traffic impacts are anticipated on the performance of the local road network no monitoring is necessary. The CTMP does however provide the mechanism to monitor the appointed contractor's adherence to traffic management measures.

12.11 Difficulties Encountered

No difficulties were encountered in compiling this chapter of the EIAR

12.12 References

Design Manual for Urban Roads and Streets, 2019, Department of Transport Tourism and Sport.

Wicklow County Development Plan 2016-2022, 2016, Wicklow County Council.

Greystones-Delgany & Kilcoole Local Area Plan 2013 - 2019, 2013, Wicklow County Council.

Sustainable Urban Housing: Design Standards for New Apartments, 2018, Department of Housing, Planning and Local Government.

Traffic and Transportation Assessment Guidelines, 2014, Transport Infrastructure Ireland.

13 Material Assets – Waste

13.1 Introduction

The chapter was written by Nikita Coulter, a Senior Environmental Consultant with Enviroguide Consulting who specialises in Waste Management. Nikita has 8 years professional experience as an Environmental Compliance Specialist in the Irish waste management industry dealing with municipal and hazardous waste management and energy recovery from waste. Nikita Coulter holds an Honours BSc. from University College Dublin and an MSc. from Trinity College Dublin, a NEBOSH Diploma with Distinction in Environmental Risk Management and a Postgraduate Diploma with Distinction in Environmental Engineering from Trinity College Dublin.

13.2 Assessment Methodology

13.2.1 Regulations and Guidance

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

- Environmental Protection Agency (EPA) (2017) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) - DRAFT
- EPA (2003) Advice Notes on Current Practice in the preparation of Environmental Impact Statements.
- EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements.
- Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste) as amended by Directive (EU) 2018/851.
- Waste Management Acts 1996-2011 (as amended)

13.2.2 Description and Assessment of Potential Impacts

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this Chapter is described in Table 13-1.

Table 13-1 Terminology used to assess the quality, significance and duration of potential impacts & effects

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment

Significance of Effects / Impacts	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

13.3 Characteristics of the Proposed Development

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7-year planning permission for a Strategic Housing Development at a 26.03ha Site at 'Coolagad', Greystones, Co. Wicklow.

The Proposed Development consists of 586 residential units comprising:

351 houses consisting of:

- 207 No. 3 bed
- 140 No. 4 bed
- 4 No. 5 bed

The houses are all 2 storey and provided in the following composition: 4 No. detached, 309 No. semidetached and 38 No. terraced.

203 No. apartments provided within 6 No. four-storey blocks (over basement parking) with residential amenity facilities (including gym, co-working space and lounge) all with associated private balconies/terraces to the north/south/east/west elevations as follows:

- 65 No. 1 bed
- 123 No. 2 bed
- 15 no. 3 bed

32 No. duplexes within 2 No. three-storey duplex blocks as follows:

- 16 no. 2 bed Duplex apartments
- 16 No. 3 bed Duplex apartments

Community building (2 storey) with 29 car parking spaces, which includes changing rooms, multipurpose room and ancillary facilities.

Creche building with 21 car parking spaces.

Provision of a new vehicular entrance with a signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11.

Provision of pedestrian and cycle connections from the site to the east and south.

Car parking spaces is provided in a mix of basement level for the apartments and off-street for the houses and duplexes. This includes:

- 702 surface car parking spaces for the houses
- 206 car parking spaces at basement level and 5 at surface level for the apartments
- 32 duplex spaces
- 10 visitor spaces
- 22 motorbike parking spaces, and
- 422 cycle spaces are also provided.

The development also includes site development infrastructure, a hierarchy of internal streets, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces (including enhancement of an existing stream), formal and informal play areas, and new boundary treatments.

ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

13.4 Baseline Description

The Proposed Development is situated at in Coolagad, Greystones, Co. Wicklow, in the townlands of Coolagad and Templecarrig, in the Electoral Division and the Civil Parish of Delgany, in the Barony of Rathdown. The entrance to the Site is located to the west of the R761 Rathdown Road, north of the Gate Lodge; north and west of Coolagad House, Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School. The R761 provides a link between Greystones and Bray town to the north of the Proposed Development Site.

The application lands are broadly L-shaped and wrap around three new schools (Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School), two detached properties, farm buildings and new residential estates to the southeast known as Waverly and Sea Green. The site consists of a number of agricultural fields (sandstone and shale till) mainly bordered by hedges and trees with the exception of the northwest boundary of the site which dissects a field in a north-south direction. A track exists on the site, linking the farm buildings located southeast of the site to other farm buildings in Templecarrig. A stream flows in an east-to-west direction centrally on the site along the northern boundary of the largest field discharging into the sea at Greystones. The site slopes from west-to-east with a change in elevation of 53m and cut and fill will be required to achieve the proposed levels for the Proposed Development.

The Blacklion neighbourhood centre is located in the vicinity and includes a supermarket and a number of shops, retail services, cafés. To the east of the site, on the R761, is the Redford Cemetery. Kindlestown Woods are located west of the site.

The subject site is currently a greenfield site and therefore has no waste management requirements at present.

13.5 Local and National Waste Action Plans

The Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021 provides the structure for the prevention, reduction and management of waste in 12 local authority areas, including Co. Wicklow. Wicklow County Council (WCC) is the local authority responsible for setting and administering waste management activities in the area of the Proposed Development. The EMR hosts a number of permitted and licensed waste facilities for management of construction and demolition (C&D), and municipal waste. These include soil recovery facilities, material recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, waste transfer stations, two waste-to-energy facilities and municipal waste landfills.

The EMR Waste Management Plan 2015-2021 has set the following targets for waste management in the region:

- *Prevent waste: a reduction of one per cent per annum in the amount of household waste generated over the period of the plan.*
- *More recycling: increase the recycle rate of domestic and commercial waste from 40 to 50 per cent by 2020.*
- *Further reduce landfill: eliminate all unprocessed waste going to landfill from 2016.*

The Department of Communications, Climate Action and Environment (DCCAE) published '*A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020-2025*' in September 2020 (updated in January 2021), which focuses on the prevention of waste disposal by maximising the value of material resources and reducing waste generation. In a circular economy, waste and resource use are minimised; the value of products and materials is maintained for as long as possible through good design, durability and repair; and when a product has reached the end of its life, its parts are used again and again to create further useful products '*A Waste Action Plan for a Circular Economy'.*

In order to comply with the targets set out in the EMR Waste Management Plan and to achieve the objectives set out in '*A Waste Action Plan for a Circular Economy',* it is imperative that robust resource and waste management plans are developed for and designed into the pre-construction, construction and operational phases of the Proposed Development.

13.6 Article 27 of the European Communities (Waste Directive) Regulations 2011

Under Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27), uncontaminated soil and stone free from anthropogenic contamination which is excavated during the Construction Phase of a development can be considered a by-product and not a waste, if (a) *further beneficial use of the material is certain, (b) it can be used directly without any further processing, (c) it is produced as an integral part of the development works and (d) the use is lawful and will not have any adverse environmental or human health impacts* (EPA, 2019).

For Article 27 to apply, the beneficial use mentioned in point (a) above must be identified for the entirety of the excavated soil from the Proposed Development prior to its production, with that use taking place within a definite timeframe, for it to be regarded as certain.

13.7 Impact Assessment

13.7.1 Construction Phase

The Construction Phase will give rise to the requirement to remove and bring quantities of various materials to and from the Site of the Proposed Development. Construction and excavation related wastes will be created during the Construction Phase. This has the potential to impact on the local waste management network. The potential impact from the Construction Phase on waste recovery and disposal is likely to be *short-term* and *moderate*.

An Outline Construction Environmental Management Plan (CEMP) has been prepared by AECOM (2022) for the Proposed Development and will be submitted with the planning application. A full CEMP will be prepared by AECOM in advance of Site works beginning, and Site clearance activities will occur in accordance with the CEMP. A Construction and Demolition Waste Management Plan (CDWMP) has been prepared for the Proposed Development by Enviroguide Consulting (2022) and has been submitted with this planning application.

As the Site of the Proposed Development is a greenfield site it will require preparatory works and site clearance, including removal of boundary vegetation hedgerows and treelines as well as the removal of topsoil and subsoils. Predicted volumes of soils and subsoils generated as part of the site clearance works have been quantified in Chapter 6, Land Soils and Geology.

It is intended, where possible, to maximise the reuse of soil within the Proposed Development for back-filling, construction of the site and landscaping to avoid importing raw materials. Excavated soil and stone pending reuse in the Proposed Development will be temporarily stockpiled in designated areas onsite during the Construction Phase.

The Cut and Fill Analysis (refer to AECOM Drawing COO-ACM-00-00-DR-CE-00-0610) has indicated that there will be a surplus of 101,904.631m^3 of soil and stone that will require removal from the site, the majority of which will be moved offsite for re-use. The final volume of material removed from Site may vary (typically +/- 20%) where bulking of soils on excavation occurs. Offsite removal of soils will be undertaken in accordance with the CDWMP, the CEMP and relevant waste management legislation. The offsite re-use of material will be prioritised to minimise the potential loss of valuable good quality soil and subsoil to landfill as a waste. The re-use of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27. Site Investigations Ltd was appointed to complete ground investigations at the Site of the Proposed Development. *Made-Ground* was recorded at three borehole locations and three trial pits across the north and east of the Site. The fill material consisted of granular gravel soils in two boreholes, while the third contained cohesive clay soils with some timber, concrete and plastic fragments. In the Site Investigation Report (2021), Site Investigations Ltd recommend that if on-site materials are to be used as fill, then the necessary laboratory testing should be conducted to confirm the suitability, and relevant lab testing should be specified where contamination may be an issue.

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

Waste will be generated during the construction of the dwelling units and the ancillary infrastructure at the Site. There will be a surplus of material such as off-cuts of timber, broken concrete blocks, plasterboard, tiles, and packaging waste. The waste materials shall be segregated at source and stored in suitably size receptables and transferred offsite for appropriate processing, recycling and recovery. Waste materials generated from the construction phase that are unsuitable for reuse or recovery shall be separately collected. Disposal of construction generated wastes will be considered a last resort, once recycling or recovery options have been ruled out. Waste will be collected as appropriate by suitably qualified and permitted nominated waste management contractors.

It is not envisaged that there will be any hazardous waste generated throughout the construction works however if generated, on-site storage of any hazardous wastes produced (i.e., waste fuels/chemicals) will be kept to a minimum, with compliant removal off-site organised on a regular basis. Offsite removal of hazardous waste will be undertaken in accordance with the CDWMP and relevant waste management legislation by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste

treatment facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Waste will also be generated from construction workers e.g., organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices. Office and canteen waste, including food waste, will be stored in wheelie bins on site and it will be collected by an appropriately authorised waste collector. All wastes generated on site will be sent for recycling, recovery, or disposal to a suitably licensed or permitted waste facility. As the quantity of waste that will be generated is small in scale, it is not considered that there will be any impact on waste management in the area.

In the absence of mitigation, the site clearance works could have a temporary, significant, negative effect on local land-use, surface water quality and waste management resources in the locality.

13.7.2 Operational Phase

The Operational Phase of the Proposed Development will result in an increase in the production of municipal waste in the region and will increase demand on waste collectors and treatment facilities. Anticipated wastes arising from the day-to-day operations at the Proposed Development are summarised in Table 13-2.

Table 13-2 Anticipated wastes arising from the Operational Phase of the Proposed Development

Waste Description	List of Waste Code
Mixed Municipal Waste	20 03 01
Mixed Dry Recyclables	20 03 01
Biodegradable Kitchen Waste	20 01 08
Glass	20 01 02
Bulky wastes	20 03 07
Waste electrical and electronic equipment*	20 01 35* 21 01 36
Batteries and accumulators*	20 01 33* 20 01 34
Textiles	20 01 11
Fluorescent tubes and other mercury containing waste*	20 01 21
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.)*	20 01 13/19/27-28/29-30
Plastic	20 01 39

Waste Description	List of Waste Code
Metals	20 01 40
Paper and Cardboard	20 01 01

*Individual waste type may contain hazardous materials

Municipal waste is made up of household waste and commercial waste that is compositionally comparable to household waste. It includes residual, recyclables, organic, bulky, and waste electrical and electronic equipment.

The Proposed Development consists of 586 No. residential units, comprised of 351 No. houses, 203 No. apartments and 32 No. duplexes. An Operational Waste Management Plan (OWMP) has been prepared by Enviroguide Consulting (*November 2021*) and has been submitted with this planning application.

13.7.2.1 Houses:

The OWMP states: "*All houses are provided with rear gardens. All houses have space within the curtilage of the dwelling to facilitate a three-bin system for the collection in standard 240 litre wheelie bins for mixed municipal (non-recyclable), dry mixed recyclables and 120 litre wheelie bins for organic waste. The bins provided will be typical of the widely rolled out "three bin system" which is provided as standard by the waste management contractor, conforming to the requirements for residents to source segregate organic and recyclable waste from the non-recyclable waste stream*."

The OWMP concludes that, through the provision of ample storage space for a three wheelie bin collection system and a fortnightly collection system, adequate capacity is provided for the estimated volume of waste arising at each dwelling. Glass bottles and items such as batteries and WEEE generated by householders will be recycled by the occupants at nearby bring bank and take-back facilities.

13.7.2.2 Apartments and Duplexes:

The OWMP states:

> "*A number of dedicated, shared waste stores are provided within each of the communal amenity space to serve the apartment and duplex units. These bin stores are centrally located to ensure security and ease of access for residents throughout the development*."

A weekly collection system will operate for the apartments/duplexes, and to accommodate this it has been calculated within the OWMP that storage for 14 no. 1,100 Litre bins for mixed municipal (non-recyclable) waste, 17 no. 1,100 Litre bins for dry mixed recyclables and 11 no. 660 Litre bins for organic/food waste bins will be required.

Any additional household wastes such as glass, bulky waste, WEEE, batteries, textiles etc. must be brought to a local recycling facility.

In order to ensure that residents segregate their waste properly in the apartments, adequate space has been allocated in the design of the kitchen area to accommodate a three-compartment bin for waste segregation at source. Additionally, the OWMP states:

> "*the Management Company will be responsible for the provision of a leaflet to all new tenants encouraging good waste segregation and pictorial information detailing the waste streams that can be placed in each bin. In addition to this, clauses that support waste*

segregation targets will be included in relevant legal documentation e.g., tenancy agreements where possible."

13.7.2.3 Creche and Community Centre

The crèche and community centre will generate similar municipal waste types to the domestic dwellings. It has been calculated within the OWMP that there will be a requirement for 1 no. 1,100 Litre bin for recyclables, 1 x 1100 Litre bin for non-recyclable waste and 2 x 240 Litre bins for organic/food waste at each facility.

Ample space is provided within the design of the crèche and community centre bin stores to accommodate these receptacles, and the bin stores will not be accessible to residents or members of the public. The crèche and community centre may also generate some office type waste and it will be the responsibility of the occupier to arrange a collection or delivery of additional waste streams materials such as ink cartridges, glass, bulky waste, WEEE, batteries, textiles to a local recycling facility.

13.8 Cumulative Impacts

The cumulative effects of Proposed Development on Material Assets have been assessed taking other planned, existing and permitted developments in the surrounding area into account. All planning permission applications that have been granted and developed have been incorporated into the baseline assessment of this application.

A planning search revealed that there have been 2 No. recent (within the last five years) applications for Strategic Housing Developments in the vicinity of the Site of the Proposed Development, which have been granted permission as detailed in Table 13-3.

Table 13-3 Recent applications granted permission in the vicinity of the Proposed Development

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

The recently permitted strategic housing developments in Delgany (ABP.Ref.305476) and Greystones (ABP.Ref.305773) were subject to Environmental Impact Assessments of their own accord. The EIARs for both developments have been assessed as part of this EIAR and were found to conclude that there will be no significant residual effects on waste as a result of the either of the permitted developments, alone or in combination with other projects.

With regard to other developments under construction and proposed in the in the vicinity of the Site of the Proposed Development, including the aforementioned recently permitted applications, there will be a greater demand on existing local waste management services and on regional waste acceptance facilities.

The capacity of waste collection companies and waste management facilities in the Eastern Midlands Region have been designed with forward planning and expansion in mind to cater for a growing population. It is necessary that all of the developments provide the infrastructure and services to assist residents to segregate domestic waste at source, in order to reduce the

generation and disposal of non-recyclable mixed waste. Existing waste collections currently take place in the local area and during the Operational Phase, the Proposed Development will be added to an existing collection route. The likely effect will be neutral and not significant on waste management facilities in the area in the long term.

13.9 Ameliorative, Remedial or Reductive Measures

13.9.1 Construction Phase

The following mitigation measures are recommended for the Construction Phase of the Proposed Development regarding Waste Management:

- Waste materials will be separated at source and will follow the Construction & Demolition Waste Management Plan.
- Prior to the commencement of the Construction Phase detailed calculations of the quantities of topsoil, subsoil and green waste will be prepared, and soils will be tested to confirm they are clean, inert or non-hazardous.
- Beneficial use must be identified for the entirety of the excavated soil from the Proposed Development prior to its production for the excavated soil and stone to be considered as a by-product under Article 27.
- A suitably competent and fully permitted waste management company will be employed to manage all waste arising for the Construction Phase. The appointed waste contractor must have the relevant authorisations for the collection and transport of waste materials, issued by the National Waste Collection Permit Office (NWCPO).
- Similarly, all waste materials will be transported to an appropriately authorised facility, which must have the relevant authorisations for the acceptance and treatment of the specific waste streams, i.e., a Certificate of Registration (COR) or a Waste Facility Permit (WFP) as granted by a Local Authority, or a Waste/Industrial Emission Licence as granted by the Environmental Protection Agency.
- All waste quantities and types will be recorded and quantified, and records will be retained onsite for the duration of the Construction Phase.

13.9.2 Operational Phase

As outlined in the OWMP for the Proposed Development, it is intended to ensure that the highest possible levels of waste reduction, waste reuse and waste recycling are achieved for the Proposed Development. Specifically, the OWMP aims to achieve waste prevention, maximum recycling and recovery of waste with a focus on diversion of waste from landfill wherever possible.

The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following:

- Dry Mixed Recyclables – These materials could potentially catch fire, and this would have a significant effect on the local environment with a short-term impact. This risk is mitigated by the design of a safe and secure bin storage area with adequate space for waste storage.

- Organic waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. The appointed Management Company will be responsible for ensuring that there is adequate vermin control in place.
- Glass – No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development.
- Mixed Municipal (Non-Recyclable) Waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. The appointed Management Company will be responsible for ensuring that there is adequate vermin control in place.

13.10 Residual Impacts (including worst case scenario)

A worst-case scenario in relation to waste would be where a previously unclassified hazardous waste stream arose on the site during excavations, which was not identified and segregated appropriately and resulted in the contamination of a non-hazardous waste stream, such as soil and stones, resulting in a large volume of hazardous waste that would require specialist removal and treatment. However, taking account of the avoidance and mitigation measures the worst-case scenario is deemed to be unlikely.

The CDWMP and the OWMP that have been prepared for the Proposed Development provide sufficient guidance to ensure that the Construction and Operational Phases of the Proposed Development will have a neutral, imperceptible to slight impact on the receiving environment in the long term. There will be an increase in waste collection in the area during the Construction and Operational Phases of the Proposed Development, however, as the surrounding area is highly residential in nature, waste collection is commonplace.

When considered in conjunction with other permitted, planned and existing developments in the vicinity of the Site, it is predicted that the likely cumulative impact of the Proposed Development with other developments in the area on waste management during both the Construction and Operational Phases will be neutral and imperceptible to slight in the long term.

Provided that the mitigation measures discussed in section 13.8 are implemented, that the conditions for Article 27 are met for the excavated soil and stone, and a high rate of reuse, recycling and recovery is achieved in both the Construction and Operational Phases, the likely effect of the residual impacts of the Proposed Development on the environment will be neutral and imperceptible to slight in the long term.

13.11 Do Nothing Scenario

In the 'Do Nothing' scenario the current land-use will not be altered, and the Site would remain for agriculture. If the Proposed Development does not proceed there would be no additional demand or loading on waste management infrastructure.

13.12 Monitoring

The excavated soil and stone will be classified in accordance with the methods described in Section 6 of the CDWMP – Waste Classification. Materials and waste generated during the Construction Phase will be carefully monitored by the Construction Environmental Site

Manager, and/or an appointed Waste Officer, to ensure compliance with relevant local authority requirements and effective implementation of the CDWMP, including maintenance of waste documentation.

The management of waste during the Operational Phase of the apartments/duplexes will be monitored by the building management company and the nominated waste contractor(s) to ensure effective implementation of the OWMP. Individual householders will be responsible for managing their own waste in accordance with their waste collectors' requirements.

13.13 Difficulties Encountered

No difficulties were encountered in the preparation of this Chapter.

13.14 References

Department of Communications, Climate Action and Environment (DCCAE) (2021) A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020-2025

Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021

Environmental Protection Agency, 2004, Storage and Transfer of Materials for Scheduled Activities

Environmental Protection Agency, 2019, Guidance on Soil and Stone By-products in the context of article 27 of the European Communities (Waste Directive) Regulations 2011, Version 3.

Environmental Protection Agency, 2017, Guidelines on the Information to Be Contained in Environmental Impact Assessment Reports, Draft, August 2017

Environmental Protection Agency, 2003, Advice Notes on Current Practice in the preparation of Environmental Impact Statements.

Environmental Protection Agency, 2002, Guidelines on the information to be contained in Environmental Impact Statements.

Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste) as amended by Directive (EU) 2018/851.

Waste Management Acts 1996-2011 (as amended)

14 Material Assets – Utilities

14.1 Introduction

This section of the EIAR has been prepared by AECOM Civil Engineers, with input from the project team, in particular Waterman Moylan Mechanical and Electrical Engineers, to assess the impacts of the proposed development on the existing services and material assets of the subject site and its surrounding, in regards to the extent of the existing networks, connection with services and infrastructure.

The Civil Engineering element of this chapter has been provided by Matteo Iannucci (Beng, MIEI) of AECOM, who has 7 years' experience in civil engineering consulting and by Laura Shaughnessy (CEng, MIEI), who was 11 years' experience delivering Civil Infrastructure projects.

The utility Engineering element of this chapter has been provided by Margaret Dolan (Waterman Moylan, CEng, MIEI) who was over 30 years' experience in building services consulting in Ireland.

14.2 Assessment Methodology

This chapter has been prepared following the "EPA Guidelines on the Information to be Contained in Environmental Impacts Assessment Reports – 2017":

> *"The meaning of this factor is less clear than others. In Directive 2011/92/EU it included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils."*

The purpose of this chapter is to assess the impacts of the proposed utilities on the existing utility networks"

- Water Supply;
- Foul Water Drainage;
- Surface Water Drainage;
- Telecommunications ;
- Natural Gas; and
- Electricity Supply.

A desktop study was carried out in relation to the material assets associated with the proposed development and their capacities and projections of the resources where made for the construction and operational phase of the development. The *Guidelines on information to be contained in an Environment Impact Statement (EPA 2002)*, the advice notes on current practice and Draft EPA guidelines published in 2017 requires assessment of 'economic assets of human origin' to be included in the impact study as a desktop study of material assets associated with the development.

The impacts are identified, described and assessed in terms of their duration of the works and their significance in relation to the site context, in accordance with the EIA Directive. All the impacts have been examined and mitigation measures have been considered and outlined below

14.3 Characteristics of the Proposed Development

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7 year planning permission for a strategic housing development at this site of c.26.03ha at 'Coolagad', Greystones, Co. Wicklow, the application site is generally located to the west of the R761 Rathdown Road, north of the Gate Lodge; north and west of Coolagad House, Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School. The lands are bounded by Waverly Avenue and Seagreen Park residential areas to the east. Templecarrig Lower is located to the north of the lands and Kindlestown Upper to the west.

The proposed development consists of:

- 586 residential units including:
  - 351 two storey houses (207 no. 3 bed, 140 no. 4 bed, 4 no. 5 bed) comprising detached, semi-detached and terraced units
  - 203 no. apartments (65 no. 1 bed, 123 no. 2 bed, 15 no. 3 bed) provided within 6 no. blocks ranging from three to four-storey (over basement) with residential amenity facilities.
  - 32 no. duplex units within 2 no. three-storey blocks (16 no. 2 bed and 16 no. 3 bed units)
- c. 5,192 sqm of communal open space is provided to serve the proposed apartment/duplex units.
- Community building (single storey) of 392 sq.m. with 29 car parking spaces, including changing rooms and a multipurpose room.
- Creche building of 734 sq.m. with 21 car parking spaces.
- A new vehicular entrance, with signalised junction and pedestrian crossings, will be provided off the R761 (Rathdown Road). The new junction will be linked to the existing signalised junction at Blacklion Manor Road / Redford Park which has a planned upgrade by Wicklow County Council. Cycle lanes will be provided along this section of the R761 on both sides. A footpath will also be provided on its western side. Car parking will be provided to the east of the R761, in the front of Redford Cemetery.
- The new access will provide a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11.
- Car and bicycle parking spaces are provided as follows:
  - 702 on curtilage car parking spaces for the houses; 206 car parking spaces at basement level and 5 at surface level for the apartments; and 32 spaces for the duplex units and 10 visitor spaces at surface level;
  - 22 motorbike parking spaces;
  - 436 resident and 118 visitor bicycle parking spaces are proposed in a mix of basement and surface levels for the apartment blocks and duplex units; 12 bicycle spaces are proposed for the creche, 12 for the community centre and 10 at the sport field.
- The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the construction of a new public foul sewer along the R761/R762 from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

- c.10.43ha open space to include a sport field, a MUGA, private, communal and public open spaces incorporating an existing stream, formal and informal play areas, and new boundary treatments.
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site development works above and below ground.

14.4 Baseline Description

14.4.1 Built Environment/Land

The site is located north west of Greystones Town Centre with significant social infrastructure, including schools and sport facilities to the east of the site.

14.4.2 Access and Ownership

The site will be accessed via a new road junction and new access road off the existing R761. The residential element will be access via links off the main access road.

14.4.3 Water Supply

There is an existing 100mm watermain running along the R761 to the east of the proposed development. It is proposed supply the development via a new watermain network that connects to the existing network along the R761. As part of the proposal approximately 200m of the existing 4 inches watermain section is required to be upgraded up to 200mm in diameter.

For further details, please refer to Appendix 14A for the existing record drawings.

14.4.4 Foul Water Drainage

No foul water drainage has been identified within the boundary of the subject site. There is an existing 300mm uPVC foul sewer located in Redford Park flowing eastwards (distance approximately 200m from the subject site); there is an existing 150mm foul sewer located in Rathdown Park flowing eastwards (distance approximately 340m from the subject site; there is an existing 225mm foul sewer located in Chapel Road flowing southwards (distance approximately 500m from the subject site). Further south, this 225mm foul sewer flows eastwards along the Rathdown Road and transitions to an existing 375mm combined sewer in Victoria Road (distance approximately 900m from the subject site). It is noted that the existing foul water network is currently flowing towards the existing pumping station in Victoria Road.

An existing 225mm foul water network has recently constructed to serve the Waverly development, located to the east of the proposed development.

For further details, please refer to Appendix 14A for the existing record drawings.

14.4.5 Surface Water Drainage

Several springs are located within the subject site and a stream drains across the centre of the subject site in an easterly direction.

Regarding surface water drainage infrastructure, a 750mm diameter culvert, approximately 6.1m long, has been identified along the existing stream that flows through the site. The culvert

appears to facilitate access between the existing fields either side of the stream and is located approximately 9.9m from the eastern boundary of the subject site.

A surface water pipe with an unknown diameter has been identified draining from, what appears to be, a natural depression located in the south eastern corner of the subject site. The pipe drains in a northerly direction discharging into the existing stream, east of the abovementioned 750mm culvert section.

There are also 2 no. culverts located in the eastern portion of the site, however their alignment and sizing are unknown. According to a neighbour, one of the culverts drains from within the subject site, at the north eastern corner of the Evans property, and drains in a south easterly direction, traversing the Evans property and back into the subject site, before it exits the subject site again.

It is understood that the second culvert drains from the site boundary at the north eastern corner of the subject site and drain in a southerly direction, before it exits the subject site approximately 75m east of where the other unknown culvert exits the site. It is unknown as to whether these 2 no. culverts link up further downstream, however it is worth noting that an existing 450mm diameter surface water pipe has been identified approximately 65m south of this location which may be the outfall.

For further details, please refer to Appendix 14B for the existing record drawings.

14.4.6 Telecommunications

Openeir have been contacted and the existing network maps for the area surrounding the proposed development have been obtained. There is an existing Openeir Network in the foot path along the main road R761 at the north east quadrant of the site, which includes dusted service with access chambers.

Virgin Media have been contacted and the existing network maps for the area surrounding the proposed development have been obtained. There is an existing Virgin Media Network in the foot path along the main road R761 at the north east quadrant of the site, which includes dusted service with access chambers.

For further details, please refer to Appendix 14C for the existing record drawings.

14.4.7 Natural Gas

Gas Networks Ireland (GNI) have been contacted and the existing network maps for the area surrounding the proposed development have been obtained. There are existing gas pipe networks in the vicinity of the site in the form of a Medium Pressure (4bar) mains pipework.

The service includes a 250mm 4 Bar natural gas main has been identified along the R761 fronting the proposed site entrance.

Please refer to Appendix 14D for Existing record drawings.

14.4.8 Electricity Supply

The ESB Networks have been contacted and an existing ESB network map for the site and the area-surrounding the proposed development has been obtained.

There are existing ESB Networks (ESBN) infrastructure within the development site in the form of High Voltage and Medium Voltage (38kV) and (10kV/20kV) overhead power lines.

The existing ESBN infrastructure consists of the following assets which currently supply areas outside of the proposed development:

- An overhead (OH) 38kV line which traverse the north western quadrant of the subject site. A total of 2 no. timber pole sets for this asset are sited within the subject site while 2 no. poles sets are sited immediately outside the subject site's boundary line, at the eastern and northern boundary.
- An OH 10kV line which run along the north of the site immediately south of the northern boundary. A total of 8 no. poles for this asset are sited within the subject site while 3no. poles are sited immediately outside the subject site's boundary line, 2 no. at the northern boundary and 1 no. at the eastern boundary.
- An OH low volage line traverses the subject site marginally at the eastern boundary of the site, near the site entrance.
- The existing overhead services on the site will be undergrounded and will be diverted as required.
- The location of the connections/diversion will be agreed with ESB Networks during the design stage of the project.

For further details, please refer to Appendix 14E for the existing record drawings.

14.5 Impact Assessment

The potential impacts of the proposed development are assessed below with respect to the impacts of the Proposed Project and other relevant projects in the proximity of the subject site, during the construction and operational phase. The analysis takes into consideration the Characteristics of the receiving baseline environment and the Characteristics of the proposed development.

14.5.1 Built Environment/Land – Construction Phase – Proposed Project Site

The installation of the utilities has the potential to cause some local impacts such as noise, traffic, dust etc. to the surrounding built environment. These construction impacts are local and can be mitigated appropriately as per the mitigation measures identified in the other chapters of this EIAR.

In constructing the development, top-soil removal and associated works will be required and any adverse environmental impacts mitigated as per Chapter 6 of this EIAR.

14.5.2 Built Environment/Land – Operational Phase – Proposed Project Site

It is unlikely that the development in the operational phase will have a likely significant effect to the built environment in the local area. The development strikes an appropriate balance between respecting amenities/properties and providing a quantum and design quality that accords with local and national residential planning policy.

14.5.3 Built Environment/Land – Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.4 Built Environment/Land – Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.5 Access and Ownership – Construction Phase – Proposed Project Site

A road opening licence will be required to carry out the road works and connections/diversions of the existing underground public services and drainage where identified.

Construction access to the application site will be via the existing roundabout to the west of the application site. This access will be managed in accordance with the Construction & Environmental Management Plan (CEMP) which will be submitted in outline with the final application and will ensure minimal impact on access for the public along the public road and footpaths.

14.5.6 Access and Ownership – Operational Phase – Proposed Project Site

The Proposed Project will be accessed via a new road junction off the existing R761. The residential element will be access via links off the main access road. As the Proposed Project will be constructed in phases, the residential units will be sold to private purchasers. Some of the units may be purchased and rented to third parties.

The internal roads and open space within the subject site will be completed to taking in charge standard and will come under the control of the local authority in time.

14.5.7 Access and Ownership – Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.8 Access and Ownership – Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.9 Water Supply, Foul and Surface Water – Construction Phase – Proposed Project Site

Due to the lack of existing surface water networks identified within the site area or along the R761 roadway, it is proposed to maintain the current flow paths from the site and drain the surface water runoff from the proposed development to either the existing stream within the site, a proposed wetland area or the existing underground pipe identified by the survey. Based on the topography for the site and the steep fall from the land that is higher to the west, a series of swales along the western boundary is proposed to intercept any over land flows that may be generated from higher up the slope. The swales have been proposed to flow along the topographical lines to connect into the existing watercourse, which would serve to replicate the existing flow paths. The development has been assessed in relation to the Sustainable Urban Drainage Systems (SuDS) with the aim to replicate the natural characteristics of rainfall runoff, minimising the environmental impact from rainfall events by reducing the runoff leaving the site

for small rainfall events. The SuDS proposed are green roofs, permeable paving, filter drain, swales, bio-retention areas.

The proposed foul water network will connect to the existing 375mm combined sewer that flows towards the Victoria Road Pumping Station. The proposed network will fall by gravity to the existing 375mm combined sewer via a new 300mm pipe to be laid along the R761 and Victoria Road roadways.

It is proposed supply the development via a new watermain network that connects to the existing network along the R761. As part of the proposal approximately 200m of the existing 4 inches watermain section is required to be upgraded up to 200mm in diameter.

A Statement of Design Acceptance (SODA) has been issued by Irish Water to confirm that the proposed foul water and water supply networks have been designed in accordance with the Irish Water standard details and code of practice.

The risk of potential adverse impacts occurring during the construction phase of the subject site (in the absence of adequate management and mitigation measures) can arise from several activities. These typically include:

- Discharge of vehicle wash-down water;
- Discharge of construction materials, e.g. uncured concrete;
- Uncontained spillage of wastewater effluent;
- Uncontrolled sediment erosion and contaminated silty runoff;
- Refuelling facilities, chemical and waste storage or handling areas;
- Polluted drainage and discharges from site;
- Silt laden groundwater from dewatering of excavations;
- Changes to the existing drainage network including interception and redirection of natural and artificial watercourses (e.g. field drains);
- Increased runoff from cleared and capped areas (relative to greenfield values);
- Watercourse crossings;
- Works within water; and
- Outfall points.

14.5.10 Water Supply, Foul and Surface Water – Operational Phase – Proposed Project Site

The potential adverse impacts during the operational phase of the subject site, in the absence of adequate management and mitigation measures are as follows:

- Uncontained spillage of wastewater effluent;
- Uncontained spillage of polluting materials stored on site, e.g. oil and lubricants for maintenance;
- Fuel / oil leaks from parked vehicles;
- Excessive discharge into the existing foul water network. The estimated peak flow is 19.7l/s;
- Excessive demand on the watermain network resulting in reduced supply or loss of pressure in the surrounding area. The estimated peak demand is 18.9 l/s;
- Potential flooding of the site resulting in contaminated floodwaters;
- Siltation of surface water drainage system and attenuation system; and
- Emergency overflow discharge from the foul sewage networks. Any discharge of foul sewage to the surface water network has the potential to impact on downstream surface waters and ecology.

14.5.11 Water Supply, Foul and Surface Water – Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.12 Water Supply, Foul and Surface Water – Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.13 Natural Gas – Construction Phase – Proposed Project Site

An air source heat pump is the choice for the heating systems in this scheme as an alternative to a gas boiler and therefore, no gas infrastructure will be required for this new development.

14.5.14 Natural Gas – Operational Phase – Proposed Project Site

On completion of the construction works, there will be no impacts on the main gas network.

14.5.15 Natural Gas – Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.16 Natural Gas – Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.17 Electrical Supply – Construction Phase – Proposed Project Site

The existing ESB Networks (ESBN) 38kV overhead infrastructure at the north western corner of the site and the existing overhead 10kV/20kV overhead which run along the north of the site immediately south of the northern boundary will be undergrounded and will be diverted as required.

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.

A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure in the area. Initial discussions and with the ESB have been ongoing and the metering strategy has been determined in accordance with the ESB requirements. Up to five new “unit sub-stations” will be provided throughout the site to meet the electrical demands associated with the new houses and duplex units a one new “unit substation” for the Creche and Community buildings while a further building built double substation with off loader rooms will be provided to serve the apartments.

The exact extent and location of the connections will be agreed with ESB Networks during the design stage of the project.

Electrical services will be assessed and designed in accordance with prevailing standards and guidance documents comprising but not limited to the following:

- ETCI Regulations ET101
- Building regulation technical guidance documents
- IS3217
- IS3218
- IS EN 60439
- IS EN 60947
- IS EN 60529
- BS 604:2000 (2006)
- Health & safety requirements
- Fire authority requirements

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 site compound will require a power connection. The likely effects will be temporary and negligible as site compound will be dismissed after completion of works and connections will be operative only during the construction works.

14.5.18 Electrical Supply – Operational Phase – Proposed Project Site

The impact of the operational phase of the proposed development on the power supply network would be required for the electrical diversified load which will be split over up to 7no ESB sub-stations located through-out the development.

14.5.19 Electrical Supply – Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.20 Electrical Supply – Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.21 Telecommunication – Construction Phase – Proposed Project Site

The existing Openeir and Virgin Media separate Networks in the foot path on the main road at the north east of the site, includes ducted service with access chambers.

New connections will be made to the existing Openeir networks at the boundary of the site and services will be distributed throughout the site as required.

The exact extent and location of these connections will be agreed with Openeir during the design stage of the project.

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 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 telecommunications connection. The likely effects will be temporary and negligible as site compound will be dismissed after completion of works and connections will be operative only during the construction works.

14.5.22 Telecommunication – Operational Phase – Proposed Project Site

The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.

14.5.23 Telecommunication – Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.5.24 Telecommunication – Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.6 Ameliorative, Remedial or Reductive Measures

The mitigation measures outlined below, have been identified for the Proposed Project site.

14.6.1 Construction Phase

A range of construction related mitigation measures are outlined below:

- Procedures for dewatering the site during construction works including licensing requirements, monitoring requirements and discharge points;
- Foul sewage arising from temporary toilets and sanitary facilities on the Project site will initially be discharged to an on-site cesspit which will require to be emptied on a regular basis. This arrangement will be in place until the sewage infrastructure is constructed and commissioned, at which point foul sewage can be transferred off-site via this main;
- Provision of grease traps at the canteen drain outlet and connection to the foul sewer;
- The site construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials. Appropriate licences may be required to be obtained from (Wicklow County Council) WCC and Irish Water for abstraction of water and discharge to the foul sewer network;

- Prevention of silt pollution from the subject site shall be carried out by minimising the generation of silt-laden runoff. This will be achieved by the Contractor carefully planning the site works so that activities likely to generate silt-laden runoff are carried out during drier weather and erosion of surface soils and excavations is controlled;
- Stockpiles will be kept to a minimum, to control erosion areas of exposed ground. Stockpiles shall be minimised to reduce silty runoff and located well away from watercourses, drains and dewatering points. Stockpiles must not be higher than 2 m high in the case of topsoil and 3 m high in the case of other materials;
- Mud shall be controlled at entry and exits to the site using wheel washes and/or road sweepers, and tools and plant must be washed out and cleaned in designated areas. A wheel wash method statement will be drawn up by the contractor to include the appropriate treatment of wheel washings. This will be agreed in advance of construction with WCC;
- Visual checks will be undertaken of suspended solids in the stream;
- Topsoil strip areas to be kept to a minimum and phased during the planning and construction phase to reduce the amount of land exposed to prevent excessive overland flow and mobilisation of suspended solids;
- Storage of oils and diesel, along with the general maintenance and refuelling of plant, will be restricted to impermeable bunded areas with a minimum volume of 110% of the capacity of the largest tank/container within the bunded area or 25% of the total volume stored within the bund, whichever is greater, and away from surface waters or areas where any spillages could easily reach surface water;
- Drip trays will be utilised on site for pumps situated within 25m of the watercourse and spill kits will be available at these locations for the duration of the contract. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation;
- Drip trays will be used underneath mobile plant and drums whilst in use on site;
- Refuelling of plant and machinery shall take place using a mobile fuel bowser and restricted to designated areas on hard standing. Only double bunded fuel bowsers shall be used. Vehicles must not be left unattended during refuelling operations;
- Leaking or empty oil drums shall be removed from the Project site immediately and disposed of via an appropriately licensed waste disposal contractor;
- Spill kits and oil absorbent material must be carried with mobile plant and located at vulnerable locations to reduce risk of spillages entering the sub-surface or groundwater environment. Booms shall be held on-site for works near drains or dewatering points. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation;
- Fixed plant shall be self-bunded. Mobile plant must be in good working order, kept clean and fitted with drip trays where appropriate The Contractor will regularly inspect these drip trays and empty the contents into a treatment system. All water runoff from designated refuelling areas shall be channelled to an oil interceptor or an alternative treatment system prior to discharge;
- Care shall be taken whilst using shuttering oils when preparing formwork. This requires operatives to be trained in the proper handling of materials, the sensitive nature of the wider drainage system, and the consequences of accidental spillage;
- All hazardous substances on-site shall be controlled within enclosed storage compounds that shall be fenced off and locked when not in use to prevent theft and vandalism;
- Ready-mixed concrete will be brought to the Project site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which

will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil;

- The pouring of concrete will take place within a designated area to prevent concrete runoff into the soil/ groundwater media. Washout of concrete transporting vehicles chutes will only take place at a designated site wash out location. The washout of full vehicle drums is not permitted on the Project site;
- Equipment, and cleaning shall be washed-out on-site into a designated area that has been designed to contain wet concrete / wash waters (see PPG6 – Working at Construction and Demolition Sites). The washout facilities should be checked and maintained on a daily basis. A record of all checks and maintenance should be kept by the Contractor and should be available for inspection at any time. The washout facility must be in good condition, must not overflow or leak and must be easily accessible to the vehicle. pH of the wash waters should be checked regularly;
- Only concrete delivery truck chutes may be washed out at the designated concrete wash out location;
- Provision of additional surveys within the subject site to identify the full extent and status of the existing surface water drainage pipes and culvers.
- Liaison with Irish Water regarding the wastewater and water connections at construction stage. Currently Irish Water has issued the Statement of Design Acceptance and a Confirmation of Feasibility where there is capacity issues within the Treatment Plant are not highlighted;
- Liaison with ESB regarding the connection/diversion of the 38KV powerline at construction stage; and
- Care shall be taken when construction is taking place close to or in the vicinity of ESB network overhead power lines. The "H.S.A. ESB code of practice for Avoiding Danger from Overhead Electricity Power Lines" shall be complied with.

As noted above, connections to the existing electricity, water services and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

14.6.2 Operational Phase

Mitigation measures for the various aspects of the built environment are outlined within other chapters of the EIAR.

No additional mitigation measures to those outlined in other chapters are considered necessary during the operational phase of the development as it is considered to have a neutral to positive effect on material assets including services and infrastructure.

14.7 Residual Impacts (including worst case scenario)

14.7.1 Construction Phase – Proposed Project Site

As per Section 14.6.1 above, which outlines the construction related mitigation measures, the residual impacts for the construction and operational phase are considered to be neutral and the significance of the impact has been assessed as not significant.

14.7.2 Construction Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.7.3 Operational Phase – Project Site

As per Section 14.6.1 above, which outlines the construction related mitigation measures, the residual impacts for the construction and operational phase are considered to be neutral and the significance of the impact has been assessed as not significant.

14.7.4 Operational Phase – Other Relevant Projects

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. This development will not have any impacts on the project site.

14.8 Do Nothing Scenario

Under a 'Do Nothing' scenario it is expected that the site would be utilised for agricultural purposes (predominantly arable).

14.9 Monitoring

No monitoring is required in addition to those specifically noted in other chapters of the EIAR.

14.10 Difficulties Encountered

There are several underground surface water drainage pipes/culverts, which their extent and sizing are still unknown, that have been identified on site.

14.11 References

Not Applicable.

15 Major Accidents and Disasters

15.1 Introduction

The chapter was written by Nikita Coulter, a Senior Environmental Consultant with Enviroguide Consulting who specialises in Waste Management. Nikita has 8 years professional experience as an Environmental Compliance Specialist in the Irish waste management industry dealing with municipal and hazardous waste management and energy recovery from waste. Nikita Coulter holds an Honours BSc. from University College Dublin and an MSc. from Trinity College Dublin, a NEBOSH Diploma with Distinction in Environmental Risk Management, and a Postgraduate Diploma with Distinction in Environmental Engineering from Trinity College Dublin.

15.2 Assessment Methodology

15.2.1Scope and Context

The relevant legislation that applies to this Chapter is the Planning and Development Regulations 2001 – 2021, as amended, and in particular Schedule 6 – Information to be contained in EIAR. The following paragraph of Schedule 6, Paragraph 2(e)(i)(IV), specifically refers to "*a description of the likely significant effects on the environment of the proposed development resulting from … the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*".

Paragraph 2(h) further expands with

> "*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*."

Additionally, the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), which implement the Seveso III Directive (2012/18/EU), and which revoked the 2006 Major Accident Regulations also applies to this Chapter.

15.2.2 Guidelines and Reference Material

Cognisance has been taken of the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA Draft, August 2017). Although this document predates the 2018 legislation it follows the requirements laid out in the Directive 2014/52/EU.

Specifically, the EPA Guidelines state that the EIAR must take 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)… The potential for a project to cause risks to human health, cultural heritage or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g. the potential effects of floods on sites with sensitive plants. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required. The EIAR should refer to those separate assessments while avoiding duplication of their contents."

Reference has also been made to the Department of the Environment, Heritage & Local Government (DoEHLG) Publication 'Guide to Risk Assessment in Major Emergency Management 2010' and the Office of Emergency Planning, Department of Defence (DOD) Publication 'A National Risk Assessment for Ireland 2020'. A consolidated list of national hazards for Ireland identified in the DOD document are identified in Table 15-1.

Table 15-1: Consolidated List of National Hazards (Source: A National Risk Assessment for Ireland (2020) Department of Defence)

Hazard: Civil	**Hazard: Natural**
• Large Crowd Event • Pandemic • Water Supply Distribution and Contamination • Food Chain Contamination • Animal Disease • Terrorist Incident	• Storm • Snow and Ice (Including prolonged low temperature) • Flooding (Including pluvial, fluvial and coastal)
Hazard: Transportation	**Hazard: Technological**
• Maritime Incident • Air Incident • Transport Hub (Includes Airports, Ports and Rail Stations)	• Structural Collapse (Including Dam, Tunnel, Bridge and Building) • Nuclear Incident (Abroad) • Cyber Incident • Disruption of Energy Supply (Including oil, gas, electricity and communications)

The Wicklow County Development Plan 2016-2022 states that in relation to the Prevention of Major Accidents (Control of Major Accident Hazards Involving Dangerous Substances) legislation, it is the objective of the Council to:

- Comply with the Seveso III Directive in reducing the risk and limiting the potential consequences of major industrial accidents,

- Where proposals are being considered for the following: (i) new establishments at risk of causing major accidents, (ii) the expansion of existing establishments designated under the Directive, and (iii) other developments proposed near to existing establishments; the Council will require that applicants must demonstrate that the following considerations are taken into account: (i) prevention of major accidents involving dangerous substances, (ii) public health and safeguarding of public health, and (iii) protection of the environment,
- Ensure that land use objectives must take account of the need to maintain appropriate distances between future major accident hazard establishments and residential areas, areas of substantial public use and areas of particular natural sensitivity or interest, and
- Have regard to the advice of the Health and Safety Authority when dealing with proposals relating to Seveso sites and land use plans in the vicinity of such sites.

15.2.3Risk Assessment Methodology

The risk assessment methodology has been supported by general risk assessment methods. Hazard analysis and risk assessment are accepted internationally as essential steps in the process of identifying the challenges that may have to be addressed by society, particularly in the context of emergency management. Mitigation as a risk treatment process involves reducing or eliminating the likelihood and/or the impact of an identified hazard (DoEHLG, 2010).

Table 15-2 Classification of National Likelihood Criteria (Source: A National Risk Assessment for Ireland (2020) Department of Defence)

National Likelihood Criteria		
Rating	**Classification**	**Average Recurrence Interval**
1	Extremely Unlikely	100 or more years between occurrences
2	Very Unlikely	51-100 year between occurrences
3	Unlikely	11-50 years between occurrences
4	Likely	1-10 years between occurrences
5	Very Likely	Ongoing/Less than 1 year between occurrences

15.3 Characteristics of the Proposed Development

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7-year planning permission for a Strategic Housing Development at a 26.03ha Site at 'Coolagad', Greystones, Co. Wicklow. The Proposed Development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building, a creche, a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The Proposed Development also includes site

development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School, Rathdown Road, Greystones.

15.4 Baseline Description

The Proposed Development is situated at in Coolagad, Greystones, Co. Wicklow, in the townlands of Coolagad and Templecarrig, in the Electoral Division and the Civil Parish of Delgany, in the Barony of Rathdown. The entrance to the Site is located to the west of the R761 Rathdown Road, north of the Gate Lodge; north and west of Coolagad House, Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School. The R761 provides a link between Greystones and Bray town to the north of the Proposed Development Site.

The application lands are broadly L-shaped and wrap around three new schools (Temple Carrig School, Gaelscoil na gCloch Liath and Greystones Educate Together National School), two detached properties, farm buildings and new residential estates to the southeast known as Waverly and Sea Green. The site consists of a number of agricultural fields (sandstone and shale till) mainly bordered by hedges and trees with the exception of the northwest boundary of the site which dissects a field in a north-south direction. A track exists on the site, linking the farm buildings located southeast of the site to other farm buildings in Templecarrig. A stream flows in an east-to-west direction centrally on the site along the northern boundary of the largest field discharging into the sea at Greystones. The site slopes from west-to-east with a change in elevation of 53m and cut and fill will be required to achieve the proposed levels for the Proposed Development.

The Blacklion neighbourhood centre is located in the vicinity and includes a supermarket and a number of shops, retail services, cafés. To the east of the site, on the R761, is the Redford Cemetery. Kindlestown Woods are located west of the site.

The surrounding context consists of a mix of residential, agricultural and educational uses. There are no industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) in the vicinity of the Site of the Proposed Development which would be likely to result in a risk to human health and safety.

15.5 Predicted Impacts

The EIAR chapters within this report identify that the Proposed Development has been designed in accordance with best practice and that the Proposed Development can be safely undertaken without risk to health.

In order to understand the potential consequences and predicted impacts of any major accident or disaster due to the Proposed Development and the vulnerability of the project a desk study was undertaken. The assessment reviewed:

- The vulnerability of the project to major accidents or disasters.
- The potential for the project to cause risks to human health, cultural heritage and the environment, as a result of that identified vulnerability.

A methodology has been used including the following phases:

Phase 1 Assessment:

The DOD Consolidated List of National Hazards was used to identify a preliminary list of potential major accident and disasters. Receptors covered by legislation were not included within the assessment e.g., construction workers.

Phase 2 Screening:

The list was screened and major events such as volcanoes were not included given the unlikely event of one occurring. Elements already addressed as a key part of the design e.g., risks of building collapse, are not repeated.

Phase 3: Mitigation and Evaluation

In the event that mitigation measures included did not mitigate against the risk, then, the potential impacts on receptors are identified in the relevant chapter. Table 15-3 lists the major accidents and/or disasters reviewed.

Table 15-3: Major Accidents and/or Disasters Reviewed

Major Accident or Disaster	Relevant for this Proposed Development? (Y/N)	Why relevant?	Potential Receptor	Covered within EIAR?
Civil				
Large Crowd Event	N	Not relevant to the Proposed Development, i.e., residential / community development.	N/A	**N/A**
Pandemic	**Y**	**COVID-19 is an illness that can affect your lungs and airways. It is caused by a virus called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is spread in sneeze or cough droplets. The Proposed Development poses no additional COVID-19 risk.** **It is anticipated that there will be a maximum of 250 workers directly employed during the construction phase of the project. The Governments 'Work Safely Protocol' and the Construction Industry Federation 'Back to Work Resource Pack ' will be adhered to. All construction staff will complete the relevant HSA Return to Work Safely Online Courses prior to commencing work on-site.** **During the construction phase of this Proposed Development HSE guidelines will be adhered to in relation to social distancing, cough and sneeze etiquette and hand washing. Appropriate welfare facilities will be provided at the construction compound. Frequently touched objects and surfaces such as door handles, machine steering wheels and gear levers will be cleaned and disinfected frequently.** **All workers directly and indirectly employed during the Operational Phase of the Proposed Development will comply with the relevant Government protocols that will be in place at that point in time in relation to COVID-19.**	**Residents/Workers**	**Chapter 4 (Population and Human Health) of this EIAR identifies the vulnerability of the project to Infectious Diseases**

Water Supply Distribution and Contamination	N	Waterborne diseases can be caused by consuming contaminated drinking water. No public health issues have been identified for the Construction Phase or Operational Phase of the Proposed Development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers in particular associated with the dewatering works and any instream works. The existing water supply for the Proposed Development will be via connection to the public supply. The only groundwater source in the vicinity of the Site is the supply well for the adjoining farm and dwelling which will be decommissioned, and an alternative supply provided with connection to the mains. There are no downgradient groundwater sources identified on the GSI database that would be potentially at risk in the unlikely event of any potential contamination arising at the Site receptors and therefore no potential human health issues associated with groundwater quality.	Residents/Workers/ Consumers	Chapter 7 (Water) of this EIAR identifies the vulnerability of the project to issues with water supply distribution and contamination.
Food Chain Contamination	Y	Potentially relevant to the Proposed Development in the Operational Phase. The Creche would have to register the premises with the HSE and would need to adhere to food safety legislation and traceability requirements if supplying food to children	Consumers/Producers	N/A
Animal Disease	N	Not relevant to the Proposed Development.	N/A	N/A
Terrorist Incident	N	Not relevant to the Proposed Development, i.e., residential / community development	N/A	N/A
Transportation				
Maritime Incident	N	Not considered vulnerable to maritime incidents. The Site of the Proposed Development is approximately 680m from the coast.	N/A	N/A
Air Incident	N	Not considered vulnerable. The closest commercial airport is Dublin Airport, which is approximately 32km north of the Site of the Proposed Development. The closest Public Safety Zone (PSZ)	N/A	N/A

		associated with the runaways at Dublin Airport is located approximately 28km north of the Site of the Proposed Development. The closest domestic airport is Newcastle Aerodrome, which is located approximately 9km south of the Site of the Proposed Development. Casement Aerodrome, Baldonell is a military airbase located approximately 30km northwest of the site.		
Transport Hub (Includes Airports, Ports and Rail Stations)	N	Not considered vulnerable. The closest commercial Port is Dublin Port, which is located approximately 22km north of Site of the Proposed Development. The closest harbour is in Greystones, approximately 1.1km east of Site of the Proposed Development. The closest train station is in Greystones, approximately 1.9km southeast of Site of the Proposed Development. *See above for Airports*	N/A	N/A
Natural				
Cultural, Archaeological and Architectural Heritage	Y	Archaeological testing carried out at the Site of the Proposed Development in 2021 under archaeological license no. 21E0083 revealed eight areas of archaeological significance. Ground disturbances associated with the Proposed Development will have a direct negative impact upon the majority of the Archaeological Areas identified at the Site. Additionally, following the completion of the Proposed Development and the establishment of greenspaces, there is potential for maintenance works, extension / refurbishment of services, future planting regimes etc. to negatively impact upon any archaeological features that are preserved in-situ beneath the public amenity greenspace.	Archaeological Areas, Artifacts and Cultural Heritage.	Chapter 11 (Archaeology and Cultural Heritage) of this EIAR has assessed the impact of the Proposed Development on the Archaeological and Cultural Heritage at the Site.

Landslides	Y	There are no recorded landslides at the Site, and two (2no.) recorded within 2km of the Proposed Development Site recorded on the GSI database. The Site of the Proposed Development is located within an area of 'Low' susceptibility to landslides, however, the requirement for excavation to 8-9m below current site levels and the placement of soils in localised areas with groundwater seepages could result in potential ground stability hazards as outlined in Chapter 6. A localised area at Kindlestown Hill west of the Site where bedrock is mapped to subcrop or outcrop is assigned a landslide susceptibility classification of Moderate' and 'High' (GSI, 2022), however there are no recorded landslides in that area. The appropriate geotechnical design avoidance and reductive measures will be incorporated into the design to prevent any potential impacts to ground stability.	Development / Workers / Residents	Chapter 6 (Land and Soils) of this EIAR assessed the vulnerability of the Proposed Development to landslides.
Sinkholes	N	The Site is not located within a karst area due to the nature of the underlying bedrock geology and therefore there are no identified risks associated with karst features, such as sinkholes, for the Proposed Development Site. GSI records verify that that there are no karst features (e.g. cave, enclosed depression, swallow hole, turlough) within 2km of the Proposed Development Site.	N/A	Chapter 6 (Land and Soils) of this EIAR assessed the vulnerability of the Proposed Development to sinkholes.
Earthquakes	N	Earthquakes are not likely to occur in the vicinity of the Site at a sufficient intensity to pose a risk for the Proposed Development.	N/A	Chapter 6 (Land and Soils) of this EIAR assessed the vulnerability of the Proposed Development to earthquakes.
Floods/ Storm surge / Tidal flooding	Y	The closest river network waterbody from the Proposed Development Site is The Greystones Stream, which flows through the Site. The Site of the Proposed Development is approximately 680m from the coast of the Irish Sea. There are no recorded historic groundwater flood events recorded at or within 2km of the Proposed Development Site (GSI, 2022) however it is noted that the groundwater flood	Development	Chapter 7 (Water) of this EIAR has assessed the vulnerability of the project to flooding.

		historical and predictive maps are only available for limestone regions, the Site is not however within a limestone region. Groundwater emergence at ground surface has been identified as springs at the Site. The site-specific flood risk assessment (SSFRA) prepared by AECOM (2022) for the Site of the Proposed Development concludes that the proposed surface water and SuDS strategy, including the proposed interceptor drainage ditch along the western boundary of the Site, will mitigate the flood potential due to excess surface water run-off and from groundwater flows from the upper reaches of from the Kindlestown Hill area. The surface water and groundwater will be discharged to the Greystones Stream at controlled rates to avoid increased discharge rates that could cause flooding downstream. There is no available data concerning pluvial flooding for the Proposed Development Site. Available coastal flooding mapping and modelling identifies that the site is not impacted with coastal flooding.		
Severe weather such as tornados, heatwaves, blizzards, droughts	N	Not considered vulnerable. In the event of severe weather events, the national meteorological service, Met Éireann, provides advance notice of severe weather, usually several days in advance. When appropriate, colour-coded weather warnings are issued. The Office of Emergency Planning works with the government departments and other key public authorities in order to ensure the best possible use of resources and compatibility across different emergency planning requirements	Residents / workers	N/A
Air Quality events	N	It is expected that adequate dust mitigation measures, as outlined in Chapter 8, will assist in preventing nuisance dust from resulting in any adverse impacts. In the event of a failure of such measures, it is not considered that adverse dust impacts will occur. Increases in traffic are deemed to have negligible impacts in terms of local air quality.	Residents/workers/ neighbours	Chapter 8 (Air Quality) of this EIAR identifies the impact of the construction and operation of the development on ambient air quality.

Wildfires	N	Wildfires have been recorded in the Wicklow Mountains National Park (WMNP), with the most recent occurring at Lough Dan in 2021, approximately 15km southwest of the Site. However, due to the topography and landscape separating the Park from the Site, the Proposed Development is not considered vulnerable.	Development/Residents	N/A
Dam, Bridge or Tunnel Failure	N	Not present	N/A	N/A
Flood defence failure	N	A site-specific preliminary flood risk assessment (SSFRA) has been produced by AECOM (2022) for the Proposed Development. Given the topography of the site, it is identified that an interceptor ditch will be required along the western boundary of the subject site to collect excess surface water and to intercept groundwater flows from the upper reaches of Kindlestown Hill. The SSFRA concludes that the proposed surface water and SuDS strategy will mitigate flood potential.	Development/Residents	Chapter 7 (Water) of this EIAR identifies the vulnerability of the project to flooding.
Fire	Y	Fire detection systems, smoke ventilation, sprinkler systems, fire alarms and emergency lighting will be fitted on all buildings. A fire evacuation strategy will be put in place in advance of dwelling occupancy.	Residents/ workers	Appendix 15 A, High Level Fire Safety Review (Jensen Hughes, 2022), details strategies to reduce the vulnerability of the project to fire.
Invasive species	N	No invasive plant or animal species listed under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) Section 49, the Third Schedule: Part 1 Plants, Third Schedule: Part 2A Animals were noted on site. No terrestrial or aquatic invasive species such as Japanese knotweed, giant rhubarb, Himalayan balsam, giant hogweed etc. that could hinder removal of soil from the site during groundworks were noted. A pre-construction survey for invasive species will be carried out at the Site prior to commencement of the Construction Phase.	Native species	Chapter 5 (Biodiversity) of this EIAR identifies the vulnerability of the project to invasive species.
Technological				
Structural Collapse (Building)	N	This has been taken into consideration in the building design. All buildings have been designed to modern standards. No further assessment is required.	N/A	The design criteria of the buildings are in accordance with all relevant building design standards.

Structural Collapse (Dam, Bridge, Tunnel)	N	Not considered vulnerable as there are no dams, bridges or tunnels are proposed as part of the development.	N/A	N/A
Nuclear incident	N	Not considered vulnerable. There are no nuclear power stations near the Proposed Development. The closest is Trawsfynydd Nuclear Power Station, which is located approximately 145km east of the Site of the Proposed Development in Wales.	N/A	N/A
Cyber incident	N	Not considered vulnerable, as this is a predominantly residential development. The creche may opt to have cyber protection in place when operational, however this will be at the discretion of the operators.	N/A	N/A
Disruption to energy supply (oil, gas, electricity)	N	Not considered vulnerable. ESB Networks maintain the electricity network in Ireland. Gas Networks Ireland maintain the natural gas network in Ireland.	N/A	Chapter 14 (Material Assets - Utilities) of this EIAR contains information on energy systems.
Utilities failure (communications)	N	Not considered vulnerable. In Ireland, the fixed-line communications market is dominated by Eir; while Eir, Three, and Vodafone own Ireland's mobile telecommunications infrastructure.	N/A	Chapter 14 (Material Assets - Utilities) of this EIAR contains information on communications systems.
Utilities failure (water supply)	N	Not considered vulnerable. Irish Water is responsible for the delivery of water services to the Site of the Proposed Development. Irish Water have produced a chart which outlines what customers can expect from different levels of water restriction if they are put in place. Restrictions include rotational shut offs, low pressures, no supply at night.	N/A	Chapter 7 (Water) and Chapter 14 (Material Assets - Utilities) of this EIAR contain information on water supply
Utilities failure (wastewater, sewage)	N	Not considered vulnerable. Irish Water has sole responsibility for the cleaning and maintenance of the public sewer network. Irish Water also operate a network of wastewater treatment plants across Ireland.	N/A	Chapter 7 (Water) and Chapter 14 (Material Assets - Utilities) of this EIAR contain information on wastewater and sewage removal and treatment
Utilities failure (solid waste)	N	Not considered vulnerable as a Construction, Demolition and Waste Management Plan has been prepared for the Construction Phase of the Proposed Development and an Operational Waste Management Plan has been prepared for the Operational Phase of the Proposed Development.	N	Chapter 13 (Material Assets - Waste) of this EIAR contains information on solid waste management, removal and treatment
Industrial accidents	N	The Site of the Proposed Development is not an industrial or	N/A	N/A

(defence, energy, oil and gas refinery, food industry, chemical industry, manufacturing, quarrying, mining)		regulated site and there are no Upper Tier Seveso sites near the Proposed Development. The closest Upper Tier Seveso sites is Dublin Waste to Energy Facility, which is located in Co. Dublin, approximately 22km north of the Site of the Proposed Development at Dublin Port. There is one Upper Tier Seveso site in County Wicklow at Sigma Aldrich Fine Chemicals, Arklow, approximately 39km south of the Site of the Proposed Development.		

15.6 Identified Risks

The Risk Assessment has identified risks relating to archaeology and cultural heritage, landslides and flooding from the Proposed Development.

15.6.1 Archaeology and Cultural Heritage

Chapter 11 (Archaeology and Cultural Heritage) of this EIAR has assessed the impact of the Proposed Development on the Archaeological and Cultural Heritage at the Site. A suite of measures designed to mitigate the impacts of the Construction Phase of the Proposed Development have been drafted in consultation with the National Monuments Service. A Monument Management Plan has been drafted in consultation with the National Monuments Service to ensure that the archaeology preserved in-situ beneath the public amenity greenspace be protected during the Operational Phase of the development. Refer to Chapter 11 for detailed information.

15.6.2 Landslides

Chapter 6 (Land and Soils) of this EIAR has assessed the potential impact of the Proposed Development on landslides and ground stability at the Site. Bulk excavations and other groundworks including engineered infill of ground to achieve Site levels could result in the stability issues during construction. A detailed design including the foundation design will be specified by an appropriately qualified geotechnical Engineer for the soil cut and fill requirements at the Site to ensure that ground stability is engineered and controlled appropriately. Refer to Chapter 6 for detailed information.

15.6.3 Flooding

Chapter 7 (Hydrology) of this EIAR has assessed the potential impact of the Proposed Development on flooding at the Site. The flood risk assessment prepared by AECOM (AECOM, 2022) for the Proposed Development Site concluded that the proposed surface water drainage and SuDS strategy will mitigate flood potential at the Site. The proposed cut off ditch along the western boundary is proposed to intercept any over land flows that may be generated from higher up the slope of Kindlestown Hill to the west of the Site and which could potentially constitute a flood risk to the Proposed Development. The water collected in this cut-off ditch will be discharged to the existing stream network at controlled rates to avoid increased discharge rates that could cause flooding downstream. The Infrastructure Report notes that the proposed surface water drainage network has been designed with particular attention to the flood exceedance routes, with the water being directed away from buildings. Water will follow the fall along the road infrastructure prior to being collected by road gullies or prior to draining to the proposed green open space. Where low points exist along the road infrastructure, double gullies will be provided to minimise the risk of water ponding.

Groundwater flood risk at the Site as groundwater emergence at ground surface or infiltration to basements and other infrastructure has been considered and assessed in Chapter 7. The potential for groundwater flooding will be managed through appropriate groundwater interception drainage as outlined in Chapter 7 and will be determined as part of the detailed design.

Refer to Chapter 7 for detailed information.

15.6.4 Fire Safety and Emergency Response

The design criteria of the apartment buildings are in accordance with all relevant building and fire safety standards. Fire detection systems, smoke ventilation, sprinkler systems, fire alarms and emergency lighting will be fitted on all buildings. A fire evacuation strategy will be put in place in advance of dwelling occupancy. Refer to Appendix 15 A, High Level Fire Safety Review (Jensen Hughes, 2022).

15.7 Cumulative Impacts

The cumulative effects of Proposed Development on Major Accidents and disasters have been assessed taking other planned, existing and permitted developments in the surrounding area into account. All planning permission applications that have been granted and developed have been incorporated into the baseline assessment of this application.

A planning search revealed that there have been 2 No. recent (within the last five years) applications for Strategic Housing Developments in the vicinity of the Site of the Proposed Development, which have been granted permission as detailed in Table 15-4.

Table 15-4 Recent applications granted permission in the vicinity of the Proposed Development

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

As noted in Table 15-3, the Site of the Proposed Development is not an industrial site, and is not regulated, connected to or close to any site regulated under the COMAH Regulations. Additionally, there are no developments under construction or proposed in the in the vicinity of the Site of the Proposed Development which will be regulated under the COMAH Regulations, and so there is no potential for cumulative impacts relating to major accidents invloving dangerous substances.

All cumulative impacts have been detailed in the relevant technical chapters and are summarised in Chapter 17 Summary of Cumulative Impacts and Interactions.

15.8 Ameliorative, Remedial or Reductive Measures

All ameliorative, remedial or reductive measures have been detailed in the relevant technical chapters of this EIAR.

15.9 Residual Impacts

Through the implementation of mitigation measures detailed in the relevant technical chapters of this EIAR, 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 as a result of the Proposed Development, alone or in combination with other projects.

15.10 Monitoring

All monitoring proposals for the individual identified risks have been detailed in the relevant technical chapters and are summarised in Chapter 16 Summary of Mitigation Measures.

15.11 Difficulties Encountered when Compiling

No difficulties were encountered in completing this Risk Chapter.

15.12 References

AECOM Ltd., 2022b. Residential Lands at Coolagad, Greystones, Co. Wicklow Flood Risk Assessment Report.

Chapter 4-14 of Volume 2 of this EIAR

Environmental Resources Management Ireland Ltd (2005) Public Safety Zones Report

EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft).

Garda Mapping Section – Seveso Sites Ireland WebMap [Viewed Online 17.02.2022] https://www.arcgis.com/home/item.html?id=a01b5a0a6ff24f10adff30beaa3b6fd0

Guide to Risk Assessment in Major Emergency Management, Department of the Environment, Heritage & Local Government, 2010).

Office of Emergency Planning (2020) 'A National Risk Assessment for Ireland 2020' Department of Defence Publication

Statutory Instrument (SI). No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018

Wicklow County Council Development Plan 2016-2022

16 Summary of Interactions and Cumulative Effects

16.1 Introduction

In addition to the assessment of impacts on individual topics presented in the previous chapters of this Environmental Impact Assessment (EIAR), the interaction between these factors has also been considered as part of the environmental impact assessment.

This chapter analyses the Interrelationships and cumulative effects and main interactions between different aspects of the environment likely to be significantly affected by the Proposed Development.

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.

The first type is the assessment of effects on receptors or receptor groups, such as local residents, which may be affected by different environmental elements generated by the proposed residential development simultaneously or concurrently. This is sometimes referred to as the 'interrelationships' or 'in combination effects' between different environmental effects. The assessment includes consideration of particular locations/receptors where several effects for example noise, air and landscape may all occur.

The second type is the assessment of effects of the proposed residential development together with other past, present or reasonably foreseeable projects, where there is potential for overlap spatially or temporally, often referred to as cumulative effects.

16.1.1 Competent Expertise

This chapter was prepared by prepared and collated by Richard Hamilton, BA, MSc, PGDip EMAE (Environmental Monitoring Assessment and Engineering), MIPI, MRTPI, Director, MacCabe Durney Barnes.

16.2 Assessment Methodology

16.2.1 Statutory Requirements

The requirement to address interactions of effects and cumulative impacts is set out in Directive 2011/92/EU, as amended by Directive 2014/52/EU, on the assessment of the effects of certain public and private projects on the environment (the EIA Directive). Article 3 of the EIA Directive outlines the information to be contained in an EIAR as follows;

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

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape; and

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

Annex IV of the amended Directive states that a description of impacts should include:

“…the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project”

The aforementioned Directive was transposed into Irish Legislation through the Planning and Development Regulations 2018.

The relevant interactions and interdependencies between specific environmental aspects have been summarised in the matrix set out in Table 16-1.

This chapter has been prepared in accordance with the following guidelines;

- Draft EPA revised Guidelines on information to be contained in Environmental Impact Statements (2017) (the Draft EPA Guidelines)
- Guidance on the preparation of Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017) (the EU EIAR Guidance)
- European Commission Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (EC, 1999)

16.3 Interaction of Effects

The major interactions between the recorded environmental impacts are assessed within the individual chapters of the EIAR. Table 16-1 provides a matrix summarising the interactions between the various parameters outlined in this EIAR from Chapters 5 to 15, inclusive.

The matrix highlights the potential for the topic or issue in the left-hand column to have an effect on the environmental issue mentioned in the top row of the matrix. If there is a “☒” in a box this means that there is potential for an effect during the operational or construction phase of the proposed project. If there is considered to be no significant potential for an effect, or if the interaction is more relevant to a different issue pair, the box will be left blank.

The purpose of the effects matrix is to identify potential significant effects on different environmental issue. Actual effects and their significance are dealt with in the most relevant chapter.

This assessment was based on information contained within this EIAR, the outcome of workshops and consultation with the relevant sub-consultants. The main environmental interactions anticipated as they relate to the Proposed Project are also summarised in the following sections.

Table 16-1: Matrix to Summarise Key Inter-relationships

Key Environmental Interaction Matrix	Population and Human Health	Biodiversity	Land, Soil and Geology	Water	Air and Climate	Noise and Vibration	Landscape and Visual Impact	Cultural Heritage, including Archaeology	Material Assets – Transportation	Material Assets – Waste	Material Assets – Utilities	Major Accidents and Disasters
Population and Human Health		X	X	X	X	X	X	X	X	X	X	
Biodiversity	X			X			X					
Land, Soil and Geology	X							X				
Water	X	X						X	X		X	
Air and Climate	X								X			
Noise and Vibration	X								X			
Landscape and Visual Impact	X	X						X				
Cultural Heritage, including Archaeology	X		X	X			X		X			
Material Assets – Transportation and Traffic	X			X	X	X		X		X	X	
Material Assets – Waste	X								X			
Material Assets – Utilities	X			X					X			
Major Accidents and Disasters												

16.4 Description of Significant Interactions

The following are the interactions anticipated from the proposed development:-

16.4.1 Population and Human Health

Chapter 4 assesses the likely impacts on Population and Human Health arising from the proposed development. During Construction;

Noise and Vibration: Construction activities may result in an increase in noise which has the potential to negatively impact on local populations.

Land, Soil and Geology: Construction activities may result in an increase in earth movements and dust which has the potential to negatively impact on local populations.

Transportation and Traffic: Construction activities may result in an increase in traffic levels which has the potential to negatively impact on local populations.

Biodiversity: Construction activities have potential to affect habitats which may be a source of amenity for local populations.

During Operation;

Landscape and Visual Operation of development activities may result in a change in views which has the potential to negatively impact on local populations, but also provide improved amenities and accessibility to recreational facilities and open space.

Transportation and Traffic Operation activities may result in an increase in traffic levels which has the potential to negatively impact on local populations.

With mitigation measures in place, no significant residual negative impacts are predicted.

16.4.2Biodiversity

'Chapter 5 assesses the likely impacts on Biodiversity arising from the proposed development.

During construction, Biodiversity has potential to interact with activities affecting;

Landscape and Visual: Construction activities may affect landscape features (hedgerows, streams, laneways) that are also biodiversity features.

Land Soil and Geology: Construction activities giving rise to earth movements (cut and fill) may potentially interact with sensitive habitats.

Water (Hydrology); Construction activities has potential to interact with environmentally sensitive locations of the site, including water bodies or water course that have ecological and hydrological value.

The Environmental Impact Assessment process involved extensive surveys and interactions within the project team being carried out over several years. The flora, fauna and habitats within the proposed development area are outlined in detail and the potential impacts on biodiversity and designated sites were assessed. Detailed mitigation measures have been outlined and will be carried out during the construction and operational phases of the development. In conclusion, the proposed development has satisfactorily addressed the potential impacts on biodiversity on site and within the potential zone of influence. It is considered that the retention of key habitats on site and the robust mitigation and enhancement measures proposed significantly reduces the possible impact of the proposed development on biodiversity.

The overall impact on the biodiversity of the proposed development is a long term neutral residual impact on the existing biodiversity. However, the implementation of the proposed landscaping would provide significant on site biodiversity enhancement features and provide long term positive benefits to the biodiversity on site.

16.4.3 Land, Soils & Geology

Chapter 6 assesses the likely impacts on Land, Soils & Geology arising from the proposed development. During Construction;

Population: Construction activities may result in an increase in earth movements and dust which has the potential to negatively impact on local populations.

Biodiversity: Construction activities may result in an interactions with existing habitats and species. Any negative impacts on water quality such as increased discharge of silt or sediment to surface water may result in impacts to biodiversity downstream of the site.

Water: Construction activities may result in interactions with existing water courses on the subject site.

Waste The management of construction of activity gives rise to potential impacts and interactions.

With mitigation measures in place, no significant residual negative impacts are predicted.

16.4.4 Air Quality and Climate

Chapter 8 assesses the likely impacts on Air Quality and Climate arising from the proposed development. During the construction phase, the following aspects would interact with Air Quality and in the absence of mitigation may give rise to likely significant effects.

Population and Human Health: Construction activities may result in a decrease in local air quality which has the potential to negatively impact on human health.

The mitigation measures that will be put in place at the proposed development for the construction phase will ensure that the impact of construction dust emissions in the form of nuisance dust soiling or human health effects are short-term and negative but overall imperceptible.

During operation, the potential interactions are:

Population and Human Health: Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the scheme with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the proposed scheme are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health.

No potential operational interactions were identified, and no other potential significant interactions have been identified other than those already described. The potential significant impacts to Air Quality have been considered within the relevant discipline and mitigation measures outlined where required.

With mitigation measures in place, no significant residual negative impacts are predicted.

16.4.5 Landscape and Visual Assessment

Chapter 10 assesses the likely impacts on landscape, and the visual impacts arising from the proposed development. During the construction phase, the following aspects would interact with Landscape and in the absence of mitigation may give rise to likely significant effects.

Population and Human Health: Potential effects to visual amenity within the locality or the wider study area as a result of the visibility of construction activities such as demolition works, the construction restoration of buildings, associated scaffolding, site traffic and construction compounds.

During operation the potential interactions are:

Population and Human Health: Potential effects of the development on views and visual amenity such as the potential for the development to alter (beneficial or adverse) the composition of the view from a viewpoint. The potential significant impacts of Landscape have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

Biodiversity: Potential impacts on biodiversity may arise due to planting and amenity proposals.

With mitigation measures in place, no significant residual negative impacts are predicted.

16.4.6 Noise and Vibration

Chapter 9 assesses the likely impacts on Noise and Vibration arising from the proposed development. During the construction phase, the following aspects would interact with Noise and Vibration and in the absence of mitigation may give rise to likely significant effects.

Population and Human Health: Increased levels of noise and vibration during construction activities may result in negative impacts to the amenity of local residents.

During operation, the potential interactions are:

Population and Human Health: Once the development is fully occupied increased levels of noise due to increased traffic and activity may result in negative impacts to the amenity of local residents.

No other potential significant interactions have been identified other than those already described. The potential significant impacts of Noise and Vibration have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

16.4.7 Archaeological, Architectural and Cultural Heritage

Chapter 11 assesses the likely impacts on Archaeological, Architectural and Cultural Heritage arising from the proposed development. During the construction phase, the following aspects in the absence of mitigation may give rise to likely significant effects.

Land, Soil and Geology: Earth works and construction activities have potential to interact with archaeological sites.

Biodiversity: The Greystones Stream dissects an existing archaeological site with potential to interact with the feature.

During operation, the potential interactions are:

Population and Human Health: Once the development is fully occupied the population has an opportunity to interact with archaeological sites with potential positive cultural and amenity impacts.

Landscape and Visual Assessment: Landscaping and amenity proposals have potential to affect the presentation and interpretation of archaeological sites.

With mitigation measures in place, no significant residual negative impacts are predicted.

16.4.8 Traffic and Transportation

Chapter 12 assesses the likely impacts on Traffic and Transportation arising from the proposed development. The following aspects would interact with Traffic and Transport and in the absence of mitigation may give rise to likely significant effects.

Population and Human Health: Construction stage traffic and traffic management measures have the potential to affect journey amenity or economic activity as a result of congestion or access restrictions

Noise and vibration: Construction traffic may give rise to local noise and vibration which may have an impact on the amenity of local residents;

Air Quality and Climate: Emissions from construction traffic may result in a decrease in local air quality. Increased greenhouse gas emissions from construction traffic may contribute to climate change.

Water (Hydrology): Construction vehicles at the site may give rise to hydrocarbon spills.

Waste Construction stage traffic have the potential to be impacted by waste generation and resource management on site.

During operation the potential interactions are:

Population and Human Health: Operational stage traffic and traffic management measures have the potential to affect journey amenity or economic activity as a result of congestion or access restrictions.

Noise and vibration: Operational traffic may give rise to local noise and vibration which may have an impact on the amenity of local residents.

Air Quality and Climate: Emissions from traffic may result in a decrease in local air quality. Increased greenhouse gas emissions from traffic may contribute to climate change.

Water (Hydrology): Increased traffic and parking at the site may give rise to hydrocarbon spills from vehicles.

The potential significant impacts of Traffic and Transport have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

16.5 Cumulative Effects

The EU Guidelines define cumulative effects/impacts as:

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

- *Incremental noise from a number of separate developments;*
- *Combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and*
- *Several developments with insignificant impacts individually but which together have a cumulative effect."*

The EPA draft guidelines on the information to be contained in EIAR's mirrors this approach and defines cumulative impacts/effects as *'The addition of any minor or significant effects, including effects of other projects, to create larger, more significant effects'.*

Therefore, the assessment of cumulative impacts considers the total impact associated with the Proposed Project when combined with other past, present and reasonably foreseeable future developments.

An examination of the potential for other projects to contribute cumulatively to the impacts from this Proposed Project was undertaken during the preparation of this EIAR. This assessment has considered cumulative impacts that are:

1. Likely;
2. Significant; and
3. Relating to an event which has either occurred or is reasonably foreseeable together with the impacts from this development.

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. Data sources included the following:

- Wicklow County Council (planning and roads section);
- An Bord Pleanála website;

- Wicklow County County Development Plan 2016-2022;
- Greystones – Delgany and Kilcoole Local Area Plan (LAP), 2013-2019;
- Coolagad Action Plan
- EIAR Portal.

Relevant development proposals and decisions are outlined as follows:

16.5.1 Relevant Planning History - Application Site

There is no relevant history on the application site.

16.5.2 Relevant Planning History - Surrounding Areas

The figure below shows the location of the estates subject of the planning history detailed in the sections hereafter.

Relevant Planning History - Estate

The Waverly estate is located generally east of the site.

Table 16-2: Relevant Applications at Waverly

Reference	Status	Decision Date	Summary
072799/ ABP 230050	Expired	ABP Grant 03/06/2009	159 residential units
114336/ABP 239380	Incomplete	22/12/11	Amendments to 072799
141952	Parent permission	01/04/2015	130 houses and creche
16783	Grant	07/09/2016	Temporary access gates
17461	Grant	19/06/2017	Extension of duration

Relevant Planning History - Seagreen Estate

The Seagreen Estate is located generally south east of the site.

Table 16-3: Relevant Applications at Seagreen

Reference	Status	Decision Date	Summary
141031	Grant	01/10/2014	Parent permission 187 houses
151152	Grant	16/01/2016	Amendments
16420	Grant	15/06/2016	Amendments
16971	Grant	26/10/2016	Amendments
161066	Withdrawn	n/a	Amendments
1722	Grant	08/03/2017	Amendments
17880	Grant	02/11/2017	Amendments
18111	Grant	02/04/2018	Alter 38 kv

18627	Grant	01/08/2018	Amendments
191089	Grant	01/12/2019	Extend appropriate period – substantial completion

Relevant Planning History - Schools

A number of schools are located adjacent to the site to its east.

Table 16-4: Relevant Applications at Adjacent Schools

Reference	Status	Decision Date	Summary
126589	Permitted	04/01/2013	Three storey school, access to ET school
138103	Permitted	17/04/2013	New school (Temple Carrig)
15608	Permitted	09/08/2015	New Irish school
15814	Permitted	01/10/2015	Sports lights for hockey pitch

Relevant SHD Applications in the Wider Area

Table 16-5: Relevant SHD Applications

Reference	Status	Summary
ABP.Ref.305476	Permitted 15/01/2020	Farankelly and Killincarraig townlands, Delgany 426 no. residential units (245 no. houses and 181 no. apartments) and creche.
ABP.Ref.305773	Permitted 19/02/2020	"Glenheron C", Greystones, 354 no. residential units (124 no. houses, 230 no. apartments)

16.6 Cumulative Impacts

16.6.1 Population

The proposed development will introduce a new residential population on a greenfield site in a suburban area of north Greystones. Based on the average household size for Greystones settlement (2016 Census) of 2.89, the development would create a new population of the order of 1,694 persons upon completion. The proposed layout provides for linkages to designated zoned residential lands north of the distributor road as well as lands to south facilitating future development. There are no current proposals for adjoining sites. The provision of social infrastructure is integral to the scheme with the provision of amenities, childcare, community and sports facilities.

Overall, the development supports the sustainable long-term development of Greystones in accordance with strategic plans for the area. The cumulative impact is considered to be moderate, long-term and positive.

16.6.2 Land, Soil and Geology

During construction, excavated soils and other surplus materials and or wastes from the Site could potentially be directed to the same authorised destination locations (sites or facilities) as materials from other permitted developments. All surplus materials from the Site will be managed in compliance with relevant materials and waste management legislation and directed to appropriately permitted or licensed waste facilities operated in compliance with the relevant statutory consents. Surplus soil by-product will only be directed to development sites under Article 27 By-Product Notification when it can be demonstrated that all tests for Article 27 compliance are met. Accordingly, it is considered that any cumulative impact on the land, soils and geology associated with the Proposed Development would be 'neutral', 'imperceptible' and 'permanent'.

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

16.6.3 Water

During Construction, the Proposed Development will be connected to the existing water main serving the Greystones area which is supplied by the connection to Irish Water mains supply operated in accordance with relevant existing statutory consents therefore there will be no cumulative impacts associated with the Proposed Development on water resources.

As capacity within the existing foul sewer network has been confirmed and Greystones WwTP operates under existing statutory consents there will be no cumulative impacts on the receiving water environment associated with discharges from the Proposed Development.

There are no cumulative impacts on the receiving water environment associated with the Proposed Development and considered offsite developments. There are no potential other cumulative impacts associated with the Proposed Development.

16.6.4 Air Quality and Climate

The cumulative effects on the air quality and climate of the current Proposed Development and other planned or existing developments have been considered, in particular through the generation of air pollutants and GHG emissions. There are no planned or proposed projects located in close proximity to the Proposed Development with potential to result in cumulative impacts, therefore cumulative impacts are not predicted in this regard.

Assessment of operational stage impacts involved traffic data which is inclusive of traffic associated with other existing and permitted developments in the vicinity of the Site. Therefore, cumulative impacts have been assessed in this regard and the impact has been determined as negligible

16.6.5 Noise and Vibration

Construction activities were noted on the adjoining site to the south during the site visits undertaken in April 2021 and are nearing completion in March 2022. It is likely that this site will

be at a different stage of development compared to the proposed SHD subject to this assessment. Additionally, as the sites are large, it is unlikely that individual NSRs in Seagreen and Waverly will be affected at levels exceeding the noise criteria for short term site development and construction activities.

Although the limits are not expected to be exceeded based on above predictions in Section 9.5.1.4, mitigation measures to minimise the impact of site development and construction noise on the nearest NSRs and to ensure compliance with construction noise criteria are set out in Section 9.8 - Ameliorative, Remedial and Reductive Measures.

The potential long term cumulative impact of traffic related noise has been addressed above in the assessment of traffic related noise emissions arising from the proposed SHD. Refer to Section 9.5.2.1 earlier.

The cumulative impacts of both increased traffic noise and MUGA related sports noise at the boundary at NSR2 has been considered. At the boundary of the property, MUGA related noise will predominate, therefore the expected cumulative effect with existing and proposed road traffic noise is expected to be long term major negative.

16.6.6 Landscape and Visual Assessment

In addition to recently completed Waverly residential development to the east, the subject site is bordered by a number of parcels of land which are zoned for residential development by Wicklow County Council; this includes Seagreen estate to the south, which is soon to be completed but still under construction. The parcel to the immediate north of the proposed development is zoned for residential development. A development of a similar size, scale, and character will likely be located here. It is also likely that its individual impact on landscape and visual resources will be similar. The parcel to the immediate south of the proposed development is zoned for residential development. A development of a similar size, scale, and character will be located here and its individual impact on landscape and visual resources will be similar. The parcel to the southwest of the proposed development is zoned for residential development.

The cumulative impacts, once they are operational, will ultimately arise from the presence of the proposed residential development and the aforementioned future residential developments within adjacent lands which have been zoned for such development by Wicklow County Council. There will likely be some local biodiversity loss that arises from the removal of vegetation to facilitate development. However, through best practice in the overall site layout and design approach, this biodiversity loss can be reduced or offset by incorporating existing and proposed ecological features within the new developments. In addition, certain views towards these new developments will likely be altered, but these changes would have at most a moderate impact and could not be considered as having a significant impact on the receiving environment.

The landscape quality of the adjacent zoned lands will be altered from an agricultural character to an urban/residential character. This change however must be considered in the context of the future development's proximity to the established town of Greystones and with regard to the scale of the future development when compared with the adjacent town. The impact of the proposed development when assessed cumulatively with adjacent residential developments that have been constructed recently or which are under construction, and other past developments within the adjacent town of Greystones is likely to be reduced. This is in part due to the precedent which has been set by the construction of new residential developments, such as Waverly and Seagreen, and the role they play in reducing the magnitude of the impact of future developments of similar nature, as well as the sensitivity of the receiving environment

perceived by receptors. This reduction of impact is also due to the relatively small scale of these future residential developments when compared with the town of Greystones overall.

Ultimately, with regard to this context and reasons outlined above, the significance of these cumulative impacts will be moderate as they will alter the character of the environment in a manner that is consistent with settlement change and development. The quality of these cumulative impacts on the landscape will be neutral as they will not affect the quality of the baseline environment in such a way as to improve or reduce it. The duration of these cumulative impacts will be permanent as they will likely last over sixty years.

16.6.7 Transport and Traffic

An assessment was undertaken of potential developments that may come on stream and impact on the forecast traffic flows for this development. It was considered that the traffic associated with these would not impact on the assessed network as they were likely to use alternative routes for travel e.g using the N11 to travel north.

The forecast flows for the development were added to the 'growthed' background traffic flows and the operational assessment of the local road network has been undertaken using Linsig v3 for signalised junctions. When considering signalised junctions, a Degree of Saturation (DoS) of greater than 90% would indicate a junction to be approaching capacity, as operation above this DoS value is poor and deteriorates quickly resulting in traffic congestion in the form of longer queues.

Linsig v3 is an industry standard software to model the capacity and queuing of signalised junctions. The meaning of the acronyms used within the capacity assessment results are discussed below.

- DoS Degree of Saturation
- MMQ Mean Max Queue length

It is generally accepted that DoS values of 90% and less are indicators that a junction is operating within capacity. Junctions are only identified as operating over capacity if these values are exceeded.

R761 / Coolagad Link Road

A model was completed using traffic surveys to assess the traffic volumes for the AM and PM peak period and future assessment years with and without the development in place at the R761 / Coolagad Link Road which is proposed to be signalised to benefit active travel users. A summary of the results is shown in Table 12-4 with the full Linsig outputs contained within Appendix C (see Table 12-4)

Based on the analysis of R761 / Coolagad Link Road junction, it is clear that with the inclusion of the junction along the R761 and addition of full development traffic, this would not result in unsatisfactory operation of the local road network. The junction will continue to operate within capacity throughout the 2023 (opening year) to the 2038 (opening year + 15) assessment with the development in place.

R761 / Black Lion Manor Road / Redford Park

In addition to the R761 / Coolagad Link Road junction, the existing signalised R761 / Black Lion Manor Road / Redford Park junction has also been assessed for its proposed updated layout. A summary of the results is shown in Table 12-5 with the full Linsig outputs contained within Appendix C. See Table 12-5.

Based on the analysis of junction, it is clear that the with the inclusion of the development traffic would not result in unsatisfactory operation. The junction will continue to operate within capacity throughout the 2023 (opening year) to the 2038 (opening year + 15) assessment with the development in place.

As demonstrated in the 2023 assessment year, the proposed site access will result in a maximum DoS value of 74.2% with a corresponding MMQ of 31.1 over two approach lanes during the AM Peak period whilst during the PM Peak it is anticipated that the maximum DoS will be 64.7% with a corresponding MMQ of 25.1. In comparison to the 2023 assessment without development trips this is considered to represent an insignificant impact on the junction.

16.7 References

European Commission (1999), Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. European Commission, Luxembourg.

Environmental Protection Agency (2017) Draft, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA. Wexford.

Health and Safety Authority (2018) Notified Seveso Establishments.www.hsa.ie

17 Summary of Mitigation Measures

17.1 Introduction

This chapter presents a summary of the key mitigation measures identified within Chapters 5 to 18 of this Environmental Impact Assessment Report (EIAR). Mitigation describes the measures proposed in order to avoid, reduce and where practicable remedy significant adverse effects. It is also a means by which design decisions for the Proposed Project are modified to avoid, reduce or remedy the adverse environmental effects that are identified.

Mitigation measures have been incorporated into the design of the Proposed Project and will be applied during the construction and operation of the Proposed Project. All mitigation measures are based on the Proposed Project as described in Chapter 2, 'Description of the Scheme. Individual chapters of the EIAR should be referred to for context and detail of specific mitigation measures however a summary has been presented in the tables below. The mitigation measures for both the construction and operational phases are detailed as appropriate.

An Outline Construction and Environmental Management Plan (CEMP) prepared by AECOM has been submitted to An Board Pleanala as part of the SHD planning application package.

17.1.1 Competent Expertise

This chapter has been by prepared and collated by Richard Hamilton, BA, MSc, PGDip EMAE (Environmental Monitoring Assessment and Engineering), MIPI, MRTPI, Director for MacCabe Durney Barnes.

17.2 Mitigation

The draft EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017) identifies that there are 4 established strategies for the mitigation of effects; avoidance, prevention, reduction and offsetting.

Mitigation by Avoidance: Avoidance usually refers to strategic issues, such as site selection, site configuration or selection of process technology. This may be the fastest, cheapest and most effective form of effect mitigation. In some cases mitigation by avoidance may also be considered as part of the "consideration of alternatives".

Mitigation by Prevention: This usually refers to technical measures. Where a potential exists for unacceptable significant effects to occur (such as noise or emissions) then measures are put in place to limit the source of effects to a permissible and acceptable level.

Mitigation by Reduction: This is a very common strategy for dealing with effects which cannot be avoided. It tends to concentrate on the emissions and effects and seeks to limit the exposure of the receptor. This is regarded as a less sustainable, though still effective, approach, implemented through reducing the effect and/or reducing exposure to the effects.

Mitigation by Remedy/Offsetting: This is a strategy used for dealing with adverse effects which cannot be prevented or reduced. Remedy is compensating for or counteracting adverse effects. Examples include increased planting of specific trees/shrubs to replace unavoidable loss of vegetation, or provision of a new amenity area to compensate for the unavoidable loss of access

to the grounds of an old house. Examples of Offsetting include reinstating buildings, walls or features, or the introduction of tunnels to enable wildlife to access other comparable habitats.

17.3 Mitigation Measures

Table 17-1 provides a summary of Mitigation measures provided for in Construction and Operation phases as presented in the specialist Chapters in this EIAR.

Table 17-1: Description General Mitigation Measures

Chapter	No.	Construction	Operation
Population and Human Health	4	Mitigation measures relating to those factors under which human health effects might occur have been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, air quality and climate, noise and vibration, townscape and visual and material assets: utilities 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. The proposed development is predominantly residential in character and it is considered that the greatest health and safety risks will be posed during the construction phase of the proposed development. As with any construction site, there will be potential risks to the health and safety in terms of injury or death of construction personnel on-site due to the usage of large, mobile machinery as well as heavy equipment and materials. An Outline Construction Demolition and Waste Management Plan (CDWMP) has been prepared. A CEMP is included with the SHD application material. The outline plan outlines the proposed works and how these works will be managed for the duration of the construction on site. These outline documents will be further updated by the contractor and agreed with Wicklow County Council prior to commencement to any construction works on site. The construction activities will occur in the context of a green-field site, and there are no existing residents at this location that may be disrupted by these works. Chapter 8 (Air Quality and Climate) identifies that the greatest potential impact on air quality during the demolition and construction phase of the proposed development is from soil excavation and construction dust emissions and the potential for nuisance dust. The Air Quality Assessment provides for 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	The Alternatives Chapter of this EIAR explains how the proposed residential development has evolved in design at pre-application stages to address opportunities and constraints afforded by the location. development provides for the following • To accommodate population growth, it provides proximity to local facilities, service and infrastructure • To address amenity demands of the new population, there is provision of on-site and community centre, playing field and amenity open space • To address Social Infrastrutcure there is provision of a creche and proximity to local schools 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. A lack of adequate recreation or amenity facilities has the potential to negatively impact human mental and / or physical health. The proposed layout provides for excellent public amenity and recreational facilities, including communal amenity space, public open space.

		legislative limit values which are based on the protection of human health Therefore, the impact of construction of the proposed development with mitigation measures in place is likely to be short-term, negative and imperceptible with respect to human health.	
Biodiversity	5	1. As existing springs, a watercourse and drainage ditches are present on site and substantial reprofiling and instream works are proposed, a project ecologist will be appointed prior to works or site clearance commencing on site. A project ecologist will oversee the project from prior to the commencement to the completion of the project including all landscaping, construction and drainage connections. 2. The retention of existing habitats outlined above including springs, hedgerows and wetland areas will involve significant input from a project ecologist and arborist prior to construction commencing on site. The names, qualifications and experience of the ecologist, hydrologist and arborist will be provided to WCC prior to any works commencing on site. 3. Tree retention will be carried out as outlined in the arborist report. Additional exclusion zones will be implemented by the project ecologist in order to protect biodiversity on site. 4. A specific site clearance, reprofiling and phasing plan will be provided to the arborist and project ecologist for approval prior to any site clearance or works commencing on site. No site clearance works will commence on site until approval has been provided by the arborist and project ecologist for the works to commence. 5. All site clearance, reprofiling and enabling works will be approved and monitored by the arborist and project ecologist to ensure that the integrity of the remaining habitats on site are maintained. 6. All works in the riparian corridor will be carried out in consultation with and to the satisfaction of Inland Fisheries Ireland and the project ecologist, following the best practice guidelines for construction in the vicinity of watercourses. All works on site and in the riparian corridor will include mitigation measures to prevent silt from runoff during works as set out below. 7. All works in the riparian corridor will be approved by Inland Fisheries Ireland prior to works commencing. 8. Abstraction of water from the watercourse or springs will not be permitted. 9. Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation the removal of woody vegetation to outside bird nesting season will be carried out. Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. If bird nests are present the woody vegetation will not be removed unless a derogation licence has been provided by NPWS and the conditions applied. 10. 50 Nest boxes placed on site during landscaping to compensate for resource loss.	1. Post construction an inspection of drainage connections to the watercourse will be carried out by the project ecologist. 2. A Habitat management will be prepared jointly by the Landscape Architect and Ecologist for the management of biodiversity and landscaping on site. 3. A post construction lighting assessment will be carried out to ensure compliance with the proposed lighting and a bar survey will be carried out to ensure foraging is continuing on site. Should foraging be inhibited in key foraging areas on site the lighting will be locally revised in consultation with a bat ecologist to ensure foraging continues on site.

		11. Light falling upon any areas of benefit to birds such as hedgerow will not exceed 3 lux to ensure that resting and nesting species are not unnecessarily disrupted. 12. A biodiversity pack will be presented to each registered owner upon moving in. This will outline the importance of biodiversity of the area and additional biodiversity resources to promote and enhance biodiversity within each of the developments. 13. A pre construction survey for invasive species, bats and terrestrial mammals will be carried out. This will include an inspection for resting and breeding places for both terrestrial mammals and bats. Should resting or breeding places be found a derogation licence will be acquired from NPWS and conditions followed prior to works commencing in the vicinity of the resting or breeding place. 14. Lighting at all stages should be done sensitively on site as directed by the project ecologist, with no direct lighting of hedgerows and treelines. 15. Replanting of the riparian corridor will be at the initial phase of the project.	
Land, Soil and Geology	6	Public Open spaces across 10.43Ha of the Site will include green spaces and appropriate management and retention on site of soil Soil and subsoil will be retained and re-used within the Proposed Development Site for engineering fill and landscaping. Surplus soil and subsoil, which is clean and inert, will be re-used off site in accordance with appropriate statutory consent procedures including Article 27 to prevent the loss of the valuable soil resource to landfill. Topsoil will be stockpiled in a controlled manner and retained for future re-use in landscaping onsite and surplus material will be directly removed for re-use offsite where appropriate. Detailed design will be specified by an appropriately qualified geotechnical Engineer for the soil cut and fill requirements at the Site to ensure that ground stability is engineered and controlled appropriately. The cementitious materials used during construction will avoid any contamination of soil and geology through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards and the CEMP for the works. All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for use and containment of fuels and other hazardous materials. Contract and procurement procedures will ensure that all imported aggregates meet with industry conformity/compliance standards and statutory obligations	There is no requirement for ameliorative, remedial or reductive measures for the Operational Phase of the Proposed Development.
Water	7	Dewatering will be undertaken in accordance with robust dewatering strategy and requirements of the CEMP	Detailed groundwater drainage design will ensure that local groundwater flow across the site is maintained

		Discharge to ground that may be required and will be managed in accordance with EPA guidelines. All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for handling, use and containment of fuels and other hazardous materials. Robust dewatering strategy will be implemented. Contract and procurement procedures will ensure compliance statutory obligations. All materials will be managed in accordance with the CDWMP for the Proposed Developments All materials will be managed in accordance with the CDWMP for the Proposed Developments. Transport of materials to and from the Site will be undertaken in accordance with measures set out in the CEMP for the Proposed Development to prevent debris being tracked onto roads. All instream works or works carried out adjacent to the Greystones Stream will follow relevant guidelines published by Inland Fisheries Ireland (IFI) and The National Roads Authority (now Transport Infrastructure Ireland) regarding instream works and river crossings. A 10m buffer will be maintained around water coursed for any works other than necessary in-stream works. Stockpiles will not be stored within this 10m buffer and will be managed to prevent sediment in runoff. The cementitious materials used during construction will avoid any contamination of soil and geology through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards and the CEMP for the works. All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for handling, use and containment of fuels and other hazardous materials. Contract and procurement procedures will ensure that all imported aggregates meet with industry conformity/compliance standards and statutory obligations	
Air and Climate	8	It is not expected that adverse air quality impacts are likely to occur at sensitive receptors as a result of the Proposed Development. However, the following mitigation measures are recommended in order to further prevent such impacts occurring. Additional measures have been outlined within the Construction Environmental Management Plan (CEMP) for the Site and these will be employed as necessary. • Enclosed vehicles or tarpaulins shall be used to transport debris, aggregates, and fine materials to and from the site to prevent blow-off of such materials; • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind and shorten the length of time for which material will be stockpiled;	It has been determined that the Operational Phase air quality impact is negligible and therefore no site-specific mitigation measures are proposed.

		• Hard surfaced areas shall be swept regularly to remove mud and aggregate materials; • Watering can also be utilised to keep unpaved areas moist, preventing dust generation. The required application frequency will vary according to soil type, weather conditions and vehicular use; • Dust suppression techniques will include employment of water bowsers to dampen the Site and haul roads, and temporary ceasing of specific operations during unfavourable weather conditions; • Wheel washing stations will be available to trucks exiting the site where necessary; • Public roads should be inspected on a daily basis (at a minimum) for cleanliness and cleaned as necessary in order to avoid causing a hazard to road users; • Exhaust emissions of volatile organic compounds, nitrogen oxides, and sulphur oxides from vehicles and machinery will be minimised by avoidance of engines running unnecessarily as idle engines shall not be permitted for excessive periods; • Unnecessary vehicle movement and manoeuvring will be avoided, and speed limits will be in place so as to prevent resuspension of particulate matter. • Daily visual observations will be made on fugitive dust levels; in the event of high dust levels, operations giving rise to such emissions will be ceased or curtailed.	
Noise and Vibration	9	The threshold or limit values for the site development and construction phases are not expected to be exceeded. Nevertheless, the following noise and vibration management measures shall apply to the proposed project to ensure the threshold values are complied with: • A Site Representative shall be appointed for matters related to noise and vibration. • Any complaints received shall be thoroughly investigated. • A written complaints log shall be maintained by the Site Representative. This shall, at a minimum, record complainant's details (where agreed) the date and time of the complaint, details of the complaint including where the effect was observed, corrective and preventative actions taken and any close-out communications. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the site. • Noise monitoring with capability for real-time review both on-site and remotely shall be conducted at nearby NSRs throughout the site development and construction phases. The equipment shall be moved as appropriate depending on location of works and proximity to nearby NSRs. • In the event of exceedance of the limits at NSRs, works shall be ceased and measures implemented immediately to ensure that the limits are complied with. • Temporary acoustic screening shall be placed along the boundaries with NSRs at Waverly, the	A 2-3m berm is proposed along the boundary with NSR2 to mitigate the effects of MUGA related noise. The berm will, at a minimum, "break the line of sight" from the boundary of the property to the MUGA, assuming a height of 1.5m above ground level in the garden. This will ensure that external private amenity areas will not be above the range 50 – 55 dB LAeq,16hr. Additionally, the landscaping plan will provide planted screening to NSRs 1 and 2 (including the cottages in the farmyard). This will not quantitatively mitigate noise but will qualitatively improve perceived tranquility for existing residents. A management plan will be developed for the MUGA which ensures that issues such as the use of offensive language are avoided. Based on 2038 traffic flows for the Coolagad Link Road and corresponding estimated external noise levels, moderate sound insulation performance glazing and acoustically attenuated ventilation opes will ensure that the criteria for good resting, dining and sleeping conditions will be met in units where internal criteria with partially open windows cannot be met ie. units with facades < 10m of the Coolagad Link Road. It is however noted that a long objective for the Coolagad Link Road is to extend it to the N11. As a result, traffic flows and traffic

		gate lodge and the existing landowners residential dwellings where works take place close to the boundary. As a general rule of thumb, it is recommended that temporary screening break the "line of sight" from the sources to the windows of the nearest NSRs where possible. • The operation of certain pieces of equipment, where substitution etc cannot be carried out shall be managed through monitoring and timing of use to ensure that the threshold values/criteria specified are complied with. • During the construction phase all equipment shall be required to comply with noise limits set out in EC Directive 2000/14/EC and the 2005/88/EC amendment on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. The directive covers equipment such as compressors, welding generators, excavators, dozers, loaders and dump trucks. • The final piling method chosen shall include a consideration of low noise and vibration methods as described earlier in Section 9.5.1.3. As a precautionary measure, vibration monitoring shall be carried out where works are in close proximity to NSRs especially during piling. In this regard, test monitoring will be conducted with the equipment on at low levels before increasing incrementally to operational levels if deemed necessary. Works will be ceased and mitigation measures implemented where monitoring detects vibration levels associated with the works above the relevant guidance values set out in Section 9.5.1.2 The outline CEMP submitted with this application shall include the noise and vibration management measures listed above.	noise may potentially significantly increase in the future, (notwithstanding that a portion of cars will be electric). Therefore, in order to future proof the development, it is recommended that high performance glazing be considered for facades of units facing towards the Coolagad Link Road. The final specifications for glazing and ventilation grilles shall be approved by an acoustic specialist at detailed design stage. It is recommended that glazing suppliers provide laboratory tests confirming the sound insulation performance to BSEN ISO 140 Part 3 1995 and BS EN ISO 717, 1997. Balustrades on balconies for units close to road shall be as high as possible to improve usability from a noise perspective. Where possible, the balustrades shall be made from a solid material (surface density 10 kg/m2) with no gaps in the construction where possible, taking account of other design requirements where necessary such as adequate daylight. Screening, in the form of blockwork walls, will be provided to gardens with boundaries within 10-20m of the roadside to mitigate the effects of traffic noise on these private spaces and ensure traffic noise is not above the range 50 -55 dB LAeq,16hr.
Landscape and Visual Impact	10	• Height of temporary stockpiles to be restricted to a practicable minimum to avoid impact on local sensitive receptors. • Hoarding will be erected around site boundaries to reduce visual impact of construction works • Plant will be held in designated compound on site • Protective fencing will be installed around the Root Protection Areas (RPAs) of existing boundary trees and tree lines particularly to the tree groups identified to the east of the site. • Visual impacts during the construction phase will be mitigated somewhat by appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish. • Appropriate site hoardings will be put in place around the perimeter of the site where required to minimise the landscape and visual impact. • The existing topography, which has informed the design in terms of the overall urban structure, arranging the different housing cells and road alignments according to the ground contours. This principle enables to minimise ground works during construction.	• The existing topography has informed the design in terms of the overall urban structure, arranging the buildings and road alignments according to the ground contours. This enables an integrated insertion of the proposed neighbourhood into the overall site landscape, mitigating the visual impact on the receiving environment and maximising the preservation of existing natural assets such as hedgerows, trees, streams, and wetland areas. • Through the positioning of the various elements of the development on site in order to enhance the appearance of the residential development as a whole through the design of the site layout and built form. • The creation of high quality public and semi-public spaces for the use and amenity of the users of development. A high-quality and varied palette of materials, consisting mainly in two types, namely buff and red reinforces the distinctiveness and variety throughout the site. The overall scheme is unified by a choice of red roof tile and pale plaster render. This material choice will ensure that the buildings proposed are durable as well as being of high quality

			visually. High quality materials are proposed throughout the scheme combined with the appropriately located landscaped open space areas. Urban context informs the overall site design according to high-quality visual amenity and existing residential pattern. The scheme takes adjacent residential landholdings located south and east by proposing a similar housing fabric at those locations to merge with the existing urban grain in terms of scale - 2-storey terraced, semi-detached and detached housing developed at an appropriate density - and architectural style, including form and materials. Future western residential developments are also considered in terms of urban continuity and connections through the green corridor envisaged at that location. Landscape Design The following mitigation measures are outlined within the Landscape Report prepared by Kevin Fitzpatrick Landscape Architects and provide a summary of the measures to be applied to mitigate impacts on the landscape baseline: • The landscape strategy aims to integrate the proposed residential development with the existing landscape. • The protection and enhancement of existing landscape features, notably large trees, the stream, wetland marsh and native hedgerows • The central open space is created around the stream and primarily focused of protection of the existing vegetation and underground archaeology and creation of new native habitats. • Linear parkland is to be provided on most perimeters of the site providing a range of habitats and spatial uses. • Green infrastructure links are provided through out the site, linking the various landscape spaces, and creating ecological corridors linking to other landscape elements outside of the site boundary. • A series of open spaces and parkland are connected by linear green links which are based on existing landscape features. These existing features form part of the existing green infrastructure links within the site and surrounding area.
Cultural Heritage, including Archaeology	11	The northern 60% of Archaeological Area 1, will be preserved in-situ beneath public amenity greenspace within the development. To ensure the integrity of the archaeology, a Construction Exclusion Zone will be established around this area. This will be delineated by a 1m high post and sheep-wire fence at a minimum of 5m distant from the recorded remains. The fence will be removed upon completion of the construction phase of the project. This area will be precluded from use as a compound or stockpile area and no services or drainage runs will be installed within the Construction Exclusion Zone. This public amenity greenspace will be landscaped to ensure that the	•A Monument Management Plan has been drafted in consultation with the National Monuments Service to ensure that the archaeology preserved in-situ beneath the public amenity greenspace be protected during the operational phase of the development (Appendix 11.8). • The mounded areas of imported topsoil will be planted with copses of the following native broadleaf species: Betula pendula, Corylus avellana, Crataegus monogyna, Malus sylvestris, Sambucus nigra, Sorbus aucuparia. The area surrounding Archaeological Area 1

		underlying archaeology is protected (Figure 11.8 and Appendix 11.8). The existing hedgerows will be retained. The existin Height of temporary stockpiles to be restricted to a practicable minimum to avoid impact on local sensitive receptors. • Hoarding will be erected around site boundaries to reduce visual impact of construction works • Plant will be held in designated compound on site • Protective fencing will be installed around the Root Protection Areas (RPAs) of existing boundary trees and tree lines particularly to the tree groups identified to the east of the site. • Visual impacts during the construction phase will be mitigated somewhat by appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish. • Appropriate site hoardings will be put in place around the perimeter of the site where required to minimise the landscape and visual impact. • The existing topography, which has informed the design in terms of the overall urban structure, arranging the different housing cells and road alignments according to the ground contours. This principle enables to minimise ground works during construction. Greystones Stream will be maintained – ensuring no substantive change to local hydrology (though some gorse thickets will be removed to improve the amenity value of the space). All pathways installed within this area will be constructed as 'no-dig' features on formation layers of imported subsoil that will be laid over the current ground surface. The importation of topsoil for the tree planting and subsoil for the formation material for the 'no-dig' paths will be carried out using lightweight dump truck (8 tonnes) and lightweight mechanical excavator (5-8 tonnes). This work be carried out during a period when the ground is dry and the use of displacement mats will be considered should there be a requirement to track over any soft ground. • The southern 40% of Archaeological Area 1 and Archaeological Areas 2, 3a-e, 4a-b, 5a & b, 6, 7 and 8 will be preserved by record (archaeological excavation) in advance of construction activity. Preservation by record will be undertaken under licence to the National Monuments Service of the Department of Housing, Local Government and Heritage (DoHLGH), with work being undertaken in accordance with a pre-agreed methodology that would include detailed finds retrieval and environmental remains strategies. • Archaeological monitoring of the topsoil stripping across the site will be undertaken in order to identify any archaeological features that have the potential to survive outside of the identified Archaeological Areas. While stockpiled soil may be managed with bulldozers, the removal of the topsoil across the site will be carried out using back acting 360 degree tracked excavators fitted with toothless grading buckets. If any features of archaeological potential are discovered during the course of the works further archaeological	will be allowed to grow naturally as meadow. Some initial intervention may be required to seed the area, though this will be restricted to sod level. No cultivation or ground disturbances are required to create this environment. • Maintenance of the grassland, stream and woodland copses will be low interaction, and will be covered within a 'Taking Charge Strategy' that will be required to be adopted within the contract of the management company that will be appointed to maintain the parks. It is envisaged that maintenance will comprise hay cuts two or three times a year to prevent any large shrubs or trees taking root, pruning of the broadleaf copses and maintaining the stream free of rubbish or detritus. • Currently there are no plans for additional planting within Archaeological Area 1. However, should this be required in the future, planting within the green space containing the enclosures will be carefully considered to avoid directly impacting on archaeological remains, and will involve plants with shallow roots, which will not exceed the depth of topsoil. Trees will not be planted in the exempt area except upon the mounded areas of topsoil due to the potential impact their root systems will have on the archaeological remains. Furthermore, all proposed planting work should be subject to an archaeological impact assessment of the proposals and be carried out in full consultation with an archaeologist and approved by the National Monuments Service of the DoHLGH. • Appropriate information signage and wayfinding will be erected within the public amenity greenspace at Archaeological Area 1in order to inform the public of the significant nature of the enclosure site and the surrounding landscape. The form and content of such should be agreed in advance with the National Monuments Service of the DoHLGH. The line of the enclosure ditches will be referenced on the surface by mown grass paths through the meadow. These will be maintained throughout the year. • Any potential future works involving ground disturbance in Archaeological Area 1 will require an archaeological impact assessment prior to going ahead and may be subject to archaeological conditions.

		mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH. • A Heritage Induction outlining the nature and significance of the archaeology within the Construction Exclusion Zone at Archaeological Area 1 will be a mandatory pre-start requirement for all contractors throughout the life of the project. • Signage should be erected in order to identify the Construction Exclusion Zone as having archaeological sensitivity and to notify any personnel that access to the exempt lands is strictly forbidden. • No construction plant or heavy vehicles with the exception of those detailed above, will be allowed to enter the Construction Exclusion Zone exclusion zone nor may any materials or plant be stored in this area. • The above mitigation measures will be enshrined in and implemented through a construction management plan.	
Material Assets – Transportation and Traffic	12	The assessment of potential traffic impacts concludes that the construction of the proposed development is not anticipated to impact the operational performance of the local road network therefore no mitigating measures are necessary in this respect. It is however good practice to prepare a CTMP for a project akin to the proposed development which sets out steps to manage construction traffic. The Outline CEMP for the proposed development sets out such measures. A detailed CTMP will subsequently be prepared by the appointed contractor which will be agreed with WCC and which will provide for the implementation of traffic management measures.	No mitigating or reductive measures are necessary from an operational perspective as the proposed development can accommodate the traffic associated with the SHD and completion of the Coolagad Link Road. The future connection between the N11 and R761 via Coolagad Link Road would further reduce the impacts experienced within the local road network, however, the Linsig Modelling of the local road network confirms that the junctions analysed operate within capacity for all future design years assessed.
Material Assets – Waste	13	• Waste materials shall be separated at source and should follow the Construction & Demolition Waste Management Plan. • Prior to commencement a detailed calculation on the quantities of topsoil, subsoil and green waste should be prepared, and soils should be tested to confirm they are clean, inert or non-hazardous. • A suitably competent and fully permitted waste management company shall be employed to manage all waste arising for the Construction Phase. The appointed waste contractor shall have the relevant authorisations for the collection and transport of waste materials office. Waste Permitting, Licences & Documentation under the Waste Management (Collection Permit) Regulations 2007, as amended, a collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO), must be held by each waste collection contractor. • Similarly, all waste shall be transported to an appropriately authorised facility (Local Authority COR/WFP or EPA licenced facility)	As outlined in the OWMP for the Proposed Development, it is intended to ensure that the highest possible levels of waste reduction, waste reuse and waste recycling are achieved for the Proposed Development. Specifically, the OWMP aims to achieve waste prevention, maximum recycling and recovery of waste with a focus on diversion of waste from landfill wherever possible. The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following: • Dry Mixed Recyclables – These materials could potentially catch fire, and this would have a significant effect on the local environment with a short-term impact. This risk is mitigated by the design of a safe and secure bin storage area with adequate space for waste storage. • Organic waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. The appointed Management Company will be responsible for ensuring that there is adequate vermin control in place.

		• All waste quantities and types shall be recorded and quantified with records retained onsite for the duration of the Construction phase.	• Glass – No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development. • Mixed Municipal (Non-Recyclable) Waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. The appointed Management Company will be responsible for ensuring that there is adequate vermin control in place.
Material Assets – Utilities	14	• Procedures for dewatering the site during construction works including licensing requirements, monitoring requirements, discharge points and maintenance requirements of water treatment plant; • Prevention of silt pollution from the subject site shall be carried out by minimising the generation of silt-laden runoff. This will be achieved by the Contractor carefully planning the site works so that activities likely to generate silt-laden runoff are carried out during drier weather and erosion of surface soils and excavations is controlled; • Mud shall be controlled at entry and exits to the site using wheel washes and/or road sweepers, and tools and plant must be washed out and cleaned in designated areas. A wheel wash method statement will be drawn up by the contractor to include the appropriate treatment of wheel washings. This will be agreed in advance of construction with LCC; • Visual checks will be undertaken of suspended solids in the stream; • Drip trays will be utilised on site for pumps situated within 25m of the watercourse and spill kits will be available at these locations for the duration of the contract. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation; • Drip trays will be used underneath mobile plant and drums whilst in use on site; • Refuelling of plant and machinery shall take place using a mobile fuel bowser and restricted to designated areas on hard standing. Only double bunded fuel bowsers shall be used. Vehicles must not be left unattended during refuelling operations; • Spill kits and oil absorbent material must be carried with mobile plant and located at vulnerable locations to reduce risk of spillages entering the sub-surface or groundwater environment. Booms shall be held on-site for works near drains or dewatering points. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation; • Care shall be taken whilst using shuttering oils when preparing formwork. This requires operatives to be trained in the proper handling of materials, the sensitive nature of the wider drainage system, and the consequences of accidental spillage;	Mitigation measures for the various aspects of the built environment are outlined within other chapters of the EIAR. No additional mitigation measures to those outlined in other chapters are considered necessary during the operational phase of the development as it is considered to have a neutral to positive effect on material assets including services and infrastructure.

		• Liaison with ESB regarding the connection/diversion of the 38KV powerline at construction stage. • Care shall be taken when construction is taking place close to or in the vicinity of ESB network overhead power lines. The "H.S.A. ESB code of practice for Avoiding Danger from Overhead Electricity Power Lines" shall be complied with. As noted above, connections to the existing electricity, water services, gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.	
Major Accidents and Disasters	15	With the implementation of the proposed mitigation measures and monitoring, no plausible major accidents or disaster hazards were identified, to which the proposed development will be vulnerable. No plausible potential risks were identified which would result in the proposed development causing a major accident or disaster on or outside the site of the proposed development during construction.	Not applicable

17.4 Monitoring

The following section summarises monitoring measures provided for in the relevant EIAR chapters

17.4.1 Population and Human Health

Measures to avoid negative impacts on Population and Human Health have been integrated into the design and layout of the proposed development. Compliance with the proposed design and layout will be a condition of any permitted development. Monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission. Monitoring of compliance with Waste and Environmental controls requirements will be in accordance with the CEMP and CDWMP.

The following monitoring measures have regard to population and Human Health.

- Housing completion statistics
- Census data
- Compliance with planning permission and development phasing
- Creche and school enrolment

17.4.2 Biodiversity

Pre-construction surveys will be carried out for terrestrial mammals, invasive species and bats. During construction an Ecologist will monitor the site from pre-construction surveys, during Construction Phases and Post Construction.

17.4.3 Land Soil and Geology

During construction phase the following monitoring measures will be considered:

- Inspections and monitoring will be undertaken during excavations, piling and other groundworks to ensure that any geotechnical design measures are implemented and effective to prevent instability of soils during groundworks and piling.

- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Monitoring and site audits will be undertaken daily by the contractor to check for any detectable nuisances such as, noise, dust or other such issues associated with excavation and offsite removal of soil.
- Materials management and waste audits will be carried out at regular intervals to monitor the following:
  - management of surplus soils on site and for removal offsite,
  - record keeping,
  - traceability of all materials, surplus soil and other waste removed from the Site and
  - ensure records are maintained of material acceptance at the end destination.

There are no monitoring requirements specifically in relation to land, soil and geology at Operation Phase.

17.4.4 Water (Hydrolgogy)

During construction phase the following monitoring measures will be considered:

- Inspections and monitoring will be undertaken during excavations, piling and other groundworks to ensure that measure that are protective of water quality are fully implemented and effective.
- Discharges to sewers will be monitoring where required in accordance with statutory consents (discharge licence).
- Monitoring and inspection of water courses will be undertaken routinely.
- Monitoring of the in-stream works by an appropriately quality Environmental Clerk of Works will be undertaken and key stages of the works. Monitoring of water courses will be undertaken during the works.
- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Materials management and waste audits will be carried out at regular intervals to monitor the following:
  - management of soils on site and for removal offsite,
  - record keeping,
  - traceability of all materials, surplus soil and other waste removed from the Site and
  - ensure records are maintained of material acceptance at the end destination.

At Operational Phase, ongoing regular operational monitoring and maintenance of drainage and the SuDS will be carried as outlined in Section 7.8.2.

17.4.5 Air and Climate

The monitoring of construction dust during the Construction Phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the Site boundary. Monitoring of dust can be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at a strategic locations along the Site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations should be carried out in consideration of the requirements of *VDI 2119* with respect to the location of the samplers relative to buildings

and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges should be removed from the Site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in mg/m^2/day in accordance with the relevant standard.

All monitoring will be carried out in line with the Construction Environmental Management Plan (CEMP) for the Site.

Due to the negligible impact on air quality and climate from the Operational Phase of the Proposed Development, no specific monitoring is recommended during this stage.

17.4.6 Landscape

In order to ensure the landscape design outlined and illustrated within this planning application is implemented in accordance with best practice, detailed documents for the tender and construction stages, including drawings and specifications, will be produced by a suitably qualified landscape architect. These drawings and documents will illustrate details and procedures for the proper implementation and execution of the scheme; these works will also be overseen be a suitably qualified landscape architect.

Before the commencement of construction, the tree protection measures outlined in the Arboricultural Report prepared by The Tree File Ltd. and specifically the measures outlined within Appendix A1 – Preliminary Arboricultural Method Statement of the report. A project arborist will be appointed to oversee the implementation of these protective measure outlined in this method statement and will supervise any related works at construction stage. The planting scheme will be full implemented within the first planting season after the main construction works have been completed.

All completed landscape works outside the Taking In Charge areas will be subject to regular maintenance which will be outlined in a landscape management and maintenance plan by an appointed management company. Amongst other measures, this ongoing maintenance will consist of pruning of trees, the control of weeds, and the replacement of planting which has failed. The roads within the proposed development and the large area called 'The Park' on the eastern side of the proposed development will be taken in charge and maintained by Wicklow County Council. To ensure that the landscape scheme does not deteriorate as each phase of the development is implemented, the landscape works will be monitored on an ongoing basis to ensure quality overall.

Monitoring of avoidance, remedial and mitigation measures is not relevant to the assessment of visual impacts on the built environment during construction or operational phase in the case of the subject application.

17.4.7 Archaeology

Archaeological monitoring of the topsoil stripping across the site will be undertaken in order to identify any archaeological features that have the potential to survive outside of the identified Archaeological Areas. While stockpiled soil may be managed with bulldozers, the removal of the topsoil across the site will be carried out using back acting 360 degree tracked excavators fitted with toothless grading buckets.

Archaeological monitoring of the landscaping works at the site of the enclosure at Archaeological Area 1 will be archaeologically monitored to ensure that the installation of root

barriers and importation of topsoil into the area is achieved without tracking across archaeologically sensitive areas or disturbing the ground.

A biennial inspection be carried out, modelled on the inspections undertaken by the OPW, as stipulated in the Monument Management Plan. These inspections will be carried out by an archaeological contractor employed by the management agency and any issues, threats, deterioration or damage will be reported on.

17.4.8 Transportation and Traffic

As no traffic impacts are anticipated on the performance of the local road network no monitoring is necessary. The CTMP does however provide the mechanism to monitor the appointed contractor's adherence to traffic management measures

17.4.9 Waste Management

The management of waste during the Construction Phase will be monitored by the Construction Environmental Site Manager, and/or an appointed Deputy, to ensure compliance with relevant local authority requirements, and effective implementation of the CDWMP, including maintenance of waste documentation.

The management of waste during the operational phase of the apartments/duplexes will be monitored by the building management company and the nominated waste contractor(s) to ensure effective implementation of the OWMP. Individual householders will be responsible for managing their own waste in accordance with their waste collectors' requirements.