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Environmental Impact Assessment Report (EIAR – Volume 2)

Continuance of Use & Extension to Ballyburn Pit

On behalf of

Dan Morrissey & Co. (Plazamont Ltd)

**Ballyburn Upper, Gortenvacan,
Knockbane, Castledermot, Co.Kildare**



MALONE O'REGAN



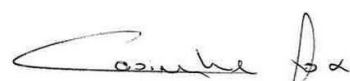
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Continuance of Use & Extension to Ballyburn Pit
Dan Morrissey & Co. (Plazamont Ltd)
Ballyburn Upper, Gorteenvacan, Knockbane, Castledermot, Co.Kildare

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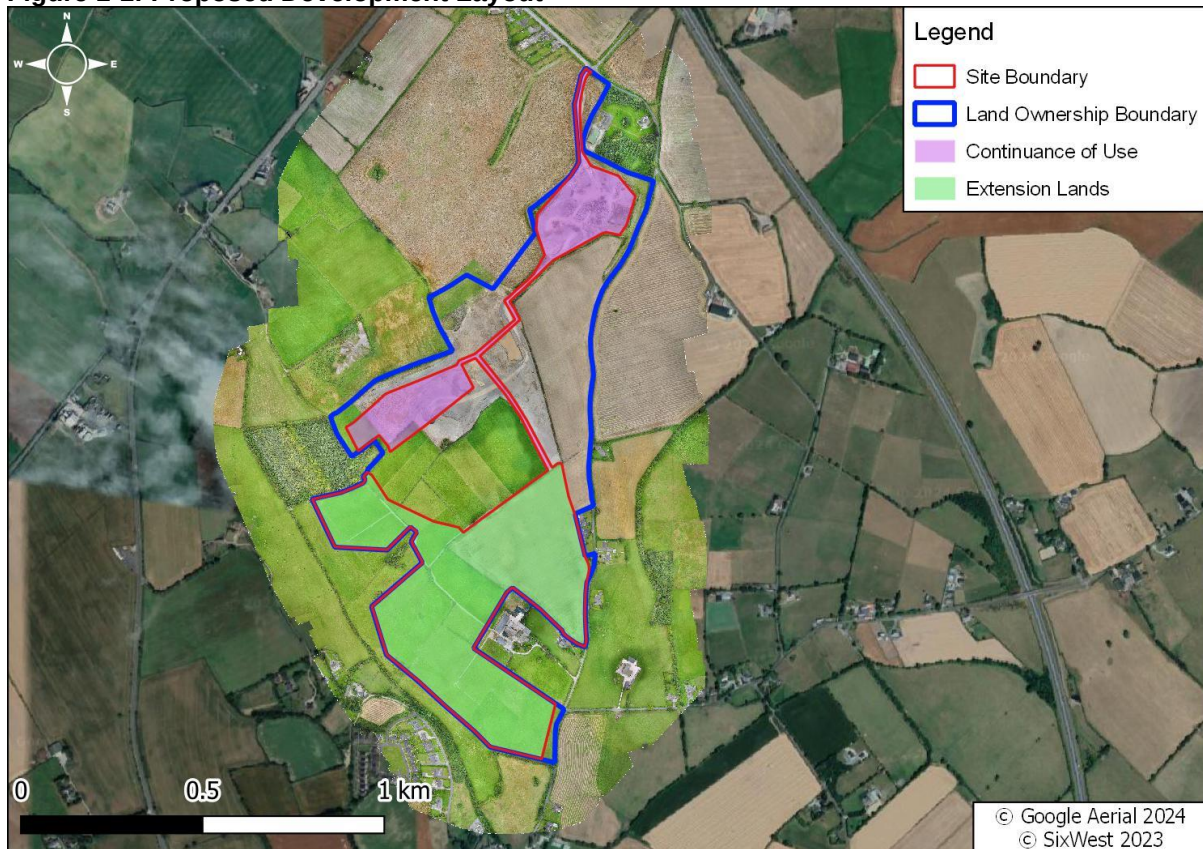
1 GENERAL

1.1 Introduction

Malone O'Regan Environmental ('MOR Environmental') was commissioned by Dan Morrissey & Co. (trading as Plazamont Ltd.), hereafter referred to as the 'Applicant', to prepare an Environmental Impact Assessment Report ('EIAR') in support of a planning application to Kildare County Council ('KCC').

This EIAR assesses the potential effects of the continuance of use of existing infrastructure including all processing equipment and the proposed extension and subsequent restoration works (henceforth referred to as the 'Proposed Development') to the existing permitted operational (planning reference number 05/2091 and PL09.220222) sand and gravel pit located at Ballyburn Upper, Gorteenvacan, Knockbane, Castledermot, Co. Kildare (henceforth referred to as 'Ballyburn Pit' or 'the Pit'). Figure 1-1 below presents the layout of the Proposed Development and the distinction between extension lands and those which constitute a continuance of use.

Figure 1-1: Proposed Development Layout



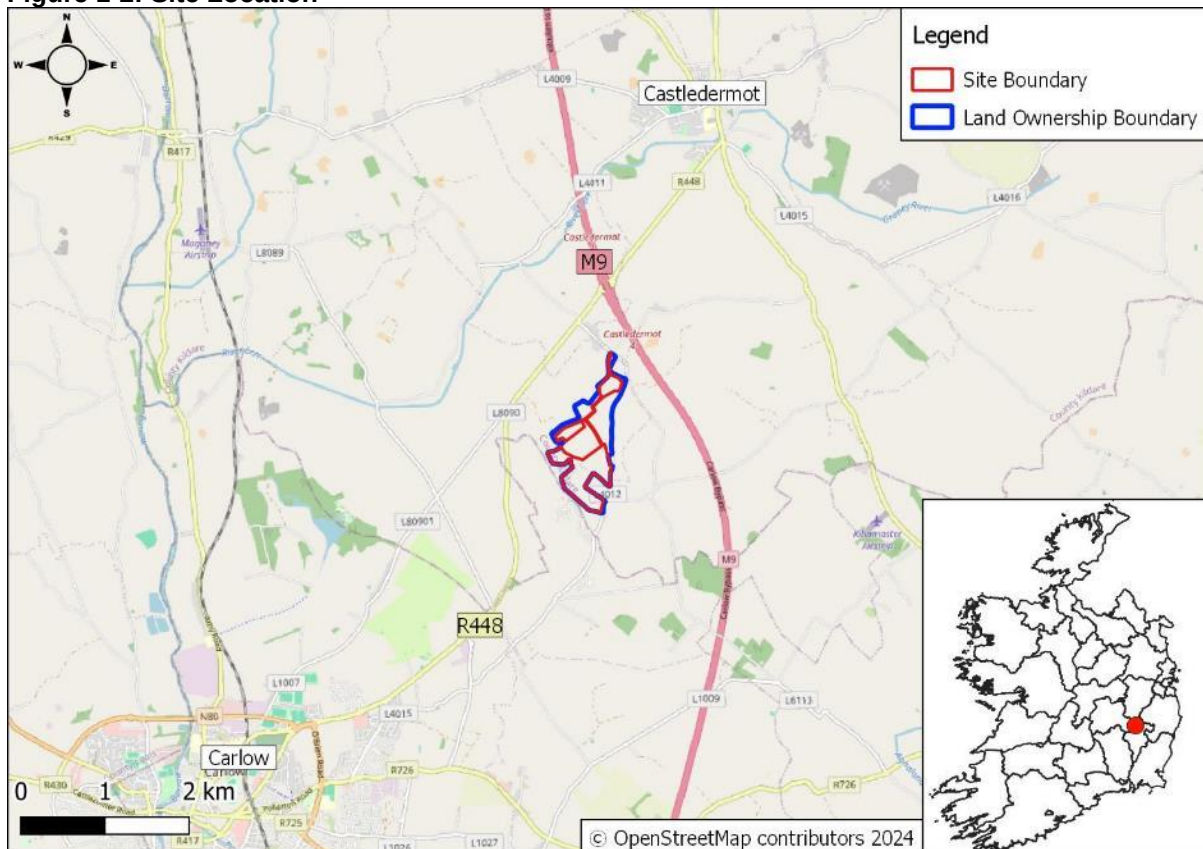
Ballyburn Pit has been permitted for the phased extraction of sand and gravel, processing of aggregates using a modular mobile washing / screening plant, and the continuous restoration of extraction areas to beneficial agricultural after-use which has been in some of form of operation since 2012. Ballyburn Pit, since its commencement, has been a source of quality aggregates, which has supplied many important local developments and provided a gainful contribution to the local economy.

The Proposed Development does not seek to increase production output at the existing pit but to provide access to a known quality aggregate reserve to an established quarry depth of approximately 71 metres ('m') above Ordnance Datum ('m AOD'), above the winter water

table. The Proposed Development also includes provisions for the restoration of the site, which will include the importation of circa ('ca.') 1,125,000 tonnes ('t') of clean, uncontaminated soil and stone by-product materials. This activity will enable participation in the local circular economy, providing a suitable destination for surplus soil materials from development sites.

The Proposed Development will be located on land covering an area of ca. 37.8 hectares ('ha') within the townland Ballyburn Upper, Gorteenvacan, Knockbane Castledermot, Co Kildare (Ordnance Survey Ireland Grid Reference ITM 676667 681155), refer to redline boundary presented in Figure 1-2 below for context ('the Site'). The Site is located ca. 4.3km south-southwest of Castledermot town, Co. Kildare and ca. 4.0km northeast of Carlow Town. The Site is suitably serviced by the M9, which is 0.8km from the entrance via the road.

Figure 1-2: Site Location



1.2 Site Description and Layout

The Site is situated within part of Applicant's existing landholding (Figure 1-3 below), covering an area of ca. 72.7ha. The Proposed Development will be comprised of:

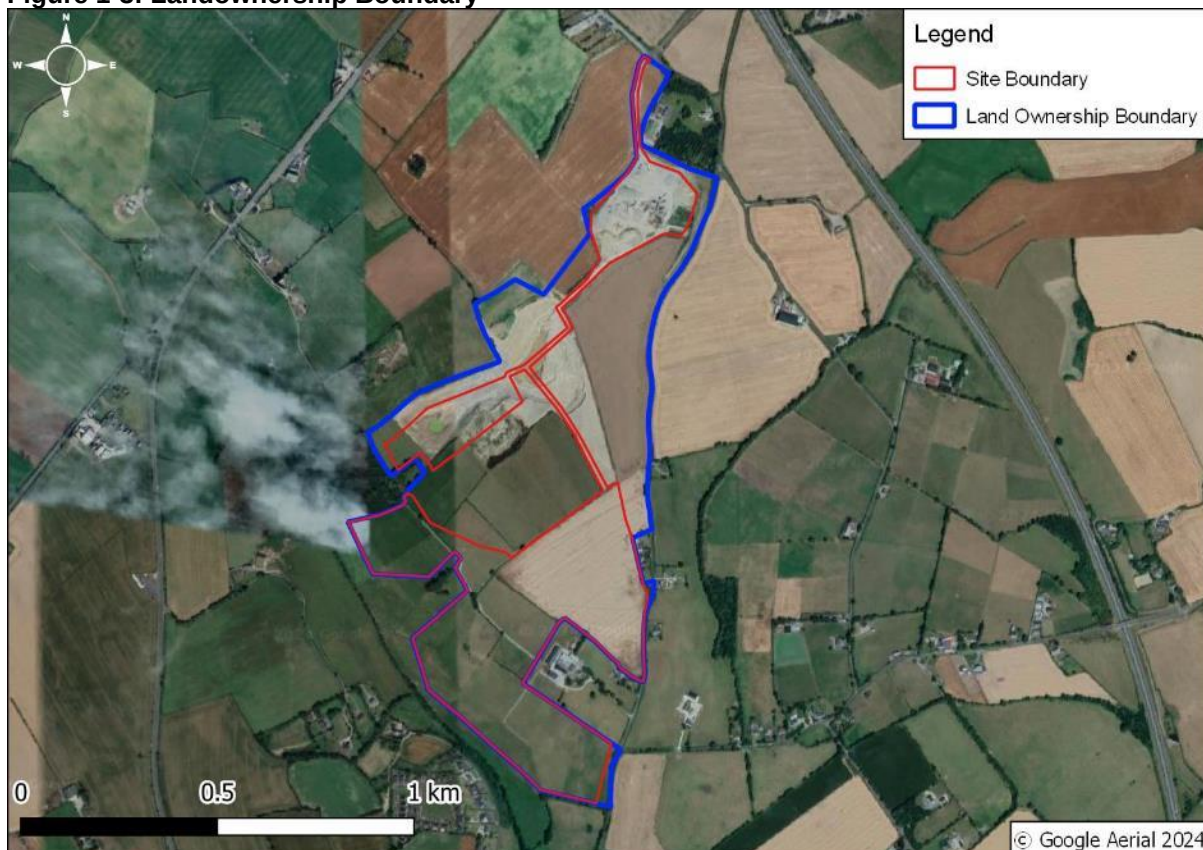
- Continuance of use (05/2091):
 - Transport corridors (including wheelwash, weighbridge etc.); and,
 - Processing area and all associated equipment.
- Extension Lands:
 - Extraction of sand and gravel.

The transport corridors define the existing routes / infrastructure which have been established to transport materials internally and facilitate off-site transportation associated with the existing pit. They are well defined and include existing infrastructure which will be used as part of the Proposed Development. The processing area forms part of the existing Ballyburn Pit. A

modular mobile screening plant and associated ancillary infrastructure are situated in this area. The primary purpose of this area will be to facilitate the processing / washing / screening of aggregates extracted from the quarry extension (further details in Chapter 3). This area and the associated haulage routes linking the various parts of the Site together cover an area of ca. 5ha. The Site's soil importation area covers ca. 4ha within the central portion of the existing Ballyburn Pit footprint. This area of the Site has undergone extraction. Clean uncontaminated soil and stone by-product material will be imported to the Site to supplement soil materials stored within the existing berms, which will ensure sufficient quantities of soil for the restoration plan. The Soil Importation area of the Site will facilitate the short-term storage and handling of clean uncontaminated soil and stone by-products, until it can be transported to the wider Site for use in restoration works.

The area of the Site, which will form the extension to Ballyburn Pit, is primarily comprised of the southern portion of the Applicant's land and is currently used for pasture and tillage covering an area of 28.3ha. This land is considered 'Greenfield' with no known previous development to have occurred on them. These lands formed part of the planning application to KCC (05/2091), which was submitted in 2005. When planning permission was received, the phase of works which incorporated the extension lands were not included. The Competent Authority's reason *'In order to enable the planning authority, in conjunction with the developer and environmental authorities, to review changes in the environmental standards and technology occurring in the intervening period subsequent to this grant planning permission'*. This EIAR and supporting documentation are a direct fulfilment of this request.

Figure 1-3: Landownership Boundary



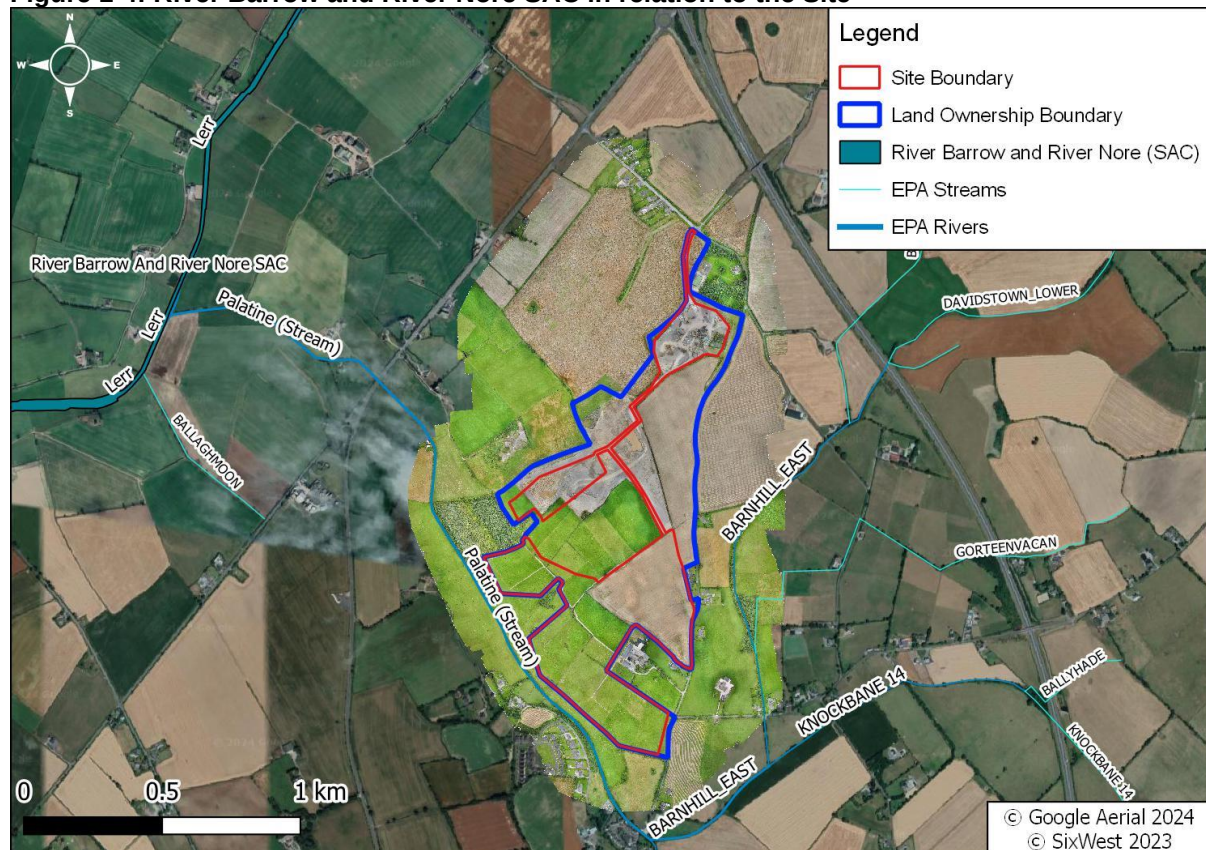
1.3 Description of the Setting of the Proposed Development

The Site is located outside the Local Area Plans for the Castledermot Rural Settlement Cluster, and therefore, there is no specific zoning identified for the Site. The Site and Ballyburn Pit are located within an area where the predominant land use is agricultural. The Site is bound

by the L4012 to the south and southeastern boundaries. All other boundaries are immediately adjacent to agricultural land.

The Palatine (stream) is located ca. 30m to the south and west of the Site which flows in a south-easterly to northwesterly direction. The Barnhill (Stream) is located ca. 170m to the east of the Site which flows in a southerly direction. Clustered residential areas are located to the south and linear one-off residential dwellings to the east of the Site. The lands to the west of the Site consist of agricultural pastures and one-off residential dwellings. The River Barrow and River Nore Special Area of Conservation ('SAC') is located ca. 1.3km northwest of the Site. Refer to Figure 1-4 below for context.

Figure 1-4: River Barrow and River Nore SAC in relation to the Site



1.4 Description of Local Transport Infrastructure

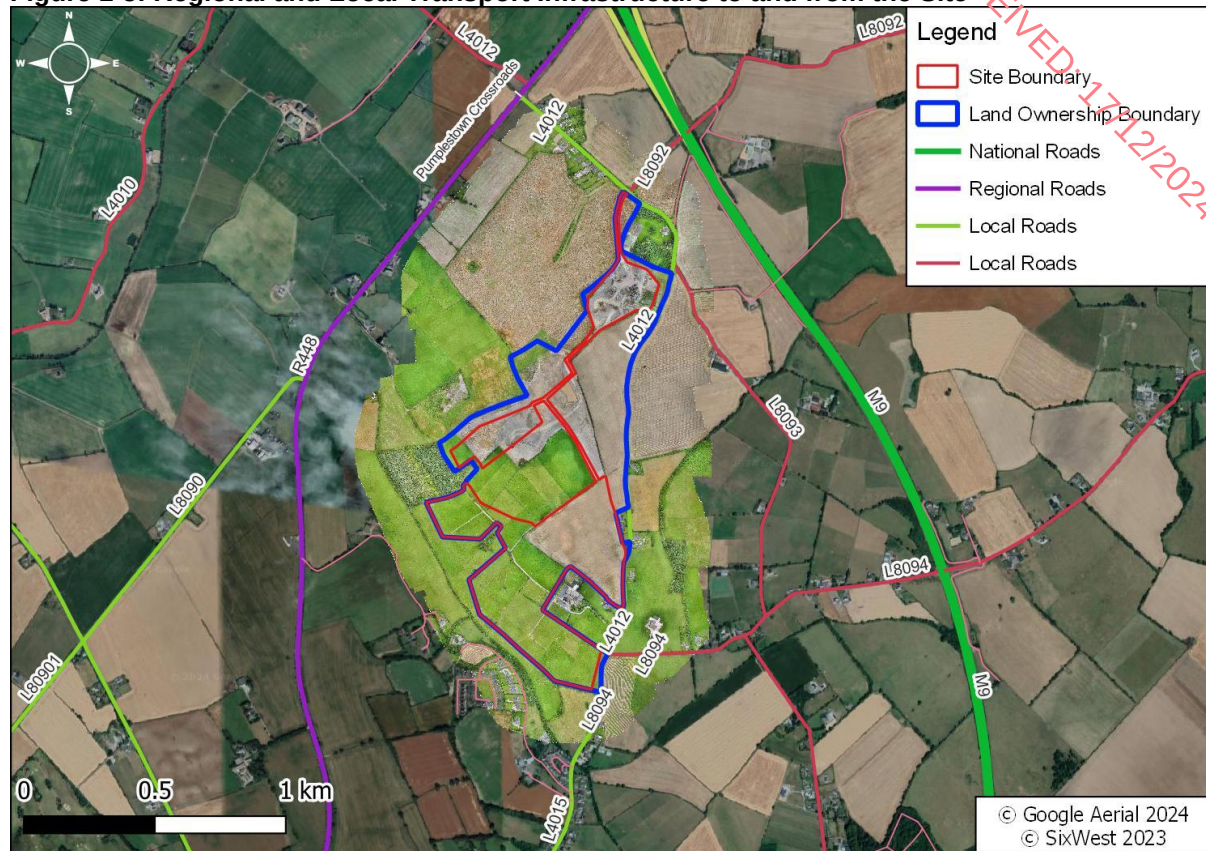
The Site is well served by existing transport infrastructure. Access to the M9 motorway is at junction 4, which is ca. 800 m by road from the Ballyburn Pit. From the M9 junction, regional road R448 travels south, meeting local road L4012 at the Prumplestown Crossroads. The L4012 travels east and then south to meet the Ballyburn Pit entrance. The L4012 runs adjacent to the east of the Site and joins the L8094 at a T-junction into Palatine Village south of the Site.

The Site is located on the southern and western side of the L4012, ca. 540m east of the R448.

The R448 is a Regional Road linking several townlands, including Castledermot, to Carlow Town and the M9 motorway. The M9 links the M7 between Naas and Newbridge to Waterford. The M9 is a high-quality dual carriageway that can facilitate the transportation of aggregates by Heavy Goods Vehicles ('HGVs') from the Site from the midlands to southern regions.

The road infrastructure local to the Site is shown in Figure 1-5 below.

Figure 1-5: Regional and Local Transport Infrastructure to and from the Site



1.5 Notable Developments in the Area

Notable developments were considered as any existing or proposed developments in the area that have the potential to interact with the Proposed Development and may lead to potential cumulative and in-combination effects.

A review of developments within 2km of the Site has been undertaken, utilising the KCC Planning Portal [1], Carlow County Council ('CCC') Planning Portal [2], the Environmental Impact Assessment ('EIA') portal [3], the An Bord Pleanála ('ABP') Portal [4], aerial imagery from google earth [5], EPA Map Viewer [6] and the Kildare County Development Plan 2023-2029 ('CDP') [7].

The majority of proposed and existing developments within the 2km study of the Site are residential dwellings or small-scale projects. As such, the potential for cumulative and in-combination effects to occur between these projects and the Proposed Development is negligible.

No other notable developments that could interact with the Proposed Development were identified at the time of writing this report.

1.6 Applicant

The Applicant, Plazamont Ltd., is an established business and supplier of aggregates and concrete to the construction materials industry. Plazamont Ltd. Trading as Dan Morrissey & Co. is run by the Morrissey family. The family has been synonymous with quality and quarrying in the southeast region for three generations. Dan Morrissey first started quarrying in Ballycrogue, Co. Carlow, in the 1930s

The Applicant's principal business is the extraction, processing and supply of materials to the construction materials industry around Ireland and the UK. The Applicant produces sand and gravel used for producing a wide range of high-specification aggregates including concrete aggregates, asphalt products and road-making materials (asphalt sand). These high-specification aggregate products are made to a wide range of aggregate standards to meet the development goals of their clients.

1.7 Project Background

Ballyburn Pit originally commenced operations in 2012 under Planning Reference(s) 05/2091 and An Bord Pleanála PL09.220222. However, following the economic downturn, operations ceased for several years before recommencing in 2019.

Operations at the pit include the extraction of sand and gravel and subsequent processing into construction products for sale. Existing quarry operations involve the extraction and screening of aggregate materials with up to ca. 500,000 tonnes excavated, processed and transported to market on an annual basis. These activities are subject to conditions of planning which manage emissions such as noise and dust within specified limits. Ballyburn Pit operates above the local winter groundwater table. Modular mobile machinery is used to work the pit face, consisting of excavators, loading shovels and articulated dump trucks to transport aggregates to the processing area to satisfy end-use requirements. Internal quarry trafficked routes are maintained to a high standard.

Ballyburn Pit is a source of employment for the local community. They currently employ 28 people directly as on-site personnel, hauliers, and maintenance personnel. Additional employment is generated from the quarry through direct contracting and indirect services, including though not limited to:

- Hauliers;
- Machinery maintenance;
- Professional services;
- Construction personnel;
- Health and safety specialists;
- Refuelling specialists;
- Environmental monitoring personnel; and,
- Quality control personnel.

1.7.1 Local Contribution to Notable Developments

Ballyburn Pit contains high-quality sand and gravel reserves, which has National Standards Authority of Ireland ('NSAI') certification for use in concrete and precast products and aggregate for use in civil engineering projects.

The Applicant supplies both locally and to Britain. Notably, aggregates sourced from the Pit were used in development of pre-cast concrete sleepers which have been rolled out across the rail network by Irish Rail. The enhancement of the rail network and strengthening of public transport infrastructure provides a sustainable alternative to private transport.

More locally, the pit has supplied aggregates to developments within the IDA Business and Technology Park. The IDA Business and Technology park is home to a number of innovative and state of the art facilities, such as Diageo's carbon neutral brewery. This brewery is currently under construction and will harness the latest process technology to minimise overall energy and water consumption and operate at net zero. Ballyburn Pit has been a source of quality aggregates for this and other developments at the business park enabling Kildare to

become a hub for innovative ventures. Moreover, the IDA business park and associated developments therein are providing a boost in jobs during construction and operation. Ballyburn Pit is perfectly located to supply locally sourced building materials to this development and many more like it as Kildare continues to develop.

Ballyburn Pit won “Quarry of the Year” in 2021 from the Machinery Movers Industry and Operator Awards for its environmental performance and initiatives, providing further evidence of the Pit’s credentials as an industry leader.

1.8 Scope of the Proposed Development

As has been outlined, Ballyburn Pit is an established facility which has been operating successfully since 2012. The Proposed Development will seek a continuance of use of this infrastructure (all processing plant and equipment, entrance, wheelwash, weighbridge, haul routes, and processing area), thereby minimising the need for additional construction / land take. The additional elements associated with the Proposed Development are primarily centred around accessing additional reserves in lands to the southeast of the existing pit. The Proposed Development seeks to extract the additional reserves to a level of 71m OD. The Proposed Development also accounts for all related ancillary works, i.e. provision of screening berms, security fencing, planting and landscape works along the perimeter of the Site. The berms will be planted with grass to preserve soil quality for future use in the restoration of the Site.

The Proposed Development also includes the importation of 1,125,000 tonnes (‘t’) of clean uncontaminated soil and stone by-product for use in the Site restoration process. These materials will be received, stored temporarily and handled in the soil importation area in the western portion (ca. 4ha) of the existing permitted extraction area. This area of the Site is screened well, providing an ideal location for this type of activity. Although the importation of soil by-products is a new activity, it will seamlessly fit with current permitted activities. Following the cessation of extraction activities in each zone, the Site will be restored to agricultural land utilising the soil within the berms. The importation of clean, uncontaminated, inert soil and stone by-products will complement the existing soil stored in the berms and will ensure sufficient soil is available to suitably restore the Site. All historic field boundaries will be restored and there is an area in the northern portion of the Site which will be planted with trees to aid biodiversity.

No additional facilities, such as a canteen, office, or washroom facilities, will be required as they are already in place within Ballyburn Pit.

The proposed operations at the Site will be an extension to the existing and historic activities at Ballyburn Pit. The Site has an estimated reserve of ca. 1,700,000 m³ of aggregates or ca. 3,060,000 tonnes (using a conversion factor of 1.8). So collectively, Proposed Development seeks to move (import clean uncontaminated soil and stone by-product / export quality aggregates) ca. 4,185,000 t of materials over the lifetime of the Proposed Development. As mentioned above, Ballyburn Pit is currently permitted (05/2091) to export up to 500,000 t of aggregates per annum. The Proposed Development will work within these permitted levels (extraction and importation), and as such, there will be no requirement to increase the current exportation rates or the associated traffic at the Pit.

There is capacity for the HGVs importing clean, uncontaminated soil and stone by-product to the Site to depart with a load of aggregate, and this practice will be maximised where possible. Nevertheless, with a 15-year permission, there will be sufficient scope to balance both activities within the existing permitted traffic levels whilst also allowing for potential downturns in the construction/construction product industry.

The restoration of the Site after operations have ceased will provide agricultural grasslands and tillage lands, with features to encourage enhanced biodiversity included.

1.9 The Environmental Impact Assessment Report ('EIAR')

This EIAR has been prepared in accordance with the requirements of the following legislation:

- The Planning and Development Act, 2000, as amended;
- Part II of the first Schedule of the European Communities (Environmental Impact Assessment ('EIA')) (Amendment) Regulations, 1999 (S.I. No. 93 of 1999);
- The Local Government Planning and Development Regulations 2001 – 2018 (S.I. No. 600 of 2001, and subsequent amending legislation); and,
- European Union ('EU') (Planning and Development) (Environmental Impact Assessment) Regulations, 2018.

The following existing guidance were also considered in preparing this EIAR:

- European Commission Interpretation of definitions of project categories of Annex I and II of the EIA Directive, 2015 [8];
- European Commission Guidance on the preparation of the Environmental Impact Assessment Report, 2017 [9];
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, 2022 [10]; and,
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018 [11].

1.9.1 EIA Amendment Directive (2014/52/EU)

On 14th April 2014, the EIA Directive (2014/52/EU) (the EIA Amendment Directive) was adopted by the Council of the European Union ('EU') and amended Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Article 2 of the EIA Amendment Directive required all Member States to bring the Directive into force by 16th May 2017.

The EIA Amendment Directive clarified aspects of the preceding Directive 2011/92/EU to bring it into line with intervening European Court of Justice ('ECJ') judgments and introduced additional provisions and procedural options. Therefore, compliance with the EIA Amendment Directive (2014/52/EU) will automatically ensure compliance with Directive 2011/92/EU. In Ireland, the EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018), came into effect on the 1st September 2018 and gave effect to Directive 2011/92/EU as amended by the EIA Amendment Directive.

Article 1 (2)(g) of the Amending EIA Directive provides that an EIA means a process consisting of:

- The preparation of an environmental impact assessment report by the developer;
- The carrying out of a consultation;
- The examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer and any relevant information received through consultation;
- The reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (c) and, where appropriate, its own supplementary examination; and,
- The integration of the competent authority's reasoned conclusion into its decision.

An EIAR document is produced as the key component of the environmental impact assessment ('EIA') process. It provides a description of:

- The baseline environment;
- Identification of the potential effects (if any - both positive and negative) that are predicted to be incurred as a result of the Proposed Development;
- A description of any control and mitigation measures required to avoid, reduce or eliminate such potential effects; and,
- A description of the reasonable alternatives studied by the persons who prepared the EIAR, which are relevant to the Proposed Development and its specific characteristics.

1.9.2 Assessment under Schedule 5

The relevant classes of developments (with regards to the Proposed Development) that require EIA are set out in Schedule 5 of the Planning and Development Regulations 2001 (as amended). Schedule 5 transposes Annex I and Annex II of the EU EIA Directive (85/337/ECC as amended) into Irish law under Parts 1 and 2 of the Schedule.

The Proposed Development is for the continuation of use of parts of Ballyburn Pit and the extension of extraction activities into agricultural lands to the south.

Part 1 – Item 19:

Quarries and open-cast mining where the surface of the site exceeds 25 hectares.

The extraction area (25.4 ha) of the Proposed Development marginally exceeds the threshold of 25 ha outlined in Item 19 of Part 1 schedule 5. The Proposed Development meets the criteria for mandatory EIA under part 1 of Schedule 5 of the Planning and Development Regulations 2001.

1.9.3 Scope of the EIAR

In accordance with the EPA Guidelines 2022 [10] the following attributes of the receiving environment and their interactions are addressed within this EIAR:

- Population and Human Health;
- Biodiversity;
- Land, Soils and Geology;
- Water (Hydrogeology & Hydrology);
- Air Quality;
- Climate;
- Acoustics (Noise and Vibration);
- Landscape and Visual;
- Cultural Heritage;
- Material Assets – Traffic and Transport; and,
- Material Assets – Natural Resources and Waste.

1.9.4 Structure of the EIAR

Table 1-1 provides a description of the EIAR structure.

Table 1-1: Structure and Description of the EIAR

Title	Description
Volume 1: Non-Technical Summary ('NTS')	
NTS	The NTS contains an overview of the Proposed Development and the principal findings of the Environmental Impact Assessment ('EIA') in non-technical language.
Volume 2: Main EIAR Report	
Chapter 1- 4	Chapters 1-4 provide an introduction to the Proposed Development, describe the Proposed Development, the need for the Proposed Development and the alternatives considered.
Chapters 5-15	Chapters 5-15 comprise of the assessment of predicted environmental impacts, together with an evaluation of their significance and a description of any mitigation measures proposed to minimise impacts. It also takes into account the interactions between the various environmental topics. Chapters 5-15 generally follow the structure set out below: • A brief introduction to the chapter; • An outline of the methodology employed; • A description of the receiving existing environment relevant to the environmental topic under consideration; • A description of the characteristics and predicted impacts of the Proposed Development on the receiving environment; • A description of the reductive or mitigation measures and / or the factors that will reduce or eliminate any significant environmental impacts identified; • A description of the residual impact of the Proposed Development. Residual impacts are the remaining impacts that will occur after the proposed mitigation measures have been taken into consideration; • A description of the interactions with other environmental attributes; • Details of any monitoring required during Site preparation and operations; • Details of any rehabilitation required; and, • Difficulties encountered in undertaking the assessment.
Chapter 16	Interactions of the Foregoing
Chapter 17	Chapter 17 outlines the overall Schedule of Commitments agreed by the applicant in the event that the planning application is authorised.
Drawings	A3 Drawings of the Proposed Development including: • Site location map; • Site Layout Map; and, • Cross Sections of the Proposed Development
Volume 3: Appendices	

Appendix	Relevant topic specific technical documentation supporting the EIAR are contained within the Appendix and presented as a separate volume of the EIAR (Volume 3)

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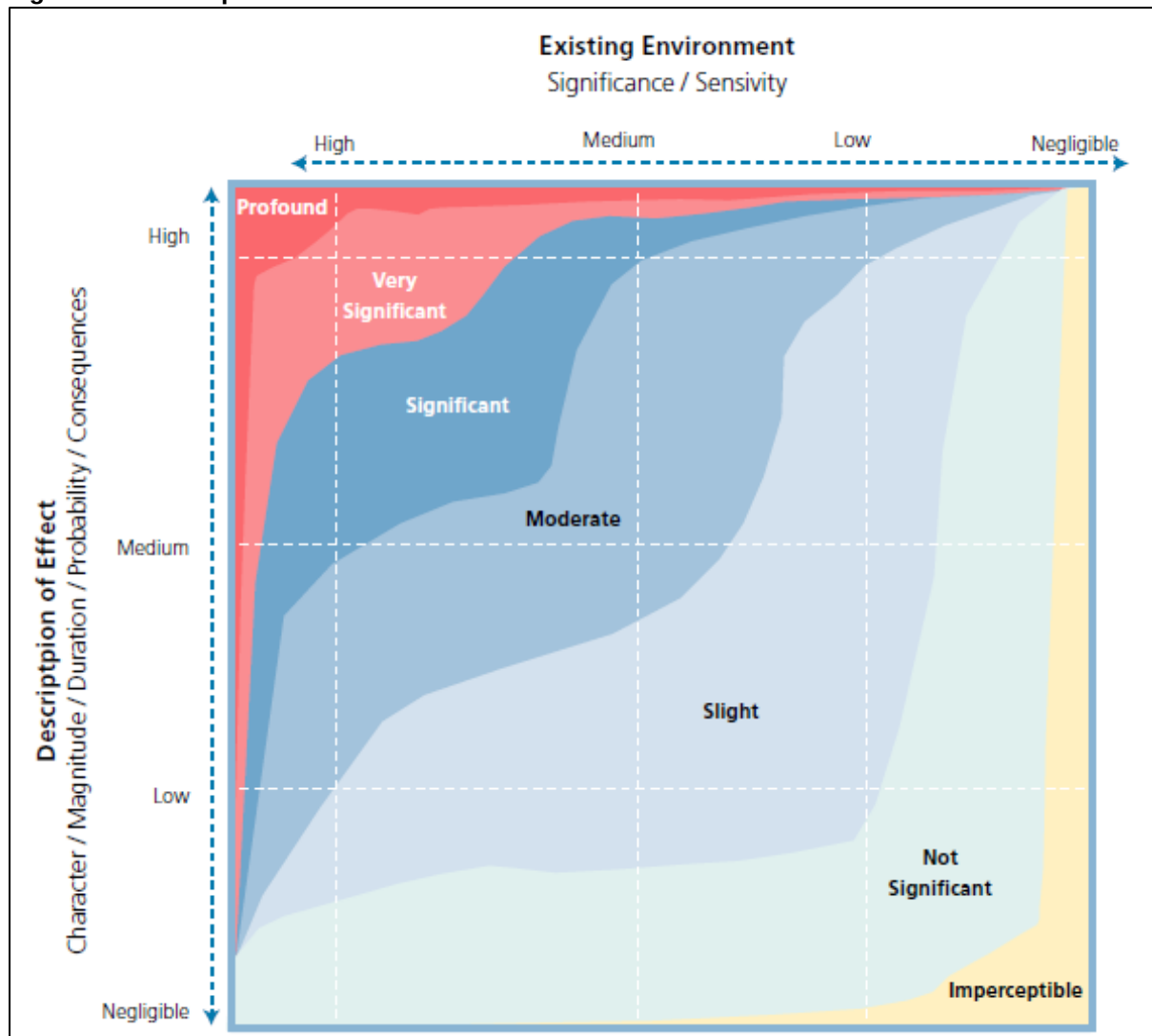
1.10 Methodology

1.10.1 Assessment of Effects – Evaluation Criteria

The assessment of effects has been undertaken in accordance with best practice, legislation and guidance notes, as listed in Section 1.8 above. The evaluation of significance considers the magnitude of the change and the sensitivity of the resource or receptor. Unless otherwise stated, this approach has been adopted throughout the EIAR.

The criteria for determining the significance of impacts and the effects are set out in Figure 1-6 below, taken from the EPA Guidance, Guidelines on the Information to be contained in an EIAR [10]. Definitions of effect, as outlined by the EPA, are included in Tables 1-2 to 1-7 below. These definitions are used throughout the EIAR. Certain chapters may use additional or alternative terms due to the specific methodology or guidance required within those chapters. Such alternative uses will be stated within the chapter.

Figure 1-6: Description of the Environmental Effects



Tables 1-2 define the quality of the effect of a proposed development on the environment, ranging from positive to negative.

Table 1-2: Quality of Effects

Type of Effect	Quality of Effect
Positive Effects	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative / Adverse Effects	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

Table 1-3 outlines the definitions of significance of effect of a Proposed Development on the environment ranging from imperceptible to profound.

Table 1-3: Describing the Significance of Effect

Classification	Criteria
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

Table 1-4 describes the terminology used to discuss the extent and context of effect of a Proposed Development on the environment.

Table 1-4: Describing the Extent and Context of Effects

Magnitude	Description
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?).

Table 1-5 shows how likely an impact is to occur.

Table 1-5: Describing Probability of Effect

Magnitude	Description
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Table 1-6 discusses the duration and frequency of effects. Momentary effects lasting from seconds to minutes will often be less concerning than long-term and permanent effects, depending on their severity.

Table 1-6: Describing Duration and Frequency of Effects

Magnitude	Description
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day (<1 day).
Temporary Effects	Effects lasting less than a year (<1 year).
Short-term Effects	Effects lasting one to seven years (1-7 years).
Medium-term Effects	Effects lasting seven to fifteen years (7-15 years).
Long-term Effects	Effects lasting fifteen to sixty years (15-60 years).
Permanent Effects	Effects lasting over sixty years (>60years).
Reversible Effects	Effects that can be undone, for example through remediation or restoration.
Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

Table 1-7 defines the types of effects that can potentially occur as a result of a Proposed Development.

Table 1-7: Describing Types of Effects

Magnitude	Description
Indirect Effects (a.k.a. Secondary Effects)	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
Do Nothing Effects	The environment as it would be in the future should the subject project not be carried out.
'Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Magnitude	Description
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents (e.g. combination of SO _x and NO _x to produce smog).

The above terminology will be used throughout this report unless superseded by an environmental topic best practice in assessing EIA. Where specialist topics defer from these terms, a topic-specific methodology will be provided for within the relevant chapter.

1.11 Non-Statutory Consultation

In accordance with best practice guidelines [10] [11], this EIAR included non-statutory consultation. Table 1-8 below lists the consultees notified about the Proposed Development, whether a response was received, and the topics of interest raised by the consultee, where relevant.

Table 1-8: Consultee Responses to the Proposed Development

Consultee	Date of Response	Method of Response	Topics Raised	Relevant Chapter
Department of Housing	08/11/23	Email	N/A	N/A
Inland Fisheries Ireland ('IFI')	13/11/23	Email	IFI concerns relating to this proposed extension will include the potential for the discharge of deleterious matter to surface waters from operations on-site and potential impacts upon quantity/quality of ground/surface waters from operations here.	Chapter 5: Population and Human Health Chapter 6: Biodiversity Chapter 8: Water
Health and Safety Authority ('HSA')	25/11/23	Email	N/A	N/A
Office of Public Works ('OPW')	10/11/23	Email	No Comment	N/A
Transport Infrastructure Ireland ('TII')	17/11/23	Email	TII notes the proposed Site is in proximity to the M9, at a location on the network. Therefore, there may be road safety considerations that are required to be considered in any subsequent application.	Chapter 13: Traffic and Transport

A copy of the EIAR Scoping Document is presented in Appendix 1-1. Copies of the submissions received from the Consultees are presented in Appendix 1-2. The Scoping Document was issued to all consultees on the 8th November 2023.

1.12 Project Team

The in-house Malone O'Regan Environmental ('MOR Environmental') project team included the following personnel:

Table 1-9: MOR Environmental In-House Project Team

Chapter(s)	Name	Role	Relevant Qualifications
All	David Dwyer	Environmental Team Lead / Project Manager	BSc, MSc with 10+ years' experience
Chapter 1-4	David Dwyer	Environmental Team Lead / Project Manager	BA, MSc with 10+ years' experience
Chapter 5 Population and Human Health	David Dwyer	Environmental Team Lead / Project Manager	BA, MSc with 10+ years' experience
Chapter 6 Biodiversity	Dyfrig Hubble	Associate Director- Ecology, Biodiversity Chapter	BSc, MSc, CIEEM Full Member, 15+ years' experience.
Chapter 7 Land, Soil and Geology	Refer to Table 1-10		
Chapter 8 Water	Refer to Table 1-10		
Chapter 9/10 Air Quality / Climate Change	Klara Kovacic	Associate Director, Air Quality & Climate Chapter	MEng, MSc, DiB, Chartered Environmentalist with 15+ years' experience.
Chapter 11 Acoustics	Kenneth Goodwin	Associate Director & Project Director	BSc, PhD Acoustics, Full Member IOA, IEMA Practitioner, 15+ years' experience
Chapter 12 Cultural Heritage	Refer to Table 1-10		
Chapter 13 Traffic	Refer to Table 1-10		
Chapter 14 Landscape and Visual	Refer to Table 1-10		
Chapter 15 Resource and Waste Management	Martin Kearns	Principal Environmental Consultant	BSc, with 10+ years' experience
Chapter 16/17 Interactions of the Foregoing/Schedule of Commitments	David Dwyer	Environmental Team Lead / Project Manager	BA, MSc with 10+ years' experience

In addition to the MOR project team, the team included the following external specialists:

Table 1-10: External Environmental Consultants

Primary Author	Company	Chapter(s)	Relevant Qualifications
Michael Gill	Hydro-Environmental Services	6 / 7 Land and Soils / Water	PGeo, BA, BAI, MSc, MIEI, (Civil/Environmental Engineer & Hydrogeologist) 20+ years' experience
Rory Curtis	Macro Works	11 / Photomontages & LVIA	BEng, BA, GDip Landscape Architecture, MILI, 10+ years' experience.
Dr. Charles Mount	Dr. Charles Mount	12 / Archaeology and Cultural Heritage	M.A. and Ph.D. degrees in Archaeology and a professional diploma in EIA and Strategic Environmental Assessment ('SEA') Management
Alan O'Reilly	PMCE	14 / Traffic Impact Assessment	BA, BAI, MSc, RSA Cert Comp, MIEI,
Oliver McCafferty	Sixwest	Survey and Planning Drawings	UAV BNUC-S™ Pilot Director

2 PLANNING CONTEXT & THE NEED FOR THE PROPOSED DEVELOPMENT

2.1 Introduction

This chapter sets out the need for the Proposed Development through analysis of the most recent County Development Plan ('CDP') 2023-2029 (the CDP) [7], planning guidelines, policy frameworks and reports issued by the county, state and semi-state bodies.

2.2 Kildare Quarry Status & Aggregate Deman

Mineral resources are generally located in rural areas, this is true of Kildare also. As such, the extractive industry is a key contributor to employment in a rural setting, with over 500 active quarries across Ireland employing ca. 5,000 people. There are ca. 26 quarries active (2019) in Kildare, providing employment opportunities across the county at various life stages, with many coming to the end of their permission period. Ballyburn Pit employs 28 people from the locality, providing a viable source of employment in a rural setting. Moreover, the industry is absolutely vital to ensure the provision of adequate raw materials for the construction industry to facilitate the building of housing, healthcare facilities, schools, roads, and social infrastructure.

There is currently a housing supply target of 13,840 housing units for County Kildare by the end of 2031 [7]. In the national context, the government are targeting 50,000 residential units per annum for the next five years. Moreover, there are 29 educational facilities in the pipeline for Kildare, which are at various stages (land acquisition, design, planning, etc.). In terms of mobility and transport, the KCC has listed 25 Priority Road and Bridge projects in the CDP to be built/upgraded pending approval of funding (refer to Table 2-1 below).

Table 2-1: Priority Road and Bridge Projects

Nr.	Name	Route
A	Maynooth Eastern Ring Road ('MERR')	R148 to R405 – Leixlip Road to Celbridge Road.
B	Maynooth Outer Orbital Route (Northwest)	L1012 Moyglare Road and Dunboyne Road (Co. Meath) to be delivered by Meath County Council under Section 85 agreement.
C	Maynooth Outer Orbital Route (West/Southwest)	R148 to L1012 c. 3km – Kilcock Road to Moyglare Road and from the Kilcock Road south to Rathcoffey/Straffan Road.
D	Examine options in consultation with South Dublin County Council, Fingal County Council, Meath County Council, TII and other statutory agencies for the delivery of a M50 resilient outer orbital link road connecting the M3 to the M4.	Preferred route to be examined and determined.
E	The Gallops Avenue, Naas	Blessington Road to Dublin Road.
F	A new bridge for pedestrians and cyclists will be constructed parallel to the existing bridge in Celbridge providing enhanced Vulnerable Road User ('VDU') infrastructure	A new bridge parallel to the existing River Liffey Bridge, Celbridge.
G	Second River Crossing - Celbridge	From R403 Clane Road to Hazelhatch Train Station.

Nr.	Name	Route
H	Second River Crossing - Newbridge.	From Old Connell Road to R416 Athgarvan Road.
I	Examine options for a Western Inner Relief Road in Maynooth.	From Kilcock Road to Rathcoffey/ Straffan Road.
J	Inner Relief Road, Newbridge.	L2028 to R416 Between Great Connell Road and Athgarvan Road (Liffey Hall Junction) with bridge crossing over River Liffey.
K	Investigate the feasibility of developing an Orbital Road around Newbridge (Barrettstown / Milltown).	
L	Improvement to Morristown Bridge in Newbridge.	
M	Improvements to Sex's Bridge, Newbridge.	
N	Inner Relief Road, Newbridge (Newbridge LAP roads objective SR05(a)).	R445 to L2018 Between Naas Road and Great Connell Road.
O	To examine the feasibility of developing a ring road on the north and north-east of Newbridge to connect with the orbital relief road and to link with the M7 south-west of the town.	North and northeast of Newbridge.
P	Kilcock Ring Road.	Kilcock.
Q	Inner Relief Road, Clane.	R403 to R407 Capdoo, Celbridge Road to Kilcock Road.
R	Examine options for a link road from the R407 to the R403 including a new Liffey Crossing east of Clane.	
S	Improvement to Moore's Bridge on the Rathbride Road in the Curragh.	
T	Examine options for road improvements on the L2030 from Newhall to Caragh.	L2030
U	Investigate the feasibility of a new river crossing to the south-east of Caragh village.	South-east of Caragh village.
V	R416 Athgarvan road improvement works on approach roads into the village.	R416 into Athgarvan, c. 1km.
W	Examine options for road improvements on the R409 from Halverstown Cross Roads to Blackwood Cross Roads.	R409
X	Realignment of bend at Castlemitchell on R428.	R428

Nr.	Name	Route
Y	Examine the feasibility of developing a ring road at Kilcullen.	Kilcullen

According to the ICF [12];

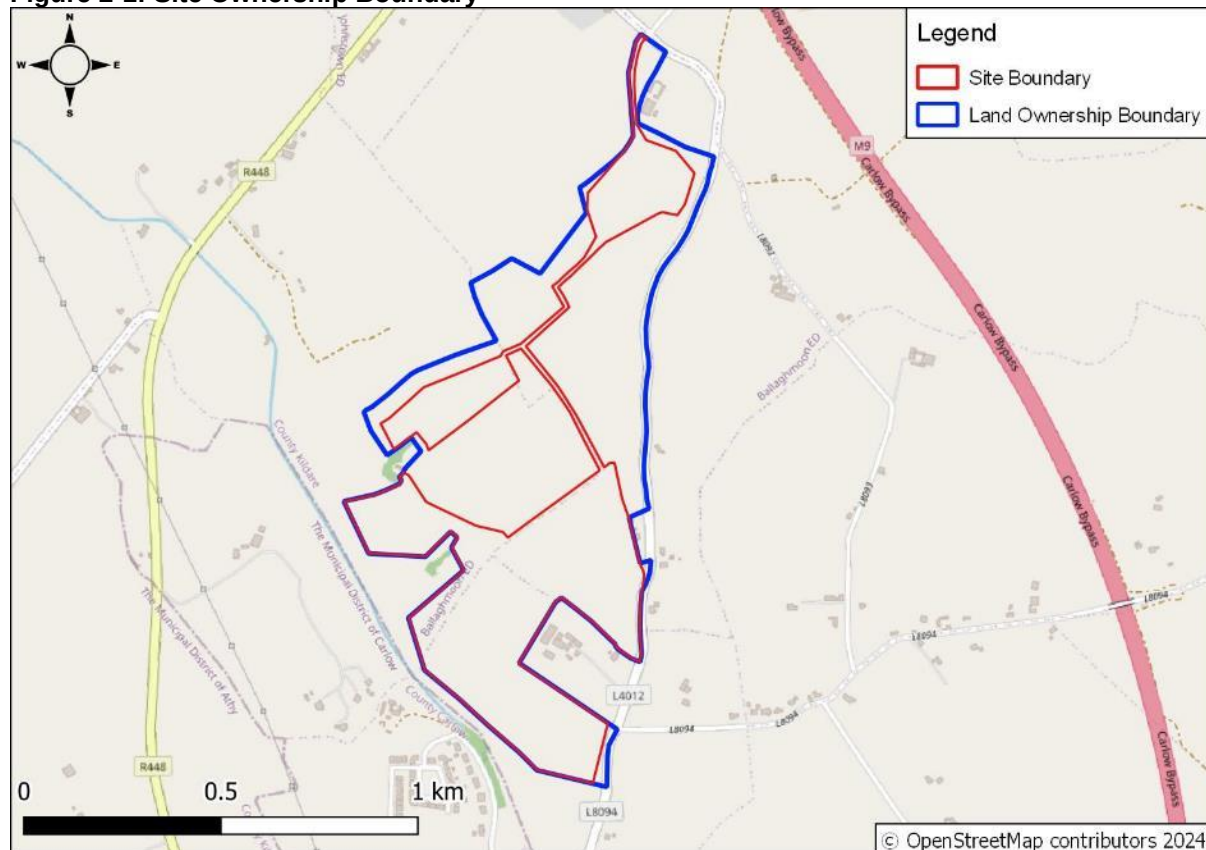
- Every new home requires 400t of aggregates to be built;
- Every new school requires 3,000t of aggregates to be built; and
- Every new 1km of road requires 30,000t of aggregates to be built.

Based on the housing and education facility targets alone, Kildare will require ca. 6,000,000t of aggregates, tens of millions more required for the priority roads and bridge projects. For context, if the Proposed Development only supplied the housing and educational facilities, they could only provide ca. 50% of the aggregates required. The aforementioned numbers of aggregates only consider some of the public infrastructure projects and no private projects, which indicates the enormity of demand in Kildare alone. Aggregate reserves are finite, and extraction can only take place where these reserves have been found. The Proposed Development is ideally located, with established infrastructure and presence adjacent to a reserve of known quality aggregates. Given the enormity of reserves required to meet the growing population of Kildare and the wider region, it would be a misuse of resources to not provide planning for the Proposed Development

2.3 Ownership Of the Lands

The Site is located within lands under the Applicant's ownership, which totals 72.7ha.

Figure 2-1: Site Ownership Boundary



2.4 Planning Application History

Prior to Ballyburn Pit receiving planning permission (05/2091), it was a “greenfield” Site.

The planning history of the Ballyburn Pit has been reviewed and is summarised in Table 2-2 below.

Table 2-2: Relevant Planning History of the Quarry

Planning Reference	Development	Decision	Grant Year
05/2091 PL 09.220222	Sand & gravel pit facility on 69.7 hectares, of which 52.7 hectares is the extraction area. The Proposed Development is for phased extraction of sand and gravel using conventional excavation techniques, processing of the material using mobile crushing, screening and washing plant (with mobile closed circuit water treatment unit and silt storage lagoons) and continuous restoration of the extraction area to beneficial agricultural after use. The development also includes a concrete block making facility, two concrete batching plants, a dry mortar manufacturing plant (3,419 square metres), a concrete recycling unit, storage of processed aggregates, an ESB substation (26square metres), office facilities including canteen and washroom facilities (226 square meters), a workshop (900 square metres), a Puraflo proprietary effluent treatment system and percolation area, bunded fuel storage tanks, new vehicular access including wheel wash and two weighbridges, a weighbridge office (195 square meters), car and truck parking area, hydrocarbon interceptors for treatment of surface water drainage prior to disposal on-site, construction of topsoil and overburden storage area and landscaped screening berms, final site restoration and all other associated site works and ancillary activities	Granted	08/08/2007

Initial planning for the quarry was granted in 2007 and it is set to expire in August 2031. There were a number of items in the permission which were never implemented (such as the dry mortar manufacturing plant, extraction area reduced etc.).

2.5 National Planning Context

Project Ireland 2040 was launched by the Government in February 2018 [13], to supersede the National Spatial Strategy. Project Ireland 2040 is the overarching policy and planning framework for the social, economic and cultural development of Ireland over the next 20 years.

Project Ireland 2040 incorporates two policy documents, i.e. the National Planning Framework (‘NPF’) and the National Development Plan 2021 - 2030.

The National Planning Framework is a strategic high-level plan for shaping future growth and development, while the National Development Plan outlines a strategy for investment of capital of over €116 billion to enable Project Ireland 2040.

2.5.1 Project Ireland 2040- National Planning Framework

The Proposed Development will contribute to the expansion of the rural economy of Kildare by facilitating the continued extraction within the county and thereby promoting a self-sustaining industry instead of commuter driven activity in Kildare.

The plan states the importance of the aggregates industry in delivering Ireland’s national infrastructure [13];

“Extractive industries are important for the supply of aggregates and construction materials and minerals to a variety of sectors, for both domestic requirements and for export. The planning process will play a key role in realising the potential of the

extractive industries sector by identifying and protecting important reserves of aggregates and minerals from development that might prejudice their utilisation. Aggregates and minerals extraction will continue to be enabled where this is compatible with the protection of the environment in terms of air and water quality, natural and cultural heritage, the quality of life of residents in the vicinity, and provides for appropriate site rehabilitation”.

Within NPF2040 there are ten National Strategic Outcomes ('NSOs'), of which NSO9 (Sustainable Management of Water, Waste and other environmental resources) states that:

'The abundant natural and environmental resources such as our water sources are critical to our environmental and economic well-being into the future. Conserving and enhancing the quality of these resources will become more important in a crowded and competitive world as well as our capacity to create beneficial uses from products previously considered as waste, creating circular economic benefits.'

National Policy Objective ('NPO') 23

'Facilitate the development of the rural economy through supporting a sustainable and economically efficient agricultural and food sector, together with forestry, fishing and aquaculture, energy and extractive industries, the bio-economy and diversification into alternative on-farm and off-farm activities, while at the same time noting the importance of maintaining and protecting the natural landscape and built heritage which are vital to rural tourism.'

The extension and continuation of quarrying activities at the Site will be a direct fulfilment of the national development objectives outlined in this Plan by providing aggregates for the local sector. In addition, the expansion of aggregate supply supports the housing goals set in by the Housing Agency within the plan;

"In the longer term to 2040, there will be a need for provision of at least 275,000 new homes in the cities, with half of these located in already built-up areas."

The NDP estimates that the public investments in infrastructure etc. laid out in the NDP will sustain approximately 80,000 direct and indirect construction jobs per annum over the lifetime of the plan. The government recently set a housing target of 303,000 homes between 2025 and 2030 [14]. Multiple National Road projects are also outlined in the NDP to improve connectivity and accessibility.

2.5.2 Essential Aggregates Providing For Ireland's Needs to 2040

Following the launch of Project Ireland 2040, the Irish Concrete Federation released the report "Essential Aggregates: Providing for Ireland's Needs to 2040" [12]. It further emphasises the importance of aggregates as identified in the NPF, stating;

"It is essential that the importance of aggregates and aggregate based products to Ireland's future is recognised by Government and that Ireland's strategic reserves of aggregates are identified and protected and their use enabled in a sustainable manner. It is equally important that the quarrying industry plays its part in ensuring that operations are carried out in a sustainable manner and that the state's planning enforcement and procurement functions ensure that only authorised operators are entitled to supply the marketplace."

The document breaks down the National Planning Framework 2018 into essential points, identifying both the restricted access to aggregates (which are limited by location) as well as the demand for "approximately 1.5 billion tonnes of aggregates" to facilitate the goals of Project Ireland 2040. It notes that there are arising scarcities in particular aggregate products, such as gravel, where;

“in the eastern and midland regions of the country [scarcities] are already emerging as terrestrial sources of aggregates from sand and gravel and rock deposits continue to be diminished. It is increasingly difficult to source quality aggregates required for construction products such as high specification concrete, adjacent to major population centres, in particular, Dublin. In the absence of a local source of aggregates, demand can only be met by transporting large volumes of heavy product over longer distances with the obvious negative economic and environmental consequences””

Therefore, based on this report, there is a clear ongoing demand for aggregates in order to meet the goals of Project Ireland 2040. Given the increasing scarcities noted in this report by the Irish Concrete Federation, the Proposed Development has the potential to be an important resource for the Eastern and Midlands region, directly addressing the availability of quality aggregates in proximity to large population centres.

2.5.3 Circular Economy Policy

The National Waste Management Plan (‘NWP’) 2024-2030 [15] outlines measures and sets objectives to transition Ireland towards a circular economy. One of the key overarching objectives set by the action plan is to shift focus from waste disposal and treatment towards prevention and reuse.

The NWP specifically addresses construction and demolition (‘C&D’) waste, identifying it as the largest waste stream in the EU and that approximately 80% of such waste is characterised as excavated soil and stone. There is also an increasing trend in soil and stone waste from 2020 (5,000,000 tonnes) to 2022 (5,410,000 tonnes), and as such there is an increasing demand for strategies to deal with this waste in line with the circular economy objectives. Of particular relevance to the Proposed Development is the target of:

“preparing for reuse, recycling and other material recovery (incl. beneficial backfilling operations using waste as a substitute) of 70% by weight of C&D non-hazardous waste (excluding natural soils & stone).”

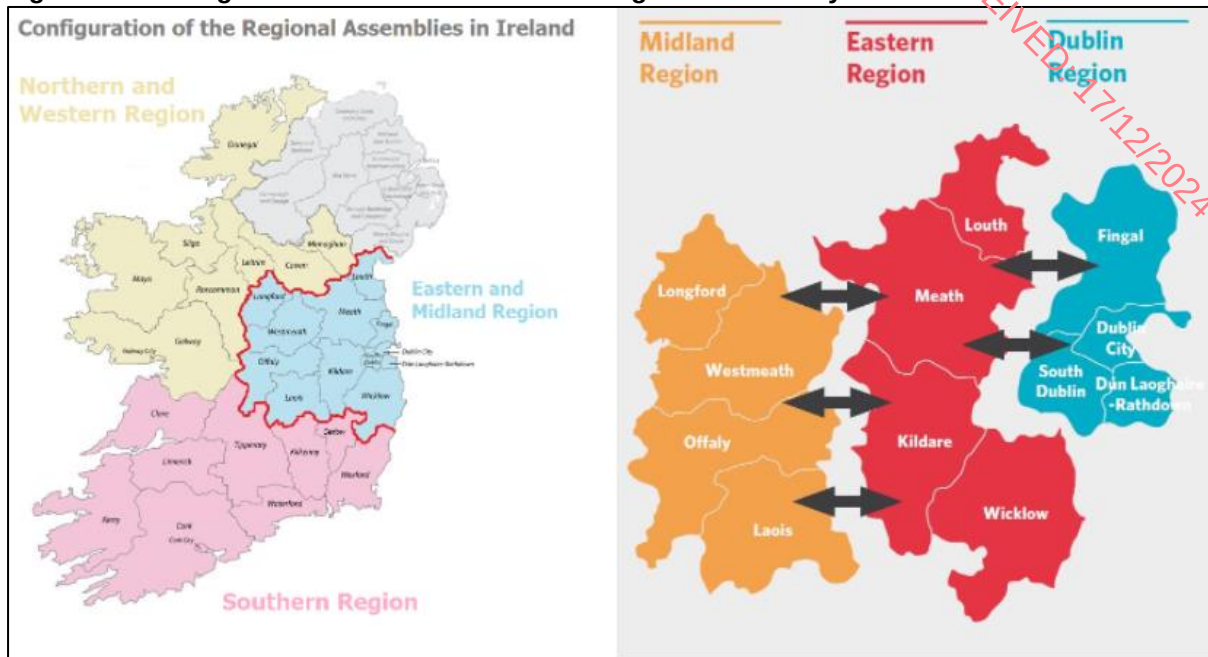
The Proposed Development will offer a beneficial end point for inert soil and stone material diverting it from the C&D waste stream for use as a by-product, by assisting in the restoration of a quarry pit with the goal of restoring agricultural land. Through the provision of a suitable end use destination in the Kildare area, this will enable developers with surplus clean uncontaminated soils to designate the Site for the soils beneficial use, rather than directing to a waste end use.

2.6 Regional and Local Planning Policy Context

2.6.1 The Eastern and Midland Regional Assembly

The Eastern and Midland Regional Assembly was formed under the Local Government Reform Act 2014 [16]. The Eastern and Midland Region comprises of the following counties: Dublin, Kildare, Laois, Longford, Louth, Meath, Offaly, Westmeath, and Wicklow [12], refer to Figure 2-2 below for context.

Figure 2-2: Configuration of the Midlands East Regional Assembly



The Eastern and Midland Regional Assembly has assumed several new functions, first and foremost being the creation and delivery of a Regional Spatial and Economic Strategy ('RSES') for the Eastern and Midland Region of Ireland to 2031 [17] .

The RSES is the link between the Project Ireland 2040 National Planning Framework, the City & County Development Plans and the Local Economic & Community Plans ('LECP') of the 12 local authorities in the region.

The RSES notes specifically the importance of the aggregate industry to rural employment and economic strength, as noted in policy RPO 6.7:

RPO 6.7:

'Support local authorities to develop sustainable and economically efficient rural economies through initiatives to enhance sectors such as agricultural and food, forestry, fishing and aquaculture, energy and extractive industries, the bioeconomy, tourism, and diversification into alternative on-farm and off-farm activities, while at the same time noting the importance of maintaining and protecting the natural landscape and built heritage.'

Furthermore, the strategy looks to the ongoing need for investment in infrastructure within the Region, which will require a local supply of good quality aggregate, through policy RPO 6.33:

RPO 6.33:

'With the allocation outcomes from the competitive calls EMRA, in cooperation with the Department of Public Expenditure and Reform (DPER), will prepare a Regional Investment Plan for the Region in accordance with Project Ireland 2040 and the Public Spending Code.'

The Eastern Region EMRA is one of the three Regional Assemblies in Ireland. It covers the smallest land area of 14,500 square kilometres but is the largest in population size of over 2.3 million people. Kildare is a core peri-urban 'hinterland' catchment around Dublin with areas in the Core Region having emerged mainly as commuting towns. High rates of population growth coupled with a weak level of services and functions for their resident populations has led to investing in the form of 'catch up' required in local services.

The EMRA notes specifically the importance of developing key towns (Graiguecullen, (Carlow), Portlaoise, Maynooth and Bray) which are economic active that provide employment;

RPO 4.36:

‘Core strategies in local authority development plans shall support objectives to achieve a minimum of 30% of housing in Key Towns by way of compact growth through the identification of key sites for regeneration.’

The EMRA outlines the need for various infrastructure projects. These include infrastructure relating to housing and population needs and within sectors such as renewable energy, tourism and transport. The RSES' Transport Investment Priorities (section 8.2 of the RSES) acknowledges that the accessibility of the Region depends on private cars and a shift towards alternatives in the use of our transport networks.

Regional infrastructure projects intended for construction and delivery into service within the lifetime of the current RSES, which would provide a market for the aggregates produced at Ballyburn Pit, include;

- DART Expansion Programme - new infrastructure and electrification of existing lines, including provision of electrified further south on the Kildare Line, Maynooth;
- M7 Naas to Newbridge bypass widening;
- Osberstown Interchange and Sallins Bypass; and,
- M4 Maynooth to Leixlip;

Key infrastructure projects have been noted in the EMRA in key towns that the Proposed Development could supply high-grade suitable aggregates for:

Graiguecullen – Carlow;

‘The preparation and adoption of a joint local area plan shall be a priority for Carlow County Council and Laois County Council to provide a coordinated planning framework to identify and deliver strategic sites and regeneration areas so that a minimum of 30% compact growth can be achieved.’

2.6.2 Kildare County Development Plan 2023-2029

Kildare County Council adopted its most recent County Development Plan (‘CDP’) on 28th January 2023 [7]. The CDP outlines the objectives and actions for economic and community development. The strategic vision of the CDP is to:

“To build on the strengths of the county in order to improve the quality of life of all residents, through the creation of high-quality job opportunities, by the provision of high-quality residential development supported by adequate community infrastructure, through the provision of a high-quality sustainable transport network, by healthy placemaking and transformational regeneration, by supporting the transition to a low carbon climate resilient environment, by embracing inclusiveness and by enhancing our natural and built environment for future generations”.

2.6.2.1 Kildare County Infrastructure Projects

With regard to infrastructure development, of those projects from the RSES listed in section 2.5.1 above two are located entirely or mainly within County Kildare:

- DART Expansion Programme - new infrastructure and electrification of existing lines, including provision of electrified further south on the Kildare Line, Maynooth;
- M7 Naas to Newbridge bypass widening;

- Sallins Bypass; and,
- M4 Maynooth to Leixlip.

2.6.2.2 Local Population Policy

The CDP [7] predicts a population growth within co. Kildare of 7.9% from to 2031 with an estimated population of 266,500 people [7]. Approximately 32.4% of Co Kildare's current population lives within rural areas and 67.6% lives within urban areas. KCC aims to increase employment by focusing on more intense growth in key towns (Naas, Maynooth).

The town of Castledermot (the nearest town to the Site) has economic offering through small scale industries, traditional natural and resource assets which will be encouraged to supply further employment opportunities.

Castledermot is one of 7 towns selected within the CDP. The predicted population for Castledermot in 2028 is 1686 persons. The CDP contains specific development objectives for the towns. The Site falls outside the "developmental envelope" of Castledermot and, therefore, is not likely to be affected by such objectives.

2.6.2.3 Local Industrial Policy

The Council recognises the importance of the extractive industries in the development of Kildare, stating that:

"Traditional sectors such as agriculture, extractive industries, and forestry will be important in helping Kildare reach targets in relation to climate change and will play a vital role over the coming years and the period of this plan to help Ireland reach its climate targets particularly in relation to food security, carbon storage, provision of renewable energy, reducing emissions, protection of water bodies and increasing biodiversity".

To address this conflict, the Council outlines a number of policy objectives within Section 9.9.1 CDP that specifically address the extractive industries within the rural economy:

RD P8

"Support and manage the appropriate future development of Kildare's natural aggregate resources in appropriate locations to ensure adequate supplies are available to meet the future needs of the county and the region in line with the principles of sustainable development and environmental management and to require operators to appropriately manage extraction sites when extraction has ceased".

RD O42

"Ensure that development for aggregate extraction, processing and associated concrete production does not significantly impact the following:

- *Special Areas of Conservation (SACs);*
- *Special Protection Areas (SPAs);*
- *Natural Heritage Areas (NHAs);*
- *Other areas of importance for the conservation of flora and fauna;*
- *Zones of Archaeological Potential;*
- *The vicinity of a recorded monument;*
- *Sensitive landscape areas as identified in Chapter 13 of this Plan;*
- *Scenic views and prospects;*

- Protected Structures;
- Established rights of way and walking routes;
- Potential World Heritage Sites in Kildare on the UNESCO Tentative List, Ireland”.

RD O43

“Consult with the Geological Survey of Ireland (GSI), with regard to any developments likely to have an impact on sites of Geological Importance listed in Chapter 12 of this Plan.”

RD O44

“Require applications for mineral or other extraction to include (but not limited to):

- *An Appropriate Assessment Screening where there is any potential for effects on a Natura 2000 site (see Chapter 12);*
- *An Environmental Impact Assessment Report (EIAR);*
- *An Ecological Impact Assessment may also be required for subthreshold developments to evaluate the existence of any protected species / habitats on-site;*
- *A detailed landscaping plan to be submitted indicating proposed screening for the operational life of the site. The predominant use of native plant species in the proposed landscaping plan will be expected;*
- *Detailed landscaping and quarry restoration plans. Habitats and species surveying shall be carried out and shall influence the restoration plan for the site;*
- *Comprehensive Site Restoration Plan and/or After-Use Strategy having regard to the principles of ‘Rehabilitation Ecology’; and,*
- *Transport Impact Assessment”.*

RD O45

“Require, where permission is granted for quarrying / extraction of aggregates, the submission by the developer of a bond (cash deposit, bond from an insurance company or other security acceptable to the planning authority) to ensure the satisfactory completion and restoration of the site.”

RD O46

“Require road re-instatement work to be on-going during operations, in the interests of road and traffic safety. Works undertaken to re-instate/improve the public road should be undertaken by the quarry developer or paid by them and completed by the Council.”

RD O47

“Protect and safeguard the county’s natural aggregate resources from inappropriate development.”

RD O48

“Manage the finite aggregate resources being mined by the extractive industries in the county to supply the future needs of our region while working to reach our climate change targets.”

RD O49

“Have regard to the following guidance documents (as may be amended, replaced, or supplemented) in the assessment of planning applications for quarries, ancillary services, restoration and after-use:

- *-Quarries and Ancillary Activities: Guidelines for Planning Authorities, DEHLG (2004);*
- *Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non-Scheduled Minerals), EPA (2006);*
- *Archaeological Code of Practice between the DEHLG and ICF (2009);*
- *Geological Heritage Guidelines for the Extractive Industry (2008);*
- *Wildlife, Habitats, and the Extractive Industry – Guidelines for the protection of biodiversity within the extractive industry, NPWS (2009).”*

RD O50

“Ensure the satisfactory and sensitive re-instatement and/or re-use of disused quarries and extraction facilities, where active extraction use has ceased. Future uses should include amenity, recreation and biodiversity areas shall be informed by an assessment of the specific site/lands and shall be subject to an ecological impact assessment or other environmental assessments as appropriate. Where it is proposed to reclaim, regenerate, or rehabilitate old quarries by filling or re-grading with inert soil or similar material, or to use worked-out quarries as disposal locations for inert materials, the acceptability of the proposal shall be evaluated against the criteria set out in Section 15.9.6 of this Plan. The Council will 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 impact.”

RD O51

“Require that quarry remediation plans provide for environmental benefit, biodiversity and re-wilding in all instances. The 80% requirement for environmental/biodiversity may be waived at sites closer to urban areas where a significant portion of the site is being provided for sports, recreation, and amenity.”

Additionally, within Section 15.9, the CDP sets out policies in relation to the Proposed Development Management Standards for the extractive industries within the county:

DMS 15.9.6

When assessing planning applications for quarry and ancillary developments, the Council will have regard to;

- *Section 261 and Section 261A of the Planning and Development Act, 2000 (as amended);*

- The Quarries and Ancillary Activities Guidelines 2004 and any amendments to the Guidelines which may be made, and
- the Environmental Protection Agency's (EPA) publication 'Environmental Management in the Extractive Industry (non– scheduled minerals)' 2006."

In addition to the above, all planning applications for quarry and ancillary developments, such as batching plants, crushing and screening, shall appropriately detail the environmental baseline of the area in which extraction is proposed, the likely impacts and proposed mitigation measures relating to;

- Human health;
- Groundwater, surface water and important aquifers and compliance with the objectives of the Water Framework Directive;
- Natura 2000 sites (Special Areas of Conservation and Special Protection Areas), Natural Heritage Areas, proposed Natural Heritage Areas and other sites for environmental or ecological protection such as Statutory Nature Reserves, Ramsar Sites, Wildfowl Sanctuary and Biogenetic Reserves;
- Flora and fauna;
- Sensitive local receptors such as residences, Areas of High Amenity, Landscape Sensitivity Areas, Key Scenic Views and Prospects, and Key Amenity Routes as outlined in Chapter 13 of this Plan;
- Landscaping, berms and screening proposals;
- Local transportation networks with particular reference to details of haul routes, trip movements and articulated lorry weights;
- Noise, vibration, and dust emissions; and
- Archaeological and architectural heritage of the area."

Planning applications shall also include general details on the Proposed Development as follows:

- Project description:
- Map(s) showing (a) total site area, (b) area to be excavated, (c) any ancillary, proposed development, (d) nearest dwellings or any other development (within 1 km of the site);
- Description of aggregate to be extracted and / or processed;
- Description of cumulative impact when taken together with all other quarries in the vicinity;
- Method of extraction and equipment to be used;
- Details of storage of materials and overburden;
- Total and annual tonnage of extracted aggregates, expected life of the extraction, maximum extent and depth of working;
- Details of any blasting;
- Fuel and chemical storage;
- Floor levels showing depths of extraction;
- Phasing programme for extraction and rehabilitation;

- *Restoration and after care proposals for the site (plans and section drawings), including long-term quarry face stability, long-term water pollution potential and control, removal of buildings, plant and machinery, fencing and security.*
- *Remediation plans provide for environmental benefit, biodiversity, and re-wilding rather than simply re-grassing and reverting back to agricultural use / sheep grazing.*

In order to facilitate the sustainable development of the extractive industry, the Council will require the lodgement of a financial bond to ensure the satisfactory reinstatement of the site following the completion of extraction and the payment of an adequate contribution towards the upgrading or repair of the local road network.

Traffic Assessments and Road Safety Audits may be required as part of any application. Proposals for batching plants, crushing, and screening on exhausted quarry sites are required to provide details on the source of aggregate and also the number of expected trips from source to plant and then from plant to off-site”

The aggregate from the Proposed Development will be used for infrastructure projects throughout the region. Aggregate is an essential material for the construction and upkeep of houses, school, hospitals, stadiums, shopping areas and other essential building and civil engineering projects, including those set out in Project Ireland 2040. The extraction activities for the Proposed Development are in line with the CDP. Additionally, the end result of the Proposed Development will be the restoration of the local landscape from an exhausted quarry pit to an agricultural landscape, which is an appropriate development for the area.

2.7 Circular Economy of Soil and Stone By-product

Excess soil and stone material may be generated during an ongoing development. These materials must be managed in an environmentally friendly manner, with the option to treat them as either waste or by-products of the production process. Where a person decides that the material is a by-product rather than waste, the person must notify the EPA of this decision. The EPA may agree with the decision or determine the material is waste.

By-products were established by the European Waste Framework Directive [18] which has been transposed into Irish law through Regulation 27 of the European Communities Regulations 2011, as amended. It should be noted that uncontaminated soil and stone excavated on-site are excluded from this Directive. Under Article 5 of the Waste Framework Directive [18], in the production process, where the substance/object is not the primary aim of the process, the substance/object will be considered a by-product if the following conditions are met:

- a) *Further use of the substance or object is certain;*
- b) *The substance or object can be used directly without any further processing other than normal industrial practice;*
- c) *The substance or object is produced as an integral part of a production process; and*
- d) *Further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.*

The EPA encourages the prevention of waste, including the lawful and beneficial use of excess soil and stone. The backfilling of exhausted quarries provides an end-of-use destination for developments with excess amounts of soil and stone, which helps reduce the amount of C&D waste that ends up in landfills while also helping to promote a circular economy within the construction and extraction industries.

In the case of the Proposed Development, the Applicant intends to import clean uncontaminated soil and stone by-product from other construction sites. This will be used to fill the void space left by the excavations carried out and to enhance the restoration efforts of the Proposed Development. The use of by-product from other construction sites negates the need to acquire primary construction materials that would be better utilised elsewhere or treated waste material.

Article 27 of the Waste Framework Directive [18] further reinforces these efforts by providing clear guidelines for classifying certain materials as by-products rather than waste. This classification encourages beneficial reuse, significantly reducing waste generation and promoting resource efficiency. Key benefits of Article 27 include:

- **Resource Efficiency:** It promotes the reuse of materials, conserving natural resources and reducing environmental impacts associated with the extraction of new materials;
- **Reduced Waste Generation:** It helps divert excess soil and stone from landfills, significantly lowering overall waste in construction projects;
- **Economic Benefits:** Utilising by-products can lead to cost savings by reducing the need for new materials and lowering disposal costs; and,
- **Support for Local Economies:** The reuse of by-products can stimulate local economies by creating markets for these materials and potentially leading to new business opportunities in waste management.

By integrating Article 27 into the management of excess soil and stone materials, stakeholders in the construction and extraction sectors can significantly contribute to the goals of the circular economy, enhancing sustainability while ensuring compliance with regulatory frameworks.

2.8 Need for the Development

The NPF2040 [13] sets out a target of sustainable growth of Ireland's rural communities, with approximately 50% of the projected population growth to 2040 intended to take place outside of the five major Irish cities (Dublin, Cork, Galway, Limerick and Waterford). Of this 50%, a minimum of 30% (15% of total population growth) is planned to take place within the existing built-up footprint of current settlements. The projected growth requires new infrastructure, including housing, schools and other public services and transport networks. The Regional policy seeks to make efficient use of the Region's natural resources and to carry out major developments within the framework of national policy. From a local sense, the ambitious goals, set by KCC in respect of housing, education, and public infrastructure will not be attainable without a sufficient source of suitably situated quality aggregates. Even within the context of a circular economic model, this will require substantial quantities of raw materials, including aggregates, and the intended rural growth means that the market for building materials will have a strong regional and local element. The scarcity of sand in the midland and eastern region (as highlighted in the ICF report [12]) adjacent to major population centres, increases the importance of supplies from the Proposed Development. This fact alone provides an insight into the regional importance of the Proposed Development. If the Proposed Development is permitted, the extended quarry is estimated to be capable of producing ca. 3,000,000 tonnes of aggregate, with an annual output of up to ca. 500,000 tonnes. This does not represent an increase of previous extraction rates. The extension will allow Ballyburn Pit to continue at previous production rates and enable the company to compete on a secure footing for the anticipated 15-year lifetime of the extended quarry. Not only will the Proposed Development provide a valuable resource to the construction market, but the Proposed Development will also offer a beneficial end point for surplus clean, uncontaminated soil and stone material arising from local and regional construction projects.

The Ballyburn Pit has supported the economy of the local area through direct employment of up to 28 staff. However, the very limited reserves available within the area originally permitted means that without the Proposed Development, it is unlikely to be able to maintain these employment levels and closure would likely follow with the loss of jobs and valuable reserves.

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3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Introduction

This chapter provides an overview of the existing environmental conditions, the current operations within the Ballyburn Pit and a description of the Proposed Development.

3.2 Ballyburn Pit

Ballyburn Pit first received planning in 2007 (Planning Reference 05/2091 and ABP PL09.220222) with operations commencing in 2012. However, following the economic downturn operations ceased for several years before recommencing in 2019. The planning application included provisions to access and extract the aggregates within the extension lands (i.e. the Proposed Development). When planning permission was received, the phase of works which incorporated the extension lands were not included. The Competent Authority's reason *'In order to enable the planning authority, in conjunction with the developer and environmental authorities, to review changes in the environmental standards and technology occurring in the intervening period subsequent to this grant planning permission'*. This EIAR and supporting documentation are a direct fulfilment of this request.

Ballyburn Pit contains high-quality sand and gravel reserves, which has NSAI certification for use in concrete and precast, and aggregate products such as aggregates for use in civil engineering. The Applicant supplies both locally and to Britain from Ballyburn Pit, with notable developments/clients such as Irish Rail and the IDA Business and Technology Park (Little Connell Newbridge) and associated developments, receiving essential aggregates from this quarry. Ballyburn Pit won "Quarry of the Year" in 2021 from the Machinery Movers Industry and Operator Awards in relation to its environmental performance and initiatives.

Ballyburn Pit is served well by suitable infrastructure, as the M9 motorway, connecting Dublin to Waterford is readily accessible via the L4012 and R448. There are linear residential dwellings present along the local and regional roads, with further housing present to the south-east. In general terms, the Ballyburn Pit is in an area primarily used for agricultural purposes.

Plate 3-1: Site Entrance Gates



The primary access to Ballyburn Pit is via an existing entrance off the L4012 local road (Refer to Plate 3-1 above). This road joins the R448 regional road at the Prumplestown Crossroads, ca. 530 m northwest of the Site entrance. From the Prumplestown Crossroads, the M9 is accessed at Junction 4, ca. 450 m to the north. Refer to Figure 3-1 below.

Existing quarry operations involve the extraction and processing of sand and gravels, with up to ca. 500,000 tonnes transported to market on an annual basis. Ballyburn Pit is subject to conditions (Planning Reference 05/2091 and ABP PL09.220222) of planning which specifies emission limits for noise and dust within specified limits. Ballyburn Pit operates above the local winter groundwater table.

Ballyburn Pit includes the following established components/infrastructure (refer to Figure 3-1 below):

- Site office;
- Vehicle parking;
- Staff welfare facilities;
- Weighbridge;
- Wheel wash;
- Settlement ponds;
- Modular mobile processing/screening plant;
- ESB substation;

- Workshop; and,
- Storage bays.

Ballyburn Pit presently utilises mobile machinery to work in the pit face, consisting of excavators, loading shovels and articulated dump trucks to transport aggregates to the processing area to satisfy end use requirements. Internal quarry trafficked routes are maintained to a high standard. The existing Ballyburn Pit has been completing active restoration, whereby lands which have been extracted to their permitted depth have been restored on an ongoing basis, as per the permitted approach. Plate 3-2 below provides an example of agricultural land which has been subject of active restoration in the north central portion of the existing Ballyburn Pit.

Plate 3-2: Restored Agricultural Land in the North Central Portion



3.2.1 Wheel Wash

The wheel wash is located ca. 80m from the Site access point on the access road between the Ballyburn Pit and the access gate onto the L4012 (see Plate 3-3 below). It consists of a concrete-lined ramp supplied by recycled water from the wheel wash drainage to a water bulk tank. During prolonged periods of dry weather, it can be topped up from the mains water supply. HGVs associated with the Proposed Development will utilise the existing wheel wash prior to exiting the Ballyburn Pit (refer to Engineering Drawing MB211108015) submitted as part of this application).

3.2.2 Weighbridge

The weighbridge is located on the internal access road adjacent to the weighbridge office. HGVs associated with the Proposed Development will utilise the existing weighbridge prior to

exiting the Ballyburn Pit (see Plate 3-3 below and refer to Engineering Drawing MB211108015).

Plate 3-3: Existing Wheel Wash and Weighbridge



3.2.3 Parking

On-site parking is provided to the west of the Site office. Reverse parking only is implemented and is sufficient for expected staffing levels, and no on-road parking will take place.

3.2.4 Staff Welfare Facilities

A staff welfare facility is provided which consists of a canteen and toilet facility for staff on-site. The toilets consist of a port-a-loo-type unit which is self-contained and emptied by a licensed contractor on a regular basis (Refer to Drawing MB24110814 submitted as part of the application).

3.2.5 Associated Settlement Lagoons

Settlement lagoons (see Plate 3-4 below) are located on the northeast boundary of the Site. These settlement lagoons collect run-off water from the processing area. This allows adequate retention time for solids to settle out of suspension prior to entering into the adjacent lagoon. The water is then recycled and reused in the washing plant. The settlement lagoons are regularly emptied to ensure suitable capacity is maintained in the settlement lagoons.

Plate 3-4: Associated Settlement Lagoons



3.2.6 Screening Plant

The mobile modular processing plant comprises a sand and gravel washing/ screening unit with secondary crushing units and an associated water treatment unit. Water used during the screening process is recycled back to the washing plant (closed system) (see Plate 3-5 below). The system is topped up to account for losses through evapotranspiration etc.

Plate 3-5: Existing Closed System Screening Plant with Workshop and Storage Bay



3.2.7 ESB Mains Supply

Ballyburn Pit's electrical needs are serviced by access to the mains electricity supply.

3.2.8 Workshop And Storage Bays

A small workshop and storage bay is located on-site at the mobile processing plant, which comprises of two storage containers (see Plate 3-5 above).

3.2.9 Existing Plant Machinery

The Ballyburn Pit owns and operates the following plant and machinery as part of the existing development;

- Mobile modular processing/screening Plant;
- Mobile conveyer belts;
- Loading shovels;
- Articulated dumpers;
- Long arm excavator; and,
- Road sweeper.

3.3 Description of the Proposed Development

From a high-level, the Proposed Development will consist of the following components:

- The continuance of use of existing site infrastructure, including all processing equipment, machinery, entrance, office/welfare facilities, carpark, wheel wash, weighbridge, haul routes and other ancillary infrastructure;
- The extension of the Site to known quality reserves in the south (ca. 28.3ha). The extraction of this extension area will result in a pit floor at ca. 71m OD, which is above the winter water table. The applicant intends to extract ca. 1.7million m³ of aggregates or ca. 3,060, 000t over the lifetime of the project; and,
- The importation of 1,125,000t of clean, uncontaminated soil and stone by-product materials to complement overburden originating from the Site during the restoration process (which will be restored to between 73/74m OD).

The Proposed Development will work within existing permitted traffic levels (500,000 tonnes per annum) to for extraction and importation activities. Plates 3-6 and 3-7 below provide a view of parts of the extension lands.

Plate 3-6: Extension Lands



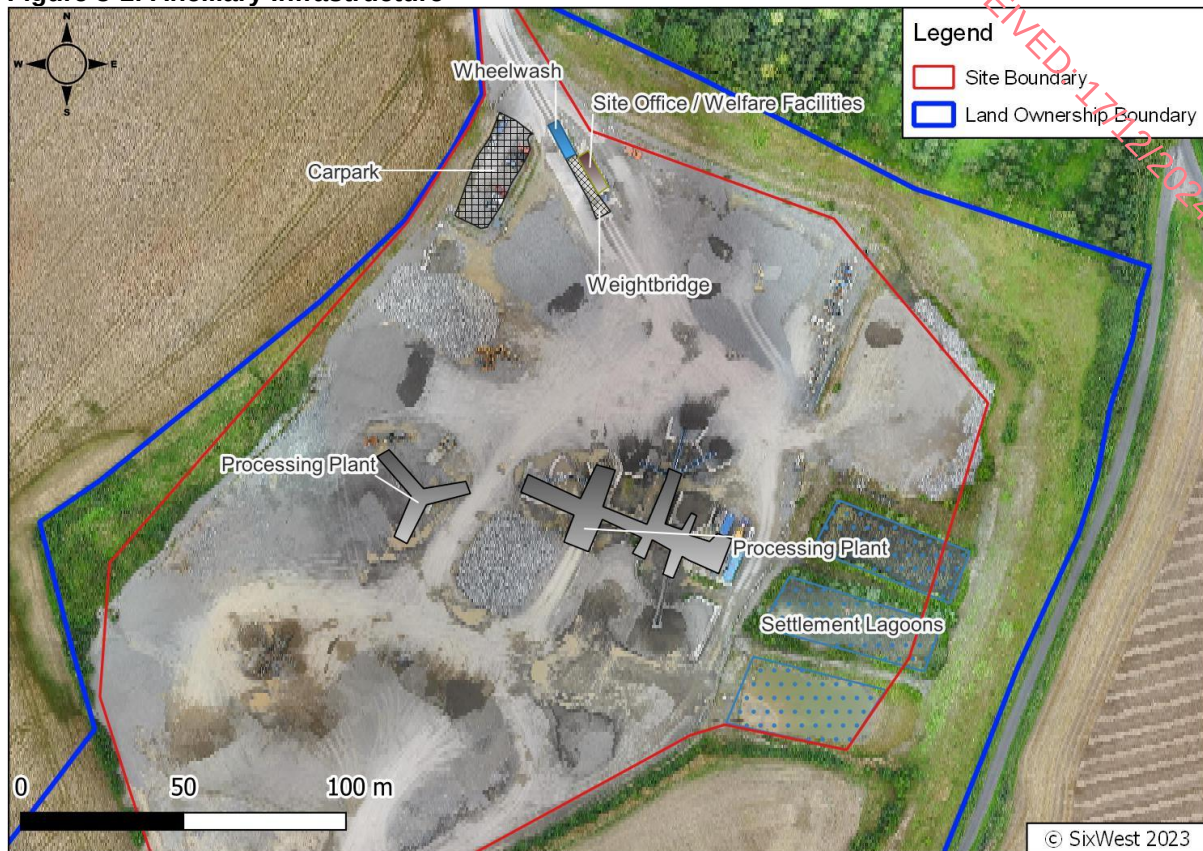
Plate 3-7: Extension Lands



The Proposed Development will be a continuation of the quarrying activities currently in-place at the Ballyburn Pit. As such, the Proposed Development will incorporate screening and stockpiling of materials into its operational phase and will not impact existing employment.

The Proposed Development will seek to utilise established ancillary infrastructure within Ballyburn Pit including the site office, weighbridge, wheel wash, aggregate processing plant, storage, and screening plant. Refer to Figure 3-1 for context.

Figure 3-1: Ancillary Infrastructure



The Proposed Development will seek to utilise existing haul routes to access the extension lands. The Proposed Development will involve the stripping of the existing overburden (where it is present) under archaeological supervision to access the underlying sand and gravel in the extension lands. An excavator will be used to remove sand and gravel aggregates and articulated dump trucks will haul the aggregate from the Site to the modular mobile processing plant for processing prior to transport to market.

The removed overburden will be used to construct peripheral screening berms and for restoration works that are contiguous to third party properties. The existing hedgerows, where present along the Site boundaries peripheries, will be retained (refer to Chapter 6 - Biodiversity).

The Proposed Development will seek to extract sand and gravel from the existing levels down to 71m OD. Cross sections of the Proposed Development's finished extraction levels are included in Volume 3.

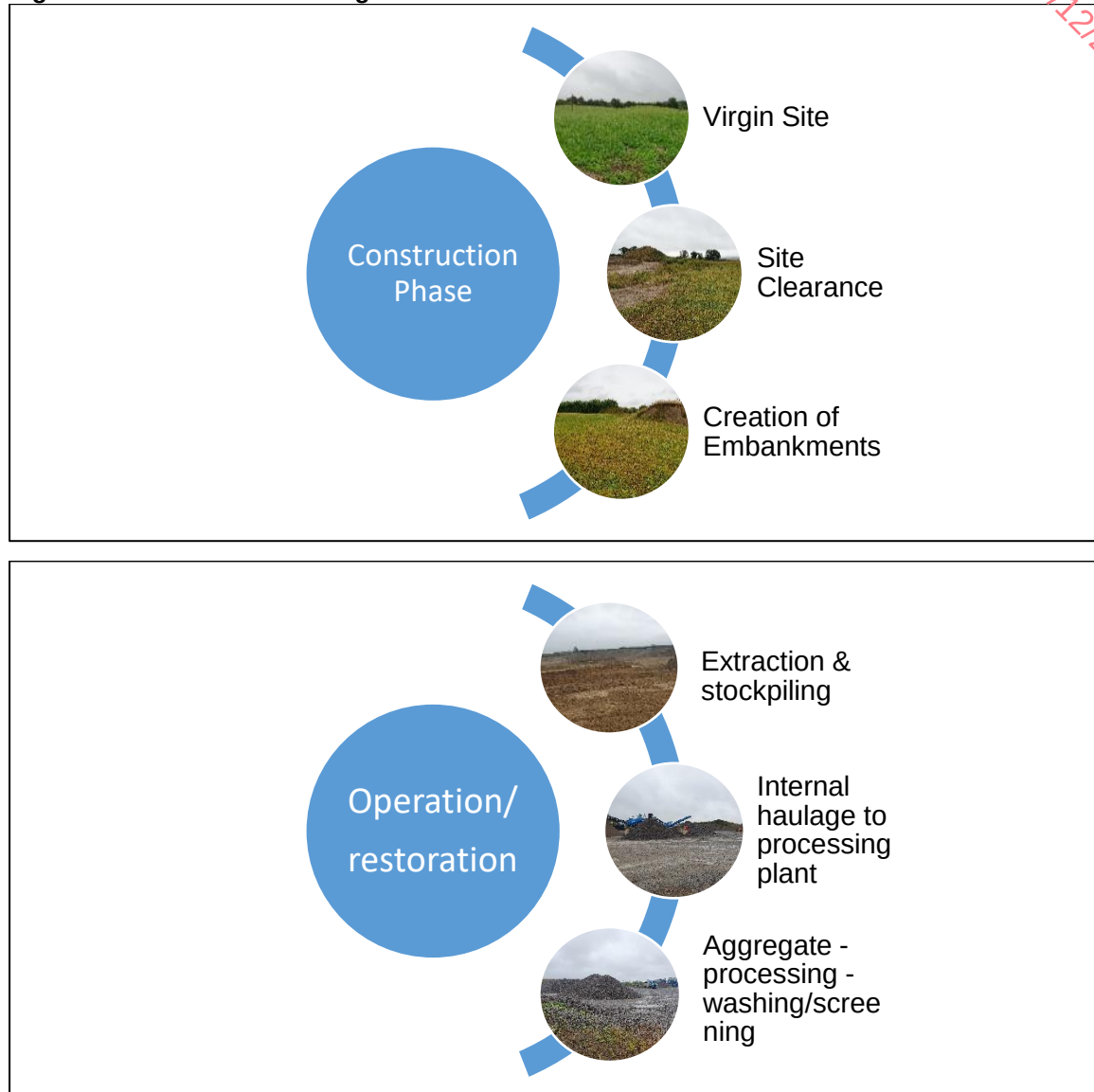
The Proposed Development will include for the importation of ca. 1,125,000 t of greenfield soil and stone by-product material to restore ground gradients throughout the extension lands following extraction. The restoration phase will include the reinstatement of all hedgerows and field boundaries which are removed as part of the extraction works.

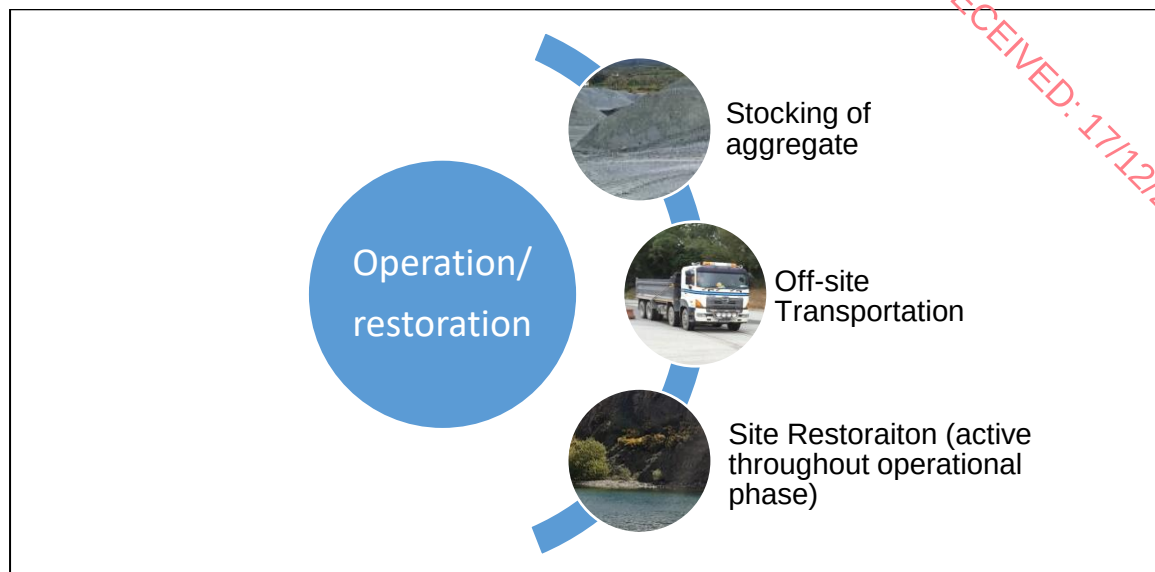
Upon removal of the aggregate reserve, the Site will undergo restoration in a phased basis as per the Restoration Plan attached as Appendix 6-2.

The Restoration Plan will supersede the rehabilitation plan submitted under planning reference 05/2091 (AB PL09.220222) where relevant (i.e. where the redline intersects planning reference 05/2091).

The general process from the Site preparation works through to rehabilitation is shown in Figure 3-2 below.

Figure 3-2: Process Flow Diagram





Each phase has distinct activities associated with the works undertaken and are discussed in detail below.

It should be noted that as the Proposed Development is an extension to Ballyburn Pit, the potential effects arising from the existing quarry in combination with the Proposed Development have been assessed as part of this EIAR.

3.3.1 Scale of the Proposed Development

The Site covers an area of ca. 37.8 hectares ('ha') in size. Ballyburn Pit has an existing permitted output of up to 500,000 tonnes of aggregates per annum. The Proposed Development will not seek an amendment to the existing permitted traffic levels and will be able to operate the off-site transportation of aggregates and importation of clean, uncontaminated soil and stone by-product within these permitted levels of traffic.

An overview of the timelines associated with the Proposed Development are as follows;

- Construction Phase (6 months cumulatively);
- Operational Phase (includes extraction and importation of clean and uncontaminated soil and stone by-product) (14 years); and,
- Restoration Phase (6 months).

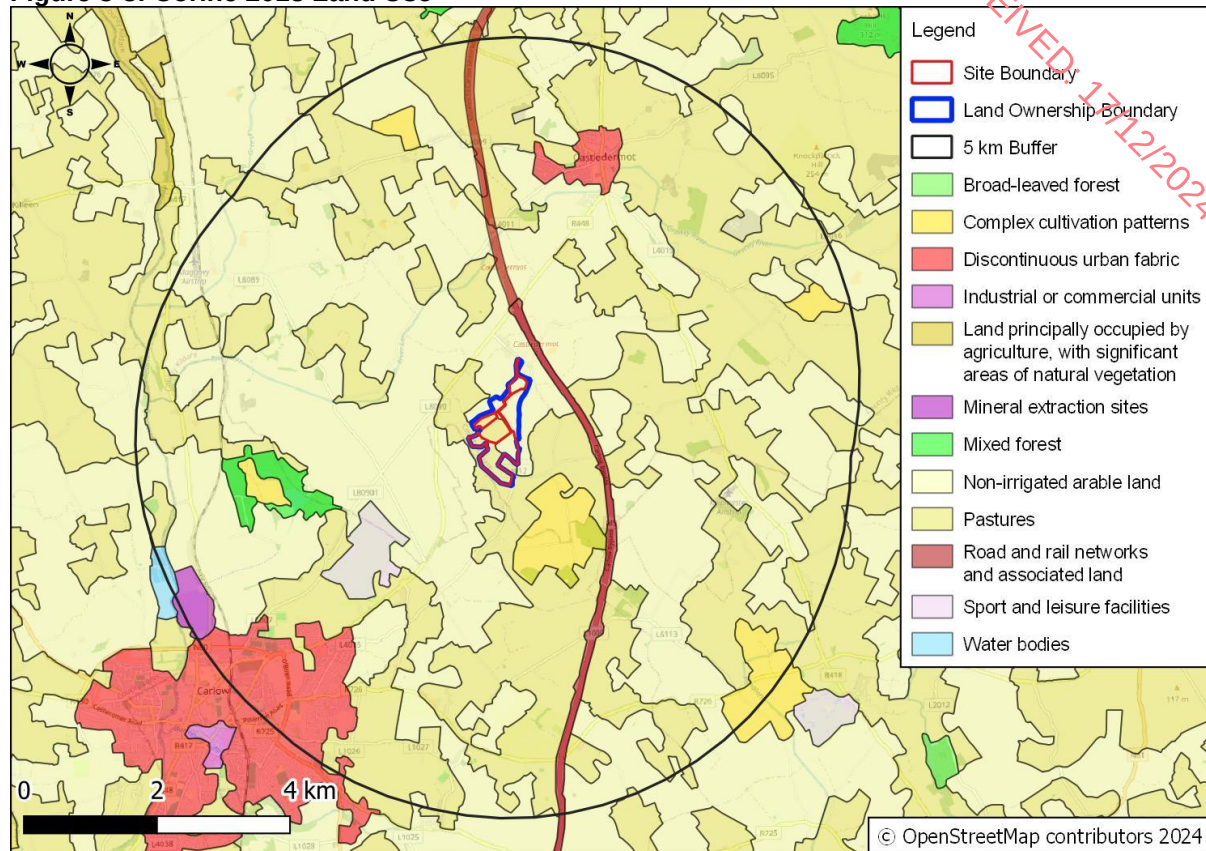
Planning permission is being sought for 15 years (up to 6 months for the Construction Phase, 14 years for the Operational Phase and 6 months for the Restoration Phase).

3.3.2 Land Take

The proposal includes for the extension of the extraction area into agricultural lands to the south with known quality reserves of sand and gravel. The extension will cover an area of 28.3ha, with the overall application area covering 37.8ha, the balance comprising continuance of use and restoration.

The land at the Proposed Development is owned by the Applicant and is utilised for agricultural purposes. Based on the Corine 2018 dataset, the locality is dominated by agricultural fields in the form of pastures with pockets of forestry to the southwest. Refer to Figure 3-3 below for further details.

Figure 3-3: Corine 2018 Land Use



3.3.3 Development Phasing

There are distinct activities associated with the works of each phase of the Proposed Development. As part of the assessment, there will be three phases assessed under each environmental topic:

- Construction Phase;
- Operational Phase; and,
- Restoration Phase.

The existing Ballyburn Pit is a well-established operation. The Proposed Development seeks the continuance of use of established infrastructure and extension of the extraction area. The Proposed Development will operate the same as the current activities at Ballyburn Pit. Refer to Plates 3-8 to 3-10 for an example of existing activities at Ballyburn Pit.

Plate 3-8: Dump truck hauling aggregates



Plate 3-9: Processing / Screening Plant



Plate 3-10: Off-site transport will be via heavy goods vehicles ('HGV's)



There are distinct activities associated with the works of each phase of the Proposed Development. As such, this assessment assesses the works and potential effects they may give rise to associated with each phase to ensure a comprehensive and coherent approach.

3.3.3.1 Construction Phase Site Preparation / Overburden Stripping

The Construction Phase relates to the preparation of the agricultural fields located in the extension lands for sand and gravel extraction activities. Works will include the:

- Installation of silt fence;
- Removal of overburden under archaeological supervision;
- Creation of soil embankments and berms along the Site boundaries;
- Seeding of embankments;
- Planting of trees;
- Creation of haul roads between all operational areas of the Site; and,
- Installation of security fencing to prevent unauthorised access to the Site.

Ballyburn Pit and the operations associated with it are well established. The Proposed Development will operate in a similar manner. The extraction area will maintain a minimum buffer with adjoining lands of ca. 10 m to provide an area of minimal disturbance around the Site. This extraction buffer will be used for the siting of the berm and security fencing. The berm will be constructed from overburden stripped as part of the preparation works in the extension lands. The berm will be ca. 4m wide and 2m high and will be constructed along the periphery of the Zone A1, A2, B1 and B2. The berms will be planted with grass sward species to ensure the soil is protected and stabilised for future use during the final site restoration works.

The plant required at this phase will primarily consist of a bulldozer, articulated dumper and excavator. This phase will result in an exposed sands and gravels, which is suitably prepared for extraction. The planting of the soil embankments as described in Chapter 6 Biodiversity will commence upon the development of the berms in order to stabilise the slopes and ensure that they blend into the local environment.

The Site will be accessed via the haul roads linking the Site to Ballyburn Pit, which itself only has a single point of access (see section 3.4.8 below). Access will be gated and secured when

activities are not occurring. It is proposed that security fencing will be positioned around designated zones, with the installation of fencing and appropriate signage along boundaries with third parties.

The construction phase (Site preparation) will be completed over a 6-month period cumulatively (i.e., over two periods for each phase). Construction will be carried out by existing Ballyburn Pit employees. Working hours for the construction phase will be the same as the working hours for the Pit:

- Monday to Friday 07:00 - 18:00 (stripping of overburden will only occur between 08:00 and 18:00);
- Saturday 08:00 – 14:00; and,
- Sunday / Bank Holiday Closed.

Workers will utilise established welfare facilities within the existing Ballyburn Pit.

3.3.3.2 Operational Phase-Aggregate Extraction and Processing

Sand and gravel will be excavated and transported via dump trucks prepared for processing. Processing will consist of washing/screening by the modular mobile plant followed by transportation, either directly to market or stockpiled within the existing Ballyburn Pit. The aggregate will be graded as per market demand.

The following modular mobile equipment will be used during the Operational Phase of the Proposed Development:

- One (1) x Excavator;
- Two (2) x Loading Shovels;
- Two (2) x Wheel Loader; and,
- One (1) x Processing and screening Plant.

The operational phase will be divided into four (4) phases and will result in the existing ground level across Zones being extracted down to 71m OD. The operational phase will also include the importation of 1,125,000 t of clean, uncontaminated soil and stone by-product for land purposes. This material will be imported to Site and temporarily stored in the soil importation area of the Site, which is situated in the western are of the existing extraction area (covering an area of ca. 4 hectares). This area will also be used for visual inspection of incoming loads with an area maintained for quarantine when circunstabces require such an area.

Figure 3-4 below presents the phasing scheme for the upper and lower elevations, as well as the western area for restoration, which is described here.

Phase 1

The first phase will commence in Zone A1. Topographical maps within Zone A1 indicate 73 m OD is the highest point within the extraction area. The applicant will extract the sand and gravel deposits in the north-western portion of the Site down to the established quarry floor, reducing the existing ground level to ca. 71m OD.

Once extraction of Zone A1 is completed, the area will be progressively restored with imported clean, uncontaminated soil and stone by-product materials and site won overburden to ca. 73/74 m OD. This phase will run concurrently with phase 2.

Phase 2

While extraction activities are occurring within Zone A1, the applicant will commence site preparation works (Construction Phase) in Zone A2 of the extension lands, following the methodology described in Section 3.3.3.1 above.

Once these lands have been prepared, extraction activities associated with phase 2 can commence. Topographical maps within Zone A2 indicates ca. 83m OD is the highest point within the extraction area. Extraction activities associated with this phase will reduce the existing ground level to ca. 71m OD. Aggregates will be transported back to the existing Ballyburn Pit for further processing via the existing haul route on the eastern periphery of the Site. However, as the ground level is reduced new temporary haul routes will be constructed to maintain connectivity with the existing pit infrastructure. This phase will run partly in concurrence with Phases 3 and 4.

Once extraction of Zone A2 is completed the area will be progressively restored with clean uncontaminated soil and stone by-product materials and sitewon overburden to a level of ca. 73/74m OD.

Phase 3

Phase 3 will seek to extract the deposits in the southern portion of Zone B1. Topographical maps within Zone B1 indicates ca. 82m OD is the highest point within the extraction area. New temporary haul routes will be constructed to maintain connectivity with the existing Ballyburn Pit infrastructure as Phase 1 and Phase 2 are progressively restored. Phase 3 will run in partial concurrence with phases 2 and 4.

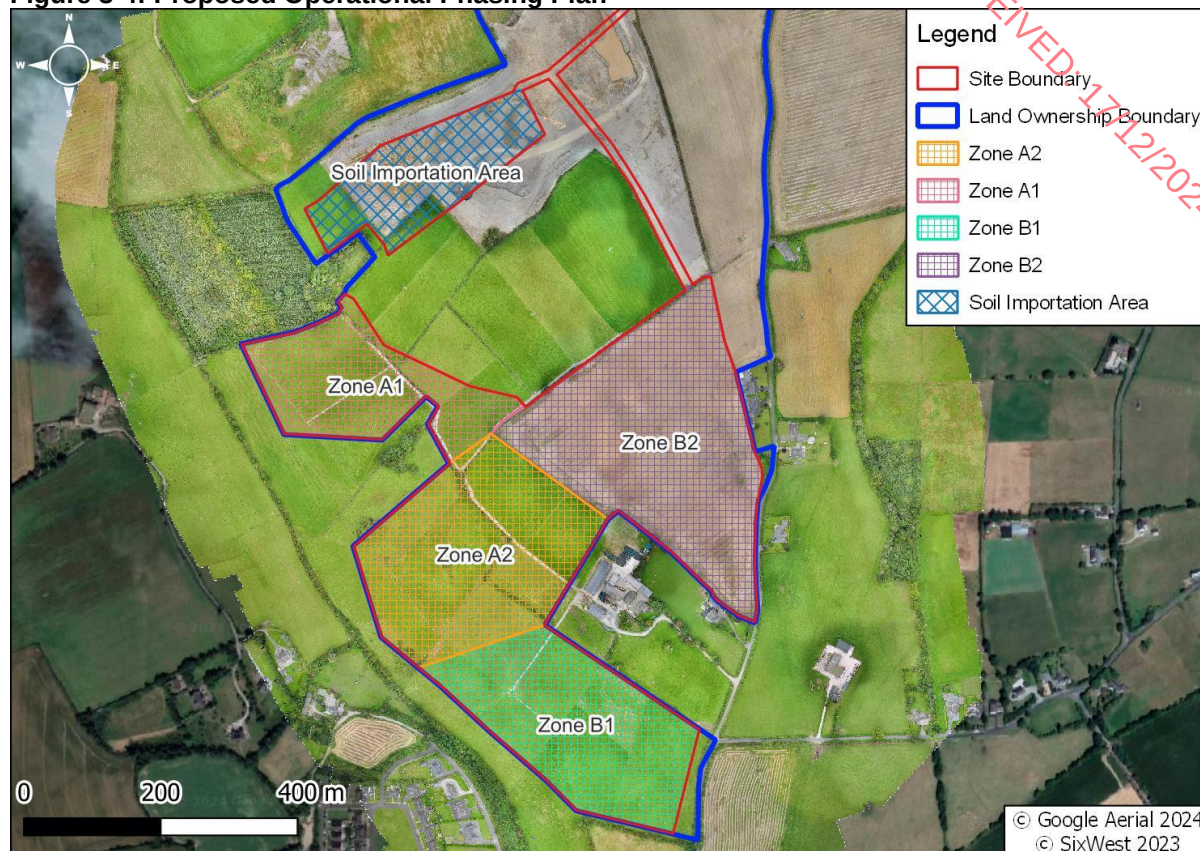
Once extraction of Zone B1 is completed the area will be progressively restored with imported greenfield soil and stone by-product materials to a level of ca. 73/74 m OD.

Phase 4

Phase 4 will seek to extract aggregate deposits within Zone B2. Topographical maps within Zone B2 indicates ca. 83m OD is the highest point within the extraction area. This phase will be the final phase of the extension lands.

This phase will provide the final zone of extraction which will be restored for the re-establishment of historic contours and agricultural fields prior to extraction activities occurring. Once extraction of Zone B1 is completed the area will be progressively restored to a level of ca. 73/74m OD.

Figure 3-4: Proposed Operational Phasing Plan



3.3.3.3 Transport of Material

As noted above, the Proposed Development does not represent an intensification of activities but rather an extension of activities. As such, the Proposed Development will operate within the bounds of existing permitted traffic numbers.

Table 3-1 provides an overview of the predicted quantities of materials exported and imported to the Site.

Table 3-1: Exported Quantities of Material and Average Daily Trips

Exported Quantities of Material and Average Daily Trips	
Total Exported/Imported Material (tonnes per annum)	500,000
Quantity (tonnes per day - 250 operational days / year)	2,000
Outbound HGV trips per day (average 25 tonnes per load)	84
Light vehicles (staff) trips outbound per	8

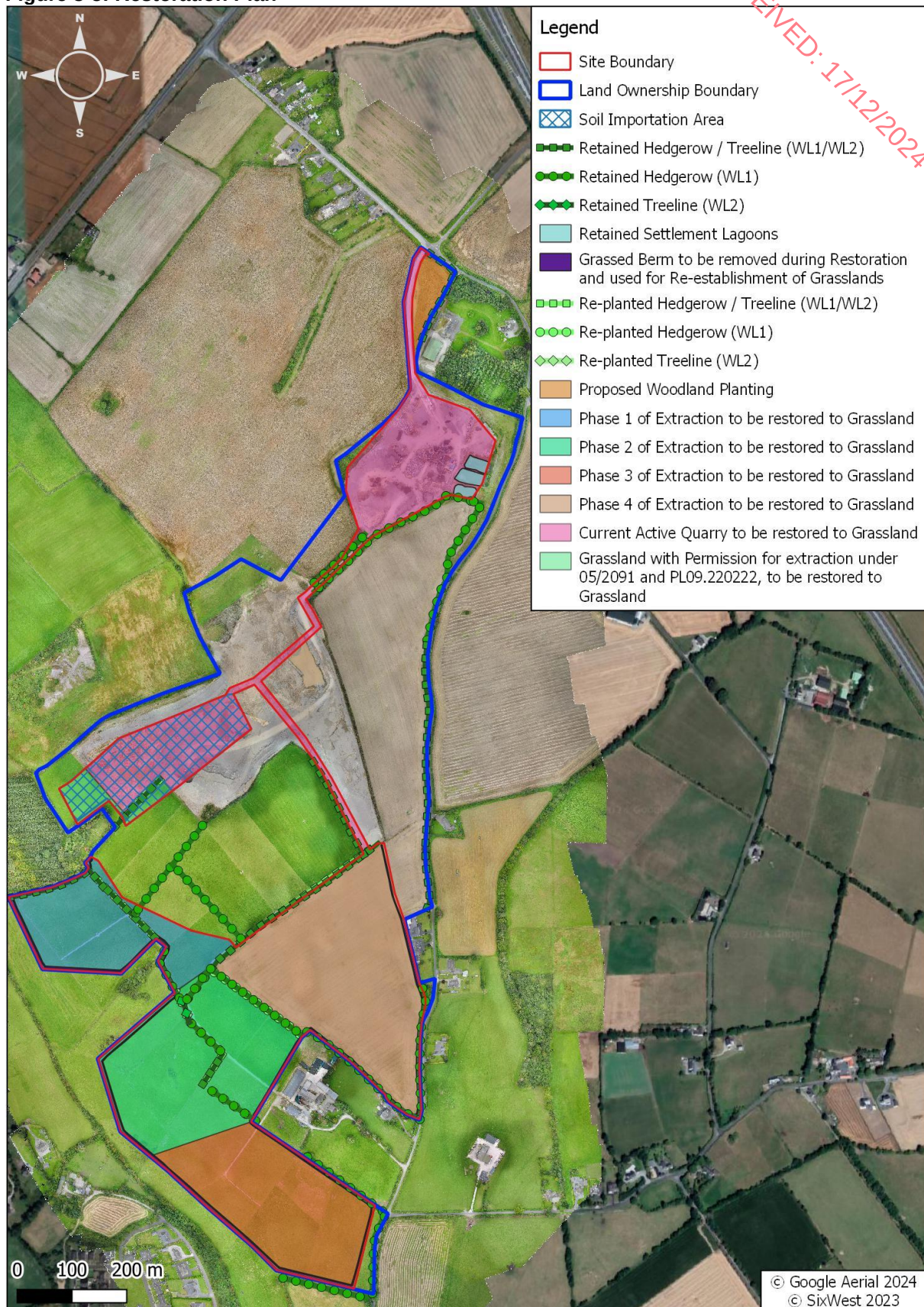
3.3.3.4 Restoration Phase – Site Closure

The restoration will be done in line with a Restoration Plan, which is submitted with this planning application. The restoration will comprise of placement of the overburden (from the berms) and subsequent seeding to establish a habitat similar to that which existed prior to the historic quarrying.

The intention for the Site is to restore the land to its historic agricultural use, which will involve reinstating the historic field boundaries where appropriate; refer to Figure 3-5 below for context.

A multi-species sward will be sown within the agricultural grassland on-site. Multi-species grass swards include grasses, legumes and herbaceous species, these swards not only provide sources of minerals, protein and energy for livestock, but the inclusion of nitrogen-fixing legumes will result in a reduced requirement for fertiliser application in future [19] and the increased diversity of plants will benefit local invertebrates and foraging wildlife. The applicant has set aside a piece of land for biodiversity enhancement in the northern area, which will be planted to create a mixed woodland (during the first initial 5 years from commencement of planning). The settlement lagoons will be retained when quarrying has finished at the Site, which will provide suitable habitat for wetland and waterbirds, as well as amphibians.

Figure 3-5: Restoration Plan



3.4 Development Design and Management

3.4.1 Landform Design

The overall proposal to restore the ground levels on-site has been designed under the following principles:

- Improving the landscape quality in the long term after extraction activities have ceased; and,
- Providing a suitable site to accept clean uncontaminated soil and stone by-product materials and participate in the circular economy.

To achieve these principles, the landform created by the main phase of restoration works needs to be stable and safe, avoid steep slopes, and eliminate drops and sudden changes in gradient.

3.4.2 Operational hours and staffing

The operational hours for the Proposed Development will reflect the current operational hours of Ballyburn Pit, which are:

- Monday to Friday 07:00 to 18:00; with extraction occurring only between 08:00 – 18:00;
- Saturday 08:00 to 14:00; and,
- Sunday & Public Holidays closed.

The existing Ballyburn Pit supports ca. 28 full time employees arising from on-site personnel, hauliers, and maintenance personnel. The Proposed Development will not result in a change to employment.

3.4.3 Car Park

Car parking facilities for on-site personnel will be maintained within the existing Ballyburn Pit, no additional parking is proposed as part of the Proposed Development.

3.4.4 Welfare

The main office / welfare unit within Ballyburn Pit will provide welfare facilities for the Site. This building contains a cafeteria, toilet and sink. No additional welfare facilities are proposed as part of the Proposed Development.

3.4.5 Drainage

There are no new permanent structures proposed for the Site. Therefore, there will be no change to the existing drainage regime.

The main sources of water that arise at the Site are mainly attributed to surface water runoff and wastewater from the processing area. Lagoons are already in place on-site to treat any water from the processing area.

The Ballyburn Pit extracts materials from above the water table. Drainage is further assessed in Chapter 8, Water (Hydrogeology and Hydrology).

3.4.6 Wheel Wash

The existing wheel wash within the Site will be utilised for the Proposed Development. No upgrades to this wheel wash are proposed. An enclosed water recycling system has been implemented for the on-site wheel wash. This system reduces and minimises the amount water wastage.

A road sweeper will be available to clean the public roads as required. This will be determined from visual inspections.

3.4.7 Fuel and Oil Storage

No fuel will be stored on-site. Fuel is delivered to the Site on an as required basis by reputable fuel companies in bunded fuel bowzers. Fuel is delivered directly to the plant and machines on the Site.

Oil interceptors are in place on-site in the process area to stop runoff before it enters the lagoons. Refuelling for dump trucks and all HGVs will be refuelled on-site, as is the current practice.

It is important to note that all plant and machinery subject to refuelling procedures within the wider landholding will be refuelled by a competent person utilising a drip tray. In addition, absorbent sands and a full spill kit system are stored within the existing Ballyburn Pit.

Nonetheless, environmental risks to water and relevant mitigation measures are outlined in Chapter 8: Water (Hydrogeology and Hydrology).

3.4.8 Transportation, Roads and Traffic

The operational phase of the Proposed Development will involve a maximum of 92 inward trips (84 HGVs and 8 staff trips) and 92 outward trips per day, or a total of 168 HGVs and 16 staff trips daily movements.

A Traffic Impact Assessment has been undertaken by PMCE, the findings of which are presented in Chapter 13: Traffic & Transport of this EIAR.

The environmental effects associated with the movement of HGVs have been incorporated into Chapter 9: Air Quality, Chapter 10: Climate and Chapter 11: Noise & Vibration.

3.4.9 Safety and Security

Access to the Site will be via the existing entrance to Ballyburn Pit off the L4012 local road refer to Plate 3-11 below. The existing entrance is gated and secured when activities are not occurring within the Ballyburn Pit. There will be warning signs at the quarry entrance.

Soil embankments and/or stock fencing is present on all other boundaries of the existing Ballyburn Pit.

As part of the Proposed Development, the extension area will be developed with both soil embankments and additional security fencing prior to activities commencing.

Plate 3-11: Site Entrance



3.4.10 Construction Management

During the construction process, the methods of working will comply with all relevant legislation and best practice guidelines to reduce the environmental impacts of the work.

3.4.11 Construction Staffing and Working Hours

Construction will be carried out by existing employees. Working hours for the construction phase will be the same as the working hours permitted for Ballyburn Pit (see section 3.4.2 above), as activities are quite similar.

3.4.12 Construction Traffic

There will be no increase in traffic levels arising from the construction phase of the Proposed Development.

3.5 Operational Phase

3.5.1 Staffing Numbers

Ballyburn Pit employs eight persons for on-site operations and a further 20 hauliers. The Proposed Development is not anticipated to increase this number. However, current Ballyburn Pit staffing numbers will not be sustainable in the long-term without the Proposed Development.

3.5.2 By-Product Soil and Stone Acceptance Criteria

When importing greenfield and uncontaminated soil and stone to a site, it is essential to adhere to specific acceptance criteria to ensure that the materials are classified as by-products rather than waste. The National By-Product Criteria (Ref No. BO-N002/2024) [20] outlines the requirements that must be met for these materials to be accepted on-site (refer to appendix 3-1 for further details). The criteria are designed to ensure environmental protection, public health safety, and compliance with regulatory standards. Below are the key acceptance criteria for both greenfield and uncontaminated soil and stone:

1. Source Verification

Materials must originate from a verified greenfield site or a site where the soil and stone are deemed uncontaminated. This includes an assessment of the source to confirm that it meets environmental standards.

Documentation demonstrating the source of the soil and stone, including any relevant site assessments, laboratory test results, and compliance certificates.

2. Physical and Chemical Composition (From non greenfield sites)

Characterisation of the soil and stone to determine its physical and chemical properties. This includes tests for pH, particle size distribution, moisture content, and organic matter content if the material is not from a greenfield site.

Ensure that contaminant levels (e.g., heavy metals, hydrocarbons, and other harmful substances) are below specified thresholds as outlined in the by-product criteria. This typically involves laboratory analysis of soil samples.

The materials should fall within acceptable soil classification categories, such as sandy, clayey, or gravelly soils, without any hazardous or toxic components.

Confirm that the materials do not pose risks to human health or the environment. This may include bioassays or leachate tests.

Perform a risk assessment to evaluate potential exposure pathways and determine the suitability of the material for the intended use on-site.

All materials imported to Site should be free of invasive species with suitable evidence provided of same.

3. Site History

Assess the historical land use of the source site to ensure that it has not been subject to activities that could result in contamination (e.g., industrial operations, landfills, or chemical spills).

Review environmental records for the source site to identify any past contamination incidents or regulatory violations.

4. Regulatory Compliance

Ensure that all necessary notifications and approvals from regulatory bodies (e.g., the EPA) are obtained before importing materials. This includes submitting the required documentation demonstrating compliance with the national by-product criteria.

Commit to continuous monitoring and reporting of the imported materials' status and compliance with the acceptance criteria throughout their lifecycle on-site.

Meeting the acceptance criteria for greenfield and uncontaminated soil and stone as outlined in the National By-Product Criteria (Ref No. BO-N002/2024) is crucial for ensuring environmental protection and compliance with regulatory standards. By implementing thorough verification processes, conducting comprehensive testing, and adhering to quality control measures, stakeholders can effectively manage the import of these materials while promoting sustainable practices within the circular economy.

Further details on acceptance criteria are presented in chapter 15

4 CONSIDERATION OF ALTERNATIVES

Schedule 6 of the Planning and Development Regulations, 2001 (S.I. No. 600 of 2001) requires an EIAR to contain:

“A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the Proposed Development on the environment.”

This chapter assesses the alternative options considered by the Applicant when deciding to progress the Proposed Development and outlines the following alternative considerations:

- Location / layout; and
- Use.

4.1 Alternative Location or Layout

The Applicant holds a landbank within the Ballyburn area which encompasses the existing Ballyburn Pit (refer to blueline in Figure 1-2).

As discussed in Section 2.4.2, the location of extractive industries is limited to where aggregates occur. As a finite resource, a proposed quarry/pit or quarry/pit extension must look at a range of environmental and commercial issues such as:

- The presence of the required aggregate;
- Contamination with other rocks or soils;
- Its depth below the surface;
- Presence of groundwater;
- Access to necessary haulage routes;
- Proximity to markets; and,
- Historical unauthorised activities.

Within the local market area, there are limited sites that meet the above criteria. The extension lands represent a prime example of viable reserves positioned adjacent an established pit with suitable infrastructure. The cost of moving the operation to another greenfield site would be prohibitive from a cost perspective and would represent a misuse of valuable resources (leaving those within the extension lands in situ). One of the Site's many advantages is that it is in close proximity to the suitable transport infrastructure, allowing ease of transport throughout the county and the wider region.

There was consideration given to alternative layout, which could have resulted in the movement of the established infrastructure from its current position. However, this would have resulted in additional land take, finance, labour and time for no benefit to the environment or the local population. Moreover, the established infrastructure was a major contributing factor when Ballyburn Pit won 'Quarry of the Year' in 2021.

4.2 Alternative Use - “Do-Nothing” Scenario

A 'do-nothing' scenario would restrict the Applicant to their existing planning for the Ballyburn Pit. This would involve the continued operation of the quarry until the sand and gravel reserves within the permitted extraction area are exhausted. The original rehabilitation plan submitted under planning reference 05/2091 (ABP PL09.220222) would be implemented after operations have ceased on-site.

A 'do-nothing' scenario would result in a shorter lifespan for the quarry and, subsequently, a shorter employment period for staff locally. Furthermore, available and economic aggregate reserves would be left in situ, representing a misuse of valuable resources for the county and wider region.

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5 POPULATION & HUMAN HEALTH

5.1 Introduction

This chapter was prepared to describe and assess the likely population and human health effects of the Proposed Development.

The local or receiving population comprises a significant element of the overall environment. In carrying out developments, one of the principal concerns is that people should experience no diminution in their quality of life as a consequence of the construction, operational and restoration phases of a development. Any project may affect human beings – both directly (e.g., impacts on air and water quality, noise, traffic etc) and indirectly (e.g., changes to landscape, impacts on flora and fauna etc). Many of these factors are addressed in the relevant specific chapters of this EIAR. This chapter, therefore, will primarily cover any potential effects not otherwise addressed elsewhere in the EIA – e.g., effects on population, housing, economics, local amenities, etc.

5.2 Methodology

A desk-based study was carried out to characterise the environment in relation to human beings, including the receiving population, population change over time, employment levels, and human health indicators.

This chapter has been prepared taking cognisance of the guidance set out in Chapter 1 and the following specific guidance documents:

- Institute of Public Health in Ireland ('IPH'): Health Impact Assessment Guidance (2021) [21] [22];
- Institute of Environmental Management and Assessment ('IEMA') – [23]Health Impact Assessment in Planning, Impact Assessment Outlook Journal, Vol. 8 (Oct 2020) [23];
- IEMA: Health in Environmental Impact Assessment, A Primer for Proportionate Approach (2017) [23];
- IEMA: Effective Scoping of Human Health in Environmental Impact Assessment (2022) [24];
- IEMA: Determining Significance for Human Health in Environmental Impact Assessment (2022) [25];
- International Association for Impact Assessment ('IAIA') and European Public Health Association ('EPHA'): Human Health – Ensuring a High Level of Protection (2020) [26]; and,
- EPA: Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022) [10].

5.2.1 Health Sensitivity

In accordance with IPH guidance, the sensitivity of the local population was determined following the methodology set out in Part 4: Analysis Tools and Resources as summarised in the Health Sensitivity Conceptual Model set out in Figure 5-1 below. The sensitivity in each factor was considered to determine an overall sensitivity for the local population. The results of the analysis are set out in section 5.3.6.1 below.

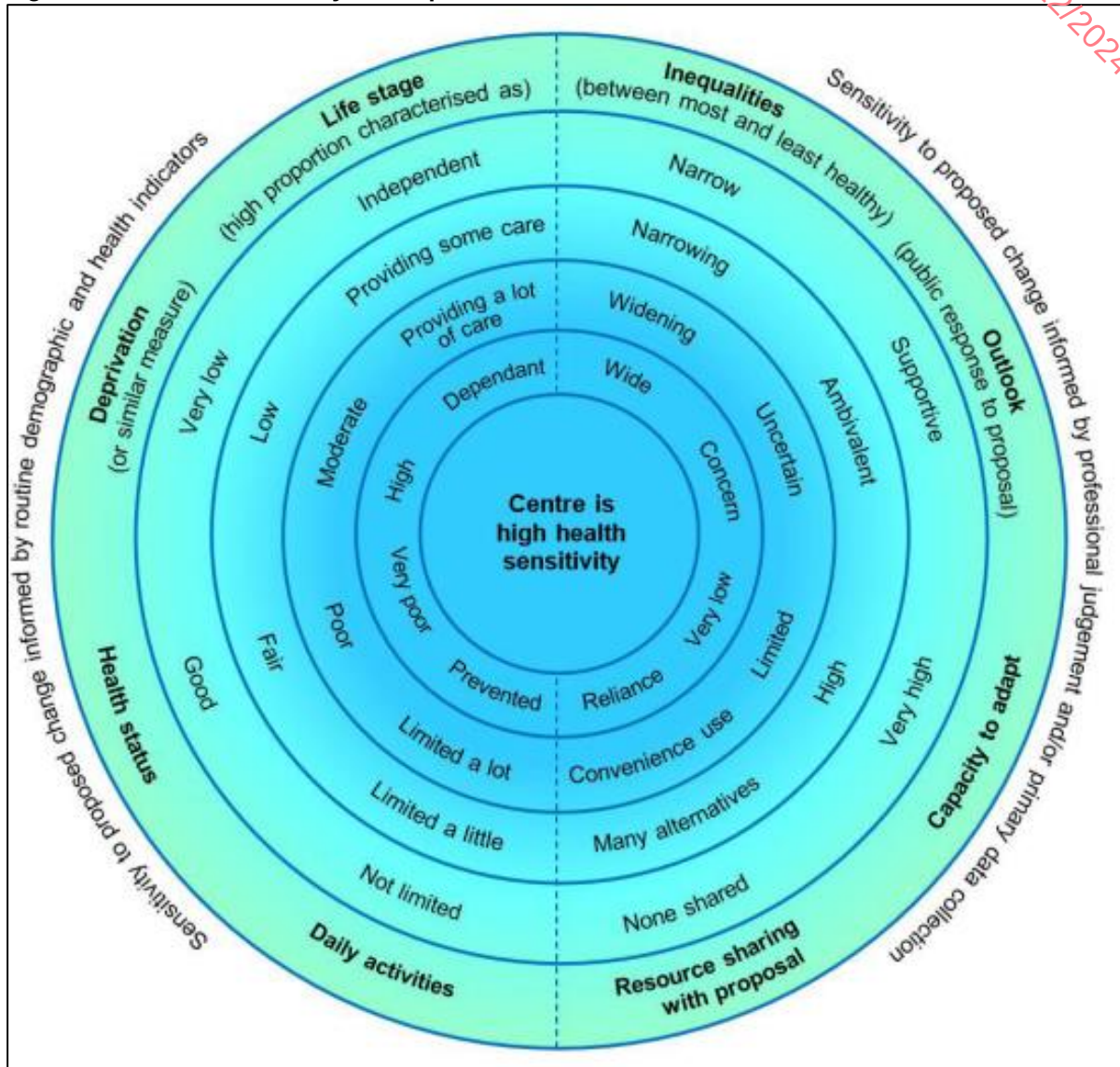
The following sources were consulted and used to determine both the sensitivity of the local population and the potential effects on them:

- Central Statistics Office ('CSO') Census Data for 2011, 2016 and 2022 [27] and,

- CSO Census Mapping Small Area Population [28]

All subsequent chapters of the EIAR have addressed specific direct and indirect effects that have the potential to affect human health.

Figure 5-1: Health Sensitivity Conceptual Model



5.3 The Receiving Environment

Here, the receiving environment is characterised by population and population trends, provided by a review of the census Small Area and relevant data from the latest census data, a review of local population trends, the existing land use locally, economic activity (employment trends), and a review of the available human health metrics.

5.3.1 Population

The CSO provides data on population and socio-economic aspects of the population at different levels, including:

- The State of Ireland;
- Counties;

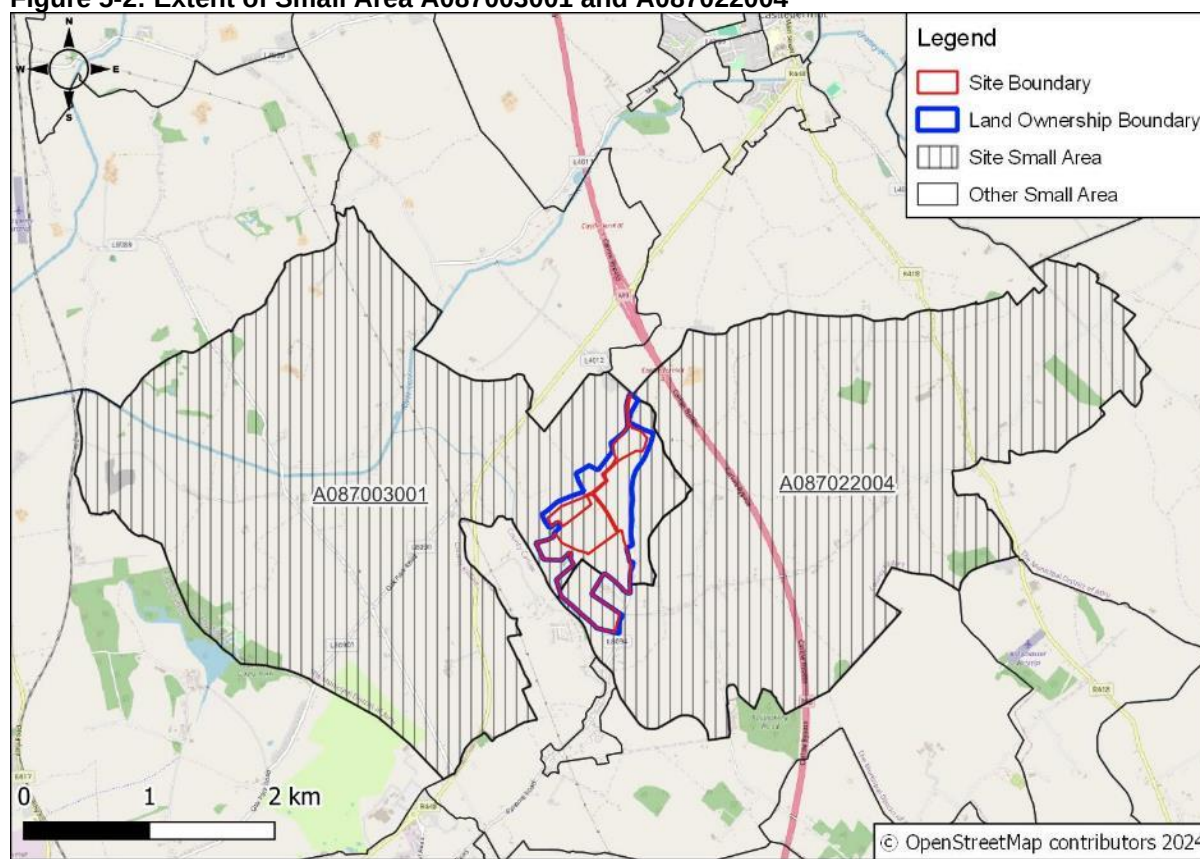
- Electoral Districts; and,
- Small Areas (sub-division introduced in the 2022 census to give greater clarity and context on population trends).

The Site is in County Kildare, population 247,774, and in the Electoral District ('ED') of Ballaghmoon, population 223, and Castledermot, population 1,853. It is situated in Ballyburn Upper, Gorteenvacan, and Knockbane Townlands. The Site is located in the Local Electoral Area of Athy as of 2019, with a recorded population of 28,641 in 2022.

5.3.2 Small Area Population Statistics

The 2011 census introduced the concept of 'Small Areas', which was established to give greater clarity and context to population trends. The small areas have been updated based on the 2022 census. The Site lies within Small Area A087003001 and A087022004 (see Figure 5-2 below).

Figure 5-2: Extent of Small Area A087003001 and A087022004



Various key statistics on the locality from the 2022 census are presented in Table 5-1 below. Figures for the relevant ED, County and the State of Ireland are shown for context. Please note that the 2021 Census was delayed until 2022 due to the COVID-19 pandemic.

Table 5-1: Population Statistics (2022)

Area	Number Of Persons	% Change				
		2011	2016	2022	2011-2016	2016 - 2022
Small Area 087003001		193	203	223	+10	+20
Small Area 087022004		316	327	251	+11	-76

Area	Number Of Persons	% Change				
		2011	2016	2022	2011-2016	2016 - 2022
Ballaghmoon ED		193	203	223	+10	+20
Castledermot ED		1,609	1,637	1,853	+28	+216
Athy LEA		31,359	26,541	28,641	-4,818	+2,100
Kildare		90,264	222,504	247,774	+132,240	+25,270
Ireland		4,588,252	4,761,865	5,149,139	+174,613	+387,274

The Small areas have shown an overall decline in population, -56 persons, which is not in keeping with the Electoral Division, +236 persons, nor the Local Electoral Area, +2,100 persons, which have all seen population increases.

5.3.3 Local Population

The nearest population centre to the Site is Palatine Village, which lies at the juncture of three Small Areas:

- SA A087022004;
- SA A017009002; and,
- SA A017009001.

Table 5-2 below shows some key statistics regarding the local population, taken from the CSO 2022 Census Mapping Small Area Population map [28]. County Kildare and Ireland figures are given for comparison. The table compares key metrics for the two Small Areas, the Site lies within (A087003001 and A087022004) to the village of Palatine (SA A017009001), county and national values.

Table 5-2: Population Statistics for the Local Area against County and National Figures (2022)

Dataset	Small Area A087003001	Small Area A087022004	Palatine Village	Co. Kildare	Ireland
Registered Permanent Households	232	247	277	82,543	1,846,938
Unoccupied Buildings	-	1	5	202	265,471
Population No (% Male / Female)	223 (49%/51%)	251 (52%/48%)	276 (49%/51%)	247,774 (50%/50%)	5,149,139 (49%/51%)
Age Breakdown (%)					
Aged 0 - 9	13%	15%	16%	14%	12%
Aged 10 – 19	12%	9%	13%	15%	7%
Aged 20 – 24	5%	5%	6%	6%	12%
Aged 25 – 64	55%	52%	55%	53%	53%
Aged 65 – 80	12%	10%	11%	10%	12%
Aged 80+	3%	2%	1%	2%	4%
% with Irish / UK Nationality	93%	92%	99%	86%	85%

Dataset	Small Area A087003001	Small Area A087022004	Palatine Village	Co. Kildare	Ireland
% Identifying as White Irish	89%	88%	97%	78%	76%
% Identifying as Irish Traveller	0%	0%	0%	0.38%	0.64%
% of:					
1 person households	8%	9%	5%	6%	23%
>1 adult households	91%	83%	82%	84%	66%
Single-parent households	9%	4%	11%	11%	11%
% Owner / Occupiers (population)	87%	85%	83%	72%	66%
% Renting (population)					
(Private Landlord)	5%	3%	10%	15%	27%
(Local Authority/Housing Body)	0%	0%	5%	9%	10%
% with Central Heating:					
(Oil-Fired)	82%	77%	89%	37%	39%
(Coal-Fired)	2%	2%	7%	1%	5%
(Wood-Fired)	4%	2%	1%	1%	5%
(Electric-Fired)	5%	2%	1%	11%	44%
(Gas-Fired)	0%	2%	0%	38%	5%
% with confirmed water supply					
(Mains Water Supply)	9%	22%	86%	89%	80%
(Private Water Supply)	91%	73%	12%	6%	10%
(Group Scheme)	0%	4%	2%	4%	8%
% with Stated Sewerage					
(Mains Sewerage)	1%	1%	79%	76%	63%
(Septic Tank)	90%	83%	18%	19%	25%
Educational Level Reached 15+:					
% No Formal Education	7%	3%	1%	2%	2%
% Primary School	8%	7%	5%	6%	7%
% Lower Secondary	28%	38%	13%	12%	13%
% Upper Secondary	38%	26%	17%	19%	18%
% Third Level +	37%	63%	39%	37%	34%

Dataset	Small Area A087003001	Small Area A087022004	Palatine Village	Co. Kildare	Ireland
% With a Disability	19%	15%	22%	20%	22%
% Working Age Unable to Work (Illness / Disability)	4%	2%	8%	3%	6%
% Caring for Disabled Person	6%	8%	7%	5%	5%
Health:					
Very Good / Good	89%	86%	88%	86%	83%
Fair	8%	6%	11%	8%	9%
Bad / Very Bad	0%	2%	0.36%	1.4%	2%

The small area population identifies as having good or very good health, with the majority having secondary or third-level or above education. The population age bracket peaks in the 25–64-year bracket, with over 20% aged under 19.

The SA's have a combined population of 474, with registered permanent households of 479 and only 1 unoccupied building. The majority, over 83% of residents are in a home with more than one adult present, with oil-fired central heating being the predominant heating method at over 77% of homes identifying it on-site.

Water supply in the rural area is predominately private supply (assumed well-water), with over 73% of homes identifying it on-site; however, in the nearby village of Palatine, residents report over 86% are on mains supply for water and over 79% for mains sewerage. The SAs both report predominately septic tanks for sewage management at over 83% of homes.

5.3.3.1 Pobal Information for SA087003001 & SA087022004

The census statistics have been used by Pobal on behalf of the Irish Government to develop deprivation indices to better inform planning and policy decisions [29]. Table 5-3 below sets out the relevant factors which indicate that the area has a score of 'marginally above average' deprivation levels, placing the area in category 4 of 7 (with '1' being 'very affluent' and '7' being 'extremely disadvantaged').

Table 5-3: Deprivation Indices for SA A087003001 & SA A087022004 (2011, 2016 and 2022)

Indicator	2011 Census	2016 Census	2022 Census
SA087003001			
Pobal HP Index	-3.10	0.16	7.57
Pobal HP Description	Marginally Below Average	Marginally Above Average	Marginally Above Average
Age dependency ratio (%)*	35.20	36.95	33.63
Primary Education only (%)	14.80	11	7.69
Third Level Education (%)	21.90	27.27	36.36

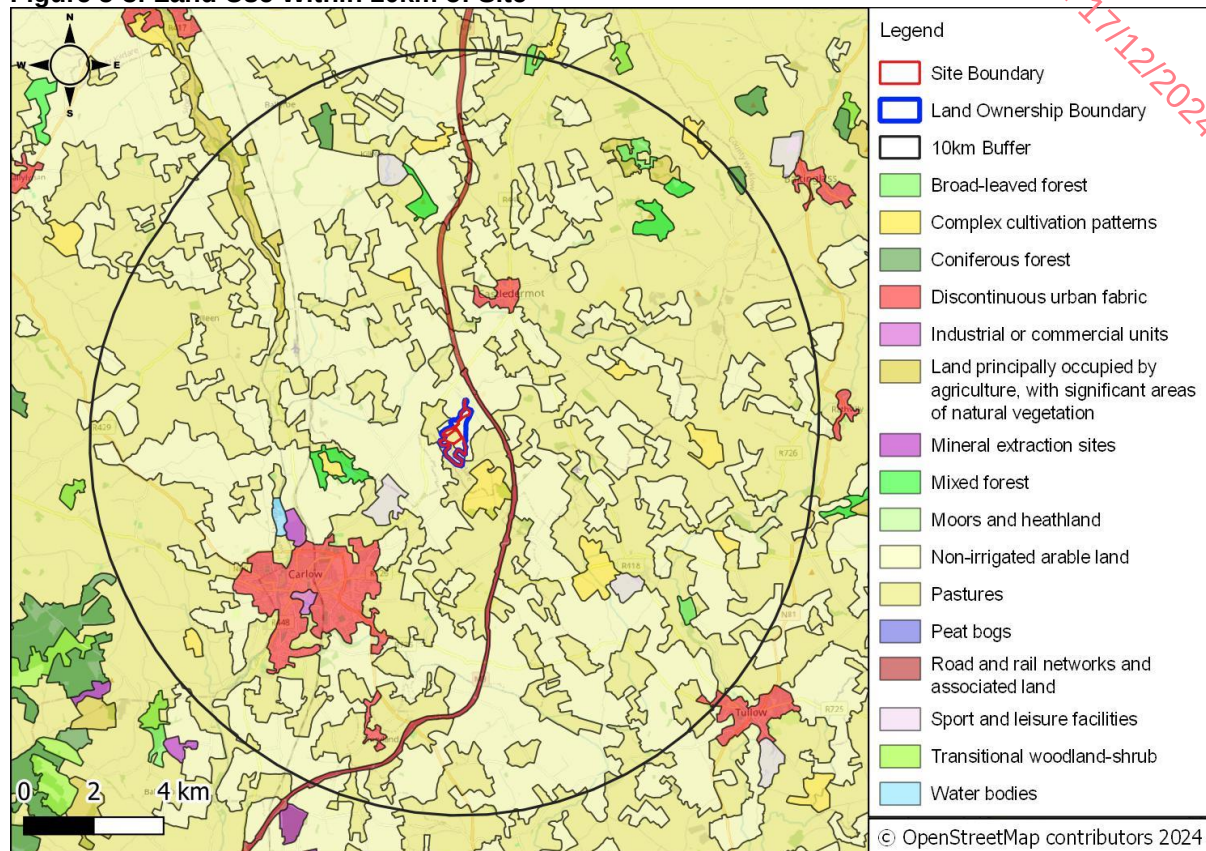
Indicator	2011 Census	2016 Census	2022 Census
Local Authority Rented (%)	0.00	0.00	0.00
Unemployment Rate – Male (%)	21.80	7.84	0.00
Unemployment Rate – Female (%)	9.40	13.51	11.32
SA087022004			
Pobal HP Index	-0.20	0.96	2.90
Pobal HP Description	Marginally Below Average	Marginally Above Average	Marginally Above Average
Age dependency ratio (%)*	28.80	31.19	39.84
Primary Education only (%)	12.80	9	5.70
Third Level Education (%)	25.60	30.91	40.51
Local Authority Rented (%)	0.90	0.00	0.00
Unemployment Rate – Male (%)	20.40	12.90	3.13
Unemployment Rate – Female (%)	12.90	8.14	5.56
County Kildare			
Pobal HP Index	2.34	3.18	3.11
Pobal HP Description	Marginally above average	Marginally above average	Marginally Above Average
Age dependency ratio (%)	32.44	33.81	33.54
Primary Education only (%)	12.30	10.53	8.37
Third Level Education (%)	32.82	37.67	44.84
Unemployment Rate – Male (%)	20.24	12.52	7.10
Unemployment Rate – Female (%)	14.97	11.70	7.47

5.3.4 Surrounding Land Use

The surrounding land use is predominantly agricultural (pasture and crops) with small water bodies and areas of coniferous/broad-leaved and mixed forest. There are also scattered agricultural businesses (e.g., pig and poultry farms) and individual rural businesses such as B&Bs and a golf club (Figure 5-3 below). Residential development consists of scattered

individual dwellings and more concentrated urban areas such as Platine village and small local towns (Catledermot).

Figure 5-3: Land Use Within 10km of Site



The majority of residences in the vicinity of the Site are scattered single dwellings and linear development along the major roads. See Chapters 9, 11, and 13 for details of possible effects of dust, noise, and traffic on these residences.

A review of local Geo-directory data from December 2022 shows 371 homes and businesses within 2km of the Site, shown in Figure 5-4 and Figure 5-5 below. Businesses are presented by their NACE code, while homes are presented by the type of build.

Figure 5-4: Building Types Within 2km of the Site

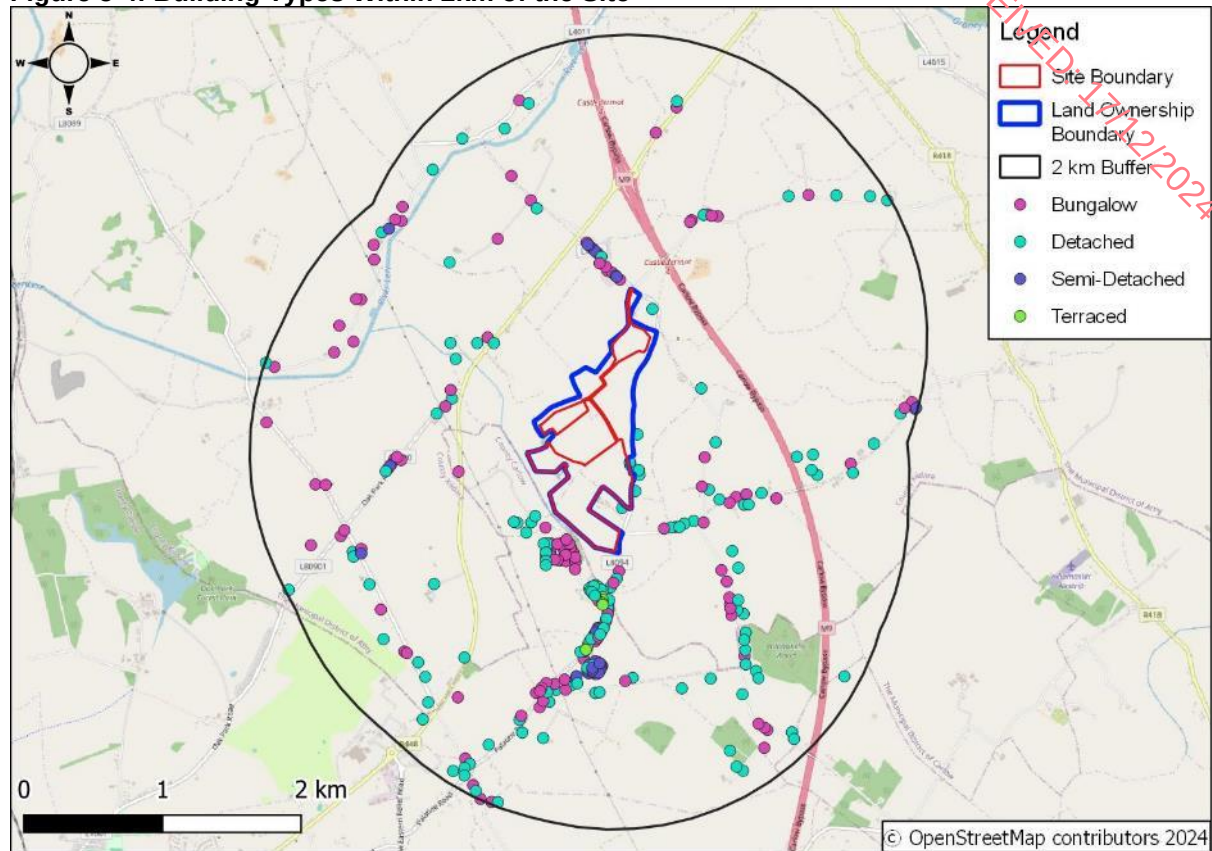
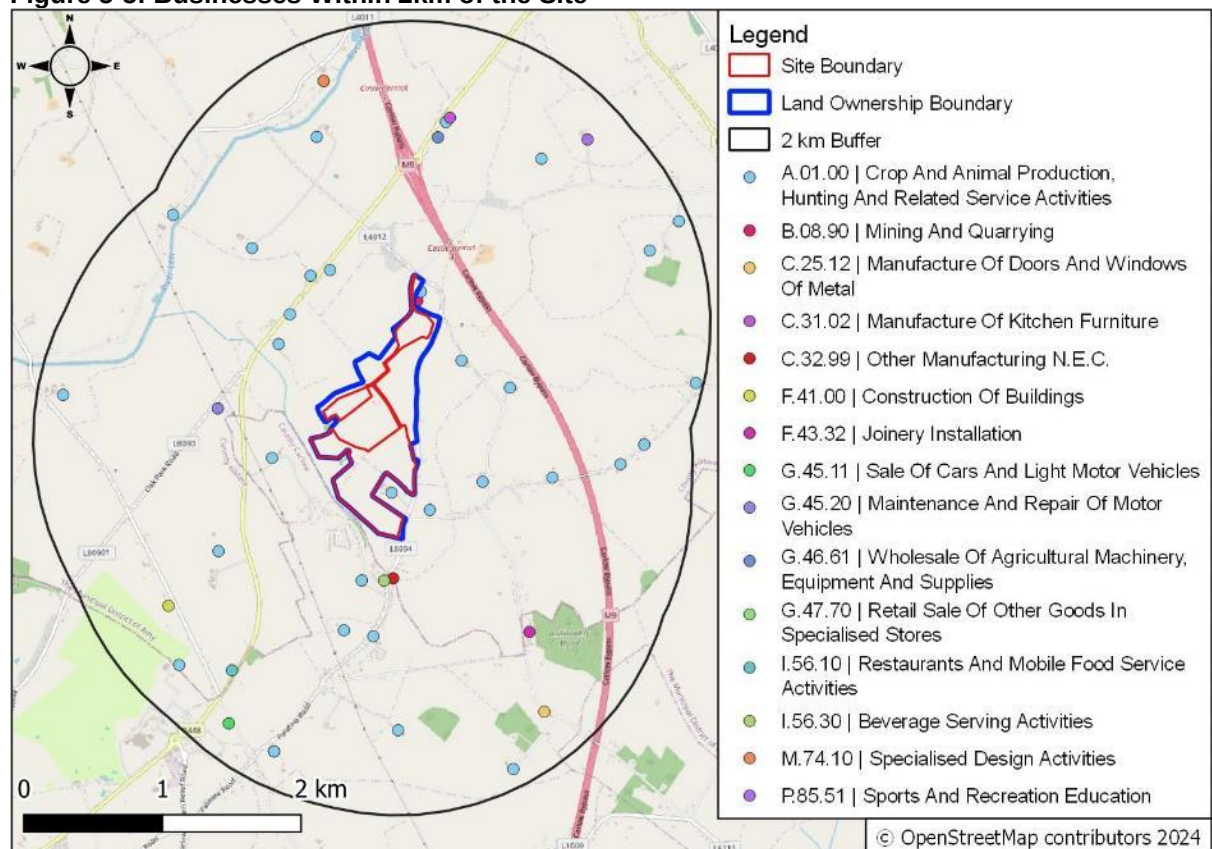


Figure 5-5: Businesses Within 2km of the Site



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The nearest sizeable settlements are:

- Castledermot Town (4km Northeast);
- Carlow Town (5km Southwest);
- Tullow Town (11km Southeast);
- Athy Town (15km Northwest); and,
- Newbridge Town (32km North).

In addition to the above, there are numerous small villages in the area around the Site. The closest is Palatine Village, which lies to the south with the village boundary ca. 200m away from the Site.

5.3.5 Economic Activity and Employment

The economic activity/employment figures and occupational details of the population aged 15-64 for the Site and its locality against the wider region are outlined in Tables 5-4 and 5-5 below [27]. The high percentage of process / plant / machine operatives and skilled tradespersons reflects the importance of construction and extraction industries in the area.

Table 5-4: Principal Economic Status According to the 2022 Census

Area	In Work	Student	Retired	Caring for home/family	Unemployed	Unable to Work
SA A087003001	61%	12%	12%	6%	3%	5%
SA A087022004	59%	9%	16%	9%	3%	3%
Palatine Village	61%	10%	13%	4%	4%	8%
Co Kildare	59%	12%	13%	7%	5%	4%
National Average	56%	0.83%	16%	7%	4%	5%

Table 5-5: Occupations of Local Working-Age Population (2022)

Occupation	SA A087003001		SA A087022004		Palatine Village		County Kildare		Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Administrative and Secretarial Occupations	9	8%	11	10%	15	11%	12,193	10%	229,737	9%
Associate Professional and Technical Occupations	18	15%	14	12%	23	17%	16,787	14%	292,273	12%
Caring, Leisure, Service Occupations	10	9%	5	4%	6	4%	8,251	7%	183,584	7%
Elementary Occupations	2	2%	2	2%	7	5%	9,494	8%	203,532	8%
Manager / Director / Senior Officials	10	9%	13	11%	11	8%	11,443	9%	192,679	8%
Process, Plant and Machine Operatives	10	9%	8	7%	12	9%	7,787	6%	172,930	7%
Professional Occupations	17	15%	26	22%	36	26%	25,617	21%	507,044	20%
Sales and Customer Service Occupations	4	3%	3	3%	8	6%	7,491	6%	154,238	6%
Skilled Trade / Occupations	30	26%	25	22%	18	13%	14,281	12%	313,921	13%
Not Stated	7	6%	9	8%	1	0.73%	8,904	7%	358,044	14%
TOTAL	117	N/A	116	N/A	137	N/A	122,248	N/A	2,496,573	N/A

5.3.5.1 Employment Opportunities in the Surrounding Area

Opportunities for employment exist within the vicinity of the Site in Castledermot (5km to the Northeast), in the town of Carlow (12km to the east) and in rural industries and smaller settlements within the surrounding area. Pre-pandemic (2016 census) in SA A087003001, 47% of the local working population and 28% of the student population travelled by private transport, with 6% of the student population travelling by bus / minibus / coach [27]. While 7% of both groups walked, and no one reported using a bicycle. Pre-pandemic in SA A087022004, 61% of the local working population and 22% of the student population travelled by private transport, with 6% of the student population travelling by bus / minibus / coach [27]. 3% of both groups walked, and no one reported using a bicycle.

Travel time for work / education in SA A087003001 was less than 30 minutes for 61% of the relevant population and less than 45 minutes for a total of 28% of the population. This indicates that much travel was relatively local. Travel time for work / education in SA087022004 was less than 30 minutes for 63% of the relevant population and less than 45 minutes for a total of 7% of the population. This indicates that much travel was relatively local. The nature of the major employment sectors in the area (process / plant / machine operatives and skilled trade) [27] precludes home-working, and therefore, the COVID-19 pandemic is unlikely to have resulted in major changes to post-pandemic school/work travel.

One difficulty in accessing the nearby employment opportunities is the low level of public transport across the area as a whole.

5.3.5.2 Site Employment

The Proposed Development will allow the Applicant to continue to offer local employment opportunities for the estimated 15-year lifespan of the extended Site. The Proposed Development will not increase the employment levels at the quarry, but will provide continued employment, at this Site for the medium term. However, without the Proposed Development, Ballyburn Pit will eventually become exhausted and be unable to employ the entirety of the current workforce, resulting in a loss of jobs, both directly and indirectly (down stream services).

5.3.6 Human Health - Sensitivity

The population of the immediate Small Areas (SA A087003001 and SA A087022004) were considered in terms of the categories set out in Figure 5-1 above, with the results set out in Table 5-6 below. The overall sensitivity of the population to any resulting impact is deemed to be 'low'.

Table 5-6: Assessed Health Sensitivity of Local Population

Criteria	Classification	Basis
SA A087003001		
Life Stage	Providing some care	Although the age-dependency ratio is below the national average, the % of people listed as carers is above the national average, which increases the overall care burden
Deprivation	Low	The Pobal Description is "marginally above average"
Health Status	Good	The proportion of people reporting bad/very bad health is on par with the national average.

Criteria	Classification	Basis
Daily Activities	Limited a little	4% of people are unable to work due to illness/disability, slightly lower than the national average, but 19% overall have a disability, which is above the national average, and 6% of people are carers for someone with a disability.
Inequalities	Narrowing	The % of people with education only to lower secondary level is higher than the national average and the % of people with a third-level+ qualification is also higher than the national average. However, the % with a third-level+ qualification has increased since 2016.
Outlook Towards Proposal	Supportive to Ambivalent	The Proposed Development has been an important local employer since extractive work began.
Capacity of Health Services to adapt	Very High	The Proposed Development is not a health-related project and will not create additional specific demands on the local health infrastructure.
Resource Sharing with Proposal	None Shared	The Site will not have high power or water demands. A high percentage of local residences have private water supplies and oil-fired heating. Traffic impact is outlined in Chapter 13.
Over-all Sensitivity Score	Low	
SA A087022004		
Life Stage	Requiring some care	The age-dependency ratio is below the national average, the % of people listed as carers are higher than the national average, which reduces the overall care burden
Deprivation	Low	The Pobal Description is “marginally above average”
Health Status	Good	The proportion of people reporting bad/very bad health is well below the national average.
Daily Activities	Not Limited from undertaking daily activities	2% of people are unable to work due to illness/disability, much lower than the national average, with 8% overall having a disability, which is below the national average, and only 2% of people are carers for someone with a disability.
Inequalities	Narrowing	The % of people with education only to lower secondary level is much higher than the national average and the % of people with a third level+ qualification is higher than the national average. Census. The % with a third-level+ qualification has increased from 2016 national average and is also a higher % again in 2022..
Outlook Towards Proposal	Supportive to Ambivalent	The Proposed Development has been an important local employer since extractive work began.
Capacity of Health Services to adapt	Very High	The Proposed Development is not a health-related project and will not create additional specific demands on the local health infrastructure.

Criteria	Classification	Basis
Resource Sharing with Proposal	None Shared	The Site will not have high power or water demands. A high percentage of local residences have private water supplies and oil-fired heating. Traffic impact is outlined in Chapter 13.
Overall Sensitivity Score	Low	The Proposed Development has been an important local employer since extractive work began.
Palatine Village		
Life Stage	Providing some care	Although the population proportion aged 65+ is lower than the national average, meaning the requirement for support of the elderly is lessened, the proportion of the local population aged 0-15 is higher than the national average, leading to a greater level of support being needed for this age group.
Deprivation	Low	Palatine village lies at the juncture of 3 SAs, all of which are rated by Pobal as being “marginally above average”
Health Status	Good	The proportion of people reporting bad/very bad health is below with the national average.
Daily Activities	Not Limited	The proportion of the local population identifying as having a disability and the proportion of local adults unable to work due to illness/disability are on par and slightly below the national average. However, the proportion of local adults who identify as caring for someone with a disability is above the national average.
Inequalities	Narrow	There is a low proportion of residents in rented accommodation, a high proportion of car-owners and a high level of internet connectivity when compared to the national average. The % of people with education only to primary school level is below the national average. However, the % with third level + has increased from the 2006 to the 2022 census.
Outlook Towards Proposal	Supportive to Ambivalent	The Proposed Development has been an important local employer since extractive work began.
Capacity of Health Services to adapt	Very High	The Proposed Development is not a health-related project and will not create additional specific demands on the local health infrastructure.
Resource Sharing with Proposal	None Shared	The Site will not have high power or water demands. A high percentage of local residences have private water supplies and oil-fired heating. Traffic impact is outlined in Chapter 13.
Overall Sensitivity Score	Low	

5.4 Characteristics and Potential Impact of Development

The characteristics of the Proposed Development are outlined in terms of population and human health metrics.

5.4.1 Population

Ballyburn Pit has enabled the Applicant to provide valuable local employment in a rural environment. The Proposed Development would enable this employment to continue into the foreseeable future.

The pit employees directly:

- 20 HGV drivers;
- 6 quarry operatives (site maintenance, site machinery drivers); and,
- 2 administration (office personnel and management).

Additionally, the pit indirectly benefits through temporary or occasional work and economic benefit:

- Hauliers;
- Machinery maintenance;
- Professional services
- Construction personnel;
- Health and safety specialists;
- Refuelling specialists;
- Environmental monitoring personnel; and,
- Quality control personnel.

5.4.2 Human Health

The potential effects on human health, particularly potential effects on residents in the immediate locality, are addressed in detail in the following specialist chapters. The conclusions of these chapters are considered here in the context of the low health sensitivity determined in section 5.3.6.1 above. Refer to the specific chapters for further details.

Chapter 7: Land Soils and Geology – The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all sites of this nature. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. As such the risk to human health is negligible.

Chapter 8: Water. This chapter assessed the Site's potential effects on hydrology and hydrogeology. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. As such the risk to human health from spillage is negligible. The effects on groundwater levels will be not significant.

Chapter 9: Air Quality. This chapter assessed potential air pollution arising from the Proposed Development and the processes in the pit, concluding that ambient dust (or PM₁₀) will have a negligible effect on human health.

Chapter 10: Climate. An assessment of the effect of the Proposed Development on greenhouse gas emissions was carried out with the conclusion that emissions associated with the operations of the Proposed Development are likely to have a not significant effect on

national Greenhouse Gas ('GHG') emissions and in turn, climate change that can impact human health.

Chapter 11: Acoustics (Noise and Vibration). This chapter assessed the noise and vibration effects arising from the Proposed Development, deeming potential effects on human health not significant.

Chapter 13: Material Assets – Traffic and Transport. An assessment on traffic and transport was undertaken which indicated that potential effects on traffic would be negligible.

5.4.2.1 Safety

The Health and Safety Authority ('HAS') views the quarrying industry as a high-risk sector [30].

The Applicant has a management system in place, which is committed to protecting all members of the public from any danger while they visit the Site. Routine inspections are carried out in the Pit in accordance with Mines & Quarries Act 1965, and Quarries (General) Regulations, 1974.

5.4.2.2 Unplanned Events

As with all similar developments, there is some risk that accidents or disasters outside the operator's control could result in a risk to the environment. Such incidents could theoretically include fire, flood and oil/fuel spills arising from vehicle accidents. However, in practice, these incidents are unlikely due to the following control measures:

- Fire - the nature of the Site means that there are very few combustible materials or sources of ignition, as the Site's plant and equipment will be maintained to a high standard of safety. In addition, the distance between the various elements of infrastructure means that there is a very low risk of a fire spreading beyond the initial point. Unplanned events, therefore, may result in a plant or machine being exposed to fire, but not a notable fire event or requirement for fire tender support;
- Flood – as extractive work does not reach the water table all works will be carried out above it. Moreover, given the sand and gravel substrate the risk of flooding is low; and,
- Vehicular accidents—Staff cars are not permitted beyond the car park area, and the modular mobile plant will only be moved by trained operatives All personnel attending the site are subjected to inductions. While daily toolbox talks and safety briefings are conducted for all personnel thereby providing further.

It should be stressed that there is no history of any unplanned events at Ballyburn Pit.

5.5 Proposed Mitigation Measures and/or Factors

Mitigation measures against the potential effects which may impact on human health from the Proposed Development are considered in detail within the following chapters:

- Chapter 7: Land soils and geology. Measures to avoid any potential contamination of soils will be in place
- Chapter 8: Water. Measures to avoid any potential contamination of water will be in place;
- Chapter 9: Air. Measures to avoid excess dust will be in place;
- Chapter 10 Climate. Measures will be in place to reduce Greenhouse Gas Emissions;
- Chapter 11: Acoustics (Noise and Vibration). Measures to reduce the noise and vibration arising from the Site will be in place; and,

- Chapter 13: Material Assets - Traffic and Transport. Measures to ensure pedestrian safety in regard to Site traffic will be in place.

5.6 Cumulative and In-Combination Effects

In combination with other businesses/enterprises in the area, Ballyburn Pit has contributed to sustaining the local economy and community. In combination with other extractive sites, the pit also has a strong history of supporting the supply of aggregates. The extractive industry is an important part of the local community across Ireland. There are over 500 active quarries across Ireland employing ca. 5000 people. The extractive industry in Kildare is no different. There are ca. 26 quarries active in Kildare, providing employment opportunities across the county. Ballyburn Pit employs 28 people from the locality. Moreover, the industry is absolutely vital to ensure the provision of adequate raw materials for the construction industry to facilitate the building of housing, healthcare facilities, schools, roads and social infrastructure. Without the provision of raw materials, the county would be unable to meet the basic needs and rights of the residents. The cumulative and in-combination effects associated with quarries and pits are positive in facilitating the needs of the population.

The distance between the Site and the closest active quarries (>5km) is of sufficient distance to ensure the cumulative and in-combination effects on human health are not likely and not significant.

5.7 Interactions with Other Environmental Attributes

A number of environmental issues have the potential to positively or negatively affect the population and human health. The relevant interactions with other key environmental factors are set out in section 5.4.2 above.

5.8 Indirect Effects

The Proposed Development will have a neutral to slight, positive long-term impact in regard to continued indirect local employment such as machinery maintenance and upkeep and professional services such as:

- Hauliers;
- Machinery maintenance;
- Professional services;
- Construction personnel;
- Health and safety specialists;
- Refuelling specialists;
- Environmental monitoring personnel; and,
- Quality control personnel.

This downstream employment is an essential part of the local economy and provides a positive effect on the local economy

5.9 Residual Effect

The effect of the Proposed Development on the population and local economy in terms of direct employment can be considered as long-term and neutral. However, if the Proposed Development is refused permission, the loss of jobs at the existing pit would have a negative moderate effect on a local scale. The effects on the local and regional aggregate supply can be considered as long-term, positive and moderate in a local sense.

The residual effect in terms of human health within the local population will be 'imperceptible' to 'not significant' and long-term (refer to relevant specialist chapters for further details).

5.10 Monitoring

Monitoring requirements are detailed in the relevant specialist chapters.

5.11 Reinstatement

See section 5.4

5.12 Difficulties Encountered in Compiling This Information.

No difficulties were encountered

REQUIRED: 17/12/2024

6 BIODIVERSITY

6.1 Introduction

This chapter of the EIAR has been prepared by MOR Environmental. This chapter provides a description and assessment of the potential, likely and significant impacts of the Proposed Development on ecology and biodiversity.

A detailed ecological appraisal has been carried out by a fully qualified and experienced MOR Environmental Ecologist in line with Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (2018 and revisions) [31]. In addition, an assessment on potential impacts on Natura 2000 sites was also undertaken and is presented in the Stage 2: Appropriate Assessment - Natura Impact Statement which forms part of the planning application, which should be read in conjunction with this chapter.

6.2 Methodology

6.2.1 Relevant Guidance

The following standards and guidance documents were utilised to characterise the baseline conditions of the Site, the assessment of potential impacts to biodiversity and the appropriate mitigation measures required:

- CIEEM, *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (2018 and revisions) [31];
- NRA, '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*' [32];
- Fossitt's Guide to Habitats in Ireland [33];
- Heritage Council's 'Best Practice Guidance for Habitat Survey & Mapping' [34];
- NRA, 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' [35];
- *Bat Surveys for Professional Ecologists - Good Practice Guidelines* (3rd ed.). London: The Bat Conservation Trust [36];
- Scottish Badgers, 'Surveying for Badgers: Good Practice Guidelines' [37];
- The Mammal Society, 'Surveying Badgers' [38];
- NRA, 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' [39];
- SNH, 'Technical Advice Note #2: Otter Surveys' [40];
- DoAHG, 'National Otter Survey of Ireland 2010 / 12' [41];
- C741 – 'Environmental Good Practice on Site (4th Edition)' [42];
- NRA, 'Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes' [43]; and,
- NRA, 'Guidance on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' [44].

6.2.2 Desk Study

The desk study focused on identifying European designated sites within a 15km radius of the Site, nationally designated sites within a 5km radius of the Site and records of legally protected and notable species within 2km of the Site.

The area from which biological data was collected was based on an assessment of the ecological zone of influence of the Site (i.e. the area that could be affected by the scheme within which there is the potential for significant ecological effects).

The following literature sources were consulted in 2024 as part of the desktop study for ecological information:

- Aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service ('NPWS') website was consulted with regard to the most up to date detail on conservation objectives for the European sites relevant to this assessment [45];
- The National Biodiversity Data Centre ('NBDC') website was consulted with regard to species distributions [46];
- The EPA Maps website was consulted to obtain details about watercourses in the vicinity of the Site [6]; and,
- The Kildare County Council Planning Portal was consulted to obtain details about existing / proposed developments in the vicinity of the Site [1].

6.2.3 Field Survey

6.2.3.1 Habitat Survey

A habitat survey was undertaken on 28th June 2023 by two suitably qualified and experienced MOR Environmental Ecologists. This survey aimed to assess the extent and quality of habitats present at the Site and to identify any potential ecological receptors. The survey was undertaken using the Fossitt's Guide to Habitats in Ireland [33] in line with the Heritage Council's 'Best Practice Guidance for Habitat Survey & Mapping' [34]. This is the standard habitat classification system used in Ireland and includes both a desk-based and field-based assessment. An updated walkover was undertaken on the 11th January 2024 by two MOR Environmental Ecologists to assess any changes in the on-site habitats.

The assessment was extended to also identify the potential for these habitats to support other features of nature conservation importance, such as species afforded legal protection under either Irish or European legislation. Based on the habitats present, additional species-specific surveys were also undertaken for bats and otters; please see details below. These surveys were undertaken by suitably qualified MOR Environmental Ecologists.

6.2.3.2 Protected / Notable Species Survey

The methodologies used to establish the presence / potential presence of faunal species are summarised below. These survey methodologies relate to the species / biological taxa that both the desk study and habitat survey indicated could occur within the Site.

Flora

The Site was assessed for the presence of notable / protected flora species in accordance with the following:

- Flora (Protection) Order 2022 (S.I. No. 235/2022); and,
- Ireland Red List No. 10: Vascular Plants [47].

Amphibians

The Site was assessed for its potential to provide sheltering, foraging and breeding habitat for amphibians in line with the National Road Authority ('NRA'), now Transport Infrastructure Ireland ('TII'), 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes,' [35]. These include static or slow-moving water bodies

suitable for egg-laying, and terrestrial habitats comprising open areas with mixed-height vegetation, such as heathland, rough grassland, open scrub or water body margins. Suitable well-drained and frost-free areas are needed to enable amphibians to survive the winter.

Badgers

The Site was examined for areas where badgers might occur by noting any evidence of badger activity. A small pocket of woodland to the southwest of the Site was also inspected for evidence of badgers. This included:

- Mammal paths;
- Badger hairs caught in sett entrances / fences / vegetation;
- Paw prints;
- Evidence of foraging (usually in the form of ‘snuffle holes’);
- Badger Scat (isolated badger droppings);
- Latrines (shallow pits/holes occurring together comprised of exposed badger droppings; and,
- Badger setts.

A mammal path was assumed to be used by badgers if the character of the path (in terms of size) was appropriate and / or if any other signs were in close vicinity (e.g. a badger sett).

The field survey of the Site was conducted in line with the following relevant guidance for badger:

- Scottish Badgers, ‘*Surveying for Badgers: Good Practice Guidelines*,’ [37];
- The Mammal Society, ‘*Surveying Badgers*’ [38]; and,
- NRA, now TII, ‘*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,’ [35].

Bats

An initial assessment was carried out during the habitat survey for the suitability of the habitats within the Site to provide bat roosting, foraging and flight path habitats. Bat habitats and commuting routes identified were considered in relation to the wider landscape to determine connectivity for local bat populations, and through the examination of aerial mapping.

Following the identification of trees suitable for roosting bats and features suitable for foraging and commuting bats, targeted bat surveys were undertaken on-site.

The survey design was informed by previous experience and the following publications:

- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* [48];
- *A Conservation Plan for Irish Vesper Bats* Irish Wildlife Manual No. 20 [49];
- *UK Bat Mitigation Guidelines: A guide to impact assessment, mitigation and compensation for developments affecting bats* [50];
- *Bat Mitigation Guidelines for Ireland*. Irish Wildlife Manuals, No. 25 [51] a publication by the NPWS; and,
- *Bat Surveys for Professional Ecologists - Good Practice Guidelines* (3rd ed.) London: The Bat Conservation Trust [36].

Please refer to Appendix 6-1 – Bat Survey Report for full details of the methodologies used.

Birds

The Site was assessed for its potential to support important assemblages of birds of rare or notable species, as well as designated bird species. Any bird activity on-site and potential nesting habitats were noted.

Otters

The Site and the Palatine stream within the vicinity of the Site was assessed for its suitability to provide habitats for foraging and commuting otters. Evidence of otter searched for included:

- Holts (features log piles, caves and cavities);
- Slides (flattened areas of mud or vegetation);
- Paw prints;
- Evidence of foraging (usually in the form of feeding remains such as fish scales and shellfish); and,
- Spraints.

The field survey of the Site was conducted in line with the following relevant guidance for otter:

- SNH, 'Technical Advice Note #2: Otter Surveys' [40];
- DoAHG, 'National Otter Survey of Ireland 2010 / 12' [41]; and,
- NRA, now TII, 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes,' [52].

Invasive species

The Site was visually assessed for the presence of any noxious / invasive species that are regulated under Regulations 16(1) and 17 of the European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024) [53] such as Japanese knotweed (*Reynoutria japonica*) and Himalayan balsam (*Impatiens glandulifera*).

The Site was also assessed for the presence of non-regulated invasive species that have the potential to impact local biodiversity.

Other species

In addition, an assessment was carried out of the potential for the Site to support any other species considered to be of value for biodiversity, including those identified as occurring locally, based on the findings of the desktop study and professional judgement.

6.2.3.3 Survey Limitations

No survey limitations were encountered.

6.2.4 Assessment Methodology

The starting point for the assessment was to undertake a scoping exercise for those ecological receptors that would require further consideration as part of the assessment. This involved differentiating the biodiversity receptors (i.e. designated sites, habitats and species populations) that could be significantly affected by the Proposed Development.

The approach that was used for determining which receptors have the potential to be significantly affected by the proposed development involved using baseline data collected through the desk study (2km away for protected species, 15km for European sites and 5km for nationally protected sites). The desk and field-based data was used to determine:

- Which, if any, of the species or habitats recorded are legally protected or controlled (see Box 1); and,
- Which, if any, sites, areas of habitat or species recorded are important for biodiversity conservation.

The next stage of the assessment was to determine whether the identified receptors are of sufficient biodiversity value that an impact upon them would be of potential significance in terms of this EIAR. In this regard:

- Biodiversity conservation value relates to the quality and / or size of sites or habitats, or the size of species' populations; and,
- Potential significance means that the effect could be of sufficient concern or, for positive effects, of such substantial benefit that it could be material to influencing the decision on planning.

Those receptors that have been identified as having sufficient value, where an impact upon them could be of potential significance, have been taken forward for further consideration. Legally protected species were also considered further. This involved:

- Identifying, for each receptor, any significant impact that is likely to be caused by the Proposed Development, which has the potential to lead to a significant effect and / or to contravene relevant legislation;
- Determining the area within which the likely impacts would cause a potentially significant impact on the identified receptor and / or could contravene relevant legislation (ecological zone of influence); and,
- If the receptor occurs or is likely to occur within the zone of influence and it is concluded that the receptor could be significantly affected and / or the relevant legislation contravened, the receptor would be subject to further assessment.

6.2.5 Evaluation of the Conservation Importance of the Site

In terms of biodiversity conservation value, identified receptors have been valued using the National Roads Authority Scheme [54], using the following scale:

- International importance;
- National importance;
- County importance (or vice-county in the case of plant or insect species);
- Local importance (higher value); and,
- Local importance (lower value).

6.2.6 Legislation / Policy Context

Within Ireland, a number of sites of international or national importance to nature conservation, as well as many species of animal and plants are afforded a degree of legal protection, as set out in Box 1 below.

A study of biodiversity related planning policy at both national, regional and local level has been undertaken for the Site and locality to highlight any potential conflicts with the relevant legislation and guidance documents.

Box 1 Designated Wildlife Sites and Protected and Otherwise Notable Habitats and Species

The National Parks and Wildlife Service ('NPWS') notifies sites in Ireland that are of international or national importance for nature conservation (although some sites that are of national importance for certain species have not been so designated).

Internationally important sites may also be designated as:

- Special Areas of Conservation ('SACs') and Candidate Special Area of Conservation ('cSACs'): the legal requirements relating to the designation and management of SACs in Ireland are set out in the European Communities (Birds and Natural Habitats) Regulations 2011-2021.
- Special Protection Areas ('SPAs') and candidate Special Protected Areas ('cSPAs'): strictly protected sites classified in accordance with Article 4 of the EC Directive on the Conservation of Wild Birds (2009/147/EC), also known as the Birds Directive; and,
- Ramsar sites: wetlands of international importance designated under the Ramsar Convention, to which Ireland is a signatory.

Other statutory site designations relating to nature conservation are:

- Natural Heritage Areas ('NHAs'): these represent examples of some of the most important natural and semi-natural terrestrial and coastal habitats in the country and are afforded protection under the Wildlife (Amendment) Act 2000. NHAs are legally protected from damage and receive protection from the date they are formally proposed for designation; and,
- Proposed Natural Heritage Areas ('pNHAs'): these sites are not afforded the same protection as NHAs. These sites are proposed by the NPWS but are not statutorily proposed or designated. Prior to statutory designation these are subject to a very limited legal protection. They are, however, sites of significance for wildlife and habitats and are important for the purposes of this Biodiversity Chapter.

Legally protected species

Many species of animal and plant receive some degree of legal protection. For the purposes of this study, legal protection refers to:

- Species included in the Wildlife (Amendment) Act 2000, excluding species that are only protected in relation to their sale, reflecting the fact that the site disposal will not include any proposals relating to the sale of species; and,
- Species afforded protection under the Flora (Protection) Order 2022 (S.I.No.235/2022).

Other notable habitat/species categories

- Biodiversity Action Plan ('BAP') species: those targeted in local or national BAPs as being of particular conservation concern (priority species);
- Red and Amber List birds: those listed as being of high or medium conservation concern as listed by Birdwatch Ireland on the Birds of Conservation Concern in Ireland 2020-2026 [55]; and,
- Other Irish Red Data Book species [56] and Nationally/Regionally/Locally Notable species where appropriate.

6.2.7 National Planning Context

6.2.7.1 Project Ireland 2040

Project Ireland 2040 was launched by the Government in February 2018 [13] incorporates two policy documents – the National Planning Framework and the National Development Plan.

National Planning Framework

Under the biodiversity section "Project Ireland 2040 National Planning Framework", the National Policy Objective 59 is to:

'Enhance the conservation status and improve the management of protected areas and protected species by:

- *Implementing relevant EU Directives to protect Ireland's environment and wildlife;*
- *Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans;*
- *Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; and,*

- *Continued research, survey programmes and monitoring of habitats and species.'*

The National Policy Objective 60 in the same document is to:

'Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance.'

The National Development Plan

The National Development Plan also lists the following items as strategic investment priorities in relation to National Heritage and biodiversity:

- *'Implementation of the current and future National Biodiversity Action Plan, delivery of National Parks and Wildlife Service Farm Plans and LIFE projects, enhanced wildlife crime investigation capacity and identification and delivery conservation measures at designated sites as identified in the Prioritised Action Framework for Ireland (2021-2027).';*
- *'Investment in nature and biodiversity, to improve the quality of natural habitats and support native plants and animals, including those under threat, and to bolster broader societal wellness and sustainability goals.'; and,*
- *'Future-proofing obligations under the Biodiversity Strategy 2030, including potential national designations and the preparation and delivery of a National Restoration Plan.'*

6.2.7.2 Ireland 4th National Biodiversity Action Plan, 2023 – 2030

The 4th National Biodiversity Action Plan ('NBAP') was published in January 2024 having been in development since 2021. The NBAP sets out a number of strategic objectives that lay out a clear framework for Ireland's approach to biodiversity and demonstrate Ireland's commitment to protecting biodiversity and halting the decline [57].

The NBAP was reviewed as part of this report, and two objectives were considered relevant to the Proposed Development.

Objective 2: 'Meet urgent conservation and restoration needs.'

There are two targeted outcomes listed under this objective which is considered relevant to the Proposed Development. This outcome is as follows:

Outcome 2A:

'The protection of existing designated areas and species is strengthened, and conservation and restoration within the existing protected area network are enhanced.'

Outcome 2H:

'Invasive alien species ('IAS') are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity, and measures are undertaken to tackle the introduction and spread of new IAS to the environment.'

Objective 3 of the NBAP aims to:

'Secure Nature's Contribution to People'

There are two targeted outcomes listed under this objective which is considered relevant to the Proposed Development. These outcomes are as follows:

Outcome 3B:

'The role of biodiversity in supporting wellbeing, livelihoods, enterprise and employment is recognised and enhanced.'

Outcome 3C:

‘Planning and development will facilitate and secure biodiversity’s contributions to people.’

6.2.8 Regional Planning Context

6.2.8.1 Eastern & Midland Regional Spatial and Economic Strategy 2019-2031

The Eastern & Midland Regional Spatial and Economic Strategy 2019-2031 (‘RSES’) [58] recognises the need to conserve and enhance biodiversity through coordinated spatial planning in the eastern and midland regions.

One of the guiding principles of this document relating to the Proposed Development is to:

‘Explore opportunities for biodiversity enhancement to improve ecological connectivity as part of the strategic re-intensification of urban infill and brownfield sites.’

Under the biodiversity section, the following regional policy objectives relative to the Proposed Development are listed:

RPO 7.16

‘Support the implementation of the Habitats Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.’

RPO 7.17

‘Facilitate cross boundary co-ordination between local authorities and the relevant agencies in the Region to provide clear governance arrangements and coordination mechanisms to support the development of ecological networks and enhanced connectivity between protected sites whilst also addressing the need for management of alien invasive species and the conservation of native species.’

RPO 10.6

‘Delivery and phasing of services shall be subject to the required appraisal, planning and environmental assessment processes and shall avoid adverse impacts on the integrity of the Natura 2000 network.’

6.2.9 Local Planning Context

6.2.9.1 Kildare County Development Plan 2023-2029

The Kildare County Development Plan (‘KCDP’) 2023-2029 [7] contains several objectives which relate directly to the protection of biodiversity and natural heritage in the context of the Proposed Development. These include policies to ensure compliance with the EU Habitats Directive and to ensure the protection of the integrity of European Sites. It also includes objectives relating to the management of invasive species and the maintenance of ecological corridors.

In Chapter 12: Biodiversity & Green Infrastructure within the KCDP policies, it is the policy of the council to:

Policy BI P1:

‘Integrate in the development management process the protection and enhancement of biodiversity and landscape features by applying the mitigation hierarchy to potential adverse impacts on important ecological features (whether designated or not), i.e. avoiding impacts where possible, minimising adverse impacts, and if significant effects

are unavoidable by including mitigation and/or compensation measures, as appropriate. Opportunities for biodiversity net gain are encouraged.'

Under policy BI P1, it is the objective of the council to:

Objective BI O1:

'Require, as part of the Development Management Process, the preparation of Ecological Impact Assessments that adequately assess the biodiversity resource within proposed development sites, to avoid habitat loss and fragmentation and to integrate this biodiversity resource into the design and layout of new development and to increase biodiversity within the proposed development. Such assessments shall be carried out in line with the CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.'

Objective BI O3

'Actively support the implementation of national biodiversity initiatives such as the All-Ireland Pollinator Plan 2021-2026.'

Objective BI O6

'Apply the precautionary principle in relation to proposed developments in environmentally sensitive areas to ensure that all potential adverse impacts on a designated NHA or Natura 2000 Site arising from any proposed development or land use activity are avoided, remedied, or mitigated.'

Policy BI P2:

'Seek to contribute to maintaining or restoring the conservation status of all sites designated for nature conservation or proposed for designation in accordance with European and national legislation and agreements. These include Special Areas of Conservation ('SACs'), Special Protection Areas ('SPAs'), Natural Heritage Areas ('NHAs'), Ramsar Sites and Statutory Nature Reserves.'

Under Policy BI P2, it is the objective of the council to:

Objective BI O9

'Avoid development that would adversely affect the integrity of any Natura 2000 site and promote favourable conservation status of habitats and protected species including those listed under the Birds Directive, the Wildlife Acts and the Habitats Directive, to support the conservation and enhancement of Natura 2000 Sites including any additional sites that may be proposed for designation during the period of this Plan and protect the Natura 2000 network from any plans and projects that are likely to have a significant effect on the coherence or integrity of a Natura 2000 Site.'

Objective BI O10

'Ensure an Appropriate Assessment Screening, in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, Section 177A of the Planning and Development Act (2001-2022) or any superseding legislation and with DEHLG guidance (2009), is carried out in respect of any plan or project not directly connected with or necessary to the management of a Natura 2000 site to determine the likelihood of the plan or project having a significant effect on a Natura 2000 site, either individually or in combination with other plans or projects and to ensure that projects which may give rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites will not be permitted (either individually or in combination with other plans or projects) unless for reasons of overriding public interest.'

Policy BI P3:

'Ensure that any proposal for development within or adjacent to a Natural Heritage Area ('NHA'), Ramsar Sites and Nature Reserves is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the site, particularly plant and animal species listed under the Wildlife Acts and the Habitats and Birds Directive including their habitats.'

Under Policy BI P3, it is the objective of the council to:

Objective BI O12

'Require the preparation of an Ecological Impact Assessment ('EclA') by a suitably qualified professional for proposals for development within or adjacent to a Natural Heritage Area ('NHA') / proposed Natural Heritage Areas ('pNHA'), to ensure the development is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the site, particularly plant and animal species listed under the Wildlife Acts. Such assessments shall be carried out in line with the CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.'

Policy BI P4:

'Ensure that any new development proposal does not have a significant adverse impact, incapable of satisfactory mitigation on plant, animal or bird species which are protected by law.'

Under Policy BI P4, it is the objective of the council to:

Objective BI O15

'Ensure that any new development proposal does not have a significant adverse impact on rare and threatened species, including those protected under the Wildlife Acts 1976 and 2012, the Birds Directive 1979 the Habitats Directive 1992 and the Flora Protection Order species and any species listed under the national red lists or that could be listed on a national red list.'

Objective BI O16

'Ensure appropriate species and habitat avoidance and mitigation measures are incorporated into all new development proposals.'

Objective BI O18

'Require all applications for new developments to identify, protect and sensitively enhance the most important ecological features and habitats, and incorporate these into the overall open space network, keeping free from development and to provide links to the wider Green Infrastructure network as an essential part of the design process and by making provision for local biodiversity (e.g. through provision of swift boxes or towers, bat roost sites, hedgehog highways, green roofs, etc.).'

Objective BI O19

'Require that all biodiversity data gathered in the preparation of planning applications will be made available to the National Biodiversity Data Centre (NDBC).'

Objective BI O20

'Conserve and protect habitats and species listed in the Annexes of the EU Habitats Directive (92143/EEC) (as amended), the Birds Directive (20091147/EC), Directive Annex 2, the Wildlife Acts 1976 to 2000, The Wildlife Acts 1976 (as amended) and the Flora Protection Order No 94 of 1999.'

Policy BI P6:

‘Recognise the important contribution trees and hedgerows make to the county biodiversity resource climate mitigation, resilience and adaptation.’

Under Policy BI P6, it is the objective of the council to:

Objective BI O26

‘Prevent, in the first instance, the removal of hedgerows to facilitate development. Where their removal is unavoidable, same must be clearly and satisfactorily demonstrated to the Planning Authority. In any event, removal shall be kept to an absolute minimum and there shall be a requirement for mitigation planting comprising a hedge of similar length and species composition to the original, established as close as is practicable to the original and where possible linking to existing adjacent hedges. Ideally, native plants of a local provenance and origin should be used for any such planting. Removal of hedgerows and trees prior to submitting a planning application will be viewed negatively by the planning authority and may result in an outright refusal.’

Objective BI O28

‘Promote the integration of boundary hedges within and along development sites into development design so as to avoid “trapped hedges” located to the boundary of houses within the development layout. Encourage the planting of woodlands, trees and hedgerows as part of new developments and as part of the Council’s own landscaping works ideally using native plants of local provenance and origin.’

6.2.9.2 Kildare County Heritage Plan 2019-2025

The Kildare County Heritage Plan (‘KCHP’) was published in 2019 by Kildare County Council [59]. This plan details actions and objectives to manage, conserve and protect the heritage resources in Kildare. The objectives within the KCHP which relate to biodiversity are:

Strategic Objective 1:

Action 8:

‘Support national initiatives such as the All-Ireland Pollinator Plan and the National Biodiversity Plan.’

Action 15:

‘Support the preparation of Local Biodiversity Action Plans’

6.2.9.3 County Kildare Biodiversity Plan 2009-2014

The Kildare Biodiversity Action Plan (‘CKBAP’) was published in 2009 by Kildare County Council [60]. At the time of writing this report, this plan had not been updated. However, it states that:

‘The objectives of the County Kildare Biodiversity Plan are the same as those adopted in the County Kildare Heritage Plan. The only difference is that the focus of the biodiversity plan is solely on natural heritage’.

In addition, updated 2021-2025 plans have been developed for 10 towns and villages within County Kildare. The CKBAP should, therefore, be read in conjunction with the more up-to-date NBAP and KCDP to ensure the most up-to-date and appropriate biodiversity actions are implemented. The CKBAP provides a framework to manage biodiversity in the area, and it outlines a series of actions which are listed under each of the four objectives of the plan:

Objective 1

‘To facilitate the collection and dissemination of heritage information.’

Objective 2

‘To raise public awareness, understanding and appreciation of County Kildare’s heritage.’

Objective 3

‘To promote best practice in heritage conservation and management.’

Objective 4

‘To inform policy and provide advice to Kildare Local Authorities.’

6.3 Receiving Environment

6.3.1 Desk Study Results

6.3.1.1 European Designated Sites

In accordance with the European Commission Methodological Guidance [61] and Policies and Objectives BI P3, BI O6, BI O9, and BI O10 of the KCDP [7] a list of European sites that can be potentially affected by the Proposed Development has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government [11] states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location, and the likely effects of the project. The key variables determining whether or not a particular European site is likely to be negatively affected by a project are:

- The physical distance from the project to the European site;
- The presence of impact pathways;
- The sensitivities of the ecological receptors; and,
- The potential for in-combination effects.

All SPAs and SACs within 15km have been considered to assess their ecological pathways and functional links. As acknowledged in the Office of Public Relations (‘OPR’) guidelines [62], few projects have a Zone of Influence this large; however, the identification of European sites within 15km has become widely accepted as the starting point for the screening process. For this reason, all SPAs and SACs within 15km have been identified for consideration as part of the screening.

Three European sites were identified within 15km of the Site - these are shown in Figure 6-1 and Table 6-1 below.

Figure 6-1: European sites within 15km of the Site

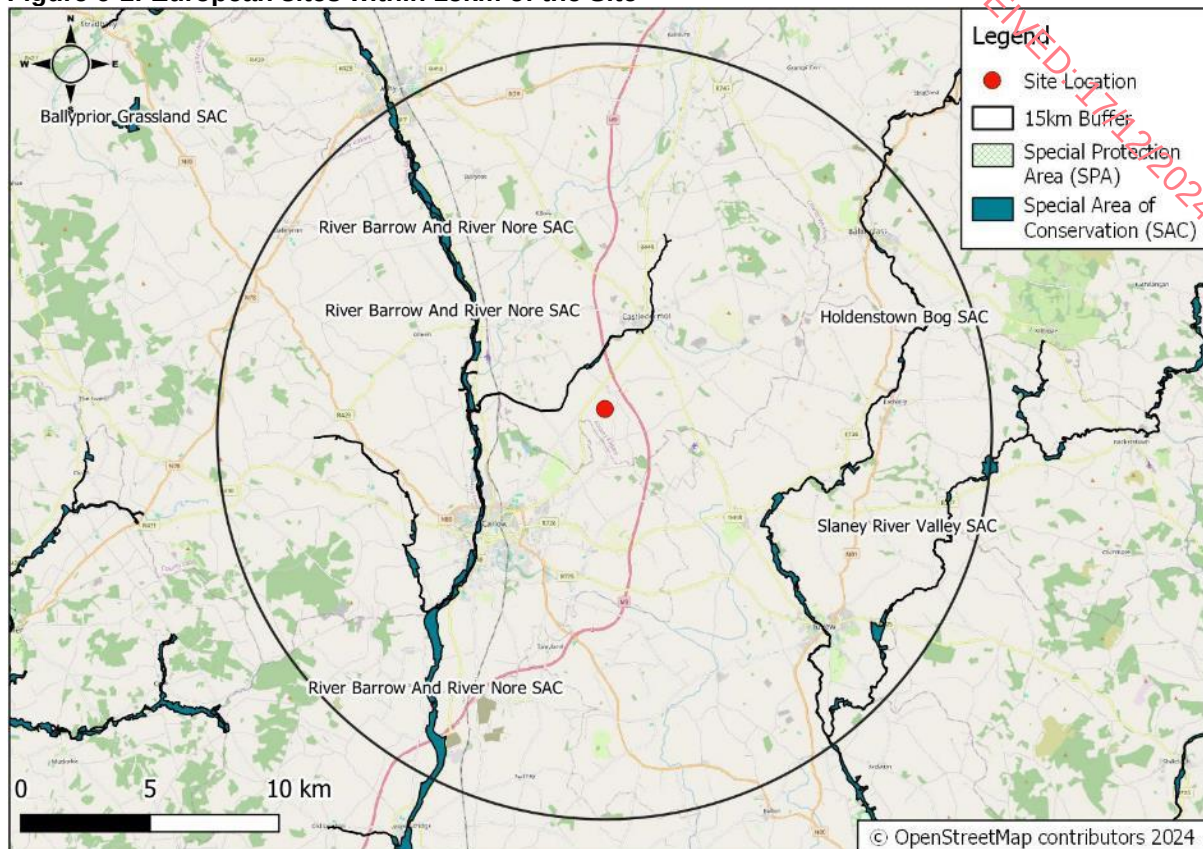


Table 6-1: European Designated Sites within 15km of the Site

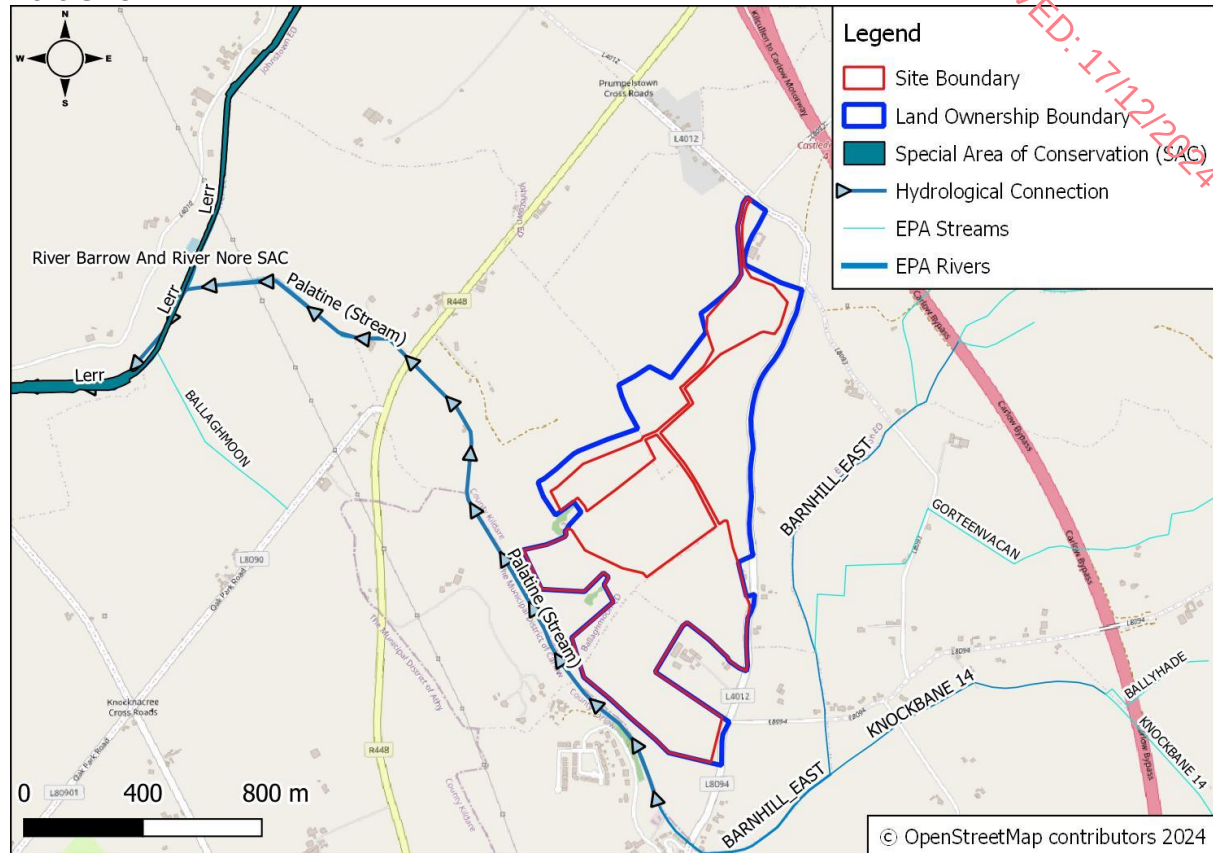
Site Name	Code	Distance (km)	Direction from the Site
Special Areas of Conservation ('SAC')			
River Barrow and River Nore SAC	002162	1.3km	NW
Slaney River Valley SAC	000781	6.6km	SE
Holdenstown Bog SAC	001757	11.5km	NE

The Site is not located within any European sites, however, the boundaries of three SACs are located within 15km from the Site.

Given the distance, intervening lands and lack of impact pathways between the Site and the Slaney River Valley SAC and Holdenstown Bog SAC, these European sites have been screened out from further consideration.

However, the Site is situated within close proximity to the Palatine Stream; should uncontrolled runoff reach this stream, it has the potential to reach the River Barrow and River Nore SAC. See Figure 6-2 below. Further consideration has been given to this site in the NIS submitted alongside this report as part of the overall planning application.

Figure 6-2: Potential Hydrological Connection between the Site and the River Barrow and River Nore SAC



6.3.1.2 Nationally Designated Sites

All Natural Heritage Areas ('NHA') and proposed Natural Heritage Areas ('pNHA') within 5km of the Site have been considered in line with policy BI P2 and objectives BI O12 of the KCDP [7]. Refer to Figure 6-3 and Table 6-2.

Figure 6-3: Proposed Natural Heritage Areas within 5km of the Site

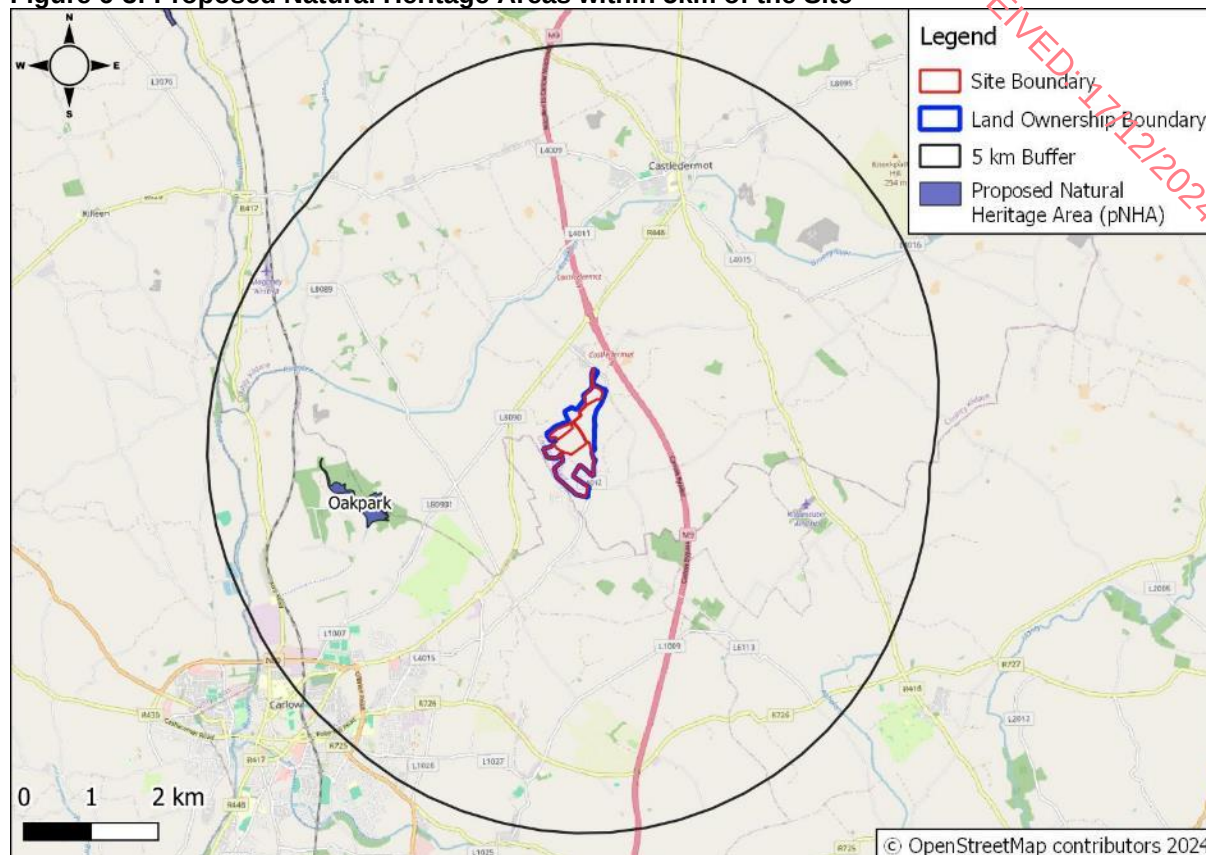


Table 6-2: Proposed Natural Heritage Areas ('pNHAs') within 5km of the Site

Site Name	Site Code	Distance (km) & Direction	Qualifying Features of Interest
Oakpark	000810	ca. 2.9km west	Oakpark is located approximately 5km north of Carlow. The Site is a shallow artificial pond, bounded almost completely by woodlands. There are eight small islands bearing coniferous and deciduous trees within the lake. Much of the open water has been colonised by Common Reed (<i>Phragmites australis</i>). A drainage channel was cut through the reed-bed in 1973 to ensure circulation of freshwater. The Site attracts a variety of birds and records have been kept since 1966. Breeding species include Little Grebe, Grey Heron (17 occupied nests in 1993), Mute Swan, Mallard, Water Rail, Coot, and many passerine species. Wintering waterfowl include Mallard (24), Golden Plover (125) and Lapwing (125) (figures are one count during 1984/85-1986/87 period). Many other species occur in winter, such as Wigeon, Teal, Shoveler, Tufted Duck and Pochard. Oakpark is the largest area of still water in the county and is of regional and local value to birds [63].

6.3.1.3 Protected / Notable Species

Table 6-3 provides a summary of records of legally protected or otherwise notable species that occur within 2km of the Site over the last 10 years [46]. The parameter of 10 years was chosen on the basis of habitat adaption and modification, it is considered that any records over 10 years old are not representative of the current distribution of species populations.

Table 6-3: Protected and or Notable Species within 2km of the Site (S77P, S77Q, S78K, S78L, S78Q, S78V)

Common Name	Scientific Name	Date of last record	Designation
Bird Species			
Barn Owl	<i>Tyto alba</i>	24/01/2023	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Red List
Barn Swallow	<i>Hirundo rustica</i>	10/04/2023	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List
Common Kestrel	<i>Falco tinnunculus</i>	26/09/2019	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Kingfisher	<i>Alcedo atthis</i>	05/03/2023	Wildlife Acts 1976 / 2000 EU Birds Directive Birds of Conservation Concern Amber List
Common Linnet	<i>Carduelis cannabina</i>	08/11/2014	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Snipe	<i>Gallinago gallinago</i>	28/01/2023	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section II and Annex III Section III Bird Species Birds of Conservation Concern Red List
Common Wood Pigeon	<i>Columba palumbus</i>	25/09/2019	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section I and Annex III Section I Bird Species
European Golden Plover	<i>Pluvialis apricaria</i>	04/04/2023	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section I and Annex III and Section III Bird Species Birds of Conservation Concern Amber List
Great Cormorant	<i>Phalacrocorax carbo</i>	25/01/2023	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
House Martin	<i>Delichon urbicum</i>	06/04/2020	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List
Little Egret	<i>Egretta garzetta</i>	12/05/2023	Wildlife Acts 1976 / 2000 EU Birds Directive

Common Name	Scientific Name	Date of last record	Designation
Red Kite	<i>Milvus milvus</i>	31/05/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List
Sand Martin	<i>Riparia riparia</i>	27/04/2023	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List
Skylark	<i>Alauda arvensis</i>	14/03/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List
Spotted Flycatcher	<i>Muscicapa striata</i>	18/05/2023	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Yellowhammer	<i>Emberiza citrenella</i>	20/04/2019	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Red List
Amphibians			
Smooth Newt	<i>Lissotriton vulgaris</i>	08/06/2015	Wildlife Acts 1976 / 2000
Terrestrial Mammal			
Pine Marten	<i>Martes martes</i>	22/09/2014	Wildlife Acts 1976 / 2000 EU Habitats Directive –Annex V
West European Hedgehog	<i>Erinaceus europaeus</i>	23/04/2023	Wildlife Acts 1976 / 2000
Bat Species			
Leisler's bat	<i>Nyctalus leisleri</i>	31/07/2019	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Daubenton's bat	<i>Myotis daubentonii</i>	09/10/2015	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Common Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	29/07/2015	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	30/07/2018	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Invasive Species*			
Japanese Knotweed	<i>Reynoutria japonica</i>	17/08/2020	Invasive Species: High Impact Regulation S.I. No. 374/2024 (Ireland)

*Only invasive species that are regulated under S.I. No. 374/2024 were included in the table.

6.3.2 Field Survey Results

The following section provides details of the field-based assessments that were undertaken for the Site on 28th June 2023 and 11th January 2024. The distribution of the habitats and target notes identifying the location of features of interest are shown in Figure 6-4.

6.3.2.1 Habitats

The habitats described below were classified under Fossitt's: A Guide to Habitats in Ireland and are all located within the Site.

Site Context and Surrounding Habitats

The Site consists of areas of the active Ballyburn Pit and the proposed extension lands to the south. It is located within a largely rural setting and is characterised by grassland, hedgerows and treelines, spoil, and bare ground.

The principal habitats recorded on-site during the field surveys comprised of active quarries, fields of improved agricultural grassland, spoil and bare ground, scrub and arable crops. The wider area surrounding the Site comprised of agricultural land, scattered residential dwellings and farm holdings.

Below is a description of the habitats and features of ecological significance, and their distribution is illustrated in Figure 6-4.

Active Quarries (ED4)

Part of Ballyburn Pit is included within the Site boundary, which is active.

Improved Agricultural Grassland (GA1)

Outside of the active quarry habitat, this was the most dominant habitat on-site.

Species found in this area during the habitat survey were creeping thistle (*Cirsium arvense*), common nettle (*Urtica dioica*), curly dock (*Rumex crispus*), creeping buttercup (*Ranunculus repens*), chickweed (*Stellaria media*), clover (*Trifolium* spp.), ragwort (*Jacobaea vulgaris*), meadow grass (*Poa annua*), daisy (*Bellis perennis*), common velvet grass (*Holcus lanatus*), perennial ryegrass (*Lolium perenne*), cocksfoot (*Dactylis glomerata*), soft brome (*Bromus hordeaceus*), wild oats (*Avena fatua*), poppy (*Papaver* spp.), nipplewort (*Lapsana communis*), willowherb (*Chamanerion* spp.), and ribwort plantain (*Plantago lanceolata*).

It should be noted that during the second field survey on the 11th January 2024, the agricultural grassland in low-lying areas of the Site was wet and had water pooling within (TN1 – Figure 6-4).

Spoil and Bare Ground (ED2)

Areas of spoil and bare ground were located in between fields northwest and southwest of the Site. These areas were used as access tracks between the agricultural fields on-site. The areas were largely unvegetated, however, species identified within the area of improved grassland (GA1) as outlined above, were beginning to establish in this area.

Scrub (WS1)

An area of scrub was located in the middle of the field in the southwest of the Site. This area of scrub was dominated by, gorse (*Ulex* spp.), thistles, ragwort, and ivy (*Hedera helix*).

Arable Crops (BC1)

During the Site visits, one field within the Site boundary was being utilised for arable crops. The field at this time contained wheat (*Triticum aestivum*).

A range of species were recorded around the field margin of the field, these included nipplewort, cleavers (*Galium aparine*), thistles, chickweed, common poppy (*Papaver rhoeas*), snowberry (*Symphoricarpos albus*), hogweed (*Heracleum sphondylium*), field mustard (*Brassica rapa*) and lesser burdock (*Arctium minus*).

Hedgerow/Treeline (WL1/WL2)

The Site was bounded by hedgerows and treelines along the northern and southeastern boundaries of the Site. Additionally, two hedgerows / treelines dissected the Site, running in a southeast to northwest direction, as shown in Figure 6-4.

The hedgerows / treelines on-site consisted of common species found throughout Ireland, these included dog rose (*Rosa canina*), willow (*Salix spp.*), sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*), elmleaf blackberry (*Rubus ulmifolius*), bramble (*Rubus fruticosus*), elder (*Sambucus nigra*), ash (*Fraxinus spp.*), blackthorn (*Prunus spinosa*), honey suckle (*Lonicera caprifolium*), nettle, gorse , and ivy.

Species were also present in the understory of the hedgerows, these included thistles, clover, cleavers, lords and ladies (*Arum maculatum*), and common burdock (*Arctium minus*).

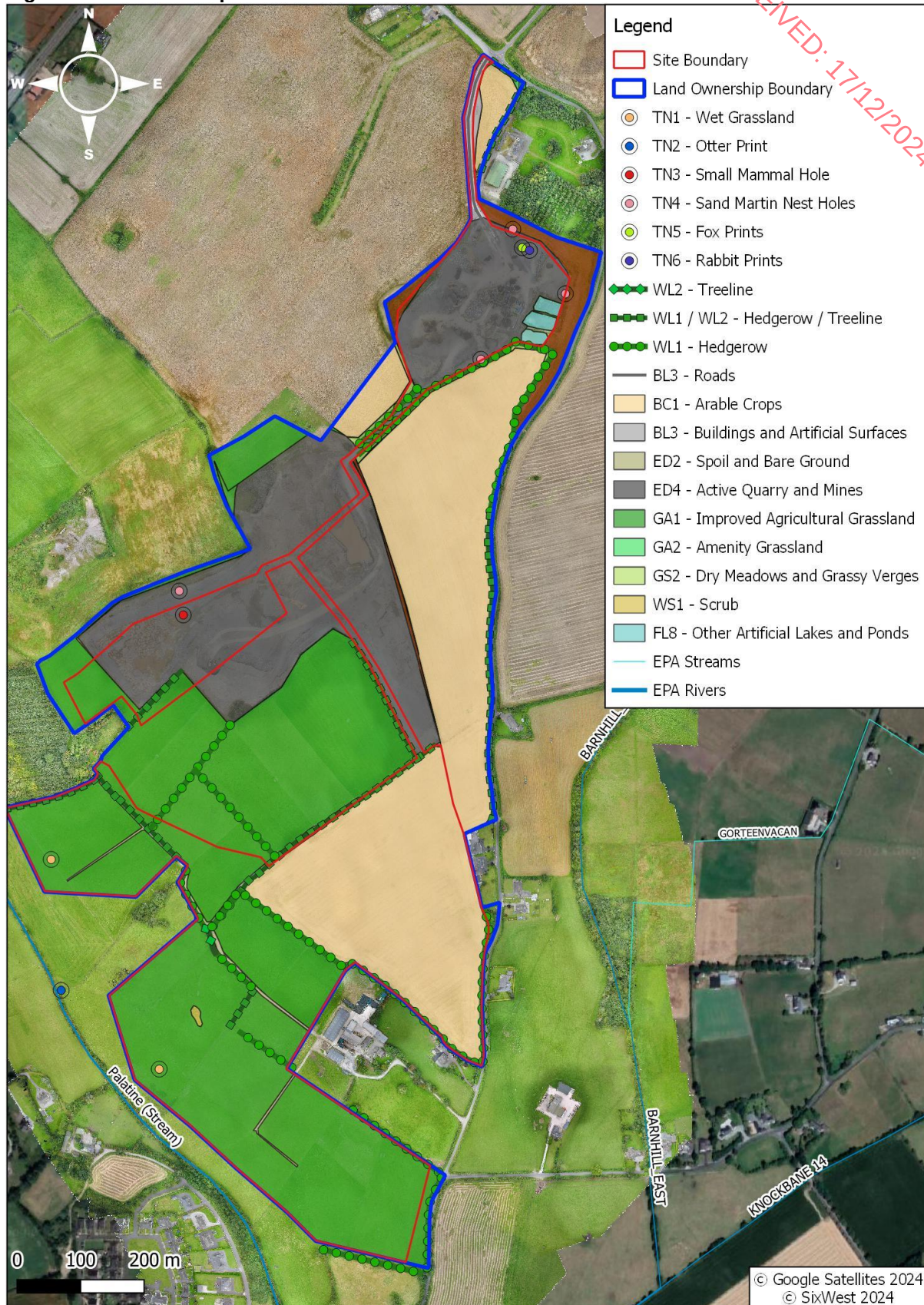
Roads (BL3)

An access road was present in the north of the Site which gives access to the active quarry.

Artificial Ponds (FL8)

Three settlement lagoons were present in the northeast of the active quarry. These lagoons collect water runoff from the processing area.

Figure 6-4: Habitat Map



6.3.2.2 Species

Flora

No plant species protected under the Flora Protection Order were recorded on-site.

Amphibians

The NBDC hold records of smooth newt within 2km of the Site [46]. The on-site habitats have the potential to support amphibians during the terrestrial phase of their life cycle. The settle ponds are considered to be suitable for breeding amphibians. These are however actively being used as part of the surface water management at the Site and some of the lagoons were turbid at the time of the survey.

Badger

The NBDC hold no records of badger within 2km of the Site [46]. There was no evidence of badger activity on-site. There were multiple small mammal holes on-site that were deemed to be too small and unsuitable to be used by badgers. The small pocket of woodland to the west of the active quarry that was surveyed also had no evidence of badger activity within.

Bats

The NBDC holds records of four of the nine resident bat species found in Ireland within 2km of the Site - common pipistrelle, soprano pipistrelle, Daubenton's bat and Leisler's bat [46].

The habitat survey identified two trees on-site with features suitable for roosting bats. Additionally, the sections of hedgerow and hedgerow / treelines traversing and bordering areas in the Site were deemed suitable for foraging and commuting bats. Two dusk emergence and activity surveys took place on-site to survey the trees for bat emergence and assess the levels of bat activity on-site. No bats were observed to be roosting within these trees, and moderate levels of activity were recorded from foraging and commuting bats on-site.

Please refer to Appendix 6-1 – Bat Report, for full details of the results of the bat surveys undertaken at the Site.

Birds

The NBDC holds records of multiple bird species within 2km of the Site [46].

The Site was assessed for its potential to provide nesting habitat for breeding birds. During the habitat survey, common bird species were noted on-site including buzzard (*Buteo buteo*) and goldfinch (*Carduelis carduelis*). Additionally, multiple sand martin (*Riparia riparia*) nest holes were identified within the active Ballyburn Pit, on the north, northeast and southwest edges of the quarry (TN4 – Figure 6-4). None of these nests were active during the January 2024 site visit, but it is considered likely that some were active during the 2023 and 2024 breeding season.

Otter

The NBDC holds no records of otter within 2km of the Site [46]. The River Lerr located ca. 1.5km to the northwest of the Site is part of the River Barrow and River Nore SAC which is designated for otter. One otter footprint was identified along a section of the Palatine stream which is located to the west of the Site (TN2- Figure 6-4). No other evidence of otter activity was identified along the Palatine stream. Additionally, no evidence of otter was identified within the Site boundary.

Invasive Species

The NBDC holds records of one high-impact invasive species within 2km of the Site – Japanese knotweed. This species was not identified on-site.

No high impact invasive species or plant species listed under Regulations 16(1) and 17 of the European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024) [53] (i.e. species of which it is an offense to disperse, spread or otherwise cause to grow in any space) were identified on-site.

Other Species

According to the NBDC, pine marten have been recorded within 2km of the Site [46]. Pine marten display a preference for woodland habitats but have also been recorded in scrub and rocky areas. No evidence of this species was identified on-site. However, there is potential for this species to utilise the scrub and woodland areas within and adjoining the Site.

Hedgehogs are common and widespread species that typically occur in scrub, woodland and rank grassland habitats. The NBDC holds records of hedgehogs within 2km of the Site [46]. No direct evidence of hedgehogs was identified on-site, however, the woodland and scrub habitats on-site and adjoining the Site provide suitable cover and sheltering habitat for this species.

Multiple rabbits, rabbit holes and droppings were identified throughout the Site. It is considered that the grassland and hedgerows provide suitable foraging / commuting habitats for this species. Additionally, fox prints (TN5) and rabbit prints (TN6) were identified within the active quarry (Figure 6-4). It is therefore likely that foxes and rabbits are using the active quarry for commuting purposes.

6.4 Characteristics & Predicted Impact of the Proposed Development

In the context of the characteristics and predicted impacts associated with the Proposed Development it must be noted that the Site is situated within and adjacent to Ballyburn Pit which is active. The existing pit is subject to environmental monitoring as part of the existing planning permission and is required to submit environmental compliance reports to Kildare County Council.

6.4.1 Sensitive Design

To minimise the potential adverse effects of the Proposed Development on biodiversity and, where possible, enhance the ecological value of the Site, a range of environmental measures have been incorporated into the project. The measures relevant to this project have been detailed below:

- A Restoration Plan for the Site will be implemented following the completion of the operational phase to restore the Site to agricultural grassland. Historical field boundaries/hedgerows will be re-instated in line with Objective BI O26 of the KCDP [7];
- Boundary trees and hedgerows that have become established will be retained where possible. A 10m buffer will be maintained between the retained hedgerow/treelines and the pit face. Only minor ancillary works can occur within this buffer zone;
- All vegetation management will be planned in accordance with relevant legislation and undertaken outside of the period between the 1st March to 31st August to avoid potential disturbance of nesting birds;
- Topsoil and overburden to be stripped from the Site, will be reused, where possible, in the restoration of the Site. This material will be stored in berms which are seeded around the perimeter of the proposed extraction area. This will ensure that impacts on the soil are minimised / avoided;

- The Site's standard operation hours will be from 07:00 to 18:00 on Monday to Friday and 07:00 to 14:00 on Saturdays. Therefore, potential impacts to nocturnal species in the area will be limited; and,
- Dust control measures will be implemented as part of ongoing, as detailed in Chapter 9 (Air Quality).

6.4.2 Identification of Potentially Significant Effects on Identified Receptors

Based on the methodology set out in Section 6.2, Table 6-4 sets out the findings of the valuation of important and legally protected receptors. Each receptor is assessed and a scoping justification for each receptor is provided for the Construction, Operational and Restoration Phases combined.

Table 6-4: Valuation of Potential Ecological Receptors

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
Protected sites				
European Sites	European Communities (Natural Habitats) Regulations 1997 (as amended)	Internationally designated sites for conservation.	A Stage One: Appropriate Assessment Screening and Stage Two: Natura Impact Statement ('NIS') was prepared as part of the overall planning application. These designated sites were assessed in line with policies BI O9 and BI O10 of the KCDP [7] and policy objectives RPO 7.16 and RPO 10.6 of the Eastern & Midland RSES [64]. The NIS concluded that the Proposed Development would not cause any significant adverse impact on any European designated sites or any of their designated features of interest if the mitigation measures presented in the report were followed. This receptor has therefore been scoped out from further consideration within the EIAR.	European sites have been scoped out from further consideration within the EIAR.
Proposed Natural Heritage Areas ('pNHAs')	Wildlife Acts 1976 / 2000	Nationally designated sites for conservation.	There is one Proposed Natural Heritage Areas ('pNHA') within 5km of the Site. This site was included in this assessment in line with objectives BI O12 of the KCDP. Due to the distance separating the Site from the pNHA and the absence of impact pathways, it is not considered that the Proposed Development will result in any significant adverse impacts on this Site. This receptor has therefore been scoped out from further consideration.	Proposed Natural Heritage Areas have been scoped out from further consideration.
Habitats				
Spoil and Bare Ground (ED2)	N/A	Low Local Value	Spoil and bare ground are of low ecological value. Therefore, any alteration / loss of this habitat is not considered to be significant. Subsequently, the impact of the Proposed Development on spoil and bare ground is not significant, and this receptor has been scoped out for further consideration.	Spoil and Bare Ground has been scoped out from further consideration.
Active Quarries (ED4)	N/A	Low Local Value	The species of note that were present within this habitat (foxes, rabbits and sand martins) will be discussed below. Apart from these species, there were no other species of note or ecological consideration within this habitat.	Active Quarries has been scoped out from further consideration.
Scrub (WS1)	Wildlife Acts 1976 / 2000	Low Local Value	A small section of low-level scrub was identified within the agricultural field. This is a common habitat throughout Ireland, and its loss is not considered significant. However as per the any vegetation removal on Site, this will be undertaken outside of the nesting bird season.	Scrub has been scoped out from further consideration.
Arable Crops (BC1)	N/A	Low Local Value	This habitat will be removed to facilitate the Proposed Development. This habitat is common throughout Ireland and is of low ecological value. No species of significant conservation value were found within this habitat.	Arable crops have been scoped out for further consideration.

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
Hedgerows/Treelines (WL1/WL2)	Wildlife Acts 1976 / 2000	High Local Value	It will be necessary to remove ca. 1216m of hedgerow / treelines on-site to facilitate the Proposed Development. Hedgerow / treelines are known to be a valued ecological receptor. Following the restoration works, historic hedgerow / treelines will be replanted. Additional woodland planting is also proposed as part of the Restoration Plan. Boundary hedgerow / treelines to be retained will be protected during the works and a 10m setback will be maintained between hedgerow / treelines and extraction works. However, it should be noted that during the Site preparation works, the overburden stripped will be used to create a grassed berm around the periphery of the proposed extraction areas (Zone A1, A2, B1 and B2). The berm will be planted with grass to preserve soil quality for future reuse within the restoration of the Site. All vegetation removal will need to take account of protected species, such as nesting birds. All clearance works will be scheduled to take place outside the nesting bird season (typically considered to be between 1st March to 31st August – weather dependent). However, further consideration will need to be given to this habitat due to its removal.	Hedgerows / Treelines have been scoped in for further consideration.
Roads (BL3)	N/A	Low Local Value	This habitat will not be removed or impacted by the Proposed Development.	Roads have been scoped out from further consideration.
Artificial Ponds (FL8)	N/A	Low Local Value	The settlement lagoons on-site are currently used to collect water runoff from the active quarry and are considered to be of low ecological value given that they are actively being used and contain turbid water. Furthermore, the settlement lagoons are located within an area that is subject to high levels of anthropogenic disturbance as they are located next to the main processing area. These settlement lagoons will not be altered as part of the Proposed Development and will continue to be used as part of the surface water management. In addition, these lagoons will be retained as part of the proposed Restoration Plan for the Site.	Artificial ponds have been scoped out from further consideration.
Improved Agricultural Grassland (GA1)	N/A	Low Local Value	This was the most abundant habitat on-site and is very commonly found throughout Ireland. The species found in this habitat were common and not of conservation concern. Furthermore, the presence of cattle within this habitat on-site suggests that the grassland is subject to frequent grazing, lowering its biodiversity value. Therefore, improved agricultural grassland has been scoped out from further consideration.	Improved Agricultural Grassland has been scoped out from further consideration.
Flora and Fauna				

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
Protected Flora	Flora (Protection) Order 2022 (S.I. No. 235/2022)	N/A	No plant species protected under the Flora Protection Order were noted on-site. Overall, the impact of the Proposed Development on notable / protected flora is considered unlikely to be significant. Therefore, this receptor has been scoped out from further consideration.	Flora have been scoped out from further consideration.
Amphibians	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex V	Low Local Value	Amphibians are commonly associated with quarry sites. It should be noted that these species are relatively widespread and abundant in Ireland. The NBDC holds records of one amphibian species, smooth newt, within 2km of the Site in the past 10 years [46]. No evidence of this species was identified within the lagoons on-site in January 2024. This habitat will remain unimpacted by the Proposed Development and retained as part of the restoration plan, and therefore amphibians have been scoped out from further consideration.	Amphibians have been scoped out from further consideration.
Badgers	Wildlife Acts 1976 / 2000	Low Local Value	The NBDC does not hold record of badger within 2km of the Site in the past 10 years [46]. No badger setts were recorded during the habitat surveys on-site and the on-site habitats are considered to be sub-optimal for sett construction. Given that no badger evidence was identified on-site, it is not considered that the Site is of significant importance to badger. However, the areas of woodland northwest of the Site are suitable for badger sett construction, and badgers may use the Site for foraging and commuting. Additionally, due to the proximity between the Site and this woodland, general mitigation measures will be implemented to ensure that badgers are not impacted by the Proposed Development. These measures align with Objectives BI O12 and BI O15 of the KCDP. [7]. Therefore, this species has been scoped in for further assessment.	Badgers have been scoped in for further consideration
Bats	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV	High Local Value	The NBDC holds records of four of the nine resident bat species found in Ireland within 2km of the Site in the past 10 years – Leisler's bat, Daubenton's bat, common pipistrelle and soprano pipistrelle. Two trees with features suitable for roosting bats on-site were surveyed for bat emergence, and the linear features on-site were deemed suitable for foraging and commuting bats. No bats were roosting in these trees, and it was concluded that the Site is of high local value to foraging and commuting bats. The Proposed Development will result in the loss of suitable foraging and commuting habitat for bats through the removal of hedgerow / treelines and the change in land use from agricultural grassland to an active quarry. It should be noted that as part of the proposed restoration of the Site, the removed hedgerow / treelines will be reinstated, therefore reinstating the suitable foraging and commuting	Bats have been scoped in for further consideration

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
			habitats for bats. A grassed berm will also be planted along the periphery of the proposed extraction areas (Zone A1, A2, B1 and B2). The berm will be planted with grass which has the potential to provide alternative foraging habitat for bats within the area. Additionally, a small area of woodland will be planted, which will provide suitable foraging habitat for bats. The settlement lagoons in the northeast of the Site will also be retained as part of the proposed Restoration Plan of the Site, which will attract insects available as prey for foraging bats on-site. No lighting is proposed as part of the Proposed Development and therefore, it is reasonable to conclude that bats and other nocturnal species will not be adversely affected as a result of the proposed operational phase as a result of light spillage into dark areas. However, as mitigation is required to compensate for the removal of foraging and commuting habitats for bats, this species has been scoped in for further consideration.	
Birds	Wildlife Acts 1976 / 2000	High Local Value	The NBDC holds record of multiple bird species within 2km of the Site in the past 10 years [46]. No notable bird species of significant conservation concern were noted on-site. The works will require the removal of hedgerows / treelines on-site which are suitable for nesting birds. Several bird species were identified utilising the agricultural fields within the Site during the walkover, but these are common farmland bird species found throughout Ireland. Although birds may be subject to some temporary disturbance during the proposed works, this is not considered likely to be significant. Additionally, any hedgerow / treelines being removed as part of the Proposed Development will be removed outside of the nesting bird season. Sand martin nest holes were present within the slopes on edges of the existing quarry, further consideration will be given to the impacts of the Proposed Development on this species.	Birds have been scoped in for further consideration
Otter	Wildlife Act 2000 (as amended) EU Habitats Directive Annex IV	High Local Value	The NBDC does not hold records of otter within 2km of the Site [46]. During the second Site walkover in January 2024, the Palatine stream was surveyed for otters. One otter print was found along the Palatine stream, and it was concluded that the Palatine stream offers suitable commuting and foraging habitats for this species. The Proposed Development will not require any works to the Palatine stream and a buffer of 30m will be maintained between the Site and the stream. However, given the proximity of the Site to the stream, and the fact that otters are using the watercourse for commuting purposes, precautionary mitigation measures will be implemented for the protection of water quality to ensure that no impacts occur to otter or any other aquatic species during the	Otter have been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
			construction works. Furthermore, mitigation measures will be implemented in order to ensure no impacts occur to others from elevated noise levels during the construction and operational phases (see Sections 6.5.3).	
Invasive Species	Species dependant	N/A	The NBDC holds record of one high impact invasive species, Japanese knotweed, within 2km of the Site in the past 10 years [46]. No evidence of this species was found on-site. No high impact invasive species listed under Regulations 16(1) and 17 of the European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024) [53] (i.e. species of which it is an offense to disperse, spread or otherwise cause to grow in any place) were noted on-site during the field surveys. However, measures will be implemented to ensure no invasive species are introduced into the Site during both the construction, operational and restoration phases (see Section 6.5.7 below). This is in compliance with objective BI O58 of the KCDP [7].	Invasive species have been scoped in for further consideration.
Other Species		Low Local Value	The NBDC holds records of pine marten and hedgehog within 2km of the Site in the past 10 years [46]. These species were not identified on-site. Given the presence of suitable habitats on-site and within the wider area for rabbits, foxes and other terrestrial mammals, standard protection measures for these species will be incorporated into the works in line with objectives BI O15 and BI O16 of the KCPD [7] refer to Section 6.5.4 below.	Other species have been scoped in for further consideration.

6.4.3 Summary of Potential Impacts

Following a detailed assessment, the following species and habitats were identified as significant receptors and were brought forward for further consideration in Section 6.5 below

- Hedgerows/Treelines (WL1/WL2);
- Badgers/ Terrestrial Mammals;
- Otters;
- Bats;
- Birds;
- Other Species; and,
- Invasive Species.

In addition to the species listed above, general mitigation / best practice measures have also been included for the Proposed Development.

6.5 Proposed Mitigation Measures and / or Factors

The following mitigation measures will be incorporated and adhered to during the Construction and Operational phases of the Proposed Development to ensure that the works do not result in contravention of wildlife legislation:

- Extractive activities will comply with all relevant legislation and best practices to reduce any potential environmental impacts;
- The mitigation measures detailed within this EIAR and the NIS will be fully adhered to;
- The Site manager shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the EIAR and the NIS;
- If protected or notable species are encountered during operations at the Site, works will stop within the area that these animals are identified in, and the project Ecological Clerk of Works ('ECoW') will be contacted for advice;
- Protected and notable species posters will be erected on the Site notice board and maintained throughout the duration of the works;
- In advance of works, all site personnel will receive a toolbox talk regarding notable and protected species. Everybody working on-site must understand the role and authority of the ECoW; and,
- An ECoW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works, to ensure that all the works are completed in line with the measures in this EIAR and wildlife legislation.

6.5.1 Protection for Hedgerow / Treelines

To ensure that no impacts or unnecessary damage occur to the hedgerows and treelines that border the Site as per objectives BI O26 and BI O28 the KCDP [7], care will be required to protect the retained vegetation on-site from both direct and indirect disturbance during the proposed works. The following protection measures will be adhered to during the works:

- All development works will be set back a minimum of approximately 5m from the existing boundary features, while the pit face will maintain a minimum of 10m buffer from hedgerows along the periphery of the Site;
- All hedgerows / treelines to be retained that will be located within close proximity to the extraction area will be fenced off by a security fence and further protected by a 2m high, grass berm. These barriers will remain in place for the lifetime of the Proposed Development and will prevent accidental disturbance and define the limits for quarrying activities. Supplemental planting will be completed if deemed necessary;
- No materials, equipment or machinery will be stored within close proximity to retained hedgerows / treelines;
- In order for treeline protection measures to work effectively, all personnel associated with the operation of heavy plant machinery must be familiar with the above principles for the protection of treelines;
- Notice boards, wires, etc. will not be attached to any trees; and,
- The construction of the berms on-site will be supervised by the ECoW to ensure that no impacts occur to bordering hedgerows / treelines.

6.5.2 Protection for Badgers / Terrestrial Mammals

Given the presence of habitats that have the potential to support sheltering, foraging and commuting mammals (inclusive of badger, pine marten and hedgehogs) on-site and bordering the Site, general construction procedures and mitigation measures, which are in line with the NRA (now TII) guidance for badgers [43], will be undertaken.

- Should the proposed works be required outside of daylight hours, the appointed project ECoW will be consulted, as required;
- Obvious mammal paths will be left clear of obstruction to allow for the free movement of smaller mammals throughout the landscape;
- If unidentified burrows are identified within the works area during works, the ECoW will be contacted for advice; and,
- The clearance of scrub / immature woodland on-site will be supervised by the ECoW.

6.5.3 Protection for Otter

During the otter survey along the Palatine stream, which is ca. 30m from the Site, evidence of otter was identified.

Mitigation measures are required to ensure that no noise disturbance occurs to otter, and water quality mitigation measures are also required to ensure that there are no impacts to the food sources for otter within the vicinity of the Site.

The following mitigation measures will therefore be implemented, as outlined below, to ensure no negative impacts to otters from noise or water quality impairment:

- Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the extraction area. These will be embedded into the local soils to ensure all site water is captured and filtered prior to recharge;
- Daily monitoring and inspections of soil stripping will be completed. Excavated soil will be used for landscaping, screening berms, and for Site restoration;
- Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses;
- Preventative maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;
- Refuelling will only occur from a fuel bowser as per the existing established operation;
- A spill kit will be kept nearby when refuelling. The spill kit will contain fuel-absorbent material, pads/mats and an oil boom for use in the event of any accidental spill;
- Drip trays and fuel absorbent mats will be used during all refuelling operations;
- On-site refuelling will be carried out by trained and competent personnel only;
- All plant and machinery will be serviced before being mobilised to the Site and regular leak inspections and fitness for purpose will be completed during the backfilling works;
- No substantial plant maintenance will be completed on-site; any broken-down plant will be removed from the Site to be fixed;
- Where deep excavations will be required on-site, appropriate measures to protect otters from ingress will be installed;
- Should construction works be required outside of daylight hours during the site clearance works, the ECoW will be consulted as required; and,

- If unidentified holts are identified within the works area during construction, works will cease within the area and the ECoW will be contacted for advice.

6.5.4 Protection for Bats

As habitats suitable for foraging and commuting bats will be removed, the following measures will be put in place for bats:

- No lighting will be installed as part of the Proposed Development;
- A minimum buffer of 10m will be maintained between the retained hedgerow / treelines and the extraction area. This will ensure that bats can continue to utilise the retained linear features for foraging and commuting purposes;
- The trees with Potential Roost Features ('PRF') which will be removed will be felled on mild days during the autumn months of October – November or during the spring months of February – March (Felling during the spring or autumn avoids the periods when bats are most active and with young).
- The grass berm will provide potential foraging habitat for bats; and,
- The Restoration Plan (attached as Appendix 6-2) will ensure that as habitats are removed, restoration occurs in other areas of the Site (e.g., the planting of the woodland area in the northeast of the Site). This will maintain potential foraging habitats for bats. In addition, the habitats to be removed to facilitate extraction will be restored to grassland after quarrying works cease.

Please refer to Appendix 6-1 - Bat Report for full details of the mitigation measures for bats.

6.5.5 Protection for Birds

To ensure no impacts occur to birds as a result of the Proposed Development, the following general mitigation measures will be put in place:

- Any vegetation clearance required will take place outside of the nesting bird season (1st March to 31st August), as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000;
- In the event that works need to be undertaken within the main breeding season, this will be undertaken in consultation with NPWS;
- Prior to any vegetation removal the ECoW will inspect the Site;
- The management and removal of vegetation on-site will be undertaken in a systematic way under the direction of an ecologist to ensure that retained areas of vegetation are not damaged by the works;
- Vegetation will be removed and replaced on a phase-by-phase basis;
- In the unlikely event birds nest within the active working area during the works, all works within the immediate area will cease, and the ECoW will be consulted; and,
- If sand martins or other notable / protected bird species are identified colonising any areas to be impacted by the works, works will cease within the identified area. An appropriate undisturbed buffer zone will be established for the duration of the breeding season or until the chicks have fledged and left the nest. This will be confirmed by the ECoW.

6.5.6 Protection for Other Species

Given the presence of habitats that have the potential to support sheltering, foraging and commuting species (inclusive of foxes and rabbits) on-site and bordering the Site, general construction procedures and mitigation measures will be implemented, including:

- Should the proposed works be required outside of daylight hours, the ECoW will be consulted, as required; and,
- If unidentified burrows are identified within the works area during construction, works will cease within the area and the ECoW will be consulted for advice.

6.5.7 Measures for Invasive Species

In order to mitigate against the unintentional introduction of invasive species to the Site during pit operations including the importation of clean uncontaminated soil and stone by-product, the following measures will be followed in line with objective BI O58 of the KCDP [7] and the NRA, now TII, guidelines for the management of noxious weeds and non-native invasive plant species [44] and Ireland's Invasive Alien Species Soil and Stone Pathway Action Plan 2023 - 2027 [65]:

- Acceptance criteria for the incoming materials would need to be adhered to as per the National By-Product Criteria Ref No. BP-N002.2024;
- Sourcing material that is determined to be by-product prior to transport to the Site;
- Pre-agreed source sites for inert material ensuring no invasive species are present;
- Regular checks of incoming loads to ensure suitability of imported material;
- The operator will have a documented waste recording procedure for all by-product material entering the Site;
- No unauthorised dumping of waste will be allowed at the Site;
- All vehicles, machinery and any other equipment used for the works will be washed prior to its use at the Site to prevent the import of plant material or seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris have been removed;
- The staff on-site will be made aware of the dangers associated with cross-contamination of invasive plant species with soil;
- Any vehicles and machinery that are not clean will not be permitted entry to the Site;
- Clean, uncontaminated soil and stone by-products accepted to the Site will be free of invasive species (suitable evidence provided from the source site prior to agreeing to take the materials, which may include 'statement of conformity from the producer or a report from a suitably qualified ecologist or similar). The applicant will engage a suitably qualified and experienced practitioner to assess the evidence if necessary; and,
- If high impact invasive species are identified on-site, including Japanese knotweed or Himalayan balsam, the ECoW will be contacted for advice.

6.5.8 Restoration Phase

Following the cessation of the quarry activities at the Site, a Restoration Plan for the Site will be implemented. Details of the Restoration Plan are attached in Appendix 6-2. The Restoration Plan has been designed to restore the Site to its former land use and habitats as an agricultural farm.

The Restoration Plan includes the use of soil stored in berms that will be used to restore the Site to grassland, re-establishment of grasslands, re-planting of hedgerows / tree lines and the creation of a woodland habitat.

6.5.9 Unplanned Events

Should any protected or notable species colonise the Site during the life cycle of the project, there is a potential for these species to be impacted by the operations on-site. However, the taxa commonly associated with quarry environments have been considered as part of this assessment.

6.6 Cumulative and In-combination Impacts

As described above, the Proposed Development works are unlikely to have any significant impacts on valued ecological receptors on-site or in the surrounding area.

Furthermore, any potential cumulative impacts will be minimised as all works will be completed in line with relevant best practice and legislation and mitigation measures detailed within the EIAR. Potential impacts associated with deterioration in water quality, air and climate have been addressed within Chapters 8, 9 and 10.

It is therefore considered unlikely that any significant cumulative and in-combination impacts will arise as a result of the Proposed Development. Subsequently, the cumulative impacts on ecology arising from the Proposed Development in-combination with other developments is considered to be imperceptible.

6.7 Interactions with other Environmental Attributes

The Environmental Attributes which flora and fauna interact include:

- Chapter 7 – Land, Soils and Geology: Potential effects on soils and geology through contamination can have adverse effects on local biodiversity and ecological conditions. Mitigation measures have been included in Chapter 7 to avoid the contamination of soils and introduction of contaminated soils to the Site;
- Chapter 8 – The Palatine stream ca. 30m from the Site, drains into the River Lerr which forms part of the River Barrow and River Nore SAC. Water quality deterioration has the potential to affect aquatic and riparian species but appropriate mitigation measures are presented in Chapter 8 to ensure any potential effects will be negligible;
- Chapter 9 – Air Quality: Dust related effects can have an impact on water quality and therefore aquatic biodiversity. Dust can also affect the ability of vegetation to photosynthesise. Dust mitigation measures have been included in Chapter 9 to minimise potential effects to negligible;
- Chapter 10 – Climate: Climate change has the potential to affect ecosystems. An assessment was carried out on the projected GHG emissions, refer to Chapter 10 for further details from this assessment; and,
- Chapter 11 – Acoustics (Noise & Vibration): species within the locality have become habituated to noise arising from quarry activities, from the existing quarry sources within the wider area.

6.8 Residual Impacts

Based on the methodology set out in Section 6.2.4, the initial assessment of ecological receptors (Table 6-4) screened out the following habitats and species:

- Improved Agricultural Grassland (GA1);
- Spoil and Bare Ground (ED2);

- Scrub (WS1);
- Flora; and,
- Amphibians.

These ecological receptors were screened out from further assessment as the potential impacts were considered to be imperceptible; refer to Table 6-4 for further details. The following protected sites, species and habitats, outlined in Table 6-4, were identified as receptors that warranted further consideration to avoid impacts:

- Hedgerows / Treelines (WL1, WL2);
- Badgers and terrestrial mammals;
- Other species;
- Bats;
- Birds;
- Otters; and,
- Invasive Species.

Mitigation has been proposed for each of these ecological receptors. The results of these measures on these ecological receptors and the resulting residual impact are described below in Table 6-5.

Table 6-5: Residual Impacts on Scoped In Receptors

Receptor	Potential Impact	Assessment of Impacts Post Mitigation and Enhancement	Residual Impact
Hedgerow (WL1) / Treeline (WL2)	Vegetation removal	Following the implementation of the proposed tree protection measures, outlined in Section 6.5.1, all retained trees will be protected from disturbance/damage. The Proposed Development will require the removal of ca. 1216m of hedgerow / treelines on-site. This will have a negative medium-long term effect. However, the historical hedgerow / treelines will be re-planted as part of the restoration works and once established will provide habitat that is similar in nature to that that is being removed.	Not significant
Badgers / Terrestrial Mammals	Disturbance	Following the implementation of the mitigation measures outlined in Section 6.5.2 and 6.5.6, it is considered that potential effects on terrestrial mammals, such as badger, will not be significant and as such there will be no residual effect.	Not significant
Other species			
Bats	Loss of roosting, foraging / commuting habitats	The mitigation measures will ensure that no adverse effect occur to roosting bats, and the successful implementation of the Restoration plan will provide habitats which can be used by foraging and commuting bats.	Not significant
Birds	Loss of nesting habitats / disturbance	The mitigation measures will ensure that no nesting bird habitats are removed during the active nesting bird season, and that potentially nesting birds in the retained hedgerow / treelines will not face disturbance from the quarry.	Not significant

Receptor	Potential Impact	Assessment of Impacts Post Mitigation and Enhancement	Residual Impact
Otters	Disturbance to foraging and commuting habitat	Water quality mitigation measures and disturbance mitigation measures will ensure that otter are not effected by the Proposed Development.	Not significant
Invasive Species	Introduction and spread of invasive species.	Provided the mitigation measures outlined in Section 6.5.7 are followed, it is considered that no effect will occur to valued ecological receptors as a result of the spread or introduction of invasive species.	Imperceptible

Considering the mitigation measures and the proposed enhancement measures for the Site, the residual impacts on ecology will be imperceptible following the completion of on-site operations.

6.9 Monitoring

The following monitoring works will be implemented to ensure that the works comply with the recommendations detailed within this chapter of the EIAR:

- An ecological clerk of works ('ECoW') will inspect the Site in advance of ground stripping works commencing and will undertake monthly Site inspections as required during the works to ensure that all of the works are completed in line with the EIAR; and,
- Dust and Water quality monitoring will be completed as part of compliance monitoring (refer to Chapters 8 and 9 for further details).

6.10 Reinstatement

Following cessation of extractive and importation activities, the Site will be fully decommissioned within a six-month period. Following the decommissioning of the Site and the implementation of the Restoration Plan, the Site will be reinstated to agricultural land.

6.11 Difficulties Encountered

No difficulties were encountered in undertaking this assessment.

It is considered that the finding of the above assessment will remain valid for a period of two years, providing that the Site conditions remain broadly unchanged.

7 LAND, SOIL AND GEOLOGY

7.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely effects of the Proposed Development on land, soils and geology within and in the vicinity of the Site.

This chapter provides a baseline assessment of the environmental setting of the Proposed Development in terms of land, soils, and geology and discusses the potential impacts that the construction and operation of the Proposed Development will have. Where required, appropriate mitigation measures to limit any identified significant effects on soils and geology are recommended and an assessment of residual effects and the significance of effects is provided.

7.1.1 Statement of Authority

Hydro-Environmental Services ('HES') are a specialist geological, hydrological, hydrogeological and environmental practice that delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core areas of expertise and experience include soils, subsoils and geology. We routinely complete impact assessments for land soils and geology, hydrology and hydrogeology for a large variety of project types.

This chapter of the EIAR was prepared by Michael Gill, Jenny Law and Conor McGettigan.

Michael Gill PGeo (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 22 years' of environmental consultancy experience in Ireland. Michael has completed numerous geological, hydrological and hydrogeological impact assessments of quarry / pit infill developments in Ireland. He has worked on the following quarry infill assessments: Clasheen Pit (Killarney), Garyhesta (Cork), Middleton (Cork), Killarney East, Kilmeague (Kildare), and Kilmessan (Meath).

Jenny Law (BSc, MSc) is an environmental geoscientist holding a first honours degree in applied environmental geosciences from the University College Cork (2022). Jenny has assisted in the preparation of the land, soils and geology and hydrology chapters for various environmental impact assessment reports, hydrological impact assessments, Water Framework Directive Assessment reports and Flood Risk Assessment reports for a variety of projects, including wind farm developments and strategic housing developments.

Conor McGettigan (BSc, MSc) is an environmental scientist with over 4 years' experience in the environmental sector in Ireland. Conor holds an MSc in Applied Environmental Science and a BSc in Geology from University College Dublin. Conor has prepared several geological impact assessments for a wide range of developments including sand and gravel pits, bedrock quarries and renewable energy developments.

7.2 Methodology

7.2.1 Legislative Context

The importance / sensitivity of the geological receptors within the Site was assessed on completion of the desk study as set out in Table 3-4 of the EPA's 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'. The Guidelines are formally adopted and published by the EPA [66].

In addition to the EPA Guidelines, the assessment was carried out in accordance with the following guidance and tailored accordingly based on professional judgement:

- Institute of Geologists Ireland ('IGI') Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements [67];
- National Roads Authority ('NRA'), now Transport Infrastructure Ireland ('TII') Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes [68];
- Department of Environment, Heritage and Local Government Quarries and Ancillary Activities - Guidance for Authorities [69];
- EPA Environmental Management in the Extractive Industry (Non-Scheduled Minerals) [70]; and,
- Institute of Environmental Management & Assessment ('IEMA') Guide: A New Perspective on Land and Soil in Environmental Impact Assessment.

7.2.2 Relevant Guidance

The Land, Soils and Geology Chapter of the EIAR is carried out in accordance with guidance contained in the following:

- Environmental Protection Agency (May 2022): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008);
- Department of the Environment, Heritage and Local Government; Quarries and Ancillary Activities – Guidance for Authorities (April, 2014); and,
- Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals).

7.3 Methodology

7.3.1 Desk-based Study

A desk study of the Site and surrounding area was completed prior to the undertaking of field mapping, walkover assessments and site investigations. The desk study involved collecting all relevant geological and hydrogeological data for the study area. This included consultation with the following:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland ('GSI') - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- EPA / Water Framework Directive "Catchments" Map Viewer (www.catchments.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 19 (Geology of Carlow - Wexford); Geological Survey of Ireland (GSI, 1994); and,
- Geological Survey of Ireland ('GSI') - Groundwater Body Characterisation Reports.

7.3.2 Baseline Surveys and Site Investigations

To complete the Land, Soils and Geology Chapter of the EIAR, the following surveys and investigations were carried out:

- A walkover survey to assess the ground conditions and layout of the proposed Site including, surveys of adjacent lands;
- Previous drilling records and geophysical data (from 2005) were provided by the applicant;
- Drilling of 4 no. investigation holes/monitoring wells to assess overburden lithology, depth to the bedrock and for groundwater level monitoring and sampling; and,
- Mineral soils and subsoils were logged according to BS: 5930:2015 Code of Practice for Ground Investigations.

7.3.3 Impact Assessment Methodology

The importance / sensitivity of the geological receptors was assessed on completion of the desk study. Using the 2008 NRA Guidance [71], an estimation of the importance / sensitivity of the geological environment within the study area is set out in Table 7-1 below.

Table 7-1: Estimation of Importance of Soil and Geology Criteria (NRA, 2008)

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; and, • Proven economically extractable mineral resources.
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 site is significant on a local scale.	• Contaminated soil on-site with previous heavy industrial usage; • Large recent landfill site for mixed wastes; • Geologically feature of high value on a local scale (County Geological Site); • Well drained and / or high-fertility soils; • Moderately sized existing quarry or pit;
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 site 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; and, • Sub-economic extractable mineral resource.

Importance	Criteria	Typical Example
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 site is small on a local scale.	- Large historical and / or recent site for construction and demolition wastes; - Small historical and / or recent site for construction and demolition wastes; - Poorly drained and / or low fertility soils; and, - Uneconomically extractable mineral resource.

Once the importance and sensitivity of the geological attribute is established, the conventional source-pathway-receptor model was applied to assess impacts on the land, soils, and geology at the Site.

Where potential impacts are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts as outlined in Section 1.10.1.

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

In order to provide an understanding of the stepwise impact assessment process applied below, we have firstly presented below a summary guide that defines the steps (one to seven) taken in each element of the impact assessment process in below. The guide also provides definitions and descriptions of the assessment process and shows how the source-pathway-target model and the EPA impact descriptors are combined.

Table 7-2: Assessment Methodology

Attribute	Status / Occurrence	Importance
Step 1	Identification and Description of Potential Impact Source This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of the effects is briefly described.	
Step 2	Pathway / Mechanism:	The route by which a potential source of impact can transfer or migrate to an identified receptor.
Step 3	Receptor:	A receptor is a part of the natural environment that could potentially be impacted, e.g., human health, plant/animal species, aquatic habitats, soils / geology, water resources, or water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	Pre-mitigation Impact:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	Proposed Mitigation Measures:	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. These measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by best practice engineering design.
Step 6	Post Mitigation Residual Impact:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation are put in place.

Attribute	Status / Occurrence	Importance
Step 7	Significance of Effects:	Describes the likely significant post-mitigation effects of the identified potential impact source on the receiving environment.

Using this defined approach, this impact assessment process is then applied to the Proposed Development activities, which have the potential to generate a source of adverse impacts on the land, soils and geological environment

7.4 Receiving Environment

7.4.1 Site Description and Topography

The Site is situated at Ballyburn Upper where a deposit of sand and gravel is present, ca. 4km to the northeast of Carlow Town and ca. 4.3km south-southwest of Castledermot Town. The Site covers an area of ca. 37.6ha (ITM centre coordinates X:676667, Y:681155 and generally extends in a southerly direction from the Site.

Topography generally varies from relatively flat to undulating due to the variable thickness of glaciofluvial sand and gravels in the area. The Site is generally set at a higher elevation to its surrounding lands, with overall topography rising eastwards towards the M9 motorway. Elevations range from 73 meters above Ordnance Datum ('m AOD') to 83m OD within the Site.

The Site is accessed in the north via the L4012 public road that bounds the Site to the north and east.

The extraction of sand and gravel material has been in operation within the northern portions of the Site, moving progressively south. Agricultural lands surround the Site on all sides and there are a number of domestic dwellings and farm holdings in the vicinity of the Site.

7.4.1.1 Previous Geological Investigations

A geophysical Survey of the Site was undertaken in July 2005 by Apex GeoServices, and consisted of an EM31 resistivity survey, a 2D resistivity survey and a seismic survey.

The results of the historic geophysical survey have been superseded by the development and exposure of the sand and gravel deposits within the existing pit, as this physical exposure is definite.

Eight boreholes were bored during July / August 2005, consisting of 2 no. Shell & Auger boreholes and 6 no. reverse circulation boreholes. The objective of these boreholes was to verify the results of the geophysical survey to obtain information on the ground profile (extent of sand & gravel, and depth to bedrock) and groundwater levels across the Site.

The borehole results indicated a maximum sand & gravel thickness of at least 22.5m (BH8) in the southern part of the main ridge, in the area of the current proposed extension. A sand & gravel thickness of 21m was recorded at BH4 in the middle of Ballyburn Pit, where extraction activities have since taken place. The location of these historic boreholes are illustrated in Figure 7-4, and the geological information from each of these boreholes is summarised in Table 7-3.

Table 7-3: Borehole Summary Details (2005 Drilling Data)

BH ID	ca. GL (m OD)	BH Type	Depth of BH (m)	Thickness of Quaternary Deposits (m)	Description of Quaternary Deposits	Depth to Bedrock (m)	Bedrock Type
BH1	82.0	S&A ¹	10	10	Sand & Gravel	>10m	-
BH2	83.0	S&A ¹	11.4	11.4	Sand & Gravel	>10m	-
BH3	77.0	S ²	14.0	11.8	Sand & Gravel, and silt material	>10m	Granite
BH4	83.0	S ²	22.9	21	Sand & Gravel, and some glacial till material	>10m	Granite
BH5	76.0	S ²	10	9	Sand & Gravel	>10m	Granite
BH6	70.0	S ²	9.4	9	Sand & Gravel	>10m	Granite
BH7	66.0	S ²	6.0	5.5	Sand & Gravel	>10m	Granite
BH8	82.0	S ²	22.5	22.5	Sand & Gravel	>10m	-
¹ Shell & Auger drilling ² Symmetrix reverse circulation drilling							

7.4.2 Quaternary Geology (Overburden)

7.4.2.1 Soils

The published soils map (www.epa.ie) for the area shows that the majority of the Site and the surrounding area are mapped to be overlain by shallow well drained mineral soil (BminSW). Shallow poorly drained and mainly basic mineral soils (BminSP) are mapped towards the very southwestern edges of the Site. An area of cut-over raised peat (Cut) is mapped to the southeast of the Site, and alluvium soils are mapped along the Palatine (Stream) to the south and west.

7.4.2.2 Subsoils

Based on the GSI subsoils map (www.gsi.ie), gravels derived from limestones ('GLs') are chiefly mapped within the Site boundary. The gravels and sand form a ridge running in a north-to-south direction through the Site, which drops away to the River Lerr tributary to the southwest and falls away to the eastern part of the Site along the third-class road. These deposits are also mapped extensively along the River Barrow, situated 5km west of the Site. The gravels within the Site are bounded on the low-lying northwest and eastern parts of the Site by glacial till consisting of Carboniferous Limestone ('TLs'). An area of cut peat is mapped adjacent to the Site in the southeast. Alluvium is mapped along the Palatine Stream that flows northwest to the west of the Site. Further to the east Site, till derived from granites subsoils are predominantly mapped by the GSI.

A local subsoil geology map is shown in Figure 7-1.

Exposures of sand and gravel within the existing extraction area confirm the mapped subsoil geology of the area. Examples of exposed sand and gravel deposits are illustrated on Figure 7-2.

Figure 7-1: Local Subsoil Geology Map

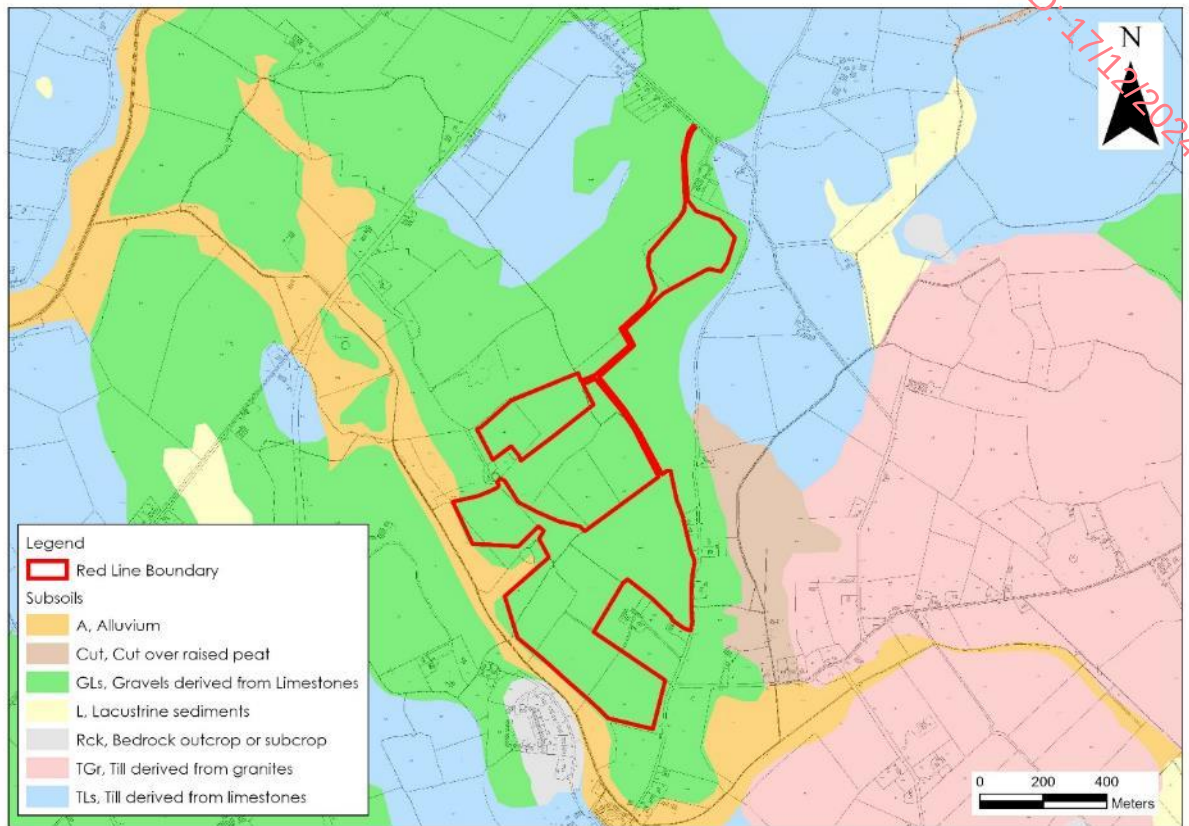


Figure 7-2: Exposed Sand and Gravel pit face within Ballyburn Pit



7.4.3 Bedrock Geology

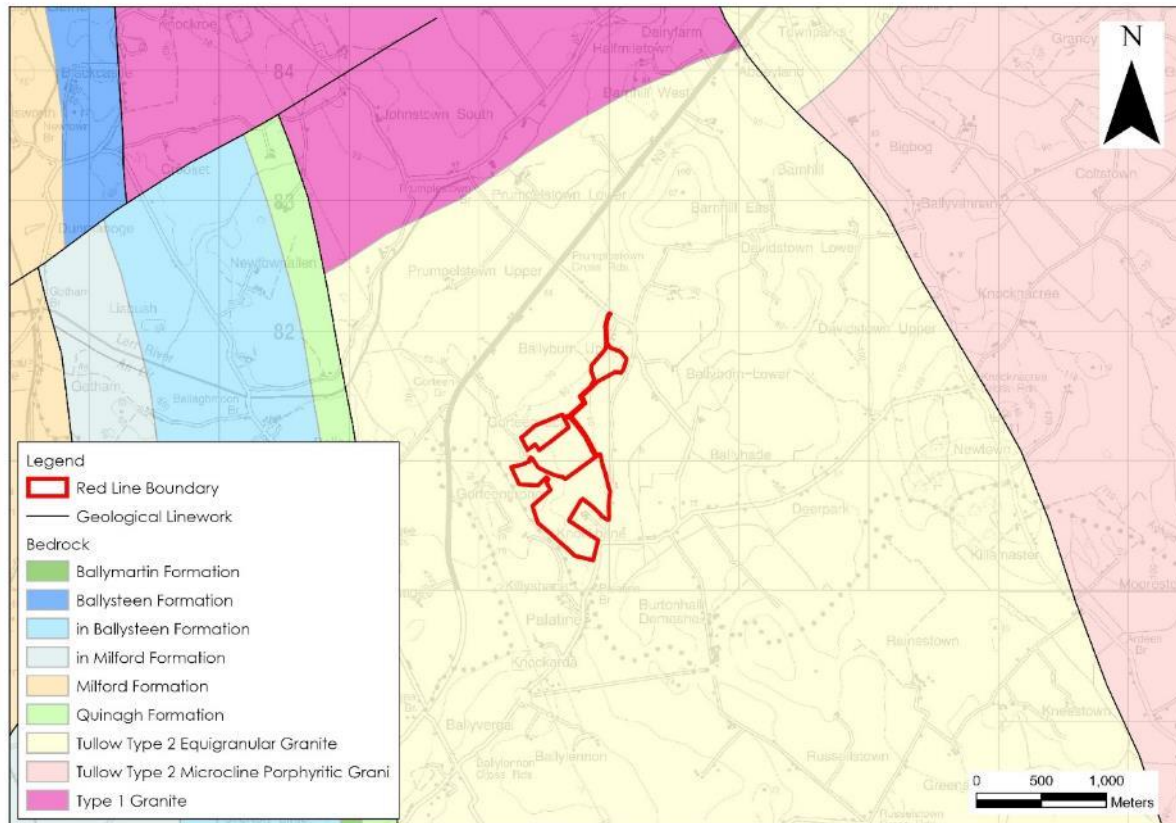
The Site is located on the western edge of the exposed Leinster granites. Based on the GSI bedrock geology map (www.gsi.ie), the sand and gravel at the Site are underlain by Caledonian aged Tullow Type 2 Equigranular Granite rocks. The Caledonian aged Tullow Type 2 Equigranular Granite consists of pale, fine to coarse-grained granite.

The western edge of the exposed granites, ca. 1.4km west of the Site, is bounded by a nonconforming contact with the younger Carboniferous aged Quinagh Formation which comprises lenticular mudstone and coarse siltstone.

There are no faults mapped by the GSI in the area of the Site. A large northwest – southeast orientated fault is situated ca. 2.3km east of the Site.

The GSI have not mapped any areas of bedrock outcrop / subcrop in the vicinity of the Site. A local bedrock geology map is shown as Figure 7-3.

Figure 7-3: Local Bedrock Geology Map



7.4.4 Site Geology

Four investigation monitoring wells (23GW101 to 23GW104) were drilled by Peterson Drilling Services Ltd at the Site between the 22nd and 24th May 2023. Refer to Appendix 7-1 for geological logs. The monitoring wells are used as groundwater monitoring wells as well as providing continuous samples through the gravel and into the underlying bedrock. All 4 no. monitoring wells intersected bedrock under thick sand and gravels with occasional layers of silt prominent throughout. The depth of bedrock at the Site is between 5.5 and 25.1m. The bedrock geology was logged during the drilling of the 4 no. monitoring wells and is summarised below in Table 7-4. The locations of these boreholes are included in Figure 7-4 below.

Figure 7-4: Site Investigation Location Map

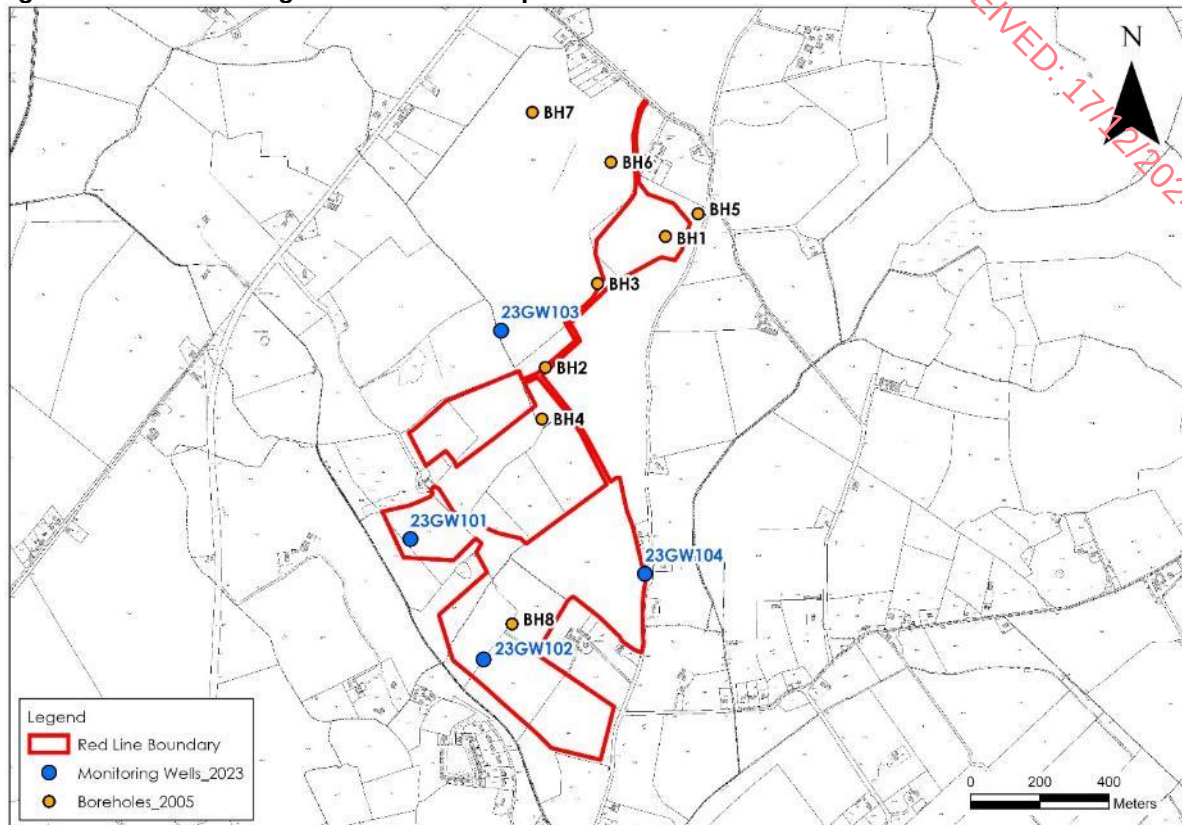


Table 7-4: Summary of Site geology from monitoring well logs

Monitoring Well	Geology (mbgl)	Total Depth ('mbgl')	Water Level ('m OD')
23GW101	0 – 0.2: Firm brown sandy TOPSOIL 0.2 -1.9: Loose reddish brown slightly gravelly SAND 1.9 – 4.2: Dense brown sub-rounded SAND AND GRAVEL, with very frequent cobbles and boulders 4.2 – 7.7: Medium dense brown gravelly SAND 7.7 – 14.8: Medium dense coarse brown sub-rounded SAND AND GRAVEL with occasional silt layers 14.8 – 24.1: Firm brown very sandy gravelly SILT 24.1 – 25.4: Firm to stiff grey silty CLAY 25.4 – 29.5: Weak to strong weathered brown GRANITE	29.50	7
23GW102	0 - 0.2: Firm brown sandy TOPSOIL 0.2 – 1.7: Loose reddish brown gravelly SAND 1.7 – 5.5: Dense brown SAND AND GRAVEL, with very frequent cobbles and boulders 5.5 – 8.6: Firm brown sandy SILT 8.6 – 13.8: Firm brown very sandy gravelly SILT with occasional sandy gravelly layers 13.8 – 15.5: Weak weathered brown GRANITE 15.5 – 17.5: Medium strong brown GRANITE	17.50	11

Monitoring Well	Geology (mbgl)	Total Depth ('mbgl')	Water Level ('m OD')
23GW103	0 - 2.2: Medium dense medium coarse brown gravelly SAND with frequent cobbles and boulders 2.2 – 8.6: Loose to Medium dense brown SAND 8.6 – 12.3: Firm brown sandy SILT 12.3 – 18.5: Dense brown very silty slightly clayey SAND AND GRAVEL, with occasional cobbles and boulders 18.5 – 19.2: weak weathered brown GRANITE 19.2 – 28: Medium strong brown GRANITE 28 – 30: Strong brown GRANITE	30	14
23GW104	0 - 0.2: Firm sandy TOPSOIL 0.2 – 2.2: Loose reddish brown sub-rounded SAND AND GRAVEL with occasional cobbles and boulders 2.2 – 9.1: Medium dense coarse greyish brown gravelly SAND 9.1 – 13.0: Soft becoming Firm brown sandy SILT 13.0 – 16.1: Firm to stiff brown sandy gravelly SILT 16.1 – 21.8: Firm to stiff brown silty sandy gravelly CLAY 21.8 – 23: Medium strong brownish weathered GRANITE 23 – 30: Medium strong brown GRANITE with occasional weathered layers	30	2

Based on all available site investigation data, the following provides a summary of the Site geology:

- There is a thin cover of topsoil across the undeveloped areas of the Site;
- Subsoils comprises limestone-derived fluvio-glacial sand and gravel deposits, with some silt lenses;
- The thickness of overburden deposits varies between ca. 5.5 to 25.1m; and,
- Bedrock below the Site is granite. The depth to bedrock encountered during drilling investigations varied between ca. 5.5 to 25.1 m.

7.4.5 Current Landuse

Land-use in the surrounding area is predominately agricultural, mapped by Corine (2018) as non-irrigated arable land to the west and southeast of the Site, with pastures to the north and northeast. To the east, there are artificial surfaces (road network) mapped along the M9 motorway connecting Waterford to Dublin mapped ca. 0.4km to the east of the Site. There are several rural residential dwellings and farm buildings at the southeastern site boundary along the L4012 local road that travels along the east of the Site.

7.4.6 Geological Heritage and Designated Site

The Geological Survey of Ireland ('GSI') Irish Geological Heritage ('IGH') Programme of audited sites was reviewed (www.gsi.ie) to establish if any geological heritage issues were present near the Site. There are no heritage sites at or in the immediate vicinity of the Site. The closest geological heritage site is Hollymount (Site Code: LS015), located ca. 7.2 km west of the Site. The Hollymount site is recommended for Geological heritage as it contains a deposit of Miocene-Pliocene (Neogene) age, which is exceedingly rare in the country.

Natural Heritage Areas
Areas of Conservation
and within any designated
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10/27/2017

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7.5.1 Construction Phase

7.5.1.1 Removal of Topsoil and Overburden

The Site has an estimated reserve of ca. 1,700,000m³ (ca. 3,000,000 tonnes of sand and gravel). The Proposed Development plans to extract and process up to the permitted maximum output of 500,000 tonnes per annum. The construction phase relates to the preparation of the agricultural fields located in the extension lands.

In order to extract the sand and gravel in the extension area, topsoil and overburden will be removed as part of the Proposed Development. This material will be stored separately and will be reused to construct 2m high berms and soil embankments around the periphery of the Site. These embankments will be seeded to preserve its integrity for future use in the restoration phase as part of the Restoration Plan.

During the construction phase, haul roads and security fencing will also be installed, but these will have limited impacts on topsoil / overburden beyond the excavation works described above.

Table 7-5: Potential Impact from Excavation of Subsoils and Overburden Material

Attribute	Description
Receptor	Land, soils and geology at the Site
Pathway	Excavation/haul roads/security fencing/berm planting
Pre-mitigation Potential Impact	Negative, direct, moderate, irreversible, likely, permanent effect on land, soil and geology.

7.5.1.2 Contamination of Soil by Leakages and Spillages

During the construction phase the Site preparation works will be completed primarily by an articulated dumper and excavator.

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk. The accumulation of small spills of fuels and lubricants during routine plant use can also be a significant pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects (i.e. contamination of soil, subsoils and pollution of the underlying aquifer) on the land, soils and geological environment.

Only small volumes of fuel/oils will be present on-site during the construction phase, and therefore, no significant effects are expected as long as standard mitigation is implemented.

Table 7-6: Potential Impact from contamination of soil/bedrock by leakages and spillages

Attribute	Description
Receptor	Soil, subsoil and bedrock at the Site
Pathway	Transport through soil, subsoil and bedrock pore space
Pre-mitigation Potential Impact	Negative, slight, direct, long-term, unlikely impact on soil and subsoil.

7.5.1.3 Effects on Land

The construction of the Proposed Development will result in the temporary loss of ca. 28.3ha of agricultural land. The loss of agricultural land will be contained within the Site and there will be no effects on the lands adjoining the Site.

The site preparation works comprising of the removal of topsoil and the creation of berms and soil embankments will result in minor local topographic changes within the Site. There will be no changes to local topography on the lands adjoining the Site.

Table 7-7: Effects on Land

Attribute	Description
Receptor	Land
Pathway	Excavation of aggregate.
Pre-mitigation Potential Impact	Negative, moderate, direct, likely, temporary effect on land.

7.5.2 Operational Phase

7.5.2.1 Excavation of Subsoils

The Proposed Development will involve the extraction of ca. 1.7 million m³, or ca. 3 million tonnes of sand and gravel down to a level of 71m OD.

Sand and gravel will be extracted by mechanical means and processed within the existing processing area.

Table 7-8: Potential Impact from Excavation of Sand and Gravel Material

Attribute	Description
Receptor	Land, soils and geology at the Site
Pathway	Excavation
Pre-mitigation Potential Impact	Negative, direct, moderate, irreversible, likely, permanent effect on land, soil and geology.

7.5.2.2 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

During the operational phase, the following diesel-powered plants will be used: Loading Shovels (2 no.), excavators (1 no.), wheel loaders (2 no.), and the processing and screening plant. The crushing plant, screening plant, and wash plant are run off electricity.

Accidental spillage during refuelling of plant with petroleum hydrocarbons is a pollution risk. The accumulation of small spills of fuels and lubricants during routine plant use can also be a significant pollution risk.

Only small volumes of fuel/oils will be present on-site during the operational phase and therefore no significant effects are expected as long as standard mitigation is implemented.

Table 7-9: Potential Impact from contamination of soil/bedrock by leakages and spillages

Attribute	Description
Receptor	Soil, subsoil and bedrock at the Site

Attribute	Description
Pathway	Transport through soil, subsoil and bedrock pore space
Pre-mitigation Potential Impact	Negative, slight, direct, long term, unlikely impact on soil and subsoil.

7.5.2.3 Erosion of Exposed Soils and Subsoils

There is a high likelihood of erosion of soil and subsoil during its excavation and during extraction works. The main impacts associated with this aspect is to the water environment, and therefore this aspect is further assessed in detail in Chapter 8.

Table 7-10: Potential Impact from Erosion of Exposed Soils and Subsoils

Attribute	Description
Receptor	Soil and subsoil at the Site
Pathway	Vehicle movement, surface water and wind action.
Pre-mitigation Potential Impact	Negative, slight, direct, short-term, likely effect on soil and subsoils by erosion and wind action.

7.5.3 Restoration Phase

7.5.3.1 Reinstatement of the Quarry Ground Profile and Land use Change

As the operational phase progresses there will be a progressive restoration of the extraction areas within the development site to deliver high quality restoration and long-term agricultural and land-use benefits.

The potential effect is described in Table 7-11 below.

Table 7-11: Potential Effect from Reinstatement of the Pit Ground Profile

Attribute	Description
Receptor	Land, soils and geology at the Proposed Development site.
Pathway	Progressive restoration of the extraction area.
Pre-mitigation Potential Impact	Positive, moderate, direct, likely, permanent effect on land, soils and geology.

7.5.3.2 Potential Effects due to Imported Material

The Proposed Development comprises importing ca. 1,125,000 tonnes of uncontaminated soil and stone by-product material to restore the proposed extraction areas.

This material will pose a very low contamination risk as no harmful contaminants will be present. In addition, this material will not contain either organic matter or liquids that will form a source of organic contamination. All imported material will be subject to soil acceptance criteria as mentioned below in Section 7.6.3.2.

Table 7-12: Potential Impact from infill materials

Attribute	Description
Receptor	Soil, subsoil and bedrock pore space at the Site

Attribute	Description
Pathway	Soil, subsoil and bedrock
Pre-mitigation Potential Impact	Negative, imperceptible, direct / indirect, unlikely, long-term effect on soil, subsoil and bedrock.

7.6 Mitigation Measures and/or Factors

7.6.1 Construction Phase

7.6.1.1 Removal of Topsoil and Overburden

Site earthworks and aggregate extraction will result in a direct impact on the local geological environment, albeit this is an acceptable and unavoidable part of the Proposed Development.

Topsoil and unusable subsoil will be stripped in the construction phase. The stripped material will be used to form a 2m high berm along the Site boundary and for the ultimate restoration of the Site (i.e. the materials within the berms will be used as the final layer during the restoration prior to reseeding).

7.6.1.2 Contamination of Soil by Leakages and Spillages

The following mitigation measures are proposed:

- All plant and machinery will be serviced before being mobilised to the Site;
- Refuelling will be completed in a controlled manner using drip trays (bundled container trays) at all times;
- Drip-trays will be used for fixed or modular mobile plant in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel plant on-site;
- Procedures and contingency plans will be set up to deal with emergency accidents and spills; and,
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spillage.

7.6.1.3 Land

The loss of agricultural land (ca. 28.3ha) resulting from the Proposed Development on a local or regional scale is minimal and therefore the effects of actual agricultural land loss is negligible.

Given the hummocky nature of local topography resulting from the glaciofluvial deposits, any change in topography is likely to be minimal in the overall landscape.

Mitigation will include a restoration plan which will restore the land to its current agricultural use with some biodiversity enhancement measures. Furthermore, the existing hedgerows, where present along the Site boundaries, will be retained. The reinstatement will involve reinstating the current field boundaries.

7.6.2 Operational Phase

7.6.2.1 Excavation of Subsoils

Aggregate extraction will result in a direct impact on the local geological environment, albeit this is an acceptable and unavoidable part of the Proposed Development. These impacts will be localised (i.e., only at the point of extraction) and will be mostly mitigated through the

adoption of a suitable landscape and restoration plan which will be undertaken during the extraction phase and on completion of extraction during the restoration phase.

The sand and gravel soils and subsoils are widely abundant in the area. Aggregate will be extracted in a phased manner from Zone A1, Zone A2, Zone B1, and Zone B2.

7.6.2.2 Contaminated of Soil by Leakages and Spillages

Mitigation as outlined in Section 7.6.1 above.

7.6.2.3 Erosion of Exposed Soils and Subsoils

The following mitigation measures are proposed:

- Soil removed from extraction areas be used to create boundary berms around the Site;
- Any available topsoil will be stripped and stored separately for use in final restoration; and,
- Re-seeding and spreading/planting will also be carried out in these areas.

7.6.3 Restoration Phase

7.6.3.1 Mitigation – Reinstatement of the Pit Ground Profile and Land use Change

The progressive restoration (following extraction) of the proposed extraction areas is seen as a positive effect with respect to land, soils and geology. The mitigation will include the adoption of a suitable restoration plan which considers the natural local topography and land-use.

The land will be restored to a level of ca. 73/74m OD and covered in available topsoil from the perimeter berms and will be replanted for agricultural use.

7.6.3.2 Mitigation – Imported Material

The following proposed mitigation measures apply to the Site for the importation of inert soil and stone.

Proposed mitigation measures include:

- Acceptance criteria for the incoming materials would need to be adhered to as per the National By-Product Criteria Ref No. BP-N002/2024;
- Sourcing material that is determined to be a by-product prior to transport to the Site;
- Pre-agreed source sites for inert material ensuring; no pollutants, unauthorised material, or invasive species are present;
- Regular checks of incoming loads to ensure the suitability of imported material;
- All required pollution prevention measures will be implemented at the Site;
- The operator will prepare and implement an Emergency response procedure;
- The operator will complete environmental monitoring, including local groundwater and surface water monitoring;
- A phased restoration of the Site will be implemented, with an agricultural use implemented following restoration;
- The operator will have a documented recording procedure for all by-product material entering the Site; and,
- No unauthorised dumping of waste will be allowed at the Site.

7.7 Interactions with other Environmental Attributes

Land and soils interact with other environmental attributes as follows:

- Chapter 6 - Biodiversity: The alteration of soil conditions on-site through the removal of topsoil and extraction of bedrock are key element to the viability of this project, however this change will impact biodiversity. The effects on biodiversity are addressed in Chapter 6;
- Chapter 8 - Water: The removal of the soils will alter the sensitivity of the underlying groundwater, further assessment is provided within chapter 8 Water. Additionally, soil reworking and bedrock extraction could release suspended solids and other material into the on-site drainage system and thereby to the on-site discharge. The effects on water quality are addressed in Chapter 8;
- Chapter 9 - Air: the mobilisation of dust through extraction processes can impact air quality. The effects on air quality are addressed in Chapter 9; and,
- Chapter 14 – Landscape & Visual: the modification of local geomorphology and topology through the extraction of bedrock on-site will likely effect the visual and landscape character of the area. The effects on visual and landscape character are addressed in Chapter 11.

7.8 Indirect Effects

No indirect effects are observed as part of historic on-site activities.

7.9 Residual Effects

7.9.1 Construction Phase

7.9.1.1 Removal of Topsoil and Overburden

The residual effects from the excavation of subsoils and overburden will be negative, not significant, irreversible, moderate, direct, likely, permanent effect on soils and subsoils.

7.9.1.2 Contamination of Soil by Leakages and Spillages

Proven and effective measures to mitigate the risk of spillages and leaks during the construction phase have been proposed above and will break the pathway between the potential source and the receptor. The residual effect will be negative, not significant, reversible, imperceptible, direct, short-term, and unlikely effect on soils, subsoils and bedrock.

7.9.2 Operational Phase

7.9.2.1 Contamination of Soil by Leakages and Spillages

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all sites of this nature. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect will be negative, not significant, reversible, imperceptible, direct, short-term, unlikely effect on soils, subsoils and bedrock

7.9.2.2 Erosion of Exposed Soils and Subsoils

Soils and spoil can be eroded by vehicle movements, wind action and water movement. To prevent this, all excavation works will be completed in accordance with the extraction plan and restoration plan for the Site (refer to Section 3.3.3.4). Following the implementation of these measures, the residual effect will be negative, not significant, slight, direct, short-term, medium probability effect on peat and subsoils by erosion and wind action.

7.9.3 Restoration Phase

The restoration plan involves the phased restoration of the proposed extension areas with 1,125,000 t of clean uncontaminated inert soil and stone by-product. Soils from the boundary berms and soil embankments will also be used during the restoration phase. No negative impacts on the land, soil, and geological environments are expected during the restoration or post-restoration phase. The restoration will have a positive effect on land use in terms of returning the Site to agriculture.

7.9.3.1 Reinstatement of the Quarry Ground Profile and Land-Use Change

Restoration of pre-extraction topography in the western portion of the Site and land-use will occur, and this will result in a positive, not significant, moderate, direct, permanent effect on the land, soils and geology environment.

7.9.3.2 Potential Effects due to Imported Material

The importation of soil and subsoil is an integral part of the Proposed Development. Proven and effective control measures to mitigate the risk of contaminated soils being imported to the Site are outlined above and in Chapter 3. Application of these controls will break the pathway between the potential source and the receptor.

The residual effect is considered to be Neutral, not significant, imperceptible, direct / indirect, unlikely, long-term effect on the land, soil and geology environment.

7.10 Monitoring

Groundwater level, surface water and groundwater quality monitoring will continue. A schedule of monitoring is proposed in Chapter 8. The Applicant will monitor all incoming by-product material and maintain appropriate records should they be requested.

7.11 Cumulative Effects

The other land use activities in the area are an existing sand and gravel pit, existing farming operations, residential land uses and peat bogs.

Due to the relatively small scale and nature of the Proposed Development and the lack of significant residual effects from the development that would affect the wider environment, there will be no significant cumulative impacts to land, soils and geology resulting from this project, and other local existing developments, projects and plans. All effects on land, soils and geology relating to the Proposed Development will be localised and within the development footprint.

7.12 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

7.13 Difficulties Encountered in Compiling This Information

No difficulties were encountered when compiling this information.

RECEIVED: 15/12/2024

8 WATER

8.1 Introduction

This chapter of the EIAR provides a description and assessment of the potential likely and significant impacts of the Proposed Development on receiving surface waters (hydrology) and groundwater (hydrogeology) at the Proposed Development Site.

Hydro-Environmental Services ('HES') was engaged by Malone O'Regan ('MOR Environmental'), to carry out an assessment of the potential impacts and associated effects of a proposed sand and gravel pit expansion at Ballyburn Upper, Gorteenvacan, Castledermot, Co. Kildare on the water environment.

8.2 Methodology

8.2.1 Legislation Context

The EU Water Framework Directive (2000/60/EC) ('WFD') established a framework for the protection of both surface and groundwater. Transposing legislation (S.I. No. 792/2009, European Communities Environmental Objective (Surface Water) Regulations 2009 as amended) outlines the water protection and water management measures required in Ireland to maintain high status of waters where it exists, prevent any deterioration in existing water status. Water bodies comprise both surface and groundwater bodies, and the achievement of a good status for these depends also on the achievement of 'good' status by dependent ecosystems.

The first cycle of the River Basin Management Plan ('RBMP') ran from 2009-2015, where eight separate plans were devised for all of the River Basin Districts ('RBDs') with the objective of achieving at least 'good' status for all waters by 2015.

The second cycle of the River Basin Management Plan ran from 2018-2021, while the third cycle (2022-2027) is currently underway and all eight RBDs have merged to form one national RBD.

The requirements of the following legislation are complied with:

- S.I. No. 349/1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84/1994, S.I. No. 101/1996, S.I. No. 351/1998, S.I. No. 93/1999, S.I. No. 450/2000 and S.I. No. 538/2001, S.I. 134/2013 and the Minerals Development Act 2017), the Planning and Development Act, and S.I. 600/2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/337/EEC and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment; and,
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).

Planning and Development Act, 2000, as amended;

- S.I. No. 296/2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law;
- S.I. No. 293/1988: European Communities (Quality of Salmonid Waters) Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;

- S.I. No. 272/2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 326/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy); and S.I. No. 722/2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) establishing a framework for the Community action in the field of water policy and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution and deterioration. Since 2000 water management in the EU has been directed by the Water Framework Directive (2000/60/EC) (as amended by Decision No. 2455/2011/EC; Directive 2008/32/EC; Directive 2008/105/EC; Directive 2009/31/EC; Directive 2013/39/EU; Council Directive 2013/64/EU; and Commission Directive 2014/101/EU ("WFD"). The WFD was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003);
- S.I. No. 684/2007: Waste Water Discharge (Authorisation) Regulations 2017, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive); S.I. No. 106/2007: European Communities (Drinking Water) Regulations 2007 and S.I. No. 122/2014: European Communities (Drinking Water) Regulations 2014, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the "Drinking Water Directive") and EU Directive 2000/60/EC;
- S.I. No. 9/2010: European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended by S.I. No. 389/2011; S.I. No. 149/2012; S.I. No. 366/2016; the Radiological Protection (Miscellaneous Provisions) Act 2014; and S.I. No. 366/2016); and,
- S.I. No. 296/2009: The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (as amended by S.I. No. 355/2018)

8.2.2 Relevant Guidance

The assessment was carried out in accordance with the following guidance and tailored accordingly based on professional judgement:

- Institute of Geologists Ireland ('IGI') (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- Environmental Protection Agency (May, 2022): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements);
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006;
- Department of the Environment, Heritage and Local Government; Quarries and Ancillary Activities – Guidance for Authorities (April, 2004);
- Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals);

- Department of Housing, Local Government and Heritage (2018): Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessments; and,

European Union (2017): Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU)

8.2.3 Desk-based Study

A desk study of the Site and surrounding area was carried out to collate all available and relevant geological, hydrogeological, hydrological and meteorological data for the study area, using the following data sources:

- Geological Survey of Ireland ('GSI') online mapping;
- Environmental Protection Agency ('EPA') Maps database;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive "Catchments" Map Viewer (www.catchments.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 19 (Geology of Carlow - Wexford); Geological Survey of Ireland (GSI, 1997);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- OPW Indicative Flood Maps (www.floodmaps.ie);
- Environmental Protection Agency – "Hydrotool" Map Viewer (<http://watermaps.wfdireland.ie/HydroTool>);
- Catchment Flood Risk Assessment and Management ('CFRAM') maps (www.floodinfo.ie); and,
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).

8.2.4 Site Investigations

Site investigation works were undertaken to characterise the baseline geological, hydrogeological, and hydrological environment. Intrusive site investigation works were carried out between 22nd – 24th May 2023, while non-intrusive site walkovers were carried out between May 2023 and September 2023. The investigations included the following:

- A detailed site walkover survey and water features survey was completed, including geological mapping of bedrock and subsoil exposures, inspection and mapping of all relevant hydrological features, such as existing drainage ditches, streams and springs;
- A preliminary Flood Risk Assessment ('FRA') for the Site and surrounding area was completed;
- Four groundwater monitoring wells (23GW101 to 23GW104) were drilled with completed geological logs around the perimeter of the Site;
- Continuous groundwater level monitoring by means of in-situ data loggers installed in seven monitoring wells (three installed in existing wells (PW1, BH2, and BH4) and 4 no. installed within the new monitoring wells (23GW101, 23GW102, 23GW103, and 23GW104);

- An Annual Environmental Report on the Ballyburn Sand and Gravel pit (2022) provided groundwater quality data from BH2 and BH4 and surface water quality data from a surface water lagoon within the Site; and,
- A topographic survey (differential Global Positioning System ('dGPS')) was undertaken whereby the monitoring wells were surveyed.

8.2.5 Impact Assessment Methodology

The importance/ sensitivity of the hydrogeological and hydrological receptors was assessed on completion of the desk study and baseline assessment.

Using the NRA Guidance [71], an estimation of the importance / sensitivity of the hydrogeological and hydrological environments within the study area is set out in Table 8-1 and Table 8-2 below.

Table 8-1: Estimation of Importance of Hydrology Attributes

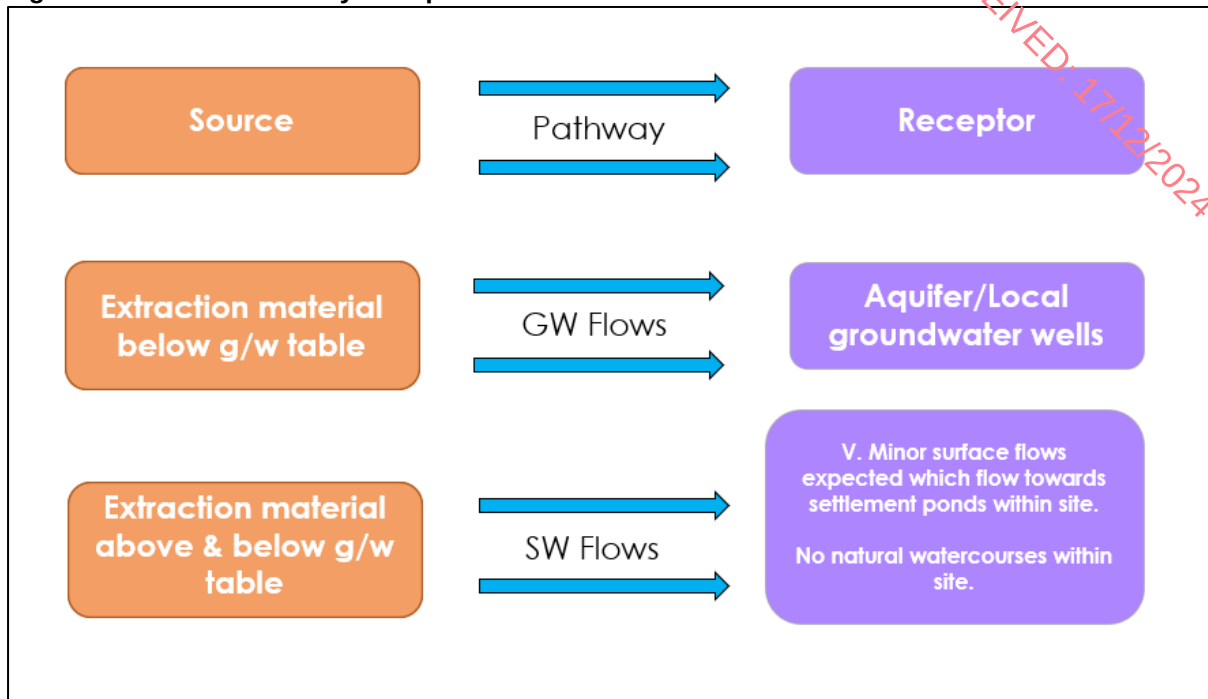
Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale	• River, wetland or surface water body ecosystem protected by EU legislation, e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	• River, wetland or surface water body ecosystem protected by national legislation – NHA status; • Regionally important potable water source supplying >2500 homes; • Quality Class A (Biotic Index Q4, Q5); • Flood plain protecting more than 50 residential or commercial properties from flooding; and, • Nationally important amenity site for wide range of leisure
High	Attribute has a high quality or value on a local scale	• Salmon fishery locally important potable water source supplying >1000 homes; • Quality Class B (Biotic Index Q3-4); • Flood plain protecting between 5 and 50 residential or commercial properties from flooding; and, • Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	• Coarse fishery; • Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3); and, • Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	• Locally important amenity site for small range of leisure activities; • Local potable water source supplying <50 homes; • Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding; and, • Amenity site used by small numbers of local people.

Table 8-2: Estimation of Importance of Hydrogeology Attributes

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 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 - 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 scale	- Regionally Important Aquifer 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.

Once the importance and sensitivity of the geological, hydrological and hydrogeological attribute is established, the conventional source-pathway-receptor model (see Figure 8-1 below) for groundwater / surface water protection was applied to assess impacts on geology, groundwater and surface water specifically on downstream sensitive ecological receptors and local groundwater supplies.

Figure 8-1: Source Pathway Receptor Model



Where potential impacts are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency ('EPA'):

- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements); and,
- Environmental Protection Agency (May 2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

In order to provide an understanding of the stepwise impact assessment process applied below. We have firstly presented below a summary guide that defines the steps (1 to 7) taken in each element of the impact assessment process in below. The guide also provides definitions and descriptions of the assessment process and shows how the source-pathway-target model and the EPA impact descriptors are combined.

Table 8-3: Assessment Methodology

Attribute	Status / Occurrence	Importance
Step 1	Identification and Description of Potential Impact Source This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	Pathway / Mechanism:	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of sand and gravel extraction, surface water and groundwater flows are the primary pathways.
Step 3	Receptor:	A receptor is a part of the natural environment which could potentially be impacted upon, e.g. human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	Pre-mitigation Impact:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	Proposed Mitigation Measures:	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. These measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by best practice engineering design.
Step 6	Post Mitigation Residual Impact:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	Significance of Effects:	Describes the likely significant post mitigation effects of the identified potential impact source on the receiving environment.

Using this defined approach, this impact assessment process is then applied to continued activities which have the potential to generate a source of significant adverse impact on the hydrological/hydrogeological (including wells, streams and water quality) environments.

- *Sources*

In the case of the Proposed Development Site the primary potential sources of impact are to groundwater quality whereby the primary potential hazards are suspended solids, leaching and spillages, and accidental discharges of potential pollutants to the local groundwater causing a deterioration in water quality.

- *Pathway*

The pathway in terms of groundwater flowpaths is via faults and fractures in the underlying bedrock aquifer, and for surface water this will be via potential baseflow entering the Palatine stream to the southwest and the River Lerr to the northwest

- *Receptor*

The primary local targets of concern are the nearby designated sites, the underlying Locally Important Aquifer, local wells and local downstream surface water receptors (i.e. baseflow to the Palatine stream and the River Lerr).

Once the importance and sensitivity of the hydrological and hydrogeological attribute is established, the conventional source-pathway-receptor model for groundwater / surface water protection was applied to assess impacts on groundwater and surface water specifically on downstream sensitive ecological receptors and local groundwater supplies. When applied to the Proposed Development's activities, the following source-pathway-receptor ('SPR') linkage below is produced.

8.3 Receiving Environment

8.3.1 Site Description and Topography

The Site is situated at Ballyburn Upper where a deposit of sand and gravel is present, ca. 4km to the northeast of Carlow Town and ca. 4.3km south-southwest of Castledermot Town. The Site covers an area of ca. 37.8ha (ITM centre coordinates X:676667, Y681155) and generally extends in a southerly direction from Ballyburn Pit (henceforth referred to as the Site).

Topography generally varies from relatively flat to undulating due to the variable thickness of glaciofluvial sand and gravels in the area. The Site is generally set at a higher elevation to its surrounding lands, with overall topography rising eastwards towards the M9 motorway. Elevations range from 73 meters above Ordnance Datum (m OD) to 83m OD within the Site.

The Site is accessed in the north via the L4012 public road that bounds the Site to the north and east.

The extraction of sand and gravel material has been in operation within the northern portions of the Site, moving progressively south. Agricultural lands surround the Site on all sides and there are a number of domestic dwellings and farm holdings in the vicinity of the Site.

8.3.2 Water Balance

The SAAR (Standard Average Annual Rainfall 1981 - 2010) recorded at Oak Park, Co. Carlow, which is located ca. 3.5km southwest of the Site, is 840.2mm (www.met.ie). Rainfall data from the station is included below within Table 8-4.

Table 8-4: Rainfall depths (mm) from Oak Park, Co. Carlow

Station		X-Coord		Y-Coord		Ht (m OD)		Opened		Closed		
Oak Park		273000		179500		61		1967		N/A		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
80.4	57.3	63.4	55.9	59.8	60.8	58.7	71.9	69.6	92.9	85.9	83.6	840.2

The closest synoptic station where the average potential evapotranspiration ('PE') is recorded is at Kilkenny, ca. 34km southwest of the Site. The long-term average PE for this station is 458.8 mm/yr (www.met.ie). This value is used as a best estimate of the Site PE. Groundwater recharge at the Site is mapped at 85% by the GSI. Due to the lack of subsoil within the existing quarry pit, recharge will likely be higher (closer to 95%). The actual evapotranspiration ('AE') at the Site is calculated to be 435.9mm (95% PE).

The effective rainfall ('ER') represents the water available for runoff and groundwater recharge. The ER for the Site is calculated as follows:

$$\begin{aligned}
 \text{Effective rainfall (ER)} &= \text{SAAR} - \text{AR} \\
 &= 840.2 \text{ mm/yr} - 435.9 \text{ mm/yr} \\
 \text{ER} &= 404.3 \text{ mm/yr}
 \end{aligned}$$

Table 8-5 below presents return period rainfall depths for the centre of the Site. These data are taken from <https://www.met.ie/climate/services/rainfall-return-periods> and they provide rainfall depths in millimetres for various storm durations and sample return periods (1-year, 5-year, 30-year, 100-year).

Table 8-5: Rainfall return periods for proposed Site (met.ie)

	Return Period (Years)			
	<u>1 year (mm)</u>	<u>5 year (mm)</u>	<u>30 year (mm)</u>	<u>100 year (mm)</u>
<u>5 mins</u>	3.7	6.1	10.3	14.2
<u>15 mins</u>	6.1	10.0	16.9	23.3
<u>1 hour</u>	10.1	15.6	24.5	32.3
<u>6 hours</u>	19.6	27.8	39.6	49.4
<u>12 hours</u>	25.4	34.7	47.8	58.3
<u>24 hours</u>	32.8	43.3	57.6	68.7
<u>2 days</u>	40.1	51.8	67.4	79.3

Due to the high permeability of sand and gravel subsoil and lack of subsoil at areas of extraction, and also as there are no surface water features within the Proposed Development site, it is expected that the majority of the effective rainfall landing on the working areas of the Site percolates (recharges) into the bedrock aquifer.

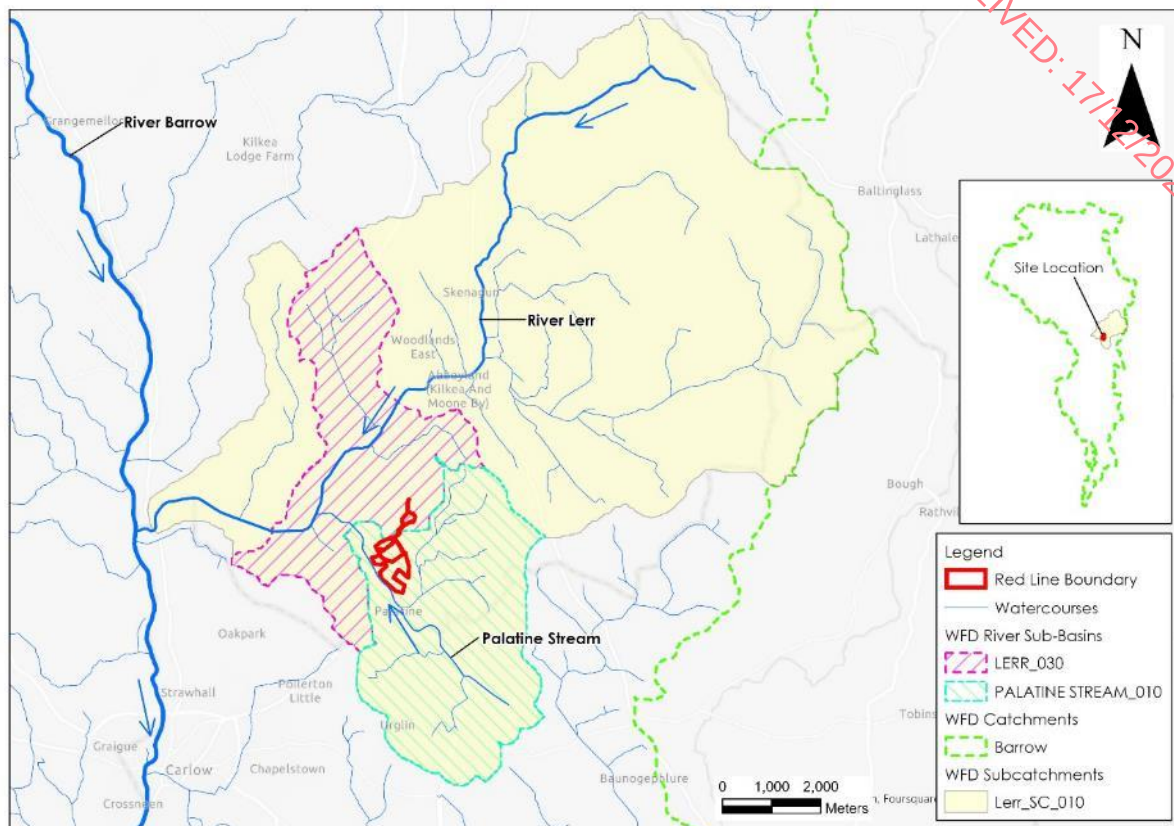
8.3.3 Regional and Hydrology

The Proposed Development Site is located within the Barrow surface water catchment (Hydrometric Area 14) of the South Eastern River Basin District ('SERBD').

On a more local scale the Proposed Development Site is located in the Lerr River sub-catchment (Lerr_SC_010) and 2 no. sub basins, the Lerr_030 to the north where the existing sand and gravel pit lies and the Palatine Stream_010 river sub basin where the majority of the extension works are proposed.

A local hydrology map of the area which shows the WFD subcatchments is shown below as Figure 8-2. A WFD Assessment report for the Proposed Development is included as Appendix 8-1.

Figure 8-2 Hydrology: Regional and Local



8.3.3.1 Local Site Drainage

A tributary of the Palatine Stream, (Barnhill East, EPA Code: 14B69) runs south near the eastern Site boundary and feeds into the Palatine stream approximately 500m south of the Site.

The Palatine Stream itself flows in a north-westerly direction to the west of the Site and feeds into the River Lerr. The River Lerr continues west and discharges into the River Barrow approximately 5km from the Site.

There is no direct hydraulic connection from the Site to any of the nearby watercourses in the vicinity.

Currently a wash water treatment plant is in use at the Site, dedicated for the operation of the mobile washing plant. The wash water treatment plant removes fine materials and comprises a dewatering unit and a clean water storage tank. 95 percent of the wash water is recycled throughout the washing process. The silt arising from the washing process is stored temporarily in two storage lagoons in the north of the Site. These silty fine materials are used in the continuous restoration processes in worked out areas of the pit.

Therefore, there is no discharge to surface waters from the existing sand and gravel pit. This system will remain for the proposed extension of the pit.

8.3.3.2 Flood Risk Assessment

A Flood Risk Assessment for the Proposed Development is attached as Appendix 8-2.

A summary is provided below.

The OPW Past Flood Events Mapping, as well as the OPW's Catchment Flood Risk Assessment and Management ('CFRAM') maps and the National Indicative Flood Mapping

(NIFM) were used to identify areas as being at risk of flooding. Historical mapping (i.e. 6" and 25" base maps) was also consulted to identify any areas at risk.

The OPW Past Flood Events Mapping records a recurring flood incident along the L4012 road that runs along the eastern Site boundary to the south at Knockbane (refer to Figure 8-3). A localised hollow on the road is flooded every year after heavy rain [Flood ID: 1581]. No other recurring flood incidences are recorded in the vicinity of the Site (www.floodinfo.ie).

The OPW (www.floodmaps.ie) do not record the presence of any Arterial Drainage Schemes near the Site. However, Benefited Lands are mapped along the course of the Barnhill east tributary stream to the east of the Site and along the Palatine stream to the west of the Site.

Where complete, the OPW CFRAM Flood Extents Mapping (www.floodinfo.ie) is now the primary reference for flood risk planning in Ireland, but this mapping is currently only available for the River Lerr and not the Palatine Stream (refer to Figure 8-4). However, there is National Indicative Fluvial Mapping ('NIFM') available for the Palatine Stream as discussed below.

NIFM for the present-day scenario (https://www.floodinfo.ie/map/floodmaps/) records fluvial flood zones along the Palatine Stream to the southwest of the Site (refer to Figure 8-4). However, these mapped fluvial flood zones do not encroach upon the Site.

The GSI Historical 2015/2016 surface water flood map show localised surface water flooding at one location ca. 1.2km west of the Site (refer to Figure 8-5). The affected areas are located adjacent to the L8090 road and do not encroach upon the Site.

Historical 6" and 25" maps for the Site were consulted to identify areas that are "prone to flooding". No areas were identified during this survey.

Based on the information gained through the flood identification process, the Site is not vulnerable to flooding.

Figure 8-3: OPW Flood hazard mapping

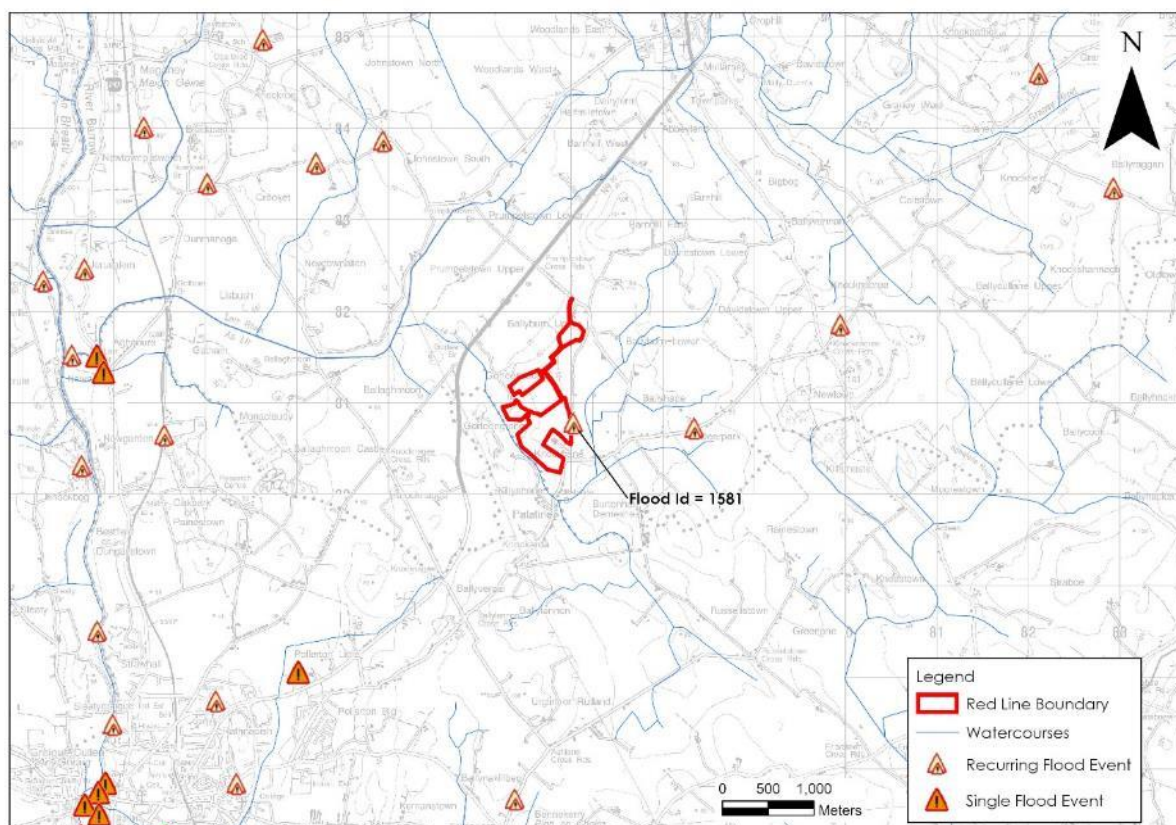


Figure 8-4: NIFM flood mapping

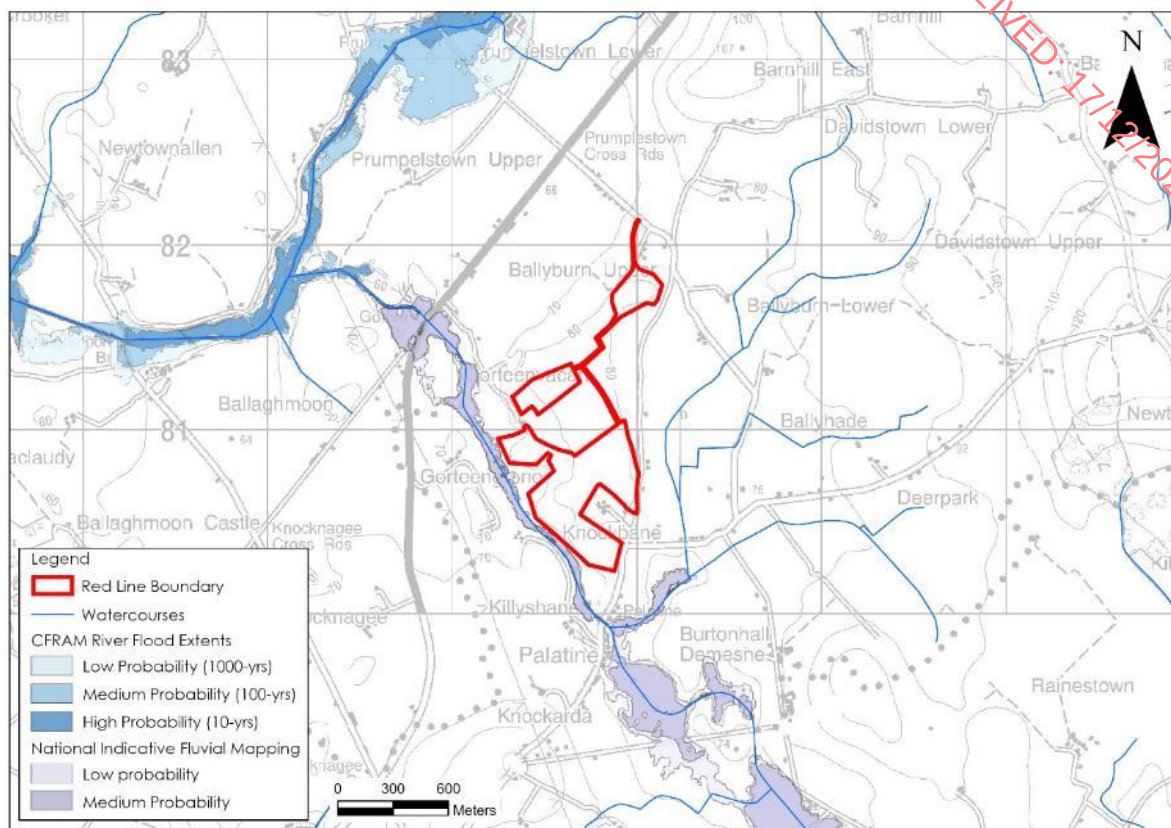
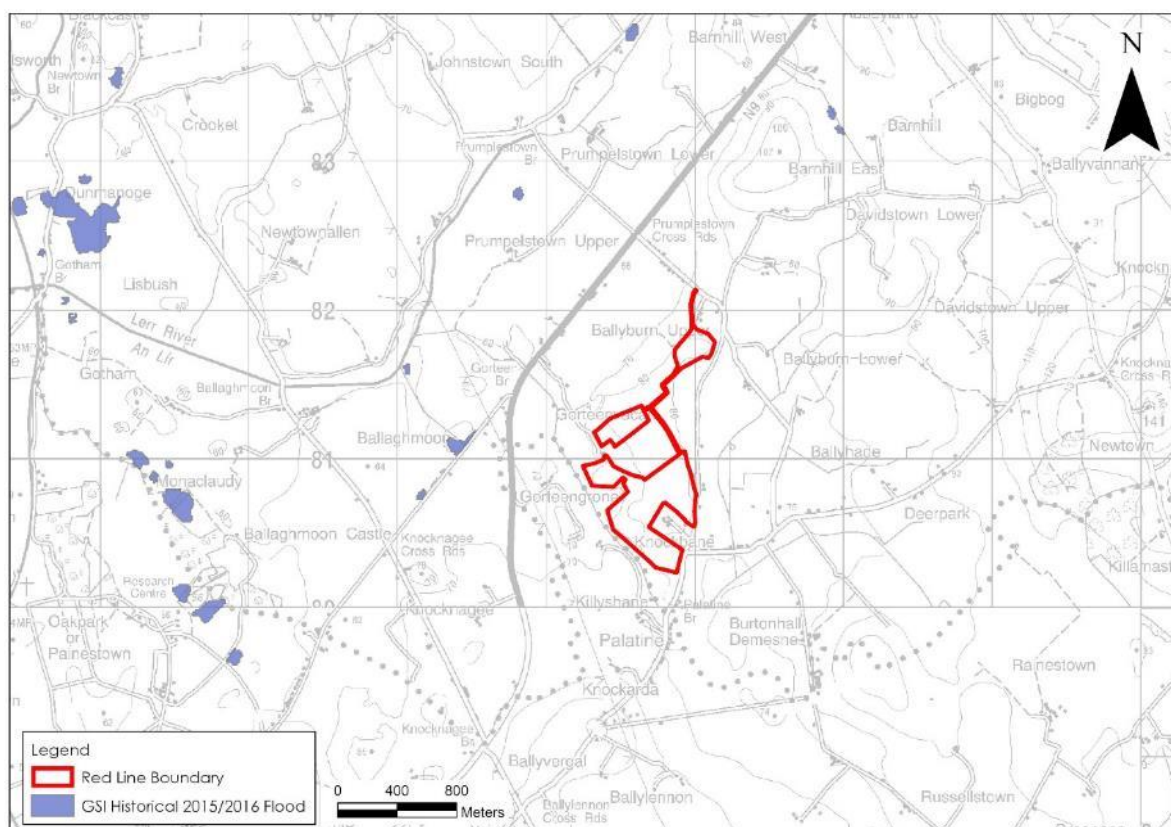


Figure 8-5: GSI Historical 2015/2016 Flood Map



Based on the information gained through the flood identification process, the Site is not vulnerable to flooding.

8.3.3.3 Surface Water Hydrochemistry

Biological Q-rating data for EPA monitoring points are available along the Palatine Stream. The most recent data available (2020) show that the Palatine Stream achieved “Moderate Status” (Q3-4) ca. 670m west of the Site (Station Code: RS14P040200).

EPA monitoring points are also located along the Lerr River northwest of the Site and downstream of the Palatine stream. Data collected in 2023 at Ballaghmoon Bridge showed that the river is of “Poor Status” (Q3) (Station Code: RS14L010250). Meanwhile, upstream of its confluence with the River Barrow the Lerr River achieved a Q-rating of Q3-4 (“Moderate Status”) at Lerr Bridge in 2023 (Station Code: RS14L010300).

An Annual Environmental Report was prepared by BHP Laboratories Ltd for the year 2022. The report consists of surface water monitoring data collected from the surface water lagoon in the northern part of the Site.

The surface water monitoring is broadly stable over the monthly sampling events in 2022. The surface water lagoon displays conductivities ranging from ca. 217-775 $\mu\text{S}/\text{cm}$ with an average of 450 $\mu\text{S}/\text{cm}$, which are typical EC values, indicative of surface water.

Total suspended solids were generally below the threshold value of 25mg/l, the water quality standards required by S.I. No. 293/1988. Total suspended solids exceeded the threshold value of 25mg/l on 3 no. occasions, 20th Jan 2022 (116mg/L), 16th Feb 2022 (28mg/L) and the 8th March 2022 (89mg/L). Significantly higher values in January and March than those recorded during other sampling rounds are possibly a reflection of turbulent conditions within the lagoon following heavy rainfall.

The measured pH ranged from 7.12 – 8.44, with an average value of 7.88, indicating surface waters which are generally neutral to slightly alkaline.

BOD ranges between >0.5 – 4.1 mg/L with the highest value occurring on 8th March 2022. 9 no. samples were below the “High” status threshold with regard S.I. No. 272/2009 and 3 no. exceeded the “Good” status threshold.

Nitrate levels within the lagoon averaged at 22.5mg/l, whilst nitrite levels ranged from 0.05 to 0.16mg/l.

Of the total 12 no. samples taken, there was only 1 no. minor detection of hydrocarbons at a very low value of 380 $\mu\text{g}/\text{L}$ on 12th September 2022.

8.3.4 Regional Hydrology

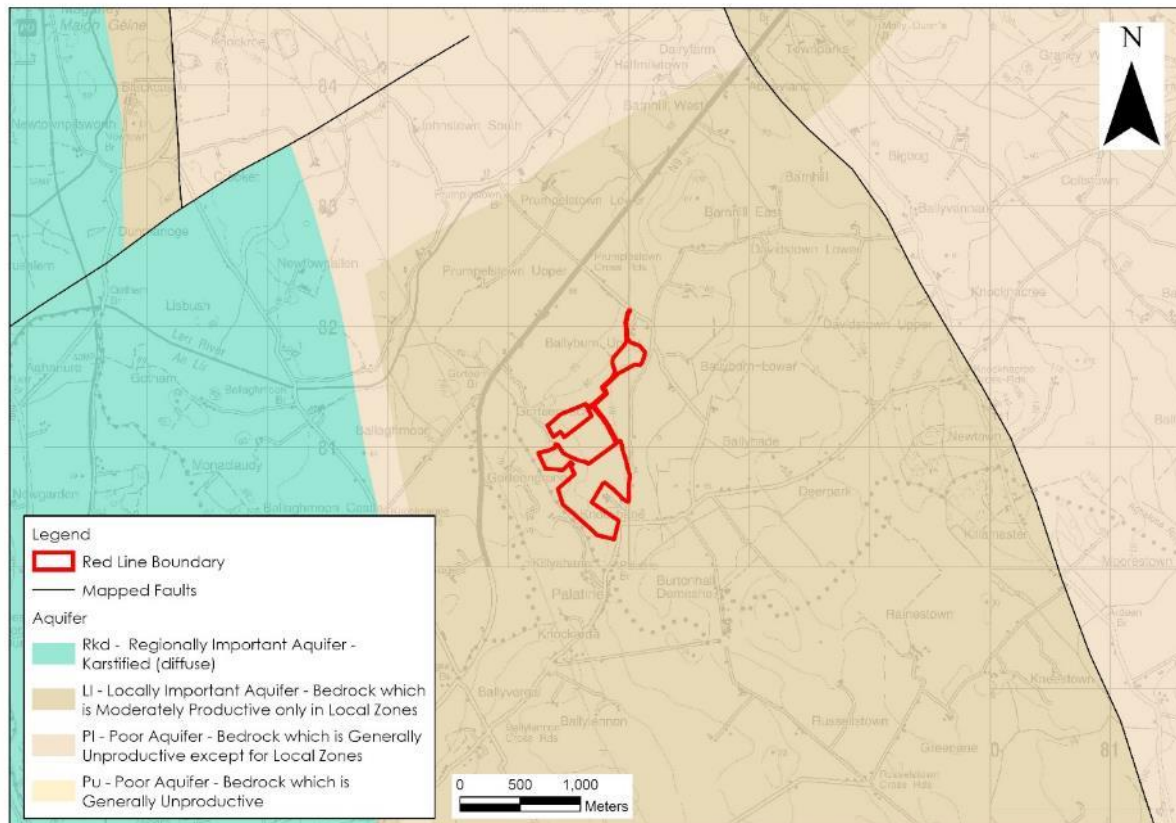
The bedrock geology underlying the Site is classified by the GSI (www.gsi.ie) as a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (LI) (refer to Figure 8-6). This area is mapped by the GSI as being part of the New Ross Groundwater Body GWB (European Code: IE_SE_G_152), consisting of 2 no. distinct types of lithologies - limestones and granites.

According to the GSI Characterisation Report of the New Ross GWB (GSI, 2004), the granites have been subject to a variety of different tectonic stresses, resulting in faulting and fracturing. The granites in this area are noted to have been extensively weathered to depths of 30m. Diffuse recharge occurs over most of the land surface through the sands and gravels, permeable till and outcrop. The sand and gravels contribute to abstractions from the limestones and provide storage for the underlying aquifer, possibly helping to maintain yields during dry weather.

It is thought that regional groundwater flows toward and discharges to the River Barrow. The aquifer is most likely to discharge to the river via baseflow through the river bed. Flow of groundwater will be limited to the upper weathered layer in the rock and its orientation and nature dominated by the fracturing of the rock on a local scale.

The limited chemical data show elevated electrical conductivity values and low hardness values. The chemical analyses indicate a calcium bicarbonate water type which is moderately soft (82-94 mg/l as CaCO₃) with a low alkalinity (45-65 mg/l as CaCO₃) and conductivity varies from 210-260 µS/cm (GSI, 2004).

Figure 8-6: Bedrock Aquifer map



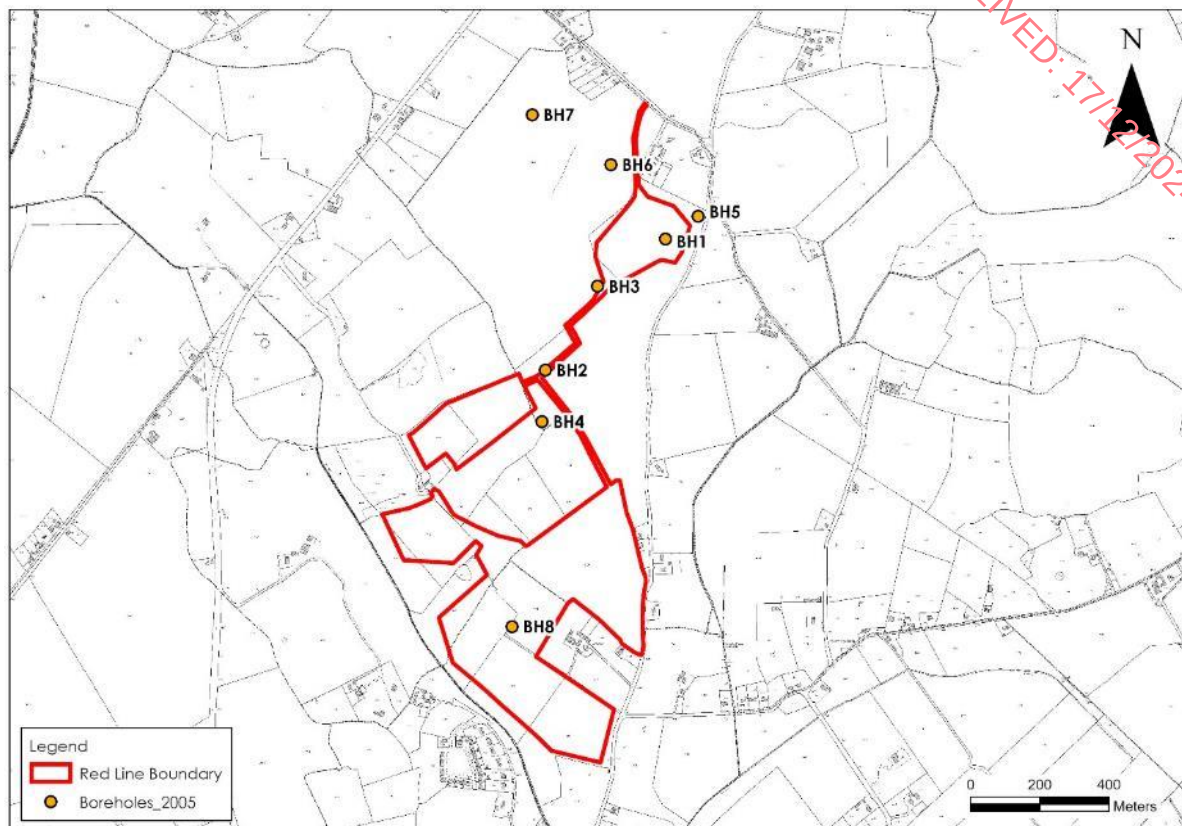
8.3.4.1 Site and Local Hydrology

The Site is underlain by the New Ross GWB. As stated above the Site is underlain by a Locally Important Aquifer.

Groundwater recharge is mapped with a recharge coefficient of 85% at the Site. Where soils are absent, as is the case in much of the existing extraction areas, recharge will likely be >95%. The GSI map the Site as having “High” groundwater vulnerability, however the current lack of overburden in some areas of the Site will more than likely result in an Extreme-X groundwater vulnerability rating. Groundwater flow is likely to be westwards towards the Barrow River and along any local preferential flow paths in faults or fractures.

Eight boreholes were bored during July/August 2005 by SLR, consisting of two Shell and Auger boreholes and six reverse circulation boreholes. The objective of these boreholes was to obtain information on the extent of sand and gravel, and depth to bedrock within the area and to monitor groundwater levels across the Site. The geological information obtained from these boreholes are described in full in Chapter 7. The location of these historic boreholes are shown below in Figure 8-7.

Figure 8-7: Site Investigation Boreholes (2005)



Since the drilling of the eight boreholes in 2005, sand and gravel extraction activities commenced within the Site. Boreholes BH1, BH2, BH4 and BH8 were removed from the monitoring programme due to either well collapse/failure or their locations within the sand and gravel pit void.

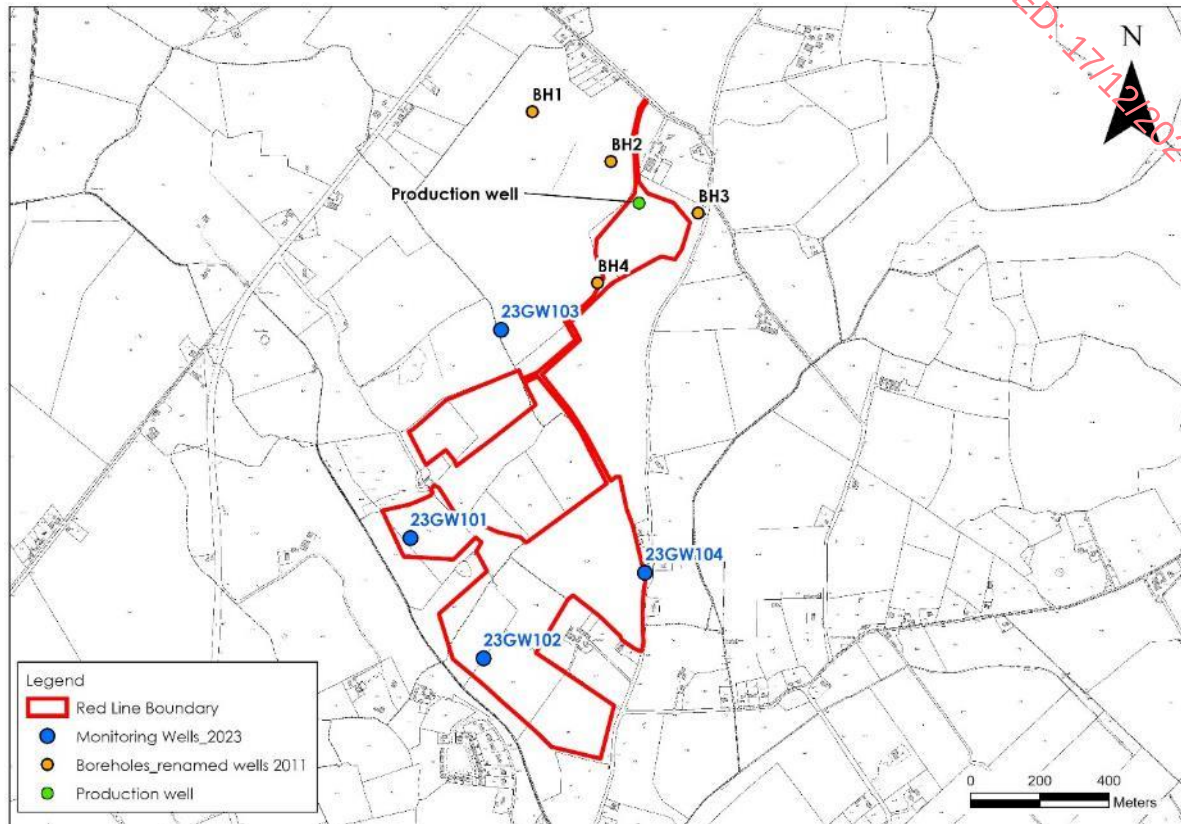
In 2011, the groundwater monitoring wells numbering system changed. The numbering system changes are outlined in Table 8-6.

Table 8-6: Groundwater Monitoring Updated Labelling System (2011)

Old Numbering	New Numbering
BH7	BH1
BH6	BH2
BH5	BH3
BH3	BH4

Figure 8-8 below shows the current labelling system used for the remaining historic monitoring wells that exist on-site, together with the new investigation wells installed in May 2023 (23GW101, 23GW102, 23GW103, and 23GW104).

Figure 8-8: Renamed Historic Site Investigation Boreholes (2011) and New Investigation Boreholes (2023)



Groundwater levels at the Site were manually measured by HES on seven occasions between May 2023 and September 2024.

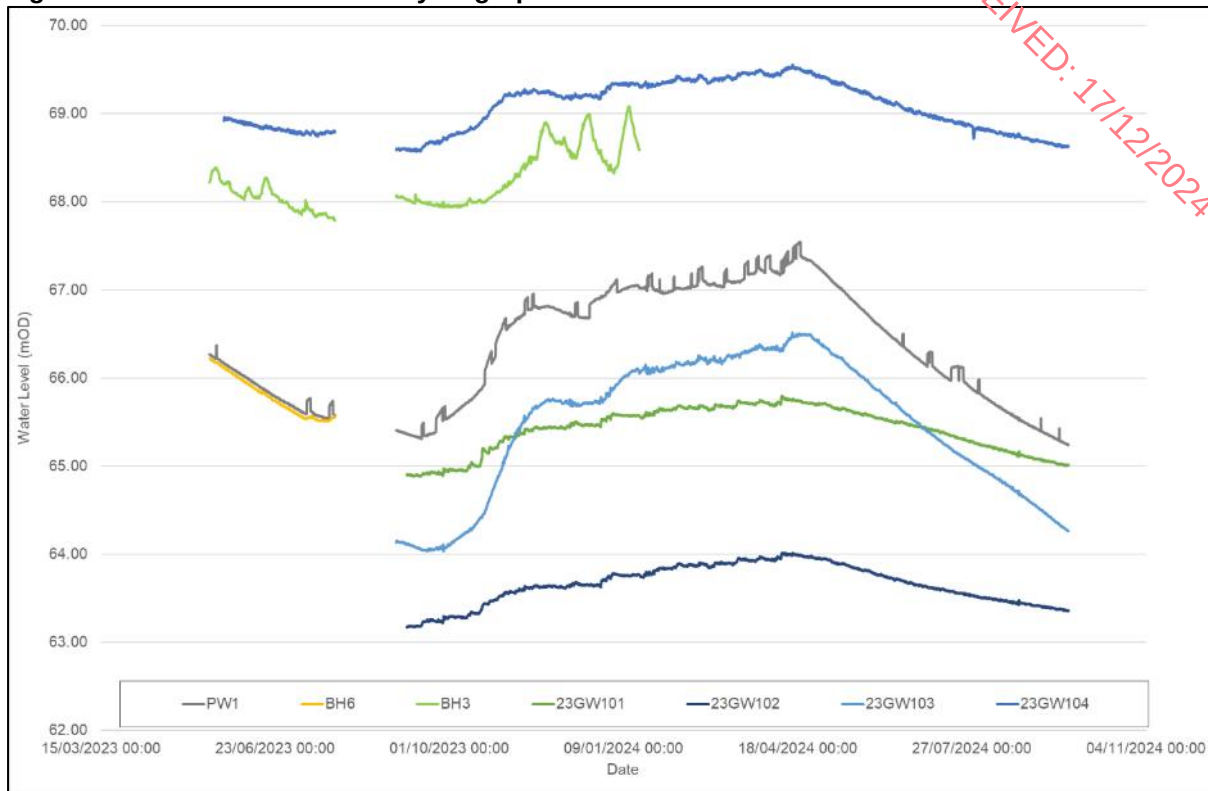
Dataloggers were also installed in the groundwater wells (Production well ('PW1'), BH2, BH4, 23GW101, 23GW102, 23GW103 and 23GW104) in order to continuously monitor groundwater levels. Dataloggers were first installed in BH3, BH6, PW1 and 23GW104 in May 2023. No continuous water level data was recorded at the Site between the 27th July 2023 to the 31st August 2023. Additional dataloggers were installed in 23GW101, 23GW102 and 23GW103 in September 2023. Continuous monitoring then continued for 12 months in five boreholes (PW1, 23GW101, 23GW102, 23GW103 and 23GW104) to September 2024.

Spatially across the Site, groundwater levels vary between ca. 63.17m OD (at 23GW102) towards the south of the Site and 69.56m OD (at 23GW104) in the southeast of the Site. The groundwater level variation across the Site is largely as a result of the undulating topography, and low/shallow groundwater gradients. The overall groundwater flow direction is westerly toward the Palatine Stream. The range in recorded water levels was less than 1m at 23GW01, 23GW102 and 23GW104. Slightly greater ranges were recorded in PW1 (2.31m) and 23GW03 (2.48m) The data is plotted in Figure 8-9.

Overall, the recorded water levels show typical seasonal variation with the greatest water levels recorded in April 2024, with water levels rising throughout the winter and spring and subsiding in the late spring and summer months. According to Met Éireann the Spring of 2024 was exceptionally wet and therefore, these recorded groundwater levels are likely to be maximum groundwater levels.

There is no proposed extraction in the area of 23GW104, and the water level here is from the bedrock, and not the overlying sand and gravel deposits.

Figure 8-9: Groundwater Level Hydrographs



8.3.4.2 Vulnerability Rating

The GSI map the Site as having “High” groundwater vulnerability, however the current lack of overburden across the majority of the Site due to extraction of sand and gravels, will more than likely result in an Extreme-X groundwater vulnerability rating.

8.3.4.3 Groundwater Use and Source Protection

There are no mapped Public Water Supply (‘PWS’) or Group Water Supplies (‘GWS’) groundwater protection zones mapped within the vicinity of the Site.

The nearest PWS is the Kilkea PWS situated ca. 7.5km north of the Site. The Kilkea Public Water Supply borehole is fed by the Feighcullen Limestone Formation which is classed as a locally important aquifer. Small sand/gravel bodies are common in the area and these are likely to provide additional groundwater storage for the bedrock aquifer (County Kildare Groundwater Protection Scheme, May 2004).

The Group Scheme Preliminary Source Protection Area of Ballyroe Leinster Lodge is situated ca. 9.6km north of the Site and the Baltinglass PWS is located ca. 10km to the northeast.

There are no other mapped PWS or GWS groundwater protection zones mapped within a 10km radius of the Site.

The Geological Survey of Ireland (‘GSI’) well database (www.gsi.ie) shows that there are several wells in the local area and these mapped wells are mainly located to the south of the Site towards the village of Palatine.

As stated above groundwater flow from the Site is expected to flow towards the Barrow River which is located ca. 5km west of the Site. There are existing dwelling/private houses located between the Site and the Barrow River and therefore potential for down-gradient domestic/farm wells (i.e. water source receptors) to be affected by groundwater flow from the Site.

The Burren_060 river waterbody, located 2.2km southwest of the Site is mapped under the Article 7 (Abstraction for Drinking Water) drinking water protection areas. This abstraction is operated by Uisce Éireann and supplies Sion Cross Water Treatment Plant. However, the Burren River is a tributary of the Barrow and the Site has no hydrological connection with the Burren_060 river waterbody.

8.3.4.4 Groundwater Quality

An Annual Environmental Report was prepared by BHP Laboratories Ltd for the year 2022. The report consists of groundwater monitoring data collected from wells BH2 and BH4.

The groundwater monitoring is broadly stable over the sampling events in 2022. The pH ranged from 6.8 to 8.12, reflecting the volcanic nature of the bedrock geology across the Site.

Nitrates were below the threshold value (25mg/l) in BH4 with one exception of 149mg/l on the 20th January 2022. However, this result is very high and it may be the case that the detection was due to a laboratory/sampling error. In BH2, nitrate levels are consistently above the threshold value (25mg/l) for the year 2022, averaging at 64.5mg/l.

Nitrites were generally below the detection limit (0.05mg/l) in both BH2 and BH4 with one exception of 0.15mg/l on the 8th July 2022 in BH4. This value exceeded the EPA interim guideline value of 0.1mg/l.

Orthophosphate values were consistently below the detection level of 0.065mg/L in both monitoring wells (BH2 and BH4) with the exception of BH2 on 08th July 2022, with a value of 0.24mg/l which exceeded the threshold value of 0.03mg/l.

All Ammonia values sampled from BH2 were less than 0.1mg/l, and below the EPA interim guideline value (0.14mg/l). In BH4 however ammonia values exceeded the EPA interim guideline value on three occasions, on 8th July 2022 (0.17mg/l), 12th September 2022 (0.41mg/l) and 10th October 2022 (0.17mg/l).

8.3.5 Designated Sites

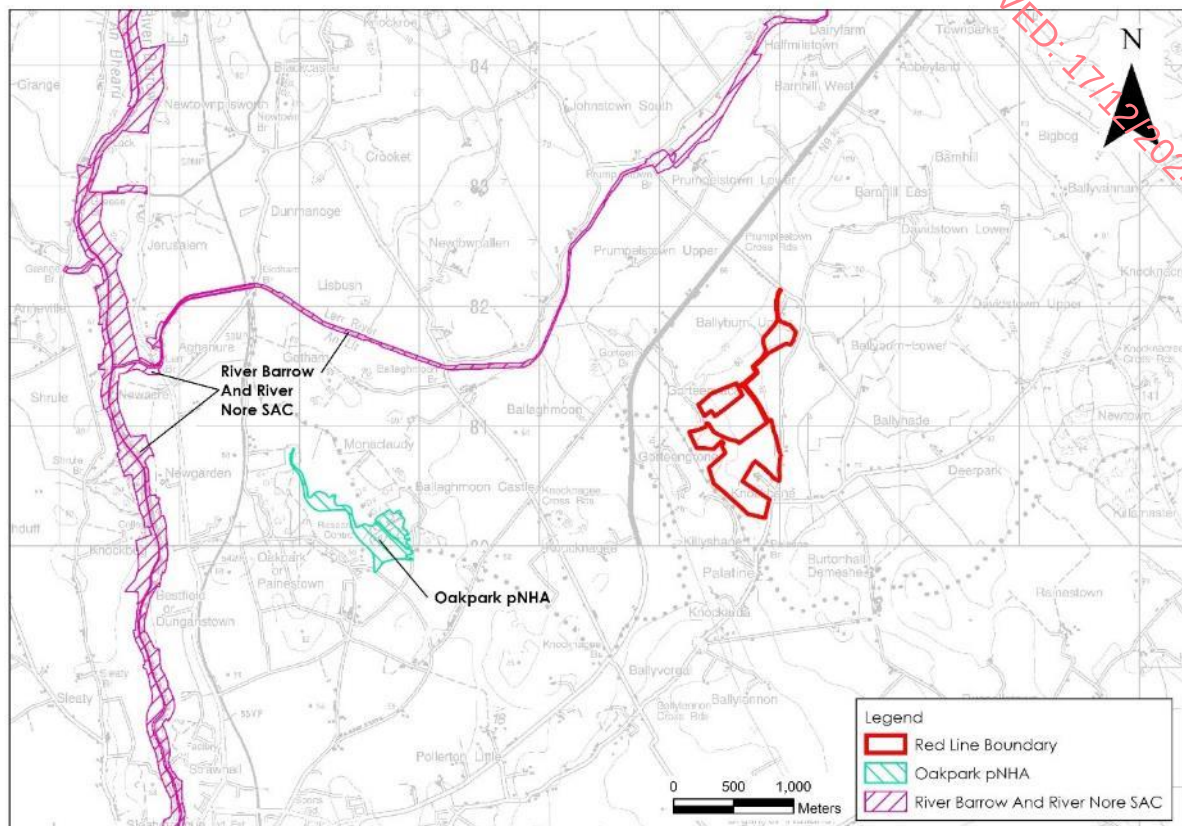
Designated sites include Natural Heritage Areas ('NHAs'), Proposed Natural Heritage Areas ('pNHAs') Special Areas of Conservation ('SACs'), candidate Special Areas of Conservation ('cSAC') and Special Protection Areas ('SPAs'). The Site is not located within any designated conservation-site.

The closest designated site is the River Barrow and River Nore SAC (Site Code: 002162) located ca. 1.3km northwest of the Site along the Lerr River. The River Barrow and River Nore SAC consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford.

The Oakpark pNHA (Site Code: 000810) is ca. 2.9km west of the Site. The park is a mature, mixed-species woodland of about 50 hectares, with a predominance of beech, oak, Scots pine, silver fir, larch and sycamore. There are no other designated sites within a 5km radius of the Site.

A map of local designated sites is included below as Figure 8-10

Figure 8-10: Designated Sites Map



8.3.6 Surface Water Body Status

A summary of the WFD status and risk of Surface Water Bodies ('SWBs') immediately upstream and downstream of the Site are shown in Table 8-7 below. Local SWB status and risk results are available from (www.catchments.ie).

The Palatine Stream is located to the west of the Site. The Palatine Stream_010 SWB (IE_SE_14P040200) achieved 'Moderate' status in all three WFD Cycles (2010-2015, 2013-2018 and 2016-2021). This SWB is deemed to be "At risk" of failing to meet its WFD objectives and is under significant pressure from agricultural activities and hydromorphology.

Further downstream the Lerr_030 SWB achieved 'Poor' status in the latest WFD cycle (2016-2021). This was a deterioration in WFD status from 'Moderate' status in the 2013-2018 cycle. The Lerr_030 SWB is also "at risk" of failing to meet its WFD objectives. This SWB is listed as being under significant pressure from agricultural activities and hydromorphology pressures.

Table 8-7: WFD Surface Water Body Summary

SWB Code	Water Body	Overall Status	Risk Status	Pressures
IE_SE_14P040200	Palatine Stream_010	Moderate	At risk	Agriculture & hydromorphology
IE_SE_14L010250	Lerr_030	Poor	At risk	Agriculture & hydromorphology

8.3.7 Groundwater Body Status

The New Ross Groundwater Body is assigned 'Good' status under the 2016-2021 WFD round. This groundwater body is deemed to be "Not at risk".

Table 8-8: WFD Groundwater Body Status

European Code	Groundwater Body Name	Overall Status	Risk Status	Pressures
IE_SE_G_152	New Ross	Good	Not at risk	-

8.3.8 Receptor Sensitivity

The primary sensitive receptors to the Site include the following:

- As stated above groundwater flow from the Site is expected to flow towards the Barrow River which is located ca. 5km west of the Site. There are existing dwelling/private houses located between the Site and the Barrow River and therefore potential for down-gradient domestic/farm wells (i.e. water source receptors) to be affected by groundwater flow from the Site.
- Furthermore, there are possible hydraulic connections with nearby designated sites via small rates of surface water runoff and via vertical migration through the unsaturated zone in the gravel aquifer followed by lateral migration and discharge into nearby surface watercourses such as the Lerr River which is mapped within the River Barrow aAnd River Nore SAC.
- The Site is underlain by a Locally Important Aquifer which can be considered very sensitive to impact. The primary risk to groundwater at the Site will be from hydrocarbon spillage and leakage. This is a common potential impact on all development sites (such as road works and industrial sites). All the infill materials will be inert and potential contamination sources are to be carefully managed at the Site during construction and operational phases of the development and mitigation measures are proposed to deal with these potential effects.
- Given the existing Site conditions, no sensitivity in respect to flooding is identified at the Site.

Comprehensive groundwater and surface water mitigation and controls are outlined in the following sections to ensure the protection of all downstream receiving waters. Mitigation measures will ensure that groundwater quality and surface runoff will be of a high quality and will therefore not impact on the quality of downstream surface water bodies. Any introduced drainage works at the Site will mimic the existing hydrological regime.

8.4 Characteristics and Potential Impacts of the Proposed Development

The Proposed Development is described in full in Chapter 3 of this EIAR.

8.4.1 Construction Phase

8.4.1.1 Earthworks / Removal of Overburden and Surface Water Quality Impacts

There will be a requirement to strip and store overburden (0.5 - 1m) from the Site. Overburden removal will be an intermittent operation and will be done so as the existing pit face is progressed from north to south (generally speaking). Overburden will be retained in berms and used during the final restoration activities.

Table 8-9: Potential Impact from Earthworks / Removal of Overburden and Surface Water Quality impacts

Attribute	Description
Receptor	Downstream surface waters (i.e. Palatine Stream and Lerr River).
Pathway	Surface water runoff.
Pre-mitigation Potential Impact	Negative, reversible, imperceptible, indirect, unlikely, effect on surface water quality.

8.4.1.2 Release of Hydrocarbon During Construction and Operational Phases

Excavation of aggregate at the Site will be completed using machinery. Such machinery are powered by diesel engines and operated using hydraulics. Unless managed carefully such plant and machinery have the potential to leak hydraulic oils or cause fuel leaks during refuelling operations.

Only small volumes of fuel/oils will be present on-site, and therefore, no significant effects are expected as long as standard mitigation is implemented.

Table 8-10: Potential Impact from Surface Water and Groundwater Contamination from Oil / Fuel Spills and Leaks

Attribute	Description
Receptor	Groundwater (The New Ross GWB) and surface water (i.e. Palatine Stream and Lerr River).
Pathway	Groundwater flowpaths
Pre-mitigation Potential Impact	Negative, reversible, slight, indirect, unlikely, long term effect on surface water and groundwater quality.

8.4.2 Operational Phase

8.4.2.1 Effect on Groundwater Vulnerability

The operational phase will involve the extraction of ca. 1.7 million m³, or ca. 3 million tonnes of sand and gravel overburden down to a level of 71m OD, which will increase the groundwater vulnerability of the sand and gravel aquifer which is currently rated as “High” based on the Site hydrogeological conditions. However, all extraction will be above winter water levels which have been recorded at a maximum of 69.56m OD in the Site.

Table 8-11: Potential Impact from Groundwater Vulnerability Rating due to Aggregate Extraction

Attribute	Description
Receptor	Groundwater vulnerability rating (The New Ross GWB)
Pathway	Aggregate extraction
Pre-mitigation Potential Impact	Negative, irreversible, moderate, direct, likely, permanent effect on groundwater vulnerability rating.

8.4.2.2 Release of Hydrocarbons during the Operational Phase

Excavation of aggregate at the Site will be completed using machinery. Such machinery are powered by diesel engines and operated using hydraulics. Unless managed carefully such plant and machinery have the potential to leak hydraulic oils or cause fuel leaks during refuelling operations.

Only small volumes of fuel/oils/lubricants will be present on-site, and therefore, no significant effects are expected as long as standard mitigation is implemented.

Table 8-12: Potential Impact from Surface Water and Groundwater Contamination from Oil / Fuel Spills and Leaks

Attribute	Description
Receptor	Groundwater (The New Ross GWB) and surface water (i.e. Palatine Stream and Lerr River).
Pathway	Groundwater flowpaths
Pre-mitigation Potential Impact	Negative, reversible, slight, indirect, unlikely, long term effect on surface water and groundwater quality.

8.4.2.3 Effects on Groundwater Levels and Local Well Supplies

As discussed in Section 8.3.4.3 above, wells were identified down-gradient of the Site. The current operation and extraction activities are not seen to have had any impacts on any downgradient local wells. In addition, no dewatering or additional groundwater abstractions from PW1 are proposed. Therefore, no impacts on groundwater quantity (levels or flows) are expected.

The closest mapped Water Supply Scheme to the Site is the Kilkea PWS situated ca. 7.5km to the north. The source is not down-gradient of the Site.

Table 8-13: Potential Impact on Groundwater Quality/Quantity Effects on Local Wells

Attribute	Description
Receptor	Local wells
Pathway	Groundwater flowpaths
Pre-mitigation Potential Impact	No effects on local groundwater wells are anticipated.

8.4.2.4 Potential Hydrological Effects on Designated Sites

There is no existing or proposed direct surface water connections between the Site and the River Barrow and River Nore SAC. The only possible hydraulic connections are via small rates of surface water runoff and via vertical migration through the unsaturated zone in the gravel aquifer followed by lateral migration and discharge into the Lerr River.

The Oak Park pNHA is remote from the Site. Therefore, there is no hydrogeological connection to the Site and therefore, it cannot be impacted by the Proposed Development.

Table 8-14: Potential Impact on Downstream Designated Sites

Attribute	Description
Receptor	River Barrow And River Nore SAC
Pathway	Groundwater flowpaths/Site run-off
Pre-mitigation Potential Impact	None can occur via direct surface water pathways as there is no direct hydraulic connection to the River Barrow And River Nore SAC. Negative, imperceptible, indirect, short-medium term, unlikely impact on groundwater quality and resulting groundwater flow towards the River Lerr. The River Lerr is a tributary to the River Barrow (River Barrow And River Nore SAC).

8.4.2.5 Potential Effects on Surface Water and Groundwater WFD Status

The Groundwater Body ('GWB') in which the proposed Site is located is called the New Ross GWB (IE_SE_G_152). This GWB is currently assigned 'Good Status', which is defined based on the quantitative status and chemical status of the GWB.

A summary of the WFD status and risk result of Palatine Stream and Lerr River Surface Water Bodies ('SWBs') in which the Proposed Development is located immediately upstream or downstream of are shown in Table 8-12 above.

Effects on surface water and groundwater quality as a result of the Proposed Development have the potential to negatively affect the WFD status.

Table 8-15: Potential Impact on Surface Water and Groundwater WFD Status

Attribute	Description
Receptor	WFD status of downstream surface water bodies (Palatine Stream and Lerr River) and the New Ross GWB.
Pathway	Surface water flowpaths and groundwater flowpaths
Pre-mitigation Potential Impact	Indirect, negative, imperceptible, long term, likely effect on surface water and groundwater bodies status.

8.4.3 Restoration

8.4.3.1 Potential Effects on Groundwater Quality due to Imported Soil and Stone Waste

The Proposed Development comprises importing approximately 1,125,000 tonnes of uncontaminated soil and stone by-product material to restore the proposed extraction areas.

Infilling with inert soil and stone will pose a very low risk to groundwater quality regardless of the vulnerability rating as no harmful contaminants will be present. In addition, inert soil and stone will not contain either organic matter or liquids that will form a source of organic

contamination. All imported material will be subject to soil acceptance criteria as mentioned below in Section 8.5 and Chapter 3.

Table 8-16: Potential Impact on groundwater quality

Attribute	Description
Receptor	Groundwater
Pathway	Groundwater recharge and flowpaths
Pre-mitigation Potential Impact	Negative, imperceptible, indirect, long term, likely, impact on groundwater quality

8.4.3.2 Release of Hydrocarbons During Restoration Phase

Deposition of soil and stone will be completed using machinery. Such machinery are powered by diesel engines and operated using hydraulics. Unless managed carefully, such plant and machinery have the potential to leak hydraulic oils or cause fuel leaks during refuelling operations.

Only small volumes of fuel/oils will be present on-site and therefore no significant effects are expected as long as standard mitigation is implemented.

Table 8-17: Potential Impact from Surface Water and Groundwater Contamination from Oil / Fuel Spills and Leak

Attribute	Description
Receptor	Groundwater (The New Ross GWB) and surface water (i.e. Palatine Stream and Lerr River).
Pathway	Groundwater flowpaths
Pre-mitigation Potential Impact	Negative, reversible, slight, indirect, unlikely, long term effect on surface water and groundwater quality.

8.4.4 Risk of Accidents and Disasters

8.4.4.1 Instability and Slope Failure

There are no peat deposits at the Site.

The side slopes of the proposed extension will be the same as existing slopes within the existing operational pit. The existing slopes are stable, and with the replication of the same slope dimensions in the extension area there is no anticipated issue with ground failure or slope stability.

8.4.4.2 Human Health Effects

Potential health effects arise mainly through the potential for groundwater contamination and impacts on local wells. Hydrocarbons, in the form of fuels and oils, will be used on-site during aggregate extraction.

In terms of groundwater protection measures, as stated in Section 8.5.2.1 below, there will be best practice controls in place to ensure any potential sources of contamination on the Site will be managed appropriately and the volumes present will be small in the context of the scale of the project. The potential residual impacts associated with groundwater contamination and subsequent health effects are negligible.

8.4.4.3 Flood Risk Impacts

As outlined in Section 8.3.3.2, there is no flood risk issues associated with the Site.

8.5 Proposed Mitigation Measures and/or Factors

8.5.1 Construction Phase

8.5.1.1 Mitigation – Earthworks / Removal of Overburden and Surface Water Quality Impacts

The proposed construction phase will be short term.

Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the extraction area. These will be embedded into the local soils to ensure all site water is captured and filtered prior to recharge.

Daily monitoring and inspections of soil stripping will be completed. Excavated soil will be used for landscaping, screening berms, and for Site restoration.

8.5.1.2 Mitigation - Release of Hydrocarbons During Construction Phase

Mitigation measures proposed to avoid release of hydrocarbons at the Site are as follows:

- Preventative maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;
- Refuelling will only occur from a fuel bowser as per the existing established operation;
- A spill kit will be kept nearby when refuelling. The spill kit will contain fuel absorbent material, pads/mats and oil boom for use in the event of any accidental spill;
- Drip trays and fuel absorbent mats will be used during all refuelling operations;
- On-site refuelling will be carried out by trained and competent personnel only;
- All plant and machinery will be serviced before being mobilised to Site and regular leak inspections and fitness for purpose will be completed during the backfilling works;
- No substantial plant maintenance will be completed on-site, any broken-down plant will be removed from Site to be fixed; and,
- The Site will operate under existing established management systems.

8.5.2 Operational Phases

8.5.2.1 Mitigation – Effects on Groundwater Vulnerability (Operational Phase)

In terms of impacting on the groundwater vulnerability of the Site, the extraction of sand and gravel across the extension area will have a negative effect on the Site in that the groundwater vulnerability rating will be higher, but this is consistent with existing and emerging baseline trends arising from the existing extraction area. Aggregate will be extracted in a phased manner from Zone A1, Zone A2, Zone B1, and Zone B2.

Proposed mitigation includes:

- Leaving ~4m-17m of subsoils above the bedrock across the Site (i.e. 71m OD) Depth of the rock at the Site has been confirmed by borehole drilling. The top of rock ranges in elevation from ca. 48 to ca. 67m OD.
- No extraction will occur below the winter groundwater table which has been recorded at a maximum of 69.5m OD.

8.5.2.2 Mitigation – Release of Hydrocarbons during Operational Phase

The same mitigation as presented in Section 8.5.1.2 will be used during the operational phase.

8.5.2.3 Mitigation - Effects on Groundwater Levels and Local Well Supplies

No dewatering is required at this Site. All extraction is and will be completed as dry workings with an anticipated finished depth across the Site of 71m AOD, ~2-6m above the existing water level. There will be no impacts on groundwater levels arising from the Proposed Development.

No specific mitigation is required as the operational phase has been designed to avoid significant effects on groundwater.

Continued seasonal monitoring of the local groundwater levels will be completed with the use of dataloggers in monitoring wells across the Site.

8.5.2.4 Mitigation - Potential Hydrological Impact on Designated Sites

Mitigation measures are outlined in Sections 8.5.2.1 (vulnerability), and 8.5.2.2 (hydrocarbons) above, which when implemented, will provide the necessary protection to groundwater quality.

The proposed mitigation measures will ensure that there will be no impact on groundwater quality. Therefore, significant direct, or indirect effects on the River Barrow and River Nore SAC will not occur.

8.5.2.5 Mitigation - Potential Effects on Surface Water and Groundwater WFD Status

No mitigation is required for surface water as there is no proposed discharge.

Mitigation for groundwater quality protection is outlined in Sections 8.5.2.1 (vulnerability), and 8.5.2.2 (hydrocarbons).

8.5.3 Restoration Phase

8.5.3.1 Mitigation - Effects on Groundwater Quality due to Imported Fill Material

The following proposed mitigation measures apply to the Site for the importation of Inert soil and stone.

Proposed mitigation measures include:

- Acceptance criteria for the incoming materials would need to be adhered to as per the National By-Product Criteria Ref No. BP-N002.2024;
- Sourcing material that is determined to be by-product prior to transport to the Site;
- Pre-agreed source sites for inert material ensuring; no pollutants, unauthorised material, invasive species is present;
- Regular checks of incoming loads to ensure suitability of imported material;
- The Site will be operated under an Environmental Management System;
- All required pollution prevention measures will be implemented at the Site;
- The operator will prepare and implement an emergency response procedure;
- The operator will complete environmental monitoring, including local groundwater and surface water monitoring;
- A phased restoration of the Site will be implemented, with an agricultural use implemented following restoration for the Site;

- The operator will have a documented waste recording procedure for all by-product material entering the Site; and,
- No unauthorised dumping of waste will be allowed at the Site.

The waste acceptance criteria is presented in Chapter 3 (Section 3.5.2) and includes criteria for 'greenfield' and 'non-greenfield' soils.

8.5.3.2 Mitigation - Release of Hydrocarbons During Restoration Phase

The same mitigation as presented in Section 8.5.2.2 will be used during the Restoration Phase.

8.6 Interactions with other Environmental Attributes

- Chapter 5 – Population and Human Health: Potential health effects arise mainly through the potential for groundwater contamination from accidental spillage of fuels/oils. Appropriate mitigation measures have been prescribed to offset these potential effects.
- Chapter 6 – Biodiversity. Potential impacts on hydrology, could also impact on ecological conditions and ecologically designated aquatic sites. Appropriate mitigation measures have been prescribed to offset these potential effects.
- Chapter 7 – Land, Soils and Geology. Contamination of the land, soils or geology could contaminate water (groundwater and surface water) and effect groundwater quality. Excavation associated the operational phase of the Proposed Development could affect groundwater availability and flow. Appropriate mitigation measures have been prescribed to offset these potential effects.
- Chapter 10 – Climate Change: Climate change could lead to intense rainfall which could contribute to flooding. The potential effects associated with climate change on water have been fully considered.

8.7 Residual Impact

8.7.1 Construction Phase

8.7.1.1 Earthworks / Removal of Overburden and Surface Water Quality impacts (Construction Phase)

No significant effects on surface waters or groundwater will occur.

8.7.1.2 Effects from Release of Hydrocarbons (Construction Phase)

The potential for the release of hydrocarbons to groundwater is a risk to local groundwater quality. Proven and effective measures to mitigate the risk of releases of hydrocarbons have been proposed above and will break the pathway between the potential source and the underlying groundwater receptor. The residual effect is considered to be - Negative, indirect, imperceptible, short term, likely impact to local groundwater quality.

8.7.2 Operational Phase

8.7.2.1 Effects on Groundwater Vulnerability (Operational Phase)

Direct, negative, moderate, permanent, likely impact on groundwater vulnerability. There will be an increased groundwater vulnerability rating through removal of the existing overburden deposits during extraction works (note that this increase in groundwater vulnerability rating will be offset by works proposed during the restoration phase whereby imported material will provide protection for the underlying bedrock aquifer).

8.7.2.2 Effects from Release of Hydrocarbons (Operational Phase)

The residual effects from the potential release of hydrocarbons are the same as the construction phase, as presented in Section 8.5.2.2.

8.7.2.3 Effects on Groundwater Levels and Local Well Supplies (Operational Phase)

No significant effects will occur.

8.7.2.4 Hydrological Effects on Designated Sites (Operational Phases)

No significant effects will occur.

8.7.2.5 Potential Effects on Surface Water and Groundwater WFD Status

No significant effects will occur.

8.7.3 Restoration Phase

8.7.3.1 Effects on Groundwater Quality due to Imported Fill Material (Restoration Phase)

The importation of soil and subsoil is an integral part of the Proposed Development. Proven and effective control measures to mitigate the risk of contaminated soils being imported to the Site are outlined above and in Chapter 3 and Chapter 7. Application of these controls will break the pathway between the potential source and the receptor. The residual effect is considered to be - Neutral, imperceptible, indirect, long term, impact on groundwater quality.

8.7.3.2 Effects from Release of Hydrocarbons (Restoration Phase)

The residual effects from the potential release of hydrocarbons are the same as the construction phase, as presented in Section 8.7.1.2.

8.8 Monitoring

As part of the Quarry's requirements under its existing planning permission, file register no. 05/2091 (AB PL09.220222), groundwater and surface water monitoring is required and carried out at the Site. There are no licence limits for either groundwater or surface water monitoring at Ballyburn Pit. The results are for information purposes only.

The monitoring requirements that apply to the existing quarry will continue throughout the duration of the lateral extension of the sand and gravel pit.

Groundwater sampling is conducted at BH2 and BH4 on a monthly basis. A summary of the groundwater monitoring results for the year 2022 are summarized in Section 8.3.4. The monitoring will continue to include the following analytes:

- Alkalinity (as CaCO₃);
- Orthophosphate (as P);
- Nitrate (as NO₃);
- Nitrite (as NO₂);
- Total ammonia (as N);
- Conductivity (25°C);
- Dissolved oxygen (%); and,
- pH.

In addition, surface water sampling is conducted at the surface water lagoon towards the north of the Site on a monthly basis. A summary of the surface water monitoring results for the year 2022 are summarised in Section 8.3.3. The monitoring will continue to include the following analytes:

- Total Ammonia (as N);
- C.O.D;
- B.O.D;
- Molybdate Reactive Phosphorus (as P);
- Sulphate (as SO_4^{2-});
- Total Suspended Solids;
- Calcium (Total as Ca);
- Magnesium (Total as Mg);
- Potassium (Total as K);
- Sodium (Total as Na);
- Nitrate (as NO_3);
- Nitrite (as NO_2);
- Total Petroleum Hydrocarbons ($>\text{C}_6\text{-C}_{40}$);
- Temperature – Field;
- Conductivity (25°C); and,
- pH.

8.9 Indirect Effects

No additional effects beyond those described and assessed throughout the Chapter are likely to occur.

8.10 Cumulative and In-Combination Effects

The Proposed Development will have no proposed discharge and therefore, the potential for increased effects on downstream surface water quality will not occur. Therefore, there is no potential for hydrological cumulative effects.

Due to the relatively small-scale nature of the Proposed Development and the lack of significant residual effects from the development that would affect the wider environment, there will be no significant cumulative impacts either on the local groundwater environment. There will be no significant cumulative effects on downstream designated sites.

8.11 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

8.12 Difficulties Encountered in Compiling this Information

No difficulties were encountered during the preparation of this chapter.

9 AIR QUALITY

9.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely impacts of the Proposed Development on air quality in the vicinity of the Site.

9.2 Methodology

The following standards and guidance documents were used to evaluate the baseline conditions and in the assessment of potential effects on the receiving environment:

- Department of Environment Heritage and Local Government ('DEHLG') – Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004 [69];
- Institute of Air Quality Management (IAQM) - Guidance on the Assessment of Mineral Dust Impacts for Planning (2016) [72];
- Environmental Management in the Extractive Industry (Non-Scheduled Minerals), 2006 [70];
- Irish Concrete Federation ('ICF') Environmental Code (2005) [73] ;[74]
- EPA - Air Quality in Ireland 2021 - Indicators of Air Quality [75];
- EPA - Air Quality in Ireland 2022 – Indicators of Air Quality [76];
- EPA – Air Quality in Ireland 2023 – Indicators of Air Quality; [77]
- Transport Infrastructure of Ireland – Air Quality Assessment for specified infrastructure projects – overarching technical document [78] ; and,
- Technical Instructions on Air Quality Control – TA Luft [79].

The main potential impacts on air quality from the Proposed Development are airborne particulate matter (PM₁₀) and nuisance dust deposition. The potential impacts caused by the release of NO₂ from normal plant and HGV operations were screened out of this assessment. This is based on the guidance relating to these emissions from the IAQM [80] and the Transport Infrastructure of Ireland [78]. Furthermore, the Proposed Development does not seek an increase in existing permitted traffic as such the baseline will be unchanged in this sense. Section 9.4.2 below provides further details on this screening for NO₂.

Given the nature of activities associated with the Proposed Development, the IAQM Guidance on Guidance on the Assessment of Mineral Impacts for Planning was used for completing a disamenity dust risk assessment, see Appendix 9-1 for further information.

9.2.1 Policy Context

The following sections will review and highlight relevant policies relating to the Proposed Development in the context of national, regional and local air quality objectives:

9.2.1.1 Clean Air Strategy

The Department of Environment, Climate Action and Communications ('DECC') are currently developing a Draft Clean Air Strategy, with information currently available through a public consultation document [81]. The aim outlined indicates the effort to reduce certain specific sources of emissions that are having the greatest impact, whilst also identifying cost effective approaches to emission reductions [81].

The Draft Clean Air Strategy outlines key strategic priorities relating to air quality in Ireland, including:

- Ensure continuous improvements in air quality across the country;

- Ensure the integration of clean air considerations into policy development across Government;
- Enhance regulation and enforcement; and,
- Promote and increase awareness of the importance of clean air.

Emissions of PM₁₀ in Ireland accounted for ca. 28.28kt in 2020, The main source of PM₁₀ emissions are from agriculture, which accounted for 31.3% share of the national total in 2020. Combustion of solid fuels from the residential and commercial/institutional sector accounted for 25.4% of the shared total [81].

9.2.1.2 KCC County Development Plan 2023-2029

The Kildare County Council ('KCC') Development Plan (2023-2029) [7] outlines objectives related to the implementation of air quality objectives such as:

"The Council also seeks to improve noise impacts, light impacts, and air quality standards throughout the county and to control harmful emissions to water and air under the relevant regulations"

The CDP outlines the following relating to air quality objectives:

IN O59

"Ensure that all future development is in accordance with the EU Ambient Air Quality and Cleaner Air for Europe (CAFÉ) Directive (2008/50/EC)."

IN O60

"Continue to monitor air quality at selected locations throughout the county in co-operation with the Health Service Executive and the Environmental Protection Agency."

IN O61

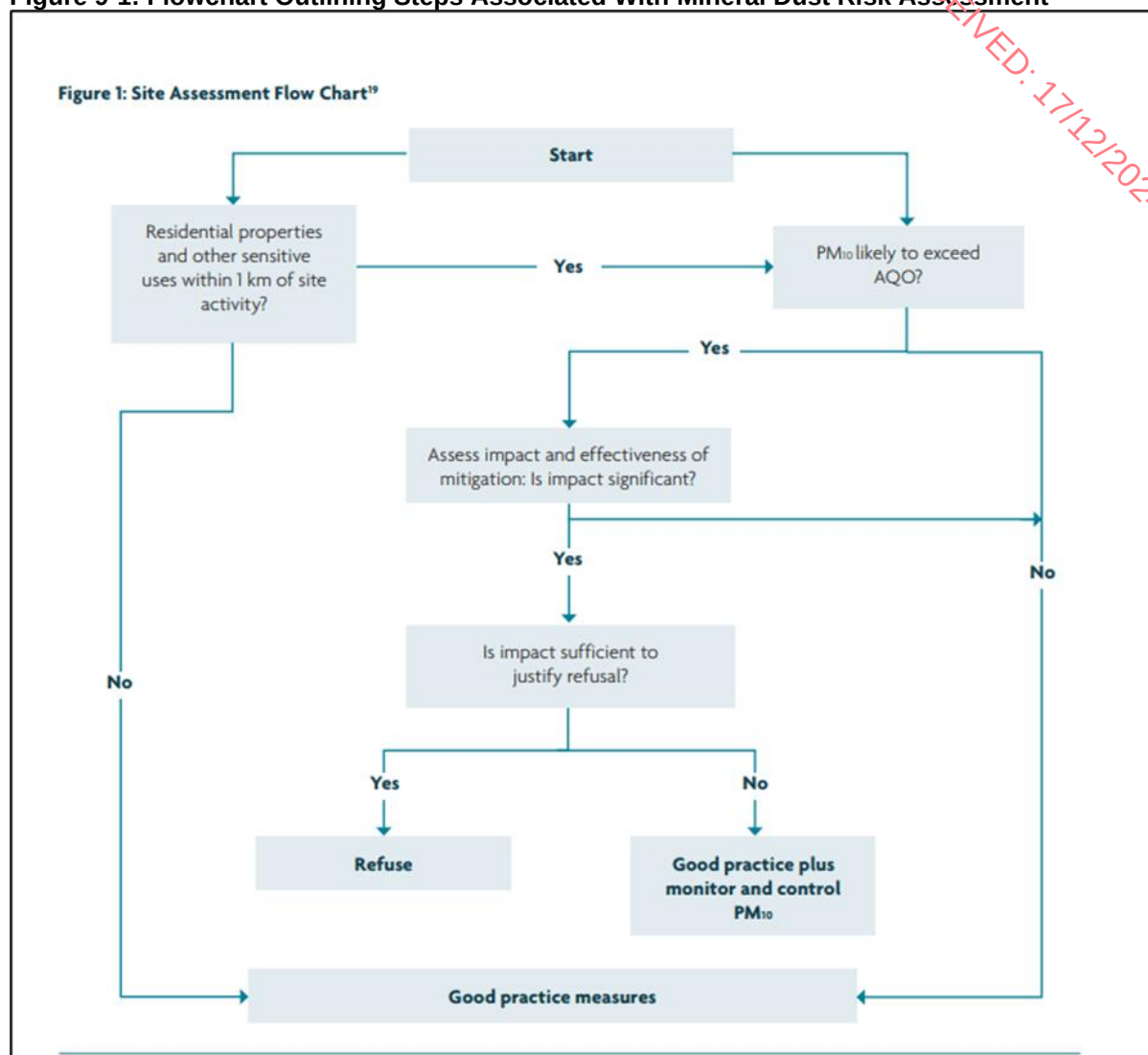
"Support the use of air quality monitors at schools throughout Kildare."

9.2.2 Mineral Dust Risk Assessment

A risk assessment of dust emissions arising from activities associated with the Proposed Development was completed in accordance with IAQM guidelines [72]. A flow chart outlining the various steps associated with the preparation of a dust risk assessment are outlined in Figure 9-1 below, with full details presented in Appendix 9-1.

The minerals discussed in this chapter/risk assessment are 'non-scheduled' associated with the extraction of sand and gravel.

Figure 9-1: Flowchart Outlining Steps Associated With Mineral Dust Risk Assessment



9.3 Existing Receiving Environment

The receiving environment for air quality is described in the following headings as Air quality standards, Dust Deposition Limits, Background Air Quality, Other Sources of Emissions in the Vicinity of the Site, Historical Dust Monitoring, MOR Environmental PM₁₀ Monitoring, Dust Sensitive Receptors, Designated Ecological Receptors and The Impact of Weather on Dust Emissions.

9.3.1 Air Quality Standards

Assessment of the significance of emissions to air is made with reference to limit values established in the latest EU legislation, the Clean Air for Europe (I) Directive (2008/50/EC) which was transposed into Irish law in 2011 (S.I. No. 180 of 2011).

The Air Quality Standards ('AQS') set out in Air Quality Directive (2008/50/EC) and S.I. No. 180 of 2011 are shown in Table 9-1 below. The AQS are based on the effects of pollutants on human health, although other factors such as effects on vegetation and ecosystems are sometimes considered.

Table 9-1: EU and Irish Air Quality Standards ('AQS') Limit Values

Pollutant	Objective			
	Concentration	Maximum No. of Exceedances permitted	Exceedance Expressed as Percentile	Measured as
Particles (PM ₁₀)	50µg/m ³	35 times in a year	90.40 th percentile	24 hour mean
	40µg/m ³	None	-	Annual mean

The above AQS limit values are applicable to the air quality in the locality of the Proposed Development. It should be noted that suspended dust associated with quarries will be coarse in the sub-fraction PM_{2.5-10} rather than in the fine fraction PM_{2.5} [80] [72]. As such, PM_{2.5} has not been considered further in this assessment.

9.3.2 Dust Deposition Limits

According to the EPA's Guidelines for Extractive Industries and the DEHLG, Quarries and Ancillary Activities [82], quarries, by their nature, generate dust, with the main impact being disamenity due to dust deposition. However, there are currently no Irish statutory limits relating specifically to dust deposition thresholds for inert dust. The Bergerhoff Method specified in the German TA Luft Air Quality Standards is typically used for monitoring of dust deposition in Ireland. [74] Also, the TA Luft dust deposition limit value of 350mg/m²/day (when averaged over a 30-day period) is typically set as a limit along all site boundaries associated with quarry and infill developments. There is an existing dust monitoring program implemented in the Ballyburn Pit, which has been considered as part of this assessment.

9.3.3 Background Air Quality

EU legislation on air quality requires that all Member States divide their territory into zones for the assessment and management of air quality. The current trends in air quality in Ireland are reported in the EPA publication Air Quality in Ireland (Key Indicators of Ambient Air Quality). The Annual Report for 2023 has just been released [83] and is currently the most up to date report on air quality in Ireland.

For ambient air quality management and monitoring in Ireland, four zones, A, B, C and D are defined in the AQS Regulations (S.I. No. 180 of 2011) and are defined as follows:

- Zone A: Dublin Conurbation;
- Zone B: Cork Conurbation;
- Zone C: 24 cities and large towns. Includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Newbridge, Mullingar, Letterkenny, Celbridge and Balbriggan, Portlaoise, Greystones and Leixlip; and,
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B & C.

According to the above classification, the Proposed Development is in Zone D. Table 9-2 below shows the baseline air quality data in a number of Zone D regions.

Table 9-2: Mean Concentrations of Pollutants Measured in Zone D

Monitoring Stations	Total Particulates PM ₁₀ Annual Mean (µg/m ³)	
	2022	2023
Castlebar	11.2	9.9
Cobh	13.2	11.8
Claremorris	7.9	8.1
Kilkitt	8.5	7.1
Roscommon Town	11.2	9.7
Enniscorthy	15.0	13.3
Macroom	16.1	11.3
Tipperary Town	13.9	10.8
Carrick-on-Shannon	10.2	8.9
Birr	14.5	13.1
Shannon Estuary/Askeaton Co. Limerick	9.4	8.4
Cavan	11.0	10.0
Edenderry	17.7	16.3
Mallow	13.5	10.5
Longford	16.0	13.1
Cobh Cork Harbour	14.4	11.4
Killarney, Co. Kerry	9.1	8.9
Malin Head	-	12.8
Average Zone D	12.5	10.9
Average Zone D (2022-2023)	11.7	

The maximum concentration recorded in Zone D for PM₁₀ was recorded at the Edenderry Station in 2022 (17.7µg/m³). Annual concentrations recorded at Zone D from 2022 to 2023 range between 7.1 and 17.7µg/m³.

Two consecutive years of annual mean concentrations of PM₁₀ across Zone D were used to determine the background for this assessment. Further details of the determination of background PM₁₀ concentrations relative to the Proposed Development are detailed in section 9.5.1 below.

9.3.4 Other Sources of Emissions to Air in the vicinity of the Site

Notable sources of emissions to air, in the vicinity of the Proposed Development include:

- Traffic associated with roads including the M9, R884, regional and local roads;
- Existing activities within the wider Ballyburn Pit;
- Agricultural activities;
- Residential dwellings (potential solid fuel combustion); and,
- Emissions related to the village of Palatine (traffic, commercial heating).

The closest Industrial Emission ('IE') licenced facilities are outlined in Table 9-3 below.

Table 9-3: The nearest IEL and IPC operations associated with the Proposed Development

Licence Number	Name of Organisation	Activities Associated	Distance to Proposed Development	Licence emissions limit
P1009-01	Waddock Composting Facility Designated Activity Company	The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required. Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving on or more of the following activities (other than activities which the Urban Waste Water Treatment Regulations 2001 (S.I.No 354 of 2001) apply)	ca. 3.5km (East)	<u>Dust Deposition</u> 350 (mg/m²/Day) <u>Odour</u> 1000 O_UE./m³ 671 O_UE./m³
PO222	Irish Sugar Limited (Carlow)	The manufacture of sugar, and the burning of any fuel in a boiler or furnace with a nominal heat output exceeding 50MW	ca. 5km (Southeast)	<u>Pulp Driers</u> Oxides of sulphur= 73.4 (kg/hr) Nitrogen oxides (as NO₂) =12.7 (kg/hr) Particulates = 23.4 (kg/hr) <u>Boiler House</u> Oxides of sulphur = 1700mg/m³ Nitrogen oxides (as NO₂) = 500mg/m³ Particulates= 200mg/m³

As per the IAQM Guidance on Mineral Dust, the conceivable impacts caused by quarry operations on PM₁₀ or nuisance dust can be observed up to 400m from a limestone quarry or 250m from a sand and gravel pit [72]. There are no licenced facilities within a 2km radius of the Proposed Development. Consequently, the likelihood of cumulative effects on local air quality, impacting sensitive receptors due to licenced facilities, is determined as being not likely and not significant.

9.3.5 Historical Dust Monitoring

Monthly dust deposition monitoring is carried out at the Ballyburn Pit. Results were reviewed from 2022, at four monitoring locations (Figure 9-2 below). This monitoring was completed utilising the Bergerhoff Method (refer to Section 9.3.2 above for further details on this method). The results of this monitoring are submitted to KCC on an annual basis.

Figure 9-2: Current Dust Monitoring Locations

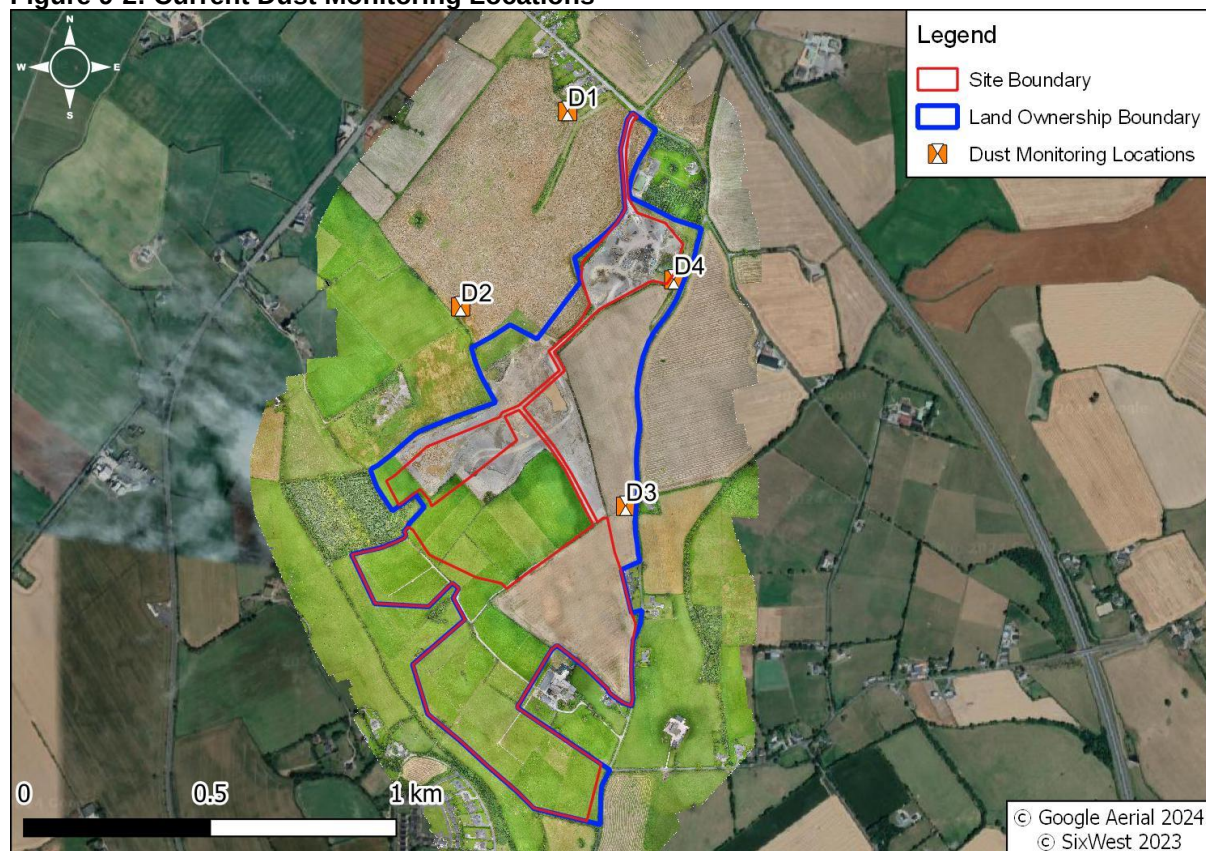


Table 9-4 below summarises the results from the four monitoring locations from January 2022 to December 2022.

Table 9-4: Summary of Historic Dust Deposition Monitoring Data 2022

Monitoring Locations	2022 Annual Mean mg/m ² /day
D1	169.4
D2	108.9
D3	124.8
D4	251.4

The mean dust deposition values from 2022 for the monitoring locations (D1, D2, D3, D4) were all below the limit value of 350mg/m²/day. The dust deposition values ranged between 31.2 mg/m²/day ('D2') to 334.5 mg/m²/day ('D4'), with the mean values, as shown in Table 9-4 above indicating compliance with their current planning conditions.

9.3.6 MOR Environmental PM₁₀ Monitoring at Site

MOR installed a PM₁₀ monitor (Osiris 4361) at one location at the Ballyburn Pit. The PM₁₀ monitor was installed by experienced MOR staff and set up and calibrated in accordance with the manufacturer's instructions. The monitor was set-up on a plateau on the western portion of the Proposed Development. The monitor was in operation from the 31st July to the 07th August 2023. The monitoring location described above is shown in Figure 9-3 below.

Figure 9-3: MOR Environmental PM₁₀ Monitoring Location

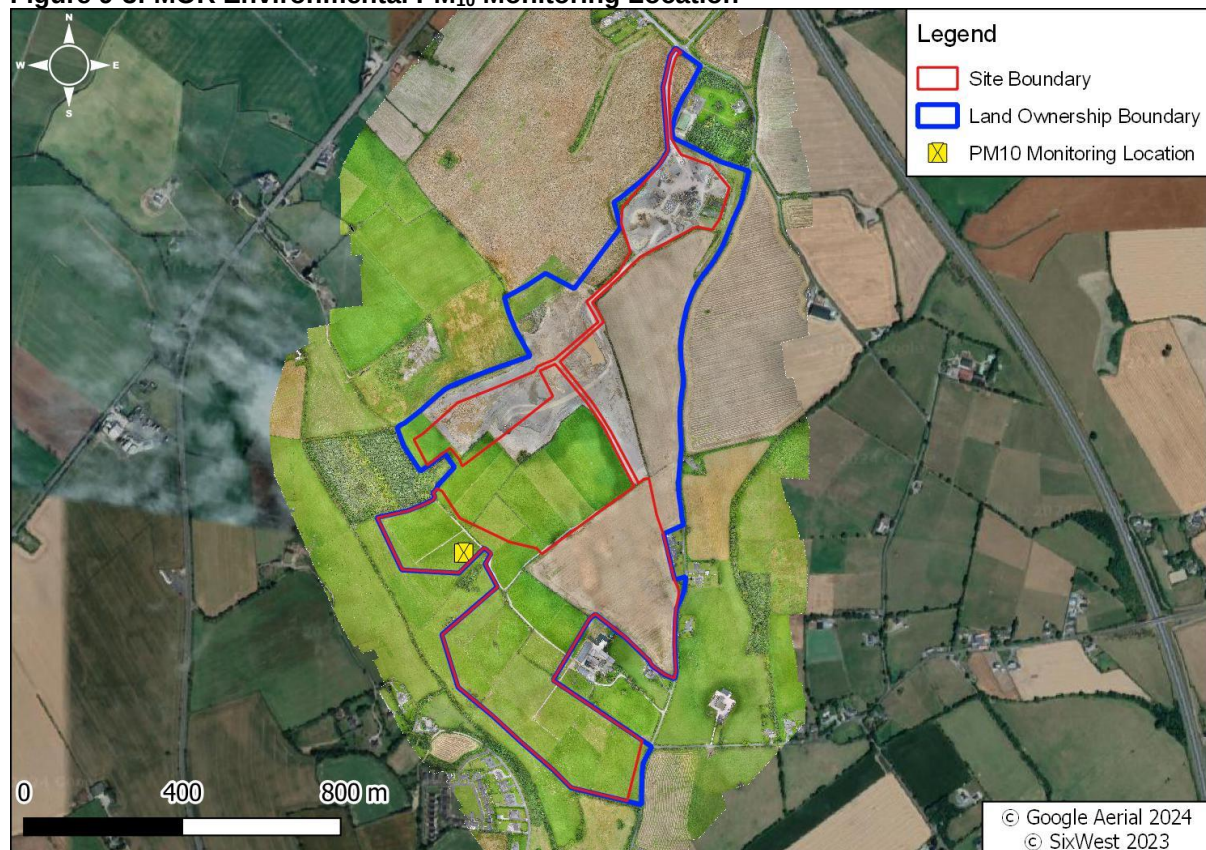


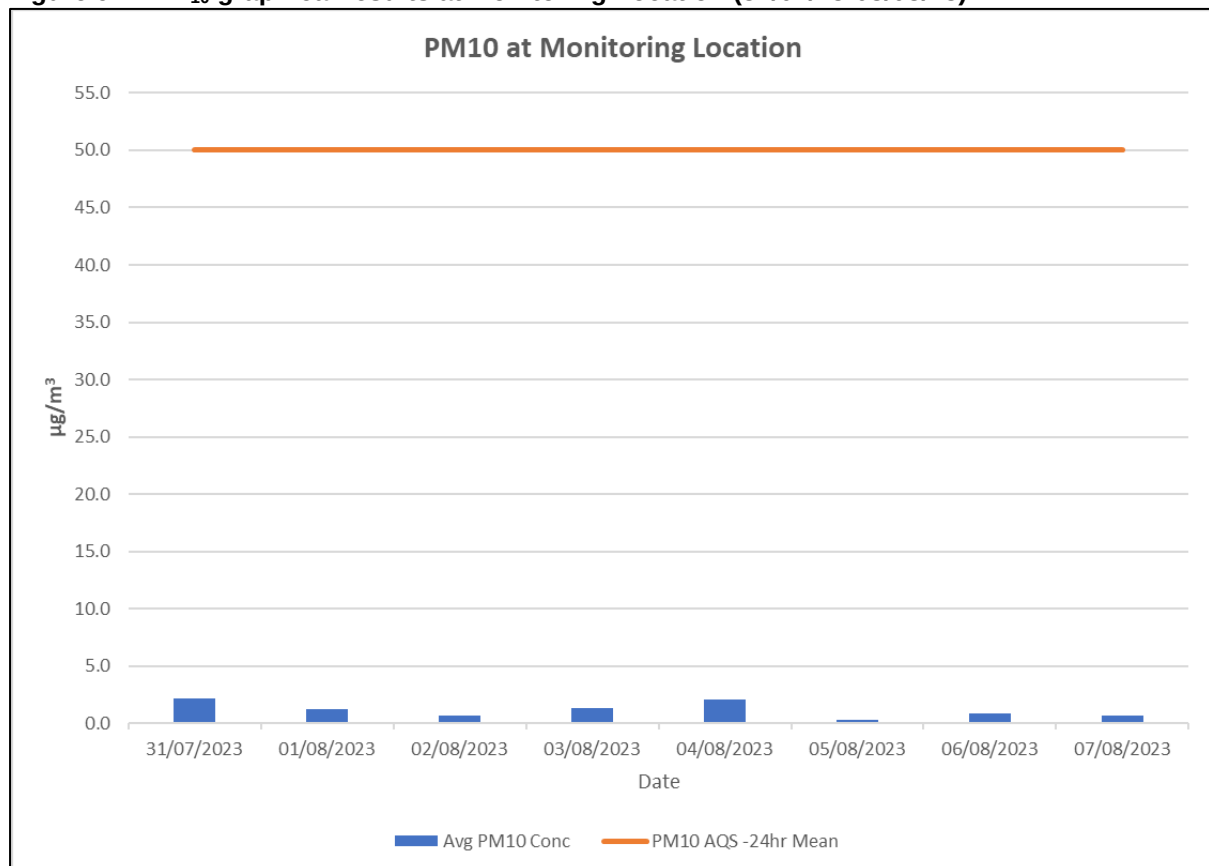
Table 9-5 below details the results from the monitoring period, with Figure 9-4 showing the results in a graphical format.

Table 9-5: PM₁₀ results at Monitoring Location (31/07/23-08/08/23)

Monitoring period	Monitored PM ₁₀ µg/m ³ 24 hour mean	% of 24 hour mean AQS
31/07/2023	2.2	4.4%
01/08/2023	1.2	2.5%
02/08/2023	0.7	1.3%
03/08/2023	1.3	2.7%
04/08/2023	2.1	4.1%
05/08/2023	0.3	0.6%
06/08/2023	0.9	1.7%
07/08/2023	0.7	1.4%
Average for the monitoring period (31st of July to the 08th August 2023)	1.2	2.9%*

*denotes % comparison with Annual mean AQS (40µg/m³)

Figure 9-4: PM₁₀ graphical results at Monitoring Location (31/07/23-08/08/23)



The mean concentration of ambient PM₁₀ detected at Monitoring Location from the 31st July to the 08th August was (1.2 ug/m³) below the EPAs 24-hour AQS limit of 50µg/m³. The 24-hour

mean concentrations throughout the monitoring period ranged between $0.7\mu\text{g}/\text{m}^3$ to $2.2\mu\text{g}/\text{m}^3$. The average concentration across the 8-days was $1.2\mu\text{g}/\text{m}^3$, which is 2% of the AQS daily limit value of $50\mu\text{g}/\text{m}^3$ and 2.9% of the annual AQS limit of $40\mu\text{g}/\text{m}^3$.

9.3.7 Dust Sensitive Receptors

The Proposed Development activities traditionally associated with sand and gravel extraction will occur as part of the Proposed Development, such as;

- Site preparation/restoration (working soil and overburden);
- Aggregate extraction;
- Materials handling;
- Aggregate processing;
- Stockpiles/exposed surfaces
- On-site transportation; and,
- Off-site truck movements (potential track out).

A risk assessment was completed in accordance with the IAQM's Guidance on The Assessment of Mineral Dust Impacts for Planning, May 2016 [72].

According to the IAQM Guidelines, adverse impacts from sand and gravel quarries (which is the case here) are uncommon beyond 250m and beyond 400m from hard rock quarries measured from the nearest dust generating activities [72]. The data indicates dust arising from sub soil materials such as clay tend to deposit within 350m from the source (which would be associated with site preparation/infill activities). As such, a conservative approach for assessing receptors within 400m of the dust generating activities has been adopted for this assessment (Figure 9-5 below).

Dust generating activities in this instance will primarily occur from the quarry void where the excavation activities are located (unless otherwise specified). Ten human receptors and one ecological receptor were identified within 400m of dust generating activities associated with the Proposed Development (SR01-SR10) and (ES01) (Table 9-6 below). Some of the locations are proxies for a cluster of receptors in a particular area. In these instances, the closest receptor was selected and used as a proxy, as the other receptors would experience a similar or reduced effect from the Proposed Development.

The Proposed Development will utilise existing infrastructure (such as a wheel wash), which will negate the requirement for unnecessary construction.

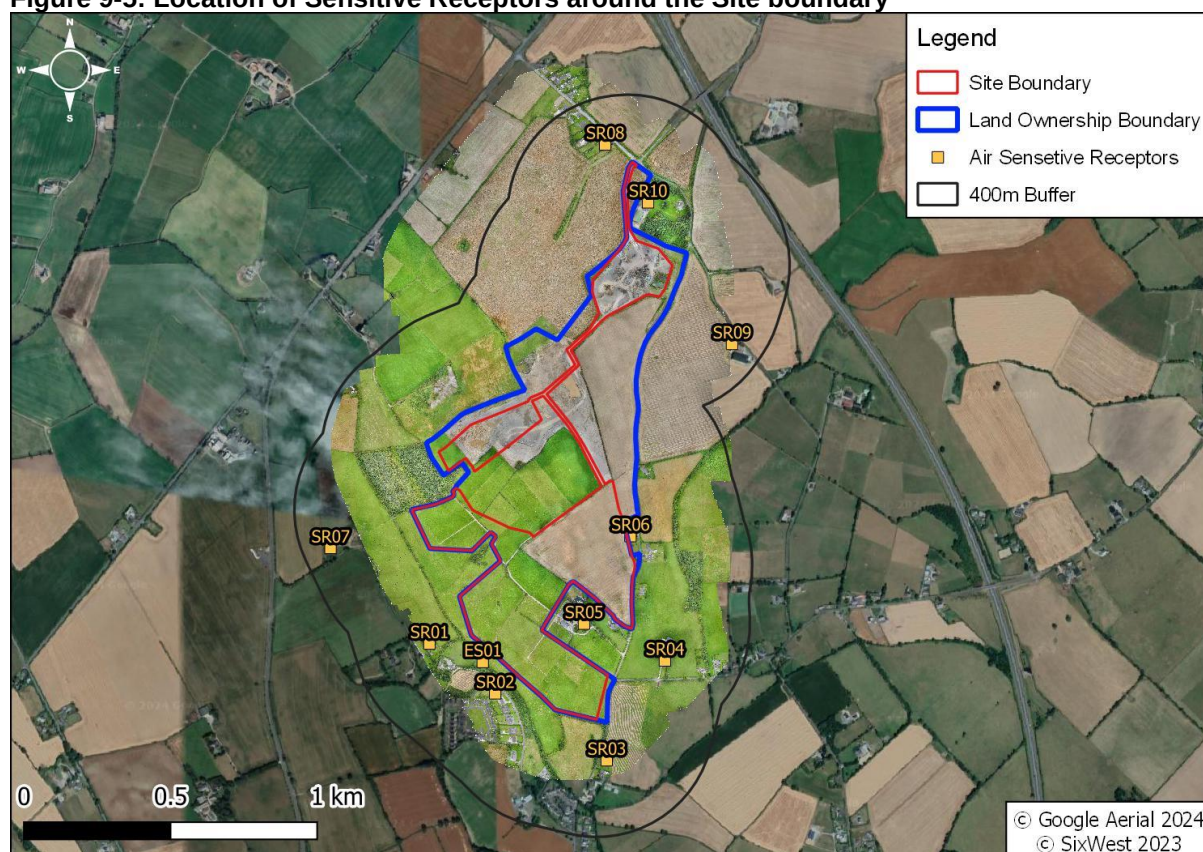
Table 9-6: Identification of Sensitive Receptors (SRs)

ID	ITM (Easting, Northing)		Description of Sensitive Receptor	Distance/ Ordination from Emission Source (m)	Terrain between Site and Receptor
	E	N			
SR01	276297	180504	Proxy for residential dwellings to the southwest of the Site	ca. 146m (southwest)	Terrain between the receptor and dust generating activities includes an agricultural field. Potential buffers within this terrain hedgerows around the periphery of the Site and hedgerow forming field boundaries.

ID	ITM (Easting, Northing)		Description of Sensitive Receptor	Distance/ Ordination from Emission Source (m)	Terrain between Site and Receptor
	E	N			
SR02	276522	180334	Proxy for residential dwellings to the southwest of the Site	ca. 96m (southwest)	Terrain between the receptor and dust generating activities includes an agricultural field. Potential buffers within this terrain hedgerows around the periphery of the Site and hedgerow forming field boundaries.
SR03	276902	180106	Proxy for residential dwellings to the south of the Site	ca. 142m (south)	Terrain between the receptor and dust generating activities includes an agricultural field. Potential buffers within this terrain is hedgerows around the periphery of the Site, and hedgerows along the road boundary
SR04	277100	180446	Proxy for residential dwellings to the east of the Site	ca. 157m (east)	Terrain between the receptor and dust generating activities includes an agricultural field. Potential buffers within this terrain hedgerows around the periphery of the Site and hedgerows along the road boundary
SR05	276824	180571	Residential dwellings to the east of the Site (proxy for both dwellings at this location)	ca. 88m (east)	Terrain between the receptor and dust generating activities includes an agricultural field. Potential buffers within this Terrain between the receptor and dust generating activities includes hedgerows around the periphery of the Site, and agricultural sheds.
SR06	276983	180869	Proxy for residential dwellings to the east of the Site	ca. 11m (east)	Terrain between the receptor and dust generating activities includes an agricultural field.
SR07	275960	180829	Residential dwellings to the west of the Site	ca. 306m (west)	Terrain between the receptor and dust generating activities includes an agricultural field, hedgerows and a small area of forestry.
SR08	276897	182203	Proxy for residential dwellings to the north northwest of the Site	ca. 114m (north northwest)	Terrain between the receptor and dust generating activities includes an agricultural field and hedgerows.
SR09	277329	181524	Agriculture Buildings to the northeast of the Site	ca. 295m (northeast)	Terrain between the receptor and dust generating activities includes an agricultural field
SR10	277043	182006	Residential dwellings and agriculture buildings to the north of the Site	ca. 75m (north)	Terrain between the receptor and dust generating activities includes an agricultural field, woodland area and existing buildings

ID	ITM (Easting, Northing)		Description of Sensitive Receptor	Distance/ Ordination from Emission Source (m)	Terrain between Site and Receptor
	E	N			
ES01	276479	180441	Ecological Receptor – Palatine Stream to the Southwest of the Site	ca. 30m (southwest)	Terrain between the receptor and dust generating activities includes an agricultural field

Figure 9-5: Location of Sensitive Receptors around the Site boundary



9.3.8 Designated Ecological Receptors

The closest ecological receptors to the Site are the River Barrow, River Nore SAC (site code: 002162), located ca. 1.7km to the west and the Palatine stream (site code: 15844), located ca.31m southeast of the Site boundary. Oakpark pNHA site code: 000810) is located ca. 2.5km to the southwest. A European Protected Site (Natura 2000), the Slaney River Valley SAC (site code: 000781) is located ca. 6.7km to the southeast.

Following the IAQM Guidance on assessing the effects of mineral dust on ecological receptors, any potential area will be included if it is located within the 400m radius of the Proposed Development. As none of the ecological sites identified are within 400m of the Proposed Development, the potential for fugitive dust effects on these receptors are determined as not likely and not significant and will not be assessed any further.

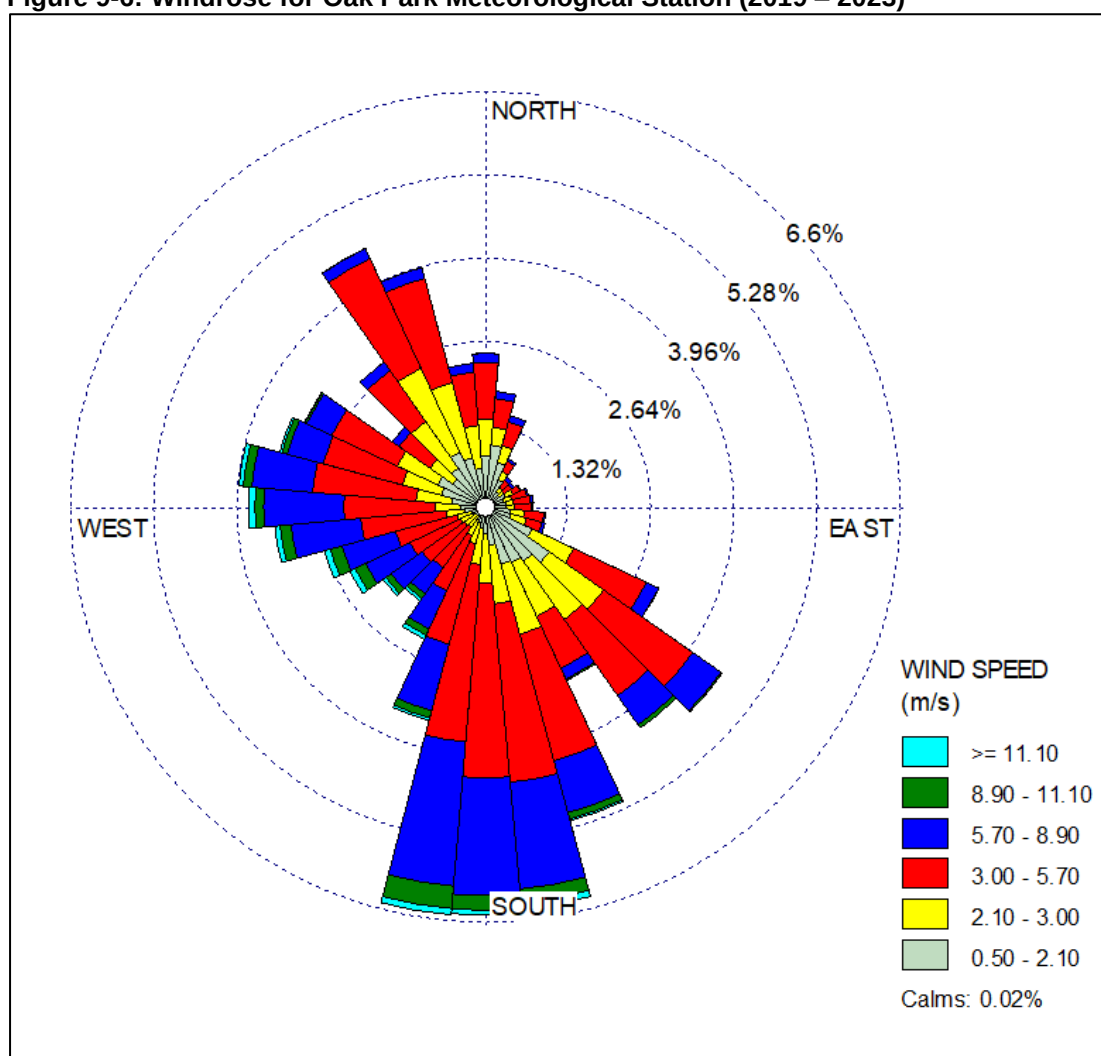
9.3.9 The Impact of Weather on Dust Emissions

Weather conditions can have a significant effect on the dispersion of ambient dust, thus influencing the impacts on nearby sensitive receptors. Higher levels of dust deposition typically occur during dry spells associated with medium to strong breezes (>5.50m/s).

The nearest synoptic meteorological station is Oak Park Co. Carlow. The station is located ca. 7.7km southwest of the Proposed Development.

A windrose diagram was completed to determine the potential influence of wind direction and speed on airborne dust particles, shown in Figure 9-6 below. The meteorological data consisted of five years of data (2019-2023 inclusive). Due to its relative proximity to the Proposed Development, the windrose taken from Oak Park station is determined to be represented of conditions at the Site.

Figure 9-6: Windrose for Oak Park Meteorological Station (2019 – 2023)



The average wind speed recorded over the period is 7.4m/s (2019-2023). The prevailing wind direction is from the south and therefore, receptors located to the north have increased sensitivity to the impacts of dust from the Proposed Development. Table 9-7 below summarises the rainfall and wind speed data from the meteorological station.

Table 9-7: Weather data for Oak Park station between 2019-2023

Year	Average Wind Speed (m/s)	Total Precipitation (mm)
2019	7.5	865.4
2020	8.1	910.1
2021	7.0	784.8
2022	7.3	840.1
2023	7.4	867.4

9.4 Characteristics & Predicted Impact of the Proposed Development

The main potential effects on air quality from the Proposed Development are dust emissions, which can have the following impacts:

- Disamenity dust arising from dust deposition on surfaces – e.g. window ledges, cars, plants, laundry drying outside; and,
- Threats to human health arising from increased concentrations of dust particles (PM₁₀) suspended in the air.

Assessment of disamenity dust and suspended dust particles (PM₁₀) is detailed below. With regard to disamenity dust, three phases of the Proposed Development were considered:

- Construction Phase (Site Preparation);
- Operational Phase; and,
- Restoration Phase.

The operation of on-site plant, which are powered by diesel engines, will omit nitrogen oxides, particulate matter and carbon monoxide, all which have the potential to impact air quality.

9.4.1 Construction Phase (Site Preparation Phase)

As per the description of the Proposed Development presented in Chapter 3, the Site preparation phase will be completed over a period of six months. The activities associated with this preparation phase includes:

- Installation of security fencing and signage around the periphery of the Site;
- Removal of topsoil under archaeological supervision;
- Removal of overburden and the construction of berms; and,
- Seeding berms to preserve the soil materials.

The planting of berms will provide a screen to sensitive receptors as the assemblage develops. The potential dust generating activities are fully considered in the mineral dust risk assessment presented in section 9.5.2 below.

9.4.2 Operational Phase

The Operational Phase of the Proposed Development is expected to last between 15 years and will present the greatest potential for dust generation of the project. The Operational Phase will comprise of the following activities:

- The extraction of sand and gravel;
- On-site transportation to the processing area;

- Washing, screening and stockpiling of aggregates;
- Off-site transportation of aggregates;
- Importation of uncontaminated soil and stone; and,
- Handling of uncontaminated soil and stone and subsequent infilling following extraction activities in each zone.

As such, an excavator, loading shovel (2x) and dump truck (2x) will be required to operate within the Site boundary for extraction purpose.

In terms of importation of greenfield soil and stone, a loading shovel, dumper truck and bulldozer will be required to spread out the fill material uniformly across the Site.

The movement of HGVs and the operation of on-site plant have the potential to cause impacts on local air quality through the release of NO₂ to the atmosphere.

Potential traffic emissions were screened in accordance with the thresholds set out by the Transport Infrastructure of Ireland, Technical Guidance on Air Quality Assessments [78]. According to the guidance, a detailed assessment is required when:

- Heavy duty vehicles ('HDVs') (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 annual AADT1 or more.

There will be no additional traffic associated with the Proposed Development.

According to the IAQM Guidance on Demolition and Construction [80], exhaust emissions from on-site plant and on-site traffic are unlikely to make a significant impact on local air quality. Therefore, assessing the potential impacts on air quality as a result of plant and traffic on-site has been screened out.

9.4.3 Restoration Phase

The restoration will be done in line with a Restoration Plan, which is submitted with this planning application. The restoration will comprise placement of the topsoil and subsequent seeding to establish a habitat similar to that which existed prior to extraction activities.

The potential for dust emissions will be similar to that outlined for the construction phase.

9.5 Dust Risk Assessment

9.5.1 Suspended Dust

The IAQM Guidance on Mineral Dust states [72]:

"if the long-term background PM₁₀ concentration is less than 17µg/m³, there is little risk that the Process Contribution (PC) would lead to an exceedance of the annual mean objective..... 17µg/m³ is considered to be a suitable screening value for an assessment of annual mean PM₁₀ concentrations"

This figure is based on the estimated maximum annual process contribution of 15µg/m³ for mineral extraction activities.

When determining the background concentrations of PM₁₀ at the Proposed Development, it was conservatively estimated that the 2-year (2022-2023) average for Zone D (11.7µg/m³) will be used. (Section 9.4.3 above).

1 Annual Average Daily Traffic

Table 9-8 below details the Predicted Environmental Concentrations ('PEC') of ambient PM₁₀.

Table 9-8 : Calculated PEC from Proposed Development

Parameter	PM ₁₀ concentrations (µg/m ³)
Maximum Process Contribution*	15µg/m ³
Background Concentration	11.7µg/m ³
Predicted Environmental Concentration (PEC)	26.7µg/m ³
Annual mean objective	32µg/m ³
Annual AQS Limit for PM ₁₀	40µg/m ³

*determined from the IAQM guidance,

The PEC is 26.7µg/m³, which is below the annual mean objective of 32µg/m³. According to the IAQM Guidance [72], if the predicted environmental concentration of PM₁₀ is less than 32µg/m³, there is little risk of the annual AQS limit being exceeded and no further consideration of the risk posed by ambient PM₁₀ concentrations is warranted.

9.5.2 Disamenity Dust Risk Assessment

As per the IAQM Guidelines [72], the assessment of disamenity dust follows the Source-Pathway-Receptor Concept, whereby a combination of the Residual Source Emission (Source), frequency of wind speeds (Pathway) and the distance of the receptors to the source (Receptor) determines the likely impacts of disamenity dust. Residual Source Emissions were determined for all activities associated with the Proposed Development and will be discussed as cumulative sources of dust emissions.

Table 9-9 below shows the estimation of the magnitude of Residual Source Emissions.

The magnitude of the Residual Source Emissions was determined based on the scale of the anticipated operations at any one time and was classified between small and large, taking into account the designed-in mitigation, see section 9.6.1. The assessment in Table 9-9 was completed in accordance with IAQM Mineral Dust Guidance [72], see Appendix 9-1.

Table 9-9: Classification of Residual Source Emissions

Activity	Activity Details (all values are approximate)	Magnitude of Residual Source Emissions
Site Preparation/Restoration	- Active site area for excavation ca. 25.5 ha; - Bunds will be ca. 2m high which will be seeded; - Total of 1,125,000 tonnes of inert soil and stone imported to the Site; - There will be less than 5 plant active at anyone time, - Stockpiling will occur.	Large

Activity	Activity Details (all values are approximate)	Magnitude of Residual Source Emissions
Mineral Extraction	- Total working extraction area ca. 25.5ha; - Extraction rate up to 500,000 tonnes per annum; - Drilling and blasting will not occur as part of the Proposed Development; - Material to be extracted is primarily sand and gravel (High dust dispersion potential); and, - Two loading shovels, two dumpers, one excavator will be used daily for movement of aggregates.	Medium
Material Handling	<10 loading plant in operation at anyone time; - The material will be transported over well established and maintained haul routes; and, - Materials will be manged/handled >50m from receptors.	Medium
On-site Transportation	- The material will be transported over well established and maintained haul routes; and - Materials will be manged/handled >50m from receptors.	Medium
Stockpiling/Exposed Surfaces	- Aggregates will continue to be screened washed using state of the art equipment with design in dust measures; - Stockpiling of aggregate will continue to occur within the existing processing area, hence providing some cover from the wind; - Daily transport of high dust potential materials; and, - Quarry production estimated at maximum 500,000 tonnes per annum.	Medium
Off-site Transportation	- There will be up to 168 HGV movements (84 trips inward and 84 trips outward) per day; - HGVs will transport materials via well established and maintained routes to the quarry; - The HGVs will go through the on-site-wheel washes before leaving the Site; and, - There will be a road sweeper available to clean public roads, if necessary.	Medium

The residual source of emission quantifies how much dust is expected to be generated by activities, including designed mitigation measures and any additional mitigation measures applied. To determine the impact on sensitive receptors, it is important to consider how the dust will be transported, i.e. the Pathway Effectiveness [72]. The site-specific factors considered to determine the Pathway Effectiveness of the dust emissions are the distance and direction of receptors, relative to the prevailing wind directions.

For each receptor, wind frequency with speed >5.5m/s from the direction of the dust source emission was calculated for the five years of Met Eireann data for Oak Park station (2019-2023). This >5.5m/s wind speed is characterised as a moderate breeze and is used as a general threshold for determining when wind dispersion is most likely to occur [72]. According to the IAQM, high-risk meteorological conditions are when the wind is coming from the direction of the dust source at a sufficient strength during periods of little or no rainfall (<0.2mm) or 'dry days'. As such, the meteorological information used for the risk assessment was filtered only to represent dry days. The direction and frequency of these wind speeds are shown in Figure 9-7 below.

Criteria for wind speed, ranging from infrequent to very frequent, are detailed in Appendix 9-1. Table 9-10 below details the categorisation of wind-related to each sensitive receptor along with the pathway effectiveness, as per the IAQM Guidelines [72].

When determining the rating of the receptor distance from the dust source, close represents a receptor less than 100m from the source, intermediate represents a receptor between 100-200m from the dust source and a distant distance represents a receptor between 200-400m from the dust source. Table 9-10 below details these sensitive receptors and their classification based on the Pathway Effectiveness.

Figure 9-7: Wind rose for Oak Park Synoptic Station 2019-2023

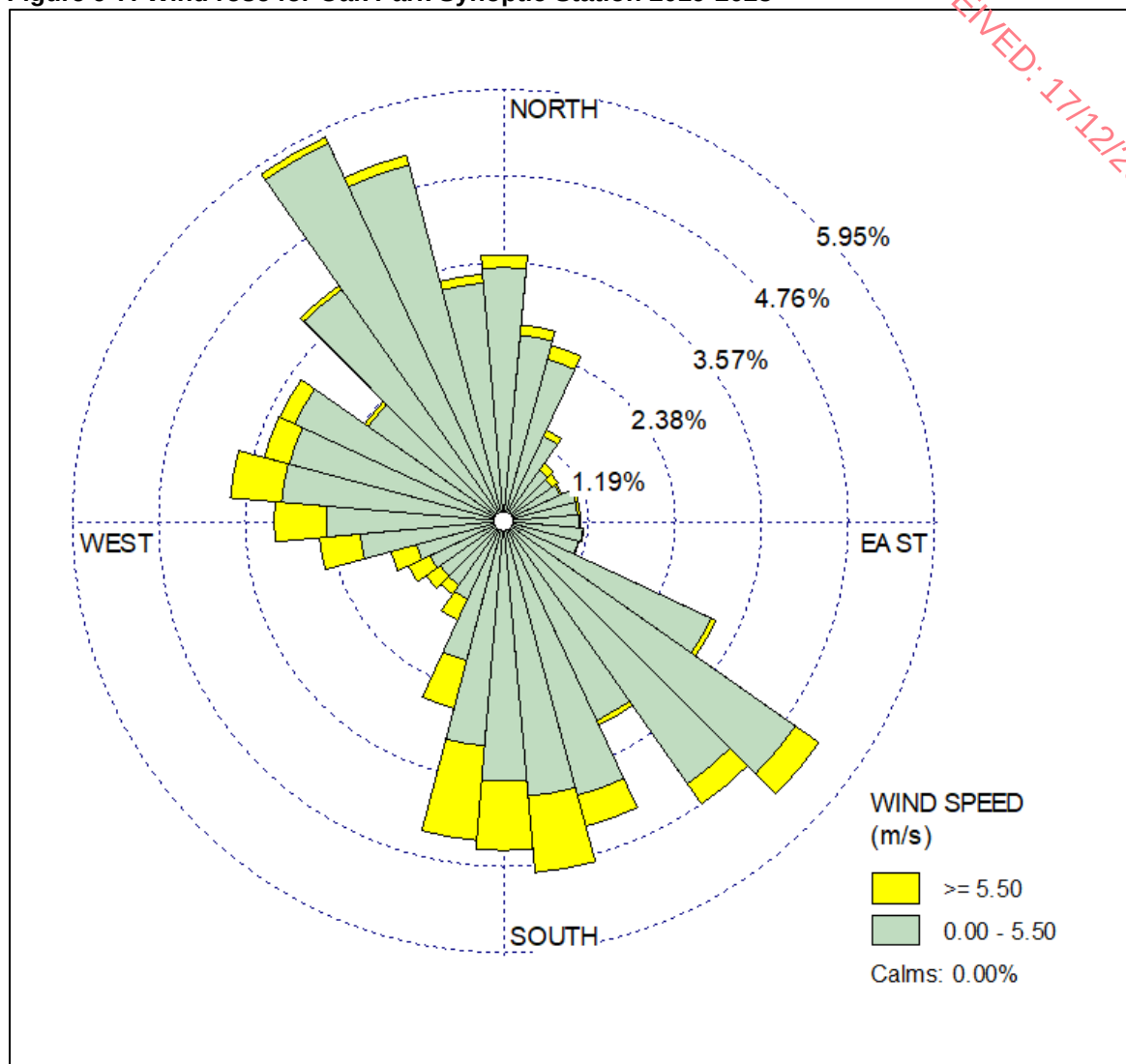


Table 9-10: Classification of Pathway Effectiveness

ID (Receptor Sensitivity)	Distance from the Emission Source (Orientation to emission source)	Frequency of wind from the direction of dust source (including dry weather) (>5.5m/s)	Pathway Effectiveness
SR01 (High)	ca. 146m (southwest) Intermediate	0.40% (156 hours) coming from the northeast (5-45 degrees) Infrequent	Ineffective
SR02 (High)	ca. 97m (South) Close	0.55% (216 hours) coming from the north (355-45 degrees) Infrequent	Ineffective
SR03 (High)	ca. 142m (southeast) Intermediate	0.5% (200 hours) coming from the northwest (335- 15 degrees) Infrequent	Ineffective
SR04 (High)	ca. 157m (west) Intermediate	0.38% (150 hours) coming from the northwest (315-355 degrees) Infrequent	Ineffective
SR05 (High)	ca. 89m (West) Close	0.6% (238 hours) coming from the northwest (325- 15 degrees) Infrequent	Ineffective
SR06 (High)	ca. 52m (northeast) Close	0.44% (174 hours) coming from the northwest (305-355 degrees) Infrequent	Ineffective
SR07 (High)	ca. 305m (west) Distant	0.2% (86 hours) coming from the northeast (35-65 degrees) Infrequent	Ineffective
SR08 (High)	ca. 114m (northeast) Intermediate	3.3% (1284 hours) coming from the southwest (175-215 degrees) Infrequent	Ineffective
SR09 (High)	ca. 295m (east) Distant	1.3% (520 hours) coming from the southwest (235- 265 degrees) Infrequent	Ineffective

ID (Receptor Sensitivity)	Distance from the Emission Source (Orientation to emission source)	Frequency of wind from the direction of dust source (including dry weather) (>5.5m/s)	Pathway Effectiveness
SR10 (High)	ca. 74m (north) Close	2.8% (1090 hours) coming from the southwest (185-235 degrees) Infrequent	Ineffective
ES01 (High)	ca. 45m (south) Close	0.6% (246 hours) coming from the northeast (345- 35 degrees) Infrequent	Ineffective

Note: Close receptors include 5 increments of degrees. Intermediate receptors include 4 increments of degrees. Distant receptors include 3 increments of degrees.

As all the SRs are residential dwellings and the ecological receptor is a hydrological connection to the River Barrow and River Nore SAC, their sensitivity to dust deposition is considered to be high.

Having considered the distance of the receptors from the emission source and the frequency of winds (>5.5m/s) on dry days, the pathway effectiveness was derived for each sensitive receptor.

From Table 9-10, the pathway effectiveness was “ineffective” for ten human receptors (SR01 to SR10) and one ecological receptor (ES01).

To identify the potential risk of dust impact on the receptors, the pathway effectiveness and residual emission sources were considered together. As the residual source emissions ranged from medium to large, large was applied to them all, as recommended in the IAQM guidelines.

The estimation of dust impact risk from this process is outlined in Table 9-11.

Table 9-11: Dust impact Risk for Sensitive Receptors

ID	Residual Source Emission	Pathway Effectiveness	Dust Impact Risk
SR01	Large	Ineffective	Low Risk
SR02	Large	Ineffective	Low Risk
SR03	Large	Ineffective	Low Risk
SR04	Large	Ineffective	Low Risk
SR05	Large	Ineffective	Low Risk
SR06	Large	Ineffective	Low Risk
SR07	Large	Ineffective	Low Risk
SR08	Large	Ineffective	Low Risk
SR09	Large	Ineffective	Low Risk
SR10	Large	Ineffective	Low Risk

ID	Residual Source Emission	Pathway Effectiveness	Dust Impact Risk
ES01	Large	Ineffective	Low Risk

The risk of dust impact has been estimated to have a 'Low risk' for human receptors SR01-SR10 and 'Low risk' for the ecological receptor (ES01) where no mitigation measures implemented.

To identify the magnitude of dust impact on the receptors, the risk of dust impact and receptor sensitivity were considered together. As all human receptors identified were dwellings and the ecological receptor is a hydrological connection to a SAC it is classed as high sensitivity. As the risk of impact from dust on receptors SR01-SR10 and ES01 was identified as Low Risk, assessment to determine the magnitude of effect (Refer to Table 9-12 below).

Table 9-12: Magnitude of Dust Impact on Human Receptors

ID	Receptor Sensitivity	Dust Impact Risk	The Magnitude of Dust Effect
SR01	High	Low Risk	Slight Adverse Effect
SR02	High	Low Risk	Slight Adverse Effect
SR03	High	Low Risk	Slight Adverse Effect
SR04	High	Low Risk	Slight Adverse Effect
SR05	High	Low Risk	Slight Adverse Effect
SR06	High	Low Risk	Slight Adverse Effect
SR07	High	Low Risk	Slight Adverse Effect
SR08	High	Low Risk	Slight Adverse Effect
SR09	High	Low Risk	Slight Adverse Effect
SR10	High	Low Risk	Slight Adverse Effect
ES01	High	Low Risk	Slight Adverse Effect

It is estimated that the magnitude of dust effect may have a "Slight adverse effect" on all human and ecological receptors without the appropriate mitigation measures in place.

9.5.3 Unplanned Events

Plant refuelling will occur on-site by a trained operator in a designated area. Nevertheless, where refuelling occurs there is always a risk of fire, which could result in emissions to air. The likelihood of such an occurrence is considered low, and the impact of consequences is considered medium. However, any adverse impact on air quality would be short-term, as the fire would be confined to the refuelling points on-site and extremely unlikely to spread to outside the Site boundary of the Proposed Mitigation Measures

9.5.4 Dust Mitigation Measures

Mitigation measures for the Proposed Development are divided into general measures (e.g. Site management and maintenance) and those more specific to the construction / operation / restoration phases of the Proposed Development.

As the dust effects for the Site showed the highest dust impact risk of “Slight Adverse Effect” based on the Disamenity dust risk assessment, this highest rating should be considered when applying general mitigation measures. Table 9-13 below details the suggested mitigation measures associated with the Proposed Development.

A dust monitoring programme is in place for the existing Ballyburn Pit and will continue for the Site and agreed upon by the Local Authority. The dust monitoring programme will be implemented primarily during the Operational Phase of the Proposed Development but will also incorporate aspects of the Site preparation and restoration phases.

Table 9-13: Proposed General Mitigation Measures

General Mitigation Measures for the Entire Site (Construction, Operation and Restoration Phases)	
Design Measures	- Hedgerows surrounding the periphery of the Site will be maintained and allowed to grow; - The materials initially excavated from the Site will be used to build an embankment along the boundaries; - Access road surfaces will be maintained to a high standard; - Additional haul routes will maintain sufficient distance away from sensitive receptors; and - There is an existing wheel wash which will be utilised for all outward movements for all phases of development.
Existing Mitigation Measures	- Internal road surfaces are maintained to a high standard; - Conveyors, stockpiles, and internal roads are sprayed with water to dampen down any dust generated; - Berms are constructed and planted with vegetation where possible to minimise dust blow-off from the site. - Roads are sprayed with water to dampen; - Regular sweeping of public roads, as required; - Maintaining all transport vehicles in a clean and appropriate visual appearance; and, - Applying a cover to vehicles transporting fine dry materials to prevent the fine material from escaping the trailers.
Construction/Operation/Restoration Measures	The following mitigation measures will be implemented to minimise dust generation, during the Construction Phase/Operational Phases/Restoration Phases: - Record all dust and air quality complaints, identify cause(s), take appropriate action; - Electronic complaints log will be maintained within the Site, available for review at any reasonable time; - Provide training to Site personnel on dust mitigation measures to be implemented at the Site; - Maintain good communication with the local community; - Public roads outside of the Site, should be regularly inspected; - Speed restrictions within and around the quarry (20km/hr); - Site roads will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface, unsurfaced routes will be kept to essential traffic only; - Stockpiled material will be dampened down as necessary to prevent dust dispersion;

- Stockpiles will be stored in enclosed areas to prevent wind whipping
- During dry and/or windy conditions, dampening of appropriate surfaces (i.e. roads, routes, infill area if necessary) should be completed as required; and,
- All vehicles used during the Proposed Development, should be maintained to a high standard to allow optimum operation conditions.

With the implementation of the above mitigation measures, the risk of potential impacts on sensitive receptors is considered “not significant”.

9.5.5 Rehabilitation Phase

Relevant mitigation measures listed in Sections 9.6.1 will be implemented during the Rehabilitation Phase, if and as required. Given the proposed rehabilitation design, dust generation is not anticipated to be significant during this phase.

9.6 Potential Cumulative and In combination Effects.

There is potential for a cumulative and in combination effect from disamenity dust from the Proposed Development and the activities within the existing Ballyburn Pit have been considered throughout this Chapter. The potential for in-combination and cumulative effects to occur beyond what has already been assessed is not likely to occur.

9.7 Interactions with other Environmental Attributes

Chapter 5 – Population and Human Health. Air Quality is an important consideration for human health, as potential PM₁₀ concentrations can effect human health. However, the assessment on air quality showed there was little risk that the Proposed Development would have exceeded the AQS-standards, indicating negligible effect on human health.

Chapter 6 – Biodiversity: Air quality can potentially impact ecosystems; however, this assessment demonstrated that the emissions to air from the Proposed Development will have no negative impacts on ecosystems.

Chapter 10 – Climate: Potential emissions associated with vehicle movement on-site can influence GHG emissions associated with the Proposed Development. These potential impacts have been further detailed in the climate chapter. Impacts from fugitive dust are determined to be short-term and therefore the impacts on climate are determined as not significant.

Chapter 13 – Material Assets: Traffic & Transport: Air quality can be impacted by increased traffic volumes. However, there will be no additional traffic associated with the Proposed Development.

9.8 Residual Impacts

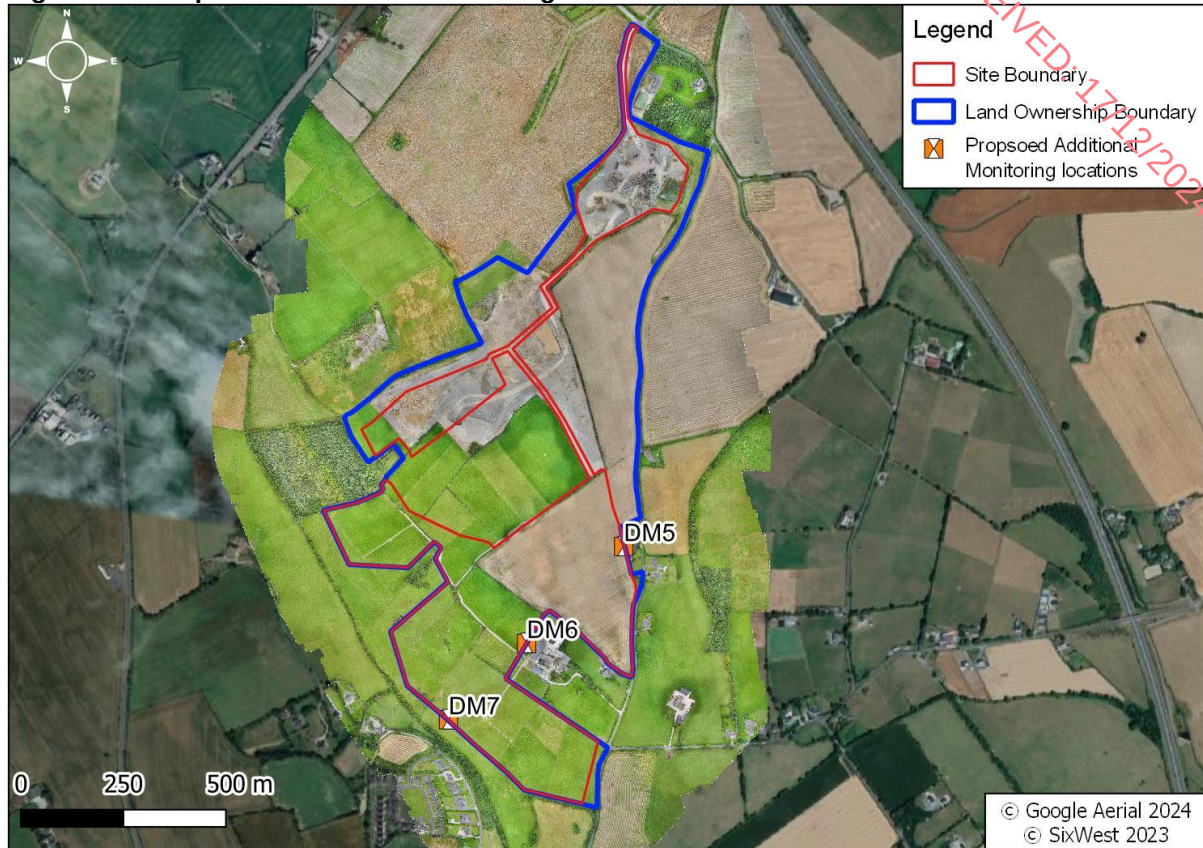
Given the baseline environment, type and intensity of activities, and mitigation measures to be implemented, the potential residual impact from ambient dust (or PM₁₀) is considered to be “Negligible”

Given the baseline environment, type and intensity of activities, and mitigation measures to be implemented, the potential residual impact from disamenity dust is considered to be “Not Significant”

9.9 Monitoring

Section 9.3.5 above details the locations of existing Bergerhoff monitoring locations associated with the Ballyburn Pit. Four locations are currently located around the boundary of the Ballyburn Pit (D1, D2, D3, D4). The location of these points is shown in Figure 9-2 above. Three additional monitoring points are proposed along the Site boundary as shown in Figure 9-8 below.

Figure 9-8: Proposed Additional Monitoring Locations



9.10 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

9.11 Difficulties Encountered

No difficulties were encountered.

10 CLIMATE CHANGE

10.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely impacts of the Proposed Development on climate change in the context of national greenhouse gas ('GHG') emissions. This chapter will also assess potential impacts to the Proposed Development from identified climate hazards.

10.2 Methodology

The potential risks of climate change to the Proposed Development have also been assessed by completing a climate risk assessment. By utilising available policy and guidance, the risk to assets associated with the Proposed Development from potential climate hazards was determined. The identification of climate hazards was achieved through a detailed desk-based review of local, regional and continental scale tools. This assessment has used the following policy and guidance:

- Kildare County Council Development Plan 2023-2029 [7];
- Kildare County Council Climate Change Adaption Strategy 2019-2024 [84];
- Irelands Greenhouse Gas Projections 2020-2040 [85];
- IEMA: Environmental Impact Assessment Guide to Assessing Greenhouse Gases and Evaluating their Significance, 2017; [86]
- International Panel on Climate Change: Guidelines for National Greenhouse Gas Inventories, 2019 [87];
- ISO 14064 Part 1: Specification with guidance at the organisational level for quantification and reporting of greenhouse gas emissions and removals [88];
- The European Commission – Climate ADAPT [89];
- The European Commission – The European Climate Data Explorer [90];
- The European Commission – The Copernicus Climate Change Service [91];
- Environmental Protection Agency – Climate Ireland [92];
- Global Facility for Disaster Reduction and Recovery - ThinkHazard [93];
- Department of Communications, Climate Action and Environment – Climate Action Plan 2023 [94];
- Transport Infrastructure of Ireland – Carbon Tool [78];
- Department of Communications, Climate Action and Environment – National Adaption Framework, Planning for a Climate Resilient Ireland, 2018 [95]; and,
- Government of Ireland – Technical Annex B Climate Change Risk Assessment, 2023.

The potential effects of the Proposed Development on climate change were determined through an assessment of the sources of GHG emissions from the Proposed Development. The assessment of GHG follows IEMA's *Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance* [86]. These guidelines specify the use of emission factors, which were sourced from the Transport Infrastructure of Ireland's ('TII') Carbon Tool [78]. The TII Carbon Tool is primarily used for lifecycle assessments of national roads and rail projects but provides a comprehensive list of emission factors and methods to calculate GHG emissions that are relative to the Proposed Development.

Due to the size and nature of the Proposed Development, there is no potential for impacts on microclimate in terms of wind tunnelling and shading. As such, potential impacts on microclimate will not be assessed.

10.2.1 Policy Context

10.2.1.1 Paris Climate Agreement

The Paris Agreement is a legally binding international treaty on climate change that was adopted by 196 parties at the COP 21 in Paris 2015 [96]. The goal of the agreement is to limit global warming to below 2°C, preferably 1.5°C, compared to pre-industrial levels. The agreement aims to reach a global peaking of GHG emissions as soon as possible to achieve climate neutrality by 2050. The agreement includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change, and calls on countries to strengthen their commitments over time [96]. The agreement provides a pathway for developed nations to assist developing nations in their climate mitigation and adaption efforts, while creating a framework for the transparent monitoring and reporting of countries' climate goals.

10.2.1.2 National Adaption Climate Framework

The National Climate Adaption Framework ('NCCAF') was developed in 2018 [95], under the Climate Action Law and Low Carbon Development Act of 2015. The aim of the statutory framework was to set out a national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. The strategy also aims at improving the enabling adaption through online engagement with the civil society, the private sector and the research community [95].

The key objective of the NCCAF is to support climate action by setting out policy and with a view of becoming more resource-efficient and contributing to the low carbon economy.

The extractive industry is not currently identified under the NCCAF, this assessment has therefore utilised the plan to provide context only. For the purpose of the GHG assessment, national limits for the Transport and Electricity sector will be considered. For those emissions not associated with the Transport or Electricity sector, the GHG emissions will be compared to the First and Second National Carbon Budget's (2021 to 2025, 2026 to 2030).

10.2.1.3 Climate Action Plan 2024

The Climate Action Plan 2024 is the annual update to Ireland's Climate Action Plan. The plan is was prepared in accordance with the Climate Action and Low Carbon Development (Amendment) Act 2021 [94].

The Climate Action Plan sets out the roadmap to deliver on Ireland's climate ambitions, and aligns with the legally binding economy-wide carbon budgets and sectoral emission ceilings that were agreed by the Government in 2022. Whilst the extractive industry is not considered in any of the sectors outlined in the Climate Action Plan, specific industries were used for contextual purposes and are discussed in section 10.3.4 below.

10.2.1.4 Climate Change Risk Assessment

The minister for the Environment, Climate and Communication has launched a set of guidelines to assist local authorities in preparing climate action plans under the Climate Action and Low Carbon Development (Amendment) Act 2021 [97].

These guidelines have been issued under the provisions of the Act and are therefore statutory in nature for the respective local authorities to complete. These are outlined in Technical Annex B – Climate Change Risk Assessment [97]. The annex was prepared for local councils to aid in preparing climate risk assessments for their constituents and includes the following:

- Identifying the range of climate hazards that have previously affected the local authority and its administrative area; and,
- Assessing the exposures and vulnerabilities of the local authorities and its administrative areas to these hazards.

Whilst the Climate Change Risk Assessment has been adapted at a county level and is therefore a much larger scale than that of the Proposed Development, the basic premise of identification and classification of the frequency and level of impact caused by hazards has been followed using this guidance as far as practicable.

10.2.1.5 Kildare County Council Development Plan 2023 to 2029

The county development plan contains the following policies with respect to climate change [7]:

Aim:

“The County Development Plan guides future growth and development in the County. The new Cork County Development Plan sets out the policy objectives and the overall strategy for the proper planning and sustainable development of the County over the plan period from 2022 to 2028. The Plan sets out an approach centred on the core principle of sustainability with a focus on creating vibrant, liveable, climate resilient communities. This Plan is consistent with both the ‘National Planning Framework’ (2018) (NPF) and the ‘Regional Spatial and Economic Strategy’ (2020) (RSES).”

CS 02:

“Ensure that the future growth and spatial development of County Kildare provides for a county that is resilient to climate change, enables the decarbonisation of the county’s economy and reduces the county’s carbon footprint in support of national targets for climate mitigation and adaption objectives as well as targets for greenhouse gas emissions reductions.”

CS 08:

“Support the implementation of Kildare’s Climate Change Adaptation Plan in conjunction with all relevant stakeholders.”

RE 02:

“Continue to promote Kildare, together with the Kildare Local Enterprise Office and national development agencies, as a strategically located economic and employment hub within the Greater Dublin Area and support and facilitate the development of an environment that fosters innovation, enterprise and entrepreneurship but also maintains a core focus on issues around climate change and biodiversity.”

RE 073:

“Ensure that climate action and sustainable development is central to economic development in the County through sustainable land use and orderly growth and a co-ordinated approach to the preparation and implementation of the Kildare County Council Climate Change Adaptation Strategy (2019-2024) and the Local Economic and Community Plan (2016-2021) and any successors thereof.”

RD 048:

“Manage the finite aggregate resources being mined by the extractive industries in the county to supply the future needs of our region while working to reach our climate change targets.”

10.2.1.6 Kildare County Council Climate Change Adaption Strategy 2019-2024

The Kildare County Council Climate Change Adaption Strategy features a range of actions across the sectors of Energy and Buildings, Flood Resilience Transport, Resource Management and Nature-Based Solutions and Communities that collectively address the targets of the plan.

The consequence of extreme weather events, relating to flooding, storms and snow and ice events, in Co. Kildare, have been assessed in the Climate Adaption Strategy and will be considered in the assessment of climate risks associated with the Proposed Development (section 10.3.3 below).

10.2.2 Assessing Greenhouse Gas Emissions

Anthropogenic greenhouse gas emissions ('GHG') emissions have a global effect when they are released into the atmosphere over time. Therefore, assessing the effects of GHG emissions of the Proposed Development at a local level are inconsequential to these global emissions.

Currently, there is no set methodology to evaluate significance criteria or a defined threshold for GHG emissions for the extractive industry. The quantity of emissions from a quarry is dependent on the size and type of activities that are occurring within a site. The main sources of GHG emissions associated with the Proposed Development are from the use of mineral diesel by vehicles as well as operating plant and equipment on-site.

According to the IPCC 2019 refinement of the 2006 publications of Guidelines for National Greenhouse Gas Inventories [87], GHG emissions can be split into three categories (or 'scope'):

- Scope 1: Direct emissions from sources owned or controlled by the reporting entity, such as emissions from combustion of fuels used in plant and machinery;
- Scope 2: Indirect emissions associated with the generation of purchase heat, steam and water; and,
- Scope 3: Other indirect emissions that occur in the value chain.

For the purpose of this stage of the assessment, potential GHG emissions have been divided into Scope 1, Scope 2 and Scope 3 emissions, as recognised by the ISO 14064 Part 1 Standard [88]. Table 10-1 below details the scopes that were considered for this assessment.

Table 10-1: Scoped Emissions used in the GHG Assessment

Scope	Source
Scope 1 – Direct Emissions	Operation of on-site plant
Scope 2 – Indirect Emissions Associated with the Proposed Development	Electricity purchased associated with the entire Site
Scope 3 – Indirect Emissions	Truck and vehicle movements assumed to be owned by third parties

Scope 1 emissions will arise from the operation of plant/equipment operated and owned by the Proposed Development. The equipment expected to be operating on-site within the Proposed Development boundary includes:

- Mobile modular processing/Screening Plant;
- Excavator;

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- Articulated Dump Truck (x2);
- Generator;
- Mobile Crusher;
- Mobile Screener;
- Dozer; and,
- Loading Shovels (x2).

It is estimated that the total diesel usage at the site is ca. 382,766 litres per annum. Emission factors (kg of Carbon Dioxide Equivalent ('CO_{2e}') per litre used) were provided by the TII Carbon Tool [98], which has taken these specific emission factors from databases such as the SEAI and the BEIS to convert GHG's into CO_{2e}.

It is estimated that 20% of HGVs travelling to and from the Site are owned by Morrissey's. However, as no exact figure is available at the time of this report, all HGV movements have been considered under Scope 3 emissions for clarity.

Scope 2 emissions were based on the electricity usage provided by the Applicant in terms of total annual electricity usage which was estimated at (50,115kWh).

Scope 3 emissions, those indirectly influenced by the operations of the Proposed Development, include vehicle movements not owned by the company (contracted HGVs, employee vehicles and delivery vehicles). It is estimated that 168 HGV movements (84 truck movements incoming and 84 outgoing) will be required in a typical day and will be inclusive of both incoming uncontaminated soils and out-going aggregates. With regards to employee movements (Scope 3 emissions) details from the Central Statistics Office estimates that the average worker travelled in 2021 was 12.7 kilometres. A conservative estimate of 15km per day (30km round trip) was used. It is estimated that approximately 16 trips (8 incoming and 8 outgoing) will be used per day to cover staff journeys (as detailed in Chapter 3).

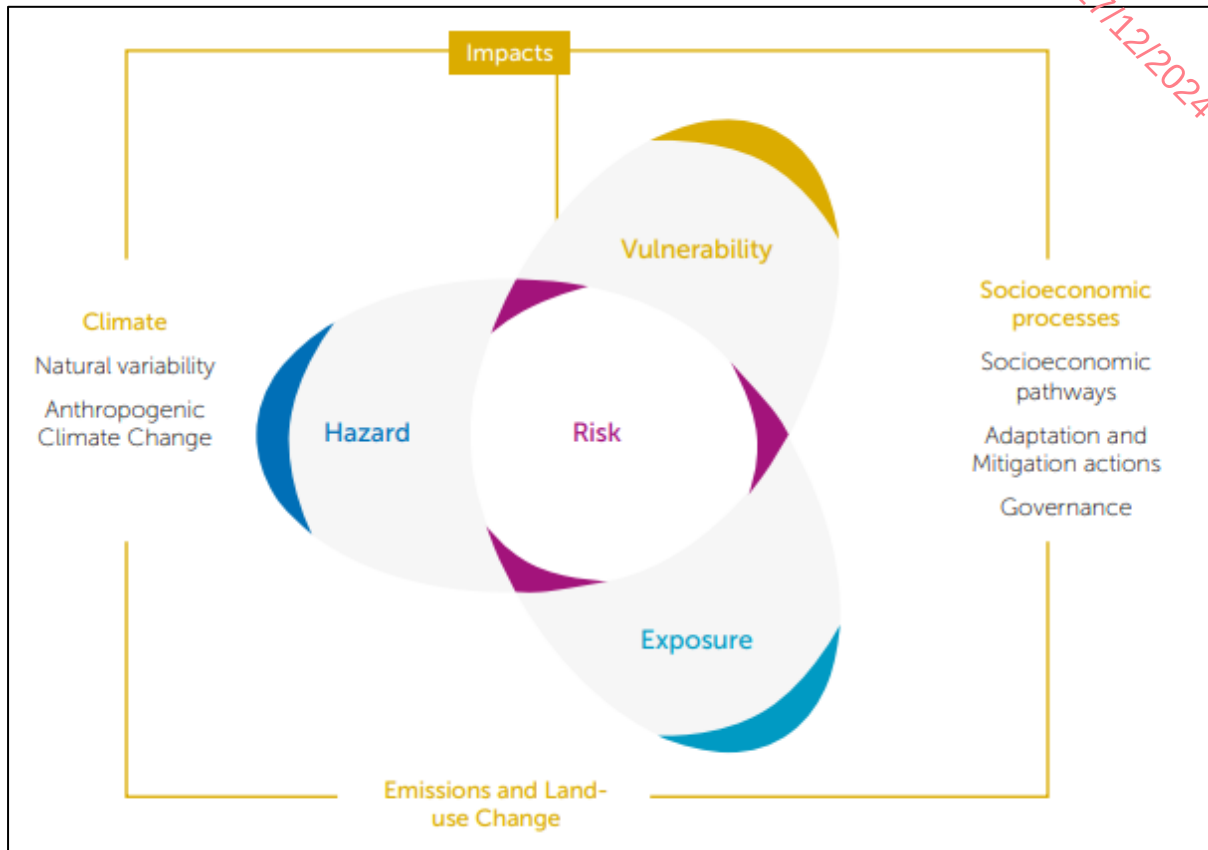
10.2.3 Climate Change Risk Assessment

The IPCC define three key components of a climate risk that interact and combine to generate the risks of climate impact. These include:

- Hazard: The potential occurrence of a natural or human-induced physical event or trend (such as heatwave, heavy rainfall event, or sea level rise) that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.
- Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services and resources, infrastructure, or economic, social or cultural assets in places and settings that could be adversely affected (e.g. homes in a flood plain); and,
- Vulnerability – The propensity or predisposition to be adversely affected (e.g. peoples underlying health conditions can be worsened by high temperatures or heatwaves).

Figure 10-1 below displays the framework for identifying potential climate risk associated with a development.

Figure 10-1: IPCC Sixth Assessment Report 'risk propellor'



In accordance with the Annex B Guidelines for local councils on identifying and characterising climate hazards, the frequency and the magnitude of impact across various risk areas (from asset damage to reputation) and the exposure of these areas to the potential climate hazards. Due to the scale and nature of the Proposed Development, the climate vulnerability assessment will only be associated with the physical vulnerability of the Proposed Development to climate hazards (present and future) defined as:

Properties of an asset related to the structure or facilities can exacerbate/reduce the impacts before, during or after a hazard event e.g. poor design and construction of building provision of active cooling.

The impacts of climate risks that will potentially cause disruption to the delivery of services and functions for the Proposed Development are considered as the main focus of this assessment. Descriptions of the level of impacts range from Catastrophic (Widespread service failure with services unable to cope with wide-scale impacts) to Negligible (Appearance of threat but no actual impact on service provision), these are further detailed in Appendix 10-1). The Magnitude of impact, in accordance with the Annex B Guidelines, will only relate to asset damage, due to the nature of activities on the site. The magnitude of impact across the asset damage categories ranges between Negligible (impacts can be absorbed) to catastrophic (Disaster with the potential to lead to shut down or collapse or loss of assets/network). The frequency of these climate hazards range from Rare (<1% occurrence in a year, occurs once in over 100 years) to Very Frequent (>100% occurrence in a year, occurs several times in a

single year). Full details on these quantitative/qualitative descriptions are presented in Appendix 10-1.

Future changes in climate hazards will be identified as likely to be of significance if the current climate hazards exposure to the Proposed Development are determined to be significant. A detailed desk-based review of available resources (Climate Ireland, ThinkHazard, Climate-ADAPT) will be used to determine the potential climate hazards that the Proposed Development may be exposed to in the present and future.

10.3 Receiving Environment

10.3.1 Baseline Climate

The climate of Ireland is primarily driven by ocean influences, mainly the Atlantic, resulting in maritime climate conditions. This results in relative warm summers and mild winters. The wettest months of the year typically occur between November to January. The prevailing wind direction is from the southwest, contributing heavily to the wet weather experienced in the winter/spring, warmer temperatures in the summer.

Typically, climate is averaged weather data over 30-year periods to determine long-term trends in important variables such as temperature, precipitation and windspeed. The period of 30-years is considered long enough to smooth out year to year variations. Recently, Met Eireann has compiled a set of climate averages for the period 1991 to 2020.

The nearest station to the Proposed Development, which has the available 30-year averages has the 1991 to 2020 averages, is Casement Aerodrome, Co. Dublin, located 53km to the northeast (Table 10-2 below).

Table 10-2: Climate Averaged Data from Casement Aerodrome (1991 to 2020)

Variable	1991 to 2020 Averages
Mean Temperature (°C)	9.9
Precipitation (sum of monthly mean in mm)	783.5
Mean of wind speed (kn)	10.1
Mean number of days with gale force winds	16

According to Met Eireann's Climate Average Report, which compares the 1961 to 1990 averages to the 1991 to 2020 averages the following is noted:

- Annual mean air temperature for Ireland has increased by approximately 0.7°C. Spring showed the highest increase (0.8°C), whilst winter showed the smallest increase (0.6°C);
- Annual average rainfall has increased by approximately 7% between the two periods. The greatest increase was seen in the west and north of the country;
- The 30-year average annual distribution of rainfall shows a typical west to east decline in the number of rain days and wet days, with east and southeast regions experiencing the lowest number of wet days; and,

- The average annual number of very wet days observed over the period 1991 to 2020 shows that these events are more frequent in the west of the country than in the eastern and midland regions.

10.3.2 Projected Future Climate Change

Observed changes in Ireland's climate over the last century are in line with global and regional trends associated with human induced climate change. Climate projections in Ireland are based on global GHG emission scenarios, predicting the future usage of fossil fuels globally and the corresponding release of GHG gases. The Representative Concentration Pathway ('RCP') is a trajectory adopted by the IPCC [99]. RCP scenario 4.5 (RCP4.5) represents an intermediate scenario with emissions expected to peak in 2040 and then decline [99]. RCP scenario 8.5 (RCP8.5) is the worst-case scenario approach based on an overestimation of projected coal outputs [99]. The range of these scenarios provide an intermediate and worst-case estimation of potential changes in the environment in response to climate change. Based on this range, the following projections were made regarding Ireland's climate:

- Projected seasonal changes in temperature range from 0.9°C to 1.9°C (RCP8.5), with an increase in the duration and intensity of heatwaves expected;
- Projected changes in the frequency of very wet days (>30mm of precipitation) range between a 21% increase (RCP4.5) and a 31% increase (RCP8.5); and,
- Projections regarding regional scale sea-level risk and changes in wind speed require more comprehensive research to determine the long-term trends.

10.3.3 Climate Hazards

As discussed in section 10.3.3, climate hazards were identified following a desk-based review of available resources. Full details on the hazards identified from the review are presented in Appendix 10-1. For the purpose of this assessment, the following hazards were considered relevant to vulnerability of the assets associated with the Proposed Development:

- Flooding (River);
- Heatwaves/Droughts;
- Cold Snaps;
- Landslides;
- Extreme Rainfall; and,
- Wildfires.

The frequency and level of impact of these hazards will be assessed based on the Annex B Guidelines on Climate Vulnerability Assessments [97].

10.3.4 National Sectoral Emission Ceiling

The National Sectoral Emission Ceilings refer to the total amount of permitted GHG emissions that each sector of the economy can produce during a specific period of time.

Under Section 6C of the Climate Action and Low Carbon Development Act (as amended) sectoral emission ceilings are set out to outline the maximum amount of GHG emissions that are permitted in different sectors of the Irish economy.

This Act commits Ireland to achieve climate neutrality by no later than 2050. The carbon budget programme, which includes three successive 5-year periods of national emission ceilings, are measured in tonnes of CO_{2e} (tCO_{2e}).

Table 10-3: Irelands National Carbon Budget

National Climate Budget	Emission Ceiling for Assessment Period
First Carbon Budget (2021 to 2025)	295,000,000
Second Carbon Budget (2026 to 2030)	200,000,000
Third Carbon Budget (2031 to 2035)	151,000,000

It is outlined that considerations need to be made with regards to how emissions may develop post 2030, to establish a basis for proposals for the provisional third carbon (2031 to 2035).

Within the national carbon budgets, sectoral emission ceilings have been created to reflect the EPA's Emission Inventory. Currently, the sectoral emission ceilings are only presented for the first two carbon budget periods (2021 to 2025 and 2026 to 2030). For GHG emissions associated with the Proposed Development, sectoral emissions for the Transport Sector (Table 10-4) will be used to account for emissions associated with vehicle movements. Emissions associated with the electricity generation will be compared against the Electricity Sector emission ceiling for the respective period (Table 10-4 below).

Table 10-4: Sectoral Emission Ceilings relative to the Proposed Development

Sectors	First Sectoral Emission Ceiling (2021 to 2025) (tCO _{2e})	Second Sectoral Emission Ceiling (2026 to 2030) (tCO _{2e})
Transport	54,000,000	37,000,000
Electricity	40,000,000	20,000,000

Other sources of emissions associated with the Proposed Development, such as the operation of plant and water usage, are not currently accounted for in any of the sectoral emission ceilings under the Current Climate Action Plan 2024 [94]. As such, these emissions were compared to the first and second national climate budgets respectively. It is anticipated that emissions beyond 2030 will be influenced by improvements in plant performance, advancements in energy sources, and increased utilisation of renewable energy. Therefore, it is not feasible to extrapolate current estimates of emissions beyond 2030.

10.4 Characteristics and Potential Effects of the Proposed Development

10.4.1 Characteristics of the Proposed Development

GHG emissions will mainly arise from the following activities that will take place at the Proposed Development:

- Movement of HGVs associated with the transport of aggregates to market and importation of uncontaminated soil and stone by-products;
- Use of machinery on-site for excavation, handling and processing of materials; and,
- Electricity usage.

The Proposed Development will operate within the current permitted capacity for Ballyburn Pit as it will utilise current permitted HGV movements and will not result in additional traffic. As such there will be no change to baseline traffic numbers.

Nevertheless, potential carbon dioxide emissions associated with the transport of aggregate materials/uncontaminated soil and stone by-product and the operation of plant and machinery have been calculated and compared to national emission targets, as part of this assessment.

10.4.1.1 Construction Phase – Site Preparation

As per the description of the Proposed Development presented in Chapter 3, the Construction Phase (Site Preparation works) will occur over a period of 6 months. The Construction Phase will include the removal of vegetation and overburden stripping.

Over the course of a 6-month period, land will be converted into a quarry landscape, which has the potential to result in a net CO_{2e} loss by the removal of vegetation that would have sequestered carbon.

The Construction Phase of the Proposed Development will use existing equipment and ancillary infrastructure (such as wheel wash and welfare facilities) as far as practicable, removing the necessity to construct or employ additional equipment, resulting in any additional GHG emissions.

10.4.1.2 Operation Phase

The Operational Phase of the Proposed Development is expected to span over ca. 15 years and will involve activities such as aggregate excavation and processing and the haulage of materials to/from the market. As discussed, no additional HGVs or plant will be used to service the Proposed Development.

For the purpose of the assessment regarding GHG emissions, calculations will be compared as a proportion of the first two sectoral emission ceilings (2021 to 2025 and 2026 to 2030) as explained in section 10.4.4 above.

To calculate the GHG emissions, a typical year will be used as the first basis and then extrapolated over the relative carbon budget period. Since the Proposed Development is anticipated to commence in 2024 only two years of CO_{2e} will be incorporated into the assessment. For the second carbon budget, a total of 5-years' worth of GHG emissions will be assessed.

The GHG emissions associated with the Proposed Development will be sourced from Scope 1 (litres of fuel used per annum), Scope 2 (electricity usage) and Scope 3 (vehicle movements), which have been identified and discussed in section 10.3.2 above. These emissions encompass direct activities from on-site processing and other emissions associated with the project supply chain.

10.4.1.3 Restoration Phase – Site Closure

Upon completion of the extraction activities proposed as part of the Operational Phase, the Site will be subject to a Restoration Plan.

The restoration will comprise of placement of the topsoil and subsequent seeding to establish a habitat similar to that which existed prior to the historic quarrying. The final restoration phase of the Site will potentially occur in ca.2039 which is outside the scope of this assessment.

10.5 Potential Effects of/to the Proposed Development

10.5.1 Climate Change Risk Assessment

The Climate Vulnerability Assessment determines the sensitivity of the Proposed Development to climate hazards combined with the corresponding exposure of the Proposed Development to these hazards. To determine the potential vulnerability, the receptors associated with the Proposed Development have been divided into the following:

- On-site Assets (e.g. plant, equipment and building);
- Inputs (Electricity and Water);
- Outputs (Mineral Processing/infill activities, Operating Capacity); and,

- Transport Links.

Table 10-5 below identifies the potential impacts to the identified receptors using UK Guidance on *Adapting to Climate Change: Industry sector examples for your risk assessment*.

Table 10-5: Potential Impacts to the identified receptors from Climate Change

Climate Hazard	Potential Impacts on Quarry Receptors
Temperature related (cold snaps, heatwaves, droughts)	• Pressures on cooling systems, such as bearing or belts; • Fuel storage, both conventional and waste, need special consideration to avoid spontaneous combustion; • Lower inherent moisture can lead to movement problems and increased dust deposition during mineral processing; • Increased heat or sun exposure can cause the expansion of metallic infrastructure in building elements or tracks, or rapid degradation of materials such as rubbers or plastics; • Increased snowing and snow loading could damage buildings and other structures; • Drought restrictions on abstractions may affect availability of water leading to reduced water for processing use and dust control; and, • Severe cold can lead to contraction of metals and embrittlement of materials such as plastic, rubber and metals.
Wildfires	• Wildfires can cause extensive damage to quarry infrastructure; • Working activities may have to be suspended during a wildfire to ensure safety of their employees and equipment; and, • Wildfires can cause damage to access roads and transportation routes.
Flooding	• Increases in groundwater levels due to sea level rise can cause quarries to become brackish; • Impacts on the wider supply chain infrastructure for critical emissions control plant by docks and road access flooding • Increased in flow may cause damage caused from flooding; • Bunded areas could get flooded reducing their capacity; • Potential for increased site surface water and flooding; • Increased rainfall can result in the washing of suspended solids from all areas, including stockpiles and roadways causing blocked drainage infrastructure and off-site pollution; and, • Increases in groundwater levels may affect material extraction from the quarry.
Landslides	• Erosion can lead to the depletion of valuable resources in the quarry, reducing the overall quality and quantity of available resources for extraction; • Landslides and erosion can damage infrastructure beyond the quarry itself; • Landslides can endanger the safety of quarry workers and equipment; and, • Landslides and soil erosion can disrupt quarry operations by blocking access roads and damaging equipment.

10.5.1.1 Frequency of Climate Hazards

Based on the Annex B Guidance on current climate hazards, the frequency of the climate hazards were quantified through an analysis of available information. The frequency scores assigned, rated between 1-5 for each hazard, are justified below.

Table 10-6: Frequency of Climate Hazards

Climate Hazard	Frequency Score	Frequency Description	Justification
Wildfires	1	Rare	According to the Global Wildfire Information Service there is no evidence for wildfire activity within 5km of the Proposed Development between 2002 and 2022.
Heatwaves / Droughts	4	Frequent	According to the Met Éireann the definition of a heat wave in Ireland is shaded air temperatures reaching highs of above 25° C on five or more consecutive days at the same location. According to temperature data from a local weather station (Oak Park– ca. 7.7km to the southwest) the following number of classified warm occurred: July 2006 (5 consecutive days above threshold). July 2013(5 consecutive days above threshold). June 2017 & 2018 (5 and 7 days consecutively above threshold); July 2018 (10 days consecutively above threshold); July 2021 (9 days consecutive above threshold); August 2022 (5 days consecutive above threshold); and, September 2023 (6 days consecutive above threshold). The frequency of Heatwave/Droughts was given the classification of 'Frequent' as the higher occurrence of heatwaves from 2021-2023
Cold Snaps	2	Occasional	According to Met Eireann a yellow weather warning occurs when low temperatures are expected to be below -3°C. The minimum temperature values from the local Oakpark weather station indicated that the following was identified: Between 2003 to 2023 the number of times minimum temperatures fell below -3°C was 105 times, including 53 times between 2010 and 2011; and, Between 2017 and 2023 the levels have fallen below the threshold 29 times, indicating a decreasing frequency of cold spells in the local area.

Climate Hazard	Frequency Score	Frequency Description	Justification
Extreme Rainfall	2	Occasional	According to Met Eireann, a yellow weather warning for rainfall occurs when daily precipitation exceeds 30mm in a single day. The daily precipitation values from a local weather station (Castledermot Kilkea House – 6.0km northwest of the Proposed Development) indicates the following: Since 1983 to 2003 the number of times daily precipitation exceeded 30mm was 17 times; Since 2003 to 2023 the number of times daily precipitation exceeded 30mm was 16; and, Records show that since 1983, an exceedance in the rainfall threshold would occur on at least one occasion every year. The occurrence of an orange weather warning (>50mm) has only occurred twice since 1985 (July 1985 & 2000). The frequency of Extreme Rainfall was given the classification of 'Occasional' as the low occurrence of an orange weather warning since 1983.
Flooding	2	Occasional	According to flood maps available, the Proposed Development is not located within the bounds of the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme for Low, Medium or High probability river flood events. The Proposed Development is located within the boundary of the National Indicative Fluvial mapping – Present Day. There is record of a reoccurring flood event ca 30m to the east of the Proposed Development, at Knockbane (ID-1581).
Landslides	1	Rare	According to the Geological Survey of Ireland (Landslide Susceptibility Map), there are no recorded landslides within 5km of the Proposed Development. The susceptibility of the Proposed Development to landslides has been classified as "Low (inferred)".

It is important to recognise that there can be co-occurrences of multiple hazards (such as prolonged dry temperatures increasing the risk of wildfires). However, given the small spatial nature of the Proposed Development and the rarity of associated hazards, these impacts are not considered further.

10.5.1.2 Potential Impacts of Current Climate Risks

The impacts of current climate risks will result in the disruption to the delivery of service and function expected to be performed by the Proposed Development. For each of the climate hazards identified, the potential impacts as categorised as "Asset Damage" will be determined in accordance with the Annex B Guidelines (Appendix 10-1). This quantification of potential impacts will be determined for each of the receptors identified

Table 10-7: Potential Impacts of Receptors to “Asset Damage” as a result of climate change

Receptors	Climate Hazard	Impact Score		Classified Asset Impact	Justification
On-site Assets		Wildfires	2	Minor	The highest impacts associated with on-site assets would be from extreme rainfall, flooding and landslide events. Due to the nature of activities located within a void, assets would be particularly vulnerable to water and moving mass as the mobility to move equipment in the event of a flash occurrence of such hazards would be severely reduced. The asset damage category of moderate is defined as “a serious event that requires additional emergency business continuity”.
		Heatwaves/ Droughts	1	Negligible	
		Cold Snaps	2	Minor	
		Extreme Rainfall	3	Moderate	
		Flooding	3	Moderate	
		Landslides	3	Moderate	
Inputs (Electricity and Water)		Wildfires	2	Minor	According to the KCC Climate Adaption strategy, cold snaps/snow events and extreme rainfall have the highest consequence to impact Kildare The asset damage category of moderate is defined as “a serious event that requires additional emergency business continuity”.
		Heatwaves/ Droughts	2	Minor	
		Cold Snaps	3	Moderate	
		Extreme Rainfall	3	Moderate	
		Flooding	3	Moderate	
		Landslides	2	Minor	
Outputs		Wildfires	2	Minor	Due to the nature of activities associated with the Proposed Development (processing and extraction of earth material) the highest level of impact for a hazard was for a flood and landslide event. The asset damage category of moderate is defined as “a serious event that requires additional emergency business continuity”.
		Heatwaves/ Droughts	1	Negligible	
		Cold Snaps	1	Negligible	
		Extreme Rainfall	2	Minor	
		Flooding	3	Moderate	
		Landslides	3	Moderate	
Transport Links		Wildfires	1	Negligible	

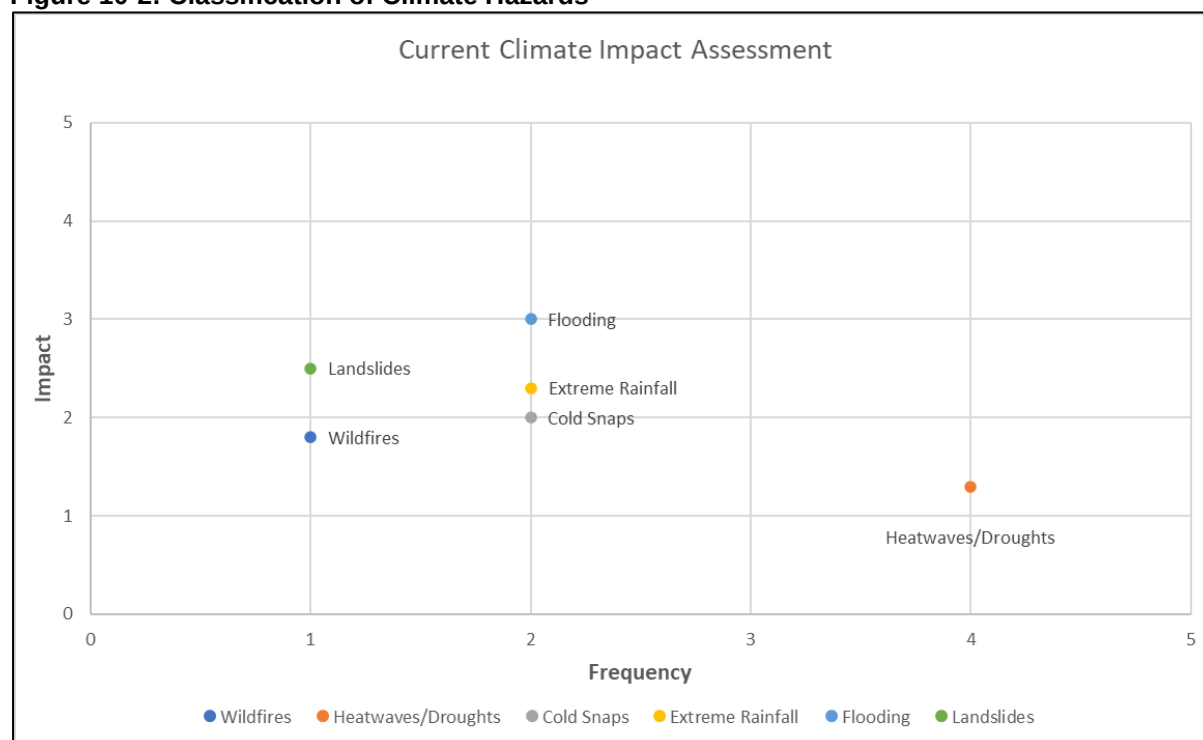
Receptors	Climate Hazard	Impact Score		Classified Asset Impact	Justification
		Heatwaves/ Droughts	1	Negligible	The highest level of impact that could affect the transport links associated with the Proposed Development would be a flood event, classified as moderate. This would be due to the nature of infrastructure, haul routes and internal road networks, would not have the adequate capacity to respond to a flood event compared to more complex road networks.
		Cold Snaps	2	Minor	
		Extreme Rainfall	1	Negligible	
		Flooding	3	Moderate	
		Landslides	2	Minor	

Based on a qualitative judgement of impacts on assets across all the receptors identified, the frequency and impact score for each hazard was identified and classified for the Proposed Development. (Table 10-8 below) with an illustrated graph presented in Figure 10-2 demonstrating how often a hazard type occurs, ranging in frequency from 1-5, and the potential impact of that hazard type on the Proposed Development ranging in impact 1-5 see Appendix 10-1 for further details.

Table 10-8: Summary of Current Climate Impacts for the hazards identified

Hazard Type	Current Frequency	Current Frequency Score	Average Impact Score (Across all Receptors)
Wildfires	Rare	1	1.8
Heatwaves/Droughts	Frequent	4	1.3
Cold Snaps	Occasional	2	2.0
Extreme Rainfall	Occasional	2	2.3
Flooding	Occasional	2	3.0
Landslides	Rare	1	2.5

Figure 10-2: Classification of Climate Hazards



***frequency is measured between 1(Rare) to 5 (Very Frequent). Impact is measured between 1 (Negligible) to 5 (Catastrophic). Further details are presented in Appendix 10-1.**

Based on the availability of information, it is not possible to quantify the potential future climate risks associated with wildfires and landslides. Based on this, and their current frequency, the potential effects of these hazards on the Proposed Development are considered not likely and not significant.

10.5.1.3 Potential Future Climate Risk

Understanding how climate change risks may evolve in the future is fundamental to identifying how existing risks may change as a result of climate change.

Table 10-9 below presents the future changes in climate hazards expected due to climate change, based on a desk-based review of the Climate Ireland platform. As assets are expected to remain similar throughout the Operational Phase of the Proposed Development, the level of impacts from these hazards will remain the same. Whilst the Operational Phase of the Proposed Development is expected to cease in ca. 2039 for a complete understanding of future climate risks, the CMIP climate scenarios outlined by Climate Ireland (RCP4.5 and RCP8.5) for the future period 2021-2050 will be discussed.

The Climate Ireland platform was used to determine the potential changes in frequency of these hazards. All climate hazards were assessed relative to the Proposed Development area as far as practicable.

Table 10-9: Future Changes in climate hazards expected due to Climate Change

Climate Hazard	Current Frequency Description	Future Frequency Description	Justification
Flooding	Occasional	Occasional	According to the CRAM Flood maps, the Proposed Development does not fall within the Mid-Range/High-End future scenario for Fluvial, or River Flood Extents. Given there is no change in the current and potential future change in frequency of flood events associated with the Proposed Development, the projected frequency of future flooding will remain occasional.
Heatwaves/Droughts	Frequent	Frequent	According to the Climate Ireland platform under RCP4.5 and RCP8.5, the number of heatwaves impacting the area associated with the Proposed Development are expected to increase to 0.2 and 0.35 heatwaves. Given the area associated with the Proposed Development shows higher levels of projected drought occurrences (Figure 10-3), compared to the rest of the country, the frequency of the hazard has been classified as Frequent.
Cold Snap	Occasional	Occasional	According to the Climate Ireland platform, under RCP4.5 the number of ice days (where the number of days when maximum temperature is <0°C) are expected to increase by 0.1 - 0.5 days between 2021-2050 associated with the Proposed Development. Under RCP8.5, the number of ice days are expected to decrease by 0.0 - 0.1 days over the same period. Due to the low change in frequency expected for ice days, the frequency of cold snaps hazards will remain as occasional (Figure 10-5 below).
Extreme Rainfall	Occasional	Occasional	According to the Climate Ireland platform, under RCP4.5 the number of days where precipitation will exceed 20mm (classified as a "Wet Day") is expected to be ca. 3-6 days, while the number of days where precipitation will exceed 30mm (classified as "Very Wet Day") is expected to be ca. 2-4 days. The number of wet days is modelled as ca 3-6 days and very wet days are modelled as ca 2-4 days under RCP8.5 also (Figure 10-4). Given the existing frequency of current rainfall events, under future climate change, the frequency of extreme rainfall is also classified as Occasional.

Figure 10-3: RCP4.5 and RCP8.5 Projected changes in number of heatwaves (2021-2050)

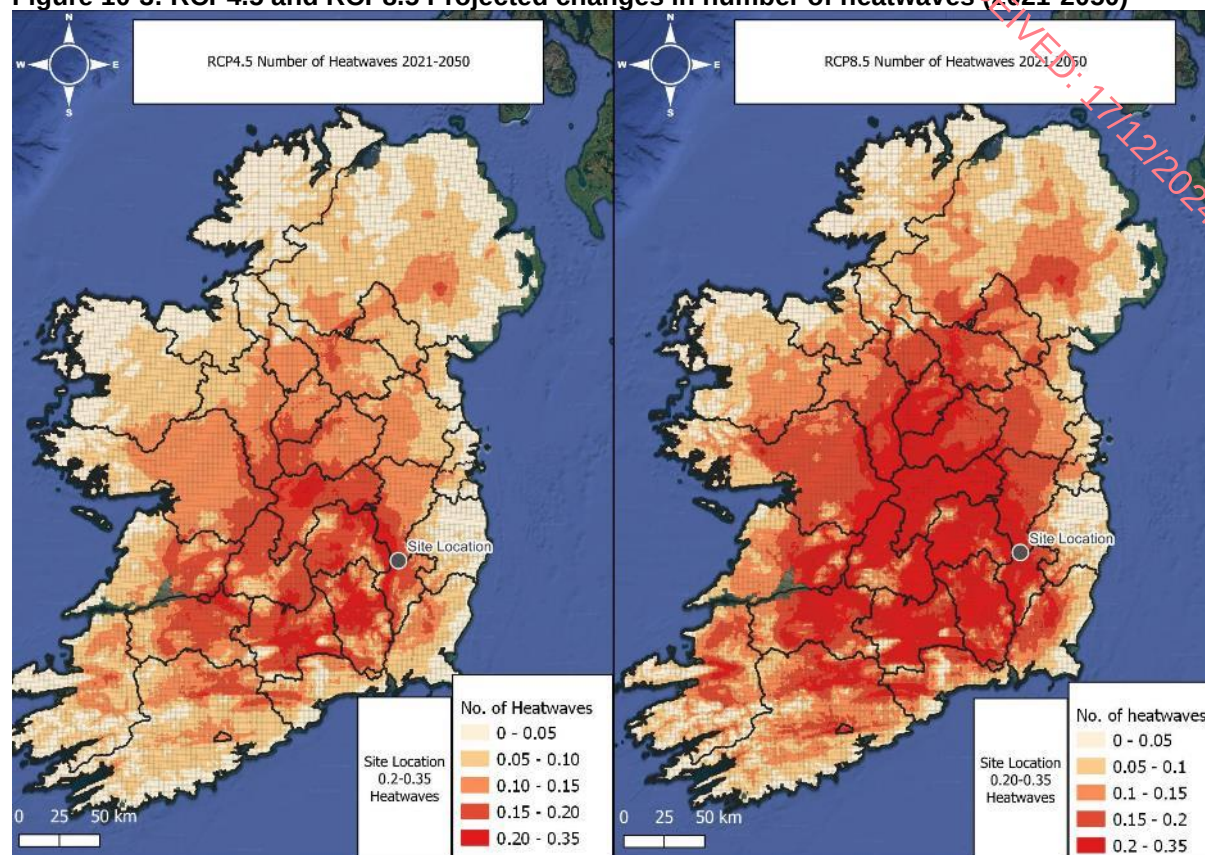


Figure 10-4: RCP4.5 and RCP8.5 Projected Changes in the number of Rain days (2021-2050)

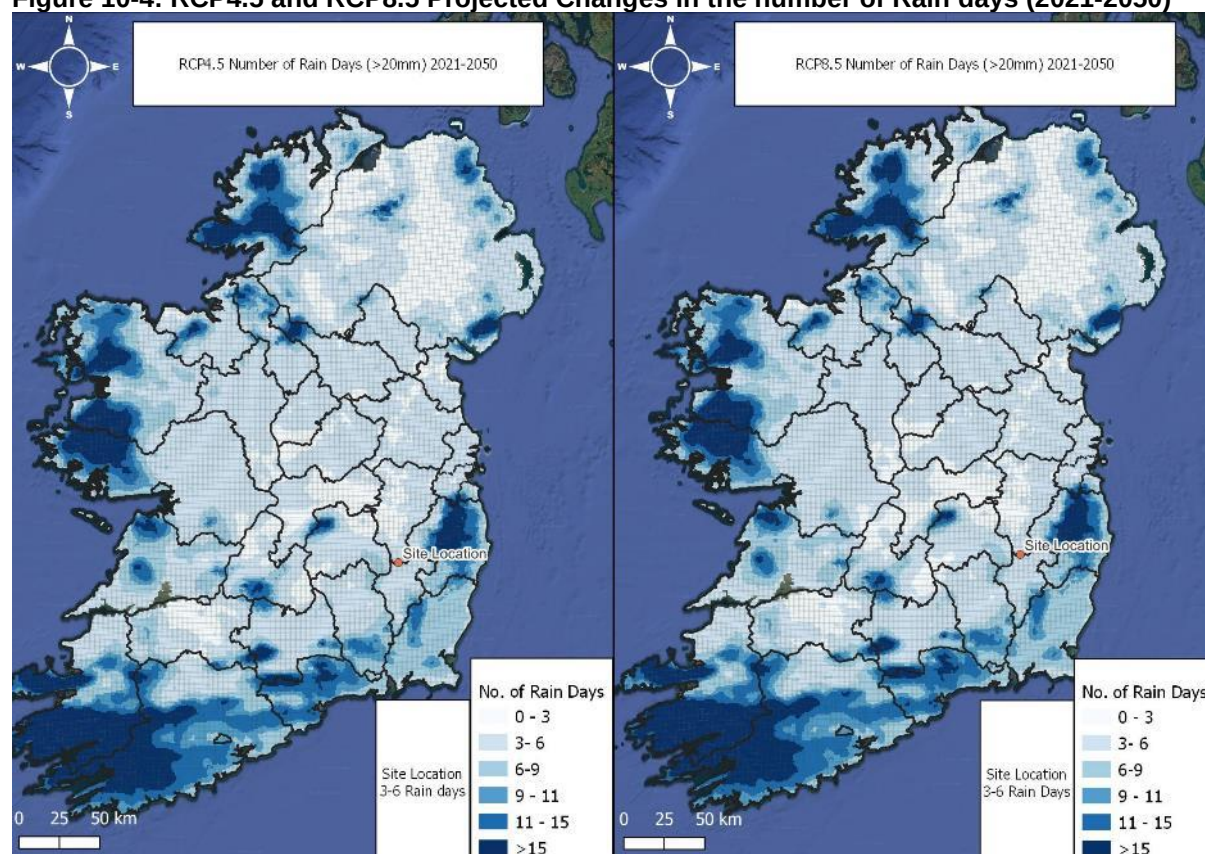
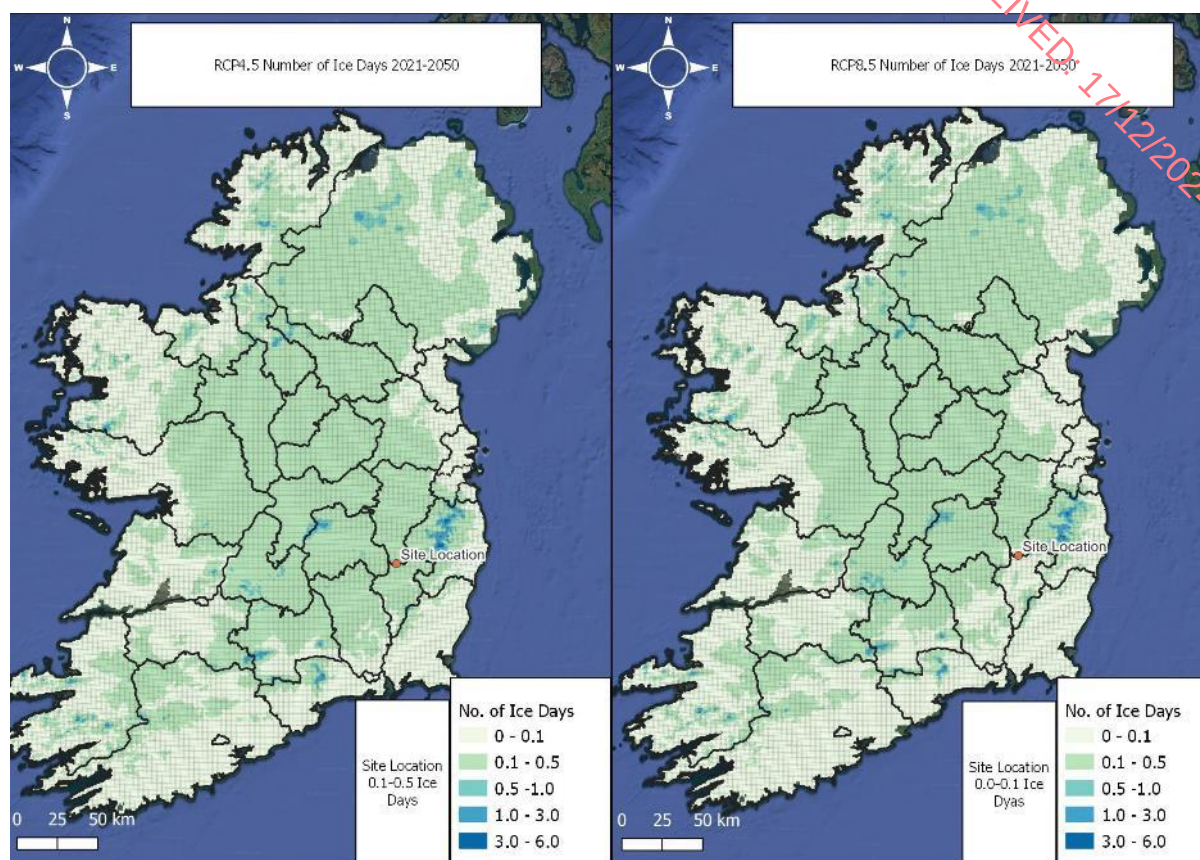


Figure 10-5: RCP4.5 and RCP8.5 Projected Changes in number of ice days (2021-2050)



Based on the availability of evidence, the frequency of most climate hazards associated with the Proposed Development will remain the same under future climate conditions. The frequency of heatwaves are expected to increase as a result of future climate change.

Due to the nature of the hazards identified and their understood change in frequency under future climate change, the county council climate adaption strategy is deemed appropriate to the scale of activities associated with the Proposed Development.

As the extractive industry is not currently covered as part of the climate adaption strategy for Kildare County Council, the indirect adaption measures proposed (such as sustainable management of water resources in response to drought conditions, and road improvement schemes as a result of warm weather) are deemed applicable to the Proposed Development. As such the impacts of climate on the Proposed Development are considered not significant in the context of these regional climate adaption strategies.

10.5.2 Greenhouse Gas Assessment

10.5.2.1 Operational Phase

The calculation of GHG emissions associated with Scope 1, Scope 2 and Scope 3 emissions, follows the methodology outlined by the IEMA Guidance [86] and the use of emission factors provided by the TII Carbon Tool, created and managed by the Transport Infrastructure of Ireland [98]. The emissions will be calculated for a typical year (250 days) and were compared against the relevant sectoral emission ceilings to evaluate significance.

The Operational Phase is expected to last ca. 15 years. However, further emissions were not completed past 2030 as the sectoral emission ceilings outline the difficulties in quantifying emissions from sectors post 2030 [95]. The extrapolation of emissions associated with the

Proposed Development represents a conservative estimation, as changes in technology will likely reduce emissions in the future.

As discussed in section 10.3.3 above, the Proposed Development is expected to use 382,766 litres of diesel per annum to fuel on-site plant. These total scope emissions equate to approximately 1021 tCO_{2e} being released as a result of this process. Thus, for the purpose of comparing emissions against the National Carbon Budget (295,000,000 tCO_{2e}), 1,021.0 tonnes of CO_{2e} will be considered representative for a typical year of fuel usage by machinery and plant operations (Table 10-10 below).

Table 10-10: Extrapolated Scope 1 Emissions in the context of National Carbon Budgets

GHG Emission Source	Tonnes of CO _{2e} (pear year)
Scope 1 Emissions (Fuel Usage)	1021
GHG Emission Source	Tonnes of CO _{2e} (2024 to 2025)
Plant emissions for the period 2025	1021
Ireland's First National Carbon Budget 2021 to 2025	295,000,000
Contribution to remaining first sectoral carbon budget (%)	0.0003%
GHG Emission Source	Tonnes of CO _{2e} (2026 to 2030)
Extrapolations of plant emissions for period 2026 to 2030	5105
Ireland's Second National Carbon Budget (2026 to 2030)	200,000,000
Contribution to second sectoral carbon budget (%)	0.003%

Based on the calculation of Scope 1 emissions, the assessment boundary would contribute to 0.0003% of Ireland First National Carbon Budget and 0.003% to Ireland's Second National Carbon Budget.

Regarding Scope 2 emissions, the 50,115kWh is expected to result in 15.1 tCO_{2e} across a typical year. Across the period associated with the first sectoral emission ceiling for the Electricity sector (2024 to 2025), this would equate to 30.2tCO_{2e} and 75.5tCO_{2e} for the second sectoral emission ceiling period (2025-2030). These low emissions are considered insignificant in the context of the Electricity sectoral emission ceilings (0.0001% and 0.0004%).

For Scope 3 emissions, relating to HGV movements and employee vehicles, it is estimated that total distance travelled by HGV's per day will equate to 60km as they will predominantly serve the local market (1,260,000km annually) and 30km per day for the eight employees (60,000km annually). Table 10-11 shows the direct emissions related to Transportation that has been compared against the sectoral emissions for the Transport sector

Table 10-11: Transportation Emissions associated with the Proposed Development

GHG Emission Source	Tonnes of CO _{2e} (pear year)
Scope 3 emissions (Transportation)	1365
GHG Emission Source	Tonnes of CO _{2e} (2024 to 2025)

GHG Emission Source	Tonnes of CO _{2e} (per year)
Vehicle emissions for the period 2025	1365
First Carbon Budget 2021 to 2025	54,000,000
Contribution to remaining first sectoral carbon budget (%)	0.003%
GHG Emission Source	Tonnes of CO _{2e} (2026 to 2030)
Extrapolations of vehicle emissions for period 2026 to 2030	6825
Carbon Budget for Transport (2026 to 2030)	37,000,000
Contribution to second sectoral carbon budget (%)	0.02%

Although it is estimated that 20% of HGVs travelling to and from the Site are owned by Morrissey's, no exact figure is available at the time of this report, all HGV movements have been considered under Scope 3 emissions for clarity.

It is calculated that vehicle emissions related to the assessment boundary will emit 1365 tonnes of CO_{2e} per annum from vehicles, based on a conservative estimation of current technologies. Compared to the sectoral emission ceiling from the first carbon budget based on one year of operations (2025), vehicle emissions would contribute to 0.003% of the overall budget. When these emissions are further extrapolated over a 5-year period, to reflect the 2026 to 2030 carbon budget, the Proposed Development would contribute to 0.02% of these emissions across the period.

Total cumulative GHG emissions related Proposed Development are predicted to be 2401 tonnes of CO_{2e}.

Table 10-12: Total GHG emissions Associated with the Proposed Development

GHG Emission Source	Tonnes of CO _{2e} (per year)
Total Emissions	2401
GHG Emission Source	Tonnes of CO _{2e} (2024 to 2025)
Total emissions for the period 2025	2401
Ireland's First National Carbon Budget 2021 to 2025	295,000,000
Contribution to remaining first sectoral carbon budget (%)	0.001%
GHG Emission Source	Tonnes of CO _{2e} (2026 to 2030)
Extrapolations of total emissions for period 2026 to 2030	12005
Ireland's Second National Carbon Budget (2026 to 2030)	200,000,000
Contribution to second sectoral carbon budget (%)	0.006%

Compared to the sectoral emission ceiling from the first carbon budget based on one year of operations (2025), total emissions would contribute to 0.001% of the overall budget Across

the period associated with the Second National Carbon Budget (2026 to 2030), the total operational phase emissions associated with the Proposed Development is predicted to contribute ca. 0.006%.

Due to the low contributions of GHG emissions to the relative sectoral emission ceiling and national carbon budgets, the effects of the Proposed Development on climate are determined as “not significant”.

10.6 Unplanned Events

No unplanned events that would have a major impact on GHG emissions associated with the Proposed Development could occur.

10.7 Proposed Mitigation Measures

Once operational, the primary GHG emissions from the Proposed Development will be fuel, transport and electricity related. Although these emissions will not be significant, a number of mitigation measures will be in place to further reduce GHG emissions related to the Proposed Development, detailed below.

- The use of alternative low-carbon fuel sources in vehicles where practicable;
- Efficient vehicle management to minimise vehicle journey numbers where possible; and,
- Reducing idling engines for on-site plant and vehicles.

10.8 Cumulative and In-combination Impacts

As discussed throughout this chapter, the assessment boundary of GHG emissions considered those currently associated with the Site. As there is expected to be no change in the number of plant used on-site, the quantity of electricity used or the number of HGVs used per day then is currently operating, the emissions presented in section 10.6.2.1 above represent a cumulative assessment of the Proposed Development.

10.9 Interactions with other Environmental Variables

Chapter 5 – Population and Human Health. Climate Change could obviously pose a serious risk to human health. The likely emissions associated with the Proposed Development were deemed not significant when compared to the relevant sectoral targets for the coming energy budgets.

Chapter 6 – Biodiversity: Climate Change has the potential to impact ecosystems. However, the effects of GHG emissions associated with the Proposed Development was determined as not significant.

Chapter 8—Water (Hydrogeology & Hydrology): Climate Change can have a direct impact on water. Under a changing climate, the frequency of extreme rainfall events is expected to increase. Based on current climate information, the Proposed Development's is not vulnerable to flooding.

Chapter 9 – Air Quality: GHG emissions can directly impact air quality. However, these emissions are “not significant” and as such air quality will not be negatively impacted.

Chapter 13 – Material Assets: Traffic and Transport. Climate change is directly linked to GHG emissions, with road traffic considered one of the highest contributors to national emissions. The assessment on GHG emissions from HGV movements has shown the effects to be “not significant”.

10.10 Residual Effects

Based on its size and type, the Proposed Development will have 'not significant' effects on GHG emissions.

The Proposed Development has considered the impact of climate change on the Proposed Development. In this regard, the impact of climate change will be 'not significant' considering the frequency of future climate hazards and their potential impact.

10.11 Indirect Effects

All significant and likely impacts have been considered in this chapter. No additional indirect impacts were identified during this assessment.

10.12 Monitoring

No monitoring of GHG emissions is required

10.13 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

10.14 Difficulties Encountered

No difficulties were encountered.

11 ACOUSTICS (NOISE & VIBRATION)

11.1 Introduction

This Chapter of the EIAR provides a description and assessment of the significant and likely effect(s) of noise and vibration from the Proposed Development on the receiving environment.

The following policies relating to the assessment of noise regarding the extractive industry are contained within Kildare County Development Plan 2023-2029 ('CDP'):

IN O63:

Implement the relevant spatial planning recommendations and actions of the Kildare Noise Action Plan 2019-2023 (and any subsequent update).

IN O64:

Ensure that future developments are designed and constructed to minimise noise disturbance and consider the multi-functional uses of streets including movement and recreation, as detailed in the Urban Design Manual (2009) and the Design Manual for Urban Roads and Streets (2013).

IN O65:

Ensure that noise levels caused by new and existing developments throughout the county do not exceed normally accepted standards.

IN O66:

Enforce and comply with European Communities (Environmental Noise) Regulations 2018 by:

Regulating and controlling activities likely to give rise to excessive noise (other than those activities which require regulation by the EPA)

Requiring new developments and / or activities likely to give rise to excessive noise to install noise mitigation measures and monitors.

IN O67:

Ensure noise sensitive development in proximity to national and other roads provides a noise impact assessment / Acoustic Design Statement to the requirements set out in the Noise Action Plan and Local Planning Advice Notes as may issue and includes appropriate spatial consideration in the design phase and, where necessary physical mitigation measures, such as noise barriers, set back landscaping and/or buffer zones between areas of land where development is proposed and existing / proposed national or other roads.

Regarding Quarries and Ancillary activities, the Kildare Noise Action Plan (2019-2023) states:

The EPA's Environmental Management Guidelines "Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006)" outlines primary sources of noise associated with quarrying and offers guidance in relation to the correct approach to be followed in respect of assessment and mitigation. Recommended noise limit values are 55dB $L_{Aeq,1hr}$ and 45dB $L_{Aeq,15min}$ for daytime and night-time respectively. In respect of blasting, the Guidance Document states:

"In relation to blasting activities within quarry development, it is recommended that the following vibration and air pressure ELVs are adopted and applied at the nearest vibration and air overpressure sensitive location. (e.g. a residential property):

Air overpressure: 125 dB (linear maximum peak value), with a 95% confidence limit."

In this Chapter the following is presented:

- The existing ambient and background acoustic / sound environment;
- Quantification of the likely construction, operational and restoration noise associated with the Proposed Development;
- Assess the likely significance of effects arising from the Proposed Development; and,
- Outlining the relevant and proportional mitigation measures to the project design.

11.2 Methodology

The following acoustic standards and guidance documents were utilised to evaluate the baseline conditions and in the assessment of impacts:

- Department of Environment Heritage and Local Government ('DEHLG') – Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004 [82];
- EPA 2006, Environmental Management Guidelines, Environmental Management in the Extractive Industry (Non-Scheduled Minerals), 2006 [70];
- Irish Concrete Federation ('ICF') 2005, Environmental Code, Second Edition, October 2005 [74];
- EPA, "Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)", 2016 [100]
- BS4142:2014 Methods for rating and assessing industrial and commercial sound, 2014 [113];
- BS5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites, Noise [101];
- SI No 140/2006 Environmental Noise Regulations 2006 [102];
- S.I. No. 549/2018 European Communities (Environmental Noise) Regulations 2018 [103];
- S.I. No. 663/2021 - European Communities (Environmental Noise) (Amendment) Regulations 2021 [104];
- NC Guidelines (Greenbook) *Environmental noise measurement guide* 2013 [105];
- IEMA Guidelines for environmental noise impact assessment, 2014 [106];
- AACI Environmental Noise Guidance for Local Authority Planning & Enforcement Departments: Advice for local authority officers involved in enforcement, assessment of noise reports, & drafting of noise conditions for planning permissions & permits Jan 2021 [107];
- ISO 1996-1:2016 Acoustics - Description, measurements and assessment of environmental noise - Part 1: Basic quantities and assessment procedures 2003 [108];
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels [109];
- NRA *Guidelines for the treatment of noise and vibration in National Road Schemes*, 2004 [110];
- NRA Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, March 2014 [122];

- Smith, Peterson and Owens *Acoustics and Noise Control*, 1996 [111];
- World Health Organization's ('WHO') *Night noise guidelines for Europe* [112];
- World Health Organization's ('WHO') *Guidelines for Community Noise* [113];
- Aggregate Levy Sustainability Fund ('ALSF'): Sustainable Aggregates Theme 1 - Reducing the environmental effect of aggregate quarrying: Dust, noise and vibration, year unknown [114];
- Kildare County Development Plan 2023-2029 [7]; and,
- Kildare Noise Action Plan 2019-2023 [115].

This chapter assesses noise impact arising from the Proposed Development through two distinct means.

- An assessment on the likely change in the acoustic environment, as audible at sensitive receptors. This methodology is based on the IOA/IEMA guidelines above.
- An assessment on the likely site-specific noise emission audible at sensitive receptors rated against standard limits for noise nuisance. This methodology is in-line with the EPA and government guidelines above.

A glossary of terminology utilised within this report is shown in Appendix 11-1.

11.2.1 Criteria Noise Impact

The limits outlined here are taken from guidelines relevant to the Proposed Development and will be utilised to ensure on-site activities can be monitored and noise control implemented.

The limits are similar to international criteria for the protection of human health from noise nuisance. These limits will therefore be applied as the criteria within this Chapter for noise impact from the Proposed Development.

11.2.1.1 Site Preparation

Site preparation phase noise will be assessed utilising the British Standard BS5228-1+A1:2014 [101], which is designed for the assessment of noise arising from construction and open sites.

This standard identifies a methodology (the ABC method, section E.3.2 of standard) for assigning construction noise limits at Noise Sensitive Receptors ('NSRs') based upon the existing ambient noise levels. An excerpt detailing the ABC method is shown in Table 11-1.

Table 11-1: BS5228-1:ABC Method for assessing Construction Noise Impact

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB) (L _{Aeq,T})		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23:00-07:00)	45	50	55
Evening and weekends ^{D)}	55	60	65
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75
Note 1	A potential significant effect is indicated if the L _{Aeq,T} noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.		
Note 2	If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total L _{Aeq,T} noise level for the period increases by more than 3dB due to site noise.		
Note 3	Applied to all residential receptors only.		
A)	Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.		

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB) (L _{Aeq,T})		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
B)	Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.		
C)	Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.		
D)	19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday.		

This method requires an understanding of the receiving environment at NSRs to allocate suitable construction noise limits.

11.2.1.2 Operational Site-Specific Noise

Existing planning conditions regarding the activities at the Ballyburn Pit are:

Condition No. 8:

- Noise levels attributable to the operation of the entire quarry complex, when measured at the nearest noise sensitive locations, shall not exceed 55dB(A) (60-minute L_{Aeq}) during permitted operating hours and shall not exceed 45dB(A) (15-minute L_{Aeq}) at any other time;
- Notwithstanding (1) above, noise levels attributable to temporary works required in the construction of screening mounds around the site shall not exceed 70dB(A) during operating permitted hours. A timeframe for the completion of such works shall be agreed in writing with the planning authority prior to the commencement of activity on the site; and,
- A quarterly noise survey and assessment programme shall be undertaken to assess the impact of noise emissions arising from the operation of the entire quarry complex. The scope and methodology of this survey and assessment programme shall be submitted to the planning authority for its written agreement prior to the commencement of any works on the site. The result obtained from the programme shall be submitted quarterly for the written agreement of the planning authority. The developer shall carry out any amendments to the programme required by the planning authority following this quarterly review.

Best guidance for quarry noise control and ancillary activities issued by the DEHLG [69], EPA [70] and Irish Concrete Federation [74] are deemed suitable for this Proposed Development based on the Site history and type of activities proposed, these guidance documents detail recommended noise limits of:

- Daytime Limit 8am to 8pm L_{Aeq,1hr} 55dB
- Night-time Limit 20pm to 8am L_{Aeq,15min} 45dBA

Based on the existing noise condition under planning reference 05/2091, and its alignment with current best practices for noise nuisance arising from the quarrying industry, this assessment will utilise the wording of Condition 8(1) for a fixed noise nuisance limit criterion.

In conjunction with the fixed limit compliance, this assessment on noise also utilises the IOA/IEMA 2014 guidance for the assessment of impact. This methodology of the IOA/IEMA Guidelines for Environmental Noise Impact Assessment [106] have been followed. Figure 11-1 below presents the relationship between noise impact and noise effect in generating an understanding of the significance of the change to an acoustic environment.

In forming an assessment of the impact, this methodology looks at the following key elements:

- The change from the baseline presented by the Proposed Development;

- Type of noise source;
- Nature of the change; and,
- Other factors.

The guidance further identifies that the impact assessment should consider the following influences:

- Averaging period;
- Time of day;
- Nature of the noise source (intermittency, etc.);
- Frequency of occurrence;
- Spectral characteristics;
- Absolute level of the noise indicator; and,
- Influence of the noise indicator used.

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Figure 11-1: IEMA IOA Chart on Magnitude, Significance and Effect

MAGNITUDE (Nature of Impact)		DESCRIPTION OF EFFECT (on a specific sensitive receptor)	SIGNIFICANCE (as required within EIA)
Substantial	BENEFICIAL	Receptor perception = Marked change Causes a material change in behaviour and/or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) Less Likely to be Significant
Moderate		Receptor perception = Noticeable improvement Improved noise climate resulting in small changes in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight		Receptor perception = Just noticeable improvement Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	
Negligible		N/A = No discernible effect on the receptor	Not Significant
Slight	ADVERSE	Receptor perception = Non-intrusive Noise impact can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) More Likely to be Significant
Moderate		Receptor perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance ⁸¹ . Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial		Receptor perception = Disruptive Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	
Severe		Receptor perception = Physically Harmful Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	

11.2.2 Site Associated Road Traffic

Traffic from the Site will be in line with existing authorised traffic movements from Ballyburn Pit. Furthermore, associated traffic is constrained to operational daytime hours, removing any associated road traffic noise during the night-time period. The combined HGV movements in/out of the Ballyburn Pit entrance will be in-line with currently authorised HGV movements for the Site.

There will be:

- No change on permitted traffic volumes; and,
- No traffic associated with the Proposed Development during the night-time period.

Accordingly, this Chapter has not identified significant and likely impacts arising from the Proposed Development for road traffic noise and it has therefore been screened out of further assessment.

Vehicular traffic within the Site have been incorporated to the noise model – refer to Chapter 14.

11.2.3 Noise Modelling

Noise modelling was carried out using Soft Noise Predictor version 2024 software. The noise model has been developed for the Proposed Development to incorporate the new noise emission sources and the layout of the local environment. The existing and future noise models only assess site-specific emissions – i.e., it does not incorporate existing ambient sources such as road traffic. The modelling inputs and outputs are presented in Appendix 11-2 and Appendix 11-3.

11.2.3.1 Model Calculations

The Noise Model calculation formula is based on ISO 9613 – 1 & 2. Utilising this standard Predictor calculates the noise level as follows:

$$L|t.per = L_{dw} - C_{m,per} - C_{t,per}$$

Where;

$$L_{dw} = L_W + D_c - A$$

$L_{lt,per}$	Long-term average octave (or 1/3-octave) SPL during the evaluation period in dB
L_{dw}	Equivalent continuous downwind octave (or 1/3-octave) SPL in dB
$C_{m,per}$	Meteorological correction during the evaluation period in dB
$C_{t,per}$	Correction for the active time of the source during the evaluation period in dB
L_W	Sound power level in dB(A) per octave (or 1/3-octave), re 1 pW
D_c	Directivity correction in dB
A	Attenuation (octave-band) in dB per octave (or 1/3-octave)

The attenuation A is calculated as follows:

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{fol} + A_{site} + A_{hous}$$

A_{div}	Geometrical divergence in dB
A_{atm}	Atmospheric absorption in dB/octave (or 1/3-octave)

A_{gr}	Ground effect in dB/octave (or 1/3-octave)
A_{bar}	Screening in dB/octave (or 1/3-octave)
A_{fol}	Attenuation due to foliage in dB/octave (or 1/3-octave)
A_{site}	Attenuation due to installations on an industrial site in dB/octave (or 1/3-octave)
A_{hous}	Attenuation due to housing in dB

11.2.4 Noise Monitoring

A noise survey was undertaken by MOR Environmental personnel on the 21st June 2023 and 16th January 2024 to establish the baseline ambient sound levels at surrounding NSRs.

11.2.4.1 Competent Person

The monitoring and analysis of the data was conducted by a MOR Environmental acoustician. This monitoring programme, data and report was directed and reviewed by a full member of the Institute of Acoustics (MIOA, AACI) with over 15+ years' experience in environmental and acoustic consultancy.

11.2.4.2 Measurements

Five noise monitoring locations (NM1 – NM5) to characterise local ambient sound levels were undertaken. The measurements were attended and included two readings taken during the daytime period, 8am to 8pm, of ca. 30 minutes each.

At all locations the Sound Level Meter ('SLM') was positioned to maximise distance from reflective surfaces and mounted on a tripod to an approximate height of 1.2 to 1.5 meters over ground level.

11.2.4.3 Equipment

Noise measurements were carried out using a Type 1 Hand-held Analyser SLM (Type 1/ Class 1), equipped with Frequency Analysis Software:

The SLM was laboratory calibrated within the last 24 months, and field calibrated utilising a:

- NTi XL2 Audio Acoustic Hand-held Analyser sound level meter ('SLM').

The monitoring equipment was calibrated prior to and following the measurement period using the below field calibrators for the 2023 and 2024 surveys respectively:

- Bruel and Kjaer Type 4321 (Serial Number 2217952); and,
- Larson Davis CAL 200 (Serial Number 20830).

The calibrators were laboratory-calibrated within the last 12 months. Broadband noise levels were measured using the A-weighted network and a fast-sampling interval unless otherwise stated.

Laboratory calibration certificates for the SLM and the BK 4231 field calibrator are available upon request.

A handheld GPS (Garmin GPS60) was utilised to position the SLM accurately.

11.3 Receiving Environment

A review of the locality was conducted utilising OSI online mapping, Google and Bing Aerial Photography.

Based on this research, NSRs were identified in the locality and are shown in Figure 11-2 and described in Table 11-2. During the Site survey a visual check of the locality was completed to identify any new NSRs, or any older buildings demolished, or changed in-use.

Figure 11-2: NSRs location

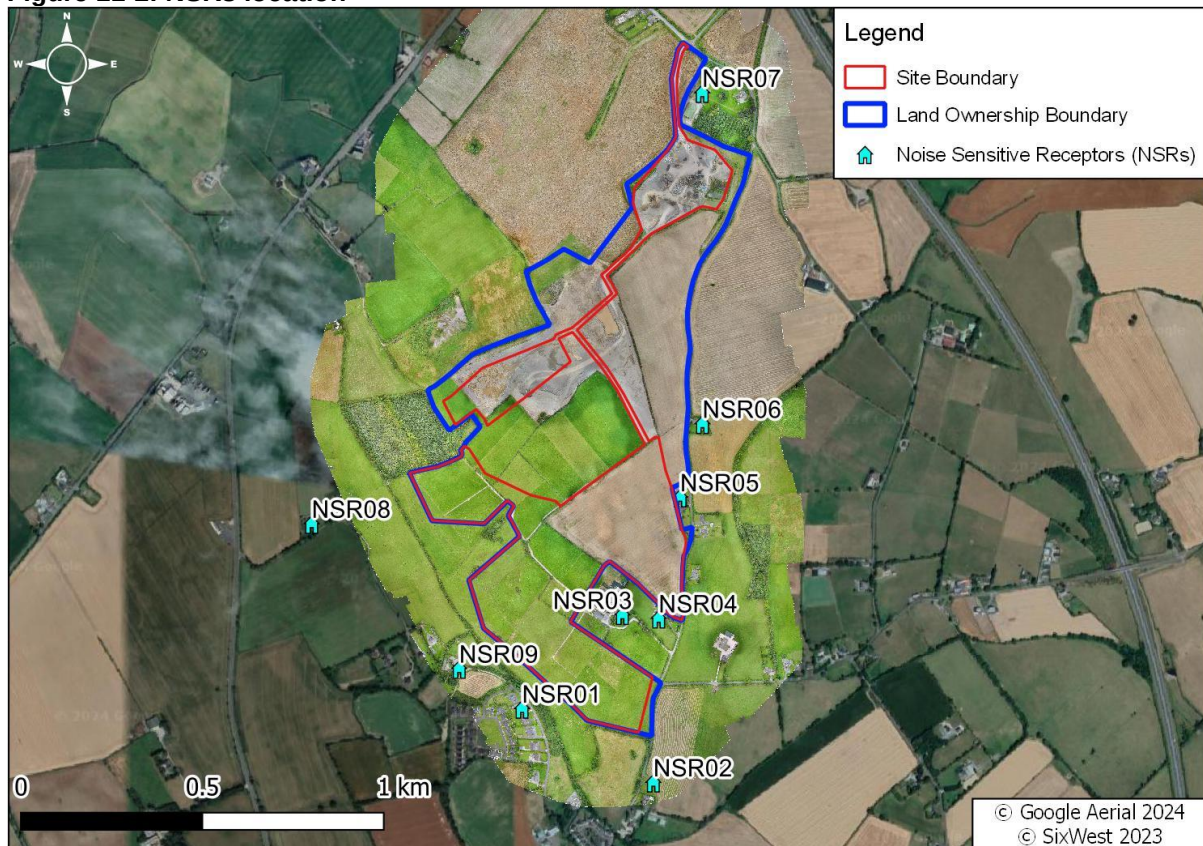


Table 11-2: Identification of Noise Sensitive Receptors ('NSRs')

NSR ID	Location Relevant to Site	Easting (ITM)	Northing (ITM)	Distance to Site Boundary (m)
NSR01	Proxy for dwellings located to the southwest of the Site.	676492	680342	ca. 105m
NSR02	Proxy for dwellings located to the south of the Site.	676854	680139	ca. 142m
NSR03	Residential dwelling located to the south-west of the Site.	676768	680600	ca. 91m
NSR04	Residential dwelling located to the south of the Site.	676868	680590	ca. 26m
NSR05	Proxy for dwellings located to the east of the Site.	676930	680898	ca. 14m

NSR ID	Location Relevant to Site	Easting (ITM)	Northing (ITM)	Distance to Site Boundary (m)
NSR06	Residential dwelling located to the east of the Site.	676989	681126	ca. 126m
NSR07	Proxy for dwellings located to the north of the Site.	676988	682037	ca. 74m
NSR08	Residential dwelling located to the west of the Site.	675912	680851	ca. 304m
NSR09	Proxy for dwellings located to the southwest of the Site.	676319	680452	ca. 129m

The Site is in an agricultural area south of Castledermot Town. As outlined in chapter 2 of this EIAR, extraction activities at the existing pit have been permitted since 2007.

As shown in Figure 11-2 above, the M9 runs in an approximate south-to-north orientation ca. 300m to the east of the Site. Residential housing and local businesses are located along the local roads off the L8094 and L4012, with several farm holdings also present.

11.3.1 Noise Monitoring Compliance

Noise monitoring for compliance has been carried out quarterly by the applicant for the Ballyburn Pit. The noise limits for the existing quarry are as follows:

- During permitted hours, $L_{Aeq,60min}$ 55dB
- At any other time $L_{Aeq,60min}$ 45dB

Monitoring compliance was completed by BHP Laboratories Limited during this period. The summary of the results for the noise compliance over 2022 are presented in Table 11-3 for daytime. Figure 11-3 presents the existing noise compliance monitoring locations within the Ballyburn Pit.

Figure 11-3: Annual Noise Compliance Monitoring locations

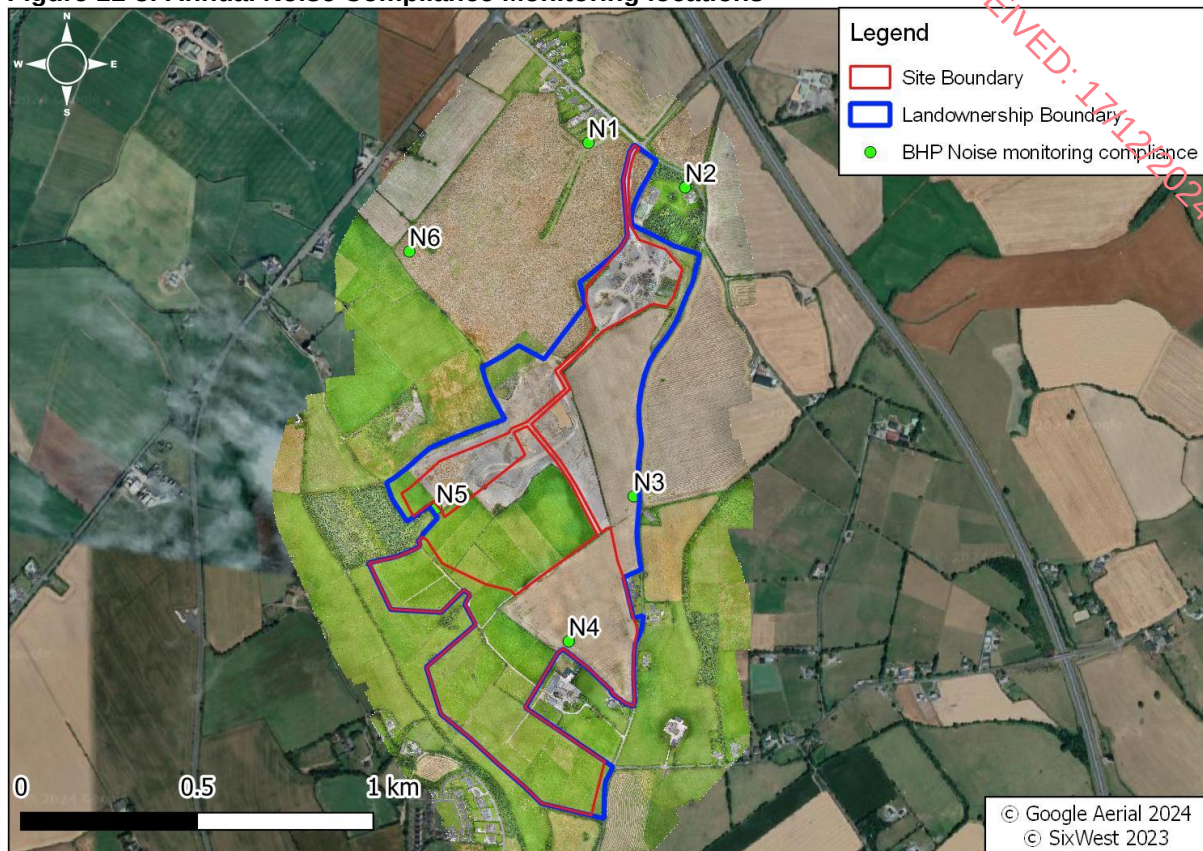


Table 11-3: Results for the Noise Compliance Monitoring for Daytime*

Noise Monitor Location	Range $L_{Aeq,60min}$ dB 2022
NM1	46 - 58
NM2	44 - 54
NM3	42 - 46
NM4	41 - 44
NM5	47 - 49
NM6	48 - 51

*Results from one survey have been discarded due to wind speeds noted above 5m/s during survey.

All monitoring is reported to relevant Competent Authorities in compliance with planning conditions.

11.3.2 Desk based Acoustic Characterisation

To acoustically characterise the locality MOR Environmental conducted desk-based assessments. This desk-based assessment included

- 'Quiet Area' Screening; and,
- Review of Strategic Noise mapping.

Quiet Area Screening was undertaken through a review of the noise action plan and screening matrix as per the EPA NG4 guidelines for rural areas. Furthermore, a review of available acoustic information, including the local strategic noise maps was undertaken.

11.3.2.1 Screening for Quiet Area

Quiet Area is a defined criterion for areas with low intrusion of human activities and have been specified within the Environmental Noise Directive and subsequent S.I. Noise Regulations as areas that should be identified within each Local Authority area for special consideration.

The Noise Action Plan notes under Quiet Area's that the types of public open spaces which could be considered appropriate and necessary to include within the assessment include areas such as:

- Recreation areas,
- Playing fields,
- Playgrounds,
- Public parks and gardens,
- Nature reserves,
- Cemeteries,
- River banks; and,
- Canals

None of the sites on the list above adjoin the Site. The Competent Authority did not designate any official Quiet Areas when preparing this assessment.

Appendix F from the Noise Action Plan has a priority decision support matrix for identifying Priority Noise Areas and "Quiet Areas in Open Country". The NSRs presented in Figure 11-2 above do not score to be considered for further assessment.

The EPA's noise guidance document, NG4 [100] , identifies a specific screening mechanism for Quiet Areas, and the screening process is shown in Table 11-4.

Table 11-4: Screening for Quiet Area

Parameter	Quiet Noise Criteria Distance	Criteria Met	Note
Distance to urban area with population >1,000 persons.	>3km	Yes	
Distance to urban area with population >5,000 persons.	>10km	No	Carlow town centre, 5.1km southwest population 27,351 (2022) – Total population [27].
Distance to urban area with population >10,000 persons.	>15km	No	
Distance to local industry (small or individual activities).	>3km	No	Local industry within 3km from the Site.
Distance to major industry centre.	>10km	No	MSD Carlow & Deerpark Business Park, 2.2km southwest of the Site.
Distance to National Primary Route.	>5km	No	M9 motorway within 1km.

Parameter	Quiet Noise Criteria Distance	Criteria Met	Note
Distance to Motorway or Dual Carriageway.	>7.5km	No	M9 motorway within 1km.
Site locality is 'Quiet Area'		No	Proximity to Carlow, M9 motorway and local and major industry centres.

The Quiet Area screening does not identify if an area has high, moderate, or low ambient noise, rather only whether the locality is at distance to select human noise emission sources. Therefore, it is always necessary to monitor the local environment.

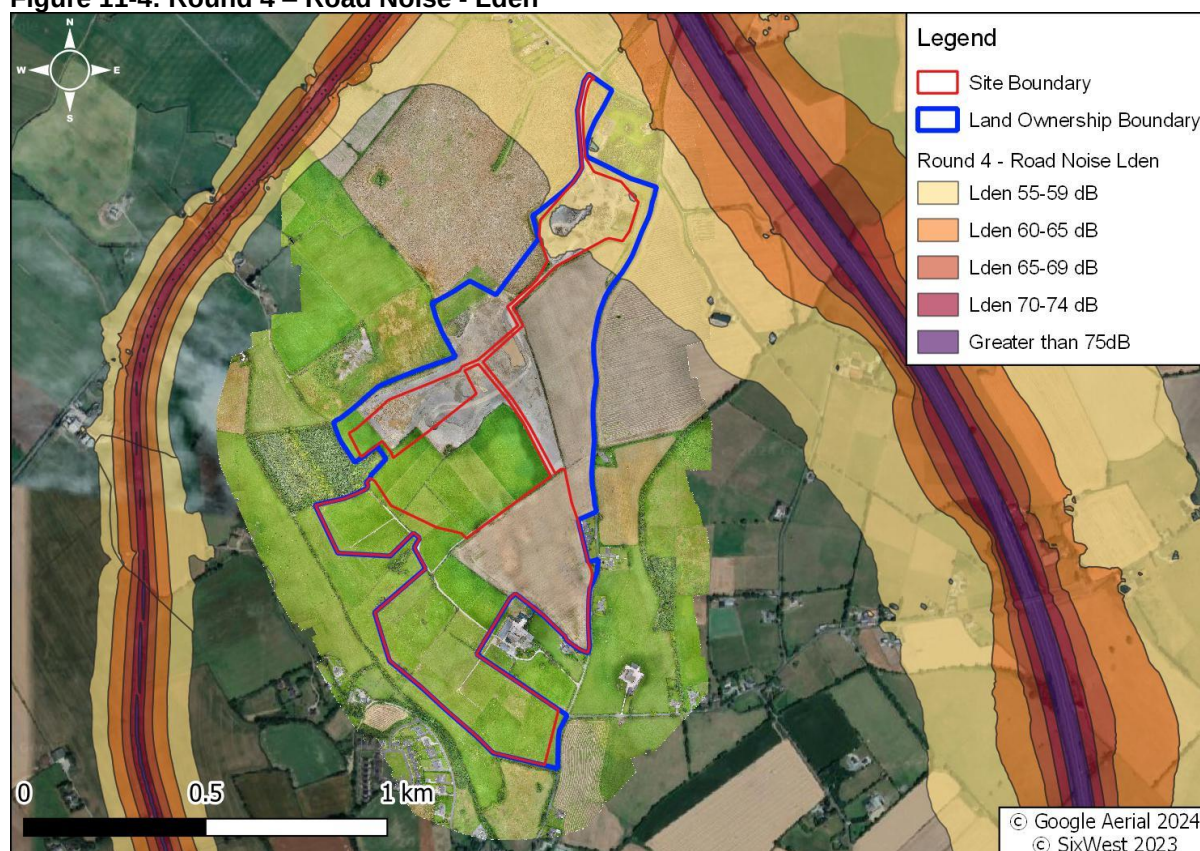
11.3.2.2 Strategic Noise Mapping

A desk-based review of available information from the EPA and KCC was conducted to evaluate the existing acoustic environment.

The M9 motorway is located to the east of the Site and the R448 regional road is located to the north and west of the Site. Both qualified for Strategic Noise Mapping under the Environmental Noise Directive ('END'), as currently transposed into Irish Law under S.I. No. 549 of 2018 Environmental Noise Regulations [116] as amended.

The Strategic Noise Mapping for the M9 Motorway and R448 Road is shown in Figure 11-4 below.

Figure 11-4: Round 4 – Road Noise - Lden



The L_{den} contours show that traffic related noise is a dominant feature along the nearest roads.

Traffic noise is a major influence at and in the vicinity of the Site due to the proximity of the L_{den} 55-59dB contour to the Site.

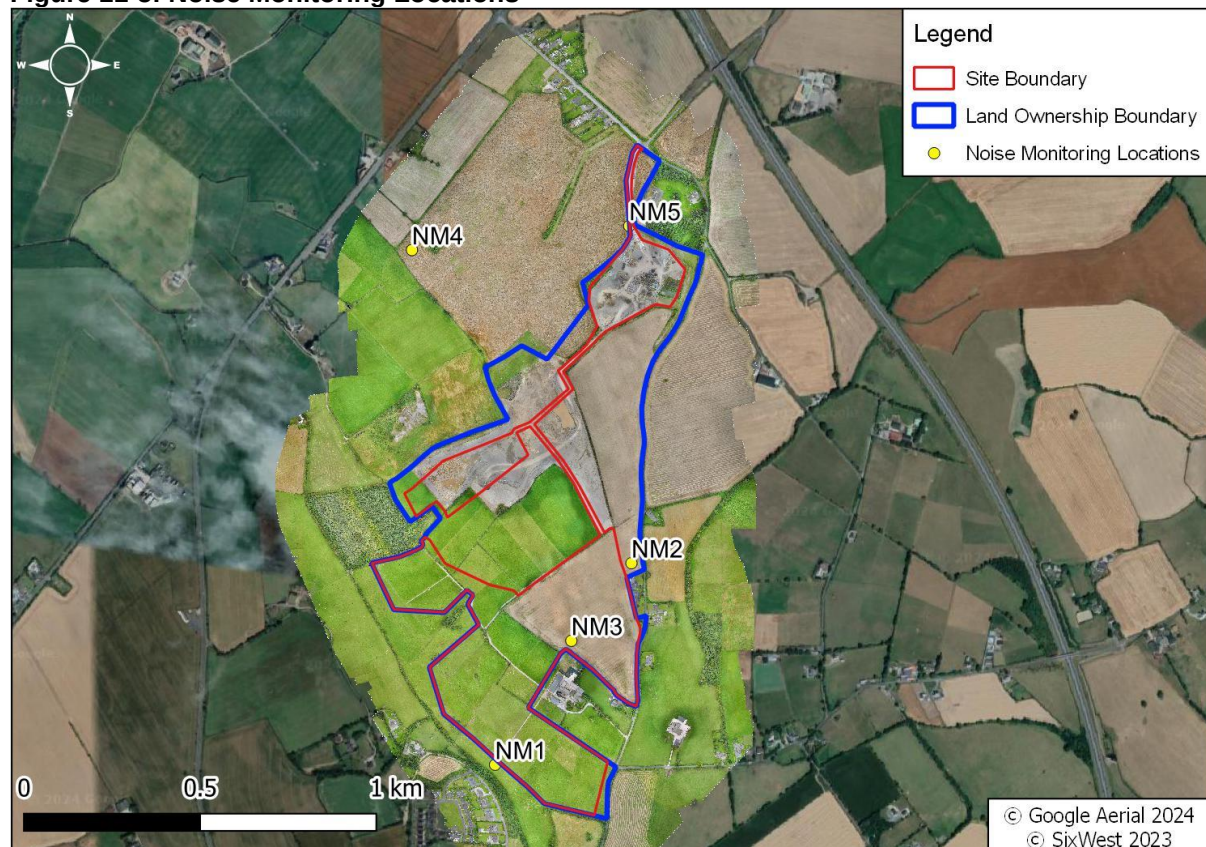
11.3.3 Baseline Ambient Acoustic Environment Survey

MOR Environmental conducted ambient noise monitoring near the Site on 21st June 2023 and 16 January 2023. The monitoring locations are described in Table 11-5 and shown in Figure 11-5 below.

Table 11-5: Noise Monitoring Locations

Monitoring Location ID	Easting	Northing	Description of Locality
NM1	676532	680418	Located to the southwest of the Site.
NM2	676919	680990	Located to the east of the Site.
NM3	676748	680770	Located in the south of the Site.
NM4	676296	681877	Located to the northwest of the Site.
NM5	676912	681945	Located in the north of the Site.

Figure 11-5: Noise Monitoring Locations



11.3.3.1 Weather Conditions

The prevailing weather conditions at the time of measurement were noted and recorded in the survey report. A portable anemometer (Kestral 2500) was used to record wind speed before,

during and after the noise survey periods. Weather conditions during the monitoring period were acceptable for the acoustic survey, as per relevant guidance.

The closest meteorological synoptic station is Oak Park, Co. Carlow 3.4km southwest of the Site. The summary of the Met Éireann weather data from this synoptic station on the day of the monitoring event is shown in Table 11-6.

Table 11-6: Met Éireann Summary for Casement Weather Station

Date	Rainfall (mm)*	Max Temp °C	Min Temp °C	Mean Wind Speed (Knots)	Maximum Gusts (if >knots)
21/06/2023	tr	23.7	12.2	4.8 (2.5m/s)	-
16/01/2024	0.0	4.0	-3.6	5.0 (2.6m/s)	-

*'tr' refers to trace precipitation.

The monitoring results of the ambient acoustic environment survey undertaken is detailed below in Table 11-7. One-third octave frequency charts and plates of the monitoring locations are attached in Appendix 11-5.

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Table 11-7: Daytime Noise Monitoring Results 21st June 2023 and 16th January 2024

NM	Start Time	Elapsed Time	L _{Aeq,T}	L _{AFmax}	L _{AF90, T}	Commentary
NM1 Run 1	21/06/2023 13:01	00:30:00	38	54	34	Bird song constant (dominant). Distant traffic (S) faintly. Wind speed: 0-1.5m/s.
NM1 Run 2	21/06/2023 13:35	00:30:00	41	62	37	Bird song constant (dominant). Distant traffic (S). Lawnmower (SW) distant at 13:40 faint. Resident talking (S) at 13:47/52. Plane (W) at 13:36 and 14:00. Car horn (S) at 13:54. Dog barking (S) at 14:02. Wind speed: 0-1.5m/s.
NM2 Run 1	21/06/2023 16:00	00:30:00	44	56	40	Bird song constant. Distant cars (N) constant faint. Five car pass-by events nearby between 16:16 and 16:30 (E). Site reverse alarms between 16:03 and 16:29 (N) faint. JCB movement audible between 16:03 and 16:28 (N) faint. Loud bang heard at 16:03 and 16:28 (N) faint. Wind speed: 0-1.5m/s.
NM2 Run 2	21/06/2023 16:31	00:30:00	44	55	42	JCB movement (N) between 16:31 and 16:53 (faint). Site reverse alarms between 16:31 and 16:57 (faint). Five car pass-by events (E) between 16:31 and 16:57. Bird song and distant cars (W) constantly. Wind speed: 0-1.5m/s.
NM3 Run 1	21/06/2023 14:25	00:30:00	38	49	35	Distant traffic (S). Bird song constant (dominant). Helicopter (S) at 14:16. Wind speed: 0-1.5m/s.
NM3 Run 2	21/06/2023 14:56	00:30:00	41	60	36	Distant traffic (S). Plane (S) at 15:15. Bird song constant (dominant). Faint reverse alarms (N) at 15:24. Wind speed: 0-1.5m/s.
NM4 Run 1	21/06/2023 10:54	00:30:00	47	59	40	Bird song constant (dominant). Distant traffic (N) regular. Almost inaudible JCB engine movements (S), faintly throughout measurements. Wind speed: 0-1.5m/s.

NM	Start Time	Elapsed Time	L _{Aeq,T}	L _{AFmax}	L _{AF90, T}	Commentary
NM4 Run 2	21/06/2023 11:24	00:30:00	48	64	43	Bird song constant (dominant). Distant traffic (N) regular. Plane at 11:52. Almost inaudible JCB engine movements (S), faintly throughout measurements. Wind speed: 0-1.5m/s.
NM5 Run 1	16/01/2024 10:07	00:30:00	58	79	48	Steady state site machinery audible (likely crusher/conveyor belt). Site truck pass by SLM on multiple occasions. Faint Reverse Alarms on-site on multiple times. Steady traffic in distance (W). Birdsong audible. Wind speed: 0-1m/s.
NM5 Run 2	16/01/2024 10:41	00:30:00	58	79	49	Steady state site machinery audible (likely crusher/conveyor belt). Faint Reverse Alarms on-site on multiple times. Site truck pass by SLM on multiple occasions. Site van pass on multiple occasions. Traffic in distance (W). Birdsong audible. Wind speed: 0-1m/s.

11.3.4 Characterisation of the Ambient Acoustic Environment

The ambient sound survey found that the local ambient acoustic environment was influenced by:

- Transport – traffic noise from the R448, M9 and surrounding road network;
- Industry – activities occurring within the wider Ballyburn Pit; and,
- Agriculture – domestic animals, and bird song and bird call.

Generally higher levels of ambient acoustic sound were found within proximity to the R448 Road.

All monitoring locations recorded averaged $L_{Aeq,T}$ values of 38dB to 48dB during daytime hours. The background ambient acoustic environment for all monitoring locations, as L_{A90} , ranged from 34dB to 43dB during daytime hours.

11.3.5 Conclusion of Existing Ambient Acoustic Environment

Based on the desk-based review of the area and the baseline survey carried out by MOR, it is reasonable to conclude that the ambient existing sound levels surrounding the Site are typical for a rural environment in proximity to a busy road (R448).

11.4 Characteristics & Predicted Impact of the Proposed Development

The potential for noise arising from the Proposed Development has three distinct phases –

- Construction (Site Preparation) Phase;
- Operational Phase; and,
- Restoration Phase.

The sources and potential impacts arising from the phases are distinctly different and, therefore, have been discussed separately.

11.4.1 Construction Phase Noise

Noise during this phase will consist mainly of the following:

- Removal of soils and topsoils;
- Creation of embankments/berms; and,
- Installation of security fencing.

The Site preparation works will require the use of an excavator and bulldozer.

Table 11-8 below gives typical sound pressure levels ($L_{Aeq,T}$) for typical equipment employed for such works. The Site Preparation Phase will be completed over a 6-month period (cumulatively).

Table 11-8: Site Preparation Phase Sound Pressure Levels

Plant	Description	Sound Pressure L_{Aeq} at 10m	Combined Sound Pressure, at 10m, $L_{Aeq,T}$ dB
Bulldozer	Clearing of soils	75	79
Excavator	Creation of embankments	77	

An assessment of the noise exposure, associated with the plant identified in Table 11-7 above, has been undertaken. The methodology assessed sound attenuation over distance, based on the methodologies of BS5228 and ISO 9613, for distance attenuation of sound.

Based on the 'ABC' method outlined in Table 11-1 above, the below construction noise limits are derived in Table 11-9 below. An assessment based on the ABC method is shown in Table 11-9 below.

Table 11-9: NSR Construction Limit Values

NSR	NML ID (proxy)	Ambient Baseline L _{Aeq,T} dB	Rounded value (closest 5dB)	ABC Limit
NSR01	NM1	38	40	65
NSR02	NM1	38	40	65
NSR03	NM3	38	40	65
NSR04	NM3	38	40	65
NSR05	NM2	44	45	65
NSR06	NM2	44	45	65
NSR07	NM5	58	60	65
NSR08	NM1	38	40	65
NSR09	NM1	38	40	65

Table 11-10: Construction Phase Impact Assessment

NSR	Predicted Site Specific Sound Pressure Level at NSR Façade L _{Aeq,T} dB	Measured Ambient Sound L _{Aeq,T} dB	Combined Noise Level (Predicted + Measured L _{Aeq,T})	'ABC' Threshold Compliant*
NSR01	59	38	59	Yes
NSR02	56	38	56	Yes
NSR03	60	38	60	Yes
NSR04	71	38	71	No
NSR05	76	44	76	No
NSR06	57	44	57	Yes
NSR07	62	58	63	Yes
NSR08	49	38	50	Yes
NSR09	57	38	57	Yes

*The ABC threshold compliance is assessed against the site-specific construction noise at the NSR.

The proposed construction stage works will be within standard limits for preventing construction-related noise nuisance, as outlined in BS5228-1, at the majority of the NSRs.

The exceedances at NSR04 and NSR05 are due to the proximity of the NSRs to the Site works, prior to mitigation.

The primary construction activities will be a short-duration, occurring over a period of approximately 6 months. However, key elements of construction will be significantly shorter. As such, construction stage noise without mitigation is deemed a negative, brief to temporary localised slight effect without mitigation, decreasing from slight to not significant beyond the closest (NSR04 and NSR05) residential locations.

11.4.2 Operational Phase Noise

The Proposed Development will consist of the extension of the Site to the south. The Proposed Development will seek to extract sand and gravel from the existing levels down to 71m OD. The Proposed Development will include for the importation of ca. 1,125,000 tonnes of uncontaminated soil and stone by-product material to restore ground gradients throughout the exhausted operated lands to a restored ground level of ca. 73m OD.

There are two operational models for the Proposed Development as presented below:

- Model A – Extraction; and
- Model B – Infill.

Model A has been modelled with extraction levels at 71m OD and Model B for Infill operation, the contours levels are modelled up to 73m OD.

Table 11-11 below gives typical sound pressure ($L_{Aeq,T}$) values for plant utilised in sand and gravel pits for each of the models.

Table 11-11: Operation Sound Pressure Levels

Model	Plant	Description	BS5228 Reference [101]	Sound Pressure L_{Aeq} at 10m
A - Extraction	Lorry / HGV	4 Axle truck movement on-site	C6.19	76
	Dump trucks	Trucks In	C2.31	87
	Dump trucks	Trucks Out	C2.30	79
	Tracked Excavator	Excavations, trenching and site development	C2.14	79
B- Infill	Dump trucks	Trucks In	C2.30	79
	Dump trucks	Trucks Out	C2.31	87
	Dozer	Transporting soils	C2.10	80
	Truck offloading	Truck offloading material	C.2.14	79

As part of this assessment, a noise model using specialist acoustic software Predictor V.2024, has been prepared to assess predicted noise emissions at the Site during the operational phase. Extraction and Infill operations could occur simultaneously at different zones. For a cumulative perspective, the peak noise emissions arising from each model have been combined. This worst-case scenario represents the maximum predicted combined noise emission from the Proposed Development, which though possible, is unlikely to occur for any protracted period of time.

The site-specific emissions for daytime from the Proposed Development, for the Site Operational activity are outlined in Table 11-11 above, are supplied in Table 11-12 below.

Activities likely to result in audible noise at NSRs will normally only occur during daytime hours. Normally, receptors will be assessed to ground floor only, however for receptors with two floors, the maximum from the different heights has been used.

Table 11-12: Site Operation Activities Noise Values – Daytime

NSR	Noise Model Output (L _{Aeq,1hr}) (dB)	Ambient Measured L _{Aeq,1hr} (dB)	Ambient Measured L _{A90, 1hr} (dB)	Predicted Cumulative (Noise Model + L _{A90}) (dB)	EPA & ICF L _{Aeq} Limit (dB)	Complaint?
NSR01*	52	38	34	52	55	Yes
NSR02	43	38	34	44		Yes
NSR03*	45	38	35	45		Yes
NSR04*	48	38	35	48		Yes
NSR05	47	44	40	48		Yes
NSR06	47	44	40	48		Yes
NSR07	43	58	48	49		Yes
NSR08	42	38	34	42		Yes
NSR09	48	38	34	48		Yes

*Assessed at 4m height

The predicted cumulative sound level at all NSRs is predicted to be below noise nuisance criteria, as stated in Section 11.2.3, operational noise limits for daytime noise of a L_{Aeq,1hr} 55dBA at sensitive receptors.

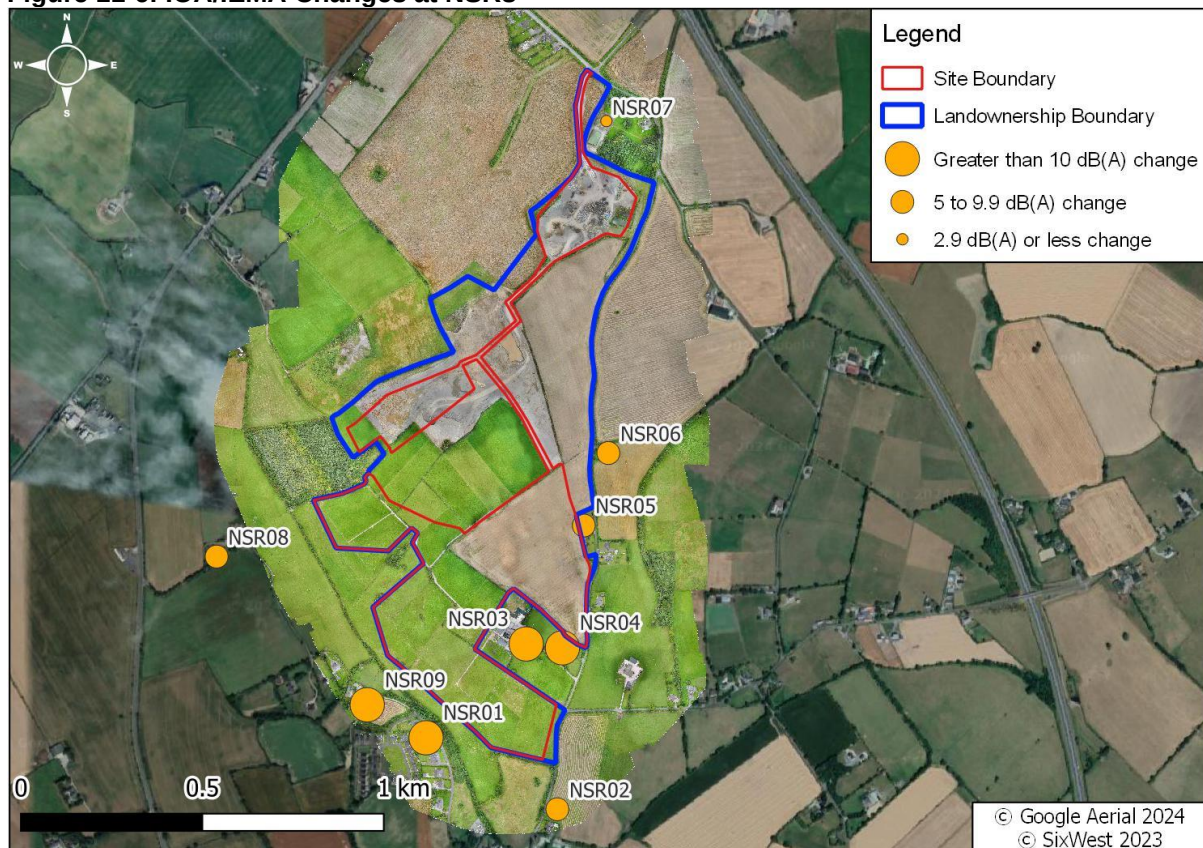
All NSRs are deemed to have an effect as per the IOA/IEMA guidelines, as shown in Figure 11-6 below. Four NSRs (NSR01, NSR03, NSR04 and NSR09) are deemed to experience a greater than 10dBA change in background, four NSRs (NSR02, NSR05, NSR06 and NSR08) are predicted to experience a change in background between 5dB and 9.9dBA and one (NSR07) is predicted to experience a change in background below 3dBA.

The effects identified in the IOA/IEMA guidelines are based on a behaviour change; therefore, the characteristics of the locality and the Proposed Development are required to understand likely change in behaviour. The Proposed Development will operate during the day as per the existing activities on-site. The Proposed Development will be unchanged from existing on-site activities, though elements of plant and operations will be moved into lands historically identified during the previous planning application as a future reserve. Although the change in sound levels is predicted to be notable, the overall sound level will be below typical levels for noise nuisance. The Proposed Development is for aggregate extraction, a business limited in terms of where it can be developed, by factors including aggregate resource availability, the quality of the resource, the availability of the land to operators to develop and the sensitivity of the local environment. Therefore, reviewing the available information and Figure 11-1

above, the Proposed Development will likely be audible however it will not be intrusive due to the overall low levels of noise predicted so therefore is not likely to result in behavioural change. As per the IOA-IEMA guidelines this is a Slight effect at the closest receptors.

Furthermore, due to the restriction of the operational hours in the Proposed Development, the effects will only occur during daytime operational hours, and no changes are presumed during evening and nighttime periods.

Figure 11-6: IOA/IEMA Changes at NSRs



11.4.3 Operational Phase Vibration

No significant Operation Phase vibration is likely.

11.4.4 Restoration Phase Noise

Noise during the restoration of the Site will be associated with the following:

- Removal of the berms;
- Seed planting; and,
- Setting of hedgerows.

Although phased restoration will occur during the life of the Operational phase and has been modelled above, a period of final restoration will be required.

This phase of the Proposed Development will be a low-intensity and short-term activity associated with the final works within the Proposed Development. As such, this stage of the work is typically assessed similarly to construction works.

This activity will require minimal plant, consisting of an agricultural tractor to spread seeds and also the removal of the berms. Table 11-13 below gives typical sound pressure ($L_{Aeq,T}$) values for plant utilised in quarry restoration sites for each of the steps

Table 11-13: Restoration Sound Pressure Levels

Activity	Plant	Description	BS5228 Reference [101]	Sound Pressure L_{Aeq} at 10m
Restoration	Tractor	Spreading seeds – towing equipment	C.4. 74	71

The predicted site-specific emissions from the Proposed Development at the closest NSR, NSR05 ca. 26m to the Site Boundary, is calculated at 63dBA, prior to mitigation, which is lower than typical construction stage noise limits of $L_{Aeq,1hr}$ of 65dBA, refer to section 11.2.1.

Plant and equipment will be operating at distinct tasks around the Site, where noise emissions will be dispersed. Therefore, to calculate the likely worst case for audible noise, the activity was assumed to occur at the boundary, while distances to NSRs were calculated from the closest boundary.

The Proposed Development will not introduce new sound characteristics, nor will the restoration project present sound qualities typically deemed to be objectionable, such as tonal or clearly impulsive/impact sounds.

Based on the assessment, the predicted impact during restoration is deemed to be slight medium-term effect on a local basis, prior to mitigation.

11.4.5 Restoration Phase Vibration

No significant Restoration Phase vibration is likely.

11.5 Proposed Mitigation Measures and / or Factors

11.5.1 Site Preparation Phase

11.5.1.1 Noise

Common noise control measures will be implemented during the development of the Site, including:

- Construction phase hours and days will be restricted, as outlined in chapter 3.3.3.1;
- Nomination of a responsible person to accept and respond to complaints;
- Ensuring all plant and equipment is serviced and in good repair;
- Inclusion of response procedure to noise complaints and noise breaches;
- Avoidance of plant or equipment left idling; and,
- Noise monitoring program during construction phase works.

Specifically in developing the lands for aggregate extraction, removed soils will be pushed to create the boundary embankments. Once created these embankments will provide acoustic screening to further preparation/construction/operational works.

11.5.1.2 Vibration

No mitigation is required for the Site Preparation Phase relating to vibration control.

11.5.2 Operational Phase

11.5.2.1 Noise

Plant operating hours will be from 07:00 to 18:00, Monday to Friday and 07:00 to 14:00 Saturdays. No activities will take place on Sundays or Public Holidays.

The equipment associated with the Operational Phase will include both modular mobile and fixed plant. The following mitigation measures will be in place as part of the Proposed Development:

- All plant (fixed and mobile) is maintained to a high standard to reduce any tonal or impulsive sounds;
- Vehicle speeds will be kept below 20km/hr within the Site;
- All plant is throttled down or switched off when not in use; and,
- Internal routes are reduced in gradients and routed to minimise noise emissions from vehicles on-site.

Incorporating the above measures, and the mobile nature of the project works within the Site, the compliance at NSRs will be a noise criterion of:

- During permitted hours, $L_{Aeq,60min}$ 55dB
- At any other time $L_{Aeq,60min}$ 45dB

11.5.2.2 Vibration

No mitigation is required for the Site Preparation Phase relating to vibration control.

11.5.3 Restoration Phase

11.5.3.1 Noise

Plant operating hours will be from 07:00 to 18:00, Monday to Friday, with processing occurring only between 08:00 – 18:00, and 07:00 to 14:00 Saturdays. No activities will take place on Sundays or Public Holidays.

The equipment associated with the Restoration Phase will be mobile. This will aid in reducing noise emissions from the operations on-site to any individual receptor.

The following mitigation measures will be in place as part of the Proposed Development:

- All plant is maintained to a high standard to reduce any tonal or impulsive sounds; and,
- All plant is throttled down or switched off when not in use.

Incorporating the above measures and the mobile nature of the project works within the Site, the compliance at NSRs will be complied with to a noise criterion of:

- During permitted hours, $L_{Aeq,60min}$ 55dB

11.5.3.2 Vibration

Not applicable.

11.6 Cumulative and In-combination Impacts

The Proposed Development has been assessed in relation to the potential variation in ambient noise levels and found that any potential impacts that might occur would be not significant.

Existing noise emissions, including those associated with the existing operations, are incorporated into the ambient noise values utilised in this assessment. There were no notable developments identified within 2km from the Site reducing the potential for cumulative and in-combination effects to occur beyond those fully assessed within the Chapter.

11.7 Interactions with Other Environmental Attributes

Chapter 5 - Noise is closely linked with human beings, as residential receptors are the primary noise-sensitive receptors and have been discussed as the primary receptor in this chapter.

Chapter 6 - Biodiversity: Noise can influence fauna through animal disturbance; impacts on specific species have been outlined in this chapter where relevant. The modelling shows no significant change to ambient noise levels at the SAC or SPAs locally.

Chapter 13 – Material Assets: Traffic and Transport. Noise can be generated from traffic movements. However, the assessment undertaken in Chapter 14 determined that there would be a “negligible” impact from traffic.

11.8 Indirect Impacts

All significant and likely impacts have been considered in this chapter. No additional indirect impacts were identified during this assessment.

11.9 Residual Impacts

The residual noise impact, based on the proposed emissions, phasing and intensity of the Site, the mitigation and practices to be employed and within the context of the existing ambient environment, is deemed to be a Slight negative, local and reversible effect during the main operational phase of works.

The Proposed Development will be subject to noise limits for the construction, operation, and restoration phases, and it has been modelled to show that it can comply with them.

Following the assessment undertaken, the baseline monitoring and site characteristics, the detailed noise modelling and the characteristics of the Proposed Development and considering the standard noise mitigation measures to be implemented, likely and significant effects are not predicted to arise in regards to noise.

11.10 Indirect Impacts

All significant and likely impacts have been considered in this chapter. No additional indirect impacts were identified during this assessment.

11.11 Monitoring

The operator will continue to conduct the following ongoing monitoring.

General activities on-site will be acoustically monitored on a bi-annual basis at the compliance locations, with a site-specific noise limit, measured at NSR of:

- During permitted hours, $L_{Aeq,60min}$ 55dB
- At any other time $L_{Aeq,60min}$ 45dB

Any tonal or impulsive characteristics of the site-specific noise emissions during the day or evening periods will accrue a 5dB weighting. No tonal or impulsive characteristics to site specific noise emissions during the night-time period. 95% of all noise levels shall comply with the specified limit value, with no noise level exceeding the limit by more than 2dB.

The extent and timing of the monitoring shall be agreed upon in advance with the Competent Authority. The monitoring results shall be submitted to the Competent Authority. The monitoring compliance locations are shown above in Figure 11-3.

11.12 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

11.13 Difficulties Encountered

There were no difficulties encountered.

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12 CULTURAL HERITAGE

12.1 Introduction

This Chapter of the EIAR, commissioned by MOR Environmental on behalf of Plazamont, addresses the impacts on the archaeological, architectural and cultural heritage of the Site, and the surrounding area, of a proposal to extend an existing quarry in the townlands of Ballyburn Upper, Gorteenvacan, and Knockbane, County Kildare.

12.2 Methodology

This study complies with the requirements of Directive EIA 2014/52/EU. The chapter is an assessment of the known or potential cultural heritage resource within a specified area and includes 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. It consists of a collation of existing written and graphic information in order to identify the likely context, character, significance and sensitivity of the known or potential cultural heritage, including architectural and archaeological aspects using an appropriate methodology [116] [117] [66]. It consists of the following study stages:

- Baseline Studies; and,
- Assessment of the Site.

The criteria and definitions for describing effects set out below is drawn from the 2022 EPA Guidelines [66], refer to Section 1.10.1 for more information.

12.2.1 Baseline Study

The baseline study research has been undertaken in two phases, the paper study phase and subsequently the field inspection phase.

12.2.1.1 Paper Study

The first phase comprised a paper survey of all available archaeological, historical and cartographic sources. This involved the following:

- a collation of existing written and graphical information to identify the likely context, character, significance and sensitivity of the known or potential cultural heritage, archaeological and architectural resource using appropriate methodology;
- a detailed investigation of the archaeological, architectural and historical background of the Site, the landholding and the surrounding area extending 1km from the development boundary (Fig. 12-1). Note the area in which the haul route, processing area and soil importation area is located has already been assessed under planning reference 05/2091 and ABP PL 09.220222. This area was examined using information from the:
 - Record of Monuments and Places ('RMP') of Counties Kildare and Carlow
 - The Sites and Monuments Record;
 - The Kildare County Development Plan 2023-2039;
 - The Carlow County Development Plan 2022-2038;
 - The National Inventory of Architectural Heritage;
 - Aerial imagery;

- Excavation reports;
- Cartographic; and,
- Documentary sources.
- The Kildare County Development Plan 2023-2029 is the statutory plan detailing the development objectives/policies of the relevant local authority. The plan includes objectives and policies relevant to this assessment, i.e. regarding cultural heritage [7];
- The National Inventory of Architectural Heritage ('NIAH') is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht and established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Culture, Heritage and the Gaeltacht to the planning authorities for the inclusion of structures in their Record of Protected Structures ('RPS');
- The Record of Monuments and Places was established under section 12 (1) of the National Monuments (Amendment) Act, 1994 and provides that the Minister shall establish and maintain a record of monuments and places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place in respect of each county in the State. The associated files contain information of documentary sources and field inspections where these have taken place. Note, although the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law by the President on October 13, 2023, the part of the act superseding the Record of Monuments with the Register of Monuments had not been commenced at the time this assessment was prepared. This assessment uses the Record of Monuments and Places, which was still in force at the time the assessment was completed;
- The Sites and Monuments Record - is maintained by the Department of Housing, Local Government and Heritage and contains information on Recorded Monuments and additional unprotected sites that have been identified since the Record of Monuments was issued;
- Aerial photographs – record crop marks, soil marks and earthworks that may not have been previously detected;
- Cartographic Sources - this includes seventeenth-century mapping as well as the 1st and 3rd editions of the Ordnance Survey six-inch maps; and,
- Documentary Sources – provide more general historical and archaeological background.

The second phase involved a field inspection and assessment of the Site.

Field inspection

- A field inspection was carried out on 21st September 2023 to identify and assess any known archaeological and architectural sites and previously unrecorded features and portable finds within the Site.

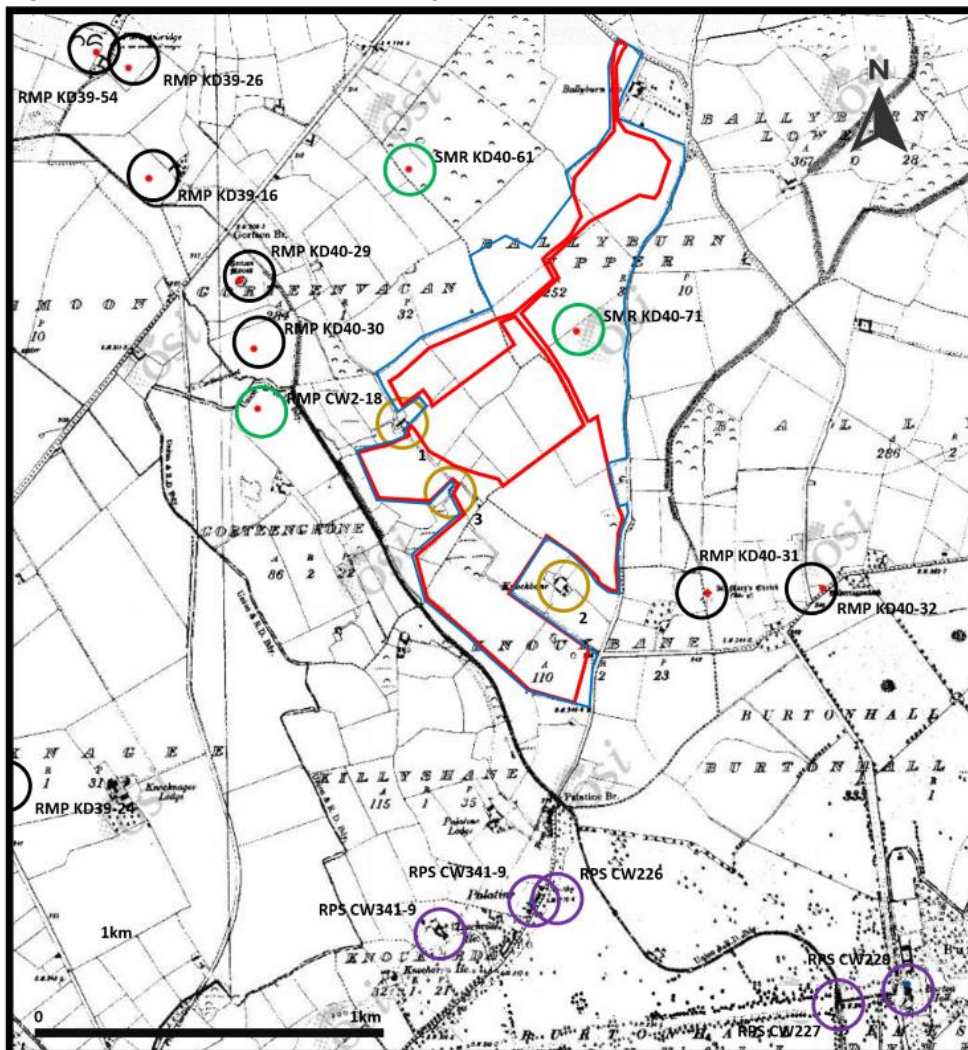
12.2.2 Assessment of the Proposed Development

An impact assessment and mitigation strategy have been prepared. An impact assessment outlines potential adverse impacts that the Proposed Development may have on the cultural resource, while a mitigation strategy is designed to avoid, reduce, or offset such adverse impacts.

Extracts from the Record of Monuments and Places for County Kildare are presented on a map of the local area around the site in Figure 12-1. RMP sites included on the Records of Monuments and Places statutory mapping are identified by black circles. The Site is shown with a red line.

The assessment study area superimposed on the SMR map for Counties Kildare and Carlow. The Site and haul route boundary are outlined by the red and pink lines and the existing permitted quarry in blue. The Sites outlined in pink have already been assessed under 05/2091 and ABP PL 09.220222. The proposed extraction area is indicated by the black line. RMPs are indicated with black circles, SMRs with green circles, RPS with purple circles, and unlisted buildings in the vicinity of the Site with brown circles.

Figure 12-1: The assessment study area



12.2.3 Guidelines

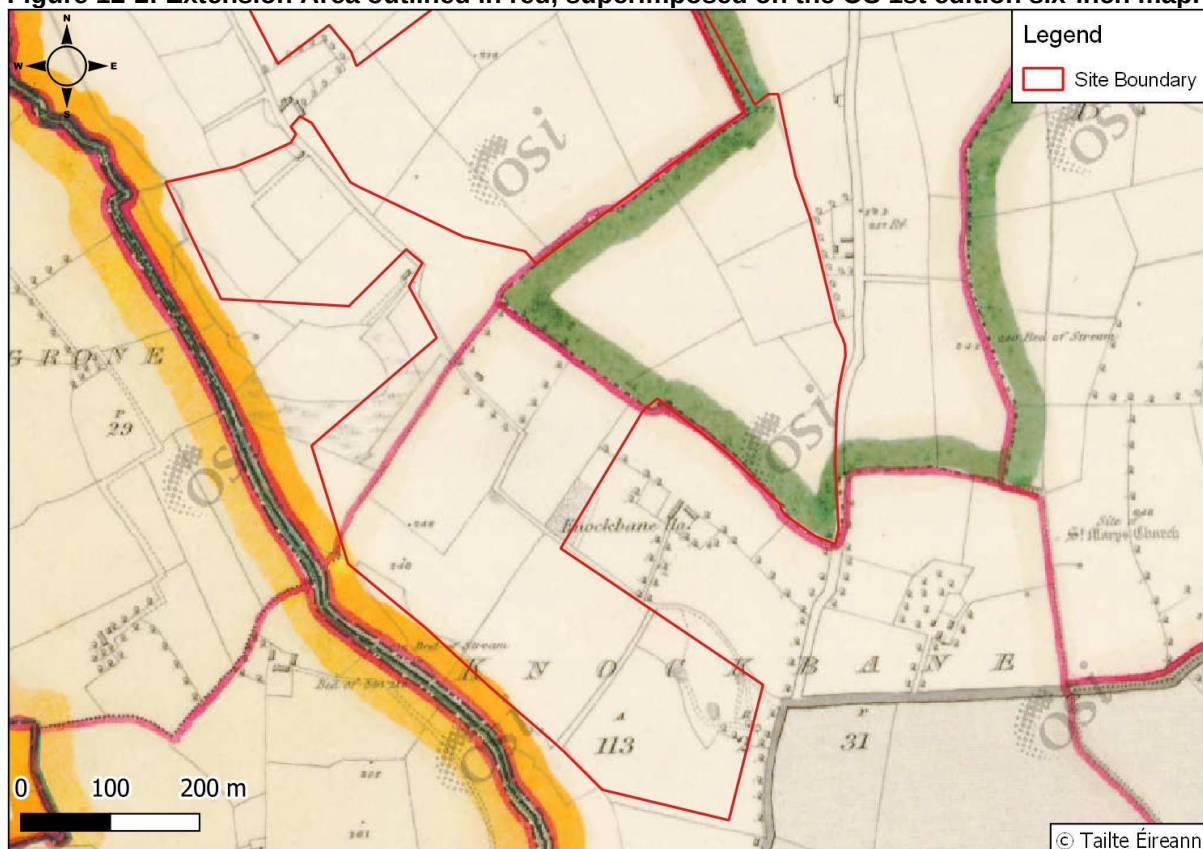
The report format and some of the descriptions of effects are based on the Guidelines on the Information to be contained in Environmental Impact Assessment Report, published by the Environmental Protection Agency ('EPA') in 2022.

12.3 Receiving Environment

12.3.1 The Landscape

The Site is located in the townlands of Ballyburn Upper, Gortenvacan, and Knockbane, Co. Kildare, on OS Six Inch sheet No. 40, ca. 3.7km to the south-west of the town of Castledermot and 0.43km west of the R448 road. The local soil is an Elton series fine loamy drift with limestones overlying drift with limestones [2]. The extension lands are currently in use for pastoral and tillage agriculture. See Figure 12-2, 12-3 and 12-4 below.

Figure 12-2: Extension Area outlined in red, superimposed on the OS 1st edition six-inch map.



2 <http://gis.teagasc.ie/soils/map/php> Irish Soils Information System (URL accessed 17-8-2023).

Figure 12-3: Extension Area outlined in red, superimposed on the OS 1st edition twenty five inch map.

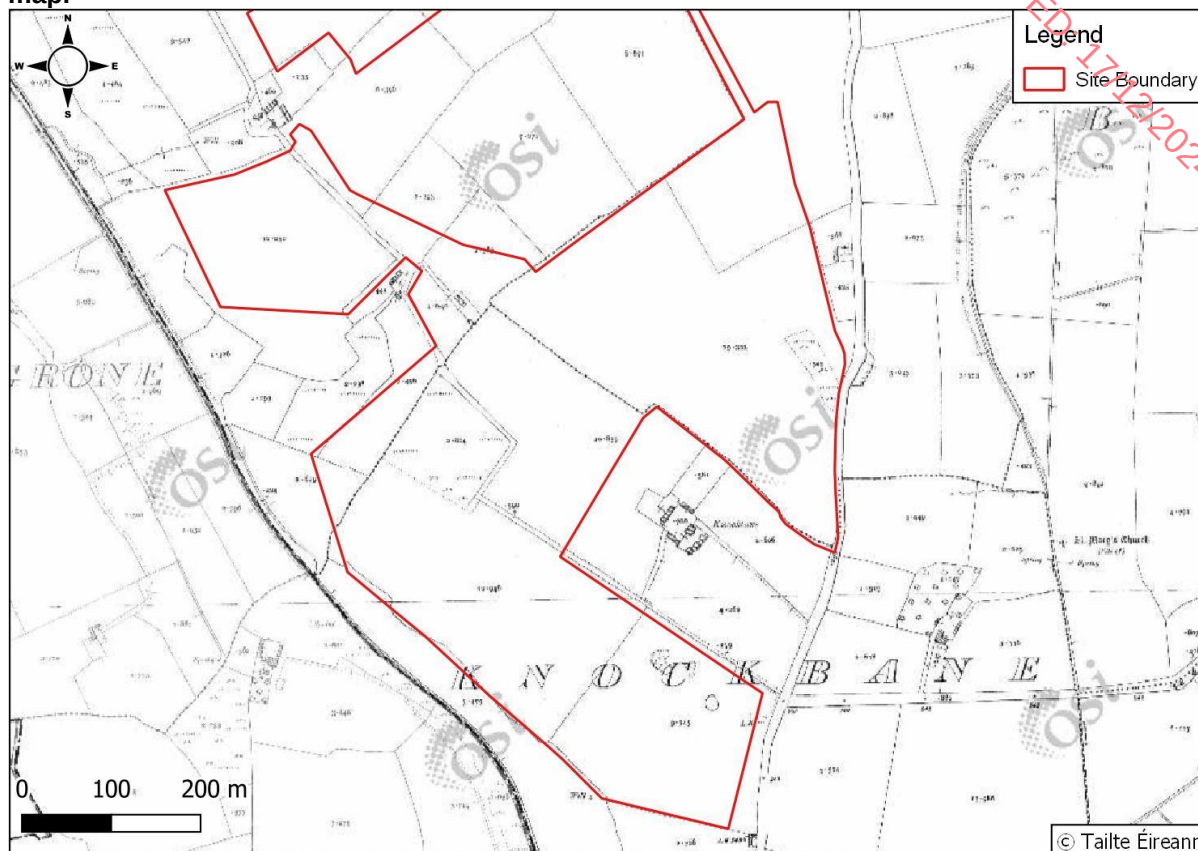


Figure 12-4: Extension area outlined in red, superimposed on LiDAR taken in 2011 (OPW 2579). Contains Irish Public Sector Data (Geological Survey Ireland & the Office of Public Works) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) license.



12.3.2 Historical and Archaeological Background

The following is a summary of the archaeological and historical development of the study area and the main types of sites, monuments and structures that are known from the surrounding area. The purpose of this approach is to place the types of sites, monuments and structures in the study area in a cultural and chronological context to assist the assessment. The Site is situated in the townlands of Ballyburn Upper, Gorteenvacan, and Knockbane, County Kildare, in the civil parishes of Castledermot and Killelan and the barony of Kilkea and Moone (Note the original spellings of placenames recorded in source material are retained in the text).

12.3.2.1 The Prehistoric Period

There is prehistoric archaeological material known in the vicinity of the Site including a Bronze Age cist burial in Gorteenvacan townland (RMP KD039-026---), a Late Bronze Age house (09E0128) and pits, post-holes, ditches and a spread (20E0185) in Ballyburn Upper and six Fulacht fia in Ballyburn Lower (A021/006-8, E002563, E002565-6) that indicate prehistoric activity in the study area.

12.3.2.2 The Early Medieval Period

In the Early Medieval period the study area was situated in the kingdom of Iarthar Liphi, later known as Uí Muiredaig, which was ruled by the Uí Muiredaig sept [118]. Classically settlement at this period is indicated by the presence of enclosed farmsteads known as ringforts, when enclosed with earthen banks, and cashels when enclosed by stone walls. A large bivallate ringfort with a souterrain and burials was excavated in the existing pit in 2013 (13E045) just to the north of the Site.

12.3.2.3 The Medieval Period

On the death of Diarmait Mac Murchade in 1171 his son-in-law Richard fitz Gilbert de Clare claimed the Lordship of Leinster. By the time of his death in 1176, when the Lordship of Leinster passed to King Henry II, the process of sub-infeudation (the granting of lands by lords to their dependents, to be held by feudal tenure) was well under way. The Uí Muireadhaigh lands in the Barony of Kilkea had been granted to Walter de Ridelisford and that sept pushed eastward into the Glen of Imaal.

In 1189 King Henry II gave Isabel de Clare, daughter and heiress of the deceased Lord of Leinster, to William Marshal in Marriage along with Leinster and other lands. With the death of the last surviving son of William and Isabel Marshall, Anselm, in 1245 the Lordship of Leinster came into the hands of King Henry III. Leinster was partitioned between Anselm's five sisters and Kildare came to Sibilla and her husband, William Ferrars. It passed through their daughter, Agnes Ferrars, to her husband William de Vescy and to their son William de Vescy, who in 1297 surrendered Kildare to King Edward I, and it became a Royal County. In 1316, following the Scottish invasion of Ireland by Robert Bruce, John fitz Thomas, the Geraldine Baron of Offaly, was made Earl of Kildare. The following year the Liberty of Kildare was given to his son Thomas fitz John, the second Earl. The Geraldines held the Earldom of Kildare until Thomas FitzGerald, 10th Earl of Kildare, forfeited the title in 1537 and Kildare once again became a Royal County.

Kilkea along with Norragh and Reban, Kilcullen and southern part of South Naas was the territory of the Uí Muireadhaigh (O Murethi) named after the King of Leinster who died in 975. They took the surname O'Toole from Tuathal, King of Leinster, who died in 926 [119]. The current barony of Kilkea and Moone was in the Medieval period three baronies: Kilkea, Moone and Dunlost. The Barony of Kilkea including the manors of Kilkea and Tristledermot (Castledermot) and Imaal in the modern barony of Upper Talbotstown was granted by Strongbow to Sir Walter de Ridelisford, Baron of Bray, before 1176. de Ridelisford drove the Uí Muireadhaigh into Imaal (Ibid. 67). However, the O'Tuathail continued to claim the barony, and the Annals note that in 1259 Felim O'Tuathail, Lord of Sil-Muireadhaigh Omurethi, died. (Annals of the Four Masters 1259.15). In 1388 John Roe O'Tuathail, Lord of the Hy-Muireadhaigh, was killed (Annals of the Four Masters 1388.3) and in 1404 Felim, the son of Hugh O'Tuathail, Lord of the Hy-Muireadhaigh, died. (Annals of the Four Masters 1404.15).

The process of sub-infeudation is normally associated with the construction of timber castles, known as Motte and Baileys. These earthwork fortifications were used to house and defend the Norman lords and their retinues while they set about the process of pacifying and organizing their new fiefs. The closest motte castle to the study area is situated in the centre of the barony ca. 6.5km to the north-west at de Ridelisford's administrative centre at Kilkea Demesne.

Manorialism describes the organisation of the feudal rural economy and society characterised by the vesting of legal and economic power in a lord supported economically from his own direct landholding and from the obligatory contributions of a legally subject part of the peasant population under his authority. In Ireland the Lord's manor house was also sometimes enclosed by a rectangular moat and these sites are referred to as moated sites. They are a useful indicator of Anglo-Norman settlement. The closest possible moated site to the Proposed Development is the rectangular cropmark site in Gorteenvacan townland (KD 40-030---), close to the ford of the River Gorteen. This was probably the Manor of the Lord who received the study area as a fief from the de Ridelisfords.

Walter de Ridelisford died in 1226 and the barony passed to his son Walter de Ridelisford II who died before 1276 without a male heir. The barony passed to his daughter Emmeline de Ridelisford who married Stephen Longespee. The barony was passed to their two daughters Eleanor and Emmeline Longespee. Emmeline's first husband was Maurice Fitzgerald, 3rd baron Offaly, and Eleanor married Robert de Marisco. After the death of de Marisco the Barony was shared between Christiana de Marisco and Emmeline Longespee from 1246.

In 1281 Christiana de Marisco agreed to trade her share to King Edward I in return for English lands. The King gave Christiana's share of the barony to his Queen Eleanor, but on her death returned the lands to Christian de Marisco. On her death the barony passed to Emmeline Longespee. On Eleanor's death in 1291 the barony was taken back into the King's hands. In 1305 Edward I granted Christiana de Marisco's part of the barony to John Wogan, The Justiciary of Ireland [120]. In 1305 Emmeline Longespee also granted her share of the barony to John Wogan [120].

On the death of John Wogan in 1311 the barony was passed to his son John Wogan. On his death in 1328 Kilkea barony passed to his son Thomas Wogan, in 1358 to his son John Wogan, in 1370 to David Wogan and in 1417 to John Wogan. John Wogan died in 1421 and Kilkea passed to his brother Thomas Wogan. In 1427 Castledermot was taken and burned by Gerald Kavanagh McMurrough and Thomas Wogan was captured. After payment of a ransom he was released in 1428 (Close Roll, 6 Henry VI, n.34, Tresham, p246b). Thomas Wogan died in 1435 and as his son Nicholas was a minor the barony was taken into the King's hands [Pat Roll, 13 Henry VI m53, imperfectly calendared in Tresham, p257b].

12.3.2.4 The Later Medieval Period

The fifteenth century was characterised by the decline of Anglo-Norman power in Ireland which had been ebbing since the early fourteenth century. Part of the response to this was the construction of masonry tower houses which sprang up after King Henry VI introduced a building subsidy of £10 in 1429 [121]. However, about 1443 Castledermot was taken by Donnchadh mac Art MacMurrough-Kavanagh and destroyed and the whole barony was overrun [122]. Kilkea remained under the control of MacMurrough-Kavanagh until Gearóid Mor Fitzgerald, 8th Earl of Kildare, reconquered the Barony between 1478 and 1483. Therefore no tower houses were constructed in the study area until the tower at Gorteenvacan was built by Richard Eustace of Ballybyrne (Ballyburn) as part of his rental agreement with Patrick Fitzgerald in 1600. He had to build a tower on Gorteen mound with one storey above the vault, a slate roof, battlements and a stone perimeter with a strong oak gate [123].

In 1483 the Irish Parliament, meeting at Limerick, granted the Earl of Kildare all the lands between Calverstown and Leighlinbridge which were not re-occupied by their original owners within 6 years [122]. This allowed the Earl to acquire title to much of the land in the study area. In 1485 the Earl received a grant of labour for the building of a castle at Castledermot and the town was also rebuilt [124]. In the Earl of Kildare's Rental Book of 1518 Ballybirn (Ballyburn), Knocknecrow (Knocknagee) and Davidistown (Davidstown) and Bealaghmone (Bellaghmoon) were all the property of the Earl and rented to his agent Conour OGeran [125].

12.3.2.5 The Post-Medieval Period

In the sixteenth century the Tudors adopted a much more interventionist policy in Ireland and sought to impose the protestant reformation on the one hand and new legislation and institutions on the other. This policy provoked the revolt of Thomas FitzGerald the 10th Earl of Kildare in 1534 which was put down the following year and resulted in his execution and the forfeiture of the earldom in 1537. Royal ecclesiastical supremacy was enacted by the Dublin Parliament of 1536-37, leading to the dissolution of the monasteries throughout Kildare and Leinster by 1541. In that year the Irish Parliament also recognized Henry VIII as king of Ireland.

The confiscation of monastic property, as the lands of absentee owners and the rebels in Co. Kildare, met most of the costs of the expanded administration.

During the revolt of Thomas FitzGerald, the 10th Earl of Kildare, Castledermot was taken in 1534 by the earl of Ormond and he was made Constable of the castle in 1540. In the subsequent Crown survey of 1541, which recorded land ownership before the FitzGerald forfeiture, Richard Walle was the tenant of Frumpalston, Galfridu Walle was the tenant of Knockbon, Henry Wale was the tent of Gurtyneovokan and the Earl of Kildare was the owner of Villa de Byrnston (Ballyburn), Villata de Ballaghmoney (Bellaghmoon), Villata de Davydyston (Davidstown) and Villata de Knocknekrey (Knocknagee) [125]. In 1554 Gerald the 11th earl of Kildare was restored to his title and lands by Queen Elizabeth [122].

Tickell (1960) noted that in 1590 Ballyburn was rented by James Eustace of Grangemore who was followed by his son Richard. FitzGerald [126] noted that in and before 1600 Patrick Fitzgerald of Damastown, Co. Dublin held the neighbouring lands of Gorteenvacan from the Earl of Kildare. In 1600 he sublet Gorteenvacan to Richard Eustace of Ballybyrne, son of James third son of John Eustace of Castlemartin. In 1608 Thomas Fitzgerald granted Richard Eustace a further 31 year lease. Richard died in 1637 and his youngest son Maurice held Gorteenvacan in 1641. On the expiration of Richard Fitzgerald's lease in 1652 Gorteenvacan was rented to the Archbolds of Timolin.

In the Civil Survey of 1654-5, the Earl of Kildare was noted as owning most of the Barony of Kilkea in 1641, over 9000 profitable acres. This included Ballyburn, Bellaghmoon, Davidstown, Gorteenvacan (which was on a long rental) and Knocknagee. The remaining lands were held by his cousins James Fitzgerald of Lackagh, Pierce Fitzgerald of Ballysonnan, the FitzGeralds of Little Birton, Nicholas Fitzgerald of Mullamast, and Thomas Fitzgerald of Belan. The lands held by the Eustaces: Sir Maurice Eustace, The Eustaces of Moone, and Walter Eustace of Ballecollan, as well as Christopher Archboulde, the Walles, Sir Andrew Aylmer of Donadea, Walter Barrowes, Walter Peppard of Kilkea, and Nicholas Whyte [127].

During the war of the Three Kingdoms the Earl of Kildare acted as Governor of Kildare and thus retained his lands at the Cromwellian settlement. The Book of Survey and Distribution c.1678 [126] indicates some changes in landholding in the area, Gorteenvacan changed from being occupied exclusively by Christopher Archboulde to being shared between him and Sr. Charles Wheeler and William Archboulde and Prumplestown, owned by Garret Wall, was noted as never seized. The Earl of Kildare appears to have retained ownership of Ballyburn and his other lands.

By 1859 Griffiths valuation indicates that the Earl of 660Kildare, Duke of Leinster since 1766, had sold all of his lands in the area, retaining only Bolton in Killelan parish. The landholding of the study area was now extremely broad.

12.3.3 Kildare County Development Plan 2023-29

Chapter 11 of the Kildare Co. Development Plan 2023-29 sets out the policies and objectives on built and cultural heritage within the County. There are several policies, objectives and actions outlined in Chapter 11 of the plan in respect of built and cultural heritage which state:

Archaeological Heritage

AH P2 *Protect and enhance archaeological sites, monuments and where appropriate and following detailed assessment, their setting, including those that are listed in the Record of Monuments and Places ('RMP') or newly discovered archaeological sites and/or subsurface and underwater archaeological remains.*

AH O2 Manage development in a manner that protects and conserves the archaeological heritage of County Kildare, avoids adverse impacts on sites, monuments, features or objects of significant historical or archaeological interest and secures the preservation in-situ or by record of all sites and features of historical and archaeological interest, including underwater cultural heritage. The Council will favour preservation in – situ in accordance with the recommendation of the Framework and Principles for the Protection of Archaeological Heritage (1999) and the Council will seek and have regard to the advice and recommendations of the Department of Housing, Local Government and Heritage.

AH O3 In co-operation with the National Monuments Service, Department of Housing, Local Government and Heritage require archaeological impact assessment, surveys, test excavation and/or monitoring and/or underwater archaeological impact assessments for planning applications in areas of archaeological importance and where a development proposal is likely to impact upon in-situ archaeological monuments, their setting and archaeological deposits, based on recommendations of a suitably qualified archaeologist and the Council will seek and have regard to the advice and recommendations of the Department of Housing, Local Government and Heritage.

AH O4 Ensure that development in the vicinity of a site of archaeological interest is not detrimental to the character of the archaeological site or its setting by reason of its location, scale, bulk or detailing and to ensure that such proposed developments are subject to an archaeological assessment prepared by a suitably qualified archaeologist. Such an assessment will seek to ensure that the development can be sited and designed in such a way as to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features, objects and areas of underwater archaeological heritage.

AH O5 Require the preservation of the context, amenity, visual integrity and connection of the setting of archaeological monuments. As a general principle, views to and from archaeological monuments shall not be obscured by inappropriate development. Where appropriate, archaeological visual impact assessments will be required to demonstrate the continued preservation of an archaeological monument's siting and context.

AH O6 Secure the preservation in-situ or by record of: • the archaeological monuments included in the Record of Monuments and Places as established under section 12 of the National Monuments (Amendment) Act, 1994 • any sites and features of historical and archaeological interest including underwater cultural heritage and protected wrecks. • any subsurface archaeological features including those underwater, that may be discovered during the course of infrastructural/development works in the operational area of the Plan. Preservation relates to archaeological sites or objects and their settings.

AH O7 Contribute towards the protection and preservation of the archaeological value of underwater or archaeological sites associated with rivers and associated features.

AH O8 Protect historic burial grounds that are recorded monuments and encourage their maintenance in accordance with best conservation principles in co-operation with the Historic Monuments Advisory Committee and the National Monuments Service, Department of Housing, Local Government and Heritage. Development may be restricted or conditions requiring substantial excavation may be imposed in and adjacent to former burial grounds.

AH O9 Promote and support in partnership with the National Monuments Section of the Department of Housing, Local Government and Heritage (DHLGH), the concept of Archaeological Landscapes where areas contain several Recorded Monuments.

AH O10 Require that all development proposals for industrial buildings and sites identified in Kildare Industrial Archaeology Survey 2007 or otherwise identified as being of industrial archaeological importance be accompanied by an industrial archaeology assessment of the surrounding environment. New development should be designed in sympathy with and to protect existing features and structures.

AH A2 Where possible, facilitate and enhance public access to and understanding of the archaeological heritage and disseminate archaeological information and advice to prospective developers and the general public.

AH A3 Identify appropriate archaeological sites in the Plan area to which public access could be provided and work to secure public access, where appropriate, in consultation with the landowners.

AH A4 Support and encourage the provision of signage in Irish and English to publicly accessible recorded monuments.

AH A5 Support the implementation of the recommendations of the Curragh Conservation, Management and Interpretation Plan, when, prepared, in association with relevant stakeholders, within the lifetime of this Development Plan.

AH A6 Encourage and promote the appropriate management and enhancement of archaeological heritage, to include community initiatives.

Walled Towns

AH P3 Support the protection and conservation of the medieval fabric and form of walled towns in the county.

AH O11 Avoid disturbance, removal and alteration of the line of identified town walls as detailed in Conservation Management and Interpretation Plans or the potential line of the town walls as identified in the Urban Archaeological Survey.

AH O12 Retain, where possible and practical, the existing street layout, historic building lines and traditional plot widths where these derive from medieval or earlier origins.

AH O13 Support and maintain the membership of Kildare, Naas, Athy and Castledermot in the Walled Towns Network.

AH O14 Support the inclusion of walled towns in County Kildare in the Historic Towns Initiative piloted by the Department of Housing, Local Government and Heritage.

AH O15 Seek the preparation and implementation of heritage led regeneration plans for the historic core of towns in Co Kildare.

AH A7 Prepare a Conservation and Management Plan for Naas Town Walls and other defences categorised as 'National Monuments' (rather than 'Recorded Monuments') under the National Walled Towns Policy, Department of Arts, Heritage and the Gaeltacht 2008.

AH A8 Continue to develop the programme of survey and maintenance of Council-owned monuments and structures of historic interest through the Historic Monuments Advisory Committee and with the support of the National Monuments Section of the Department of Housing, Local Government and Heritage.

World Heritage

AH P4 Recognise and respect potential World Heritage Sites in Kildare on the UNESCO Tentative List – Ireland.

AH O16 Support the State in the nomination process of Dun Ailinne to World Heritage status as part of an assemblage of Royal and Monastic Sites in co-operation with the relevant Local Authorities.

AH O17 Protect and enhance the setting of Dun Ailinne and support managed limited public access to the site. Only sensitive development that does not undermine the archaeological and cultural significance of the site will be permitted.

AH O18 Protect and sustain the established appearance and character of views associated with Dun Ailinne. Require any development proposals within/around Dun Ailinne to demonstrate that no adverse effects will occur on the established appearance or character of Dun Ailinne as viewed from either the Protected Panoramic Views or from surrounding public roads.

Features of Historical Interest

AH P5 Secure the identification, protection and conservation of historic items and features of interest throughout the county including street furniture, surface finishes, roadside installations, items of industrial heritage, riverine heritage, and other stand-alone features of interest (items not listed on the RMP or RPS).

AH O19 Ensure that development within the county including Council development retains, refurbishes and incorporates features of historical interest, as deemed appropriate in each instance.

AH A9 Develop a database of features of historical interest including street furniture, surface finishes, roadside installations, items of industrial heritage, riverine heritage, and other stand-alone features of interest (items not listed on the RMP or RPS) within villages and towns in County Kildare and ensure they are included in relevant Local Area Plans.

Architectural Heritage

Protected Structures

AH P6 Protect, conserve and manage the archaeological and architectural heritage of the county and to encourage sensitive sustainable development in order to ensure its survival, protection and maintenance for future generations.

AH O20 Conserve and protect buildings, structures and sites contained on the Record of Protected Structures of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

AH O21 Protect the curtilage of protected structures or proposed protected structures and to refuse planning permission for inappropriate development that would adversely impact on the setting, curtilage, or attendant grounds of a protected structure, cause loss of or damage to the special character of the protected structure and/or any structures of architectural heritage value within its curtilage. Any proposed development within the curtilage and/or attendant grounds must demonstrate that it is part of an overall strategy for the future conservation of the entire built heritage complex and contributes positively to that aim.

AH O22 Refuse planning permission for the demolition of any protected structure unless the Council is satisfied that exceptional circumstances exist. The demolition of a protected structure with the retention of its façade will likewise not generally be permitted.

AH O23 Require an Architectural Heritage Assessment Report, as described in Appendix B of the Architectural Heritage Protection, Guidelines for Planning Authorities 2011, to accompany all applications with potential for visual or physical impacts on a Protected Structure, its curtilage, demesne and setting. This report should be prepared by a person with conservation expertise that is appropriate to the significance of the historic building or site and the complexity of the proposed works.

AH O24 Safeguard the amenities of Castletown House including the main avenue, Donaghcumper, St Wolstans and the River Liffey environs as shown on Map V1 - 11.14. - Safeguard the amenities of The Wonderful Barn including the adjacent buildings.

AH O25 Maintain the views from Castletown House to the River Liffey and to protect the integrity of the designed landscape at Castletown Demesne, including the pathways, avenues, and the following views:

- Axial views between Castletown House and the Conolly Folly, Obelisk;
- Views between Castletown House and the Wonderful Barn including the trees and natural growth areas within same;
- Views from the House to the river and across the back parterre;
- Views across the river and to the linked demesnes of Donaghcumper and St. Wolstans; and,
- Views from the main avenue to, and across, the river towards Castletown, and up and down the river to Celbridge and New Bridges. Ensuring development does not inappropriately encroach on same.

AH O26 Require that planning applications in proximity to 'Views to be Preserved' are accompanied by a Visual Impact Assessment.

AH O27 Maintain the views to and from Carton House and protect the character of the historic designed landscape within Carton Demesne, as outlined in Map V1 - 11.13.

AH O28 Support the re-development of Clongowes Wood College to ensure the continued and enhanced educational use of this protected structure. Any proposed development within the curtilage and/or attendant grounds must demonstrate that it is part of an overall strategy for the future conservation of the entire complex including the structures, demesne and/or attendant grounds.

AH O29 Preserve and protect the historic, architectural, and military heritage of The Curragh Camp. Ensure that proposed development within the curtilage and/or attendant grounds demonstrates that it is part of an overall strategy to protect the heritage significance of the entire Curragh Camp.

AH O30 Ensure that, in the event of planning permission being granted for development within the curtilage and attendant grounds of a protected structure, a sustainable use and appropriate maintenance plan is in place for the structure and any associated buildings or structures of

heritage interest. The proposed works to the protected structure should occur in the first phase of the development to prevent endangerment, abandonment and dereliction of the structure.

AH O31 Protect the designed landscapes associated with protected structures and retain important elements of the built heritage including historic gardens, stone walls, pathways, and avenues within the curtilage and attendant grounds of protected structures.

AH O32 Ensure that new development will not adversely impact on the setting of a protected structure or obscure established views of its principal elevations.

AH O33 Promote best practice and the use of skilled specialist practitioners in the conservation of, and any works to, protected structures. Architectural Heritage Impact Assessment reports should make reference to the DHLGH Advice Series on how best to repair and maintain historic buildings. The AHIA report should summarise the principal impacts on the character and special interest of the structure or site and describe how it is proposed to minimise these impacts. It may also describe how the works have been designed or specified to have regard to the character of the architectural heritage.

AH O34 Encourage high quality design in relation to planning applications that are made for the construction of extensions or new buildings affecting protected structures or older buildings of architectural merit not included in the RPS. The Council will have regard for the visual impacts on the setting and character of protected structures and/or buildings of architectural merit not included on the RPS, when considering applications on neighbouring sites.

AH O35 Favourably consider the change of use of any structure included on the Record of Protected Structures, where such a change of use does not adversely impact on its intrinsic character or special interest and where such a use may otherwise not conform to the zoning matrix associated with any Local Area Plan.

AH O36 Actively encourage uses that are compatible with the character of protected structures. In certain cases, the Planning Authority may relax site restrictions / development standards in order to secure the preservation and restoration of a protected structure or building of architectural merit that is not included on the RPS.

AH O37 Promote the use of energy upgrade materials and technologies that follow good conservation practice and are compatible with the character and vapour permeable construction of traditionally built structures.

AH O38 Support appropriate and sensitive thermal upgrade of protected structures and other heritage buildings. These works shall be undertaken with the necessary planning permission / statutory declarations with the advice of Kildare County Council's Architectural Conservation Officer.

AH O39 Promote the maintenance and appropriate re-use of buildings of architectural, cultural, historic and aesthetic merit which make a positive contribution to the character, appearance and quality of the streetscape or landscape and the sustainable development of the county. Any works associated with the re-use of such buildings should be carried out in accordance with best conservation practice.

AH O40 Encourage appropriate change of use and reuse of industrial buildings of heritage interest, provided such a change does not seriously impact on the intrinsic character of the structure and that all works are carried out in accordance with best conservation practice.

AH O41 Promote the retention of original or early building fabric including timber sash windows, stonework, brickwork, joinery, render and slate. Likewise, the Council will encourage the re-instatement of historically correct traditional features.

AH O42 Retain where practicable a protected structure which has been damaged by fire, and to retain those elements of that structure that have survived (either in whole or in part) and that contribute to its special interest.

AH O43 Ensure that national guidelines and the principles of conservation best practice are followed in assessing the significance of a Protected Structure and in considering the impact of proposed development on the character and special interest of the structure, its curtilage, demesne and setting.

AH O44 Co-operate with Waterways Ireland in the management, maintenance and enhancement of the Royal Canal and Grand Canal and associated structures/features. Such projects shall be subject to an AA Screening Report, and where applicable, Stage 2 AA. They shall have a regard for any hydrological connection shared with a European Site and their qualifying interest species. The project shall account for any potential likely significant effects and provide mitigation and monitoring where appropriate.

AH O45 Support the implementation of the National Policy on Architecture, 'Places for People' prepared by the Department of Housing, Local Government and Heritage.

AH A10 Review and amend on an ongoing basis the Record of Protected Structures and make additions, deletions and corrections as appropriate over the period of this Plan.

AH A11 Prepare a Buildings at Risk Register to prevent the endangerment of Protected Structures, historic or vernacular buildings.

AH A12 Carry out an audit and assess the condition of all protected structures within the Council's ownership and devise a management plan including a range of proposed uses for these structures, which may include community uses.

AH A13 Carry out field surveys of industrial heritage in the county and make recommendations for its protection.

AH A14 Carry out an audit of all historic rail and road bridges and disused railway lines in Kildare and liaise with Iarnród Éireann and Transport Infrastructure Ireland regarding the management, maintenance and enhancement of same.

AH A15 Carry out a pilot study on the sympathetic re-use of a Protected Structure/ or groups of buildings in an Architectural Conservation Area (ACA) to address high quality residential reuse in historic urban cores of towns and villages.

Country Houses and Demesnes

AH P7 Promote appreciation of the landscape and historical importance of traditional and historic gardens, demesnes and parks within County Kildare and particularly where they constitute an important and intrinsic value to the setting of a protected structure.

AH P8 Preserve and protect the historic gardens and designed landscapes identified in the National Inventory of Architectural Heritage Survey of Historic Gardens and Designed

AH O46 Encourage conservation, renewal and improvement which enhances the character and the setting of parks, gardens, and demesnes of historic interest within the county.

AH O47 Assess the demesnes and historic designed landscapes within Kildare and promote the conservation of their essential character, both built and natural, while allowing for appropriate re-use.

AH O48 Co-operate with owners in the protection, promotion and enhancement of heritage gardens and parks in the county, to support public awareness, enjoyment of and access to these sites and to seek the co-operation and assistance of other interested parties, including Government Departments and state agencies, in this regard.

AH O49 Preserve, protect and where necessary encourage the use of heritage/traditional varieties of plants and trees that form part of the local/ regional biodiversity resource and that contribute to local identity.

AH O50 Require where appropriate that an Architectural Heritage Impact Assessment report is prepared in accordance with DHLGH Guidelines and conservation best practice to inform visual or physical impacts of a proposed development on a demesne, designed landscape, or park, that is associated with a protected structure or located within an Architectural Conservation Area.

AH O51 Require that planning applications take into consideration the impacts of the development on their landscapes and demonstrate that the development proposal has been designed to take account of the heritage resource of the landscape.

AH O52 Designate and protect historic landscape areas including demesnes and ensure that new development enhances the special character and visual setting of these historic landscapes and to prevent development that would have a negative impact on the character of the lands within these historic landscape areas.

AH A16 Designate Architectural Conservation Areas, through the local area plan process, and where considered appropriate, to preserve the character of a historic designed landscape.

AH A17 Carry out a pilot study to protect and enhance the amenity value of significant demesnes in the county, in cooperation with the property owners.

AH A18 Review and update Map V1 - 11.13, with respect to the extent of existing woodland within the Demesne Walls of Carton Demesne, during the life of the Plan.

Built Vernacular Heritage

AH P9 Promote the protection, retention, appreciation and appropriate revitalisation of the built vernacular heritage of the county.

AH O53 Ensure that an assessment of the existing buildings on-site is undertaken through an analysis of historic maps and an appraisal of the historic fabric and features. Development proposals should retain and incorporate existing buildings of merit and any elements that contribute to their distinctive character.

AH O54 Have regard to guidance in the DHLGH Guidelines and conservation best practice in assessing proposed interventions to vernacular structures, traditional farmhouses, their curtilage, out buildings and settings.

AH O55 Resist the demolition of built vernacular heritage, in particular thatched cottages and farmhouses, and to encourage their sensitive reuse having regard to the intrinsic character of the structure and the potential to prolong the life cycle of the embodied carbon contained within the structure.

AH O56 Require that a sustainable use and appropriate maintenance plan is in place for earlier dwellings of heritage interest on farms or rural sites, where planning permission is sought for a new dwelling.

AH O57 Require the submission of a written report from a suitably qualified professional where it is proposed to redevelop a derelict property or one that has been unoccupied for a long period of time. The report must demonstrate that any proposal will not structurally compromise the subject building and shall outline the measures to be taken in order to protect the building from collapse, both prior to and during construction works.

AH O58 Have regard to guidance in *The Thatched Houses of Kildare 2005* and *Reusing Farm Buildings, A Kildare Perspective 2007* published by Kildare County Council and *A Living Tradition – A Strategy to Enhance the Understanding, Minding and Handling of our Built Heritage (2021)* published by the Department of Housing, Local Government and Heritage in assessing planning applications relating to vernacular buildings, thatched cottages, and traditional farm buildings.

AH O59 Respect the setting, form, scale and materials of existing vernacular structures and to only permit changes to these structures where they are sympathetic to their special features and character.

AH O60 Preserve the character, including original building features or materials should be retained such as windows, doors, roof coverings and setting (e.g. gates, gate piers, boundary treatments, courtyards etc) of vernacular buildings, where deemed appropriate by the planning authority. Proposals for extensions to historic or vernacular buildings should not erode the setting and design qualities of the original structure and should be in proportion or subservient to the existing building.

AH O61 Require the use of appropriate materials and methods when undertaking repairs to the historic fabric.

AH O62 Protect (through the use of ACAs, the RPS and in the normal course of development management) vernacular buildings where they contribute to the character of areas and/or where they are rare examples of a structure type.

AH O63 Ensure that new buildings adjacent to vernacular structures and extensions to vernacular buildings are of an appropriate design and do not detract from the character of these structures.

AH O64 Seek the repair and retention of traditional timber and/or rendered shop fronts and pub fronts, including those that may not be protected structures.

AH A19 Identify and retain good examples of historic street furniture in situ e.g. cast-iron post-boxes, water pumps, signage, street lighting, kerbing and traditional road and street surface coverings.

AH A20 Develop and publish guidelines on the conservation and appropriate re-use of Local Authority cottages and similar vernacular structures.

Architectural Conservation Areas

AH O65 Ensure that any development, modifications, alterations, or extensions within an ACA are sited and designed appropriately and are not detrimental to the character of the structure or to its setting or the general character of the ACA and are in keeping with any Architectural Conservation Area Statement of Character Guidance Documents prepared for the relevant ACA.

AH O66 Ensure that all planning applications for new developments within or immediately contiguous to an ACA include an Architectural Heritage Impact Assessment and Design Rationale addressing design considerations such as urban structure and grain, density and mix, scale, height, materials, landscape, views and landmarks and historic development.

AH A21 Investigate the designation of further ACAs at appropriate locations throughout the county including The Curragh Camp, Johnstown, Ballymore Eustace, Kilcullen, Brannockstown, Rathmore, Clane, Newbridge and Castledermot.

AH A22 (a) Prepare “Guidelines for the Management and Development of ACAs” identified in this plan. (b) Carry out a pilot study on developing a pro-active and dynamic framework for ACAs for the physical and economic enhancement of the built heritage character of a town/village.

AH A23 Have regard to DHLGH Guidelines and conservation best practice in assessing the character and significance of a historic town or urban area and the formulation of an ACA or in assessing development proposals relating to an ACA.

AH A24 Require where appropriate that an Architectural Heritage Impact Assessment report is prepared in accordance with DHLGH Guidelines and conservation best practice to inform the visual or physical impacts of a proposed development on an ACA.

AH A25 Prepare a character statement appraisal and area specific policy for each ACA within the county and to preserve, protect and enhance the character of these areas.

12.3.4 Buildings

Designated structures

The Record of Protected Structures (‘RPS’) in the Kildare County Development Plan 2023-2029 and the Carlow County Development Plan 2022-2028 were reviewed as part of the baseline study for this EIAR chapter [7] [128]. The review established that there are no structures within the Site. There are thirteen structures in the study area listed in the Record of Protected Structures (see Table 12-1 below).

The closest RPS externally to the Site is a water pump (RPS CW226) that is located ca.0.5km south of the Site. This and the remaining structures listed in the RPS are considered to be too far distant to be directly or indirectly impacted by the Proposed Development.

Table 12-1: Structures in the vicinity of the Site.

No. CW226	Water Pump
Structure type	Water pump
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None

No. CW226	Water Pump
Significance & quality of impact	None
Description	A late-nineteenth century hand pump set in a walled recess.
Plate	-
No. CW227	Bridge
Structure type	Bridge
Townland	Burton Hall Demesne
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	On the former avenue up to Burton Hall is a tall bridge over a stream. It is a single, round-headed arch of ashlar stone with raised voussoirs which rise from moulded base-moulds. The arch appears to date from the mid-18th century or earlier. The parapet wall and terminating piers appear to date from the early 19th century.
Plate	-
No. CW229	House
Structure type	Bridge
Townland	Burton Hall Demesne
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	The present house is a wing of the original Burton Hall which fell into decay in the late 19th century and was demolished sometime around 1900. The surviving wing is a three-bay, single-storey building over a high basement and dates from circa 1730. It is built of granite ashlar with limestone raised coigns, base-mould, block and start dressings to the tall windows and a heavy cornice. The slated roof is hipped at the North end. The South end was linked to the original house. A further range was added behind the original wing and has simple details.
Plate	-
No. CW341	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW342	Cottage
Structure type	Cottage

No. CW226	Water Pump
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW343	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW344	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW345	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None

No. CW226	Water Pump
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW346	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW347	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW348	Cottage
Structure type	Cottage
Townland	Killyshane
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW349	Cottage
Structure type	Cottage
Townland	Killyshane

No. CW226	Water Pump
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	One of row of eight, three-bay, single-storey, semi-detached cottages dated 1866 and built of coursed rubble granite. One pair has doorcases at the front while the other three pairs have entrances at the rear. There have been various minor alterations to these cottages with changes in glazing but they are essentially unaltered.
Plate	-
No. CW357	House
Structure type	House
Townland	Knockarda
Designation	RPS
Data source	Carlow Co. Development Plan 2022-28
Perceived Significance:	Regional
Type of impact:	None
Significance & quality of impact	None
Description	A three-bay, two-storey house of circa 1840 with smooth-rendered walls. There is a tetrastyle porch which has a shallow half octagon of Doric columns with marginal glazing, a mono-pitched roof with wide eaves. The porch is probably original and an interesting design solution. The sash windows have six panes in each sash and the slated, low-pitched, hipped roof has wide eaves with brackets and a pair of stacks.
Plate	-

Structures National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage ('NIAH') which is maintained by the Dept. of Housing, Local Government and Heritage was examined as part of the baseline study for this section of the EIAR on the 22nd of August 2023³. The review established that there are no additional structures within the Site or the study listed in the NIAH.

Field inspection

On the 19th of September 2023 fieldwork was carried out to identify any additional unlisted upstanding structures in the vicinity of the Site. This involved assessing all upstanding structures that are marked on the 1909 edition of the six-inch Ordnance Survey mapping within 100m of the Site (see Table 12-3 and Fig. 12-1). There are three of these structures in this area (see below). None of these structures are of special architectural interest.

3 <http://webgis.archaeology.ie/historicenvironment/> Historic Environment Viewer of the Department of Culture, Heritage and the Gaeltacht. (URL accessed 22-8-2023)

Figure 12-5: Extension Area.

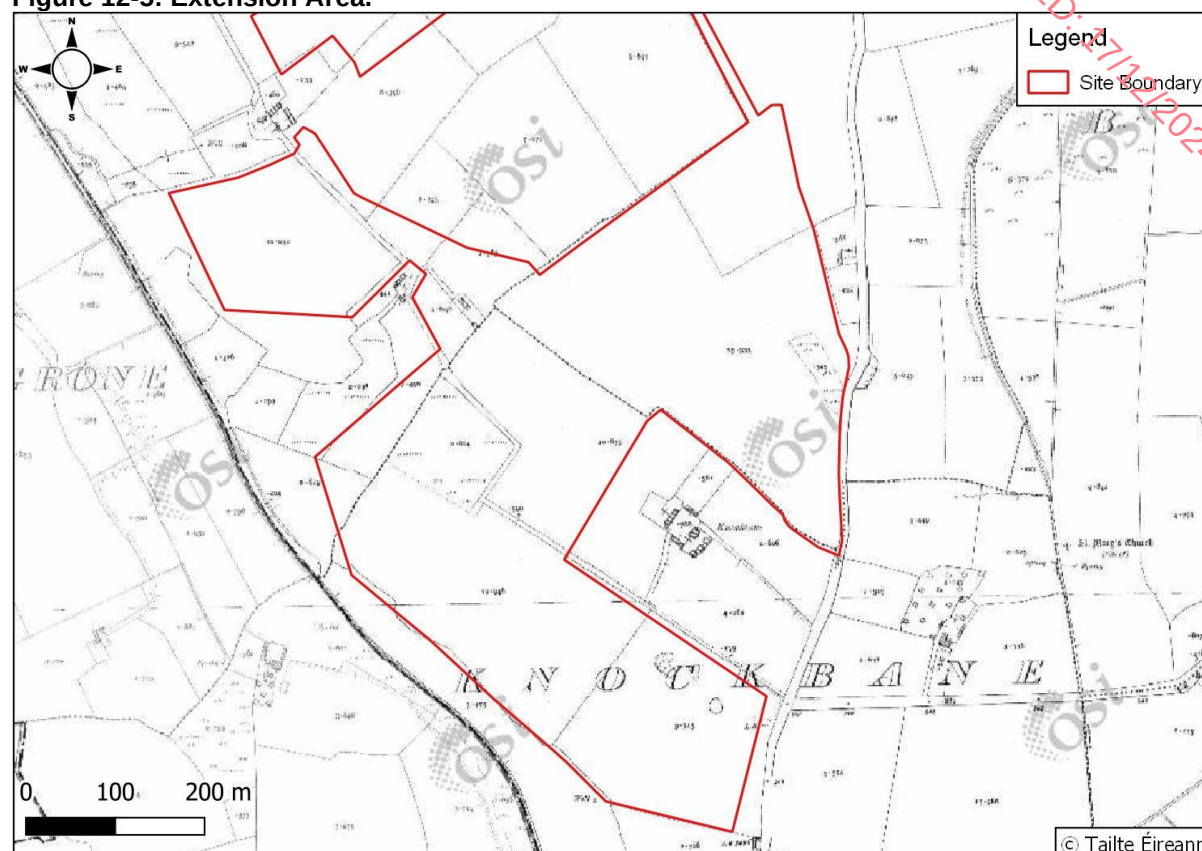


Table 12-2: Structures in the vicinity of the Site.

No. 1	House
Structure type	House
Townland	Gortenvacan
Designation	None
Data source	1909 edition of the six-inch Ordnance Survey map
Perceived Significance:	None
Type of impact:	None
Significance & quality of impact	None
Description	Ruined single-storey house with corrugated roof. Interior overgrown. Part of an overgrown, ruined farmyard. No special architectural interest.
Plate	Plate 12-1

No. 2	House
Structure type	House
Townland	Knockbane
Designation	None
Data source	1909 edition of the six-inch Ordnance Survey map
Perceived Significance:	None
Type of impact:	None
Significance & quality of impact	None

No. 2	House
Description	Three-bay two-storey house with slate roof and front porch extension. No special architectural interest.
Plate	Plate 12-2

No. 3	Shed
Structure type	Shed
Townland	Knockbane
Designation	None
Data source	1909 edition of the six-inch Ordnance Survey map
Perceived Significance:	None
Type of impact:	None
Significance & quality of impact	None
Description	Ruined and overgrown single-storey shed with low lintelled doorway and no windows. Roof collapsed. No special architectural interest.
Plate	Plate 12-3

Plate 12-1: Structure 1 looking southwest



RECEIVED: 17/12/2024

Plate 12-2: Structure 2 looking northeast



Plate 12-3: View of structure 3 looking southeast



12.4 Archaeological Assessment

12.4.1 Recorded Monuments

Examination of the Record of Monuments and Places for Counties Kildare and Carlow indicated that there are no Recorded Monuments located in the Site (see Fig. 12-1). Note that

in accordance with the Historic and Archaeological Heritage and Miscellaneous Provisions Bill 2023 the RMP will be replaced by the Register of Monuments, but the RMP was still legally in force when this assessment was prepared.

The closest Recorded Monument externally to the Site is that of a church KD040-031---- (see Appendix 12-1). This is described in the Record of Monuments as:

KD040-031---- Ballyhade Church

The site was already marked as 'site of' on the 1837 OS 6-inch map. Situated in a shallow valley. No visible surface traces.

The site of this monument is located c.240m east of the Site. The monument is no longer upstanding and will not be directly or indirectly impacted by the Proposed Development.

The next closest Recorded Monument externally to the Site is the cropmark of a possible Moated site KD040-030---- (see Appendix 12-1). This is described in the Record of Monuments as:

KD040-030---- Gorteenvacan Moated site

Aerial photograph (CUCAP AYL 48) shows a cropmark of the S, W and N sides of a large rectangular enclosure consisting of an earthen bank with an external fosse (dims. of interior, c 100m x c 50m). Cropmarks of the bank and fosse are visible at ground level. Also visible on a 1990 G. Barrett aerial photo (GB90.CL.33) Situated in undulating pasture land, with a ridge which is possibly natural, closing off the site at the E. A possible castle site lies to the N..

The site of this monument is located c.300m north-west of the Site. The monument is no longer upstanding and will not be directly or indirectly impacted by the Proposed Development.

The remaining Recorded Monuments listed in the study area are all considered to be too far distant to be directly or indirectly impacted by the proposal.

12.4.2 The Sites and Monuments Record

Examination of the Sites and Monuments Record (SMR) which is maintained by the Dept. of Housing, Local Government and Heritage on the 21st of August 2023⁴ indicated that there are no SMRs in the Site. The closest SMR externally to the Site is KD040-071---- (see Appendix 12-2). This SMR is described in the SMR as:

KD040-071---- Ballyburn Upper Field system

Cropmark of two rectangular shaped enclosures (approx. diam. 30m) with a linear ditch running along W side visible on Google earth aerial imagery.

Note that this possible field system is located within the permitted area of the existing quarry area and is considered to be too far distant to be directly or indirectly impacted by this proposal.

The remaining SMRs listed in the study area is considered to be too far distant to be directly or indirectly impacted by the proposal.

4 <http://webgis.archaeology.ie/historicenvironment/> Historic Environment Viewer of the Department of Culture, Heritage and the Gaeltacht. (URL accessed 21-8-2023)

12.4.3 Cartographic Sources

The Ordnance Survey 1st and 3rd edition six-inch maps and the first edition twenty-five-inch maps of the area were examined (see Figs 12-2 and 12-3). There are several sand and gravel pits and two lime kilns indicated on the OS 1st edition map in field 3 near the road (see Plate 12-5 below for area numbers). There is also a lime kiln visible on the 1st edition twenty-five inch map in the same location. The lime kilns are no longer visible at ground level. There is a small structure visible in the south-west part of area 10 and another in the northern corner of area 8 on the 1st edition six-inch map that are not visible at ground level.

12.4.4 Place name evidence

The place names were extracted from the cartography in order to facilitate the search for structures and monuments and small finds, to help identify any unrecorded monuments or structures, to search for any published papers and documents related to the study area and to assist in the study of the historical development of the area. The place names were looked up in the Placenames Database of Ireland at Logainm.ie⁵ (see Table 12-2). The placenames refer primarily to propitiators, topographical features and landcover. Burton Hall was originally Baile na Coille, town of the church wood which may refer to St. Mary's Church (RMP KD040-031----) which is nearby in Ballyhade townland. There is no church associated with Killyshane townland.

Table 12-3: Townland names in the study area

Townland name	Translation
Ballaghmoon	Mughain's road or pass
Ballyburn Upper / Lower	Uí Bhroin's town
Ballyhade	Aide's town or Hade's town'
Ballyvergal	O'Morgal's town'
Burton Hall/Demesne	Originally Baile na Coille, town of the church wood
Gorteengrone	dark little garden
Gorteenvacan	little field of the parsnips
Killyshane	John's Church'
Knockarda	high hills
Knockbane	white hill
Knocknagee	hill of the wind

12.4.5 Aerial imagery

Online Ordnance Survey aerial photography taken in 1995, 1999-2000 and 2004-2005, 2005-2006 and 2013-2014, Google Earth imagery from 2005, 2009, 2011, 2013, 2015, 2016, 2018, 2019, 2020, 2021 and 2022, and Microsoft Bing imagery from 2011 were reviewed (see Plates 12-4 and 12-5). On the July 2018 Google Earth image there is a dark oval grass mark measuring ca. 128m east-west by 78m north-south visible in area 8 (indicated as No.1 on Plate 12-4). This could potentially be the remains of an oval enclosure or relict field system. There is no visible indication of the possible site at ground level (see Plate 12-14). There is also a dark circular grass mark ca. 31m in diameter indicated on the same image in the southern part of area 7, that is also visible on a 1995 OS orthophoto (indicated as No. 2 on

⁵ www.logainm.ie - The Placenames Database of Ireland, developed by Fiontar & Scoil na Gaeilge (Dublin City University) and The Placenames Branch (Department of Culture, Heritage and the Gaeltacht). (URL accessed: 17-8-2023).

Plate 1-4). This could potentially be the remains of a circular enclosure. There is no visible indication of the possible site at ground level (see Plate 12-13). OPW LiDAR of the area was also reviewed but indicated nothing of potential archaeological significance (see Figure 12-4).

Plate 12-4: Google Earth aerial photo of the Site (the red line) taken in July 2018



12.4.6 Stray finds

Examination of the topographical files of the National Museum of Ireland for the townlands in the study area revealed two artefacts from the study (see Table 12-3). A number of standard artefact corpus studies were also consulted and no other artefacts were identified [129] [130] [131] [132] [133].

Table 12-4: Stray Finds from the study area

Townland	Description
Ballyhade	Saddle quern, oval with concave upper surface, made from fine grained foliated granite with a percentage of amethystine quartz. Found on the surface of a field during ploughing in 1964. NMI 1966:118
Gorteenvacan	Four handled bronze mortar, seventeenth century in date. Found on the surface of plough soil in 1979.

12.4.7 Archaeological investigations

Examination of the Excavations Bulletin at Excavations.ie⁶ indicated that there have been several licensed excavations carried out in the study area. Five of these excavations were carried out in the existing permitted quarry (08E0634, 09E0128, 09E0193, 13E045 and

⁶ <https://excavations.ie/> - Database of Irish Excavation Reports (URL accessed 23-08-2023).

20E0185) and identified extensive prehistoric and Early Medieval archaeological remains. The summaries below are from the Excavations Bulletin.

12.4.7.1 Ballyburn Lower A021/006 Fulacht fiadh

This site was identified during archaeological testing of Area 1 of Archaeological Services Contract 3, N9/N10 Kilcullen–Waterford scheme: Kilcullen to Powerstown (A021/001). Area 1 ran from Prumplestown Lower to Russellstown townlands. Test-trenches totalling c. 19,000 linear metres were excavated within Area 1 and nine areas of archaeological significance were identified (Sites 1–10; A021/006–015, this volume, Nos 729–31, 733, 738–41 and 785–6). Two spreads of burnt-mound material were identified in the southwest corner of Field 5, truncated by a number of field drains. One spread was 15m in length by 13m and was identified in Trenches 9, 12 and 11. The other spread was located 10m to the east and recorded in Trenches 7 and 12. A 4m by 4m area was visible, but the exact dimensions could not be ascertained as the burnt-mound material continued beyond the limit of the CPO. A small test-pit excavated to ascertain the depth of the upcast material identified the presence of a potential wood-lined trough at a depth of 0.7m below the burnt-mound material.

12.4.7.2 Ballyburn Lower A021/007 Fulacht fiadh

This site was identified during testing of Area 1 of Archaeological Services Contract 3, N9/N10 Kilcullen–Waterford scheme: Kilcullen to Powerstown (A021/001). Area 1 ran from Prumplestown Lower to Russellstown townlands. Test-trenches totalling c. 19,000 linear metres were excavated within Area 1 and nine areas of archaeological significance were identified (Sites 1–10; A021/006–015, this volume, Nos 729–31, 733, 738–41 and 785–6). A single spread of burnt-mound material measuring 9m in length, 6.5m in width and 0.15m deep was located within Trenches 3 and 5. Two grey circular pits were located within Trench 5, north of the fulacht fiadh, adjacent to this burnt mound. One was circular in plan and measured 1.15m in diameter and 0.62m in depth. It had an irregular break of slope and a concave base. A further pit was identified adjacent to the east but was not investigated.

12.4.7.3 Ballyburn Lower A021/008 Fulacht fiadh

This site was identified during testing of Area 1 of Archaeological Services Contract 3, N9/N10 Kilcullen–Waterford scheme: Kilcullen to Powerstown (A021/001). Area 1 ran from Prumplestown Lower to Russellstown townlands. Test-trenches totalling c. 19,000 linear metres were excavated within Area 1 and nine areas of archaeological significance were identified (Sites 1–10; A021/006–015, this volume, Nos 729–31, 733, 738–41 and 785–6). A single burnt-mound spread with visible dimensions of c. 10m by 6m and a depth of around 0.2m was identified in Trenches 1 and 19. Additional burnt-mound material was located in Trench 18, although this did not extend in a continuous unbroken layer and may have been a result of plough erosion or a discrete spread.

12.4.7.4 Ballyburn Lower E002563 Fulacht fiadh

The site, a substantial subcircular burnt mound measuring 15m long (east–west) and 9m wide, was excavated as part of the N9/N10 Kilcullen to Waterford scheme: Kilcullen to Powerstown. The mound comprised heat-shattered sandstone and charcoal to a depth of c. 0.5m. A circular stone-filled trough was revealed beneath the mound; no lining was present. A small amount of disarticulated animal bone and cut timber were found in various locations under the mound, which was truncated by a modern field boundary on its southern edge. No finds were recovered from this excavation.

12.4.7.5 Ballyburn Lower E002565 Fulacht fiadh

A shallow, irregular-shaped mound of charcoal and heat-shattered limestone and sandstone measuring 11m long (north–south) and 4.5m wide was excavated as part of the N9/N10

Kilcullen to Waterford road scheme: Kilcullen to Powerstown. A sub-oval trough measuring 2.5m long (east–west) and 1.2m wide was found c. 2m to the north of the mound, adjacent to a small running stream. The trough had timber rails running lengthwise, at the exact level of the groundwater in the area and showed evidence of expert construction in the placement of the rails and strengthening of the sides to create a suitable and convenient working space. To the west of the trough, a total of 144 stake-holes were clustered in a tight group, running approximately in a north-south orientation, possibly creating a windbreak or storage racks. From the amount and placement of stake-holes, it is possible that this trough was seasonally or repeatedly used. A circular pit measuring 2.2m in diameter was located c. 1.5m to the east of the trough, containing heat-shattered stone and charcoal, and evidence of recutting. No finds were recovered from this excavation.

12.4.7.6 Ballyburn Lower E002566 Fulacht fiadh

The site was excavated as part of the N9/N10 Kilcullen to Waterford scheme: Kilcullen to Powerstown. A large circular pit measuring 5.5m in diameter, cut to below groundwater level and with 76 stake-holes located at the water level mark in a double row formation around the pit, was excavated. These stake-holes possibly formed a light structure over the ‘pond’ and heat-affected stones were found in the base of the feature, suggesting that the water was heated within a protective covering, with access at the north-east side. Two knapping stones and a possible whetstone were recovered from the fills. A 3m-diameter pit abutted the pond, containing a substantial amount of random brushwood and organic material, with a sloping drainage channel attached on the northern side. A small burnt spread of charcoal and heat-shattered stone was located nearby and was much truncated by two modern field boundaries and a hardcore-filled drain. A separate possible structure, aligned around a possibly rectangular pit, was also disturbed by these modern features. It is thought that the burnt mound was originally quite substantial, but subsequent agricultural activity has eradicated the majority of the material. A number of other features in the area suggest that tree clearance was practised on the site before the described activity took place.

12.4.7.7 Ballyburn Upper 08E0634 Prehistoric pits; adjacent to the possible ringfort

Testing (Phase 1) was undertaken at the site of a new quarry in Ballyburn Upper, Co. Kildare, on behalf of the Irish Concrete Federation and Dan Morrissey (IRL) Ltd. The development is situated 3km southwest of Castledermot, 0.5km east of the main Castledermot to Carlow road and 1km south of the new N9/N10 Carlow bypass. The development site is currently being used for tillage agriculture and consists of a field c. 200 acres in size.

Based on the results of a geophysical survey carried out by Earthsound, seven separate areas containing 25 linear trenches were excavated. Archaeological features were uncovered in Areas 1, 3, 5, and 8 (Area 7 was not tested). The geophysical survey also detected a probable bi- or trivalent enclosure, probably a ringfort, in Area 9 to the south of the areas tested in this phase. It is intended to test Area 9 as part of Phase 2 works.

Area 1 was close to the northern limit of the site and revealed a possible kiln and associated charcoal-production pit. Several pits, post- and stake-holes with no discernible pattern were also uncovered. The kiln appeared figure-of-eight in plan with fire-reddened clay at the eastern end. Interpretation of this feature as a kiln was not entirely certain. Although it was figure-of-eight in plan with relatively intense fire reddening at one end, it was quite small and shallow, at 1.9m in length, 0.7m in width and 0.1m in depth. If there was a superstructure it had been removed due to deep ploughing. The associated charcoal-production pit was located 1.6m to the south of the probable kiln. It measures 1.35m in length, 0.4m in width and 0.1m in depth. Its entire base and sides were fire-reddened, and it contained ca. 80% charcoal below a

deposit of clayey silt. The remaining features in Area 1 were possible pits, post- and stake-holes. No coherent pattern was discernible and fills of these features did not provide any finds or recognisable environmental material (prior to specialist analysis) to identify the purpose of these features.

Area 3 revealed two small pits, one of which measured 0.62m in length, 0.5m in width and 0.22m in depth and produced a sherd of probable (Bronze Age) prehistoric pottery.

Area 5 was clearly the location of significant archaeological activity with numerous features uncovered in several trenches. These included a group of five medium-sized circular pits, one of which was 0.67m in diameter and 0.51m in depth and contained burnt and unburnt bone and much charcoal. Two probable charcoal-production pits, two clusters of post- and stake-holes with no coherent pattern, deposits of charcoal-rich silty clay with much animal bone and several linear features were also located here.

Area 8 contained three linear features. One of these appeared to be a possible foundation trench with vertical sides and a flat base and measured 0.2m in width and 0.22m in depth. The second was possibly a drainage feature. The third corresponded with the location of a field boundary as depicted on the first-edition OS map.

Except for the possible prehistoric pits in Area 3, this site appears to contain significant archaeological remains associated with the enclosure or ringfort.

12.4.7.8 Ballyburn Upper 09E0128 Bronze Age structure, early medieval pits, charcoal-production pits and deposits

Excavations were carried out on behalf of the Irish Concrete Federation and Dan Morrissey (IRL) Ltd at Ballyburn Upper, Co. Kildare, between 22 March and 17 April 2009. The works were undertaken on foot of the results of a geophysical survey and subsequent testing in December 2008, in advance of a new quarry development (Excavations 2008, No. 649, 08E0634). Four areas (Areas A–D) were stripped of topsoil and resolved.

Area A was located close to the north-western corner of the development and measured 75m north-south by 50m. This area produced seven charcoal-production pits, three of which were radiocarbon-dated to the early medieval period, plus a pit and post-hole. Area B was located 96m south of Area A and measured 50m east-west by 50m. This area produced nothing of archaeological interest. Area C was located 380m south of Area B, measured 75m north-south by 50m and revealed a circular arrangement of post-holes and post-pits with numerous internal stake-holes, two pits and a deposit. Radiocarbon dates showed that this structure dated to the Middle to Late Bronze Age while one of the postholes contained a spindle whirl. Three pits were located within 2m of this structure, with two containing Middle Bronze Age pottery. A pit providing a date in the early medieval period was located 5m south-east of the structure. Area D was located ca. 180m northeast of Area C and measured 80m northwest/southeast by 80m. This area revealed 61 pits, three post-holes, four spreads, four field boundaries, two linear features, three tree boles and one (recorded) plough furrow and contained the majority of archaeological features and artefacts on this site. A pit located towards the eastern end of the area contained 40–50% of a bucket-shaped vessel of Middle Bronze Age date. A line of three stake-holes immediately to its west may have been related. Although no coherent pattern or alignment of features (mainly pits) was apparent, the remaining features in Area D were grouped into a further ten groups of features through proximity. Many of these features revealed a rich assemblage of animal bone, grain and metal waste dating to the early medieval period. Also retrieved were a strap-end that was zoomorphic in design and a hybrid of Irish and Anglo-Saxon influences, a ringed pin, a buckle fragment, a bone pin, a corroded flanged object, possibly a wool-combing, carpentry or leather-working tool, a weaving tool and four whittle-tanged knives.

This activity may be related to two enclosures uncovered through geophysical survey and subsequent non-invasive testing 200m to the south of Area D under licence 09E0193.

12.4.7.9 Ballyburn Upper 09E0193 Two enclosures, numerous associated features and deposits plus a possible structure

Non-invasive testing was conducted in April 2009 on behalf of Dan Morrissey (Ireland) Ltd and the Irish Concrete Federation as part of Phase 2 works for a new quarry site in Ballyburn Upper, Co. Kildare.

A geophysical survey revealed the presence of two circular enclosures on the summit and easterly slope of a low hill with commanding views of the surrounding countryside. A rectangular enclosure or possible field system was also suggested by the geophysical survey to the northwest of the enclosures. The first enclosure had two concentric ditches with a probable internal bank immediately inside the inner ditch. No bank was detected for the other ditch. The inner ditch enclosed a space 40m in diameter, while the outer ditch enclosed a space 85m in diameter. The inner ditch was 6m wide, while the outer ditch was 3.5–4m wide. A deposit of heat-shattered stones in a matrix of charcoal-rich sandy silt c. 12m in diameter was uncovered in the interior of the inner enclosure, while numerous pits and probable post-holes were also recorded. The second enclosure was located 5–10m northwest of the first. It enclosed a space 46m in diameter with a ditch 2m in width. Only two possible features (probable pits) were found in or near this enclosure. Two trenches to the south of these enclosures revealed two pits and a linear feature, while the second revealed a curvilinear alignment of four probable post-holes with a firespot (potentially a hearth) inside this curve and may represent a structure.

These enclosures appeared to represent ringforts and may be related to the early medieval activity to their north recorded under excavation licence 09E0128.

Ballyburn Upper 13E045 Medieval bivallate enclosure with souterrain, burials excavations were carried out on behalf of Dan Morrissey (IRL) Ltd at Ballyburn Upper, Co. Kildare from 2 April to 19 June 2013. The works were undertaken in advance of a new quarry development. These works represent the third phase of archaeological excavation at the site.

An initial geophysical investigation of this site was carried out by Earthsound Archaeological Geophysics in April 2008 using magnetic gradiometry. This work identified a number of potential archaeological features. Subsequent work at the site consisted of an archaeological assessment, including text excavation, undertaken from 1-4 December 2008 under excavation licence 08E0634.

A second phase of excavation undertaken by Nial O'Neill of Rubicon Heritage Services Ltd and took place from 22nd March to 17th April 2009 under excavation licence 09E0128. Excavation took place in four distinct areas (Areas A-D). This work uncovered numerous pits and other associated features dating primarily from the early medieval period and associated with industrial activity. One pit returned a radiocarbon date from the late Bronze Age.

The current phase of works represents the third and most extensive phase of archaeological work at the site. This phase focused on features identified from a geophysical survey and interpreted as being a multivallate enclosure, with a possible second enclosure a short distance to the west. Horizontal extents of these features were assessed during phase one, however vertical stratigraphy was not assessed as per the terms of the excavation licence.

Subsequent excavation of these features revealed a bivallate enclosure with substantial ditches with extensive evidence for human habitation in the interior including an earth-cut souterrain. Evidence for industrial activity was also uncovered between the two enclosing ditches. The potential second enclosure identified by the geophysical survey and subsequent assessment proved to be a single shallow, curvilinear ditch which is presumed to be contemporary with the bivallate enclosure.

During the excavation, an extensive array of early medieval artefacts, including whittle-tanged knives, copper alloy pins, one ringed pin, bone pins, bone comb fragments, lignite bracelet fragments, a single blue glass bead, and ground-stone objects, were recovered.

The disarticulated remains of an adult male (including elements of the skull and long bones) were excavated from the inner ditch in the vicinity of the entrance on the eastern side. The disarticulated remains of two juveniles were uncovered in close proximity to one another within the inner ditch fill on the south-western side. Within the interior of the enclosure a single articulated male skeleton was uncovered. This inhumation was interred in a flexed position.

A considerable assemblage of animal bone was recovered from the ditch fills and also the fills of other cut features throughout the site. Metallurgical debris was also found on the site indicating that metalworking was taking place.

12.4.7.10 Ballyburn Upper 20E0185 Prehistoric

A programme of archaeological monitoring was undertaken during February 2020 to assess the archaeological potential of an area subject to topsoil stripping within Ballyburn Pit, in Ballyburn Upper townland, Co. Kildare. A number of features with archaeological potential were identified, and isolated from activities at the quarry.

Full excavation was carried out between 29th July and 17th August 2020. The excavation uncovered what appears to be prehistoric activity, comprising pits, post-holes, ditches, and a spread, with later plough furrows and modern or non-archaeological features.

The excavation area consisted of isolated features as well as clusters of varying form and complexity, with discernible stratigraphy within the clusters but no apparent stratigraphic relationship across the site. The earliest features consisted of pits and post-holes, cut and re-cut into the natural subsoil, a very light pale brown sandy clay below topsoil and an orange-brown sandy clay subsoil. Subsoil was present across much of the excavated area, particularly visible to the northeast half. Many of the fills of the early features produced evidence of burning and some potential lithics. In places, these features were cut by agricultural furrows and other later features. Some features were identified as modern due to their form and the nature of their fills, rather than any stratigraphic relationship.

Burton hall Demesne 07E0800 No archaeological significance

A pre-development test excavation was undertaken at Burton Hall Demesne close to the old gate lodge. A total of three test trenches were excavated to a depth of 0.25–0.3m, exposing orange/brown natural clays. No features of archaeological significance were identified.

12.4.8 Field Inspection

A field inspection was carried out on 21st September 2023. This involved the visual inspection of all the lands in the Site (see Figure 12-1 and Plate 12-5). Note the area in which the haul route is located has already been assessed under ABP PL 09.220222.

Plate 12-5 Google earth aerial photo of the Site (indicated with the red line) taken in July 2021 with the fieldwork areas numbered. Fences enclosing fields are indicated by the dashed black lines.



Area 1

Rectilinear-shaped field of southwest sloping pasture enclosed by wire fences (see Plate 12-6). There is no visible indication of any ground-level archaeological, architectural or cultural heritage material.

Plate 12-6: Panoramic view of area 1 looking east



Area 2

Pentagonal-shaped field of south sloping pasture enclosed by wire fences and hedgerow. (see Plate 12-7). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-7: View of area 1 looking north



Area 3

Rectilinear-shaped field of undulating pasture enclosed by hedgerow and wire fences (see Plate 12-8). The lime kilns indicated on the OS 1st edition map and the 1st edition twenty-five-inch map near the road are not visible at ground level. There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-8: Panoramic view of area 3 looking south



Area 4

Eastern part of a field of south-west sloping pasture enclosed by wire fences and hedgerow (see Plate 12-9). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-9: View of area 4 looking south



Area 5

Rectilinear-shaped field of south-west sloping pasture enclosed by wire fences and hedgerow (see Plate 12-10). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-10: Panoramic view of area 5 looking west



Area 6

Rectilinear shaped field of west sloping pasture enclosed by wire fences and hedgerow (see Plate 12-11). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-11: Panoramic view of area 6 looking east



Area 7

Most of a field of steeply undulating pasture enclosed by wire fences and hedgerow (see Plate 12-12). The location of aerial photograph site No. 2 is in this field but there is nothing visible at ground level (see plate 12-13). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-12: Panoramic view of area 7 looking southeast



Plate 12-13: View of the location of AP site 2 looking northwest



Area 8

Part of a field of undulating pasture enclosed by wire fences and hedgerow. The location of aerial photograph site No. 1 is in this field but there is nothing visible at ground level (see Plate 12-14). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-14: Panoramic view of area 8 looking northwest with the location of AP site 1 in the foreground



Area 9

Part of a field of flat pasture enclosed by wire fences and hedgerow (see Plate 12-15). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-15: View of area 9 looking southeast



Area 10

Rectilinear-shaped field of north-west sloping pasture enclosed by wire fences and hedgerow (see Plate 12-16). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-16: Panoramic view of area 10 looking northwest



Area 11

Rectilinear-shaped field of undulating pasture enclosed by wire fences and hedgerow (see Plate 12-17). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-17: Panoramic view of area 11 looking west



Area 12

Large triangular field of east-sloping tillage enclosed by hedgerow (see Plate 12-18). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 12-18: Panoramic view of area 12 looking northwest



12.5 Characteristics and Potential Impacts of the Proposed Development

12.5.1 Construction and Operational Stage

12.5.1.1 Direct Impacts

There will be no direct impact on any known items of archaeology, buildings of heritage interest, or cultural heritage in the Site or the vicinity during the construction, operational or restoration phase of the Proposed Development. There are two grass marks visible on aerial photography (No 1 and 2) that are not at visible ground level that have the potential to be of archaeological significance.

12.5.1.2 Indirect Impacts

There will be no indirect impacts on any known items of archaeology, buildings of heritage interest, or cultural heritage in the Site or the vicinity during the construction and operational phase of the proposal.

12.5.1.3 Interaction with other Impacts

No interaction with other impacts has been identified.

12.5.1.4 Do nothing Impact

If the Proposed Development were not to proceed, there would be no negative impact on archaeology, buildings of heritage interest, or cultural heritage.

12.5.1.5 Worst Case Impact

In the worst-case scenario, soil stripping in areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 has the potential to have a permanent, significant, irreversible, total, negative/adverse impact on potential aerial photography sites Nos 1 and 2, as well as previously unknown subsurface archaeological deposits or artefacts without preservation by record taking place.

12.5.1.6 Cumulative Impact

No effects arising in respect of existing developments has been found that would impact on archaeology, cultural heritage or buildings of heritage interest in the Site.

12.5.1.7 Major Accidents

No impacts on any known items of archaeology, buildings of heritage interest, or cultural heritage in the Site or the vicinity arising from unplanned events associated with the proposal have been identified by the assessment.

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12.5.2 Closure Stage

12.5.2.1 Direct Impacts

There will be no direct impacts on any known items of archaeology, buildings of heritage interest, or cultural heritage in the Site or the vicinity during the closure phase of the proposal.

12.5.2.2 Indirect Impacts

There will be no indirect impacts on any known items of archaeology, buildings of heritage interest, or cultural heritage in the Site or the vicinity during the closure phase of the proposal.

12.5.2.3 Interaction with other Impacts

No interaction with other impacts has been identified.

12.5.2.4 Do nothing Impact

If the Proposed Development were not to proceed, there would be no negative impact on the cultural heritage.

12.5.2.5 Worst case Impact

No worst-case scenario has been identified at the closure stage.

12.5.2.6 Residual Impacts

After the proposed mitigation measures have been implemented, there will be no residual impacts on cultural heritage present within the Site or the vicinity.

12.6 Proposed Mitigation Measures and/or Factors

Due to the impacts on potential aerial photography sites Nos 1 and 2, and the potential survival of previously unknown sub-surface archaeological deposits or finds within the application area in areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 all soil-stripping in those areas will be monitored by a qualified archaeologist under licence from the National Monuments Service. Any archaeological material identified during monitoring should be preserved by record under licence from the National Monuments Service in advance of development. Note that under the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 all archaeological monitoring will require a licence.

12.7 Cumulative and In-combination Effects

No projects in the vicinity of the Site were identified that have the potential to lead to cumulative effects with the Proposed Development on any known items of archaeology, buildings of architectural heritage significance, or cultural heritage. As such, no cumulative effects will arise.

12.8 Interaction with other Environmental Attributes

Chapter 5 – Population and Human Health: An assessment of the cultural heritage effects of the Proposed Development was carried out in this Chapter. After the proposed mitigation measures have been implemented there will be no residual effects on any known items of archaeology, buildings of architectural heritage significance, or cultural heritage. As such, there will be no diminution in the quality of life for the local population in this regard.

12.9 Residual Effects

After the proposed mitigation measures have been implemented, there will be no residual effects on cultural heritage present within the Site or the vicinity.

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12.10 Monitoring

No additional monitoring, other than that required for mitigation, will be required.

12.11 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

12.12 Difficulties Encountered

No difficulties were encountered during the desktop study, field survey or in preparing this report.

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13 MATERIAL ASSETS – TRAFFIC & TRANSPORT

13.1 Introduction

The following chapter assesses the traffic effects associated with the Proposed Development at Ballyburn Pit, Ballyburn Upper, Castledermot, Co. Kildare.

In preparing this chapter, reference has been made to the following documents:

- “Traffic and Transport Assessment Guidelines” (May 2014), published by Transport Infrastructure Ireland (‘TII’) [134];
- “Unit 5.3 (Travel Demand Projections) of the “Project Appraisal Guidelines” (October 2021), published by Transport Infrastructure Ireland [135];
- “Project Appraisal Guidelines for National Roads Unit 16.1 - Expansion Factors for Short Period Traffic Counts” (October 2016), published by Transport Infrastructure Ireland [136];
- Traffic Count Survey Data, collected by Traffinomics;
- Unit 16.1 - Expansion Factors for Short Period Traffic Counts” (October 2016), published by Transport Infrastructure Ireland [137];
- TII Publications document DN-GEO-03031, “Rural Road Link Design” (June 2017), published by TII [138];
- TII Publications document DN-GEO-03060, “Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade-separated and compact grade-separated junctions)” (May 2023), published by TII [139]; and,
- Topographical Survey Data/Mapping provided by Malone O’ Regan Environmental Services Ltd.

The objective of this assessment is to examine the traffic implications associated with the Proposed Development in terms of its integration with existing traffic in the area. The assessment determines and quantifies the extent of existing and/or additional trips generated by the Proposed Development, and the effects on operational performance of such trips on the local road network.

13.2 Methodology

13.2.1 Desktop Review

The methodology adopted for this appraisal involved, in brief:

- A Site visit on Wednesday 31st May 2023, at which time the weather was dry, and the ground surface was dry;
- 12-hour (7 am – 7 pm) manual classified Junction Turning Count (JTC) surveys carried out by Traffinomics on 4th May 2023;
- Trip Generation and Trip Assignment – This is used to derive trip rates and forecast trips for the Proposed Development, and to assign generated traffic flows onto the existing road network;
- Link Capacity Assessment - To estimate an AADT value for each of the main roads on the surrounding road network and assess their capacity with and without the Proposed Development;

- Junction Capacity Assessment – The traffic count data was used to develop a model for two junctions on the existing road network and their capacity was assessed using the 'Junctions 9' computer programme; and,
- Future Year Assessments – The estimated future year volumes on the study area network, as a result of the increase in background traffic and any development related traffic, was used to assess the future operational performance of all junctions and the surrounding road network for 2024 (assumed year of opening) and at two future assessment years, the opening year +5 (2029) and the opening year +15 (2039).

13.3 Receiving Environment

13.3.1 Site Location

Figure 1-5 in Chapter 1 shows the location of the Proposed Development in relation to the existing Ballyburn Pit, Ballyburn Upper, Castledermot, Co. Kildare and the surrounding road network.

13.3.2 Description of Local Roads and Infrastructure

13.3.2.1 L4012

The L4012 Local Road is a two-way single carriageway road running in a northwest-southeast direction over a length of approximately 6.2km, extending from its junction with the L4009 in the north to its junction with the L8094 in the south. The L4012 is approximately 6m wide in the vicinity of the Site access and has a posted speed limit of 80kph.

Footpaths are provided intermittently on both sides of the L4012. On the northern side the footpath commences downstream of the junction with the R448 Regional Road and extends for approximately 230m before terminating at the last residential property on this side of the road. At this location the footpath on the southern side of the road commences, extending as far as the Site access. Public lighting is provided throughout the length of both sections of footpath on the L4012.

Figure 13-1: L4012 Local Road Looking Northwards



13.3.2.2 R448

The R448 Regional Road is a two-way single carriageway road running in a northeast-southwest direction providing a connection to the N80 and Carlow Town in the west and to Castledermot and Naas, in Co. Kildare, to the east. The road width varies along its length but is approximately 9m wide in the vicinity of its junction with the L4012 and has a posted speed limit of 100kph.

In the vicinity of the junction with the L4012, there are no footpaths or cycle facilities provided, and public lighting is provided on its eastern side.

Figure 13-2: R448 Regional Road Looking Southwards



13.4 Characteristics and Potential Effects of the Proposed Development

13.4.1 Existing and Proposed Traffic Conditions

12-hour classified Junction Turning Counts were carried out on Thursday 4th May 2023 at the following locations:

- The L4012 crossroads junction with the Site access;
- The L4012/R448 Staggered Junction (Prumplestown Cross); and,
- The dumbbell interchange at Junction 4 of the M9 Motorway.

The traffic counts were carried out between 7:00am and 7:00pm, with this time period also including the peak hours on the adjacent road network. Surveyed vehicles were broken down into five categories as follows: -

1. Cars;
2. LGV's (Light Goods Vehicles);
3. OGV1 (Two and three axle goods vehicles);
4. OGV2 (Four and five axle goods vehicles); and,

5. Buses.

The detailed results of the traffic survey are summarised in Tables 13-1 to 13-4 below. The morning and evening peak hours have been established as follows:

- **4-Arm Crossroads Junction of the Site Access and the L4012** (referred to as the 'Site Access Junction' in this report) – 08:00 to 09:00 (AM Peak) and 16:15 to 17:15 (PM Peak));
- **4-Arm Staggered Junction of the L4012 and R448** (referred to as 'Prumplestown Cross' in this report) – 08:00 to 09:00 (AM Peak) and 17:00 to 18:00 (PM Peak);
- **Western Roundabout at Junction 4 of the M9** (referred to as the 'M9 Western Roundabout' in this report – 08:00 to 09:00 (AM Peak) and 17:00 to 18:00 (PM Peak); and,
- **Eastern Roundabout at Junction 4 of the M9** (referred to as the 'M9 Eastern Roundabout' in this report – 08:00 to 09:00 (AM Peak) and 17:00 to 18:00 (PM Peak).

The count data for each site has been converted to Annual Average Daily Traffic ('AADT') values using the methodology described in "Expansion Factors for Short Period Traffic Counts" (Unit 16.1 NRA Project Appraisal Guidelines, October 2016) [137]. Appendices A to C of the above document were used in the expansion of traffic counts to AADTs. The AADT was calculated to determine the percentage increase in traffic volumes on the road network as a result of the trips generated by the Proposed Development.

A combined factor of 0.775 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This was then converted to Weekly Average Daily Traffic ('WADT') using an index of 0.94 for the Thursday traffic count. Finally, this was converted to AADT using an index of 0.98 for the month of May. These factors were used to calculate the AADT for each of the four junctions.

The resulting AADT figures at each junction are provided below.

Table 13-1: 4-Arm Crossroads Junction of the Site Access and the L4012

Hour Ending	L4012 (North)	L8092	L4012 (South)	Site Access
08:00	53	9	24	20
09:00	59	12	40	13
10:00	45	6	23	18
11:00	28	6	19	5
12:00	26	6	14	8
13:00	37	6	21	16
14:00	48	5	26	21
15:00	34	8	19	9
16:00	40	4	28	8
17:00	88	12	50	28
18:00	76	19	45	22
19:00	46	14	32	2
Period Total	580	107	341	170
Period Total HGVs	167	6	25	144
% HGVs	29%	6%	7%	85%
Total AADT	689	127	405	202

Table 13-2: Arm Staggered Junction of the L4012 and R448

Hour Ending	R448 (West)	L4012 (North)	R448 (East)	L4012 (South)
08:00	708	53	758	55
09:00	975	86	1,023	66

Hour Ending	R448 (West)	L4012 (North)	R448 (East)	L4012 (South)
10:00	746	54	778	60
11:00	578	42	583	31
12:00	556	67	543	32
13:00	592	39	591	50
14:00	671	57	683	53
15:00	653	65	647	41
16:00	773	85	783	41
17:00	939	95	993	91
18:00	1,126	103	1,162	79
19:00	789	67	805	49
Period Total	9,106	813	9,349	648
Period Total HGVs	513	66	634	167
% HGVs	6%	8%	7%	26%
Total AADT	10,824	966	11,113	770

Table 13-3: Western Roundabout at Junction 4 of the M9

Hour Ending	R448 (West)	M9 On – Slip (Northbound)	M9 Overbridge	M9 Off – Slip (Northbound)
08:00	758	460	475	43
09:00	1,023	412	791	74
10:00	778	269	614	43
11:00	583	179	501	41
12:00	543	188	430	33
13:00	591	177	474	32
14:00	683	171	609	47
15:00	647	181	550	50
16:00	783	225	662	56
17:00	993	270	820	75
18:00	1,162	302	983	85
19:00	805	157	743	79
Period Total	9,349	2,991	7,652	658
Period Total HGVs	634	248	548	104
% HGVs	7%	8%	7%	16%
Total AADT	11,113	3,555	9,096	782

Table 13-4: Eastern Roundabout at Junction 4 of the M9

Hour Ending	M9 Overbridge	M9 Off – Slip (Southbound)	R448 (East)	M9 On – Slip (Southbound)
08:00	475	197	361	57
09:00	791	330	593	86
10:00	614	238	470	56
11:00	501	199	390	40
12:00	430	152	360	34
13:00	474	171	402	33
14:00	609	268	462	37
15:00	550	210	451	35
16:00	662	302	518	52
17:00	820	405	634	61
18:00	983	527	693	47
19:00	743	413	499	43
Period Total	7,652	3,412	5,833	581
Period Total HGVs	548	269	445	102
% HGVs	7%	8%	8%	18%
Total AADT	9,096	4,056	6,933	691

13.4.2 Trip Generation

The Ballyburn Pit currently extracts up to a maximum of 500,000 tonnes of sand and gravel annually, which is processed and removed from the Site, and it is not proposed to intensify these current extraction rates.

In determining the daily traffic volumes associated with the Proposed Development an average of 84 loads per day from the Site has been calculated based on the following assumptions:

- The Site operates for 250 operational days per year;
- Material is transported to / from the site in 20 and 30 tonne loads (25 tonnes/load average);
- The facility will operate for six days per week (Monday to Saturday) inclusive; and,
- The development opening times will be 07:00 to 18:00 on Monday to Friday and 07:00 to 14:00 on Saturday, giving 5.5 days per week.

Table 13-5 below summarises the calculation of daily trips to / from the Site from the average annual import rates.

Table 13-5: Exported Quantities of Material

Exported Quantities	
Quantity per annum	500,000
Quantity per Day (250 operational days / year)	2,000
Loads per Day (25 tonnes / load)	84

The Site currently employs 8 staff members, and it is not anticipated that these numbers will increase. Staff movements will generate 16 peak hour trips, 8 inbound trips in the morning peak and 8 outbound trips in the evening peak. Staff car movements have been distributed in accordance with the existing light vehicle distribution at the Site access and surrounding junctions.

13.4.3 Trip Distribution & Composition

Appendix A of the Traffic and Transport Assessment Report, which accompanies this EIAR, contains extracts from the TRICS database giving the forecast arrival and departure distribution for quarry sites. By inspection, it can be seen that the pattern of arrivals / departures is consistent with a short turnaround within the sites, e.g. that vehicles generally arrive and depart within a short time period, likely to be less than an hour. The distribution of the development traffic on the adjacent road network is based on an assessment of the existing traffic flows at the Site access derived from the traffic count data.

Table 13-6 details the trip distribution that has been applied to the Proposed Development traffic as part of the junction capacity analysis.

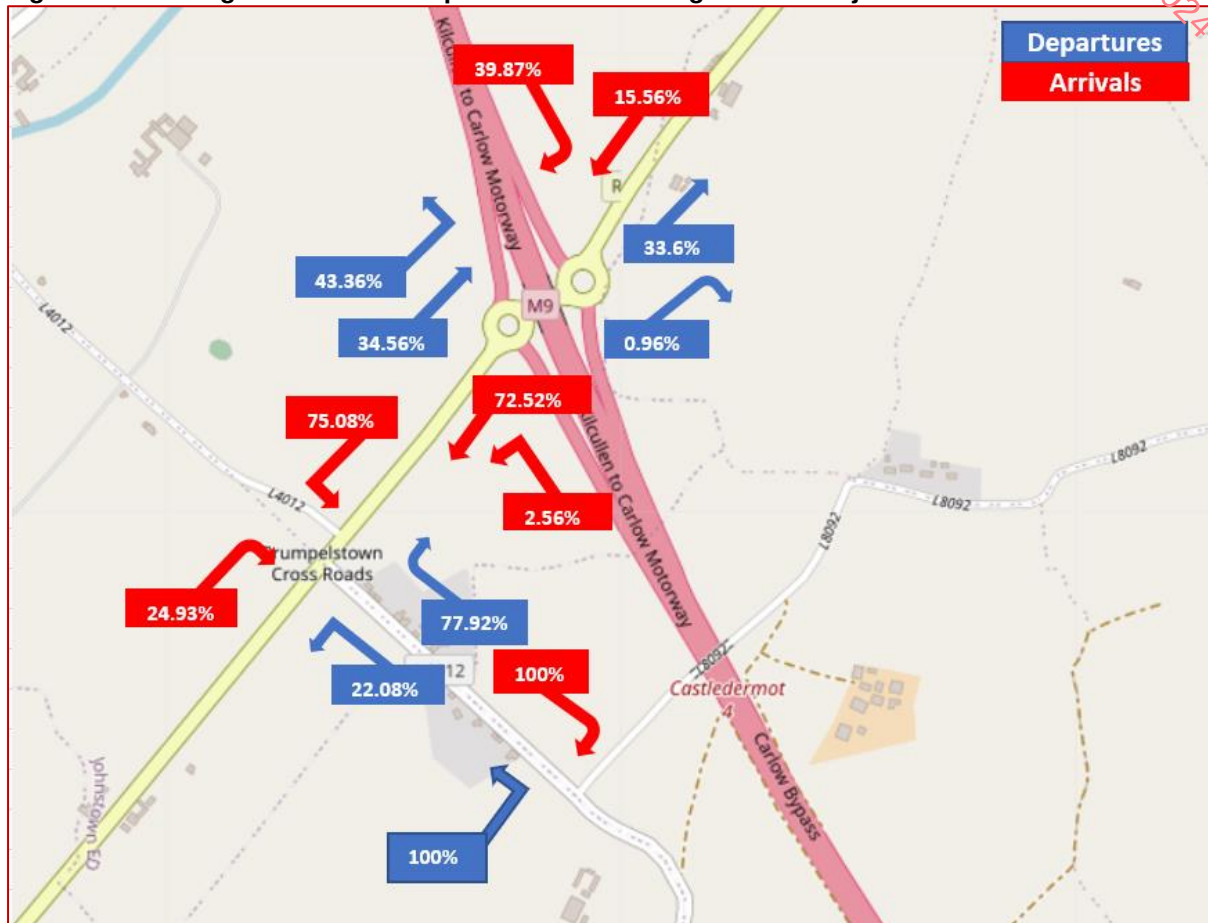
Table 13-6: Summary of Predicted Daily Trips in Opening Year and Beyond

Development	Type of Traffic	Daily Trips	
		Arrivals	Departures
Quarry	Export /import(HGVs)	84	40
	Staff (LVs)	8	8
Total		92	92

13.4.4 Trip Assignment

The distribution of the Proposed Development traffic on the adjacent road network is based on an assessment of the existing traffic flows at the assessed junctions derived from the traffic count data and the projected haul routes. The traffic assignment is illustrated in Figure 13-3.

Figure 13-3: Assignment of Development Traffic throughout the Adjacent Road Network

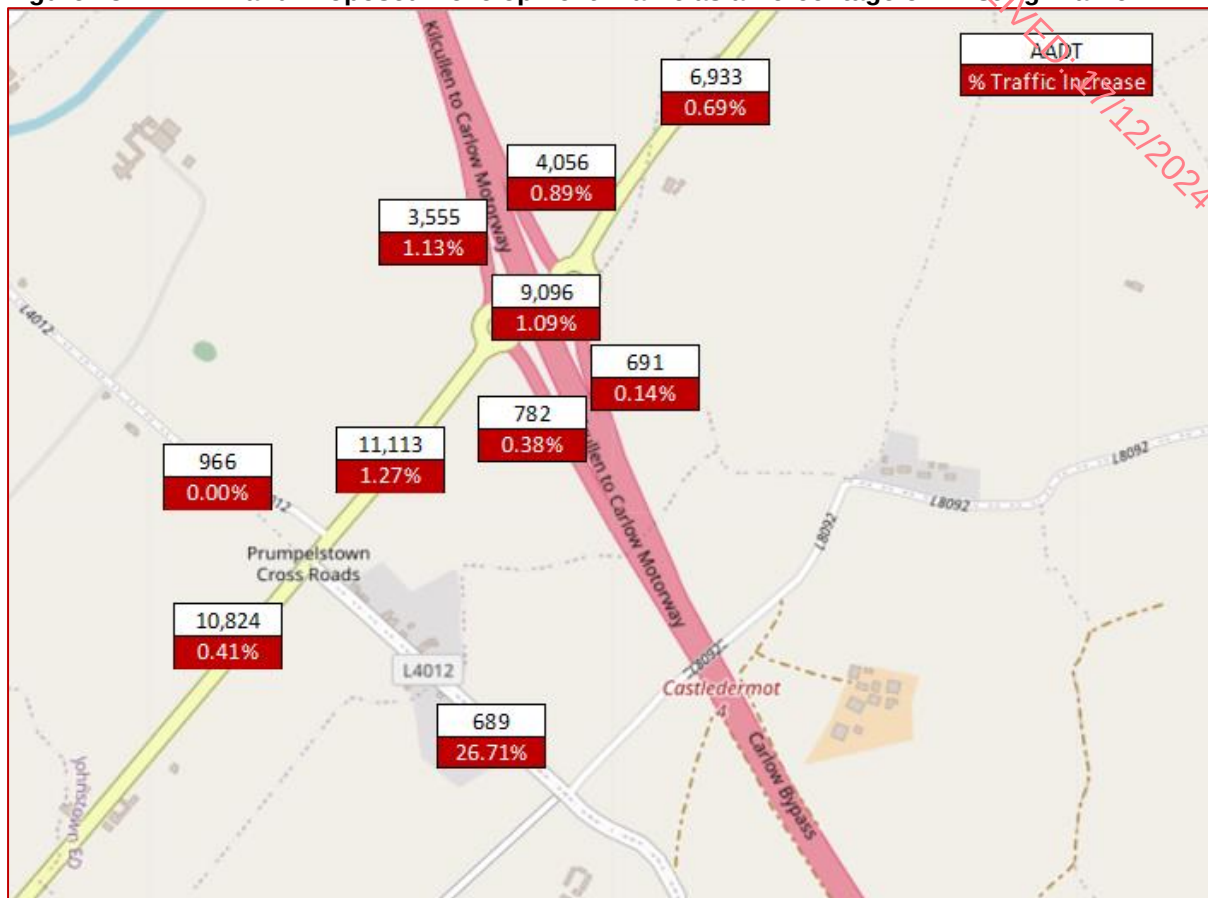


13.4.5 Scope of Assessment

Section 2.1 of the “Traffic and Transport Assessment Guidelines,” published by Transport Infrastructure Ireland, recommends that in an urban or congested setting, a traffic assessment should cover all roads and junctions where the development traffic exceeds 5% of the existing or background traffic or 10% of background traffic when located in rural areas.

Figure 13-4 outlines the distributed Proposed Development traffic as a percentage of the background traffic on the adjacent road network.

Figure 13-4: AADT and Proposed Development Traffic as a Percentage of Existing Traffic



As shown in Figure 13-4, the Proposed Development traffic is indicated as exceeding 5% of the background traffic on the L4012 Local Road. As a result, in accordance with Section 2.1 of the “Traffic and Transport Assessment Guidelines,” a full capacity assessment is required on the L4012 and at junctions where the L4012 forms an intersecting arm.

In summary, a link capacity assessment has been undertaken on the L4012, while a junction capacity analysis has been undertaken at the following junctions:

- Site Access Junction; and,
- Prumplestown Cross.

13.4.6 Operational Assessment

13.4.7 Future Year Traffic Growth

The "Project Appraisal Guidelines - Unit 5.3 – Travel Demand Projections (PE-PAG-02017)," published by TII in October 2021 has been used to determine future year traffic flows on the network from the 2023 traffic count [135].

Table 13-7 contains a summary of the traffic growth factors published in the "Project Appraisal Guidelines." For this assessment, a central growth scenario has been adopted (a 'central' growth scenario was assumed given the Site location and scale).

Table 13-7: Future Year Traffic Growth Figures (County Kildare)

Year	Low Growth		Central Growth		High Growth	
	LV	HV	LV	HV	LV	HV
2016-2030	1.0180	1.0363	1.0197	1.0378	1.0229	1.0413
2030-2040	1.0044	1.0135	1.0062	1.0155	1.0098	1.0191

13.4.8 Link Capacity Assessment

The TII Publications document reference DN-GEO-03031 (June 2017) provides guidance on recommended rural road layouts in Table 6/1 [138]. It advises that the capacity of a Type 3 Single Carriageway road with a 6.0m cross-section is 5,000 AADT for a Level of Service D. The L4012, adjacent to the Site, has an average cross-section width of approximately 6m with no hard shoulders present. Therefore, the L4012 is considered to be most similar to the Type 3 Single Carriageway cross-section in this document with a capacity of 5,000 AADT for Level of Service D.

The combined background and Site Traffic volumes, outlined in Table 13-8, in each of the assessment years is less than the LOS D capacity of 5,000 AADT for a Type 3 Single Carriageway. It is, therefore, considered that the L4012 will operate within capacity for each of the assessment years.

Table 13-8 indicates that the traffic associated with the Proposed Development represents between 18.91% and 15.90% of the total traffic on the L4012 during the assessment years 2023 to 2039.

Table 13-8: Combined AADT for each Assessment Year on the L4012

	Assessment Year			
	2023	2024	2029	2039
Background Traffic	770	789	891	973
Additional Proposed Development Traffic	184	184	184	184
Combined Traffic (Background + Additional Proposed Development Traffic)	954	973	1,075	1,157
Additional Traffic as % of Combined Traffic	19.29%	18.91%	17.12%	15.90%

13.4.9 Junction Capacity Assessment

The capacity of the surveyed junctions was assessed using the Transport Research Laboratory's ('TRL') Junctions 9 computer programme.

Junction performance is measured as a ratio between the flow and capacity ('RFC'). The capacity analysis has been carried out for a period of 12-hours, which corresponds to the operational hours of the Proposed Development works for each of the assessment years (2024, 2029, and 2039).

A rural junction with an RFC below 0.85 is considered to be operating within capacity, and an RFC of 0.85 indicates a junction operating at capacity.

The capacity of a stream or arm of a junction refers to the maximum flow of vehicles entering the junction within a given time period and is based on the formula given in LR942 (Kimber, 1980). The formulae describing the theoretical capacity of a junction were derived empirically and have a $\pm 15\%$ confidence interval. Consequently, the standard approach to junction capacity analysis for priority-controlled junctions uses an RFC of 0.85 to describe the theoretical maximum capacity; however, in reality, there may be additional capacity above this level.

Where the flow on an arm exceeds the theoretical capacity in a given time period, this will result in increased time to traverse the junction, leading to delays and queues forming. In normal operation, queues forming at a junction will dissipate over time as the volume of vehicles arriving at the junction falls below the available capacity.

The capacity of a signalised junction can also be measured by its Level of Service (LOS). The LOS is denoted by a letter ranging from A – F. The following list describes the traffic conditions on a road network for each Level of Service:

- **LOS A:** Free-flow traffic with individual users virtually unaffected by the presence of others in the traffic stream (free-flow);
- **LOS B:** Stable traffic flow with a high degree of freedom to select speed and operating conditions but with some influence from other users (reasonably free flow);
- **LOS C:** Restricted flow that remains stable but with significant interactions with others in the traffic stream. The general level of comfort and convenience declines noticeably at this level (stable flow);
- **LOS D:** High-density flow in which speed and freedom to manoeuvre are severely restricted, and comfort and convenience have declined even though flow remains stable (approaching unstable flow);
- **LOS E:** Unstable flow at, or near, capacity levels with poor levels of comfort and convenience (unstable flow); and,
- **LOS F:** Forced traffic flow in which the amount of traffic approaching a point exceeds the amount that can be served. This is characterised by stop-and-go waves, poor travel times and low comfort and convenience (forced or breakdown flow).

It is therefore considered that a junction operating at a LOS E is close to, or at, capacity and a junction operating at LOS F is considered to be above capacity.

The detailed junction capacity analysis outputs for the analysed junction, for each of the assessment years, are contained within Appendix D of the Traffic and Transport Assessment report, which accompanies this EIAR.

Location 1: Site Access Junction

A summary of the junction capacity analysis results for this junction are shown in Table 13-9. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2024, 2029 and 2039.

Table 13-9: Summary of Junction Capacity Analysis at Site Access Junction

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	Delay (s)	RFC	LOS
Stream	2024 Without Proposed Development			
L8092 – L4012 (S) / Site Access	0.0	5.06	0.01	A
L8092 – L4012 (N) / Site Access	0.0	9.62	0.04	A
L4012 (N) – L8092 / L4012 (S) / Site Access	0.0	0.00	0.00	A
Site Access – L4012 (N) / L8092	0.0	0.00	0.00	A
Site Access – L8092 / L4012 (S)	0.0	0.00	0.00	A
L4012 (S) – L4012 (N) / L8092 / Site Access	0.0	5.1	0.01	A
Stream	2024 With Proposed Development			
L8092 – L4012 (S) / Site Access	0.0	5.06	0.01	A
L8092 – L4012 (N) / Site Access	0.0	9.80	0.04	A
L4012 (N) – L8092 / L4012 (S) / Site Access	0.0	11.76	0.04	B
Site Access – L4012 (N) / L8092	0.0	9.82	0.03	A
Site Access – L8092 / L4012 (S)	0.0	0.00	0.00	A
L4012 (S) – L4012 (N) / L8092 / Site Access	0.0	5.16	0.01	A
Stream	2029 Without Proposed Development			
L8092 – L4012 (S) / Site Access	0.0	5.08	0.01	A
L8092 – L4012 (N) / Site Access	0.0	9.79	0.04	A
L4012 (N) – L8092 / L4012 (S) / Site Access	0.0	0.00	0.00	A
Site Access – L4012 (N) / L8092	0.0	0.00	0.00	A
Site Access – L8092 / L4012 (S)	0.0	0.00	0.00	A
L4012 (S) – L4012 (N) / L8092 / Site Access	0.0	5.17	0.01	A
Stream	2029 With Proposed Development			
L8092 – L4012 (S) / Site Access	0.0	5.08	0.01	A
L8092 – L4012 (N) / Site Access	0.1	9.97	0.04	A
L4012 (N) – L8092 / L4012 (S) / Site Access	0.0	11.74	0.04	B
Site Access – L4012 (N) / L8092	0.0	9.84	0.03	A
Site Access – L8092 / L4012 (S)	0.0	0.00	0.00	A
L4012 (S) – L4012 (N) / L8092 / Site Access	0.0	5.18	0.01	A
Stream	2039 Without Proposed Development			
L8092 – L4012 (S) / Site Access	0.0	5.08	0.01	A
L8092 – L4012 (N) / Site Access	0.1	9.97	0.05	A
L4012 (N) – L8092 / L4012 (S) / Site Access	0.0	0.00	0.00	A
Site Access – L4012 (N) / L8092	0.0	0.00	0.00	A
Site Access – L8092 / L4012 (S)	0.0	0.00	0.00	A
L4012 (S) – L4012 (N) / L8092 / Site Access	0.0	5.19	0.01	A
Stream	2039 With Proposed Development			
L8092 – L4012 (S) / Site Access	0.0	5.08	0.01	A
L8092 – L4012 (N) / Site Access	0.1	10.16	0.05	B
L4012 (N) – L8092 / L4012 (S) / Site Access	0.0	11.73	0.04	B

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	Delay (s)	RFC	LOS
Stream	2024 Without Proposed Development			
Site Access – L4012 (N) / L8092	0.0	9.86	0.03	A
Site Access – L8092 / L4012 (S)	0.0	0.00	0.00	A
L4012 (S) – L4012 (N) / L8092 / Site Access	0.0	5.20	0.01	A

Location 2: Prumplestown Cross

A summary of the junction capacity analysis results for Prumplestown Cross are shown in Table 13-10. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2024, 2029 and 2039.

Table 13-10: Summary of Traffic Analysis at Prumplestown Cross

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	Delay (s)	RFC	LOS
Stream	2024 Without Proposed Development			
L4012 North – R448 East	0.1	10.02	0.12	B
L4012 North – R448 West / L4012 South	0.1	12.56	0.10	B
R448 West – L4012 North / R448 East / L4012 South	0.0	0.00	0.00	A
L4012 South – R448 West	0.0	11.62	0.03	B
L4012 South – L4012 North / R448 East	0.2	12.53	0.14	B
R448 East – R448 West / L4012 North / L4012 South	0.3	6.20	0.12	A
Stream	2024 With Proposed Development			
L4012 North – R448 East	0.1	10.07	0.12	B
L4012 North – R448 West / L4012 South	0.1	12.76	0.10	B
R448 West – L4012 North / R448 East / L4012 South	0.0	7.13	0.01	A
L4012 South – R448 West	0.0	12.00	0.03	B
L4012 South – L4012 North / R448 East	0.2	13.25	0.17	B
R448 East – R448 West / L4012 North / L4012 South	0.3	6.18	0.12	A
Stream	2029 Without Proposed Development			
L4012 North – R448 East	0.2	10.38	0.13	B
L4012 North – R448 West / L4012 South	0.1	13.86	0.11	B
R448 West – L4012 North / R448 East / L4012 South	0.0	0.00	0.00	A
L4012 South – R448 West	0.0	12.03	0.03	B
L4012 South – L4012 North / R448 East	0.2	13.69	0.17	B
R448 East – R448 West / L4012 North / L4012 South	0.4	6.76	0.15	A
Stream	2029 With Proposed Development			
L4012 North – R448 East	0.2	10.44	0.14	B
L4012 North – R448 West / L4012 South	0.1	14.10	0.12	B
R448 West – L4012 North / R448 East / L4012 South	0.0	6.90	0.02	A
L4012 South – R448 West	0.0	12.49	0.03	B
L4012 South – L4012 North / R448 East	0.2	14.43	0.20	B
R448 East – R448 West / L4012 North / L4012 South	0.4	6.74	0.15	A
Stream	2039 Without Proposed Development			
L4012 North – R448 East	0.2	10.72	0.15	B
L4012 North – R448 West / L4012 South	0.1	15.07	0.13	C

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	Delay (s)	RFC	LOS
Stream	2024 Without Proposed Development			
R448 West – L4012 North / R448 East / L4012 South	0.0	0.00	0.00	A
L4012 South – R448 West	0.0	12.38	0.03	B
L4012 South – L4012 North / R448 East	0.3	14.78	0.20	B
R448 East – R448 West / L4012 North / L4012 South	0.5	6.62	0.17	A
Stream	2039 With Development			
L4012 North – R448 East	0.2	10.78	0.15	B
L4012 North – R448 West / L4012 South	0.1	15.35	0.13	C
R448 West – L4012 North / R448 East / L4012 South	0.0	6.75	0.02	A
L4012 South – R448 West	0.1	12.91	0.04	B
L4012 South – L4012 North / R448 East	0.3	15.54	0.23	C
R448 East – R448 West / L4012 North / L4012 South	0.5	6.60	0.17	A

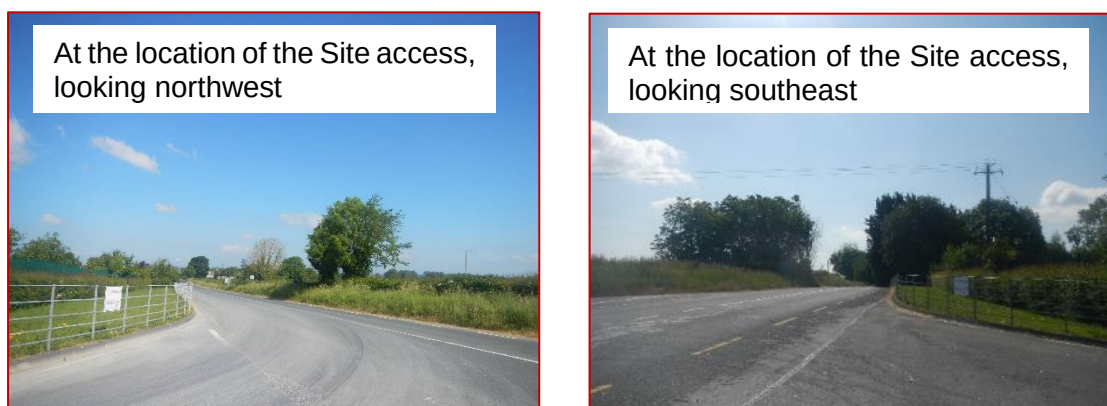
13.4.10 Parking

The Site currently contains capacity for 15 parking spaces and it is not proposed to revise this provision. The parking provision is considered sufficient to accommodate the number of staff working on-site, as well as any visitors to the Site, when required.

13.4.11 Sightlines

Sightlines in both directions at the access to the Sand & Gravel Quarry have been assessed in accordance with Section 5.6.3 of TII Publications document DN-GEO-03060, which requires 160m of unobstructed visibility (where the design speed is 85kph) at a point 3.0m back from the edge of the carriageway. The posted speed limit on the L4012 is 80kph.

Figure 13-5: Visibility to the Northwest (Left) and Southeast (Right) from the Site Access



The required visibility to the northwest is provided with sightlines in excess of 160m, as noted during the Site visit. The required visibility to the southeast is, however, not available. Visibility to the southeast was recorded as 70m (approx.), which is limited by a combination of both the vertical and horizontal alignment on the L4012 at this location.

However, low volumes of traffic approaching from the southeast were observed at the time of the Site visit, with this supported by the traffic survey data which recorded a total of 158 vehicles (146 travelling past the access) approaching from this direction during the 12-hour survey period, approximately 13 vehicles per hour. Also, due to the road layout and high demand road alignment to the southeast, it is unlikely that vehicles would be approaching at

speeds close to 80kph. It should be noted that this is an existing access, which has been operating safely for several years. As such, the existing sightlines at the access are not expected to give rise to any safety concerns.

13.4.12 Public Transport

There are no existing public transport provisions in place in the vicinity of the Site.

13.4.13 Pedestrians & Cyclists

There are no existing pedestrian cycle facilities provided on either side of the L4012 in the immediate vicinity of the Site. Footpaths are provided intermittently on both sides of the L4012. On the northern side the footpath commences downstream of the junction with the R448 Regional Road and extends for approximately 230m before terminating at the last residential property on this side of the road. At this location the footpath on the southern side of the road commences, extending as far as the Site access. These footpaths primarily provide access to the residential properties on the L4012.

It is not envisaged that there is a desire line for pedestrians and cyclists to/from the Site.

13.4.14 Operational Assessment Conclusions

The following conclusions have been determined:

- Link capacity analysis was carried out on the L4012, and it was determined that it will continue to operate within capacity for each of the assessment years, 2024, 2029, and 2039;
- Junction capacity analysis was carried out at the Site Access Junction and Prumplestown Cross, and it was determined that these junctions will operate within capacity for each of the assessment years, 2024, 2029, and 2039;
- The assessment therefore indicates that the Proposed development will have a imperceptible impact on traffic flows on the existing road network due to the low volumes of traffic being generated by the Proposed Development;
- Sightlines in both directions at the access to the Sand & Gravel Quarry have been assessed in accordance with Section 5.6.3 of TII Publications document DN-GEO-03060, which requires 160m of visibility. Whilst this is achieved to the northwest, the required visibility to the southeast is not available;
- Visibility to the southeast was recorded as 70m (approx.), which is limited by a combination of both the vertical and horizontal alignment on the L4012 at this location. However, low volumes of traffic were recorded approaching from the southeast. Also, the road layout and high demand road alignment to the southeast, would result in vehicles travelling at speeds less than 80kph. It should be noted that this is an existing access, which has been operating safely for several years. As such, the existing sightlines at the access are not expected to give rise to any safety concerns; and,
- The parking provision at the Site is sufficient to meet the required demand.

13.5 Proposed Mitigation Measures and / or Factors

13.5.1 Mitigation and Management

Following the link, and junction, capacity assessments, the trips associated with the operation of the Proposed Development at the Ballyburn Pit, Ballyburn Upper, were found to have an imperceptible impact on the link capacity of the L4012 and the junction capacity of the site access and Prumplestown Cross.

The impact of the Proposed Development, in relation to road safety and the existing road infrastructure, was also determined to be imperceptible. Therefore, no mitigation is proposed.

13.5.2 Residual effects

The residual effects of the Proposed Development on the surrounding road environment are deemed to be imperceptible.

13.6 Cumulative and In-Combination Effects

A search of planned future developments which may have an impact on future traffic flows in the vicinity of the Proposed Development was undertaken. These are developments that have received planning permission but have not yet commenced construction. Their cumulative effects in combination with the Proposed Development were assessed and found to have an imperceptible impact on the local road network.

13.7 Interactions with other Environmental Attributes

Chapter 5 – Population and Human Health: Road safety measures have been included as part of this Chapter. These measures will protect road users and, therefore, will ensure that there is no significant effect on human health.

Chapter 9 – Air Quality: Traffic can have an adverse effect on air quality. This has been assessed in Chapter 9 and any potential effects arising from traffic movements have been identified as ‘not significant;’

Chapter 10 – Climate: Traffic can give rise to GHGs, this has been assessed in Chapter 10. Based on the estimates of emissions from HGVs and employee vehicles, the potential effect of traffic on climate has been determined as ‘not significant’ in the context of sectoral or national emissions; and,

Chapter 11 – Noise: Noise can be generated from traffic movements, this has been assessed appropriately and effective mitigation measures prescribed in Chapter 11.

13.8 Indirect Effects

There are no additional effects beyond those described and assessed in this chapter which are likely.

13.9 Residual Effects

The residual effects of the Proposed Development on the surrounding road environment are deemed to be imperceptible.

13.10 Monitoring

Should the Proposed Development be granted permission to proceed, monitoring of the surrounding road network’s performance is not proposed, or considered to be required, in this case, as the Opening Year+5 and Opening Year+15 analysis has determined that the local road network will continue to operate within capacity, with an imperceptible effect from the Proposed Development.

13.11 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

13.12 Difficulties Encountered

There were no particular difficulties encountered during the compilation of this chapter.

RECEIVED: 17/12/2024

14 LANDSCAPE AND VISUAL

14.1 Introduction

This Landscape and Visual Assessment ('LVIA') has been prepared to accompany a planning application for the Proposed Development.

This LVIA describes the landscape context of the Proposed Development and assesses the scheme's likely landscape and visual impacts on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment ('LIA') relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment ('VIA') relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from Visual Obstruction (blocking of a view, be it full, partial or intermittent) or Visual Intrusion (interruption of a view without blocking).

14.1.1 Approach

This LVIA adopts an approach that is founded in the following best practice guidance documents:

- Landscape Institute and the Institute of Environmental Management and Assessment ('IEMA') publication entitled Guidelines for Landscape and Visual Impact Assessment, 2013 (GLVIA3);
- Environmental Protection Agency ('EPA') publication 'Guidelines on the Information to be contained in Environmental Impact Statements (2022); and,
- 'Photography and Photomontage in Landscape and Visual Impact Assessment', Landscape Institute Technical Guidance Note 06/2019.

14.2 Methodology

This document uses methodology as prescribed in the previously mentioned GLVIA3, which follows the European Landscape Convention ('ELC') definition of landscape:

- *'Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000). Thus, GLVIA-2013 covers all landscapes from "high mountains and wild countryside to urban and fringe farmland (rural landscapes), marine and coastal landscapes (seascapes) and the landscapes of villages towns and cities (townscapes)" - whether protected or degraded⁷.*

⁷ Available at Council of Europe (2000). The European Landscape Convention [Online] Available from <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Landscape> [Accessed 23 August 2018].

14.2.1 Scope of the Assessment

GLVIA3 establishes guidelines and not a specific methodology. The preface recognises that:

‘This edition concentrates on principles and processes. It does not provide a detailed or formulaic ‘recipe’ that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand.’

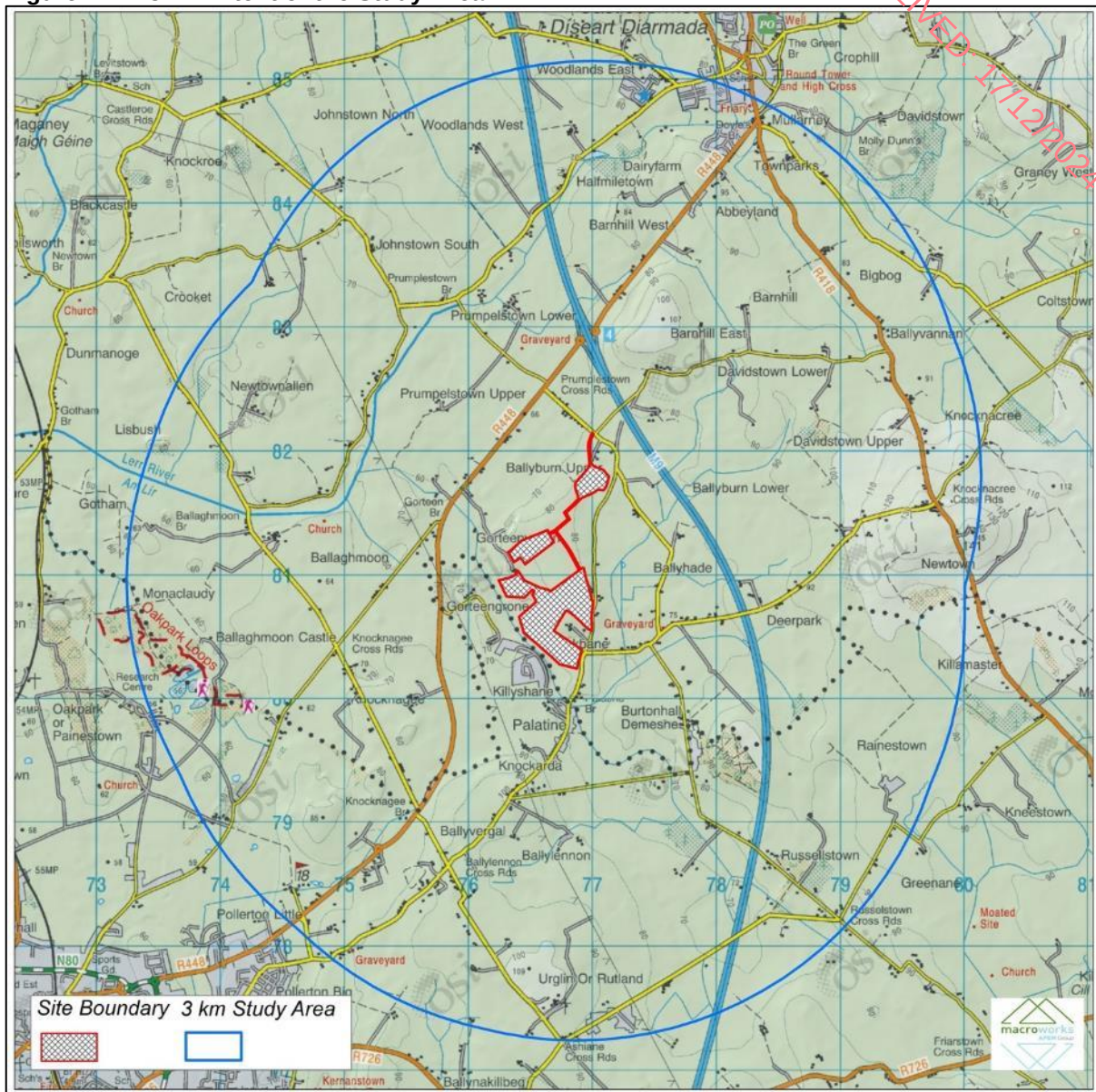
The methodology for this assessment has therefore been developed specifically for this assessment to ensure that it is appropriate and fit for purpose. The LVIA Methodology can be summarised as undertaking the following key tasks:

- Desk study and Site visits in May 2024;
- Defining the Baseline Landscape setting and conditions;
- Identification and Evaluation of key components of the Proposed Development;
- Consideration of Mitigation Measures;
- Assessment of Landscape Effects;
- Assessment of Visual Effects; and,
- Summary Statement of Significance.

14.2.2 Study Area

From similar studies, it is anticipated that the Proposed Development is likely to be difficult to discern beyond approximately 3 km and is not likely to give rise to significant landscape or visual impacts beyond approximately 1 km. In the interests of a comprehensive appraisal, a 3 km radius study area is used in this instance. However, there will be a particular focus on receptors within 2km, except where iconic or designated scenic viewpoints exist at greater distances out to 3 km (refer to Figure 14-1). A study area of 3 km has typically been used for quarry projects in Ireland, Northern Ireland and Great Britain, and this approach has been deemed acceptable by multiple planning authorities, including Kildare County Council.

Figure 14-1: 3km Extent of the Study Area



14.2.3 Landscape Impact Assessment Criteria

This part of the LVIA provides an assessment of how the introduction of the Proposed Development will affect the physical features and fabric of the landscape, and then how the proposals influence landscape character with reference to published descriptions of character and an understanding of the contemporary character of the landscape as informed through desktop and site studies.

When assessing the potential landscape effects of the development, the value and sensitivity of the landscape receptor is weighed against the magnitude of impact to determine the significance of the landscape effect. Criteria outlined below are used to guide these judgements.

14.2.3.1 Landscape Sensitivity

The sensitivity of the landscape to change is the degree to which a particular setting can accommodate changes or new elements without unacceptable detrimental effects to its

essential characteristics. In accordance with GLVIA3, the sensitivity of a landscape receptor (Landscape Character Area or feature) is derived from combining judgements in relation to its susceptibility to change and its value. The judgement reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted. Landscape Sensitivity is classified using the following criteria set out in Table 14-1.

Table 14-1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

14.2.4 Magnitude of Change – Landscape

The magnitude of change is a product of the scale, extent or degree of change that is likely to be experienced as a result of the Proposed Development and to a lesser extent the duration and reversibility of that effect. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the immediate setting that may have an effect on the landscape character. Table 14-2 outlines the criteria used to inform this judgement.

Table 14-2: Magnitude of Change - Landscape

Sensitivity	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an extensive change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to a considerable change of the landscape in terms of character, value and quality.

Sensitivity	Description
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to noticeable changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements that would lead to discernible changes in landscape character, and quality.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable leading to no material change to landscape character, and quality.

14.2.5 Visual Impact Assessment Criteria

This part of the LVIA provides an assessment of how the introduction of the Proposed Development will affect views within the landscape. It therefore, needs to consider:

- Direct impacts of the Proposed Development upon views through intrusion or obstruction;
- The reaction of viewers who may be affected, e.g. residents, walkers, road users; and,
- The overall impact on visual amenity.

It has been deemed appropriate to structure the assessment around a series of representative viewpoint locations. All viewpoints are located within the public domain and are representative of views available from main thoroughfares and pedestrian areas within the vicinity of the Proposed Development. The selected viewpoints are considered to be comprehensive in communicating the variable nature of the visual effects.

When assessing the potential visual effects of the development, the sensitivity of the visual receptor is weighed against the magnitude of the visual impact to determine the significance of the visual effect. Criteria outlined below are used to guide these judgements.

14.2.5.1 Sensitivity of Visual Receptors

As with landscape sensitivity, the sensitivity of a visual receptor is categorised as Very High, High, Medium, Low, and Negligible. Unlike landscape sensitivity however, the sensitivity of visual receptors has an anthropocentric (human) basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity the viewer is engaged in and whether this heightens their awareness of the surrounding environment.

A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below to establish visual receptor sensitivity at each viewpoint location.

14.2.5.2 Susceptibility of Visual Receptors to Change

In accordance with GLVIA3, visual receptors most susceptible to changes in views and visual amenity are:

- “Residents at home;

- People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;
- Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;
- Communities where views contribute to the landscape setting enjoyed by residents in the area;
- Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened”.
- Visual receptors that are less susceptible to changes in views and visual amenity include;
- “People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and,
- People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life.”

14.2.5.3 Values attached to Views

The value attached to a view is determined by considering the following:

- Recognised scenic value of the view (Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;
- Views from within highly sensitive landscape areas. These are likely to be in the form of Architectural Conservation Areas, which are incorporated within the Development Plan and therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
- Primary views from residential receptors. Even within a dynamic city context, views from residential properties are an important consideration in respect of residential amenity;
- Intensity of use, popularity. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at a national or regional scale;
- Provision of vast, elevated panoramic views. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;
- Sense of remoteness and/or tranquillity. Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;
- Degree of perceived naturalness. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;
- Presence of striking or noteworthy features. A view might be strongly valued because it contains a distinctive and memorable landscape / townscape feature such as a cathedral or castle;

- Historical, cultural and / or spiritual significance. Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;
- Rarity or uniqueness of the view. This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;
- Integrity of the landscape character. This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;
- Sense of place. This considers whether there is special sense of wholeness and harmony at the viewing location; and,
- Sense of awe. This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity, and no relative importance is inferred by the order of listing.

It is recognised that a viewer's interpretation and experience of the landscape can have preferential and subjective components. Where relevant, judgements are made on those elements of the landscape that are considered to contribute more prominently and positively to the visual landscape resource as well as those elements that contribute negatively. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

14.2.6 Magnitude of Change – Visual

The magnitude of change is again a product of the scale, extent, or degree of change that is likely to be experienced as a result of the Proposed Development. This is directly influenced by its 'visual presence / prominence', as experienced by visual receptors in the landscape. These terms are somewhat quantitative in nature, and essentially relate to how noticeable or 'dominant' the proposal is within a particular view. Aside from the obvious influence of scale and distance, a development's visual presence is influenced by the extent and complexity of the view, contextual movement in the landscape, the nature of its backdrop, and its relationship with other focal points or prominent features within the view. It is often, though not always, expressed using one of the following terms: Minimal; Sub-dominant; Co-dominant; Dominant; Highly dominant. Criteria used to inform judgements are provided in Table 1-3.

Table 14-3: Magnitude of Change – Visuals

Sensitivity	Description
Very High	Complete or very substantial change in view, dominant, involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements.
High	A major change in the view that is highly prominent and has a strong influence on the overall view. This may involve the substantial obstruction of existing views or a complete change in character and composition of baseline, e.g. through removal of key elements or the introduction of new features that would heavily influence key elements.
Medium	Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.

Sensitivity	Description
Low	Minor change in baseline, i.e. pre-development view - change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.
Negligible	Very slight change in baseline, i.e. pre-development view - change would be barely discernible. Composition and character of view substantially unaltered.

14.2.7 Significant of Effect

The significance of a landscape or visual effect is based on a balance between the sensitivity of the receptor and the magnitude of change, and is categorised as Profound, Substantial, Moderate, Slight, or Imperceptible. Intermediate judgements are also provided to enable an effect to be more accurately described where relevant. 'No Effect' may also be recorded as appropriate where the effect is so negligible it is not noteworthy.

The significance category judgement is arrived at using the Significance Matrix at Table 14-4 as a guide. This applies the principle of significance being a function of magnitude weighed against sensitivity but employs slightly different terminology that avoids the potentially confusing use of the term 'significant' (as recommended by GLVIA3 Statement of Clarification 1/13 (Landscape Institute, 10th June 2013)).

Indicative criteria descriptions used in relation to the significance of effect category are presented at Table 14-4.

Table 14-4: Significance Matrix

	Sensitivity of Receptor				
Magnitude	Very High	High	Medium	Low	Negligible
Very High	Profound	Profound-substantial	Substantial	Moderate	Slight
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Table 14-5: Indicative Significance of Effect Criteria Descriptions

	Landscape	Visual
Profound	There are notable changes in landscape characteristics over an extensive area or a very intensive change over a more limited area.	The view is entirely altered, obscured or affected.

	Landscape	Visual
Substantial	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area or an intensive change over a more limited area.	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. There are minor changes over some of the area or moderate changes in a localised area.	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.
Slight	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition or changes the view in a marginal manner.
Imperceptible	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.	An effect capable of measurement but without noticeable consequences. Although the development may be visible, it would be difficult to discern resulting in minimal change to views.

It is important that the likely effects of the proposals are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making a planning decision.

As such, whilst the significance matrix and criteria provide a useful guide, the significance of an effect is ultimately determined by the landscape specialist using professional judgement, and also in the context of occasionally using hybrid judgements to account for nuance.

Effects assessed as 'Substantial' or greater (shaded cells) are considered to be the most notable in landscape and visual terms, and may be regarded as 'Significant', albeit it is important to note that this is not a reflection on their acceptability in planning terms.

14.2.8 Quality of Effects

In addition to assessing the significance of landscape and visual effects, the quality of the effects is also determined. Within this LVIA, effects are described as negative/adverse, neutral, or positive/beneficial, and the following criteria has been used to guide these judgements.

- Positive/beneficial - A change which improves the quality of the environment, enhancing the existing view/landscape;
- Neutral - No effects or effects that are imperceptible, within normal bounds of variation e.g. will neither detract from nor enhance the existing view/landscape; and,
- Negative/adverse - A change which reduces the quality of the environment, detracting from the existing view/landscape.

In the case of new energy / infrastructure developments within rural and semi-rural settings, the landscape and visual change brought about by an increased scale and intensity of built

form is seldom considered to be positive / beneficial. Effects in these contexts are generally considered to be adverse in nature, or neutral, where the effect has little influence on the landscape/views.

14.2.9 Kildare County Development Plan

Chapter 13 of the Kildare County Development Plan 2023 – 2029 relates to landscape. It categorises County Kildare into 14 geographically distinct landscape character areas (LCAs), of which the 4 is situated in the LCA – ‘Eastern Transition’ (see Figure 14-2, below). Each LCAs in County Kildare has been designated with a sensitivity class ranging from Class 2 – Medium Sensitivity, to Class 5 – Unique Sensitivity. However, it should be noted that the Kildare County Development Plan 2023 – 2029 states that ‘within each of these areas there can be a wide variety of local conditions that can significantly increase or decrease sensitivity.’ The sensitivity of each of the LCA is identified in Table 13-1 of the Kildare County Development Plan 2023 – 2029, and the ‘Eastern Transition’ LCA is identified as ‘Class 2 – Medium Sensitivity’ and is described in Table 13-2 of the Kildare County Development Plan 2023 – 2029 as:

‘Areas with the capacity to accommodate a range of uses without significant adverse effects on the appearance or character of the landscape having regards to localized sensitivity factors.’

Figure 14-2: Excerpt from Map V1 - 13-1 of the Kildare County Development Plan 2023 - 2029 showing the approximate location of the Site in relation to designated landscape character areas

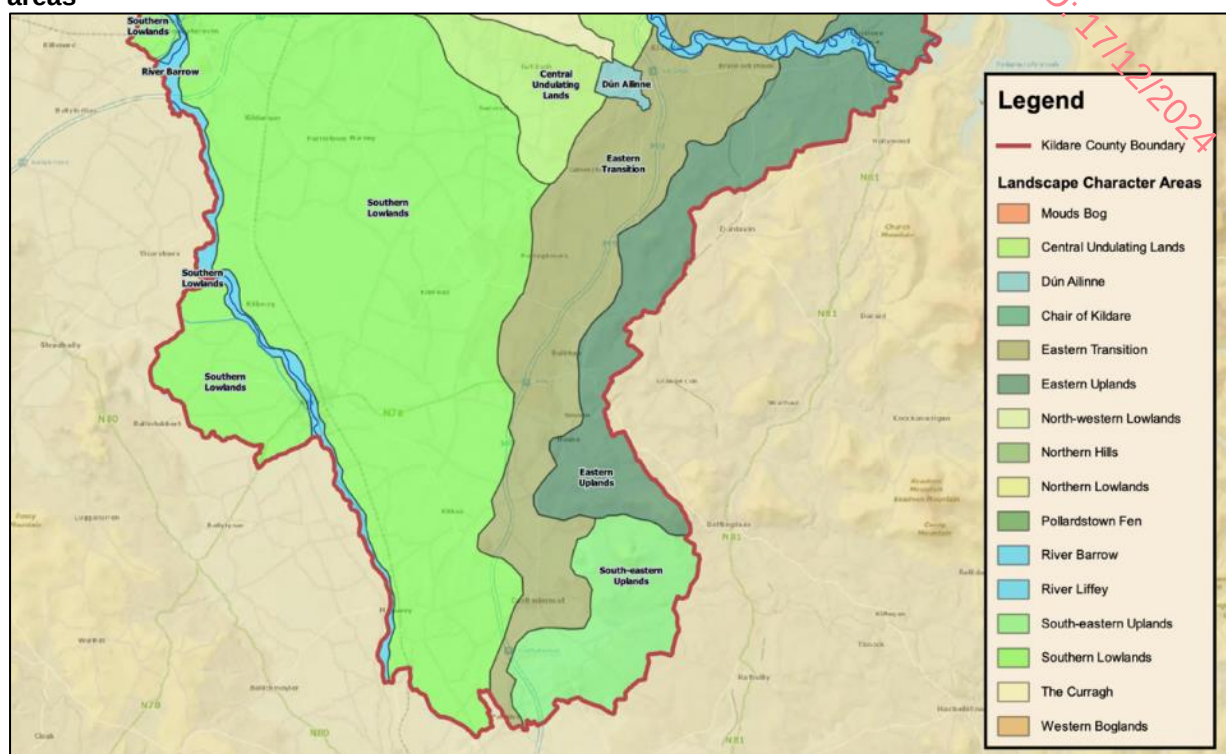


Table 13-3 in Section 13.3.2 of the Kildare County Development Plan 2023 - 2029 indicates the likely compatibility of some of the 'Landscape Character Areas' within the County with particular development types based on five categories (see Figure 14-3 below). 'Eastern Transition' LCA is shown in this Table has a 'High' compatibility with the following forms of development types:

¹ Whilst influenced by the value and sensitivity judgements for particular Landscape Character Areas in the County Development Plan for Kildare, independent landscape sensitivity judgements are provided for this assessment based on the more universal criteria, which are derived from the GLVIA-2013 Guidelines (Landscape Institute and Institute of Environmental Management & Assessment 2013) and accounts for the susceptibility of the landscape to the Proposed Works. This approach is consistent with best practice and also accounts for the inconsistency that commonly occurs in assigning landscape sensitivity to similar or adjoining landscape units between Counties.

- Major Powerlines;
- Sand & Gravel;
- Rock; and
- Solar projects.

'Eastern Transition' LCA is shown in this Table have 'Medium' compatibility with the following forms of development types:

- Rural Housing;
- Urban Expansion;
- Industrial projects; and,

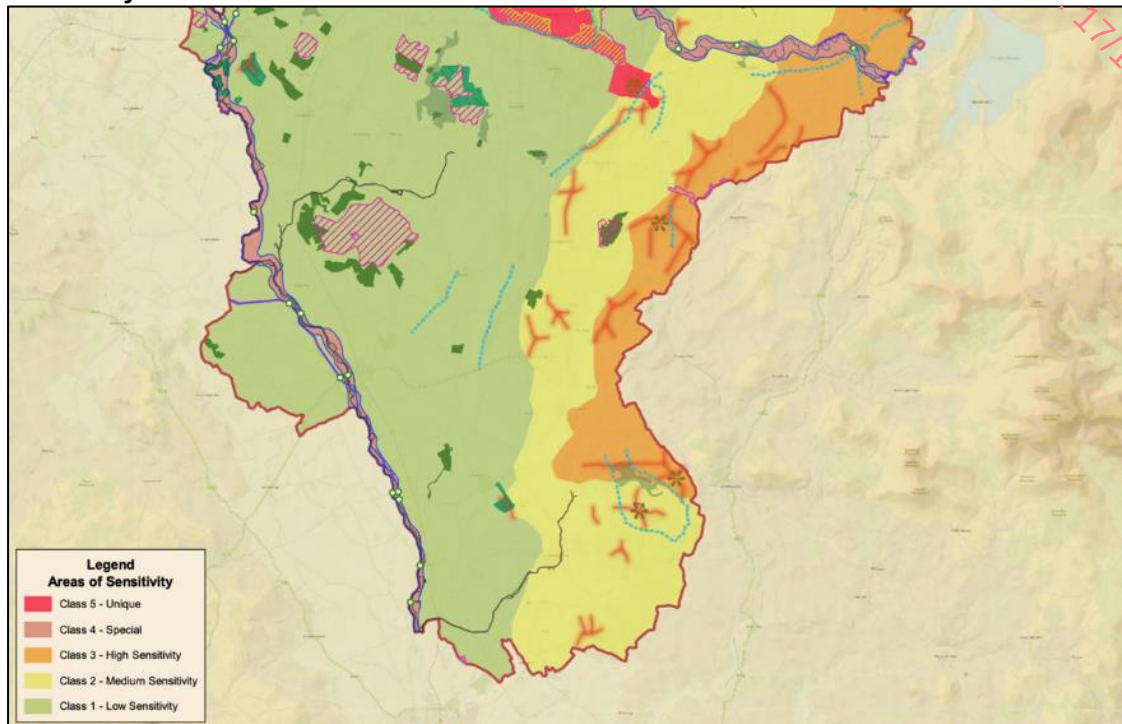
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Compatibility Key		Sensitivity Class	Agriculture and Forestry		Housing	Urbanisation		Infrastructure	Extraction		Energy						
Most	High		Medium	Low	Least	Agriculture	Forestry	Rural Housing	Urban Expansion	Industrial Projects	Tourism Projects	Major Powerlines *	Sand & Gravel	Rock	Windfarm	Solar	
Principal Landscape Character Areas																	
North Western Lowlands	1																
Northern Lowlands	1																
Southern Lowlands	1																
Central Undulating Lands	1																
Western Boglands	3																
Eastern Transition	2																
Eastern Uplands	3																
South-Eastern Uplands	2																
Sub-ordinate Landscape Areas																	
Northern Hills	4																
Chair of Kildare	4																
The Curragh	5																
Pollardstown Fen	5																
Allen Bog	4																
River Liffey	4																
River Barrow	4																
Dun Ailinne	5																

Table 13.3 - Likely compatibility between a range of land-uses and Principal Landscape Areas.

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Figure 14-4: Excerpt from Map V1 - 13-2 of the Kildare County Development Plan 2023 - 2029 showing the approximate location of the Site in relation to Landscape Sensitivity Areas and Sensitivity Factors



A second matrix (Table 13-4 in the Kildare County Development Plan 2023 - 2029) relates to the compatibility of various land uses with 'Principal Landscape Sensitivity Factors' (see Figure 14-5, below). This is based on sensitive landscape features situated within 300m of Proposed Developments. Compatibility is measured from '0 – Very unlikely to be compatible' to '5 – Likely to be very compatible in most circumstances'. The 'Principal Landscape Sensitivity Factors' within the study area are more than 300m from the Proposed Development.

Figure 14-5: Kildare County Development Plan 2023-2029 - Table 13.4

5 - Likely to be very compatible in most circumstances. 4 - Likely to be compatible with reasonable care. 3 - Likely to be compatible with great care. 2 - Compatible only in certain circumstances. 1 - Compatible only in exceptional circumstances. 0 - Very unlikely to be compatible.	Agriculture and Forestry		Housing		Urbanisation			Infrastructure		Extraction		Energy	
	Agriculture	Forestry	Rural Housing	Urban Expansion	Industrial Projects	Tourism Projects	Major Powerlines	Sand and Gravel	Rock	Windfarm	Solar		
Proximity within 300m of Principal Landscape Sensitivity Factors.													
Major Rivers and Water bodies	5	5	2	2	2	3	2	1	0	1	0		
Canals	5	5	2	2	2	3	2	1	0	1	1		
Ridgelines	5	5	1	1	1	1	1	0	0	2	0		
Green Urban Areas	4	5	2	0	0	4	3	3	3	2	2		
Broad-Leaved Forestry	3	5	2	2	2	4	3	2	3	1	2		
Mixed Forestry	3	5	2	2	2	4	3	2	3	1	2		
Natural Grasslands	5	2	2	1	1	4	2	1	1	2	2		
Moors and Heathlands	2	2	1	0	0	1	2	1	0	2	1		
Agricultural Land with Natural Vegetation	5	5	2	2	2	3	3	3	3	4	2		
Peat Bogs	0	0	0	0	0	3	2	0	0	2	1		
Scenic View	5	5	2	1	1	5	1	3	0	0	2		
Scenic Route	5	5	2	1	1	5	1	3	0	0	2		

Table 13.4 - Likely compatibility between a range of land-uses and proximity to Principal Landscape Sensitivity Factors.

14.2.9.1 Policies and Objectives

The Kildare County Development Plan 2023 – 2029 contains the following landscape policy:

‘LR P1 - Protect and enhance the county’s landscape, by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the existing local landscape.’

The Kildare County Development Plan 2023 – 2029 lists several objectives, the following have relevance to the Proposed Works:

‘LR O1 - Ensure that consideration of landscape sensitivity is an important factor in determining development uses. In areas of high landscape sensitivity, the design, type and

the choice of location of proposed development in the landscape will also be critical considerations.

LR O4 - Ensure that local landscape features, including historic features and buildings, hedgerows, shelter belts and stone walls, are retained, protected and enhanced where appropriate, so as to preserve the local landscape and character of an area.

LR O9 - Continue to support development that can utilise existing structures, settlement areas and infrastructure, whilst taking account of local absorption opportunities provided by the landscape, landform and prevailing vegetation.

LR O10 - Recognise that the lowlands and the transitional area are made up of a variety of working landscapes, which are critical resources for sustaining the economic and social well-being of the county and include areas of significant landscape and ecological value, which are worthy of protection. Such landscapes include the internationally recognised landscape of Punchestown and its environs.

LR O14 - Maintain the visual integrity of Eastern Transition Lands which have retained an upland character.

LR O15 - Continue to facilitate appropriate development in the Eastern Transition Lands, in an incremental and clustered manner, where feasible, that respects the scale, character and sensitivities of the local landscape, recognising the need for sustainable settlement patterns and economic activity within the county.'

14.2.9.2 Kildare Landscape Character Assessment (2004)

A Landscape Character Assessment was produced in 2004 for County Kildare and is referenced in the Kildare County Development Plan 2023 – 2029. The Landscape Character Assessment describes the 'Eastern Transition' LCA as follows:

'This transitional landscape character unit, located between the uplands and lowlands to the east of the County, is characterised by undulating topography. The River Liffey bisects the unit north and south. The lands are generally of medium size and regular pattern, with commonly well-maintained hedgerows. Gorse and natural vegetation occur at some areas of this unit.'

In regards to land use within the Eastern Transition, the Landscape Character Assessment states that:

'The major and most extensive landuse in the area is pasture, with patches of non-irrigated agricultural lands (mainly tillage). Small clusters of naturally occurring vegetation together with some coniferous forests and woodlands can also be found.'

The Landscape Character Assessment further establishes the presence and ability of vegetation in the area and its ability to allow for open views or to screen views of development:

' The grassland, tillage fields and generally low hedgerows of this area are usually uniform in appearance, failing to break up vistas, and allowing long distance visibility. Existing well maintained hedgerows partially screen the lowest land parcels. Nevertheless, the commonly low vegetation proves unable to visually absorb new development.'

14.2.10 Views of Recognised Scenic Value

14.2.10.1 Kildare County Development Plan

Chapter 13 of the Kildare County Development Plan 2023 – 2029. The nearest scenic route to the Site relate to views of Corballis Hill from Scenic Route 19 - 'Views to and from Corballis Hills'; county roads, L8097, L8095 and L8053, from Carrigeen to Sheriffhill Cross Road but this Scenic Route and Corballis Hill occurs outside the study area. The nearest scenic Viewpoint to the Site relate to views of Greese Bridge from RB1 but this scenic Viewpoint and Greese Bridge occur outside the study area.

14.2.10.2 Carlow County Development Plan

There are two scenic designations identified in the Carlow County Development Plan 2022 - 2028 that occur within the study area, however, neither are orientated towards the Site:

- Views and Prospects ID 22: 'Central plain and avenue to Duckett's Grove'; and,
- Views and Prospects ID 23: 'Panorama over central plain to Killeshin Hills'.

Both were investigated during fieldwork, but due to a high degree of screening in the direction of the Site, there is no potential for views of the Proposed Development.

14.3 Receiving Environment

14.3.1 Landscape Baseline

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape brought about by the Proposed Development will be assessed. A description of the landscape context of the proposed Site and wider study area is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and public amenities and facilities. Although this description forms part of the landscape baseline, many of the landscape elements identified also relate to visual receptors i.e. places and transport routes from which viewers can potentially see the Proposed Development. The visual resource will be described in greater detail in Section 14.6.2.

14.3.1.1 Landform and Drainage

At a macro level, the study area is between the Castlecomer plateau to the west and the foothills of the Wicklow mountains to the east. The most elevated location in the study area is 141 m Above Ordnance Datum (AOD) at Newtown in the eastern extent of the study area. The Site is situated in a broad, low-rolling terrain area and contains a locally elevated ridge. As a result of this, the Site drains in various directions. The Palatine stream flows in a northerly direction past the Site's western boundary and the Barnhill stream flows in a southerly direction through the lands to the east of the Site. Several rivers and streams flow throughout the study area; the most notable is the Lerr River, situated approximately 1.4 km northwest of the Site and flows westerly. This river is designated as a Special Area of Conservation (SAC).

14.3.1.2 Vegetation and Landuse

The land use of the Site is predominantly the existing quarry. The Site's immediate surroundings are typically rural, comprising agricultural farmland defined by relatively low-clipped hedgerows. The field pattern is composed of small to medium-sized fields. Small patches of woodland occur in the southwestern, south-eastern and north-eastern extents of the study area, the most notable being an oak-ash-hazel broadleaved woodland

approximately 3 km to the west of the Site and woodland relating to the historical demesne of Russellstown Park approximately 2.4 km to the southwest. Bands of riparian woodland flank the Palatine Stream and the Lerr River. immediately southwest of the Site. The southern edge of the Castledermot settlement occurs in the study area's northern portion. Another notable land use in the vicinity is the M9 motorway corridor. Deerpark Business Park is situated approximately 1.8 km to the southwest of the Site.

14.3.1.3 Centres of Population and Housing

The most notable and relevant population centre is Castledermot in the northern portion of the study area. As Carlow town is located just to the southwest of the study area, there is a relatively high-density rural population dispersed across the study area. There is a cluster of residences in Killyshane and Palatine immediately to the southwest and south of the Proposed Development, respectively. Several other cross-road settlements and clusters of dwellings are also located within the outer periphery of the study area. A number of farmsteads are dispersed throughout the study area.

14.3.1.4 Transport Routes

Oriented in a north-south direction, the M9 motorway is situated in the eastern portion of the study area and at its nearest point is approximately 300 m east of the Site. Oriented in a southwest-northeast direction, the R448 regional road runs approximately 500 m to the northwest of the Site at its nearest point, whilst the R418 regional road, which is oriented in a southeast-northwest direction, runs approximately 2.3 km to the northeast of the Site at its nearest point. A network of local roads also traverses the study area, and the nearest of these is the L4012, which adjoins the eastern side and the northern tip of the Site.

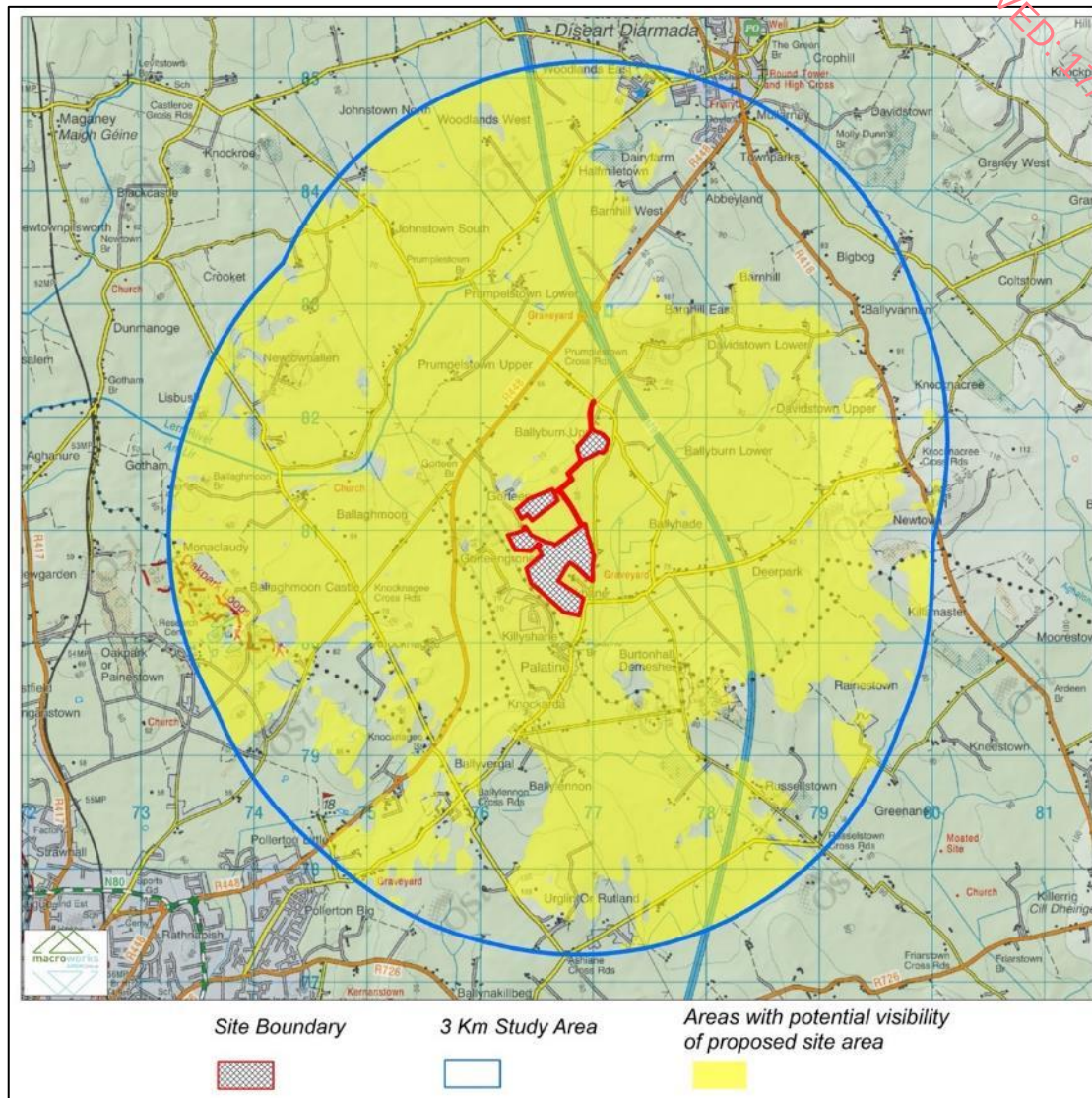
14.3.1.5 Tourism, Heritage and Public Amenities

Oakpark Loops walking trail is located in the broadleaf woodland in the western extent of the study area within Oak Park Forest Park, a proposed Natural Heritage Area (pNHA). Carlow Golf Club has a golf course in the southwestern extent of the study area. In Ballinakelly Wood 1.1 km southwest of the Site, in a woodland associated with the historic demesne of Burtonhall, there is a *taxus baccata*, which is recorded as a Heritage Tree of Ireland.

14.3.2 Visual Baseline

Only those parts of the receiving environment that potentially afford views of the Proposed Development are of concern to this section of the assessment. A computer-generated Zone of Theoretical Visibility (ZTV) map has been prepared to illustrate where the Proposed Development is potentially visible. The ZTV map is based solely on terrain data (bare ground visibility), and ignores features such as trees, hedges or buildings, which may screen views. Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the Proposed Development will not be visible due to terrain screening within the 3 km study area.

Figure 14-6: Standard (bare-ground) ZTV map



The following key points are illustrated by the 'bare-ground' ZTV map (see Figure 14-6 above):

- The locally elevated topography within the Site, combined with the undulating, low-lying terrain within the study area, means there is theoretical potential for views of the Proposed Development from many areas within the study area, which is indicated by the yellow-coloured ZTV pattern that occurs throughout the study area.
- There is no potential for visibility of the Proposed Development from the locations where the yellow-coloured ZTV pattern is absent. Such low-lying hollows are dotted sporadically across the study area.
- Only a limited area within the settlement of Castledermot occurs within the ZTV pattern.

The most important point to make about this 'bare-ground' ZTV map is that it is theoretical. The Proposed Development will not rise much above the underlying terrain/pre-existing ground level. It will, therefore, be considerably screened by surrounding and intervening hedgerow vegetation, trees, and numerous buildings, walls, and embankments scattered throughout the study area, resulting in a much lesser degree of actual visibility.

14.3.2.1 Identification of Viewshed Reference Points as a Basis for Assessment

Viewshed Reference Points ('VRPs') are the locations used to study the visual impacts of a Proposed Development in detail. It is not warranted to include each and every location that provides a view of a development as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the Proposed Development. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances and angles. The visual impact of a Proposed Development is assessed by Macro Works using up to 6 no. categories of receptor type as listed below:

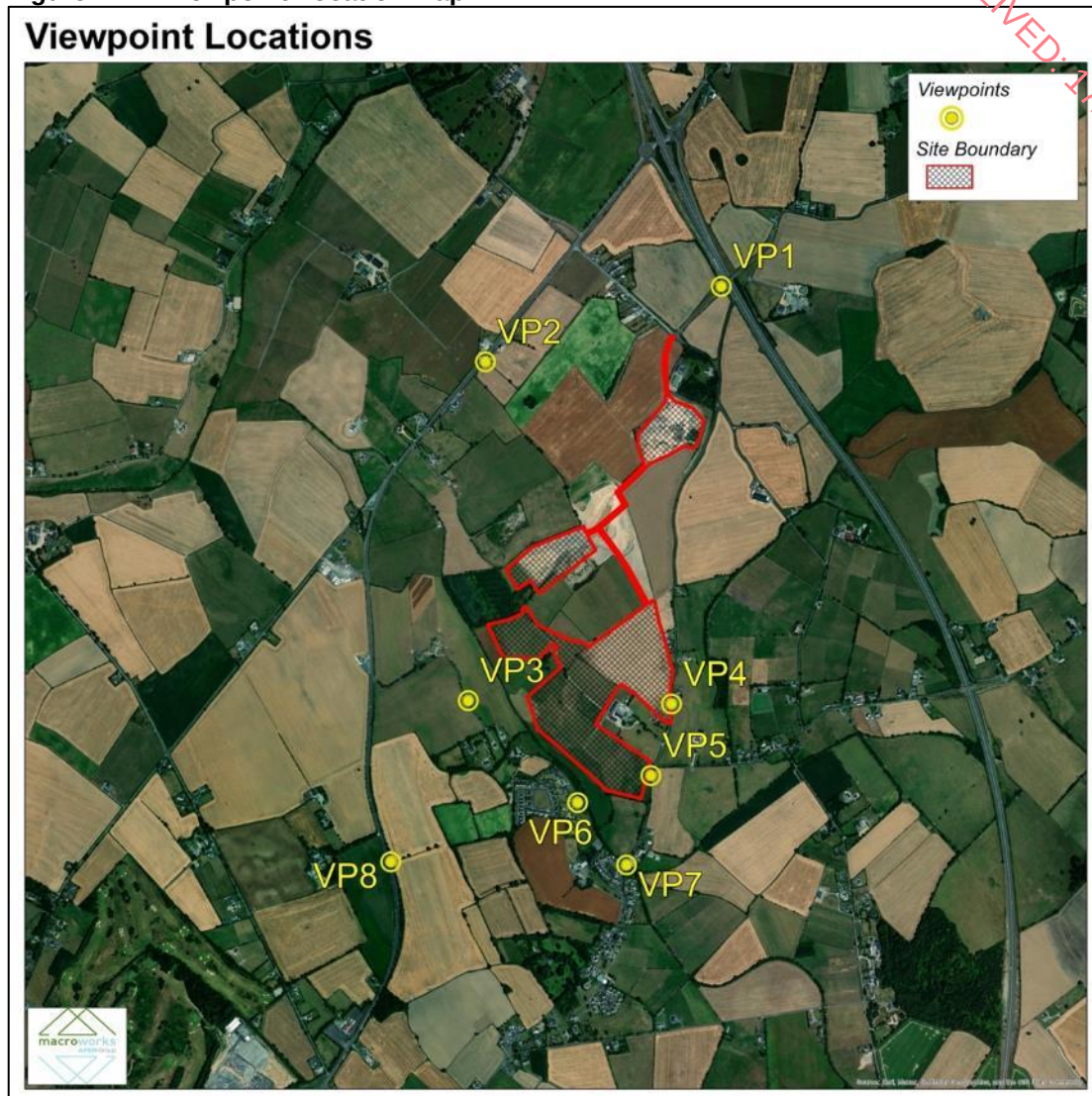
- Key Views (from features of national or international importance) ('KV');
- Designated Scenic Routes and Views ('SR' / 'SV');
- Local Community views ('LCV');
- Centres of Population ('CP');
- Major Routes ('MR'); and,
- Amenity and heritage features ('AH').

VRP's might be relevant to more than one category and this makes them even more valid for inclusion in the assessment. The receptors that are intended to be represented by a particular VRP are listed at the beginning of each viewpoint appraisal. The VPRs selected in this instance are set out in the Table 14-6 and Figure 14-7 below.

Table 14-6: Outline description of Selected Viewshed Reference Points ('VRPs')

VRP	Location	Representative of	Direction of view
VP1	Local road, Ballyburn Lower	MR	S
VP2	R448 regional road, Prumpeilstown Upper	MR & LCV	SE
VP3	Local road, Gorteengrone	LCV	NE
VP4	Local road, Ballyburn Upper	LCV	W
VP5	Local road, Knockbane	LCV	W
VP6	Local road, Killyshane	CP & LCV	NE
VP7	Local road, Burtonhall Demense	CP & LCV	N
VP8	R448 regional road, Knocknagee	MR & LCV	NE

Figure 14-7: Viewpoint Location Map



14.4 Characteristics and Potential Effects of the Proposed Development

14.4.1 Do nothing Scenario

The '*do-nothing*' impact refers to the non-implementation of the Proposed Development. The primary effect of this would be that the impacts and effects identified would not directly occur. In this regard the following issues are relevant: The Site, which is currently contained in pastoral farmland, would likely be managed for typical agricultural practices, whilst the surrounding perimeter vegetation would continue to grow out, some of which would be maintained by the current landowners.

14.4.2 Assessment of Receptor Sensitivity – Landscape

Landscape value and sensitivity are considered in relation to a number of factors highlighted in the Guidelines for Landscape and Visual Impact Assessment 2013, which are set out below and discussed relative to the Proposed Development Site and wider study area.

14.4.2.1 Landscape quality (condition)

The study area comprises a mix of land uses. In the broader study area, the predominant land use is agricultural farmland, with quarrying/extractive industry evident in the central portion of

the study area. There are also several other contrasting intensive land uses, such as a business park, the settlement of Castledermot and major transport infrastructure such as the M9 motorway. Otherwise, this is a typical rolling rural landscape with relatively well-maintained field boundaries, comprising mature tree-lined hedgerows and occasional woodlands. While the Site contains areas depleted of material, the landscape character beyond is not unduly influenced by it. Instead, it is perceived as a typical productive rural hinterland landscape on the outskirts of Carlow town.

14.4.2.2 Scenic Quality

Scenic quality exists to the south of Palatine in relation to views to the east, south west, and northwest, as designated in the Carlow County Development Plan. This area of scenic amenity is in the woodlands in the eastern and western extents of the study area; however, these are heavily enclosed settings and do not reflect the Site or the remainder of the study area.

14.4.2.3 Rarity and Representativeness

The majority of it is typical of an urban-rural interface with associated diverse and productive land uses. Overall, the landscape within the study area is not considered particularly rare or distinctive.

14.4.2.4 Conservation Interests

The Lerr River is a SAC, and the Oak Park Forest Park woodland is a pNHA.

14.4.2.5 Recreation Value

The landscape of the study area is not synonymous with recreation. Oak Park Forest Park contains the Oakpark Loop walking trails. There is recreation value for cyclists and walkers along the local roads.

14.4.2.6 Perceptual Aspects and Associations

There are no overt landscape associations with historic events of people within the study area or at least the central study area. That is not to say that none exist, as all areas have local landscape associations with particular families or historical incidents. However, these would not necessarily be associated with landscape values for the wider population.

14.4.2.7 Landscape Sensitivity Summary

Overall, this is considered a relatively diverse landscape comprising several contrasting land uses where transitions between each are clear and comprehensible. The Site is dominated by existing extractive industry. Within the study area, there are some sensitive landscape attributes in the woodlands in the eastern and western extents of the study area; these are not closely associated or linked to the Site and central study area.

Therefore, considering all these factors and in accordance with the criteria outlined in Table 1-1, the landscape sensitivity is deemed to be Medium-low, with localised areas of higher and lower sensitivity.

14.4.3 Assessment of Receptor Sensitivity – Visual

Scenic routes and view designations typically identify the more elevated and scenic parts of the surrounding landscape. Nonetheless, it is important to note that scenic views can present with different degrees of sensitivities and values. Some scenic designations relate to views of local value. In contrast, others are recognised more for their regional and national values, i.e. Carlow scenic view 22 relates to views over a broad working landscape of local and regional importance. In contrast, Carlow scenic view 23 is associated with Duckett's Grove, a heritage feature of national importance. Both of these scenic views generate a degree of scenic amenity; many present a longstanding sense of human intervention on the landscape and are

influenced by an array of working, and highly anthropogenic land uses such as major route corridors, quarries and urban settlements. The study area also comprises some locally susceptible areas afforded a strong sense of containment, such as the woodlands, which are noted for their recreational and naturalistic values. These parts of the landscape are typically highly susceptible to change and range in sensitivity between Medium to High-medium depending on their influence from other surrounding landscape areas.

Views of the working agricultural landscape are generally pleasant in terms of its rolling pastoral aesthetic and 'green', settled working character. The network of hedgerows and vegetation throughout it contributes to some sense of naturalness and, combined with its undulating topography, generates a sense of containment in many locations. However, whilst a pleasant pastoral aesthetic is noted throughout some parts of the study area, as noted above, the surrounding local and wider landscape is also influenced by an array of anthropogenic features such as major transport routes, urban settlements, and industrial development. Overall, the sensitivity of visual receptors within the more typical working landscape context tends to range between Medium and Medium-low.

Key differentials in visual receptor sensitivity relate to the occupation of the visual receptor and whether views of the surrounding landscape are an inherent part of the experience. Static residential receptors are considered generally more susceptible to changes in views over those where views are experienced transiently by those travelling through the landscape, particularly on major transport routes where road infrastructure and traffic volume draw from visual amenity. Likewise, receptors located in closer proximity to the Site are considered more susceptible to changes in views over those where views are experienced at a distance.

Based on the Site-specific factors outlined above, and in accordance with the general visual receptor sensitivity considerations contained in the methodology Section 1.2.5, visual receptor sensitivity judgement are provided for each VPR in the table below in section 1.6.7 below.

14.4.4 Magnitude of Landscape Effects

14.4.4.1 Extraction Phase

The extraction area is divided into four adjoining zones located in the southern half of the planning application boundary. Regarding physical landscape effects, the proposal involves constructing peripheral screening berms along the external boundaries of these four zones apart from the two field boundaries facing the existing quarry. This will alter the existing landform within the Site resulting in localised elevated topography. Conversely, the extraction area will create a void within the Site from approximately 84.5m AOD (at the highest elevation) down to a maximum final extraction level of approximately 71m AOD. This extraction area is essentially an extension of the existing quarry to the north. The physical landscape impacts are classified as 'negative', and their duration is medium-term (effects defined as lasting seven to fifteen years in accordance with EPA guidelines). Although quarrying activities are generally not readily reversible, this Site is subject to a restoration proposal involving infilling the quarry in the future; this will be assessed separately.

In the first instance, the proposed new screening berm will slightly detract from the natural contours within the four zones, but its presence is still considered preferable to unobstructed views of the proposed new extraction areas within the quarry complex. Furthermore, once the proposed grass seeding becomes established, it will appear more naturalistic.

This productive rural landscape contains the existing adjacent active quarry, intensive arable agricultural, transportation infrastructure and other rural land uses. Therefore, it is not considered that the proposed extended extraction area will noticeably detract from the integrity of landscape patterns or the productive landscape character that prevails in the area.

Quarry-related activities, such as the movement of heavy vehicles within and to and from the existing quarry, are already commonplace in the immediate context of the Site. The proposed extended extraction area is immediately adjacent to the south of an already active quarry, so it will only involve an extension to the duration of the current quarrying activity without a notable change in nature or frequency.

On the basis of the factors discussed above, the magnitude of landscape impact is in the order of Medium in the immediate vicinity of the Site (ca. <500m from Site boundaries). The magnitude of impact is will soon reduce thereafter as the proposed extension to the existing extraction area becomes a smaller component of the overall landscape fabric and is more likely to be read in conjunction with the existing quarry.

With reference to the significance matrix (Table 1.4) above, the Medium-low landscape sensitivity judgement attributed to the study area, coupled with a Medium magnitude of landscape impact in the immediate vicinity (<500m) of the Proposed Development is considered to result in an overall significance of no greater than Moderate, with the remainder of the 3 km radius study area likely to experience Slight or Imperceptible landscape impacts.

14.4.4.2 Restoration Phase

Physical Landscape Effect

In terms of physical landscape effects, the estimated total volume of material required to restore the Site to the proposed final restoration contours is 1,125,000 tonnes. Final finished ground contour levels will be similar to (73.73m OD) and will tie into the surrounding lands and will replicate to the landform that existed prior to the aggregate extraction on this Site. The infilled areas will be dressed with topsoil and seeded with an appropriate grass seed mix. Once complete, the physical impact on the Site is therefore considered to be positive as the quarry void will be returned to usable farmland, similar to the original contours within the Site.

Effects on the Landscape Character

During the restoration phase, there will be activity within the Site in the form of workers and earth-moving machinery, though most of this activity will remain below surrounding ground levels and, therefore, from many surrounding locations, out of sight until close to the finished levels are achieved. Thus, effects from Site related activities will be temporary/short-term in duration and of a magnitude at the lower end of the spectrum.

In addition to site activity, there will also be some Heavy Goods Vehicles (HGV) movements required along surrounding local roads, to and from the site entrance, as they import the uncontaminated soil and stones to be utilised for the restoration. However, these movements are currently permitted for the Site and there will be no need to increase this activity as the Applicant will work within existing permitted numbers. The off-site HGV movements will add to the general activity within the vicinity of the site, and each movement will cause momentary visual impacts as HGVs pass surrounding dwellings. However, it should be noted that the momentary visual impact of HGV traffic is commonplace (and already occurring at Ballyburn Pit) along many local roads throughout the country particularly those in productive rural areas with forestry, agriculture, and quarrying activities as exists in the vicinity of this site. Furthermore, the intermittent visual impacts of such traffic tend to be less of a concern to residents than other environmental factors.

The proposed restoration height, form and aesthetic are in keeping with the prevailing landscape character of the study area. Once the restoration is complete and grassland has been restored to the infilled areas, there will be little or no discernible impact on the local landscape character other than a positive one.

On the basis of the factors discussed above it is considered that the magnitude of landscape impact will be **Medium-low** and of a Negative quality during the restoration phase, but Low

and of a Positive quality once the restoration is complete, machinery has vacated the Site and grassland vegetation has become established. The duration of effect is deemed to be medium-term (effects defined as lasting seven to fifteen years in accordance with EPA guidelines).

With reference to the significance matrix (Table 14-3), the **Medium-Low** landscape sensitivity judgement attributed to the receiving landscape coupled with a **Medium-low** magnitude of landscape impact (restoration phase) is considered to result in an overall landscape significance of no greater than **Slight** and this will be Negative.

Magnitude of Visual Effects

The assessment of visual impacts at each of the selected VRPs is aided by photomontages of the Proposed Development. Photomontages are a 'photo-real' depiction of the scheme within the view utilising a rendered three-dimensional model of the development, which has been geo-referenced to allow accurate placement and scale. For each viewpoint, the following images have been produced:

- 1 Existing view;
- 2 Outline view (yellow outline showing the extent of the Proposed Development location and the Proposed Development overlaid on the photograph);
- 3 Montage view - Extraction Phase; and
- 4 Montage view - Restoration Phase.

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
VP1	Local road, Ballyburn Lower: This is a broad view from a bridge on a local road that spans the M9 motorway. This VRP was selected to represent the motorway, but it is noted that the view from the motorway is at a lower elevation and thus will be more visually enclosed. In the foreground, the road pavement is on an embankment that gradually slopes downhill to the south of this location. A slightly elevated view of rolling arable fields is afforded, and a belt of woodland is found in the middle ground. Distant ridges form a backcloth in the background of the view.	Medium-low	Visual impact description (Extraction Phase) The Proposed Development will be fully screened by existing vegetation and landform from this location, consequently the magnitude of impact is deemed to be Negligible. Visual impact description (Restoration Phase) The Proposed Development will be fully screened by existing vegetation and landform from this location, consequently the magnitude of impact is deemed to be Negligible.	Imperceptible / Neutral / No Duration	Imperceptible / Neutral / No Duration
VP2	R448 regional road, Prumpestown Upper: This view represents nearby dwellings and local community views. It is a broad view afforded from a regional road to the	Medium-low	Visual impact description (Extraction Phase) The Proposed Development will be fully screened by existing vegetation and landform from this location, consequently the magnitude of impact is deemed Negligible.	Imperceptible / Neutral / No Duration	Imperceptible / Neutral / No Duration

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
	northwest of the Site. A mature tree indicates the alignment of a former hedgerow in the foreground. Arable fields sweep through the fore-to-middle distance. The landform rises into a low ridge in the background to form a farmed and vegetated skyline.		Visual impact description (Restoration Phase) The Proposed Development will be fully screened by existing vegetation and landform from this location, consequently the magnitude of impact is deemed to be Negligible.		
VP3	Local road, Gorteengrone: This view is located on a cul-de-sac southwest of the Proposed Development. It affords a broad but contained view of a rolling pastoral scene foreshortened by a low ridge in the middle distance.	Medium-low	Visual impact description (Extraction Phase) Sand and gravel will be extracted from the low ridges in the view's background. The lateral extents of the extraction area will be fully legible from this location. During the extraction phase, the land cover and landform will be noticeably altered as sand and gravel are gradually removed from the extraction areas, decreasing elevations in the Site over time. The intervening vegetation will not provide much screening but will help to break up the view of the extraction area. Changes to the landform within the extraction area will be gradual and relatively modest in scale. The southern portion of the extraction area will be the most noticeable portion of the Site as it is the most elevated and exposed portion.	Moderate / Negative / Medium-term	Slight-imperceptible / Negative / Permanent

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
			There will be a point during the extraction phase when it is clear to an observer that the alterations made to the landform are the result of man-made interventions. However, it's important to note that this will be impermanent. Once the extraction is complete, the restoration phase will commence, underscoring the temporary nature of the impact. For these reasons, the magnitude of impact is deemed to be Medium. Visual impact description (Restoration Phase) The restoration phase would involve returning the Site contours to levels similar to the current/historical heights. The infill areas will be dressed with topsoil seeded with an appropriate grass seed mix and returned to agricultural use. Some loss of vegetation and hedgerows within the Site will be identifiable and permanent, but otherwise, there will be little indication that a man-made intervention has occurred within the Site, and it will be difficult for a casual observer to discern that the landscape has been modified. For these reasons, the magnitude of impact is deemed to be Low-negligible.		
VP4	Local road, Ballyburn Upper:	Medium-low	Visual impact description (Extraction Phase)	Slight-imperceptible / Negative / Medium-term	Imperceptible / Neutral / Long-term

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
	This viewshed reference point represents a potential view afforded to the local community and road users of this narrow local road. The roadside hedgerow is neatly trimmed and thus affords a view into the Site.		The hedgerow in the foreground will be allowed to 'grow out' and will largely screen the view into the site. A portion of the proposed screening berm along the eastern perimeter of the proposed extension will be identifiable in the gap at the field gate. A small portion of the extraction area may be visible above the berm, but this view would be fleeting for people passing by this field gate. In context, such 'gateway views' tend to be momentary and transient by nature while presenting at an oblique angle to road users. The 'growing out' of hedgerows is common across the county, but it has the result of foreshortening views, which is a visual change; however, in this instance, it is anticipated that it will not detract from the overall visual amenity at this location. For these reasons, the magnitude of impact is deemed to be Low-negligible. Visual impact description (Restoration Phase) The restoration phase would involve returning the Site contours to levels similar to the current/historical heights. The infill areas will be dressed with topsoil, seeded with an appropriate grass seed mix, and returned to agricultural use. There will be few indications that a man-made intervention had occurred within the Site. Regular maintenance of the roadside		

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
			hedgerow will resume. For these reasons, the magnitude of impact is deemed Negligible.		
VP5	Local road, Knockbane: This view represents local community views and road users on this local road. Over a low-trimmed roadside hedgerow in the foreground, there is a view of rolling agricultural fields, with houses nestled amongst mature trees in the middle distance and glimpses of distant hills in the background.	Medium-low	Visual impact description (Extraction Phase) The hedgerow in the foreground will be allowed to 'grow out' and will screen the view into the Site. The 'growing out' of hedgerows is common across the county but has the effect of foreshortening views, a visual change. In this instance, it is anticipated to detract from the overall visual amenity at this location, but it is preferable to a view of a quarry. For these reasons, the magnitude of impact is deemed to be Low-negligible. Visual impact description (Restoration Phase) The restoration phase would involve returning the Site contours to levels similar to the current/historical heights. The infill areas will be dressed with topsoil, seeded with an appropriate grass seed mix, and returned to agricultural use. There will be few indications that a man-made intervention had occurred within the Site. Regular maintenance of the roadside hedgerow will resume. For these reasons, the magnitude of impact is deemed Negligible.	Slight / Negative / Medium-term	Imperceptible / Neutral / Long-term

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
VP6	Local road, Killyshane: This view is representative of the adjacent dwellings situated on this local road, which are orientated to experience views in the direction of the Site, as well as the road users who would be travelling to and from the other dwellings in the housing estate in Killyshane to the rear of the adjacent dwellings. The foreground of the view contains low vegetation growing between a timber post-and-rail fence. The landform drops off steeply towards the Palatine stream. Mature vegetation and trees on this sloping terrain provide intermittent screening of views of (the Site's) rolling agricultural fields in the middle distance. A sizeable agricultural farm building sits on a low ridge in the background.	Medium	Visual impact description (Extraction Phase) Sand and gravel will be extracted from rolling fields in the middle distance. The temporary topsoil berms enclosing the perimeter of the extraction area will be visible. One of these berms will partially screen the agricultural farm building in the view's background. Only the southernmost portion of the extraction area (parts of Zone B1 and Zone A2) will be visible from this location. Zone A1 and B2 will be thoroughly screened from view. The land cover and landform will be noticeably altered during the extraction phase as sand and gravel are gradually removed from the extraction area. As the elevation within the extraction area decreases over time, views to the west will become available. The intervening vegetation in the foreground will only provide limited screening but will 'break up' views of the quarry. Changes to the landform within the extraction area will be gradual and relatively modest in scale. There will be a reduction to the visual amenity afforded from this location as the lands in the middle distance evolve from agricultural use to an extractive land use.	Moderate / Negative / Medium-term	Imperceptible / Neutral / Long-term

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
			For these reasons, the magnitude of visual impact is deemed to be Medium. Visual impact description (Restoration Phase) The restoration phase would involve returning the Site contours to levels similar to the current/historical heights. The infill areas will be dressed with topsoil, seeded with an appropriate grass seed mix, and returned to agricultural use. There will be little indication that a man-made intervention occurred within the Site. For these reasons, the magnitude of impact is deemed Negligible.		
VP7	Local road, Burtonhall Demense: This view represents the adjacent dwellings and local community views from the nearby area. The local road is bounded by a low drystone wall over which a view is afforded of a sloping field. Mature hedgerow trees along the field boundary on the opposite side of the field screen views of lower-lying undulating lands in the distance.	Medium-low	Visual impact description (Extraction Phase) A tiny portion of the proposed additional extraction area in the southern portion of the site may be identifiable between gaps in the trees in the view's background, but the Proposed Development will be almost fully screened by existing vegetation and landform from this location; consequently, the magnitude of impact is deemed Low-negligible. Visual impact description (Restoration Phase)	Imperceptible / Negative / Medium-term	Imperceptible / Neutral / Long-term

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
			The restoration phase would involve returning the Site contours to levels similar to the current/historical heights. The infill areas will be dressed with topsoil, seeded with an appropriate grass seed mix, and returned to agricultural use. There will be few indications that a man-made intervention had occurred within the Site. For these reasons, the magnitude of impact is deemed to be Negligible.		
VP8	R448 regional road, Knocknagee: This VRP represents road users on the regional road. However, this channelled view is only afforded from a field access gate, whereas the other nearby sections of the road do not afford views in the direction of the Site.	Medium-low	Visual impact description (Extraction Phase) A tiny portion of the proposed additional extraction area in the Site's southern portion may be identifiable between tree branches in the view's background. However, the Proposed Development will be almost fully screened by existing vegetation and landforms from this location. Consequently, the magnitude of impact is deemed Negligible. Visual impact description (Restoration Phase) A tiny portion of the reinstated infill area in the southern portion of the Site may be identifiable between gaps in the trees in the background of the view. However, the Proposed Development will be almost fully screened by existing vegetation and landform from this location. Consequently,	Imperceptible / Neutral / Medium-term	Imperceptible / Neutral / Long-term

VRP	EXISTING VIEW	VRP SENSITIVITY	VISUAL IMPACT MAGNITUDE (PRE & POST MITIGATION)	EXTRACTION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT	RESTORATION PHASE SIGNIFICANCE / QUALITY / DURATION OF IMPACT
			the magnitude of impact is deemed Negligible.		

14.5 Proposed Mitigation Measures and/or Factors

To enhance the visual screening and promote biodiversity, it is recommended that the existing hedgerow at VP5 be managed and encourage natural growth. Allowing the hedgerow to mature without significant trimming will increase density and effectiveness as a visual buffer, contributing to the overall landscape integration of the Site.

14.5.1 Cumulative and In-combination Effects

The main cumulative effect in this instance concerns the existing active/former quarries located in the study area. The in-combination effects of the existing active/former quarries and this proposed quarry have been accounted for in the assessment already undertaken in respect of both landscape impacts and visual impacts in Section 1.6. Therefore, separate consideration of cumulative effects is not considered necessary in this instance.

14.6 Interactions with Other Environmental Attributes

Chapter 5 – Population and Human Health: The Proposed Development will not have a significant effect in terms of landscape and visual effects and therefore the visual impact on the population and human health will be not significant.

Chapter 7 – Land, Soils and Geology: The effect from change in land use will have a not significant effect on the receiving environment (refer to Chapter 7 for further information).

14.7 Indirect Effect

All likely and significant effects have been fully considered throughout the Chapter.

14.8 Residual Effect

Regarding landscape impacts, the Proposed Development is considered to have a relatively modest physical impact on the Site as the Proposed Development is contained within the existing hedgerow network, and the Proposed Development will result in only very minor areas of permanent hedgerow and vegetation removal. Concerning landscape character, even though the Proposed Development will appear somewhat incongruous in this landscape context, the Proposed Development is thematically linked to the existing quarry and other development trends within the hinterland landscape of the study area. Indeed, it is likely to be perceived as an evolution of the existing quarrying activity on the Site. This is a productive rural landscape with associated landscape values, and whilst the Proposed Development may alter the 'landscape fabric' of the area, it does not markedly affect the prevailing landscape pattern or predominantly working rural landscape character of the area. This is considered an appropriately sited development in a robust landscape context. Consequently, the impact on landscape character will be of Moderate significance and a Negative quality with a medium-term duration during the extraction phase. The impact on landscape character will be of Slight significance and a Negative quality with a medium-term duration during the restoration phase.

Visual impacts were assessed at eight VRPs, representing various viewing distances, angles and receptor types. The visual receptor sensitivity judgements ranged from Medium to Medium-low. The overall significance of visual impacts was of 'Moderate' significance at the VRP to the southwest and south of the Site (VP3 and VP4), with a Negative quality and a medium-term duration. At all the other viewshed reference points, the impact was deemed to be 'Slight' (VP5), 'Slight-imperceptible' (VP4) and 'Imperceptible' (VP1, VP2, VP7 and VP8). This is principally a consequence of the high degree of existing screening located within the intervening low-lying landscape, which heavily reduces the visual exposure of the Proposed Development.

Based on the landscape and visual impact judgements provided throughout this LVIA, the Proposed Development is not considered to give rise to any significant landscape or visual impacts and concerning cumulative effects, no significant ones are anticipated.

Based on the landscape and visual impact judgements provided throughout this LVIA, it is considered that the Proposed Development will not give rise to any significant residual impacts. Instead, landscape impacts are not considered to exceed 'Slight' significance, even in the Site's immediate context and residual visual impacts are not considered to exceed 'Slight-imperceptible' significance. In the context of this Proposed Development, it is considered that these residual impacts represent an acceptable impact on the receiving landscape.

14.9 Monitoring

Rehabilitation success monitoring will be undertaken after the cessation of commercial activities at the Site in accordance with the Restoration Plan.

14.10 Reinstatement

The Proposed Development includes provisions for the restoration of the Site following the cessation of activities. As such, the potential effects associated with this phase of works has been fully considered throughout this report.

14.11 Difficulties Encountered in Compiling This Information

There were no difficulties encountered in the process of completing the LVIA.

15 MATERIAL ASSETS – NATURAL RESOURCES AND WASTE

15.1 Introduction

This chapter of the EIAR provides a description and assessment of the potential and likely effects of the Proposed Development on natural resource(s) and waste infrastructure.

15.1.1 Waste

The Proposed Development will establish a destination for clean uncontaminated soil and stone which has been notified as by-product at the source site from greenfield and non-greenfield sites throughout the region, as detailed in Chapter 2. This material will contribute to the restoration of the Site, specifically raising the final elevation of 73.7 m AOD. The Site will accept ca. 1,125,000 t of clean uncontaminated soil and stone by-product material, to reach this target elevation, facilitating a structured and sustainable approach to site restoration.

No significant waste will be generated during the Proposed Development. There will be no requirement for a construction compound, and personnel will utilise the existing carpark, canteen and welfare facilities within Ballyburn Pit. Moreover, all overburned excavated during the construction phase will be used to construct berms around the periphery of the Site prior to reuse in the restoration of the Site.

15.1.2 Natural Resources

The Proposed Development aims to extend the operational life of the existing quarry, supporting continued extraction of natural resources. This extension will excavate ca. 1,700,000m³ of sand and gravel aggregates, essential for construction production and activities across the region. Through the continuance of use of established infrastructure, the project maximises resource availability while contributing to the demand for quality construction materials.

15.2 Methodology

The following plans and reports were consulted in order to prepare this chapter of the EIAR including:

- Kildare County Development Plan 2023 - 2029 [7]
- The Eastern-Midlands Region Waste Management Plan (WMP) 2015-2021 [140] [141]
- Guidance on Soil and Stone By-products in the context of Article 27 on the European Communities (Waste Directive) Regulations 2011, (2019) [142] [142];
- Construction and Demolition Waste Soil and Stone Recovery / Disposal Capacity – Update Report 2020 [143]; and,
- IEMA Guide to: Material and Waste in Environmental Impact Assessment [135].

15.2.1 Sensitive Receptors

Materials are defined as substances used in each lifecycle stage of a development, with a particular focus on the construction, operation and maintenance, and decommissioning or 'end of first life' phases [144]. Wastes are defined in accordance with the Waste Framework Directive (Directive 2008/98/EC)26 as 'any substance or object which the holder discards or intends or is required to discard '.

The IEMA guide to: Materials and Waste in Environmental Impact Assessment [144] outlines the following definitions of sensitive receptors;

- Materials: “Consuming materials impacts upon their immediate and (in the case of primary materials) long term availability, this results in the depletion of natural resources and adversely impacts the environment”; and,
- Waste: “The sensitive receptor is landfill capacity. Landfill is a finite resource, and hence – through the ongoing disposal of waste – there is a continued need to expand existing and develop new facilities. This required the depletion of natural and other resources which, in turn, adversely impacts the environment”.

15.2.2 Material Assets: Natural Resources and Waste – Scoping

The following study areas were identified for this assessment:

- The Site in terms of materials and waste within the Site boundary;
- The national supply of key construction resources; and,
- The waste infrastructure in the Eastern-Midland Waste Region.

A summary of the key effects identified during the construction and operational / restoration phase of the project are outlined in Table 15-1.

Table 15-1: Key Effects Scoping

Project Phase	Effect	Scoped in / out
Construction	Changes in demand for materials	Out
	Changes in baseline waste arisings	Out
	Changes in available landfill capacity	Out
	Changes to an allocated mineral site	Out
Operational/restoration	Changes in availability of materials	In
	Changes in baseline waste arisings	Out
	Changes in landfill capacity	In
	Changes in soil and stone capacity	In

The Proposed Development seeks the continuance of use of established infrastructure at the Ballyburn Pit . Therefore, the construction stage is relatively minor and is primarily concerned with preparing the extension lands for extraction. As such, there will be minimal materials required and waste arising from the construction phase, providing a likely imperceptible effect on availability of materials, landfill capacity etc., hence why they have been scoped out.

The operational / restoration phase of the Proposed Development will not require materials (i.e. other than fuel for plant and equipment – imperceptible) and will operate using clean uncontaminated soil and stone by-product sourced from greenfield and non-greenfield sites in the locality for the restoration of the Ballyburn Pit. This material, as described in Chapter 2, is not a waste material. There is minimal waste predicted during the operational / restoration phase. As such, changes in baseline waste arisings have been scoped out. The Proposed Development will increase the availability of aggregate material increase landfill capacity and inert soil and stone waste recovery capacity; therefore, these effects have been scoped in.

15.2.3 Defining the Effect Threshold

Using baseline and assessment data and forecasts, an assessment of a development's impacts (the magnitude of change on sensitive receptors) can be undertaken to allow the effects (the consequences) to be identified and its significance evaluated [144]. The potential for significant environmental effects is determined by considering the scale and nature of impacts within the context of the sensitivity of receptors affected [144].

A summary of the effect thresholds utilised in this assessment is provided in Table 15-2.

Table 15-2: Effect Thresholds Utilised for Waste and Use of Natural Resources [144]

Magnitude of Impact						
Sensitivity (or value) of receptor		No change	Negligible	Minor	Moderate	Major
	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral slight or	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral slight or	Neutral slight or	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral slight or	Neutral slight or	Slight

15.3 Receiving Environment

At a regional level, Kildare is grouped with counties Dublin (South Dublin, Dublin City, Dun Laoghaire - Rathdown and Fingal), Wicklow, Meath, Laois, Offaly, Longford and Westmeath, who together make up the Eastern-Midland Waste Management Planning Region.

The Eastern - Midland Regional WMP 2015-2021 [141] aims to establish and maintain a framework which protects the health of the environment and citizens through the sustainable management of wastes generated in the region. The plan focuses on three target areas covering:

- Waste generation prevention;
- Recycling; and,
- Landfilling.

A strong emphasis is placed on waste prevention and material reuse activities. There is also a focus on enhancing the collection of quality materials from waste to build on the progress made in recycling. Further efforts will be made in order to improve the recovery and generation of energy from waste treatment. Finally, the strategy will seek to further reduce the role of landfilling in favour of higher value recovery options.

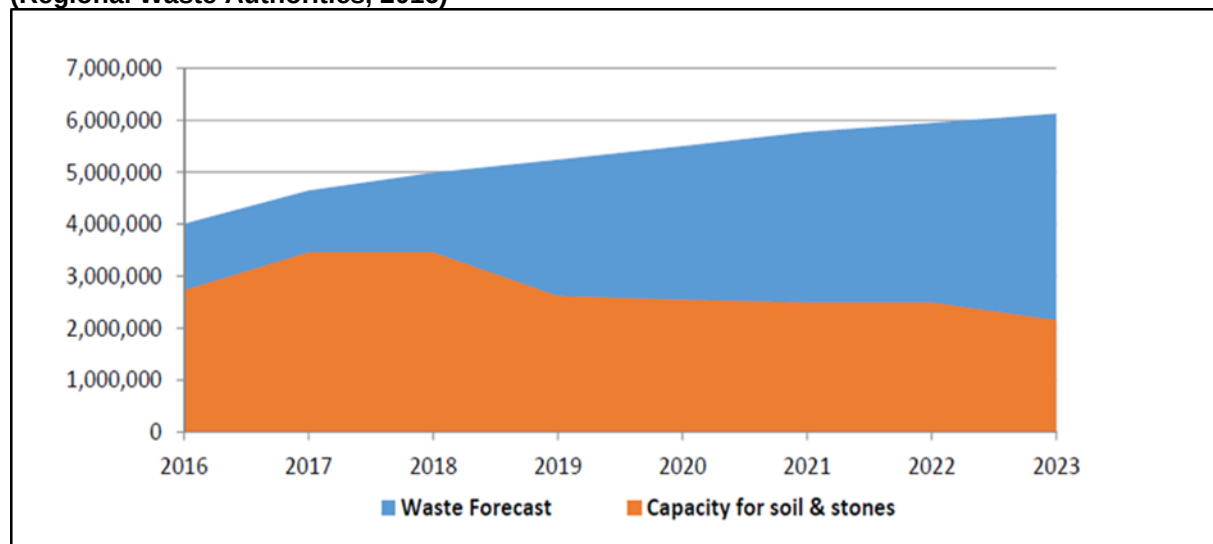
15.3.1 Existing National Waste and Recovery infrastructure overview

The Construction and Demolition Soil and Stone Recovery / Disposal Capacity Update Report, published in 2020, highlights the distribution of EPA licenced and Local Authority permitted soil and stone recovery facilities across Ireland. A large portion of the licenced soil and stone recovery facilities are located in the Eastern Midlands Region. According to the Construction and Demolition Soil and Stone Recovery / Disposal Capacity Update Report [141] there were

15 licenced soil recovery facilities in the Eastern Midland Region in 2020. The annual active licensed capacity for the Eastern Midland Region annually is 2,411,400 tonnes with an overall authorised capacity of 19,988,096 tonnes. At the end of 2018, there were 49 active permitted facilities operating in the Eastern Midland Region. In 2018, these facilities had a remaining capacity of 1,330,000 million tonnes. There are also a number of certificates of registration facilities in the Eastern Midland Region. However, most are small and do not provide a meaningful capacity to the construction industry [141]. Therefore, as per 2020, the remaining available capacity for soil and stone in licensed and permitted facilities in the Eastern Midland Region was ca. 21,320,000

The need for additional and alternative soil and stone recovery facilities becomes more evident as construction levels increase with Ireland's growing economy and population. Figure 15-1 below highlights the projected shortage in C&D and soils waste capacity versus increasing C&D and soil waste volumes for the period 2016 – 2023.

Figure 15-1: Forecast of National C&D and Soil Waste Volumes vs Treatment / Disposal Capacity (Regional Waste Authorities, 2016)



The construction and demolition waste in Ireland was 8.3million tonnes in 2022, of which 81% of the C&D waste was backfilled, 7% went for disposal and 10% was recycled, [145]ca. 82% of the construction and demolition waste collected and generated in 2022 was made up of soil and stones [145].

Having an adequate, authorised treatment capacity for such material, is vital to avoid unauthorised and unregulated disposal. The Waste Management Planning Regions have highlighted a lack of capacity for soil & stones .

The Proposed Development will have a positive effect on landfill capacity. The increase of soil and stone recovery facilities for backfilling / restoration reduces the volume of C&D materials being disposed of in landfills. Redirecting clean uncontaminated soil and stone for recovery therefore increases landfill capacity.

15.4 Characteristics & Predicted Effects of the Proposed Development

15.4.1 Construction Phase

The construction phase of the Proposed Development will have a neutral effect on the waste infrastructure. As described in detail in Chapter 3, the Proposed Development is provides for a continuation of use of established ancillary infrastructure within Ballyburn Pit including the all processing equipment, site office, weighbridge, wheel wash, aggregate processing plant,

storage, and haulage routes. Moreover, all overburden excavated as part of the Proposed Development will be stored and preserved on-site for future use in the restoration phase.

15.4.2 Operational Phase

The Proposed Development will increase the availability of sand and gravel aggregate (3,060,000 t over the life time of the project) for construction activities in the county and region. There is currently a housing supply target of 13,840 housing units for County Kildare to the end of 2031 [7]. In the national context the government are targeting 50,000 residential units per annum for the next five years. According to the ICF each residential unit requires ca. 400t of aggregates, each education facility requires 3,000 t of aggregates, and each km of road requires 30,000 t of aggregates [12]. As such, to meet Kildare housing objectives to 2028 there would be ca. 6,000,000t of aggregates required. From a national perspective there will be ca. 20,000,000 t per annum or 100,000,000t of aggregates over 5 years to meet these goals alone. Moreover, there are 29 education facilities in the pipeline at various stages (i.e. site acquisition, design, planning of plan, which would require ca. 90,000t of aggregates. There are several road improvement projects in the pipeline for Kildare (refer to Chapter 2 for further) which will require significant quantities of aggregates. The Proposed Development will provide a local source of quality aggregates for these vital public infrastructure projects. For context, the Proposed Development would only provide 50% of the aggregates for Kildare's housing needs to 2031, which highlights the enormity of demand for aggregates in Kildare and the country at large. Overall, the effect of the operational phase on material availability is deemed to be moderately positive.

Through the diversion of clean uncontaminated soil and stone materials to the Site, rather than a waste soil recovery facility this would free up ca. 5.3% in capacity for these facility types. The magnitude of the Proposed Development, according to IEMA magnitude assessment, is therefore minor positive [144].

The significance of effect of the volume of any new waste(s) generated by the Proposed Development across all work phases is concluded to be imperceptible.

15.4.3 Hazardous Materials

Insignificant quantities of hazardous wastes such as batteries, printer ink cartridges, etc. are likely to arise during the operational phase of the Proposed Development. These hazardous wastes will be stored and managed in accordance with all relevant waste legislation and the Pit's existing management procedures.

15.5 Proposed Mitigation measures and / or Factors

The Proposed Development seeks a continuance of use of the existing established infrastructure thereby minimising the need for land take and materials.

The Proposed Development will only accept clean uncontaminated soil and stone by-product materials in accordance with the National By-Product Criteria [20] and by-product guidance criteria [142].

The Proposed Development will reuse all overburden stripped across the extension lands in the restoration process.

All waste (albeit minimal) will be managed in accordance with all relevant waste legislation and the Pit's existing management procedures.

15.6 Cumulative and In-Combination Impacts

As outlined above, the development needs as projected by Project Ireland 2040 of Kildare and the wider country will require ca. 1,500,000,000t of aggregates. The Proposed Development represents a source of quality aggregates adjacent established infrastructure which will

contribute in a meaningful manner to the demand for aggregates. The Proposed Development would fulfil 0.004% of the aggregates required to meet the development goals of the Project Ireland, providing a slight positive effect on materials availability.

15.7 Interactions with other Environmental Attributes

The other environmental factors with which solid waste interacts include:

Chapter 6 – Biodiversity: The potential for the importation of invasive species has been discussed with appropriate mitigation measures prescribed.

Chapter 7 – Land and Soils: The interaction of by-product with Land, Soils and Geology is discussed in Chapter 6 of this EIAR with appropriate mitigation measures prescribed; and,

Chapter 8 – Water (Hydrology and Hydrogeology): The potential interaction of by-product with water is discussed in Chapter 8 of this EIAR with appropriate mitigation measures prescribed.

15.8 Residual Impacts

The Proposed Development will have a slight positive effect on materials availability. The Proposed Development will have a minor positive effect on landfill capacity.

15.9 Indirect Effects

The Proposed Development will indirectly provide additional landfill/waste soil recovery capacity through the diversion of clean uncontaminated soil and stone for use as a by-product.

15.10 Monitoring

Visual inspection and the tracking of dockets from source site to the Site, will be the primary controls for ensuring materials arrive from the site of inspection. Notified by-product uncontaminated soil and stone material will only be accepted at the Proposed Development, refer to Table 3-2 for further details.

15.11 Reinstatement

The Proposed Development is part a restoration project, as such reinstatement has been considered throughout the Chapter.

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16 INTERACTIONS OF THE FOREGOING

Description	Population and Human Health	Biodiversity	Land, Soils and Geology	Water	Air Quality	Climate	Acoustics (Noise and Vibration)	Landscape and Visual	Cultural Heritage	Material Assets (Transport and Traffic)	Material Assets (by-product)
Population and Human Health		X	X	✓	✓	✓	✓	✓	✓	✓	X
Biodiversity	X		✓	✓	✓	✓	✓	X	X	X	✓
Land, Soils and Geology	✓	✓		✓	✓	✓	X	✓	X	X	✓
Water	✓	✓	✓		X	X	X	X	X	X	✓
Air Quality	✓	✓	✓	X		✓	X	X	X	✓	X
Climate	✓	✓	X	✓	✓		X	X	X	✓	X

Description	Population and Human Health	Biodiversity	Land, Soils and Geology	Water	Air Quality	Climate	Acoustics (Noise and Vibration)	Landscape and Visual	Cultural Heritage	Material Assets (Transport and Traffic)	Material Assets (by-product)
Noise and Vibration	✓	✓	X	X	X	X		X	X	✓	X
Landscape and Visual	✓	X	✓	X	X	X	X		X	X	X
Cultural Heritage	X	X	X	X	X	X	X	X		X	X
Material Assets (Transport and Traffic)	✓	X	X	X	✓	✓	✓	X	X		X

Description	Population and Human Health	Biodiversity	Land, Soils and Geology	Water	Air Quality	Climate	Acoustics (Noise and Vibration)	Landscape and Visual	Cultural Heritage	Material Assets (Transport and Traffic)	Material Assets (by-product)
Material Assets (Waste)	X	X	✓	✓	X	X	X	X	X	X	

17 SCHEDULE OF COMMITMENTS

Table 17-1 outlines the environmental commitment which will be undertaken as part of the Proposed Development, during the Site Preparation, Operational and Restoration Phases.

Table 17-1: Schedule of Commitments

Commitment
General
Quarrying activities will comply with all relevant legislation and best practices to reduce any potential environmental impacts.
The quarry operator contractor will ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the EIAR.
The Proposed Development involves the extension into land to the east and south of the Site for an extension of the extraction area of ca. 28.3ha and to an extraction depth of 71mAOD. The Site boundary covers a total area of ca. 37.8ha. Situated within the Applicant's existing landholding.
Additional facilities such as canteen, office and washroom facilities will be utilised at the existing Ballyburn Pit.
A restoration plan will be submitted as part of this application and will develop on the proposed landscaping works, providing for the additional embankment/berms, woodland planting, the provision of future habitats for both flora and fauna species and rehabilitation measures to be undertaken once operations have ceased.
The main construction hours for the Proposed Development will be from 07:00 to 18:00 Monday to Friday and 08:00 to 14:00 on Saturday. No works will take place on-site on Sundays or Bank Holidays/Public Holidays.
A wheel wash and weighbridge are located at the main construction access.
No fuel will be stored within the Site. Fuel is delivered directly to the plant and machines on the Site. Specialised personnel will refuel modular mobile plant via a fuel bowser.
Biodiversity
General Measures
- Quarrying activities will comply with all relevant legislation and best practices to reduce any potential environmental impacts; - The mitigation measures detailed within this EIAR and the NIS will be fully adhered to; - The Site manager shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the EIAR and the NIS; - If protected or notable species are encountered during operations at the Site, works will stop within the area that these animals are identified in, and the project Ecological Clerk of Works ('ECOW') will be contacted for advice; - Protected and notable species posters will be erected on the Site notice board and maintained throughout the duration of the works; - In advance of works, all site personnel will receive a toolbox talk regarding notable and protected species. Everybody working on-site must understand the role and authority of the ECOW; and, - An ECOW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works, to ensure that all the works are completed in line with the measures in this EIAR and wildlife legislation

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Measures for Hedgerow / Treelines

- All development works will be set back a minimum of approximately 10m from the existing boundary features;
- All hedgerows / treelines to be retained that will be located within close proximity to the extraction area will be fenced off by a security fence and further protected by a 2m high, grass berm. These barriers will remain in place for the lifetime of the Proposed Development and will prevent accidental disturbance and define the limits for quarrying activities;
- No materials, equipment or machinery will be stored within close proximity to retained hedgerows / treelines;
- In order for treeline protection measures to work effectively, all personnel associated with the operation of heavy plant machinery must be familiar with the above principles for the protection of treelines;
- Notice boards, wires, etc. will not be attached to any trees; and,
- The construction of the berms on-site will be supervised by the ECoW to ensure that no impacts occur to bordering hedgerows / treelines.

Measures for Badgers / Terrestrial Mammals

- Should the proposed works be required outside of daylight hours, the appointed project ECoW will be consulted, as required;
- Obvious mammal paths will be left clear of obstruction to allow for the free movement of smaller mammals throughout the landscape;
- If unidentified burrows are identified within the works area during works, the ECoW will be contacted for advice; and,
- The clearance of scrub / immature woodland on-site will be supervised by the ECoW.

Measures for Otter

- Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the extraction area. These will be embedded into the local soils to ensure all site water is captured and filtered prior to recharge;
- Daily monitoring and inspections of soil stripping will be completed. Excavated soil will be used for landscaping, screening berms, and for Site restoration;
- Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses;
- Preventative maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;
- Refuelling will only occur from a fuel bowser as per the existing established operation;
- A spill kit will be kept nearby when refuelling. The spill kit will contain fuel-absorbent material, pads/mats and an oil boom for use in the event of any accidental spill;
- Drip trays and fuel absorbent mats will be used during all refuelling operations;
- On-site refuelling will be carried out by trained and competent personnel only;
- All plant and machinery will be serviced before being mobilised to the Site and regular leak inspections and fitness for purpose will be completed during the backfilling works;
- No substantial plant maintenance will be completed on-site; any broken-down plant will be removed from the Site to be fixed;
- Where deep excavations will be required on-site, appropriate measures to protect otters from ingress will be installed;
- Should construction works be required outside of daylight hours during the site clearance works, the ECoW will be consulted as required; and,

- If unidentified holts are identified within the works area during construction, works will cease within the area and the ECoW will be contacted for advice.

Measures for Bats

- No lighting will be installed as part of the Proposed Development;
- A minimum buffer of 10m will be maintained between the retained hedgerow / treelines and the extraction area. This will ensure that bats can continue to utilise the retained linear features for foraging and commuting purposes;
- The trees with Potential Roost Features ('PRF') which will be removed will be felled on mild days during the autumn months of October – November or during the spring months of February – March (Felling during the spring or autumn avoids the periods when bats are most active and with young).
- The grass berm will provide potential foraging habitat for bats; and,
- The Restoration Plan (attached as Appendix 6-2) will ensure that as habitats are removed, restoration occurs in other areas of the Site (e.g., the planting of the woodland area in the northeast of the Site). This will maintain potential foraging habitats for bats. In addition, the habitats to be removed to facilitate extraction will be restored to grassland after quarrying works cease.

Measures for Birds

- Any vegetation clearance required will take place outside of the nesting bird season (1st March to 31st August), as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000;
- In the event that works need to be undertaken within the main breeding season, this will be undertaken in consultation with NPWS;
- Prior to any vegetation removal the ECoW will inspect the Site;
- The management and removal of vegetation on-site will be undertaken in a systematic way under the direction of an ecologist to ensure that retained areas of vegetation are not damaged by the works;
- Vegetation will be removed and replaced on a phase-by-phase basis;
- In the unlikely event birds nest within the active working area during the works, all works within the immediate area will cease and the ECoW will be consulted; and,
- If sand martins or other notable/protected bird species are identified colonising any areas to be impacted by the works, works will cease within the identified area. An appropriate undisturbed buffer zone will be established for the duration of the breeding season or until the chicks have fledged and left the nest. This will be confirmed by the ECoW.

Measures for Other Species

- Should the proposed works be required outside of daylight hours, the ECoW will be consulted, as required;
- Where deep excavations will be required on-site, appropriate measures to protect mammals from ingress will be installed; and,
- If unidentified burrows are identified within the works area during construction, works will cease within the area and the ECoW will be consulted for advice.

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Measures for Invasive Species

- All vehicles, machinery and any other equipment that may be used for the works will be washed and cleaned prior to being mobilised to the Site to prevent the import of plant material/seeds;
- Prior to machinery or equipment being unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed;
- The staff on-site will be made aware of the dangers associated with cross-contamination of invasive plant species with soil;
- Any vehicles and machinery that are not clean will not be permitted entry to the Site;
- Clean, uncontaminated soil and stone by-products accepted to the Site will be free of invasive species (suitable evidence provided from the source site prior to agreeing to take the materials which may include 'statement of conformity from the producer or a report from a suitably qualified ecologist or similar). The applicant will engage a suitably qualified and experienced practitioner to assess the evidence if necessary; and,
- If high impact invasive species are identified on-site, including Japanese knotweed or Himalayan balsam, the ECoW will be contacted for advice.

Land Use, Soils and Geology

Oil Storage / Refuelling

The following mitigation measures will be applied, in accordance with the EPA (2006) Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals);

- All plant and machinery will be serviced before being mobilised to the Site;
- Refuelling will be completed in a controlled manner using drip trays (bundled container trays) at all times;
- Drip-trays will be used for fixed or modular mobile plant in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel plant on-site;
- Procedures and contingency plans will be set up to deal with emergency accidents and spills; and,
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spillage; and,
- Any spillage of fuel, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the Site and appropriately disposed of.

Soil Management

Stockpiling of the excavated material will be required and will be appropriately managed on-site. All topsoil will be stored in stockpiles, some of which will be used for the remediation stage of the Site. Topsoil removal and storage will be conducted considering best practice guidance from DEFRA (2009). To minimise the overall impact on soils arising during the construction phase, the following mitigation measures will be adhered to;

- Soil stripping and stockpiling will not take place during particularly dry or wet weather. This will minimise damage to the soil structure;
- The stockpiles will clearly be defined to differentiate soil materials;
- Overburden removal will be an intermittent operation and will be done so as the existing pit face is progressed from north to south (generally speaking);
- Overburden will be retained in berms and used during the final restoration activities;

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- Installation of security fencing to prevent unauthorised access to the Site;
- The traffic movement will be confined to designated routes;
- Berms should be seeded as soon as possible to ensure the stability of the stockpiled soil; and,
- Berms will be dampened down during dry periods to prevent wind dispersion until planting has been established.

Water

During preparatory and operational works at the Proposed Development the usage of fuel powered equipment and machinery will be required. In order to limit the risk of contamination from these materials mitigation measures will be in accordance with the EPA (2006) Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals) [70] whereby;

- Preventative maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;
- All quarry vehicles will be refuelled on a hard-standing area via dedicated refuelling bowser per the existing established operation and with adequate spill protection measures employed;
- Only small volumes of fuel/oils/lubricants will be present on-site;
- Items of plant and machinery will be refuelled by a competent person utilising adequately sized and positioned drip trays;
- A spill kit will be kept nearby when refuelling. The spill kit will contain fuel absorbent material, pads/mats and oil boom for use in the event of any accidental spill.
- Fuel is delivered to the Site on an as required basis by reputable fuel companies in bunded fuel bowsers.;
- The wheel wash will be serviced and maintained. All plant and machinery will be serviced before being mobilised to the Site and regular leak inspections and fitness for purpose will be completed during the backfilling works;
- Unauthorised access is prevented in so far as possible;
- All plant and machinery will be serviced before being mobilised to Site and regular leak inspections and fitness for purpose will be completed during the backfilling works;
- No substantial plant maintenance will be completed on-site, any broken-down plant will be removed from Site to be fixed; and,
- The Site will operate under an existing Management System.

In addition, the following measures will be implemented to prevent groundwater vulnerability and groundwater quality:

- Leaving ~4m-17m of subsoils above the bedrock across the Site (i.e. 71m OD) Depth of the rock at the Site has been confirmed by borehole drilling. The top of rock ranges in elevation from ca. 48 to ca. 67m OD;
- No extraction will occur below the winter groundwater table which has been recorded at a maximum of 69.5m OD;
- Acceptance criteria for the incoming materials would need to be adhered to as per the National By-Product Criteria;
- Sourcing material that is determined to be by-product prior to transport to the Site;
- Pre-agreed source sites for inert material ensuring; no pollutants, unauthorised material, invasive species is present;

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- Regular checks of incoming loads to ensure suitability of imported material;
- The Site will be operated under an Environmental Management System;
- All required pollution prevention measures will be implemented at the Site;
- The operator will prepare and implement an emergency response procedure;
- The operator will complete environmental monitoring, including local groundwater and surface water monitoring;
- A phased restoration of the Site will be implemented, with an agricultural use implemented following restoration for the Site;
- The operator will have a documented waste recording procedure for all by-product material entering the Site; and,
- No unauthorised dumping of waste will be allowed at the Site.

Air Quality

The mitigation measures can be divided into Design Measures, Construction Phase, Operational Phase and Rehabilitation Phase.

Design Measures

The design measures to reduce dust will include:

- Treelines and hedgerows surrounding the periphery of the Site will be enhanced during the Construction Phase and maintained during the Operational and Rehabilitation Phases. The hedgerows, once mature, should result in dense foliage;
- The materials initially excavated from the Site will be used to build an embankment along the boundaries, which will be planted to significantly reduce risk of disamenity dust leaving the Site boundary in the subsequent Operational Phase;
- Access roads will consist of hardstanding, minimising exposed surfaces;
- Additional haul routes will maintain a sufficient distance away from sensitive receptors;
- The existing wheel wash will be utilised for all outward movements for all phases of the development; and,
- Exposed surfaces, e.g. topsoil and overburden storage mounds, will be planted with grass.

Existing Measures

The existing measures to reduce dust include:

- Internal road surfaces are maintained to a high standard;
- Conveyors, stockpiles, and internal roads are sprayed with water to dampen down any dust generated;
- Berms are constructed and planted with vegetation where possible to minimise dust blow-off from the site.
- Roads are sprayed with water to dampen;
- Regular sweeping of public roads, as required;
- Maintaining all transport vehicles in a clean and appropriate visual appearance; and,

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- Applying a cover to vehicles transporting fine dry materials to prevent the fine material from escaping the trailers.

Construction and Operational/Restoration measures Phase

The following mitigation measures will be implemented to minimise dust generation, during the Construction Phase and Operational Phases:

General

- Record all dust and air quality complaints, identify cause(s), take appropriate action;
- An electronic logbook record of complaints will be maintained and made available to the local authority on request;
- Provide training to Site personnel on dust mitigation measures will be implemented at the Site;
- Maintaining good communication with the local community;
- Public roads outside of the Site, should be regularly inspected;
- Speed restrictions within and around the quarry;
- Site roads will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface, unsurfaced routes will be kept to essential traffic only;
- Stockpiled material will be dampened down as necessary to prevent dust dispersion;
- Stockpiles will be stored in enclosed areas to prevent wind whipping;
- During dry and/or windy conditions, dampening of appropriate surfaces (i.e. roads, routes, infill area if necessary) should be completed as required; and,
- All vehicles used during the Proposed Development, will be maintained to a high standard to allow optimum operation conditions.

Site preparation

- Installation of security fencing and signage around the periphery of the Site;
- Removal of topsoil under archaeological supervision;
- Removal of overburden and the construction of berms; and,
- Seeding berms to preserve the soil materials.

Mineral processing

- Crushing and screening will take place within sheltered parts of the quarry to reduce the likelihood of transport of dust via wind;
- Dampen material during dry periods prior to crushing operation;
- Crushing and screening plant will be used within its design capacity; and,
- All plant and equipment will be subjected to routine preventative maintenance.

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Material Handling

- Materials will be dampened sufficiently during dry conditions;
- Dampen conveyers where required from fixed sprays bowser;
- Washing, screening and stockpiling of aggregates;
- Importation of uncontaminated soil and stone;
- Handling of uncontaminated soil and stone and subsequent infilling following extraction activities in each zone; and,
- Clearance of any spillage during extraction should be completed regularly to minimise accumulation of loose dry materials.

Vehicle movements

- Off-site transportation of aggregates;
- The material will be transported over well established and maintained haul routes;
- Materials will be manged/handled >50m from receptors;
- Regular clearing, grading and maintenance of haul routes will be conducted;
- The material will be transported over well established and maintained haul routes;
- Materials will be manged/handled >50m from receptors;
- Vehicles will be evenly loaded to reduce the possibility of spillages;
- Daily application of water to haul routes during dry conditions will be completed;
- HGVs will pass through wheel wash onto hardstanding prior to leaving the Site; and,
- Road sweepers will be utilised to maintain local roads on a need-to basis.

Climate

- The use of alternative low-carbon fuel sources in vehicles where practicable;
- Efficient vehicle management to minimise vehicle journey numbers where possible; and,
- Reducing idling engines for on-site plant and vehicles.

Acoustics (Noise and Vibration)

The potential for noise arising from the development has three distinct phases - the Site Preparation Phase, Operational Phase and Rehabilitation Phase. The mitigation measures of the phases are distinctly different and therefore are discussed separately.

Site Preparation Phase

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Noise

Based on the assessment conducted here, typical mitigation measures should be implemented as:

- Construction Phase works will be designed to avoid noisy work outside the hours of:
 - Monday to Friday 07:00 to 19:00; and,
 - Saturday 08:00 to 17:00.
- Work occurring outside typical daytime hours (Monday to Friday 07:00 to 19:00 and Saturday (07:00 to 13:00) will be subject to tighter construction stage noise limits, as per BS5228-1 (Section 11.2.1.1 of this EIAR):
- Nomination of a responsible person to accept and respond to complaints;
- Ensuring all plant and equipment is serviced and in good repair;
- Inclusion of response procedure to noise complaints and noise breaches;
- Avoidance of plant or equipment left idling;
- Planning of works to ensure drop heights from equipment or during demolition are minimised to reduce noise generated; and,
- Noise monitoring programme during construction phase works.

Vibration

- No mitigation required for the Site Preparation Phase relating to vibration control.

Operational Phase

The following mitigation measures will be put in place as part of ongoing operations on-site.

- Operational Phase works will be designed to avoid noisy work outside the hours of:
 - Monday to Friday 07:00 to 18:00; and,
 - Saturday 07:00 to 14:00.
- All plant (fixed and mobile) is maintained to a high standard to reduce any tonal or impulsive sounds;
- All plant is throttled down or switched off when not in use;
- Vehicle speeds will be kept below 20km/hr within the Site; and,
- Internal routes will be reduced in gradients and routed to minimise noise emissions from vehicles on-site.

Vibration

- No mitigation is required for the Operational Phase relating to vibration control.

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Rehabilitation Phase

Noise

The Rehabilitation Phase will be temporary insofar as it will be at periodic intervals over the lifetime of the quarry. The Rehabilitation Phase will be limited to the operational times of 07:00 to 18:00, Monday to Friday and 07:00 to 14:00 on Saturdays. No works will occur on Sundays or Public Holidays.

- All modular mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds; and,
- All modular mobile plant will be throttled down or switched off when not in use.

Vibration

- No likely significant vibration impacts to sensitive receptors during the Rehabilitation Phase.

Incorporating the above measures and the mobile nature of the project works within the Site, the compliance at NSRs will be complied with to a noise criterion of:

- During permitted hours, $L_{Aeq,60min}$ 55dB

Landscape and Visual

- The main mitigation by avoidance measure is the siting of the Proposed Development in a contained landscape context that avails of a high degree of existing screening in the form of existing vegetation.
- Existing vegetation will be allowed to grow out to reach maturity and will soften and screen surrounding landscape and visual receptors as it matures.

Cultural Heritage

- All soil-stripping in areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 will be monitored by a qualified archaeologist.
- Any archaeological material identified during monitoring should be preserved by record under licence from the National Monuments Service in advance of development.

Material Assets – Traffic & Transport

- n/a

Material Assets – Natural Resources and Waste

- The Proposed Development will utilise existing welfare facilities at the Site to minimise the potential effects associated with the construction phase of the development.
- The Proposed Development will only accept clean uncontaminated soil and stone by-product materials in accordance with the National By-Product Criteria and by-product guidance criteria.
- The Proposed Development will reuse all overburden stripped across the extension lands in the restoration process.
- All waste will be managed in accordance with all relevant waste legislation and the Pit's existing management procedures.

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