February 2024

Environmental Impact Assessment Report (EIAR) Volume 2

Quarry Extension, Kilmacow, Co. Kilkenny

Roadstone Ltd.

Fortunestown, Dublin 24, Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

Form ES - 04

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Environmental Impact Assessment Report (EIAR) Volume 2

Quarry Extension, Kilmacow, Co. Kilkenny

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1 INTRODUCTION

1.1 Introduction

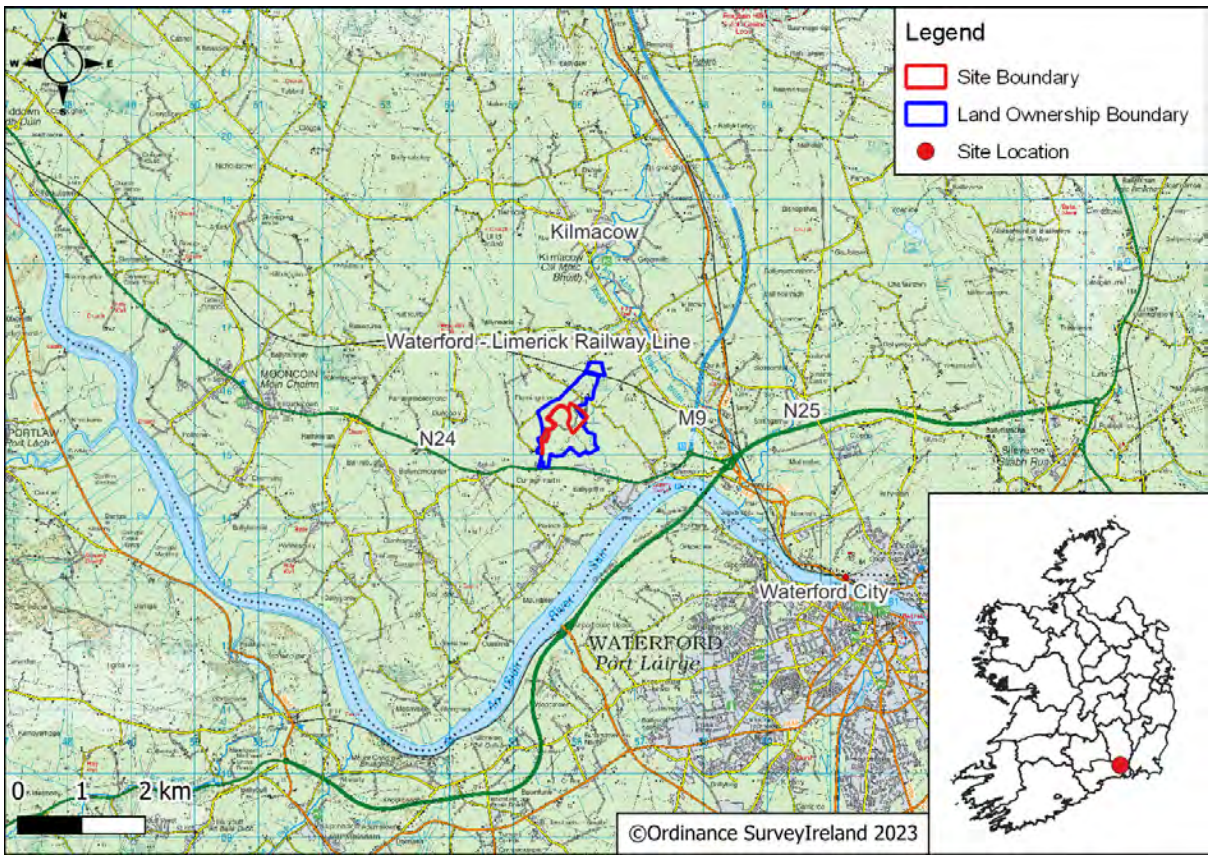
Malone O'Regan Environmental (MOR) has been commissioned by Roadstone Ltd. ('the Applicant' or 'Roadstone') to prepare an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) in support of a planning application to Kilkenny County Council (KCC) for an extension of their existing rock quarry in Kilmacow, Co. Kilkenny.

Kilmacow Quarry is primarily located in the townland of Granny, with the southern portion of the landholding extending into Aglish North. Kilmacow Quarry is located circa (ca.) 40km south of Kilkenny Town, Co. Kilkenny, and ca.5.5km northwest of Waterford City, Co. Waterford. The currently permitted extractive area of the quarry is ca.27 Hectares (ha), but with the inclusion of ancillary infrastructure, the collective area is 62.07ha ('the Quarry'). The Quarry is situated in the Roadstone landholding which covers an area of ca.84ha, refer to the blueline boundary presented in Figure 1-1 for context ('the Landholding').

This EIAR assesses the potential effects associated with the proposed extension to the Quarry and the associated activities. The proposed extension does not seek to increase production output at the Quarry, but to provide access to a known quality aggregate reserve at depths of up to -45 metres Ordnance Datum (mOD) from a surface level of ca.34mOD (the 'Proposed Development'). As such, this application will not seek to amend the authorised output from the Quarry, but rather extend the extraction area and extend the operational life for the Quarry in terms of aggregate production.

The Proposed Development will be located on a site covering an area of ca.10.3ha at the Ordnance Survey centre co-ordinates Irish Transverse Mercator (ITM) (655604 615465), refer to the redline boundary presented in Figure 1-1 below for context ('the Site').

Figure 1-1: Site Location



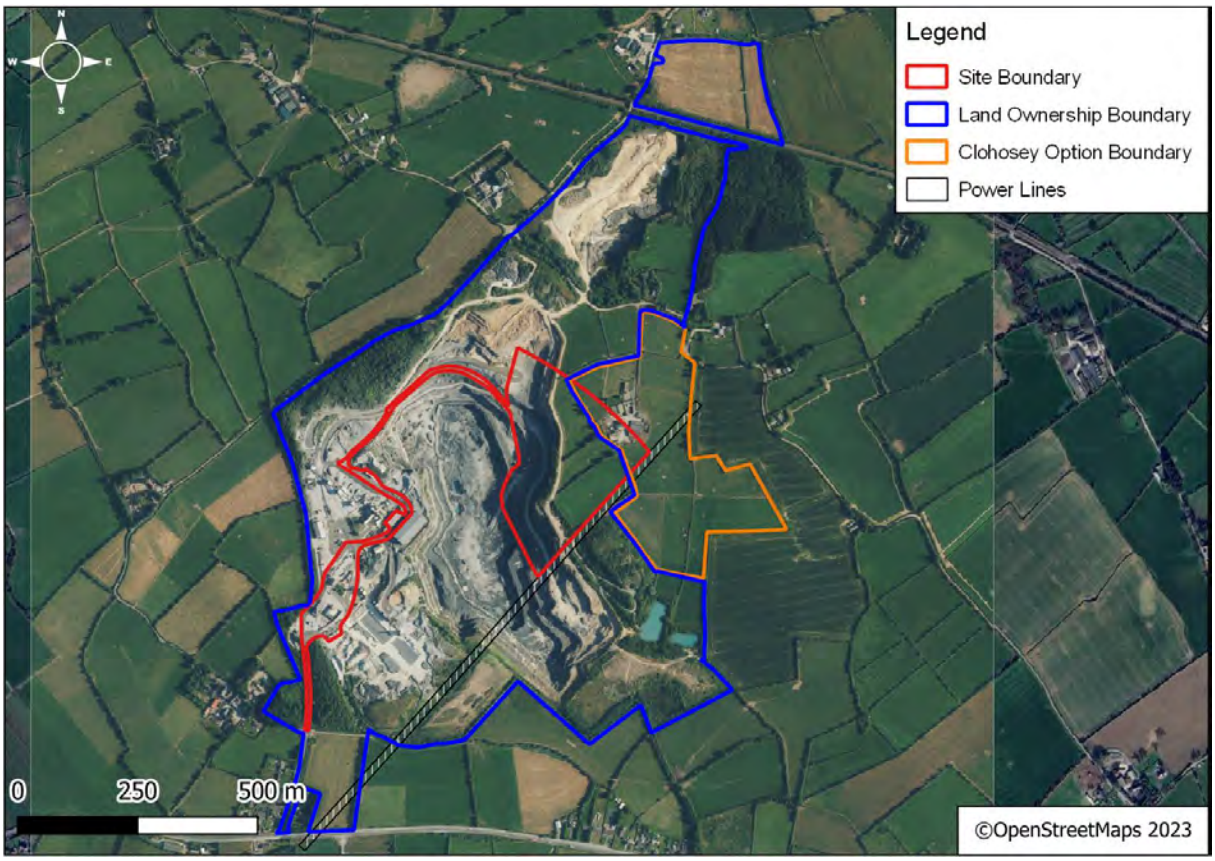
1.2 Site Description and Layout

Extraction at the Quarry dates back to 1971, when outline planning permission for a quarry was granted under planning reference: 1/1/1754. The Site is primarily comprised of agricultural land within the Landholding. The easternmost portion of the Site extends beyond the Landholding into the Clohosey's lands. These lands are part of a 10.9ha. landholding currently owned by Mr Liam Clohosey. Roadstone has an agreement in place with Mr. Clohosey, should this application be successful, to purchase the lands to extend their overall landholding, refer to the letter submitted as Appendix 1-1. The Clohosey lands comprise of improved agricultural grassland, hedgerows/treelines, a house, and farm outbuildings. Clohosey's house and associated buildings will be unoccupied should the Proposed Development proceed. Refer to Figure 1-2 below for context.

The westernmost portion of the Site extends back into the Quarry, primarily to allow for the seamless integration of the as-authorised quarry face with the proposed extension lands, and to maintain access through the established entrance to the southwest. This area comprises active quarry operations and infrastructure such as internal haul roads, an existing weighbridge and wheel wash. To date, quarrying activities within this area have extracted material to a depth of -45mOD.

Powerlines are located outside the Site boundary to the southeast, these powerlines cross over the quarry pit within the Quarry. The design of the Proposed Development and location of the Site has taken these powerlines into account.

Figure 1-2: Site Context



1.3 Overview of Proposed Development

The Proposed Development will consist of the extension of the Quarry into known quality aggregates east of the existing permitted extraction area. The extension will seek to complete

5 benches which are 15m high, reducing the existing level of land from ca.34mOD down to -45 mOD, which is the final depth in the permitted extraction area (planning reference: 16/700). The Proposed Development will involve blasting, extraction and processing of rock using mobile primary crushing/screening and associated plant on the quarry floor. The Proposed Development will seek to utilise existing established infrastructure including entrance, office/welfare facilities, carpark, wheel wash, weighbridge, haul routes and ancillary infrastructure for further secondary processing of aggregates.

The Proposed Development includes for the demolition and removal of two (2No.) agricultural sheds and a small pump house (currently in Clohosey Lands) and the completion of boundary berms, access tracks and associated safety features at the Site boundary. The farmyard and remaining buildings will be left intact and safely fenced off from the Proposed Development.

The estimated reserve within the Site is ca.2,920,000 m^3 (or ca.7,592,000 tonnes) of aggregates. The Proposed Development represents an extension of the Quarry into known quality aggregates. It will operate within the permitted outputs which currently range from 700,000 to 1,000,000 tonnes per annum pending market conditions (up to 250 outward trips of HGVs per day). It should be noted that the works within the proposed extraction area will occur above and below the groundwater table (the static level is ca.16mOD). This is in keeping with the existing operations onsite. Further details are presented in Chapter 3 – Description of the Proposed Development and Chapter 8 – Water.

1.4 Description of the Setting of the Proposed Development

The Site is in County Kilkenny, within the Aglish Electoral District; however, its proximity to Waterford means that it also lies within the Waterford Metropolitan Area. There is no specific land-use zoning for the Site or the surrounding area within either the Kilkenny County Development Plan (KCDP) 2021-2027 [1] or the Waterford Metropolitan Area Strategic Plan (WMASP), as determined by the Regional Spatial and Economic Strategy (RSES) for the Southern Region [2].

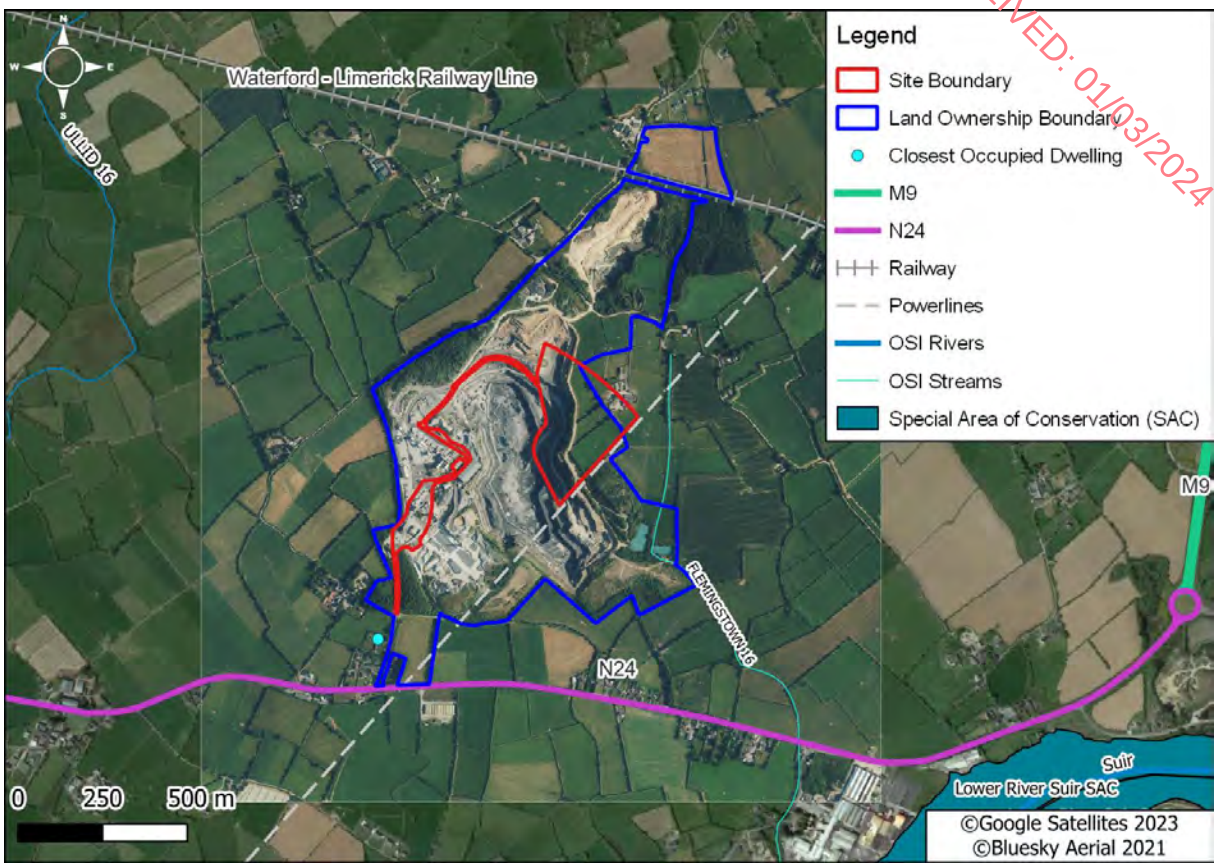
The lands owned by Roadstone are divided into two (2No.) sections by the L7433 local road with ca.68ha to the south of this road and ca.16ha to the north. The Site and Quarry are located to the south of the L7433. There is a power line running through the southeast portion of the Quarry. However, the Proposed Development has been designed to maintain a 25m buffer between these lines and the extraction area. As such, there will be no requirement for the Proposed Development to interact with these power lines.

The Waterford-Limerick railway is located ca.540m north of the Site. Roadstone own lands immediately north and south of this railway line as shown in Figure1-3. The N24 national road is located ca.215m south of the Site along the southern extent of the Landholding.

The Flemingstown Stream is located ca.90m from the Site at its closest point. The existing attenuation ponds within the Quarry discharge to this stream. The Flemingstown Stream flows into the Middle Suir Estuary. The Middle Suir Estuary is located ca.1.4km southeast of the Site at its closest point. The Middle Suir Estuary forms part of the Lower River Suir SAC and is a key ecological and heritage feature of the surrounding landscape. Further details are presented in Chapter 6 – Biodiversity and Chapter 8 – Water.

The lands surrounding the Site and Quarry comprise of agricultural fields in the form of pastures and one-off residential dwellings. As described above, the buildings within the lands owned by Mr. Clohosey will be unoccupied should the Proposed Development proceed. Therefore, the closest dwelling to the Proposed Development will be ca.81m southwest. Refer to Figure 1-3 below for context.

Figure 1-3: Setting of the Proposed Development



Kilkenny County Council, in partnership with Tipperary County Council, Transport Infrastructure Ireland (TII) and the Department of Transport (DoT) are developing the N24 Waterford to Cahir Road Scheme. The section of the N24 being considered by this project is approximately 60km in length. It extends from the M8 Junction 10 Cahir North Roundabout, north of Cahir in Co. Tipperary, to the southern terminal of the M9 Dublin to Waterford motorway at the Quarry Roundabout, north of Waterford City in Co. Kilkenny. There are four (4No.) phases associated with this project;

1. Concept and Feasibility;
2. Options Selection;
3. Design and Environmental Evaluation; and,
4. Statutory Process.

The project is currently in Phase 2, whereby, three (3No.) options for the amended route are up for consideration. One (1No.) of these options extends through the northern portion of the Landholding. The other two (2No.) options are located to the south of the Quarry. The public display of the preferred transport solution (option) was published on 23rd January 2024. The preferred transport solution is to upgrade the existing N24 corridor to the south of the Quarry (presented as the management option corridor in Figures 1-5 and 1-6). This preferred option will not affect the Site.

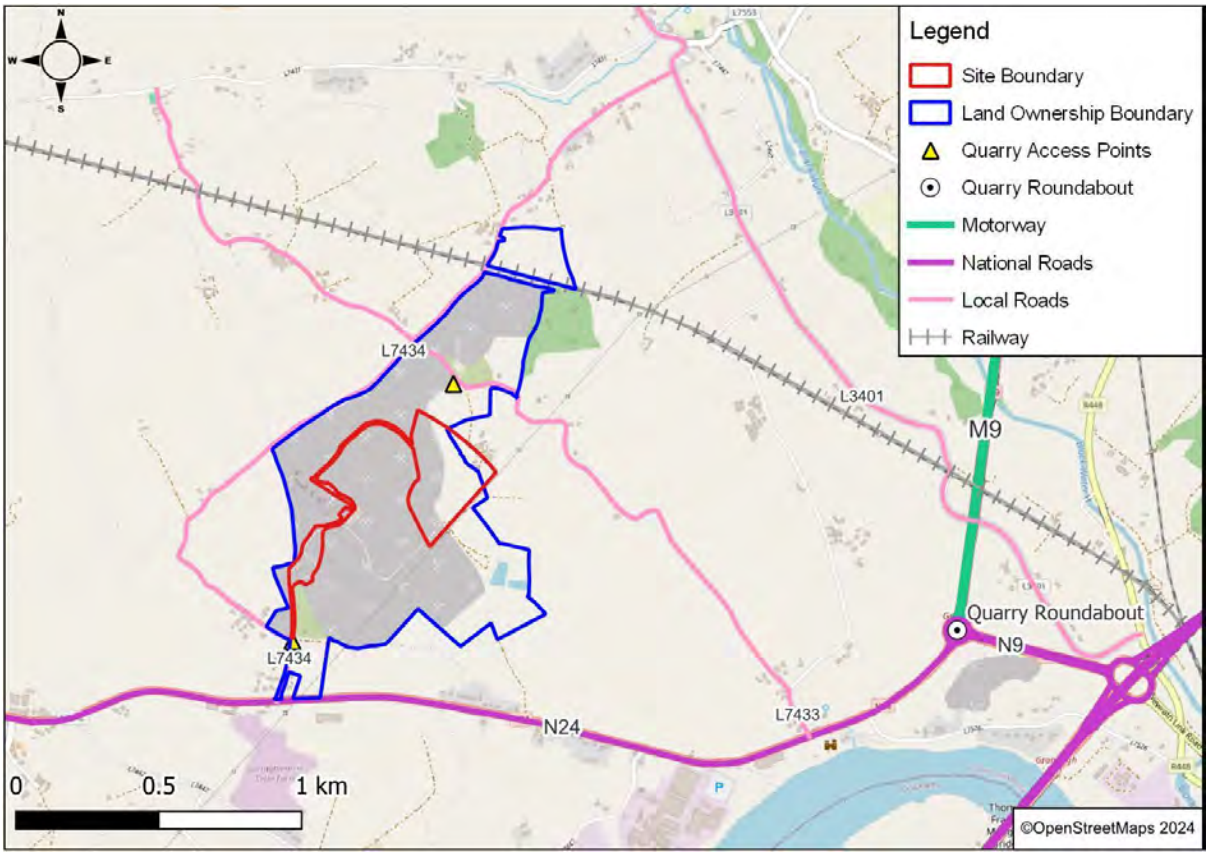
1.5 Description of Local Road Infrastructure

The Quarry is well served by transport infrastructure with access to the N24, the national primary road between Waterford and Limerick, directly south of the Site. The N24 extends east to join the Quarry Roundabout 2.5km from the quarry entrance. The Quarry Roundabout

provides access to the M9 and N9. The M9 motorway linking the M7 at Naas to Waterford. The N9 provides access to the N25 ca.500m southeast of the Quarry Roundabout. The N25 is the national primary road between Rosslare Europort to Cork.

Access to the Quarry is via an established entrance along the L7434 local road. The L7434 adjoins the N24 ca.215m south of the Quarry and terminates at a T-junction with the L3401 ca.1.5km northeast of the Site. The L7433 runs in a southeast-northwest direction and bisects the L7434 ca.244m northwest of the Site. As described above, the L7433 divides the lands owned by Roadstone into two (2No.) sections. The L7433 is located ca.150m northeast of the Site at its closest point. The Clohosey lands and an existing agricultural access point to the Site is located along the L7433 local road. The Proposed Development will only utilise the existing quarry entrance. Refer to Figure 1-4 below for context.

Figure 1-4: Local Roads



1.6 Notable Developments in the Area

Notable developments are considered to be existing or proposed developments in the area that have the potential to interact with the Proposed Development and lead to potential in-combination effects.

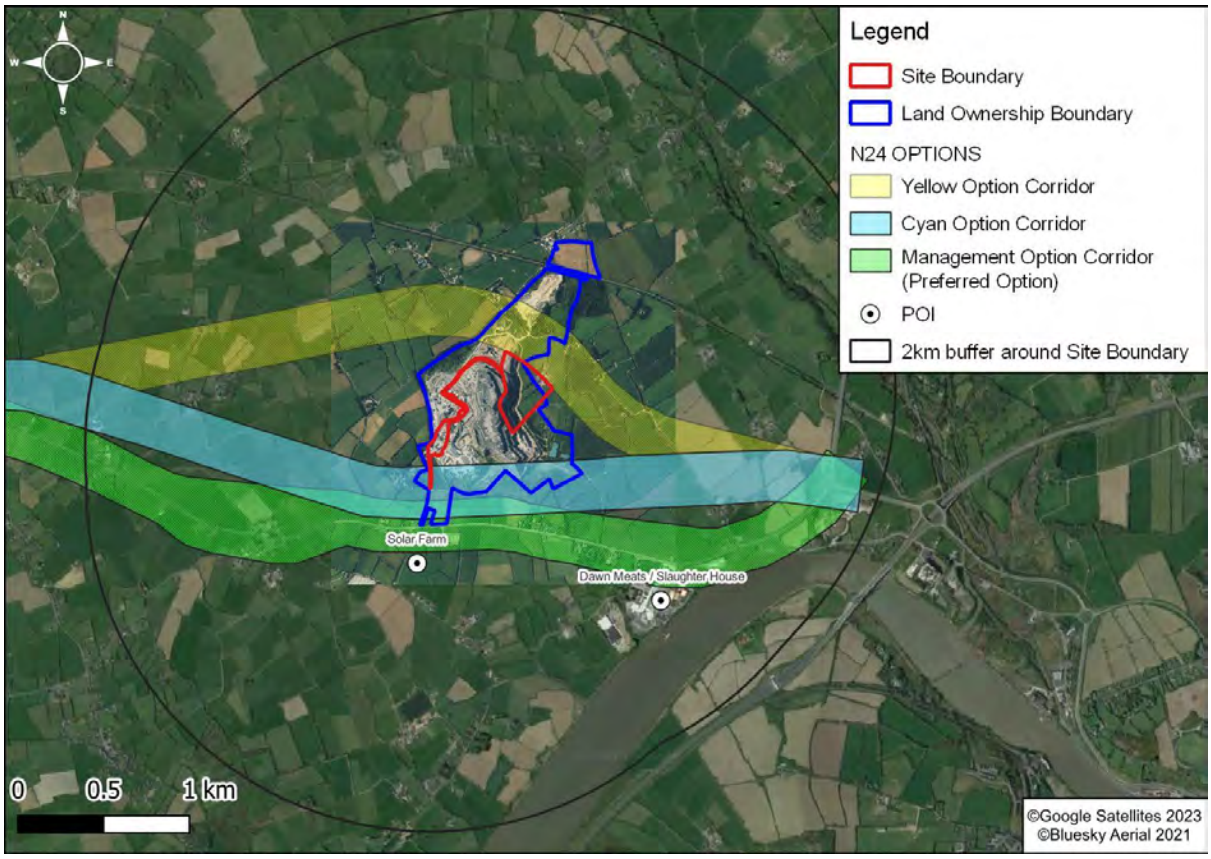
A review of developments within 2km of the Site has been undertaken utilising the following sources:

- Kilkenny County Council (KCC) planning portal [3];
- Waterford City and County Council (WCCC) planning portal [4];
- Environmental Impact Assessment (EIA) portal [5];
- An Bord Pleanála (ABP) Portal [6];

- Aerial imagery from google earth [7];
- The 'N24 Waterford to Cahir' website [8];
- KCDP 2021-2027 [1]; and,
- Waterford City and County Development Plan (WCCDP) 2022-2028 [9].

The majority of proposed and existing developments within the 2km study area of the Site were residential dwellings, farm buildings or small-scale projects. Figure 1-5 below presents notable developments, as points of interest (POI) within the study area.

Figure 1-5: Notable Developments



Of these developments, two (2No.) have received conditional planning permission recently (i.e. in the last 2 years) under planning references: 22/698 and 22/143. However, given the small-scale nature of these developments, it is not considered that the construction of a new two-storey or single-storey dwelling with associated site development works will lead to in-combination effects with the Proposed Development.

In addition to once-off and smaller-scale developments, the POIs noted in Figure 1-5 above include:

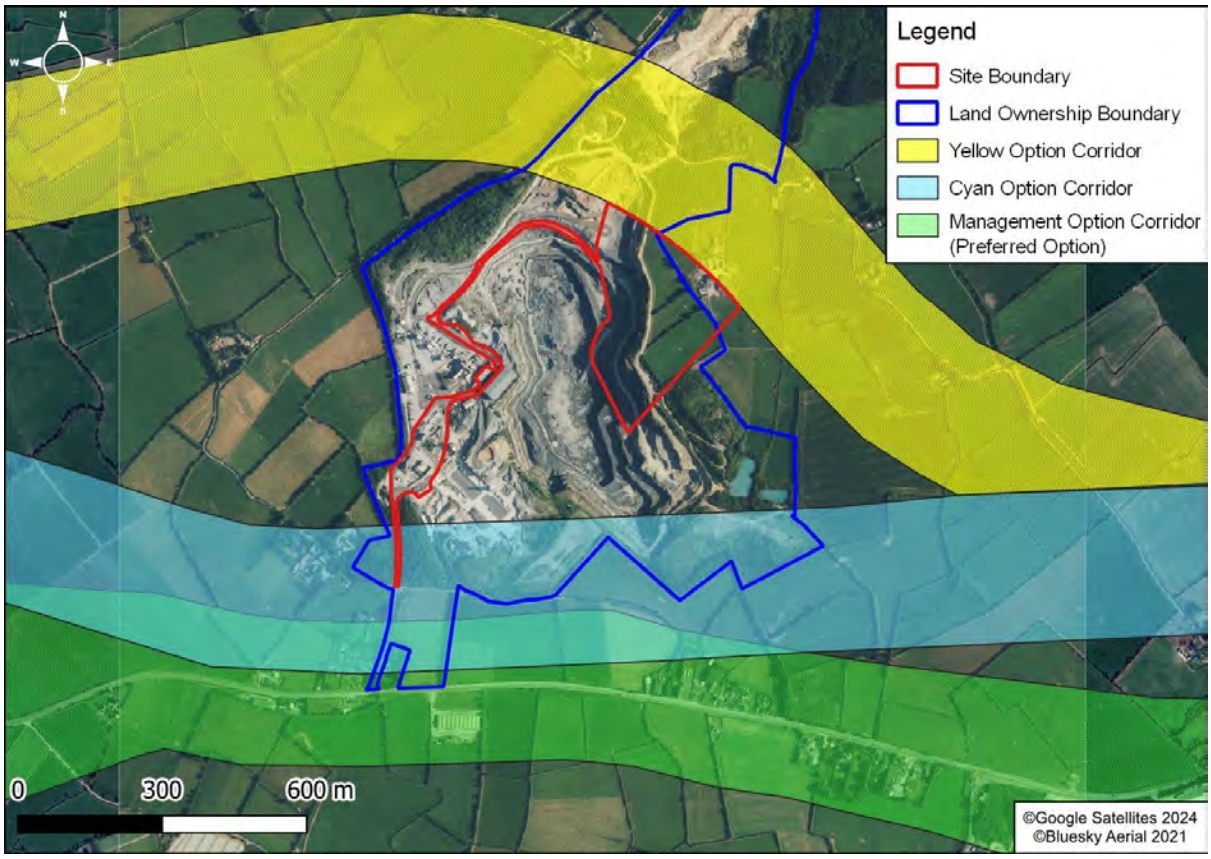
- Wexford Solar Farm, planning references: 16/193 and 18/62 and 20/893;
- N24 Waterford to Cahir Study Area; and,
- Grannagh Business Complex EPA licensed activities P0175-02 and P0179-01.

Wexford Solar Farm is situated ca.250m south of the Site entrance, across the N24. This solar site is ca.6ha in size and was granted under planning reference: 16193, amended under planning reference: 1861, and an extension of duration was granted in 2020 under planning reference: 20893. It is not envisaged that the operational phase of the solar farm will lead to

significant in-combination effects with the Proposed Development given the inert nature of solar farms.

The Waterford to Cahir section of the proposed road improvement scheme extends from the N24/M9 at Waterford to the N24/M8 junction at Cahir, North Tipperary. There were three (3No.) option corridors for the section immediately outside Waterford. All three (3No.) option corridors are located within close proximity to the Site, the Yellow Option Corridor borders the Site to the north, the Cyan Option Corridor passes directly through the Quarry and site entrance and the Management Option Corridor passes through the Landholding, refer to Figure 1-6 below. However, as stated in Section 1.4 above; the public display of the preferred transport solution (option) was published on the 23rd January 2024. The preferred option is to upgrade the existing N24 corridor to the south of the Quarry (presented as the management option corridor in Figures 1-5 and 1-6). This option does not pass through or immediately border the Site and, as such, is unlikely to affect the Site.

Figure 1-6: N24 Option Corridors



In addition, Grannagh Business Complex is located ca.1.3km southeast of the Site and is accessed via a junction off the N24. This complex contains a production facility owned by Queally Pig Slaughtering Ltd. and a production, material storage and packaging facility owned by Dawn Meats Ireland. Both of these facilities operate under an Integrated Pollution Prevention and Control Licence; reference no. P0175-02 and P0179-01 respectively. Therefore, emissions to the environment such as surface water discharge, the spreading of organic matter, emissions to air and waste disposal are controlled and monitored. Nonetheless, as these two (2No.) facilities are located within 2km of the Site, potential cumulative in-combination effects with the Proposed Development have been assessed within this EIAR.

It is important to note that the Proposed Development is an extension of an existing quarry. Therefore, the potential for in-combination effects with ongoing operations within the Quarry has been considered throughout this report. No other notable developments that could interact with the Proposed Development were identified at the time of writing this report.

1.7 Applicant

Roadstone was originally founded by the Roche Brothers in the 1930s and became part of Cement Roadstone Holdings (CRH) plc in 1970, following the merger of Roadstone and Cement Ltd. The present-day company was formed in 2009 by the amalgamation of CRH's three construction materials businesses in Ireland:

- Roadstone Dublin Ltd.;
- Roadstone Provinces Ltd.; and,
- John A. Wood Ltd.

The company is Ireland's leading supplier of aggregates, construction and road-building materials and employs several hundred people at locations throughout the country. CRH is the leading global diversified building materials business in the world, employing 75,800 people in 29 countries worldwide.

Roadstone has NSAI accreditation for both Environmental Management (ISO 14001) and Energy Management (ISO 50001). These systems are externally audited and verify the company's commitment to continuous assessment and improvement of its performance systems in these areas.

Under the Roadstone commitments to social sustainability, Roadstone uses local products sourced on its sites and delivers to customers in the locality and wider region as required. Roadstone employs local people, both directly and indirectly, and these employees in turn support their local economy.

1.8 Project Background

The Quarry and ancillary activities are authorised under the following planning references by Kilkenny County Council (KCC) or An Bord Pleanála (ABP):

- KCC Ref 16/700;
- KCC Ref 16/830;
- KCC Ref 1/1/1754;
- KCC Ref 1/1/5611 and ABP 10/5/36501;
- KCC Ref 97/863 and ABP PL10.108741; and,
- KCC Ref 03/487 & ABP PL 10.5.36501.

The Quarry produces a variety of products including a range of aggregates, readymix concrete, concrete blocks and blacktop.

From a high level, operations at the Quarry include the extraction (involving blasting) and subsequent processing of aggregates to produce various products for use in the construction industry. To facilitate these works, the following plant and facilities are located within the Quarry:

- Asphalt Plant and associated infrastructure;
- Concrete batching plant and associated infrastructure;
- Sheds and other storage facilities;

- Office/welfare facilities;
- Laboratory;
- Wheel wash;
- Weighbridge;
- Car park; and,
- Secure entrances via the L7434 to the south, and via the L7434 and L7433 to the north.

The aggregate extracted on site is high-quality limestone aggregate. Limestone is one of the main sources of construction aggregate and therefore, this material is in high demand. The Proposed Development seeks to maintain access to this valuable resource. The need for the Proposed Development is discussed in further detail in Chapter 2.

The Quarry currently employs ca.15-20 staff directly as onsite personnel, hauliers, maintenance crews, blast engineers and off-site staff. Additional employment is generated from the Site through the direct contracting for machinery maintenance and upkeep, as well as ancillary requirements for professional services, including, though not limited to:

- Health and safety specialists;
- Refuelling;
- Environmental monitoring personnel; and,
- Quality control personnel.

The Proposed Development will not impact employment as the current employees will be retained and no additional jobs will be created. It is also not proposed to introduce new facilities such as a canteen, office or washroom as these facilities are already in place within the Quarry.

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 [10];
- Part II of the first Schedule of the European Communities (Environmental Impact Assessment (EIA)) (Amendment) Regulations, 1999 (S.I. No. 93 of 1999) [11];
- The Local Government Planning and Development Regulations 2001, as amended (S.I. No. 600 of 2001 and subsequent amending legislation) [12]; and,
- European Union (EU) (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No.296 of 2018) [13].

The following existing and draft guidance were considered in preparing this EIAR:

- European Commission: *Interpretation of definitions of project categories of Annex I and II of the EIA Directive*, 2015 [14];
- European Commission: *Guidance on the preparation of the Environmental Impact Assessment Report*, 2017 [15];
- EPA: *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*, 2022 [16];
- Department of Housing, Planning and Local Government (DeHPLG): *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*, 2018 [17];

- Department of Environment Heritage and Local Government (DeEHLG): *Quarries and Ancillary Activities: Guidelines for Planning Authorities*, 2004 [18];
- Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals) [19];
- Department of Arts, Heritage and the Gaeltacht (DeAHG): *Wildlife, Habitats & the Extractive Industry*. Dublin, 2007 [20];
- Department of Housing, Planning, Community and Local Government (DeHPCLG): *Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) Circular Letter 1/2017*, May 2017;
- DeHPCLG: *Transposition of 2014 EIA Directive (2014/52/EU) in the Land-Use Planning and EPA Licencing Systems Key Issues Consultation Paper*, May 2017; and,
- Office of the Planning Regulator (OPR): *OPR Practice Note PNO2 - Environmental Impact Assessment Screening*, 2021 [21].

1.9.1 EIA Amending 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), which 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 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;

1. The preparation of an environmental impact assessment report by the developer;
2. The carrying out of a consultation;
3. 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;
4. 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,
5. The integration of the competent authority's reasoned conclusion into its decision.

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

- 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 (Mandatory EIAR)

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. There are no new criteria under S.I. No. 296 of 2018.

The Proposed Development is for the continuation of quarrying activities within the Quarry and the extension of extraction activities into the Site.

Part 1- Item 19:

> *"Quarries and open-cast mining where the surface of the site exceeds 25 ha."*

The Quarry covers an area of ca.62.07ha and has a permitted extractive area of ca.27ha. The Site contains a proposed extraction area of ca.6ha which can be further divided into 3.4ha of the permitted extraction area and 2.6ha of additional lands.

The extension of the Quarry to the east will result in a total extraction area / exposed quarry surface of ca.29.6ha. The Proposed Development considered by itself would not constitute an activity that would require a mandatory EIAR under Part 1.

With respect to Part 2 of Schedule 5 of the Planning and Development Regulations 2001 (as amended), the following activities have been identified as potentially relevant to the Proposed Development:

Part 2. Item 2(b) – Extractive Industry:

> *"Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares."*

Part 2 – Item 13(a) - Changes, extensions, development and testing*:*

> *"Any change or extension of development already authorised, executed or in the process of being executed (not being a change or extension referred to in Part 1) which would:-*
>
> *i) result in the development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, and*
> *ii) result in an increase in size greater than*
> - *25 per cent, or*
> - *an amount equal to 50 per cent of the appropriate threshold, whichever is the greater.*

The Proposed Development is an extension of an authorised development. The size of the extension is less than the threshold outlined under Part 2 Item 2(b) (5ha), however, this is ca.52%, at 2.6ha, of the threshold, and as such the Proposed Development is deemed to be subject to EIA under Part 2, Item 13a part (ii).

1.9.3 Scope of the EIAR

In accordance with EPA Guidelines [16], the following attributes of the receiving environment and their interactions will be addressed within this EIAR:

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

1.9.4 Structure of the EIAR

Table 1-1 describes 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 introduce the Proposed Development, describes 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 effects, together with an evaluation of their significance and a description of any mitigation measures proposed to minimise effects. It also takes into account the interactions between the various environmental topics. Chapters 5-15 generally follows the structure set out below: a) A brief introduction to the chapter; b) An outline of the methodology employed; c) A description of the receiving existing environment relevant to the environmental topic under consideration; d) A description of the characteristics and predicted effects of the Proposed Development on the receiving environment; e) A description of the reductive or mitigation measures and / or the factors that will reduce or eliminate any significant environmental effects identified; f) A description of the residual effects of the Proposed Development. Residual effects are the remaining effects that will occur after the proposed mitigation measures have been taken into consideration; g) A description of the interactions with other environmental attributes; h) Details of any monitoring required during Site preparation and operations;

Title	Description
	i) Details of any rehabilitation required; and, j) Difficulties encountered in undertaking the assessment.
Chapter 16	Interactions of the Foregoing – provides an overview of the major interactions between the environmental impact topics assessed within Chapters 5-15
Chapter 17	Chapter 17 outlines the overall Schedule of Commitments agreed by the applicant in the event that the planning application is authorised.
Volume 3: Appendices	
Appendix	Relevant topic-specific technical documentation supporting the EIAR are contained within appendices which are presented as a separate Volume of the EIAR (Volume 3)

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 1-7 below, taken from the EPA Guidance, Guidelines on the Information to be contained in an EIAR [16]. 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 1-7: Description of the Environmental Effects

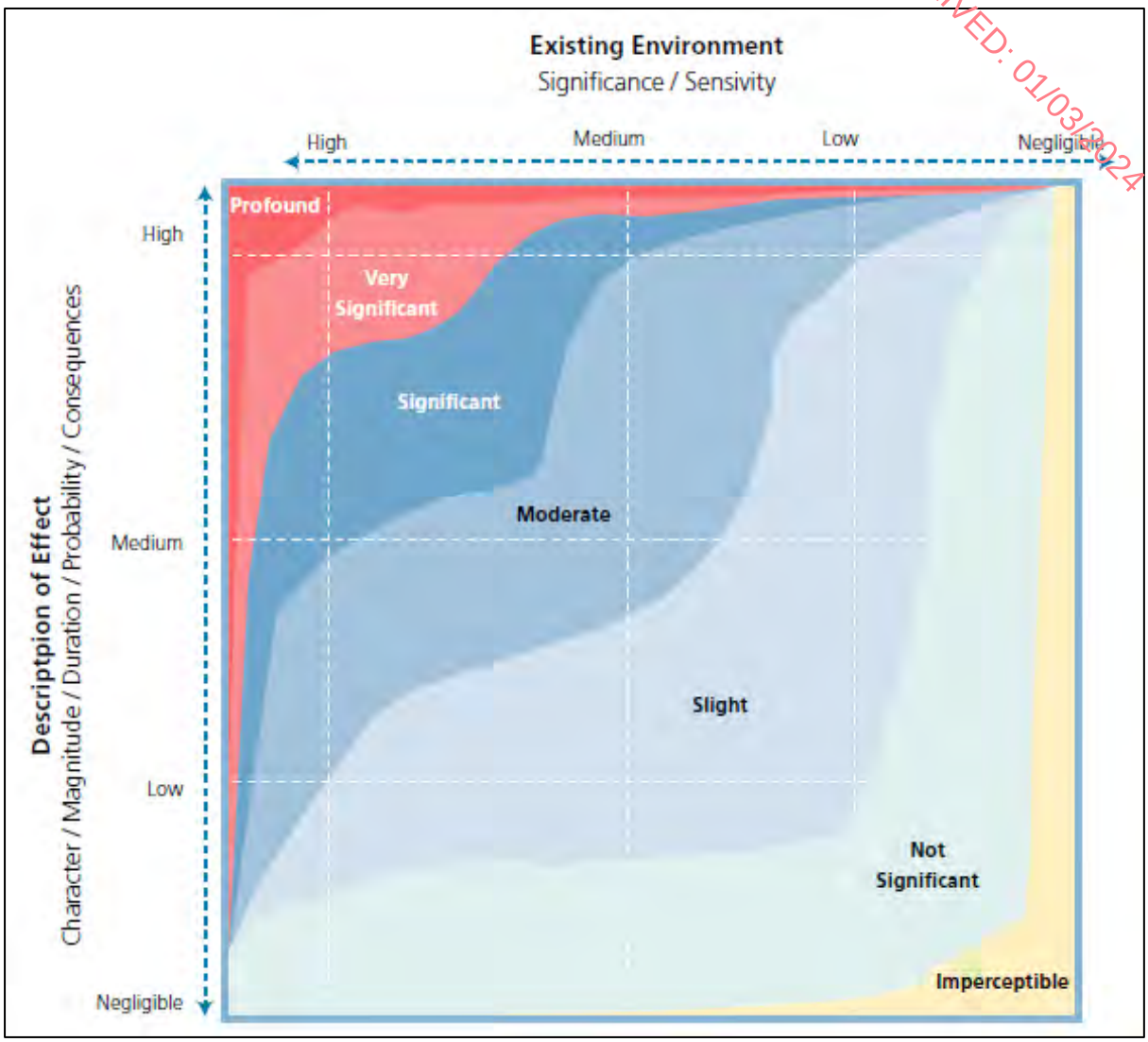


Table 1-2 defines the quality of the effect of a Proposed Development on the environment ranging from positive to negative.

Table 1-2: Quality of Effect

Type of Effect	Quality of Effect
Positive Effects	A change which improves the quality of the environment.
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.

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: Definitions of 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).

Magnitude	Description
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.
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).

1.10.2 Assessment of Cumulative Impacts

Cumulative effects have been considered within the EIAR under each relevant environmental topic in Chapters 5-15. This assessment considers Annex IV(5) subsection (e)23 of the EIA Directive, as amended, states that an EIAR should contain:

> *"A description of the likely significant effects of the project on the environment resulting from, inter alia:*
>
> *e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources."*

Annex IV(5) also states:

"The description of the likely significant effects on the [environmental] factors should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project."

1.11 Non-Statutory Consultation

In accordance with the best practice guidance [22], extensive non-statutory consultation was undertaken in preparation for this EIAR. Table 1-8 below lists the consultees that responded to the scoping document.

Table 1-8: Consultee Responses to the Scoping Document

Consultee	Date of Response	Method of Response	Topics Raised	Relevant Chapter
Development Applications Unit (DAU)	23/11/2023	Email	Consultation acknowledgement received by the DAU which is the coordinating unit for the Department of Housing, Local Government and Heritage (DeHLGH). The consultee has raised no topics for attention.	N/A
Uisce Éireann / Irish Water	21/12/2023	Email (letter attached)	Consultation acknowledgement received. *"Due to the extent and depth of excavation proposed, a Dewatering Plan must be prepared and submitted for Uisce Éireann's review as part of the planning application".* *"The existing quarry is connected to an Uisce Éireann network that discharges wastewater to the Suir River a "protected"/ sensitive area, consideration as to whether the integrity of the site / conservation objectives of the site would be compromised should be identified within the report".* Additionally they request notification for when the proposal is lodged.	8 Sections 8.3.4 & 8.4.2 Sections 8.3.8, 8.4.5.3, and 8.4.5.5
Transport Infrastructure Ireland (TII)	22/12/2023	Email	Consultation acknowledgement received. The consultee has raised the assessment of impacts on local and national road infrastructure and has requested that consultation take place with the local authority in relation to existing and future road schemes including the N24 Cahir to Waterford Scheme. The consultee has also specified the need for an assessment of visual impact and noise. In addition, the consultee requests a Traffic and Transport Assessment, if it is deemed appropriate. Finally, the consultee has requested the identification of appropriate haul roads that can properly serve the material being exported from the Site.	11, 12, 14
Health and Safety Authority (HSA)	16/01/2024	Email (letter attached)	Consultation acknowledgement received. The consultee has raised no topics for attention.	N/A

Consultee	Date of Response	Method of Response	Topics Raised	Relevant Chapter
Health Service Executive (HSE)	09/02/2024	Email (letter attached)	Consultation acknowledgement received. The consultee has raised the following topics for attention: population and human health, water, lands and soils, air, dust and odour, climate change and opportunity for health gain, noise and vibration, waste management, ancillary facilities and cumulative impacts. Additionally, the consultee has requested that public consultation take place and a restoration plan is submitted. The consultee has also outlined dust control and mitigation measures to be implemented and requested the use of data from existing operations within the quarry as part of the EIAR.	5, 7, 8, 9, 10, 11, 14 and 15.

A copy of the EIAR Scoping Document, which was issued on 22nd November 2023, is presented in Appendix 1-2. The full list of consultees which were notified is presented in Appendix 1-3. Copies of the submissions received from the Consultees are presented in Appendix 1-4.

1.12 Assessment of the Risk of Accidents and Unplanned Events

In accordance with the EPA guidance [16], the risk of accidents and unplanned events which may be either caused by or have an impact on the Site, have been assessed in all relevant specialist chapters of this EIAR. A risk-based approach was employed for these assessments, as recommended in the EPA guidance. [16]

1.13 Project Team

The in-house MOR project team included the following:

Table 1-9: MOR Project Team

Chapter(s)	Name	Role	Relevant Qualifications
All	David Dwyer	Environmental Team Lead / Project Manager	BSc, MSc with 10+ years' experience
Chapter 1-5, 16 & 17	David Dwyer	Environmental Team Lead / Project Manager	BA, MSc with 10+ years' experience
Chapter 6	Dyfrig Hubble	Associate Director-Ecology, Biodiversity Chapter	BSc, MSc, CIEEM Full Member, 15+ years' experience.
Chapter 7	Refer to Table 1-9		
Chapter 8	Refer to Table 1-9		
Chapter 9-10	Klara Kovacic	Associate Director, Air Quality & Climate Chapter	MEng, MSc, DiB, Chartered Environmentalist with 15+ years' experience.
Chapter 11	Kenneth Goodwin	Associate Director, Chapter 10: Acoustics (Noise and Vibration);	BSc, Grad.Dip. Acoustics, Full Member IOA, member AACI, IEMA Practitioner, 15+ years' experience

Chapter(s)	Name	Role	Relevant Qualifications
Chapter 12	Refer to Table 1-9		
Chapter 13	Refer to Table 1-9		
Chapter 14	Refer to Table 1-9		
Chapter 15	Martin Kearns	Principal Environmental Consultant, Waste Chapter	BSc, with 10+ years' experience

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

Table 1-10: External Consultants

Primary Author	Company	Chapter(s)	Relevant Qualifications
David Broderick	Hydro Environmental Services	Chapter 7 – Land, Soils and Geology Chapter 8 – Water (Hydrogeology and Hydrology) and	BSc, H. Dip Env Eng, MSc, P. Geo (Hydrogeologist)
Rory Curtis	Macroworks	Photomontages and Chapter 12: Landscape and Visual	BEng, BA, GDip Landscape Architecture, MILI, 10+ years' experience.
Dr. Charles Mount	N/A	Chapter 13 – Cultural Heritage	M.A. and Ph.D. degrees in Archaeology and a professional diploma in EIA and Strategic Environmental Assessment (SEA) Management. Member of Institute of Archaeologists of Ireland
Alan O'Reilly	PMCE	Chapter 14: Material Assets – Traffic and Transport	Chartered Engineer, BA, BAI, MSc, RSA Cert Comp, MIEI
Corwun O'Brien	Malone O'Regan Consulting Engineers	Project Engineer	BEng, MSc Eng, CEng MIEI, 12+ years' experience

2 PLANNING CONTEXT AND NEED FOR THE PROPOSED DEVELOPMENT

2.1 Introduction

This chapter of the EIAR sets out the need for the Proposed Development through analysis of the most recent development plans, planning guidelines, policy frameworks and reports issued by the relevant county, regional, state and semi-state bodies. It also provides a summary of the planning history of the Site and adjoining lands.

2.2 Ownership of the Lands

The Site occupies an area of ca.10.3ha which spans the greenfield extension lands and a portion of the Quarry.

The majority of the greenfield extension lands lie within the current Roadstone Landholding. These lands are currently rented to Mr. Liam Clohosey, who uses them as grazing pastures, primarily for cattle.

The easternmost portion of the Site extends beyond the Landholding into the Clohosey's lands. These lands amount to 0.95ha of the Site and are part of the 10.9ha. currently owned by Mr Clohosey. These lands form part of folio KK7688F and include some of the existing farmyard used by Mr Clohosey. Mr Clohosey has given his consent for Roadstone to make a planning application for the development of lands within the Site boundary. The letter of consent issued by Mr. Clohosey is included with this EIAR as Appendix 1-1. Figure 1-2 above shows the Site in the context of the land ownership boundaries.

The lands owned by Roadstone are registered across seventeen (17No.) Land Registry Folios. The Roadstone landownership boundary encompasses ca.84ha in total, refer to Table 2-1 for context.

Table 2-1: Folio Schedule for Roadstone Lands in Kilmacow

Folio Number	Folio Map Number	Folio Area (Hectares)
KK517F	151, 154	7.98
KK1008F	60, 155	4.73
KK3796F	37	2.64
KK4231F	39	2.19
KK7695F	189	13.27
KK8046	8046_2, 8046_3	9.95
KK8051	8051	16.82
KK8052	8052_1, 8052_3	8.17
KK12655	61	2.26
KK13168	65	0.23
KK15662	115	1.24
KK16702	122	1.09

Folio Number	Folio Map Number	Folio Area (Hectares)
KK18071	145	1.3
KK18097	18	0.57
KK29574F	BK0C7	10.05
KK23806F	17U3, 8054	0.96
Unregistered		0.62
Total Combined Folio Area (Hectares)		84.07

The addition of the lands owned by Mr. Clohosey (ca.10.9ha within folio KK7688F) will bring the overall landholding owned by Roadstone up to 94.97ha.

2.3 Planning Application History

Extraction at the Quarry dates back to at least 1971, when outline planning permission for a quarry was granted under planning reference: 1/1/1754 (ABP ref 10/5/15539). Permission for a quarry was granted in 1977 under planning reference: 1/1/5611 (ABP ref 10/5/36501) and an extension to the quarry was later granted in 1999 under planning reference: 97863 (ABP ref 10.108741). A further extension in 2004 was granted under planning reference: 033487 (ABP ref 10.206788). A continuance of use of quarrying activities was granted in 2017 under planning reference: 16/700.

A review of the planning history within the lands currently held by Mr. Clohosey was undertaken. The easternmost portion of the Site falls within these lands. The lands owned by Mr. Clohosey feature a residential dwelling and numerous farm outbuildings. These structures predate the planning system and therefore, there are no records of these buildings on the KCC planning portal [3]. Historic mapping shows that some of the farm outbuildings within the lands owned by Mr. Clohosey have been present since the First Edition of the 6-inch-scale maps. The remaining lands owned by Mr. Clohosey have been utilised for pasture with no history of development.

Table 2-2: Planning History of the Quarry

Planning Refence	Applicant	Development	Decision	Grant Year
1/1/1754 ABP ref 10/5/15539	Roadstone Provinces Ltd.	Outline planning permission for a quarry	Granted	1971
1/1/5611 ABP ref 10/5/36501	Roadstone Provinces Ltd.	Permission for a quarry	Granted.	1977
97863 ABP ref 10.108741	Roadstone Provinces Ltd.	Extension to existing limestone quarry, retention of site office, erection and operation of batching plant and block plant, erection of a machinery garage, provision of a septic tank and landscaping works.	Conditional Approval	1999
03487 ABP ref 10.206788	Roadstone Provinces Ltd.	A 5.06ha southward extension to existing quarry, in three benches, to a finished floor level of 15mOD (Malin Head): a 2ha overburden mound (to a height of approx. 4.5m): associated landscaping works; and construction of a 110m^2 (gross floor area) single storey dispatch office.	Conditional Approval	2004
08734 ABP ref 10.230500	Roadstone Provinces Ltd.	Erection of a temporary (2 years) 60m-high meteorological mast and associated site works.	Conditional Approval. Not constructed.	2009
15/31	Roadstone Ltd.	For development comprising establishment and operation of an inert construction and demolition (C&D) waste recovery facility. The development provides for the importation, processing and recovery of inert construction and demolition waste (principally mixed concrete, blacktop, bricks, tiles, and ceramics) on a 1.1ha site within the existing quarry landholding. It includes provision for a hardstanding area for stockpiling and crushing of waste materials and a waste inspection/quarantine shed	Conditional Approval	2015
16/700	Roadstone Ltd.	The development will consist of continuation of quarrying activities within the red line application area of 62.04ha to include the extension of the existing excavation by an additional 2 x 15m high benches from the current floor level of ca.-15m AOD to -45 m AOD within the permitted extraction footprint area of 27.06ha. The proposed development will involve the continuation of stripping of overburden and its storage for use in site restoration; the extraction of rock by means of blasting, the crushing of blasted rock on the quarry floor, and subsequent processing of crushed rock in the existing aggregate plant to produce a range of aggregates. The proposed development will also	Conditional Approval	2017

Planning Refence	Applicant	Development	Decision	Grant Year
		include the continuation of use of the existing wheel wash and associated hardstanding area, bunded fuel tank and associated refuelling area.		
16830	Roadstone Ltd.	The development will consist of continuation of use of structures related to quarrying activities; (i) Garage and Service Building (775m^2), (ii) Site Laboratory (141m^2), (iii) Concrete Plant (377m^2), and, (iv) Bitumen Coating/Asphalt Plant (474m^2). The development will also involve the construction of three additional structures; (v)Garage and Service Building (775m^2), (vi) RAP (reclaimed asphalt pavement) System to Bitumen Coating/Asphalt Plant (201m^2) and, (vii) RAP and Sand Storage Shed (1986m^2), within an area of ca.4.9ha.	Conditional Approval	2017

2.3.1 Permits and Licences

Table 2-3 below outlines the licence/permits that are associated with the operation of the Quarry.

Table 2-3: Licence and Permits at the Quarry

Licence/Permit Type	Licence/Permit No.	Grant Date
Water Discharge Licence	ENV/W82	17/10/2005
Air Pollution Licence	ENV/APL13	13/10/2010
Waste Facility Permit	WFP-KK-21-0001-02	05/05/2021

Between 2016-2021, the Quarry operated under the Waste Facility Permit: WFPKK 150008-01. The Quarry currently operates under the permit listed in Table 2-3 above. This permit authorises the acceptance of the following waste types:

- Concrete (European Waste Code (EWC): 17 01 01);
- Bricks (EWC: 17 01 02);
- Tiles and ceramics (EWC: 17 01 03);
- A mixture of concrete, bricks tiles and ceramics other than those mentioned in 17 01 06 (EWC: 17 01 07);
- Bituminous mixtures containing other than those mentioned in 17 03 01 (EWC 17 03 01); and,
- Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 (EWC: 17 09 04).

This permit provides for the acceptance of ca.50,000 tonnes of material annually.

Water from the Quarry is currently discharged under licence to Flemingstown Stream in the east. This discharge permits Roadstone to discharge a maximum volume of trade water of 13,000m^3/day under strict conditions on quality.

The asphalt plant operates in accordance with the conditions of Air Pollution Licence ENV/APL/13 which was issued on the 10th December 2010.

2.4 National Planning Context

Project Ireland 2040 was launched by the Government in 2018 [23] 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 (2No.) policy documents i.e. the National Planning Framework (NPF) [23] and the National Development Plan (NDP) 2021-2030 [24].

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.

2.4.1 Project Ireland 2040 – National Planning Framework

The Proposed Development will contribute to the expansion of the rural economy of Kilkenny by facilitating the continued extraction within the county and thereby promoting a self-sustaining industry within the Kilkenny hinterland.

The plan states the importance of the aggregates industry in delivering Ireland's national infrastructure:

> *'Extractive industries are important for the supply of aggregates and construction materials and 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.'*

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. For example, National Policy Objective (NPO) 23 is to:

> *'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.'*

In addition, the Plan 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 (5No.) 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. In addition, Waterford, which is located ca.5.5km southeast of the Site is targeted to grow by at least 50% to 2040. Maintenance of the existing built-up footprint alongside the development of new urban infrastructure will require aggregate as a resource.

The expansion of aggregate supply also directly supports the housing goals set 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."*

2.4.2 Project Ireland 2040 –National Development Plan

The NDP 2021-2030 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. It outlines the intent to deliver approximately 6,000 affordable homes per year and to improve regional accessibility through enhanced public infrastructure. Multiple National Road projects are also outlined in the NDP to improve connectivity and accessibility.

2.4.3 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" [25]. 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 ten (10No.) essential points as follows:

1. *'Ireland has abundant natural reserves of high quality aggregates (stone, sand and gravel).*
2. *These Aggregates are the essential raw materials from which Ireland's future infrastructure will be built, including our homes, offices, schools, hospitals and transport network.*
3. *Aggregates can only be accessed where they occur. Currently there are approximately 500 large commercial quarries extracting aggregates throughout Ireland.*
4. *The supply of local aggregates is essential to the sustainable development of Irish communities. Local supplies of raw materials reduce transport distances, thereby reducing their carbon footprint compared to non-local sources.*
5. *Current demand for aggregates in Ireland at 12 tonnes per capita is twice the average demand in the EU 28. Project Ireland 2040 will necessitate the production of approximately 1.5 billion tonnes of aggregates.*
6. *Scarcities of some particular aggregate products are already emerging in the eastern and midland regions. Therefore, the future supply of aggregates needs to be planned, monitored and managed in a sustainable manner.*
7. *In recognition of the strategically essential role of aggregates, Ireland needs a National Aggregates Planning Policy to underpin local and regional planning policy.*
8. *To provide for the country's future development, Ireland's strategic reserves of aggregates need to be identified, quantified and protected.*
9. *A robust, effective and efficient planning system for quarries is necessary to ensure that the extraction of Ireland's aggregate reserve is enabled in a sustainable manner. Currently, the average decision making timeframe for quarry planning applications is 76 weeks with some decisions taking in excess of 2 years.*
10. *The state's planning enforcement and procurement functions must ensure that only authorised operators are entitled to supply the marketplace.'*

The Proposed Development is an expansion of an existing quarry into a known aggregate reserve which will help maintain the supply of aggregates within the southeast region, particularly for population centres such as Kilkenny and Waterford (ca.5.5km southeast). The Proposed Development will help supply the demand for *"approximately 1.5 billion tonnes of aggregates"* to facilitate the goals of Project Ireland 2040.

2.5 Regional Planning Policy Context

2.5.1 Regional Spatial and Economic Strategy for the Southern Region of Ireland

The Southern Regional Assembly was formed under the Local Government Reform Act 2014 [26]. The Southern Regional Assembly comprises of the following counties: Carlow, Clare, Cork, Kerry, Kilkenny, Limerick, Tipperary, Waterford, and Wexford. The total population of the Southern Region according to the 2022 Census was 1,479,389 persons [27].

One of the main functions of the Southern Regional Assembly is the creation and delivery of a Regional Spatial and Economic Strategy (RSES) for the Southern Region of Ireland [2].

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 nine (9No.) local authorities in the region.

The main strategy of the Southern Region is to, '*build a strong, resilient, sustainable region*'. The RSES has identified eleven ways to achieve this overall strategy, of which the following points were considered relevant to the Proposed Development:

1. *Compact Growth: strengthening and growing our cities and metropolitan areas harnessing the combined strength of our 3 cities [Cork, Limerick and Waterford] as a counterbalance to the Greater Dublin Area, through quality development, regeneration and compact growth, building on the strong network of towns and supporting our villages and rural areas.*

8. *Low Carbon, Climate Resilient and Sustainable Society: Safeguarding and enhancing our environment through sustainable development, prioritising action on climate change across the Region, driving the transition to a low carbon and climate resilient society.*

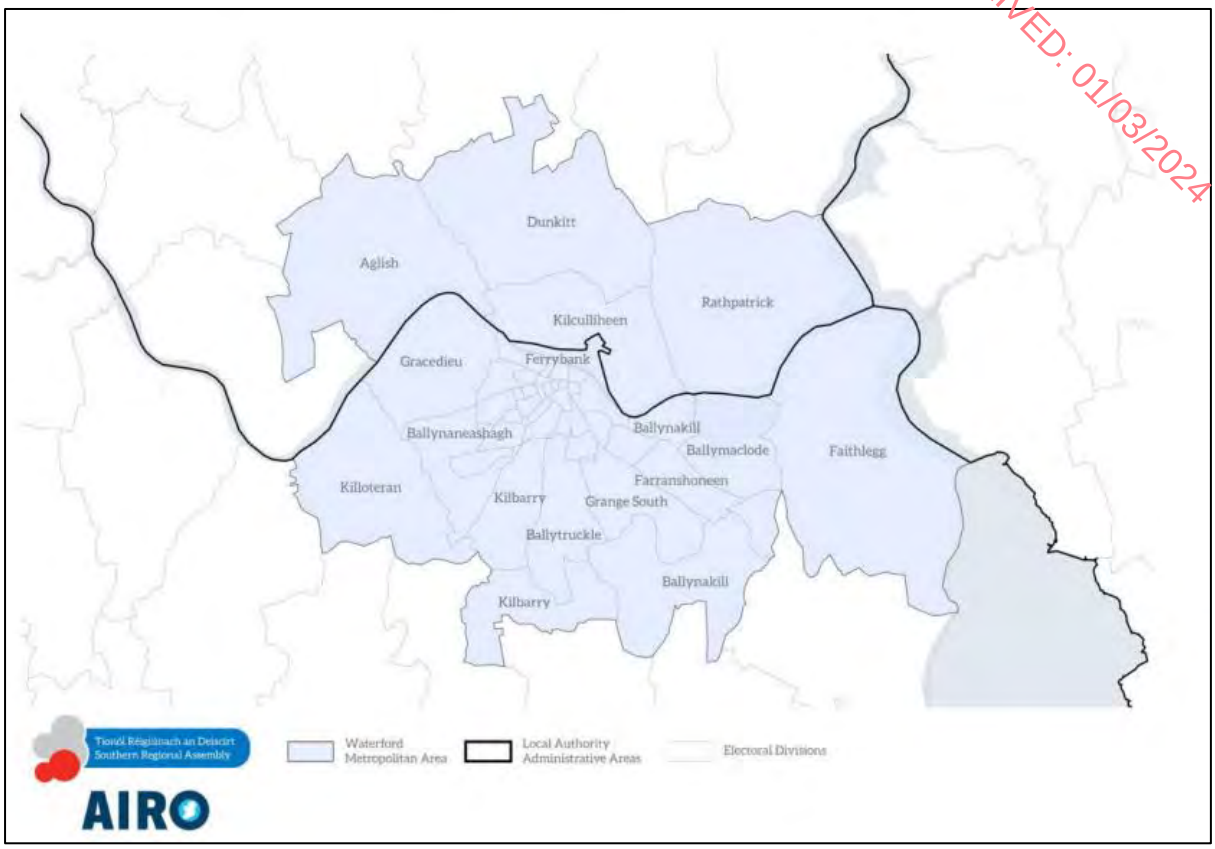
9. *Sustainable, Planned and Infrastructure-led Development: Providing infrastructure and services in a sustainable, planned and infrastructure-led manner to ensure the sustainable management of water waste and other environmental resources.*

The Southern Region is further divided into different Strategic Planning Areas. The Site lies within the Southeast Strategic Planning Area which encompasses Carlow, Kilkenny, Waterford, Wexford and Tipperary. This Strategic Planning Area has already experienced marked growth. According to the 2022 census, the population within this Southeast Strategic Planning Area was 625,305 persons which represents a 7.5% increase on the 2016 census [27]. The provision of services and infrastructure to urban centres, villages and rural areas undergoing development and expansion (as inferred in points 1 and 9 above) will require a supply of good quality aggregate. In addition, a local source of aggregates will avoid large volumes of material travelling over long distances and therefore, the Proposed Development presents a way to reduce the environmental consequences of sourcing materials from afar (in keeping with point 8 above).

2.5.1.1 Waterford Metropolitan Area Strategic Plan

The RSES includes Metropolitan Area Strategic Plans (MASPs) for Cork, Limerick-Shannon and Waterford. The Waterford MASP covers an area of 143km^2, of which 57.6km^2 lies within southern County Kilkenny, encompassing the Electoral Divisions (ED) of Aglish, Dunkitt, Kilculliheen and Rathpatrick. The Site is located within the Aglish ED and therefore falls within the Waterford MASP area. Refer to Figure 2-1 below for context [1].

Figure 2-1: Waterford MASP showing Electoral Divisions [1].



The aim for the Waterford MASP in the RSES is:

> *'to be a dynamic, concentric, modern European city of scale and significance, a UNESCO Learning City, driving national and regional growth, prosperity, innovation and creativity which is supported by focused investment in transformational rejuvenation across the Metropolitan Area, a vibrant and diverse University City with a high quality of life for all through a high standard of physical and community infrastructure and housing options, education, amenities and opportunities for employment.'*

The key priorities of the Waterford MASP relevant to the Proposed Development have been summarised below:

- The North Quays Innovation District which involves extending the city centre across the river.
- The continued development of the city centre with urban amenity projects to create a mixed-use of housing, retail and cultural life;
- Bridging the River Suir to develop new north-south connections and to link existing and planned urban neighbourhoods;
- Improved road and rail networks;
- Investment in infrastructure to realise the full potential of the Port of Waterford and Waterford Airport; and,
- Development of University Hospital Waterford.

These priorities will require high-quality aggregate and other extractive minerals as will the references to, *'accelerated housing delivery to meet housing need supported by better public services and public transport,'* and, *'enabling infrastructure,'* within the Waterford MASP.

2.6 Local Policy

2.6.1 Kilkenny County Development Plan 2021-2027

The Kilkenny County Development Plan (KCDP) 2021-2027 was adopted on 3rd September 2021, and came into effect on 15th October 2021 [1]. The KCDP outlines the objectives and actions for economic and community development with Chapter 7 focusing on rural development and extractive industries.

The KCDP states the following concerning the extractive industry:

> *'There are numerous sand and gravel and stone resources within the County currently in operation. The Council recognises the importance of extractive industries to the local and national economy as valuable sources of raw material for industry in general and the construction industry in particular and as an important source of employment.'*

However, the council also stresses that the extractive industry:

> '*Can have serious detrimental impacts on the landscape and amenities generally, including traffic generation, vibration, dust, noise, water pollution and visual intrusion.'*

It is important to note that this EIAR will assess all potential effects arising from the Proposed Development and implement mitigation as required as outlined in Section 1.10 of this report.

Given the importance of this industry and the potential for detrimental environmental effects, the KCDP emphasises that,

> '*It is important to facilitate development with due regard to mineral reserves so that inappropriate development does not impinge on the viable exploitation of the resource.'*

The KCDP also states that it is a Council policy objective to,

> *'Protect natural resources such as minerals and construction aggregates.'*

The KCDP outlines the following development management requirements for the extractive industry:

- *'The Council will have regard to the following:*
  - *Quarries and Ancillary Activities, Guidelines for Planning Authorities* [28]*;*
  - *The ICF Environmental Code* [29]*;*
  - *Environmental Management Guidelines, Environmental Management in the Extractive Industry* [19]*;*
  - *Undertaking non-energy extractive activities in according with Natura 2000 requirements* [30]*;*
  - *NPWS Guidelines for the Protection of Biodiversity within the Extractive Industry* [31]*;*
  - *GSI's Geological Heritage Guidelines for the Extractive Industry* [32]*;*
  - *The Archaeological Code of Practice* [33] *agreed between the ICF and the National Monuments Division in section 6.4.2 Development Management Requirements;*
- *Adherence to the EPA Guidelines Environmental Management in the Extractive Industry as standard for the extractive industry in Kilkenny;*

- *The Council will ensure that all existing workings shall be rehabilitated and that all future extraction activities will allow for the rehabilitation of pits and proper land use management.*
    - *The Council may require that development is phased and that each phase is rehabilitated before the next phase is developed/commenced;*
    - *The Council shall require applicants to submit a restoration programme with their application on the manner and timing of restoration;*
    - *The Council will consider the current land/quarry resource of the applicant and may seek that current quarries are restored before new sites are developed.*
- *The Council will seek to minimise environmental and other impacts of mineral extraction through rigorous application of licensing, development control and enforcement requirements for quarry and other associated developments including, but not limited to, consideration of visual impacts, methods of extraction, noise levels, dust prevention, protection of ground and surface waters, impacts on residential and other amenities, impacts on the road network (particularly with regard to making good any damage to roads), road safety, phasing, re-instatement and landscaping of worked sites.*
- *The Council will ensure that any extractive development does not significantly impact on existing public rights of way, walking routes or tourist or recreational activities.*
- *The Council will consider the current land / quarry resource of the applicant and may seek that current quarries are restored before new sites are developed.'*

This EIAR and the design of the Proposed Development has taken full cognisance of the above development management requirements.

2.6.2 Waterford City and County Development Plan 2022-2028

The Waterford City and County Development Plan (WCCDP) 2022-2028 [9] came into effect on Tuesday 19th July 2022. Given the location of the Site within the Waterford MASP area, as outlined in Section 2.5.1.1, and the proximity of the Site to Waterford City (ca.5.5km southeast), the WCCDP has been considered within this report. However, it is important to note that KCC remains the relevant Planning Authority for the Proposed Development.

Concerning the Waterford MASP, the WCCDP states the following strategic objectives:

> *'Plan for and deliver a future for Waterford City as envisaged in the NPF, Waterford PLUTS and Waterford City MASP (RSES) where Waterford fulfils its role as the Regional City and home to the South East Technological University.*
>
> *As a leading member of the MASP implementation body, in collaboration with the Southern Regional Assembly, Kilkenny County Council, State and other agencies/ stakeholders, we will implement the priorities and objectives of the Waterford MASP to support the critical mass required for Waterford City to function as a regional city of scale in support of the broader southeast region.*
>
> *We will identify investment priorities to deliver the concentric city model founded on the principle of transport orientated and infrastructure led development.'*

A key Rural and Marine Policy Objective within the WCCDP is Objective ECON 13:

> *'To facilitate farm or rural resource related enterprises and diversification, including food production and processing on farm/ agricultural holdings, mineral and aggregate extractive industry, aquaculture and marine, the circular economy, and proposals which support rural tourism initiatives which are developed upon rural enterprise, social*

enterprise, natural/ cultural heritage assets and outdoor recreational activities, subject to the capacity of the site and the location to facilitate the proposal.

Subject to environmental policies and the development management standards of this Development Plan, the nature and scale of any proposed development will be assessed having regard to a number of factors, including nature and scale of the existing operation, building, or tourist attractions, source of material (where appropriate), traffic movements, water and wastewater requirements, capacity to reuse existing and redundant buildings, and likely impacts on amenity and the environment and the Natura 2000 Network.'

The Proposed Development represents, *'a rural resource related enterprise,'* as listed in Objective ECON 13 and will be a source of quality aggregate for the development and expansion of Waterford City as planned in the Waterford MASP.

2.7 Need for the Proposed Development

The NPF sets out a target of sustainable growth of Ireland's rural communities and five (5No.) major cities (Cork, Dublin, Galway, Limerick and Waterford) to a projected population increase of 1 million people [23]. The projected growth requires new infrastructure, including housing, schools and other public services and transport networks. The NPF aims to increase the existing built-up footprint of Irish towns and villages by ca.15%. The RSES seeks to make efficient use of the Southern Region's natural resources and to carry out major developments within the framework of national policy. The local policies also refer to the growth of the Waterford Metropolitan Area, the importance of the extractive industry and the sustainable use of natural resources.

The fulfilment of local, regional and national policy will require substantial quantities of raw materials including aggregates. The ICF report states *"approximately 1.5 billion tonnes of aggregates"* is required for this purpose. In addition, the intended volume of rural and local (Waterford Metropolitan Area) growth means that the market for building materials will have a strong regional and local element. The Proposed Development aligns with the national, regional, and local strategies by offering an appropriately sited quarry, with significant quantities of quality rock with suitably established infrastructure to supply the development goals of the region. Moreover, the Proposed Development will protect employment in the locality into the future.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Introduction

This Chapter provides a detailed description of the Proposed Development comprising information on the design, size and other relevant features.

3.2 Overview of the Proposed Development

The Site covers an area of ca.10.3ha, extending from the Quarry into the adjacent greenfield lands owned by Roadstone and Mr. Clohosey. The Quarry currently incorporates a permitted extraction area of ca.27ha. The Site includes ca.3.4ha of the existing extraction area, to ensure that the Proposed Development seamlessly adjoins the Quarry. The Proposed Development will provide for a ca.6ha quarry floor. As such, the footprint of the current extraction area will increase by ca.2.6ha. The remainder of the Site will be utilised for boundary treatments including fencing, landscaped berms, access and buffers between sensitive features (i.e. powerlines etc.). Images of the Quarry and Site are shown in Plate 3-1 and Plate 3-2 below.

Plate 3-1: Existing Quarry – View of Eastern Quarry Face with Extension Lands in the Distance

Plate 3-2: Field within Extension Lands – Facing West towards Quarry

The Site has an estimated reserve of ca.2,920,000 m^3 (or ca.7,592,000 tonnes) of aggregates within a proposed extraction area of ca.6ha.

The Proposed Development will involve the stripping of existing overburden to access the underlying rock within the proposed extraction area. Overburden removed will be used to construct peripheral screening berms around the permitter of the extraction area. The proposed works will also involve the demolition of two (2No.) farm outbuildings and a pump house within the Clohosey lands alongside the relocation of pipes carrying water from the quarry floor to the attenuation ponds that currently pass through the proposed extraction area.

Industry standard blasting methods will be utilised to produce broken rock by opening a series of 15m high benches. A mobile crusher and screening plant will follow the operational face within the Site boundary. After this initial processing, blast rock which has undergone primary crushing/screening will be hauled to the fixed crushing and screening plant within the Quarry by articulated dump trucks. The quarry extension will be ca.5 benches deep when complete, depending upon existing ground elevation, bringing the finished ground level to ca.-45mOD (from existing levels of ca.34mOD).

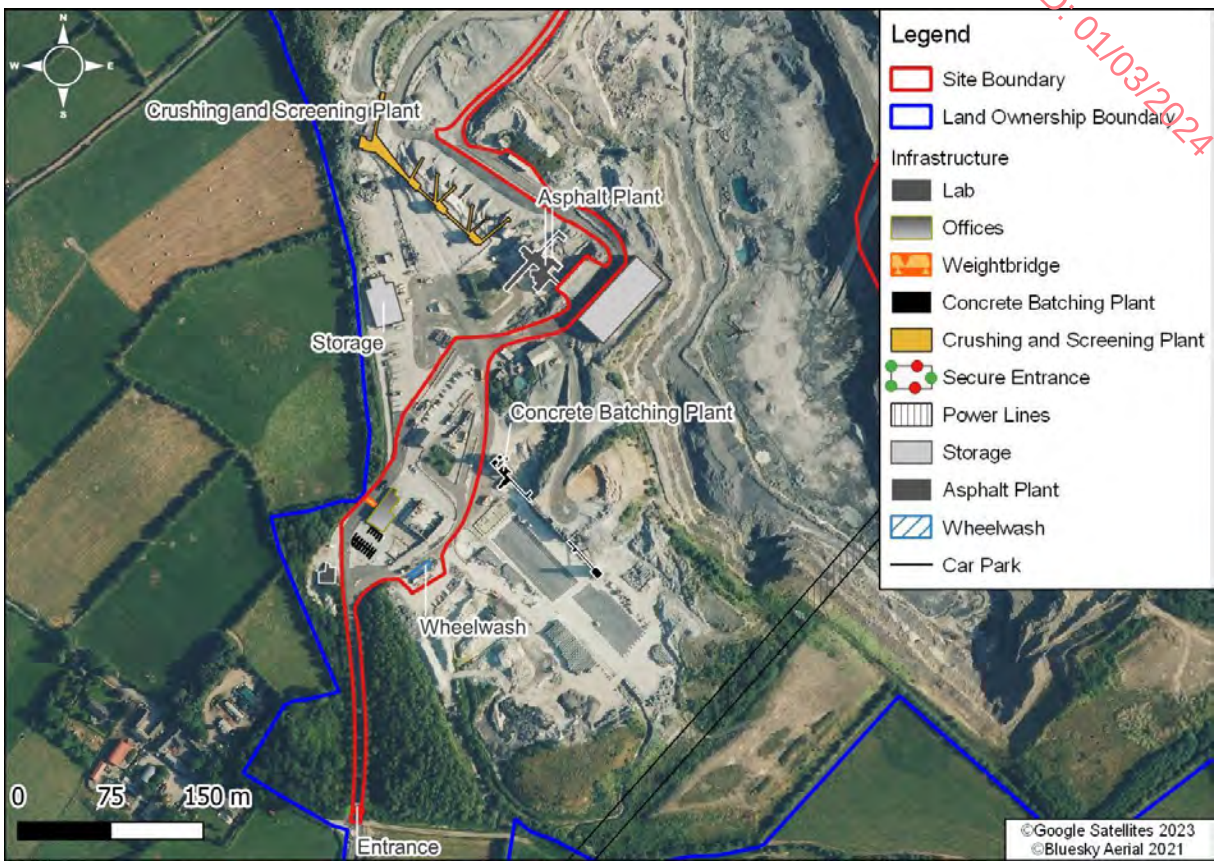
The Proposed Development will be a continuation of the quarrying activities currently in-place at the Quarry. As such, the Proposed Development will incorporate blasting, crushing, screening and stockpiling of materials into its operational phase.

The Proposed Development will seek to utilise established ancillary infrastructure within the Quarry including the:

- Existing haul routes;
- Site office;
- Weighbridge;
- Wheel wash;
- Aggregate processing plant;
- Concrete batching plant;
- Asphalt plant;
- Attenuation ponds;
- Maintenance garage;
- Storage; and,
- Crushing and screening plant.

Refer to Figure 3-1 below for context on the existing infrastructure within the Quarry.

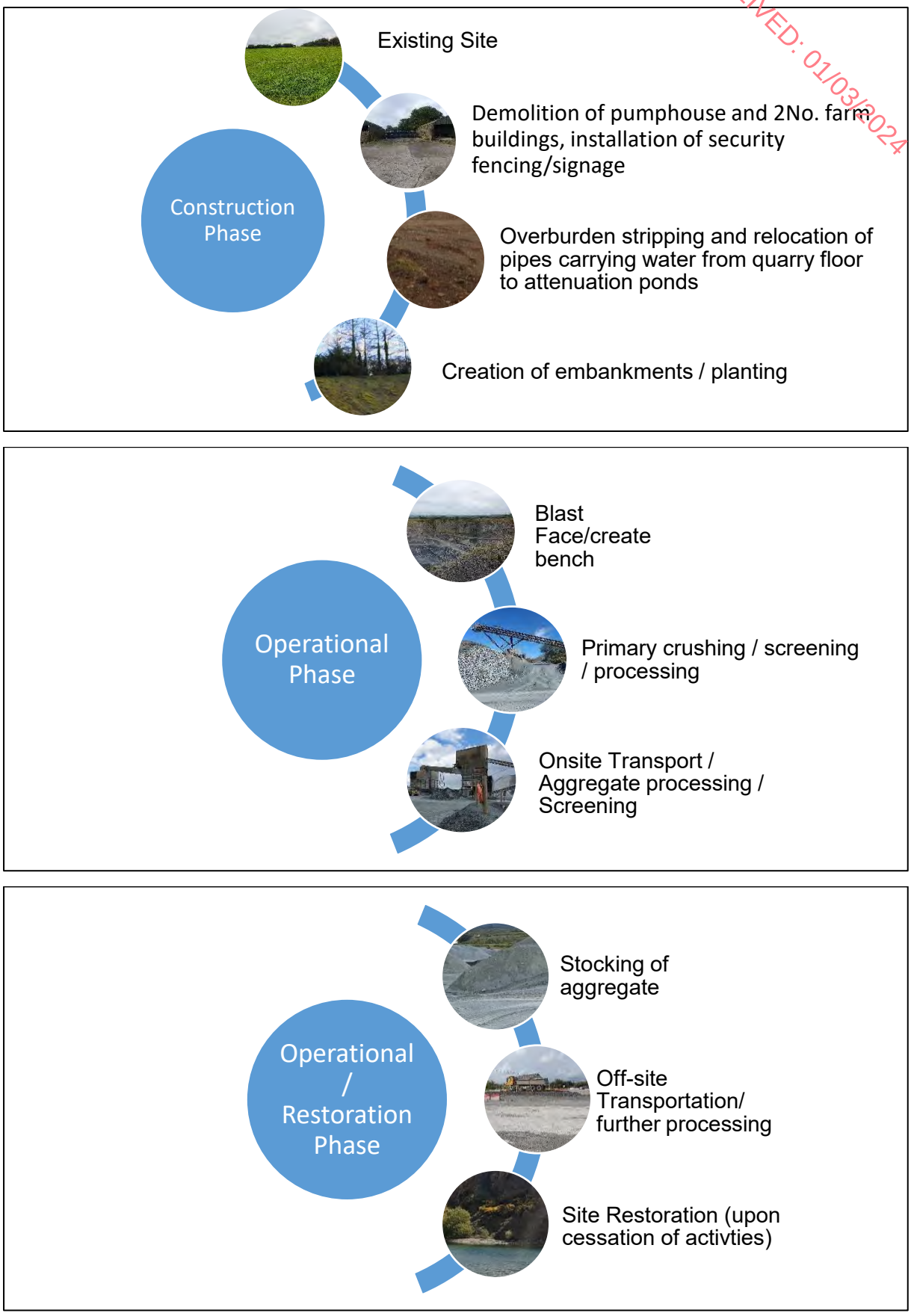
Figure 3-1: Existing Ancillary Infrastructure



Upon removal of the aggregate reserve, the Site will undergo rehabilitation as per the Restoration Plan attached as Appendix 6-1. The Restoration Plan has been designed to align with the existing restoration plan which was submitted and agreed with the Competent Authority under planning reference: 16/700.

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

Figure 3-2: Process Flow Diagram



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

3.2.1 Scale of the Proposed Development

The Site is ca.10.3ha in size which includes a proposed extraction area of 6 ha (of which ca.3.4ha are greenfield lands). It is proposed to extract aggregates within the permitted outputs which range from 700,000-1,000,000 tonnes of aggregates per annum pending market conditions.

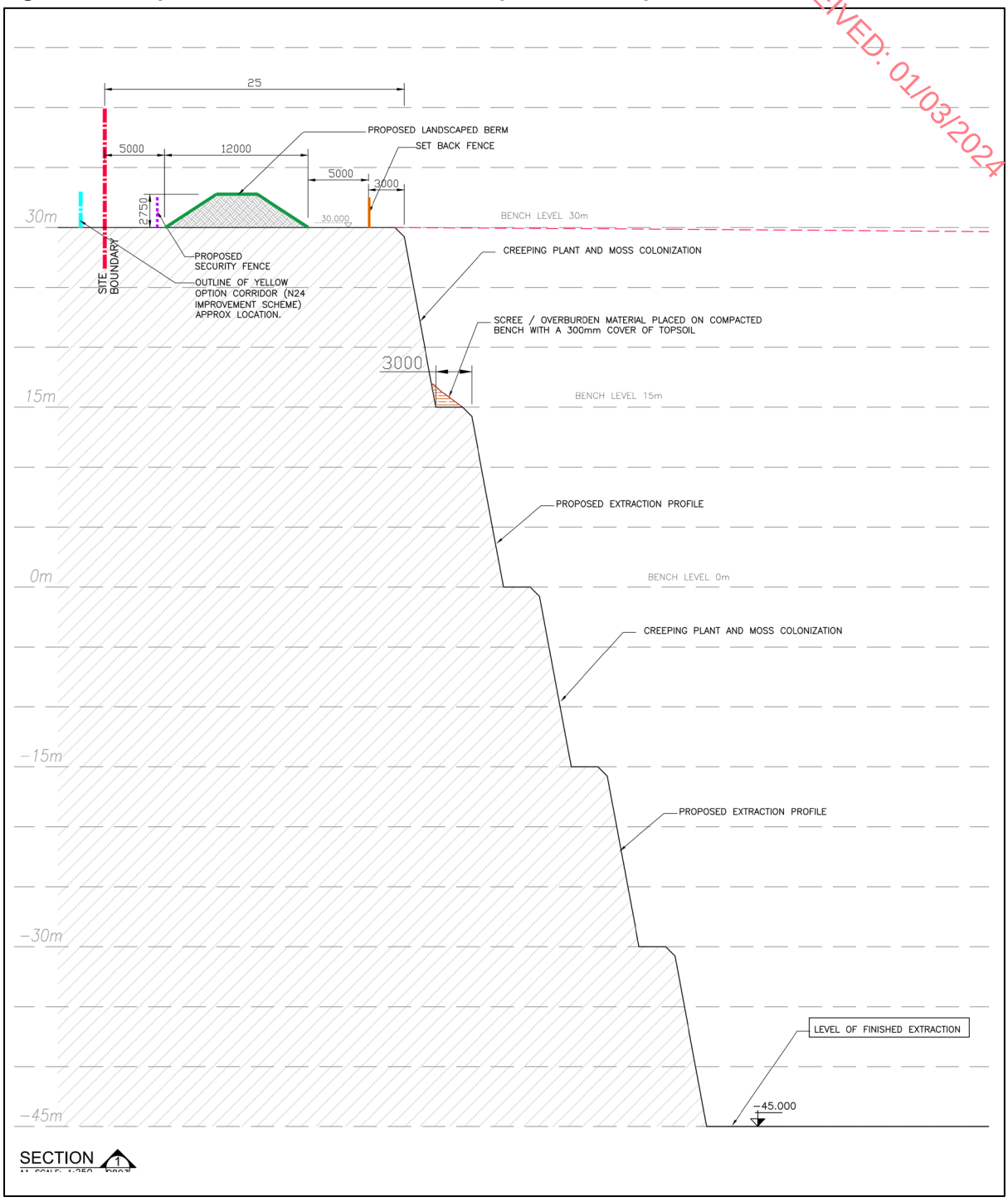
An overview of the timelines associated with the Proposed Development are as follows:

- Construction Phase (0.5 years);
- Operation Phase (19 years); and,
- Restoration Phase (0.5 years).

If the Proposed Development meets the proposed peak extraction rate (ca.1,000,000 tonnes per annum), the Site could be exhausted over a 7.5-year operational period. However, due to the unknown future economic and market needs, it is likely that the Proposed Development will extract at a lower rate than the historic peak and will therefore need a longer operational period. Planning permission is therefore being sought for a 19-year operational period.

The Proposed Development will be completed in a phased manner. Cross sections of the Proposed Development's finished extraction levels are included in Figure 3-3 below, as extracted from Drawing P804_P.

Figure 3-3: Proposed Cross Sections of the Proposed Development



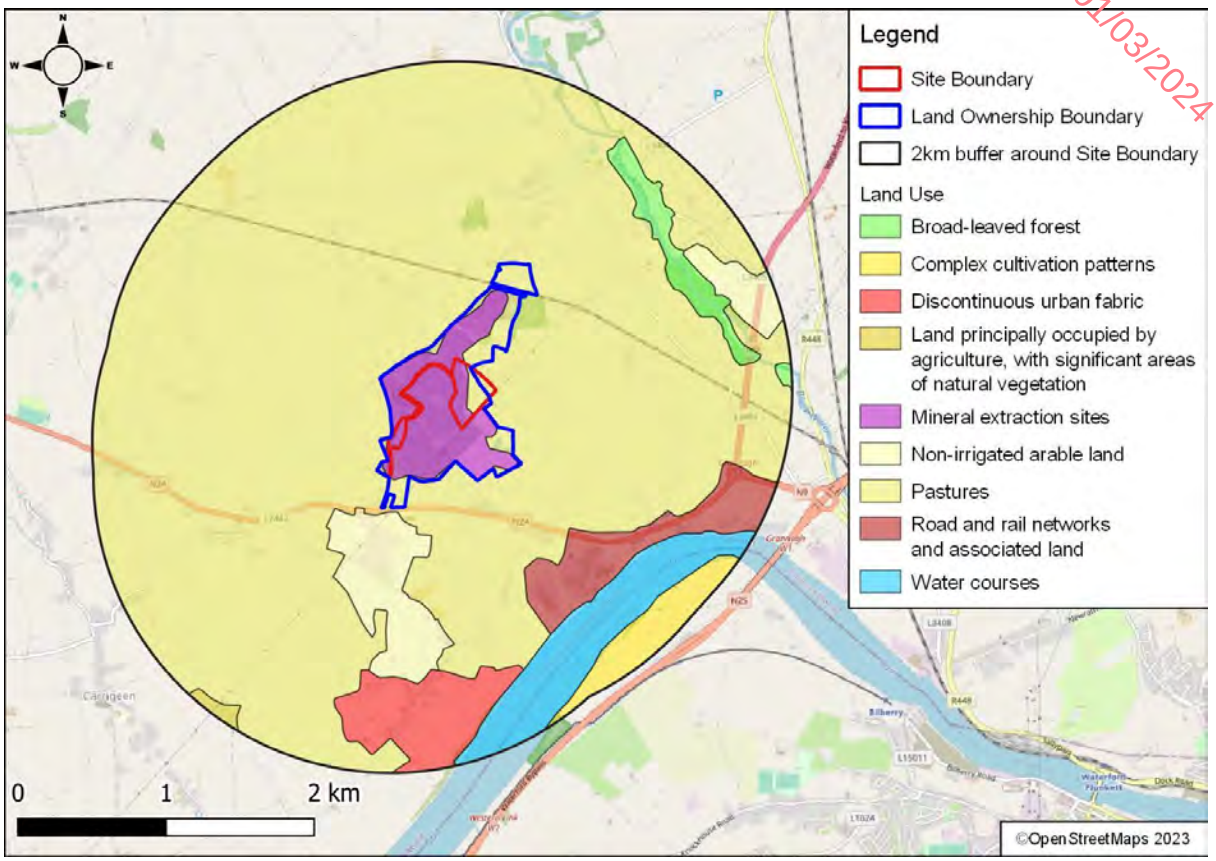
3.2.1.1 Land-take

The Site incorporates an area of ca.10.3ha which will extend the permitted quarry and existing extraction area in an easterly direction.

The majority of the Site is owned by Roadstone and comprises of the Quarry and greenfield lands with a minor portion extending into a farmyard. The easternmost portion of the Site is owned by Mr. Liam Clohosey and is under agricultural use. Based on the Corine 2018 dataset, the locality is dominated by agricultural fields in the form of pastures with scattered areas of

non-irrigated arable land also present. The Quarry directly adjacent to the Site is classified as a mineral extraction site. Refer to Figure 3-4 below for further details.

Figure 3-4: Corine 2018 Land Use within 2km of the Site.



3.3 Development Phasing

3.3.1 Construction Phase

Prior to commencement of aggregate extraction, the Site must be prepared accordingly. The Site preparation works, which will be completed as part of the Construction Phase, will be undertaken by the Applicant over a period of 6 months. The Construction Phase will include the following:

- Installation of security fencing and signage around the periphery;
- Demolition / removal of structures;
- Relocation of pipes;
- Vegetation clearance;
- Removal of topsoil under archaeological supervision and overburden stripping;
- Construction of berms with overburden, covering in topsoil, seedings and planting; and,
- Construction / preparation of haul routes.

The Quarry is currently secure with boundary fencing and an established site entrance to the south and an alternative secure entrance to the L7433 to the north. As part of the construction phase, additional security fencing will be installed along the eastern boundary of the Site to encompass the proposed extension lands. This additional fencing will tie into the existing

security fence onsite. The fencing will include safety signage at regular intervals to ensure personnel approaching the Site can clearly understand the dangers associated with activities at the Site.

Furthermore, general infrastructure required for the Proposed Development is currently in-place within the Quarry. The Proposed Development will utilise existing ancillary infrastructure, thereby reducing the potential effects associated with the construction phase.

3.3.1.1 Demolition / Removal of Structures

Two (2No.) farm outbuildings and a pump house located on Clohosey lands will be removed to facilitate the Proposed Development. These structures are of a simple nature and consist of a corrugated iron roof over concrete. These structures are located within the eastern portion of the Site as shown in Figure 3-5 below and presented in Drawings P802_P and P803_P. Full details on these structures are presented in Engineering Drawings P805_P to P807_P. Photographs of these buildings are also shown in Plates 3-3 and 3-4 below.

The structures will be completely dismantled and removed using a long arm excavator, hydraulic breaker, excavator and articulated dump truck. The cement used to secure the foundations of the outbuildings and pumphouse will be broken up and removed to reveal the underlying ground. The quality of the concrete material will be assessed and if appropriate, it will undergo processing and recovery within the C&D waste recovery facility at the Quarry. If the material is not suitable for processing at the Quarry, it will be transported to an offsite location for appropriate disposal in a licensed facility. The sheds and pump houses are minor structures, and the resultant waste will be minimal. All works will be undertaken in accordance with best practice guidance and legislation applicable at the time of decommissioning.

Figure 3-5: Structures to be Removed.

Plate 3-3: Farm Outbuildings to be Removed.

Plate 3-4: Pump House to be Removed.

3.3.1.2 Relocation of Pipes

The Quarry currently pumps water from the quarry floor up its eastern face, funnelling it through pipes atop the quarry face to attenuation ponds in the southeast portion of the Landholding, refer to Plate 3-5 for context. This overall process will not change as a result of the Proposed Development, however, pipes transporting water will be moved to facilitate the new extraction area. The pipes reaching the top of the quarry face will be relocated further to the southeast away from extraction activities. It is important to note that these pipes are not fixed in place nor deeply buried.

Plate 3-5: View of Pipes atop Eastern Quarry Face

3.3.1.3 Vegetation Clearance and Overburden Stripping

The Construction Phase will include the preparation of agricultural fields for aggregate processing activities. Works will include the clearance of hedgerows / treelines at the appropriate time of year and the stripping of topsoil and subsoils. It should be noted that the topsoil will be stripped under supervision by a suitably qualified archaeologist.

Plant will primarily include the use of a bulldozer and excavator. This phase will result in an exposed rock outcropping which will be suitably prepared to commence blasting.

3.3.1.4 Construction of Berms / Landscaping

Approximately 8,500m^3 of stripped topsoil and subsoil will be utilised to create two (2No.) soil embankments along the eastern boundary of the Site and proposed extraction area, refer to Drawing P803_P for context. The subsoils will be deposited first and subsequently built up until the desired height is reached. The topsoil will be placed on top of the subsoils, which will be ca.0.2m thick to allow for planting/seeding. The first berm will be ca.140m long and the second berm will be ca.250m long. The combined length of these berms is 390m and they are ca.12m wide and 2.75m high.

Once these works are complete, a planting mix will be introduced to occupy the berms and provide screening. The planting mix has been designed to replace the native species removed during the vegetation clearance works and to reflect the species found in hedgerows in the wider surrounding area. The planting mix is outlined in Table 3-1 below.

Table 3-1: Proposed Berm Planting Mix

Common Name	**Scientific Name**
High Canopy – Dominants (20%)	
Ash	*Fraxinus excelsior*
Pedunculate oak	*Quercus robur*

Common Name	Scientific Name
Scots pine	*Pinus sylvestris*
Lower Canopy – Sub-dominants (20-25%)	
Alder	*Alnus glutinosa*
Downy birch	*Betula pubescens*
Rowan	*Sorbus aucuparia*
Understory and Fringe (Higher Shrubs (20-40%)	
Bird Cherry	*Prunus padus*
Crab Apple	*Malus sylvestris*
Elder	*Sambucus nigra*
Hawthorn	*Cratageus monogyna*
Holly	*Ilex aquifolium*
Hazel	*Corylus avellana*
Understorey and Edge – Lower Shrubs (15-25%)	
Blackthorn	*Prunus spinosa*
Dog-rose	*Rosa canina*
Spindle	*Euonymus europaeus*

A setback fence will be installed between the proposed extraction area and the berms. A security fence will also be erected around the Site boundary. This fence will tie into existing fencing within the Quarry and will ensure the extension lands are secure from unauthorised access.

3.3.2 Operational Phase – Aggregate Extraction

The Quarry is a well-established operation. The Proposed Development will operate in a similar manner to the current activities at the Quarry. The proposed face will be developed in a phased manner, using industry standard drilling and blasting techniques to release the rock from the quarry benches (as presented in Figure 3-3 above and Table 3-2 below).

A mobile crusher and screening plant will follow the operational face within the Site boundary. Front end loaders will feed the blast rock into the mobile crushing and screening plant for processing. The resultant aggregate will be stockpiled temporarily, before being transported back to the Quarry for additional processing (refer to Plate 3-7 below) or will be transported offsite for direct use. The screened aggregate will be stockpiled using a loading shovel and, when required, dump trucks will be the primary mode of onsite transport for aggregates. Offsite transport will be via heavy goods vehicles (HGV's), refer to Plate 3-6 for context.

The Operational Phase will include the following activities:

- Drilling and blasting of the rock face;

- The primary crushing / screening of blast rock through a mobile primary crusher / screener;
- The placement of rock into stockpiles; and,
- The onsite transportation of rock to existing processing infrastructure within the Quarry or offsite transportation for direct use.

Table 3-2 below presents an overview of the phasing associated with the Proposed Development which is primarily based upon bench levels (ca.15m height).

Table 3-2: Planned Quarry Benching

Phase / Bench	Ground Level Range (mOD)
Bench 1	30 to 15
Bench 2	15 to 0
Bench 3	0 to -15
Bench 4	-15 to -30
Bench 5	-30 to -45
Restoration	Water level to replenish to 16mOD

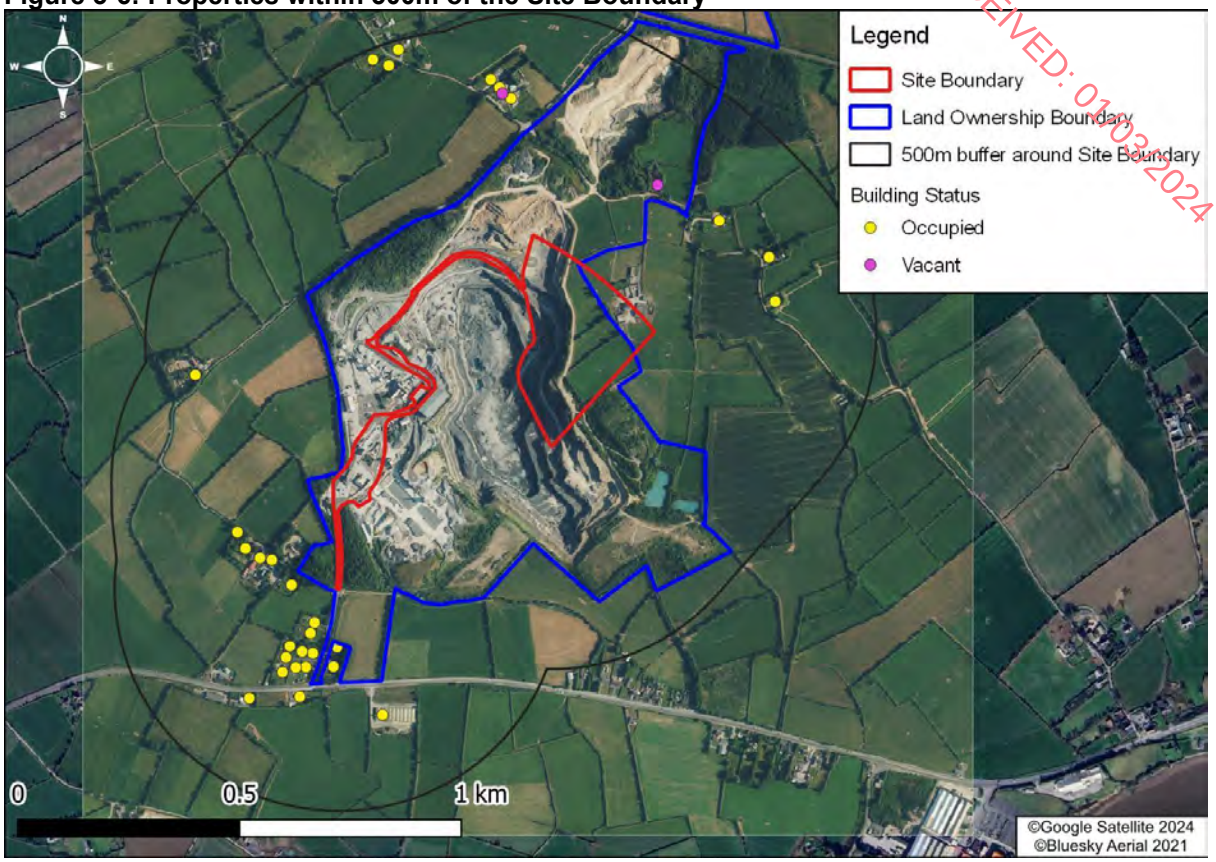
3.3.2.1 Preparation for Blasting

A drill rig will be positioned on the top of the bench that will be the subject of the blast. A hole will be drilled to a predetermined specified depth and diameter. The drillholes, to be specified by the Roadstone Blasting Engineer, will be dependent upon the size of the blast to be generated, the rock encountered, and the condition of the rock to be blasted (known fracturing, or changes in type). This preparatory work will typically last for several days.

The Roadstone Blasting Engineer will notify the supplier of the explosives, arrange the delivery and the date of the blast. The Gardai will also be notified of the time and date of the blast.

Roadstone will notify Kilkenny County Council and all residents within 500m from the Site boundary of the proposed blast date, including details for contacting Roadstone in the event of pre-blast enquiries or post blast submissions. It should be noted that the receptor which occurs within the Roadstone Landholding, is owned by Roadstone, vacant and will not be used for residential purposes at any point during the future of the Proposed Development. Refer to Figure 3-6 for context.

Figure 3-6: Properties within 500m of the Site Boundary



3.3.2.2 Blasting

On the date of the blast, the Roadstone Blasting Engineer will place the necessary quantity of explosive at the pre-determined depth and position, and back fill each hole.

A safety zone will be established, where all personnel, plant and equipment will be removed from this zone. The safety zone will be specified by the Roadstone Blasting Engineer and will be enforced by Roadstone. Typically, no other operations on the Site, within the blast zone, will occur during a planned blast event. Blasting will likely take place at a rate of one per week.

3.3.2.3 Crushing / Screening and Stockpiling of Aggregate

The rock is collected by either a front-end loader or dumper and transported to the mobile crushing and screening plant which is set up close to the blasted rock pile. This will break the rock into pre-selected sizes / grades, generating aggregate stockpiles of the graded rock. This is a mechanical process. The rock will then be collected by a dumper truck and transported to the fixed crushing and screening plant within the Quarry or directly offsite. This will break the rock into pre-selected sizes / grades, generating aggregate stockpiles of graded rock.

Plate 3-6: Examples of a Loading Shovel, HGV and Dump Truck

Plate 3-7: Fixed Screening and Crushing Plant

3.3.2.4 Export of Material

Aggregate will be exported from the Quarry by HGVs. Table 3-3 below provides an overview of the existing maximum permitted daily trips from HGVs associated with the Quarry. The Proposed Development will operate within these numbers.

Table 3-3: Summary of Existing Daily Trips

Type of Traffic	Daily Trips		
	Arrivals	Departures	Total
Exported Quarried Material (HGVs)	250	250	500
Staff (LVs)	15	15	30
Miscellaneous (LVs)	10	10	20
Total	275	275	550

3.3.3 Restoration Phase – Site Closure

Upon completion of extraction activities, the Site will be subject to a Restoration Plan.

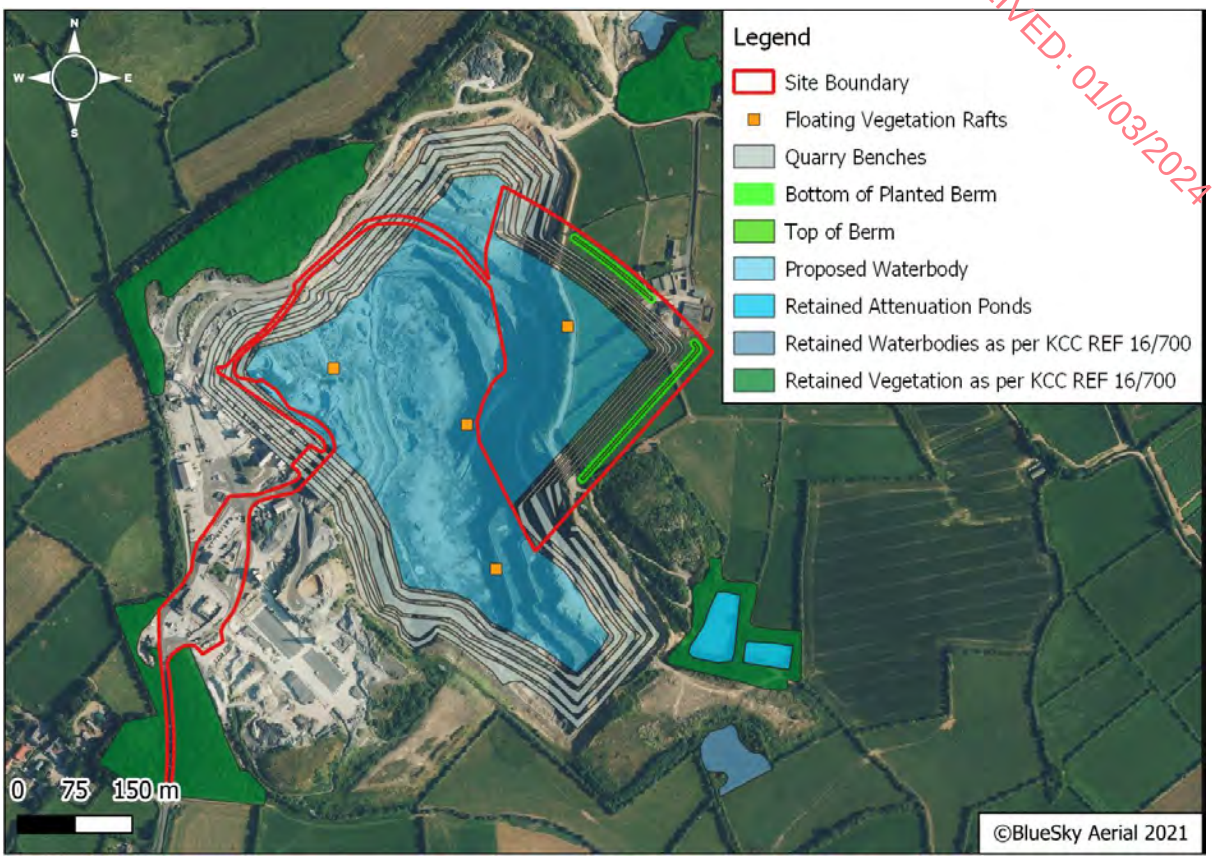
The restoration plan submitted under planning reference: 16/700 has been updated to include the Site. Therefore, the Restoration Plan submitted as part of this application (attached as Appendix 6-1) supersedes the previous restoration plan for the Quarry.

The Site will be made safe and engineered to enable a biodiverse habitat to develop. This will involve the following works:

- Removal of all plant and equipment;
- Access to the haul ramp and upper benches will be made secure;
- Boundary fencing will be inspected and improved where necessary to prevent unauthorised access;
- Water will be allowed to recharge to 16mOD creating a central surface waterbody;
- The lower sections of the haul ramps (where they enter the water) will be graded and planted with marginal and emergent vegetation appropriate to the environment;
- Floating vegetation rafts will be installed within the waterbody; and,
- It is proposed to maintain the hardstanding area adjacent to the Site offices for light industrial use. The use of this area will be subject to securing the necessary planning permission for a change of use when quarry works are complete.

The Restoration Plan will provide a mosaic of habitats onsite, refer to Figure 3-7 below for context.

Figure 3-7: Proposed Restoration Plan



3.4 Development Design and Management

3.4.1 Construction Hours

The main construction hours for the Proposed Development will be:

- 07:00 – 19:00 Monday – Friday;
- 07:00 – 13:00 Saturday; and,
- Closed Sundays and Bank Holidays.

No noisy works will be permitted outside these hours. However, light works such as screen planting can take place. Light works will be restricted to the operational hours (i.e. those hours outside of the construction hours listed above) listed below in Section 3.4.2.

3.4.2 Operational Hours and Staffing

The operational hours for the Proposed Development will reflect the current operational hours of the Quarry which are:

- 07:00 – 20:00 Monday – Friday;
- 07:00 – 18:00 Saturday; and
- Closed Sundays and Bank Holidays.

It should be noted that the bitumen plant in the Quarry may commence at 06:00 on occasion depending on market needs. The operational hours of the bitumen plant will not be affected by the Proposed Development.

The Quarry supports ca.15-20 full time employees arising from onsite 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 onsite personnel will be maintained within the Quarry. No additional parking is proposed as part of the Proposed Development. Onsite parking is sufficient and will continue to be.

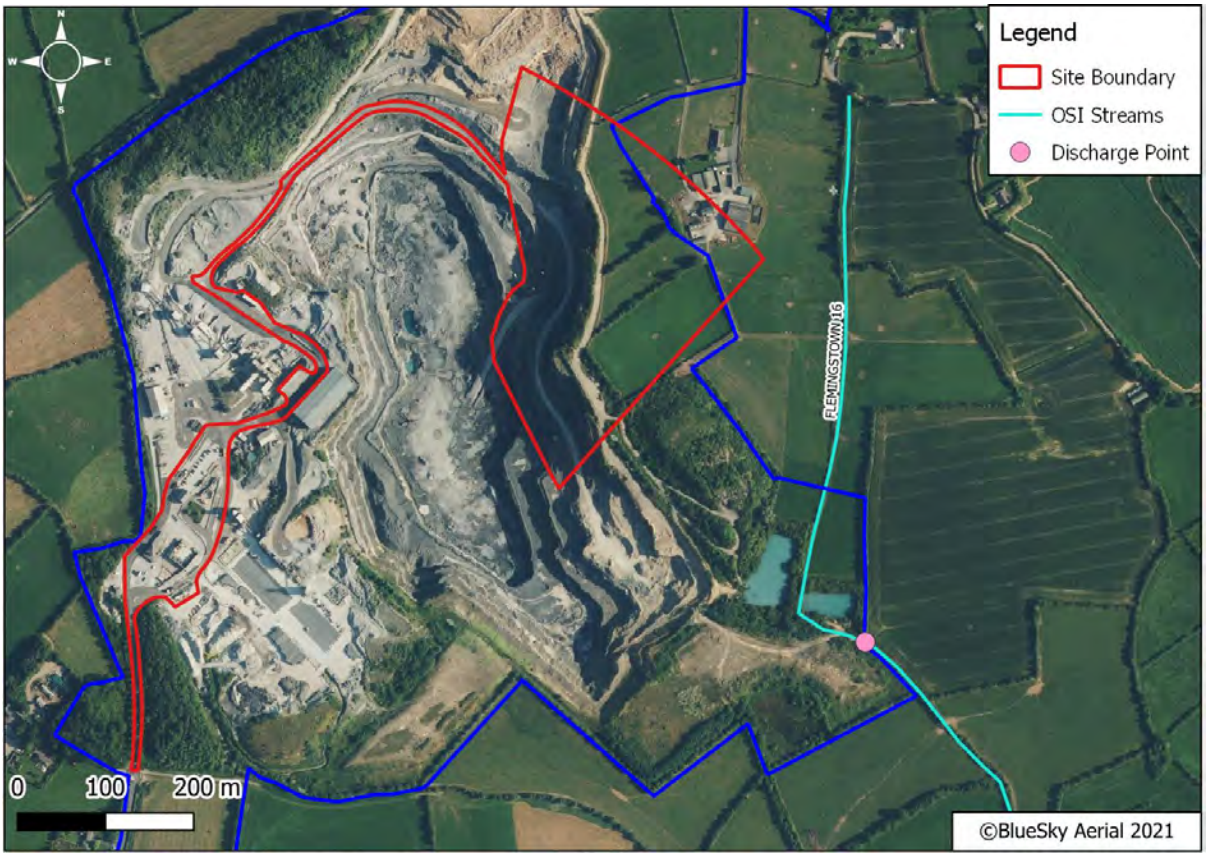
3.4.4 Welfare

The Quarry contains a main office and staff welfare facilities. These buildings are on mains water and are connected to two (2No.) septic tanks. No additional welfare facilities are required or proposed as part of the Proposed Development.

3.4.5 Drainage

Water arising within the existing quarry pit is currently pumped up the eastern face and directed through pipes into two (2No.) settlement ponds to the southeast of the Site. These ponds cover an area of ca.340m^2 and 250m^2 respectively. These ponds discharge to Flemingstown Stream which drains into the Middle Suir Estuary ca.1.3km southeast of the Site. Refer to Figure 3-8 for context on the location of the discharge point.

Figure 3-8: Quarry Discharge Point



This process will not change as a result of the Proposed Development; however, the route of the pipes to the attenuation ponds will be altered to accommodate the proposed extraction area as outlined in Section 3.3.1.2 above.

General surface water run-off within the wider Site will percolate to ground in line with the current drainage regime.

3.4.6 Wheel wash

The existing wheel wash onsite will be utilised for the proposed works. The existing wheel wash is shown in Plate 3-8 below. The wheel wash is located in the southwest section of the Site near the Site entrance onto the L7434. The existing wheel wash runs on closed-loop system and contains a gate, which prevents HGVs from driving through the wheel wash too quickly, allowing sufficient time for HGVs to be cleaned.

No upgrades to this wheel wash are proposed. The wheel wash will be cleaned out regularly, with sludge removed offsite in accordance with the requirements of relevant waste legislation.

Plate 3-8: Existing Wheel Wash

3.4.7 Fuel and Oil Storage

No fuel will be stored within the Site. Any fuels/oils (and/or lubricants) used at the Site will continue to be stored in the existing bunded tanks in the Quarry. Re-fuelling of mobile plant will continue to take place on an existing hard-standing area immediately adjacent to the bunded fuel storage area.

Fixed crushing and screening plant will be utilised to provide secondary / tertiary processing of aggregate from the Site within the Quarry (Plate 3-7 above). This plant is located outside the Site and will continue to be refuelled as per the existing operational procedures of the Quarry.

It is important to note that all plant and machinery subject to refuelling procedures within the 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 Quarry.

Nonetheless, environmental risks to soils and groundwater and relevant mitigation measures are outlined in Chapter 7 – Lands, Soils and Geology and Chapter 8 – Water (Hydrogeology and Hydrology).

3.4.8 Transportation, Roads and Traffic

The Proposed Development will utilise the existing access and internal haul routes within the Quarry. HGVs will travel via the N24 and L7434 to gain access to the Site. Return routes will utilise the same route.

As outlined in Section 1.7, the Proposed Development does not seek to increase permitted traffic numbers (currently authorised average of ca.550 trips per day i.e. 250 outward HGV trips, 15 outward staff trips and 10 outward miscellaneous trips per day under planning reference: 16/700), and as such contributing to sustaining the current quarry output of

ca.700,000 to 1,000,000 tonnes per annum (tpa). Further details are presented in Chapter 14 – Material Assets: Traffic & Transport.

A Traffic Impact Assessment has been undertaken by PMCE, the findings of which are presented in Chapter 14 – Material Assets: Traffic & Transport of this EIAR.

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

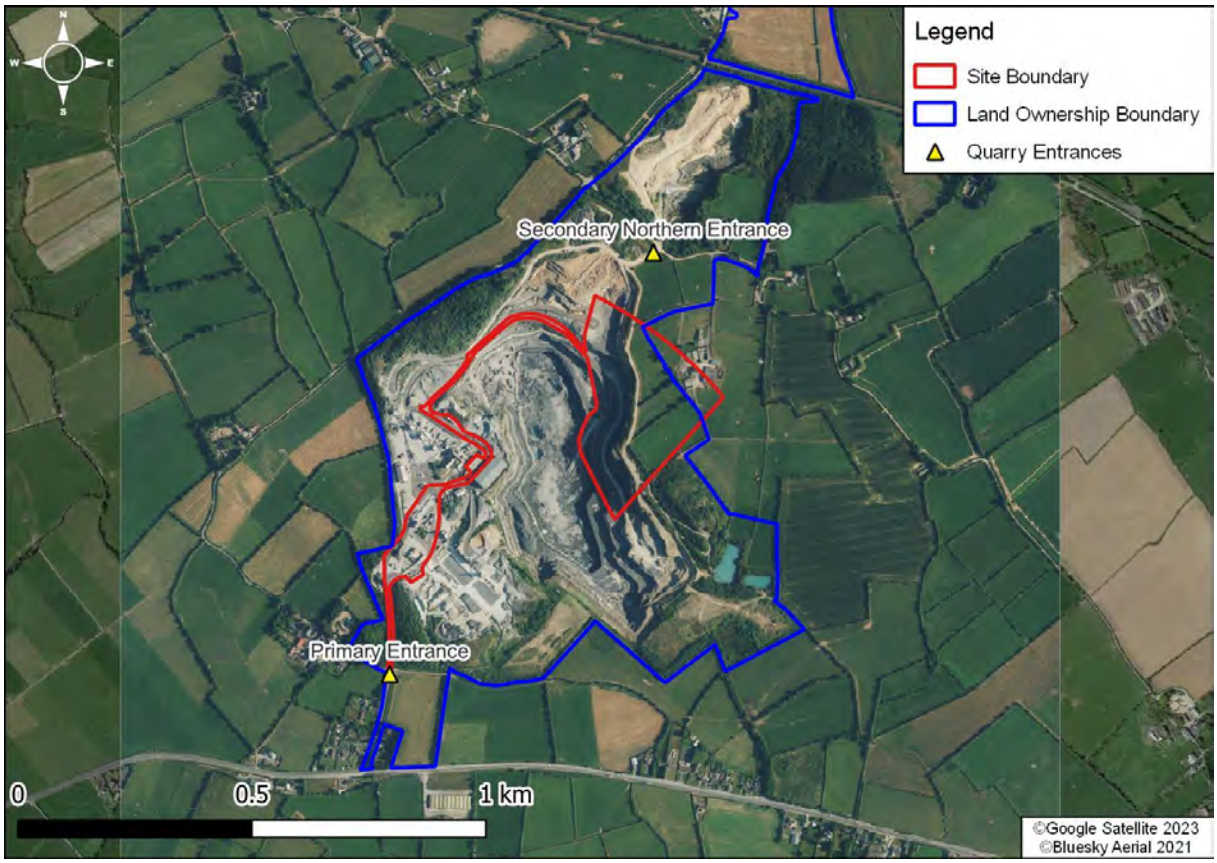
3.4.9 Security

The existing perimeter security fence will continue to be checked monthly and after any incident. The additional security fence to be installed as part of the Proposed Development will be subject to the same checks. Records of checking, maintenance and repairs of the fence will be maintained in the EMS. The Quarry has a remotely monitored CCTV system installed, with cameras monitoring the entrance gates on the southern and northern sides of the Quarry, the office and fuel storage area.

Primary access to the Site will be via the existing entrance to the Quarry off the L7434 at the southern aspect of the Quarry. The existing entrance is gated and secured when activities are not occurring within the quarry. The Quarry is bound by soil embankments, screening vegetation and stockproof fencing.

There is secondary northern entrance to the Quarry off the L7434, which is primarily used by Roadstone personnel only. No HGVs associated with the Proposed Development will utilise this entrance under any circumstance. Refer to Figure 3-9 below for further context.

Figure 3-99: Current Quarry Access Entrances



The contact details of the Location Manager are clearly displayed on a sign at the main (southern) entrance from the public road. Any complaints received will be logged in the complaint register which will be maintained onsite as part of the EMS.

Existing signage located at the Quarry entrance from the public road states the existence of the Quarry and includes contact details of the quarry operator. Separately, '*No Unauthorized Access*' and warning signs are located on the pillars at the Site entrances. Signs will continue to be maintained along the perimeter fence and access gates on the southern and northern side of the quarry providing notice of the quarrying activities.

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

4 CONSIDERATION OF ALTERNATIVES

4.1 Introduction

The Planning and Development Regulations 2001 (as amended) specify the information to be contained within an Environment Impact Statement (EIS). Schedule 6 1(d) specifies that an EIS shall include 'An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice taking into account the effects on the environment.'

The EIA Directive 2014/52/EU requires an EIAR to contain:

> '*A description of the reasonable alternatives (for example, in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including comparison of the environmental effects*.'

The EPA's 2022 guidelines further state:

> *'The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected. Option. A detailed assessment (or 'mini-EIA') of each alternative is not required.*'

Taking account of the above and considering the nature of the Proposed Development, this Chapter documents the alternatives to the Proposed Development that were considered, including the 'Do Nothing' scenario.

This Chapter assesses the alternatives considered in the decision taken by the Applicant to extend the Quarry into the Site and outlines the following alternative considerations:

* Location; and,
* Design.

4.2 Alternative Location

Roadstone holds a landbank within the townlands of Granny and Aglish North which encompasses the Quarry and greenfield lands to the east. Roadstone own the majority of the lands required for the Proposed Development and an agreement is in place with Mr. Liam Clohosey for the purchase of additional lands bordering this landbank.

As discussed in Section 2.4.3, the location of extractive industries is limited to where aggregates occur. As a finite resource, a proposed quarry or quarry extension must look at a range of environmental and commercial issues such as:

- The presence of the required aggregate;
- Contamination with other rock 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. A review of Geological Survey Ireland (GSI) Bedrock Geology 1:100,000 data indicated the presence of high-quality limestone rock within the extension lands to the east of the Site alongside areas immediately to the north and west. The Site is underlain by the Bullockpark Bay Member Formation which is comprised of oolitic limestone [34].

The Landholding to the north is bisected by the Waterford-Limerick railway and are located within close proximity to residential dwellings. These lands have the potential to be cut-off from the Quarry as a result of the Proposed N24 Improvement Scheme. Therefore, it was not considered viable to extend the Quarry northwards at this time.

In addition, it was not considered suitable to extend the quarry to the west. An extension to the west would require the development of a new extraction area rather than the continuation of activities against an existing quarry face. This was not considered to be a viable option.

The occurrence of high-quality rock in proximity to a well-established quarry with suitable infrastructure for exploitation of the rock, makes the Site a prime location. The Site is located largely within the Landholding as outlined above and is able to accommodate a significant extension whilst maintaining appropriate buffers to the proposed N24 Road Improvement Scheme and residential dwellings. The siting of the Proposed Development allows for a direct extension to the existing extraction area and therefore, the haulage routes, pumping equipment and attenuation ponds are already established. Utilising the greenfield lands within the Landholding to the east and the lands owned by Mr. Clohosey is considered to be the most viable option. This option meets the criteria listed above for Roadstone.

4.3 Alternative Design

4.3.1 Access

A review of the surrounding road network was undertaken as part of the assessment of alternative access points.

The Quarry has a secondary access point located off the L7433. Consideration was given to the use of this access road as part of the operational phase of the Proposed Development. However, utilising this access would increase the presence of HGVs on the local road network to the north of the Site which has the potential to disrupt local traffic. Additional infrastructure, such as a wheel wash and weighbridge, would be required to prevent the tracking of material onto the road and to enable the sign in / out of HGVs.

It is likely that operating out of this secondary access point would lead to confusion and an unnecessary doubling up of resources. As such, an alternative access was not given further consideration as a viable alternative.

4.3.2 Process

There are limited processes suitable for the extraction and screening of aggregate material. The aggregate extraction, for developments of this scale, can typically require the use of loading shovels and dump trucks. Alternative variations, through the use of variations to plant onsite, i.e. different brands / sized machinery, are not seen as cost effective. The existing plant have been in operation within the Quarry with no issues. They are well maintained with a documented service history. Furthermore, the development of fixed screening and crushing and screening plant within the Site was not considered necessary or cost-effective, given the presence of suitable secondary plant within the Quarry.

4.4 Alternative Uses Including a “Do-Nothing” Scenario

In addition to the main alternatives considered above, a “do-nothing” scenario was also considered.

A 'do-nothing' scenario would restrict Roadstone to their existing planning for the Quarry (planning reference: 16/700). This would involve the continued operation of the quarry until the stone reserves within the permitted extraction area are exhausted. The original restoration plan submitted under planning reference: 16/700 would be implemented after operations have ceased onsite.

A 'do-nothing' scenario would result in a shorter lifespan for the Quarry and subsequently a shorter employment period for staff locally. The Quarry is authorised to extract 700,000-1,000,000 tonnes of aggregates per annum pending market conditions. This output would be maintained as part of the Proposed Development. This is a significant source of aggregates for Kilkenny and Waterford which, as outlined in Chapter 2, require large amounts of aggregate for their continued development. A 'do-nothing' scenario was not considered to be a viable option instead, it would likely exacerbate the existing scarcities in quality aggregate material. A 'do-nothing scenario,' would result in a lost opportunity to protect important aggregate reserves. Any aggregate reserves within the extension lands would be lost to the continuation of farming.

5 POPULATION AND HUMAN HEALTH

5.1 Introduction

This Chapter was prepared to provide a description and assessment of the likely effects of the Proposed Development on population and human health.

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 all phases of a development.

5.2 Methodology

A desk-based study was carried out to characterise the environment in relation to human beings, including the receiving population, change over time in population, 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 Ireland (IPHI) Health Impact Assessment Guidance (2021) [35];
- Institute of Environmental Management and Assessment (IEMA) Health Impact Assessment in Planning, Impact Assessment Outlook Journal, Vol 8 (2020) [36];
- IEMA Health in Environmental Impact Assessment, A Primer for a Proportionate Approach (2017) [37]
- IEMA: Effective Scoping of Human Health in Environmental Impact Assessment (2022) [38];
- IEMA: Determining Significance for Human Health in Environmental Impact Assessment (2022) [39];
- International Association for Impact Assessment (IAIA) and European Public Health Association (EPHA): Human Health – Ensuring a High Level of Protection (2020) [40]; and,
- EPA: Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022) [16].

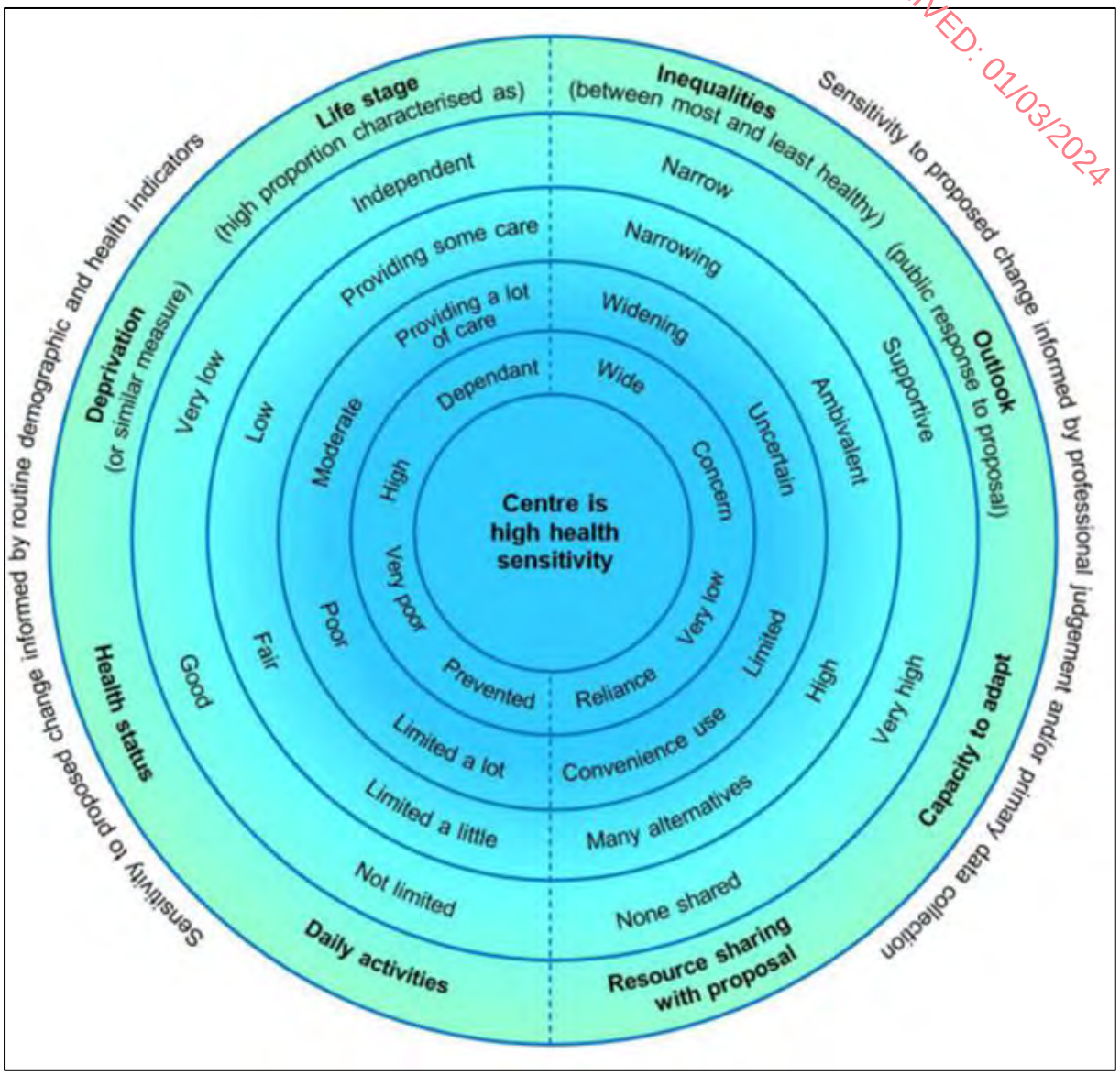
5.2.1 Health Sensitivity

In accordance with the IPHI guidance, the health sensitivity of the local population was determined following the methodology set out in *Part 4 – Analysis: tools and resources* of the above Guidance [35] and summarised in Figure 5-1 below. The determined sensitivity in each factor was considered in order to determine an over-all sensitivity for the local population of both the immediate area and of the nearest sizable population centre – Waterford City and Suburbs. The results of this analysis are set out in section 5.6 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 Maps [41].

Figure 5-1: Health Sensitivity Conceptual Model



5.3 Receiving Environment

5.3.1 Population

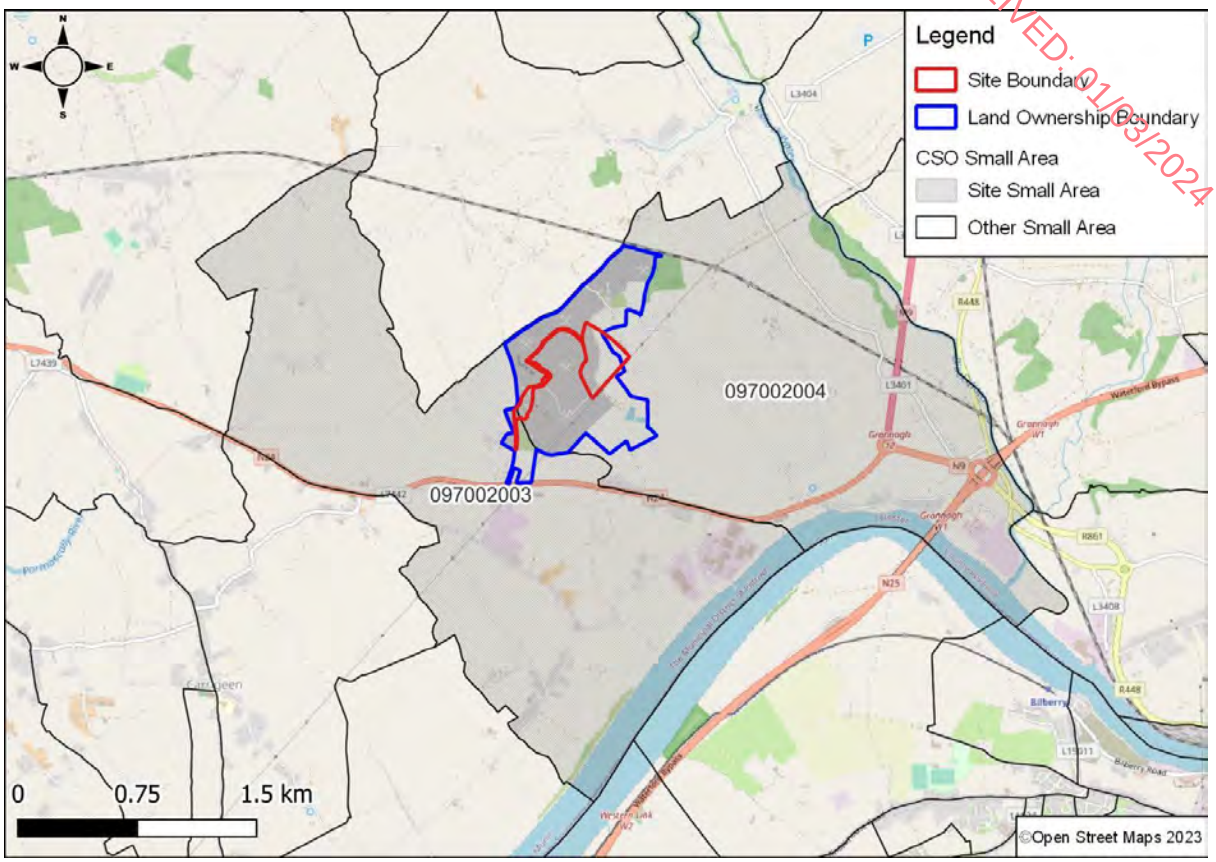
The CSO provides data on population and socio-economic aspects of the population at different levels for the entire state, at county level and for individual Electoral Districts (ED) within each County [27]. The 2022 Census results are the most recent figures (the census scheduled for 2021 was delayed until 2022 due to the COVID-19 pandemic).

The Site is situated in the Local Electoral Area (LEA) of Piltown, and within the ED of Aglish, in southern County Kilkenny.

5.3.2 Small Area Population Statistics

Small Areas (SAs) were established in the 2011 Census in order to give greater clarity and context to population trends. The Site is mainly located within SA A097002004 with the entrance located partially in SA A097002003. The boundaries of the relevant SAs are shown in Figure 5-2 below.

Figure 5-2: Extent of Small Area A097002004 and A097002003



The CSO population statistics from the 2011, 2016 and 2022 census data are set out in Table 5-1 below [41]. The corresponding figures for the relevant ED, County and State are also shown for context. The population changes from 2011-2022 and 2016-2022 are also shown.

Table 5-1: Local Population Statistics from Census from 2006 to 2022

Area	Population by Census Year			% Change	
	2011	2016	2022	2016-2022	2011-2022
SA A097002004	211	191	208	+8.90%	-1.42%
SA A097002003	215	231	243	+5.19%	+13.02%
Aglish ED, KCC	871	883	975	+10.42%	+11.94%
Co. Kilkenny	95,419	99,232	104,160	+4.97%	+9.16%
Ireland	4,588,252	4,761,865	5,149,139	+8.13%	+12.22%

The low population reflects the predominately rural nature of the locality. The population of SA A097002004 has declined very slightly since 2011, although it has seen an increase over the 2016 census figures. The population of SA A097002003 has increased since both the 2011 and the 2016 census. On a wider scale, the population figures for the ED, the County and the State have increased substantially over the period since 2011.

5.3.3 Local Population

The nearest sizable population centre to the Site is Waterford City and suburbs, which is situated ca.5 km southeast of the Site.

Table 5-2 below shows some key statistics regarding the local population, taken from the CSO 2022 Census Mapping Small Area Population map [41]. The County Kilkenny and Ireland figures are given for comparison.

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

Dataset	SA A097002004	SA A097002003	W'ford City & Suburbs	Co. Kilkenny	Ireland
Registered Permanent Households	74	92	23,252	36,821	1,846,938
Unoccupied Buildings (%)	15%	6%	9%	10%	13%
Population No (% Male/Female)	48/52%	54/46%	49/51%	50/50%	49/51%
Age Breakdown (%)					
Aged 0 - 9	8.65%	13.17%	11.95%	12.58%	12.39%
Aged 10 – 14	5.77%	5.76%	6.92%	7.67%	7.27%
Aged 15 - 19	4.81%	8.23%	6.63%	6.77%	6.56%
Aged 20 – 24	3.85%	3.29%	6.73%	4.95%	5.96%
Aged 25 – 64	50.00%	51.85%	53.05%	51.66%	52.74%
Aged 65 – 80	19.23%	12.76%	10.85%	12.52%	11.56%
Aged 80+	7.69%	4.94%	3.87%	3.85%	3.52%
Age Dependency Ratio*	70.49%	57.79%	50.59%	57.79%	53.22%
% with Irish/UK Nationality	99.04%	95.06%	79.94%	90.16%	84.52%
% Identifying as White Irish	95.19%	88.89%	68.02%	83.51%	75.61%
% Identifying as Irish Traveller	0.00%	2.9%	0.71%	0.61%	0.64%
% 1 Adult Households	16.22%	22.83%	26.92%	22.31%	23.14%
% >1 Adult Households	79.73%	71.74%	58.64%	62.77%	65.48%
% Single-Parent Households	4.05%	5.43%	14.44%	10.84%	11.38%
% Owner/Occupiers	91.89%	85.87%	51.95%	70.88%	65.7%
%Renting	4.05%	3.26%	38.21%	23.01%	27.48%
(Private Landlord)	(4.05%)	(3.26%)	(22.12%)	(12.63%)	(17.96%)
(Local Authority/Housing Body)	(0.00%)	(0.00%)	(16.09%)	(10.38%)	(9.52%)
% with Central Heating:	98.65%	91.30%	91.69%	95.07%	93.87%
(Oil-Fired)	(72.97%)	(76.09%)	(15.02%)	(54.12%)	(38.67%)
(Coal-Fired)	(8.11%)	(5.43%)	(3.78%)	(6.41%)	(3.43%)
(Wood-Fired)	(4.05%)	(3.26%)	(0.58%)	(3.17%)	(1.72%)
(Electric-Fired)	(6.76%)	(4.35%)	(13.38%)	(7.50%)	(11.70%)

Dataset	SA A097002004	SA A097002003	W'ford City & Suburbs	Co. Kilkenny	Ireland
(Gas-Fired)	(4.05%)	(1.09%)	(58.02%)	(21.19%)	(32.56%)
% with confirmed water supply	100.00%	95.65%	95.48%	99.49%	100%
(Mains Water Supply)	(79.73%)	(66.30%)	(93.60%)	(62.85%)	(79.65%)
(Private Water Supply)	(12.16%)	(14.13%)	(0.85%)	(27.00%)	(9.9%)
(Group Scheme)	(8.11%)	(15.22%)	(1.03%)	(8.49%)	(7.7%)
% with Stated Sewerage	100.00%	95.65%	94.94%	98.21%	90.30%
(Mains Sewerage)	(13.51%)	(1.09%)	(92.15%)	(52.88%)	(63.10%)
(Septic Tank)	(82.43%)	(91.30%)	(2.10%)	(39.59%)	(24.70%)
% With a Disability	23.08%	17.70%	23.61%	21.51%	21.55%
% Working Age Unable to Work (Illness/Disability)	7.30%	4.06%	5.64%	4.65%	4.58%
% Caring for Disabled Person	6.73%	6.58%	5.44%	6.24%	5.81%
Health:					
Very Good/Good	86.06%	84.77%	78.06%	85.35%	82.89%
Fair	9.62%	7.41%	9.68%	8.53%	8.64%
Bad/Very Bad	2.40%	1.23%	2.02%	1.63%	1.74%

*The age dependency ratio is the number of dependents (people aged 0-15 and 65+) per hundred people of working age (i.e. 15-64). A higher ratio indicates more pressure on the working population.

5.3.3.1 EPA Pobal Information for SA097002004 and SA097002003

The census statistics have been used by Pobal on behalf of the Government of Ireland to develop deprivation indices to help inform planning and policy decisions [42]. Deprivation is categorised into eight bands from 'extremely affluent' to 'extremely disadvantaged'.

Table 5-3 below sets out the relevant factors drawn from the 2011, 2016 and 2022 census results for Small Areas A097002003 and A097002004. Both Small Areas were categorised as being 'Marginally Below Average' based on the 2011 and 2016 censuses. In the 2022 census, both areas were categorised as being 'Marginally Above Average'.

Table 5-3: Deprivation Indices for SA097002004 and SA097002003 (2011 to 2022)

Indicator	2011 Census	2016 Census	2022 Census
Small Area A097002004			
Pobal HP Index	-6.40	-2.94	1.51
Pobal HP Description	Marginally Below Average	Marginally Below Average	Marginally Above Average
Primary Education only	18.80%	17.00%	10.83%
Third Level Education	21.90%	28.57%	35.03%
Male Unemployment Rate	26.20%	8.16%	9.43%

Indicator	2011 Census	2016 Census	2022 Census
Female Unemployment Rate	22.20%	9.68%	0.0%#
Small Area A097002003			
Pobal HP Index	-1.60	-3.62	1.21
Pobal HP Description	Marginally Below Average	Marginally Below Average	Marginally Above Average
Primary Education only	13.70%	12.00%	9.09%
Third Level Education	26.70%	26.88%	30.3%
Male Unemployment Rate	18.80%	13.56%	2.86%
Female Unemployment Rate	11.90%	13.33%	4.55%

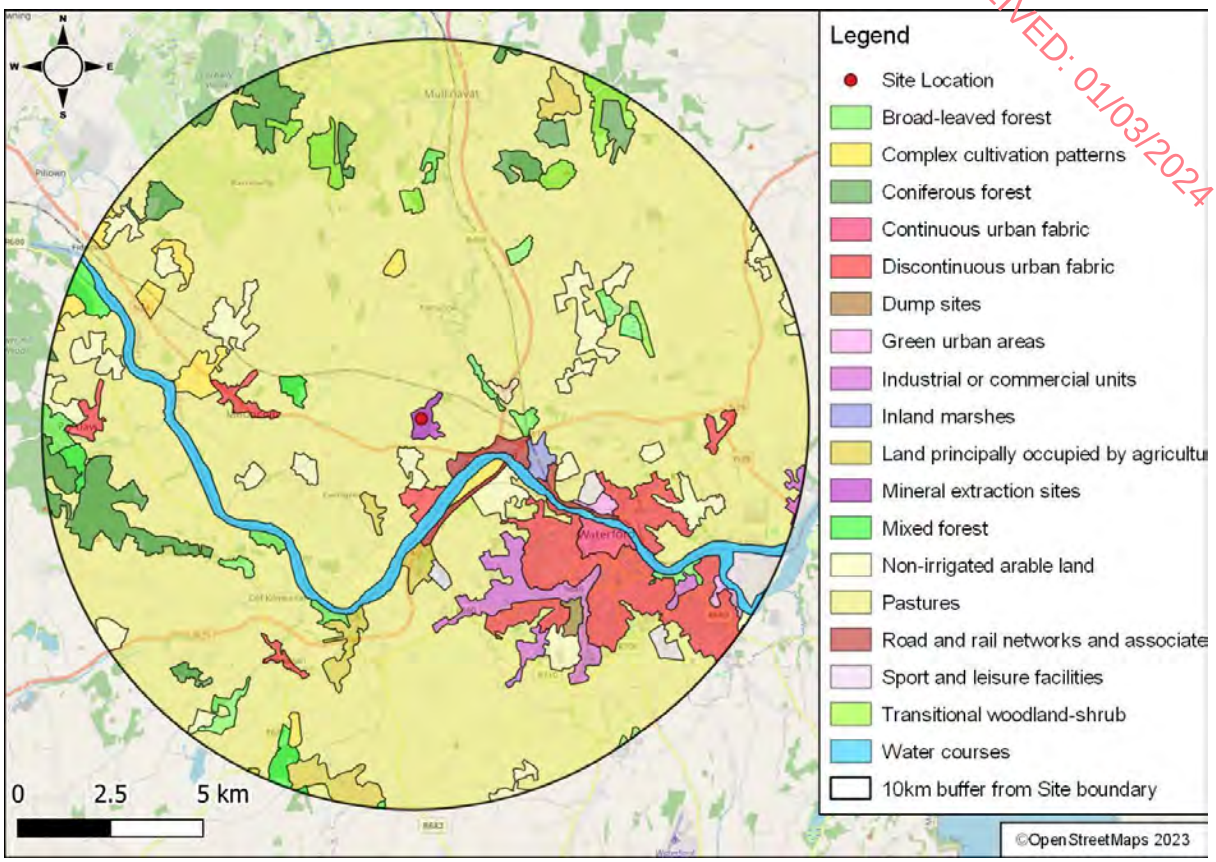
Notes The 2022 national unemployment rate was 8.6% for males and 8.0% for females [27]

These figures are taken from the Pobal site.

5.3.4 Surrounding Land Use

The surrounding land use is predominantly agricultural (pasture and crops) with the Middle Suir Estuary to the southeast and intermittent areas of coniferous/broad-leaved and mixed forest. There are also scattered agricultural businesses (e.g., pig and poultry farms) and individual rural businesses (e.g., B&Bs and a golf club). Residential development consists of scattered individual dwellings and more concentrated urban areas such as Kilmacow village and Waterford City. See Figure 5-3 below.

Figure 5-33: Land Use with 10km of Proposed Development



The nearest settlements are:

- Kilmacow Village (2km North);
- Mooncoin (4km West); and,
- Waterford City and Suburbs (5km Southeast).

There are numerous small villages in the area around the Site. The closest is Kilmacow village, which lies to the north. The village contains St Senan's National School and Kilmacow Montessori School (lying in the north of the village), a playground and a community hall. Kilmacow GAA club and Saint Senan's AC lies ca.1.8km southeast of the village. The Middle Suir Estuary is located ca.1.3km to the South and the River Blackwater is located ca.1.5km east of the Site.

5.3.5 Economic Activity and Employment

The economic activity/employment figures for those of working age (15-64) and the occupational details of the population aged 15 or over for the Site and its locality are outlined in Tables 5-4 and 5-5 below [41]. The County and State figures are provided for comparison. The high percentage of skilled tradespersons reflects the importance of construction and extraction industries in the area.

Table 5-4: Principal Economic Status according to 2022 Census

Area	In Work	Student	Retired	Caring for home/family	Unemployed	Unable to Work
Small Area 097002004	48.88%	5.62%	24.16%	11.24%	2.81%	7.30%

Small Area 097002003	55.84%	10.66%	19.80%	6.09%	2.03%	4.06%
Waterford City and Suburbs	53.14%	11.30%	16.33%	6.05%	7.04%	5.64%
Co. Kilkenny	52.83%	9.75%	16.04%	6.46%	9.59%	4.65%
National Average	56.09%	11.10%	15.90%	6.58%	5.10%	4.58%

Table 5-5: Current or Former Occupations of Local Working-Age Population (2022 Census)

Occupation	Small Area 097002004		Small Area 097002003		W'ford City & Suburbs		County Kilkenny		Ireland	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%	Numbers	%
Administrative and Secretarial Occupations	9	9.78%	12	10.53%	2,245	7.79%	4,359	8.79%	229,737	9.20%
Associate Professional and Technical Occupations	9	9.78%	11	9.65%	2,684	9.31%	5,211	10.51%	292,273	11.71%
Caring, Leisure, Service Occupations	4	4.35%	6	5.26%	2,202	7.64%	4,124	8.32%	183,584	7.35%
Elementary Occupations	9	9.78%	4	3.51%	3,152	10.94%	4,131	8.33%	203,532	8.15%
Manager/Director/Senior Officials	13	14.13%	10	8.77%	1,673	5.80%	3,831	7.73%	192,679	7.72%
Process, Plant and Machine Operatives	7	7.61%	15	13.16%	2,736	9.49%	3,404	6.87%	172,521	6.91%
Professional Occupations	15	16.30%	17	14.91%	4,550	15.79%	9,582	19.33%	507,044	20.31%
Sales and Customer Service Occupations	3	3.26%	5	4.39%	2,496	8.66%	2,856	5.76%	154,238	6.18%
Skilled Trade/Occupations	17	18.48%	26	22.81%	2,807	9.74%	8,602	17.35%	313,921	12.57%
Not Stated	6	6.52%	8	7.02%	4,278	14.84%	3,474	7.01%	247,044	9.90%
TOTAL	**92**	**100%**	**114**	**100%**	**28,823**	**100%**	**49,574**	**100%**	**2,496,573**	**100%**

5.3.5.1 Employment Opportunities in the Surrounding Area

Opportunities for employment exist in the vicinity of the Site within the village of Kilmacow and other neighbouring settlements such as Carrick on Suir, New Ross and the City of Waterford, as well as in the rural industries and smaller settlements within the surrounding area.

The majority of journeys to work and school in the area are taken by private transport, with some journeys to school taking place by bus. This has remained the case across the 2016 census and the post-COVID 2022 census, although there has been a rise in the proportion of people stating that they work from home in the 2022 census: see Tables 5-6 and 5-7 below. This change is likely to be connected to the general changes in wider working patterns arising from the COVID19 pandemic. Although SA 097002003 continues to have a greater proportion of people working from home than the national average, SA 097002004 has not seen as great an increase in working from home as the national average. This may be connected to the local importance of skilled trade and plant operation in local employment. It should be noted that when assessing the impact of the Site on local receptors, all local residential dwellings are treated with the highest sensitivity rating. As such, the increase in numbers of people working from home does not affect the findings of subsequent chapters.

Table 5-6: Commuting to Work and School (2016 Census) - Method and Time Taken

Travel						
Type of Travel/ Population Group	**SA 097002004**		**SA 097002003**		**Ireland**	
	Working Population	Student Population	Working Population	Student Population	Working Population	Student Population
Private (%)	86.30%	73.68%	78.89%	87.5%	68.81%	50.15%
Public Transport (%)	0.00%	21.05%	1.11%	10.0%	8.86%	20.33%
Bike (%)	0.00%	2.63%	0.00%	0.00%	2.88%	2.32%
Walk (%)	2.74%	2.63%	3.33%	2.50%	8.88%	23.09%
Work From Home	2.74%	0.0%	13.33%	0.0%	4.82%	0.10%

Table 5-7: Commuting to Work and School (2022 Census) - Method and Time Taken

Travel						
Type of Travel/ Population Group	**SA 097002004**		**SA 097002003**		**Ireland**	
	Working Population	Student Population	Working Population	Student Population	Working Population	Student Population
Private (%)	80.46%	81.08%	72.73%	73.77%	62.73%	50.36%
Public Transport (%)	0.0%	8.11%	0.91%	18.03%	7.85%	17.37%
Bike (%)	1.15%	0.0%	0.0%	0.0%	2.65%	2.77%
Walk (%)	5.75%	8.11%	1.82%	0.0%	7.77%	21.08%
Work From Home	9.2%	0.0%	16.36%	0.0%	11.31%	0.55%

5.3.5.2 Site Employment

The Proposed Development will allow the Applicant to continue to offer local employment opportunities for the estimated 19-year lifespan of the extended Site. The Proposed Development will not increase the employment levels at the Quarry. However, without the Proposed Development, the Quarry will eventually become exhausted and be unable to employ the entirety of the current workforce, resulting in a loss of jobs.

5.3.6 Human Health

5.3.6.1 Sensitivity

The populations of Small Areas A097002004 and A097002003 were considered in terms of the categories set out in Figure 5-1 above, with the results set out in Table 5-8 below. The over-all sensitivity of the population to any resulting impact is deemed to be 'low'.

Table 5-8: Assessed Sensitivity of Populations

Criteria	Classification	Basis
SA097002004		
Life Stage	Providing a lot of care	The % of the population aged 0-9 is below the national figure. However, the Age Dependency Ratio and the % of the population aged 64+ are both well above the national figure, increasing the over-all care burden. In addition, the % of people caring for someone with a disability is above the national figure.
Deprivation	Very Low	The Pobal Description is "marginally above average"
Health Status	Good	Although the % of people reporting 'bad/very bad' health is slightly above the national average, the % of people reporting 'very good/good' and 'fair' health is also above the national average.
Daily Activities	Limited a little	The number of people caring for people with a disability is slightly higher than the national average %, and the % of people unable to work due to disability is 1.5 times higher than the national average.
Inequalities	Narrowing	Although the male unemployment rate is above the national average, the Pobal Deprivation Index has changed from -2.94 (2016 data) to +1.51 (2022 data). The % of the population with primary-only education has decreased at each census from the 2011 to the 2022 census, and the % with a third-level education has increased over the same timeframe. The rate of home ownership is well above the national average, the over-all % in rented accommodation is below the national average and the rate of Local Authority/Housing Body renting is zero.
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 comparatively high percentage of local residences have private water supplies and oil-fired heating.

Criteria	Classification	Basis
Overall Sensitivity Score	**Low**	
SA097002003		
Life Stage	Providing some care	The age-dependency ratio is somewhat above the national figure, increasing the over-all care burden. The % of the population identifying as carers for those with disabilities is above the national figure.
Deprivation	Low/Moderate	The Pobal Description is "Marginally above average"
Health Status	Good	The % of people reporting 'bad/very bad' health is slightly below the national figure, and the % of people reporting 'very good/good' and 'fair' health is above the national figure.
Daily Activities	Limited a little	The % of people caring for someone with a disability is slightly above the national average. However, the % of people with a disability and the % of people unable to work due to illness/disability are both below the national average.
Inequalities	Narrowing	The figures for both male and female unemployment are below the national average. The % with primary-only education has decreased at each census from the 2016 to the 2022 census, and the % with a third-level education has increased over the same timeframe. The % of home-ownership is well above the national average. The over-all % in rented accommodation is below the national average and the rate of Local Authority/Housing Body renting is zero.
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. The percentage of residences with private water supplies is comparable to the national average. A relatively high percentage of residences have oil-fired heating. Traffic impact is outlined in Chapter 14.
Overall Sensitivity Score	**Low**	

5.4 Characteristics and Potential Effects of the Proposed Development

This section examines the potential effects on population and human health that may arise from the Proposed Development during all phases of the Development and also examines potential impacts that may arise if the Proposed Development did not proceed. This includes the potential for unplanned events.

5.4.1 Population

The Quarry 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.

5.4.2 Human Health

The potential effects on human health, particularly potential impacts 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: Potential health effects in relation to land, soils and geology mainly occur due to direct and indirect (dust) contact with contaminated soil. However, as stated in Section 7.5.1.2 there will be best practice controls in place to ensure any potential sources of contamination on the Site will be managed appropriately. Also, the Site will not be open to the public and therefore direct contact is unlikely. Hydrocarbons, in the form of fuels and oils, will be used onsite during extraction works. However, the volumes will be small in the context of the scale of the project and will be handled in accordance with best practice mitigation measures. The potential residual effects associated with land, soils and geology contamination and subsequent health effects are imperceptible.

Chapter 8 – Water (Hydrology and Hydrogeology)Potential health effects arise mainly through the potential for groundwater contamination. Hydrocarbons, in the form of fuels and oils, will be used on-site during the extraction works. In relation to oils and fuels, 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. All water pumped from the proposed extraction area will be passed through the existing oil interceptors. The potential residual effects associated with groundwater contamination and subsequent health effects are imperceptible.

Chapter 9 – Air Quality: This assessment looked at the potential risks from the Proposed Development to human health. In brief, given the relatively low background concentrations of suspended dust (PM_{10}) in the receiving environment, there was little risk of the annual AQS being exceeded from process contribution, thereby providing a negligible risk to human health.

Chapter 10 – Climate: An assessment of the effect of the Proposed Development on greenhouse gas emissions was carried. 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. From this perspective the Proposed Development will not be a significant contributor to climate change.

Chapter 11 – Acoustics (Noise and Vibration): An assessment of the noise and vibration effects arising from the Proposed Development for all phases was carried out in this Chapter. The predicted cumulative, site-specific and ambient, noise levels are below typical values of 55dB for daytime period as recommended by WHO guidelines. Historical activities showed that blasting operations in relation to vibration were below the limits, and therefore the likely effects from the Proposed Development were deemed imperceptible.

Chapter 12 – Landscape and Visual. An assessment of the landscape impacts and visual impacts arising from the Proposed Development was carried out in this Chapter, with potential effects on sensitive receptors being deemed imperceptible. Therefore, the effect on human health will also be imperceptible.

Chapter 13 – Cultural Heritage. 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.

Chapter 14 – Material Assets: Traffic and Transport. Traffic has the potential effect human health and quality of life. However, the assessment of effects from Traffic and Transport on the receiving environment was deemed 'imperceptible'.

5.4.2.1 Safety

The Health and Safety Authority (HSA) views the quarrying industry as a high-risk sector [43].

The use of onsite explosives to break the quarry faces for processing will be carried out in a carefully controlled manner by the suitably qualified and competent Roadstone Blasting Engineer. No explosives will be stored onsite. Before and after blast events, the area around the blast will be cleared of personnel.

The Safety and Health Commission for the Mining and other Extractive Industries (an EU Commission) produced Guidance on the Safe Use of Explosives in Quarries (2001) [44] and this is the guidance document utilised by the HSA to determine safe working practices. Extraction activities at the quarry will continue to take cognisance of this guidance document.

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, explosions, 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 very little 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 reaches and passes the water-table, water will be collected in an onsite sump and pumped to the settlement ponds prior to discharge offsite. The Proposed Development is flood compatible, with the deeper void spaces capable of holding flood waters, while key plant and equipment is moved onto the higher elevation by the main processing plant and site entrance;
- Explosion – as stated in Section 5.4.2.1 above, onsite blasting explosions will be planned and carried out by experts and no explosives will be stored onsite; and,
- Vehicular accidents – staff cars are not permitted beyond the car-park area and mobile plant will only be moved by trained operatives utilising designated routes.

5.5 Proposed Mitigation Measures and / or Factors

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

- Chapter 7 – Land, Soils and Geology: Measures to avoid any potential contamination of land soil and geology will be implemented;
- Chapter 8 – Water (Hydrogeology and Hydrology). Measures to avoid any potential contamination of water will be in place;
- Chapter 9 – Air Quality. 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;
- Chapter 12 – Landscape and Visual – measures will be implemented to avoid the effects on the landscape and visual experience of the local population; and,
- Chapter 14 – Material Assets: Traffic and Transport. Measures to ensure pedestrian safety in regard to Site traffic will be put in place.

5.6 Cumulative and In-Combination Effects

In combination with other businesses/enterprises in the area, the Quarry has contributed to sustaining the local economy and community. In combination with other extractive sites, the quarry also has a strong history of supporting the national supply of aggregates.

There is only one (1No) other working quarry within 10km radius of the Site: Kent Quarry, 8.7km to the northeast. The distance between the Site and this quarry negates the risk of cumulative and in-combination effects occurring on human health in the local population.

The Proposed Development will not lead to any increase in the annual volume extracted from the Quarry beyond the historical maximum rate of between 700,000 to 1,000,000 tonnes, nor will it lead to any increase in traffic levels related to the quarry previously experienced. Therefore, there are no cumulative impacts on the population or human health arising from the Proposed Development and Quarry.

5.7 Interactions with other Environmental Attributes

Population and human health have the potential to be impacted positively or negatively by a number of environmental issues. The relevant interactions with other key environmental factors are set out in Section 5.4.2 above (and more extensively in Chapters 6-15).

5.8 Indirect Effects

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

- Health and safety specialists;
- Refuelling;
- Blast specialists;
- Environmental monitoring personnel; and,
- Quality control personnel.

5.9 Residual Effects

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. The effects on the local and regional aggregate supply can be considered as long-term, positive and moderate.

The residual effect in terms of human health within the local population will be ‘imperceptible’ to ‘not significant’ and long-term.

5.10 Monitoring

Monitoring requirements are detailed in the relevant specialist chapters.

5.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

5.12 Difficulties Encountered in Compiling this Information

No difficulties were encountered.

6 BIODIVERSITY

6.1 Introduction

This Chapter of the EIAR details the methods and results of a desk study and field surveys undertaken to establish the baseline ecological status of the Site and its immediate surroundings and to assess the potential effects of the Proposed Development.

A detailed ecological appraisal has been carried out by a fully qualified and experienced MOR Ecologist in line with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (2018 and revisions)* [45]. In addition, an assessment on potential impacts on European sites was also undertaken and is presented in the Natura Impact Statement (NIS) submitted as part of the overall planning application.

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 effects 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) [45];
- NRA, '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*' [46];
- Fossitt's '*Guide to Habitats in Ireland'* [47];
- Heritage Council's '*Best Practice Guidance for Habitat Survey & Mapping*' [48];
- NRA, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*;' [49];
- Scottish Badgers, '*Surveying for Badgers: Good Practice Guidelines,*' [50];
- The Mammal Society, '*Surveying Badgers,*' [51];
- NRA, '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' [52];
- BCT, '*Bat Surveys for Professional Ecologists Good Practice Guidelines*' [53];
- NPWS, '*Bat Mitigation Guidelines for Ireland - Ireland Wildlife Manual No.25*' [54];
- NPWS, '*A Conservation Plan for Irish Vesper Bats – Ireland Wildlife Manual No.20*' [55];
- Ministry of Environment, Lands and Parks, '*Inventory Methods for Swallows and Swifts: Standards for Components of British Columbia's Biodiversity No. 16*.' [56];
- Barn Swallow Nest Monitoring Methods [57];
- Raptors: A Field Guide for Surveys and Monitoring [58];
- BTO – A Field Guide to Monitoring Nests [59];
- Common Bird Census (CBC) in Bird Monitoring Methods [60];
- C741 – '*Environmental Good Practice on Site (4th Edition)*' [61];
- NRA, '*Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes*' [62]; and,

- NRA, '*Guidance on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'* [63].

6.2.2 Desk Study

As a starting point, 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 a/w82nd notable species within 2km of the Site.

The area for which biological data were 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 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 (https://www.npws.ie/) [64];
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions (https://maps.biodiversityireland.ie/Map) [65];
- The EPA Maps website was consulted to obtain details about watercourses in the vicinity of the Site (https://gis.epa.ie/EPAMaps/) [66];
- The Kilkenny County Council Planning Portal was consulted to obtain details about existing / proposed developments in the vicinity of the Site (https://www.eplanning.ie/KilkennyCC/searchtypes) [3]; and,
- The Waterford City and County Council Planning Portal was also consulted to obtain details about existing / proposed developments in the vicinity of the Site (https://www.eplanning.ie/WaterfordCCC/searchtypes) [4].

6.2.3 Field Survey

In order to gain a full understanding of the Site and surrounding habitats, the field-based assessment was extended to cover a larger study area as outlined in Figure 6-1 ('the Study Area'). The Study Area encompasses the full Site alongside Mr. Clohosey's landholding and the existing quarry void. The quarry void was included within the Study Area primarily as a potential peregrine falcon habitat.

Figure 6-1: Study Area for Ecological Assessments

6.2.3.1 Habitat Survey

To establish baseline conditions within the Study Area, a field survey was undertaken on 12th July 2022 by two (2No.) suitably qualified MOR Ecologists. This survey was conducted to assess the extent and quality of habitats within the Study Area. The habitat survey was undertaken using the Fossitt's '*Guide to Habitats in Ireland*' [47] in line with the Heritage Council's '*Best Practice Guidance for Habitat Survey & Mapping*' [48].

An updated survey was carried out on the 29th September 2023 by a suitably qualified and experienced MOR Ecologist to ensure any changes to the habitats within the Study Area were recorded and reflected in this assessment.

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.

6.2.3.2 Protected / Notable Species Surveys

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 Study Area.

Flora

The Study Area 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 [67].

Amphibians

The Study Area was assessed for its potential to provide sheltering, foraging and breeding habitat for amphibians in line with the NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes,*' [49]. These include 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 survey aimed to identify and examine areas where badgers might occur by noting any evidence of badger activity. This included:

- Mammal paths;
- Badger hairs caught in sett entrances / fences / vegetation;
- Paw prints;
- Evidence of foraging (usually in the form of 'snuffle holes');
- Latrines; 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 Study Area was conducted in line with the following relevant guidance for badger:

- Scottish Badgers, '*Surveying for Badgers: Good Practice Guidelines*,' [50];
- The Mammal Society, '*Surveying Badgers,* [51]'; and,
- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [49] .

Bats

An initial assessment was carried out on the suitability of the habitats within the Study Area to support bat roosting, foraging, and commuting. This involved an inspection of mature trees and buildings during the habitat survey in accordance with the NRA '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' [52].

Mature trees were inspected for evidence of cavities, splits, cracks, loose bark, and dense and woody ivy (*Hedera helix*) growth that could be used by bats for roosting. Buildings were inspected for suitable access points, bat droppings / urine splashes, specimens, evidence of feeding remains and / or fur-oil staining. After the tree and building inspection, it was deemed necessary to undertake further assessment in relation to bats. Habitats with moderate bat suitability that have the potential to be disturbed / impacted by the Proposed Development were subject to dusk emergence and dawn re-entry surveys. A dusk emergence survey was undertaken by five (5No.) MOR Ecologists on 29th August 2022 and dawn re-entry surveys were undertaken on 17th August 2022 and 9th August 2023.

Refer to Appendix 6-2 – Bat Report for full survey methodologies.

Birds

The Study Area was assessed for its potential to provide nesting habitat for breeding birds or to support important assemblages of rare or notable bird species, as well as designated bird species. Any activity and potential nesting habitats were noted.

It should be noted that peregrine falcon surveys were begun in 2021 as part of on-going monitoring at the Quarry. Roadstone requested these surveys as part of their EMS due to the presence of suitable peregrine falcon nesting areas within the existing extraction area. As such targeted peregrine falcon surveys were undertaken in 2021, 2022 and 2023 to confirm the presence / absence of this species within the Quarry. As part of the assessment of the Proposed Development, the data from these surveys were used to determine whether any nest sites are located within close proximity to the Site. The peregrine falcon surveys were undertaken on the following dates: 19th May 2021, 15th June 2021, 19th May 2022, 3rd June 2022, 11th May 2023 and 9th June 2023.

After the initial assessment of the Study Area, it was deemed necessary to undertake breeding bird transect surveys and specialist barn swallow surveys. The breeding bird transect surveys were carried out on 11th May 2023 and 9th June 2023. The breeding bird surveys were conducted in line with the methodology described in:

- BTO - A Field Guide to Monitoring Nests [59]; and,
- Common Bird Census in Bird Monitoring Methods [60].

Specialist barn swallow surveys were also conducted on the 29th of August 2022, 11th May 2023 and 9th June 2023. These surveys followed an adapted methodology in line with the following guidance:

- Ministry of Environment, Lands and Parks, '*Inventory Methods for Swallows and Swifts: Standards for Components of British Columbia's Biodiversity No. 16*.' [56]; and,
- Barn Swallow Nest Monitoring Methods [57].

Refer to Appendix 6-3 – Bird Report for full survey methodologies.

Invasive species

The Study Area was visually assessed for the presence of any noxious / invasive species that are regulated under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) [55] such as Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*).

The Study Area 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 for the potential of the Study Area to support any other species considered to be of value for biodiversity, including those that were identified as occurring locally by the desktop study.

6.2.3.3 Survey Constraints

No survey constraints 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) and field surveys for the Site and 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 of importance 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 EIA. In this regard:

- Biodiversity conservation value relates to the quality and / or size of sites or habitats, or the size of species' populations;
- 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 impact would cause a potentially significant effect 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 [46], 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 in order 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 [68]; and,
- Other Irish Red Data Book species [69] 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 [23] incorporates two (2No.) 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.'*
- *'Future-proofing obligations under the Biodiversity Strategy 2030, including potential national designations and the preparation and delivery of a National Restoration Plan.'*

6.2.8 Regional Planning Context

6.2.8.1 Regional Spatial and Economic Strategy for the Southern Region

The Regional Spatial and Economic Strategy for the Southern Region (RSES) [2] recognises the need to conserve and enhance biodiversity through co-ordinated spatial planning between the counties within the southern region of Ireland. This strategy came into effect on 31st January 2020.

Under the biodiversity section, **Regional Policy Objective 126** states that the Southern Regional Assembly will:

a) *'Promote biodiversity protection and habitat connectivity both within protected areas and in the landscape through promoting the integration of green infrastructure and ecosystem services, including landscape, heritage, biodiversity and management of invasive and alien species in the preparation of statutory and non-statutory land-use plans. The RSES recognises the role of the National Biodiversity Data Centre through its Citizen Science initiatives;*

b) *Support local authorities acting together with relevant stakeholders in implementing measures designed to identify, conserve and enhance the biodiversity of the Region; seek and support the implementation of the All-Ireland Pollinator Plan, National Biodiversity Action Plan and National Raised Bog SAC Management Plan;*

c) *Local Authorities are required to carry out required screening of proposed projects and any draft land-use plan or amendment/ variation to any such plan for any potential ecological impact on areas designated or proposed for inclusion as Natura 2000/ European Sites and shall decide if an Appropriate Assessment is necessary, of the potential impacts of the project or plan on the conservation objectives of any Natura 2000/European Site;*

d) *Support local authorities to carry out, monitor and review biodiversity plans throughout the Region. Planning authorities should set objectives in their land use plans to*

implement and monitor the actions as set out in the National and County Biodiversity Plans, as the conservation of biodiversity is an essential component of sustainable development. Local authorities should address the issue of fisheries protection and invasive introduced species and encourage the use of native species for landscape planting in rural areas, in the review of their biodiversity plans;

e) *Support local authorities to work with all stakeholders to conserve, manage and where possible enhance the Regions natural heritage including all habitats, species, landscapes and geological heritage of conservation interest and to promote increased understanding and awareness of the natural heritage of the Region*.'

The RSES also contains policies relating to invasive species. **Regional Policy Objective 127** states that it is an objective to:

a) *'Support coordination between the Region's local authorities in terms of their measures to survey invasive species in their counties and coordinate regional responses*;

b) *Encourage greater awareness of potential threats caused by invasive species and how they are spread*;

c) *Carefully consider and implement the management of invasive species where there is a corridor, such as hydrological connections to European Sites in order to prevent the spread of invasive to sensitive sites.*'

6.2.9 Local Planning Context

6.2.9.1 Kilkenny City and County Development Plan 2021-2027

The KCCDP 2021-2027 [1] 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.

Under Chapter 9: Heritage, Culture and the Arts of the KCCDP, the Council have identified the following Development Management Requirements in relation to designated sites and protected / notable species:

- *'Ensure that an ecological impact assessment is carried out, by suitably qualified professional(s), for any proposed development likely to have a significant impact on rare and threatened species including those species protected by law and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.'*
- *'To ensure that development proposals, where relevant, improve the ecological coherence of the Natura 2000 network and encourage the retention and management of landscape features that are of major importance for wild fauna and flora as per Article 10 of the Habitats Directive.'*
- *'To protect and where possible enhance wildlife habitats and landscape features which act as ecological corridors/networks and steppingstones, such as river corridors, hedgerows and road verges, and to minimise the loss of habitats and features of the wider countryside (such as ponds, wetlands, trees) which are not within designated sites.'*
- *'To ensure that appropriate mitigation and/or compensation measures to conserve biodiversity, landscape character and green infrastructure networks are required in developments where habitats are at risk or lost as part of a development.'*

- *'Require all developments in the early pre-planning stage of the planning process to identify, protect and enhance ecological features and habitats, and making provision for local biodiversity (e.g. through protection of existing breeding sites, and provision of appropriate new infrastructure such as swift, bat and barn owl boxes, bat roost sites, green roofs, etc.) and provide links to the wider Green Infrastructure network as an essential part of the design process.'*

In relation to hedgerows, the Council state the following:

'*The Council will promote the planting of native tree and shrub species, by committing to using native species, of local provenance wherever possible) in its landscaping work and on County Council property and maximise the opportunity to enhance biodiversity within the City and County during the lifetime of the plan.'*

The Council also list the following Development Management Requirements in relation to the protection of trees, hedgerows and woodlands:

- *'To protect existing woodlands, trees and hedgerows which are of amenity or biodiversity value and/or contribute to landscape character of the county, and to ensure that proper provision is made for their protection and management, when undertaking, approving or authorising development.'*
- *'To ensure that when undertaking, approving or authorising development that sufficient information is provided to enable an assessment of impacts on woodlands, trees, and hedgerows.'*
- *'To have regard to, and seek the conservation of identified trees and woodlands from a) the National Survey of Ancient and Long-Established Woodlands, b) the Tree Register of Ireland (c) sites of significance identified in the Kilkenny Woodlands Survey 1997, (d) the National Survey of Native Woodlands, and (e) Survey of Mature Trees in Kilkenny City and Environs, in the assessment of planning applications.'*
- *'To retain hedgerows, and other distinctive boundary treatment such as stone walls, when undertaking, authorising or approving development; where the loss of the existing boundary is unavoidable as part of development, to ensure that a new hedgerow is planted using native species, and species of local provenance to replace the existing hedgerow and/or that the wall is re-built using local stone and local vernacular design.'*
- *'To discourage the felling of mature trees to facilitate development and, where appropriate make use of Tree Preservation Orders to protect important trees and groups of trees which may be at risk or have an amenity, biodiversity or historic value.'*
- *'To require the planting of native broadleaved species, and species of local provenance, in new developments as appropriate.'*

The Council lists the following Development Management Requirements in relation to native and invasive species:

- *'To require relevant development proposals to address the presence or absence of invasive alien species on proposed development sites and (if necessary) require applicants to prepare and submit an Invasive Species Management Plan where such a species exists to comply with the provisions of the European Communities (Birds and Natural Habitats) Regulations 2011-2015'*
- *'The Council will promote the use of native plants and seeds from indigenous seed sources in all landscape projects.'*

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 [70], 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 [17] 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 OPR guidelines [21], 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 in 15km have been identified for consideration as part of the screening.

Five (5No.) European sites were identified within 15km of the Site - these are presented in Figure 6-2 and Table 6-1 below.

Figure 6-2: European Sites within 15km of the Site

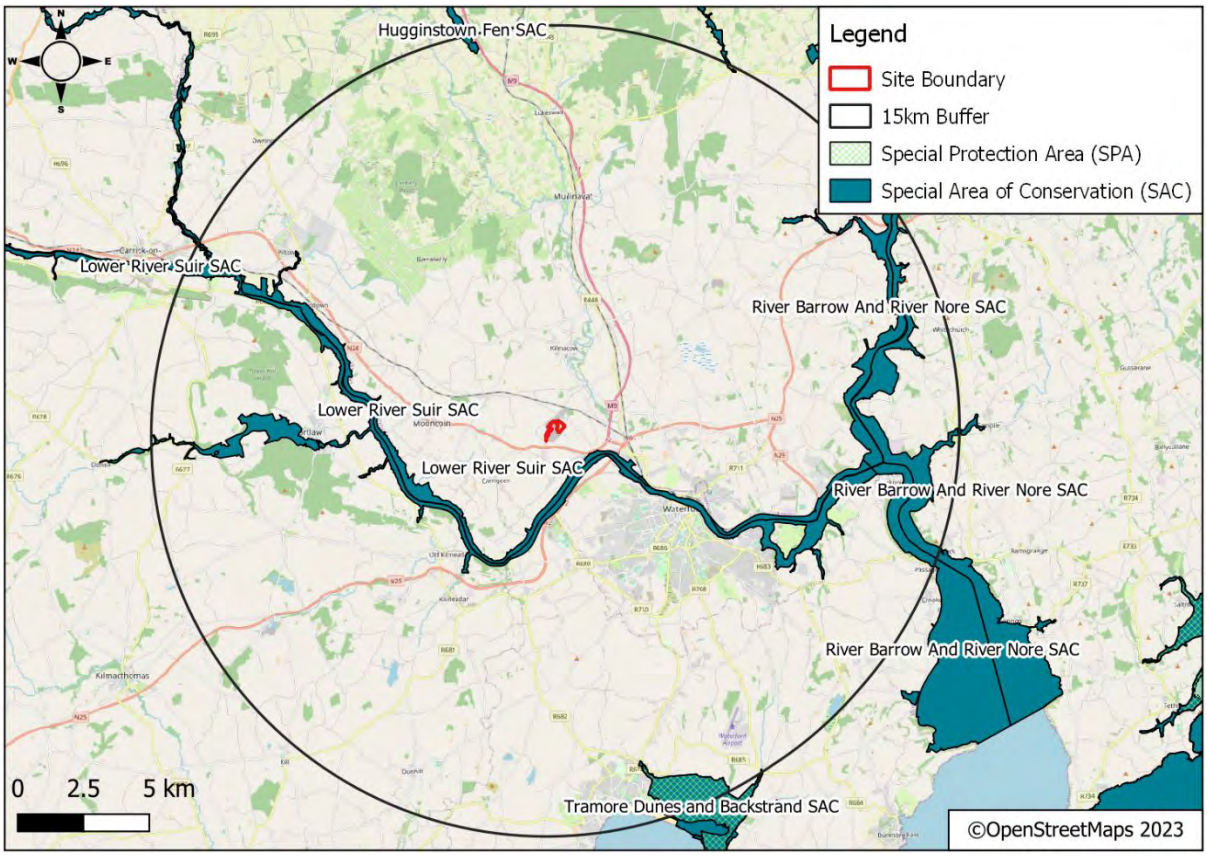


Table 6-1: European Designated Sites within 15km of the Site

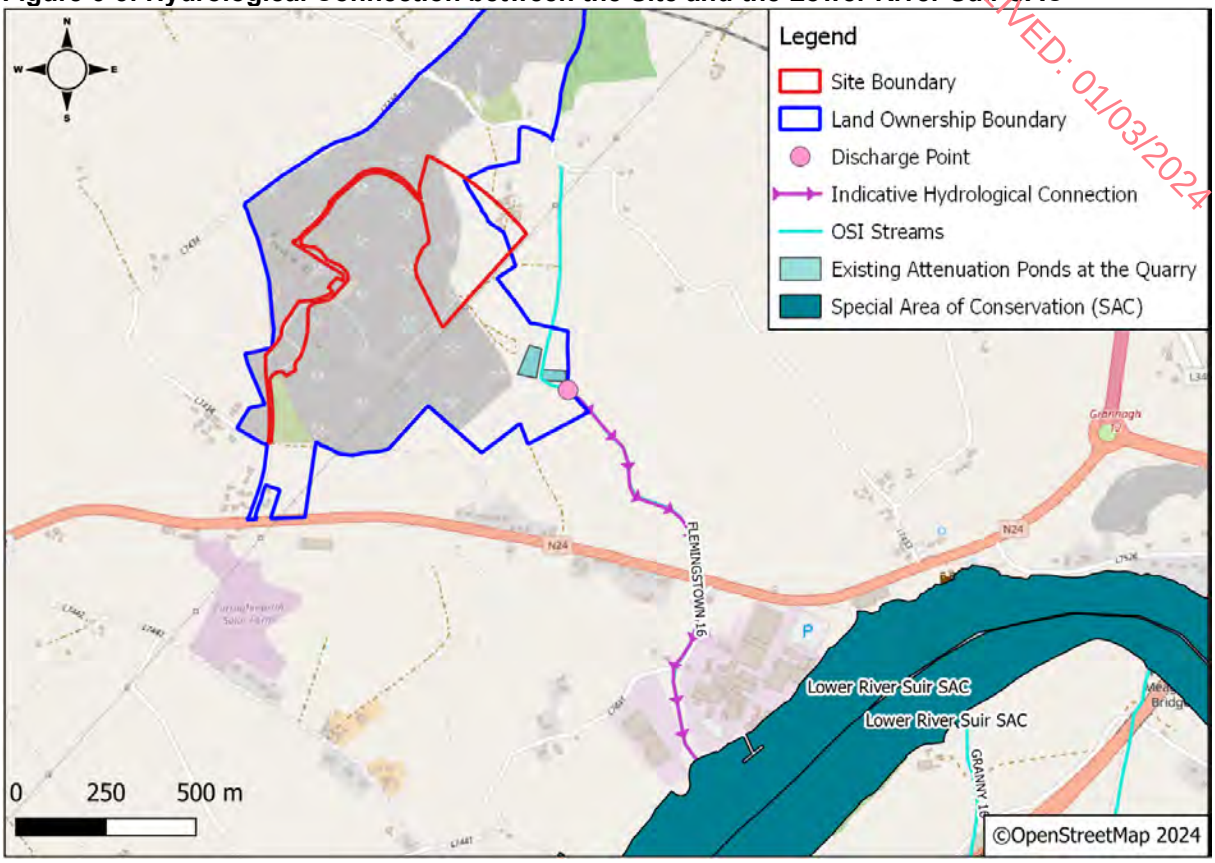
Site Name	Code	Distance (km)	Direction from the Site
Special Areas of Conservation (SAC)			
Lower River Suir SAC	002137	1.4km	S
River Barrow and River Nore SAC	002162	11.5km	SE
Hugginstown Fen SAC	000404	14.5km	NW
Tramore Dunes and Backstrand SAC	000671	13km	SE
Special Area of Protection (SPA)			
Tramore Back Strand SPA	004027	13.1km	SE

The Site is not located within any European sites, however, the boundaries of four (4No.) SACs and one (1No) SPA are located within 15km from the Site.

Given the distance, intervening lands and lack of functional impact pathways between the Site and the River Barrow and River Nore SAC, the Hugginstown Fen SAC, the Tramore Dunes and Backstrand SAC and the Tramore Back Strand SPA, these European sites have been screened out from further consideration.

However, as outlined in Section 2.3.1, the Quarry has a discharge licence (ENV/W82) which permits the discharge of water from the quarry pit via attenuation ponds to Flemingstown Stream. As such, the Site shares a hydrological connection to the Lower River Suir SAC via Flemingstown Stream, refer to Figure 6-3 below for context. Given the hydrological connection and proximity of the Site to this European designated site (ca.1.4km), further consideration was given to the Lower River Suir SAC in a Natura Impact Statement (NIS) submitted alongside this report as part of the overall planning application.

Figure 6-3: Hydrological Connection between the Site and the Lower River Suir SAC



6.3.1.2 Nationally Designated Sites

No Natural Heritage Areas (NHA) were identified within 5km of the Site. However, one (1No.) proposed Natural Heritage Area (pNHA) was identified within 5km of the Site, refer to Figure 6-4 and Table 6-2.

Figure 6-4: 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
Grannyferry	000833	2.4km west	The Grannyferry site is comprised of the lower portion of the Blackwater (Kilmacow)_050 river, a tributary to the River Suir. The lower portion of the river is tidal and this area can experience flooding. The southern section contains reed-swamps, marshes and wet fields under salt influence. These habitats contain species such as saltmarsh rush (*Juncus gerardi*) sea aster (*Aster tripolium*) and the protected plant species meadow barley (*Hordeum secalinum*). The upstream areas of the river revert to wet grasslands containing lesser pond sedge (*Carex acutiformis*), hard rush (*Juncus inflexus*) and yellow iris (*Iris pseudacorus*).

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 [65]. 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 (S51S, S51M, S51N and S51T)

Common Name	*Scientific Name*	Date of last record	Designation
Bird Species			
Barn Owl	*Tyto alba*	20/12/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Red List
Barn Swallow	*Hirundo rustica*	23/05/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Black-Headed Gull	*Larus ridibundus*	24/02/2020	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List
Common Kestrel	*Falco tinnunculus*	08/07/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern - Red List
Common Kingfisher	*Alcedo atthis*	24/08/2019	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex I Bird Species Birds of Conservation Concern Amber List
Common Linnet	*Carduelis cannabina*	01/10/2014	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Pheasant	*Phasianus colchicus*	08/01/2019	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section I and Annex III and Section III Bird Species
Common Redshank	*Tringa tetanus*	08/01/2019	Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Red List
Common Swift	*Apus apus*	08/05/2019	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Red List
Eurasian Teal	*Anas crecca*	24/02/2020	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
Eurasian Wigeon	*Anas penelope*	05/01/2019	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

Common Name	*Scientific Name*	Date of last record	Designation
Great Black-backed Gull	*Larus marinus*	24/02/2020	Wildlife Acts 1976 / 2000
Great Cormorant	*Phalacrocoras carbo*	24/02/2020	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Herring Gull	*Larus argentatus*	05/01/2019	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Lesser Black-backed Gull	*Larus fuscus*	24/02/2020	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Little Egret	*Egretta garzetta*	05/01/2019	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex I Bird Species
Mallard	*Anas platyrhynchos*	08/01/2019	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
Mew Gull	*Larus canus*	24/02/2020	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Northern Lapwing	*Vanellus vanellus*	03/01/2023	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section I and Annex III and Section III Bird Species Birds of Conservation Concern Red List
Rock Pigeon	*Columba livia*	24/02/2020	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section I
Sand Martin	*Riparia riparia*	14/04/2019	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Sky Lark	*Alauda arvensis*	23/05/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Yellowhammer	*Emberiza citrinella*	11/01/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Red List
Terrestrial Mammal Species			
West European Hedgehog	*Erinaceus europaeus*	06/09/2022	Wildlife Acts 1976 / 2000

Common Name	*Scientific Name*	Date of last record	Designation
Aquatic Mammal Species			
Common Porpoise	*Phocoena phocoena*	03/10/2015	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II and Annex IV
Bat Species			
Lesser Noctule	*Nyctalus leisleri*	20/06/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Common Pipistrelle	*Pipistrellus pipistrellus sensu lato*	20/06/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Invasive Species*			
Brown Rat	*Rattus norvegicus*	30/06/2015	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Japanese Knotweed	*Fallopia japonica*	30/05/2018	High Impact Invasive Species Regulation S.I. 477 (Ireland)

*Only invasive species that are regulated under S.I. 477 were included in the Table.

6.3.2 Field Survey Results

The following section provides details of the field-based assessment that was undertaken on the 12th July 2022 and the updated habitat assessment conducted on 29th September 2023. The distribution of the habitats and target notes identifying the location of features of interest are located in Figure 6-5.

6.3.2.1 Habitat Survey

Habitats within the Site Boundary

Improved Agricultural Grassland (GA1)

Three (3No.) improved agricultural grassland fields are present within the eastern portion of the Site. These fields were species poor, comprising of typical grassland species such as perennial ryegrass (*Lolium perenne*), meadow grass (*Poa annua*) and clover (*Trifolium spp*.). During the 2022 habitat survey, these fields were utilised as pastures for cattle. During the updated survey in 2023, these fields had recently been cut for sileage.

The field margins comprised mainly of hedgerows / treelines and their associated understory which are detailed below. However, the western boundary of the northern and central field was delineated by a fence. The following species were recorded along the fence line: cow parsley (*Anthriscus sylvestris*), creeping buttercup (*Ranunculus repens*), stinging nettle (*Urtica dioica*), ragwort (*Jacobaea vulgaris*), common daisy (*Bellis perennis*), common velvet grass (*Holcus lanatus*), cocksfoot (*Dactylis glomerata*), hairy willowherb (*Epilobium hirsutum*), and ribwort plantain (*Plantago lanceolata*).

Hedgerows (WL1) /Treelines (WL2)

Treelines form the principal field boundaries within the eastern portion of the Site. The upper field contains a north-south running treeline along its eastern boundary. This treeline separates the agricultural fields from the farmyard. A treeline running from east to west divides the northern field from the central field. In addition, treelines were present in between the central field and the southern field and in between the southern field and the quarry habitats to the west. Sections of stone walls were present underneath the roots of these treelines. A small section of hedgerow / treeline extends into the Site at the existing farmyard. Refer to Figure 6-5 for indicative locations.

The treelines within the Site comprised of common species found throughout Ireland. The dominant species recorded were ash (*Fraxinus excelsior*), hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*) and sycamore (*Acer pseudoplatanus*). Ivy (*Hedera helix*), dog rose (*Rosa canina*) and brambles (*Rubus fruticosus*) were commonplace within these treelines. The small section of hedgerow / treeline adjacent to the farmyard also contained holly (*Ilex aquifolium*).

A hedgerow is present to the north of the Site. The majority of this hedgerow lies outside the Site boundary; however, the western end extends into the Site. This hedgerow bounds the upper field to the north. Another hedgerow is present within the southeast portion of the Site. This is a managed hedgerow which separates the lower field from the access track into the farmyard. The hedgerows onsite comprised of dense hawthorn trees with wild privet (*Lingustrum vulgare*) identified in sections.

The following species were recorded within the understory of the hedgerows and treelines onsite: bull thistles (*Cirsium vulgare*), bush vetch (*Vicia sepium*), hairy willowherb, cleavers (*Galium aparine*), hearts tongue fern (*Asplenium scolopendrium*), shield fern (*Polystichum setiferum*), gooseberry (*Phyllanthus emblica*), stinging nettles (*Urtica dioica*) and primrose (*Primula vulgaris*).

Scrub (WS1)

An area of scrub was located along the western boundary of the southern field, in between the greenfield lands and the Quarry. As outlined above and in Figure 6-5, a treeline borders this scrub habitat. This narrow section of scrub links into a wider area of scrub within the Study Area.

Species recorded in this scrub habitat include nettle, bramble, shield fern, willowherb, elder, willow (Salix spp.), meadow buttercup, dock (*Rumex obtusifolius*), gorse (*Ulex europaeus*), ground ivy (*Glechoma hederacea*), hawthorn, cleavers, ragwort, horsetail (*Epuisteum arvense*), dog rose, dandelion (*Taraxacum vulgaria)* and rushes (*Juncus spp*.).

Patches of scrub were identified growing on berms in between the existing extraction area and the existing upper access track within the Quarry. These berms were dominated by brambles and gorse.

Buildings and Artificial Surfaces (BL3)

Three (3No.) agricultural sheds and the edge of a fourth agricultural shed were located within the Site boundary. A pump house was also located within the eastern portion of the Site. These buildings form part of an existing farmyard which extends outside the Site boundary.

The two (2No.) agricultural sheds and pumphouse to be removed are shown in Plate 6-1 below. These structures all have rendered walls and corrugated iron roofs. At the time of survey, these sheds formed part of an active farmyard and were subject to regular disturbance.

Plate 6-1: Structures Onsite to be Removed.

The ground within this section of the Site is covered by concrete slabs. However, patches of grass and recolonising bare ground have established in the gaps between slabs. Delicate fern moss (*Thuidium delicatulum*) was recorded in this area.

The southeastern portion of the Site also contains artificial surfaces and buildings. This area contained the Site office, carpark, weighbridge, wheel wash, secure entrance and access road into the Site. This area was covered in hardstanding and was devoid of vegetation.

Spoil and Bare Ground (ED2)

Access tracks leading to and from the existing farmyard comprised of spoil and bare ground. These areas were species poor.

Active Quarries and Mines (ED4)

The western section of the Site comprised of active quarry habitat. Given the level of disturbance from ongoing rock extraction, this habitat was mostly devoid of vegetation. Steep quarry faces, exposed rock, spoil and bare ground were key features of this habitat.

An access road runs along the top of the eastern quarry face within the Quarry. Vegetation has recolonised some of the road margins, however no species of note were recorded along the road.

Habitats within the Wider Study Area

The Study Area encompasses both active quarry habitats and greenfield lands. The following habitats were identified within the wider Study Area, outside the Site boundary:

- Improved Agricultural Grassland (GA1);
- Amenity Grassland (GA2);
- Hedgerows / treelines (WL1 / WL2);
- Scrub (WS1);
- Buildings and Artificial Surfaces (BL3);
- Flemingstown Stream;
- Other Artificial Lakes and Ponds (FL8);
- Active Quarry and Mines (ED4);
- Recolonising Bare Ground (ED3); and,
- Spoil and Bare Ground (ED2).

As per the habitats identified onsite, the greenfield lands within the Study Area were bound by a combination of fencing, managed hedgerows (WL1) and hedgerow / treelines (WL1 / WL2). The majority of greenfield lands within the Study Area comprised of improved agricultural grassland (GA1) in the form of cattle pastures.

An area of scrub (WS1) was present within the southeast portion of the Study Area. This scrub habitat surrounded two (2No.) attenuation ponds (FL8) and an area of recolonising bare ground (ED3). These attenuation ponds collect water from the quarry pit and discharge it under licence (ENV/W82) to the Flemingstown Stream. The Flemingstown Stream runs through the eastern portion of the Study Area and is located ca.88m from the Site boundary at its closest point.

The Study Area encompasses the aforementioned farmyard. This farmyard lies atop concrete slabs and contains agricultural sheds, storage areas and outbuildings (BL3). A residential dwelling (BL3) is located to the north of the farmyard. Two (2No.) areas of amenity grassland / garden habitats (GA2) surround the residential dwelling onsite. A road leads through the Study Area to the farmyard and residential dwelling. Refer to Figure 6-5 for context.

The active quarry habitat (ED4) within the Study Area is largely devoid of vegetation due to ongoing disturbance; however, patches of recolonising vegetation were observed atop the quarry benches to the west.

Figure 6-5: Habitat Map

6.3.2.2 Protected / Notable Species Surveys

Flora

No plant species protected under the Flora Protection Order were recorded within the Study Area.

Amphibians

The NBDC holds no records of amphibians within 2km of the Site [65]. The habitats within the Study Area were not considered suitable for breeding amphibians and no evidence of common frog or smooth newt was identified during the field surveys.

The attenuation ponds outside the Site boundary were steep-sided and did not contain shallow areas suitable for breeding amphibians. Flemingstown Stream was also not considered suitable for breeding amphibians due to its flow.

However, the habitats within the Site boundary and wider Study Area have the potential to support amphibians during the terrestrial phase of their life cycle.

Badger

The NBDC hold no records for badger within 2km of the Site [65]. The field surveys conducted within the Study Area did not identify any direct evidence of badger in the form of snuffle holes, scat, prints or feeding remains nor any potential setts.

However, the improved agricultural grasslands, scrub habitat and hedgerows / treelines have the potential to support commuting / foraging badger and a number of mammal paths were recorded within Study Area as outlined in Figure 6-5.

Bats

The Site and surrounding area are of medium-high suitability for bats (28.11-36.44) [65]. The NBDC contains records of Leisler's bats and common pipistrelle within 2km of the Site over the last 10 years [65].

The initial assessment of the Site identified multiple trees across the Study Area that had features considered suitable for roosting bats i.e. thick ivy growth, knot holes, cracks, broken limbs and loose bark. Eight (8No.) mature trees were brought forward for further consideration due to their proximity to the Site and the potential for disturbance effects arising from the Proposed Development. Seven (7No.) of these trees will be removed as part of the Proposed Development and one (1No.) tree is located within 15m of the Site boundary. These trees were subject to dusk emergence and dawn re-entry surveys. However, trees identified with bat roost potential along the north and east boundary of the Study Area were not considered further as these features were over 90m from the Site boundary and as such, were not considered to be within the zone of potential disturbance.

In addition, all buildings within the farmyard that were identified to have moderate bat roost suitability were subject to dusk emergence and dawn re-entry surveys. It should be noted that the two (2No.) agricultural sheds and the pumphouse to be removed as part of the Proposed Development were not considered suitable for roosting bats.

The dawn re-entry and dusk emergence surveys undertaken did not identify any roosting bats in the trees or buildings brought forward for further consideration. However, foraging and commuting behaviour was recorded around the surveyed treelines and over buildings in the farmyard. These habitats were determined to have low-moderate value for foraging and commuting bats.

Full details on the bat survey results are presented in the Bat Report attached as Appendix 6-2.

Birds

The Study Area were assessed for their potential to provide nesting habitat for birds. The key findings from the comprehensive bird surveys were:

- A total of twenty-four (24No.) species were recorded during the transect breeding bird surveys. Out of the species recorded, fourteen (14No.) were classified as '*possibly breeding*,' and four (4No.) species were classified as '*confirmed breeding*.'
- Barn swallows and starlings were classified as '*confirmed breeding'* within the farmyard in 2022 and 2023. However, no nests were recorded within the structures to be demolished as part of the Proposed Development;
- Peregrine falcons were classified as '*confirmed breeding*' within the Quarry in 2021 and 2022. However, no breeding activity was recorded in 2023; and,
- Sand martins were classified as 'confirmed breeding' within the Quarry in 2023.

Please refer to Appendix 6-3 – Bird Survey Report for further details.

Otter

The NBDC holds no records for otter within 2km of the Site [65]. No evidence of otter was identified during the field surveys and the section of the Flemingstown Stream within the Study Area was not considered suitable for otter.

However, the Flemingstown Stream discharges into the Middle Suir Estuary. The Middle Suir Estuary is known to support otter and therefore, a hydrological impact pathway was identified from the Study Area to habitats that support this species.

Invasive Species

No high impact invasive species or plant species listed on the Third Schedule of the 2011 European Communities (Birds and Natural Habitats) Regulations (i.e. species of which it is an offense to disperse, spread or otherwise cause to grow in any space) were identified within the Study Area.

Other Species

Hedgehogs are a 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 [65]. No direct evidence of hedgehogs was identified within the Study Area; however, the areas of scrub, grassland habitats and hedgerows / treelines provide suitable cover and sheltering habitat for this species.

European rabbits were directly observed on multiple occasions during the field surveys within the Study Area. Rabbit holes and droppings were identified throughout the Study Area. It is considered that the improved agricultural grasslands and hedgerows / treelines provide suitable foraging, commuting and sheltering habitat for this species.

There are records of common porpoise within 2km of the Site [65]. There are no suitable habitats within the Study Area for this species. However, a hydrological connection is present between the Study Area and the Middle Suir Estuary (which is known to support this species) via the existing attenuation ponds and Flemingstown Stream.

6.4 Characteristics and Potential Effects of the Proposed Development

6.4.1 Sensitive Design

Roadstone is a subsidiary of CRH plc, and therefore operates under CRH's environmental policy and principles in respect of biodiversity. In relation to mitigating against impacts on biodiversity for extractive activities, CRH's Sustainability Report [71] states the following:

'To demonstrate that biodiversity is a priority, we have stringent mitigation plans in place and operating companies apply the principles of the 'Mitigation Hierarchy' to avoid, minimise, restore and offset any negative effects on the environment. This helps us to avoid and minimise potential impacts on water quality, the disturbance of birds, animals and plants, and the fragmentation of biodiversity corridors. In addition, environmental impact assessments (EIAs) and rehabilitation plans associated with permit applications require biodiversity management plans (BMPs) to be incorporated into site management plans.'

'Extractive activities can transform land into important habitats for rare species. We enhance these habitats through incorporating specific wildlife-led design features, such as providing structures suitable for the nesting of bats, birds, bees and other species of ecological importance. Other measures include suspending blasting during nesting periods and excluding specific areas from quarrying to avoid valuable habitats.'

Roadstone also operate all of their quarries in accordance with an EMS which is accredited with ISO 14001:2015 and thereby independently audited.

To achieve these objectives, 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 Proposed Development. The measures relevant to this project have been detailed below.

- A Restoration Plan will be implemented following completion of the quarrying activities in order to conserve and, where possible, enhance the areas of retained and created habitat. Extractive activities can create important habitats which are suitable for a number of rare and protected species, such as red hemp-nettle (*Galeopsis angustifolia*), basil thyme (*Acinos arvensis*), rare orchids, sand martins and peregrine falcons;
- 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 to be stripped from the Site, will be reused, where possible, in berms 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 20:00 on Monday to Friday and 07:00 to 18:00 on Saturdays. Therefore, potential impacts to nocturnal species in the area will be limited; and,
- Dust control measures will be implemented as part on going works, as detailed in Chapter 9 – Air Quality.

6.4.2 Identification of Potentially Significant Effects on Identified Receptors

Based on the methodology that is 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 Two Appropriate Assessment Report: Natura Impact Statement (NIS) was prepared as part of the overall planning application. 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 provided that the mitigation measures incorporated in the NIS are fully adhered to and that progression to Stage Three of the Appropriate Assessment process (i.e., Assessment of Alternative Solutions) was not considered necessary. For full details on the assessment of effects to Natura 2000 sites, refer to the NIS submitted as part of planning.	European sites have been scoped in for further consideration. Refer to the NIS submitted as part of planning for full details.
Proposed Natural Heritage Areas (pNHAs)	Wildlife Act 2000 (as amended).	Nationally designated sites for conservation.	There are no Natura Heritage Areas (NHA) within 5km of the Site and one (1No.) Proposed Natural Heritage Areas (pNHA). Due to the distance separating the Site from the Grannyferry pNHA and the absence of impact pathways, it is not considered that the Proposed Development will result in any significant adverse impacts on this pNHA. This receptor has therefore been scoped out from further consideration.	Proposed Natural Heritage Areas have been scoped out from further consideration.
Habitats				
Improved Agricultural Grassland (GA1)	N/A	Low Local Value	Improved agricultural grasslands are widespread across Ireland. The species recorded in this habitat were typical grassland species and not of conservation concern. This grassland is subject to frequent grazing and sileage cuts, lowering its biodiversity value. Any loss of this habitat is not considered to be significant. Therefore, the impact of the Proposed Development on this habitat is not significant and this receptor has been scoped out from further consideration.	Improved agricultural grassland has been scoped out from further consideration.
Spoil and Bare Ground (ED2)	N/A	Low Local Value	Spoil and bare ground habitats are of limited 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 from further consideration.	Spoil and bare ground have been scoped out from further consideration.

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
Active Quarries and Mines (ED4)	N/A	Low Local Value	Given the disturbed and active nature of this habitat, it is considered to be of limited ecological value. Therefore, any alteration / loss of this habitat is not considered to be significant. Subsequently, the impact of the Proposed Development on active quarry areas is not significant and this receptor has been scoped out from further consideration.	Active Quarry has been scoped out from further consideration.
Scrub (WS1)	Wildlife Act 2000 (as amended)	Low Local Value	The Proposed Development will result in the removal of scrub to facilitate the extraction of material within the extension lands to the east. The loss of this habitat is not considered to be significant due to the small area of scrub to be removed and the proximity of this habitat to the active quarry and access road. Therefore, this receptor has been screened out from further consideration. However, any vegetation clearance works will be subject to restrictions, see nesting birds below.	Scrub has been scoped out from further consideration.
Hedgerows/Treelines (WL2/WL2)	Wildlife Act 2000 (as amended)	High Local Value	The majority of hedgerows and treelines within the Site boundary will be removed to facilitate the Proposed Development. Due to the loss of this habitat, which is of high local value, this receptor has been scoped in for further consideration. It should also be noted that, restrictions apply with regards to the time of year in which vegetation can be cut in order to avoid impacts to protected species such as nesting birds (see below).	Hedgerows / Treelines have been scoped in for further consideration.
Buildings and Artificial Surfaces (BL3)	N/A	Low Local Value	The Proposed Development includes for the removal of two (2No.) agricultural sheds and a pumphouse . These structures are not considered to be of high ecological value; however, they have the potential to support breeding birds. Refer to the relevant species section below. Adopting a precautionary approach, these structures have been scoped in for further consideration.	Buildings and artificial surfaces have been scoped in for further consideration.
Flora and Fauna				
Flora	Flora (Protection) Order 2022 (S.I. No. 235/2022)	N/A	No plant species protected under the Flora Protection Order were recorded within the Study Area. Overall, the impact of the Proposed Development on notable / protected flora is considered to be imperceptible.	Flora have been scoped out from further consideration.

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
Amphibians	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex V	Low Value Local	Amphibians are commonly associated with quarry sites. These species are relatively widespread and abundant in Ireland and they are of conservational interest and are protected under the Schedule V of the Wildlife Act. However, no suitable breeding habitats for frogs or newts were identified within the Study Area. Therefore, this receptor has been scoped out from further consideration.	Amphibians have been scoped out from further consideration.
Badgers	Wildlife Acts 1976 / 2000	Low Value Local	No evidence of badger nor any badger setts were identified within the Study Area during the field surveys. However, badgers are a common and widespread species across Ireland and the habitats within the Study Area provide opportunities for foraging and commuting badger. Taking a precautionary approach, general mitigation measures to prevent impacts on badger will be undertaken, refer to Section 6.5 below. 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	Low Value Local	Eight (8No.) mature trees and all buildings with bat roost potential within the farmyard were surveyed for roosting bats. No bat roosts were identified during these surveys; however, foraging and commuting activity was recorded. Given the presence of foraging and commuting activity within the Study Area and the presence of trees / buildings with the potential to support bats in the future, a precautionary approach has been taken and this receptor has been scoped in for further assessment. It is important to note that 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 light spillage into dark areas.	Bats have been scoped in for further consideration.
Birds	<u>Nesting Birds</u> Wildlife Acts 1976 / 2000 <u>Peregrine Falcon</u> Wildlife Acts 1976 / 2000 European Habitats Directive	High Value Local	<u>Nesting Birds</u> The works will require the removal of ca.479 linear metres of hedgerows / treelines onsite and ca.0.27ha of scrub. This will result in the loss of potential nesting and foraging habitat for a range of common countryside birds. Therefore, mitigation measures have been incorporated below in relation to common nesting birds. It is important to note that additional planting will be implemented to compensate for the vegetation removed during the construction phase of the Proposed Development. <u>Peregrine Falcon</u> The quarry habitats within the Study Area have the potential to support breeding peregrine falcon and active nests were recorded in 2021 and 2022 along the western quarry face. No evidence of breeding activity was identified in 2023.	Birds have been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
	Annex I Bird Species Sand Martin Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List Barn Swallows Wildlife Acts 1976 / 2000 Birds of Conservation Concern – Amber List		As peregrine falcons are a legally protected Annex I species and have been observed within the Study Area, further consideration will be given to this species in order to ensure this species is not disturbed by the Proposed Development. Sand Martin Sand martin are commonly associated with quarries as these sites often provide suitable nesting habitat in exposed / disturbed banks. A number of sand martin nest holes were identified within the Study Area during the 2023 peregrine falcon survey. As such, further consideration will be given to this species in order to ensure this species is not disturbed by the Proposed Development. Barn Swallow Barn swallows were not identified utilising the structures to be removed as part of the Proposed Development for breeding purposes. However, barn swallows were recorded breeding within the adjacent farmyard. There is potential that barn swallows will move into the structures to be demolished prior to their removal. Therefore, precautionary mitigation has been included below in relation to this species and the demolition of buildings onsite.	
Otter	Wildlife Acts 1976 / 2000	Low Local Value	As discussed in Section 6.3.2.2, Flemingstown Stream is not considered suitable for otter and no evidence of this species was identified in the Study Area. However, given the hydrological connection between the Site and the Middle Suir Estuary, which is known to support otter, mitigation measures will be required to protect otters and other aquatic species from effects associated with water quality impairment. Refer to Section 6.5 and Chapter 8 for further details.	Otters have been scoped in for further consideration.
Invasive Species	N/A	N/A	No high impact invasive species listed on the Third Schedule of the 2011 European Communities (Birds and Natural Habitats) Regulations (i.e., species of which it is an offense to disperse, spread or otherwise cause to grow in any place) were recorded within the Study Area during the field surveys. Standard measures will be implemented in order to ensure no invasive species are introduced into the Site during the construction, operational and restoration phase of the Proposed Development (see Section 6.5 below). This is in compliance with development management requirements of the KCCDP [1].	Invasive species have been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation / Policies	Valuation of the Site	Scoping Result and Justification	Scoping Result
Other Species	Common species N/A	Low Local Value	Given the presence of suitable habitats within the Study Area for rabbits, foxes and other terrestrial mammals, standard protection measures for these species will be incorporated into the works in line with the development management requirements [1] refer to Section 6.5.5 below. In addition, mitigation measures have been incorporated into Chapter 8: Water (Hydrogeology and Hydrology) to prevent water quality impairment.	Other species have been scoped in for further consideration.

6.4.3 Summary

Following a detailed assessment, the following species and habitats were identified as receptors that warranted further consideration in Section 6.5 below and the NIS submitted as part of planning:

- Natura 2000 sites;
- Hedgerows / Treelines (WL1/WL2);
- Buildings and Artificial Surfaces (BL3)
- Badgers;
- Bats;
- Birds;
- Otters;
- Invasive Species; and,
- Other Species

In addition to the species listed above, general mitigation / best practice measures have also been included for the Proposed Development. As noted above, a Restoration Plan will be developed for the Site to be implemented following completion of the quarrying activities. An outline plan is presented as part of Appendix 6-1, for further details refer to Section 6.5.5 below.

6.5 Proposed Mitigation Measures and / or Factors

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

- Quarrying activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The mitigation measures detailed within this EIAR will be fully adhered to; and,
- The Site manager shall ensure that all personnel working onsite are trained and aware of the mitigation measures detailed within the EIAR.

The following general measures will also be adhered to during the Proposed Development works:

- If protected or notable species are encountered during operations at the Site, works will stop within the area that these animals are identified, the Ecological Clerk of Works (ECoW) will be contacted for advice; and,
- Should unidentified burrows be identified within the works area, the ECoW will be contacted, and advice sought.

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 Proposed Planting

The hedgerows / treelines onsite are considered to be of high local biodiversity value. As part of the Proposed Development, 479 linear metres of hedgerows / treelines will be removed and as such this habitat was screened in for further consideration.

However, as outlined in Section 3.3.1.4 of this EIAR, two (2No.) planted berms will be created onsite to fully replace any vegetation lost to facilitate the Proposed Development. The first berm will be ca.140m long and the second berm will be ca.250m long. The combined length of these berms is 390m and they are ca.12m wide. The existing hedgerows / treelines to be removed are 2-3m wide. As such, the berms provide a larger area for vegetation to become established. This will result in a net increase in trees / shrub vegetation cover onsite.

The planting will take place within the first available season (November to March) and any trees that fail to become established within 5 years of planting will be replaced by trees of a similar size / species within the next planting season. Refer to Appendix 6-1 for full details.

6.5.2 Protection for Bats

The following measures, outlined in the Bat Report submitted as Appendix 6-2, will ensure that the Proposed Development does not result in any adverse impacts to bats:

- Two (2No.) soil embankments will be planted along the eastern boundary of the Site, which will provide linear habitats for foraging and commuting bats and compensate for the loss of vegetation during the construction phase of the Proposed Development;
- No works are proposed to any buildings identified with bat roost potential as these buildings are located within the portion of the farmyard outside the Site boundary. Any future works to these structures will be subject to the required environmental assessments and mandatory statutory consents;
- No bats were confirmed to be roosting in the seven (7No.) trees with Potential Roost Features (PRF) to be removed. As a precautionary measure, an updated tree

inspection will be undertaken to confirm onsite conditions have not changed prior to the removal of these trees. If conditions onsite remain the same, no monitoring in relation to bats will be required. If these trees show evidence of bat activity or an increased potential for supporting roosting bats, updated emergence / re-entry surveys will be undertaken. If bats are found to be roosting within these trees after updated surveys, then further measures will need to be considered in order to protect bats against any disturbance. The NPWS will be consulted for advice and a derogation licence will be obtained if required; and,

- Where possible, the PRF trees and buildings which are to be removed, should be felled / demolished on mild days during the autumn months of October – November or during spring months of February-March (felling during the spring or autumn avoids the periods when bats are most active and without young).

6.5.3 Protection for Birds

6.5.3.1 Nesting Birds

To ensure no impacts occur to nesting birds within the vegetation onsite, the following mitigation measures will be put in place:

- During the construction phase clearance works, as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000, the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated land or in hedges or ditches will be restricted during the nesting and breeding season for birds and wildlife, from 1st March to 31st August;
    - In the event that works need to be undertaken within the main breeding season, this would be undertaken in consultation with the ECoW and NPWS;
    - Prior to the vegetation removal the ECoW will inspect the Site;
    - All vegetation clearance works will be undertaken in a systematic way; and,
- In the unlikely event birds nest within the active working area during the works, all works will stop within the immediate area and the ECoW will be consulted.

As outlined in Section 6.5.1, the proposed berms will be planted with a mix of native trees and shrubs. This will compensate for the loss of potential nesting habitat for birds and provide potential habitat for birds in the future. Following the implementation of the above-mentioned mitigation measures and taking into account the species identified onsite (refer to Appendix 6-3 Bird Report for further information), it is considered unlikely that birds will be significantly impacted as a result of the Proposed Development aside from some noise disturbances during construction and operation. As birds are highly mobile, it can be concluded that any temporarily disturbed birds will move away from the disturbance to a more suitable area. Therefore, disturbance is not considered likely to be a significant effect. In addition, given the presence of the long established Quarry, it is considered that any birds utilising the area would be habituated to high levels of noise and disturbance during the existing operating hours.

6.5.3.2 Peregrine Falcon and Sand Martin

To avoid potential effects on peregrine falcons and sand martins as a result of the proposed works, the following measures will be implemented:

- All personnel operating onsite will be made aware of the legal protection afforded to peregrine falcons and sand martin;

- The previous peregrine falcon nest area (identified in 2021 and 2022 surveys) within the Quarry will continue to be monitored for the presence of nesting on an annual basis;
- If peregrine falcons or sand martin are identified colonising any areas to be impacted by the Proposed Development, then works will stop within the identified area. An appropriate undisturbed buffer zone will need to be established for the duration of the breeding season or until the chicks have fledged and left the nest, which will be confirmed by the ECoW; and,
- Should a peregrine falcon or sand martin nest be identified onsite, all personnel operating on the Site will be made aware of the presence and location of the nest.

The 2021 and 2022 surveys identified active peregrine nests along the western face of the Quarry; however, no active nests and minimal activity were recorded in 2023. As outlined above, mitigation measures will be implemented onsite to ensure that the Proposed Development does not result in undue disturbances to peregrine falcons.

6.5.3.3 Barn Swallows

To avoid potential impacts on barn swallows or any other breeding bird utilising the structures onsite, the following measures will be implemented:

- The demolition of the two (2No.) agricultural sheds and pumphouse onsite will take place outside of the nesting bird season (1st March to 31st August); and,
- Should demolition works be required within the bird nesting season, an external and internal building inspection will be required to confirm the presence / absence of breeding birds within these buildings. If birds are identified to be nesting within these structures during the building inspection, then all works must cease and the ECoW and NPWS will be consulted.

6.5.4 Protection for Otters and Aquatic Species

Should run-off of potential pollutants from the proposed works enter the Flemingstown Stream, this could adversely affect the water quality within this watercourse and further downstream within the wider catchment. It is important to note that the Flemingstown Stream discharges into the Middle Suir Estuary which forms part of the Lower River Suir SAC. The Middle Suir Estuary is known to support otters and aquatic species such as Atlantic salmon, twaite shad and lamprey species.

Potential pollutants resulting from the proposed works include suspended solids, silt and hydrocarbons. Sediment and silt have the potential to clog fish gills, degrade spawning habitats and cover / smother aquatic vegetation. Therefore, these pollutants could directly affect aquatic species or indirectly affect riparian species such as otter by changing the populations of their food supply. In addition, hydrocarbons have the potential to change the chemical balance of a waterbody and are persistent in the environment which can prove toxic to fish and other wildlife such as otters. Hydrocarbon is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in the death of aquatic organisms.

It should be noted that it is considered highly unlikely that any potential pollutants from the Site will have a significant effect on aquatic species within the Middle Suir Estuary. This is due to the intervening downstream distance and the large body of water associated with the Middle Suir Estuary. It is considered that any potential pollutants arising from the Proposed Development would be dispersed, diluted or would settle out of the river network before any adverse effects on aquatic species occurs.

However, a precautionary approach has been taken and mitigation measures will be implemented during the construction and operational phases of the Proposed Development to ensure that there will be no potential release of pollutants from the Site to Flemingstown Stream and subsequently the Middle Suir Estuary, refer to Chapter 8: Water (Hydrogeology to Hydrology) for further information.

6.5.5 Protection for 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) onsite 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 Site clearance works be required outside of daylight hours, the appointed ECoW will be consulted;
- If unidentified burrows are identified within the works area during works, the ECoW will be contacted for advice; and,
- The clearance of dense areas of scrub will be supervised by the ECoW.

6.5.6 Measures for Invasive Species

In order to mitigate against the unintentional introduction of invasive species to the Site during quarrying operations, the following measures will be followed in-line with Objective 2 of the NBAP and the NRA guidelines for the management of noxious weeds and non-native invasive plant species [63]:

- All vehicles, machinery and any other equipment that may be used for the works will be washed and clean while being used on the Site to prevent the import of plant material / seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed; and,
- Any vehicles and machinery that are not clean will not be permitted entry to the Site.

6.5.7 Restoration Phase

Following 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 6-1. The Restoration Plan has been developed taking into account the restoration plan for the Quarry, the species that will likely utilise the area following completion of the works, and also measures to enhance the Quarry for these species.

The Restoration Plan includes for the accumulation of water within the quarry pit after operations have ceased. Bare ground ‘scrapes’ will be left in areas of the Quarry for invertebrate species that specialise in bare ground habitats. In addition, emergent and marginal vegetation will be planted on the ramps entering the waterbody onsite with the aim of creating a self-sustaining plant community in the shallow areas of water.

The Site will be subject to an updated ecological assessment in advance of the implementation of the Restoration Plan to ensure that the recommendations remain relevant and to ensure that the works required to implement the plan will not result in any impacts on biodiversity or breaches of relevant wildlife legislation.

6.5.8 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 onsite. However, the

taxa commonly associated with quarry environments have been considered as part of this assessment.

Ongoing ecological monitoring throughout the life cycle of the Proposed Development will ensure that any protected or notable species will be identified and that appropriate mitigation / preventative actions can be taken.

6.6 Cumulative and In-combination Effects

As described above, the Proposed Development works will not have a significant effect on valued ecological receptors at the Site or within the wider Study Area. The Proposed Development consists of an extension to the Quarry, therefore, cumulative or in-combination effects of the Proposed Development in combination with the existing extraction activity at the Quarry have been considered throughout this assessment.

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 8 – Water (Hydrogeology and Hydrology): Flemingstown Stream runs through the Study Area, ca.90m east of the Site. This watercourse is hydrologically connected to the Middle Suir Estuary which forms part of the Lower River Suir SAC. Water quality deterioration has the potential to affect aquatic and riparian species. However, appropriate mitigation measures are presented in Chapter 8 to mitigate potential effects.
- Chapter 9 – Air Quality: Dust related effects can affect the ability of vegetation to photosynthesise. Dust mitigation measures have been included in Chapter 9 to minimise potential effects to identified ecological receptors; and,
- Chapter 10 – Climate: Climate change has the potential to affect ecosystems. An assessment was carried out on the projected GHG emissions, the potential residual effects from the Proposed Development were deemed ‘not significant’, refer to Chapter 10 for further details from this assessment.

6.8 Indirect Effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout the Chapter.

6.9 Residual Effects

Based on the methodology set out in Section 6.2, the initial assessment of ecological receptors (Table 6-4) screened out the following habitats and species:

- Proposed National Heritage Areas (pNHAs);
- Improved Agricultural Grassland (GA1);
- Scrub (WS1);

- Spoil and Bare Ground (ED2);
- Active Quarries and Mines (ED4);
- Flora; and,
- Amphibians.

These ecological receptors were screened out from further assessment as the potential impacts were considered to be imperceptible or not significant, 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:

- Natura 2000 sites;
- Hedgerows / Treelines (WL1 / WL2);
- Buildings and Artificial Surfaces (BL3)
- Badgers
- Bats;
- Birds;
- Invasive Species; and,
- Other Species.

Mitigation has been proposed for each of these ecological receptors alongside enhancement measures for the Site as part of the Restoration Plan as outlined in Section 6.5 and Appendix 6-1. The results of these measures on these ecological receptors and the resulting residual impact are described below in Table 6-5.

Table 6-5: Valuation of Potential Ecological Receptors Post Mitigation and Enhancement

Receptor	Potential Impact	Assessment of Impacts Post Mitigation and Enhancement	Residual Impact
Hedgerow (WL1) / Treeline (WL2)	Vegetation removal	The Proposed Development will require patches of scrub and ca.479 linear metres of treelines and hedgerows to be removed. This will have a negative medium-long term effect. However, as part of the proposed works, berms will be planted with native species to replace the vegetation lost during the vegetation clearance works. The first berm will be ca.140m long and the second berm will be ca.250m long. Although the combined length of these berms is 390m, they are ca.12m wide and 2.75m high. As such, the berms will provide a wide area for planting and the ca.479m of removed hedgerows / treelines will be fully replaced by double / triple rows of vegetation atop the berms. This landscape planting will ensure that the vegetation clearance undertaken at the Site is not significant.	Not significant
Bats	Disturbance of roosts and foraging / commuting habitats	Following the implementation of the mitigation measures outlined in Section 6.5.2, it is considered that potential effects on bats will be not significant.	Not significant
Badgers	Disturbance	Following the implementation of the mitigation measures outlined in Section 6.5.4, it is considered that potential effects on terrestrial mammals, such as badger, will not be significant.	Not significant
Other species			

Birds	Disturbance of breeding birds	Following the implementation of the mitigation measures outlined in Section 6.5.3, it is considered that the potential effects on breeding birds will not be significant.	Not significant
Otter	Water quality impairment	Following the implementation of the mitigation measures referred to in Section 6.5.4 and outlined in Chapter 8, water quality within Flemingstown Stream and therefore, the Middle Suir Estuary will be protected. Subsequently, species utilising the river network downstream of the Site will be safe guarded.	Imperceptible
Invasive Species	Introduction and spread of invasive species.	Provided the mitigation outlined in Section 6.5.5 is followed, the effects to valued ecological receptors as a result of the spread or introduction of invasive species will be imperceptible.	Imperceptible

Overall, the majority of the Site is considered to be of low ecological value. Taking into account the mitigation measures and proposed planting that will be implemented, it is considered that the impacts on ecology from the construction and operational phase of the Proposed Development will be not significant.

In the longer-term, following the cessation of quarry activities at the Site and the successful implementation of the Restoration Plan, it is considered that the Proposed Development will not have a significant negative effect on biodiversity. The implementation of the Restoration Plan, which includes the creation of an additional lake habitat with emergent and marginal vegetation, areas of bare ground and planted berms will tie into the existing restoration plan for the Quarry granted under planning reference: 16/700.

6.10 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 to ensure that all of the works are completed in line with the EIAR, NIS and CEMP;
- The ECoW will undertake monthly Site inspections as required during the construction works to ensure all works are completed in line with the EIAR, NIS and CEMP;
- The success of the berm planting will be monitored and any trees that fail to become established within 5 years of planting will be replaced by trees of a similar size / species within the next planting season;
- The previous peregrine falcon nest area (identified in 2021 and 2022 within the Quarry) will continue to be monitored for the presence of nesting on an annual basis; and,
- Rehabilitation success monitoring will be undertaken after the cessation of quarry activities onsite. Refer to Appendix 6-1 for further information.

6.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

6.12 Difficulties Encountered

No difficulties were encountered in undertaking this assessment.

7 LAND, SOILS AND GEOLOGY

7.1 Introduction

This chapter of the EIAR provides a baseline description and assessment of the potential likely and significant effects of the Proposed Development on the receiving land, soils and geological environment at the Site in Kilmacow, Co. Kilkenny.

7.2 Methodology

7.2.1 Legislation Context

The following European Union (EU) Directive relate to Land, Soils and Geology at the Site in this EIAR:

- Environmental Impact Assessment Directive (2011/92/EU) ;
- Environmental Impact Assessment Directive (2014/52/EU);
- The management of waste from extractive industries (2006/21/EC); and,
- Environmental Liability Directive (2004/35/EC).

The EU EIA Directive regulates the information impact assessment process and information in this EIAR. The management of waste Directive and the Environmental Liability Directive regulates the activities at the Site.

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 of 1995, S.I. No. 352/1998, S.I. No. 93/1999, S.I. No. 450/2000 and S.I. No. 538/2001), S.I. No. 30/2000, the Planning and Development Act, and S.I. 600/2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/373/EEC and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- 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: 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; and,
- The Heritage Act 1995, as amended.

7.2.2 Relevant Guidance

The Land, Soils and Geology section of this EIAR has been prepared with regard to the following guidelines:

- EPA: Guidelines on the Information to be Contained in Environmental Impact Assessment Reports [22];
- DoEHLG: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities [72];

- Geological Survey of Ireland (GSI) and Irish Concrete Federation (ICF) Geological Heritage Guidelines for the Extractive Industry [32];
- Institute of Geologists of Ireland (IGI) (2002) Geology in Environmental Impact Statements, A Guide [73];
- IGI (2007) Recommended collection, presentation and interpretation of geological and hydrogeological information for quarry developments [74];
- NRA (2008) Environmental Impact Assessment of National Road Schemes - A Practical Guide [75];
- NRA (2008) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes [76];
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment [17]; and,
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU) [77].

7.2.3 Desk Study

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

- Geological Survey of Ireland (GSI) online mapping (www.gsi.ie) [34];
- Environmental Protection Agency (EPA) Maps database (www.epa.ie) [66];
- Geological Survey of Ireland (GSI) - Groundwater Database [78];
- Met Eireann Meteorological Databases (www.met.ie) [79];
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie) [64];
- GSI Bedrock Geology 1:100,000 Scale Map Series, Sheet 23 (Geology of South Wexford), GSI, 1994; and,
- GSI Bedrock Geology 1:100,000 Scale Map Series, Sheet 22 (Geology of East Cork - Waterford), GSI, 1995.

7.2.4 Available Site Data

All available geological data from previous site investigations was compiled by HES for the Proposed Development baseline and impact assessment. The various previous site investigation sources are detailed below:

- Apex Geoservices (2008) Report on Geophysical Survey at Kilmacow, Co. Kilkenny [80];
- Hydro Environmental Services (2009) Hydrogeological Monitoring Report for Roadstone Quarry at Kilmacow Co. Kilkenny [81];
- Hydro Environmental Services (2015) Hydrogeological Monitoring Report for Roadstone Quarry at Kilmacow Co. Kilkenny – Groundwater Monitoring Report 2009 -2015 [82];
- Hydro Environmental Services (2015) Hydrogeological Investigation Report for Kilmacow Quarry [83];
- Golder Associates (2016) Environment Impact Statement – Kilmacow Quarry Extension, Co. Kilkenny [84]; and,

- Previous blast hole drilling information dating back over 20 years or more.

7.2.5 Recent Site Investigations

In order to further characterise the geology at the Site the following additional surveys and site investigations were undertaken:

- Walkover survey of the Site and Landholding as well as mapping of all relevant geological features at and in the vicinity of the Landholding and current extraction area;
- Discussions with the applicant's long term blast hole driller to acquire knowledge of previous drilling and areas where difficult drilling was encountered in the past; and,
- Drilling of three (3No.) additional investigation holes/groundwater monitoring wells within the proposed extension lands to be purchased from Mr Clohosey.

7.2.6 Scoping

The scope for this EIAR has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties. This consultation process is outlined in Section 1.11 of this EIAR. There were no responses regarding Land, Soils and Geology.

7.2.7 Impact Assessment Methodology

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

Using the NRA Guidance [85], an estimation of the importance / sensitivity of the geological environments at the Site location is set out in Table 7-1.

Table 7-1: Estimation of Importance of Geology Attributes [76]

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 resource.
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and / or soft organic soil underlying 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; and, • Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance, or value on a local scale.	• Contaminated soil on site with previous light industrial usage; • Small recent landfill site for mixed wastes;

Importance	Criteria	Typical Example
	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.	• Moderately drained and / or moderate fertility soils; • Small existing quarry or pit; and, • Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and / or soft organic soil underlying 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 for 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 contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- EPA: Guidelines on the Information to be Contained in Environmental Impact Assessment Reports [22].

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 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 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 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

Attribute	Status / Occurrence	Importance
		indirect nature of the potential impact before mitigation is put in place.
Step 4	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 5	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 6	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 extension activities which have the potential to generate a source of adverse effects on the land, soil and geological environment.

7.2.8 Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of this chapter.

7.3 Receiving Environment

7.3.1 Site Description and Topography

The Site is located within the townlands of Grannagh and Aglish North, in the south of County Kilkenny approximately 5.5km northwest of Waterford City.

The total area of the Landholding area is ca.84ha while the current permitted extraction area is ca.27ha.

The Site covers a total area of 10.3ha which comprises primarily agricultural grassland and farmstead on the east of the Landholding. The Site also includes the existing quarry access road, established entrance, weighbridge, wheel wash, carpark and office/welfare facilities. The greenfield area proposed for extraction is ca.2.2ha.

The proposed greenfield extension lands are located on the east of the Site and immediately adjacent (east) to the current extraction area where the deepest quarry floor is at ca.-45mOD. The existing ground level in the grasslands proposed for extraction range from ca.28mOD to 32mOD with the slope to the east and away from the current extraction area.

There are some farm buildings, which are associated with agricultural land, located at the northeastern boundary of the Site. The extension lands are part of a wider farm landholding that extends further to the east (Mr. Clohosey lands). As described above, the extension lands are bordered to the west by the current extraction area void.

Within the Quarry, there are areas for the crushing, screening and processing of stone, an asphalt plant, concrete block batching plant settlement ponds and associated offices and other buildings. The main processing area along with the office blocks and site entrance are located on the southwest of the Landholding.

7.3.2 Land Use

Land use in the area of the Quarry is mainly agricultural with a residential pattern of farmhouses and one-off houses. Small commercial units also exist along the N24 to the south of the Site.

The Site itself comprises mainly of agricultural grassland and associated farm stead along with existing infrastructure and extraction areas associated with the permitted Quarry.

7.3.3 Soils & Subsoils

The Teagasc soils map (www.epa.ie) shows that shallow well drained mainly basic mineral soil (BminSW) is mapped over the majority of the Landholding (much of which has been removed at this stage due to extraction) and the Site.

Acid Brown Earths/Brown Podzolics (AminDW) are prominently mapped in the surrounding lands as well as some surface water Gleys/Acidic groundwater Gleys (AminPD). Local soils map is show below as Figure 7-1.

The GSI subsoils map (www.gsi.ie) for the area shows that the majority of the Landholding and Site are mapped as bedrock outcrop or subcrop (i.e. bedrock close or at the ground surface).

The lands surrounding the Landholding and Site are mapped to be overlain by sandstone tills. Local subsoils map is shown as Figure 7-2.

Figure 7-1: Local Soils Map

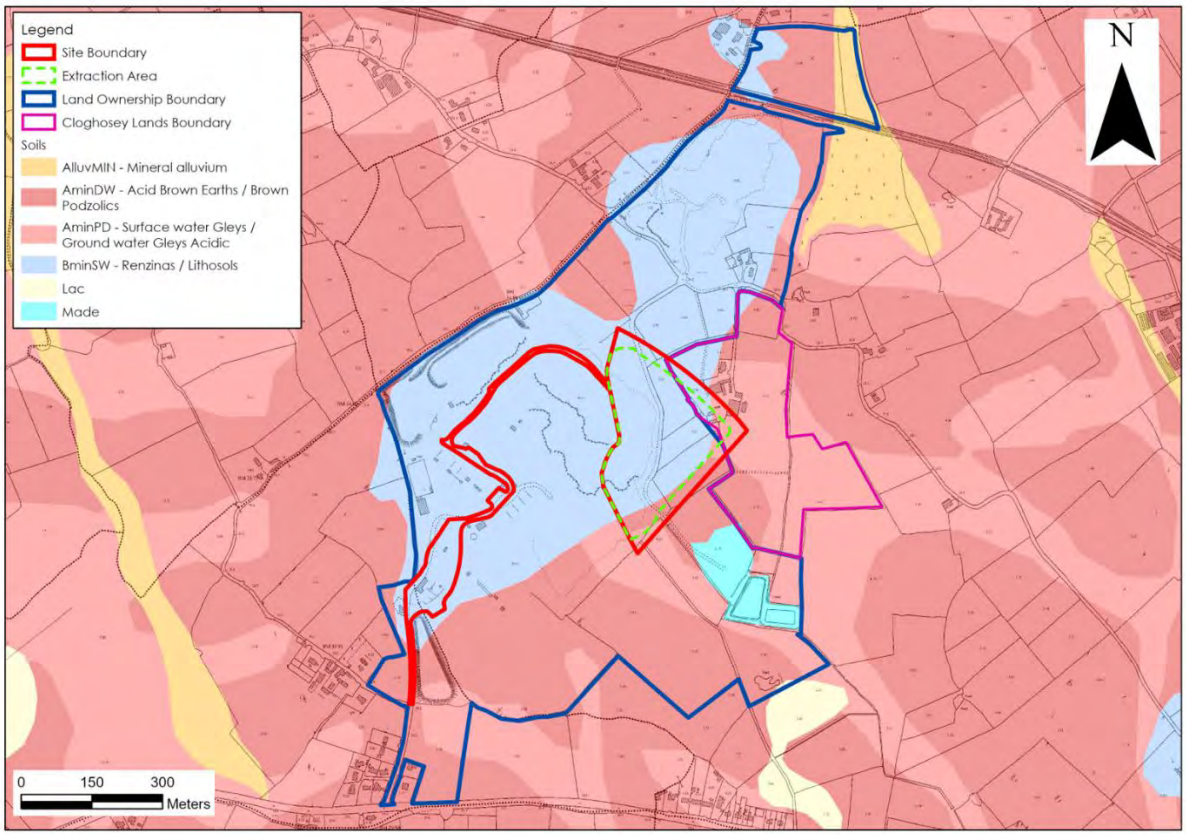
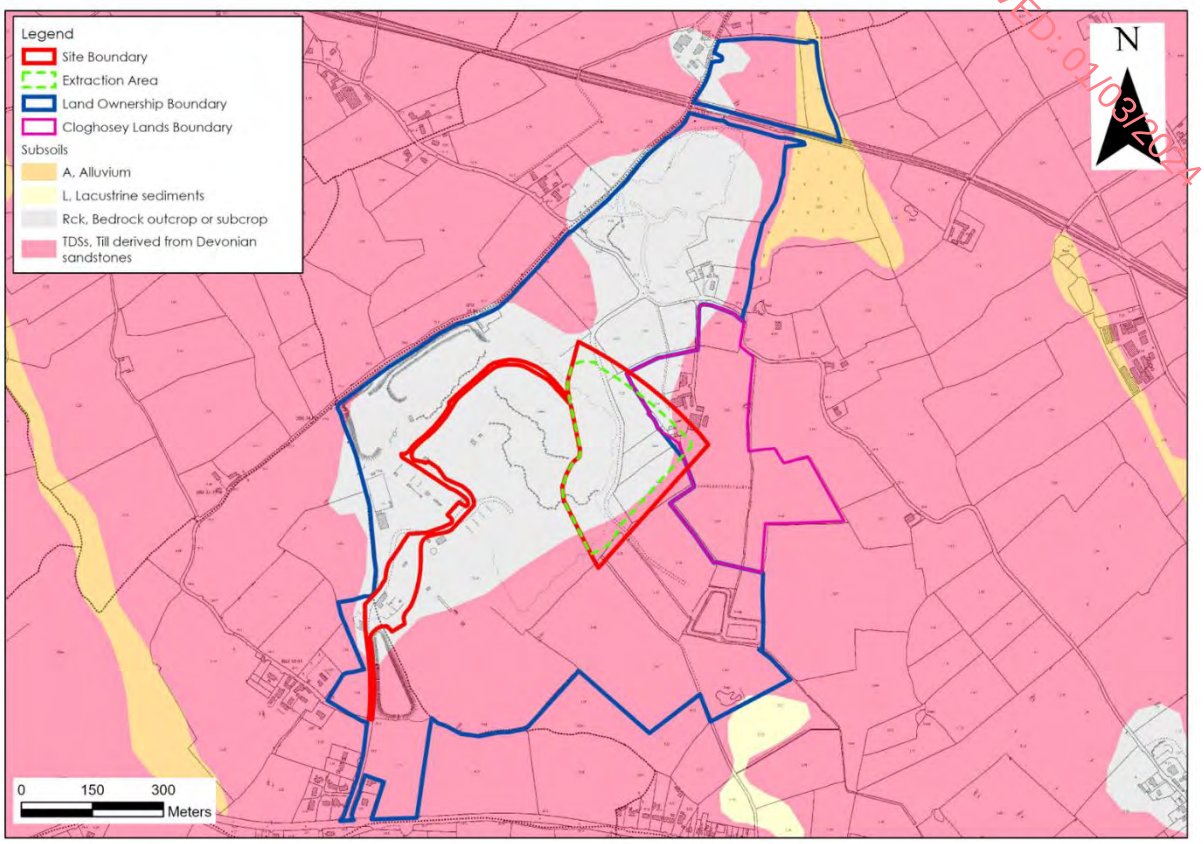


Figure 7-2: Local Subsoils Map



7.3.4 Bedrock Geology

The Geological Survey of Ireland (GSI) 1:100,000 geology sheet 23 (South Wexford) shows the majority of the Landholding, including the Site are underlain by the Bullockpark Bay Member, of the Hook Head Limestone Formation, which is denoted by its oolitic limestones[1].

A small section of the Landholding to the south is underlain by the Ballysteen Formation, denoted by its dark muddy limestone and shale with thicknesses ranging from 100m to 200m.The Ballysteen Formation consists of well bedded relative clean calcarenitic (sand grade) limestones, and it passes up into finer grained and more muddy limestones.

There is no clear change in geology evident within the existing quarry extraction area. Between the Quarry and the Middle Suir Estuary there are three (3No.) lithologies mapped from the Dinantian series of the Carboniferous period. These include the Ballymartin Formation (Limestone & dark-grey calcareous shale) and the Porters Gate Formation (Sandstone, shale & thin limestone) that are divided by a thin stratigraphical unit known as the Ballyvergin Shale Formation. This formation is a very widespread distinctive marker horizon across much of the North Munster Shelf, consisting of Mudstone and siltstone. Further to the south and proximal to the Middle Suir Estuary there is a change in geology to the uppermost unit of Old Red Sandstone from the Devonian system; the Kiltorcan Formation. The Kiltorcan Formation is characterized as a yellow & red sandstone & green mudstone.

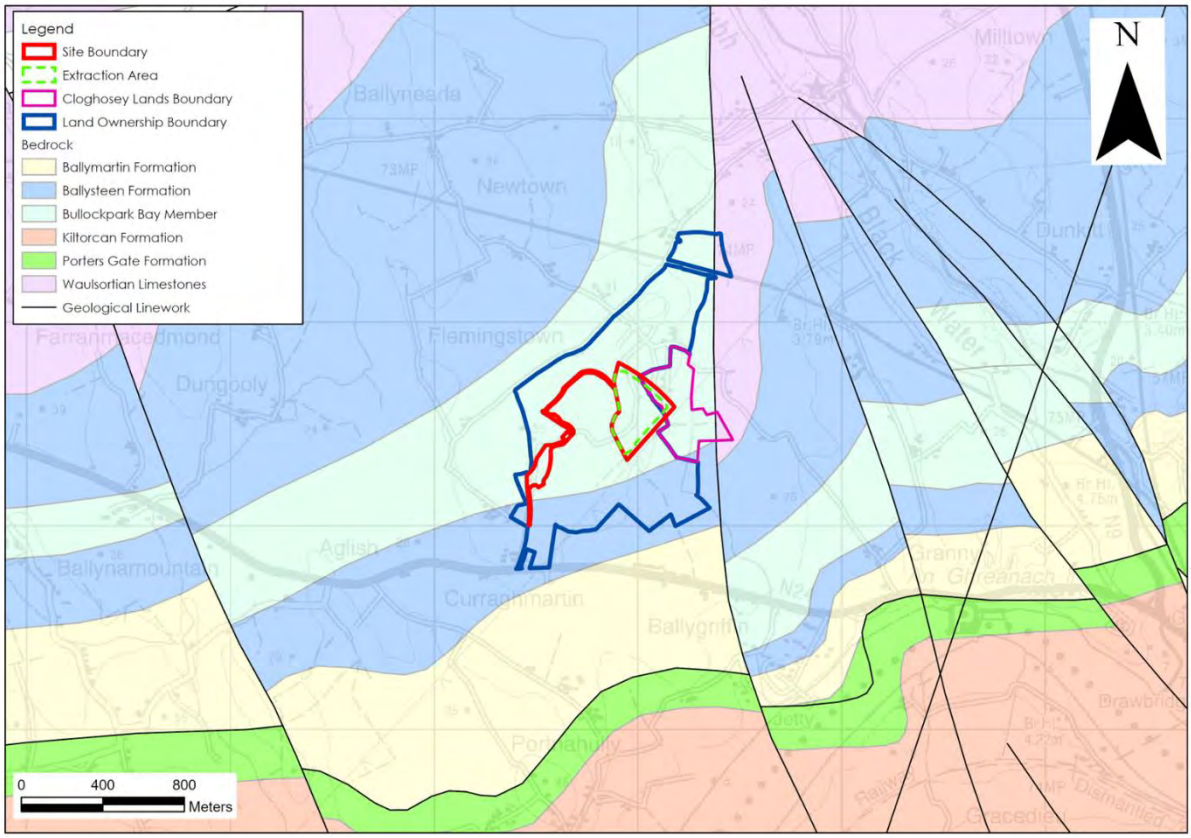
[1] Oolitic limestone is a carbonate rock made up mostly of ooliths (or ooids) which are sand-sized carbonate particles that have concentric rings of $CaCO_3$. These rings are formed around grains of sand or shell fragments that were rolled around on the shallow sea floor, gathering layer after layer of limestone.

The bedding planes within the existing extraction area strike at 250 degrees and have an approximate dip of 35 degrees to the north. The rock is also heavily jointed with the joints orientated at around 277 strikes with a steep dip of 72 degrees to the south. The axis of the Carrick-on-Suir syncline is mapped as being approximately 2.5km north of the Site.

An axial trace of a syncline appears to run through the northern section of the Landholding. This syncline is most likely a parasitic fold present on the southern limb of the Carrick-on-Suir syncline.

There are no faults mapped by the GSI within the Site itself. However, regional faults with a general south to north orientation are mapped to the east of the Site. The closest mapped fault is located ca.300m to the east of the Site. A local bedrock geology map is shown as Figure 7-3.

Figure 7-3: Bedrock Geology Map



7.3.5 Site Investigations

7.3.5.1 General Blast Hole Drilling

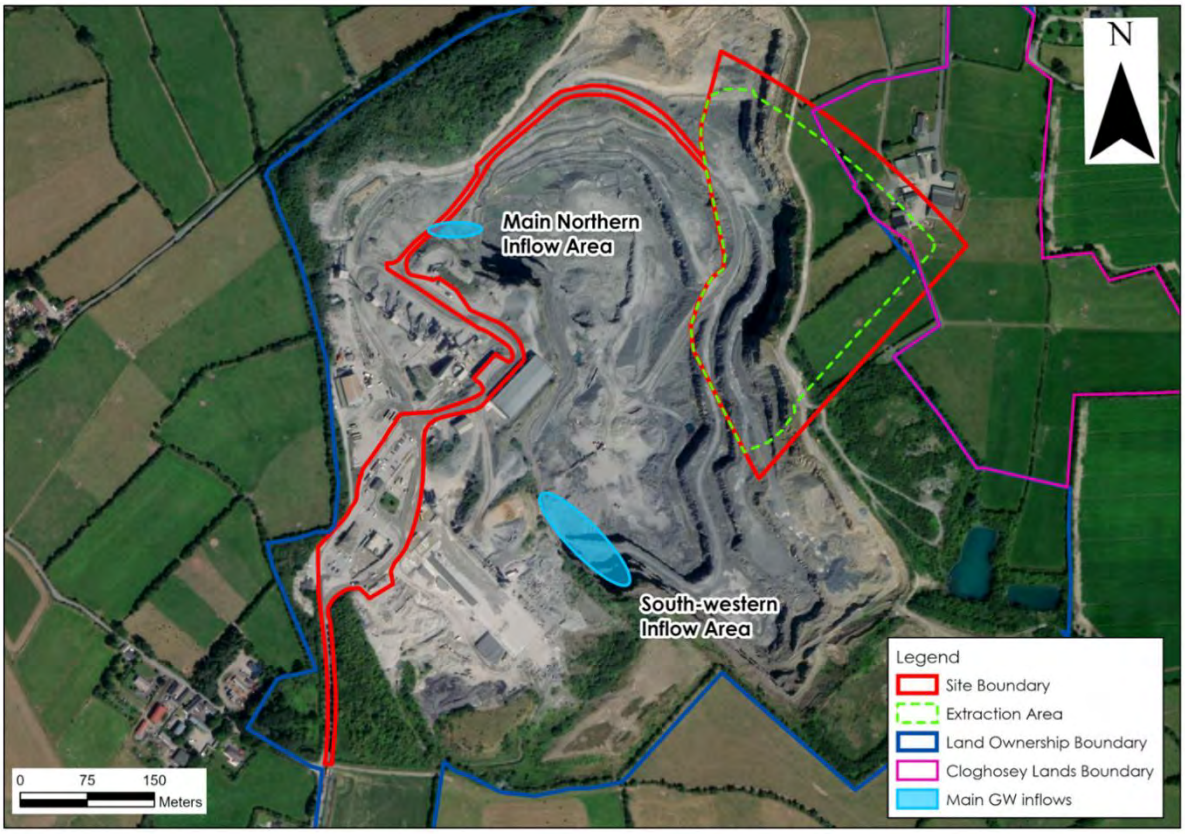
There is ongoing drilling works associated with blasting at the Quarry. The same drillers have been drilling blast holes in the quarry for 20 years or more, and the drillers have good knowledge of the bedrock conditions at the Quarry and the Site.

While the information provided by the drillers is anecdotal, it does tie in somewhat with the quarry face conditions and the general geological sequence visible at the subsoil bedrock interface and around the floor of the Quarry. For example, areas reported to have poor drilling conditions were generally noted to the south of the Quarry at higher benches, i.e. those removed already. Poorer rock conditions are visibly notable in the walls of the quarry face at the southern boundary of the current quarry floor.

Another area identified where poorer drilling conditions occurred was in the northwestern corner, below the main groundwater inflow to the Quarry. Again, below this area there is clear evidence in the face of the quarry wall that bedrock is weathered and fractured. This area illustrated in Figure 7-4 below.

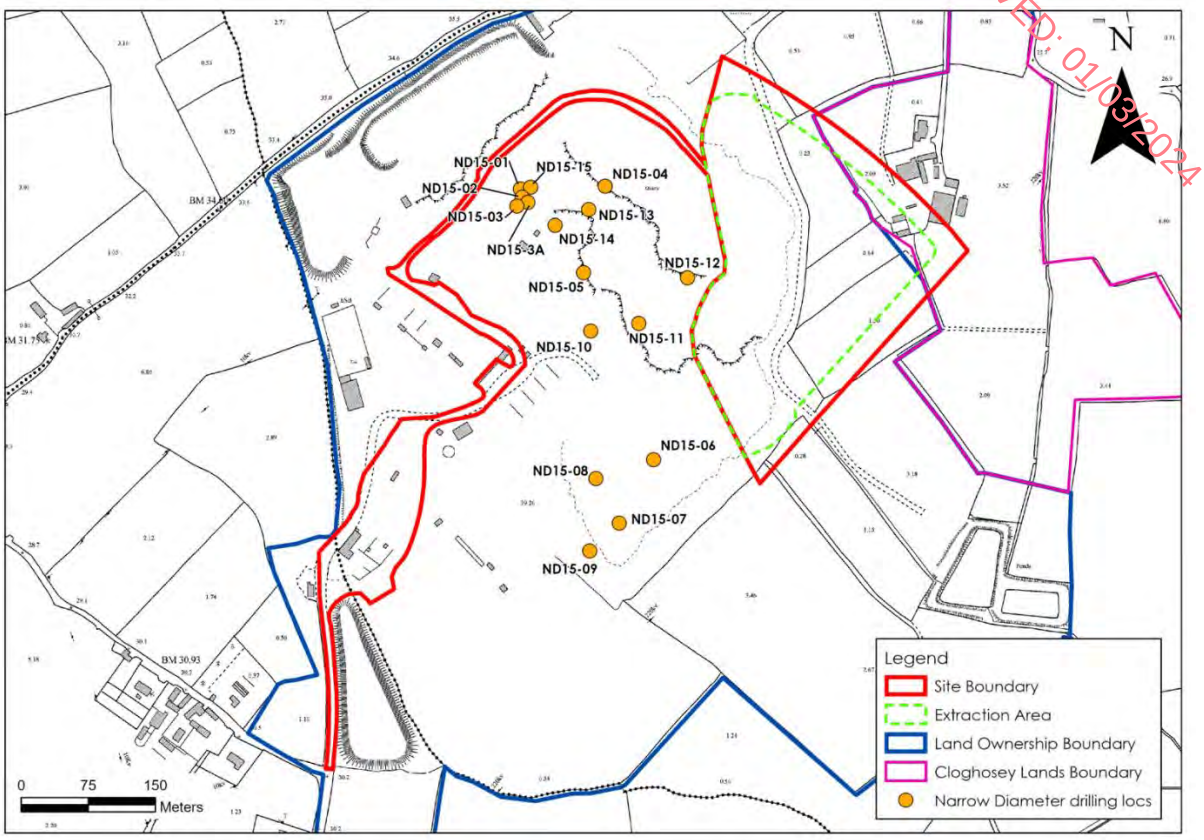
It is important to note that the areas of poorer drilling occurred on benches of the Quarry that have already been removed by quarrying, and that the deeper quarry floor is in general comprised of competent solid bedrock. These two (2No.) identified areas are also the main areas of groundwater inflow to the Quarry.

Figure 7-4: Broken rock areas in upper benches where main groundwater inflows occur.



Narrow diameter rapid quarry floor drilling down to a maximum depth of ca.-54mOD was carried out in August 2015 under the main groundwater inflow on the northwest of the current extraction area as it was expected to find an associated fracture zone at depth across the quarry floor. However, no fracture zone was present, and the bedrock was found to be largely competent. Additional holes were then completed at random locations to see if any major deeper fractures existed, and this was confirmed as negative. Refer to Figure 7-5 below for quarry floor drilling locations.

Figure 7-5: 2015 Quarry Floor Investigation



Drilling logs for the quarry floor investigation holes are attached as Appendix 7-1.

7.3.5.2 Geophysical Surveys

2D Resistivity Profiling and Seismic Refraction Profiling was carried out in several areas of the Landholding by Apex Geoservices in 2008. The geophysical report is attached as Appendix 7-2.

2D resistivity profiles R1 and R2 are located within the area of the Site extension lands. Profile R3 is located to the north of the extension lands.

Profile R2 runs centrally through the extension lands in an SW-NE orientation while profile R1 runs through the south of the extension lands in a similar orientation. Profile R1 and R2 indicates overburden depths (silty gravelly CLAY) of between 2 and 5m within the Site extension lands boundary (depth increasing from west to the east).

The profiling suggests overburden depths increase significantly (up to 27m) further to the east of the Site. The increasing overburden depths to the east are possibly associated with the fault which is mapped 300m to the east of the Site. More details in Section 7.3.5.3 below.

The underling bedrock with the Site extension lands is interpreted as having a couple of metres of weathered LIMESTONE at the subsoil/bedrock interface which is then underlain by more competent LIMESTONE. Profile R3 findings were similar to R1 and R2.

7.3.5.3 Monitoring Well Drilling

Four (4No.) investigation holes / monitoring wells were drilled at the Quarry by HES in September 2015 (MW15-01 – MW15-04). They were drilled outside of the extraction footprint of the Quarry along identified potential fracture zone orientations, or at optimum locations.

The locations of the 2015 wells are illustrated on Figure 7-6 and outlined in Table 7-3 below. Drilling logs for these investigation holes are attached as Appendix 7-3.

Table 7-3: Quarry Monitoring Well Locations and Elevations

Location	Easting	Northing	Ground Elevation (m OD)	Hole Depth (m OD)
MW15-01	255699	115853	35.31	-47
MW15-02	256041	115363	29.58	-37.5
MW15-03	256331	115086	22.27	-9.7
MW15-04	255787	114993	30.98	-48
MW22-01	256217	115778	25.30	-54.7
MW22-02	256459	115421	25.73	-54.27
MW22-03	255705	115858	34.70	-52.30

Note: MW22-03 was drilled as a replacement for MW15-01 which collapsed.

MW22-0 was abandoned due to deep overburden.

MW15-02, which is located 80m to the south of the proposed extension lands, is the closest monitoring well to the proposed extraction area.

Shallow weathered rock (0-3m) over solid calcarenitic LIMESTONE was recorded between 3m to 31.7mbgl (-2.12m OD) in MW15-02. From this depth on the drilling comprised sequences of broken and solid LIMESTONE rock, with clay infill occurred. This sequence remained to the final depth of 67.1mbgl (-37.52m OD).

Additional investigation/monitoring well drilling was carried out on the agricultural lands to the east of the Site in September 2022. Monitoring wells MW22-0 (abandoned during drilling) and MW22-01 are located to the northeast of the proposed extension lands at distances of ca.210m and 170m respectively.

MW22-0 encountered 29.5m of overburden (sandy gravelly CLAY) before drilling was terminated at -6.2m OD (29.5mbgl) due to bedrock not been met and the depth limitations of the drilling rig to progress deeper into overburden.

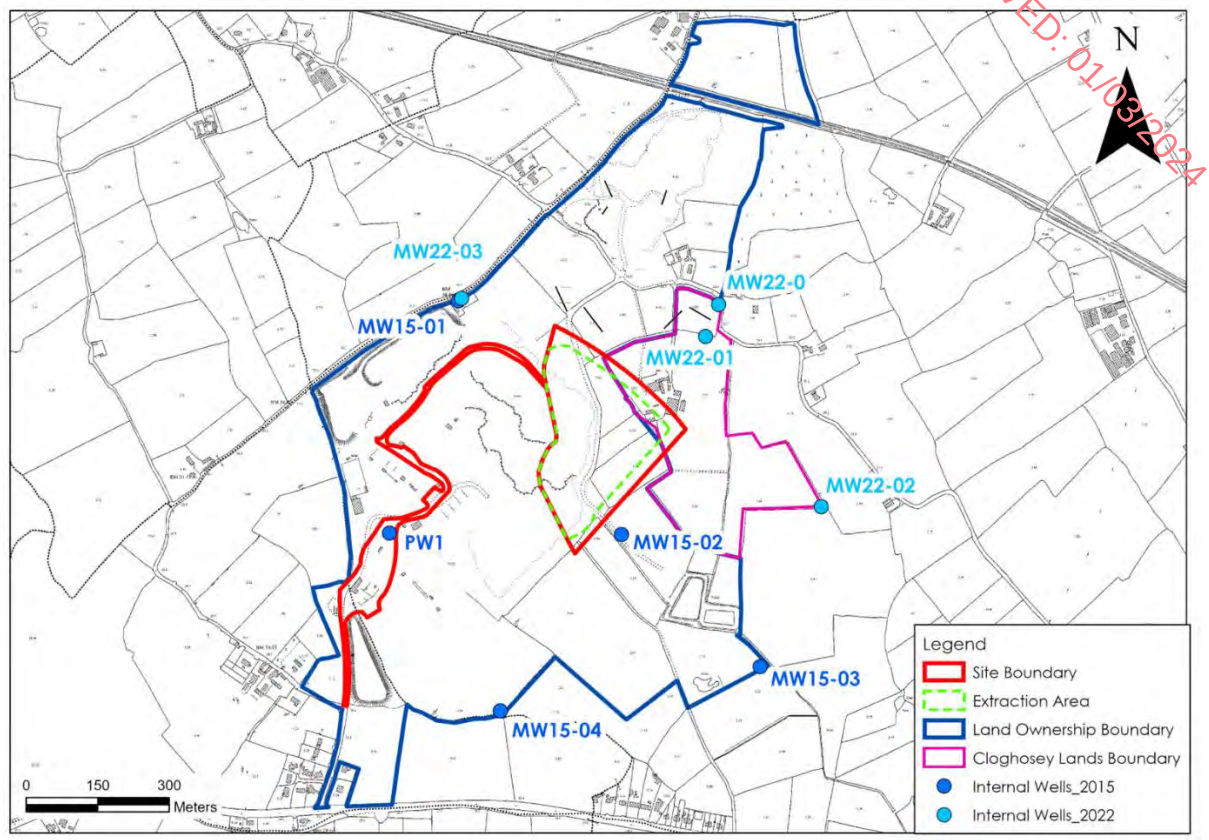
MW22-01 is located 50m to the west of MW22-0 (i.e. closer to the proposed extension lands) where bedrock was met at 3.7m OD (21.6mbgl). The drilling shows bedrock dips down steadily to the east where the bedrock fault is mapped (i.e. 300m to the east of the Site). The fault is mapped to be located 90m east of MW22-0. The drilling is consistent with the geophysics findings.

MW22-02 is located 350m to the southeast of the Site where bedrock was met at 11.1m OD (14.6mbgl). MW22-02 is located approximately 50m east of the mapped fault.

The deep overburden (>29.5m) in the area of MW22-0 and the shallower depths to bedrock towards the east (i.e. MW22-02) and west (i.e. MW22-01) would suggest the presence of a north/south trending fault somewhere between MW22-01 and MW22-02.

The locations of the Quarry monitoring wells are shown on Figure 7-6. All investigation/monitoring well drilling logs (2015 & 2022) are shown as Appendix 7-3**.**

Figure 7-6: Locations of Monitoring Wells



7.3.5.4 Karstification

Karstification is the process whereby fissures, faults and joints in the purer units of limestone are enlarged by dissolution. Karstification can considerably enhance the permeability of limestone which has essentially no inter-granular permeability. The Bullockpark Bay Member is a cross bedded oolitic limestone and does not appear to be karstified in the area of the Quarry.

Karstified limestone is mapped just east of the fault which exists to the east of the Site. However, based on the GSI mapping of the area, the closest karst feature is a spring located 1.6km to the southeast of the Site (IE_GSI_Karst_40K_3289).

7.3.6 Geological Heritage Sites and Designated Site

There are no recorded Geological Heritage sites with or adjacent to the Site. However, Granny Quarry, a disused quarry with exposed faces of limestone and shale with localised karst weathering (Site Code: KK011), exists ca.1.9km southeast of the Site.

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 or adjacent to any designated conservation site.

The closest designated site to the Site is the Lower River Suir SAC [Site code: 002137] which is located ca.1.4km to the southeast of the Site where the River Suir channel exists. Downstream designated sites such as the Lower River Suir SAC are addressed in Chapter 8 – Water (Hydrogeology and Hydrology).

7.3.7 Economic Geology

The limestone bedrock at the Site could be classified as having "High" importance with a rating of 7/10 for the APM Overall Lithology Score (www.gsi.ie). The bedrock is a proven economically extractable mineral resource for construction purposes. The bedrock in the Quarry has been used in the past for this purpose.

7.3.8 Soil Contamination

There are no known areas of soil contamination on the Site or Landholding. During the site walkovers or drilling investigations, no areas of particular contamination concern were noted or identified. The groundwater, surface water and discharge sampling results also confirm this (refer to Chapter 8).

According to the EPA online mapping (http://gis.epa.ie/EPAMaps), there are no existing licensed waste facilities on or within the immediate environs of the Site.

There are no historic mines at or in the immediate vicinity of the Site that could potentially have contaminated tailings.

7.4 Characteristics and Potential Impacts of the Proposed Development

7.4.1 Construction and the Operational Phase – Likely and Significant Effects

7.4.1.1 Soil, Subsoil and Bedrock Excavation

The Proposed Development will extract 7,592,000 tonnes of rock.

In order to quarry the proposed extension, approximately 8,500m^3 of overburden (topsoil and subsoil) will have to removed and stored as berms.

The likely pre-mitigation effect is described in Table 7-4 below.

Table 7-4: Potential Impact from soil, Subsoil and Bedrock Excavation

Attribute	Description
Receptor	Soil, Subsoil and Bedrock
Pathway	Stripping and Excavation
Pre-mitigation Potential Effect	Negative, Moderate, Direct, Likely, Permanent effect on soil, subsoil and bedrock

7.4.1.2 Contamination of Soil/Bedrock by Leakages and Spillages

All earthworks and excavation on-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.

The likely pre-mitigation effect is described in Table 7-5 below.

Table 7-5: Potential Impact from the contamination of soil/bedrock by leakages and spillages

Attribute	Description
Receptor	Soil, Subsoil and Bedrock
Pathway	Soil, subsoil and bedrock pore space

Pre-mitigation Potential Impact	Negative, Direct, slight, long-term, unlikely effect on soil, subsoil and bedrock

7.4.1.3 Effects on Land and Land use

The Proposed Development will result in the permanent loss of approximately 2.7ha of agricultural grassland. The extraction will result in local topographic changes with the removal of overburden and bedrock from the Site. There will be no effects on the lands adjoining the Site.

The likely pre-mitigation effect is described in Table 7-6 below.

Table 7-6: Effects on Land and Land use

Attribute	Description
Receptor	Land and Land use
Pathway	Excavation of overburden and extraction of aggregate.
Pre-mitigation Potential Effect	Negative, slight, direct, likely, permanent effect on land and land use.

7.4.2 Restoration Phase - Likely and Significant Effects

The restoration of the quarry void is seen as a positive effect with respect land, soils and geology. The mitigation will include the adoption of suitable restoration plan which considers the natural local topography and land use. The restoration plan is deemed the most appropriate for this kind of development.

7.5 Proposed Mitigation Measures and / or Factors

7.5.1 Construction and Operational Phase Mitigation Measures

7.5.1.1 Soil, Subsoil and Bedrock Excavation

Removal of soils, subsoils and aggregate extraction will result in a direct impact on the 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 quarrying) and will be mostly mitigated through the adoption of a suitable restoration plan for the Quarry once quarrying activities have substantially finished. The soil and subsoil which will be removed and the rock to be quarried at the Site are not notable from a geological heritage point of view.

The stripped topsoil will be stockpiled permanently and used for the final quarry restoration. The stripped subsoils will be used to form edge protection berms around the extraction area as well as screening berms.

7.5.1.2 Contamination of Soil/Bedrock by Leakages and Spillages

The operation of the Quarry and yard includes existing management for the control of hydrocarbons and chemical and these already minimise as far as possible the risk of spillage that could lead to ground contamination.

Proposed mitigation measures are outlined as follows (much of these are already implemented at the Quarry):

- Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur;

- Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer's recommendations will be implemented;
- All plant and machinery will continue to be regularly serviced before being used on site;
- Refuelling will be completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored. This is the case for the existing on site bunds;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel mobile plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills; and,
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill in the quarry floor.

Highest standards of site management will continue to be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during operation of the Proposed Development.

7.5.1.3 Land and Land use

The loss of agricultural land resulting from the Proposed Development on a local or regional scale is minimal and therefore the effects of actual agricultural land loss is imperceptible. The loss of land and change in land use is an acceptable and unavoidable part of the Proposed Development. No mitigation is required.

7.6 Cumulative and In-combination Effects

The other land use activities in the area include the permitted Quarry operation, existing farming operations, residential land uses and light industrial.

Due to the relatively small scale of the Proposed Development and the lack of significant residual impacts from the development that would affect the wider environment, the cumulative impacts to land, soils and geology resulting from the Proposed Development will be not significant. All effects on land, soils and geology relating to the Proposed Development will be localised and within the Site.

7.7 Interactions with other Environmental Attributes

- Chapter 5 – Population and Human Health: Potential health effects in relation to land, soils and geology mainly occur due to direct and indirect contact with contaminated soil. Appropriate mitigation measures are in place to ensure any potential sources of contamination on the Site will be managed accordingly to offset these effects.

- Chapter 8 – Water (Hydrogeology and Hydrology). Potential effects on land, soils and geology could also affect hydrology/hydrogeology and downstream designated aquatic sites. The potential effects are offset through the implementation of the mitigation measures;
- Chapter 9 – Air Quality. Air-borne dust arising from the Proposed Development are sourced directly from the geology at the Site. This is a key component of air quality at the Site and has been comprehensively considered, with appropriate mitigation measures provided.
- Chapter 12 – Landscape and Visual. Potential effects associated with change in land-use and the integration of the Proposed Development within the landscape.
- Chapter 15 – Natural Resources and Waste: The aggregates being produced are sourced from the underlying geology. The potential effects associated with removing this geology have been fully considered.

7.8 Residual Effects

7.8.1 Construction and Operational Phase Residual Effects

7.8.1.1 Soil, Subsoil and Bedrock Excavation

Post Mitigation Residual Impact:

The extension to the Quarry will be local to and consistent with ongoing operation. The bedrock at the Site is classified as of “High” importance as the rock is a proven economically extractable mineral resource. The impact is the removal/movement of overburden and extraction of ca.7.59 million tonnes of underlying bedrock.

A suitable landscape restoration plan which will be implemented when extraction is complete. The residual effect will be negative, direct, slight to moderate, likely, permanent effect on soils, subsoils, and bedrock. The significance of the effect will be ‘not significant’.

7.8.1.2 Contamination of Soil/Bedrock by Leakages and Spillages (Construction Phase)

Post mitigation Residual Impact:

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all quarry sites. 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, direct / indirect, imperceptible, reversible, unlikely, brief effect on soil and bedrock. The significance of the effect will be ‘not significant’.

7.9 Indirect Effects

7.9.1 Human Health Effects

Potential health effects in relation to land, soils and geology mainly occur due to direct and indirect (dust) contact with contaminated soil. However, as stated in Section 7.5.1.2 there will be best practice controls in place to ensure any potential sources of contamination on the Site will be managed appropriately. Also, the Site will not be open to the public and therefore direct contact is unlikely.

Hydrocarbons, in the form of fuels and oils, will be used onsite during extraction works. However, the volumes will be small in the context of the scale of the project and will be handled in accordance with best practice mitigation measures. The potential residual effects associated with land, soils and geology contamination and subsequent health effects are imperceptible.

7.10 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

7.11 Monitoring

None required.

7.12 Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

8 WATER (HYDROGEOLOGY AND HYDROLOGY)

8.1 Introduction

This chapter of the EIAR provides a description and assessment of the potential likely and significant effects of the Proposed Development on the receiving water environment.

The objectives of the assessment are:

- Produce a baseline study of the existing water environment (surface water and groundwater) in the area of the Proposed Development;
- Identify likely potential effects of the Proposed Development (positive or negative) on the baseline surface water and groundwater regime;
- Identify mitigation measures to avoid, remediate or reduce significant negative effects (if any) on surface water or groundwater receptors;
- Identify residual effects post mitigation; and,
- Assess any hydrological/hydrogeological cumulative effects of the Proposed Development due other activities and developments in the local area.

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 of 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 third cycle of the River Basin Management Plan: 2022-2027, is currently underway and all eight RBDs have merged to form one national RBD.

This chapter is carried out in accordance with the following Irish legislation:

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, 1989 and subsequent Amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000, S.I. No. 538 of 2001 and S.I. No. 296 of 2018), S.I. No. 30 of 2000, the Planning and Development Act, 2000 and S.I. 600 of 2001: Planning and Development Regulations 2001 and all subsequent Amendments. These instruments implement EU Directive 85/337/EEC (EIA Directive) and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Acts 2000-2018;
- Planning and Development Regulations, 2001-2018;
- S.I. No. 94 of 1997: European Communities (Natural Habitats) Regulations, 1997 resulting from EU Directives 92/43/EEC on the conservation of natural habitats and

of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);

- S.I. No. 293 of 1988: Quality of Salmon Water Regulations, 1988 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. 41 of 1999: Protection of Groundwater Regulations, 1999 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. 249 of 1989: Quality of Surface Water Intended for Abstraction (Drinking Water), 1989 resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
- S.I. No. 439 of 2000: Quality of Water intended for Human Consumption Regulations 2000 and S.I. No. 278 of 2007 European Communities (Drinking Water No. 2) Regulations 2007, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and WFD 2000/60/EC (the Water Framework Directive);
- S.I. No. 77/2019: European Communities Environmental Objectives (Surface Waters) Regulations 2019;
- S.I. No. 366/2016: European Communities Environmental Objectives (Groundwater) Regulations 2016; and,
- S.I. No. 99/2023: European Communities Environmental Objectives (Drinking Water) Regulations 2023.

8.2.2 Guidance

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

- IGI (2013) Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements [86];
- EPA (2022): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports [22];
- NRA (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes [85];
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006 [87];
- Department of the Environment, Heritage and Local Government (DoEHLG); Quarries and Ancillary Activities – Guidance for Authorities (April, 2004) [28]; and,
- Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals) [19].

8.2.3 Scoping

The scope for this EIAR has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties. This consultation process is outlined in Section 1.11 of this EIAR.

8.2.4 Desk Study

A desk study of the Proposed Development site ("the Site") and receiving environment was carried out to collate all available and relevant geological, hydrogeological, hydrological and meteorological data using the following data sources:

- Geological Survey of Ireland (GSI) online mapping (www.gsi.ie) [34];).
- Environmental Protection Agency (EPA) Maps database [66];
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie) [78];
- Met Eireann Meteorological Databases (www.met.ie) [79] [79];
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie) [64];
- Water Framework Directive/EPA "Catchments" Map Viewer (www.catchments.ie) [88];
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 23 (Geology of South Wexford); Geological Survey of Ireland (GSI, 1997); and,
- Geological Survey of Ireland - Groundwater Body Characterisation Reports.

8.2.5 Geological Survey of Ireland - Groundwater Body Characterisation Reports.

- Annual Groundwater Report – 2007 for Roadstone Quarry, Kilmacow, Co. Kilkenny Technical Report prepared by AWN Consulting [89];
- Apex Geoservices (2008) Report on Geophysical Survey at Kilmacow, Co. Kilkenny [80];
- Hydrogeological Monitoring Report for Roadstone Quarry at Kilmacow Co. Kilkenny – Groundwater Monitoring Report 2008 – Hydro Environmental Services – July 2009 [81];
- Hydrogeological Monitoring Report for Roadstone Quarry at Kilmacow Co. Kilkenny – Groundwater Monitoring Report 2009-2015 – Hydro Environmental Services –- June 2015 [82];
- Hydrogeological Investigation Report for Kilmacow Quarry – December 2015 – Hydro Environmental Services [83];
- Golder Associates (2016) Environment Impact Statement (EIS) – Kilmacow Quarry Extension, Co. Kilkenny [84];
- Automated daily monitoring of licensed quarry water discharge volumes;
- Quarterly water quality monitoring of licenced quarry water discharge; and,
- Monthly groundwater level monitoring of quarry internal monitoring wells and selected third party private wells (external monitoring wells).

8.2.6 Site Investigation

In order to characterise the hydrology and hydrogeology at the Site and receiving environment the following additional surveys and site investigations were undertaken:

- Walkover surveys and hydrological mapping of the Landholding and the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded;

- Logging of exposed subsoil profiles and existing bedrock quarry side walls for structural features and groundwater inflows/seepages;
- Drilling of two (2No.) additional monitoring wells within the lands to be purchased from Mr Clohosey;
- Continuous groundwater level monitoring using in-situ data loggers in the internal monitoring wells (October 2022 to present);
- Field hydrochemistry measurements (electrical conductivity, pH and temperature) were taken to determine the origin and nature of surface water flows, groundwater inflows as well as characterisation of quarry discharge water;
- Quarry discharge water and receiving river waterbody sampling was undertaken for baseline water quality and impact assessment; and,
- Groundwater quality baseline sampling of the internal monitoring wells.

8.2.7 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 [85], an estimation of the importance / sensitivity of the geological, 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

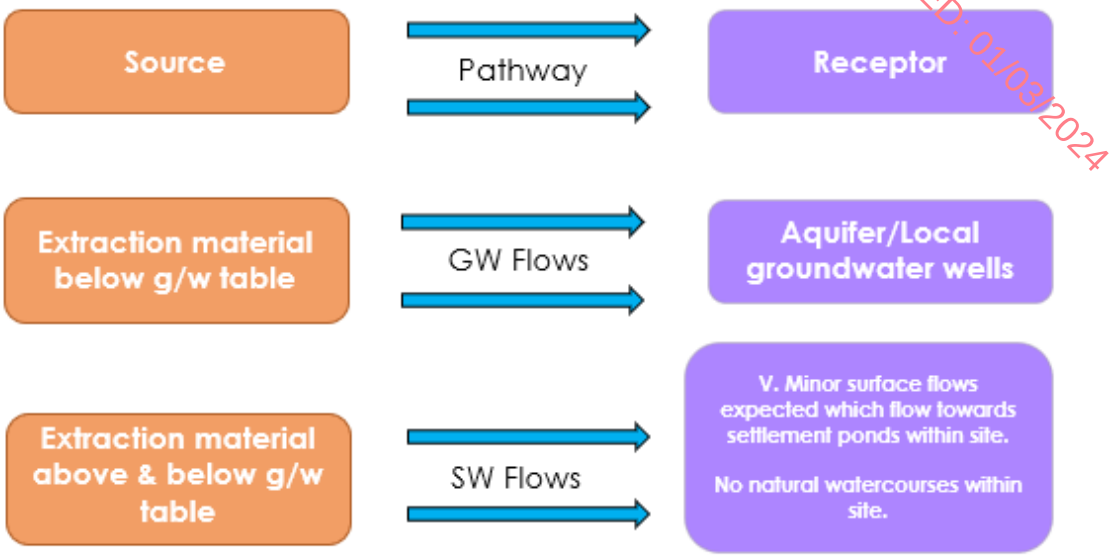
Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale	• Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	• 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. • Nationally important amenity site for wide range of leisure activities.
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.
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). • Flood plain protecting between 1 and 5 residential or commercial properties from flooding.

Importance	Criteria	Typical Example
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. • Amenity site used by small numbers of local people.

Table 8-2: Estimation of Importance of Hydrogeology Attributes [85]

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 hydrological and hydrogeological attributes are established, the conventional source-pathway-receptor model (see graphic below) 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.



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):

- EPA: Guidelines on the Information to be contained in Environmental Impact Assessment Reports [22].

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 in Table 8-3 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.

Attribute	Status / Occurrence	Importance
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 extraction 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 the primary potential source of impact is the further extraction and extension of the quarry void whereby the primary potential hazards are suspended solids/rock fines in quarry discharge water, oil/fuel leakages and spillages, and accidental discharges of potential pollutants to the local groundwater and surface water causing a deterioration in water quality. Quarry dewatering is a potential source of groundwater level/quality effects.

- *Pathway*

The primary containment pathway to downstream river waterbodies is by quarry discharge. The pathway in terms of groundwater quality and quantity/level effects is via potential fractures in the underlying limestone bedrock aquifer.

- *Receptor*

The primary local targets of concern are downstream receiving surface waters, designated sites, the underlying locally important aquifer, and local private wells.

8.3 Receiving Environment

8.3.1 Site Description and Topography

The Site is located within in the townlands of Granny and Aglish North, in the south of County Kilkenny approximately 5.5km northwest of Waterford City and 3km south of Kilmacow.

The total area of the existing Roadstone Landholding is ca.84ha while the current permitted extraction area is ca.27ha which is currently at -45m OD at its lowest bench floor level.

The total Site area is 10.3ha and is a mixture agricultural grassland/farmstead on the east of the Landholding as well as areas of the existing Quarry footprint. The Site includes the existing quarry access road which extends southerly to the established entrance via the weighbridge, wheel wash, carpark, office/welfare facilities as well as previously extracted areas. The greenfield area inside the Site is 3.4ha which will be used for extraction (2.2ha), berm construction and buffers.

The proposed extension lands are located on the east of the Site and immediately adjacent to the current extraction area where the quarry floor is at approximately -45m OD at its lowest level on the northern side of the void. The ground level in the greenfield lands proposed for extraction range from ca.28m OD to 32m OD with the slope to the east and away from the current extraction area. The proposed extraction area amounts to 6ha with approximately 2.2ha being greenfield agricultural land.

There are some farm buildings, which are associated with agricultural land, located at the northeastern boundary of the Site. The extension lands are part of a wider farm landholding that extend further to the east.

Within the Quarry, there are areas for the crushing, screening and processing of stone, an asphalt plant, concrete block batching plant, settlement ponds and associated offices and other buildings. The main processing area along with the office blocks and site entrance are located on the southwest of the Site. The overall landholding is securely fenced with screen mounds on the site perimeter.

A Site layout map is shown on Figure 3-1 in Chapter 3.

8.3.2 Water Balance

Met Eireann records show that the 30-year Average Annual Rainfall (1980 - 2010) at Mooncoin, which is the closest rainfall station to the Site with long term averages (located ca.5.5km northeast of the Site), is ~1,050mm. The data is presented in Table 8-4.

The closest synoptic station where the average potential evapotranspiration (PE) is recorded is at Kilkenny approximately 40km northeast of the Site. The long term average PE for this station is 458mm/year. This value is used as a best estimate of the Site PE. Actual Evaporation (AE) at the Site is conservatively estimated as 435mm/year (which is 0.95 PE).

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

$$\text{Effective rainfall (ER)} = \text{AAR} - \text{AE}$$

$$= 1{,}050\text{mm/year} - 435\text{mm/year}$$

$$\text{ER} = 615\text{mm/year}$$

Table 8-4: Mooncoin 30-year Average Rainfall (1980-2010)

Station		X-Coord		Y-Coord		Ht (mOD)		Year Start		Year End		
Mooncoin		251,000		115,800		53		1939		1944		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
112.1	77.6	82.6	73.1	73.1	74.1	64.2	83.8	85.7	114.1	106.8	103.2	1050.4

In addition to average rainfall data, extreme value rainfall levels are available from Met Eireann[2] A summary of various return period and duration rainfall depths for the Site are presented in Table 8-5.

[2] www.met.ie. Depth duration frequency model rainfall are an estimation of point rainfall frequencies for a range of durations for any location in Ireland. Computer applications were written to apply the model and produce outputs of the return period rainfall depths. These data are freely available on www.met.ie

Table 8-5: Kilmacow – Return Period Rainfall Depths (mm)

	Return Period (Years)			
Duration	5	10	30	100
5min	6.7	8.4	11.6	16.3
15min	11.0	13.8	19.2	26.7
30min	14.1	17.5	23.9	33.0
1 hour	18.0	22.2	29.9	40.8
12 hours	43.5	51.9	66.9	87.4
24 hours	55.6	65.8	83.8	108.0

Based on the Site area of 10.3ha, the average long term rainfall input is 63,530m^3/year (174m^3/day).

8.3.3 Regional and Local Hydrology

On a regional scale the Roadstone Landholding is located in the River Suir surface water catchment within Hydrometric Area 16 of the South Eastern River Basin District [66].

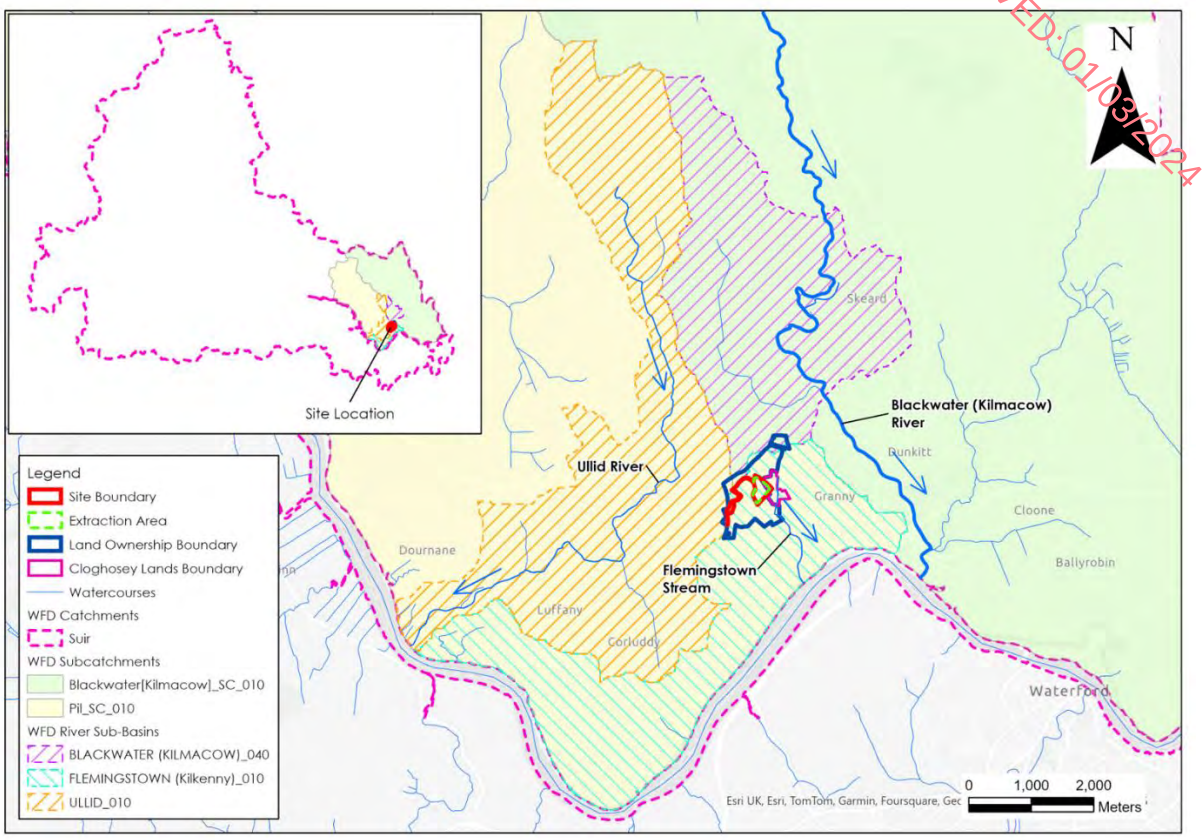
The Landholding is mapped within two (2No.) sub-catchments with the majority of the Landholding located in the Pil_SC_010 and a small section in the north being within the Blackwater (Kilmacow)_SC_010 [66]. The Site as well as the current permitted extraction area are located in the Pil_SC_010. [66]

On a local scale the Landholding exists within three (3No.) river waterbody sub-basins. The Site as well as the current permitted extraction area are located in the Flemingstown (Kilkenny)_010 sub-basin [66].

The Flemingstown Stream flows in a southerly direction 90m to the east of the Site. This watercourse, into which the Quarry currently discharges, flows into the Suir River approximately 1.4km downstream of the Site. Small sections on the north and west of the Landholding are mapped to lie within the Blackwater_Kilmacow _040 sub-basin and Ullid_010 sub-basin respectively [66]. A local hydrology map is shown as 8- 1 below.

The Flemingstown Stream was observed on several occasions between September 2015 and January 2024 and no measurable flows were noted to come from upstream of the Quarry discharge point. Discharge from Quarry makes up the majority of the flow within the watercourse.

Figure 8-1: Local Hydrology Map



8.3.4 Existing Quarry Drainage and Water Management

There are no natural drainage features within the Quarry or Site. The closest surface water feature to the Site is the Flemingstown Stream that flows in a southerly direction to the east of the Site. This is the receiving water for the existing licenced quarry discharge.

Groundwater and surface water entering the existing quarry void is pumped out to this watercourse using three (3No.) sump pumps located on the existing floor levels of the Quarry. There are two (2No.) sumps on the -28m OD floor level and one (1No.) sump on the -45m OD floor level.

The water is pumped to two (2No.) inline settlement ponds which drain through an oil interceptor prior to discharging into the receiving watercourse (at discharge point location E256158 N115265) as per water discharge licence ENV/W82.

There are two main visible groundwater inflows/seepages from the existing quarry walls (along several smaller seepages) and water from these inflows/seepages flow discretely across the quarry floor towards the sump locations. These inflows are discussed in the sections below.

Surface water runoff from the concrete block batching yard, which exists on the southwest of the Landholding, drains to a sump/lagoon which is located to the south of the office block area. There is a second smaller sump located at the wheel wash area which holds water and silt from the washing area.

The discharge point for the Quarry is shown in Figure 3-8.

8.3.5 Existing Quarry Discharge Volumes

Monitoring of discharge volumes from the Quarry dewatering has been ongoing for several years and is a requirement of the discharge licence (ENV/W/82).

The current discharge licence limits the daily discharge from the Quarry to 13,000m^3/day, and states the following:

"*The licence holder shall ensure that the maximum rate of discharge does not exceed 13,000m^3/day, this being marginally in excess of the estimated maximum flow rate during wintertime*."

Total daily discharge volumes for years 2021, 2022 and 2023, which are a good representation of the current baseline scenario, are shown on Figure 8-2 below.

These data shows that the maximum peak daily discharge was 8,190m^3/day over this period which is significantly under the discharge licence limit of 13,000m^3/day.

Pumping rates above 8,000m^3/day only occurred on three (3No.) occasions over this period. The majority of the peak wintered discharges were between 7,000 and 8,000m^3/day. The average discharge was 3,230m^3/day.

A flow duration curve of total daily discharge volumes is shown in Figure 8-3 below. The flow-duration curve is a cumulative frequency curve that shows the percent of time specified discharges were equalled or exceeded during a given period. Discharges rates of 8,000m^3/day were exceeded only 0.3% of the time. The 50%ile and 95% (dry weather flow) are 2,845 m^3/day and 1,264m^3/day respectively.

Discharge from the Quarry is heavily influenced by rainfall events during wet periods, i.e. flows increase due to surface water input, rather than significant increases in groundwater inflow to the Quarry. The 95% flow (1,264m^3/day) is likely to be groundwater dominated summertime discharge.

Permission was granted in March 2017 to vertically extend the quarry floor from -14m OD to -45m OD over two benches. The Quarry is currently extracting from both -28m OD and -45m OD bench floor levels.

On comparison of current discharge volumes with pre-2017 discharge volumes, it is notable that there has been no increase in peak discharge volumes. Peak discharge volumes pre-2017 were also mainly between 8,000 and 9,000m^3/day (refer to Chapter 6 of the 2016 EIS by Tobin's). The surface water catchment to the Quarry (i.e. direct rainfall input and runoff) did not change significantly post 2017 and therefore if any increases in discharge rates had occurred it could only have been attributable to groundwater inflows solely.

The fact that no increased pumping trends were observed post 2017 shows no significant groundwater inflows were encountered below -14m OD, which is consistent with the lack of significant groundwater inflows observed from the lower bench walls.

From a baseline hydrogeological perspective with regard the Site, this is notable information and is discussed further in Section 8.3.10 and Section 8.3.11 below.

Figure 8-2: Daily water discharge volumes and rainfall at Kilmacow Quarry (2021-2023)

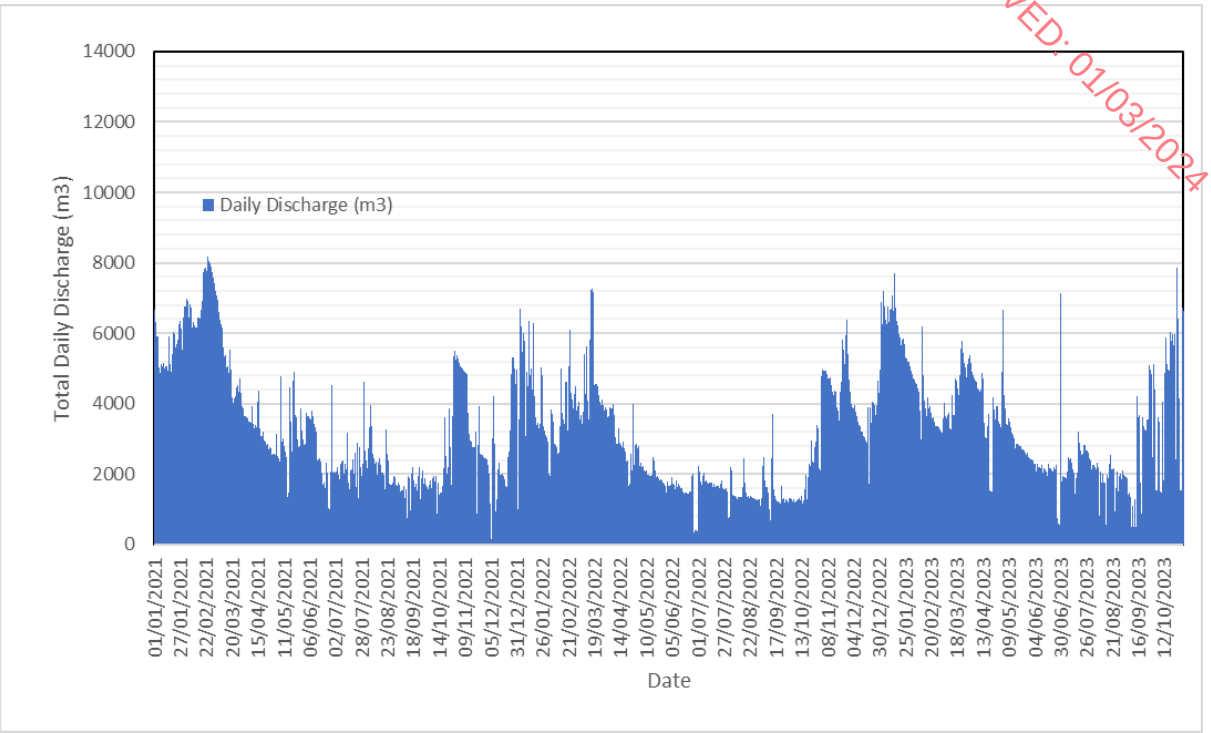
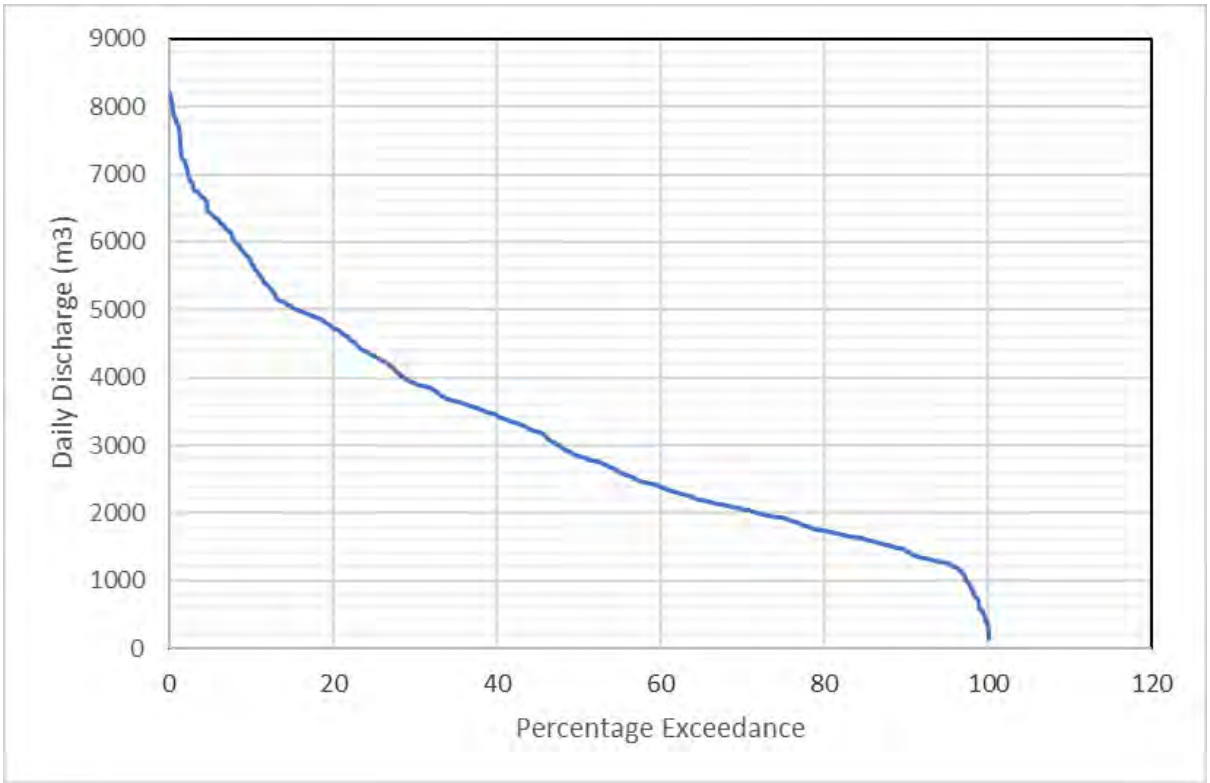


Figure 8-3: Quarry Discharge (Daily Totals) Flow Duration Curve (2021-2023)



8.3.6 Flood Risk Assessment

This section provides a summary of a Flood Risk Assessment (FRA) carried out for the Proposed Development. The FRA report is attached as Appendix 8-1.

OPW's River Flood Extents Mapping, National Indicative Fluvial Mapping, Past Flood Event mapping (https://www.floodinfo.ie/map/floodmaps/) and historical mapping (i.e. 6" & 25" base maps) were consulted to identify those areas of the Proposed Development as being at risk of fluvial flooding.

No recurring flood incidents within the Site or neighbouring land were identified from OPW's indicative river and coastal flood map. The closest area that is mapped to have recurring flooding is located 1.9km to the southwest of the Site (Ballymountain Bridge Recurring: ID 2594). The source of flooding is given as "River".

There are no areas adjacent to the Landholding or downstream lands mapped as "Benefiting Lands". Benefiting lands are defined as a dataset prepared by the Office of Public Works identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage.

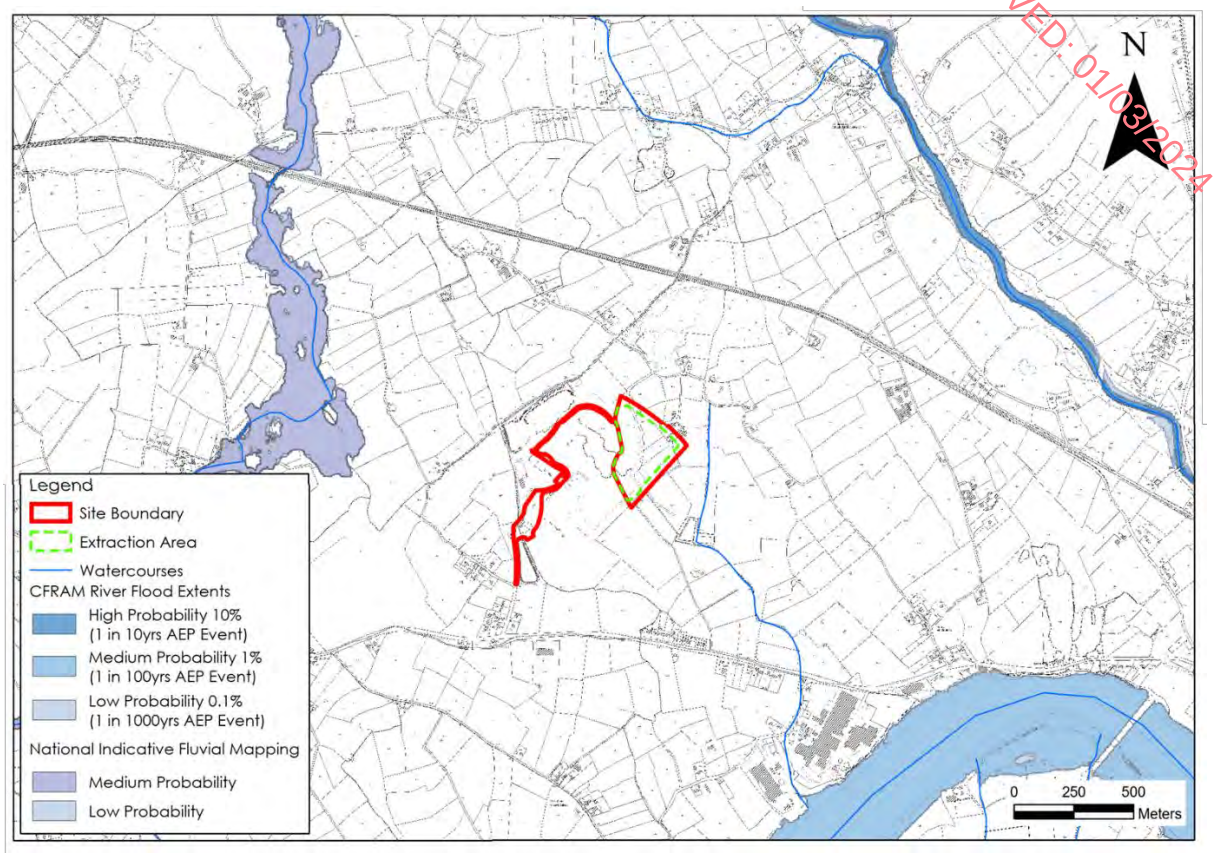
Based on historical 6" mapping for the study area, no areas in the vicinity of the Proposed Development are mapped as "Liable to flooding".

Where complete the OPW CFRAM Flood Extents Mapping (www.floodinfo.ie) [90] is now the primary reference for flood risk planning in Ireland. CFRAM flood maps indicate that no part of the Site is located within a fluvial or coastal flood zone (Flood Zones A or B) [90]. The OPW flood extents map for the area is shown in Figure 8-4 below.

The National Indicative Fluvial Mapping also has no flood zones mapped in the area of the Site as also shown on Figure 8-4 below [90].

Also, as stated in Section 8.3.5 above, quarry discharge volumes are compliant with discharge licence (ENV/W/82) and there has been no observed or reported flooding issues in the Flemingstown Stream due to quarry discharges.

Figure 8-4: OPW Flood Zone Mapping



8.3.7 Surface Water Quality

There are no publicly available EPA Biological Q-rating[3] data for Flemingstown Stream downstream of the Site. WFD status is dealt with in Section 8.3.17 below.

A round of surface water sampling was carried out on the Flemingstown Stream downstream of the quarry discharge point on 10th January 2024 for baseline assessment purposes. The laboratory analysis results are shown in Table 8-6 below. Refer to Appendix 8-2 for laboratory certificates of analysis.

Table 8-6: Flemingstown Stream Sampling Results

Parameter	EQS	Sample Date
		10/01/2024
Total Suspended Solids (mg/L)	25(+)	<7
Ammonia (mg/L)	Good Status: ≤0.065 High Status ≤ 0.04(*)	0.03
Nitrate NO_2 (mg/L)	-	<0.05
Ortho-Phosphate – P (mg/L)	Good Status ≤ 0.035 to High Status: ≤0.025(*)	<0.02

[3] The Q-Rating scheme method is used whereby a Quality-index is assigned to a river or stream based on macroinvertebrate data

Parameter	EQS	Sample Date
		10/01/2024
Nitrate NO_3 (mg/L)	-	28.7
Phosphorus (mg/L)	-	<0.10
Chloride (mg/L)	-	24
BOD		

(+) S.I. No. 293/1988: Quality of Salmon Water Regulations.
(*) S.I. No. 77/ 2019: European Communities Environmental Objectives (Surface Waters) Regulations 2019.

Total suspended solids were <7mg/L which is below the 25mg/L standard set out in S.I. 293/1988.

The concentrations of nitrite, phosphorus and orthophosphate were generally low with all the results below the laboratory detection limit.

The results for ammonia, orthophosphate and BOD were below the "High Status" threshold with respect the Surface Water Regulations (S.I. 77/2019).

Nitrate was reported at 28.7mg/L which would suggest some agricultural influence on water quality. Chloride was present at 24mg/L which is within normal range for a near coastal setting.

8.3.8 Quarry Discharge Water Quality

The quality of quarry discharge water is monitored on a quarterly basis in accordance with the discharge licence.

A summary of discharge water quality monitoring data (2021 to 2023) along with the discharge limits are shown in Table 8-7 below. Total petroleum hydrocarbons (TPH) are included in the table, but TPH testing is not a requirement of the discharge licence.

During the twelve (12No.) rounds of sampling conducted over the period 2021 to 2023, there was only one (1No.) confirmed** exceedance each for ammonia and orthophosphate as well as three (3No.) for nitrate.

The Discharge Limit (DL) for Nitrate N is 5.65mgL (25mg/L NO_3). However, the monitoring well sampling shows that the baseline concentration of nitrate in the local groundwater can be in excess of 5.65mgL at times and therefore the exceedances are likely not as result of the quarry operation, but most likely from surrounding agricultural activities (refer to Section 8.3.14 below for groundwater quality data).

Levels of nitrate in the local groundwater are likely to be variable both temporarily and spatially depending on what land use activities are taking place in the catchment.

The singular exceedance for ammonia and orthophosphate is also likely to be baseline groundwater quality related. Suspended solids were consistently under the DL limit which is noteworthy. There were also no detections of TPH over that period.

Suspended solids and TPH are the primary potential contaminants in quarry discharge waters.

Table 8-7: Summary of Quarterly Discharge Monitoring Data (2021 - 2023)

Parameter	Min	Max	Average*	Confirmed No. of Samples with DL exceedance**	DL
pH (pH Units)	7.18	8.17	7.7	0	6.5 – 8.5

Parameter	Min	Max	Average*	Confirmed No. of Samples with DL exceedance**	DL
Suspended Solids (mg/L)	<5	24	7.36	0	25
BOD (mg/L)	<0.1	1.3	0.36	0	10
Total Ammonia as N (mg/L)	<0.1	3	0.4	1	1
Nitrate as N (mg/L)	<0.016	<0.35	0.05	0	0.05
Nitrate as N (mg/L)	2.5	9.5	5.13	3	5.65
Total Phosphorus as P (mg/L)	<0.1	<0.5	0.43	0	0.05
Orthophosphate as P (mg/L)	<0.01	0.073	0.06	1	0.03
Fats/Oils/Grease (mg/L)	<0.6	<3	1.5	0	1.0 or better
Total Petroleum Hydrocarbons (mg/L)	<0.01	<0.01	0.01	0	N/A

*The average was calculated used the laboratory detection limit, therefore is very conservative.
**Where the laboratory detection limit is above the DL limit, the exceedance is not considered to be confirmed.

In addition to the regular quarterly sampling, the quarry discharge water was sampled by HES in November 2022 and sent to the laboratory and tested for a more extensive range of water quality parameters which included metals and hydrocarbons. Refer to Table 1 in Appendix 8-3.

With regard the Surface Water Regulations (S.I. 77/2019) threshold values, results for ammonia (<0.06mg/L), BOD (<1mg/L) and orthophosphate (<0.05mg/L) were all at least below the Good Status threshold. This is noteworthy given that the WFD status of the Flemingstown Stream is Poor.

The majority of metals analysed for, including heavy metals cadmium, chromium, mercury and lead were below the laboratory detection limits.

Total suspended solids were reported at <5mg/L and there was no detection of hydrocarbons.

Nitrate N was reported as 6.3mg/L which exceeds the discharge licence limit of 5.65mg/L. However, analysis of groundwater samples from the monitoring wells (sampled the same day as the discharge, refer to Section 8.3.14 below), show Nitrate N levels ranging between <1 and 5.97mg/L. This shows that baseline nitrate levels in groundwater inflows to the quarry void can exceed the discharge limit of 5.65mg/L. As discussed above, the most likely source of elevated nitrates is from surrounding agricultural activities rather than as a direct result of quarry operations.

8.3.9 Regional Hydrology

As discussed in Chapter 7 – Land, Soils and Geology, the majority of the Landholding, including the Site, are underlain by the Bullock Park Bay Member which is a Dinantian Pure Bedded Limestone (DPBL). The far southern section of the Landholding is mapped to be underlain by the Ballysteen Formation which is a Dinantian Lower Impure (muddy) Limestone (DLIL) with shale in places. The Site exists within the Clonmel GWB (IE_SE_G_040).

Regional and local hydrogeology is controlled by the bedrock type, structural trends and overburden cover and thickness. The Bullock Park Bay Member is classified as a Locally Important Aquifer - bedrock which is generally moderately productive (Lm), while the

Ballysteen Formation is classed as Locally Important (LI), bedrock which is generally moderately productive in local zones only. These classifications mean the aquifer at the Site typically has localised groundwater flowpaths due to a limited and relatively poorly connected network of fractures, fissures and joints, giving a low fissure permeability which tends to decrease further with depth.

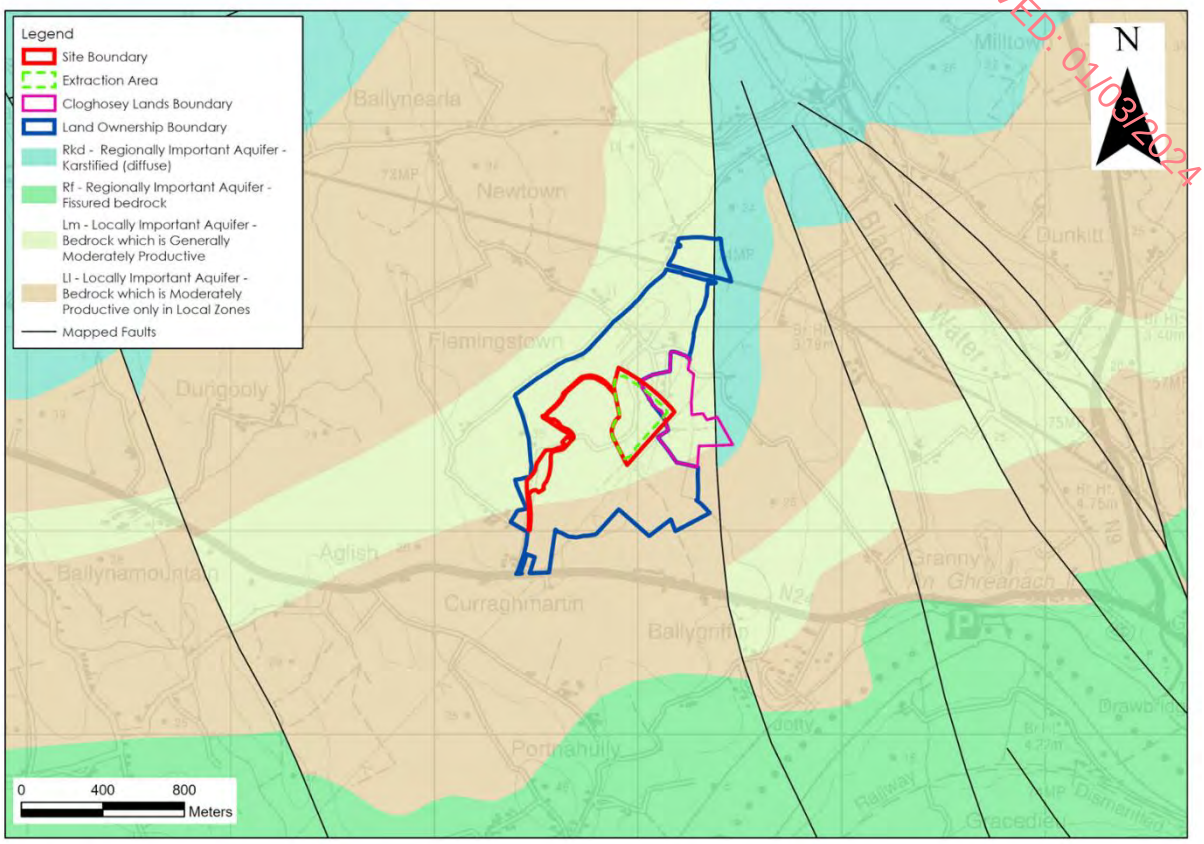
The limited number of relatively low volume groundwater inflows/seepages into the Quarry is consistent with the aquifer classification (Refer to Section 8.3.10.2 below). A bedrock aquifer map is shown as Figure 8-5 below.

According to the Clonmel GWB Characterization Report [91] most of the groundwater in this area moves relatively rapidly along short flow paths and discharges into the streams which cross the aquifers. Natural groundwater gradients in the general area of the Site are expected to be south-easterly towards the Flemingstown Stream and the Middle Suir Estuary.

The axis of the Carrick-on-Suir syncline is mapped as being approximately 2.5 km northwest of the Site and it appears this syncline is having some influence on the structure of the geology in the area of the Quarry. There is an axial trace of a syncline visible on the northeast face of the Quarry and this appears to pass through the northern section of the Quarry in a northwest / southeast orientation. This syncline is most likely a parasitic fold present on the southern limb of the Carrick-on-Suir syncline.

It is reported by the GSI [91] that the permeability of the aquifers in the areas influenced by the syncline are defined by the structural features as opposed to the lithology. We are potentially seen this in the Quarry as the main groundwater inflow to the Quarry void is an inflow on the northwest corner and this area appears to lie along the axial trace of the syncline seen in the eastern face of the Quarry. Inflows to the Quarry are discussed in Section 8.3.10.2 below.

Figure 8-5: Bedrock Aquifer Map



8.3.10 Site and Local Hydrogeology

8.3.10.1 Proposed Extension Area Geological Setting

The proposed extraction area extension lands are located on the east of the Site and immediately adjacent (east/northeast) to the current extraction area where the deepest quarry floor is at ca.-45m OD at the northern end at -28m OD towards the southern end.

The existing ground level in the greenfield lands proposed for extraction range from ca.28m OD to 32m OD with the slope to the east and away from the current extraction area.

The mapped bedrock type in the current extraction area is the same as the proposed extension (i.e. Bullock Park Bay Member). Locally Important Aquifer - bedrock which is generally moderately productive (Lm).

Geophysical surveys indicate overburden depths (silty gravelly CLAY) of between 2 and 5m within the Site extension lands boundary (depth increasing from west to the east).

The underling bedrock with the Site extension lands is interpreted from the geophysics as having a couple of metres of weathered LIMESTONE at the subsoil/bedrock interface which is then underlain by more competent LIMESTONE. Competent limestone is visible on the quarry walls where the extension is proposed.

An existing monitoring well, MW15-02, which is located 80m to the south of the Site, is the closest monitoring well to the proposed extraction area.

Shallow weathered rock (0 -3m) over solid calcarenitic LIMESTONE was recorded between 3m (27.3m OD) to 31.7mbgl (-2.12m OD) in MW15-02. From this depth on the drilling

comprised sequences of broken and solid LIMESTONE rock, with clay infill occurred. This sequence remained to the final depth of 67.1mbgl (-37.52m OD).

There is a north/south trending mapped fault located approximately 270m to the east of the Site. The monitoring well drilling carried out in September 2022, supports the presence of this fault whereby steep bedrock dips were recorded at depths in excess of 29.5mbgl (-6.2m OD) to the east of the Site near the mapped fault location. Refer to Chapter 7 – Land, Soils and Geology for details of the 2022 monitoring well drilling. (MW22-0, MW22-01, MW22-02 and MW22-03).

Of relevance to the proposed extension, the geophysical survey and drilling investigations suggest that the nearby bedrock fault is not affecting rock quality/competency at the Site extension area.

The investigations indicate that the bedrock quality between the Site and the fault location further to the east is strong and competent. MW22-01 was drilled between the Site and the fault location where the bedrock encountered at 21.6mbgl (3.7m OD) was strong and competent to the final drilling depth of -54.7m OD (80mbgl).

8.3.10.2 Existing Quarry Groundwater Inflows

Groundwater inflows occur from the face of the existing quarry wall at a number of locations, and these appear to be emerging from discrete horizons, rather than uniformly. As mentioned above, the main groundwater inflow to the Quarry emerges from the northwest corner of the existing quarry void and it is thought that this is related to the syncline which is visible on the eastern quarry wall. This inflow occurs at approximately 5m OD and the emerging water discharges at two locations and cascades down over the bench ledge and falls to the quarry floor which is at -45m OD at that location.

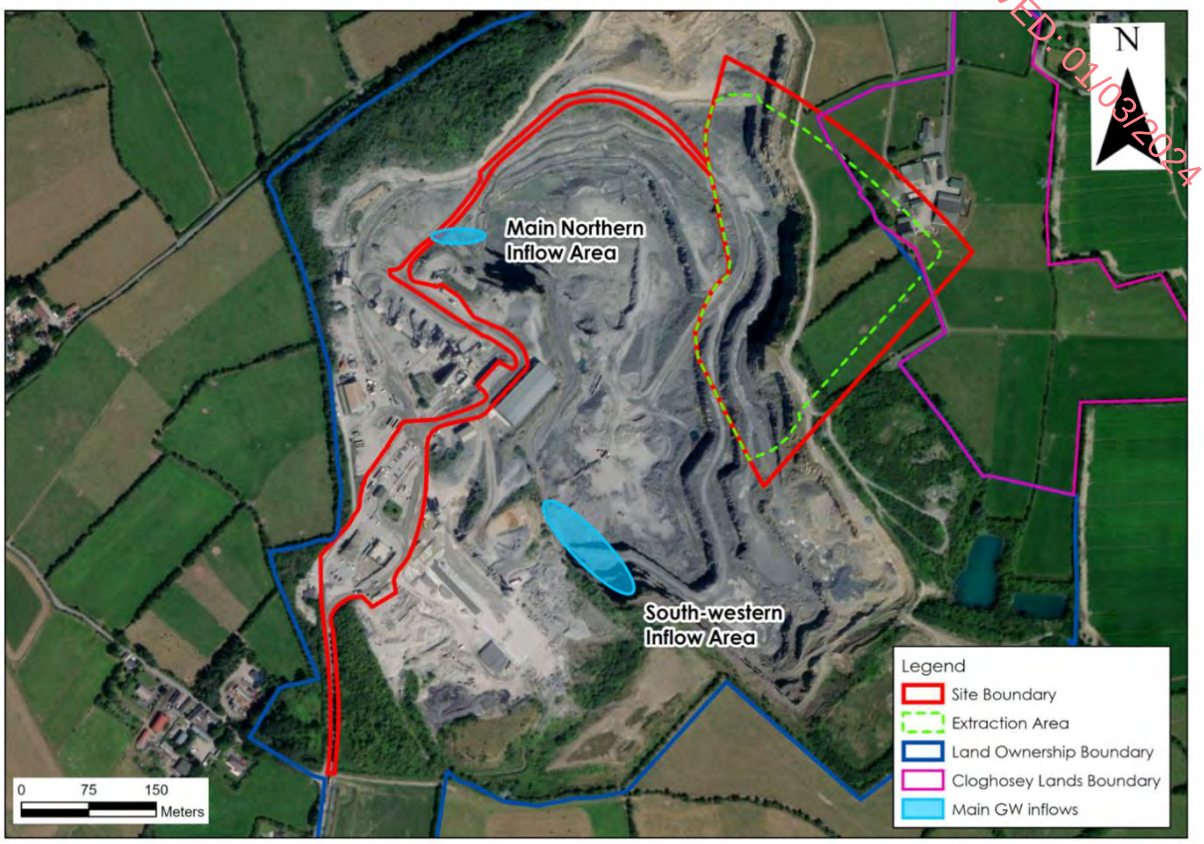
The other main inflow is from the southwest corner or the Quarry where poor rock conditions are noted on the quarry walls above -14m OD. The locations of the main groundwater inflows are shown on Figure 8- 6.

These groundwater inflows volumes were quantified in 2015/2016 as part of the vertical extension application when volumes in the range of 2,000 – 3,000m^3/day were measured.

Repeating of measurements for this planning application were not possible due to alterations of the quarry floor levels making flow measurements on the quarry floor (as previously done) not possible. However, visually the inflow volumes appear to remain unchanged.

No significant groundwater inflows arise from the eastern quarry face where the extension is proposed. Only very minor seepages along bedding planes on the quarry face above the -28mOD floor level were observed.

Figure 8-6: Main Groundwater Inflows to the Quarry



8.3.11 Previous Quarry Floor Drilling Investigations

A phase of narrow diameter quarry floor drilling was undertaking in the Quarry in September 2015. The purpose of this investigation was to investigate the bedrock condition below the then existing quarry floor in terms of potential water bearing fracture zones. The drilling was carried out on the lower bench floor which was at -14m OD at that time. The drilling went to a maximum depth of -54m OD.

A total of sixteen (16No.) narrow diameter bore holes (100mm diameter) were completed at the locations shown on Figure 8-7 below. Drilling logs for these boreholes are attached to Chapter 7: Land, Soils and Geology.

The quarry floor drilling (16No. boreholes) was initially targeted at features noted in the quarry face (as described above).

Overall, apart from a few minor exceptions, bedrock between -14m OD and -45m OD was found to be massive, and largely devoid of fractures and additional groundwater strikes. Many of the boreholes only returned dust, and many others only had water inflows within 1-2 m of quarry floor level, and this water was flowing in the broken rock (from blasting) close to the quarry floor level rather than being any significant regional groundwater flow. These shallow water strikes were interpreted as surface water from the floor of the Quarry.

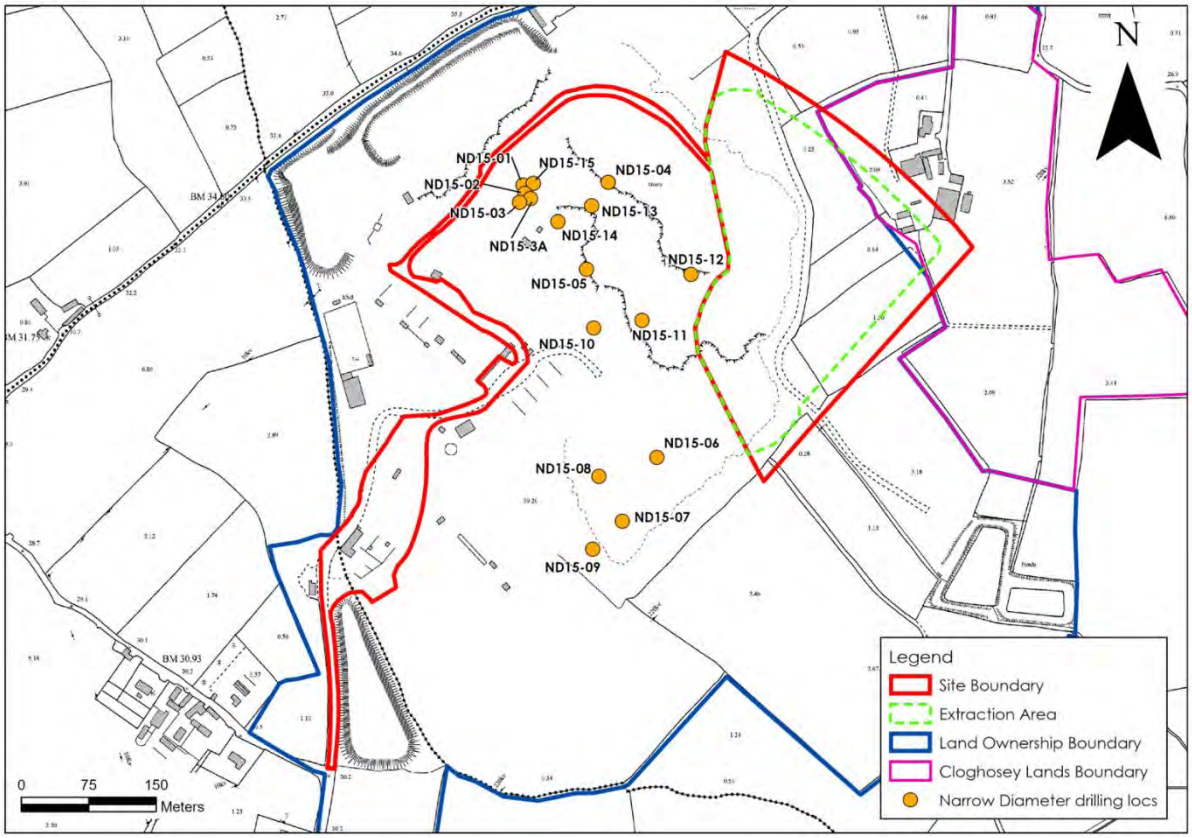
Falling head tests undertaken on the quarry floor holes following drilling gave low permeability values in the range 5.0 x 10-6 – 4.7 x 10-7m/s and this is consistent with the bedrock below the existing quarry floor which is massive and largely devoid of fractures and additional groundwater strikes.

The lack of significant groundwater inflows between -14m OD and -45m OD was confirmed during the extraction of the fourth (-28m OD) and fifth benches (-45m OD). No additional significant groundwater inflows have been exposed to date during the extraction below -14m OD.

It is expected that the same rock type/quality that was found between -14m OD and -45m OD will extend easterly into the proposed extension area.

The geophysical surveys and 2022 drilling investigations also suggest good rock quality in the proposed extension area.

Figure 8-7: Narrow Diameter Drilling Locations Map (September 2015)



8.3.12 Quarry Groundwater Levels

Monthly groundwater levels are available for four (4No.) monitoring wells that were installed in 2015 (MW15-01 to MW15-04) and also for wells RPL3 and PW1 that existed before 2015. PW1 is the Quarry water supply well and RPL3 is an old investigation hole. These wells (referred to as internal monitoring wells) are dipped monthly by Roadstone staff. The internal monitoring wells are shown on Figure 8-8 below.

A groundwater level graph from September 2015 to September 2023 are shown on Figure 8-9 below for the internal monitoring wells. The graph also shows the vertical progression of the deepest quarry floor level over this period which is from -14m OD to -45m OD.

MW15-02 and MW15-03 are the only wells to show a long-term decline over this period, albeit not very significant. MW15-02 showed the greatest reducing trend in groundwater levels and this is likely to its close proximity to the current extraction area. MW15-02 is the closest monitoring well to the quarry void and this is likely the reason for the increased groundwater level reduction at this location.

MW15-03 is located at the southeast corner of the Landholding. A potential fracture was encountered 32mbgl (-9.73m OD) in this well during drilling which may allow preferential dewatering towards the extraction area. MW15-03 is also located at the down-gradient side of the Quarry where groundwater levels are potentially more reduced due to groundwater from the northwest (up-gradient of quarry) being intercepted by the quarry void.

The overall reducing trend in the MW15-02 and MW15-03 since 2015 is estimated to be 4m and 1m respectively (see Table 8-8 below). Given the close proximity of these wells to the extraction area, this reduction is not significant given the quarry floor was lowered from -14m to -45m OD during this period.

The lowest groundwater level recorded in MW15-02 over this period was -8.32m OD which is 36.7m above the lowest quarry floor level (-45m OD). This is a steep localised groundwater level gradient. Its shows that the cone of drawdown is localised to the Landholding which is consistent with the lack of groundwater level effects in the external monitoring wells (see Section 8.3.13 below).

Groundwater levels in the other internal wells show a steady level or even increasing trend since 2015 which shows the current quarry dewatering is not affecting groundwater levels in these areas.

MW22-01 and MW22-02 were drilled on the agricultural lands to the east of the Site in September 2022. MW22-01 is located 170m to the northeast of the Site while MW22-02 is located 350m to the southwest. As described in Chapter 7 – Land, Soils and Geology, MW22-01 and MW22-02 are located to the west and east respectively of a mapped fault that runs in a north-south orientation to the east of the Site.

Data loggers were installed in a number of the internal monitoring wells in November 2022 for continuous groundwater level monitoring (2hr intervals). See Table 8-9 below for summary data and Figure 8-10 below for graph.

MW22-01 and MW22-02 show similar seasonal water level variations to the wells to the north (MW15-01/MW22-03), west (PW1 and RPL3) and south (MW15-04) of the current extraction area, albeit the groundwater levels in MW22-01 and MW22-02 are slightly lower than the forementioned wells and this is likely attributed to the natural lower ground elevations at their locations (i.e. 25m OD).

As stated, described above, the long-term monthly data for these wells suggest that the Quarry is having no significant effects on groundwater levels, which also appears to the case for MW22-01 and MW22-02.

Figure 8-8: Quarry Internal Groundwater Monitoring Well Locations

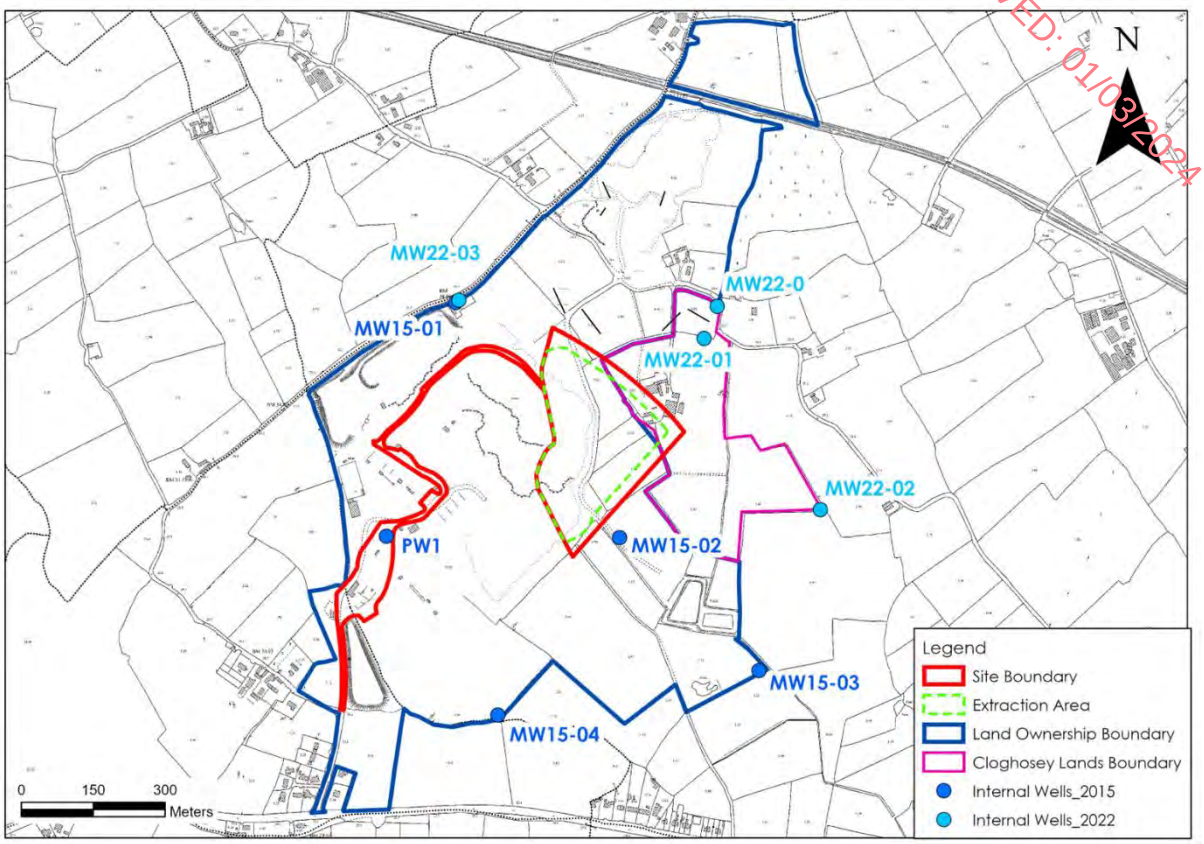


Figure 8-9: Internal Monitoring Well Monthly Water Level Monitoring (2015 – 2023).

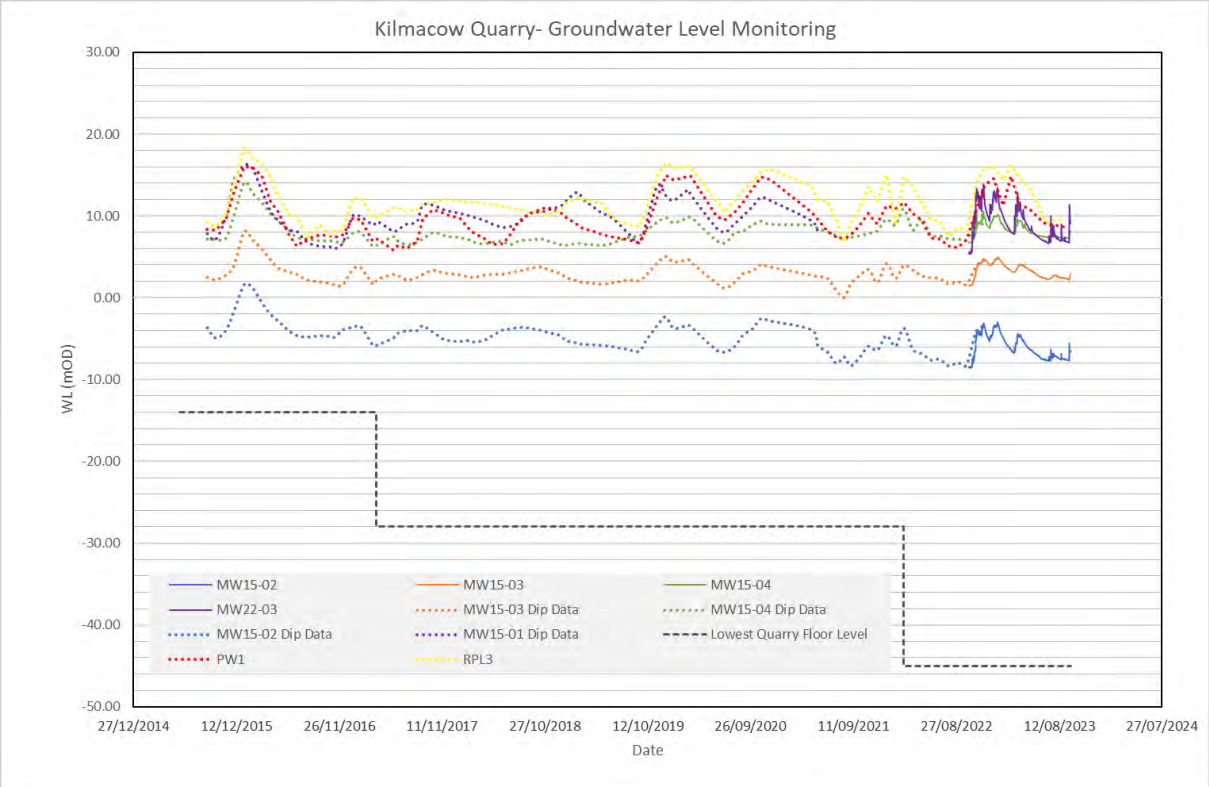


Figure 8-10: Internal Wells Continuous Groundwater level Monitoring (Nov 2022 to Present)

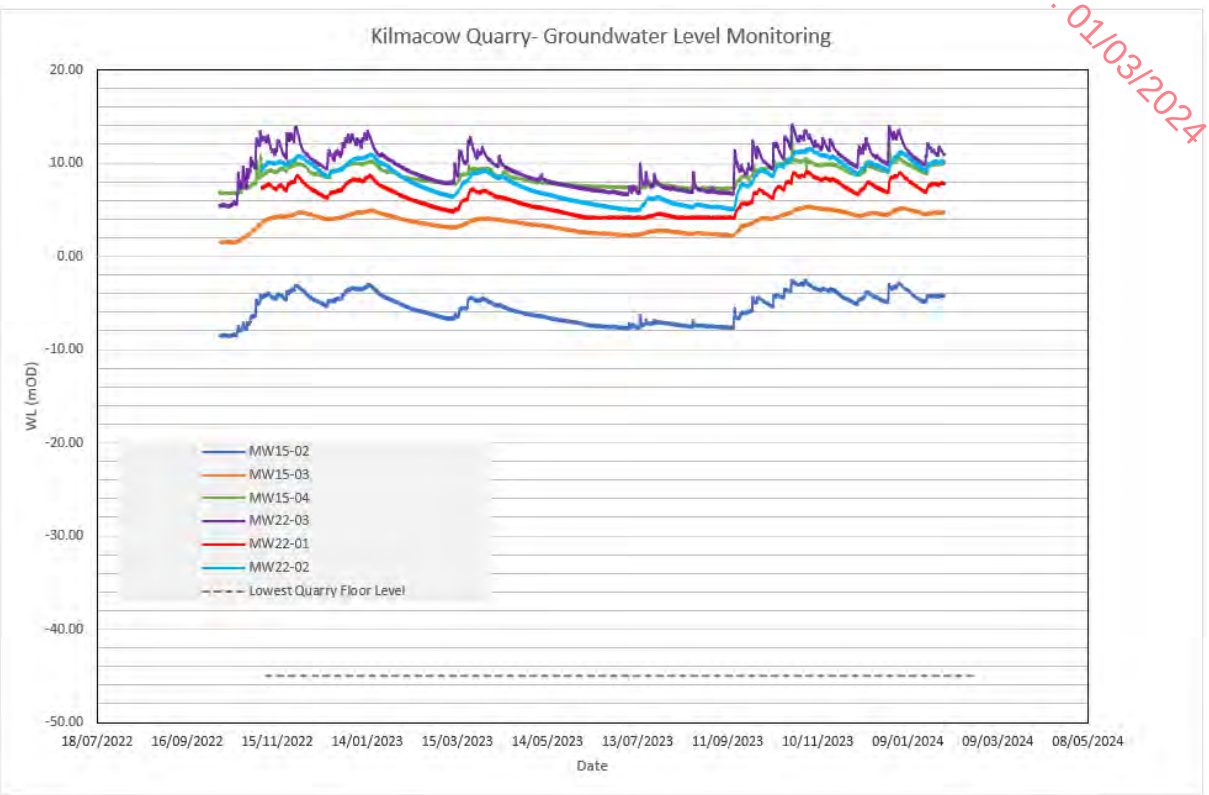


Table 8-8: Internal Monitoring Wells Summary Groundwater Levels (2015 – 2023)

Well ID	G.L (m OD)	Min Level (m OD)	Max Level (m OD)	Trend (-/+m)
MW15-01	34.94	6.01	16.21	+0.5
MW15-02	29.58	-8.32	1.63	-4.0
MW15-03	22.27	0.07	8.07	-1.0
MW15-04	30.98	6.28	14.08	0
PW1	36	5.8	16.0	+1.0
RPL3	35	6.82	18.32	+1.0

Table 8-9: Summary of Continuous Groundwater Level Monitoring (Nov 2022 – Sep 2023)

Well ID	G.L (m OD)	Min Level (m OD)	Max Level (m OD)
MW22-01	25.3	4.11	8.64
MW22-02	25.7	4.95	10.9
MW22-03*	34.7	5.34	13.89
MW15-02	29.58	-8.56	-2.94

Well ID	G.L (m OD)	Min Level (m OD)	Max Level (m OD)
MW15-03	322.27	1.49	4.93
MW15-04	30.98	6.67	10.88

*MW22-03 replaced MW15-01 which blocked in June 2021

Overall, the available groundwater level data for the internal monitoring wells suggests that that cone of drawdown towards the sump appears to be localised to the Quarry on the northern, western, southern and eastern boundaries. There appears to be some preferential dewatering extending to the southeast of the Quarry and it is likely that this is related to fractured bedrock that was encountered in this area. However, the progression of the cone of drawdown appears to be small with MW15-03 only showing an estimated 1m drop in groundwater levels since 2015.

8.3.13 External Groundwater Levels

There is a network of private third-party wells in the area of the Quarry used for external groundwater level monitoring. These wells are also dipped on a monthly basis, and data is available as far back as January 1998 for some wells, albeit data is not continuous for many.

Several of the wells have good continuous datasets from 2009 and these wells water levels are show graphically in Figure 8-11 and are summarised in Table 8- 10 below. The graph also shows the vertical progression of the deepest quarry floor level over that period which is from -14m OD to -45m OD.

The location of these external (from the Quarry) monitoring wells, most of which are local domestic wells, are shown on Figure 8-12 below.

It should be noted that the majority of the private wells are being actively pumped. Therefore, the recorded water levels may not be the static water level on the dates recorded, i.e. the well may be temporarily lower than normal as a result of contemporary pumping from the well being monitored.

The wells display typical seasonal variations but show no obvious effect on groundwater levels due to quarry dewatering/pumping. The groundwater level trends do not in any obvious way reflect the vertical deepening of the Quarry since 2009.

In the vicinity of the Quarry, groundwater levels are highest on the northwest and lowest to the southeast, which suggests natural groundwater gradients are to the southeast towards the Middle Suir Estuary.

Table 8-4: Third Party Wells (External Monitoring Wells)

Well	Ground Elevation (m OD)	Distance from Centre of Quarry Void (km)	Min Level (m OD)	Max Level (m OD)
EGW2	26.38	0.65	3.68	13.70
EGW4	20.76	0.96	5.56	15.56
EGW6	28.16	1.62	15.26	23.56
EGW7	18	2.35	11	18
EGW8	36	2.12	22.18	34.48

Well	Ground Elevation (m OD)	Distance from Centre of Quarry Void (km)	Min Level (m OD)	Max Level (m OD)
EGW9	28.39	2.52	14.99	26.39
EGW10	8.32	1.5	1.32	6.12

Figure 8-11: External Private Wells Groundwater Level Monitoring

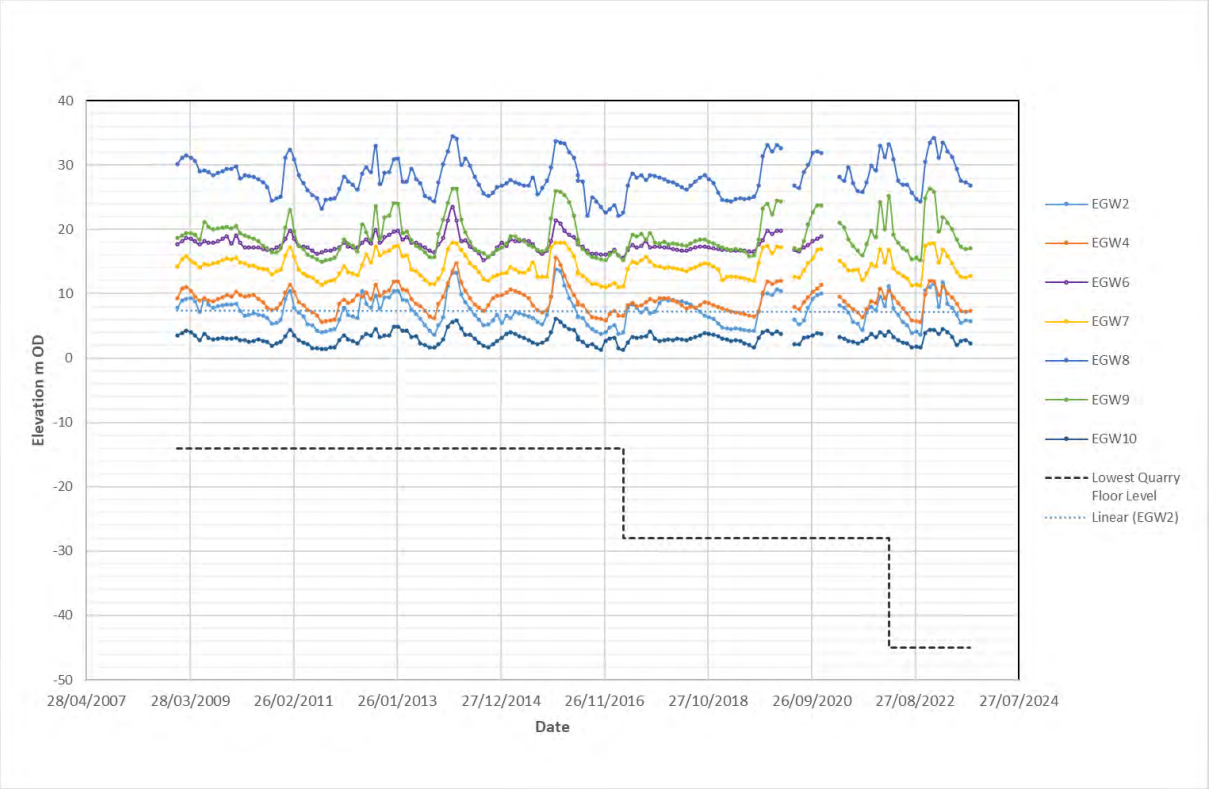
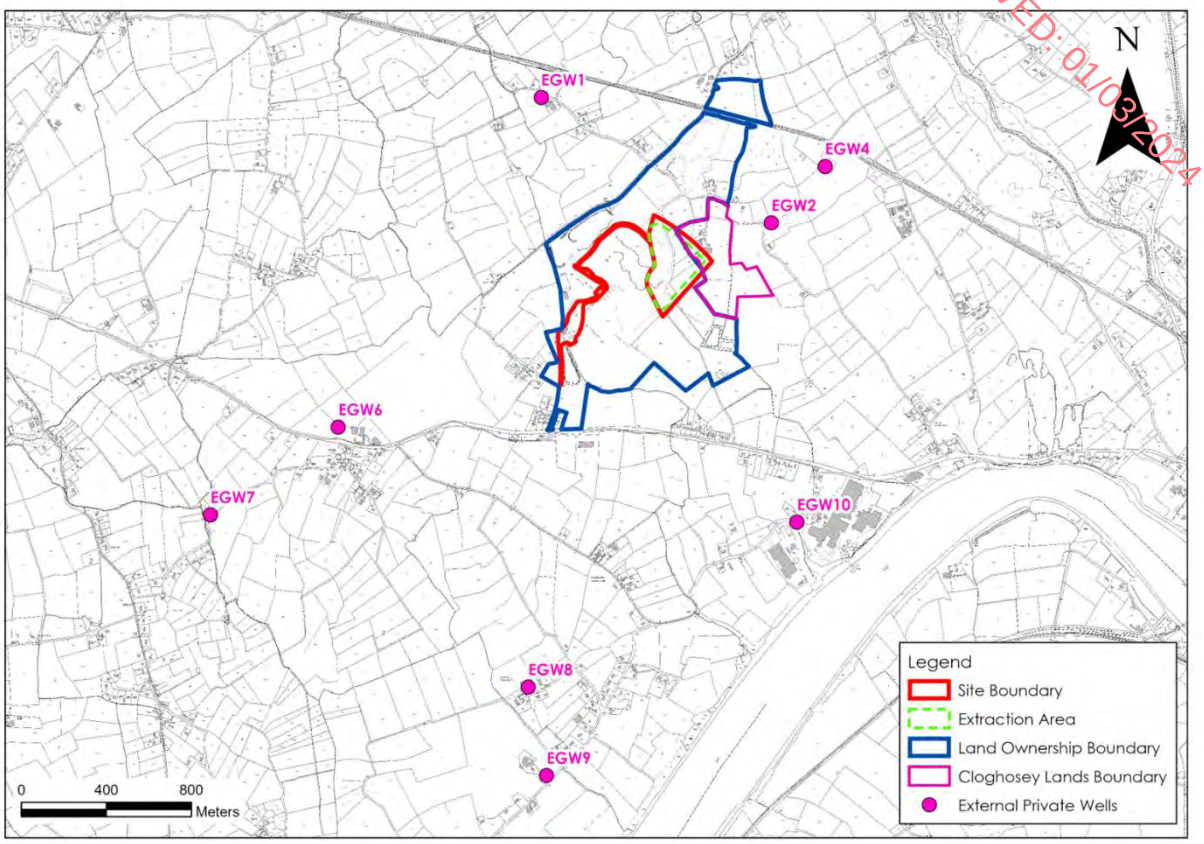


Figure 8-12: External Monitoring Well Locations



8.3.14 Groundwater Quality

Groundwater sampling of all internal monitoring was carried out by HES on 2nd November 2023. Unstable parameters pH, electrical conductivity and temperature were also measured in the field on the day.

Tabulated (Table 1) groundwater quality data are attached as Appendix 8-3. Results of analysis are shown alongside relevant groundwater regulation and drinking water regulation values (S.I. No. 366/2016 and S.I. No. 99/2023). Laboratory certificates are shown in Appendix 8-2.

Some chloride values did exceed the lower threshold range of 24mg/L with regard the groundwater regulations, but these levels would be considered normal for a coastal setting due to saline in rainwater.

It's also worth noting that there was no detection of hydrocarbons which is one of the main potential contaminants at a quarry development.

In relation to ammonia, nitrate and nitrogen, which are potential residues of quarry explosives, no elevated levels were noted. Ammonia was below the laboratory detection limit in all samples while nitrate (NO_3) was significantly below the groundwater regulation threshold value of 37.5mg/L. Total nitrogen was typically below 5mg/L.

Due to the proximity of the Site to the Middle Suir Estuary, saline intrusion due to dewatering also needs to be considered. However, chloride levels, which typically ranged between 22 – 28mg/L in the groundwater samples, would be normal for a near coastal location setting such as the Site.

The chloride level is noted to be elevated in MW22-01 (42mg/L), but this well is located on the inland side of the Site (i.e. not in the direction of the Middle Suir Estuary) and therefore not likely related to saline intrusion.

Also, the electrical conductivity values are within normal range in all wells (545 - 650µS/cm). Electrical conductivity values in excess of 800µS/cm indicate saline intrusion according to S.I. No. 366/2016.

MW15-03 is the well where you would expect the first signs of saline intrusion to be picked up as it is located in line between the Site and the Middle Suir Estuary. MW15-03 also appears to be located along a preferential line of drawdown extending from the Quarry. Chloride (27.8mg/L) and electrical conductivity (628µS/cm) levels are normal at MW15-03.

The lack of saline intrusion water quality indictors is also reflected in the quarry discharge quality which was sampled on the same day as the monitoring wells. Chloride and electrical conductivity were 25.7mg/L and 590µS/cm respectively which are normal levels.

8.3.15 Water Framework Directive Status and Objectives

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ("WFD"), was established to ensure the protection of the water environment. The Directive was transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

The WFD requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the WFD is not compromised.

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021.

The River Basin Management Plan 2018 – 2021 objectives, which have been considered with regard the Proposed Development [92], include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration and maintain a 'high' status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least good status by 2027;
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at (1) targeting water bodies close to meeting their objectives and (2) addressing more complex issues that will build knowledge for the third cycle.

Our understanding of these objectives is that water bodies, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed.

Furthermore, the Department of Housing, Local Government and Heritage are currently reviewing the submissions made on the Draft River Basin Management Plan 2022 – 2027 [93] which was out for public consultation in Q4 of 2021 and Q1 of 2022. The draft plan was to be updated with a view to finalisation and publication in Q3/Q4 of 2022. As of February 2024, the plan has not been published while the draft plan is available to view at

https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027/ [93].

A WFD Compliance Report for the Proposed Development is attached as Appendix 8-4.

8.3.16 Groundwater Body Status

Local Groundwater Body (GWB) and Surface Water Body (SWB) status reports are available for download from www.catchments.ie [88].

The entirety of the Site is situated within the Clonmel GWB (IE_SE_G_040), which is assigned 'Good Status' in respect of both quantitative status and chemical status according to the 2016-2021 WFD Status. The objectives for the GWB are to protect the current 'Good Status' condition, requiring that its chemical and quantitative status needs to be maintained.

Table 8-5: WFD Groundwater Body Status

European Code	Groundwater Body Name	Overall Status	Risk Status	Pressures
IE_SE_G_040	Clonmel	Good	At Risk	Agricultural

8.3.17 Surface Water Body Status

The majority of the Site is located upstream of the transitionary zone of the River Suir i.e. the Middle Suir Estuary. The existing WFD status of the local surface water catchments as shown in (www.catchments.ie) are briefly outlined below [88].

The Site is mainly located in the Flemingstown (Kilkenny)_010 WFD river sub basin. The quarry discharge receiving stream has been assigned a "Poor" WFD status and is deemed to be "At risk" of missing the WFD's 2027 objectives.

A small section of the Site to the west is located in the Ullid_010 WFD river sub basin and its SWBs have a 2016-2021 Status of "Moderate" and are currently "Under Review" for the Risk 3rd Cycle.

Another small section of the Site to the north is located in the Blackwater (Kilmacow)_040 WFD river sub basin and its SWBs have a 2016-2021 Status of "Moderate" and are currently deemed by the Risk 3rd Cycle to be "At risk" of missing out on the WFDs 2027 objectives.

There is no discharge or drainage from the Quarry or Site into either the Ullid_010 basin or the Blackwater (Kilmacow)_040 basin.

A summary of the surface water body status, risk result and pressures for the local freshwater SWBs is shown in Table 8-12 below.

Table 8-6: WFD Surface Water Body Status

Water Body	2016-2021 WFD Status	3rd Cycle Risk	Pressures
Flemingstown (Kilkenny)_010	Poor	Review	-
Ullid_010	Moderate	Review	-
Kilmacow (Blackwater)_040	Moderate	At Risk	Ag, DWW

8.3.18 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).

There is one local designated site of relevance to this hydrogeological assessment, namely the Lower River Suir SAC [Site code: 002137]. Its qualifying interests and conservation objectives are set out in the site synopsis report and conservation objective report [both are available at www.npws.ie] and a general summary with regards to hydrology is as follows:

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [1330] Atlantic Salt Meadows;
- [1410] Mediterranean Salt Meadows;
- [3260] Floating River Vegetation;
- [6430] Hydrophilous Tall Herb Communities;
- [91A0] Old Oak Woodlands;
- [91E0] Alluvial Forests;*
- [91J0] Yew Woodlands;*
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*);
- [1092] White-clawed Crayfish (*Austropotamobius pallipes*);
- [1095] Sea Lamprey (*Petromyzon marinus*);
- [1096] Brook Lamprey (*Lampetra planeri*);
- [1099] River Lamprey (*Lampetra fluviatilis*) [1103];
- Twaite Shad (*Alosa fallax*);
- [1106] Atlantic Salmon (*Salmo salar*); and,
- [1355] Otter (*Lutra lutra*).

8.3.19 Local Water Supplies

Based on the GSI mapping the Site is not located within any groundwater source protection zones relating to public water supplies or group water schemes.

Refer to Section 8.3.13 above for details on local private wells that are used for external groundwater level monitoring. Comprehensive groundwater level monitoring data are available for these wells since 2009.

The wells display typical seasonal variations but show no obvious effect on groundwater levels due to quarry pumping/dewatering. The groundwater level trends do not in any obvious way mirror the vertical deepening of the Quarry since 2009.

The closet third party well to the proposed extension is EGW2 which is located approximately 380m to the northeast of the Site and proposed extension area. EGW2 is currently located approximately 465m from the current extraction area.

Based on the groundwater level monitoring that has been carried out since 2009, as with all the external monitoring wells, EGW2 is showing no significant groundwater level effects as a result of the quarry dewatering.

8.3.20 Receptor Sensitivity

The Site is underlain by a Locally Important Aquifer – bedrock which is generally moderately productive which can be considered 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 construction sites (such as road works and industrial sites).

Surface waters such as the Flemingstown Stream and the downstream Middle Suir Estuary could be considered very sensitive, particularly due to quarry discharge which provides a pathway to these downstream river waterbodies. The Lower River Suir SAC is also a very sensitive receptor.

8.4 Characteristics and Potential Effects of the Proposed Development

8.4.1 Future Quarry Discharge Volumes

Total daily discharge volumes for years 2021, 2022 and 2023 are shown on Figure 8-3 above.

The data shows that the maximum daily discharge was 8,190m^3/day over this period which is significantly under the discharge licence limit of 13,000m^3/day. The average discharge was 3,230m^3/day.

The proposed extension will essentially involve the lateral expansion of the permitted extraction area which is currently extracting from its final permitted bench level (-45m OD). -45m OD is also the proposed final depth of the proposed extension.

Therefore, no significant additional groundwater inflows are expected during the proposed lateral expansion as the groundwater gradient towards the existing quarry void is not likely to increase significantly. The existing gradient towards the Quarry means the rock in the proposed extension area is already being dewatering to some extent.

However, the increased footprint of the extraction area will result in an increase in the surface water catchment (i.e. direct rainfall and runoff). The proposed extension will increase the surface water catchment to the Quarry by approximately 3.2ha. By applying a conservative 10-year 24hour return period rainfall depth (65.8mm), this gives a daily volume of 2,105m^3.

Taking the maximum recorded daily discharge volume between 2021 – 2023 (8,190m^3/day) as baseline. Even with the additional potential rainfall/runoff volumes, the current discharge limit of 13,000m^3/day will still provide a freeboard of over 2,700m^3/day which will be more than sufficient to account for any additional groundwater inflows that might occur.

There will be no requirement to undertake a review of the existing discharge licence.

8.4.2 “Do Nothing” Scenario

If the proposed quarry extension does not proceed, the Quarry will operate in accordance with the current planning permissions and related planning conditions (Planning Ref: 16/830 and 16/700) until the planning permission has expired.

8.4.3 Construction Phase – Likely and Significant Effects

8.4.3.1 Downstream Surface Water Quality Effects from Suspended Sediments during Site Preparation Works and Overburden Stripping /Removal

There will be a requirement to strip and store overburden from the proposed extension greenfield area. Overburden removal will be an intermittent operation but will be completed in the early stages, which will progress in advance of the rock extraction during periods of

suitable weather. Overburden will be retained and stored as berms along the Site boundaries. The preparation works also include upgrading the haul routes within the Quarry and demolition of two (2No.) agricultural sheds and pump house at the proposed extension area. These works have the potential to result in the release of suspended sediments to downstream watercourses including Flemingstown Stream and the Middle Suir Estuary. The Middle Suir Estuary forms part of the Lower River Suir SAC which is the only designated site hydrologically connected to the Site.

Table 8-7:Downstream Surface Water Quality Effects from Suspended Sediments during Site Preparation Works and Overburden Stripping /Removal

Attribute	Description
Receptor	Downstream surface waters (Flemingstown Stream and Middle Suir Estuary) and the Lower River Suir SAC
Pathway	Surface water runoff and quarry discharge waters
Pre-mitigation Potential Effects	Negative, reversible, slight, indirect, likely, temporary effect on surface water quality

8.4.4 Operational Phase – Likely and Significant Effects

8.4.4.1 Groundwater Level Effects (Increase in the Groundwater Zone of Contribution)

The Proposed Development seeks to extend the quarry floor laterally by approximately 2.6ha with a final floor level of -45m OD which is the same level as currently permitted.

The Quarry has been operating below the local groundwater table for several years and dewatering is ongoing to facilitate this. There is likely to be some small increase in groundwater inflows/seepages as the surface area of the extraction area below the groundwater table increases.

However, the Quarry is already operating at its deepest permitted level (-45m OD) and the water level effects in the internal monitoring wells has not been significant as shown by the long-term monitoring. There have also been no observed significant effects on the groundwater levels in the external monitoring wells either.

The existing gradient towards the Quarry void means the rock in the proposed extension area is already being dewatering to some extent. Therefore, no significant additional groundwater inflows are expected during the Proposed Development.

Table 8-8:Groundwater Level Effects (Increase in the Groundwater Zone of Contribution)

Attribute	Description
Receptor	Groundwater levels and quantity in the Clonmel GWB
Pathway	Quarry Pumping / Dewatering
Pre-mitigation Potential Effect	Negative, reversible, slight, indirect, likely, long term effect on groundwater levels and quantity in the Clonmel GWB

8.4.4.2 Groundwater Level/Quantity Effect on Local Private Wells

Based on the long term groundwater level monitoring data for local wells there is no evidence to suggest that the Quarry is significantly impacting on local groundwater supplies.

As stated above, due to the fact that the Quarry is already operating at its maximum permissible depth (-45m OD) and that the proposed bedrock for extraction is already being dewatered to some extent, no significant increase in the groundwater cone of drawdown is expected outside of the Landholding.

Table 8-9:Potential Drawdown Effects on Local Private Wells

Attribute	Description
Receptors	Local groundwater wells
Pathway	Quarry Pumping / Dewatering
Pre-mitigation Potential Effect	Indirect, negative, imperceptible, temporary, long term likely effect on local groundwater supplies.

8.4.4.3 Effects on Surface Water Quality from Increased Quarry Discharge Volumes

There is likely to be a small increase in quarry pumping rates due to a slightly larger surface water catchment to the void (i.e. direct rainfall input and runoff) and additional groundwater seepages due increased quarry surface area below the groundwater table.

However, as calculated in Section 8.4.2 above, the increased volume (from surface water inputs and groundwater seepages) will not exceed the existing discharge licence limit of 13,000m^3/day.

Therefore, the small increased pumping rate will not have the potential to significantly affect the surface water quality in the Flemingstown Stream or Middle Suir Estuary.

The scheduled quarterly discharge water quality monitoring shows that the quality is generally compliant with the discharge licence threshold values. Any confirmed exceedances (i.e. nitrate, ammonia and orthophosphate) appear to be related to background groundwater quality in the GWB itself and not quarry activities.

The more extensive water quality analysis completed in November 2022 shows the discharge water satisfies Good to High Status quality and therefore will have no negative effects on downstream water quality. The discharge quality is likely to improve the WFD status of the Flemingstown Stream which is Poor.

Table 8-10:Effects on Surface Water Quality from Increased Quarry Discharge Volumes

Attribute	Description
Receptor	Receiving surface water bodies (Flemingstown Stream and Middle Suir Estuary)
Pathway	Licenced quarry discharge
Pre-Mitigation Potential Effect	Indirect, positive, slight, long term, likely effect to surface water quality.

8.4.4.4 Effects of Potential Release of Hydrocarbons/Chemicals

Accidental spillage during refuelling of construction/excavation plant with petroleum hydrocarbons is a significant contamination risk to soils, groundwater, and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a contamination risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms. A pathway exists between the Site and the Lower River Suir SAC via the site drainage network and Flemingstown Stream. As outlined above, the Lower River Suir SAC is designated for a number of habitats and species which have the potential to be affected by the release of hydrocarbons.

However, as described in Section 8.3.8 above, the current discharge quality is very good and hydrocarbons are consistently below laboratory detection limits.

Table 8-11:Effects of Potential Release of Hydrocarbons/Chemicals

Attribute	Description
Receptor	Groundwater and surface water including the Lower River Suir SAC
Pathway	Groundwater flow paths and site drainage network.
Pre-Mitigation Potential Effect	Indirect, negative, slight, long term, likely effect on groundwater and surface water quality.

8.4.4.5 Effects on Downstream Designated Sites in relation to Quarry Discharge

The only designated site that is hydrologically connected to the Site is the Lower River Suir SAC. The Lower River Suir SAC is located immediately downstream of Flemingstown Stream which is the quarry discharge receiving water.

However, as stated above there will be no exceedance of the current discharge limit of 13,000m^3/day.

The scheduled quarterly discharge water quality monitoring shows that the quality is generally compliant with the discharge licence threshold values.

The more extensive water quality analysis completed in November 2022 shows the discharge water satisfies High Status quality and therefore negative effects on downstream water quality in the Middle Suir Estuary are highly unlikely. The measures relating to the potential release of hydrocarbons / chemicals, referred to in Section 8.4.5.4 above and outlined below will further protect the SAC from impact.

The groundwater quality analysis (Section 8.3.14) shows the Quarry is having no effect on groundwater quality.

Table 8-12:Potential Effects on Downstream Designated Sites

Attribute	Description
Receptor	Lower River Suir SAC
Pathway	Surface water and groundwater flow paths
Pre-Mitigation Potential Effect	Indirect, neutral, imperceptible, long term, likely effect on surface water quality.

8.4.4.6 Effects on River Waterbody and Groundwater Body WFD Status

The scheduled quarterly discharge water quality monitoring shows that the quality is generally compliant with the discharge licence threshold values. Any confirmed exceedances (i.e. nitrate, ammonia and orthophosphate) appear to be related to background groundwater quality and not quarry activities.

The more extensive water quality analysis completed in November 2022 shows the discharge water satisfies High Status quality and therefore will have no negative effects on downstream water quality. The discharge quality is likely to improve the WFD status of the Flemingstown Stream which is Poor as confirmed by the surface water sampling of the Flemingstown Stream (refer to Section 8.3.7).

The groundwater quality analysis (Section 8.3.16) shows the development is having no effect on groundwater quality.

Table 8-19:Potential Effects on WFD Status

Attribute	Description
Receptor	Flemingstown River Waterbody, Middle Suir Estuary and Clonmel GWB
Pathway	Surface water and groundwater flow paths
Pre-Mitigation Potential Effect	Indirect, neutral to positive, slight, long term, likely effect on WFD Status.

8.4.4.7 Restoration Phase Effects

On completion of the restoration works, the quarry sump pump will be removed from the quarry void and the groundwater level will be allowed to return to its natural level which is estimated to be approximately 16m OD based on the available groundwater level data for the Site. There will be no drainage/discharge from the Site post closure.

Potential effects associated with the post closure phase of the Proposed Development will be not significant.

8.5 Proposed Mitigation Measures and / or Factors

8.5.1 Proposed Construction Phase Mitigation Measures

8.5.1.1 Downstream Surface Water Quality Effects from Suspended Sediments during Site Preparation Works and Overburden Stripping /Removal

Proposed mitigation measures will be implemented as follows:

- All surface water arising during the soil stripping works in the extension area will be captured and directed to the existing quarry floor where it will be pumped to the existing settlement ponds for treatment;

- Prior to the commencement of overburden stripping works silt fencing will be placed down-slope of the excavation area along the eastern boundary of the Site. These will be embedded into the local soils to ensure all site water is captured and filtered;
- Surface water will be collected at low points across the soil stripping works area;
- Discharge into the Quarry will occur following settlement treatment in local temporary settlement ponds if required, and any water discharge from these ponds to the quarry floor will be routed through silt bags which will filter any remaining sediment from the pumped water. The entire soil stripping and landscaping works area will be enclosed by a perimeter of double silt fencing;
- Daily monitoring of the overburden stripping/landscaping earthworks will be completed by a suitably qualified person. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter will enter the downstream receiving waters;
- Overburden stripping and landscaping works will be scheduled for periods of low rainfall to reduce run-off and potential siltation;
- Landscaped areas and perimeter berms will be planted with trees and grasses as soon as possible after formation to reduce the potential of surface water erosion;
- Good construction practices such as wheel wash and dust suppression on site roads, and regular plant maintenance will ensure minimal risk. The Construction Industry Research and Information Association (CIRIA) provide guidance on the control and management of water pollution from construction sites ('Control of Water Pollution from Construction Sites, guidance for consultants and contractors', CIRIA, 2001), which provides information on these issues. This will ensure that surface water arising during the course of overburden stripping and landscaping activities will contain minimum sediment; and,
- All water discharged during the construction phase will be subject to monitoring and discharge requirements of the Discharge Licence (ENV/W82).

8.5.2 Proposed Operational Phase Mitigation Measures

8.5.2.1 Groundwater Level effects (Increase in the Groundwater Zone of Contribution)

Due to the not significant, localised groundwater level effects which are contained with the Landholding, no additional mitigation other than on-going groundwater level monitoring of the internal and external monitoring wells is proposed.

8.5.2.2 Groundwater Level/Quantity Effect on Local Private Wells

While no significant effects on local private wells have occurred to date, mitigation to address any such impacts can be implemented in the following form:

- A new deeper well will be provided at any effected location; and
- An alternative water supply will be provided to the effected property.

8.5.2.3 Effects of Potential Release of Hydrocarbons/Chemicals

The operation of the Quarry includes existing management for the control of hydrocarbons and chemical and these already minimise as far as possible the risk of spillage that could lead to surface and groundwater contamination.

Proposed mitigation measures are outlined as follows (much of these are already implemented at the Quarry):

- Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur;
- Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer's recommendations will be implemented;
- All plant and machinery will continue to be regularly serviced before being used on site;
- Refuelling will continue to be completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored. This is the case for the existing on site bunds;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel mobile plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill in the quarry floor; and,
- All water discharged during the operational phase will be subject to the monitoring and discharge requirements of the Discharge Licence (ENV/W82).

Highest standards of site management will continue to be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during operation of the Proposed Development.

8.5.2.4 Effects on Surface Water Quality from Increased Quarry Discharge Volumes

No additional mitigation proposed as the current discharge limit will not be exceeded. Also, the discharge quality is largely compliant with the discharge licence and will not affect WFD status of receiving waters.

Discharge from the Quarry is and will continue to be passed through adequately sized settlement ponds and hydrocarbon interceptor. The discharge quality is monitored on a quarterly basis, and this is to continue at the Quarry. Discharge volumes are continuously monitored at the discharge point location.

8.5.2.5 Effects on Downstream Designated Sites (Lower River Suir SAC/River Barrow and River Nore SAC)

No additional mitigation proposed as the current discharge limit will not be exceeded and measures are outlined above in relation to suspended sediments and the potential release of hydrocarbons which will protect the Lower River Suir SAC and the adjoining river network from any potential impact. Also, the discharge quality is largely compliant with the discharge licence and will not affect WFD status of receiving waters.

Discharge from the Quarry is and will continue to be passed through an adequately sized settlement ponds and hydrocarbon interceptor. The discharge quality is monitored on a quarterly basis, and this is to continue at the Quarry. Discharge volumes are continuously monitored at the discharge point location.

8.5.2.6 Impacts on WFD Status

The discharge quality is largely compliant with the discharge licence and will not affect WFD status of receiving waters.

The groundwater quality analysis shows the development is having no effect on groundwater quality. No additional mitigation is considered necessary.

8.6 Cumulative and In-Combination Effects

There have been no significant or likely cumulative or in-combination effects identified outside of those previously assessed throughout this chapter.

8.7 Residual Effects

8.7.1 Construction Phase Residual Effects

8.7.1.1 Downstream Surface Water Quality Effects from Suspended Sediments during Site Preparation Works and Overburden Stripping /Removal

All construction drainage/runoff water will be contained and treated to a high standard as per the ongoing quarry inflow water, therefore the residual effects will be negative, indirect, imperceptible, reversible, likely, short term effect on surface water quality.

8.7.2 Operational Phase Residual Effects

8.7.2.1 Groundwater Level effects (Increase in the Groundwater Zone of Contribution)

Given the effects (not significant) associated with current pumping regime on local groundwater levels and the low potential for increased groundwater inflows associated with the proposed extension as demonstrated by the quarry floor site investigations, residual effects will be negative, indirect, slight, long term, likely effects on groundwater levels.

8.7.2.2 Groundwater Level/Quantity Effect on Local Private Wells

Due to the lack of significant effects of the current pumping regime on local wells and the fact the proposed extension will not exceed the current maximum permitted depth of -45m residual effects will be negative, indirect, imperceptible, long term, likely effects on local wells.

8.7.2.3 Effects on Surface Water Quality from Increased Quarry Discharge Volumes

Due to the proven quality of quarry discharges and the fact there will be no exceedance of the licenced discharge limits due to quarry activities, residual effects on downstream surface waters will be not significant.

8.7.2.4 Impacts of Potential Release of Hydrocarbons /Chemicals

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all quarry sites. 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, indirect, imperceptible, long term, unlikely effect on groundwater and surface water quality.

8.7.2.5 Impacts on Downstream Designated Sites

Due to the proven quality of quarry discharges and the fact there will be no exceedance of the licenced discharge limits due to quarry activities, no negative residual effects on downstream designated sites will occur.

8.7.2.6 Impacts on WFD Status

Due the proven quality of quarry discharges and the fact there will be no exceedance of the licenced discharge limits due to quarry activities, no residual effects on WFD status will occur.

8.8 Indirect Effects

8.8.1 Human Health Effects

Potential health effects arise mainly through the potential for groundwater contamination. Hydrocarbons, in the form of fuels and oils, will be used on-site during the extraction works.

In relation to oils and fuels, 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. All water pumped from the proposed extraction area will be passed through the existing oil interceptors. The monitoring well groundwater samples had no detection of hydrocarbons.

The potential residual effects associated with groundwater contamination and subsequent health effects are imperceptible.

8.9 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.

8.10 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

8.11 Monitoring

There is a network of monitoring wells at the Landholding that will continue to be monitored regularly for groundwater levels and groundwater quality. The wells drilled in 2022 will also be included in the internal groundwater monitoring network. Potential effects on local wells will continue to be monitored using a select network of external monitoring wells.

Monitoring as required by the existing discharge licence will also continue.

8.12 Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

9 AIR QUALITY

9.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely effects 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 assess the baseline conditions and in the assessment of potential effects:

- Department of Environment, Heritage and Local Government (DEHLG) – Quarries and Ancillary Activities: Guidelines for Planning Authorities (2004) [18];
- Institute of Air Quality Management (IAQM) - Guidance on the Assessment of Mineral Dust Impacts for Planning (2016) [94];
- EPA - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006) [19];
- Irish Concrete Federation (ICF) Environmental Code (2005) [29];
- EPA - Air Quality in Ireland 2021 – Indicators of Air Quality [87];
- EPA - Air Quality in Ireland 2022 – Indicators of Air Quality [95]
- EPA – Air Dispersion Modelling from Industrial Installations Guidance (AG4) (2019);
- Transport Infrastructure of Ireland – Air Quality Assessment for specified infrastructure projects – overarching technical document (2022) [88]; and,
- Federal Government of Germany - Technical Instructions on Air Quality Control (TA-Luft) (2002) [89].

Given the nature of activities associated with the Proposed Development, the IAQM Guidance on the Assessment of Mineral Dust for Planning [94] for completing a disamenity dust risk assessment was used, see Appendix 9-1 for further information.

The main potential effects on air quality associated with the Proposed Development are airborne particulate matter (PM_{10}) and nuisance dust deposition. The potential effects caused by the release of NO_2, from plant and HGV movements, were screened out of this assessment. This is based on the guidance relating to these emissions from the IAQM [94] and the Transport Infrastructure of Ireland [96]. Section 9.4.1.2 below provides further details on this screening for NO_2.

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 climate and air quality objectives.

9.2.1.1 Clean Air Strategy

The Department of Communications, Climate Action and Environment (DCCAE) prepared a Clean Air Strategy which was published in 2023 [97]. This strategy outlines efforts to reduce certain specific sources of emissions that are having the greatest impact, whilst also identifying cost effective approaches to emission reductions [97].

The 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 PM_{10} in Ireland amounted to ca.28.28kt in 2020. The main source of PM_{10} emissions are from agriculture which accounted for 31.3% share of the national total in 2020, with combustion in the combined sectors of residential and commercial/institutional accounting of 25.4% of the shared total.

9.2.1.2 Kilkenny City and County Development Plan 2021-2027

The CDP [1] promotes the importance to Air Quality, relevant to the Proposed Development:

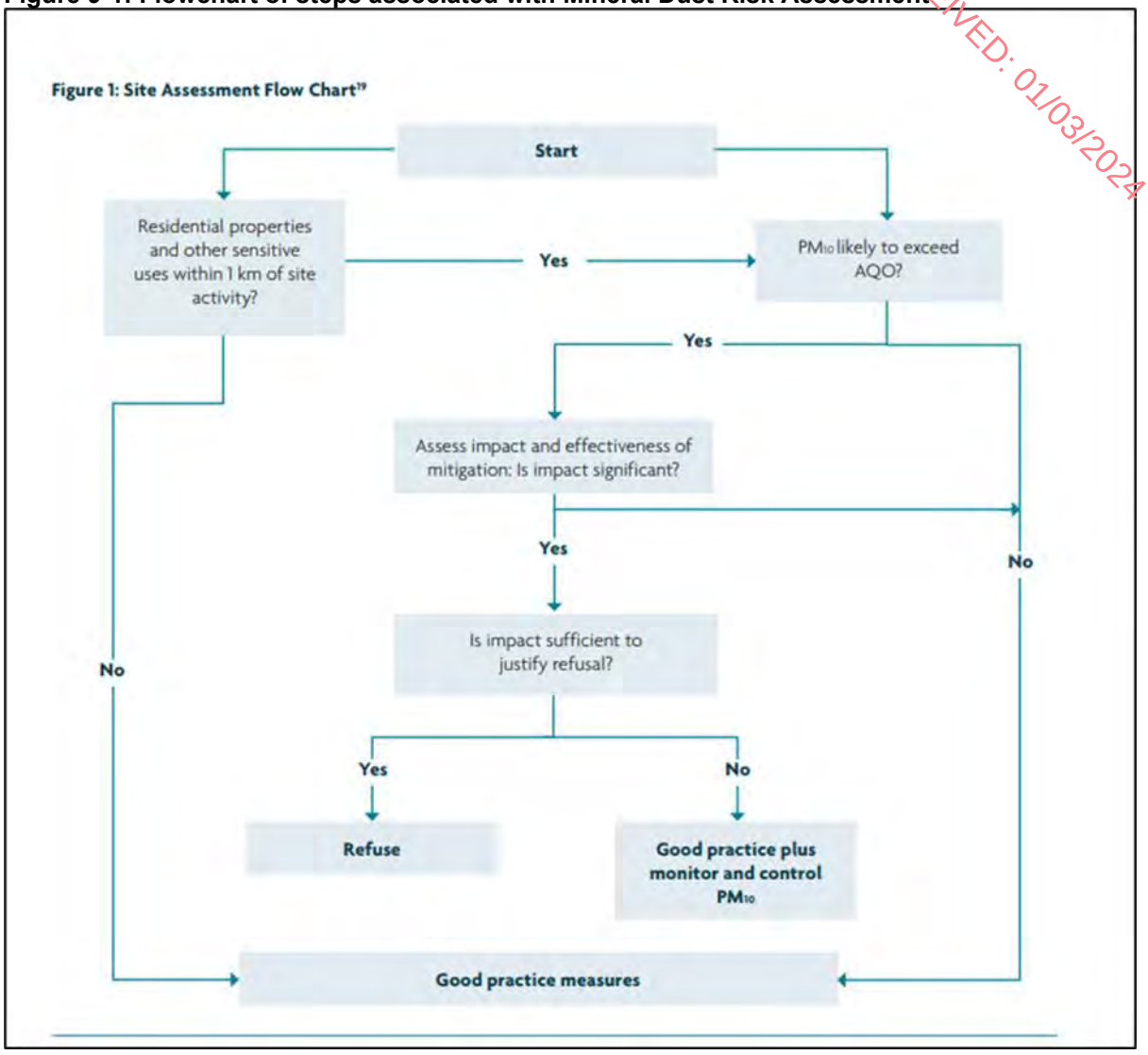
> *10.2.1.1 Air Quality*
>
> *"The Council's role in relation to air quality is mainly to promote a reduction in air pollution, through the implementation of relevant legislation and through the provision of advice and guidance on best practice. The Council also implements the provisions of the Air Pollution Act 1987 and Air Pollution (Licensing of Industrial Plant) Regulations 1988. The Council will promote the best ambient air quality compatible achievable with sustainable development."*

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 the IAQM Guidance [94]. 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 rock/stone.

Figure 9-1: Flowchart of steps associated with Mineral Dust Risk Assessment



9.3 Receiving Environment

9.3.1 Air Quality Standards

Air Quality Standards within Ireland are laid down by the Clean Air for Europe (CAFE) Directive 2008 (2008/50/EC), which was transposed into Irish law as the Air Quality Standards Regulations 2011 (S.I. 180 of 2011).

Air Quality Standards (AQSs) are typically based on the effects of the relevant pollutants on human health, although effects on other receptors such as vegetation are sometimes considered. The relevant limit values for particulate matter are laid out in Table 9-1 below.

Table 9-1: EU and Irish Air Quality Standards (AQS) Limit Values

Pollutant	Objective			
	Concentration (µg/m^3)	Maximum No of Exceedances Permitted/Annum	Exceedance as %	Measured as
Particulate Matter (PM_{10})	50µg/m^3	35 times in a year	90.40th 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 that suspended dust associated with quarries will be coarse in the sub-fraction $PM_{2.5-10}$ rather than in the fine fraction $PM_{2.5}$ [98]. 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 [18], quarries, by their nature, generate dust, with the main impact being disamenity due to dust deposition. However, there are currently no Irish Statutory limits or Guidelines relating specifically to dust deposition thresholds for inert dust. The Bergerhoff Method specified in the German TA Luft Air Quality Standards is presented in both the EPA [19] DEHLG [18] and ICF [29] guidance for monitoring of dust deposition in quarries. Also, the TA Luft dust deposition limit value of 350mg/m^2/day (when averaged over a 30-day period) is typically set as a limit along all site boundaries associated with quarry and infill developments. [99]There is an existing dust monitoring program implemented at the Quarry, which is reviewed 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 – Annual Report 2022 [95]which is the most up to date report on air quality in Ireland.

For ambient air quality management and monitoring in Ireland, the AQS Regulations (S.I. No. 180 of 2011) defines four (4No.) zones, set out as follows:

- Air Zone A – Dublin Conurbation;
- Air Zone B – Cork Conurbation;
- Air Zone C – A total of 24 cities and large towns: Athlone, Balbriggan, Bray, Carlow, Celbridge, Clonmel, Drogheda, Dundalk, Ennis, Galway, Greystones, Kilkenny, Leixlip, Letterkenny, Limerick, Mullingar, Naas, Navan, Newbridge, Portlaoise, Sligo, Tralee, Waterford and Wexford; and,
- Air Zone D - Rural Ireland i.e., the remainder of the country excluding Zones A, B and C.

Given the proximity to Waterford City, the Site is situated in Zone C. Table 9-2 below shows the baseline air quality data monitored by the EPA in stations across towns located in Zone C. Figure 9-2 below shows the location of the Site in relation to Zone C.

Figure 9-2: Location of Site in Air Quality Zone C

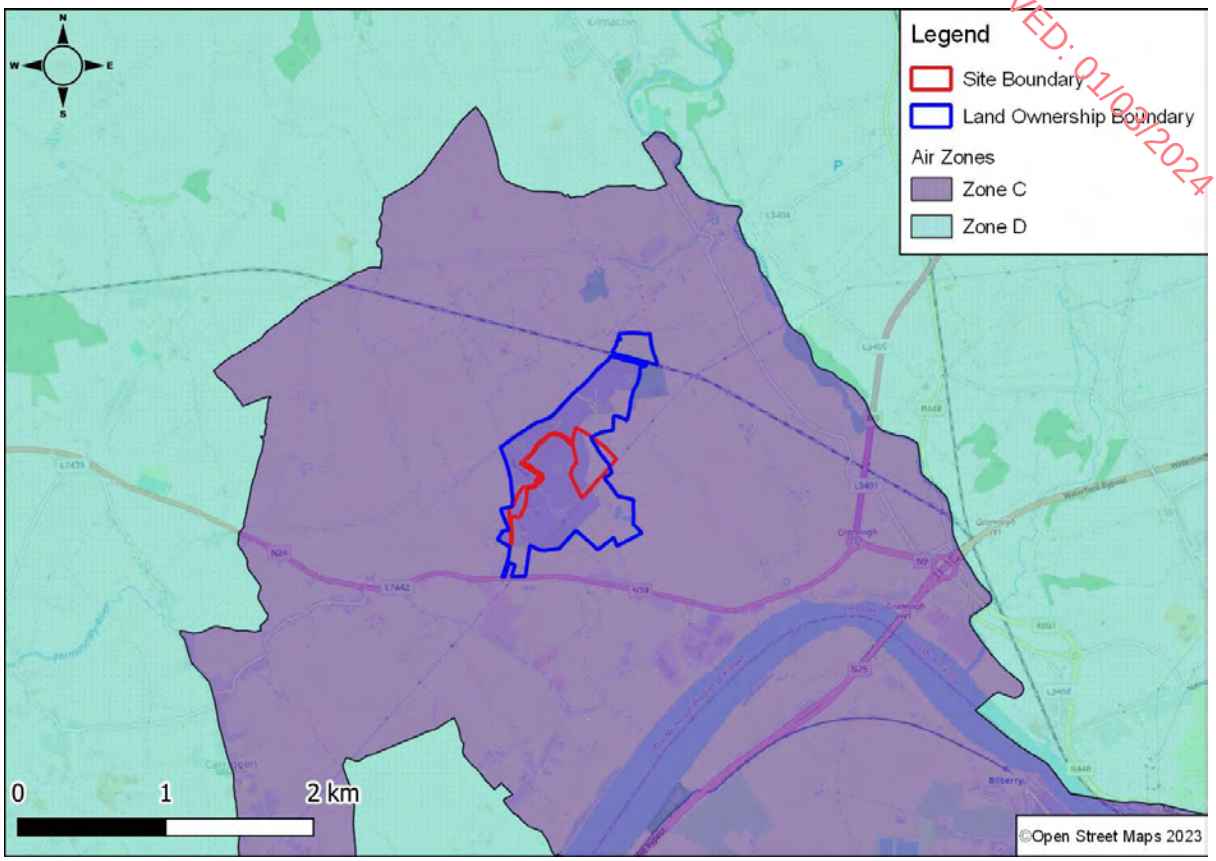


Table 9-2:Annual Mean Concentrations of PM_{10} Measured at Zone C Stations

Parameter / Monitoring Stations	Total Particulates PM_{10} Annual Mean (µg/m³)	
	2021 Annual Mean (µg/m³)	2022 Annual Mean (µg/m³)
Portlaoise	11.4	12.0
Ennis	19	20.0
Sligo	18.3	-
Galway Rahoon	11.4	12.6
Galway Briarhill	-	14.2
Clonmel	12	10.6
Claremorris	-	7.9
Dundalk	11.7	12.3
Carlow Town	10.4	11.3

Parameter / Monitoring Stations	Total Particulates PM_{10} Annual Mean ($\mu g/m^3$)	
	2021 Annual Mean ($\mu g/m^3$)	2022 Annual Mean ($\mu g/m^3$)
Waterford Brownes Road	-	-
Navan	13.5	14.2
Kilkenny Seville Lodge	16.7	17.5
Letterkenny	14.7	14.2
Wexford Town	13.5	14.5
Limerick Henry Street	11.1	13.9
Limerick People's Park	12.6	13.9
Athlone	12.1	12.3
Tralee	17.1	17.9
Drogheda	10.7	11.9
Naas	10.5	12.3
Greystones	9.7	11.6
Bray	-	10.0
Leixlip	-	11.2
Average Zone C		
Average Zone C (2021-2022)	**13.2**	

The maximum concentration recorded in Zone C for PM_{10} was recorded at the Ennis Station in 2022 (20µg/m^3). Annual concentrations recorded across Zone C from 2021 to 2022 range between 10 and 20µg/m^3. The closet EPA station to the Proposed Development is Merchants Quay, Waterford City (Station 87), ca.5.1km to the southwest. However, this station does not monitor PM_{10}. The average of the two (2No.) most recent years of available EPA data for Zone C was used (2021-2022) for this assessment[4]. The mean concentrations for Zone C between 2021 and 2022 was 13.2µg/m^3.

[4] According to the EPAs Guidance on Air Dispersion Modelling (AG4), when determining background concentrations, a minimum of two-consecutive years are to be used [159].

9.3.4 Other Sources of Emissions to Air

Notable sources of emissions to air in the vicinity of the Proposed Development include:

- Traffic associated with the National Road N24 road and local roads;
- Agricultural activities; and,
- Residential dwellings in the vicinity of the Site and from the nearby City of Waterford.

Table 9-3 below gives further information on licenced facilities in the surrounding area of the Proposed Development.

Table 9-3: IEL and IPC licences associated with the Proposed Development

Licence Number	Name of Organisation/ Person Responsible	Activities Associated	Distance to Proposed Development	Licence emission limit
PO175	Queally Pig Slaughtering Limited	The operation of slaughterhouses with a carcass production capacity greater than 50 tonnes per day,	ca.1.3km (Southeast)	N/A
PO179	Dawn Meats Ireland Unlimited Company	The slaughter of animals in installations where the daily capacity exceeds 1500 units and where the units have the following equivalents - 1 Head of Cattle = 5 units.	ca.1.2km (Southeast)	N/A
P0385	Galco (Waterford) Limited	The processing of non-ferrous metals, by thermal means, in installations with a batch capacity exceeding 0.5 tonnes	ca.4.4km (Southeast)	Zinc - 5 (mg/m^3) Particulate matter - 10 (mg/m^3) Lead - 2 (mg/m^3) Cadmium -0.5 (mg/m^3) Chlorides (as HCl) - 30 (mg/m^3) Chlorides (as HCl) (From September 02,2000) - 30 mg/m^3
P0698	Honeywell International Technologies Limited Trading As Honeywell Engines, Systems and Services	The processing of iron and steel in forges, drawing plants and rolling mills where the production area exceeds 500 square metres,.	ca.4.2km	Fluorine and its gaseous compounds to be indicated as hydrogen fluoride -0.2 mg/m^3 Nitric acid - 20 mg/m^3 Sulphuric acid - 20 mg/m^3 Oil mist -15 mg/m^3

According to the IAQM Guidance on mineral dust, potential effects from dust caused by rock quarries will mainly occur within 400 m of the activity. There are no EPA licenced sites within 3km of the Site with limits for air emissions. In addition, with the exception P0385 none of the

other facilities identified have an ELV for dust or Particulate Matter. Due to the distance between the Site and the aforementioned IEL/IPC facility, it is considered unlikely that a cumulative effect would exist between these facilities and the Proposed Development. As a result, the potential for cumulative effects on sensitive receptors on local air quality from licensed facilities and the Proposed Development is determined as not likely and not significant.

9.3.5 Historic Dust Monitoring

The Quarry routinely completes Bergerhoff monitoring at five (5No.) locations in accordance with conditions of planning. Data from 2021 to September 2023 has been reviewed as part of the assessment of the receiving environment. Bergerhoff monitoring at the Site is managed and conducted by BHP laboratories on behalf of Roadstone. The results are presented in Table 9-4 below.

Table 9-4:Historical Dust Monitoring Results

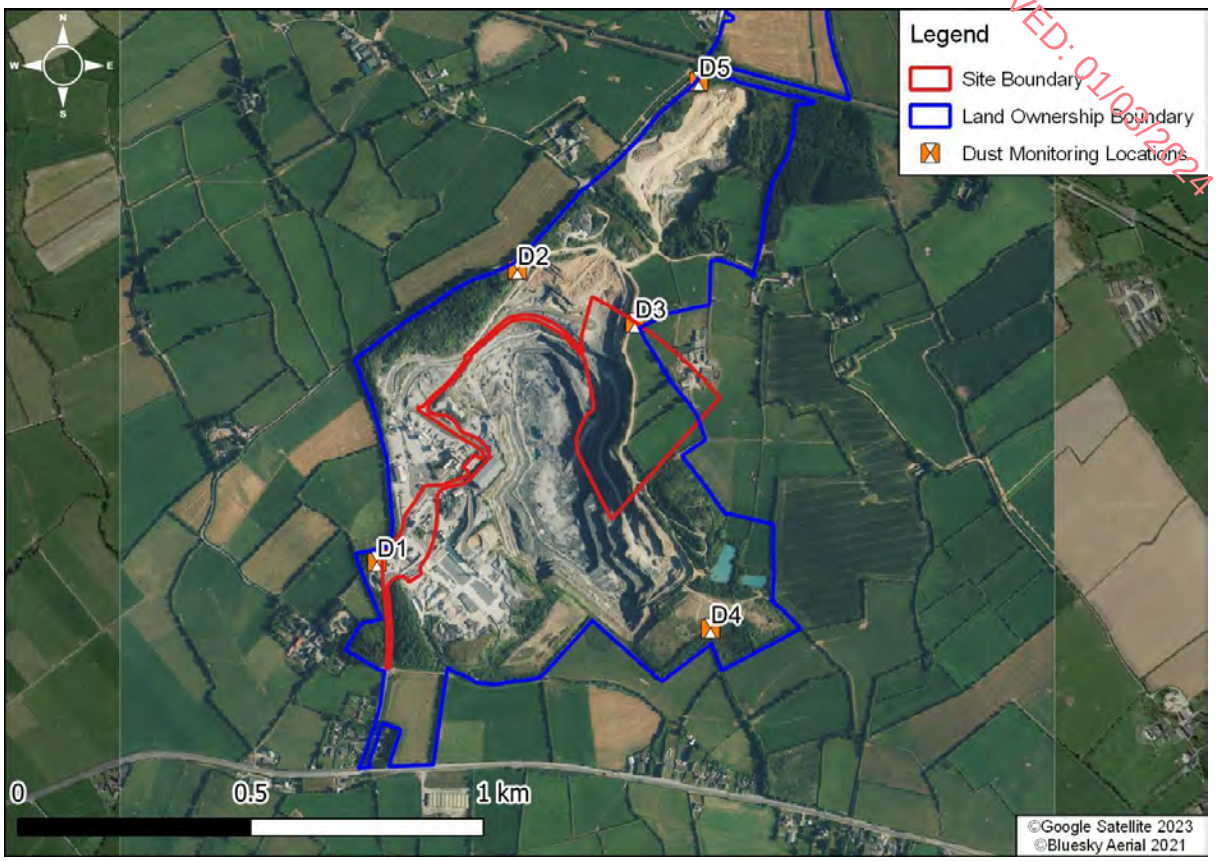
ID	2021 Mean Dust Deposition Values ($mg/m^2/day$)	2022 Mean Dust Deposition Values ($mg/m^2/day$)	2023 Mean Dust Deposition Values ($mg/m^2/day$)
D1	131.0	194.0	164*
D2	214.8	299.3	225.8*
D3	89.5	166.1	94.8*
D4	180.4	248.5	119.6*
D5	149.5	213.7	211.8*

*Note: Dust Data representative up to September 2023

Across the monitoring period, the annual mean values recorded were below the TA Luft limit value of 350$mg/m^2/day$. Individual elevated concentrations of dust results have been identified by Roadstone during the course of the three (3No.) monitoring years with corrective action taken thereafter. Dust monitoring results are submitted to the Local Authority on an ongoing basis.

Figure 9-3 below presents the dust monitoring locations from where the results outlined above correspond to.

Figure 9-3:Current Dust Monitoring Locations



9.3.6 Dust Sensitive Receptors

The Proposed Development will involve activities associated with mineral extraction, such as:

- Site preparation/restoration (working soil and over burden);
- Materials Handling;
- Blasting and crushing / screening of rock material;
- Onsite transportation; and,
- Offsite truck movements (potential track out).

A risk assessment of receptors and the effects from potential dust was completed in accordance with the IAQM's Guidance on 'The Assessment of Mineral Dust Impacts for Planning' [94].

As identified above adverse impacts from rock quarries "*are uncommon beyond*" 400m measured from the nearest dust generating activities [94]. As such, occupied receptors which occur within 400m or less from the Site boundary have been considered in this dust risk assessment.

Dust generating activities will occur over a ca.20-year period (inclusive of Construction and Restoration Phase), covering the majority of land within the Site boundary. As a conservative estimation of dust generating activities, a 400m buffer will be used from the site boundary of the Proposed Development, rather than the quarry void.

A total of seven (7No.) receptors were identified in this buffer (SR01 – SR0).

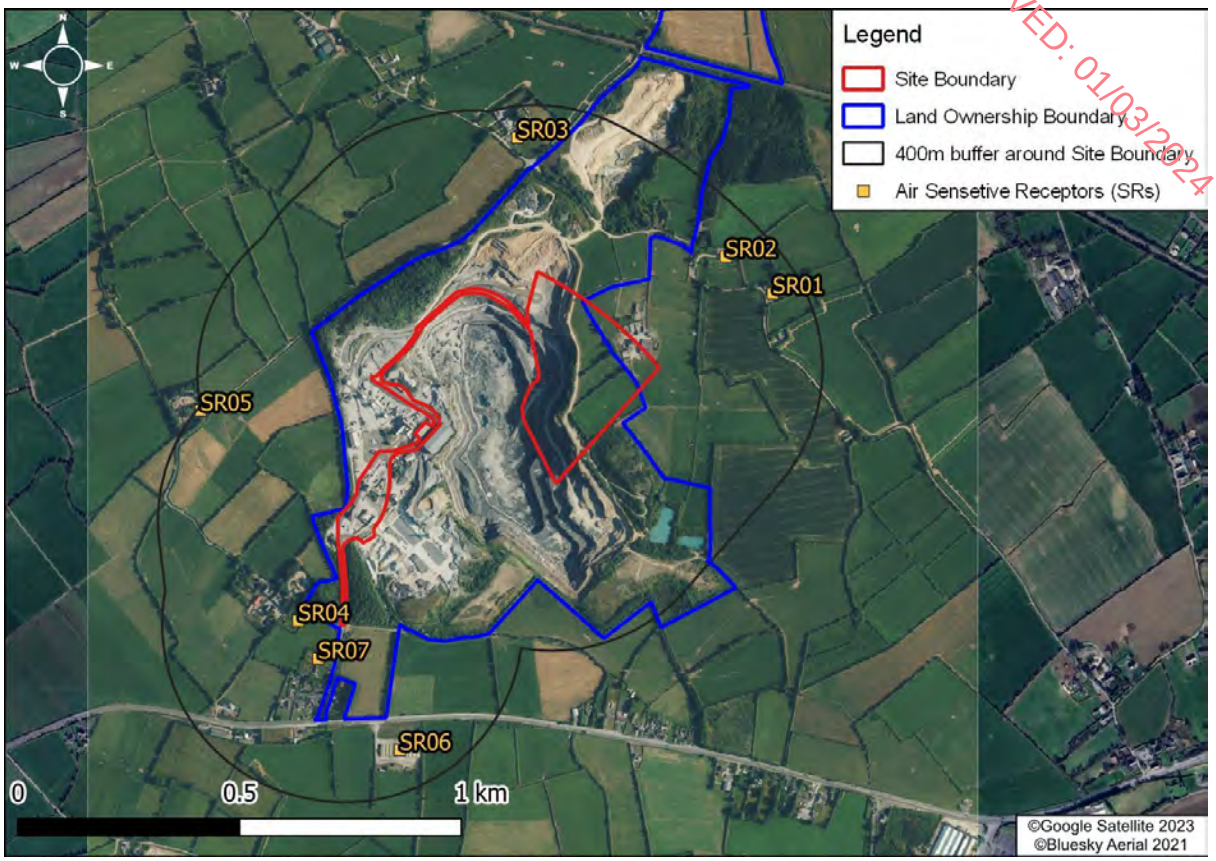
The Proposed Development will utilise existing infrastructure (such as a wheel wash), which will negate the requirement for unnecessary construction.

Table 9-5 below describes the sensitive receptors and potential landscape features that will potentially screen dust deposition.

Table 9-5: Identification of Sensitive Receptors (SRs)

ID	ITM (Easting, Northings)		Description of Sensitive Receptor	Distance/ Ordination from Emission Source (m)	Terrain between Site and Receptor
	E	N			
SR01	656371	615803	Residential Dwelling	ca.310m **(Northeast)**	Tree cover in hedgerows to the west of the receptor will provide some degree of screening from fugitive dust emitted from the Proposed Development.
SR02	656265	615887	Residential Dwelling	ca.280m **(Northeast)**	Tree cover in hedgerows to the southwest of the receptor will provide some degree of screening from fugitive dust emitted from the Proposed Development.
SR03	655795	616154	Proxy for Residential Dwellings	ca.310m **(North)**	Tree line to the south and southeast of the receptor will provide some degree of screening from fugitive dust emitted from the Proposed Development.
SR04	255355	115031	Proxy for Residential Dwellings	ca.100m **(Southwest)**	Scrub and Tree line to the north of the receptor will provide some degree of screening from fugitive dust emitted from the Proposed Development
SR05	255134	115505	Residential Dwelling	ca.390m **(West)**	Tree line to the east of the receptor will provide some degree of screening from fugitive dust emitted from the Proposed Development.
SR06	255584	114740	Farm Yard	ca.310m **(South)**	Tree line, hedgerows to the north of the receptor to provide screening fugitive dust emitted from the Proposed Development.
SR07	655345	614982	Proxy for Residential Dwellings	ca.90m **(South)**	Tree line, hedgerows to the north and east of the receptor to provide screening fugitive dust emitted from the Proposed Development.

Figure 9-4: Location of Sensitive Receptors



9.3.6.1 Designated Ecological Receptors

The closest European Protected Designated Sites (Natura 2000) is Lower River Suir SAC, located ca.1.4km to the southwest of the Site. The Granny ferry (pNHA) is located ca.2.4km to the east of the Site.

Following the IAQM Guidance on assessing the effects of mineral dust on ecological receptors, any potential sensitive area will be included if it is located within a 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.

9.3.7 The Impact of Weather on Dust Emissions

Weather conditions can have a significant effect on the dispersion of ambient dust, thus influencing the effects on nearby sensitive receptors. Higher levels of dust deposition typically occur during dry spells associated with medium to strong breezes (>5.0m/s).

The nearest synoptic meteorological station, that provides hourly data, is Johnstown Castle 2 Co Wexford. The Johnstown Castle 2 station is located ca.46km to the east of the Proposed Development.

A windrose diagram was constructed to determine the potential influence of wind direction and speed on airborne dust particles, shown in Figure 9-5 below. The meteorological data consisted of five (5No.) years of data (2018-2022 inclusive). Due to its relative proximity to the Proposed Development, the windrose taken from Johnstown Castle 2 station is determined to be represented of conditions at the Site.

Figure 9-5: Windrose for Johnstown Castle 2 Co. Wexford (2018-2022)

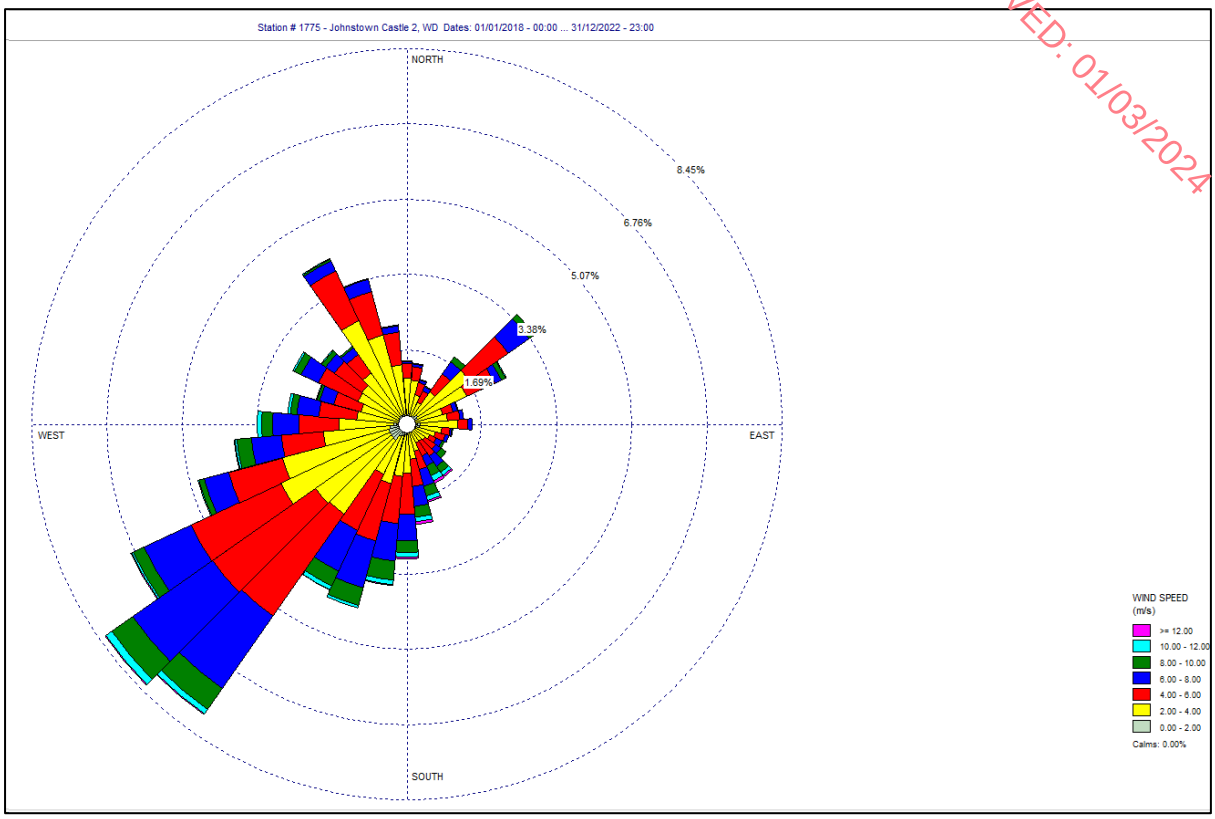


Table 9-6 below summarises the important meteorological variables recorded at the Johnstown Castle 2 station between 2018-2022.

Table 9-6: Meteorological Data at Johnstown Castle 2 Co. Wexford

Year	Annual Total Precipitation (mm)	Annual Average Windspeed (m/s)
2018	1147.2	8.7
2019	1060.3	8.7
2020	1149.6	9.2
2021	1068.5	8.1
2022	994.7	8.4

9.4 Characteristics and Potential Effects of the Proposed Development

9.4.1 Characteristics of the Proposed Development

The main potential effects on air quality from rock quarries are dust emissions, which can have the following effects:

- Disamenity arising from dust deposition on surfaces – e.g., window ledges, cars, plants, laundry drying outside etc; and,
- Human health effects arising from increased concentrations of dust particles (PM_{10}) suspended in the air.

Assessment of disamenity dust and suspended PM_{10} particles has been considered for all phases of the Proposed Development:

- The Construction Phase (Site Preparation Phase);
- The Operational Phase; and,
- The Restoration Phase.

HGV vehicles associated with the Proposed Development will transport aggregates directly from the Site to market and the effects of which was considered directly in this assessment. Processing of material is limited to the equipment discussed in Section 9.4.1.2 below.

The operations of onsite plant, which are powered by diesel engines, will omit nitrogen oxides, particulate matter and carbon monoxide, all which can have the potential to impact air quality.

9.4.1.1 Construction Phase

The Construction Phase associated with the Proposed Development is anticipated to ca.6 months. Activities associated with the Construction Phase, which has the potential to generate dust, includes:

- Installation of security fencing and signage around the periphery of the Site,
- Removal of topsoil under archaeological supervision;
- Removal of overburden and construction of berms;
- Covering of berms with topsoil;
- Landscaping, and planting of berms;
- Preparation of haul routes; and
- Demolition of pumphouse, and two (2No.) agricultural sheds.

These activities are fully considered in the mineral dust risk assessment below (refer to Section 9.4.2.1).

9.4.1.2 Operational Phase/Restoration Phase

The Operational Phase of the Proposed Development is expected to last ca.19 years (with six months for restoration) and will present the greatest potential for dust generation from the Proposed Development. The Operational Phase will comprise a continuation of extraction and an extension into the eastern agricultural area, (for further details refer to Chapter 3).

The main activities associated with the Operational Phase are:

- Drilling and blasting of the rock face;
- The primary crushing / screening of blast rock through a mobile primary crusher / screener;

- The placement of rock into stockpiles;
- The onsite transportation of rock to existing processing infrastructure within the Quarry; and,
- Extraction of material at ca.700,000-1,000,000 tonnes per annum.

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

- Hydraulic Breaker;
- Primary Crusher / Screener;
- Front Loader;
- Excavator; and,
- Two (2No.) articulated dump trucks.

The movement of HGVs and the operation of onsite plant have the potential to cause effects on local air quality, through the release of NO_2 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 [96]. According to the guidance, a detailed assessment is required when:

- Heavy good vehicles (HGV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more.

There is no change in HGV movement associated with the Proposed Development, as it will operate within current permitted traffic levels,

According to the IAQM Guidance on Demolition and Construction [98], exhaust emissions from onsite plant and onsite traffic are unlikely to make a significant impact on local air quality.

Therefore, assessing the potential effects on air quality as a result of plant and traffic both onsite and offsite has also been screened out.

As the restoration phase will include minor works such as removal of plant and equipment from the Site, no additional sources of dust are considered.

9.4.2 Potential Effects of/to the Proposed Development

9.4.2.1 Dust Risk Assessment

Suspended Dust

The IAQM Guidance on Mineral Dust States [94]

> *"If the long-term background PM_{10} concentration is less than 17µg/m^3 there is little risk that the Process Contribution (PC) would lead to an exceedance of the annual-mean objective…..17µg/m^3 is considered to be a suitable screening value for an assessment of annual mean PM_{10} concentrations"*

This figure is based on the estimated maximum annual process contribution of 15µg/m^3 for mineral extraction activities.

The most recent two-year average of background PM_{10} concentration for Zone C is 13.2µg/m^3 (see Section 9.3.3 above).

Table 9-7 below details the Predicted Environmental Concentrations (PEC) of ambient PM_{10}, which sums the expected process contribution to the background concentrations.

Table 9-7: Predicted Environmental Concentrations of PM_{10} (µg/m^3)

Parameters	PM_{10} Concentrations (µg/m3)
Maximum Process Contribution	15µg/m^3
Background Concentrations	13.2µg/m^3
Predicted Environmental Concentration (PEC)	28.2µg/m^3
Annual Mean Objective	32µg/m^3
Annual AQS Limit for	40µg/m^3

The predicted environmental concentration of PM_{10} from the Proposed Development is 28.2µg/m^3, which is below the annual mean objective of 32µg/m^3. As such, there is little risk of the annual AQS limit being exceeded and no further consideration of the risk posed by ambient PM_{10} concentrations is warranted.

Disamenity Dust Risk Assessment

As per the IAQM Guidelines [94], 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 effects 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 9-8 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 9.5.1. The assessment in Table 9-8 was completed in accordance with the IAQM Mineral Dust Guidance [94], see Appendix 9-1.

Table 9-8: Classification of Residual Source of Emissions

Activity	Activity Details (all values are approximate)	Magnitude of Residual Source Emission
Site Preparation	• Total area associated with the Proposed Development is 10.3ha; • Total of three to four (3-4No.) of plant equipment in operation at any one time; • An estimated area of <10 ha of overburden will likely be stripped as part of the Proposed Development; • Creation of soil embankments and berms will be completed with a maximum height of 2.75m and; • Stockpiling will occur when required.	**Medium**
Mineral Extraction	• Total working area ca.7.2ha; • Drilling and blasting will occur as part of the Proposed Development;	**Large**

Activity	Activity Details (all values are approximate)	Magnitude of Residual Source Emission
	• Primary crushing / screening of blast rock at the quarry face; and; • Maximum extraction rate estimated at 700,000-1,000,000 tonnes per annum.	
Material Handling	• Six (6No.) loading plant used at any one time; • Four (4No.) Mobile plant equipment onsite (crusher, screening equipment).;and, • Part consolidated surface for access routes unconsolidated ground around Site.	**Medium**
Mineral Processing	• Primary crushing / screening of blast rock at the quarry face will occur; • Limestone materials extracted and; • A maximum of 750,000-1,000,000 tonnes of material would be extracted per annum.	**Large**
Onsite transportation	• Articulated dump trucks will be used to transport materials (<250 vehicle movements will occur per day.); • As ground level is reduced, new haul routes will be created to maintain efficient movement of vehicles; • Maximum transport speed is 25km/hr.	**Large**
Offsite Transportation	• There will be up to 250 HGV outward movements associated with the Proposed Development traffic and exported quarry material; • HGVs will transport materials via resurfaced/improved access routes to the quarry void; • HGVs traversing unpaved access routes will be minimised, where practicable; • HGVs will be subject to current speed limits (i.e. 25km/hr).	**Large**
Stockpiling/Exposed Surfaces	• Aggregates are stockpiled onsite of High dust potential material; • Quarry production estimated at 700,0000-1,000,000 tonnes per annum; • Stockpiles frequently created as part of operations.	**Medium**

The residual source of emission quantifies how much dust is expected to be generated by activities, without mitigation measures applied. To determine the impact on sensitive receptors, it is important to consider how the dust will be transported, the Pathway

Effectiveness [94]. The site-specific factors considered to determine the Pathway Effectiveness of the dust emissions are the distance and direction of the receptors, relative to the prevailing wind directions.

For each receptor, wind frequency with speeds >5.0m/s from the direction of the dust source emissions was calculated for the five (5No.) years of Met Eireann data for the Johnstown Castle 2 meteorological station. This 5.0m/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 [94]. 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 to only represent dry days. The direction and frequency of these wind speeds are shown in Figure 9-6 below,

Criteria for wind speed ranging from infrequent to very frequent, are detailed in Appendix 9-1. Table 9-8 below details the categorisation of wind related to each sensitive receptor along with the pathway effectiveness, as per the IAQM Guidelines [94].

When determining the rating of the receptor distance from the dust source, close represents a receptor less than 100m from the source, an intermediate distance represents a receptor between 100-200m from the dust source and a distant distance represents a receptor located >200m from the dust source. As mentioned above, the dust source for the Proposed Development is determined as the site boundary. The sensitivity classification of receptors in Table 9-9 was taken from the IAQM Guidance [94]. Residential dwellings are considered 'High' sensitive receptors and farm/storage facilities considered as 'Low'. In brief, this is based on the level of amenity expected to be enjoyed by the receptors.

Figure 9-6: Windrose for Johnstown Castle 2 synoptic station 2018-2022 corrected to remove wet days

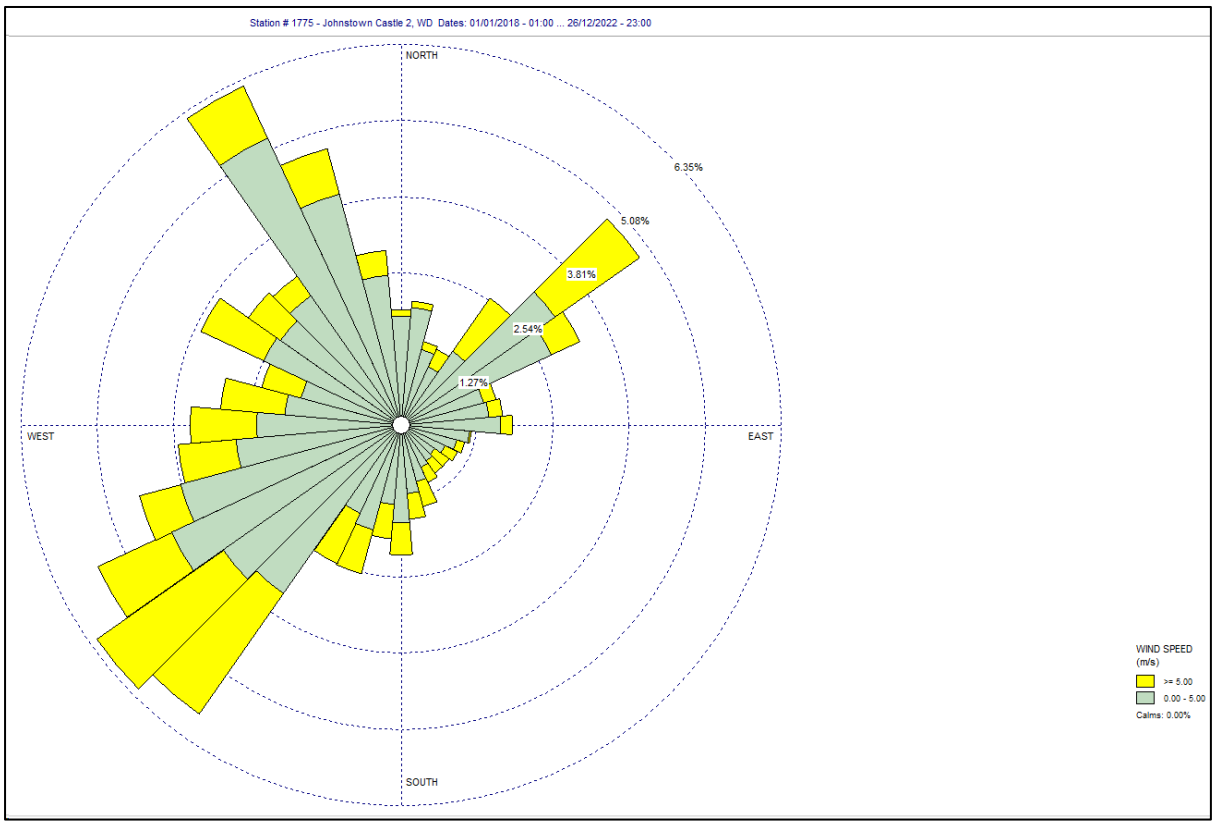


Table 9-9: Classification of the Pathway Effectiveness

ID (Receptor Sensitivity)	Distance from the Emission Source (Orientation to emission source)	Frequency of wind from the direction of dust source (dry weather) (>5.0m/s)	Pathway Effectiveness
SR01 **(High)**	ca.307m (northeast) **(Distant)**	2.9% (527 hours) coming from the southwest (235-295degrees) **Infrequent**	**Ineffective**
SR02 **(High)**	ca.281m (northeast) **(Distant)**	5.9% (1089 hours) coming from the southwest (205-235 degrees) **Moderately frequent**	**Ineffective**
SR03 **(High)**	ca.306m (north) **(Distant)**	1.5% (281 hours) coming from the south (165-195 degrees) **Infrequent**	**Ineffective**
SR04 **(High)**	ca.96m (southwest) **(Close)**	2.2% (413 hours) coming from the northeast (05-75 degrees) **Infrequent**	**Ineffective**
SR05 **(High)**	ca.391m (west) **(Distant)**	0.6% (119 hours) coming from the west (65-95 degrees) **Infrequent**	**Ineffective**
SR06 **(Low)**	ca.306m (south) **(Distant)**	0.6% (103 hours) coming from the northeast (-25 degrees) **Infrequent**	**Ineffective**
SR07 **(High)**	ca.91m (south) **(Close)**	3.4% (616 hours) coming from the northeast (05-55 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.

All receptors except SR06 was identified as having a high sensitivity to dust deposition.

Having considered the distance of the receptors from the emission source and the frequency of winds (>5.0m/s) on dry days, the pathway effectiveness was derived for each sensitive receptor.

From Table 9-9 above, the pathway effectiveness was “Ineffective” for all seven (7No.) human receptors (SR01-SR07).

To identify the potential risk of dust impact on the receptors, the pathway effectiveness and Residual Source Emission were considered together. As the Residual Source Emissions ranged from medium to Large (Table 9-8 above), Large was applied to them all, as recommended in the IAQM guidelines [94].

The estimation of dust impact risk from this process is outlined in Table 9-10 below.

Table 9-10: 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

The 'Risk' of dust impact on identified receptors has been classified as having a 'Low' without appropriate mitigation measures implemented.

To identify the magnitude of effect from dust on the receptors, the 'Risk of Dust Impact' and 'Receptor Sensitivity' were considered together.

The descriptor is outlined in Table 9-11 below.

Table 9-11: Magnitude of Dust Impact on Sensitive 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	Low	Low Risk	Negligible Effect
SR07	High	Low Risk	Slight Adverse Effect

It is estimated that the magnitude of dust effect may have a "Slight Adverse Effect" on six (6No.) sensitive receptors and 'Negligible Effect' on SR06, without the appropriate mitigation measures implemented.

9.5 Proposed Mitigation Measures and / or Factors

9.5.1 Dust Mitigation Measures

The dust risk assessment has identified that dis-amenity dust from the Proposed Development could give rise to "slight adverse effect" to identified receptors without any mitigation measures implemented. To reduce this potential effect, and to ensure the applicant implements basic good practice, the following mitigation measures are to be implemented.

Mitigation measures for the Proposed Development are divided into general measures (e.g. site management and maintenance) and those more specific to the Construction/Operational/Restoration Phase of the Site (e.g. HGV movements).

Prior to commencement of the Proposed Development, a Dust Management Plan should be agreed with the Local Authority. Table 9-12 below details the mitigation measures associated with the Proposed Development.

Table 9-12: Proposed Mitigation Measures

General Mitigation Measures for the Entire Site
Existing Mitigation Measures • A monitoring programme for dust deposition is in place and will continue to be implemented during restoration; • Optimise timing of operations, particularly in relation to meteorological conditions; • Stockpiles in general are conditioned with water to minimise dust during dry and windy conditions; • Siting of stockpiles to take advantage of shelter from wind; • Overburden mounds are grass seeded and planted to eliminate wind-blown dust; • Plant is regularly maintained; • Internal haul roads are compacted and maintained. In addition, optimise separation distances of haul roads to sensitive receptors; • A water bowser is available to minimise dust during dry and windy conditions; • Internal haul roads are maintained wet with a water bowser to minimise dust during dry and windy conditions; • On site speed restrictions (<20 kph) are in place in order to limit the generation of fugitive dust emissions; • Electronic barrier is in place at wheel wash to prevent lorries passing through; • Regular cleaning and maintenance of wheel wash; • Training of new HGV drivers to onsite wheel wash and barrier systems; • Toolbox talks on dust and importance of the wheel wash onsite; • A dust sprinkler system is installed from the wheel wash to the quarry entrance; • A water bowser is available at all times; • Cleaning regime for the public roads within the quarry vicinity. Increased cleaning to three times a week when quarry is operational; • During extended period of dry weather the increased usage of the road sweeper every day will be reviewed by the quarry manager; and, • New road gullies are cleaned twice a year by a road sweeper.
Design Measures • The majority of works will be completed in the quarry void, below all sensitive receptors. This will provide an enclosed environment for the majority of the works associated with the Proposed Development;

General Mitigation Measures for the Entire Site
• HGVs exiting the Site will be via the existing wheel wash; • The peripheries of the quarry void are covered with well-established scrub/treeline, which will provide further screening to sensitive receptors from activities associated with the Proposed Development; • During initial site preparation the creation of screening berms around the peripheries of the site boundary will be covered with vegetation, which will provide further screening; and, • Haul routes, tips and stockpiles will be located away from sensitive receptors.
Construction/Operational/Restoration Measures The following mitigation measures will be implemented to minimise dust generation during all phases of the Proposed Development. • All dust and air quality complaints will be recorded, their potential causes identified, and appropriate measures taken to reduce emissions in a timely manner; • Electronic complaints will be maintained onsite available for review at any reasonable time; • Maintain good communication with the surrounding communities; • Regular inspections of the Site will be completed to ensure basic good practice mitigation measures are implemented; • Provide training to the site personnel on dust mitigation to be implemented on Site; • Site stripping and reinstatement operation handling activities should be avoided during dry and windy conditions; • Vegetate exposed berms planted with a mix of native trees and shrubs; • All plant and equipment will be maintained to a high standard; • Use the mobile crushing and screening plant within its design capacity; • Internal haul roads are compacted and maintained; • Internal haul roads are maintained wet with a water bowser to minimise dust during dry and windy conditions; • A water bowser is available to minimise dust during dry and windy conditions; • Dampen the material extracted when possible; • Clearance of any spillages will be completed to avoid the accumulation of dry loose materials around the Site; • Extend the existing sprinkler along the Site haul road; and, • Use covered vehicles for the transport of dry fine materials.

9.6 Cumulative and In-combination Effects

The surrounding landscape from the Site is primarily used for grazing, rather than tillage. Due to the nature of surrounding activities, minimal dust is expected to be generated directly from grazing activities. There is potential that land in the vicinity of the Site is used to cut hay and silage. However, these activities will typically occur during the summer months. As such, given the short-term nature of the activities, the cumulative and in combination effects of agriculture on air quality are determined as not likely or significant.

9.6.1 Potential Cumulative Ambient Dust Effects

The background concentrations of PM_{10} have been identified and justified in Section 9.3.3. it is considered that the background concentration of PM_{10} selected from Zone C constitutes the cumulative concentration of PM_{10} from the receiving environment. The potential concentrations of PM_{10} associated with the Proposed Development were outlined in Section

9.4.2.1, which identified there was little risk of the annual AQS being exceeded given the existing background concentrations and likely process contribution. As such, the potential for cumulative and in-combination effects to arise from ambient dust is not significant.

9.6.2 Potential Cumulative for Disamenity Dust Effects

There is potential for a cumulative and in combination effect from disamenity dust from the Proposed Development and the activities within the Quarry. As presented in Chapter 3, the Quarry will complete the majority of processing and off-site transportation of minerals that will be extracted from the Proposed Development.

When considered in tandem with the other processes occurring onsite, the residual source emission for offsite transportation did not increase, given the number of HGVs leaving the Site will not increase from the Quarry. The residual source emission for stockpiling/exposed surfaces increased from medium to large, given the increased exposed area. There was no change in any other residual source emission associated with the Proposed Development.

Sensitive receptors to the north and west had their distances modified, as they are located closer to the existing permitted quarry extraction area than the Proposed Development. However, sensitive receptors (SR03 & SR05) did not have their distance classification upgraded from 'Distant'.

Having considered the distance of the receptors from the emission source and the frequency of winds (>5.0m/s) on dry days, the pathway effectiveness was derived for SR03 & SR05.

With the reclassification of the receptors based on distance the magnitude of dust effects can be considered as "Slight Adverse Effect" for sensitive receptors (SR03 & SR05) which is consistent with the risk identified in the mineral dust risk assessment for the Proposed Development. The mitigation measures outlined in Section 9.5.1 will be sufficient to manage dust emissions along with existing mitigation measures implemented at the Quarry.

9.7 Interactions with Other Environmental Attributes

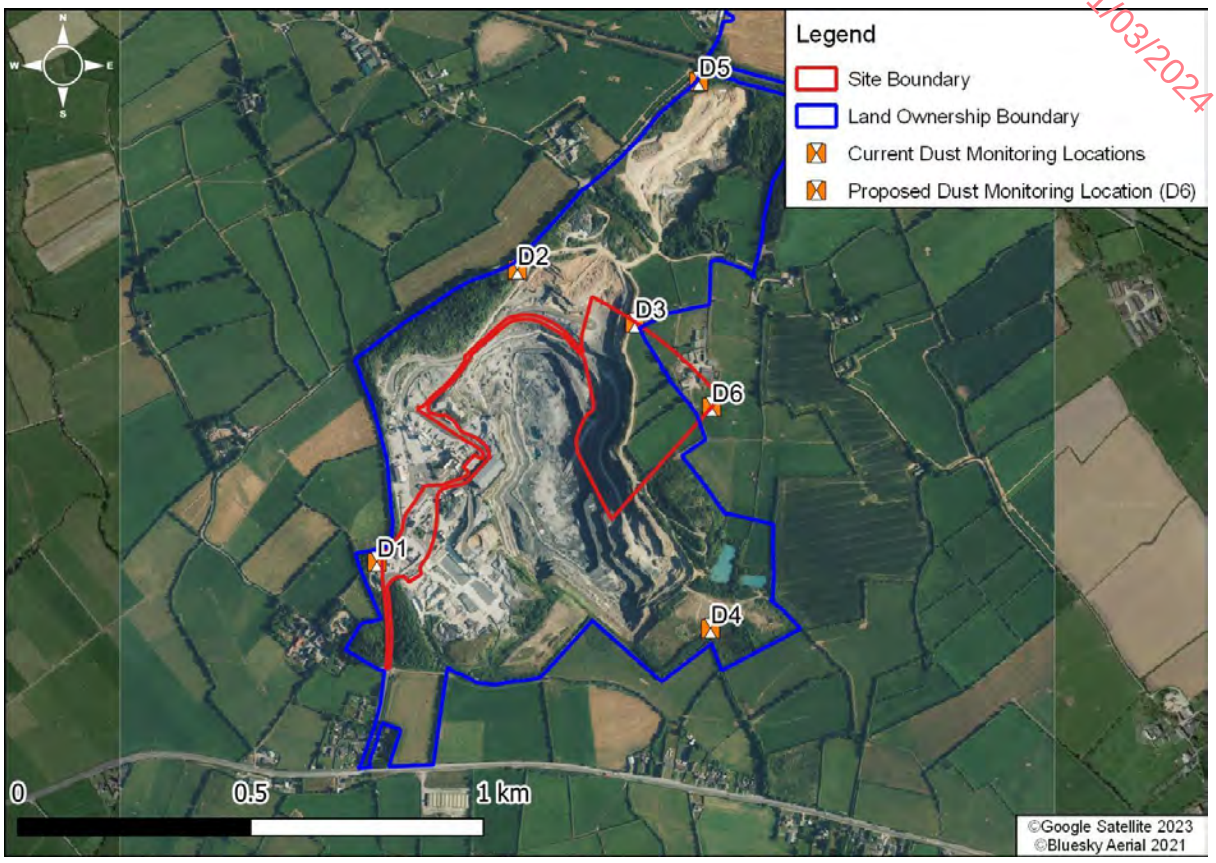
- Chapter 5 – Population and Human Health. Air Quality is an important consideration for human health, as potential PM_{10} concentrations can effect human health. However, the assessment on air quality showed there was little risk that the Proposed Development would have exceeded the AQS-standards, indicating negligible effect on human health.
- Chapter 6 – Biodiversity. Air quality can potentially effect ecosystems, however, this assessment demonstrated that emissions from air associated with the Proposed Development will have no negative effect on protected ecosystems given the distance between the Proposed Development and the closest ecological receptor.
- Chapter 7 – Land, Soils and Geology. Air-borne dust arising from the Proposed Development are sourced directly from the geology at the Site. This is a key component of air quality at the Site and has been comprehensively considered in this chapter (Chapter 9).
- Chapter 14 – Material Assets: Traffic & Transport. Air quality can be impacted by increased traffic volumes. However, the traffic volumes associated with the Site will not be increased and therefore would not have an effect on the .

9.8 Monitoring

Section 9.3.5 above details the locations of existing Bergerhoff monitoring locations associated with the Quarry. It is proposed that one (1No.) additional location will be monitored around the eastern boundary of the Proposed Development and Quarry. The location of these

points is shown in Figure 9-7 below. It is proposed that Bergerhoff monitoring at the current locations continues.

Figure 9-7: Proposed Dust Monitoring Location



9.9 Indirect Effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout this chapter.

9.10 Residual Effects

Based on the receiving environment, type and intensity of activities (associated with the Proposed Development), and the mitigation measures to be implemented, the residual effects on human health will be 'not significant'.

Based on the receiving environment, type and intensity of activities (associated with the Proposed Development), and the mitigation measures to be implemented, the residual effects on receptors from disamenity dust will be 'not significant'.

9.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

9.12 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 effects of the Proposed Development on climate change in the context of national greenhouse gas (GHG) emissions and relevant sectoral targets. This chapter also assess the potential effects to the Proposed Development from climate change.

10.2 Methodology

As part of this chapter, the following guidance's and statutory regulations were reviewed:

- Kilkenny City and County Council Development Plan 2021 to 2027 [1];
- Kilkenny County Council Climate Change Adaption Strategy 2019 to 2024 [100];
- IEMA: Environmental Impact Assessment Guide to Assessing Greenhouse Gases and Evaluating their Significance, 2017 [101];
- International Panel on Climate Change: Guidelines for National Greenhouse Gas Inventories, 2019 [102];
- ISO 14064 Part 1: Specification with guidance at the organisational level for quantification and reporting of greenhouse gas emissions and removals [103];
- The European Commission – Climate ADAPT [104];
- The European Commission – The European Climate Data Explorer [105];
- The European Commission – The Copernicus Climate Change Service [106];
- Environmental Protection Agency – Climate Ireland [107];
- Global Facility for Disaster Reduction and Recovery - ThinkHazard [108];
- Department of Communications, Climate Action and Environment – Climate Action Plan 2023 [109];
- Transport Infrastructure of Ireland – Carbon Tool [96];
- Department of Communications, Climate Action and Environment – National Adaption Framework, Planning for a Climate Resilient Ireland, 2018 [110]; and,
- Government of Ireland – Technical Annex B Climate Change Risk Assessment, 2023 [111]

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 Greenhous Gas Emissions and Evaluating their Significance* [101]. These guidelines specify the use of emission factors, which were sourced from the Transport Infrastructure of Ireland's (TII) Carbon Tool [112]. TII's 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. The results of these calculations were combined with information on GHG emissions supplied directly by the client.

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.

Due to the size and nature of the Proposed Development, there are no potential effects on microclimate in terms of wind tunnelling and shading. As such, the potential effects on microclimate will not be assessed.

10.2.1 Policy Context

10.2.1.1 Paris Climate Agreement

The Paris Climate Agreement is a legally binding international treaty on climate change that was adopted by 196 parties at the COP 21 in Paris 2015 [113]. The goal of the agreement is to limit global warming potential by 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 [113]. The agreement provides a pathway for developed nations to assist the 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 Climate Change Adaption Framework

The National Climate Change Adaption Framework (NCCAF) was developed in 2018 [110], under the Climate Action Law and Low Carbon Development Act of 2015. The aim of the statutory framework was set out as 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 and civil society, the private sector and the research community.

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 2023

The Climate Action Plan 2023 is the second annual update to Ireland's Climate Action Plan. The plan is the first to be prepared in accordance with the Climate Action and Low Carbon Development (Amendment) Act 2021 [109].

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 [111].

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* [111]. The annex was prepared for local councils to aid in preparing climate risk assessments for their constitutes 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 Kilkenny City and County Council Development Plan 2021 to 2027

The county development plan contains the following policies with respect to climate change [1]:

Strategic Aim: *To provide a policy framework with objectives and actions in this City and County Development Plan to facilitate the transition to a low carbon and climate resilient County with an emphasis on reduction in energy demand and greenhouse gas emissions, through a combination of effective mitigation and adaption responses to climate change.*

Strategic Objective (2A): *To support and encourage sustainable compact growth and settlement patterns, integrate land use and transportation, and maximise opportunities through development form, layout and design to secure climate resilience and reduce carbon emissions.*

Strategic Objective (5L): *To promote a diverse and sustainable local economy through the designation of sufficient lands for employment related uses, including facilities, to promote SME growth through the local area plans for the District towns.*

10.2.1.6 Kilkenny County Council Climate Change Adaption Strategy 2019-2024

The Kilkenny 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. Kilkenny, 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 GHG emissions have a global effect when they are released into the atmosphere over time. Therefore, assessing the effects of GHG emissions of the 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 vehicles onsite as well as the operation of plant and equipment.

According to the IPCC 2019 refinement of the 2006 publication of Guidelines for National Greenhouse Gas Inventories [102], GHG emissions can be split into three (3No.) categories (or 'scope')[5]:

- 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 electricity and,
- Scope 3: Other indirect emissions that occur in the value chain.

Roadstone provided comprehensive details on the reporting of Scope 1 and Scope 2 emissions associated with the Quarry. There is an expectation that the number of plant used (Scope 1) and electricity generated (Scope 2) will remain unchanged as a result of the Proposed Development, in comparison to the current usage in the Quarry. Emission data for the year 2023 (January to October) was provided, and this was extrapolated to represent a typical year of operation (302 days). Therefore, following IEMA's Guidance, the assessment boundary for GHG emissions encompasses both the Proposed Development boundary and the Quarry. Processes where emission data was provided includes:

- Blacktop Production;
- Activities at the Block Yard;
- Concrete Batching;
- Stone Production; and,
- Miscellaneous.

In order to determine the level of significance associated with the release of GHG emissions, relevant emissions must be compared to the specific sectoral emission ceilings data for the applicable industry (discussed in Section 10.3.4 below). The Scope 1 emissions provided by the client, measured in tonnes of CO_{2e}, included for both the processes in the Quarry (i.e. associated with blacktop production, concrete batching etc.) and offsite transportation. To compare these emissions with the relative sectoral emissions ceilings for Transport, assumptions were made regarding this proportion. Calculations for HGV emissions were performed using the TII Carbon Tool, taking into account the known number of HGVs that will be used on a typical day and an estimation of their typical travel distance. The resulting emissions were considered as the proportion of Scope 1 emissions that could be comparable to Transport sectoral emissions ceilings.

The Proposed Development will operate within the Quarry's permitted traffic numbers, which facilitates 700,000t-1,000,000t per annum. A conservative estimate for offsite transportation, which was used for this assessment, would be 250 outward trips in a day.

The two (2No.) closest population centres to the Quarry are Waterford City and Kilkenny City, 8.1km and 49.5km away, respectively. As these are the two (2No.) most likely destination for aggregates and other products, their distance from the Proposed Development based on the typical route taken (ca.28.8km average) has been used to estimate the likely travel distances for products leaving the Site (or the Quarry). To ensure consistency in the approach for using the TII Carbon Tools emission factors as part of this assessment, an average laden condition was assumed for HGV's both entering and leaving the Site (Table 10-1).

[5] Direct and Indirect emissions do not relate to the EIA Directive of "Direct" and "Indirect" effects and are assessed separately

Scope 2 emissions are derived from estimations of electricity used in a typical year associated with the Quarry.

With regards to LGV movements (Scope 3 emissions), details from the Central Statistics Office estimates that the average worker travels 15km per day (30km round trip). This was used as an estimated distance for all LGV vehicles (including service vehicles and employee vehicles (Table 10-1). It is estimated that approximately 50 trips will be used per day to cover staff and miscellaneous journeys (as detailed in Chapter 3).

Table 10-1: Details of Vehicle Emissions

Transport Type	Distance travelled per movement (km)	Total Distance Travelled Per Year (km)	Emission Factor (kg of CO_{2e} per km
500No. HGV Movements	28.8	4,363,200	0.3
50No. LGV's Movements	15	227,250	0.2

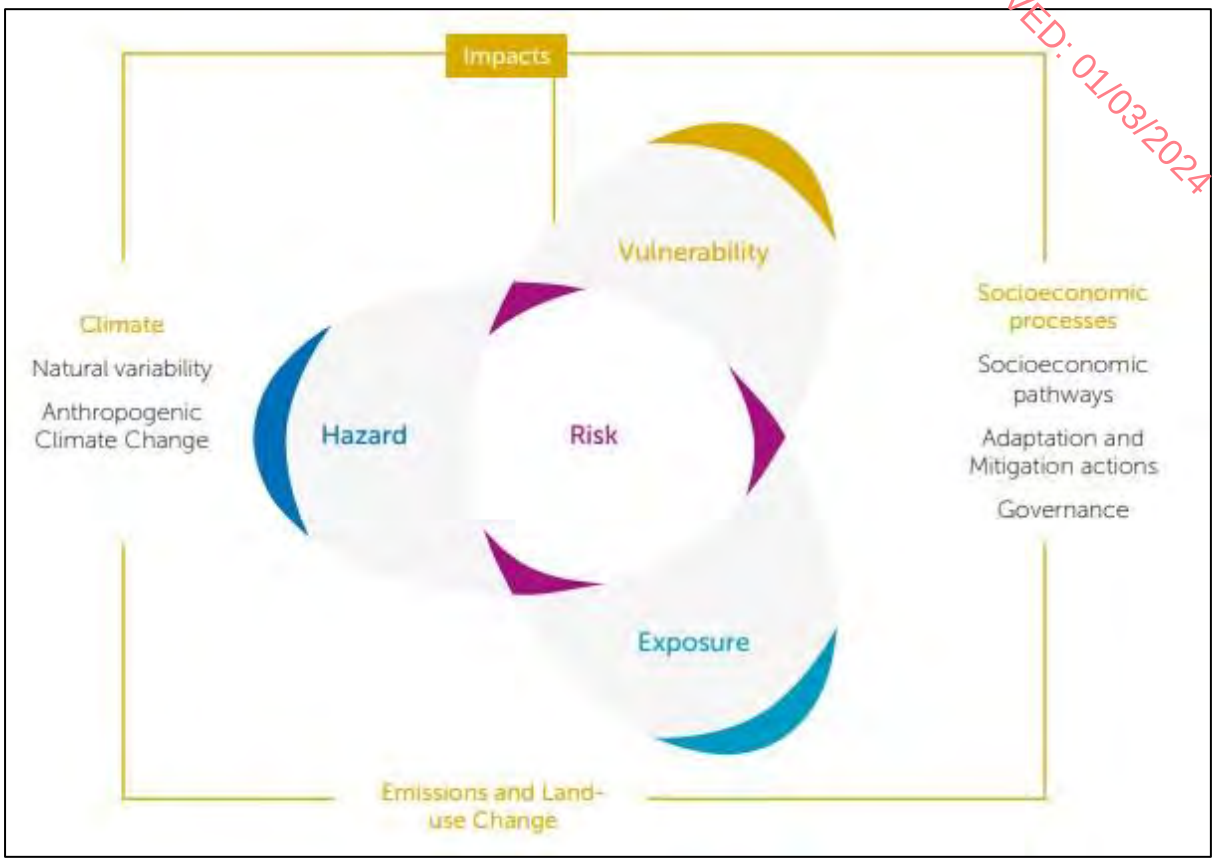
10.2.3 Climate Change Risk Assessment

The IPCC define three (3No.) key components for identifying climate risk that interact to generate the risk of climate impacts. These include:

- Hazard: The potential occurrence of a natural or a human induced physical event or trend (such as a 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 irks associated with a development and in turn the completion of a climate risk assessment.

Figure 10-1: IPCC Sixth Assessment Report ' Risk Propellor'



In adherence to the Annex B Guidelines provided for local councils, the assessment process entails the identification and characteristics of climate hazards. This involves both the frequency and magnitude of impacts across the ' Asset Damage' category.

Given the scale and nature of the Proposed Development, the climate risk assessment will focus exclusively on the physical vulnerabilities of the Proposed Development to climate hazards both present and future. According to Annex B these physical vulnerabilities are described 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 impact of climate risks that will potentially cause disruptions of services and functions of the Proposed Development are considered to be the main focus of this assessment. Full details on the qualitative descriptions of impacts can be found 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 spring and warmer temperatures in the summer.

Typically, climate is averaged weather data over a 30-year period 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 1991 to 2020 averages, is Casement Aerodrome, Co. Dublin, located 120km 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 (2No.) 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 [114]. RCP scenario 4.5 (RCP4.5) represents an intermediate scenario with emissions expected to peak in 2040 and then decline [114]. RCP scenario 8.5 (RCP8.5) is the worst-case scenario approach based on an overestimation of projected coal outputs [93]. 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; and,

- 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).

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

According to the IPCC's Sixth Assessment Report, climate impacts are becoming more severe and are manifesting at an accelerated pace [114]. These impacts can have cascading effects on both natural and human systems, often interacting with other human activities. The IPCC defines climate risk as the potential for adverse consequences to human and ecological systems, recognising the diverse values and objectives associated with these systems [114].

Section 2 of Appendix 10-1 highlights the scales used to identify the climate hazards that have the potential to impact the Proposed Development from a desk-based review of available resources. Following this review, the following hazards identified as relevant to the Proposed Development are as followed:

- Wildfires;
- Heatwaves/ Droughts;
- Cold snaps;
- Extreme Rainfall
- Flooding; and,
- Landslides.

Aspects of some hazard categories, such as ocean acidification and sea-level rise will not have a direct impact on the Proposed Development, due to the nature of activities and its location. As a result, these hazards have been screened out of consideration when identifying the level of risk associated with the Proposed Development.

10.3.4 National Sectoral Emission Ceiling

The National Sectoral Emission Ceilings refer to the total amount of GHG emissions that a 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 (3No.) successive 5-year periods of national emission ceilings, are measured in tonnes of CO_{2e} (tCO_{2e}) (Table 10-3 below).

Table 10-3:Ireland's National Carbon Budget

National Climate Budget	Emission Ceiling for Assessment Period (tCO_{2e})
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 budget (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 (2No.) carbon budget periods (2021 to 2025 and 2026 to 2030). For Scope 3 emissions associated with the GHG assessment, those calculated will be compared against the sectoral emission ceiling for the Transport sector (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

Scope 1 emissions provided by Roadstone PLC relating to the Quarry will be compared to the first and second national carbon budget (Table 10-3 above), as plant operations are not currently accounted for in any of the sectors identified under the current Climate Action Plan.

It is anticipated that emissions beyond 2030 will be influenced by the 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,
- Use of machinery onsite.

According to the National Stone and Gravel Association [115], enhanced blasting practices have the potential to reduce electrical energy consumption by minimising the primary and secondary crusher requirements. The association outlines that the potential impacts on GHG emissions will be relatively small because indirect emissions due to electricity purchased are small at crushed stone and sand producing plants. As such, the effects of blasting on GHG emissions have been determined as not significant.

10.4.1.1 Construction Phase (Site Preparation Phase)

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 ancillary infrastructure as far as practicable, removing the necessity to employ additional equipment, resulting in GHG emissions.

10.4.1.2 Operational Phase

The Operational Phase of the Proposed Development is expected to span over ca.19 years and will involve activities such as blasting, mineral processing and the haulage of materials to market. As discussed, no additional HGVs or plant are anticipated to be used compared to the Quarry and therefore the boundary in which GHG are assessed will be related to both the Quarry and the Proposed Development.

For the purpose of the assessment regarding GHG emissions, calculations will be compared as a proportion of the first two (2No.) sectoral emission ceilings (2021 to 2025 and 2026 to 2030) as explained in Section 10.3.4 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 (2No.) 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 and Scope 3 emissions, which have been identified and discussed in Section 10.2.2 above. These emissions encompass direct activities from onsite processing and other emissions associated with the project supply chain.

10.4.1.3 Site Restoration Phase

Upon completion of the extraction activities proposed as part of the Operational Phase, the Site will be subject to a Restoration Plan.

The Restoration Plan has been updated to include the additional extracted lands associated with the Proposed Development. This includes ensuring the Site is made safe and to allow groundwater to recharge, forming a lake habitat.

10.4.2 Climate Change Risk Assessment

The Climate Change Risk Assessment determines the potential impacts to the Proposed Development from climate hazards and the frequency of these events. To determine the level of risk associated to the Proposed Development, receptors have been divided into the following:

- Onsite Assets (e.g. plant, equipment and building);
- Inputs (Electricity and Water);
- Outputs (Mineral Processing, 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 hazards

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,

Climate Hazard	Potential Impacts on Quarry Receptors
	• 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 offsite 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.

10.4.2.1 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	3	Common	According to the KCC Climate Action Plan a heatwave is indicated by 5 consecutive days of temperatures over ca.24°C. According to temperature data from a local weather station (Greenhill – ca.5km to the north) the following number of classified heatwaves occurred:

Climate Hazard	Frequency Score	Frequency Description	Justification
			• July 2013 (9 consecutive days above threshold); • June and July 2018 (7 and 11 days consecutively above threshold); and, • July 2021 (11 consecutive above threshold).
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 Greenshill weather station indicated that the following was identified: • Between 2010 to 2016 the number of times minimum temperatures fell below -3°C was 65 times, including 45 times between 2010 and 2011; and, • Between 2017 and 2023 the levels have fallen below the threshold 44 times, indicating a decreasing frequency of cold spells in the local area.
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 (Mullinavat – 5.7km north of the Proposed Development) indicates the following: • Since 1984 the number of times daily precipitation exceeded 30mm was 110 times; and, • Records show that since 1984, 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 2015 (December 2015 &2021) having previously occurred once every 2-3years prior.
Flooding	1	Rare	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 flood events. The Proposed Development is also not located within the bounds of the National Indicative Fluvial mapping – Present Day. There is no occurrence of a flood event within 1.5km of the Proposed Development. The Proposed Development is also not located within any GSI Groundwater Flooding Probability for Low, Medium or High flood events
Landslides	1	Rare	According to the Geological Survey if 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.

10.4.2.2 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
Onsite Assets		Wildfires	2	Minor	The highest impacts associated with onsite assets would be from extreme rainfall, flooding and landslide events. Due to the nature of activities located within a void, existing pumps are located within the quarry to dewater surface water and groundwater to the current discharge point. The current discharge rate of 13,000 m^3 still provides a freeboard of over 2,500m^3/day to allow for any excess inflow to occur. The Proposed Development will create benches onsite which are properly designed and suitable to stabilise slopes to minimise the risk of landslides occurring to onsite assets. Discharge from the quarry can be influenced by rainfall events during wet periods. In more extreme rainfall events given the size of the quarry void water can be stored within the quarry floor and pumped out over several days at discharge rate not exceeding 13,000m^3/day. This will prevent increased downstream flood risk. The asset damage category of minor is defined as "an adverse event that can be absorbed by taking business continuity action".
		Heatwaves/ Droughts	1	Negligible	
		Cold Snaps	2	Minor	
		Extreme Rainfall	2	Minor	
		Flooding	2	Minor	
		Landslides	2	Minor	
Inputs (Electricity and Water)		Wildfires	2	Minor	According to the KCC Climate Adaption strategy, cold snaps and extreme rainfall have the highest consequence to impact areas within the Critical Infrastructure & the Built Environment and Water Resources. However, residential developments are most vulnerable as they require electricity and communication network form external supplier. The Proposed Development has access to diesel generators and groundwater wells to provide services for the Site in the event of electricity or water loss due to extreme weather events. The asset damage category of minor is defined as "an adverse event that can be absorbed by taking business continuity action".
		Heatwaves/ Droughts	2	Minor	
		Cold Snaps	2	Minor	
		Extreme Rainfall	2	Minor	
		Flooding	2	Minor	
		Landslides	2	Minor	
Outputs		Wildfires	2	Minor	

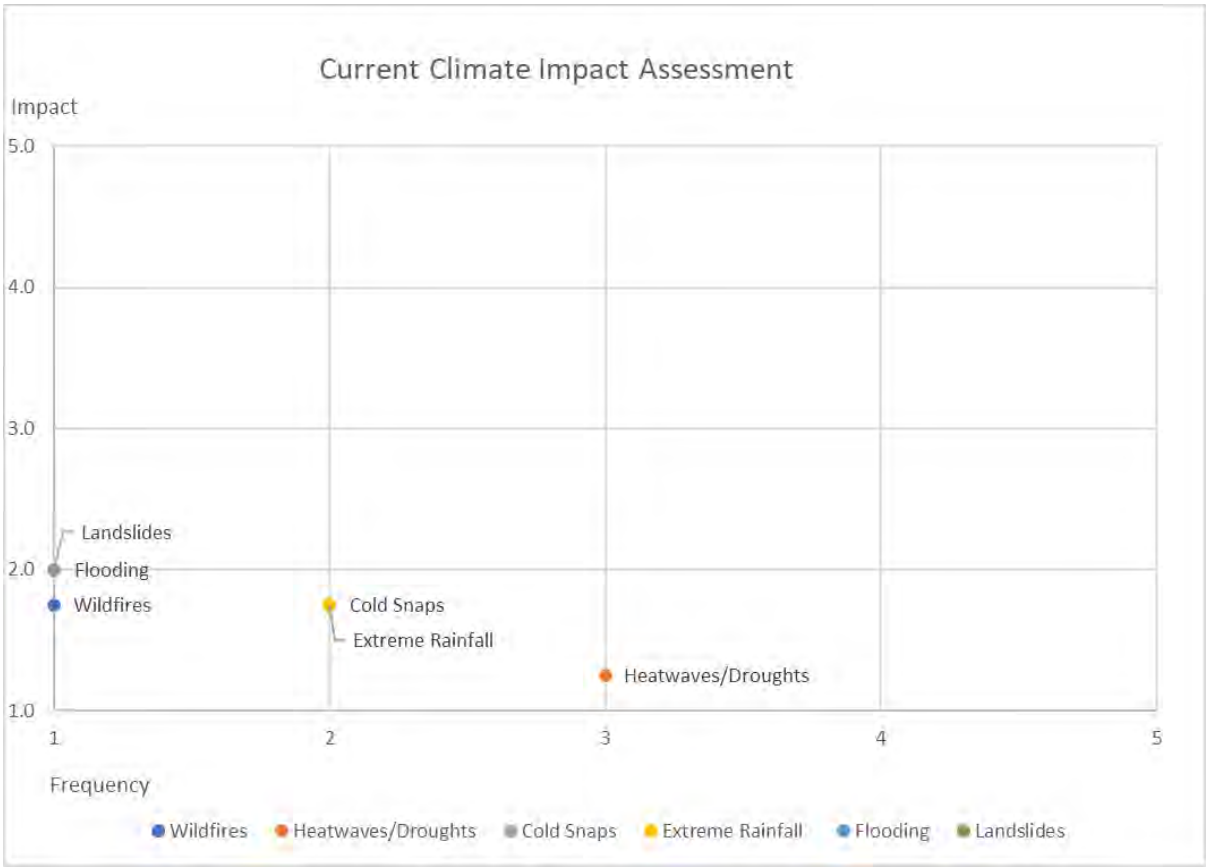
Receptors	Climate Hazard	Impact Score		Classified Asset Impact	Justification
		Heatwaves/ Droughts	1	Negligible	Due to the nature of activities associated with the Proposed Development (processing and extraction of earth material) the highest level of impact for a hazard was for a flood, extreme rainfall and landslide event. The asset damage category of minor is defined as "an adverse event that can be absorbed by taking business continuity action".
		Cold Snaps	1	Negligible	
		Extreme Rainfall	2	Minor	
		Flooding	2	Minor	
		Landslides	2	Minor	
Transport Links		Wildfires	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 minor. This would be due to the existing dewatering infrastructure to mitigate excess surface water that may impact haul routes and internal road networks within the quarry void.
		Heatwaves/ Droughts	1	Negligible	
		Cold Snaps	2	Minor	
		Extreme Rainfall	1	Negligible	
		Flooding	2	Minor	
		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.

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	Common	3	1.3
Cold Snaps	Occasional	2	1.8
Extreme Rainfall	Occasional	2	1.8
Flooding	Rare	1	2.0
Landslides	Rare	1	2.0

Figure 10-2:Classification of current 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 10-2.**

Based on the availability of information, it is not possible to quantify the potential for future climate risks associated with wildfires and landslide susceptibility. Based on this, and their current frequency, the potential effects of these hazards on the Proposed Development are considered not likely and not significant.

10.4.2.3 Potential Future Climate Risks and Impacts

Understanding how climate change risks are likely to evolve in the future is fundamental to identify how existing risks may change as a result of climate change.

Table 10-9 below presents the future change in climate hazards expected due to climate change based on the Climate Ireland Platform. As assets are expected to remain similar throughout the Operational Phase of the Proposed Development, the level of impacts on these assets from the hazards will remain the same. Whilst the Operational Phase of the Proposed Development is expected to cease in 2043, for a comprehensive understanding of potential future climate risks, the climate scenarios outlined by Climate Ireland (2041-2060) 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 Kilmacow area as far as practicable.

Table 10-9: Future Change in Climate Hazards Expected due to Climate Change

Hazard	Current Frequency	Projected Frequency	Justification
Heatwaves / Droughts	Common	Common	According to the Climate Ireland Platform, the Proposed Development would experience an increase in the number of heatwave occurrences during the 2041-2060 period under RCP4.5 and RCP8.5. The projected change in the number of dry periods are also expected to increase under both modelling scenarios for this period. However, the projected change in heatwaves/dry periods are lower than the national projections for the country, with the Proposed Development also showing reduced levels compared to the town of Kilmacow located ca.3km to the northeast of the Proposed Development, therefore the frequency of such events in this context has been classified as common.
Cold Snaps	Occasional	Rare	The number of occurrences of frost days are expected to decrease by 44% and 59% under RCP4.5 and RCP8.5 respectively. The number of occurrences of ice days are expected to decrease by 72% and 85% under RCP4.5 and RCP8.5, respectively. Due to the large magnitude of decreasing occurrence of cold variables available, the frequency of such events have been reclassified as rare.
Extreme Rainfall	Occasional	Occasional	The projected change in the number of days where rainfall is expected to exceed 20mm (wet days) is an increase of 5% and 8% under RCP4.5 and 8.5, respectively. The projected change in the number of days where daily rainfall exceeds 30mm (very wet days) is an increase of 13% and 19% under RCP4.5 and RCP8.5, respectively. According to the local weather data used to classify current precipitation, an orange weather warning based on precipitation would have occurred on 9 occasions between 1984 and 2023, with no evident increase in recent periods. Assuming conservatively a 20% increase in the number of occurrences across a 40-year period, the 11 occurrences of an orange weather warning would remain an Occasional frequency of extreme rainfall. Therefore, the classification has remained the same.
Flooding	Rare	Rare	According to the CRAM Flood maps, the Proposed Development does not fall within the Mid-Range/High-End future scenario for Fluvial, Coastal 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 rare.

Figure 10-3: RCP4.5 and RCP8.5 Projected changes in number of heatwaves (2021-2050)

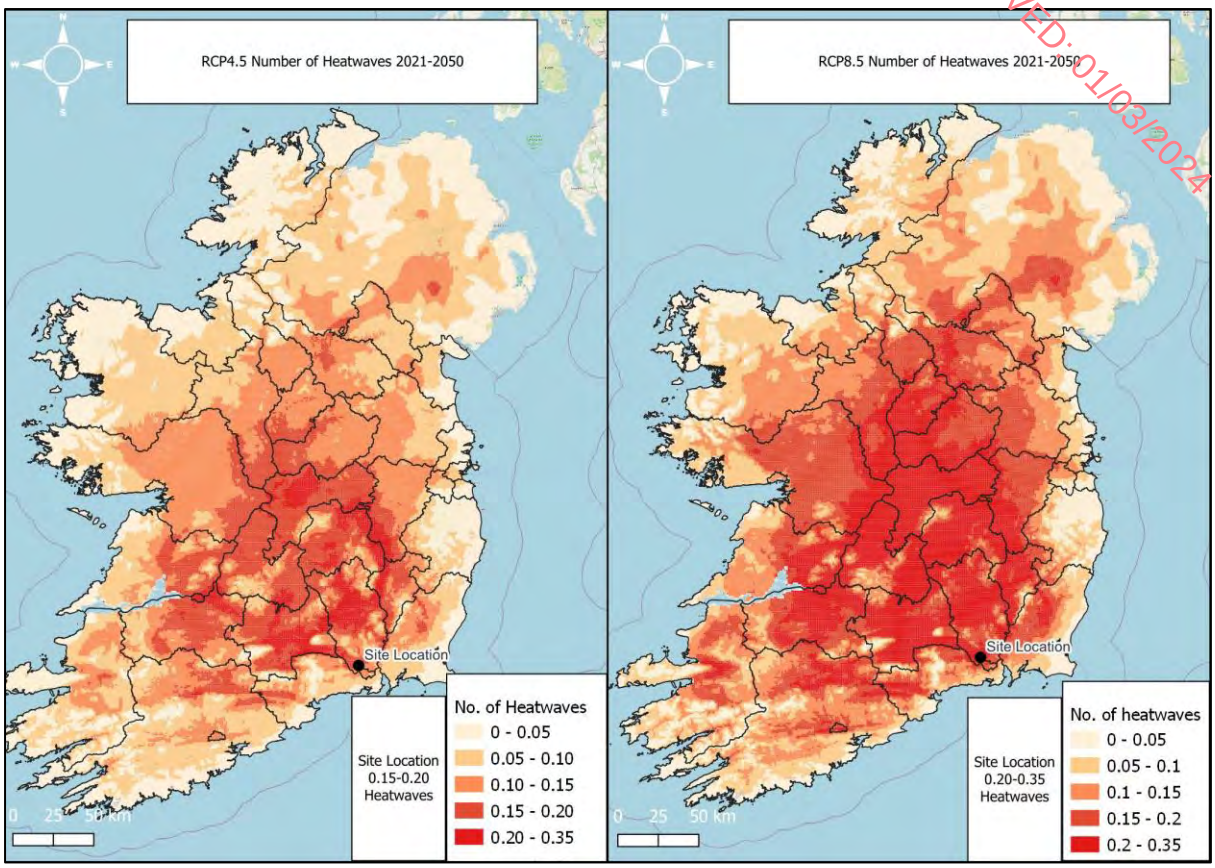


Figure 10-4: RCP4.5 and RCP8.5 Projected changes in number of Ice Days (2021-2050)

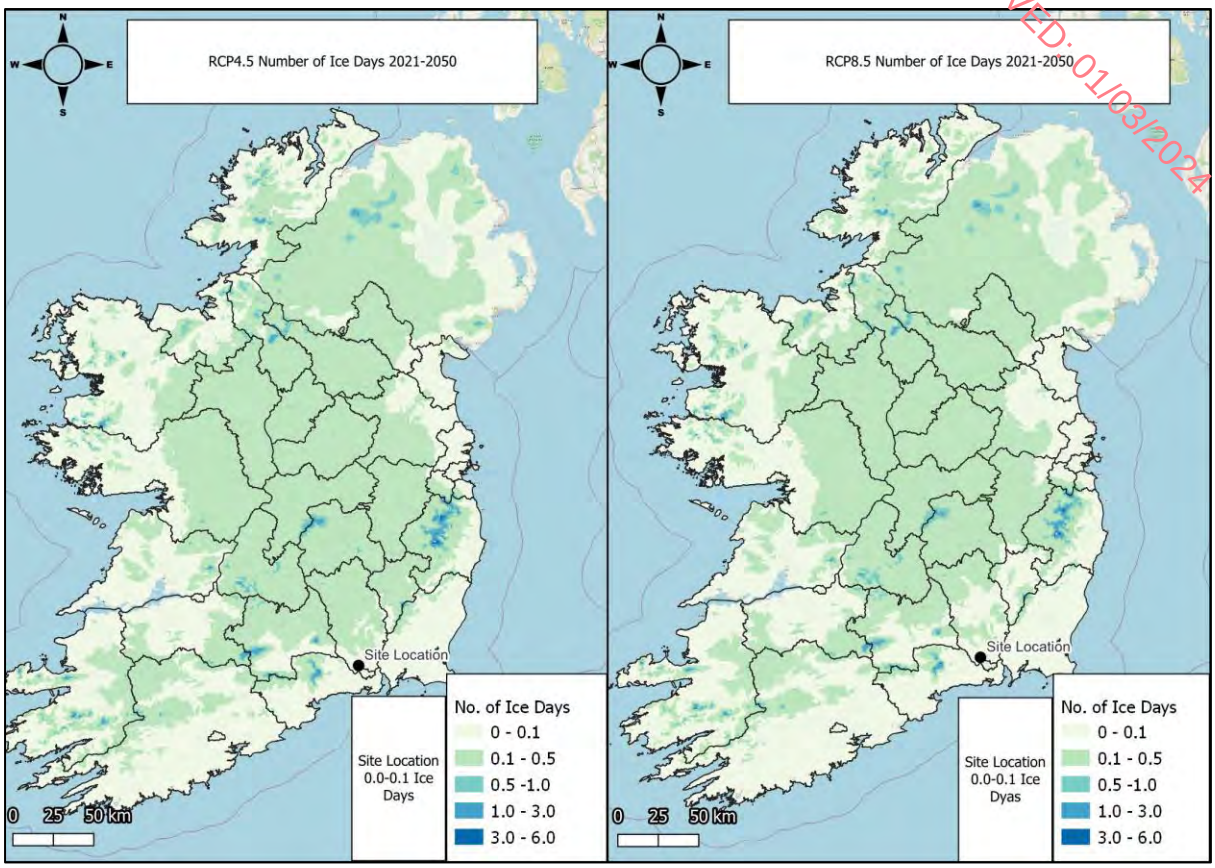
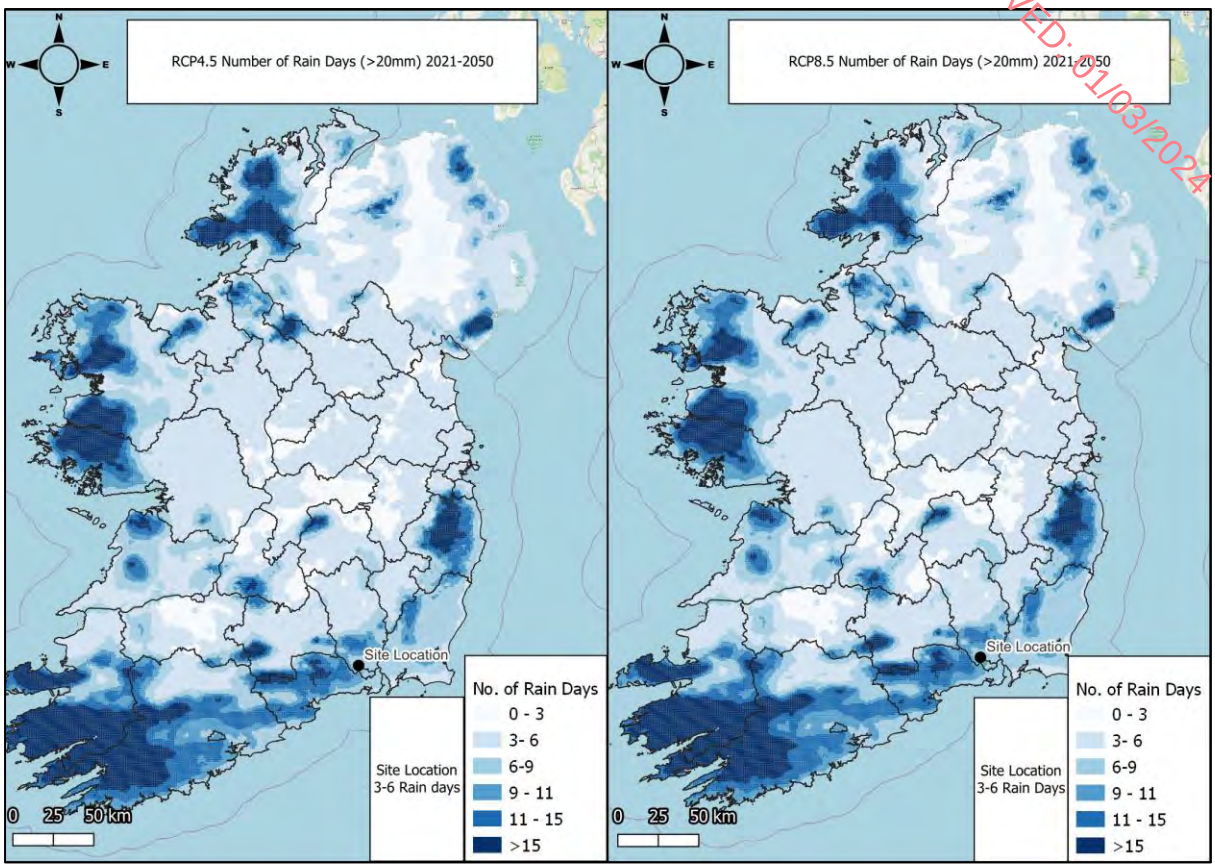


Figure 10-5: RCP4.5 and RCP8.5 Projected changes in number of Rain Days (2021-2050)



Based on the availability of evidence, the frequency of most hazards associated with the Proposed Development will remain the same under future climate conditions. Cold snaps are expected to decrease 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 effects of climate change on the Proposed Development is determined as not likely and not significant.

10.4.3 Greenhouse Gas Assessment

10.4.3.1 Operational Phase

The calculation of GHG emissions associated with Scope 3 emissions, those not provided by Roadstone, follows the methodology outlined by the IEMA Guidance [101] and the use of emission factors provided by the TII Carbon Tool, created and managed by the Transport Infrastructure of Ireland [112]. The contribution of Scope 1 emissions provided for 2023 (January to October) and the Scope 3 calculated for a typical year (302 days) were compared against the relevant sectoral emission ceilings to evaluate significance.

According to detailed information provided by Roadstone, 100% of the electricity used onsite is provided by Green Electricity (ca.640,000 kWh for the period January to October). Scope 2 emissions were provided as 0 tonnes of CO_{2e} and therefore will not be discussed further.

Planning permission is being sought for ca.20 years, with the Operational Phase expected to last ca.19 years. However, further emissions were not completed as the sectoral emission ceilings outline the difficulties in quantifying potential emissions from sectors post 2030 [109]. The extrapolation of emissions associated with the Quarry and the Proposed Development

represents a conservative estimation, as changes in technology will likely reduce emissions in the future.

According to information provided, across the processes described in Section 10.2.2 above, the Quarry produced ca.6,623 tonnes of CO_{2e}.

The reported Scope 1 emissions encompass transportation-related emissions associated with onsite and offsite movements of materials, as well as those associated with process related fuel combustion. Calculations, based on assumptions about the total distance covered by all HGVs over a typical year (as detailed in Table 10-1), suggests HGV emissions would yield 4,681.5 tonnes of CO_{2e} (approximately 70.7% of total Scope 1 emissions). Thus, for the purpose of comparing emissions against the National Carbon Budget, 1,941.5 tonnes of CO_{2e} will be considered representative for a typical year of quarry activities (total emissions minus HGV emissions) (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 (excluding transportation)	1,941
GHG Emission Source	**Tonnes of CO_{2e} (2024 to 2025)**
Extrapolations of plant emissions for period 2024 to 2025	3,883
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 plant emissions for period 2026 to 2030	9,707.5
Ireland's Second National Carbon Budget (2026 to 2030)	200,000,000
Contribution to second sectoral carbon budget (%)	0.005%

Based on the calculation of Scope 1 emissions, the assessment boundary would contribute to 0.001% of Ireland First National Carbon Budget at 0.005% to Ireland's Second National Carbon Budget.

Regarding both Scope 1 emissions (HGV movements) and Scope 3 emissions (employee vehicles and transportation), Table 10-11 shows the direct emission 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)**
HGVs and LGVs (deliveries and employee vehicles) associated with Proposed Development	4,749.5
GHG Emission Source	**Tonnes of CO_{2e} (2024 to 2025)**
Extrapolations of vehicle emissions for period 2024 to 2025	9,499.0
First Carbon Budget 2021 to 2025	54,000,000
Contribution to remaining first sectoral carbon budget (%)	0.02%

GHG Emission Source	Tonnes of CO_{2e} (2026 to 2030)
Extrapolations of vehicle emissions for period 2026 to 2030	23,747.4
Carbon Budget for Transport (2026 to 2030)	37,000,000
Contribution to second sectoral carbon budget (%)	0.1%

It is calculated that vehicle emissions related to assessment boundary will emit 4.749.5 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 two (2No.) years of operations (2024 and 2025), vehicle emissions would contribute to 0.02% 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 0.1% of these emissions across the period.

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”.

10.4.4 Unplanned Events

No unplanned events that would have a major impact on GHG emissions associates with the Proposed Development could occur. The potential for climate hazards (such as cold snaps, floods and droughts) to impact assets and workers onsite will be covered by Roadstone’s EMS policies and are not considered further.

10.5 Proposed Mitigation Measures and / or Factors

Roadstone is owned by CRH PLC, which has a comprehensive sustainability policy in place which is implemented across all CRH operations. Energy usage and carbon emissions are key environmental issues for CRH PLC who measure energy usage and carbon emissions at each of their sites and annually report the findings in their publicly available Sustainability Report [71]. CRH PLC’s environmental policy is to optimise use of energy and all resources. CRH PLC report their carbon emissions under the Carbon Enclosure Project.

CRH aim to achieve carbon neutrality by 2050 and aim to continue to reduce emissions from the activities and processes. According to the sustainability report, Scope 1 emissions decreased by ca.7% in 2022 compared to 2021, with Scope 2 decreasing by 8%.

In addition to above, the following mitigation measures will also be implemented during the works associated with the Proposed Development:

- Reduce the idle times by providing an efficient material handling plan that minimises the waiting time for loads and unloads;
- Turning off vehicle engines when not in use for more than 5-minutes;
- HVO as an alternate fuel to diesel fuel during the lifetime of the project;
- Ensure regular maintenance of plant and equipment; and,
- Use low energy equipment as far as practicable.

10.6 Cumulative and In Combination Effects

As discussed throughout this chapter, the assessment boundary of GHG emissions took into account those currently associated with the Quarry. As there is expected to be no change in the number of plant used onsite, the quantity of electricity used or the number of HGVs used

per day then is currently operating, the emissions presented in Section 10.4.3.1 above represent a cumulative assessment of the Quarry and Proposed Development.

10.7 Interactions with other Environmental Attributes

- 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: 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.
- Chapter 14 – 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 vehicle movements associated with the Proposed Development has shown effects to be not significant.

10.8 Indirect Effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout this chapter.

10.9 Residual Effects

The effects of GHG emissions as a result of the Proposed Development will be 'not significant' based on the size and type of the Proposed Development. The effects of climate on the Proposed Development will be 'not significant' based on the results of the climate change risk assessment.

10.10 Monitoring

No additional monitoring of GHG emissions, that are not already undertaken as part of the annual reports to CRH, is required as part of the Proposed Development.

10.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

10.12 Difficulties Encountered

No difficulties were encountered when undertaking the assessments outlined.

11 ACOUSTICS (NOISE AND VIBRATION)

11.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely effect of the Proposed Development on noise and vibration.

In this chapter the following is presented:

- Quantifying the existing ambient and background acoustic / sound environment;
- Quantifying the likely construction and operational 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 [18];
- EPA 2006, *Environmental Management Guidelines, Environmental Management in the Extractive Industry (Non-Scheduled Minerals), 2006* [19];
- BS4142:2014 *Methods for rating and assessing industrial and commercial sound*, 2014 [116];
- SI No 140/2006 *Environmental Noise Regulations 2006* [117];
- ANC Guidelines (Greenbook) *Environmental noise measurement guide* 2013 [118];
- IEMA *Guidelines for environmental noise impact assessment*, 2014 [119];
- ISO 1996-1:2016 *Acoustics - Description, measurements and assessment of environmental noise - Part 1: Basic quantities and assessment procedures* 2003 [120];
- ISO 1996-2:2017 *Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels* [121];
- ISO 9613-1:1993 Acoustics — Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere [122];
- ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation [123];
- NRA *Guidelines for the treatment of noise and vibration in National Road Schemes*, 2004 [124];
- Smith, Peterson and Owens *Acoustics and Noise Control*, 1996 [125];
- World Health Organization's (WHO) *Night noise guidelines for Europe* [126];
- World Health Organization's (WHO) *Guidelines for Community Noise* [127];
- *Aggregate Levy Sustainability Fund (ALSF): Sustainable Aggregates Theme 1 - Reducing the environmental effect of aggregate quarrying: Dust, noise and vibration, year unknown* [128];

- *Irish Concrete Federation (ICF) 2005, Environmental Code, Second Edition, October 2005* [129].
- *Kilkenny City and County Development 2021 – 2027,and;* [1]
- *Kilkenny Noise Action Plan 2019- 2023* [130].

This chapter assesses the potential noise effects arising from the Proposed Development through two (2No.) 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; and,
- An assessment on the likely site-specific noise emissions audible and vibration at sensitive receptors rated against standard limits for noise nuisance and vibration from quarries. This methodology is in-line with the EPA and government guidelines above for quarries.

A glossary of terminology utilised within this report is shown in Appendix 11-1.

11.2.1 Criteria Impact

The limits outlined here are taken from guidelines relevant to the Proposed Development and will be utilised to ensure onsite activities can be monitored and noise control implemented. The limits are similar to international criteria for the protection of human health from noise nuisance and protection of human health. These limits will therefore be applied as the criteria within this chapter for noise and vibration impact from the Proposed Development.

11.2.1.1 Construction Phase

Construction Phase noise will be assessed utilising the British Standard BS5228-1 [131], 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 NSRs based upon the existing ambient noise levels. An excerpt detailing the ABC method is shown in Table 11-1.

Table 11-1: BS5228 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.

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.

19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday.

This method requires an understanding of the receiving environmental at NSRs to allocate suitable construction noise limits.

11.2.1.2 Operational Noise

Ambient monitoring and best guidance for quarry noise control issued by the EPA [132] and Irish Concrete Federation [129] which detail recommended noise limits of:

- Daytime (i.e. 08:00 to 20:00 indicate) $L_{Aeq,1hr}$ 55dB(A); and,
- Night-time (i.e. 20:00 to 08:00) $L_{Aeq,1hr}$ 45dB(A).

Under the requirements of the Environmental Noise Regulations 2006 (S.I. No. 140 of 2006) as revoked by the European Communities (Environmental Noise) Regulations 2018 (S.I. No. 549/2018) and its amendment S.I. No. 663/2021 - European Communities (Environmental Noise) (Amendment) Regulations 2021, competent authorities have the remit to classify 'Quiet Areas'.

The EPA have developed a Quiet Area Screening methodology which has been prepared for this Site. A modification to the setting of limits at baseline monitoring methods are triggered in 'Quiet Areas'.

Operational noise is currently controlled under condition 9 of planning permission 16/700. Condition 9 states:

Condition 9 – Noise

- *Activities on site shall not give rise to noise levels off site, at noise sensitive locations, which exceed the following sound pressure limits:*

  Daytime (08:00 – 22:00) *55dBA* $L_{Aeq,60min}$

  Night-time (22:00 – 08:00) *45dBA* $L_{Aeq,15min}$

  The above limits are inclusive of any necessary adjustments to account for tonal or impulsive character in the noise.

- *Noise monitoring shall be carried out quarterly as per the current environmental monitoring plan (described in the Environmental Impact Statement) with results being submitted to the Planning Authority within 2 weeks of such monitoring.*

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 [119] have been followed. Figure 11-1 below presents the relationship between noise impact and noise effect in generating an understanding of significance from the change to an acoustic environment.

In forming an assessment on the impact, this methodology looks at the following key elements:

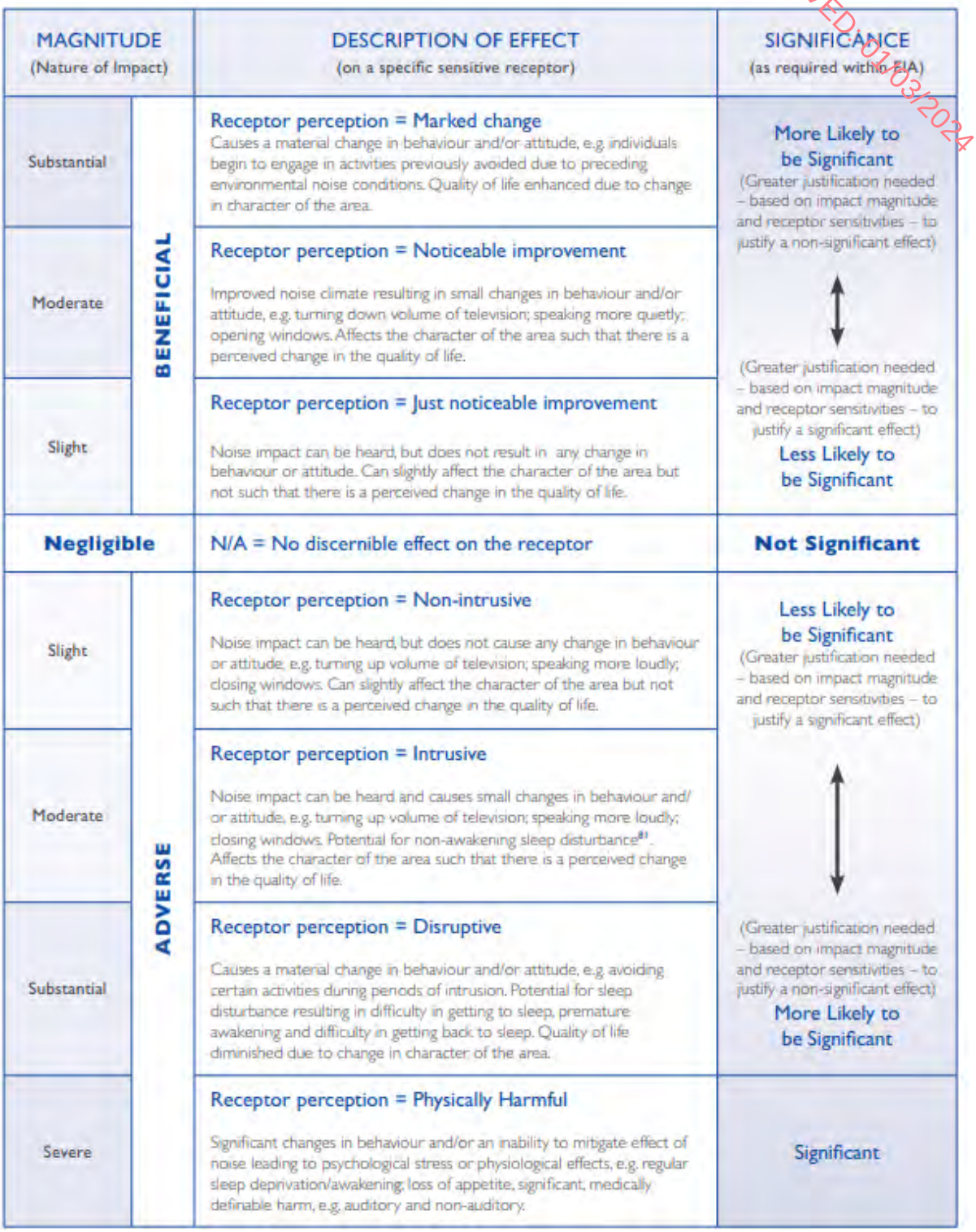
- The change from the baseline presented by the Proposed Development;
- Type of noise source;
- Nature of the change; and,
- Other factors.

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.

Figure 11-1: IEMA IOA Chart on Magnitude, Significance and Effect

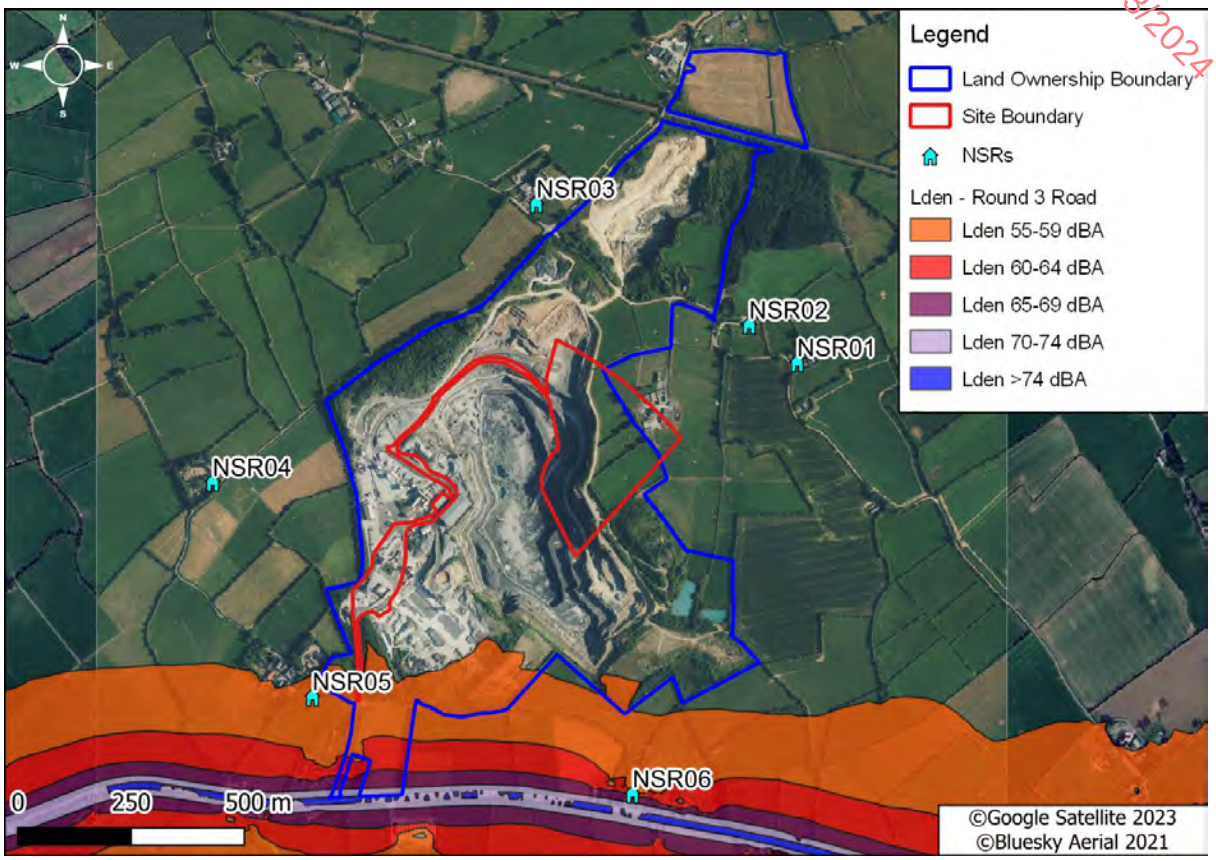


11.2.1.3 Site Associated Road Traffic

Vehicles access and egress the Site via the Local Road - L7434. The L7434 is not a major road as per the Environmental Noise Regulations 2018 (S.I. 549/2018).

However, the Site is located close to the N24 national road, which qualified for strategic noise mapping. The L_{den} from the Round 3 strategic noise mapping and as utilised within the Noise Action Plan [130] is presented in Figure 11-2 below.

Figure 11-2: Strategic Noise Maps – Round 3 Road - L_{den}



Traffic from the Site will be in line with existing authorised traffic movements from Roadstone. Furthermore, typical Roadstone associated traffic is constrained to operational hours. The combined HGV movements in/out of the Roadstone entrance will be in-line with currently authorised HGV movements for the Site.

There will be:

- No change on permitted traffic volumes; and,
- All traffic associated with the Proposed Development will occur during operational hours.

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 operational noise model, which is further described in Section 11.4.3 below.

11.2.1.4 Site Blasting

As a rock quarry, aggregate is first broken from the ground through means of blasting. During the blasting events, the monitoring criteria are set to ensure the safety of residents and their buildings. There are two (2No.) distinct aspects that are therefore monitored:

Air overpressure - the sound pressure wave, transmitted through the air from the blast. Although much of this sound pressure wave is generated under 20Hz (low frequency) it is accompanied by higher, audible frequencies, ensuring that the sound pressure wave is audible. This is typically, due to the inaudible less than 20Hz component, monitored under a dB linear weighting (also known as un-weighted).

Vibration - the acoustic pressure wave, transmitted through the ground from the blast. Although the pressure is transmitted through the ground, reverberation within surface structures, including building components (glass) can result in an audible emission.

Both air overpressure and vibration are emitted from the source blast in predominately low frequencies, therefore both are predominately sensory rather than audible.

The existing blasting operations are controlled under Condition 11 in planning reference: 16/700 which states:

Condition 11 – Vibration and Blasting

a) *Blasting shall be designed and undertaken in such a manner such that groundbourne vibration levels shall not exceed a peak particle velocity of 8mm/sec measured at nearest inhabited dwellings and air overpressure values shall not exceed 125dB($L_{in,max}$).*

b) *Results of monitoring undertaken for each blast shall be submitted to the Planning Authority on a quarterly basis along with the noise and dust monitoring results.*

National guidance from the EPA [132] and ICF [129] relating to blast limits at sensitive receptors are outlined in Table 11-2 below.

Table 11-2: Blasting Limits

Parameter	EPA	ICF
Ground borne Vibration Limit	**Peak particle velocity = 12mm/s**, measured in any of the three mutually orthogonal directions at the receiving location (for vibration with a frequency of less than 40Hz).	The vibration levels from blasting should not exceed a **peak particle velocity of 12mm/s**, measured in any three mutually orthogonal directions at a receiver location. These levels are well below the levels at which structural damage occurs.
Air Overpressure Limit	**125dB (linear maximum peak value) with a 95% confidence limit.**	Blasting should not give rise to air overpressure values **at sensitive locations which are in excess of 125dB (Lin) max pea**k. To allow for wind fluctuations and weather conditions**, 95%** of all air over-pressure levels measured at the nearest noise sensitive locations **should conform to the specified limit value**. No individual air over-pressure value should exceed the limit value by more than 5dB (Lin).

Parameter	EPA	ICF
Other Notes	Normal hours of blasting should be defined (e.g. 09:00 - 18:00 Monday to Friday), and provision should be included to permit blasting outside these hours for emergency or safety reasons beyond the control of the quarry operator. It is recommended that quarry operators provide advance notification of blasting to nearby residents through use of written notes, signage at site entrance, telephone, or warning sirens (or a combination of these methods).	Planning permissions will normally specify hours of blasting and the local community should be advised in advance. Blast information including vibration, air over pressure, explosive charge and distance of the blast from blast sensitive installation, should be monitored and recorded.

Utilising the conditions at Planning Application 16/700, the following criteria for compliance have been used within this assessment:

- Vibration - PPV 8mm/s measured in any of the three (3No.) mutually orthogonal directions at the nearest inhabited dwellings; and,
- AOP - 125dB (Lin) max peak measured at the receiving location.

11.2.2 Noise Modelling

Noise modelling was carried out using Soft Noise Predictor version 2023.01 software. The noise model has been developed for the Site to incorporate the noise emission sources during the operation of the Proposed Development, and the layout of the local environment. The model only assesses site specific emissions – i.e., it does not incorporate existing ambient sources such as road traffic.

The model was run utilising ISO 9613 1 & 2 for the basis of sound transmission from source to receiver.

11.2.2.1 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

The modelling inputs and outputs are presented in Appendix 11-2. In developing the model all operational sources are deemed on for the full daytime period, i.e., it is calculated as been on for the full 12-hour period and operating at full duty capacity. In reality, many emissions will operate below duty capacity, will move in and around the Site and will be off or powered low for period so the day. As such this model presents a worst-case scenario for most hours.

11.3 Receiving Environment

A review of the locality was conducted utilising OSI online mapping, Google and Bing Aerial Photography.

Based on this research, Noise Sensitive Receptors (NSRs) were identified in the locality and are shown in Figure 11-3 and described in Table 11-3. The distances from the NSRs are calculated to the Extraction Area where noise and vibration sources will be present within the Site.

Figure 11-3: Noise Sensitive Receptor Locations

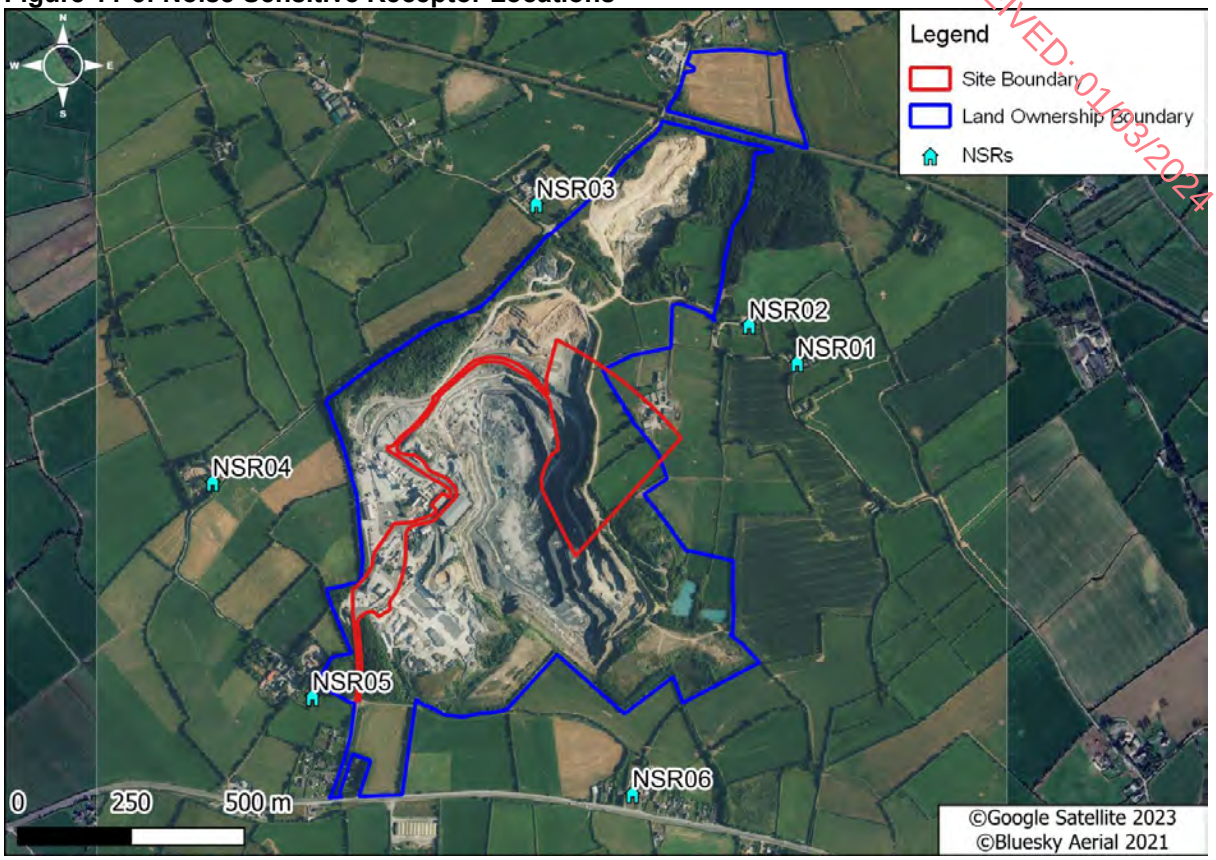


Table 11-3: Identification of Noise Sensitive Receptors (NSRs)

ID	ITM		Location Relevant to Site	Approximate Distance to Extraction Area (m)
	Easting	Northing		
NSR01	656371	615804	Dwelling Northeast to the Site.	ca.310m
NSR02	656265	615888	Dwelling Northeast to the Site.	ca.280m
NSR03	655795	616155	Dwelling Northwest to the Site.	ca.310m
NSR04	655080	615541	Dwelling West to the Site.	ca.728m
NSR05	655301	615067	Proxy locations for dwellings West to the Site.	ca.658m
NSR06	656007	614853	Dwelling South to the Site.	ca.539m

The Site is in an agricultural area, with several agricultural activities in the immediate locality.

The Town Centre of Kilmacow is located over 2km to the north, while the Waterford to Limerick Junction rail line lies between the Site and the town.

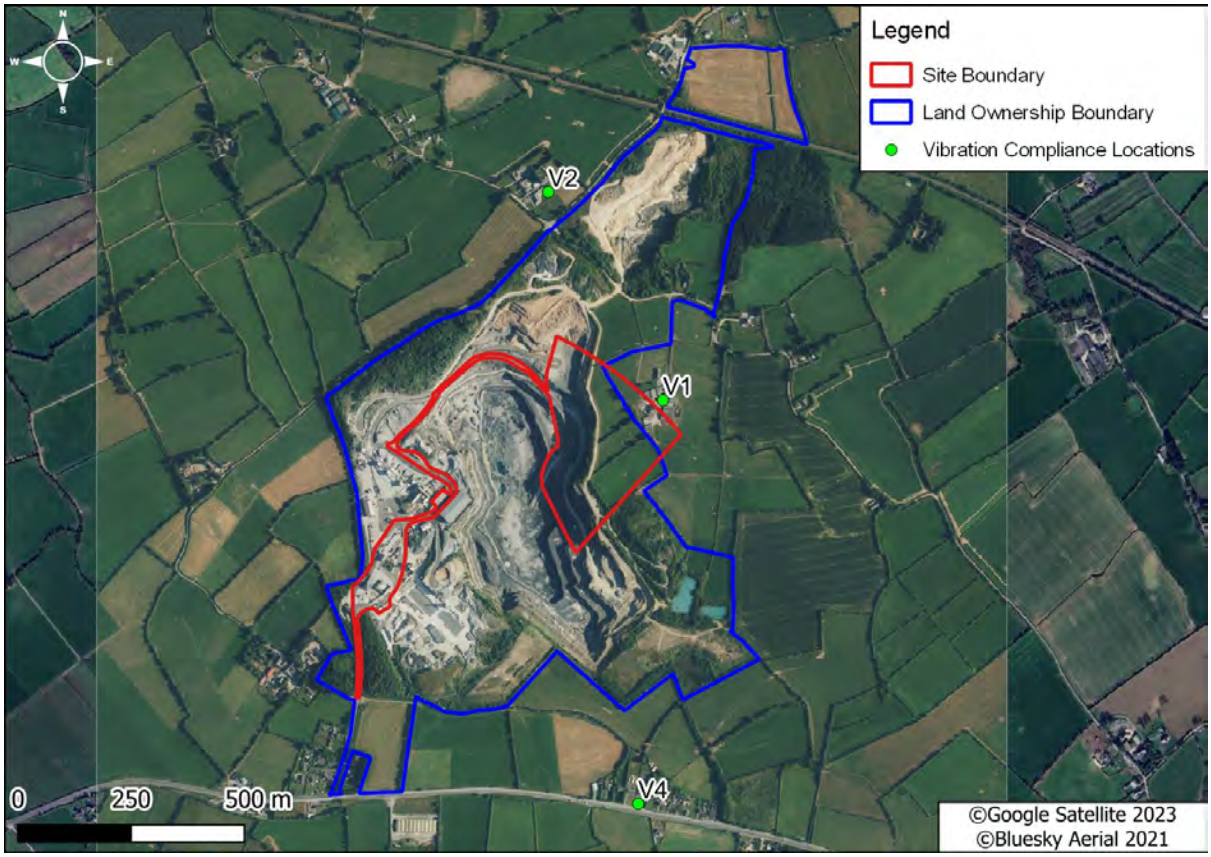
There are several residential properties within the vicinity of the Site, with the closest, NSR02, being located approximately 281m from the Site's proposed operational face, refer to Figure 11-1.

11.3.1 Baseline Vibration

Blasting is actively carried out in the Quarry, as such current baseline conditions do comprise blast activities within the locality.

Vibration monitoring is currently carried out at each blasting event for the Quarry. All monitoring results are filed and maintained onsite. The results for historic blasting operations for 2022 and 2023 are presented in Appendix 11-4 and the locations are shown in Figure 11-4.

Figure 11-4: Vibration Monitoring Compliance Locations



11.3.2 Noise Monitoring Compliance

Noise monitoring for compliance have been carried out by the applicant at the Quarry. The noise limits for the existing Roadstone operations in the operational Quarry are as follows:

- Daytime Limit (08:00 to 22:00) L_{Aeq} 55dBA
- Night-time Limit (22:00 to 08:00) L_{Aeq} 45dBA

The results for the noise compliance are presented in Table 11-4 and 11-5 for daytime and night-time respectively and compliance monitoring locations are shown in Figure 11-5. The monitoring period covers measurements from Q1 2021 to Q2 2023 and include eleven (No.11) measurements for daytime and six (6No.) measurements for night-time period.

Figure 11-5: Noise Monitoring Compliance Locations

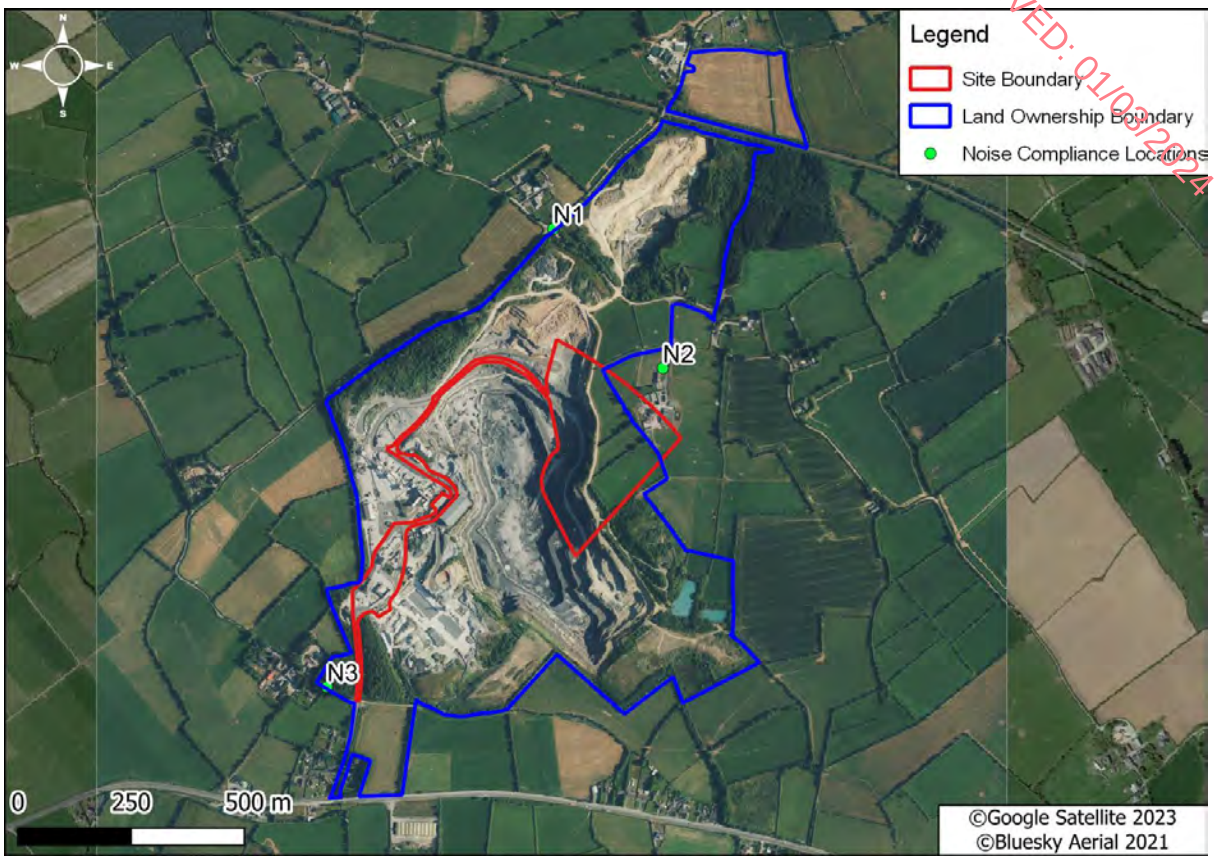


Table 11-4: Summary Results for the Noise Compliance Monitoring – Daytime

Location	Sampling Period	Duration	$L_{Aeq,T}$ dB			$L_{A90,T}$ dB		
			Min	Avg.	Max	Min	Median	Max
N1	March 2021 to April 2023	30min	44	45	48	35	39	45
N2		30min	40	49	54	35	42	47
N3		30min	42	52	57	37	43	44

Table 11-5: Summary Results for the Noise Compliance Monitoring - Night-time

Location	Sampling Period	Duration	$L_{Aeq,T}$ dB			$L_{A90,T}$ dB		
			Min	Avg.	Max	Min	Median	Max
N1	March 2021 to April 2023	15min	42	44	46	35	37	39

Location	Sampling Period	Duration	$L_{Aeq,T}$ dB			$L_{A90,T}$ dB		
			Min	Avg.	Max	Min	Median	Max
N2		15min	36	40	42	32	35	36
N3		15min	37	48	55	33	37	40

All reviewed compliance monitoring locations are compliant for daytime and night-time periods.

11.3.3 Baseline Ambient Sound Assessment

In assessing the existing baseline sound environment, screening of the locality for Quiet Area, and an assessment of ambient sound, through monitoring undertaken by MOR in 2023, has been undertaken.

11.3.3.1 Screening for Quite Area

Quite Area is a defined criteria 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.

NG4 identifies a specific screening mechanism for Quite Areas, and the screening process is shown in Table 11-6.

Table 11-6: Screening for Quite Area

Parameter	Quite Noise Criteria Distance	Criteria Met	Note
Distance to urban area with population >1,000 persons.	>3km	Yes	Waterford City within 10km to the southeast. Population of 49,213 (CSO 2016
Distance to urban area with population >5,000 persons.	>10km	No	
Distance to urban area with population >10,000 persons.	>15km	No	
Distance to local industry (small or individual activities).	>3km	Yes.	Grannagh Business Complex within 3km to the Southeast.
Distance to major industry centre.	>10km	Yes	Waterford City within 10km.
Distance to National Primary Route.	>5km	Yes	N24 road within 5km to the south.
Distance to Motorway or Dual Carriageway.	>7.5km	Yes	M9 motorway within 7.5km to the east.
Site locality is 'Quiet Area'		**No**	**Proximity to urban areas, industry and National Roads.**

The Quite Area screening does not identify if an area has high, moderate, or low ambient noise, rather only if the locality is at distance to select human noise emission sources. Therefore, it is always necessary to monitor the local environment.

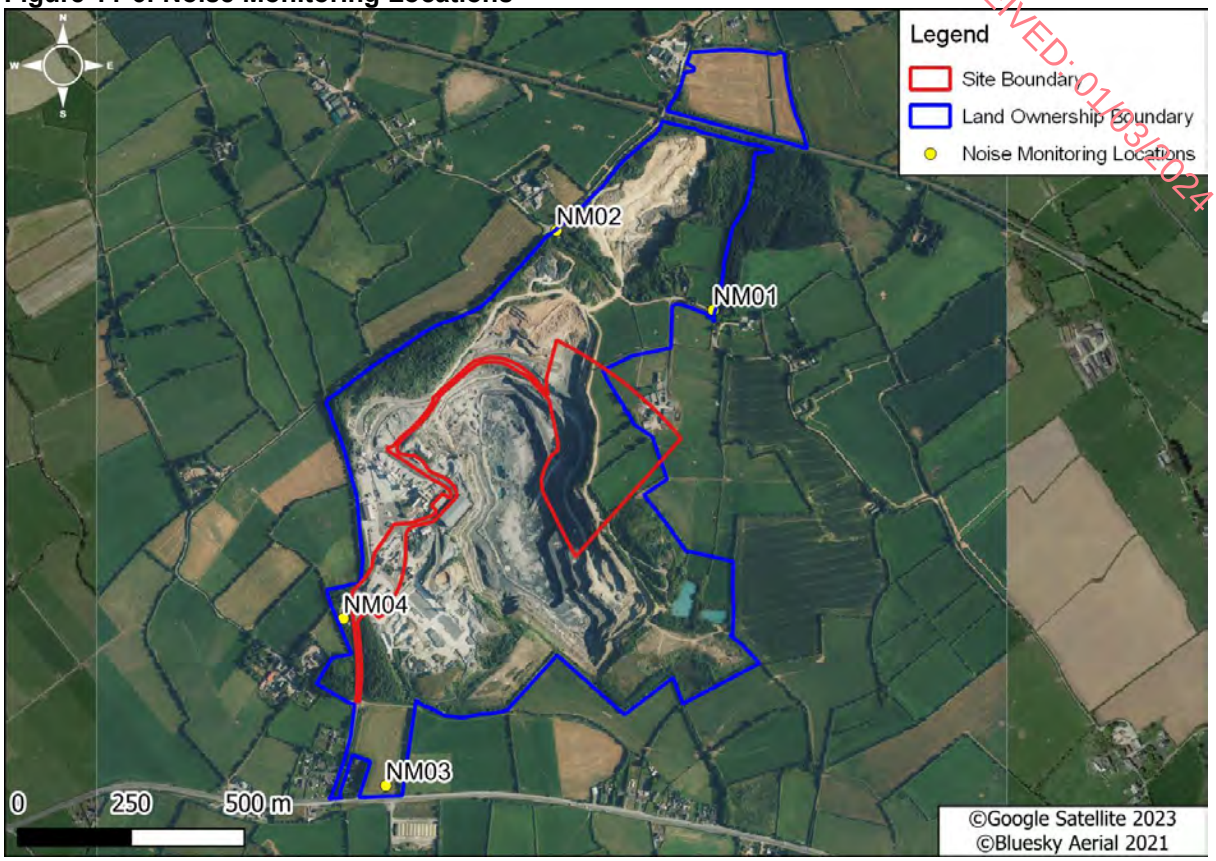
11.3.3.2 Baseline Ambient Acoustic Environment Survey

In addition to a review of on-going compliance monitoring, MOR acousticians undertook Site specific monitoring to develop an understanding of the receiving environment for the Proposed Development. Monitoring locations are identified as boundary, or as proxy locations to NSRs in Table 11-7 below and presented in Figure 11-6. NSR proxy locations are deemed to be representative of the likely noise audible at NSRs, arising from the Site. Boundary locations are at distance from NSRs and are utilised to evaluate Site specific or ambient noise levels.

Table 11-7: Noise Monitoring Locations

Monitoring Point	Description of Location	Boundary or NSR
NM01	Located to the northeast of the Site. In proximity to compliance monitoring location N2.	Boundary
NM02	Located to the northwest of the Site. In proximity to compliance monitoring location N1.	Boundary
NM03	Located to the south of the Site.	Boundary
NM04	Located to the west of the Site. In proximity to compliance monitoring location N3.	Boundary

Figure 11-6: Noise Monitoring Locations



A survey of the local ambient acoustic environment was conducted by MOR on 25th October 2023. The monitoring results of the ambient acoustic environment survey undertaken is detailed below in Table 11-8 below. One-third octave frequency charts and plates of the monitoring locations are attached in Appendix 11-3.

Table 11-8: Daytime Noise Monitoring Results 25th October 2023

NM	Start Time	Elapsed Time	$L_{Aeq,T}$	L_{AFmax}	$L_{AF90,T}$	Commentary
NM1	2023-10-25 13:38	0:30:00	42	60	40	Front loader vehicle onsite (W) audible (engine loading) very faint. Loading (faint) on multiple occasions. Traffic in distance on N24 (S) audible. Bird song. Plane overhead at 13:44. Pedestrian talking at 13:38. Wind speed: 0-2m/2.
	2023-10-25 14:10	0:30:00	47	73	41	Front loader vehicle onsite (W) audible faint. Bird song. Distant N24 traffic. Car pass nearby on multiple occasions (highly audible). Faint loading noise on multiple occasions. Wind speed: 0-2m/s.
NM2	2023-10-25 12:26	0:30:00	51	76	36	Bird song audible during lull of traffic. Distant traffic (SE) on multiple occasions. N24 audible. Excavator audible at NSL (faint engine) (NW) between 12:21 and 12:57. Front loader audible on site boundary at 12:33. Wind speed: 0-2m/s.
	2023-10-25 12:57	0:30:00	48	74	37	Excavator and HGV faintly audible at NSL between 13:05 and 13:27 (excavator activity occurring off-site). Distant traffic (SE) throughout from N24. Plane overhead at 13:16. Bird song frequently audible. Wind speed: 0-2m/s.
NM3	2023-10-25 11:08	0:30:00	59	79	53	Frequent vehicles passing on N24 (Dominant) Traffic count 11:11 - 11:16 (5min): 40 vehicles. Bird song audible. Truck pass at N24 and nearby road on multiple occasions. Wind speed: 0-2m/s.

NM	Start Time	Elapsed Time	$L_{Aeq,T}$	L_{AFmax}	$L_{AF90,T}$	Commentary
	2023-10-25 11:38	0:30:00	59	68	52	Frequent N24 vehicles passing dominant. Bird song audible. Traffic count (5min) 45 vehicles. Site truck pass on N24 Multiple occasions. Plant unloading audible (bang) from site (N) on multiple occasions. Wind speed: 0-2m/s.
NM4	2023-10-25 09:46	0:30:00	53	73	48	Site truck pass at nearby site entrance audible on multiple occasions. Concrete batch plant site machinery audible on multiple occasions (NE). Faint steady state site noise emission audible (E). Truck engines audible in the distance onsite (E) on multiple occasions. Bird song audible. Truck horn on one occasion (E). Wind speed: 0-2m/s.
	2023-10-25 10:18	0:29:59	65	79	48	Worker moving wheelbarrow nearby and moving equipment between 10:18 and 10:25. Truck pass nearby entrance on multiple occasion. Concrete batch plant site machinery audible on multiple occasions (NE). Faint steady state site noise emission audible (E). Between 10:37 and 10:41, a concrete truck arrived near the SLM to unload materials. It was highly audible, and the concrete drum was rotating. Site worker shovelling and using hose between 10:44 and 10:49. Bird song audible. Wind speed: 0-2m/s.

11.3.3.3 Characterisation of the Ambient Acoustic Environment

The noise survey found that the local ambient acoustic environment was influenced by:

- Agriculture - domestic animals, farm machinery and birdsong;
- Industry - Quarry plant and activities; and,
- Transport - traffic noise from local road movements.

Generally higher levels of ambient acoustic sound were found at NM04 due to the proximity of the SLM to the quarry plant and activities. This monitoring location recorded $L_{Aeq,1hr}$ values of 53dB to 65dB, and background values, measured as $L_{A90,1hr}$ of 48dB.

The remaining three (3No.) monitoring locations NM01, NM02 and NM03 were influenced by birdsong and bird call, and local traffic passing. Monitoring values at these three (3No.) locations recorded L_{Aeq} values of 42dB to 59dB and background ambient values, as $L_{A90,}$ ranged from 36dB to 53dB.

11.3.3.4 Conclusion of Existing Ambient Acoustic Environment

Following the desk-based review of the area and the baseline survey carried out by MOR on 25th October 2023 it is reasonable to conclude that the ambient existing sound levels surrounding the Site are low to moderate with significant influence at NSRs arising from traffic on the road infrastructure locally.

11.4 Characteristics and Potential Effects of the Proposed Development

The potential for noise arising from the Proposed Development has three (3No.) distinct phases:

- Construction 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 the Site Preparation Phase will consist mainly of topsoil and overburden removal and construction of soil embankments.

The Site Preparation Phase work will require the use of a bulldozer or similar unit along with an excavator unit for creation of the embankment.

Table 11-9 below gives typical sound pressure levels ($L_{Aeq,T}$) for typical equipment employed for such works. The Site Preparation Phase will last up to 6 months.

Table 11-9: Site Preparation Phase Sound Power Levels

Plant	**Description**	**Reference** [131]	**Sound Pressure (dB) L_{Aeq}**
Bulldozer	Clearing of soils	C.2.01	75
Excavator	Creation of embankments	C.2.02	77
Combined Sound Pressure Level (at 10m)			79dBA

Activities with negligible sound such as surveying, planting of embankments etc. have been omitted, similarly activities that are characteristic of the agricultural area including fencing and hedgerow maintenance have not been assessed.

As part of the Proposed Development works there are two (2No.) agricultural sheds and one (1No.) pumphouse scheduled for demolition, within the northern boundary of the Site. These buildings are farm type structures, refer to Plates 3-3 and 3-4 and will likely require simplistic demolition methods, as such from a noise and vibration perspective, the dominant noise will remain from the bulldozer and excavators on the Site during the Construction Stage.

Table 11-10 below details the construction noise impact at NSRs utilising the BS5228 ABC Method for peak noise associated with the Site Preparation Phase and combined sound pressure of 79dB at 10m.

Table 11-10: Construction Noise Assessment (BS 5228 Example ABC Method)

NSR	Predicted Site Specific Sound Pressure Level $L_{Aeq,T}$ dB	Measured Ambient Sound Pressure Level $L_{Aeq,T}$ dB	Combined Noise Level (Predicted + Highest Measured Ambient $L_{Aeq,T}$)	65dB Threshold Compliant
NSR01	49	42	50	Compliant
NSR02	50	42	51	Compliant
NSR03	49	48	52	Compliant
NSR04	42	53	53	Compliant
NSR05	43	53	53	Compliant
NSR06	44	59	59	Compliant

All NSRs identified (NSR 01 to NSR 06) will experience less than a $L_{Aeq,1hr}$ of 59dB, due to the distances between NSRs and the proposed construction works. These values represent the worst case when plant will be operational on the closest boundary to each of the properties.

This assessment assumes all onsite plant is operating at the closest point of the boundary to these receptors for a constant duration of 1hour. These values are below the typical construction noise nuisance limit of $L_{Aeq,1hr}$ 65dB for daytime period as specified in Table 11-1.

In the event works are required outside of 'daytime hours, the following noise limits would be applicable for such construction stage works.

- Evening & Weekends - $L_{Aeq,1hour}$ 55dB; and,
- Night-time (11pm to 7am) – $L_{Aeq,1hour}$ 45dB

11.4.2 Construction Phase Vibration

Examining the plant, equipment, and stages outlined in Table 11-9, along with considering the agricultural characteristics of the land slated for work and its surroundings, it is determined that the probability of vibration extending over distance to the nearest receptors is unlikely. Consequently, vibrations from the Site Preparation phase are deemed negligible.

11.4.3 Operational Phase Noise

Noise during the operational phase will consist of blast preparation, blasting, rock breaking (2-3 days post blast), crushing, screening and aggregate transport.

The future acoustic emissions will be similar to ongoing activities within the rock quarry. These can be broadly divided into two (2No.) distinct steps:

- Blasting preparation; and,
- Aggregate processing.

Blasting preparation involves the use of a drilling rig on the top of the bench to be removed. Upon completion of the initial work, the blast event will occur. During the blast event, Roadstone will shut down operations in that area of the Site and remove all personnel from the blast zone as explosives are used to break / shatter a portion of the rock face to the ground. No further activities are conducted until the site is declared safe by the Roadstone Blasting Engineer.

Aggregate processing is the breaking of the larger boulders, the crushing and screening of aggregate and stockpiling of the aggregate and haulage of the aggregate off site. This is the primary activity within the Quarry.

Table 11-11 below gives typical sound pressure ($L_{Aeq,T}$) values for plant utilised within rock quarries for each of the step.

Table 11-11: Site Operation Sound Pressure Levels at 10m

Phase	Plant	Description	Reference [131]	Sound Pressure L_{Aeq} at 10m
Drilling	Drilling Rig	Tracked rig installing blast holes to 125mm diameter	C.9.01	90
Operational Phase	Tracked Excavator	Mounted with rock breaker, operational within quarry floor	C.9.11	93
	Wheeled loader	Transporting aggregate within quarry floor	C.9.07	90
	Tracked mobile plant	Crushing and screening of aggregate	C.9.14	90
	Articulated dump truck	Transporting material	C.9.22	89
	Articulated dump truck	Transporting material	C.9.22	89
	Lorry / HGV	4 Axle truck movement onsite	C.2.34	80
	Lorry / HGV	Truck offloading	C.2.34	80

As part of this assessment, a noise model has been prepared to assess predicted noise emissions at the Site during the operational works associated with the Proposed Development. The site-specific emissions from the Proposed Development, outlined in Table 11-11 above, are assessed in Table 11-12 below, utilising the IOA/IEMA method. The results of the modelling are given in Appendix 11-2.

The results are predicted at 1.5m height, as the Proposed Development will typically operate during daytime periods.

Additionally, the predicted change is the worst-case scenario as only the initial bench, i.e., a working pit floor at ca.15mOD, has been modelled as the working floor. As the works progress

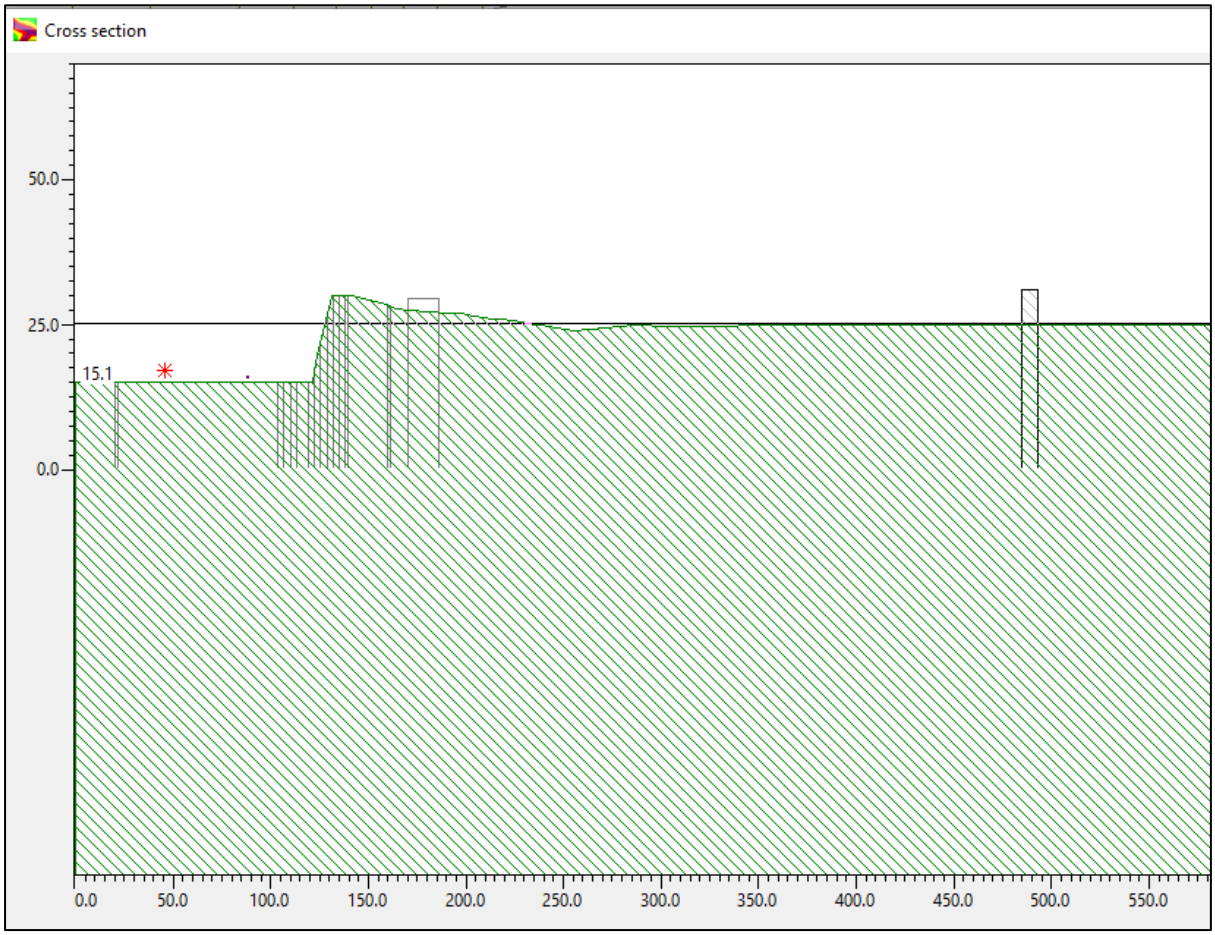
for each bench, the noise will be reduced at NSRs due to the increasing relative height of noise sources to the berms, cliff face and NSRs.

Table 11-12: Operational Noise Assessment Bench 01 ca.15mOD

NSR	Predictor Output $L_{Aeq,1hr}$ (dB)	Ambient Measured $L_{Aeq,1hr}$ (dB)	Ambient Measured $L_{A90,1hr}$ (dB)	Predicted Cumulative (Predictor + L_{A90}) (dB)	Change in dB
NSR01	43	42	40	45	+5dB
NSR02	44	42	40	45	+5dB
NSR03	40	48	36	42	+6dB
NSR04	45	53	48	50	+2dB
NSR05	45	53	48	50	+2dB
NSR06	38	59	52	52	No change

Predicted cumulative sound level at all NSRs are predicted to be below noise nuisance criteria, as stated in Section 11.2.1.2, best guidance for quarry noise control issued by the EPA and ICF for daytime noise of a L_{Aeq} 55dBA at sensitive receptors. Predicted cumulative sound level is predicted to be below the operational hours noise limit presented in Condition 9 of Planning Application 16700.

Figure 11-7: Extract Noise Model, showing Cross Section Through 1st Bench.



Five (5No.) NSRs (NSR01, NSR02, NSR03, NSR04 and NSR05) were deemed to have an effect as per the IOA/IEMA guidelines, with a predicted change on ambient backgrounds of +3 to +6dB at these NSRs. The Proposed Development will therefore potentially be audible at these NSRs. The character of the future noise will be similar in character as the existing noise presented locally, as the same machinery and plant used for the Proposed Development will be plant moved from within the existing development.

These sensitive receptors are in proximity to the Site, located to the north and east. Based on the similarity of future activities to existing activities, activity onsite been maintained, and not increased, sound values predicted to be below typical noise nuisance levels, the impact as per IOA/IEMA methodology is deemed Slight local effect.

11.4.4 Operational Phase Blast Events

The number of blasts per month varies depending on the demand. Blasting of rock is carried out between 10:00 hours and 16:30 hours, Monday to Friday and at not at all on Saturdays, Sundays, Bank Holidays or Public Holidays. Currently blasting occurs between three and four times a month. No upper limit on the number of blasts per month is imposed in the DoEHLG and the Environmental Protection Agency (EPA) Guidelines. The Guidelines indicate that ppv values must be reduced to less than 8 mm/s peak particle velocity at sensitive locations if blasting occurs more than once per week. The blast event itself is a short duration, high intensity, predominately low acoustic frequency event. An integral part of the rock blast is the emission during the event into the air, known as air overpressure. As stated, the predominant sound pressure within this air overpressure is low frequency and inaudible.

The procedures to give notice to the public prior to blasting are as follows:

1. Blast dates and time are scheduled and agreed with the quarry manager, the Roadstone Blasting Engineer, explosives supervisor and Gardai;
2. All dwellings within 500m to be informed in advance by a telephone call or by other means;
3. Blasting operations shall take place between 10:00 hours and 16:30 hours, Monday to Friday; and,
4. An audible alarm will be sounded for three minutes prior to the blast and sounded for 1 minute after the blast to signal the ‘all clear’.

These procedures are considered to be in line with specific guidance and industry best practice.

Under current onsite practices, as a standard procedure, all blast events at the Quarry are monitored by the Roadstone Blasting Engineer for both air-over pressure and vibration. The results from the blast records from 2022 to 2023 for air overpressure and vibration are presented in Appendix 11-4.

A review of the blast record indicate that blasts were below the industry standard compliance limits presented in Section 11.2.1.4 by the EPA and the ICF and compliant with condition 11 of planning permission 16/700.

The air over-pressure effect is a temporary local moderate effect.

11.4.5 Operational Phase Vibration

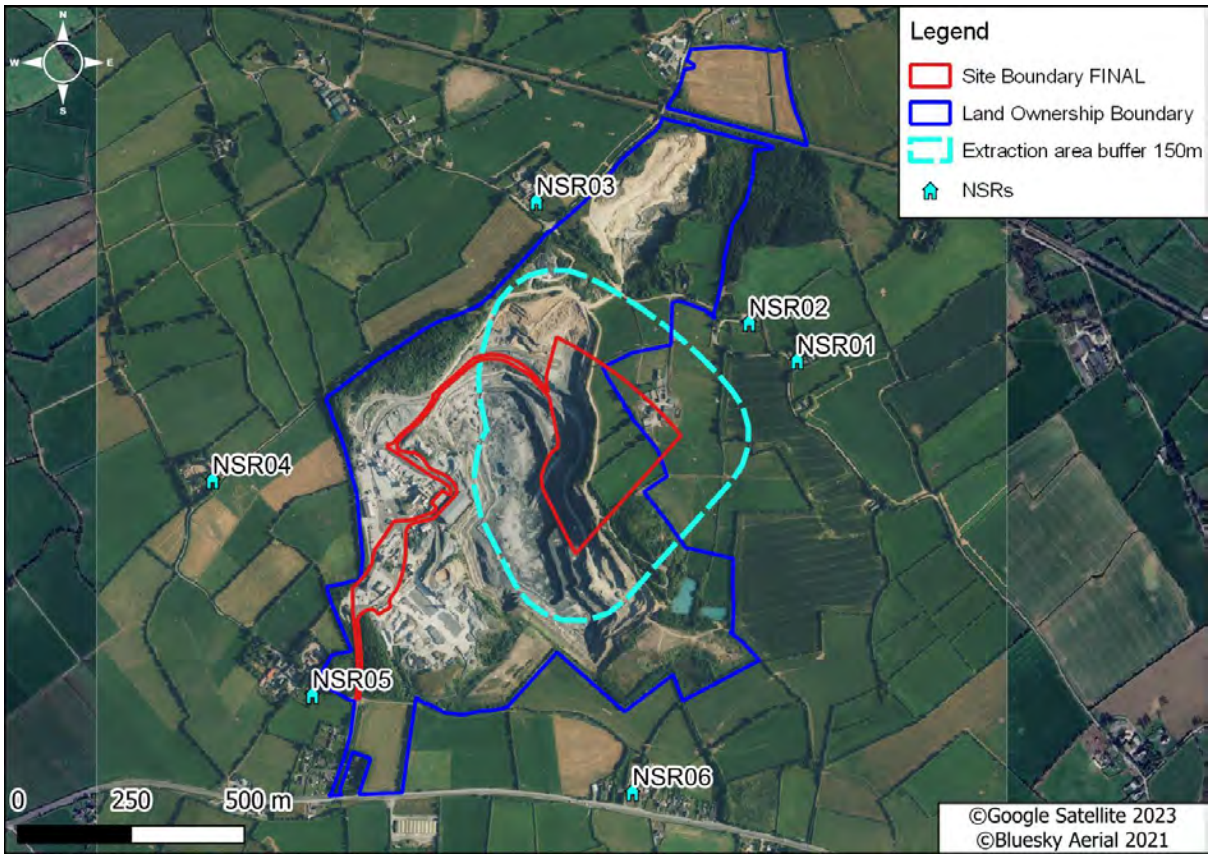
Operational Phase vibration will occur during quarry face blasting. Efficient blasting ensues that as much of the explosive energy as possible is utilised for rock fragmentation, and ground vibration and air overpressure is an inefficient use of this energy. [19]

Blasting during previous operations at the Quarry is considered as a good representation of future predicted blast events at the Proposed Development as the site setting remains the same and blasts will be designed in line with historical blast experience.

During the operation of the Proposed Development, rock will continue to be extracted by blasting and in compliance with current vibration limits for the Quarry, refer to Section 11.2.1.4 above.

Based on the existing experience at this Site, a 150m buffer will be used to offset effects from blasting vibration, the buffer has been calculated and is shown in Figure 11-8. The potential risk zone extends approximately 150 meters, and under such circumstances, the unoccupied farmyard may experience potential vibration damage. However, it is noteworthy that there have not been any exceedances historically, through competent blast design. The blast event is therefore a temporary local moderate effect, considering the standard control measures on site and known experience through years of blast management within this Quarry.

Figure 11-8: 150m buffer from Extraction Area



11.4.6 Restoration Phase Noise

Noise during the restoration of the Site will be associated with the following:

- The lower sections of the haul ramps (where they enter the water) will be graded and planted with marginal and emergent vegetation appropriate to the environment.

This activity will require minimal plant, consisting of tractor to spread seeds. 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	Reference [131]	Sound Pressure L_{Aeq} at 10m
Restoration	Tractor	Spreading seeds - towing equipment	C.4. 74	71

These activities will predominantly occur within the existing pit floor. The peak site-specific emissions from the Proposed Development at the closest NSR to the extraction area, NSR02 ca.282m from the Site Boundary, is calculated to be 42dBA. This is below noise nuisance limits of $L_{Aeq,1hr}$ of 65dBA.

The Proposed Development will not introduce new sound characteristics, nor will the restoration stage present sound qualities typically deemed to be objectionable, such as tonal or clearly impulsive/impact sounds.

Based on the assessment the predicted impact is deemed so be not significant short-term impact on a local basis.

11.5 Proposed Mitigation Measures and / or Factors

Mitigation Measures are presented for each phase of the Proposed Development below.

11.5.1 Construction Phase

11.5.1.1 Noise

Prior to commencing development of the Site, the CEMP (submitted as part of the overall planning application) will be revised and agreed with the Local Authority. This will identify common noise control measures to be in-place during the construction phase of the project. Based on the assessment conducted here, the revised CEMP will include the following mitigation measures during construction:

- Construction Phase works will be designed to avoid noisy work outside the hours of:
  - Monday to Friday 07:00 to 19:00; and,
  - Saturday 07:00 to 13:00.
- Work occurring outside these hours will be subject to tighter construction stage noise limits, as per BS5228 (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 within CEMP 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.

The effects on Construction Phase noise is Not Significant.

11.5.1.2 Vibration

No mitigation required for the Site Preparation Phase relating to vibration control.

The effects on Construction Phase vibration is Not Significant.

11.5.2 Operational Phase

11.5.2.1 Noise

Plant operating hours will be from 07:00 to 20:00, Monday to Friday and 07:00 to 18:00 on Saturdays. No quarrying activities will take place on Sundays or Public Holidays.

The associated equipment during the Operational Phase will be in proximity to the working face of the quarry at different intervals during the operational lifetime within the Site. This will aid in reducing noise emissions from the operations onsite. Berms created during the site preparation works will also aid in reducing noise emissions from the Site.

The following mitigation measures will be implemented:

- 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;
- Drop heights of material are minimised;
- Where possible, plant and machinery are enclosed or cladded; and,
- Internal routes are reduced in gradients and routed to minimise noise emissions from vehicles onsite.

As a standard procedure all blast events on the Site will be monitored by the blast specialist for both air-over pressure and vibrations. Receptors within 500m will be informed prior to any blast activity, with monitoring occurring at the closest receptor to the blast.

The blast event is a temporary local moderate effect prior to mitigation. The blast specialist will ensure all blasts will be conducted in line with relevant health and safety requirements, and ensure, through design of the proposed blast, that air over pressure levels will be below the limits established in Section 11.2.1.4.

Prior to any blast a blast specification will be developed by the explosives supervisor, be specific to each individual blast to occur on the site and take full cognisance of the site conditions on the day of the blast event. This specification will ensure:

- Minimisation of fly rock being projected outside of the declared danger zone;
- Minimise the risk of misfires; and,
- Enable location of misfires to be identified.

Ensure faces are left in a safe condition following the blast event.

Air overpressure from a blast is difficult to control because of its variability, however, much can be done to reduce the effect. In line with best practice mitigation measures from vibration sources, good communication and public relations are a key factor in reducing any startle effects to residents.

Part 44, from HSA [43], stated about blasting specification (Regulations 47):

> *"47. The operator shall ensure that –*
>
> *(a) an adequate written blast specification, including identification of the danger zone based on an assessment of the risks, is prepared by the explosives supervisor for each shotfiring operation at the quarry to ensure that, so far as is reasonably practicable, when such shotfiring occurs, it will not give rise to danger, and*
>
> *(b) a copy of any relevant information contained in the blast specification referred to in paragraph (a) is given to any person upon whom it imposes duties".*

The effects on operational noise, following mitigation is Not Significant.

11.5.2.2 Vibration

Operational stage vibration will arise during quarry face blast events. The control of the ground borne vibration will be a key aspect of the Roadstone Blasting Engineer's approach. Design methods to reduce ground borne vibration will include the following items as identified in BS 5228-2 [103]:

- Ensuring appropriate burden to avoid over or under confinement of the charge;
- Accurate setting out and drilling;
- Appropriate charging;
- Appropriate stemming with appropriate material such as sized gravel or stone chippings;
- Using delay detonations to ensure smaller maximum instantons charges;
- Using decked charges and in-hole delays;
- Blast monitoring to enable adjustment of subsequent charges;
- Designing each blast to maximise its efficiency and reduce the transmission of vibration; and,
- Avoiding the use of exposed detonating cord on the surface in order to minimise air overpressure.

It will be the task of the competent Roadstone Blasting Engineer to take into consideration the current quarry face, the known geology and modern blasting best practices, to maximise the efficiency and thereby minimise energy loss through ground borne vibration to the surrounding environment.

The effects on operational vibration, following mitigation is Not Significant.

11.5.3 Restoration Phase

11.5.3.1 Noise

The Restoration Phase will be temporary insofar as it will be at periodic intervals over the lifetime of the quarry.

The Restoration Phase will be limited to the operational times of 07:00 to 20:00, Monday to Friday and 07:00 to 18:00 on Saturdays. No works will occur on Sundays or Public Holidays.

Mitigation measures as mentioned in Section 11.5.1 will be adhered to including:

- All mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds; and,
- All mobile plant throttled down or switched off when not in use.

The effects on Restoration noise, following mitigation is Not Significant.

11.5.3.2 Vibration

No likely significant vibration impacts to sensitive receptors during the Restoration Phase.

The effects on Restoration vibration, is Not Significant.

11.6 Cumulative or In-combination Effects

The Proposed Development has been assessed in relation to the potential variation in ambient noise levels and found no significant impacts.

Existing noise emissions, including those associated with the existing Roadstone operations, are incorporated to the ambient noise values utilised in this assessment.

11.7 Interactions with Other Environmental Attributes

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.

Noise/vibration can influence fauna, through disturbance of animals, potential effects have been assessed in Chapter 6 – Biodiversity where relevant.

Noise and traffic is closely linked. The potential effects from noise arising from traffic associated with Proposed Development have formed an integral part of the assessment.

11.8 Indirect Effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout this chapter.

11.9 Residual Effects

The residual noise effect, based on the proposed emissions, phasing and intensity of activities, the mitigation and practices to be employed and within the context of the existing ambient environment, is deemed to be imperceptible.

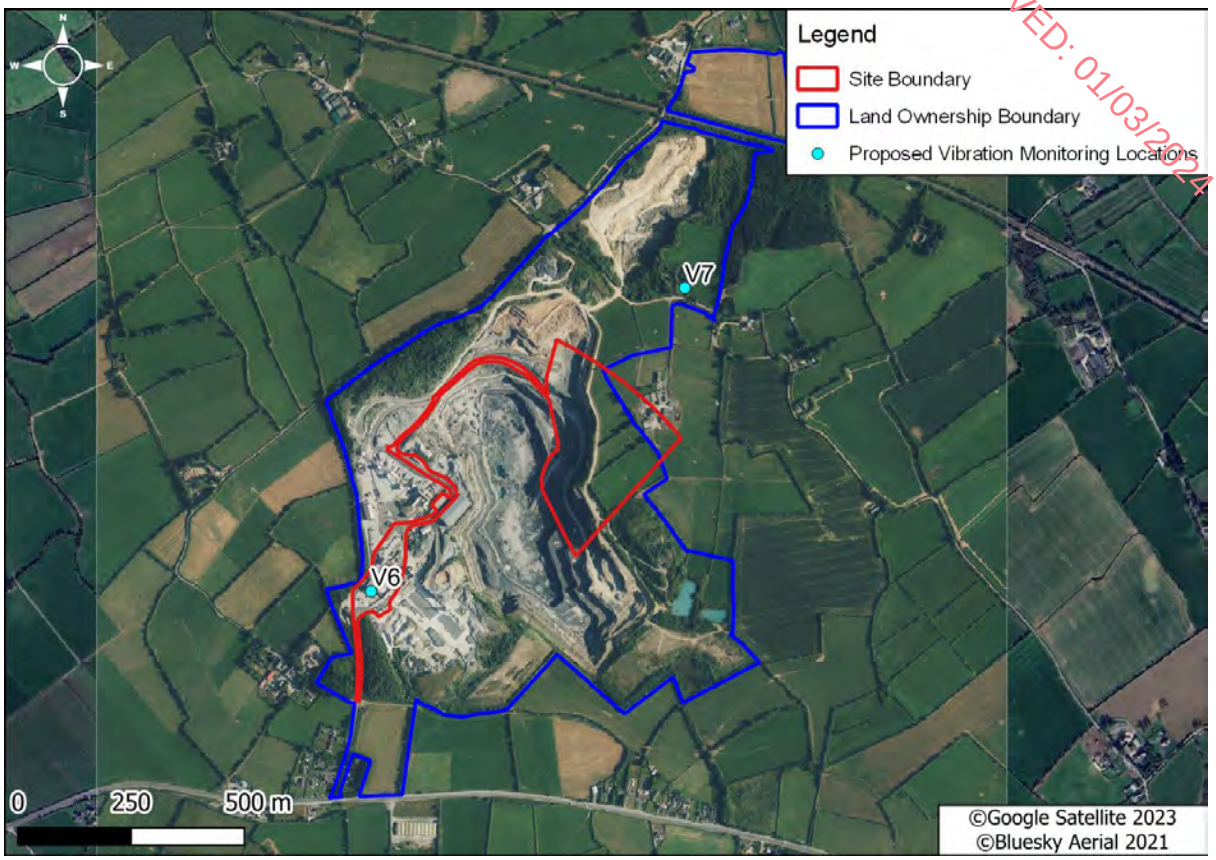
The residual vibration effect, based on the proposed emissions and historical activities is deemed to be imperceptible.

11.10 Monitoring

The operator will conduct the following ongoing monitoring:

All blast events will be monitored at the two (2No.) locations (V6 and V7) shown in Figure 11-9 for vibration and air overpressure and the results submitted to the Local Authority on a regular basis. If a NSR requests monitoring at their property, it will be carried out and if they agree, the results of this monitoring will be submitted to the Local Authority. All monitoring will be carried out as per existing Quarry condition 11 of planning permission 16/700. A ground borne vibration limit for peak particle velocity of 8mm/s measured in any of the three (3No.) mutually orthogonal directions at the receiving location (at frequencies less than 40Hz), and an air overpressure limit of 125dB linear with a 95% confidence limit.

Figure 11-9: Proposed Vibration Monitoring Locations



General activities onsite will be acoustically monitored as currently, with a site-specific noise limit, measured at Noise Sensitive Receptors of:

- Daytime $L_{Ar,1hr}$ 55dB; and
- Night-time $L_{Aeq,15min}$ 45dB.

Noise monitoring will be carried out as per condition 9 of planning permission 16/700 at the four (4No.) locations shown in Figure 11-6. The results of the monitoring shall be submitted to the Local Authority on a regular basis.

11.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

11.12 Difficulties Encountered

There were no difficulties encountered.

12 LANDSCAPE AND VISUAL

12.1 Introduction

This Landscape and Visual Impact Assessment (LVIA) has been prepared in respect of a planning application for the proposed extension at the Quarry. The LVIA report describes the landscape context of the Site and assesses the likely landscape and visual impacts of the Proposed Development on the receiving environment.

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).

This LVIA uses methodology as prescribed in the following guidance documents:

- '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports*', EPA, May 2022 [22];
- *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), Third Edition, Landscape Institute and Institute of Environmental Management and Assessment (IEMA); 2013 [133]; and
- '*Photography and Photomontage in Landscape and Visual Impact Assessment*', Landscape Institute Technical Guidance Note 06/2019 [134].

12.1.1 Statement of Authority

This Landscape and Visual Impact Assessment report was prepared by Macro Works Ltd. (part of the APEM Group); a landscape consultancy firm specialising in LVIA along with associated visibility mapping and photomontage graphics. Relevant experience includes landscape and visual assessments for a range of industrial, commercial and infrastructural developments. Experience extends to the assessment of over 150 wind energy developments, 120 solar energy developments and numerous quarry and quarry remediation projects.

12.2 Methodology

Production of this Landscape and Visual Impact Assessment involved:

- A desktop study to establish an appropriate study area, relevant landscape and visual designations in the current Kilkenny County Development Plans as well as other sensitive visual receptors. This stage culminates in the selection of a set of potential viewpoints from which to study the effects of the proposal;
- Fieldwork to establish the landscape character of the receiving environment and to confirm and refine the set of viewpoints to be used for the visual assessment stage;
- Assessment of the significance of the landscape impact of the Proposed Development as a function of landscape sensitivity weighed against the magnitude of the landscape impact; and

- Assessment of the significance of the visual impact of the Proposed Development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact. This aspect of the assessment is supported by photomontages prepared in respect of the selected viewpoints and attached as Appendix 12-1.
- Incorporation of mitigation measures to reduce potential impacts and estimation of residual impacts once mitigation has become established.

12.2.1 Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from a Proposed Development, the following criteria are considered:

- Landscape character, value and sensitivity;
- Magnitude of likely impacts; and
- Significance of landscape effects.

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified using the following criteria set out in Table 12-1.

Table 12-1: 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.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the Proposed Development. 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 site boundary that may have an effect on the landscape character of the area. Table 12-2 refers.

Table 12-2: Magnitude of Landscape Impacts

Magnitude of Impact	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 overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 12-3.

Table 12-3: Impact Significance Matrix

	Sensitivity of Receptor				
Scale/Magnitude	**Very High**	**High**	**Medium**	**Low**	**Negligible**
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
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

12.2.2 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the Proposed Development will be assessed as a function of sensitivity versus magnitude. In this instance, the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

12.2.2.1 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below and used in Table 12-6 below to establish visual receptor sensitivity at each VRP:

1. **Susceptibility of Receptors** - In accordance with the Institute of Environmental Management and Assessment ("IEMA") Guidelines for Landscape and Visual Assessment (3rd edition 2013) [133] 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; and
    - 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".
2. **Recognised scenic value of the view** (County 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;
3. **Views from within highly sensitive landscape areas**. Again, highly sensitive landscape designations are usually part of a county's Landscape Character Assessment, which is then incorporated within the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
4. **Primary views from dwellings.** A Proposed Development might be seen from anywhere within a particular residential property with varying degrees of sensitivity. Therefore, this category is reserved for those instances in which the design of dwellings or housing estates, has been influenced by the desire to take in a particular view. This might involve the use of a slope or the specific orientation of a house and/or its internal social rooms and exterior spaces;

5. **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 county or regional scale;
6. **Connection with the landscape.** This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e. commuters hurriedly driving on busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;
7. **Provision of 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;
8. **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;
9. **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;
10. **Presence of striking or noteworthy features.** A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory headland, lough or castle;
11. **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;
12. **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;
13. **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;
14. **Sense of place.** This considers whether there is special sense of wholeness and harmony at the viewing location; and
15. **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. No relative importance is inferred by the order of listing in Table 12-4 below. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one (1No.) or two (2No.) in particular.

12.2.2.2 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two (2No.) factors; the visual presence (relative visual dominance) of the proposal and its effect on visual amenity.

Visual presence is a somewhat quantitative measure relating to how noticeable or visually dominant the proposal is within a particular view. This is based on a number of aspects, aside from scale in relation to distance. Some of these aspects include the extent and complexity of the view, as well as the degree of existing contextual movement experienced. The backdrop against which the development is presented and its relationship with other focal points or prominent features within the view is also considered. Visual presence is essentially a

measure of the relative visual dominance of the proposal within the available vista and is often, though not always, expressed as one (1No.) of the following terms:

- Minimal;
- Sub-dominant;
- Co-dominant;
- Dominant; and,
- Highly dominant.

Given that the Proposed Development, apart from the proposed berms, will be below current levels within the Site boundary, visual impacts will result almost entirely from visual 'intrusion' rather than visual 'obstruction' (the blocking of a view). The magnitude of visual impacts is classified in Table 12-4.

Table 12-4: Magnitude of Visual Impact

Criteria	Description
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene

12.2.2.3 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same EPA definitions of significance as used earlier in respect of landscape impacts (Table 12-3).

12.2.2.4 Quality and Timescale of Effects

In addition to assessing the significance of landscape effects and visual effects, EPA Guidance for EIAs requires that the quality of the effects is also determined. This could be negative/adverse, neutral, or positive/beneficial. 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.

Landscape and Visual effects are also categorised according to their duration:

- Temporary – Lasting for one (1No.) year or less;

- Short Term – Lasting one (1No.) to seven (7No.) years;
- Medium Term – Lasting seven (7No.) to fifteen (15No.) years;
- Long Term – Lasting fifteen (15No.) years to sixty (60No.) years; and,
- Permanent – Lasting over sixty (60No.) years.

12.3 Receiving Environment

12.3.1 Definition of the Study Area

From similar studies it is anticipated that the Proposed Development is likely to be difficult to discern beyond approximately 3km and is not likely to give rise to significant landscape or visual impacts beyond approximately 2km. In the interests of a comprehensive appraisal, a 3km radius study area was selected in this instance.

Figure 12-1: Study Area.

12.3.2 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 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 12.3.4 Visual Baseline.

12.3.2.1 Landform and Drainage

This is a gently rolling landscape interspersed with watercourses. The Black Water River flows in a southerly direction through the eastern portion of the study area. It merges with the River Suir, the principal watercourse within the study area, to the southeast of the Site. A small stream (Flemingstown 16) is the nearest watercourse, located adjacent to the eastern side of the Site. At a localised scale, the Site is contained on a localised plateau at ca.30mOD, while the River Suir is at less than 5mOD.

12.3.2.2 Vegetation and Land Use

The predominant land use within the study area is agricultural farmland, contained in a small to medium-scale field pattern that is generally well-defined by treelined hedgerows. Black Water River is flanked by riparian vegetation. Within this river valley is a Wet willow-alder-ash woodland / Oak-ash-hazel woodland. There are areas of transitional scrub located approximately 250m to the northeast and 2.5km east of the Site. The Quarry dominates the central portion of the study area.

12.3.2.3 Centres of Population and Houses

In the immediate environs of the Quarry is relatively sparsely populated with just occasional farmsteads and a small settlement at New Aglish to the south. The settlement of Kilmacow lies approximately ca.2km north of the site boundary; nevertheless, there is a reasonably dispersed rural population along the local roads throughout the wider study area.

12.3.2.4 Transport Routes

The most notable transport route within the study area is the M9 motorway, which traverses the study area in a north-south orientation, passing the Site approximately 1km to the east. The Quarry lies between a section of the national railway line to the north and a section of the N24 national road to the south. The N25 passes through the southeast segment of the study area. The R448 occurs in the vicinity of the M9 motorway. Additionally, there is a strong network of local roads.

12.3.2.5 Tourism, Heritage and Public Amenities

There is a picnic area on the north bank of the River Suir where views of Grannagh Castle are afforded. The castle itself is not publicly accessible. The Waterford Greenway passes along the N25 national primary road on the south bank of the River Suir. The River Suir is an amenity for water-based recreational activities. Otherwise, outdoor recreational amenities are limited to walking and cycling on the public road network.

12.3.2.6 Ecological Designations

There are no ecological protections pertaining to the Site. The nearest designation relates to the River Suir Special Area of Conservation. A small area, approximately 2.4km southeast of

the Site boundary, between the N25 and the R448, forms the Grannyferry proposed Natural Heritage Area.

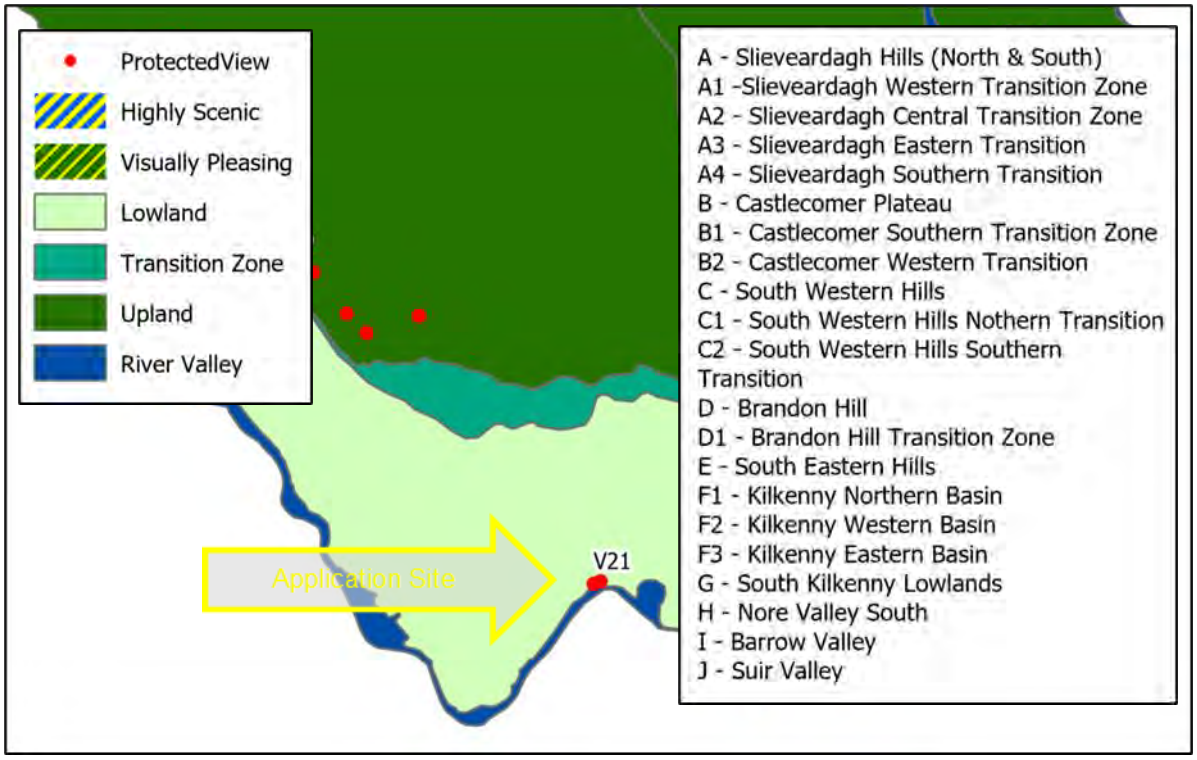
12.3.3 Landscape Planning Context

12.3.4 Kilkenny County Development Plan 2021-2027

A Landscape Character Assessment was prepared for Kilkenny County in 2003, which still informs and provides a framework for landscape-related policy in the current Kilkenny CDP. The Landscape Character Assessment identifies four (4No.) landscape character types, which are subdivided into 14 landscape character areas, with some areas identified as being of special landscape character value or possessing features and areas of high landscape sensitivity.

The Site is located within the 'G - South Kilkenny Lowlands' landscape character area, a 'Lowland' landscape character type, with the 'J - Suir Valley' landscape character area, a 'River Valley' landscape character type, to the south (Figure 12-2 refers).

Figure 12-2: Extract of Figure 9.2 of the Kilkenny CDP.



South Kilkenny Lowlands

According to Section 4.7 of the Kilkenny Landscape Character Assessment, this landscape character area is described as:

> *"This expansive lowland area to the south-west of the County has extensive views of the River Suir valley and the South Kilkenny Uplands, Tory Hill and Carrigatubbrid Hill. Distant views include the Comeragh Mountains. This area has open lands with regular (medium sized) field patterns. Medium sized hedgerows act as field boundaries where few trees can also be found. Rock outcroppings are a feature of this area.*
>
> *The unit is perceived as being special in landscape terms, particularly around Piltown, Mooncoin and Kilmacow. The area is perceived as being generally suitable for tourism*

development, and other type of projects can be acceptable in the environs of Waterford City"

Landscape Character Sensitivities

Section 9.2.12 of the CDP pertains to Landscape. Section 9.2.12.5 describes Landscape Character Sensitivity as being:

> *"The sensitivity of the Landscape Character Areas is defined as its overall resilience to sustain its character in the face of change and its ability to recover from loss or damage to its components."*

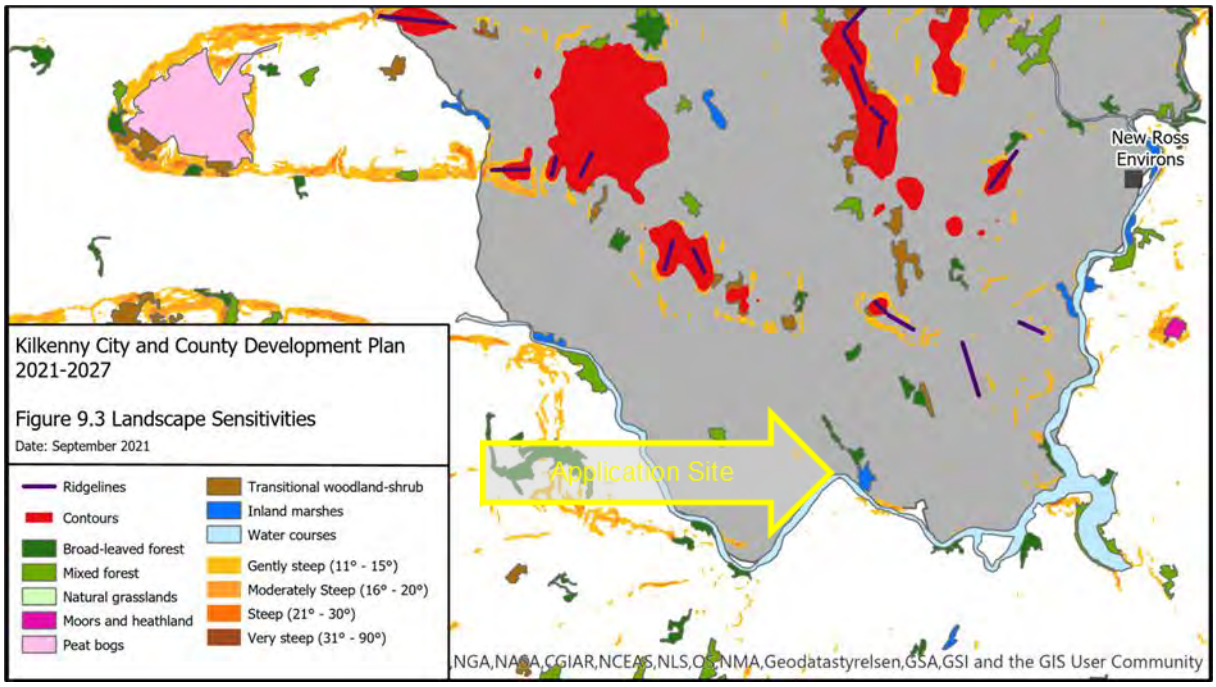
The CDP identifies 'landscape areas of highly scenic and significant visual amenity value.' The nearest of these designations in the study area is the River Suir watercourse to the south of the Site (ca.1.4km). This riverine designation adhere to the banks of the watercourses and the immediate vicinity, not beyond. There is a secondary designation relating to the broad-leafed vegetation within the Black Water River valley, approx. 1.5km east of the site. There is an inland marsh where the Black Water River meets the River Suir which is also identified as scenic/sensitive.

Landscape sensitivity within County Kilkenny is addressed by 'areas of greater sensitivity'. These are:

> *"… Areas throughout the county that are highly sensitive to development and have a limited capacity for change … These areas take account of areas of higher altitude in the county and of land cover. In general areas of elevated topography, with low growing or sparse vegetation and little existing development are landscapes of high sensitivity and have a low potential to absorb new development."*

> *"Sensitive land-use categories include areas which are open and exposed with sparse or low growing vegetation cover which is insufficient to provide screening. Even if planting is introduced, the exposed nature of these areas will not support any significant tall vegetation. Due to this, any development would be visible over a wide area."*

Figure 12-3: Extract of '*Figure 8.3 Landscape Sensitivities*' of the Kilkenny CDP in relation to the Proposed Development.



The CDP also sets out a number of 'development management requirements,' most of which relate to the Site and the Proposed Development, and are listed below:

- *"To protect the landscape character, quality and local distinctiveness of County Kilkenny, and have regard to the guidance set out in the Landscape Character Assessment;*
- *Where necessary, to require that applications are accompanied by a visual impact assessment, particularly in upland areas, river valleys and areas of greater sensitivity;*
- *To facilitate appropriate development that reflects the scale, character and sensitivities of the local landscape throughout the county, and require that developments minimise the loss of natural features such as trees, hedgerows and stone walls;*
- *To facilitate, where appropriate, developments that have a functional and locational natural resource requirement to be situated on steep or elevated sites (e.g. reservoir, telecommunications or wind energy structures) with reference to the appropriate County strategies currently in place, and to ensure that any residual adverse visual impacts are minimised or mitigated;*
- *To continue to permit development that can utilise existing structures and settlement areas whilst taking account of the local visual absorption opportunities provided by existing topography and prevailing vegetation and to direct new development whenever possible towards the vicinity of existing structures and mature vegetation in the Lowland Areas, River Valleys and Transitional Areas.*
- *To maintain the visual integrity of areas of greater sensitivity in the county and ensure that any development in these areas is appropriately sited and designed. Applicants shall demonstrate that the Proposed Development can be assimilated into the landscape and will not have a disproportionate visual impact on the landscape."*

12.3.4.1 Views of Recognised Scenic Value

Views of recognised scenic value are primarily indicated within County Development Plans in the context of scenic views/routes designations, but they might also be indicated on touring maps, website, guidebooks, roadside rest stops or on post cards that represent the area.

Scenic designations are indicated on Figure 9-2 (Figure 12-2 refers) and are listed in Appendix H of the CDP. The CDP states that the Council seeks to:

> *"… preserve and support the improvement of places or areas from which views or prospects of special amenity value exist, as identified in Appendix H and on Figure 9.2."*

Section 9.2.12.6 of the CDP pertains to views and prospects. It states that:

> *"There is a need to protect and conserve views and prospects adjoining public roads and river valleys throughout the county where these views are of high amenity value. In conserving views, it is not proposed that this should give rise to the prohibition of development along these routes but development, where permitted, should not seriously hinder or obstruct these views and should be designed and located to minimise their impact … The Planning Authority will be cognisant of the impact of developments within the county on views from neighbouring counties."*

Two (2No.) scenic views occur within the study area and are listed below (but both occur outside of the zone of theoretical visibility, Figure 12-2 refers, so there is no potential for any visual impacts.)

'V20. Views south over King's river valley on Road no. LS5067 between Kells and the R713 (Waterford Road).

V21. Views southwest over the River Suir at Grannagh Castle to the Comeraghs.'

12.3.5 Visual Baseline

Only those parts of the study area that potentially afford views of the Proposed Development are of interest to this part of the assessment. Therefore, the first part of the visual baseline is establishing a Zone of Theoretical Visibility (ZTV) and subsequently, identifying important visual receptors from which to base the visual impact assessment.

12.3.5.1 Zone of Theoretical Visibility

A computer-generated ZTV map has been prepared to illustrate from where the Proposed Development is potentially visible. The ZTV below is based on a worst-case scenario for potential visibility within the study area. 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 definitely not be visible, due to terrain screening within the 3km study area. Refer to Figure 12-4.

Figure 12-4: Standard (bare-ground) ZTV map (excluding all existing vegetation and man-made features)

The following key points are illustrated by the 'bare-ground' ZTV map (see Figure 12-4 above):

- The rolling terrain means there is little or no potential for views of the Proposed Development from many areas within the study area, most notably in the more low-lying areas to the west of the Site and the river valleys of the River Suir and Black Water River (where no colour is shown); and,
- The highest theoretical visibility of the Proposed Development will occur immediately to the north, east and south of the Site (where yellow colour is shown). This area comprises agricultural fields, flanked to the north by the railway and to the south by a section of the N24 national primary road.

The most important point to make regarding this 'bare-ground' ZTV map is that it is theoretical. Apart from the proposed screening berm, the Proposed Development will not rise more than the existing level of the terrain within the Site; therefore, the Proposed Development will be

considerably screened by surrounding and intervening hedgerow vegetation, trees, buildings and walls throughout the study area, resulting in a much lesser degree of actual visibility.

12.3.6 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 proposal 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:

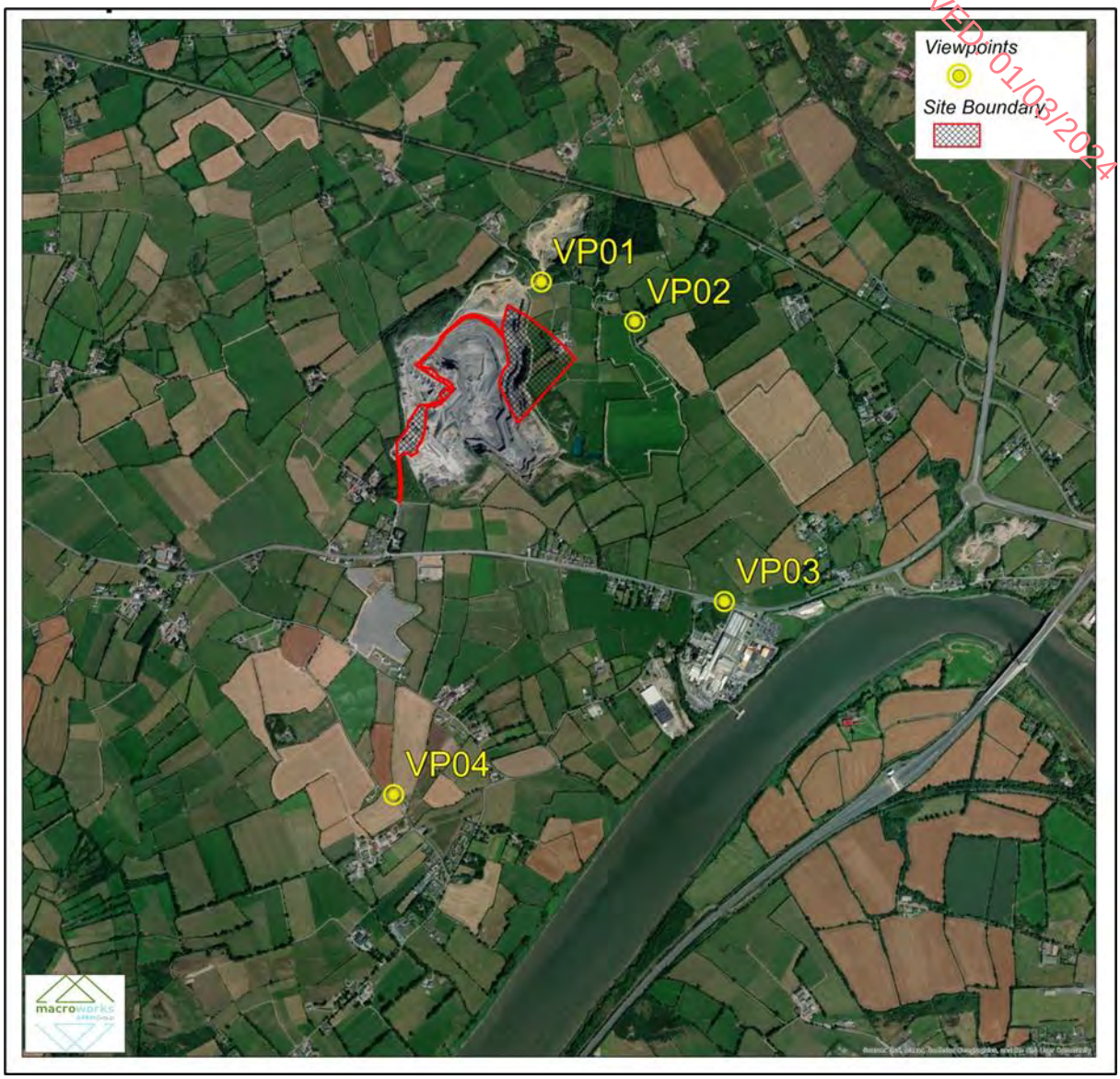
- Key Views (from features of national or international importance);
- Designated Scenic Routes and Views;
- Local Community views;
- Centres of Population;
- Major Routes; and,
- Amenity and heritage features.

VRP's might be relevant to more than one (1No.) 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 VRPs selected in this instance are set out in the Table 12-5 and Figure 12-5 below.

Table 12-5: Outline Description of Selected Viewshed Reference Points (VRPs)

VRP No.	Location	Direction of view
VP01	Local road north of the Site in Granny	S
VP02	Local road east of Site in Granny	SW
VP03	N24 national road in Ballygriffin	NW
VP04	Local road in Portnahully	NE

Figure 12-5: Viewpoint location map.



12.4 Characteristics and Potential Effects of the Proposed Development

12.4.1 Proposed Development Characteristics

This LVIA assess the potential effects of the proposed extension to the existing permitted and operational quarry area at Quarry. The Proposed Development covers an area of ca.10.3ha and includes an extension of the Quarry into the greenfield lands to the east. The Quarry covers an area of ca.62.07ha. Topsoil and subsoil will be extracted from within the extension area and reused to construct landscaped berms along the northeast and southeast of the extension area, which will have a screening effect. The Proposed Development will involve the stripping of existing overburden to access the underlying rock within the proposed extraction area and will continue to excavate developing a series of benches in the process.

It is important to note that the Proposed Development is an extension to an existing quarry and therefore, the potential for in-combination effects with ongoing operations within the Quarry have been considered throughout this report. The proposed operations onsite will emulate the existing excavation and processing operations within the Quarry.

Upon removal of the aggregate reserve, the Site will undergo rehabilitation as per the Restoration Plan. An overview of the timelines associated with the Proposed Development are as follows;

- Construction Phase (0.5 year(s))
- Operational Phase (19 years); and,
- Restoration Phase (0.5 years).

12.4.2 Landscape Impact Assessment

12.4.2.1 Landscape Value and Sensitivity

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 proposal site and wider study area.

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 evident in the central portions of the study area. Otherwise, this is a typical rolling rural landscape with relatively well-maintained field boundaries, comprising a mix of mature tree-lined hedgerows. Although this is a highly modified landscape, it is not degraded.

Scenic quality

Scenic quality exists within the Black Water River valley due to the natural vegetation in an enclosed setting. The River Suir is a more substantial river offering broad views. The scenic quality of the Suir is evidenced by the presence of two (2No.) designated views within the study area, which relate to the view from the bank of the River Suir (>1.5km from the site boundary.)

Rarity and Representativeness

There are some areas and features of aesthetic, cultural or heritage value within the study area, including Grannagh Castle, several Holly Wells, Mottes and churches. Overall, it is not considered that the landscape within the nearer context of the Site is particularly rare or distinctive.

Conservation interests

Ecological designations are associated with the River Suir, which is at a contextual remove from the Site primarily due to distance.

Recreation Value

There is recreation value associated with the River Suir and the Waterford Greenway and for cyclists and walkers along the local roads away from the major routes.

Perceptual Aspects and Associations

There do not appear to be any strong landscape associations to particular people, historical events or mythology in the central portion of the study area surrounding the Quarry. That is not to say that none exist, as all locations have local landscape associations with particular families or historical incidents. Still, these would not necessarily be associated with landscape values for the wider population.

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 Quarry and the busy

corridor of the N24 national primary road dominate the Site and central study area. However, the valleys of the Black Water River and the River Suir are landscape components with increased sensitivity. There are some relatively small areas of broad-leafed vegetation with naturalistic qualities. However, these are not within the visual envelope of the Site and are separated by larger regions of typical working rural landscape that are not considered to be particularly distinctive or unique. On balance of these factors and in accordance with the criteria outlined in Table 12-1 the landscape sensitivity is deemed to be Medium-low.

12.4.2.2 Magnitude of Landscape Effects

In terms of physical landscape effects, the proposal involves constructing peripheral screening berms along the southeast and northeast boundaries of the proposed extension. 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 32mOD down to a final extraction level of -45mOD. This extraction area is essentially an extension of the Quarry immediately to the west. The physical landscape impacts are classified as 'negative' and their duration is 'permanent' (effects defined as lasting over sixty years in accordance with EPA guidelines).

The proposed new vegetated screening berm will detract slightly from the natural slope, but it's presence is still considered preferable to views of the excavated near-vertical faces within the quarry. Furthermore, once the proposed vegetation becomes established it will appear more naturalistic.

This is a productive rural landscape containing the adjoining 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, as well as to and from the Quarry are already commonplace in the immediate context of the Site. The Site is immediately adjoining the east of an already active quarry thus the Proposed Development will only involve an extension to the duration of the current quarrying activity, but without a notable change in nature or frequency.

On the basis of the factors discussed above it is considered that 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 Quarry.

With reference to the significance matrix (Table 12-3), the Medium-low landscape sensitivity judgement attributed to the study area coupled with a medium magnitude of landscape impact is considered to result in an overall significance of no greater than Moderate-slight and Permanent within the immediate vicinity of the Site and reducing to slight and imperceptible at greater distances.

12.4.3 Visual Impact Assessment

12.4.3.1 Sensitivity of Visual Receptors

Views of the agricultural landscape are generally pleasant in terms of its rolling pastoral aesthetic and 'green', settled working character. The network of hedgerows and vegetation that occur throughout it contribute to some sense of naturalness, and in combination with its undulating topography generates a high degree of containment in many locations.

However, whilst the agricultural context forms the primary landscape and visual experience, in the local landscape of the Site, this is interrupted by features and activity associated with

major transport routes. Indeed, all parts of this landscape, including those areas in agricultural use, demonstrate longstanding human intervention in the landscape.

There are some scenic view designations within the study area that are applicable to the River Suir. However, views towards the Site are not considered to be unique, or form a core part of any key views. Likewise, the integrity and quality of landscape features is not considered to contribute to, or generate any specific scenic value. Views within the study area tend to be typical and contained agricultural views rather than expansive and/or exceptional views.

Key differentials in terms of 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 at closer proximity to the Site are considered more susceptible to changes in views over those where views are experienced at distance.

On the basis of the site-specific factors outlined above and in accordance with the general visual receptor sensitivity considerations contained in the methodology Sections 12.2.2, visual receptor sensitivity judgement are provided for each representative viewpoint in Table 12-6.

12.4.4 Magnitude of Visual Effects

The assessment of visual impacts at each of the selected viewpoints is aided by photomontages / outline montages (as applicable) of the Proposed Development, refer to Appendix 12-1. 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 / magenta outlines showing the extent of the proposed extension relative to the existing quarry void; and,
3. Montage view (where appropriate).

Table 12-6: Magnitude and Significance of Visual Effects

VP No.	Title and description of existing view	Receptor Sensitivity	Description and Magnitude of Visual impact	Significance of Visual Impact
VP1	Local road north of site boundary in Granny This view is afforded to the local community from an access gate into the Quarry. In the foreground is a barbed wire fence which encloses a large pasture. Portions of the Quarry are identifiable beyond intervening screening in the middle ground. A low-farmed ridge in the background foreshortens the view to the southeast.	**Medium-low**	A portion of the proposed screening berm along the northeast perimeter of the Site will be identifiable in the middle ground. It will marginally alter the contour of the natural landform, but this is unlikely to be barely discernible. The berm will be vegetated, and once established, it will be difficult to differentiate from the adjoining agricultural fields; thus, it is not anticipated that it will detract from the visual amenity at this location. Therefore, the magnitude of the effect is deemed to be Negligible.	**Imperceptible / Negative / Permanent**
VP2	Local road east of site boundary in Granny This is a glimpse view to the southwest over a section of low-trimmed hedgerow. Sloping farmland in the middle ground contains a cluster of agricultural buildings. Structures within the Quarry are identifiable in the background of the view.	**Medium-low**	A portion of the proposed screening berm along the easternmost part of the perimeter of the Site will be identifiable to the left of the existing agricultural buildings. It will marginally alter the contour of the landform, but this is unlikely to be noticeable to a casual observer. The berm will be vegetated, and once established, it will be challenging to differentiate from the adjoining agricultural fields; thus, it is not anticipated that it will detract from the visual amenity at this location. Therefore, the magnitude of the effect is deemed to be Negligible.	**Imperceptible / Negative / Permanent**
VP3	N24 national road in Ballygriffin This is a broad view from a busy major transport route. An undulating arable field predominates in the fore-to-middle ground, with a mature hedgerow protruding from a low ridge in the middle ground.	**Medium-low**	This is an 'illustrative view' used to confirm the absence of any potential for visual impact from this major route receptor. The Proposed Development will be thoroughly screened from here by a combination of natural intervening terrain and existing vegetation. The magnitude is, therefore, Negligible by default.	**Imperceptible / Negative / Permanent**
VP4	Local road in Portnahully This is a slightly elevated view. The landform falls away from this viewpoint towards the north to reveal a long distance over rolling lowland farmland. Hills in the background form a distant backcloth.	**Medium-low**	This is an 'illustrative view' used to confirm the absence of any potential for visual impact from this major route receptor. The Proposed Development will be thoroughly screened from here by a combination of natural intervening terrain and existing vegetation. The magnitude is, therefore, Negligible by default.	**Imperceptible / Negative / Permanent**

12.5 Proposed Mitigation Measures and / or Factors

Proposed landscape and visual mitigation measures principally relate to the proposed berm which will be planted with native vegetation and will aid the screening of the excavation area and associated operational activities within the Site. This mitigation is embedded within the overall design of the development as the berm will be formed from excavated overburden within the Site.

12.6 Cumulative and In-combination Effects

The main cumulative effect in this instance is in relation to the Quarry. The in-combination effects of the Quarry and this proposed extension to it has been the focus of the assessment already undertaken in respect of both landscape impacts and visual impacts. Separate consideration of cumulative effects is, therefore, not considered necessary in this instance.

Overall, the cumulative landscape and visual impact of the Proposed Development is not significant.

12.7 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 impact and therefore visual impact on population and human health will be not significant.

Chapter 7 – Land Soils and Geology: A change in land use can affect the landscape of an area. the potential effects from change in land use have been considered in Chapter 7.

12.8 Indirect effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout this chapter.

12.9 Residual Effects

The proposed mitigation, in the form of vegetated perimeter embankments, were considered to be embedded within the design of the Proposed Development and were therefore included in the photomontages (attached as Appendix 12-1) and formed an integral part of the assessment of predicted impacts in Section 12.4.3. Thus, residual impacts are considered to be the same as predicted impacts in this instance, as it was considered unnecessary / confusing to assess pre-mitigation and post-mitigation views separately.

12.10 Monitoring

Rehabilitation success monitoring will be undertaken after the cessation of quarry activities onsite in accordance with Chapter 6 - Biodiversity. Refer to Appendix 6-1 for further information.

12.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

12.12 Difficulties Encountered

There we no difficulties encountered in the process of completing the LVIA.

13 CULTURAL HERITAGE

13.1 Introduction

This chapter of the EIAR, commissioned by MOR on behalf of Roadstone, addresses the impacts on the archaeological, architectural, and cultural heritage of the Site, and the surrounding area arising from the Proposed Development.

13.2 Methodology

This study complies with the requirements of Directive EIA 2014/52/EU [135]. This 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 Proposed Development on the environment, taking into account current knowledge and methods of assessment. This chapter consists of the following study stages:

- Baseline Studies; and,
- Assessment of the Site.

13.2.1 Baseline Study

The baseline study research has been undertaken in two (2No.) phases, the paper study phase and subsequently the field inspection phase.

13.2.1.1 Paper Study

The first phase comprised a paper survey of all available archaeological, architectural, 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 structural resource using appropriate methodology;
- A detailed investigation of the archaeological and historical background of the Site, the landholding and the surrounding area extending 1km from the Site boundary (Figure. 13-1). This area was examined using information from the:
    - Record of Monuments and Places (RMP) of County Kilkenny [136];
    - The Sites and Monuments Record [137];
    - The Kilkenny County Development Plan 2021-2027 [1];
    - The National Inventory of Architectural Heritage [138];
    - Aerial photographs;
    - Excavation reports;
    - Cartographic; and,
    - Documentary sources.

- The Kilkenny County Development Plan 2021-2027 [1]: 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.
- The National Inventory of Architectural Heritage (NIAH) [138] - 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 [136] - 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 that although the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law by the President on October 13, 2023, the act had not been commenced at the time this assessment was prepared. This assessment uses the National Monuments Acts 1930-2014, which were still in force at the time the assessment was completed.
- The Sites and Monuments Record [137] 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 cropmarks, soil marks and earthworks that may have not been previously detected.
- Cartographic Sources - this includes seventeenth century mapping as well as the 1st and 2nd editions of the Ordnance Survey six-inch maps.
- Documentary Sources – provide more general historical and archaeological background.

13.2.1.2 Field Inspection

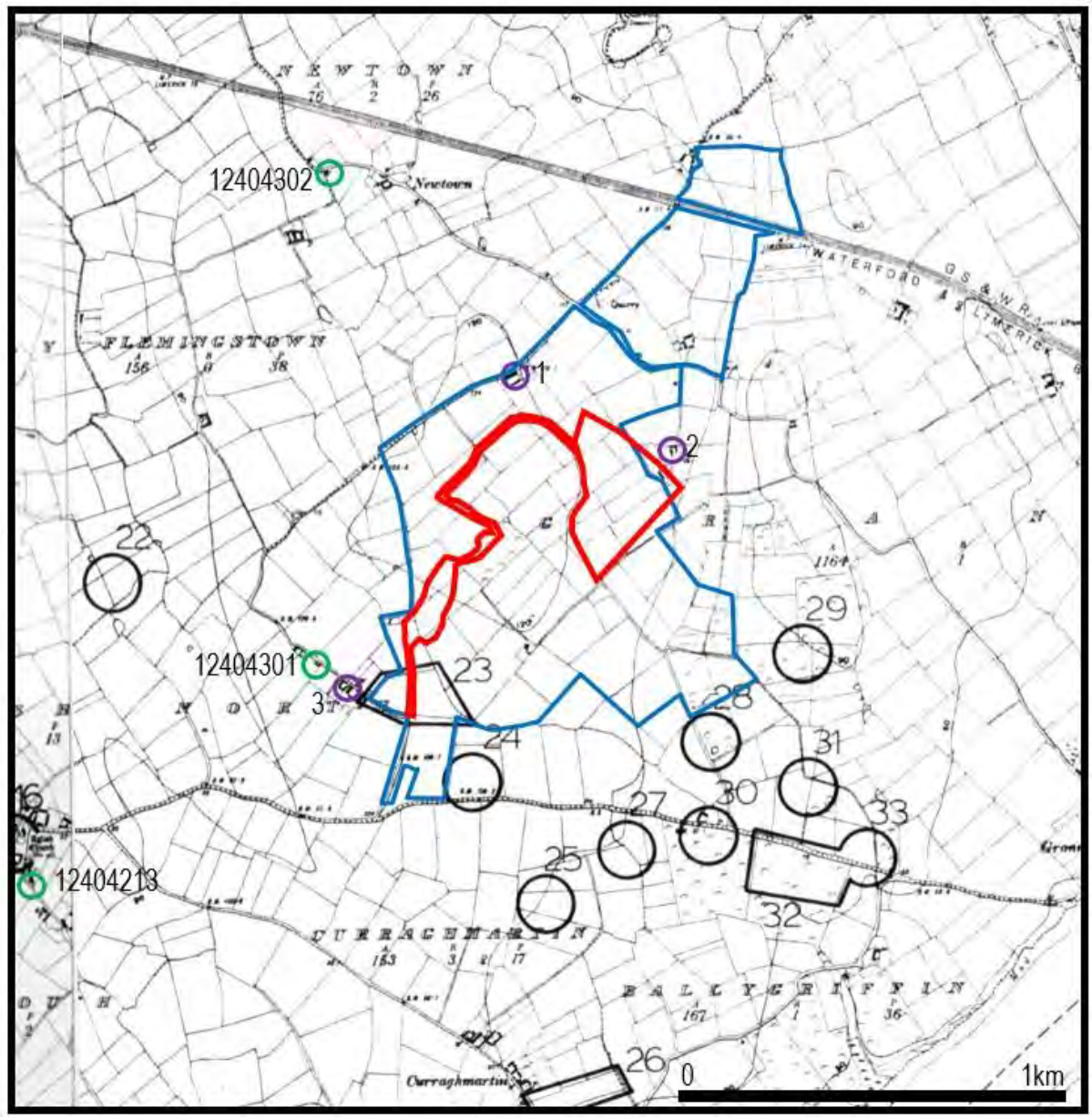
The second phase involved a field inspection and assessment of the Site. A field inspection was carried out on the 8th December 2023 to identify and assess any known archaeological sites and architectural structures and previously unrecorded features and portable finds within the Site.

13.2.2 Assessment of the Proposed Development

An impact assessment and mitigation strategy have been prepared. An impact assessment is undertaken to outline 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 Kilkenny are presented on a map of the local area around the Site in Figure 13-1. RMP sites included on the Records of Monuments and Places statutory mapping are identified by black circles, SMR sites with blue circles, NIAH sites with green circles and undesignated buildings in the vicinity of the Site with purple circles. The Site is shown with a red line.

Figure 13-1:The assessment study area superimposed on the RMP map for County Kilkenny.



13.2.3 Legislation / Policy Context

13.2.3.1 Kilkenny County Development Plan 2021 – 2027

Chapter 9 of the Kilkenny County Development Plan 2021-27 (KCDP) sets out the policies and objectives on heritage within the County. The strategic aim is to seek the protection and sustainable management of the arts, culture and heritage of Kilkenny for the benefit of current and future generations; to encourage the collection of knowledge to inform its protection; and to promote access to, awareness of and enjoyment of Heritage, Arts and Culture, to further develop the infrastructure and actively support engagement with communities throughout Kilkenny.

The are several objectives outlined in the plan regarding archaeological heritage such as:

Objective 9C

> *'To protect archaeological sites and monuments (including their setting), underwater archaeology, and archaeological objects, including those that are listed in the Record of Monuments and Places, and in the Urban Archaeological Survey of County Kilkenny or newly discovered sub-surface and underwater archaeological remains.'*

Objective 9D

> *'To carry out further research on the eighteen archaeological landscapes as identified in the Preliminary Audit of Archaeological Landscapes in County Kilkenny.'*

Objective 9E

> *'To develop an enhanced policy framework for the three priority sites identified in Section Any additional sites identified through Objective 9D above.'*

Objective 9F

> *'To provide assistance to owners of protected structures in undertaking essential repairs and maintenance by the provision of relevant information.'*

Objective 9G

> *'To respond to the Ministerial recommendation to include in the RPS, structures which have been identified as being of regional, national or international significance in the National Inventory of Architectural Heritage survey and to consider for inclusion those rated as being of local significance.'*

Objective 9H

> *'To continue to review the Record of Protected Structures and add or delete structures as appropriate.'*

Objective 9I

> *'To ensure all digital mapping for the Record of Protected Structures is up to date and current, and readily accessible to the public.'*

Objective 9J

> *'To ensure the preservation of the special character of each ACA listed in this Plan (See Table 9.2 and Volume 2 Heritage Strategy) with particular regard to building scale, proportions, historical plot sizes, building lines, height, general land use, fenestration, signage, and other appendages such as electrical wiring, building materials, historic street furniture, paving and shopfronts.'*

Objective 9K

'To designate ACAs where appropriate and provide a local policy framework for the preservation of the character of these areas.'

Objective 9L

'To prepare and introduce a set of Shopfront Guidelines.'

13.3 Receiving Environment

13.3.1 The Landscape

The Site is located in the townland of Granny, Co. Kilkenny, on OS six-inch sheet No. 43, 2km south of the town of Kilmacow, and just to the north of the N24 Limerick to Waterford Road. It is situated in an area of rolling lowland. The local soil is a Clonroche series fine loamy drift with Siliceous stones overlying drift with siliceous stones [139]. The lands are currently in use for pastoral agriculture.

13.3.2 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 townland of Granny, in the civil parish of the parish of Kilmacow and the barony of Iverk. Note the original spellings of placenames recorded in source material are retained in the text.

13.3.2.1 The Prehistoric Period

There is evidence of prehistoric activity in the study area dating to the Bronze Age and possibly the Iron Age in the form of 12 Fulachta fia known from Aglish North (KK043-02301, KK043-02302 and KK043-024---) Curraghmartin (KK043-025---), Ballygriffin (KK043-027---, KK043-030---, KK043-03201 and KK043-03202) and Granny townlands (KK043-028---, KK043-029---, KK043-031--- and KK043-033---). Fulachta fia are by far the most common site type in the study area representing 80% of the known archaeological sites.

13.3.2.2 Early Medieval Period

In the Early Medieval period the study area formed part of the cantred of Overk which was part of the Kingdom of Ossory. Overk derives its name from the Uí Eirc sept who controlled the area (MacCotter 2009, 183). Classically settlement in the Early Medieval period is indicated by the presence of enclosed farmsteads known as ringforts. There is only one (1No.) possible Ringfort known from the study area in Dungooly townland to the west of the Site (KK043-02201).

13.3.2.3 The Medieval Period

In the 1170s Leister came under the control of Strongbow, the Anglo-Norman Earl of Pembroke, and he subsequently granted the cantred of Overk, to Milo fitz David (Orpen 1911-20, I, 389) [140]. The Manor of Grenaghe in which the Site is situated subsequently came into the hands of the le Poer family. Manorialism describes the organisation of the feudal rural economy and society. 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. There are no moated sites known in the study area. The administrative centre of the Manor of Grennaghe was in Granny castle (KK043-034001-) which is situated outside the study to the southeast on the River Suir. In 1344 Eustace le Poer granted his lands in Dombryn and Grennagh to Sir William de Caldwell (Curtis 1932-43, I, 326) [141]. In 1374 Arnald le Poer sold the manor of Dombryn and Grenagh in Oreynan to James le Botiller Earl of Ormond (Curtis 1932-43 II, 138) [141]. Thomas Earl of Ormond held

Grenaghe in 1571 and the Down Survey records the Earl of Ormond held Granny in 1641 and continued to hold it in 1670 (Curtis 1932-43, V, 200, Downsurveytcd.ie) [141].

13.3.2.4 The Post-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. The closest Tower House to the Site is just outside the study area in Granny townland (RMP KK043-034001-). Thomas Earl of Ormond held Grenaghe in 1571 and the Down Survey records the Earl of Ormond held Granny in 1641 and continued to hold it in 1670 (Curtis 1932-43, V, 200, Downsurveytcd.ie) [141]. Griffiths valuation records that in the early nineteenth century the Site was held by Richard Greene and leased to John Fennelly, [142].

13.3.3 Buildings

13.3.3.1 Designated structures

The Record of Protected Structures in the Kilkenny County Development Plan 2021-27 [1] was reviewed as part of the baseline study for this chapter. The review established that there are no structures within the Site listed in the Record of Protected Structures. There are also no structures in the study area listed in the Records of Protected Structures.

13.3.3.2 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 15th November 2023 [143]. The review established that there are no structures within the Site listed in the NIAH. There are three (3No.) structures in the study area listed in the NIAH (see Table 13-1). The closest structure to the Site listed in the NIAH is a house in Aglish North townland No. 12404301 which is located ca.800m to the southwest and is considered to be too far distant to be directly or indirectly effected by the Proposed Development. The remaining structures in the study area listed in the NIAH are further away and are considered to be too far distant be directly or indirectly effected by the Proposed Development.

Table 13-1: NIAH structures in the study area.

No.	**12404301**
Structure Type	House
Townland	Aglish North
Designation	NIAH
Data Source	-
Perceived Significance:	Regional
Type of Effect:	Neutral
Significance of effect:	Not significant

No.	**12404301**
Description	Detached three-bay single-storey thatched cottage, ca.1825, with single-bay (three-bay deep) single-storey gabled projecting end bay to right possibly originally separate cottage. Extensively renovated with single-bay single-storey gabled projecting open porch added. Pitched roofs (gabled to porch) with replacement water reed thatch having rope work to ridge and rendered chimney stacks. Painted rendered walls over random rubble stone construction possibly having sections of mud wall construction with rendered strips to corners to end bay having 'timber frame' detailing to gable. Square-headed window openings with no sills, concealed dressings, and replacement timber casement windows retaining two-over-two timber sash windows to end bay. Square-headed door opening under open porch on timber posts with replacement tongue-and-groove timber panelled door having sidelights on tongue-and-groove timber panelled risers. Square-headed door opening to end bay with replacement tongue-and-groove timber panelled door. Road fronted.
No.	**12404213**
Structure Type	House
Townland	Aglish South
Designation	-
Data Source	NIAH
Perceived Significance	Regional
Type of Effect:	Neutral
Significance of effect:	Not Significant
Description	Detached four-bay single-storey thatched cottage with dormer attic, ca1825, on a corner site with entrance windbreak. Hipped and pitched roof with water reed thatch having rope work to ridge, red brick Running bond chimney stack, and rendered coping to gable. Painted rendered walls over random rubble stone construction having slight batter with rendered walls to windbreak, and roughcast wall to rear (west) elevation. Square-headed window openings with painted cut-stone sills, rendered surrounds, and two-over-two timber sash windows having one three-over-six timber sash window (one six-over-three timber sash window to rear (west) elevation having iron bars). Square-headed door opening with timber door. Set in own grounds on a corner site with stone cobbled courtyard, and rear (west) elevation fronting on to road. (ii) Detached single-bay single-storey outbuilding, pre-1840, with single-bay single-storey lower end bay to right. Pitched slate roofs with clay ridge tiles, and no rainwater goods. Random rubble stone walls. Square-headed door openings with red brick voussoirs, timber lintel to end bay, and timber boarded door having painted corrugated-iron door to end bay. (iii) Detached three-bay single-storey outbuilding, pre-1840, with camber-headed carriageway to right. Pitched slate roof with clay ridge tiles, and no rainwater goods. Random rubble stone walls. Square-headed window opening with no sill, red brick voussoirs, and remains of timber fitting. Square-headed door opening with red brick voussoirs, and timber boarded half-door. Camber-headed carriageway to right with red brick voussoirs, and iron door. (iv) Detached single-bay single-storey outbuilding, post-1840, with square-headed carriageway. Reroofed, ca.1950. Pitched roof with replacement corrugated-asbestos, ca.1950, concrete ridge, rendered coping, and iron rainwater goods on rendered eaves. Unpainted roughcast walls. Square-headed carriageway with timber boarded double doors.

No.	**12404302**
Structure Type	House
Townland	Newtown
Designation	-
Data Source	NIAH
Perceived Significance	Regional
Type of Effect:	Neutral
Significance of Effect:	Not Significant
Description	Detached three-bay single-storey thatched cottage with dormer attic, ca.1825, on a corner site with single-bay single-storey projecting porch to centre originally flat-roofed. Reroofed, post-1994. Hipped roof (hipped to porch possibly over flat concrete roof) with replacement water reed thatch, post-1994, having rope work to ridge, and rendered chimney stack having stringcourses. Painted rendered walls over random rubble stone construction. Square-headed window openings with painted shallow sills, and one-over-one timber sash windows. Square-headed door opening with replacement tongue-and-groove timber panelled door, post-1994. Set in own grounds on a corner site perpendicular to road. (ii) Detached single-bay single-storey outbuilding, pre-1840, to southwest. Reroofed, post-1994. Pitched roof with replacement corrugated-iron, post-1994, iron ridge, and rendered coping. Painted rendered walls. Square-headed door opening with timber door.

13.3.3.3 Field inspection

On the 8th of December 2023 fieldwork was carried out to identify any additional unlisted upstanding structures in or in the vicinity of the Site. This involved assessing all upstanding structures that are marked on the 1910 edition of the six-inch Ordnance Survey mapping within 300m of the Site (see Table 13-2 and Figure 13-1).

There are three (3No.) such structures (including a farm complex) in this area. These structures are not examples of significant architectural heritage (see Table 13-2, 13-3 and 13-4 below).

Table 13-2: Structure No.1 in the vicinity of the Site.

No. 1	**House**
Structure Type	House
Townland	Granny
Designation	None
Data Source	1910 edition of the six-inch Ordnance Survey map
Perceived Significance	None
Type of Effect:	Neural
Significance of Effect:	Not Significant

No. 1	House
Description	Mostly demolished house of which only one wall survives. No special architectural interest.
Plate	Plate 13-1

Plate 13-1:Structure 1

Table 13-3: Structure No.2 in the vicinity of the Site.

No.2	House
Structure Type	Farmstead Complex
Townland	Granny
Designation	None
Data Source	1910 edition of the six-inch Ordnance Survey map
Perceived Significance	None
Type of Effect:	Neutral
Significance of Effect:	Not Significant
Description	The farmstead consists of a farmhouse and 11 outbuildings and sheds. The house is a four-bay single-storey house, pre-1836, with corrugated roof. The outbuildings consist of partly stone and brick built sheds with slate and

No.2	House
	corrugated roofs and concrete and galvanised sheds. The sheds illustrated in Plates 13-11 and 13-12 are proposed for demolition.
Plate	Plates 13-2 to 13-12

Plate 13-2: View of Structure 2 Farmstead: Farmhouse

Plate 13-3: Structure 2 Farmstead: Outbuilding

Plate 13-4: Structure 2 Farmstead: Outbuilding.

Plate 13-5: Structure 2 Farmstead: Outbuilding.

Plate 13-6: Structure 2 Farmstead: Outbuilding.

Plate 13-7: Structure 2 Farmstead: shed.

Plate 13-8: Structure 2 Farmstead: shed.

Plate 13-9: Structure 2 Farmstead: shed.

Plate 13-10: Structure 2 Farmstead: shed.

Plate 13-11: Structure 2 Farmstead: shed. Proposed for demolition.

Plate 13-12: Structure 2 Farmstead: shed. Proposed for demolition.

Table 13-4: Structure No.3 in the vicinity of the Site.

No.3	**House**
Structure Type	House
Townland	Granny
Designation	None
Data Source	1910 edition of the six-inch Ordnance Survey map
Perceived Significance	None
Description	One storey four-bay cottage with slate roof and one chimney with sheds to east and south. No special architectural interest.
Plate	Plate 13-12

Plate 13-13: Structure 3

13.3.4 Archaeological Assessment

13.3.4.1 Recorded Monuments

Examination of the Record of Monuments and Places for Co. Kilkenny indicated that part of the Site, the existing road access, extends through the zone of notification of two (2No.) sites of Fulacht fiadh site (see Figure 13-1 and Appendix 13-1). These are:

KK043-02301 Aglish North Fulachta fia site

This site was identified in the National Museum of Ireland Fulachta fia survey. No further details are available in the Archaeological Survey file.

KK043-02302 Aglish North Fulachta fia site

This site was identified in the National Museum of Ireland Fulachta fia survey. No further details are available in the Archaeological Survey file.

The road access that extends through the area of notification has already been developed and therefore will not have any impact on the Fulachta fia sites.

The next closest Recorded Monument to the Site externally is another Fulachta fia site noted in the RMP as:

K043-024 Aglish North Fulachta Fia site

Spread of burnt stone and charcoal noted during field walking (NMI file). Not visible at ground level.

This monument is located ca.225m south of the already developed Quarry access road and is not directly or indirectly effected by the Proposed Development. The remaining Recorded

Monuments listed in the study area are located further away and are all considered to be too far distant to be directly or indirectly effected by the Proposed Development.

13.3.4.2 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 16th November 2023 indicated that there are no SMRs in the Site or in the study area [143].

13.3.4.3 Cartographic Sources

The Ordnance Survey 1st and 3rd edition six-inch maps and the 1st edition 25-inch map of the area were examined, refer to Figures 13-2 and 13-3. There are three (3No.) structures indicated on the 1st six-inch map in area 5 that don't appear 1st edition 25-inch map and appear to have been levelled. Structure 3 appears on 1st edition 25-inch map and is late nineteenth century in date. There are no other archaeological, structural or cultural heritage features indicated in the Site.

Figure 13-2: The Site outlined in red, superimposed on the OS 1st edition six-inch map.

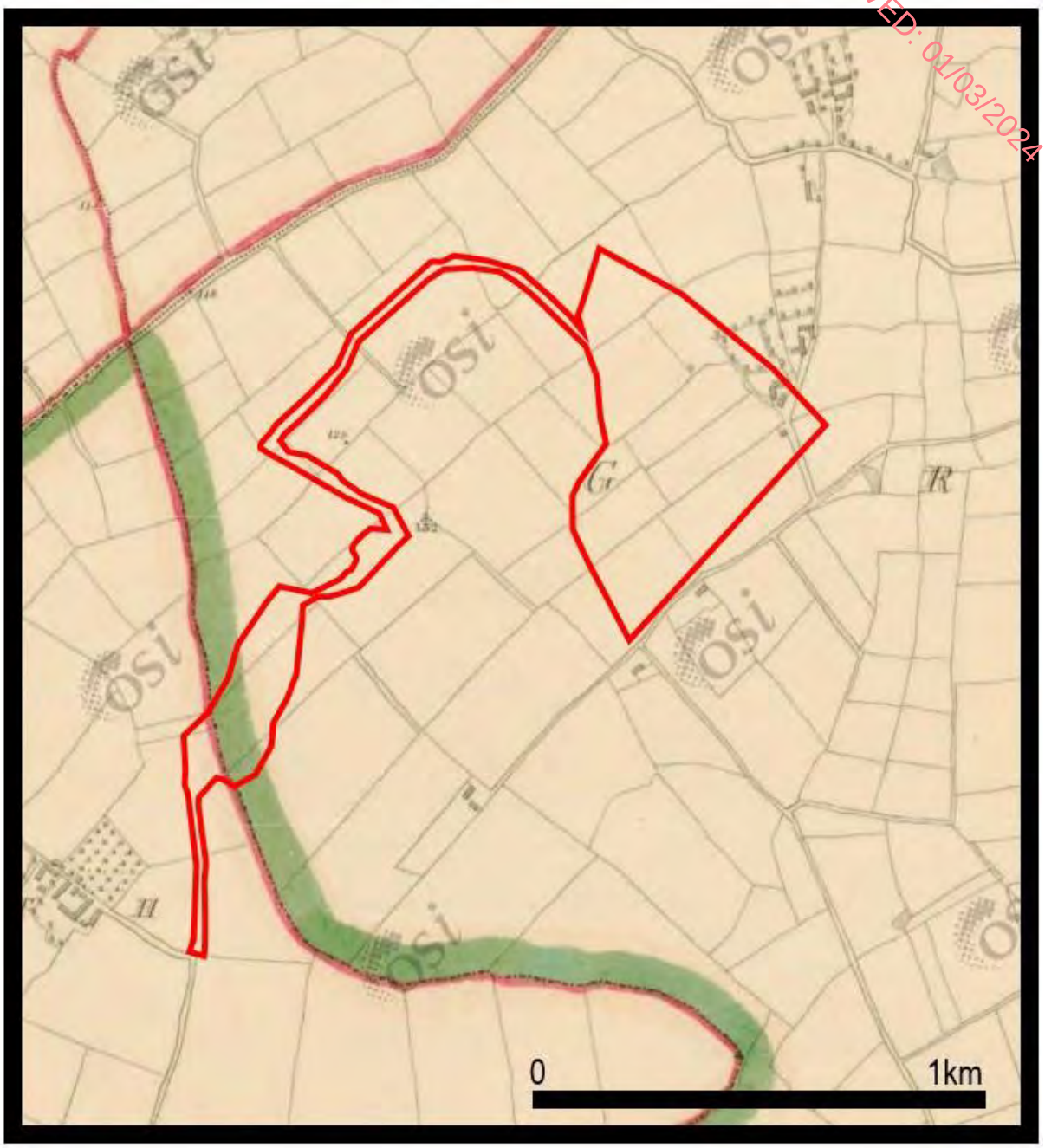
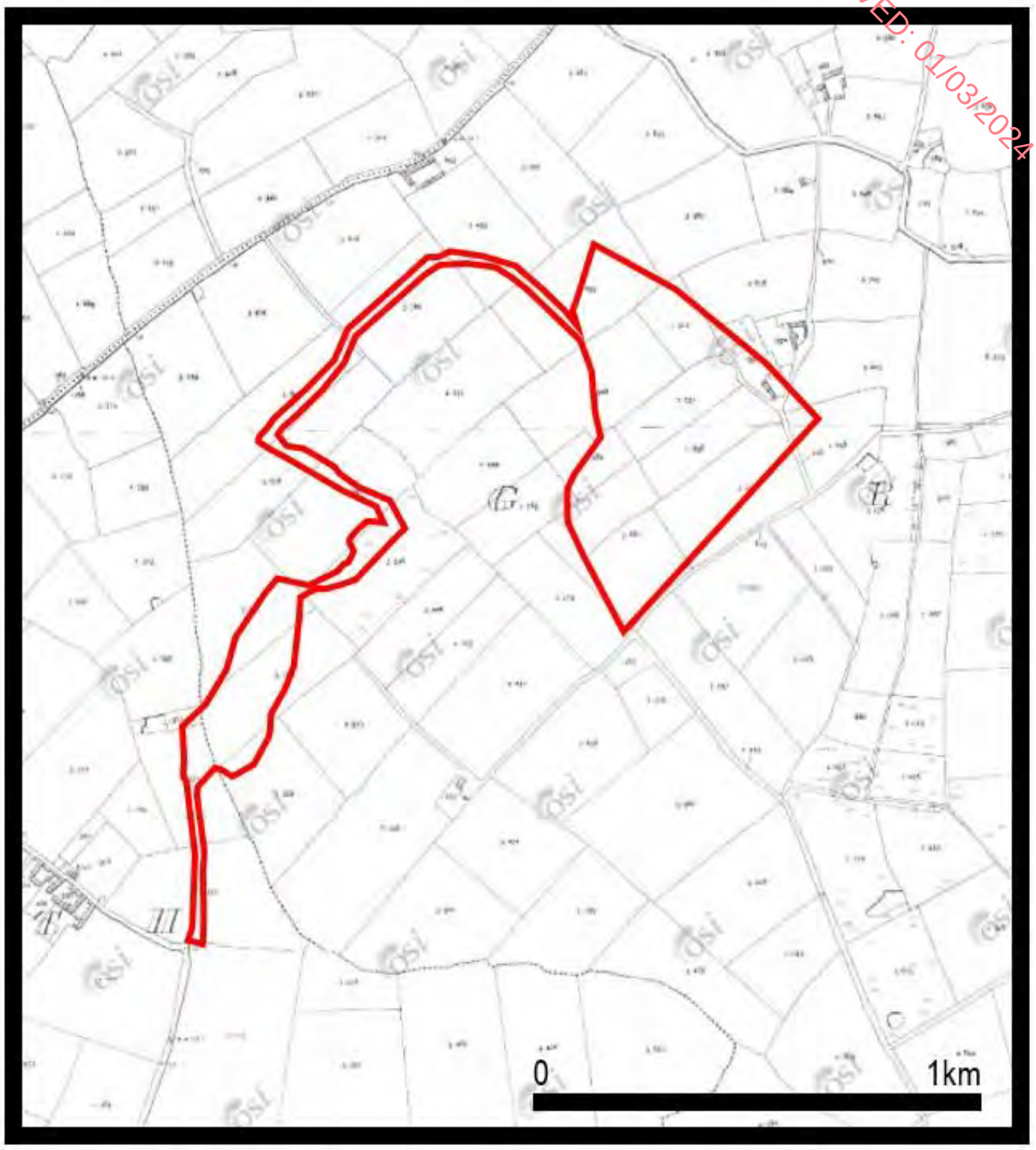


Figure 13-3: The Site outlined in red, superimposed on the OS 1st edition twenty five-inch map.



13.3.4.4 Place Name Evidence

The place names were extracted from the cartography 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.ie [144], refer to Table 13-5. The placenames refer primarily to topographical features and landcover. The placenames do not indicate any additional heritage sites within the Site.

Table 13-5: Townland names in the study area

Townland name	Translation
Aglish North and South	The church
Ballygriffin	McGiffin's town
Ballynearla	Town of the Girley family
Curraghmartin	Martin's marsh
Dungooly	Fort of the poles or stakes
Flemingstown	Town of the Fleming family
Granny	Gravelly place
Kilmacow	St. Mochan's Church
Newtown	Anglicised, original name unknown
Portnahully	Port of all

13.3.4.5 Aerial Photography

Online Ordnance Survey aerial photography taken in 1995, 1996-7, 2001-2002, 2006-2007, and 2013-14, Google Earth imagery from 2008, 20-09, 2011, 2015, 2018, 2019, 2020, 2021 and 2022, and Microsoft Bing imagery from 2011 were reviewed. The aerial photography review did not identify any visible archaeological, architectural or cultural heritage features within the Site.

13.3.4.6 Other Sources

Examination of archaeological corpus works on prehistoric artefacts [145] [146] [147] [148] [149] [150] did not reveal any additional material from the study area.

13.3.4.7 Archaeological Investigation

Examination of the excavations.ie database of Irish excavation reports indicated that there have been several archaeological investigations carried out in the study area, two (2No.) of which involved monitoring of topsoil stripping within the extracted area of the Quarry (See below). The only feature uncovered by the monitoring was a charcoal spread measuring 0.6m x 0.4m (99E0466). A burnt mound / fulacht fiadh 6m in length and 0.3m in depth was identified during archaeological testing carried out in advance of the development of a business park in Ballygriffin townland to the southeast of the Site (08E0511) and an enclosure and kiln activity was identified in advance of a solar development in Curraghmartin townland (20E0623).

<u>GRANNY AND AGLISH NORTH Burnt spread 99E0466</u>

Mary Henry, 24 Queen Street, Clonmel, Co. Tipperary.

Monitoring of topsoil-stripping was carried out as part of the Quarry and pursuant to planning permission. The monitoring commenced in late August 1999 and continued very occasionally throughout autumn 1999. Works ceased in winter 1999 and will resume in spring 2000.

Two (2No.) areas that required monitoring measured 140m by 50m and 350m by 220m. Between 15% and 20% was monitored during 1999, with the remainder to be monitored in 2000. The nearest point in the larger area is 8m from the outer edges of the constraint area for an archaeological site (SMR 43:02301 and 43:02302-two fulachta fiadh).

A total of 0.6m of topsoil and the upper level of subsoil were removed. Other than the occasional stray finds, modern pottery (chinaware, porcelain and kitchen delph), modern glass and broken clay pipes, nothing of archaeological significance was found in the smaller of the two (2No.) areas looked at. However, in the second, larger area, nearest the archaeological site, a spread of charcoal was found beneath the topsoil. It measured 0.6m by 0.4m and was 0.15m thick and 0.15m below ground level. It had no clear or defined shape. A small number of burnt stones were in the midst of the charcoal. The burning appeared to occur in situ. It was not possible to determine whether it could be associated with the fulacht fiadh, ca.200m away.

GRANNY AND AGLISH NORTH Burnt spread 99E0466 ext.

Anne Marie Lennon, Mary Henry Archaeological Services Ltd., 24 Queen

Monitoring was undertaken of ground disturbance at Kilmacow, Co Kilkenny. The owners of the site had obtained planning permission to extend an existing quarry. One (1No.) of the conditions of planning permission required that all groundworks should be monitored. There was no recorded monument within the confines of the part of the site being extended in early 2001. Nothing of archaeological interest was uncovered.

BALLYGRIFFIN Burnt mound, stake-holes and a linear feature 08E0511

Nial O'Neill, Headland Archaeology Ltd., Unit 1, Wallingstown Business Park, Little Island, Cork.

Testing was undertaken on the site of a proposed light industrial/warehousing business park. The site of the development was 4km south of Kilmacow and 200m north of the River Suir in the townland of Ballygriffin, Co. Kilkenny. The site was within 1km of numerous entries in the Record of Monuments and Places including eighteen burnt mounds/fulachta fiadh and Granny Castle, a medieval stone castle, KK046–034(001).

Twelve (12No.) linear trenches with a combined length of 1071m were excavated across the footprint of the development. Eight (8No.) of the trenches were located on the grounds of a disused factory. It became evident that the grounds of the factory had been subject to substantial groundworks with some areas 5m below original ground level whilst other areas had 5m of soil built up. Consequently, the test-trenching was limited in its scope.

The adjacent field to the west of the factory grounds was also part of the present development and was tested. A burnt mound/fulacht fiadh 6m in length and 0.3m in depth was found on the eastern edge of this field. Approximately 65m north of the burnt mound a linear feature was uncovered that was 0.5m in width and 0.2m in depth; a whetstone was recovered from the fill of this feature. Two (2No.) stake-holes were uncovered towards the western end of this field; both were conical in shape, 0.15m in diameter and 0.19m in depth. A piece of flint was recovered from one (1No.) of these stake-holes.

AGLISH SOUTH No archaeology found 17E0332

The project concerned a previously modernised house forming part of a larger settlement or clachán centred on the medieval Aglish Church (pre-1700; demolished, pre-1840). The owners of Aglish Mews wished to convert and connect a barn to the dwelling house, by means of a connecting room. The upgrade also included new service run to a new septic tank. No archaeological finds or features were exposed during the works.

CURRAGHMARTIN Testing; enclosure and other features 20E0623

Archaeological test-excavation was carried out from 23 to 26 November 2020 at Curraghmartin, Mooncoin, Co. Kilkenny on behalf of PNG Energy Ltd. as part of on-going archaeological mitigation in respect of Condition 17 of the grant of planning pertaining to a ground mounted solar development on agricultural land (Planning Ref. 16/193).

Test-excavation was informed by a geophysical survey, undertaken in accordance with detection device consent no. 20R0209 (Shanahan & Greiner, October 2020). The geophysical survey produced strong evidence for sub-surface archaeological remains at the site, notably a potential circular enclosure at the northeast limit of the site, evidence of historic field systems and areas of concentrated magnetic response. A total of 21 test trenches were excavated across the site.

The combination of geophysical survey and archaeological test-excavation confirmed the presence of a bi-vallate enclosure in the northeast limits of the site. Test-trenches also confirmed the presence of a number of possibly archaeological linear cuts as well as plough furrows across the site. A number of sub-circular and sub-oval cuts and charcoal-rich deposits were also found, some of which may be archaeological in origin, and which can only be confirmed through excavation.

A small quantity of finds was retrieved as a representative sample of the nature of the material present in the sod and topsoil layer at the site. The retrieved assemblage includes pottery sherds, clay pipe stem fragments, glass shards, occasional fragmented metal and 2 x flint fragments; the latter were recovered exclusively in the topsoil layer above the location of the circular enclosure at the northeast limit of the site.

CURRAGHMARTIN Kiln and pits 20E0623 ext.

Targeted archaeological test trenches were excavated here in November 2020. A potential circular enclosure recorded during an earlier geophysical survey (20R0209) at the northeast limit of the site was identified in Trench 1 as a bi-vallate enclosure with an outer, U-shaped ditch measuring 3m in width and 1.66m in depth, and an inner ditch measuring 0.5m in width. An area of concentrated magnetic response was investigated in Trench 12, which identified linear cuts and fills and a possible pit feature, all containing charcoal.

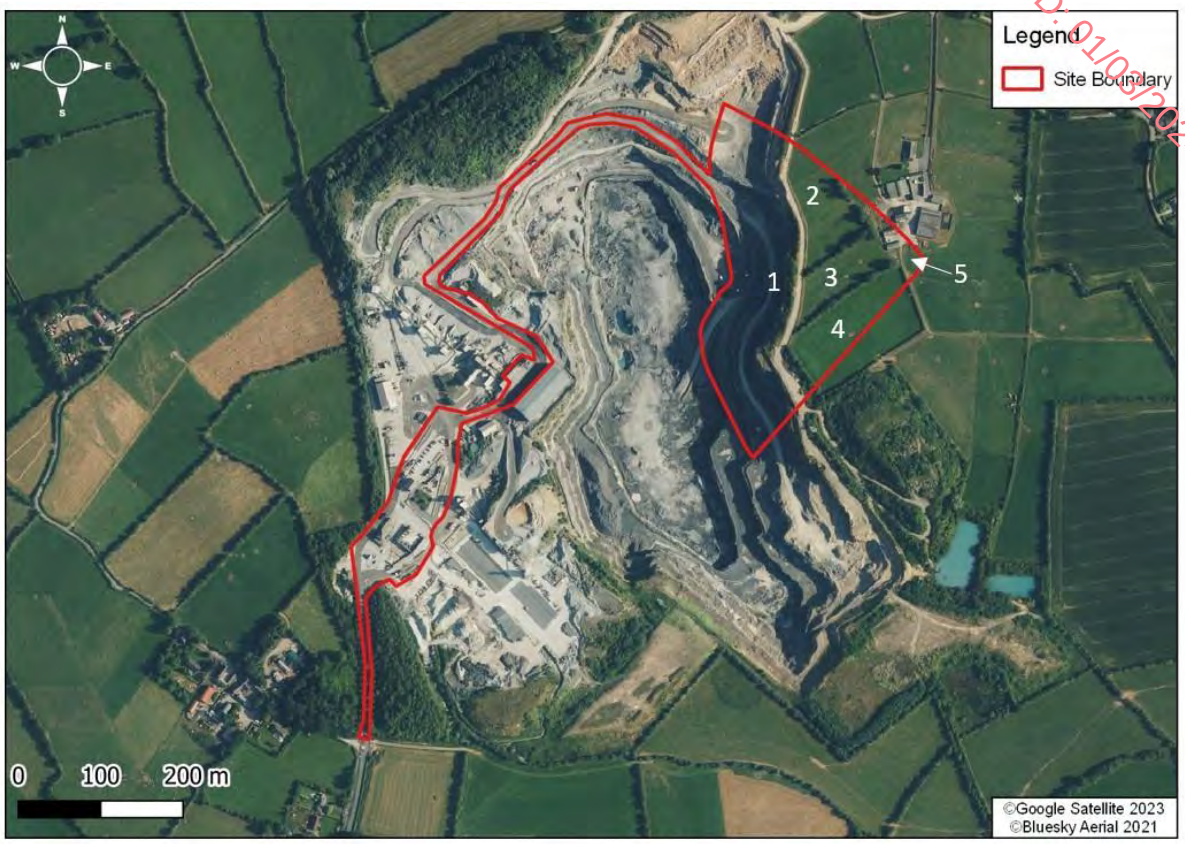
Following the identification of these features during testing, excavations were conducted from 28 February to 15th March 2022 to archaeologically resolve and preserve by record features identified in Trench 12 during testing. An area measuring 20m x 20m was stripped of topsoil under constant archaeological supervision in February 2022. Three (3No.) features of archaeological interest were uncovered, recorded and fully excavated. These features appear to represent kiln activity, the exact date and nature of which is as yet unclear. No archaeological objects were recovered during the course of the excavations. Environmental samples were recovered which are proposed for further analysis.

In addition to the excavation of the previously identified features, monitoring of all groundworks associated with ground investigation trial pits, the construction of an approach road, a temporary works compound, access roads, substations and cable trenches was also undertaken from June 2021 to August 2022. A feature containing charcoal and burnt stones was observed in the section of one (1No.) of the cable trenches in the western extent of the site ca.57m southwest of the previous excavation area. This feature was recorded and samples retained.

13.3.4.8 Field Inspection

A field inspection was carried out on the 8th December 2023. This involved an inspection of all the lands in the Site (see Figure 13-1 and 13-4).

Figure 13-4: Aerial photo of the Site (indicated with the red line) with the fieldwork areas numbered.



Area 1

Area 1 is the Quarry that has already been extracted (see 13-4). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Area 2

Area 2 is a rectilinear shaped area of gently southeast-sloping pasture, enclosed by hedgerow with trees and fences (see Plate 13-14). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 13-14: View of Area 2, looking northwest

Area 3

Area 3 is rectilinear-shaped area of northeast sloping pasture, enclosed by hedgerow with mature trees (see Plate 13-15). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 13-15: Panoramic View of Area 3, looking west.

Area 4

Area 4 is the northwest part of a rectilinear-shaped area of northeast sloping pasture, enclosed by hedgerow with some mature trees (see Plate 13-16). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 13-16: Panoramic View of Area 4, looking southwest

Area 5

Area 5 is a small area in the northwest part of a field of east sloping pasture, enclosed by fences (see Plate 13-17). There is no visible indication of any archaeological, architectural or cultural heritage material at ground level.

Plate 13-17: View of Area 5, looking north

13.4 Characteristics and Potential Effects of the Proposed Development.

There will be no direct or indirect effects on any known items of archaeology, buildings of architectural heritage significance, or cultural heritage in the Site or the vicinity during the construction and operational phase of the Proposed Development.

No interaction with other impacts has been identified as part of the assessment of effects arising from the Proposed Development. In the worst-case scenario, soil stripping in Areas 2, 3, 4 and 5 has the potential to have a permanent significant, irreversible, total, negative/adverse impact on previously unknown subsurface archaeological deposits or artefacts without preservation by record taking place. No worst-case scenario has been identified at closure stage.

In the case of a do-nothing scenario, if the Proposed Development were not to proceed, the proposed extension area would remain in agricultural use and any potential unidentified subsurface archaeological remains would remain intact. There would be no negative effect on archaeology, buildings of architectural heritage significance, or cultural heritage.

13.5 Proposed Mitigation Measures and / or Factors

Due to the potential survival of previously unknown sub-surface archaeological deposits or finds within the Site in areas 2, 3, 4 and 5 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.

13.6 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.

13.7 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.

13.8 Indirect Effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout this chapter.

13.9 Residual Effects

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.

13.10 Monitoring

No additional monitoring, other than that required for mitigation, will be required.

13.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

13.12 Difficulties Encountered

No difficulties were encountered during the desktop study, field survey or in the preparation of this report.

14 MATERIAL ASSETS – TRAFFIC AND TRANSPORT

14.1 Introduction

PMCE Ltd. were commissioned by Malone O'Regan Environmental Services Ltd., on behalf of Roadstone, to undertake an assessment of the traffic impacts associated with the proposed extension at the Quarry in Granny, Co. Kilkenny.

In preparing this chapter, reference was made to the following documents:

- "*Traffic and Transport Assessment Guidelines*" published by Transport Infrastructure Ireland (TII) [151]*;*
- *"Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections"* (October 2021) published by TII [152];
- *Project Appraisal Guidelines for National Roads Unit 16.1 - Expansion Factors for Short Period Traffic Counts* published by TII [153];
- Traffic Count Survey Data, collected by Traffinomics;
- Document DN-GEO-03031 - "*Rural Road Link Design*," published by TII [154];
- Document DN-GEO-03060, "*Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade-separated and compact grade-separated junctions)"* (June 2017) published by TII [155]; 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. This chapter determines and quantifies the extent of existing and / or additional trips generated by the Proposed Development, and the impact on operational performance of such trips on the local road network.

14.2 Methodology

14.2.1 Desktop Review

The methodology adopted for this appraisal involved, in brief:

- A Site visit on the 29th November 2023, at which time the weather was dry, and the road surface was wet;
- 12-hour (7am – 7pm) manual classified Junction Turning Count (JTC) surveys carried out by Traffinomics on the 7th November 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 (2No.) 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 (2No.) future assessment years, the opening year +5 (2029) and the opening year +15 (2039).

14.3 Receiving Environment

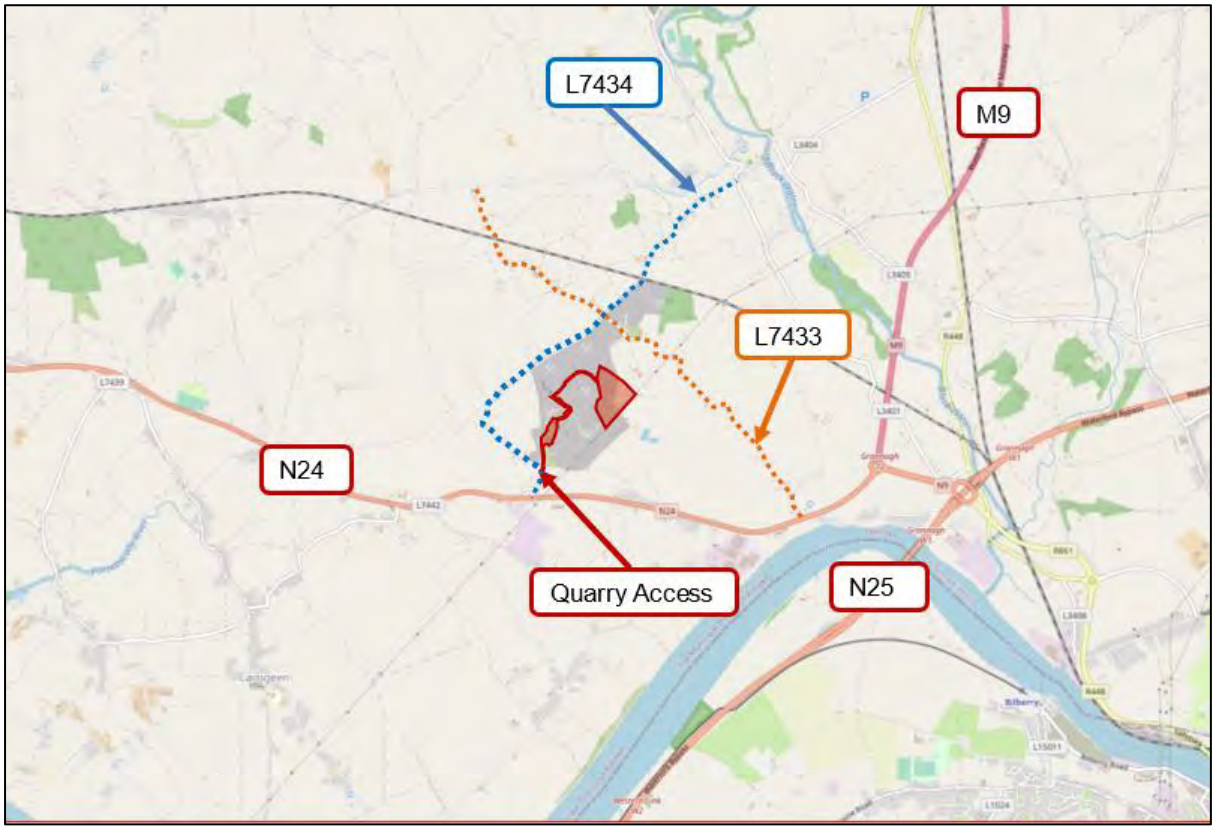
14.3.1 Site Location

Figure 14-1 shows the Site, Quarry and surrounding road network.

The Quarry is located on the L7434 local road in Granny, Co. Kilkenny north of its junction with the N24 national road which is located approximately 2.5km from the Grannagh roundabout where the M9 motorway terminates / commences.

The Quarry comprises an area of ca.62.07ha within which is a permitted extraction area of ca.22.5ha. The Site is ca.10.3ha in size and spans the Site entrance and internal haul roads, a portion of the existing extraction area and greenfield lands to the east. All Site related traffic will enter the Site via the Quarry entrance on the L7434, which includes a mini-roundabout junction to the south. The mini-roundabout forms a junction of the Quarry access and the L7434 local road. Existing permitted development traffic volumes will not increase as a result of the Proposed Development.

Figure 14-1: Location Plan (Source: www.openstreetmap.org)



14.3.2 Description of Local Roads and Infrastructure

14.3.2.1 L7434

The Quarry access is located on the L7434 local road. The L7434 is 8m wide at the Quarry access. The L7434 turns west at the access and narrows in cross section as it continues away from the Quarry access. The access joins the L7434 at a mini-roundabout, located on

a 90° bend in the horizontal alignment. There are currently no proposals to modify the existing access.

There is a footpath on the eastern side of the carriageway, which extends south to the N24.

The Quarry traffic reaches the Quarry access mini-roundabout through the L7434 north of its junction with the N24. However, the L7434 / N24 junction is a junction of the public road network. Therefore, this junction serves other residential and agricultural properties along the L7434 continuing west of the quarry mini-roundabout.

Plate 14-**1: L7434 Local Road Looking North**

14.3.2.2 N24

The N24 national road runs in an east-west direction, extending west from its junction with the M9 motorway at Grannagh roundabout, and continuing to junction 29 of the M7 motorway where it terminates.

In the vicinity of its junction with the L7434 the N24 is a two-way single carriageway road with hard shoulders. The N24 carriageway is approximately 10m wide including hard shoulders and has a 3m wide right turn lane at its junction with the L7434, refer to Plate 14-2 for context.

Plate 14-2: N24 National Road Looking West

A future strategic scheme, the 'N24 Waterford to Cahir Project', is currently being developed on the N24 National Road, which is being led by Kilkenny County Council in partnership with Tipperary County Council, Transport Infrastructure Ireland (TII), and the Department of Transport.

This strategic project proposes to connect major ports as well as a number of urban centres between Limerick and Waterford. The study area under consideration is approximately 60km in length, extending from the M8 (Junction 10) in Co. Tipperary, to the southern terminal of the M9 Dublin to Waterford motorway in Co. Kilkenny.

At the time of this Traffic and Transport Assessment, the project was still at an early stage (i.e. Phase 2, route option selection). As such, it has not been possible to undertake a forensic assessment of any impacts that may be generated by the strategic project in relation to the Proposed Development. However, as stated in Section 1.4, the public display of the preferred transport solution (option) was published on the 23rd January 2024. The preferred transport solution is to upgrade the existing N24 corridor to the south of the Quarry (presented as the management option corridor in Figure 1-5 and 1-6) and will not affect the Site.

14.4 Characteristics and Potential Effects of the Proposed Development

14.4.1 Existing and Proposed Traffic Conditions

A 12-hour classified Junction Turning Count (JTCs) was undertaken on Tuesday 7th November 2023 at the following locations:

- The Quarry Access/L7434 mini-roundabout junction;
- The L7434/N24 junction;
- The L7433 crossroads junction with the secondary site access; and,

- The L7434/L7433 crossroads junction.

Each of the traffic counts were carried out between 7:00am and 7:00pm, with this time period including the peak hours on the adjacent road network. Surveyed vehicles were broken down into five (5No.) 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 Appendix B of the Traffic and Transport Assessment which accompanies this EIAR. The morning and evening peak hours have been established as follows:

- Mini-roundabout Junction of the L7434 and the quarry main access (referred to as the 'Quarry mini-roundabout' in this report) – 07:30 to 08:30 (AM Peak) and 14:30 to 15:30 (PM Peak);
- 3-Arm T-Junction of the L7434 and the N24 (referred to as the 'N24 Junction' in this report)– 07:30 to 08:30 (AM Peak) and 16:30 to 17:30 (PM Peak);
- 4-Arm Crossroads Junction of the L7433 and the quarry secondary access (referred to as the 'Quarry Crossroads' in this report)– 08:45 to 09:45 (AM Peak) and 16:00 to 17:00 (PM Peak); and,
- 4-Arm Crossroads Junction of the L7434 and the L7433 (referred to as the 'L7434 Crossroads' in this report) – 07:45 to 08:45 (AM Peak) and 16:45 to 17:45 (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). Appendices A to C of the above document were used in the expansion of traffic counts to AADT's.

A combined factor of 0.851 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 a Weekly Average Daily Traffic (WADT) using an index of 0.98 for the Tuesday traffic count. Finally, this was converted to AADT using an index of 1.01 for the month of November. These factors were used to calculate the AADT for each of the four (4No.) junctions.

The resulting AADT figures at each junction are provided below in Tables 14-1, 14-2, 14-3 and 14-4.

Table 14-1: Estimated AADTs at Junction 1 – (N24 Junction)

Hour Ending	N24 (West)	L7434	N24 (East)
8:00	873	84	919
9:00	798	68	840
10:00	619	76	673
11:00	505	76	559
12:00	496	78	544

Hour Ending	N24 (West)	L7434	N24 (East)
13:00	576	73	604
14:00	606	69	637
15:00	664	76	688
16:00	690	76	738
17:00	871	61	898
18:00	878	70	906
19:00	725	34	741
Period Total	**8,301**	**841**	**8,752**
Period Total HGVs	**1,079**	**558**	**1,487**
% HGVs	**13.00%**	**66.35%**	**16.99%**
Total AADT	**9,655**	**979**	**10,180**

Table 14-2: Estimated AADTs at Junction 2 – (Quarry Mini-Roundabout)

Hour Ending	L7434 (South)	L7434 (West)	Quarry Access
8:00	82	47	39
9:00	66	37	31
10:00	73	39	36
11:00	74	35	41
12:00	75	41	36
13:00	67	37	34
14:00	65	34	31
15:00	74	37	37
16:00	71	30	41
17:00	61	25	36
18:00	69	32	41
19:00	32	15	23
Period Total	**809**	**409**	**426**
Period Total HGVs	**556**	**285**	**287**
% HGVs	**68.70%**	**69.70%**	**67.40%**

Total AADT	**941**	**476**	**496**

Table 14-3: Estimated AADTs at Junction 3 – (Quarry Crossroads)

Hour Ending	L7433 (West)	Quarry Secondary Access (North)	L7433 (East)	Quarry Secondary Access (South)
8:00	3	0	3	0
9:00	3	0	3	0
10:00	6	0	6	0
11:00	2	0	2	0
12:00	1	0	1	0
13:00	2	0	2	0
14:00	3	0	3	0
15:00	1	0	1	0
16:00	4	0	4	0
17:00	9	0	9	0
18:00	4	0	4	0
19:00	3	0	3	0
Period Total	**41**	**0**	**41**	**0**
Period Total HGVs	**7**	**0**	**7**	**0**
% HGVs	**17.10%**	**-**	**17.10%**	**-**
Total AADT	**48**	**0**	**48**	**0**

Table 14-4: Estimated AADTs at Junction 4 – (L7433 Crossroads)

Hour Ending	L7434 (South)	L7433 (West)	L7434 (North)	L7433 (East)
8:00	6	5	8	3
9:00	3	8	8	3
10:00	5	5	12	6
11:00	2	7	5	2
12:00	2	6	5	1
13:00	5	6	9	2
14:00	5	8	12	3
15:00	6	8	11	1

Hour Ending	L7434 (South)	L7433 (West)	L7434 (North)	L7433 (East)
16:00	4	10	10	4
17:00	5	6	10	9
18:00	5	9	8	4
19:00	5	8	8	3
Period Total	**53**	**86**	**106**	**41**
Period Total HGVs	**8**	**8**	**9**	**7**
% HGVs	**15.10%**	**9.30%**	**8.50%**	**17.1%**
Total AADT	**62**	**101**	**124**	**48**

14.4.2 Trip Generation

The Quarry currently extracts between 700,000 – 1,000,000 tonnes of limestone, which is processed and removed from the Quarry annually, and it is not proposed to increase these current extraction rates. The Quarry also produces a variety of products including a range of aggregates, readymix concrete, concrete blocks, and black top. The average figure for all existing operations at the Quarry is 125 loads (125 inbound trips and 125 outbound trips) per day (includes ancillary, manufacturing activities and waste recovery facility). The Proposed Development will maintain existing production levels over the life of the Quarry, with no increase in traffic levels anticipated.

To account for possible variations in the average operating figure for the Quarry, it is considered prudent to assess a worst-case scenario to accommodate periods where demand for the Proposed Development, ancillary and manufacturing activities and waste recovery facility occurs in concentrated peaks. To reflect this scenario, the traffic modelling assessment undertaken is based upon the Quarry facilitating 250 loads per day, which is an additional 125 loads above the average rate, the highest possible rate of extraction that is likely to be experienced at the Quarry. The 'worst-case' scenario equates to a total of 500 trips (i.e. 250 inbound trips and 250 outbound trips) from the Quarry.

The Quarry will continue to employ 15-20 staff members and it is not anticipated that these numbers will increase as a result of the Proposed Development. Staff movements will generate 30 peak hour trips, 15 inbound trips in the morning peak and 15 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.

A total of 20 trips (10 inbound trips and 10 outbound trips) has been assumed to occur daily to cater for possible miscellaneous trips associated with the Quarry. These miscellaneous trips also allow for operations meetings, site inspections, maintenance operations for plant and machinery, etc. It is not considered that these trips would coincide with either peak hour.

14.4.3 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 turn around 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 14-5 contains a summary of an assumed 'worst case scenario' number of trips associated with the Quarry and the Proposed Development.

The figure of 250 loads per day (which is double the average 125 loads per day) was used to calculate the 'worst case scenario' total predicted daily trips. Using the figure of 250 loads per day (and staff and miscellaneous trips), the total amount of trips resulting from the 'worst case scenario' is expected to be in the order of 550 based on the figures used for the trip distribution that has been applied to the development traffic as part of the junction capacity analysis.

Table 14-5: Summary of Predicted Daily Trips in Opening Year and Beyond

Type of Traffic	Daily Trip	
	Arrivals	Departures
Quarry Operations (HGVs)	250	250
Staff (LVs)	15	15
Misc (LVs)	10	10
Total	275	275

14.4.4 Trip Assignment

The distribution of the 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 14-2 and 14-3.

Figure 14-2: Assignment of Development Traffic throughout the Adjacent Road Network (HGVs)

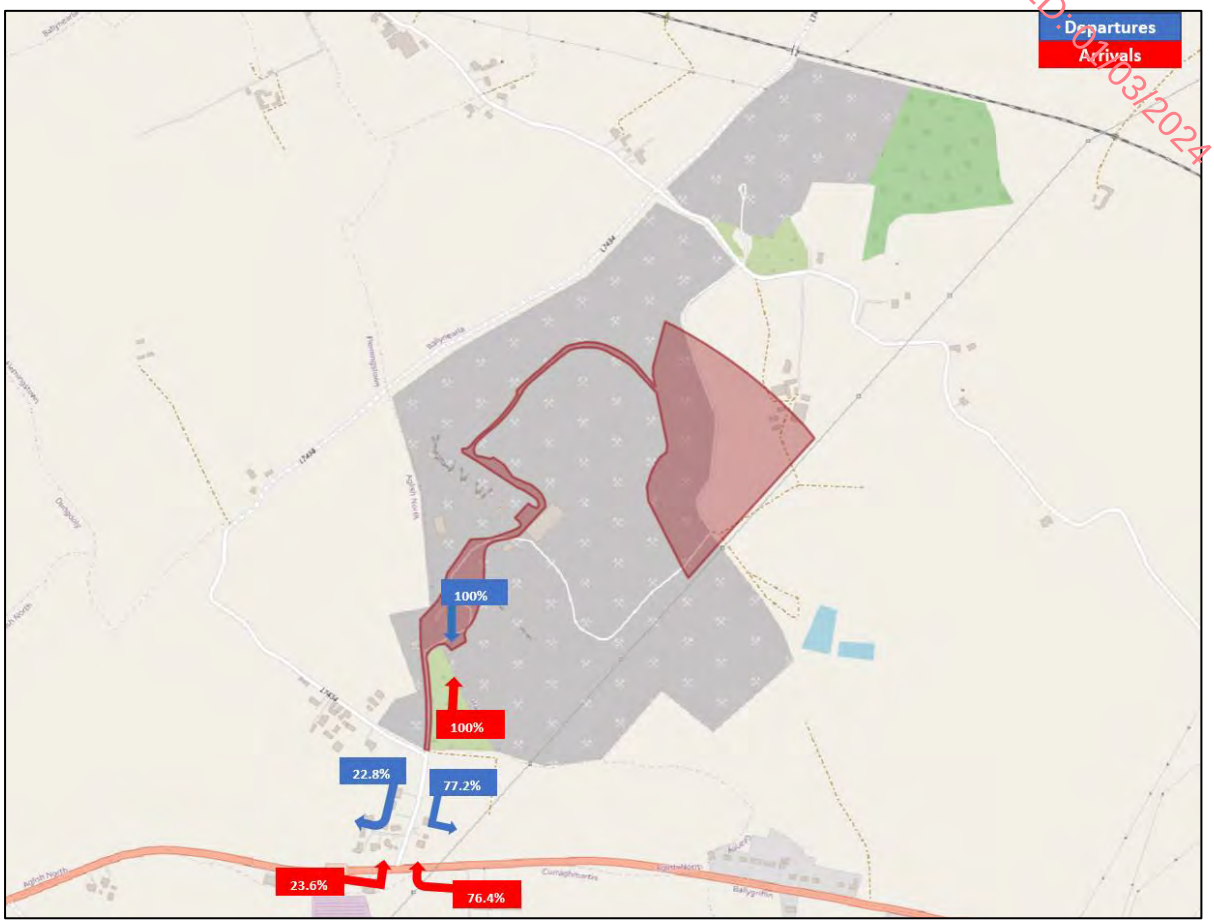
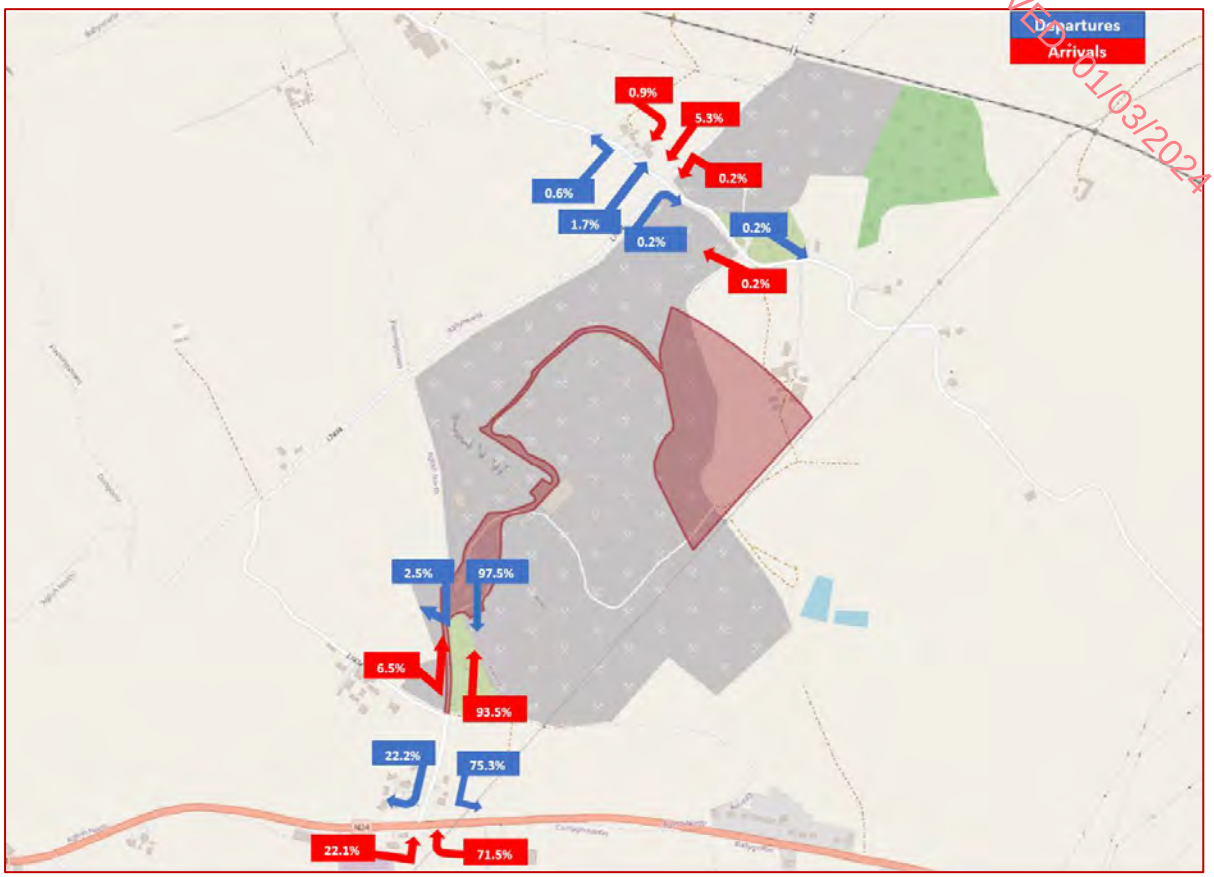


Figure 14-3: Assignment of Development Traffic throughout the Adjacent Road Network (LVs)



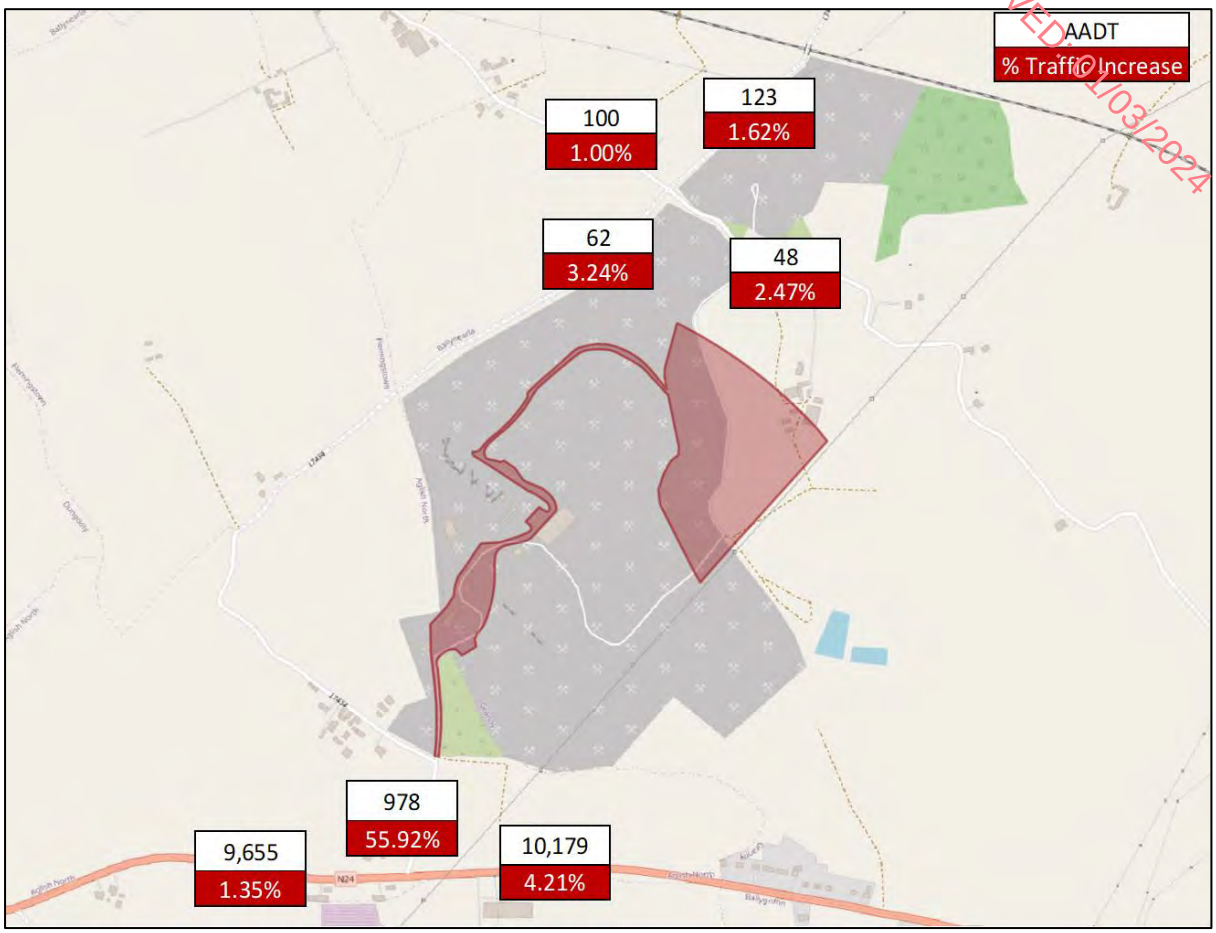
14.4.5 Scope of Assessment

The operations at the Quarry, result in an increase in the traffic volumes at junctions within the surrounding road network in the vicinity of the Site.

Section 2.1 of the "Traffic and Transport Assessment Guidelines," published by Transport Infrastructure Ireland recommends that in an urban or congested setting that 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 14-4 outlines the distributed development traffic as a percentage of the background traffic on the adjacent road network.

Figure 14-4: AADT and Development Traffic as a Percentage of Existing Traffic



As shown in Figure 14-4, the development traffic is indicated as exceeding 5% of the background traffic on the L7434 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 L7434 and at junctions where the L7434 forms an intersecting arm [151].

In summary, a link capacity assessment has been undertaken on the L7434 while a junction capacity analysis has been undertaken at the following junctions:

- L7434/Quarry mini-roundabout Junction; and,
- L7434/N24 Junction

14.4.6 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 [152].

Table 14-6 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 14-6: Future Year Traffic Growth Figures (County Kilkenny)

Year	Low Growth		Central Growth		High Growth	
	LV	HV	LV	HV	LV	HV
2016 – 2023	1.0108	1.0253	1.0124	1.0268	1.0157	1.0302
2030 - 2040	1.0016	1.0109	1.0037	1.0129	1.0075	1.0166

14.4.7 Link Capacity Assessment

The TII Publications document reference DN-GEO-03031 provides guidance on recommended rural road layouts in its Table 6-1 [154]. It advises that the capacity of a Type 3 Single Carriageway road with 6.0m cross section is 5,000 AADT for a Level of Service D. The L7434, adjacent to the Quarry, has an average cross section width of approximately 6m with no hard shoulders present. Therefore, the L7434 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 1-7, 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 L7434 will operate within capacity for each of the assessment years.

Table 14-7 indicates that the traffic associated with the Proposed Development represents between 53.87% and 48.51% of the total traffic on the L7434 during the assessment years 2023 to 2039.

Table 14-7: Combined AADT for each Assessment Year on the L7434

Traffic Type	Assessment Year			
	2023	2024	2029	2039
Background Traffic	461	471	527	584
Additional Development Traffic	-	550	550	550
Combined Traffic (Background + Additional Dev. Traffic)	461	1,021	1,077	1,134
Additional Traffic as % of Combined Traffic	-	53.87%	51.09%	48.51%

14.4.8 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 extension 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 ±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, in a given time period, exceeds the theoretical capacity 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 fall 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.

14.4.8.1 Location 1: N24 Junction

A summary of the junction capacity analysis results for N24 Junction are shown in Table 14-8. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2024, 2029 and 2039.

Table 14-8: Summary of Traffic Analysis at N24 Junction

Stream(s)	12 Hours (07:00 – 19:00)			
	Queue (Veh)	Delay(s)	RFC	LOS
Stream	**2024 With Development**			
7434- N24 (East)	0.3	16.21	0.22	C
7434- N24 (West)	0.2	25.82	0.15	D
N24	0.4	14.80	0.28	B
Stream	**2024 Without Development**			
7434- N24 (East)	0.2	14.42	0.16	B
7434- N24 (West)	0.1	19.71	0.11	C
N24	0.2	12.25	0.14	B
Stream	**2029 With Development**			
7434- N24 (East)	0.3	17.25	0.24	C
7434- N24 (West)	0.2	28.52	0.14	D
N24	0.4	15.81	0.30	C
Stream	**2029 Without Development**			
7434- N24 (East)	0.2	15.27	0.18	C
7434- N24 (West)	0.2	21.70	0.12	C
N24	0.2	12.91	0.16	B
Stream	**2039 Without Development**			
7434- N24 (East)	0.4	18.36	0.27	C
7434- N24 (West)	0.2	31.41	0.19	D
N24	0.5	16.84	0.33	C
Stream	**2039 Without Development**			
7434- N24 (East)	0.3	16.16	0.21	C
7434- N24 (West)	0.2	23.82	0.14	C
N24	0.2	13.68	0.19	B

14.4.8.2 Location 2: Mini-Roundabout

A summary of the junction capacity analysis results for this junction are shown in Table 14-9. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2024, 2029 and 2039.

Table 14-9: Summary of Junction Capacity Analysis at Quarry mini-roundabout

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	**Delay(s)**	**RFC**	**LOS**
Stream	**2024 With Development**			
L7434 (South)	0.2	6.49	0.16	A
L7434 (West)	0.0	7.49	0.02	A
Quarry Access	0.1	4.36	0.07	A
Stream	**2024 Without Development**			
L7434 (South)	0.1	7.36	0.10	A
L7434 (West)	0.0	7.42	0.02	A
Quarry Access	0.0	0.00	0.00	A
Stream	**2029 With Development**			
L7434 (South)	0.2	6.55	0.18	A
L7434 (West)	0.0	7.51	0.02	A
Quarry Access	0.1	4.36	0.07	A
Stream	**2029 Without Development**			
L7434 (South)	0.1	7.44	0.11	A
L7434 (West)	0.0	7.44	0.02	A
Quarry Access	0.0	0.00	0.00	A
Stream	**2039 Without Development**			
L7434 (South)	0.2	6.64	0.19	A
L7434 (West)	0.0	7.53	0.02	A
Quarry Access	0.1	4.36	0.07	A
Stream	**2039 Without Development**			
L7434 (South)	0.1	7.53	0.13	A
L7434 (West)	0.0	7.45	0.02	A
Quarry Access	0.0	0.00	0.0	A

14.4.9 Parking

The parking provision is considered sufficient to accommodate the number of staff (ca.15-20) working onsite, as well as any visitors to the Site, when required.

14.4.10 Sightlines

The existing quarry entrance forms the northern arm of a three-arm mini-roundabout junction, with the L7434 forming the southern and western arms. Visibility to the mini-roundabout is acceptable from each of three (3No.) approaching arms, with on-going vegetation removal/cutback provided to maintain sightlines.

As noted earlier in the report, Quarry traffic will continue to use the existing mini-roundabout junction layout without amendment. However, the mini-roundabout markings shall be fully refreshed, and the Stop sign at the quarry access, which is currently missing, shall be replaced.

14.4.11 Public Transport

There are no existing public transport provisions in place in the vicinity of the Site.

14.4.12 Pedestrians & Cyclists

There is a footpath on the eastern side of the carriageway from the Quarry access to the N24 national road however the kerb is damaged and has failed in a number of locations. This footpath terminates at the N24 national road. There are no pedestrian or cycle facilities along the N24 national road at this location. There are no designated cycle facilities on the N24 national road or the L7434 local road.

14.4.13 Assessment Conclusions

The following conclusions have been determined:

- Link capacity analysis was carried out on the L7434, 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 Quarry mini-roundabout and the N24 junction, 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 an imperceptible impact on traffic flows on the existing road network due to the relatively low volumes of traffic being generated by the Proposed Development;
- That visibility to the mini-roundabout from each arm will remain unchanged, with quarry traffic continuing to use the existing mini-roundabout junction layout without amendments. On-going vegetation removal/cutback shall be provided to maintain sightlines at the mini-roundabout junction; and,
- The parking provision at the Quarry is sufficient to meet the required demand.

14.5 Proposed Mitigation Measures and / or Factors

14.5.1 Mitigation and Management

Following the link, and junction, capacity assessments, the trips associated with the operation of the proposed extension at the Quarry, were found to have an imperceptible effect on the link capacity of the L7434, and the junction capacity of the quarry mini-roundabout access and the N24 junction.

The effect of the Proposed Development, in relation to road safety and the existing road infrastructure, was also determined to be imperceptible.

However, fresh line markings at the mini-roundabout, on-going vegetation removal, and power washing the footway at the mini-roundabout were identified as measures that will maintain the quality of infrastructure at the quarry access.

The indirect effects of the Proposed Development on the surrounding road environment are deemed to be imperceptible.

14.6 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 Site 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.

14.7 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

14.8 Indirect Effects

There have been no significant or likely indirect effects identified outside of those previously assessed throughout the chapter.

14.9 Residual Effects

The residual effects of the Proposed Development on the surrounding road environment are deemed to be imperceptible.

14.10 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 impact from the Proposed Development.

14.11 Reinstatement

The Site will be subject to a Restoration Plan following the cessation of extraction onsite. Details of the Restoration Plan are included in Appendix 6-1.

14.12 Difficulties Encountered

There were no particular difficulties encountered during the compilation of this chapter.

15 MATERIAL ASSETS – NATURAL RESOURCES AND WASTE

15.1 Introduction

This chapter of the EIAR provides a description and assessment of the potential, likely and significant effects of the Proposed Development on natural resources and waste infrastructure.

15.2 Methodology

The following plans and reports were consulted in order to prepare this chapter of the EIAR including:

- The Irish Concrete Federation Essential Aggregates – Providing for Ireland's Needs to 2040 [25]
- IEMA Guide to: Material and Waste in Environmental Impact Assessment [156]
- The Southern Region Waste Management Plan (WMP) 2015-2021 [157]

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. [158] 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 [158] 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 Southern 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: Scoping of Effects - Construction / Operational Phase

Project Phase	Effect	Scoped in / out
Construction	Changes in demand for materials	Out
	Changes in baseline waste arisings	Out

Project Phase	Effect	Scoped in / out
	Changes in available landfill capacity	Out
	Changes to an allocated mineral site	Out
Operational	Changes in availability of materials	In
	Changes in baseline waste arisings	Out
	Changes in landfill capacity	Out
	Changes in soil and stone capacity	Out

During the construction phase of the Proposed Development, minimal waste is expected. Demolition of two (2No.) agricultural sheds and one (1No.) pumphouse will occur, with concrete to be sent to the waste facility in the Quarry. Any remaining demolition materials, such as steel and wood, will be sent to a C&D recycling facility. No construction compound will be needed, as personnel will utilise existing facilities within the Quarry, including the carpark, canteen, and welfare facilities. No off-site soil removal will be completed during construction, with excavated topsoil utilized for constructing boundary berms.

Similarly, during the operational phase, no significant waste is anticipated as pre-existing operations continue without major changes.

Therefore, the construction phase of the Proposed Development is expected to generate minimal materials and waste, resulting in imperceptible impacts on material availability and landfill capacity. These aspects have been scoped out from detailed consideration due to their insignificance. Similarly, during the operational phase, the Proposed Development will maintain ongoing operations with minimal material requirements and waste generation, primarily limited to fuel for plant and equipment. Consequently, changes in baseline waste generation, landfill capacity, and soil and stone capacity have been scoped out from assessment. However, the Proposed Development is anticipated to enhance material availability, and this aspect has been scoped in.

15.2.3 Defining the Effect Threshold

Using baseline and assessment data and forecasts, an assessment of a development's effects (the magnitude of change on sensitive receptors) can be undertaken to allow the effects (the consequences) to be identified and its significance evaluated [156]. The potential for significant environmental effects is determined by considering the scale and nature of effects within the context of the sensitivity of receptors affected [156].

A summary of the effect thresholds in this assessment is provided in Table 15-2.

Table 15-2: Effect Thresholds Utilised for Waste and Use of Natural Resources [156]

	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

	Magnitude of Impact					
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

15.3 Receiving Environment

The Irish Government introduced Project Ireland 2040 in February 2018, outlining a comprehensive national plan for infrastructure investment spanning the next two decades. Project Ireland 2040 is discussed in more detail in Chapter 2.

Following the launch of Project Ireland 2040, the Irish Concrete Federation released the report "Essential Aggregates: Providing for Ireland's Needs to 2040" [25]. 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 ten (10No.) essential points as follows:

1) 'Ireland has abundant natural reserves of high quality aggregates (stone, sand and gravel).
2) *These Aggregates are the essential raw materials from which Ireland's future infrastructure will be built, including our homes, offices, schools, hospitals and transport network.*
3) *Aggregates can only be accessed where they occur. Currently there are approximately 500 large commercial quarries extracting aggregates throughout Ireland.*
4) *The supply of local aggregates is essential to the sustainable development of Irish communities. Local supplies of raw materials reduce transport distances, thereby reducing their carbon footprint compared to non-local sources.*
5) *Current demand for aggregates in Ireland at 12 tonnes per capita is twice the average demand in the EU 28. Project Ireland 2040 will necessitate the production of approximately 1.5 billion tonnes of aggregates.*
6) *Scarcities of some particular aggregate products are already emerging in the eastern and midland regions. Therefore, the future supply of aggregates needs to be planned, monitored and managed in a sustainable manner.*
7) *In recognition of the strategically essential role of aggregates, Ireland needs a National Aggregates Planning Policy to underpin local and regional planning policy.*
8) *To provide for the country's future development, Ireland's strategic reserves of aggregates need to be identified, quantified and protected.*

9) *A robust, effective and efficient planning system for quarries is necessary to ensure that the extraction of Ireland's aggregate reserve is enabled in a sustainable manner. Currently, the average decision making timeframe for quarry planning applications is 76 weeks with some decisions taking in excess of 2 years.*
10) *The state's planning enforcement and procurement functions must ensure that only authorised operators are entitled to supply the marketplace.'*

The Proposed Development is an expansion of an existing quarry into a known aggregate reserve which will help maintain the supply of aggregates within the southeast region particularly for population centres such as Kilkenny and Waterford (ca.5.5km southeast). The Proposed Development will help supply the demand for *"approximately 1.5 billion tonnes of aggregates"* in order to facilitate the goals of Project Ireland 2040.

15.4 Characteristics and Potential Effects of the Proposed Development

15.4.1 Construction Phase

The construction phase of the Proposed Development will have negligible need for additional materials, as the existing infrastructure suffices for the required works. No extra plant or equipment will be necessary, as everything required is already available on-site. The utilisation of equipment during construction mirrors that of the existing development, resulting in no change in the materials needed. Moreover, no additional soils will be required for constructing safety berms, as all excavated soils will be stockpiled and repurposed for this purpose. Consequently, the construction phase is expected to have a negligible impact on material availability.

The construction phase of the Proposed Development will have an imperceptible impact on the waste infrastructure. The welfare facilities in the existing Roadstone premises will be utilised for personnel working in and visiting the Site during this phase of the works. The construction phase will generate a small volume of C&D waste which will be sent to a licensed C&D waste recycling facility. No soils will be removed from the Proposed Development during the construction phase. All soils removed will be stockpiled and used to construct safety berms around the Site.

15.4.2 Operational Phase

During the operational phase of the Proposed Development, approximately 7,590,000 tonnes of aggregates are expected to be generated over its lifespan. This will contribute to increased availability of aggregates in the region, aligning with the objectives of Project Ireland 2040, which aims to address the demand for "*approximately 1.5 billion tonnes of aggregates*". The additional availability from the Proposed Development constitutes approximately 0.008% of the required volume for Project Ireland 2040. Overall, the impact of the operational phase on material availability is deemed to be neutral positive.

15.5 Proposed Mitigation Measures and / or Factors

The Proposed Development aims to utilise existing welfare amenities at the Site to mitigate potential impacts during the construction phase.

The limited volume of anticipated Construction and Demolition (C&D) waste will be sent to a licensed Recycling Waste Facility. Comprehensive records of waste transfer dockets and gate receipts will be maintained.

An Environmental Management System will be developed for the Operational Phase of the Project.

15.6 Cumulative and in Combination Effects

There are no additional cumulative and in-combination effects beyond those described above.

15.7 Interactions with other Environmental Attributes

The other environmental factors with which natural resources and waste interacts include:

- Chapter 7 – Land, Soils and Geology: The aggregates being produced will have an effect on the geology which has been considered in Chapter 7.
    - The use of aggregates and excavated soils during the construction phase will impact on local geology in terms of extraction.
- Chapter 8 – Water (Hydrogeology and Hydrology): The interaction of waste with water is discussed in Chapter 8 of this EIAR.
    - Pollution arising from improper or badly planned waste disposal can result in water pollution. Responsible waste management practices, detailed above, will protect the hydrological environment.

15.8 Indirect Effects

All significant and likely effects have been considered in this chapter. No additional indirect effects were identified during this assessment.

15.9 Residual Effects

Considering the direct and cumulative effects and mitigation measures, the residual effect on the natural resources and waste infrastructure, associated with the Proposed Development will be not significant.

15.10 Monitoring

Waste records will be kept during both the construction and operational phases.

15.11 Reinstatement

Reinstatement is discussed in Chapter 2

15.12 Difficulties Encountered

No difficulties were encountered in the drafting of this chapter.

16 INTERACTIONS OF THE FOREGOING

The major interactions between the environmental impact topics are assessed within the above chapters of this EIAR. Table 16-1 demonstrates a matrix to summarise the interactions between effects on the various topic areas.

Description	Population and Human Health	Biodiversity	Land, Soils and Geology	Water	Air Quality	Climate	Acoustics	Landscape and Visual	Cultural Heritage	Material Assets - Traffic and Transport	Material Assets - Waste
Population and Human Health		X	✓	✓	✓	✓	✓	✓	✓	✓	X
Biodiversity	X		X	✓	✓	✓	✓	X	X	X	X
Land, Soils and Geology	✓	X		✓	✓	X	X	✓	X	X	✓
Water	✓	✓	✓		X	✓	X	X	X	X	X
Air Quality	✓	✓	✓	X		X	X	X	X	✓	X
Climate	✓	✓	X	✓	X		X	X	X	✓	X
Acoustics (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

Description	Population and Human Health	Biodiversity	Land, Soils and Geology	Water	Air Quality	Climate	Acoustics	Landscape and Visual	Cultural Heritage	Material Assets – Traffic and Transport	Material Assets - Waste
Material Assets – Traffic and Transport	✓	X	X	X	✓	✓	✓	X	X		X
Material Assets – Natural Resources	X	X	✓	X	X	X	X	X	X	X	

Interaction	✓
No Interaction	X

Schedule of Commitments

Commitment
General
All activities will comply with all relevant legislation and documented best practice to reduce any potential environmental impacts. The mitigation measures detailed within this EIAR will be fully adhered to; • The Proposed Development will seek to utilise established ancillary infrastructure, including the wheel wash, weighbridge and offices; • The main construction hours will be from 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturday. No construction works will take place on Sundays and Bank Holidays. No noisy construction works will be permitted outside these hours; • The operational hours will align with the current operational hours at the Quarry which are 07:00 to 20:00 Monday to Friday and 07:-18:00 on Saturday. No works will take place onsite on Sundays or Bank Holidays during the operational phase of the Proposed Development; • The restoration phase will be done in line with a Restoration Plan; • The Site manager shall ensure that all personnel working onsite are trained and aware of the mitigation measures detailed within the EIAR; • A comprehensive Environmental Management System (EMS) will be prepared in accordance with current best practice guidelines, detailing environmental protection and mitigation measures for all phases of the Proposed Development; • Roadstone will notify all residents within 500m from the blast of the proposed blast date and the Gardai will be notified of the time and date of the blast; • The Proposed Development will operate within the currently authorised average of 550 trips per day i.e. 250 outward HGV trips, 15 outward staff trips and 10 outward miscellaneous trips per day); • No fuel will be stored within the Site. Any fuels/oils (and/or lubricants) used at the Site will continue to be stored in the existing bunded tanks in the Quarry; and, • Re-fuelling of mobile plant will continue to take place on an existing hard-standing area immediately adjacent to the bunded fuel storage area.

Biodiversity
<u>General measures</u> The following mitigation measures will be incorporated and adhered to during the Construction, Operation and Rehabilitation Phases at the Site to ensure that the works do not result in contravention of wildlife legislation: • The site manager shall ensure that all personnel working onsite are trained and aware of the mitigation measures detailed within the EIAR; • If protected or notable species are encountered during operations at the Site, works will stop within the area that these animals are identified and the project Ecological Clerk of Works (ECoW) will be contacted for advice; • A Restoration Plan will be implemented following completion of the quarrying activities in order to conserve and, where possible, enhance the areas of retained and created habitat; • 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 to be stripped from the Site, will be reused, where possible, in berms 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 20:00 on Monday to Friday and 07:00 to 18:00 on Saturdays. Therefore, potential impacts to nocturnal species in the area will be limited; • Dust control measures will be implemented as part of ongoing works; • An ECoW will inspect the Site in advance of works commencing and will undertake site inspections as required during the construction works, to ensure that all of the works are completed in line with the measures in this EIAR and wildlife legislation; • If protected or notable species are encountered during operations at the Site, works will stop within the area that these animals are identified, the ECoW will be contacted for advice; • Should unidentified burrows be identified within the works area, the ECoW will be contacted, and advice sought; and, • Ongoing ecological monitoring throughout the life cycle of the Proposed Development will ensure that any protected or notable species will be identified and that appropriate mitigation / preventative actions can be taken.
<u>Proposed Planting</u> • The berms will be planted with the proposed mix outlined in Table 3-1 within the first available planting season (November to March); and,

- And any trees that fail to become established within 5 years of planting will be replaced by trees of a similar size / species within the next planting season.

Protection for Bats

The following measures, outlined in the Bat Report submitted as Appendix 6-2, will ensure that the Proposed Development does not result in any adverse impacts to bats:

- Two (2No.) soil embankments will be planted along the eastern boundary of the Site, which will provide linear habitats for foraging and commuting bats and compensate for the loss of vegetation during the construction phase of the Proposed Development;
- No works are proposed to any buildings identified with bat roost potential as these buildings are located within the portion of the farmyard outside the Site boundary. Any future works to these structures will be subject to the required environmental assessments and mandatory statutory consents;
- No bats were confirmed to be roosting in the seven (7No.) trees with Potential Roost Features (PRF) to be removed. As a precautionary measure, an updated tree inspection will be undertaken to confirm onsite conditions have not changed prior to the removal of these trees. If conditions onsite remain the same, no monitoring in relation to bats will be required. If these trees show evidence of bat activity or an increased potential for supporting roosting bats, updated emergence / re-entry surveys will be undertaken. If bats are found to be roosting within these trees after updated surveys, then further measures will need to be considered in order to protect bats against any disturbance. The NPWS will be consulted for advice and a derogation licence will be obtained if required; and,
- Where possible, the PRF trees and buildings which are to be removed, should be felled / demolished on mild days during the autumn months of October – November or during spring months of February-March (felling during the spring or autumn avoids the periods when bats are most active and without young).

Protection for Nesting Birds

To ensure no impacts occur to nesting birds within the vegetation onsite, the following mitigation measures will be put in place:

- During the construction phase clearance works, as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000, the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated land or in hedges or ditches will be restricted during the nesting and breeding season for birds and wildlife, from 1st March to 31st August;
    - In the event that works need to be undertaken within the main breeding season, this would be undertaken in consultation with the ECoW and NPWS;
    - Prior to the vegetation removal the ECoW will inspect the Site;
    - All vegetation clearance works will be undertaken in a systematic way; and,
- In the unlikely event birds nest within the active working area during the works, all works will stop within the immediate area and the ECoW will be consulted.

Protection for Peregrine Falcon and Sand Martin

- All personnel operating onsite will be made aware of the legal protection afforded to peregrine falcons and sand martin;

- The previous peregrine falcon nest area (identified in 2021 and 2022 surveys) within the Quarry will continue to be monitored for the presence of nesting on an annual basis;
- If peregrine falcons or sand martin are identified colonising any areas to be impacted by the Proposed Development, then works will stop within the identified area. An appropriate undisturbed buffer zone will need to be established for the duration of the breeding season or until the chicks have fledged and left the nest, which will be confirmed by the ECoW; and,
- Should a peregrine falcon or sand martin nest be identified onsite, all personnel operating on the Site will be made aware of the presence and location of the nest.

Protection for Barn Swallows

- The demolition of the two (2No.) agricultural sheds and pumphouse onsite will take place outside of the nesting bird season (1st March to 31st August); and,
- Should demolition works be required within the bird nesting season, an external and internal building inspection will be required to confirm the presence / absence of breeding birds within these buildings. If birds are identified to be nesting within these structures during the building inspection, then all works must cease and the ECoW and NPWS will be consulted.

Protection for 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) onsite and bordering the Site, general construction procedures and mitigation measures, which are in line with the NRA (now TII) [151] guidance for badgers, will be undertaken.

- Should Site clearance works be required outside of daylight hours, the appointed ECoW will be consulted;
- If unidentified burrows are identified within the works area during works, the ECoW will be contacted for advice; and,
- The clearance of dense areas of scrub will be supervised by the ECoW.

Measures for Invasive Species

In order to mitigate against the unintentional introduction of invasive species to the Site during quarrying operations, the following measures will be followed in-line with Objective 2 of the NBAP and the NRA guidelines for the management of noxious weeds and non-native invasive plant species [63]

- All vehicles, machinery and any other equipment that may be used for the works will be washed and clean while being used on the Site to prevent the import of plant material / seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed; and,
- Any vehicles and machinery that are not clean will not be permitted entry to the Site.

Restoration Phase

- The quarry pit will accumulate water after operations cease, forming a new aquatic habitat;
- Bare ground "scrapes" will be created to provide specialized habitat for ground-dwelling invertebrates;
- Emergent and marginal vegetation will be planted around the waterbody's edges. This will foster a self-sustaining plant community in shallow water areas; and,
- The Site will be subject to an updated ecological assessment before implementing the Restoration Plan:

Monitoring

The following monitoring works will be implemented to ensure that the works comply with the recommendations detailed within Chapter 6: Biodiversity of the EIAR:

- An ecological clerk of works (ECoW) will inspect the Site in advance of ground stripping works commencing to ensure that all of the works are completed in line with the EIAR, NIS and CEMP;
- The ECoW will undertake monthly Site inspections as required during the construction works to ensure all works are completed in line with the EIAR, NIS and CEMP;
- The success of the berm planting will be monitored and any trees that fail to become established within 5 years of planting will be replaced by trees of a similar size / species within the next planting season;
- The previous peregrine falcon nest area (identified in 2021 and 2022 within the Quarry) will continue to be monitored for the presence of nesting on an annual basis; and,
- Rehabilitation success monitoring will be undertaken after the cessation of quarry activities onsite. Refer to Appendix 6-1 for further information.

Land, Soils and Geology

Prevention of Contamination of Soil / bedrock from Leakages and Spillages

The operation of the Quarry and yard includes existing management for the control of hydrocarbons and chemical and these already minimise as far as possible the risk of spillage that could lead to ground contamination. Proposed mitigation measures are outlined as follows (much of these are already implemented at the Quarry):

- Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur;
- Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer's recommendations will be implemented;
- All plant and machinery will continue to be regularly serviced before being used on site;
- Refuelling will be completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;

- Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored. This is the case for the existing on site bunds;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel mobile plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills; and,
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill in the quarry floor.

Highest standards of site management will continue to be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during operation of the Proposed Development.

Restoration.

Stockpiled topsoil and subsoil will be used for final restoration, including the creation of protective and screening berms.

Water

Prevention of Downstream Surface Water Quality Effects from Suspended Sediments during Site Preparation Works and Overburden Stripping / Removal

- All surface water arising during the soil stripping works in the extension area will be captured and directed to the existing quarry floor where it will be pumped to the existing settlement ponds for treatment;
- Prior to the commencement of overburden stripping works silt fencing will be placed down-slope of the excavation area along the eastern boundary of the Site; These will be embedded into the local soils to ensure all site water is captured and filtered;
- Surface water will be collected at low points across the soil stripping works area;
- Discharge into the Quarry will occur following settlement treatment in local temporary settlement ponds if required, and any water discharge from these ponds to the quarry floor will be routed through silt bags which will filter any remaining sediment from the pumped water. The entire soil stripping and landscaping works area will be enclosed by a perimeter of double silt fencing;
- Daily monitoring of the overburden stripping/landscaping earthworks will be completed by a suitably qualified person. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter will enter the downstream receiving waters;
- Overburden stripping and landscaping works will be scheduled for periods of low rainfall to reduce run-off and potential siltation;

- Landscaped areas and perimeter berms will be planted with trees and grasses as soon as possible after formation to reduce the potential of surface water erosion;
- Good construction practices such as wheel wash and dust suppression on site roads, and regular plant maintenance will ensure minimal risk to water. The Construction Industry Research and Information Association (CIRIA) provide guidance on the control and management of water pollution from construction sites ('Control of Water Pollution from Construction Sites, guidance for consultants and contractors', CIRIA, 2001), which provides information on these issues. This will ensure that surface water arising during the course of overburden stripping and landscaping activities will contain minimum sediment.
- All water discharged during the construction phase will be subject to monitoring and discharge requirements of the Discharge Licence (ENV/W82).

Protection of Groundwater Level and Quantity in Local Private Wells

While no significant effects on local private wells have occurred to date, mitigation to address any such impacts can be implemented in the following form:

- A new deeper well will be provided at any effected location; and
- An alternative water supply will be provided to the effected property.

Prevention of Release of Hydrocarbons / Chemicals

The operation of the Quarry includes existing management for the control of hydrocarbons and chemical and these already minimise as far as possible the risk of spillage that could lead to surface and groundwater contamination. Proposed mitigation measures are outlined as follows (much of these are already implemented at the Quarry):

- Continued operation and maintenance of the existing bunds and hydrocarbon interceptor will occur;
- Regular maintenance and emptying of the hydrocarbon interceptor as per manufacturer's recommendations will be implemented;
- All plant and machinery will continue to be regularly serviced before being used on site;
- Refuelling will continue to be completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Fuel and oil containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored. This is the case for the existing on site bunds;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel mobile plant on site;

- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill in the quarry floor; and,
- All water discharged during the operational phase will be subject to the monitoring and discharge requirements of the Discharge Licence (ENVW82).

Air Quality

Existing Mitigation Measures:

- A monitoring programme for dust deposition is in place and will continue to be implemented during restoration;
- Optimise timing of operations, particularly in relation to meteorological conditions;
- Stockpiles in general are conditioned with water to minimise dust during dry and windy conditions;
- Siting of stockpiles to take advantage of shelter from wind;
- Overburden mounds are grass seeded and planted to eliminate wind-blown dust;
- Plant is regularly maintained;
- Internal haul roads are compacted and maintained. In addition, optimise separation distances of haul roads to sensitive receptors;
- A water bowser is available to minimise dust during dry and windy conditions;
- Internal haul roads are maintained wet with a water bowser to minimise dust during dry and windy conditions;
- On site speed restrictions (<20 kph) are in place in order to limit the generation of fugitive dust emissions;
- Electronic barrier is in place at wheel wash to prevent lorries passing through;
- Regular cleaning and maintenance of wheel wash;
- Training of new HGV drivers to onsite wheel wash and barrier systems;
- Toolbox talks on dust and importance of the wheel wash onsite;
- A dust sprinkler system is installed from the wheel wash to the quarry entrance;
- A water bowser is available at all times;

- Cleaning regime for the public roads within the quarry vicinity. Increased cleaning to three times a week when quarry is operational;
- During extended period of dry weather the increased usage of the road sweeper every day will be reviewed by the quarry manager; and,
- New road gullies are cleaned twice a year by a road sweeper.

Design Measures

- The majority of works will be completed in the quarry void, below all sensitive receptors. This will provide an enclosed environment for the majority of the works associated with the Proposed Development;
- HGVs exiting the Site will be via the existing wheel wash;
- The peripheries of the quarry void are covered with well-established scrub/treeline, which will provide further screening to sensitive receptors from activities associated with the Proposed Development;
- During initial site preparation the creation of screening berms around the peripheries of the site boundary will be covered with vegetation, which will provide further screening; and,
- Haul routes, tips and stockpiles will be located away from sensitive receptors.

Construction / Operational / Restoration Measures

- All dust and air quality complaints will be recorded, their potential causes identified, and appropriate measures taken to reduce emissions in a timely manner;
- Electronic complaints will be maintained onsite available for review at any reasonable time;
- Maintain good communication with the surrounding communities;
- Regular inspections of the Site will be completed to ensure basic good practice mitigation measures are implemented;
- Provide training to the site personnel on dust mitigation to be implemented on Site;
- Site stripping and reinstatement operation handling activities should be avoided during dry and windy conditions;
- Vegetate exposed berms planted with a mix of native trees and shrubs;
- All plant and equipment will be maintained to a high standard;
- Use the mobile crushing and screening plant within its design capacity;
- Internal haul roads are compacted and maintained;

- Internal haul roads are maintained wet with a water bowser to minimise dust during dry and windy conditions;
- A water bowser is available to minimise dust during dry and windy conditions;
- Dampen the material extracted when possible;
- Clearance of any spillages will be completed to avoid the accumulation of dry loose materials around the Site;
- Extend the existing sprinkler along the Site haul road; and,
- Use covered vehicles for the transport of dry fine materials.

Monitoring

Section 9.3.5 above details the locations of existing Bergerhoff monitoring locations associated with the Quarry. It is proposed that one (1No.) additional location will be monitored around the eastern boundary of the Proposed Development and Quarry. It is proposed that Bergerhoff monitoring at the current locations continues.

Climate

Proposed Mitigation

- Reduce the idle times by providing an efficient material handling plan that minimises the waiting time for loads and unloads;
- Turning off vehicle engines when not in use for more than 5-minutes;
- HVO as an alternate fuel to diesel fuel during the lifetime of the project;

Ensure regular maintenance of plant and equipment; and,

- Use low energy equipment as far as practicable.

Acoustics (Noise and Vibration)

Construction Noise Mitigation

Prior to commencing development of the Site, the CEMP (submitted as part of the overall planning application) will be revised and agreed with the Local Authority. This will identify common noise control measures to be put in-place during the construction phase of the Proposed Development.

Construction Phase works will be designed to avoid noisy work outside the hours of:

- Monday to Friday 07:00 to 19:00; and,
- Saturday 07:00 to 13:00.

- Work occurring outside these hours will be subject to tighter construction stage noise limits, as per BS5228 (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 within CEMP 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.

Operational Noise Mitigation Measures:

- 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;
- Drop heights of material are minimised;
- Where possible, plant and machinery are enclosed or cladded; and,
- Internal routes are reduced in gradients and routed to minimise noise emissions from vehicles onsite.
- Prior to any blast a blast specification will be developed by the explosives supervisor, be specific to each individual blast to occur on the site and take full cognisance of the site conditions on the day of the blast event. This specification will ensure:
    - Minimisation of fly rock being projected outside of the declared danger zone;
    - Minimise the risk of misfires;
    - Enable location of misfires to be identified; and,
    - Ensure faces are left in a safe condition following the blast event.

Restoration Noise Mitigation Measures:

- The Restoration Phase will be limited to the operational times of 07:00 to 20:00, Monday to Friday and 07:00 to 18:00 on Saturdays. No works will occur on Sundays or Public Holidays;
- All mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds; and,

- All mobile plant throttled down or switched off when not in use.

Operational Vibration Mitigation Measures:

- Ensuring appropriate burden to avoid over or under confinement of the charge;
- Accurate setting out and drilling;
- Appropriate charging;
- Appropriate stemming with appropriate material such as sized gravel or stone chippings;
- Using delay detonations to ensure smaller maximum instantons charges;
- Using decked charges and in-hole delays;
- Blast monitoring to enable adjustment of subsequent charges;
- Designing each blast to maximise its efficiency and reduce the transmission of vibration;
- Avoiding the use of exposed detonating cord on the surface in order to minimise air overpressure; and,
- It will be the task of the competent Roadstone Blasting Engineer to take into consideration the current quarry face, the known geology and modern blasting best practices, to maximise the efficiency and thereby minimise energy loss through ground borne vibration to the surrounding environment.

Noise Monitoring

- General activities onsite will be acoustically monitored as currently, with a site-specific noise limit, measured at Noise Sensitive Receptors of:
    - Daytime LAr,1hr 55dB; and,
    - Night-time LAeq,15min 45dB.
- Noise monitoring will be carried out as per condition 9 of planning permission 16/700 at the four (4No.) locations shown in Figure 11-6. The results of the monitoring shall be submitted to the Local Authority on a regular basis.

Vibration Monitoring

- All blast events will be monitored at the two (2No.) locations (V6 and V7) shown in Figure 11-9 for vibration and air overpressure and the results submitted to the Local Authority on a regular basis;
- If a NSR requests monitoring at their property, it will be carried out and if they agree, the results of this monitoring will be submitted to the Local Authority;

• All monitoring will be carried out as per existing Quarry condition 11 of planning permission 16/700; and, • A ground borne vibration limit for peak particle velocity of 8mm/s measured in any of the three (3No.) mutually orthogonal directions at the receiving location (at frequencies less than 40Hz), and an air overpressure limit of 125dB linear with a 95% confidence limit.
Landscape and Visual
• The proposed berm which will be planted with native vegetation and will aid the screening of the excavation area and associated operational activities within the Site; and, • The berm will be formed from excavated overburden within the Site.
Cultural Heritage
Due to the potential survival of previously unknown sub-surface deposits or finds within the Site in Areas 2, 3, 4 and 5, the following mitigation measures will be implemented: • All soil-stripping in those areas will be monitored by a qualified archaeologist under licence from the National Monuments Service; and, • 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 and Transport
Existing permitted development traffic volumes will not increase as a result of the Proposed Development. <u>Measures that will maintain the quality of infrastructure at the quarry access:</u> • Fresh line markings at the mini-roundabout; • On-going vegetation removal, and, • Power washing the footway at the mini-roundabout.
Material Assets –Natural Resources and Waste
• The Proposed Development aims to utilise existing welfare amenities at the Site to mitigate potential impacts during the construction phase; • The limited volume of anticipated Construction and Demolition (C&D) waste will be sent to a licensed Recycling Waste Facility;

- Comprehensive records of waste transfer dockets and gate receipts will be maintained;
- An Environmental Management System will be developed for the Operational Phase of the Proposed Development; and,
- Waste records will be kept during both the construction and operational phases.

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