February 2024

Environmental Impact Assessment Report (EIAR) Volume 3

Quarry Extension Kilmacow, Co. Kilkenny

Roadstone Ltd

Fortunestown, Dublin 24, Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

Title: Environmental Impact Assessment Report (EIAR) Volume 3, Quarry Extension Kilmacow, Co. Kilkenny, Roadstone Ltd, Fortunestown, Dublin 24, Co. Dublin

Job Number: E2189

Prepared By: Sarah de Courcy **Signed:** _____

Checked By: David Dwyer **Signed:** _____

Approved By: Kenneth Goodwin **Signed:** _____

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	29/02/24	Report	Final	SDC	DD	KG

Environmental Impact Assessment Report (EIAR) Volume 3

Quarry Extension Kilmacow, Co. Kilkenny

Roadstone Ltd

Fortunestown, Dublin 24, Co. Dublin

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roadstone
A CRH COMPANY

Roadstone Ltd.,
Fortunestown,
Tallaght,
Dublin 24.

T +353 (01) 404 1200
E info@roadstone.ie
W roadstone.ie

RE: PLANNING PERMISSION APPLICATION TO KILKENNY COUNTY COUNCIL

To whom it concerns

I Liam Clohosey of Grannagh Knock, Kilmacow, County Kilkenny consent to Roadstone Limited applying for planning permission to Kilkenny County Council in relation to a development for a quarry on my lands in land folio KK7688F

Yours Sincerely,

Liam Clohosey L Clohosey

APPENDIX 1-2

November 2023

EIA Scoping Report

Quarry Extension, Kilmacow, Co. Kilkenny

Roadstone Ltd

Fortunestown, Dublin 24, Co. Dublin

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Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

Title: EIA Scoping Report, Quarry Extension, Kilmacow, Co. Kilkenny, Roadstone Ltd, Fortunestown, Dublin 24, Co. Dublin

Job Number: E2189

Prepared By: Ruth Crumpton **Signed:** _____

Checked By: David Dwyer **Signed:** _____

Approved By: Kenneth Goodwin **Signed:** _____

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	22/11/23	Final	Final	RC	DD	KG

EIA Scoping Report

Quarry Extension, Kilmacow, Co. Kilkenny

Roadstone Ltd

Fortunestown, Dublin 24, Co. Dublin

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1.1 Introduction

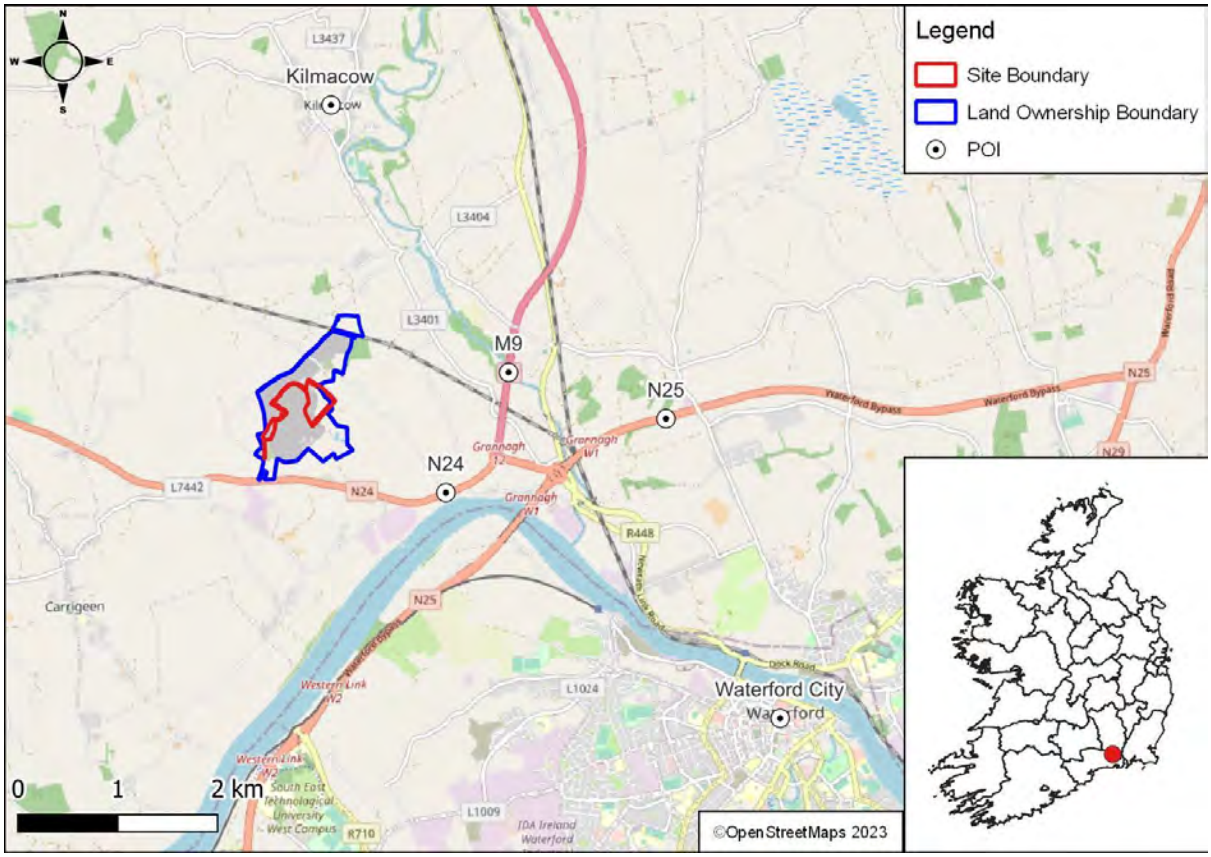
Malone O'Regan Environmental (MOR) has been commissioned by Roadstone Ltd (the Applicant) to prepare an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) in support of a planning application to Kilkenny County Council (KCC) for an expansion of their existing rock quarry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

The Kilmacow Quarry is primarily located in the townland of Granny, with the southern portion of the landholding extending into Aglish North. The Kilmacow Quarry is located 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 at Ordnance Survey Reference 655754 615477 (henceforth referred to as 'the Quarry'). The Quarry is situated in the Roadstone Landholdings which covers an area of 84 hectares at Ordnance Survey Reference ITM 655604 615465.

The application area will cover 10.3ha primarily consisting of agricultural land adjoining the eastern periphery of the Quarry, - Ordnance Survey Reference ITM 655914 615659 (henceforth referred to as 'the Site').

The proposed development does not seek to increase production output at the Quarry, but to provide access to a known quality aggregate reserve at depths down to -45 metres above Ordnance Datum (mOD) from a surface level of ca.30mOD (the 'Proposed Development'). As such, this application will not seek to amend the authorised output from the Quarry, but rather extend the extraction area.

Figure 1-1: Site Location



1.2 The 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. Roadstone employs local people, both directly and indirectly, and these employees in turn support their local economy.

1.3 Existing Development

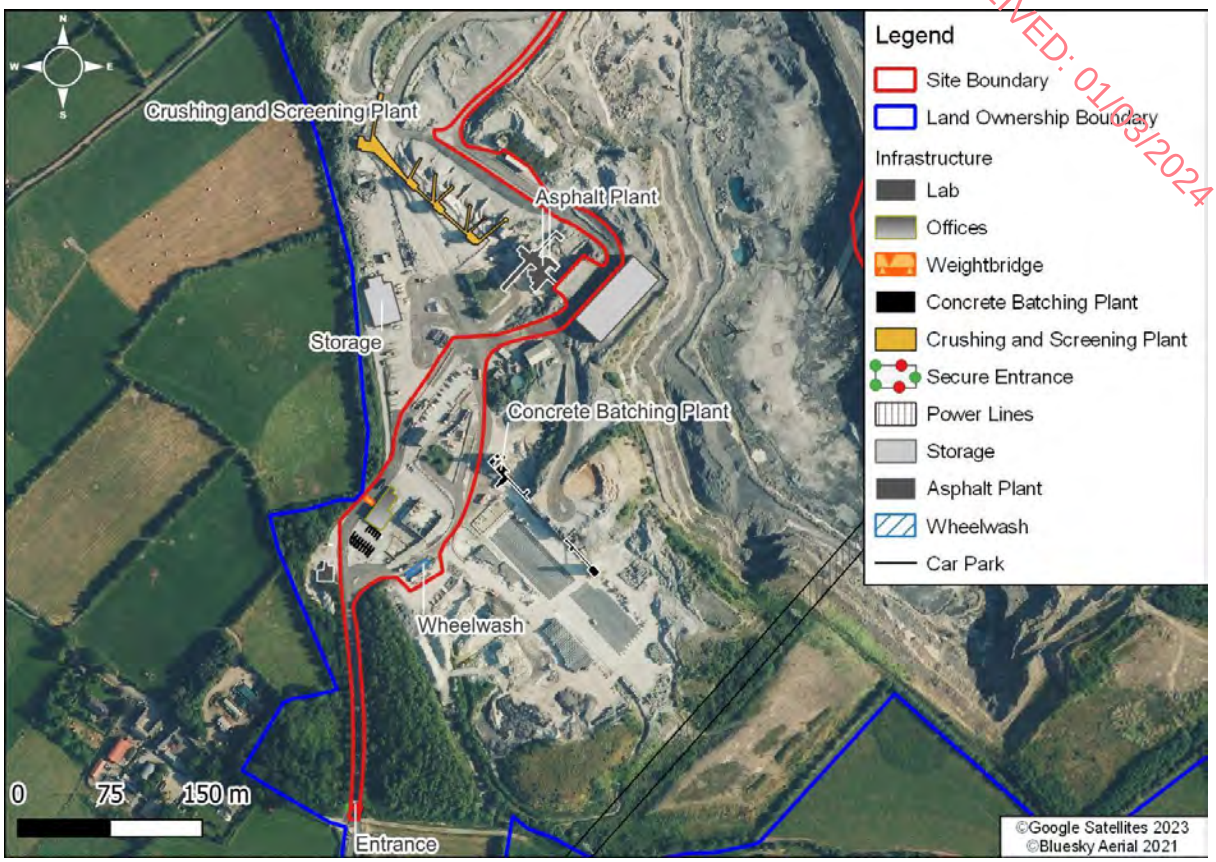
The Quarry is a limestone quarry and has been in operation since at least the 1970's. The Quarry produces a variety of products including a range of aggregates, ready-mix concrete, concrete blocks and black top.

The Quarry is authorised under the following planning references KCC Ref 16700, KCC Ref 1/1/1754 KCC Ref 1/1/5611 and An Bord Pleanála (ABP) 10/5/36501; KCC Ref 97/863 & ABP PL10.108741 and KCC Ref 03/487 & ABP PL 10.5.36501. Operations at the Quarry include the extraction (involving blasting) and processing (screening and crushing) of aggregate and fill material for sale. To facilitate these works the following facilities and plant 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 Proposed Development will seek to utilise all existing infrastructure in order to avoid unnecessary development but will also be capable of operating without the aforementioned infrastructure if necessary.

Figure 1-2: Existing Infrastructure



The N24 lies immediately to the south of the Quarry and the overall landholding, with the river Suir beyond. To the west, the landholding is partially bounded by the L7434. The Quarry is bound by agricultural land in all other orientations. The northern portion of the landholding is intersected by the L7433 and bound by the Waterford Sligo railway.

The Quarry is well served by transport infrastructure with access to the National Primary Route N24 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 forming the route between Rosslare Europort to Cork.

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 4 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 options for the amended route are up for consideration. As such, there are currently 3 options for consideration, one of which extends

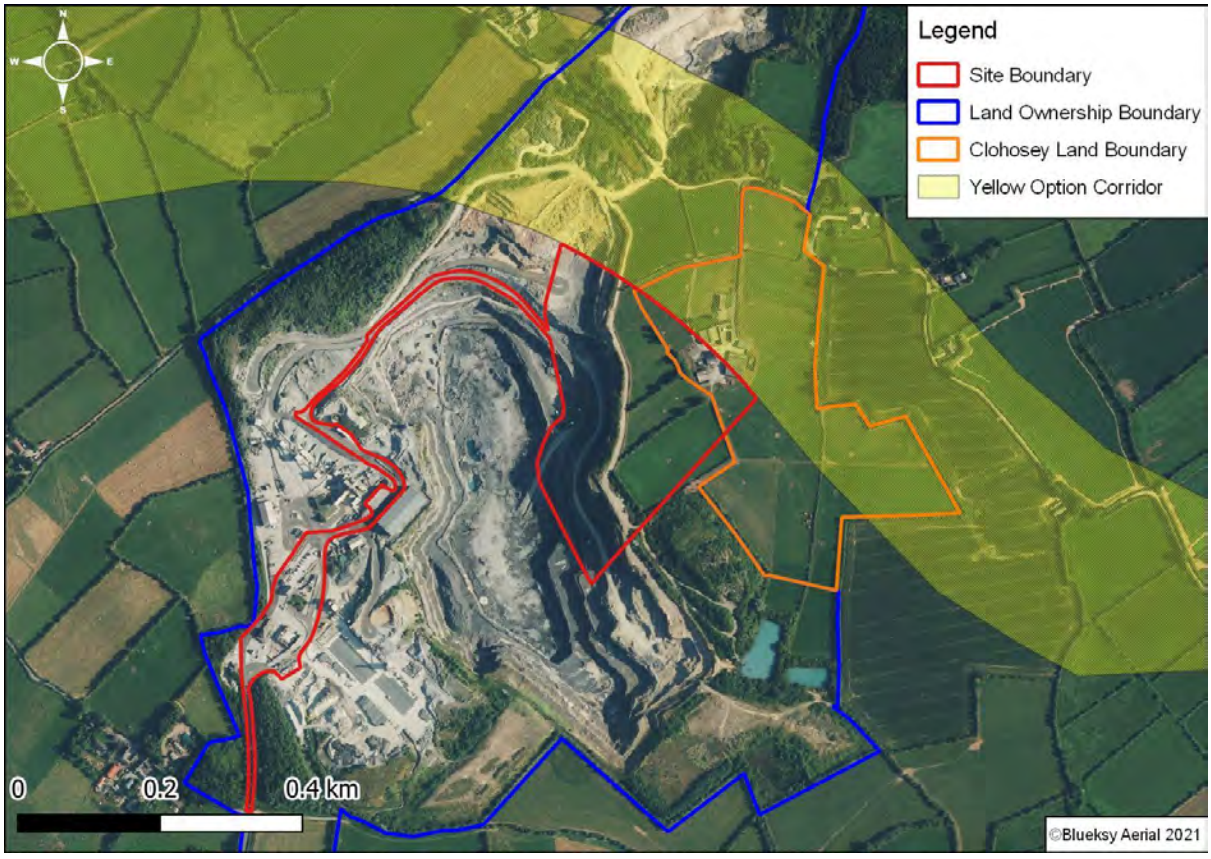
through the northern portion of the Quarry. The other two options are located to the south of the Quarry.

1.4 Description of the Existing Site

The Site is primarily comprised of agricultural land within the Roadstone landholding, but also includes an existing access route which extends in a southerly direction to the established entrance via the weighbridge, wheel wash, carpark, offices/welfare facilities. The easternmost portion of the Site extends beyond the Roadstone landholding into the Clohosey lands. These lands are part of a 10.9ha. landholding currently owned by Mr Liam Clohosey. Roadstone have an option agreement in place with Mr. Clohosey, should this application be successful, Roadstone will purchase the lands and they will extend their overall landholding. As such, Clohosey's house and associated buildings will be unoccupied should the Proposed Development proceed. The extent of the Site has taken cognisance of the options currently under consideration for the Waterford to Cahir N24 Road Scheme.

There is a power line running through the south-eastern portion of the Quarry. The Site has also 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.

Figure 1-3: Intersection of Roadstone and Clohosey Lands



1.5 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 x 15m high benches, reducing the existing level of lands from ca. 30mOD down to -45 mOD, which is the final depth in the permitted extraction area (Planning Reference 16700). The Proposed Development will involve blasting, extraction and processing of rock using mobile

primary crushing 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 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. See Figure 1-4 below for the location of the buildings to be removed. The farmyard and remaining buildings will be left intact and safely fenced off from the Proposed Development.

Figure 1-4: Outbuildings and Pump House to be demolished.

The estimated reserve within Site is ca. 2,920,000 m^3 (or ca. 7,592,000 tonnes) of aggregates. The Proposed Development represents an extension of the existing quarry into known quality aggregates and will operate within the permitted outputs which currently range from 700,000 to 1,000,000 tonnes per annum pending market conditions. At maximum extraction rates, the estimated reserves would 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 20-year period. The Proposed Development consists of three distinct phases, Construction Phase, Operational Phase and Restoration Phase.

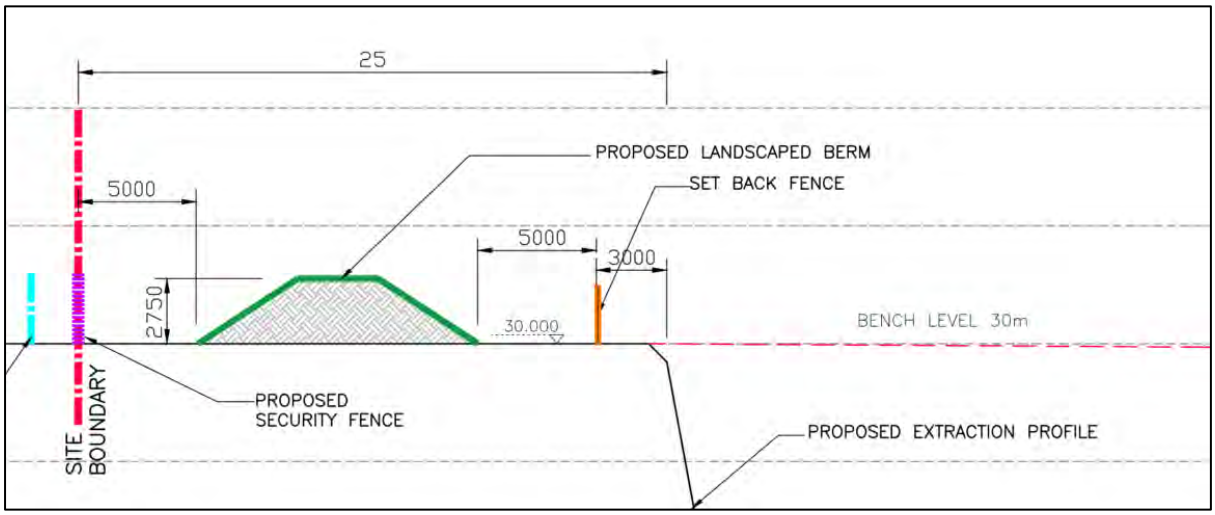
The construction phase will aim to prepare the Site for extraction and consist of the following activities;

- 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 agricultural sheds.

The construction phase will likely take up to 6 months to complete. Figure 1-5 below details the preliminary boundary design.

Figure 1-5: Boundary Design



The operational phase will consist of;

- Extension of existing excavation activities to the east;
- Completion of 5 x 15m benches from the current level of 30mOD to -45mOD;
- Extraction of rock by means of blasting;
- Crushing of blast rock on the quarry floor utilising a mobile primary crusher;
- Onsite transport of the aggregate for secondary processing or be used in ancillary activities (i.e., concrete production, blacktop production, block manufacture).
- Offsite transportation of aggregates to market.

The operational phase will take up to 19 years to complete.

Permitted planning applications 16700 & 16830 included a restoration plan for the groundwater recharging of the quarry void. It is intended to revise this restoration plan to include the Site within the restoration plan if permitted. The average depth following recharge is estimated to be 16mOD. As part of the restoration plan, access to the haul ramp and upper benches would be secured; upper benches would be made suitable for planting, and the area where the haul ramp becomes submerged would be graded and planted. It is anticipated that the quarry walls will be colonised by moss and other vegetation. The restoration phase could take up to 6 months to complete.

2 LEGAL AND PLANNING CCONTEXT

2.1 Legal Context

Planning regulation in Ireland is based on the Planning and Development Act 2000 (as amended), which covers a range of planning-related matter and combines a wide range of legislation into one place.

The specific requirements for planning development are outlined within the Planning and Development Regulations 2001 (as amended), which implement the 2000 Act. The Regulations consolidate all previous Planning and Development Regulations and replace the Local Government (Planning and Development) Regulations 1994-2000.

The Environmental Impact Assessment (EIA) Directive (2014/52/EU) was adopted on 14th April 2014, amending Directive 2011/92/EU with regard to the assessment of the effects on the environment of various public and private projects. This Directive was transposed into Irish law via Statutory Instrument S.I. No 296 of 2018 (S.I. 2018/296), with a commencement date of 1st September 2018.

Projects requiring an EIA are specified in Schedule 5 of the 2001 Regulations (as amended). This Schedule transports Annex I and II of the EIA Directive into Parts 1 and 2 of the Schedule.

No new criteria for EIA projects were introduced under EIA Directive 2014/52/EU.

Schedule 7 of the 2001 Regulations sets out the criteria for assessing whether a project is likely to have 'likely' and 'significant' effects on the environment. Such projects are required to have an EIA where the proposed project is listed under Schedule 5 but is not mandatory under Part II thresholds. These criteria include:

- Characteristics of the proposed development;
- Location of the proposed development; and
- Characteristics of the potential impacts.

The Environmental Impact Assessment Report (EIAR) is the document prepared by or on behalf of the proposer of a project setting out the positive and negative effects that the Proposed Development would have on the environment.

2.2 Planning Context

2.2.1 Planning Policies and Guidance

The following national, regional and local policies and guidance will be reviewed:

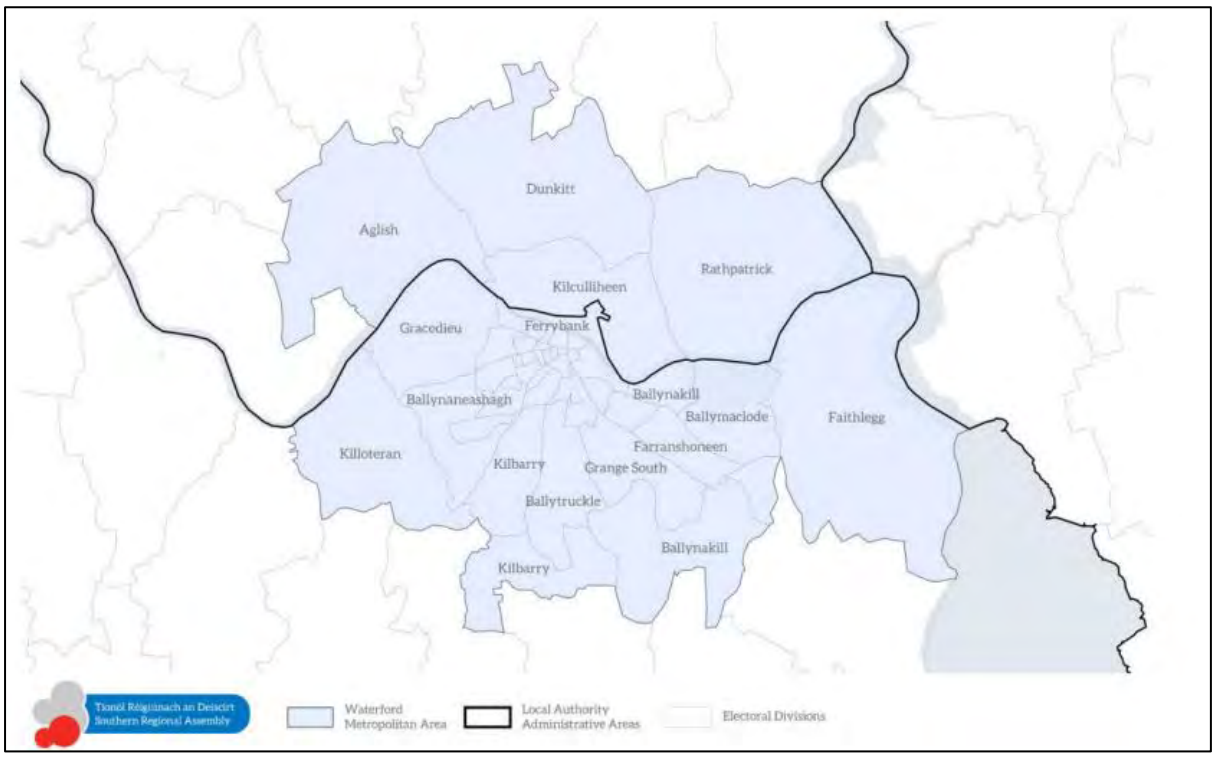
- Project Ireland 2040 National Planning Framework [1]
- National Development Plan 2021-2030 [2]
- Department of the Environment, Heritage, and Local Government (DoEHLG) – Quarries and Ancillary Activities: Guidelines for Planning Authorities (2004) [3]
- Department of Housing, Local Government and Heritage (DoHLGH) – The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) [4]
- Regional Spatial and Economic Strategy for the Southern Region (2020) [5]
- Kilkenny County Development Plan 2021 – 2027 (KCDP) [6]
- Waterford County Development Plan 2022 – 2028 (WCDP) [7]
- EPA - Environmental Management Guidelines – Environmental Management in the Extractive Industry [8]
- ICF – Environmental Code (2005, 2nd Edition) [8]
- ICF – Essential Aggregates: Providing for Ireland's Needs to 2040 [9]
- ICF & Geological Survey of Ireland – Geological Heritage Guidelines for the Extractive Industry (2008) [10]

Guidance specific to the individual chapters of the EIAR will be listed in section 3 below.

2.2.2 Zoning

The Site is located in County Kilkenny, within the Aglish Electoral District. However, its proximity to Waterford means that it lies within the Waterford Metropolitan Area, and therefore falls under the Waterford Metropolitan Area Strategic Plan (WMASP) (see Figure 2-1 below, sourced from the KCDP [6]. There is no specific zoning for the Site within either the KCDP or the WMASP.

Figure 2-1 Location of Site's Electoral District within Waterford Metropolitan Area



2.2.3 Planning History

Extraction at Roadstone Kilmacow quarry dates back to at least 1971, when outline planning permission for a quarry was granted under planning ref 1/1/1754. Permission for a quarry was granted in 1977 under planning ref 1/1/5611 and an extension to the quarry was later granted in 1999 under planning reference 97863. A further extension in 2004 was granted under planning reference 033487. A continuance of use of quarrying activities was granted in 2017 under planning permission 16700.

Table 2-1 below provides an overview of the planning history associated with the Quarry. There are no known planning permissions for Mr Clohosey's lands registered on the Kilkenny County Council ePlanning website. Historic mapping shows that the extension lands were under agricultural use from the time of the First Edition of the 6-inch-scale maps. Buildings are shown at the site of Mr Clohosey's farmyard. At the time of the Last Edition 6-inch-scale maps, there are no changes to the map display for this location.

Table 2-1: Relevant Planning History

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 110m2 (gross floor area) single storey dispatch office.	Conditional Approval	2004
08692	Roadstone Provinces Ltd	Erection of a temporary (2 years) 60m-high meteorological mast and associated site works.	Incomplete Application	N/A
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
1531	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

Planning Refence	Applicant	Development	Decision	Grant Year
16700	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 include the continuation of use of the existing wheel-wash and associated hardstanding area, bunded fuel tank and associated refuelling area.	Conditional Approval	2017
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 License and Permits

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

Table 2-2: Licence and Permits

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	WF-KK-21-0001-02	05/05/2021

3 ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Structure and Contents of EIAR

The EIAR will be prepared in accordance with the following guidance documents:

- EU Guidance Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report;
- EPA Advice notes on current practice in the preparation of Environmental Impact Statements; and,
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022).

The EIAR will contain the following key sections:

Non-Technical Summary

An overview of the Proposed Development, its location, the identity of the applicant and the reason the EIAR was prepared. The Non-Technical Summary is a review of the main text of the EIAR to enable the clear identification of significant impacts, relevant mitigation measures (where such are required) and the residual impacts.

Description of the Proposed Development

A full description of the Proposed Development in physical and functional terms during the Site preparation, operational and restoration stages.

Main Alternatives Considered

A summary of the alternatives considered in respect of the proposal and environmental aspects will be included within the EIAR, including alternative site layout and site use.

Assessment of environmental effects

The significance of the effect of the Proposed Development on various aspects of the environment will be assessed under the headings set out in section 3.2.

3.2 Aspects of the Environment Considered in the EIAR

The EIAR will assess following environmental aspects:

- Population and human health;
- Biodiversity;
- Water (Hydrology and hydrogeology);
- Lands and soils;
- Air;
- Climate;
- Noise and vibration;
- Landscape and visual impacts;
- Cultural heritage;
- Material assets such as traffic and waste; and
- Interactions of the above.

As far as practicable, the examination of each aspect of the environment will be undertaken as follows:

- The Receiving Environment (‘baseline’). A description of the specific receiving environment relevant to the chapter.
- The potential effects of the Proposed Development. A general description of the probable or ‘likely’ effect which the Proposed Development would be likely to produce.

- Cumulative Effects of the Proposed Development – where relevant, the cumulative effects of the Proposed Development will be studied.
- Mitigation Measures – a description of any specific remedial or reductive measures considered necessary and practicable as a result of the assessment of potential effects.
- Residual Effects of the Proposed Development – the assessment of the significance of direct and indirect effects of the Proposed Development after mitigation measures have been enacted.
- Interactions – a description of interactions of each environmental discipline with other environmental attributes.
- Monitoring – a description of any monitoring of effects on the environment which might be required, covering the monitoring methods and the agencies responsible for their implementation.
- Reinstatement – where required, a description of the reinstatement measures and the agencies responsible for their implementation.
- Difficulties Encountered – an indication of the difficulties encountered, if any, during the compilation of the information presented in or supporting the chapter.

3.3 Description of the Proposed Assessments

3.3.1 Population and Human Health

The Quarry has been in use since at least the late 1970s and is a local employer. However, no extra employment is considered likely to result from this expansion. Therefore, an assessment of the Proposed Development on the local population is not proposed as there are unlikely to be any significant impacts, either positive or negative.

An assessment of the sensitivity of the local population to development and specifically to the Proposed Development will be carried out in light of HSE guidance for the EIAs and the Institute of Environmental Management (IEMA) guidance for Determining Human Health in Environmental Impact Assessments.

In addition, the Proposed Development includes potential sources for effects on human health via air, water, soil, noise etc. These effects will be assessed in detail in the respective chapters.

3.3.2 Biodiversity

This chapter of the EIAR aims to establish the baseline ecological status of the Site and its immediate surroundings and to assess the potential effects of the Proposed Development on biodiversity. A detailed ecological appraisal will be carried out by a suitably qualified MOR Ecologist in line with '*Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine'* (2018 and revisions).

As a starting point, the following parameters will be used for the desk-based study: 2km for protected species, 15km for European sites and 5km for nationally protected sites. The desk-based study will involve a review of the following resources:

- Aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service (NPWS) website, consulted with regard to the most up to date detail on conservation objectives for any relevant Natura 2000 (https://www.npws.ie/);
- The National Biodiversity Data Centre (NBDC) website, consulted with regard to species distributions (https://maps.biodiversityireland.ie/Map);
- The EPA Maps website, consulted to obtain details about watercourses in the vicinity of the Site (https://gis.epa.ie/EPAMaps/);
- The Kilkenny and Waterford County Council Planning Portals, consulted to obtain details about existing / proposed developments in the vicinity of the Site

(https://www.eplanning.ie/KilkennyCC/searchtypes) and https://www.eplanning.ie/WaterfordCCC/searchtypes.

In addition, a habitat survey will be undertaken to assess the quality of the habitats on and bordering the Site and to 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. The habitat survey will be undertaken using *Fossitt's Guide to Habitats in Ireland* and will be conducted in line with the following guidance documents:

- Heritage Council – 'Best Practice Guidance for Habitat Survey & Mapping' [11];
- National Roads Authority (NRA), now Transport Infrastructure Ireland (TII) – 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' [12]; National Parks and Wildlife Service (NPWS) – Wildlife, Habitats, and the Extractive Industry – Guidelines for the Protection of Biodiversity within the Extractive Industry [13];
- NRA - 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes [14];
- Scottish Badgers - 'Surveying for Badgers: Good Practice Guidelines' [15];
- The Mammal Society, *'Surveying Badgers*' [16]; and,
- NRA, 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' [17].

The habitat survey will take full cognisance of any species protected under the Flora (Protection) Order 2022 (S.I. No. 235/2022) or listed on Ireland Red List No. 10: Vascular Plants [18].

Given the proposed removal of hedgerow / treelines onsite, specialist bat surveys will be undertaken in line with the following guidance:

- DoEHLG -'Bat Mitigation Guidelines for Ireland' [19]; and,
- BCT - 'Bat Surveys for Professional Ecologists Good Practice Guidelines' [20].

In addition to the bat surveys, breeding bird surveys will be undertaken in line with the following guidance:

- British Trust for Ornithology – 'A Field Guide to Monitoring Nests' [21]; and,
- Common Bird Census (CBC) Methodology in 'Bird Monitoring Methods' [22].

An assessment will be undertaken to assess the quality of the hedgerows onsite.

The potential effect on biodiversity from the Proposed Development will be assessed to include all phases of the Proposed Development. The scale of activities onsite will be considered when determining the zone of influence. When identifying suitable mitigation measures for the protection of biodiversity against potential impacts arising from the Proposed Development, the following guidance will be referred to:

- Construction Industry Research and Information Association (CIRIA) C– 'Environmental Good Practice on Site (C741) (4th Edition)' [23];
- NRA - 'Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes' [24]; and
- NRA -, 'Guidance on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' [25].

In addition to the EIAR, a Stage One: Screening for Appropriate Assessment (AA) will be undertaken to identify potential impacts on European designated sites. The AA will be prepared in accordance with the following documents:

- European Commission – 'Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC' (2001) [26];
- European Commission – 'Managing Natura 2000 Sites: The provision of Article 6 of the Habitats Directive 92/43/EEC' (2018)' [27];
- Office of the Planning Regulator (OPR) - 'Appropriate Assessment. Screening for Development Management' (2021) [28]; and
- Department of Environment, Heritage, and Local Government (DoEHLG) – 'Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities' (2010) [29].

Should the findings of the AA indicate a need for a Natura Impact Statement (NIS), this will be produced as a separate document.

3.3.3 Water

On a regional scale the Site is located in the river Suir surface water catchment within Hydrometric Area 16 of the Southeastern River Basin District. On a local scale Site exists within 3 no. surface water bodies. The majority of the landholding is mapped to lie within the Middle Suir Estuary (Code: IE_SE_100_0550) and draining this waterbody in the area of the Site is a watercourse that runs in a southerly direction immediately to the east of the landholding boundary. This watercourse, which the Quarry currently discharges into, flows into the Suir River approximately 1.5km downstream of the Site. Small sections on the north and west of the Quarry are mapped to lie within the Blackwater SWB (Code: IE_SE_16_4237) and Luffany SWB (Code: IE16_01) respectively.

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. This means that in general, groundwater resources and storage is moderate to low, with a limited and relatively poorly connected network of fractures, fissures and joints, giving a low fissure permeability which tends to decrease further with depth.

Baseline monitoring and investigations will be carried out as part of the hydrogeological/ hydrological assessment of the Proposed Development which will include:

- Walkover surveys and drainage mapping
- Additional monitoring well drilling (2 no.)
- Automated groundwater level monitoring in 6 no. monitoring wells
- Private third-party wells groundwater level monitoring
- Licenced water discharge monitoring (quality and volumetric)
- Groundwater and surface water quality monitoring

The EIAR will present existing surface water and groundwater regime at the Site and assess the potential effects posed by the Proposed Development, including local groundwater vulnerability effects, groundwater and surface water bodies, groundwater abstractions for public/private supply, downstream designated sites and WFD status. Potential cumulative effects and human health effects will also be considered.

A site-specific flood risk assessment (Stage 2) and WFD Assessment will be provided with the EIAR.

3.3.4 Land, Soils and Geology

The GSI soils map (www.gsi.ie) shows that Grey Brown Podzolic/Brown Earths Basic (BminDW) are mapped in the majority of the Quarry. Acid Brown Earths/Brown Podzolic (AminDW) are mapped to the south as well as some surface water Gleys/Acidic groundwater Gleys (AminPD). The GSI subsoils map (www.gsi.ie) for the area also shows that the northern section of the Quarry is mapped to have bedrock close to the surface while the southern section of the site is mapped to be overlain by sandstone tills. Apart from the southern section of the Quarry much of the subsoils have been removed due to quarrying. Outside of the Quarry subsoils are also mapped as sandstone tills.

The Geological Survey of Ireland (GSI) 1:100,000 geology sheet 23 (South Wexford) shows the Kilmacow area to be underlain by limestones of the Ballysteen Formation and it's Bullockpark Bay Member. The northern part of the Quarry is characterised by Dinantian Pure Bedded Limestones, while the southern part of the Quarry is mapped as Dinantian Lower Impure Limestones. The Ballysteen Formation consists of well bedded relative clean calcarenitic (sand grade) limestones, and it passes up into finer grained and more muddy limestones. The Bullockpark Bay Member is a cross bedded oolitic limestone[1]. There is no clear change in geology evident within the open quarry floor. Between the Quarry and the River Suir Lower Limestone and Shales area mapped and these are underlain by the Kiltorcan Formation, and this in turn is underlain by the Carrigmaclea Formation.

Site investigations will be carried out as part of the land, soils and geological assessment of the Proposed Development which will include:

- Walkover survey and geological mapping of exposed rock faces
- Assessment of historical site investigation borehole logs
- Drilling 2 no. additional boreholes as monitoring wells
- Logging of soil/subsoil faces where possible.

The EIAR will present soil, subsoil and geological conditions at the Site and assess the potential effects of the Proposed Development, including the effects on geological and future land-use. Where required, mitigation measures will be specified within the EIAR to avoid significant effects on the land, soils and geological environment along with potential human health effects.

3.3.5 Air Quality

The potential effects on air quality will be assessed across all phases of the Proposed Development. A desk-based review of existing monitoring results will be conducted to better understand the air quality in the area. This will involve reviewing data collected by the Environmental Protection Agency as well as historical monitoring conducted onsite (i.e., Bergerhoff dust monitoring completed at the Quarry).

The methodology proposed by the UK Institute of Air Quality Management (IAQM) in their *Guidance on Mineral Dust for Planning* (2016) [35] will be used to determine the potential effects on sensitive receptors (within 400m of the Proposed Development) from disamenity dust and ambient dust (i.e., human health effects of PM_{10} exposure).

These assessments will consider potential dust generation from typical quarry activities (e.g., overburden removal, blasting, processing, onsite and offsite transportation etc.) and determine the likely effects on sensitive receptors with appropriate mitigation measures prescribed to offset effects, where necessary.

3.3.6 Climate

The potential effects on climate will be assessed by determining the levels of greenhouse gases (GHGs) emitted by the Site during a typical year of operation.

Generally, greenhouse gases are grouped into three categories:

- Scope 1: Emissions directly associated with the operations of the development (plant equipment, facility owned vehicles, employee vehicles etc.)
- Scope 2: Indirect emissions associated with the operations of the development. This mainly relates to the use of electricity associated with the Site (lighting, wheel washes, buildings onsite etc)
- Scope 3: Indirect emissions not directly associated with the development. This will mainly relate to the movement of HGVs during the typical operations of the quarry.

Based on the information available, estimations for GHGs will be calculated for both the Site itself and the Quarry. The assessment of GHGs will follow IEMAs Guidance '*Assessing Greenhouse Gases and Evaluating their Significance'* (2nd edition, 2022) [36].

A Climate Change Vulnerability Assessment will also be completed following the methodology proposed by the European Commission's *Technical Guidance on the climate proofing of infrastructure in the period 2021-2027* (2021) [37]. A desk-based review of available climate data, online resources (such as the Global Facility for Disaster Reduction and Recovery) and local area climate action plans to determine the potential vulnerability of the Proposed Development to climate hazards. This chapter will also examine the predicted GHGs against the national Climate Action Plan 2023 and include a review of local plans and policies.

3.3.7 Noise and Vibration

The EIAR will assess both noise and vibration arising from all stages associated with the Proposed Development.

The noise assessment will take cognisance of World Health Organisation research along with UK and Irish guidance specific to activities in the outdoors and quarrying works.

A baseline noise survey will be completed to characterise the daytime ambient acoustic characteristics. This will be completed in line with ISO 1996 Part 1:2016 *'Acoustics – Description, measurement and assessment of environmental noise Part 1: Basic quantities and assessment procedures.'* (2016) [39]

The assessment will be based on:

- IEMA and Institute of Acoustics (IOA) – Guidelines for Environmental Noise Impact Assessment, 2014 [40]; and
- British Standards institute (BSI) – Code of practice for noise and vibration control on construction and open sites Part 1: Noise 5228:2009+A1:2014 (2014) [41].

Furthermore, an assessment of noise and vibration to the emission limit values set out within the EPA document *'Environmental Management Guidelines: Environmental Management in the Extractive Industry'* [8] will be carried out and presented.

Vibration will be assessed in line with BS 5228-2:2009 and BS7385-2:1993, and the measures incorporated to manage any activities likely to result in notable vibration off-site, including blasting. Where relevant, mitigation will be identified.

The acoustics assessment will extend beyond the Site boundaries to the closest noise sensitive receptors and will include site modelling of the future noise emission compared to existing ambient background levels and to standard industrial quarry limits.

3.3.8 Landscape and Visual

The EIAR will examine the potential effect to the physical landscape, landscape character and visual amenity arising from the Proposed Development.

The Landscape and Visual Impact Assessment (LVIA) for the Site involves a desktop study to identify relevant landscape and visual designations and sensitive visual receptors, followed by fieldwork to establish the landscape character of the receiving environment and select potential viewpoints. A 2km study area will be used.

The LVIA will consider criteria for assessing the potential effects on the landscape, including landscape character, value, sensitivity, magnitude of likely impacts, and significance of landscape effects. The sensitivity of the landscape receptor and the magnitude of the predicted landscape impact will determine the significance of the landscape effect.

The visual effect of the Site will also be assessed by considering the sensitivity of visual receptors and the magnitude of the visual effect. The magnitude of visual effects will be determined based on the relative visual dominance of the Site and its effect on visual amenity. The significance of visual effects will be determined as a function of visual receptor sensitivity and visual impact magnitude.

In addition to assessing the significance of landscape and visual effects, the LVIA will also consider the quality and timescale of the effects, categorizing them as temporary, short-term, medium-term, long-term, or permanent.

The assessment will be carried out in accordance with:

- IEMA and Landscape Institute 'Guidelines for Landscape and Visual Impact Assessment' (3rd edition, 2013) [42] (UK) and
- Department of the Environment and Local Government (later DoEHLG) - '*Landscape and Landscape Assessment Consultation Draft Guidelines for Planning Authorities*,' (2000) [43].

3.3.9 Cultural Heritage

This Chapter of the EIAR addresses the effects on the archaeological, architectural and cultural heritage of the Site, and the surrounding area. The study complies with the requirements of Directive EIA 2014/52/EU and the criteria and definitions for describing effects are drawn from the 2022 EPA Guidelines [44].

The assessment will utilise information from:

- the Record of Monuments and Places (RMP) of County Kilkenny and County Waterford;
- the Sites and Monuments Record;
- Kilkenny County Development Plan 2021-2027 [6];
- Waterford County Development Plan 2022-2028 [7];
- the National Inventory of Architectural Heritage;
- Aerial photographs;
- Excavation reports;
- Cartographic;
- Documentary sources; and
- A field inspection.

Interactions with other environmental topics, including vibration and visual effects will be assessed. Where relevant, further mitigation will be identified.

3.3.10 Material Assets

The EIAR will examine the potential effects of all phases of the Proposed Development with regard to traffic, roads and waste management.

3.3.10.1 Traffic and Roads

The effect on local roads and on the level of local traffic arising from all phases will be assessed in line with the Institute of Highways and Transportation *Guidelines for Traffic Impact Assessment* (TIA).

Traffic counts will be undertaken as part of the TIA to confirm existing traffic volumes using this road. Site specific traffic count data will be obtained from the surrounding road network and be used to inform the TIA.

Cumulative effects of the future operations at the Site will be carefully integrated into the assessment.

3.3.10.2 Waste Management

The potential impacts of the Proposed Development on solid waste management in the area during the phases will be examined. The assessment will be undertaken by means of a desk-based review of all relevant existing information, published EPA documents and regional and national documents on solid waste management. The Proposed Development and its potential effect on the existing waste infrastructure both locally and nationally will be assessed.

4 ALTERNATIVES, INDIRECT AND CUMULATIVE IMPACTS

The requirement to consider alternatives within an EIAR is set out in Annex IV (2) of the EIA Directive (2014/52/EU) which state, "*A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment*."

This is expanded upon in Annex IV to the EIA Directive, which provides that the EIAR shall include "*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*."

The Proposed Development alternatives will include various alternative options that were considered during the design stage.

5 SCOPING

This document forms the Scoping Document for the project and has been issued to relevant prescribed bodies. Responses to the project, specifically in relation to the scope and extent of the proposed environmental assessment are requested to be sent to the MOR offices within 6 weeks from the date of the issue. Submissions from the prescribed bodies will be taken into consideration when preparing the EIAR.

Correspondence should be submitted to the following address:

Malone O'Regan Environmental

Ground Floor - Unit 3

Bracken Business Park

Bracken Road, Sandyford

Dublin 18, D18 32Y

Or alternatively to: admin@mores.ie

To ensure that the response finds the relevant persons, in all correspondence ensure to reference the project as:

- E2189 Proposed Development Roadstone Kilmacow Quarry.

6 REFERENCES

[1] Department of Housing, Planning and Local Government (DHPLG), "Project Ireland 2040 - National Planning Framework," DHPLG, 2018.

[2] Government of Ireland, "National Development Plan 2021-2030," Government of Ireland, 2018.

[3] DoEHLG, "Quarries and Ancillary Activities," Department of Environment, Heritage and Local Government, Dublin, 2004.

[4] Department of Environment, Hertiage and Local Government, "The Planning System and Flood Risk Management - Guidelines for Planning Authorities," Government of Ireland, Dublin, 2009.

[5] Southern Regional Assembly, "Regional Spatial and Economic Strategy for the Southern Region," SRA, Waterford, 2020.

[6] Killkenny County Council, "Kilkenny City and County Development Plan 2021 - 2027," KCC, Kilkenny, 2021.

[7] Waterford County Council, "Waterford County Development Plan 2022 - 2028," WCC, Waterford, 2022.

[8] EPA, "Environmental Management in the Extractive Industry - Non-Scheduled Minerals," EPA, Dublin, 2006.

[9] Irish Concrete Federation (ICF), "Environmental Code," ICF, 2005.

[10] Irish Concrete Federation (ICF), "Essential Aggregates: Providing for Ireland's Needs to 2040," ICF, Dublin, 2019.

[11] ICF & GSI, "Geological Heritage Guidelines for the Extractive Industry," 2008.

[12] G. Smith, P. O'Donoghue and K. &. D. E. O'Hara, "Best Practice and Guidance for Habitat Surveying and Mapping," Heritage Council, 2011.

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[14] National Parks and Wildlife Service, "Wildlife, Habitats and the Extractive Industry: Guidelines for the Protection of Biodiversity within the Extractive Industry," NPWS.

[15] NRA, "Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes," NRA, 2009.

[16] Scottish National Heritage, "Surveying for Badgers: Good Practice Guidelines Version 1," SNH, 2018.

[17] S. Harris, P. Cresswell and D. Jefferies, "Surveying Badgers - An Occasional Publication of The Mammal Soceity No.9," The Mammal Society, London, 1989.

[18] NRA, "Guidelines for the Treatment of Bats during the Construction of National Road Schemes," NRA, Dublin, 2005.

[19] M. Wyse-Jackson, Ú. Fitzpatrick, E. Cole, M. Jebb, D. McFerran, M. Sheehy-Skeffington and M. Wright, "Ireland Red List No. 10: Vascular Plants.," National Parks and Wildlife Service, 2016.

[20] F. Marnell, C. Kelleher and E. Mullen, "Bat mitigation guidelines for Ireland V2," *Irish Wildlife Manuals No 134,* 2022.

[21] Collins, J. (Ed.), Bat Surveys: Good Practice Guidelines, BCT: Inverness, 2016.

[22] J. Ferguson-Lees, R. Castell and D. Leech, A Field Guide to Monitoring Nests, BTO, 2011.

[23] G. Gilbert, D. Gibbons and J. Evans, "Bird Monitoring Methods: A Manual of Techniques for UK Key Species," RSPB, Sandy, 1998.

[24] CIRIA, "C741 Environmental Good Practice on Site (4th ed)," CIRIA, London, 2014.

[25] National Roads Authority, "Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes," NRA, Dublin, 2009.

[26] NRA, "Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads," National Roads Authority, Dublin, 2010.

[27] European Commission, "Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC," EU, Brussels, 2021.

[28] European Commission, "Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC," EC, Brussels, 2018.

[29] Office of the Planning Regulator, "Appropriate Assessment Screening for Development Management," OPR, Dublin, 2021.

[30] Department of Environment, Heritage and Local Government, "Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities," DoEHLG, Dublin, 2009.

[31] Insitute of Air Quality Management (IAQM), "Guidance on the Assessment of Mineral Dust Impacts for Planning," IAQM, London, 2016.

[32] IEMA, "Assessing Greenhouse Gases and Evaluating their Significance," IEMA, 2022.

[33] European Commission, "Technical Guidance on the climate proofing of infrastructure in the period 2021-2027," EC, Brussels, 2021.

[34] ISO, "ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise Part 1: Basic quantities and assessment procedures," ISO, Geneva, 2016.

[35] IEMA; IOA, "Guidelines for Environmental Noise Assessment," IEMA, Lincoln, 2014.

[36] British Standards Institute, "BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites (3rd ed)," BSI, London, 2008.

[37] Landscape Institute and IEMA (Institute of Environmental Management and Assessment), "Guidelines for Landscape and Visual Assessment," Routledge, 2013.

[38] Department of the Environment and Local Government, "Landscape and Landscape Assessment Consultation Draft Guidelines for Planning Authorities," DoELG, Dublin, 2000.

[39] EPA, " Guidelines on the Information to be Contained in Environmental Impact Assessment Reports," Environmental Protection Agency, Dublin, 2022.

APPENDIX 1-3

Consultee
Local Authorities
Kildare County Council
Waterford City and County Council
Charities/NGOs/Professional Bodies
An Taisce
BirdWatch Ireland
Friends of the Irish Environment
Fáilte Ireland
Irish Wildlife Trust
Utilities
Electricity Supply Board (ESB)
Uisce Eireann / Irish Water
Gas Networks Ireland
Government Departments
Department of Agriculture, Food and the Marine (DAFM)
Department of Business, Enterprise and Innovation (DBEI)
Department of Communications, Climate Action and Environment (DCCAE)
Department of Culture, Heritage and the Gaeltacht (DCHG)
Department of Rural and Community Development (DRCD)
Department of Transport, Tourism and Sport (DTTS)
Development Applications Unit (DAU) – National Parks and Wildlife Service (NPWS)
National Monuments Service
National/State Agencies
Environmental Protection Agency (EPA)
Geological Survey of Ireland (GSI)
Health and Safety Authority (HSA)
Health Service Executive (HSE)

Consultee
The Heritage Council
Inland Fisheries Ireland (IFI)
Office of Public Works (OPW)
Sustainable Energy Authority of Ireland (SEAI)
Teagasc
Transport Infrastructure Ireland (TII)

APPENDIX 1-4

Health and Safety Authority

From:	Geoff Hynes
To:	Admin - (Mores)
Subject:	RE: E2189 Proposed Development Roadstone Kilmacow Quarry
Date:	Tuesday 16 January 2024 09:46:39
Attachments:	image001.png Roadstone Kilmacow, Co Kilhenny, HSA ref 4308.pdf

To whom it may concern,
Please see attached in relation to the above.
Regards,
Geoff

Geoff Hynes
Inspector | CCPS Unit | Health & Safety Authority
Mobile: 087-6002298
Email: geoff_hynes@hsa.ie
Web: www.hsa.ie

Health and Safety Authority,
Metropolitan Building,
James Joyce Street,
Dublin 1,
D01 KOY8

An tÚdarás Sláinte agus Sábháilteachta,
An Foirgneamh Uirbeach,
Sráid James Joyce,
Baile Átha Cliath 1
D01 KOY8

Ár bhFís: Saolta agus fiontair shláintiúla, shábháilte agus tháirgiúla
Our Vision: Healthy, safe and productive lives and enterprises

HSA Twitter
HSA Facebook
HSA YouTube

This footnote also confirms that this email message has been swept for the presence of computer viruses.

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An tÚdarás Sláinte agus Sábháilteachta
Health and Safety Authority
0818 289 389 landuseplanning@hsa.ie www.hsa.ie

Malone O'Regan Environmental
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 32Y

Our Ref: 4038

16/01/2023

Re: Planning Application Scoping Document for the proposed extension at the Kilmacow Quarry, Co. Kilkenny for development by Roadstone Ltd in Kilkenny, & your letter of 18th December 2023

To whom it may concern,

The Health and Safety Authority (the Authority), acting as the Central Competent Authority under the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015) gives technical advice to the Planning Authority when requested, under regulation 24(2) in relation to:

(a) the siting and development of new establishments;

(b) modifications to establishments of the type described in Regulation 12(1);

(c) new developments including transport routes, locations of public use and residential areas in the vicinity of establishments, where the siting, modifications or developments may be the source of, or increase the risk or consequences of, a major accident.

Since the above-referenced application appears to be outside the scope of the Regulations, the Authority has no observations to forward.

If you have any queries please contact the undersigned.

Yours sincerely

J.Hynes

Geoff Hynes
Inspector,
COMAH, Chemical Production & Storage (CCPS)

Health Service Executive

From: Andrew Sulley
To: Admin - (Mores)
Subject: E2189 Proposed Development Roadstone Kilmacow Quarry scoping EIA
Date: Friday 9 February 2024 13:37:55
Attachments: EHS Sub Kilmacow QuarryE2189.pdf

Please find comments from the Environmental Health Service for scoping of the EIA for the Proposed Development Roadstone Kilmacow Quarry. Ref E2189

Any clarification that might be required should be directed to Andrew.sulley@hse.ie

Andrew Sulley
Environment and Climate Change Network Support Unit
National Environmental Health Service
Andrew.sulley@hse.ie

An tOifig Náisiúnta um Sláinte Chomhshaoil
Feidhmeannacht na Seirbhíse Sláinte,
Urlár 2, Teach na Darach, Ascaill na Teile
Páirc na Mílaoise, An Nás, Co. Chill Dara.

National Office for Environmental Health Services
2nd Floor, Oak House, Lime Tree Avenue
Millennium Park, Naas, Co. Kildare
Eircode: W91KDC2

7th February 2024

Malone O'Regan Environmental
enviro@mores.ie
Your Ref: E2189
EHS Ref: ID3607

EIA Scoping Quarry Extension, Kilmacow, Co. Kilkenny
Roadstone Ltd

National Environmental Health Service Submission

Enclosed is the National Environmental Health Service comments on the scoping of the EIA for the quarry extendion at Kilmacow, Co. Kilkenny.

The following HSE stakeholders have been consulted with regard to the scoping of this EIA on the 29th December 2023:

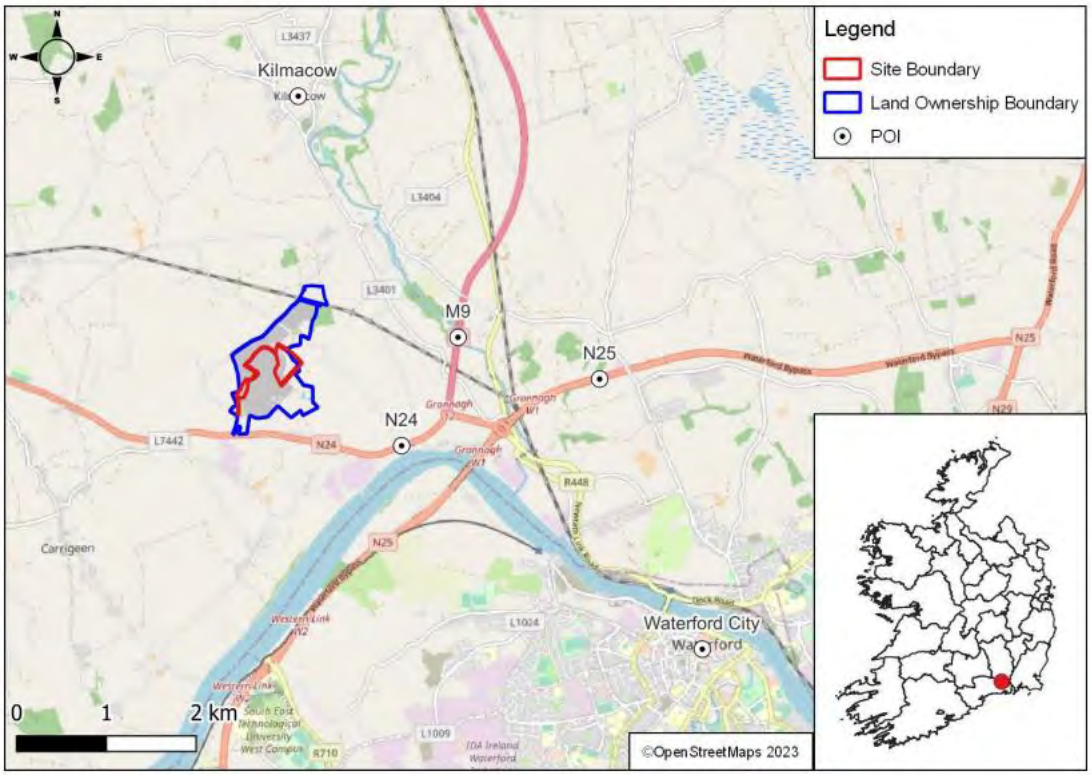
- HSE South Emergency Management
- HSE Estates
- Director of National Health Protection
- Community Health Organisation

Any clarification on the content of this submission should be directed to Andrew Sulley at andrew.sulley@hse.ie

It is noted from the scoping document dated November 2023 that:

> The proposed development does not seek to increase production output at the Quarry, but to provide access to a known quality aggregate reserve at depths down to -45 metres above Ordnance Datum (mOD) from a surface level of ca.30mOD (the 'Proposed Development'). As such, this application will not seek to amend the authorised output from the Quarry, but rather extend the extraction area.

Figure 1-1: Site Location



General Introduction

The following documents should be taken into consideration when preparing the Environmental Impact Assessment Report:

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment
https://www.housing.gov.ie/sites/default/files/publications/files/guidelines_for_planning_authorities_and_an_bord_pleanála_on_carrying_out_eia_-_august_2018.pdf

EU publication: Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, EU, 2017
http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

Adoption of the Directive (2014/52/EU) in April 2014 initiated a review of the National Guidance for EIA and the EIAR accompanying a planning application. New guidelines can be seen at:
https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php

The introduction of the new Guidance is supported by a Webinar produced by the EPA and can be found at:
https://www.youtube.com/embed/ejKVFUztxBY

Generally the Environmental Impact Assessment should examine all likely significant impacts and provide the following information for each:

a) Description of the receiving environment;
b) The nature and scale of the impact;
c) An assessment of the significance of the impact;
d) Proposed mitigation measures;
e) Residual impacts.

Directive 2014/52/EU has an enhanced requirement to assess likely significant impacts on Population and Human Health. It is the experience of the Environmental Health Service (EHS) that impacts on human health are often inadequately assessed in EIAs in Ireland. It is recommended that the wider determinants of health and wellbeing are considered in a proportionate manner when considering the EIA. Guidance on wider determinants of health can be found at www.publichealth.ie

In addition to any likely significant negative impacts from the proposed development, any positive likely significant impacts should also be assessed

The Environmental Health Service (EHS) recommends that the following matters are included and assessed in the EIAR:

- Public Consultation
- Population and Human Health
- Water (Hydrology and Hydrogeology)
- Land and Soils
- Air, Dust and Odour
- Climate Change and Opportunity for Health Gain
- Noise and Vibration
- Waste Management
- Ancillary Facilities
- Cumulative Impacts

Public consultation, where the local community is fully informed of the proposed development must be undertaken. Members of the public should be given sufficient opportunities to express their views on the proposed development. Early and meaningful public consultation with the local community should be carried out to ensure all potentially significant impacts have been adequately addressed. All parties affected by the proposed development must be fully informed of what the proposal entails especially with regard to potential impacts on surrounding areas. Sensitive receptors and other stake-holders should be identified to ensure all necessary and appropriate mitigation measures are put in place.

The Environmental Impact Assessment Report (EIAR) should clearly demonstrate the link between public consultations and how those consultations have influenced the decision-making process in the EIAR.

The decommissioning of the site must be considered in the EIAR. A site restoration plan should be included in the EIAR with a timeframe for restoration works.

The potential impacts for noise and vibration from the proposed development on all noise sensitive locations must be clearly identified in the EIAR. The EIAR must also consider the appropriateness and effectiveness of all proposed mitigation measures to minimise noise and vibration.

Due to the nature of the proposed works, generation of airborne dust has the potential to have significant impacts on sensitive receptors. Dust control and mitigation measures should be identified in the EIAR.
Measures should include:

- Sweeping of hard road surfaces
- Provision of a water bowser on site, regular spraying of haul roads
- Wheel washing facilities at site exit
- Restrict speed on site
- Provide covers to all delivery trucks to minimise dust generation
- Inspect and clean public roads in the vicinity if necessary
- Material stockpiling provided with adequate protection from the wind
- Dust monitoring at the site boundary
- Truck inspection and maintenance plan
- Details of a road maintenance agreement between the operator and the Local Roads Authority to clarify responsibility for the upkeep and repair of access roads.

The proposed development has the potential to have a significant impact on the quality of both surface and ground water. All drinking water sources, both surface and ground water, must be identified. Public and Group Water Scheme sources and supplies should be identified in addition to any private wells supplying potable water to houses in the vicinity of the proposed development. Measures to ensure that all sources and supplies are protected should be described.

Any potential significant impacts to drinking water sources should be assessed. Details of bedrock, overburden, vulnerability, groundwater flows, aquifers and catchment areas should be considered when assessing potential impacts and any proposed mitigation measures.

The EIAR should include details of the location of the site office, construction compound, fuel storage depot, wheel washing, sanitary accommodation and canteen, Proposals for the sanitary disposal of wastewater and the provision of a potable water supply to the site canteen should be included.

All existing or proposed Quarries/industry or developments/housing in the vicinity should be clearly identified in the EIAR. The impact on sensitive receptors of the proposed development combined

with any other developments in the vicinity should be considered. The EIAR should include a detailed assessment of any likely significant cumulative impacts of the proposed development.

As this is an existing quarry, a review should be undertaken of compliance with any current planning conditions and any complaints received and any action taken to resolve complaints. Particularly around noise and dust emissions and use of the local road network as part of the activities of the existing quarry.

Because this is an application for extension of the operation of an existing development the predictive methodology routinely employed in EIA can be supported by actual data of operation of the existing quarry.

Therefore, any assessment of likely significant impacts from the continued use should be supported by data of actual impacts during the operation phase of the current development.

This assessment should include the effectiveness of any existing mitigation measures and identify where mitigation should be continued and/or reviewed,

The public consultation should include consultation on how the existing quarry might or might not be impacting on local communities.

The HSE will consider the final EIAR accompanying the planning application and will make comments to An Bord Pleanála/Local Planning Authority on the methodology used for assessing the likely significant impacts and the evaluation criteria used in assessing the significance of the impact.

Andrew Sulley

Uisce Éireann / Irish Water

From:	Planning
To:	Admin - (Mores)
Cc:	Aisling Mcgrath (C)
Subject:	E2189 Proposed Development Roadstone Killmacow Quarry
Date:	Thursday 21 December 2023 11:57:17
Attachments:	Roadstone Quarry Extension Kilmacow EIAR Scoping Response.pdf

Dear Sir/Madam,

In response to a referral for an Environmental Impact Assessment (EIA) scoping request relating to ; E2189 Proposed Development Roadstone Quarry Extension, Kilmacow, Co Kilkenny.

Please find attached Uisce Éireann's observations.

I hope you find this information helpful. If you have any queries please do not hesitate to contact me.

Kind regards,

Martha Gilligan
Planning Application Specialist

Uisce Éireann
Bosca OP 860, Oifig Sheachadta na Cathrach Theas, Cathair Chorcaí, Éire
Irish Water
PO Box 860, South City Delivery Office, Cork City, Ireland

T: 1800 278 278
Text to Voice/Voice to Text 1800 378 378
www.water.ie

truaillithe, idircheaptha agus i leith leasuithe neamhúdaraithe. Séanann Uisce Éireann aon fhreagracht as athruithe nó as idircheapadh a rinneadh ar an ríomhphost seo nó as aon dochar do chórais na bhfaighteoirí déanta ag an teachtaireacht seo nó ag a ceangaltáin tar éis a sheolta. Tabhair faoi deara go bhféadfadh monatóireacht a bheith á dhéanamh ar theachtaireachtaí chuig Uisce Éireann agus ó Uisce Éireann d'fhonn ár ngnó a chosaint agus chun a chinntiú go bhfuiltear ag teacht le beartais agus le caighdeáin Uisce Éireann. Is cuideachta gníomhaíochta ainmnithe é Uisce Éireann atá faoi theorainn scaireanna, a bunaíodh de bhun fhorálacha na n-Achtanna um Sheirbhísí Uisce 2007-2022, a bhfuil a bpríomh-ionad gnó ag Teach Colvill, 24-26 Sráid na Talbóide, BÁC 1.

Go raibh maith agat as d'aird a thabhairt.

Thank you for your attention.

Malone O'Regan Environmental
Ground Floor – Unit 3 Bracken Business Park,
Bracken Road
Sandyford
Dublin 18,
D18 32Y

Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
D01 WA07
Éire

Uisce Éireann
PO Box 6000
Dublin 1
D01 WA07
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

21 December 2023

By Email: admin@mores.ie

Re: EIAR Scoping Request – E2189 Proposed Development Roadstone Quarry Extension, Kilmacow, Co Kilkenny.

To whom it may concern,

Uisce Éireann has received notification of your Environmental Impact Assessment (EIA) scoping request relating to Roadstone Ltd forthcoming application for the quarry extension at Kilmacow, Co. Kilkenny.

Having reviewed the EIA report submitted the following must be addressed **prior to** lodgement of a planning application.

1. The site is currently connected to public water. Given the nature of the development, the impacts of the existing and proposed quarry on the capacity of water services must be determined (*i.e. do existing water services have the capacity to cater for the development as a whole*). The developer must submit a Pre-Connection Enquiry (PCE) enquiry to Uisce Éireann to determine the feasibility of connection to the Uisce Éireann network. This is confirmed by Uisce Éireann in the form of a Confirmation of Feasibility (COF).

   All pre-connection enquiry forms are available from https://www.water.ie/connections/connection-steps/.

2. The applicant must identify any upgrading of water services infrastructure that would be required to accommodate the proposed quarry extension.

It is noted that the EIA Scoping Report submitted does not refer to the following:

Dewatering

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.

Discharging to SPA

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.

In order to avoid delays in the planning application/consenting process it is strongly suggested that additional pre planning discussions with Uisce Eireann are held **prior to** the lodgement of the planning application.

In addition to above the following general aspects of Water Services must be considered in the scope of an EIA where relevant;

a) Where the development proposal has the potential to impact an Uisce Éireann Drinking Water Source(s), the applicant shall provide details of measures to be taken to ensure that there will be no negative impact to Uisce Éireann's Drinking Water Source(s) during the construction and operational phases of the development. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified as part of the report.

b) Where the development proposes the backfilling of materials, the applicant is required to include a waste sampling strategy to ensure the material is inert.

c) Mitigations should be proposed for any potential negative impacts on any water source(s) which may be in proximity and included in the environmental management plan and incident response.

d) Any and all potential impacts on the nearby reservoir as public water supply water source(s) are assessed, including any impact on hydrogeology and any groundwater/ surface water interactions.

e) In relation to a development that would discharge trade effluent – any upstream treatment or attenuation of discharges required prior to discharging to an Uisce Éireann collection network.

f) In relation to the management of surface water; the potential impact of surface water discharges to combined sewer networks and potential measures to minimise and or / stop surface waters from combined sewers.

g) Any physical impact on Uisce Éireann assets – reservoir, drinking water source, treatment works, pipes, pumping stations, discharges outfalls etc. including any relocation of assets.

h) When considering a development proposal, the applicant is advised to determine the location of public water services assets, possible connection points from the applicant's site / lands to the public network and any drinking water abstraction catchments to ensure these are included and fully assessed in any pre-planning proposals. Details, where known, can be obtained by emailing an Ordnance Survey map identifying the proposed location of the applicant's intended development to datarequests@water.ie

i) Other indicators or methodologies for identifying infrastructure located within the applicant's lands are the presence of registered wayleave agreements, visible

manholes, vent stacks, valve chambers, marker posts etc. within the proposed site.

j) Any potential impacts on the assimilative capacity of receiving waters in relation to Uisce Éireann discharge outfalls including changes in dispersion / circulation characterises. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified within the report.

k) Any potential impact on the contributing catchment of water sources either in terms of water abstraction for the development (*and resultant potential impact on the capacity of the source*) or the potential of the development to influence / present a risk to the quality of the water abstracted by Uisce Éireann for public supply should be identified within the report.

l) Mitigation measures in relation to any of the above ensuring a zero risk to any Uisce Éireann drinking water sources (Surface and Ground water).

Please note that Uisce Éireann will not accept new surface water discharges to combined sewer networks.

Queries relating to the above, terms and the EIA scoping opinion should be directed to planning@water.ie

PP. *Ali Robinson*

Yvonne Harris

Connections and Developer Services

Development Applications Unit

From:	Housing Manager DAU
To:	Admin - (Mores)
Subject:	RE: E2189-Roadstone Kilmacow Scoping Document
Date:	Thursday 23 November 2023 11:57:43

Our Ref: G Pre00310/2023 (Please quote in all related correspondence)

A Chara,

I acknowledge receipt of your recent consultation.

In the event of observations, you will receive a co-ordinated heritage-related response by email from Development Applications Unit (DAU).

The normal target turnaround for pre-planning and other general consultations is six weeks from date of receipt. In relation to general consultations from public bodies under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 to 2011, the Department endeavours to meet deadline dates, where requested.

Please note Development Applications Unit (DAU) is the coordinating unit for the Department of Housing, Local Government and Heritage, coordinating responses/submission from National Parks and Wildlife Service, National Monuments Service, Architectural Heritage and Underwater Archaeology Unit. All Correspondence is to be issued to and from DAU. Can you please ensure you update your files to only submit applications to DAU.

If you have not heard from DAU and wish to receive an update, please email manager.dau@npws.gov.ie
Kind regards

Edel Griffin
Executive Officer
___
An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage
Aonad na nIarratas ar Fhorbairt
Development Applications Unit
Oifigí an Rialtais
Government Offices
Bóthar an Bhaile Nua, Loch Garman, Contae Loch Garman, Y35 AP90
Newtown Road, Wexford, County Wexford, Y35 AP90

From: Admin - (Mores) <admin@mores.ie>
Sent: Wednesday 22 November 2023 15:34
Subject: E2189-Roadstone Kilmacow Scoping Document

To Whom It May Concern,

Please find attached a Scoping Document for the proposed extension at the Kilmacow Quarry, Co. Kilkenny, on behalf of Roadstone Limited. This document forms the Scoping Document for the project and has been issued to relevant prescribed bodies. Responses to the project, specifically in relation to the scope and extent of the proposed environmental assessment are requested to be sent to the MOR offices within 6 weeks from the date of the issue. Submissions from the prescribed bodies will be taken into consideration when preparing the EIAR.

Correspondence should be submitted to the following address:
Malone O'Regan Environmental
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 32Y

Or alternatively to: admin@mores.ie

To ensure that the response finds the relevant persons, in all correspondence ensure to reference the project as:

- E2189 Proposed Development Roadstone Kilmacow Quarry.

Kind Regards,
Meabh Corbally
Administrator

for and on behalf of
Malone O'Regan Environmental
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
+353 1 567 76 55
✉: *mcorbally@mores.ie*
Web*: www.mores.ie*

Transport Infrastructure Ireland

From: INFO
To: Admin - (Mores)
Subject: TII Ref: TII23-125675 -EIAR - Roadstone Kilmacow Quarry Kilkenny Scoping Document
Date: Friday 22 December 2023 09:34:52

Dear A chara,

Thank you for your correspondence of 18 December 2023 regarding the above. Transport Infrastructure Ireland's (TII's) position in relation to your enquiry is as follows.

TII will endeavour to consider and respond to planning applications referred to it, given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by TII in making such submissions or comments, will seek to uphold official policy and guidelines, as outlined in the Section 28 Ministerial Guidelines 'Spatial Planning and National Roads Guidelines for Planning Authorities' (DoECLG, 2012). Regard should also be had to other relevant guidance available at www.TII.ie.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals, following the examination of any valid planning application referred.

With respect to EIAR scoping issues, the recommendations indicated below provide only general guidance for the preparation of an EIAR, which may affect the national road network.

The developer/scheme promoter should have regard, inter alia, to the following:

- Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to the locations of existing and future national road schemes, e.g., N24 Cahir to Waterford Scheme.

- TII would be specifically concerned as to potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development.

- The developer should assess visual impacts from existing national roads.

- The developer should have regard to any EIAR/EIS and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should, in particular, have regard to any potential cumulative impacts.

- The developer, in preparing EIAR, should have regard to TII Publications (formerly DMRB and the Manual of Contract Documents for Road Works).

- The developer, in preparing EIAR, should have regard to TII's Environmental Assessment and Construction Guidelines, including the 'Guidelines for the Treatment of Air Quality During

the Planning and Construction of National Road Schemes' (National Roads Authority (NRA), 2006).

- The EIAR/EIS should consider the' Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see 'Guidelines for the Treatment of Noise and Vibration in National Road Schemes' (1st Rev., NRA, 2004)).

- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site, with reference to impacts on the national road network and junctions of lower category roads with national roads.

While it is noted that Section 3.3.10.1 of the EIAR Scoping Report makes reference to utilising the IHT Guidelines for Traffic Impact Assessment, TII recommends, in relation to national roads, that TII's 'Traffic and Transport Assessment Guidelines' (2014) should be referred to.

The scheme promoter is also advised to have regard to Section 2.2 of TII's TTA Guidelines, which addresses requirements for sub-threshold TTA. Any improvements required to facilitate development should be identified. It will be the responsibility of the developer to pay for the costs of any improvements to national roads to facilitate the private development proposed, as TII will not be responsible for such costs.

- The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required.

- In the interests of maintaining the safety and standard of the national road network, the EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network.

- TII recommends that the applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed. Where abnormal 'weight' loads are proposed, separate structure approvals/permits and other licences may be required in connection with the proposed haul route and all structures on the haul route through all the relevant County Council administrative areas should be checked by the applicant/developer, to confirm their capacity to accommodate any abnormal 'weight' load proposed.

Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practice.

I hope that this information is of assistance to you.

Is mise le meas,

_____

Andrew Moore
Senior Regulatory & Administration Executive

From: Admin - (Mores) <admin@mores.ie>
Sent: Monday, December 18, 2023 3:37 PM
Subject: E2189 - Roadstone Kilmacow Scoping Document

To Whom It May Concern,

Please find attached a Scoping Document for the proposed extension at the Kilmacow Quarry, Co. Kilkenny, on behalf of Roadstone Limited. This document forms the Scoping Document for the project and has been issued to relevant prescribed bodies. Responses to the project, specifically in relation to the scope and extent of the proposed environmental assessment are requested to be sent to the MOR offices within 6 weeks from the date of the issue. Submissions from the prescribed bodies will be taken into consideration when preparing the EIAR.

Correspondence should be submitted to the following address:
Malone O'Regan Environmental
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 32Y

Or alternatively to: admin@mores.ie

To ensure that the response finds the relevant persons, in all correspondence ensure to reference the project as:
• E2189 Proposed Development Roadstone Kilmacow Quarry.

Kind Regards,
Meabh Corbally
Administrator

for and on behalf of
Malone O'Regan Environmental
Ground Floor - Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
+353 1 567 76 55
✉: *mcorbally@mores.ie*
Web: *www.mores.ie*

In accordance with TII's Right to Disconnect policy, if you are receiving this email outside of normal working hours, I do not expect a response or action outside of your own working hours unless it is clearly noted as requiring urgent attention.

De réir pholasaí BIÉ An Ceart gan a bheith Ceangailte, má tá an ríomhphost seo á fháil agat lasmuigh de na gnáthuaireanta oibre, nílim ag súil le freagra ná le gníomh uait lasmuigh de do ghnáthuaireanta oibre féin mura bhfuil sé ráite go soiléir go bhfuil gá gníomhú go práinneach.

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Córas r-phoist BIE: Tá an ríomhphost seo agus aon chomhaid a tharchuirtear leis faoi rún agus beartaithe lena n-úsáid ag an duine aonair nó ag an eintiteas a bhfuil siad dírithe chuige/chuici

amháin. Más rud é go bhfuair tú an ríomhphost seo trí bhotún, cuir sin in iúil do postmaster@tii.ie, le do thoil, agus scrios an ríomhphost bunaidh agus aon cheangaltáin.

In accordance with TII's Right to Disconnect policy, if you are receiving this email outside of normal working hours, I do not expect a response or action outside of your own working hours unless it is clearly noted as requiring urgent attention.

De réir pholasaí BIÉ An Ceart gan a bheith Ceangailte, má tá an ríomhphost seo á fháil agat lasmuigh de na gnáthuaireanta oibre, nílim ag súil le freagra ná le gníomh uait lasmuigh de do ghnáthuaireanta oibre féin mura bhfuil sé ráite go soiléir go bhfuil gá gníomhú go práinneach.

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APPENDIX 6

Appendix 6-1

February 2024

Restoration Plan

Quarry Extension, Kilmacow, Co. Kilkenny

Roadstone Ltd.

Fortunestown, Dublin 24, Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

Title: Restoration Plan, Quarry Extension, Kilmacow, Co. Kilkenny, Roadstone Ltd., Fortunestown, Dublin 24, Co. Dublin

Job Number: E2189

Prepared By: Sarah de Courcy **Signed:** _____

Checked By: David Dwyer **Signed:** _____

Approved By: Dyfrig Hubble **Signed:** _____

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	27/02/24	Report	Final	SDC	DD	DH

Restoration Plan
Quarry Extension, Kilmacow, Co. Kilkenny
Roadstone Ltd.
Fortunestown, Dublin 24, Co. Dublin

Contents

FIGURES

TABLES

1 INTRODUCTION

Malone O'Regan Environmental (MOR) has been commissioned by Roadstone Ltd. (the Applicant) to prepare a Restoration Plan in support of a planning application to Kilkenny County Council (KCC) for an expansion 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 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 at Ordnance Survey Reference ITM 655754 615477 (henceforth referred to as 'the Quarry'). The Quarry is authorised under the following planning references KCC Ref 16700, KCC Ref 1/1/1754 KCC Ref 1/1/5611 and An Bord Pleanála (ABP) 10/5/36501; KCC Ref 97/863 & ABP PL10.108741 and KCC Ref 03/487 & ABP PL 10.5.36501.

The Quarry is situated in the Roadstone Landholdings which covers an area of ca. 84ha at Ordnance Survey Reference ITM 655604 615465.

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) to surface level circa (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.

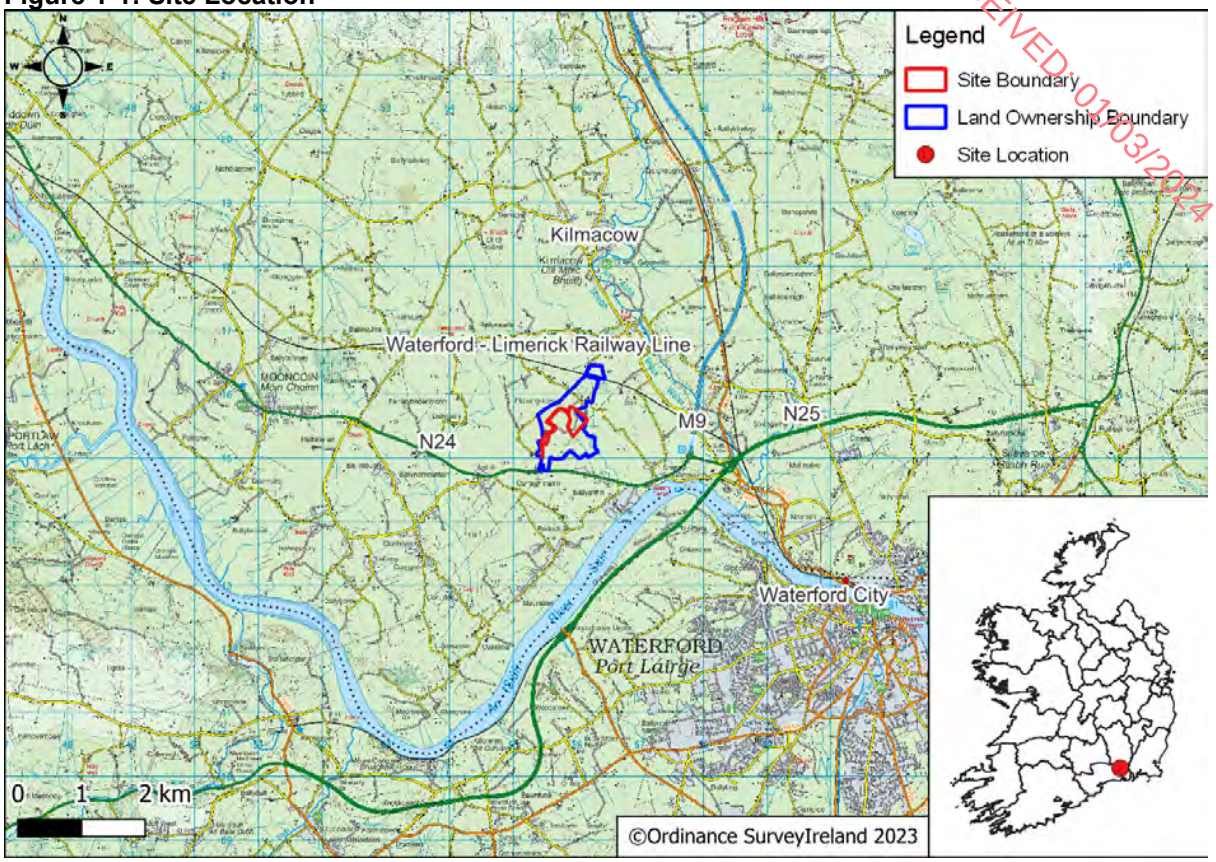
The Proposed Development will be located on a site covering an area of ca.10.3ha within the townlands of Granny and Aglish North, Kilkenny (Ordnance Survey Ireland Grid Reference ITM 655604 615465), refer to redline boundary presented in Figure 1-1 below for context ('the Site'). The Site is located ca.40km south of Kilkenny Town, Co. Kilkenny and ca.5.5km northwest of Waterford City, Co. Waterford. 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) to surface level circa (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.

The Site is ca.10.3ha in size which can be further subdivided as follows:

- The proposed extraction area covers ca.6ha;
    - Greenfield lands form ca.2.2ha of the proposed extraction area;
    - Existing quarry habitat forms the remaining ca.3.8ha of the proposed extraction area;
- The existing quarry and internal road structure leading to the established Site entrance, wheel wash and weighbridge covers ca.3.1ha;
- The remaining ca.1.2ha within the eastern portion of the Site will be used to facilitate ancillary works such as the proposed screening berms, vegetation planting and security fencing.

This Restoration Plan seeks to incorporate the proposed extension into the existing restoration plan for the Quarry. As such this Restoration Plan will supersede the plan submitted under KCC planning reference 16700.

Figure 1-1: Site Location



1.1 Purpose

The management measures described in this Restoration Plan are based on the ecological baseline survey works undertaken as part of the ecological assessment of the Site as outlined in Chapter 6 – Biodiversity in the EIAR prepared in support of this planning application.

This Restoration Plan includes ecological enhancements measures and has taken full cognisance of protected and notable species that have the potential to be present within the area after the closure of the Site and the already permitted restoration plan for Kilmacow Quarry submitted under planning reference 16700.

1.2 Statement of Authority

The Restoration Plan was prepared under the direction of Dyfrig Hubble, Associate Director of Ecology, who provided peer review and support to the project.

Dyfrig Hubble has a B.Sc. (Hons) Tropical Environmental Science and an M.Sc. in Environmental Forestry. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management. Dyfrig has over 18 years' experience working in the ecological consultancy sector including habitat appraisals and specialist species specific surveys. Dyfrig has extensive experience in the preparation of Habitat Engagement / Restoration Plans and Habitat Management Plans for various projects within both the UK and Ireland.

1.3 Methodology

This Restoration Plan has been prepared in accordance with best practice guidelines and legislation including:

- Wildlife Habitats & the Extractive Industry - Guidelines for the Protection of Biodiversity within the Extractive Industry [1]; and,

- Environmental Management in the Extractive Industry (Non-Scheduled Minerals) [2].

1.4 Overview of Quarry Restoration

Quarries can be of very high value for nature conservation and are often termed biodiversity hotspots. Mineral extraction creates a large variety of landscapes and habitats which support numerous floral and faunal species. Over the years, biologists have generated an abundance of evidence highlighting the importance of quarries for rare floral species such as red hemp nettle, insects such as bumble bees and dragonflies, and bird species such as sand martin and ringed plover.

Roadstone operate to preserve and protect biodiversity at their quarries during extraction activities and strive to promote biodiversity after extraction has finished. Therefore, the proposed end-use for the Site will be for nature conservation.

Until recently, many quarry rehabilitation strategies were aimed at producing vegetation cover as quickly as possible. However, allowing plants to naturally colonise bare ground and other quarry habitats is now recognised as an important element of quarry rehabilitation. Quarries provide excellent opportunities for natural regeneration and natural habitat conservation.

Studies have shown that natural regeneration of quarries allows for the development of natural landscapes with increased biodiversity and species preservation compared with the 'classic' regeneration of quarries via the planting of vegetation cover.

The aim of any natural rehabilitation plan is to restore ecological balance and to produce self-sustaining plant and wildlife communities and habitats. Old quarry sites can create both terrestrial and wetland habitats for wildlife, significantly contributing to Ireland's biodiversity goals and enhancing the environmental credentials of the company.

This Restoration Plan provides detailed guidance for the rehabilitation of the Site to enhance its nature conservation value, specifically in terms of its capacity to support breeding / nesting bird species commonly associated with quarries by allowing natural erosion of aggregate faces and the development of a waterbody onsite.

1.5 Structure of the Restoration Plan

The structure of this Restoration Plan is as follows:

- Site Analysis: provides contextual detail;
- Rehabilitation Plan: details the rehabilitation works proposed at the Site; and,
- Monitoring and Aftercare: provides details regarding the monitoring and review of the plan as the rehabilitation strategy progresses.

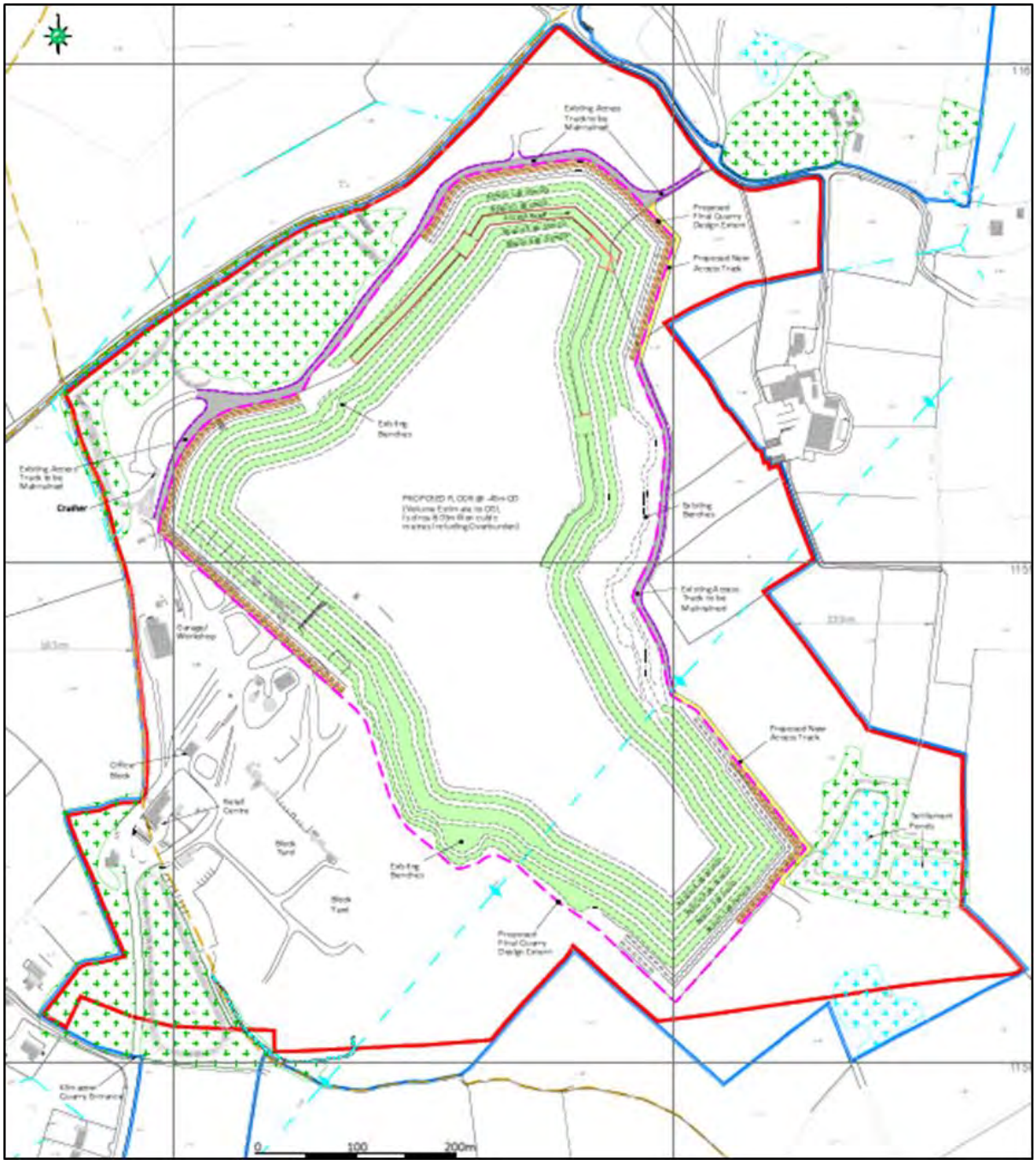
2 SITE ANALYSIS

2.1 Existing Restoration Plan

The Quarry is subject to a permitted restoration plan submitted under planning reference 16700. The permitted plan is outlined in Figure 2-1 below.

The approach to restoration within this permitted plan has been taken into account whilst designing the proposed plan, refer to Section 3 for further details.

Figure 2-1: Permitted Restoration Plan under KCC Planning Reference 16700



2.2 Existing Site

The Site covers the proposed extension lands to the east and a portion of the existing quarry pit in Kilmacow Quarry.

The proposed extension lands encompass three (3No.) agricultural fields and the western portion of an existing farmyard. The agricultural fields were utilised as pastures and were bound by a combination of fencing and treelines. Scrub was present within the southwest corner of the agricultural lands, in between the greenfield site and the existing quarry. No drainage ditches or water features were present within these fields at the time of survey.

The western portion of the Site spans the access road into the Quarry, a portion of the quarry pit and a section of an access route atop the eastern quarry face. This area was included within the Site boundary in order to facilitate access between the proposed extension lands and the existing quarry. Sections of the upper access route contained recolonising bare ground or scrub habitats; however, the majority of the western portion of the Site was active quarry habitat / bare ground.

The immediate area to the east of the Site contains a residential dwelling owned by Mr. Clohosey and a farmyard containing several outbuildings whilst the wider area surrounding the Site comprises agricultural land, local road infrastructure, scattered residential dwellings and additional farm holdings.

2.3 Ecological Context

2.3.1 Habitats

The following habitats were identified onsite using Fossitt's, '*A Guide to Habitats in Ireland*,' [3]:

- Improved Agricultural Grassland (GA1);
- Hedgerows (WL1) /Treelines (WL2);
- Scrub (WS1);
- Buildings and Artificial Surfaces (BL3);
- Spoil and Bare Ground (ED2); and,
- Active Quarries and Mines (ED4).

Refer to Figure 2-2 for context.

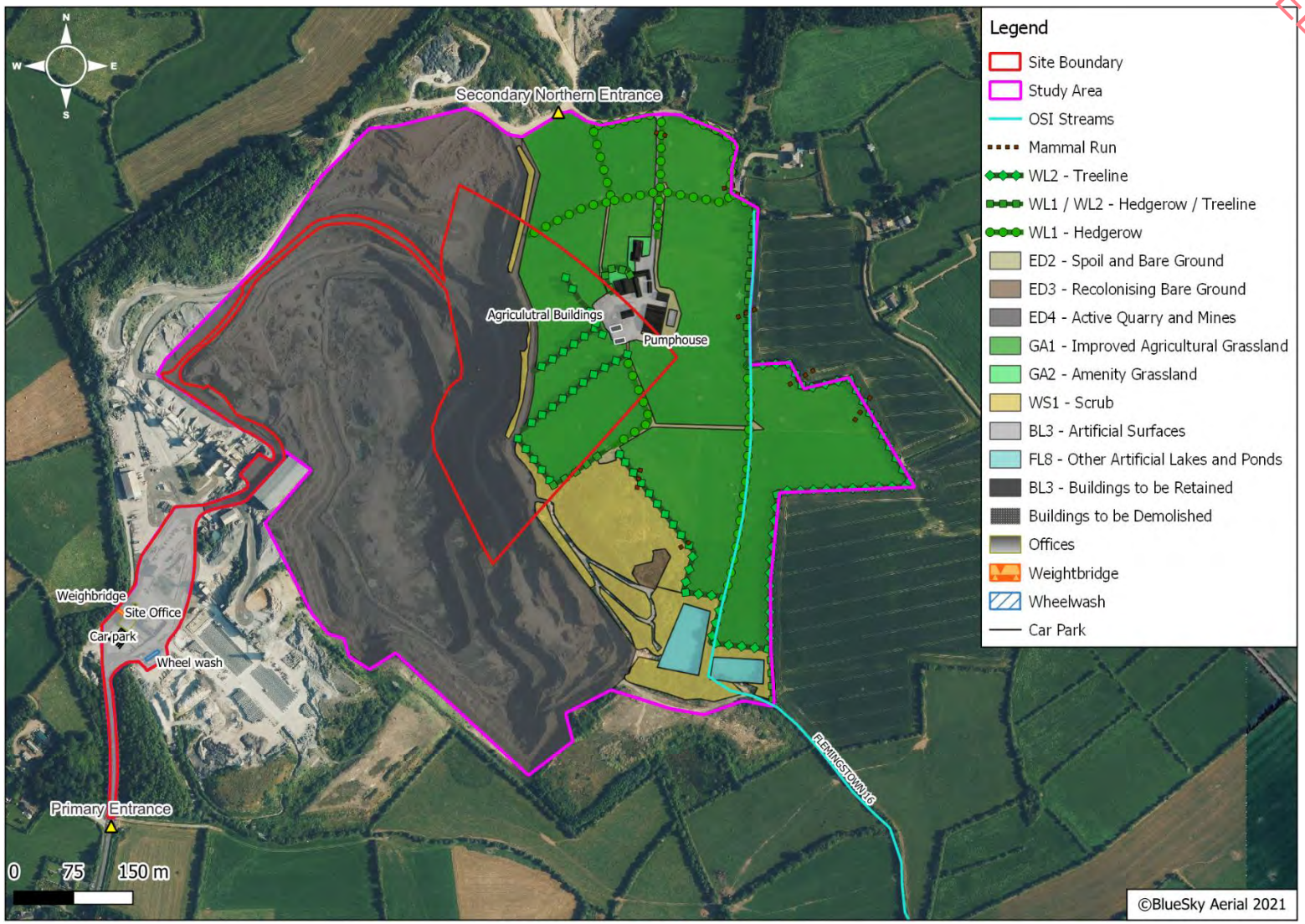
2.3.2 Species

The following notable / protected species were identified onsite and within the wider landholding (either directly through sight or sound; or indirectly through prints, scats or other field evidence) between 2021 and 2023:

- Barn swallows (*Hirundo rustica*);
- Blackbird (*Turdus merula*);
- Blackcap (*Sylvia atricapilla*);
- Blue tit (*Cyanistes caeruleus*);
- Brown long-eared bats (*Plecotus auratus*);
- Bullfinch (*Pyrrhula pyrrhula*);
- Buzzard (*Buteo buteo*);

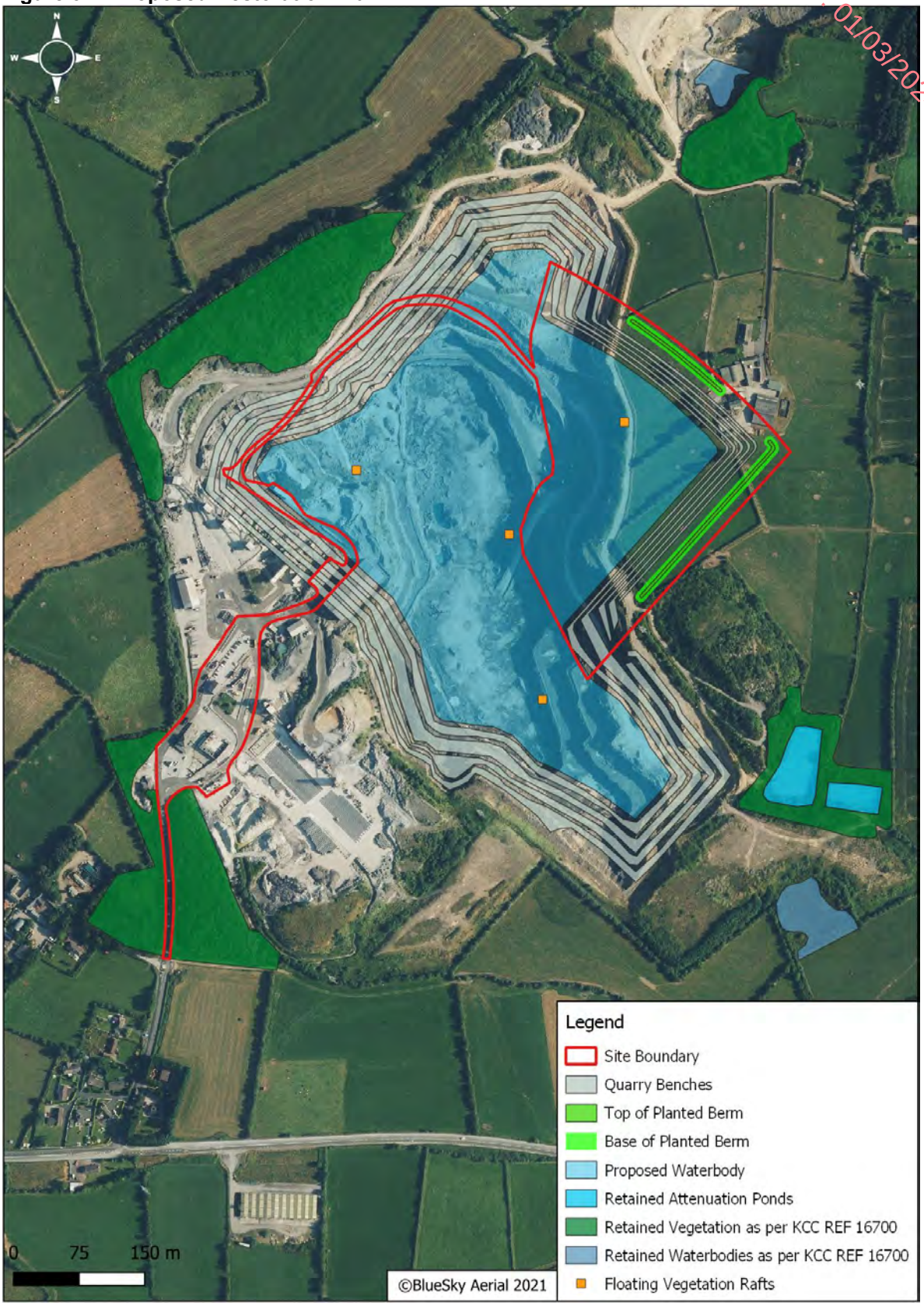
- Chaffinch (*Fringilla coelebs*);
- Chiffchaff (*Phylloscopus collybita*);
- Common pipistrelle (*Pipistrellus pygmaeus*);
- Dunnock (*Prunella modularis*);
- European rabbits (*Oryctolagus cuniculus*);
- Goldfinch (*Cardeulis carduelis*);
- Great tit (*Parus major*);
- Hooded crow (*Corvus cornix*);
- House sparrow (*Passer domesticus*);
- Jackdaw (*Corvus monedula*);
- Leisler's bats (*Nyctalus leisler*);
- Lesser black-backed gull (*Larus fuscus*);
- Linnet (*Carduelis cannabina*);
- Magpie (*Pica pica*);
- Peregrine falcon (*Falco peregrinus*);
- Pied wagtail (*Motacilla alba yarrellii*);
- Robin (*Erithacus rubecula*);
- Sand martin (*Riparia riparia*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Starling (*Sturnus vulgaris*);
- Willow warbler (*Phylloscopus trochilus*);
- Wood pigeon (*Columba palumbus*); and,
- Wren (*Troglodytes troglodytes*).

Figure 2-2: Habitat Map



3 RESTORATION PLAN

Figure 3-1: Proposed Restoration Plan



3.1 Phase 1 – Construction / Site Preparation

The first stage of the Restoration Plan will happen at the pre-construction stage. This will involve ground clearance and soil stripping works. Scrub vegetation and ca.479m of hedgerows / treelines within the eastern portion of the Site will be lost to facilitate the proposed extraction area.

The topsoil and overburden from these activities will be used to create berms. 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. The existing hedgerows / treelines to be removed are 2-3m wide. As such, the berms provide a larger area for vegetation. This will result in a net increase in trees / shrub vegetation cover onsite.

These berms will be planted with a planting mix as detailed in Table 3-1 below. Advanced nursery stock will be used as part of the planting mix. 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.

Table 3-1: Berm Planting Mix

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

Common Name	Scientific Name
Dog-rose	*Rosa canina*
Spindle	*Euonymus europaeus*

3.2 Phase 2 – Site Closure and Safety Preparation

This Restoration Plan has been carefully designed to prevent the creation of potential hazards that may pose a threat to public safety. Following cessation of quarrying activities, the Site will be decommissioned within a three-month period.

All plant and equipment will be removed. However, it is proposed to maintain the hardstanding area adjacent to the office for the purposes of light industrial use. The use of this area around the Site offices will be subject to securing the necessary planning permission for a change of use when quarry works are complete.

Boundary fencing will be inspected and improved where necessary to prevent unauthorised access by members of the public. Signage relating to safety (i.e. warning signs for cliff edges, unstable banks etc) will be left in-situ / erected as appropriate.

Waste considered unsuitable for re-use or recycling, which includes, *inter alia*, domestic waste, will be disposed of off-site by an appropriately permitted waste contractor at a suitable permitted waste facility.

The removal of pumping plant within the Quarry will lead to the creation of a waterbody onsite and within the adjoining quarry.

3.3 Phase 3 – Habitat Creation and Maintenance

3.3.1 Artificial Waterbody

The Quarry operates below the groundwater table to a permitted depth of -45mOD. The Proposed Development seeks to extend the quarry pit to the east and to maintain the quarry floor at -45mOD.

Currently, any water pooling on the quarry floor is pumped into attenuation ponds and discharged to the Flemingstown stream under licence ENV/W82. Upon, cessation of works, this water will be allowed to naturally recharge and flood the existing and proposed extraction area to a level of ca.16mOD. The resulting waterbody will be ca.60m in depth and will constitute an important part of the mosaic of habitats onsite, see Figure 3-1 above.

Waterfowl birds, such as little grebe, coot and mallards, are expected to use the Site once quarrying operations cease.

3.3.1.1 Emergent and Marginal Vegetation Planting

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. New plant material will be sourced from suppliers who specialise in the provision of local seeds and plant materials. Each of the plant specimens will be checked prior to planting to avoid the transferral of fish or material from undesirable plants.

Aquatic vegetation will be planted in containerised baskets. Plants will be planted into soil in groups of between 5 and 8 individuals of the same species. The container will then be sited in the water at a depth of no more than 750mm.

Topsoil will be spread on the ramps leading into the waterbody in order to facilitate plug planting of marginal vegetation. Planting will be in groups of the same species, with individual plants spaced about 300mm apart. The exact location and type of aquatic and marginal

vegetation will be determined by an experienced ecologist and only after the waterbody has been created. This is to allow the ecologist to make an assessment of the exact conditions that have been created and thus to ensure that the planting is sited in the most appropriate location possible. Therefore the exact areas have not been presented in Figure 3-1, however, these areas will be located on ramps into the quarry pit which will cut through the presented quarry benches in the figure. Table 3-2 presents an example mix of marginal and aquatic plants.

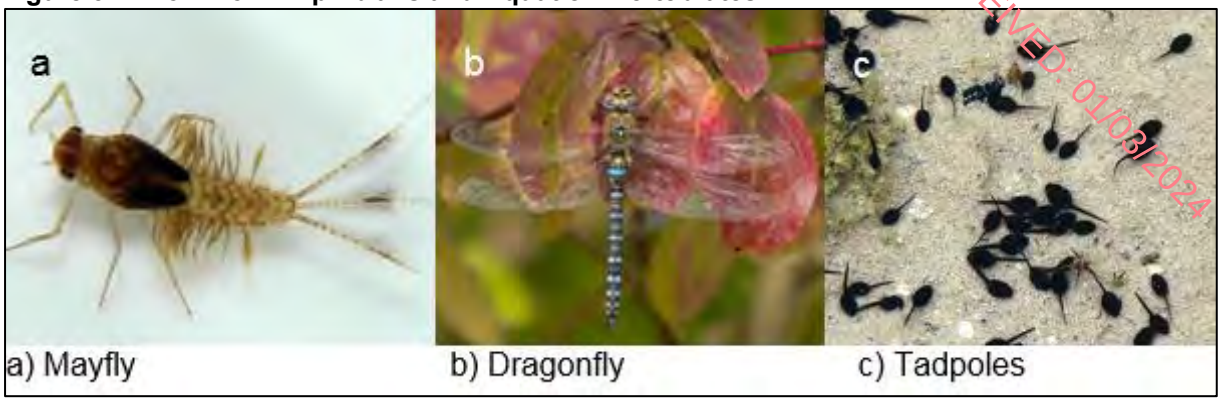
Table 3-2: Example Mix for Emergent and Marginal Mix Vegetation

Common Name	Scientific Name
Aquatics	
Pond water crowfoot	*Ranunculus peltatus*
Pondweeds	*Potamogeton natans, or perfoliatus*
Common hornweed	*Ceratophyllum demersum*
Frog bit	*Hydrocharis morus-rane*
Lesser water parnsip	*Berula eracta*
Water-starwort	*Callitriche platycarpa*
Marginals	
Soft rush	*Juncus effusus*
Arrow-head	*Sagittaria sagittifolia*
Water mint	*Mentha aquatica*
Reed sweet-grass	*Glyceria maxima*
Branched bur-reed	*Sparganium erectum*
Meadowsweet	*Filipendula ulmaria*
Ragged robin	*Lychnis flos-cuculi*
Water forget-me-not	*Myosotis scorpioides*
Yellow flag iris	*Iris psedudacorus*
Water plantain	*Alisma plantago-aquatica*
Marshmallow	*Althaea officinalis*

For frogs, newts, birds and many species of insect, the availability of still water with emergent wetland vegetation is essential to allow them to breed and reproduce.

Shallow areas / shelves will be incorporated where possible through the use of stockpiled material and overburden. These shallow areas (including the haul ramps) will provide suitable breeding habitat for amphibians and a host of invertebrate species, refer to Figure 3-2 below for examples. This in turn will provide food sources for birds and bats.

Figure 3-2: Common Amphibians and Aquatic-Invertebrates



3.3.1.2 Floating Vegetation Rafts

Following the cessation of quarrying works and the creation of the waterbody onsite, bird platforms will be placed on floating vegetation rafts in the artificial waterbody to provide suitable nesting habitat and resting habitat for birds within the area, refer to Figure 3-3 for examples. Floating vegetation rafts do not have to be large to be useful. Moorhens, coots and grebes will nest on rafts little bigger than their own nests [4]. Raft design, number and location will be determined by the project ECoW. Indicative locations for raft anchoring points are shown in Figure 3-1.

Figure 3-3: Examples of Floating Vegetation Rafts

3.3.2 Bare Ground

All the upper haul routes onsite will be left as bare and disturbed ground. Bare and disturbed ground will provide the basis for natural regeneration at the Site. It is envisaged that pioneer species will colonise these open areas, creating a highly diverse range of specialist flora and fauna.

The bare ground onsite will also be important for a suite of invertebrates which use open areas for nesting, chasing after prey and basking. Examples of invertebrates that utilise bare ground habitats include solitary bees, butterflies and moths.

3.3.3 Steep Sided Slopes

Rock faces in quarries can serve as breeding sites for cliff breeding bird species such as peregrine falcons. Peregrine falcons were identified breeding onsite in 2021 and 2022. Given the potential for the Site to be used by this species, the upper quarry faces within the Quarry and the Site will be retained in benches. These benches will be allowed to erode naturally to enable the continual creation of bare and disturbed ground.

4 MONITORING AND AFTERCARE

4.1 Peregrine Falcon Surveys

Annual peregrine falcon surveys will be undertaken onsite and will continue throughout the lifetime of the development by the project ECoW to ensure no impacts occur to breeding peregrine within the vicinity of the Site.

4.2 Rehabilitation Success Monitoring

The Project Ecologist will conduct an annual review of the Site's rehabilitation starting the first year following the cessation of the quarrying works. This annual review will continue an additional five years following the completion of the rehabilitation works, for a total of 5 years of annual monitoring. The annual review will involve compiling a species record of flora and fauna at the restored Site.

A report will be submitted to KCC each year detailing the progress of the Restoration Plan and outlining any additional works required to ensure the Restoration Plan achieves its primary objective of increasing biodiversity onsite. Following this five-year period, a review will be undertaken to assess the requirements for additional / further works / monitoring.

5 REFERENCES

[1] DoAHG, “Wildlife, Habitats & the Extractive Industry,” Department of Arts, Heritage and the Gaeltacht, Dublin, 2007.

[2] EPA, “Environmental Management in the Extractive Industry,” Environmental Protection Agency, Wexford, 2006.

[3] J. A. Fossitt, A Guide to Habitats in Ireland, Dublin : The Heritage Council, 2000.

[4] NAM, “Artificial Rafts and Floating Islands on Mineral Sites: Designs.,” 2017. [Online]. Available: file:///C:/Users/aflaherty/Downloads/Floating%20islands%20&%20rafts%20Advisory%20sheet%20NAM.pdf.

APPENDIX 6-2

February 2024

Bat Survey Report

Quarry Extension, Kilmacow, Co. Kilkenny

Roadstone Ltd.

Fortunestown, Dublin 24,

Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

Title: Bat Survey Report, Quarry Extension, Kilmacow, Co. Kilkenny, Roadstone Ltd., Fortunestown, Dublin 24, Co. Dublin.

Job Number: E2189

Prepared By: Stephanie Lonergan **Signed:** S. Lonergan

Checked By: Sarah de Courcy **Signed:**

Approved By: Dyfrig Hubble **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	27/02/24	Report	Final	SL	SDC	DH

Bat Survey Report
Quarry Extension, Kilmacow, Co. Kilkenny
Roadstone Ltd.
Fortunestown, Dublin 24.

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1 INTRODUCTION

This Bat Survey Report has been prepared by Malone O'Regan Environmental (MOR) on behalf of Roadstone Ltd. ('the Applicant') in support of a planning application to Kilkenny County Council (KCC) for an extension to an existing rock quarry in Kilmacow, Co. Kilkenny.

The proposed extension does not seek to increase production output at the existing 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'). Full details of the Proposed Development are presented in the Environmental Impact Assessment Report (EIAR) submitted as part of the overall planning application. This Bat Survey Report should be read in conjunction with the EIAR.

The Proposed Development will be located on a site covering an area of circa (ca.) 10.3 hectares (ha) (Ordnance Survey centre co-ordinates as Irish Trans Mercator (ITM) 655978 615719). Refer to the redline boundary presented in Figure 1-1 below for context ('the Site'). The Site comprises of the following components: the existing access into the quarry, a portion of the existing extraction area, greenfield lands within the Roadstone landholding, greenfield lands owned by Mr. Clohosey and a small portion of an existing farmyard owned 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. Figure 1-2 below shows the Site in the context of the landownership boundaries.

This report presents the findings of the bat surveys conducted onsite which included tree and building inspections alongside dusk emergence and dawn re-entry surveys.

Figure 1-1: Site Location

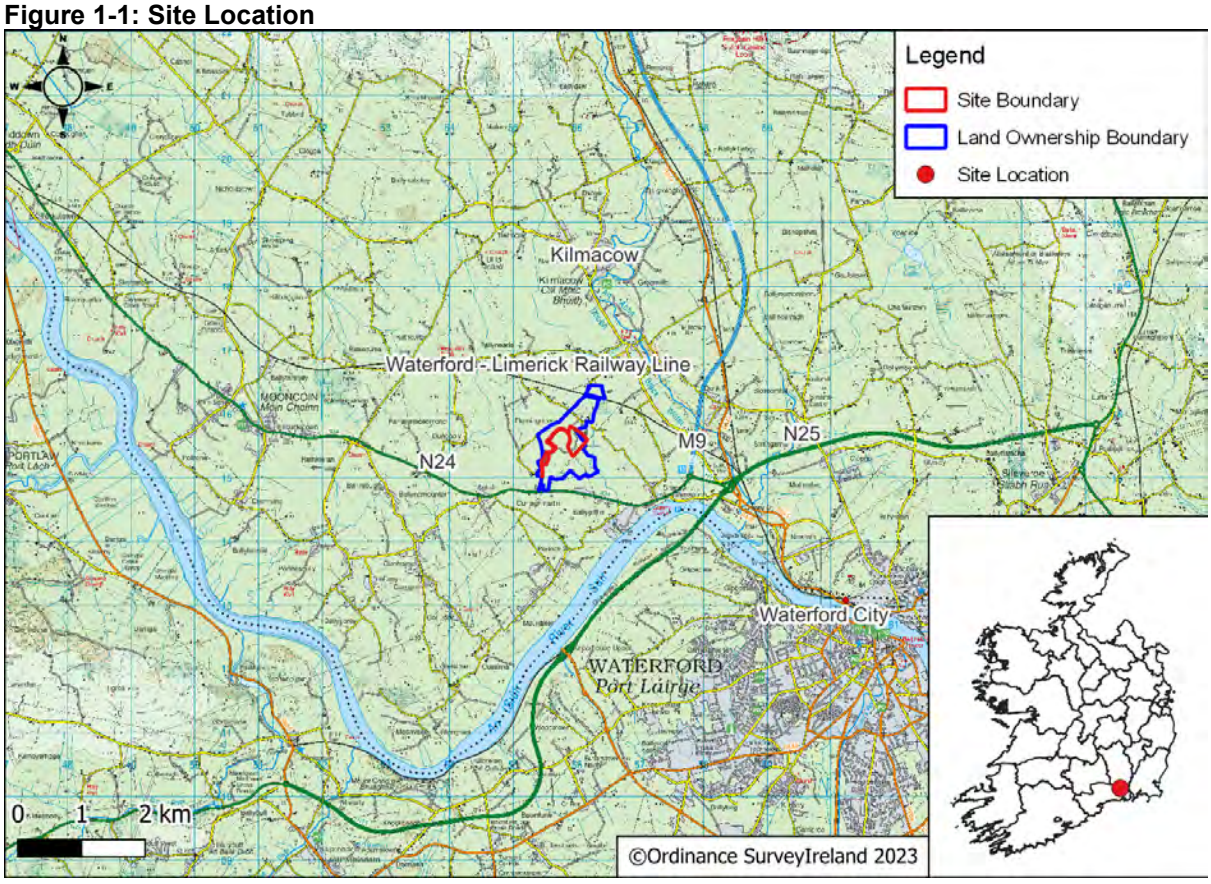
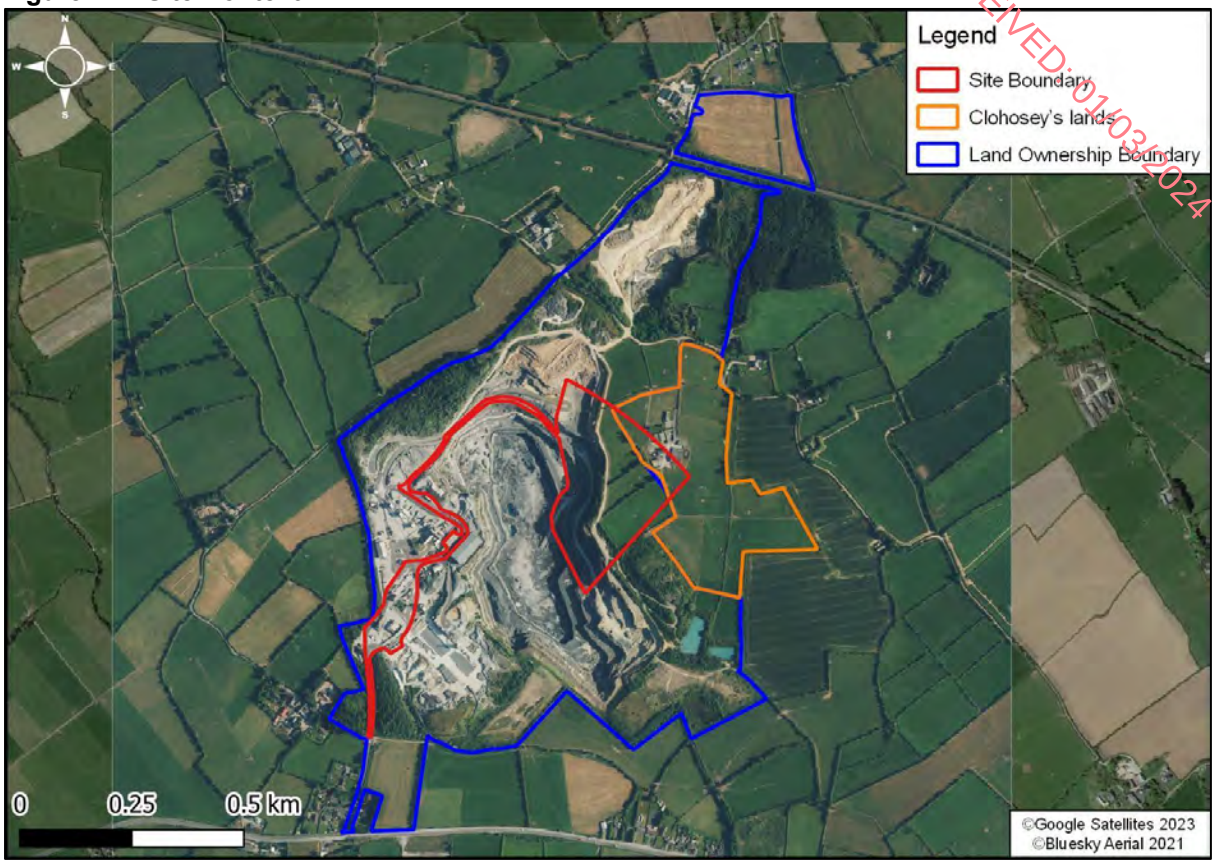


Figure 1-2: Site Context



1.1 Relevant Legislation

All Irish bat species are protected by law under the Wildlife Act 1976 and its subsequent amendments. They are afforded full protection under this act, which makes it a criminal offence for anyone without a licence to:

- Kill, injure or handle a bat;
- Possess a bat (whether alive or dead);
- Disturb a roosting bat; and,
- Damage, destroy or obstruct access to any place used by bats for shelter, whether they are present or not.

In addition to domestic legislation, bats are also protected under the EU Habitats Directive (92/43/EEC). All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II, which make it an offence to:

- Deliberately capture, injure or kill any bat;
- Deliberately disturb a bat, in particular any disturbance which is likely;
    - (a) To impair their ability:
        - (i) To survive, to breed or reproduce, or to rear or nurture their young; or,
        - (ii) To hibernate or migrate.
    - (b) To significantly affect the local distribution or abundance of the bat species; or,

- Damage or destroy a breeding site or resting place of a bat.

Therefore, the destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation and a derogation license must be obtained from the National Parks and Wildlife Service (NPWS) before works can commence.

Furthermore, any works interfering with bats, especially their roosts, may only be carried out under a license to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. For example, the installation of lighting in the vicinity of a known bat roost requires a licence.

1.2 Statement of Authority

This bat report was prepared by Stephanie Lonergan, Environmental Consultant, has a B.A. (Mod) (Hons) in Environmental Science. Stephanie is a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM) with a particular interest in bat ecology and conservation. Stephanie has completed courses on bat ecology, identification, handling, biometrics and mitigation with CIEEM and Bat Conservation Ireland. Stephanie has undertaken training run by Wildlife Acoustics for analysis of bat calls in Kaleidoscope Pro Software and regularly uses this programme within her role at MOR. Stephanie has experience undertaking bat surveys and tree / building assessments and regularly attends events held by local bat groups.

This report was reviewed and approved by Dyfrig Hubble, Associate Director - Ecologist, has a B.Sc. (Hons) in Tropical Environmental Science and an M.Sc. Environmental Forestry. Dyfrig is a full member of the CIEEM. Dyfrig has over 18 years' experience working in the ecological consultancy sector including habitat appraisals and specialist species specific surveys. Dyfrig has extensive experience in undertaking surveys for bats and in the preparation of survey reports for various projects within both the UK and Ireland.

1.3 Species Background

There are eleven recorded bat species in Ireland, nine (9No.) of which are considered resident and two (2No.) which are considered vagrants (Please see Table 1-1 below).

Table 1-1: Status of Irish Bat Species

Bat Species		**Irish status**	**European Status**
Common Name	**Scientific Name**		
Resident Bat Species			
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Least Concern	Least Concern
Brown Long-eared Bat	*Plecotus auritus*	Least Concern	Least Concern
Common Pipistrelle	*Pipistrellus pipistrellus*	Least Concern	Least Concern
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	Least Concern	Near Threatened
Whiskered Bat	*Myotis mystacinus*	Least Concern	Least Concern
Daubenton's Bat	*Myotis daubentonii*	Least Concern	Least Concern
Leisler's Bat	*Nyctalus leisleri*	Least Concern	Least Concern
Nathusius' Pipistrelle	*Pipistrellus nathusii*	Least Concern	Least Concern

Bat Species		Irish status	European Status
Common Name	**Scientific Name**		
Natterer's Bat	*Myotis nattereri*	Least Concern	Least Concern
Vagrants			
Brandt's bat	*Myotis brandtii*	Data Deficient	Least Concern
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*	Data Deficient	Near Threatened

1.3.1 Types of Bat Roosts

Bats were originally cave and tree dwelling animals; however many now use buildings to roost within. Buildings are highly important roosting sites for all Irish bat species as they can support all roost types. Maternity roosts are the most significant roost type found in buildings, but cellars and attics can serve as hibernation sites for bats. Roosts within buildings can far exceed the numbers encountered in trees, bridges, caves or cliffs with roosts of over 1,000 bats recorded [1].

Bats are social animals, and most species congregate in large colonies during late spring / summer. These colonies consist mostly of females, with some juvenile males from the previous year. Male bats normally roost individually or in small groups until it is time to mate in late autumn. In summer, bats seek warm dry buildings in which they can give birth and suckle their young. In winter, they seek out places with a constant low temperature and high humidity where they can become torpid and hibernate during adverse weather conditions. However, bats do not hibernate continuously during winter and will awake and hunt during mild nights when there are insects available, and it is energetically advantageous to forage [2].

One purpose of daytime tree or building inspections is to determine the potential of bat roosts within the survey area. Due to the transient nature of bats and their seasonal life cycle, there are a number of different types of bat roosts. Where possible, one of the objectives of the surveys is to be able to identify the types of roosts present, if any.

Table 1-2 below defines the various types of bat roosts and which time of year they are utilised.

Table 1-2: Types of Bat Roosts [2]

Roost Type	Definition	Time of Survey
Day Roost	A place where individual bats or small groups of males, rest or shelter in the daytime but are rarely found by night in the summer.	Anytime of the year
Night Roost	These are roosts which are used as resting places for bats between foraging bouts. They also provide retreats for bats from predators or during inclement weather conditions. They also function as feeding perches and may be important for socialising. May be used by a single bat on occasion or it could be used regularly by the whole colony.	Anytime of the year
Feeding Roost	A place where individual bats or a few bats rest or feed during the night but are rarely present by day.	Anytime of the year
Transitional Roost	A place used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.	Outside the main maternity and hibernation periods.

Roost Type	Definition	Time of Survey
Mating Site	Most bat species mate in late summer / autumn but pregnancy does not occur until the following spring. During this time males will take possession of a cavity in a building, tree, bridge, cave or mine and attract females to these sites to establish a harem. Male bats call both from a perch and in flight in much the same manner that male birds sing.	Late Summer into Autumn
Maternity Site	Maternity roosts are the most significant roosts, and they are predominantly all female aggregations that are formed from late May onwards and remain as a relatively cohesive unit until late August. Not all female bats give birth annually. These females that do bear young in a given year avail of a suitable roosting site within a building, tree and sometimes cave (or equivalent). The young are flightless for several weeks and hence are vulnerable to dangers such as tree felling and restoration, reinforcement or demolition of structures such as buildings and bridges.	Summer Months
Hibernation Site	Bats have a high metabolic rate and in temperate countries, such as Ireland, flying insects are not available in sufficient numbers during winter to sustain bats. Therefore, bats 'hibernate' during winter. In hibernation sites, bats are often completely inactive for several days and are extremely vulnerable to disturbance by human activities due to the time taken for them to become sufficiently active to allow escape. Hibernation may extend from November to the end of March, during which time bat activity will take place sporadically.	Winter Months in cold weather conditions
Satellite Roost	An alternative roost found in close proximity to the main nursery colony and is used by a few individuals throughout the breeding season.	Summer Months

1.4 Purpose of Survey Work

The implication of these legislative policies is that the proposed quarry extension needs to take account of the potential effects on bats. Survey work is necessary to establish whether the species are currently present in areas where suitable habitat exists and in areas where bats have previously been recorded. Survey work also enables appropriate mitigation measures to be incorporated into the design of a project and ensures that there are no adverse effects on the conservation status of the species.

Survey work was deemed necessary based on desktop surveys and suitable roosting, foraging and commuting habitat being identified during the baseline surveys of the Site.

2 METHODOLOGY

The methodologies used to establish the presence / potential presence of bats are summarised below.

2.1 Desk-based Studies

A desk-based study was undertaken to identify records of bats within the Study Area. The following sources of information were reviewed:

- The National Parks and Wildlife Service (NPWS) website was consulted to obtain the most up to date detail on conservation objectives for the European sites relevant to this assessment [3];
- Aerial mapping was reviewed to identify any habitats and features likely to be used by bats. Maps and images of the Study Area and general landscape were examined for suitable foraging or commuting habitats including hedgerows, treelines, watercourses, woodlands and forestry; and,
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to bat species distributions and bat habitat suitability index [4].

2.2 Field-based Studies

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 2-1 ('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 2-1: Study Area for Ecological Assessments

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

- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* [1];
- *A Conservation Plan for Irish Vesper Bats* Irish Wildlife Manual No. 20 [5];
- *Bat Mitigation Guidelines for Ireland*. Irish Wildlife Manuals, No. 25 [6] a publication by the NPWS; and,
- *Bat Surveys for Professional Ecologists - Good Practice Guidelines* (3rd ed.). London: The Bat Conservation Trust [2].

2.2.1 Tree Inspection

As part of the habitat survey conducted on 12th July 2022, all trees within the Study Area were assessed for the presence of features that could be utilised by roosting bats. This survey was undertaken using close-focusing binoculars and a powerful focused-beam light source. The following criteria were used:

- Presence of natural cavities, splits, cracks, loose bark and rot holes in the trunk or boughs of the tree;
- Presence of dense and woody ivy (*Hedera helix*) growth that could be used by bats for roosting;
- Evidence of bat droppings, which may also be seen as a black streak beneath holes, cracks, branches, etc;
- Presence of smooth edges with dark marks and urine stains at potential entrances to roosts;
- Presence of suitable adjoining habitats which are likely to be important to bats, including a river corridor, open water, old stone structures or hedgerows / treelines that offer a variety of potential foraging, roosting and commuting opportunities for bats; and,
- Presence of adjoining potential roosts / known roosts. This raises the likelihood of a tree being of benefit as bats may move roosts if the roost becomes too hot or cold during roosting and a nearby alternative roost is highly desirable.

2.2.2 External and Internal Building Inspection

An internal and external inspection of the buildings within the Study Area was undertaken by two (2No.) suitably qualified MOR Ecologists on the 12th July 2022,

The inspection aimed to assess the buildings within the Study Area for the presence of features suitable for roosting bats. These features include:

- Evidence of bat droppings / urine splashes;
- Bat specimens (live or dead);
- Evidence of feeding remains, (insect wings on the floor); and,
- Evidence of fur-oil staining.

Assessment criteria for evaluating the potential suitability of the Study Area for bats was done in concurrence with 'Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed)' [2].

Table 2-1: Assessment guidelines for assessing the potential suitability of proposed development sites for bats [2]

Suitability	Description of Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[1] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential[2]	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[1] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[1] and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

2.2.3 Dusk Emergence and Activity Survey

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. The dusk emergence and activity surveys were undertaken on 29th August 2022 by five (5No.) suitably qualified MOR Ecologists. The surveys commenced fifteen (15No.) minutes before sunset and ended two (2No.) hours after sunset. Therefore, these surveys encompassed the typical emergence times of Irish bat species.

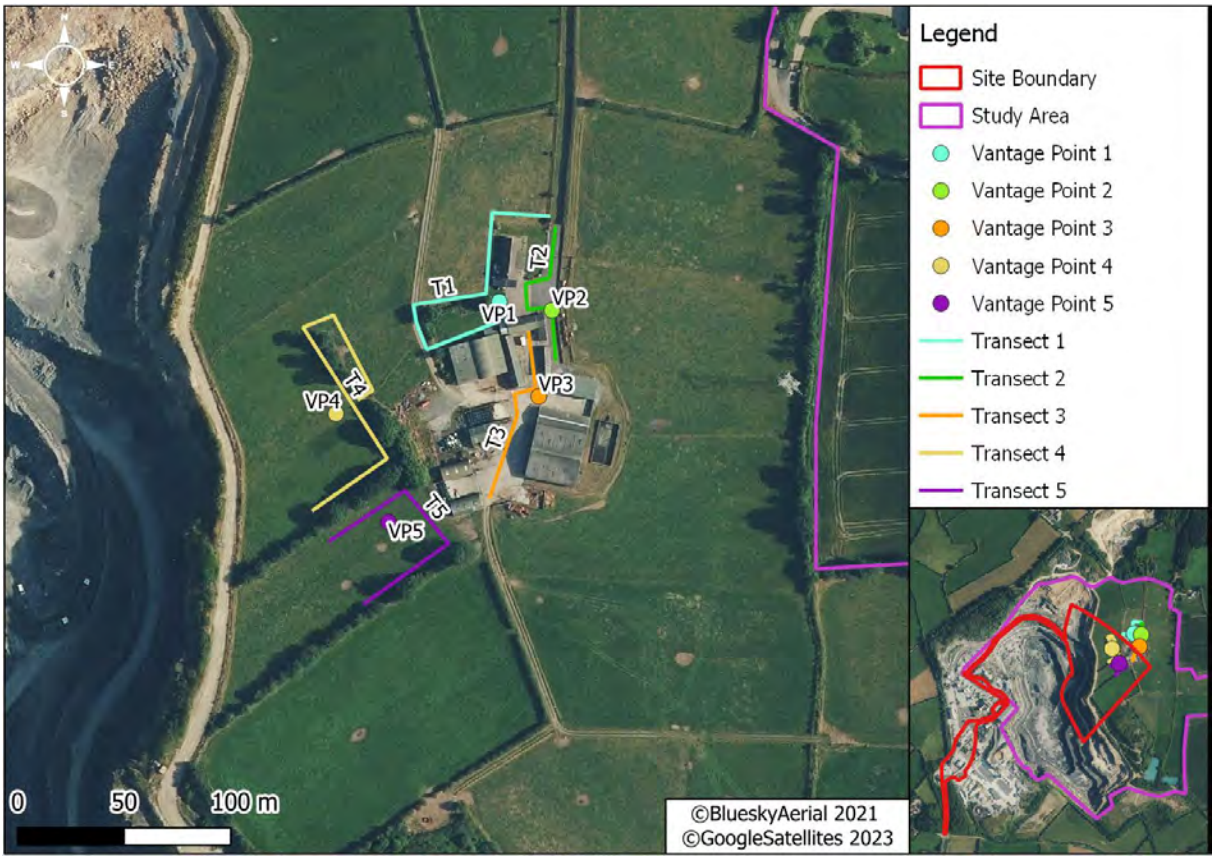
[1] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.
[2] This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

The surveyors were positioned at Vantage Points (VPs) VP1 – VP5 to capture the trees and buildings identified as having bat roost potential during the tree and building inspections. Refer to Figure 2-1 for context.

The VP survey took place for one (1No.) hour and fifteen (15No.) minutes. The VP survey was immediately followed by a transect survey which took place for one (1No.) additional hour. The transects were designed to incorporate all treelines, linear features and other areas of the Study Area identified as providing suitable habitats for foraging and commuting bats (See Figure 2-2). The transects aimed to capture bat activity levels within the wider Study Area and to determine what areas were important habitats for bats.

A combination of visual observation and listening to ultrasonic bat calls using frequency division bat detectors (Batbox Duet) and Echo Meter Touch2 Pro (Apple IOS) were used throughout the emergence survey. Bat calls were recorded digitally using Edirol Roland R-05 recorder and the Echo Meter Touch2 Pro application.

Figure 2-2: Bat Survey VP Locations and Transects



2.2.4 Dawn Re-Entry and Activity Survey

The dawn re-entry and activity survey took place on 17th August 2022. The dawn survey commenced two (2No.) hours before sunrise and finished fifteen (15No.) minutes after sunrise. The dawn survey was conducted using a similar methodology as the dusk emergence surveys, however, in accordance with the guidelines, the transect surveys were conducted for the first hour and then the vantage point surveys were conducted for the last hour and fifteen (15No.) minutes. The locations of the VPs and transects were the same as the dusk survey described in Section 2.2.3 above, refer to Figure 2-2 for context.

2.2.5 Updated Dawn Re-Entry and Activity Survey

An updated dawn re-entry and activity survey was undertaken on the 9th August 2023 to ensure that the results of the 2022 surveys were still applicable to the Proposed Development. This dawn survey followed the same transects, VPs and methodology of the 2022 dawn survey as described in Section 2.2.4 above.

2.2.6 Data Analysis

The bat recordings taken during the surveys were analysed using the software KaleidoscopePro to aid the identification of bat species present. A combination of the visual observations taken during the survey and the number of bat passes [3] identified on the recordings were used to determine bat activity levels within the area.

2.2.7 Survey Limitations

Bat surveys are a snapshot of the bat activity within an area at the time of surveying. It is therefore important that a number of surveys are utilised to provide as much information on the bat usage of the area in question. Subsequently, a combination of surveys was used to determine the importance of the Study Area on local bat populations.

All survey work was conducted in accordance with current best practice guidelines. All of the surveys were undertaken when there was no rain or wind, and the temperature was above 10°C. In these weather conditions, bats will not have been deterred from flying and no survey limitations were encountered.

Table 2-2: Bat Survey Metadata

Date	Survey Type	Sunset / Sunrise	Survey Times (Start-End)	Weather	Temperature (°C) Start - End
29/08/2022	Dusk	20:23	20:07 – 22:23	No rain, no wind	17°C - 15°C
17/08/2022	Dawn	6:15	4:15 – 6:30	No rain, no wind	11°C - 11°C
09/08/2023	Dawn	6.01	4:01-6.10	No rain, no wind	14°C - 15°C

[3] It is important to acknowledge that bat calls provide a measure of bat activity rather than the number of individuals in a population. In practice, bat activity (as, for example, represented by 100 recordings) could be from 100 bats passing the detector or one bat passing 100 times [7].

3 RESULTS

3.1 Desk-Based Results

Prior to conducting the field surveys and following completion of surveys, a desk-based review of information sources was completed.

According to the NBDC, two (2No.) of the nine (9No.) bats species present in Ireland, Leisler's bat and common pipistrelle, have been recorded within a 2km radius of the Site over the last ten (10No.) years [4]. .

Table 3-1 provides details of the habitat suitability index for the Study Area [4]. The habitat suitability index identifies the geographical areas that are suitable for individual species. The index ranges from 0 to 100, with 100 being the most favourable to bats. The index presented is for all species combined, in addition to the individual species indices within the Study Area.

From the indices, it can be established that the Study Area has an overall high habitat suitability index range of 28 to 36. All of the Irish bat species have a moderate to very high habitat suitability index for the area, with the exception of the lesser horseshoe and Nathusius' pipistrelle. Therefore, it can be concluded that all of the other listed species are likely to occur within the area.

Table 3-1: Habitat Suitability Index

Bat Species	Suitability Index Range	Suitability Index Level
All Bat Species	28 – 36	High
Soprano Pipistrelle *(Pipistrellus pygmaeus)*	39 - 45	High
Brown Long-eared Bat (*Plecotus auritus)*	50 - 79	Very High
Common Pipistrelle (*Pipistrellus pipistrellus)*	48 - 72	Very High
Lesser Horseshoe Bat (*Rhinolophus hipposideros)*	0 – 4	Very Low
Whiskered Bat *(Myotis mystacinus)*	21 - 31	Moderate
Daubenton's Bat *(Myotis daubentonii)*	30 – 38	High
Leisler's bat *(Nyctalus leisleri)*	38 – 46	High
Nathusius' Pipistrelle *(Pipistrellus nathusii)*	6 – 15	Low
Natterer's Bat *(Myotis nattereri)*	37 - 48	High

3.2 Field Based Results

The Study Area was determined to have moderate roosting, commuting and foraging suitability due to the presence of derelict buildings, mature trees, hedgerows / treelines and farmland within its bounds. Flemingstown stream is also located within the fields to the east of the Study Area.

3.2.1 Tree Inspection

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, refer to Figure 3-1. 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. Table 3-2 provides details on the assessment of these trees.

Table 3-2: Tree Survey Results

Tree No.	Species	Bat Potential	Ivy	Knotholes	Loose Bark	Cracks and Crevices
1	Sycamore	✓	✓	✓	X	✓
2	Ash	✓	✓	✓	X	X
3	Ash	✓	✓	✓	X	X
4	Ash	✓	X	✓	X	✓
5	Ash	✓	X	✓	X	X
6	Ash	✓	✓	X	X	✓
7	Ash	✓	X	✓	X	X
8	Sycamore	✓	✓	X	X	X

Figure 3-1: Trees Identified with Features Suitable for Roosting Bats with the Potential to be affected by the Proposed Development

3.2.2 Building Inspection

There are sixteen (16No.) buildings within the Study Area including agricultural sheds, stone outbuildings, a residential dwelling and a small pump house. Out of these buildings, five (5No.) had features and access points considered suitable for bats. These buildings were determined to have moderate bat roost suitability. Seven (7No.) of these features are presented in Table 3-3 and Figure 3-2 below.

Table 3-3: Building Inspection Results

ID	Building	Potential Roost Features (PRFs) / Access Points	Bat Suitability
1+2	Residence with apex roof	• Gaps in Roof; • Loose roof tiles.	Moderate
3	Stone outbuilding with corrugated metal roof	• Cracks and cervices in stone walls	Moderate
4	Stone outbuilding with corrugated metal roof	• Cracks and cervices in stone walls; • Cracked window frame.	Moderate
5	Stone outbuilding with slate roof	• Cracks and cervices in stone walls; • Loose roof tiles.	Moderate
6	Stone outbuilding with slate roof	• Loose roof tiles	Moderate
7	Stone outbuilding with slate roof	• Cracks and cervices in stone walls; • Loose roof tiles.	Moderate

Figure 3-2: Potential Access Points

It should be noted that although multiple access points were identified, no direct evidence of bats was recorded during the internal or external building inspections. The buildings considered to have moderate bat roost potential are shown in Plate 3-1 below.

Plate 3-1: Buildings with Potential Access Points for Bats

All potential access points were subject to dusk emergence and dawn re-entry surveys.

The two (2No.) agricultural sheds and the pumphouse to be removed did not contain any features suitable for roosting bats nor any evidence of bat activity. These structures all have rendered walls and corrugated iron roofs. Refer to Plate 3-2 for context.

Plate 3-2: Structures to be Removed as Part of the Proposed Development.

3.2.3 Dusk Emergence, Dawn Re-entry and Activity Survey Results

3.2.3.1 Dusk Emergence

The dusk emergence survey in August 2022 did not identify any bats roosting within the buildings or trees surveyed. Sunset was at 20:23.

There was low activity recorded at all VPs and transects during the survey. Full details on the survey results at each VP are outlined below.

VP1 / T1

Activity was low at VP1. The first bat recorded during the survey was a Leisler's bat at 20:21. This bat was not seen and was recorded as a single pass. A common pipistrelle was recorded

at 20:40 but was not visually identified. A Leisler's bat was recorded at 20:48 as a single pass. At 21:11 a soprano pipistrelle was observed foraging along a fence line to the east. Another soprano pipistrelle was recorded at 21:14.

Activity picked up slightly during the transect survey along T1. A soprano pipistrelle was observed foraging down the drive to the north at 21:30. None of the other bats recorded were seen. In total, the transect picked up four (4No.) Leisler's bats calls, five (5No.) common pipistrelle calls and five (5No.) soprano pipistrelle calls).

VP2 / T2

Activity was low at VP2. The first bat recorded during the survey was a soprano pipistrelle at 20:35. This bat was not seen and was recorded as a single pass. A common pipistrelle was recorded at 20:39, this bat was also not seen. Another common pipistrelle was observed flying southwards over VP2 at 20:47. At 20:53, 2-3 common pipistrelles began flying around and within a metal shed to the east of VP3 and continued until 20:56. This was also picked up from VP3. The bats then flew east out of sight. After this, a few common pipistrelles and Leisler's bats were picked up commuting / foraging.

Activity was similar during the transect. A common pipistrelle was recorded at 21:33 and 21:35 near the metal shed. This bat was also picked up at VP3. None of the other bats recorded were seen. In total, the transect picked up five (5No.) common pipistrelle calls and one (1No.) soprano pipistrelle call.

VP3 / T3

Activity was highest at this VP but still considered low overall. The first bat recorded during the survey was a common pipistrelle at 20:40 from VP3. This bat was seen flying above a metal storage shed to the east of VP3. This bat was also picked up by the VP2 recorder. Another common pipistrelle was observed flying southwards over VP3 at 20:47. A Leisler's bat was seen flying to the east at 20:48. At 20:52, 2-3 common pipistrelles began flying around and within a metal shed to the east of VP3 and continued until 20:56. This was also picked up from VP2. The bats then flew east out of sight. After this, a few common pipistrelle, Leisler's bat and soprano pipistrelles were picked up commuting / foraging near VP3 until the end of the vantage point at 21: 22.

Activity was similar during the transect. The transect picked up four (4No.) Leisler's bats, eight (8No.) common pipistrelle calls and three (3No.) soprano pipistrelle calls. Common pipistrelles were observed foraging near the metal shed again at 21:35 and then again at 21:41.

VP4 / T4

Activity was low at VP4. The first bat seen was commuting along the treeline, likely a pipistrelle *spp.* at 20:45, the recorder did not pick up a call for this species. A Leisler's bat was recorded at 20:48 and another was observed foraging above the treeline at 21:02. A common pipistrelle was recorded at 21:22.

Activity was similar during the transect. The transect picked up one (1No.) Leisler's bat call and nine (9No.) pipistrelle *spp.* Calls.

VP5 / T5

Activity was low at VP5. The first bat recorded during the survey was a common pipistrelle at 20:43. This bat was seen foraging in the field and along the northern treeline within the field containing VP5. Common pipistrelles were seen foraging along this treeline every 2-3 minutes until 20:57. After this, a few common pipistrelles and one (1No.) Leisler's bat were recorded until the end of the vantage point survey at 21:22. These bats were not visible to the surveyor.

Activity was similar during the transect. The transect picked up two (2No.) Leisler's bats calls, seven (7No.) common pipistrelle calls and two (2No.) soprano pipistrelle calls.

3.2.3.2 Dawn Re-entry

The dawn re-entry survey in August 2022 did not identify any bats roosting within the buildings or trees surveyed. Sunrise was at 6:15.

There was very low activity recorded at all VPs and transects during the survey. The results of the dawn re-entry survey are summarised below.

A few common and soprano pipistrelles were recorded during the transects at T1,T2,T3. T4 and T5 had the most activity during the transects with seven (7No.) pipistrelle spp. calls recorded from 4:15 to 5:15. The surveyors along T4 and T5 noted that the same bat was responsible for four (4No.) of the calls recorded.

During the vantage point portion of the survey, no bats were recorded re-entering the buildings or PRF trees and overall activity was very low in keeping with the transects. No bats were recorded at VP1, VP3 or VP4 during the vantage points. A single common pipistrelle was recorded commuting at 5:39 from VP2. A few pipistrelle calls were recorded from VP5, with the last recording at 5:40. There were no bats recorded from any VPs from 5:40 until the end of the survey at 6:30.

3.2.3.3 Updated Dawn Re-entry

The dawn re-entry survey in August 2023 did not identify any bats roosting within the buildings or trees surveyed. Sunrise was at 06.01.

There was very low activity recorded at VP2, VP3, and VP4 and their associated transects during the survey. However, VP5 had moderate levels of activity during the transect and VP1 identified high levels of activity. The results of the dawn re-entry survey are summarised below.

VP1 / T1

Activity was high at this transect, with eighty-six (86No.) bat passes recorded during the hour-long transect from 04.01-05.01. The only bats visually identified by the surveyor during this transect were a common pipistrelle commuting south over a farm outbuilding, a common pipistrelle commuting southwest over the same building, and a common pipistrelle foraging in the grassland to the north of the farmyard. Of the bat passes recorded and analysed after the survey, seventy-five (75No.) were common pipistrelles, six (6No.) were from soprano pipistrelles, three (3No.) were from Leisler's bats and two (2No.) were brown long-eared bats.

During the VP survey, twenty-four (24No.) bat passes were recorded. From 05.31-05.38 one (1No.) soprano pipistrelle was seen foraging in the grassland to the north of the farm buildings. The last bat seen at this VP was a soprano pipistrelle at 05.38. This bat was recorded foraging around the residential property / farmyard within the Study Area. Of the bat passes recorded and analysed after the survey, six (6No.) were common pipistrelles, fourteen (14No.) were soprano pipistrelles and four (4No.) were from Leisler's bats.

The last bat recorded was at 05.36. No bats were observed to be roosting in the buildings surveyed at VP1.

VP2 / T2

Activity was very low at this transect. Only three (3No.) bat passes were recorded during the hour long transect. All three (3No.) passes were soprano pipistrelles and took place between 04.51-04.55. Three (3No.) bats were observed by the surveyor commuting southwest over the farm buildings within the Study Area.

Activity was also very low during the VP survey, with only eight (8No.) bat passes recorded. The only bat observed by the surveyor was a common pipistrelle at 05.10 commuting north over the farm buildings within the Study Area. Of the eight (8No.) bat passes recorded, there were four (4No.) Leisler's bats, three (3No.) soprano pipistrelles and one (1No.) common pipistrelle.

The last bat recorded was at 05.29. No bats were observed to be roosting in the buildings surveyed at VP2.

VP3 / T3

Bat activity was very low at this transect. Only 4No. bat passes were recorded during the hour long transect. One (1No.) soprano pipistrelle was recorded at 04.01 along T3 and three (3No.) more were recorded between 04.50-04.55. No bats were observed by the surveyor during the transect survey.

Activity was also very low at VP3 for the VP survey. One (1No.) common pipistrelle was observed commuting from east to west over the farm buildings at 05.11.

No bats were observed to be roosting in the buildings surveyed at this VP.

VP4 / T4

Activity was low during the transect survey. Ten (10No.) bat passes were recorded during the hour long transect- all from soprano pipistrelles. No bats were observed by the surveyor along T4.

Bat activity was moderate at this VP, with forty-two (42No.) bat passes recorded. At 05.07 four (4No.) bats were seen foraging and commuting over the treeline to the northeast. Software analysis of the bat recordings taken at this time identified calls from soprano pipistrelles, common pipistrelles and Leisler's bat, so it is likely that the bats observed were a combination of these species. Soprano pipistrelles were also observed foraging in the grassland to the south of VP4. Bats were observed foraging and commuting at VP4 until 05.26 when the last bat was observed. Of the forty-two (42No.) bat passes recorded during the VP survey, twenty-seven (27No.) were of Leisler's bats, thirteen (13No.) were of soprano pipistrelles and two (2No.) were from common pipistrelles.

No bats were observed to be roosting in the trees surveyed at this VP.

VP5 / T5

Activity was moderate at this transect, with eighteen (18No.) bat passes recorded during the hour-long transect. Most calls were from common pipistrelles, followed by soprano pipistrelles. There was one (1No.) call from a Natterer's bat at 04.21. No bats were seen by the surveyor along T5.

Bat activity was low at this VP, with ten (10No.) bat passes recorded from Leisler's bats. No bats were observed by the surveyor at this VP and no bats were observed to be roosting in the trees surveyed at this VP.

3.2.3.4 Summary of 2022 and 2023 Survey Results

The results of the dusk emergence and dawn re-entry surveys are as follows:

- No bats were identified to be roosting within the trees or buildings in the Study Area. However, bats were recorded soon after dusk during the emergence survey indicating that a pipistrelle bat roost may be present within the local area;
- The surveys recorded bats commuting and foraging along hedgerows / treelines and near a metal storage shed within the Study Area;

- In total, five (5No.) bat species were recorded during the dusk emergence and dawn re-entry surveys:
    - Common pipistrelle;
    - Soprano pipistrelle;
    - Leisler's bat;
    - Brown long-eared bats; and,
    - Natterer's bat.
- Based on the levels of activity and movement of bats recorded during the dusk emergence and dawn re-entry surveys, it is considered that the Study Area is of:
    - Moderate value for foraging and commuting soprano pipistrelles, common pipistrelles and Leisler's bats; and,
    - Low value for brown long-eared bats and Natterer's bats.

Figure 3-3 below shows the foraging and commuting activity recorded during both the dusk emergence and dawn re-entry surveys conducted in 2022 and the dawn re-entry survey conducted in 2023.

Figure 3-3: Bat Foraging and Commuting Activity in 2022 and 2023

Over the course of the bat surveys, the surveyors noted the presence of active barn swallow nests within the farm outbuildings and sheds. Due to the large numbers of nesting birds, the landowner has attempted to close access points with scrap material and mesh nets in front of some windows and doors. These actions have the potential to deter bats from entering the buildings within the Study Area and therefore, reduce the potential that bats utilise these spaces as roosting sites.

4 IMPACT ASSESSMENT AND MITIGATION

The following bat species were recorded during the 2022 and 2023 bat surveys: common pipistrelle, soprano pipistrelle, Leisler's bat and brown long-eared bats. All bat species recorded during the bat surveys are Annex IV species under the EU Habitats Directive and all have a favourable status in Ireland.

Bat species within the Study Area will be affected by both the construction phase and operational phase of the Proposed Development. This impact assessment and the proposed mitigation is informed by all the bat species recorded within the Study Area.

4.1 Potential Impacts on Bats

The potential impacts of the Proposed Development on bat fauna may be summarised as follows:

4.1.1 Loss of Habitat

The 2022 and 2023 surveys did not identify any bat roosts within the Study Area. However, active commuting and foraging habitats were identified along the hedgerows / treelines within the Site boundary and over the farmyard within the wider Study Area. The hedgerows / treelines supporting foraging and commuting activity will be removed to facilitate the Proposed Development. Therefore, without appropriate consideration to foraging and commuting bats, the Proposed Development could have a negative impact on bat species.

A total of ca.479m of hedgerows and hedgerows / treelines will be removed to facilitate the Proposed Development alongside ca.0.27ha of scrub. The hedgerow / treelines to be removed contained seven (7No.) trees with bat roost potential. However, no bat roosts were recorded during the 2022 and 2023 bat surveys – only foraging and commuting activity.

The change of land use from agricultural to a quarry will also mean the loss of grassland areas that was suitable foraging habitat for bats. However, it should be noted that this grassland habitat is common within the wider Study Area.

4.1.2 Lighting

Bats, as nocturnal species, are affected by lighting. The degree of this impact is dependent on the sensitivity of the bat species, as some bats are more tolerant than others. Pipistrelles will tolerate low levels of lighting, while brown long-eared bats and *Myotis* species are very sensitive to lighting and require the light levels to be below 1lux.

No lighting is proposed as part of the Proposed Development. Therefore, it can be concluded that the Proposed Development will not negatively impact commuting and foraging bats as a result of lighting.

4.2 Mitigation Measures

The following mitigation measures are recommended to reduce the potential impact of the Proposed Development on local bat populations:

4.2.1 Planting of Landscaped Berms

The stripped topsoil and subsoil from the construction phase of the Proposed Developed will be utilised to create two (2No.) soil embankments along the eastern boundary of the Site and proposed extraction area, refer to Drawing P703_PP for context. 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. The existing hedgerows / treelines to be removed are 2-3m wide and 479m in length. As such, the berms provide a larger area for vegetation to grow. This will result in a net increase in trees / shrub vegetation cover onsite.

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. Advanced nursery stock will be used as part of the planting mix. The planting mix is outlined in Table 4-1 below.

Table 4-1: Proposed Berm Planting Mix

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

These berms will not directly replace the hedgerows / treelines removed onsite; however, they will provide linear habitats for foraging and commuting bats within the area. These berms will be planted during the construction phase of the Proposed Development and will remain in place during both the operational and restoration phase of the Proposed Development. 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.

The following landscape recommendations are also advised:

- Avoid the use of chemicals (weed killers, etc.) onsite.

4.2.2 Restoration Plan

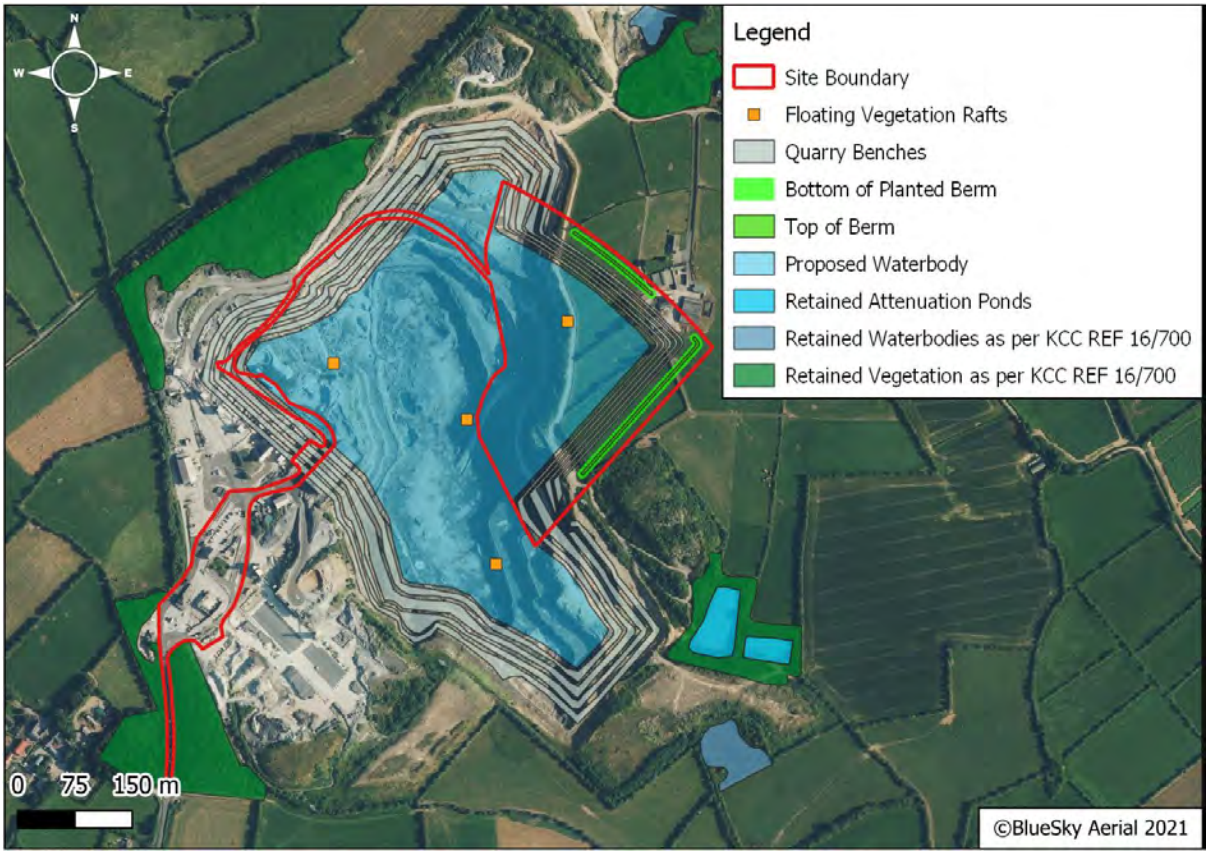
The restoration plan submitted under Planning Reference 16700 has been updated to include the proposed extension lands. Therefore, the Restoration Plan submitted as part of this application (attached as Appendix 6-1 to Chapter 6 of the EIAR) supersedes the previous restoration plan for Kilmacow Quarry.

The Site will be made safe and developed to enable a biodiverse habitat to be maintained. 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 normal levels creating a central lake;
- 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; and,
- Floating vegetation rafts will be installed within the lake.

The Restoration Plan will provide a mosaic of habitats onsite which support a variety of species. It is considered that the creation of a lake habitat with areas of floating and marginal vegetation alongside the retention of bare ground scrapes will provide food sources for bats, refer to Figure 4-1 below for context.

Figure 4-1: Proposed Restoration Plan



4.2.3 Monitoring

In order to ensure that the works in relation to the Proposed Development do not have significant impacts on bats, the following construction procedures and mitigation measures should be implemented. These measures are in line with the NRA (now TII) Guidance for Bats [1]:

- No works are proposed to the buildings identified with bat roost potential within the Study Area. 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 may 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;
- Where possible, the PRF trees and buildings which are to be removed, should be felled 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).

5 CONCLUSIONS

The bat surveys undertaken for the Proposed Development included a walkover of the lands within the Study Area, tree inspections, dusk emergence survey and a dawn re-entry survey. The walkover and tree inspection identified eight (8No.) trees within the Study Area that had the potential to be affected by the Proposed Development. The building inspection also identified seven (7No.) potential roost features in the buildings within the Study Area. These trees and buildings were subject to dusk emergence and dawn re-entry surveys; however, no bats were observed roosting within these features.

Based on the bat activity within the Study Area shortly after sunset and right before sunrise, it is considered likely that there are bats roosting within the locality of the Proposed Development. The surveys identified soprano pipistrelle, common pipistrelle, Leisler's bats, brown long-eared bats and *Myotis* species commuting and foraging along sections of the treelines / hedgerows and grassland areas within the Study Area. Bats were also observed commuting adjacent to the buildings within the Study Area. There was low bat activity recorded during the 2022 dusk and dawn surveys. The updated dawn re-entry had slightly higher levels of activity.

The Proposed Development will result in the loss of commuting / foraging habitats for bats through the removal of hedgerows / treelines and agricultural grassland.

Overall, the Study Area is considered to be of low - moderate importance for commuting and foraging bats within the local area. It is considered that provided the mitigation measures presented within this report are followed, the potential impacts on bats will be reduced and the overall impact from the Proposed Development on bats will be Low-Negligible.

6 REFERENCES

[1] NRA, "Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes," National Roads Authority, 2006.

[2] J. Collins, "Bat Surveys for Professional Ecologists - Good Practice Guidelines (3rd ed.)," The Bat Conservation Trust, London, 2016.

[3] NPWS, "National Parks and Wildlife Service," 2024. [Online]. Available: https://www.npws.ie.

[4] NBDC, "National Biodiveristy Live Maps," 2024. [Online]. Available: http://maps.biodiversityireland.ie/.

[5] McAney, K. et al., "A conservation plan for Irish vesper bats, Irish Wildlife Manual No.20," National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland, 2006.

[6] Kelleher, C. & Marnell, F. , "Bat Mitigation Guidlines for Ireland. Irish Wildlife Manuals, No. 25.," Department of Environment, Hertiage and Local Government, Dublin, 2006.

[7] BCT, "Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)," The Bat Conservation Trust, London, 2016.

APPENDIX 6-3

February 2024

Breeding Bird Survey Report

Quarry Extension, Kilmacow, Co. Kilkenny

On behalf of

Roadstone Ltd.

Fortunestown, Dublin 24, Co. Dublin

MALONE O'REGAN ENVIRONMENTAL

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

Title: Breeding Bird Survey Report, Quarry Extension, Kilmacow, Co. Kilkenny, Roadstone Ltd, Fortunestown, Dublin 24, Co. Dublin

Job Number: E2189

Prepared By: Sarah de Courcy **Signed:** _____

Checked By: Amelia Keane **Signed:** _____

Approved By: Dyfrig Hubble **Signed:** _____

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	27/02/24	Breeding Bird Report	Final	SDC	AK	DH

Breeding Bird Survey Report
Quarry Extension, Kilmacow, Co. Kilkenny
Roadstone Limited
Fortunestown, Tallaght, Dublin 24

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1 INTRODUCTION

This bird report has been prepared by Malone O'Regan Environmental (MOR) on behalf of Roadstone Ltd ('the Applicant') in support of a planning application to Kilkenny County Council (KCC) for an extension to an existing rock quarry in Kilmacow, Co. Kilkenny.

The proposed extension does not seek to increase production output at the existing 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'). Full details of the Proposed Development are presented in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) submitted as part of the overall planning application. This bird survey report should be read in conjunction with the EIAR and NIS.

The Proposed Development will be located on a site covering an area of circa (ca.) 10.3 hectares (ha) (Ordnance Survey centre co-ordinates as Irish Trans Mercator (ITM) 655978 615719). Refer to the redline boundary presented in Figure 1-1 below for context ('the Site'). The Site comprises

of the following components: the existing access into the quarry, a portion of the existing extraction area, greenfield lands within the Roadstone landholding, greenfield lands owned by Mr. Clohosey and a small portion of an existing farmyard owned 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. Figure 1-2 below shows the Site in the context of the landownership boundaries.

This report presents the findings of the breeding bird surveys conducted onsite, which included breeding bird transect surveys, targeted peregrine falcon surveys and barn swallow surveys.

Figure 1-1: Site Location

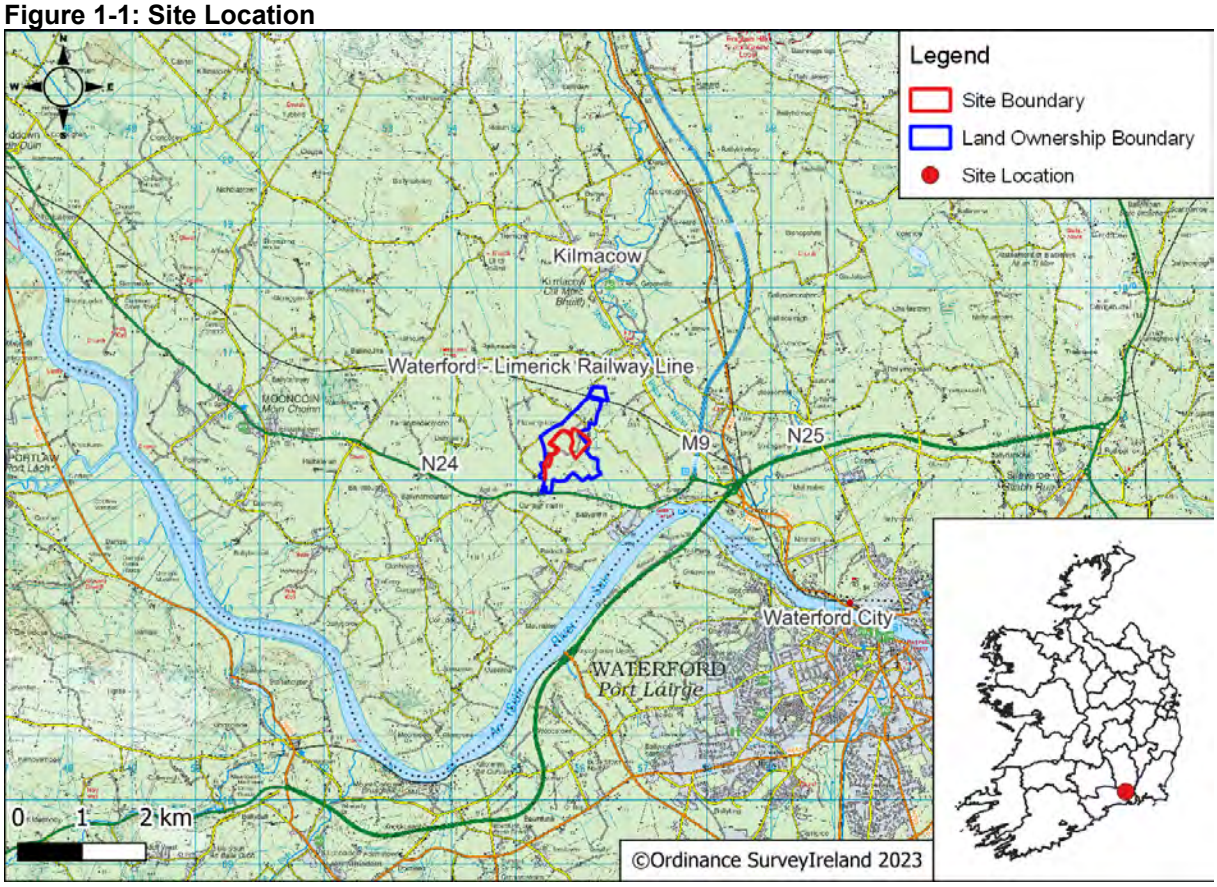
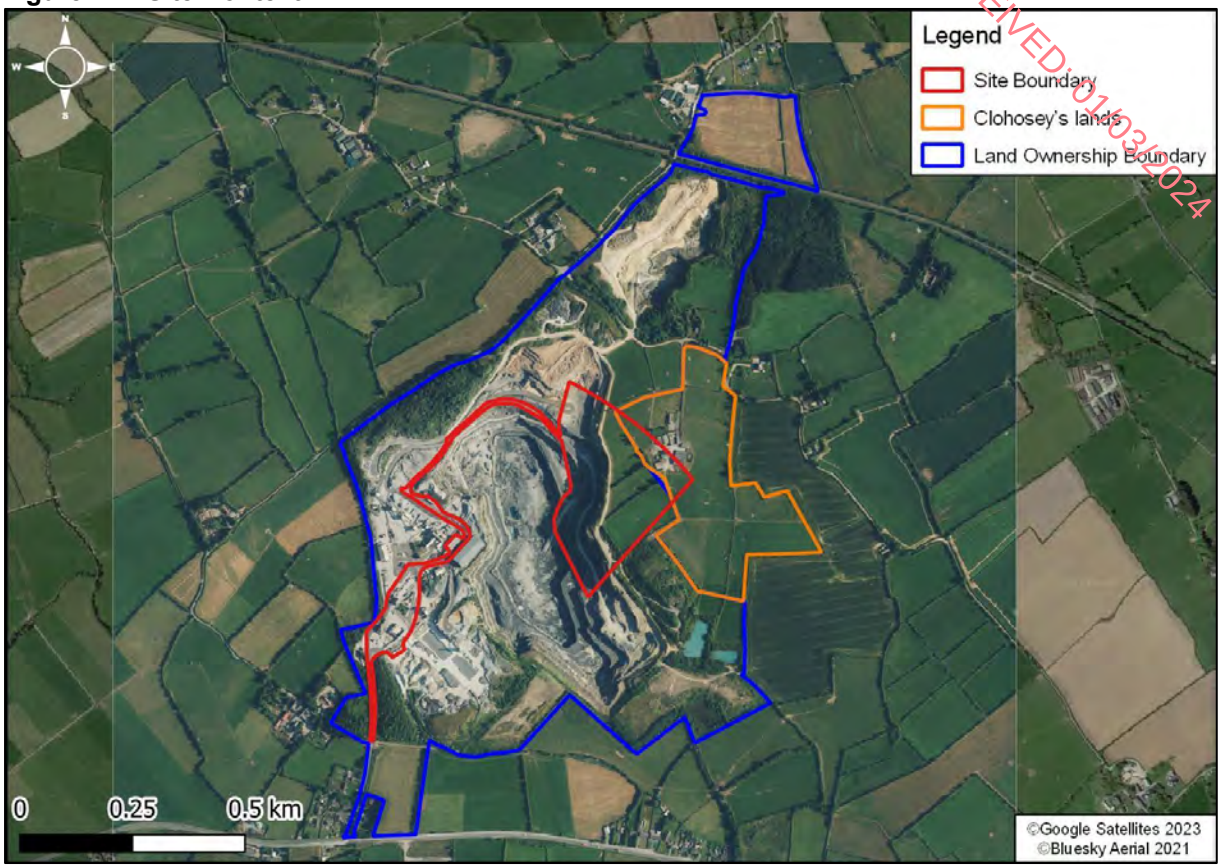


Figure 1-2: Site Context



1.1 Relevant Legislation

All wild birds are protected by law under the Wildlife Act 1976 and subsequent amendments. All species are afforded full protection under this Act, which makes it a criminal offence for anyone without a licence to:

- Kill or injure a wild bird;
- Disturb, damage or remove a wild bird nest or eggs; and,
- Disturb any wild bird while at the nest.

In addition to domestic legislation birds are also protected under the EU Birds Directive (2009/147/EC). The Birds Directive provides for a network of sites to protect birds at their breeding, feeding, roosting and wintering areas.

For the purposes of this report, a species was considered to be of 'conservation concern' should it be included one or more the following:

- Annex I, II or III of the EU Birds Directive;
- Part I of the Fourth Schedule of the Wildlife Act, 1976 (as amended);
- Birds of Conservation Concern in Ireland (BoCCI) red list; and,
- BoCCI amber list.

1.2 Objectives

This assessment aimed to:

- Identify and assess the number of active breeding bird territories within the Study Area;
- Map active nests, where present, within the Study Area;
- Evaluate the overall bird community within the Study Area by recording all behavioural activity of birds;
- Utilise the information in order to identify and assess any areas that may require special consideration during the breeding bird season;
- Assess all potential impacts, if any, of the Proposed Development on breeding bird species; and,
- Provide additional mitigation measures, should they be required.

1.3 Statement of Authority

This report was prepared by Ms. Sarah de Courcy, Environmental Consultant. Sarah is a qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and has over 3 years' experience working in the ecological consultancy sector. As part of her role, Sarah regularly conducts ornithological surveys and assessments for various projects across Ireland and has experience in conducting surveys in line with Best Practice Guidelines.

This report was checked by Ms. Amelia Keane, Senior Environmental Consultant. Amelia is a qualify of the CIEEM and has over four years' experience working in the ecological consultancy with a specialist interest in ornithology. As part of her role, Amelia is required regularly conducts ornithological surveys and prepare specialist ornithological assessments and reports.

The report was reviewed and approved by Mr. Dyfrig Hubble, Associate Director – Ecologist. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management. Dyfrig has over 18 years' experience working in the ecological consultancy sector, including habitat surveys and appraisals and specialist protected species surveys in support of Appropriate Assessments.

2 METHODOLOGY

The methodologies used to establish the presence / potential presence of breeding birds are summarised below.

2.1 Desk-based Studies

A desk-based review of information sources was completed, which included the following sources of information:

- Review of aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service (NPWS) website was consulted to obtain the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment [1]; and,
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions within 2km of the Site [2].

2.2 Field-based Studies

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 2-1 ('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 2-1: Study Area for Ecological Assessments

2.2.1 Habitat Assessment

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*' [4] and was conducted in line with the Heritage Council's '*Best Practice Guidance for Habitat Survey and Mapping*' [5].

During this survey, the Study Area was assessed for its potential to support assemblages of rare or notable bird species, as well as designated bird species. Any activity and potential nesting habitats were noted. Additional validation surveys were completed on the 29th September 2023 to confirm the present, extent and species composition of habitats within the Site remained valid.

Following the initial Site assessment, it was deemed necessary to undertake specialist breeding bird and barn swallow (*Hirundo rustica*) surveys within the greenfield areas of the Study Area.

It should be noted that peregrine falcon surveys were begun in 2021 as part of on-going monitoring at the existing 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 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. As such, the existing extraction area has been included within the Study Area as outlined in Figure 2-1 and the methodology and results of these surveys have been included in this report.

2.2.2 Bird Surveys

2.2.2.1 Peregrine Falcon Surveys

Peregrine falcon surveys were undertaken to confirm the presence / absence of this species within the Study Area during the breeding bird seasons in 2021, 2022 and 2023. These surveys aimed to establish whether peregrine falcon utilise the Study Area for breeding purposes and if so, to determine whether any nest sites are located within close proximity to the Site. The aim of these surveys was to determine if the Proposed Development will result in any potential impacts on this species and to ensure appropriate mitigation is included as required.

The peregrine falcon surveys were undertaken by a suitably qualified MOR Ecologist on the 19th May 2021, 15th June 2021, 19th May 2022, 3rd June 2022, 11th May 2023 and the 9th June 2023.

The surveys were conducted over a 3-hour period and utilised designated Vantage Points (VPs), which provided appropriate views of the quarry walls within the Study Area that were noted as having potential nesting habitat for peregrine falcon (see Figure 2-2). It should be noted that VP locations were adjusted as required to get adequate views of potential nests or high activity areas identified during previous surveys. The vantage points were selected to ensure that no potential disturbance to peregrine falcon should they be present, occurred during the survey works.

Survey dates, times, vantage point locations and weather conditions are described in Table 2-1.

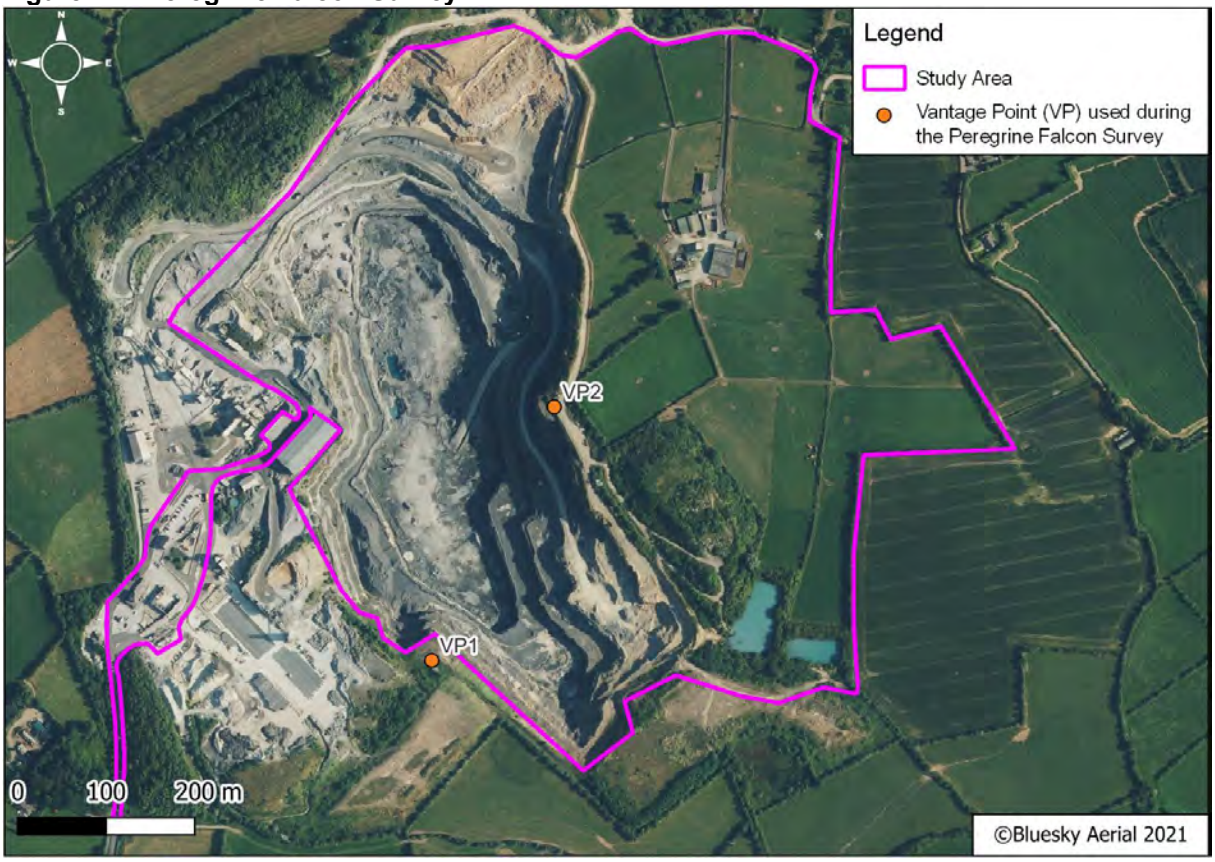
The peregrine falcon survey was conducted in line with the guidelines described in *Raptors: A Field Guide for Surveys and Monitoring* [6].

Table 2-1: Peregrine Falcon Survey Metadata

Visit	Date	Survey Times (Start-End)	VP Location Utilised	Temperature (°C) (Start – End)	Wind (Beaufort Scale)	Rain	Cloud Cover
1	19/05/2021	10:00-13:00	VP1	12-14°C	2	None	Clear
2	15/06/2021	10:00-13:00	VP1 & VP2	15-16°C	1-2	None	Clear
3	19/05/2022	10:15-13:15	VP2	14-12°C	6	None	Overcast / Scattered Clouds
4	03/06/2022	09:30-12:30	VP2	13-15°C	1	None	Overcast
5	11/05/2023	09:00-12:30*	VP2	12-11°C	4	Intermittent rain	Overcast
6	09/06/2023	10:45-13:45	VP2	18-19°C	4	None	Overcast

*Survey was extended due to heavy rain from 11:00-11:15.

Figure 2-2: Peregrine Falcon Survey



2.2.2.2 Transect Breeding Bird Surveys

Transect breeding bird surveys were undertaken on 11th May and 9th June 2023. The breeding bird surveys were conducted in line with the methodology described in:

- BTO – *A Field Guide to Monitoring Nests* [7]; and,
- Common Bird Census in *Bird Monitoring Methods* [8].

The breeding bird surveys spanned the entirety of the greenfield lands within the Study Area. Transects were walked by a suitably qualified MOR ecologist along all field boundaries within the Study Area. The transect route is presented in Figure 2-3 below.

All birds were recorded through sight and sound. Optical equipment was used, including binoculars, in order to minimise disturbance to potentially breeding birds. The hedgerows, hedgerows / treelines and bordering scrub within the Study Area were examined for the presence of nests as far as possible. During the survey, the behavioural activity of the recorded birds was noted using the BTO breeding status codes [9]. Birds that displayed non-territorial behaviours were recorded as well (i.e., birds that were flying over the Study Area, birds that were foraging and not calling, birds that were loafing).

Therefore, birds were classified as non-breeding, possibly breeding and confirmed breeding based on the behaviours exhibited. The criterion for each classification is described below:

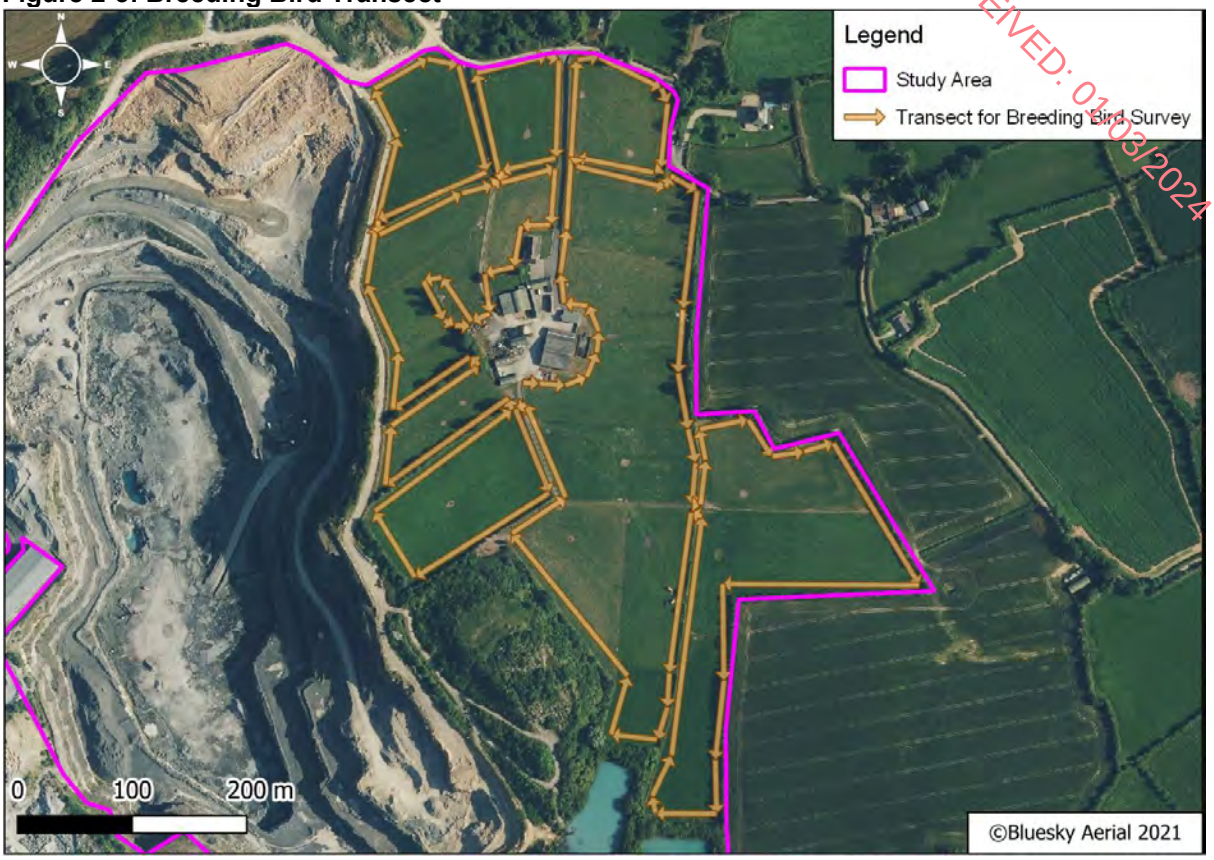
- Non-breeding – Birds that were flying over the Study Area, birds that were foraging and not calling, birds that were loafing;
- Possible Breeding – Birds observed in suitable nesting habitat and displaying either territorial and / or courtship behaviours, nest building behaviours or observed visiting a possible nest; and,
- Confirmed Breeding – Birds observed either on nest or carrying faecal sac or food, sighting of a nest with eggs / chicks, used nests, eggshells or recently fledged young.

The survey dates, times and weather conditions for both dates are described in Table 2-2.

Table 2-2: Breeding Bird Survey Dates, Times and Weather Conditions

Visit	Date	Survey Times (Start-End)	Temperature (°C) (Start – End)	Wind (Beaufort Wind Scale)	Rain	Cloud Cover
1	11/05/2023	09:00-11:00	13-12°C	1	Drizzle	Overcast
2	09/06/2023	07:30-09:30	14-16°C	3	None	Scattered Clouds

Figure 2-3: Breeding Bird Transect



2.2.2.3 Barn Swallow Building Survey

Following the identification of barn swallow nesting areas within the farmyard owned by Mr. Clohosey during the initial walkover, barn swallow surveys were undertaken in 2022 and 2023.

The surveys aimed to establish whether this species or any other breeding birds were utilising the farm outbuildings and agricultural sheds within the Study Area for breeding purposes, and to determine any likely impacts on these species from the Proposed Development.

Each building within the farmyard was given a reference number, refer to Figure 2-4 below for context. The surveyor recorded all species within these buildings (including any species flushed from the buildings upon entry), the behavioural activity of any species identified within the buildings was recorded using BTO breeding status codes [9], the maturity of the birds was also recorded where possible (i.e., juvenile or adult) and the number and location of nests within each building.

The initial barn swallow survey was undertaken by a suitably qualified MOR Ecologist on the 29th August 2022, prior to a dusk emergence bat survey. Follow up surveys were undertaken on the 11th May and the 9th June 2023.

The barn swallow 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'* [9]; and,
- Barn Swallow Nest Monitoring Methods [10].

Figure 2-4: Barn Swallow Building Survey

Table 2-3: Barn Swallow Survey Dates, Times and Weather Conditions

Visit	Date	Survey Times (Start-End)	Temperature (°C) (Start – End)	Wind (Beaufort Wind Scale)	Rain	Cloud Cover
1	29/08/2022	19:30-20:00	18°C	2	None	0-33%
2	11/05/2023	12:00 – 12:30	12°C	1	None	33-66%
3	09/06/2023	09:30 – 10:00	16 – 18°C	3	None	33 – 66%

2.3 Survey Limitations

The presence of young bulls inhibited access to certain fields during both transect surveys; however, the surveyor visually assessed these areas and adjusted the transect accordingly.

One (1No.) agricultural shed (Building Reference 12) contained cattle during the barn swallow survey conducted on 9th June 2023 and was inaccessible. In addition, a section of a farm outbuilding (Building Reference 3) was locked during this survey. These areas were not assessed during the final barn swallow survey. However, all buildings were accessible during the surveys conducted on 29th August 2022 and 11th May 2023. It is not considered that the results of the final barn swallow survey within these two (2No.) buildings will materially alter the findings of this assessment.

It is considered that there is potential that some birds may have been missed during the surveys due to the nature of breeding bird and birds may not have been vocalising or seen in the dense vegetation. However, given the fact that the results of multiple surveys were combined and given the simple nature of the habitats within the Study Area, it is considered

that the results of the surveys provide an accurate assessment of the ecological value of the Study Area for breeding birds.

3 RESULTS

3.1 Desk-Based Results

3.1.1 National Biodiversity Data Centre

Table 3-1 provides a summary of records of legally protected or notable bird species within 2km of the Site within the past 10 years [2]. The parameter of 10 years was chosen to allow for 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 3-1: NBDC Records for Species Designated 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

Common Name	*Scientific Name*	Date of Last Record	Designation
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
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

Common Name	*Scientific Name*	Date of Last Record	Designation
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

3.2 Field-Based Results

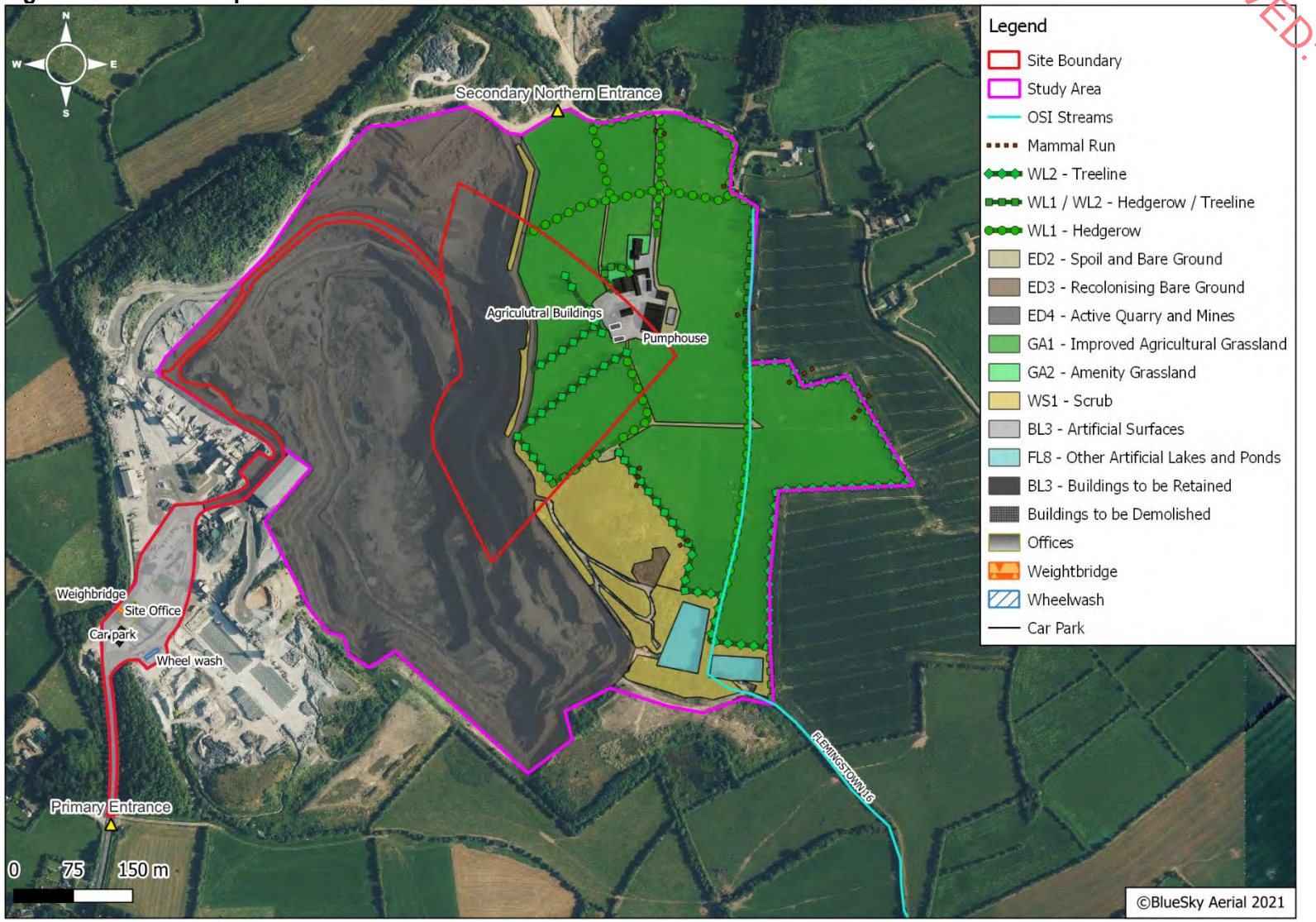
3.2.1 Habitat Assessment

The habitats identified within the Study Area during the surveys are as follows:

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

The distribution of habitats is illustrated below in Figure 3-1.

Figure 3-1: Habitat Map



3.2.2 Bird Surveys

3.2.2.1 Peregrine Falcon Surveys

Within the existing quarry, there are steep sided quarry faces with ledges that provide suitable nesting habitat for peregrine falcon along the eastern quarry wall and within the wider quarry. Results from the peregrine falcon surveys are described in Table 3-2 and Presented in Figure 3-2.

It should be noted that an active peregrine falcon nest was identified in 2021 and 2022; however, no active nest was identified during the 2023 survey.

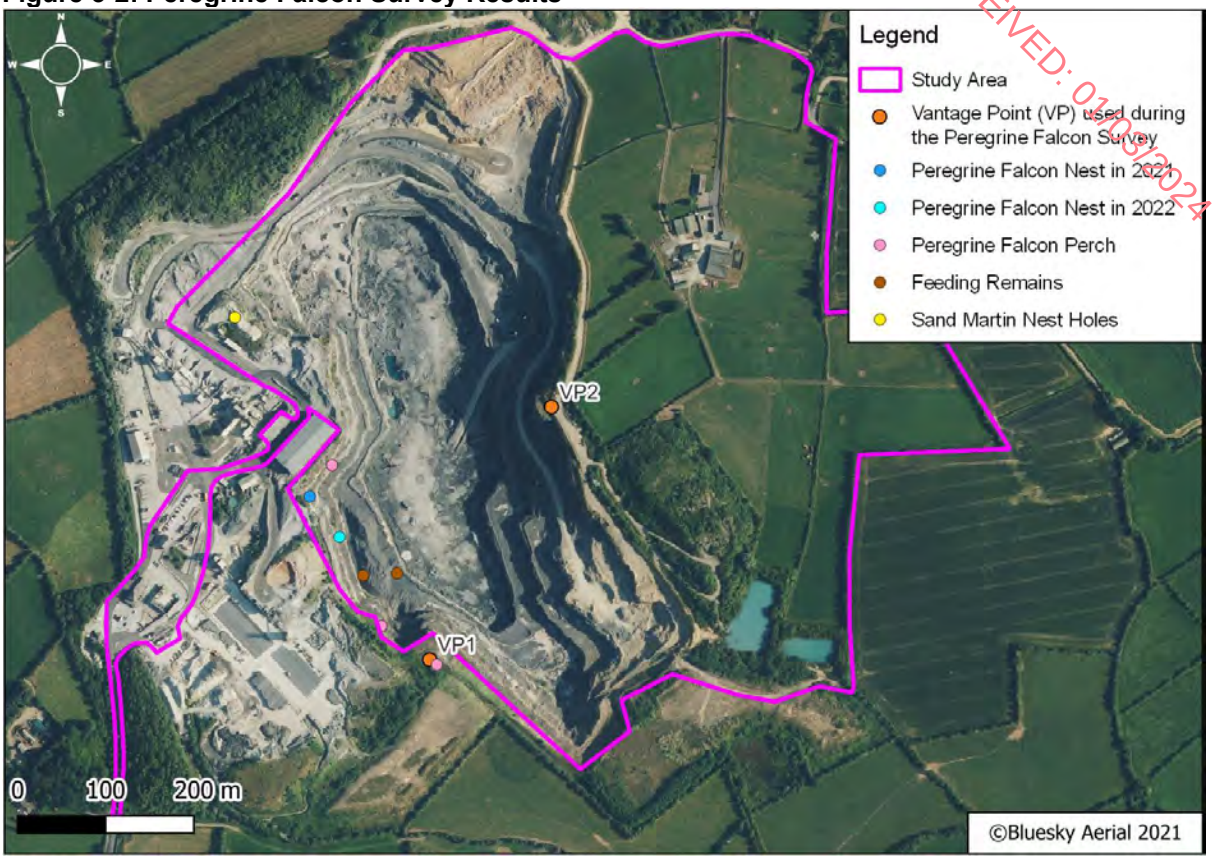
Table 3-2: Peregrine Falcon Survey Results

Visit	Number Recorded	Notes	Breeding Status
2021 Surveys			
1	2	A pair of adult peregrine falcons were observed perching / preening on the northwestern quarry face, below the storage shed. One (1No.) peregrine was observed flying out of the quarry in a southwest direction and then flew over the quarry from the north ca.40 minutes later. The second peregrine falcon then also flew out of the quarry. A single adult peregrine was observed flying into the quarry from the northwest ca.15 minutes later and was mobbed whilst in flight by jackdaws. This peregrine momentarily perched along the western quarry face before exiting the quarry. An adult peregrine falcon was observed flying into the quarry landing along the western quarry face ca.30 minutes later and perched for ca.10 minutes before it exited the quarry in a northwest direction. No further peregrine falcons were observed for the remainder of the survey.	Possibly breeding
2	4*	Two (2No.) peregrine falcons were recorded emerged from an area along the western quarry face and the pair were observed circling over the quarry before returning to the same area to perch and preen. VP1 did not provide a good view of this area, so the surveyor moved to VP2 to gain a better view of the western face. From VP2, the surveyor noted a total of four (4No.) peregrine falcons perching close together on the western quarry face. This group was made up of two (2No.) adults and two (2No.) juvenile peregrine falcons. One (1No.) adult peregrine was observed flying northeast out of the quarry, while the other three (3No.) peregrines stayed within the quarry bounds for the remainder of the survey. These peregrines were identified perching and preening on ledges marked by whitewash. The surveyor noted the presence of a previous nest site within this area.	Confirmed breeding
2022 Surveys			
3	2	A single adult peregrine falcon was observed perching / preening on an area of whitewash along the western quarry face underneath the storage shed. This peregrine flew southwards, perching briefly on some gorse along the western quarry face, before returning to its previous perch. This peregrine falcon was heard calling at 11:48 before flying northeast out of the Study Area. At 13:11, a single adult peregrine falcon was noted perching / preening along the western quarry face. This peregrine falcon remained within the Study Area until the end of the survey.	Possibly breeding

Visit	Number Recorded	Notes	Breeding Status
4	4*	A single adult peregrine falcon was observed outside a nest containing two (2No.) chicks. The adult peregrine falcon was observed grooming the chicks before all three (3No.) birds went out of view. As these birds moved further into the quarry face; the line of sight was obstructed by out jutting ledges / rocks along the western quarry face. The adult peregrine falcon was observed leaving the nest, circling the quarry and then flying south / southwest out of sight. A single peregrine falcon entered the quarry from the southeast ca.30 minutes later and was observed perching on a pylon for ca.15 minutes. This peregrine falcon was then observed hunting within the quarry and perching adjacent to the nest site for ca.10 minutes and then left the quarry. Approximately 15 minutes later, a pair of adult peregrine falcons were observed co-operatively hunting within the existing quarry and over the greenfield lands to the east. The pair of peregrines returned to the quarry and were observed circling overhead. One (1No.) peregrine landed beside the nest and the second peregrine was seen exiting the quarry to the west.	Confirmed breeding
2023 Surveys			
5	0	No calling or sightings recorded within the Study Area. No nest evidence was identified within the quarry. However, whitewash was identified along the western quarry face.	Non-breeding
6	0	No calling or sightings recorded within the Study Area. Evidence of feeding remains, and whitewash were noted along the western quarry wall. The surveyor noted the presence of sand martin nest holes within the northern portion of the quarry.	Non-breeding

*Including juveniles.

Figure 3-2: Peregrine Falcon Survey Results



3.2.2.2 Transect Breeding Bird Surveys

The hedgerows / treelines, scrub, and agricultural grassland are considered suitable for a range of common countryside birds.

Table 3-3 contains a summary of the birds recorded in the Study Area during the 2023 breeding bird surveys and their status according to the Birds of Conservation Concern in Ireland (BoCCI), which is the third assessment of the status of all regularly occurring birds on the island of Ireland [11].

A total of twenty-four (24No.) species were recorded during the surveys. Of these species, fourteen (14No.) were observed displaying territorial behaviours and were classified as '*possible breeding*.' In addition, four (4No.) species were classified as '*confirmed breeding*,' as they were observed carrying food parcels or accompanying recently fledged young. Most birds recorded within the Study Area were identified within areas of vegetation, outside the Site boundary, within the wider Study Area.

Of the twenty-four (24No.) species that were recorded:

- Nineteen (19No.) Green BoCCI listed non-annex I species were recorded – blackbird, blackcap, blue tit, bullfinch, buzzard, chaffinch, chiffchaff, dunnock, goldfinch, great tit, hooded crow, house sparrow, jackdaw, magpie, pied wagtail, robin, willow warbler, wood pigeon and wren;
- Five (5No.) Amber BoCCI listed non-annex I species were recorded – lesser black-backed gull, linnet, sand martin, starling and barn swallow.

Details on the species that were recorded and notes of their behaviour during the 2023 surveys are provided in Table 3-3.

Table 3-3: Birds recorded within the Study Area during the 2023 Breeding Season

BoCCI Status	Species	Latin Name	No. of Individuals		Notes	Breeding Status
			Visit 1	Visit 2		
Green Listed	Blackbird	*Turdus merula*	2	5	Visit 1 Two (2No.) blackbirds were identified during the May 2023 survey. Both individuals were identified calling within hedgerows / treelines, one (1No.) within the northeast portion of the Study Area and one (1No.) within a hedgerow / treeline to the west. Visit 2 Blackbirds were present throughout the Study Area within hedgerows / treelines and areas of scrub. Four (4No.) individuals were flushed from vegetation during the transects and one (1No.) was recorded perching. The surveyor observed a blackbird carrying a food parcel into an area of vegetation within the eastern portion of the Study Area.	Confirmed Breeding
	Blackcap	*Sylvia atricapilla*	2	0	Visit 1 Two (2No.) individuals were identified calling within the hedgerows / treelines within the southern portion of the Study Area, adjacent to areas of scrub and to the north of existing attenuation ponds. Visit 2 No blackcaps were recorded in the Study Area during the June 2023 survey.	Possibly Breeding
	Blue tit	*Cyanistes caeruleus*	2	4	Visit 1 One (1No.) blue tit was recorded perching on an ESB line within the northern portion of the Study Area. A second individual was heard calling in the southernmost hedgerow / treeline. Visit 2 Four (4No.) blue tits were identified calling and singing within the hedgerow / treelines separating the improved agricultural grassland from the area of scrub to the south.	Possibly Breeding
	Bullfinch	*Pyrrhula pyrrhula*	1	0	Visit 1 One (1No.) individual was identified foraging and calling in the hedgerow / treeline along the eastern boundary of the Study Area.	Possibly Breeding

BoCCI Status	Species	Latin Name	No. of Individuals		Notes	Breeding Status
			Visit 1	Visit 2		
					Visit 2 No bullfinches were recorded in the Study Area during the June 2023 survey.	
	Buzzard	*Buteo buteo*	0	5	Visit 1 No buzzards were recorded in the Study Area during the May 2023 survey. Visit 2 Three (3No.) buzzards were observed soaring over the areas of improved agricultural grassland, scrub and hedgerows / treelines within the southwest portion of the Study Area. The buzzards were heard calling whilst in flight. One (1No.) buzzard was recorded perching within the treeline separating the grassland fields from the area of scrub in the southwest portion of the Study Area. One (1No.) buzzard was seen flying southwest into the quarry from the northwest corner of the Study Area.	Possibly Breeding
	Chaffinch	*Fringilla coelebs*	9	1	Visit 1 Chaffinches were present throughout the Study Area during the May 2023 survey. All chaffinches recorded within the Study Area were identified calling from vegetation. Visit 2 One (1No.) individual was identified calling within the hedgerow / treeline along the northern boundary of the Study Area.	Possibly Breeding
	Chiffchaff	*Phylloscopus collybita*	3	1	Visit 1 Three (3No.) individuals were heard calling within the hedgerows / treelines within the southern portion of the Study Area. Visit 2 One individual was heard singing within the scrub separating the grassland fields from the attenuation ponds to the south.	Possibly Breeding
	Dunnock	*Prunella modularis*	2	3	Visit 1 Two (2No.) individuals were heard calling with vegetation to the north of the Study Area.	Possibly Breeding

BoCCI Status	Species	Latin Name	No. of Individuals		Notes	Breeding Status
			Visit 1	Visit 2		
					Visit 2 One (1No.) dunnock was observed foraging within an area of scrub to the south of the Study Area. At least two (2No.) more were heard calling from the vegetation.	
	Goldfinch	*Carduelis carduelis*	2	3	Visit 1 Two (2No.) individuals were identified calling from hedgerows / treelines within the north and eastern portion of the Study Area. Visit 2 Three (3No.) individuals were identified perching on overhead lines in the northern portion of the Study Area.	Possibly Breeding
	Great tit	*Parus major*	5	0	Visit 1 Multiple great tits were heard calling from hedgerows / treelines across the Study Area. Visit 2 No great tits were recorded in the Study Area during the June 2023 survey.	Possibly Breeding
	House sparrow	*Passer domesticus*	6	16	Visit 1 Four (4No.) house sparrows were identified perching and calling on agricultural sheds and outbuildings within the farmyard. Two (2No.) individuals were identified perching and calling within hedgerows / treelines. Visit 2 Six (6No.) individuals were foraging along the access track to the north of the Study Area, eight (8No.) more individuals were flushed from hedgerows as the surveyor walked the transect line. Two (2No.) individuals were identified perching and calling on overhead lines in this northern area.	Possibly Breeding
	Hooded crow	*Corvus cornix*	0	1	Visit 1 No hooded crows were recorded in the Study Area during the May 2023 survey.	Non-breeding

BoCCI Status	Species	Latin Name	No. of Individuals		Notes	Breeding Status
			Visit 1	Visit 2		
					Visit 2 One (1No.) individual was flushed from the treeline within the western portion of the Study Area. This individual was observed flying west into the quarry.	
	Magpie	*Pica pica*	0	1	Visit 1 No magpies were recorded in the Study Area during the May 2023 survey. Visit 2 One (1No.) individual was observed flying into the area of scrub within the southwest portion of the Study Area.	Non-breeding
	Jackdaw	*Corvus monedula*	0	26	Visit 1 No jackdaws were recorded in the Study Area during the May 2023 survey. Visit 2 Numerous jackdaws were observed flying, foraging and calling throughout the Study Area.	Possibly Breeding
	Pied wagtail	*Motacilla alba yarrellii*	3	0	Visit 1 Three (3No.) pied wagtails were observed flying over the area of improved agricultural grassland in the Study Area. Visit 2 No pied wagtails were recorded in the Study Area during the June 2023 survey.	Non-breeding
	Robin	*Erithacus rubecula*	7	12	Visit 1 Multiple robins were observed calling and perching within hedgerows / treelines across the Study Area. Visit 2 One (1No.) individual was observed carrying a food parcel within the hedgerow bordering the Study Area to the north. Multiple robins were observed calling, singing, and perching within vegetation across the Study Area.	Confirmed Breeding

BoCCI Status	Species	Latin Name	No. of Individuals		Notes	Breeding Status
			Visit 1	Visit 2		
	Willow warbler	*Phylloscopus trochilus*	3	1	Visit 1 A single (1No.) willow warbler was heard calling from within an area of vegetation to the north of the Study Area. Two (2No.) individuals were heard calling from an area of scrub to the south of the Study Area. Visit 2 One individual (1No.) was heard singing within the area of scrub in between the Study Area and the attenuation ponds to the south.	Possibly Breeding
	Woodpigeon	*Columba palumbus*	0	13	Visit 1 No woodpigeons were recorded in the Study Area during the May 2023 survey. Visit 2 Multiple woodpigeons were flushed from trees by the surveyor or were observed flying over the Study Area during the June 2023 survey.	Non-breeding
	Wren	*Troglodytes troglodytes*	28	21	Visit 1 Multiple wrens were recorded calling and perching within the Study Area. Visit 2 Multiple wrens were observed within the Study Area calling, singing, perching, and displaying territorial behaviour.	Possibly Breeding
Amber-listed	Lesser black-backed gull	*Larus fuscus*	0	1	Visit 1 No lesser black-backed gulls were recorded in the Study Area during the May 2023 survey. Visit 2 One (1No.) lesser black-backed gull was observed flying southeast over the Study Area.	Non-breeding
	Linnet	*Carduelis cannabina*	0	2	Visit 1 No linnets were recorded in the Study Area the May 2023 survey.	Possibly Breeding

BoCCI Status	Species	Latin Name	No. of Individuals		Notes	Breeding Status
			Visit 1	Visit 2		
					Visit 2 Two (2No.) linnets were observed perching and calling to each other within the northeast portion of the Study Area. One (1No.) individual was identified perching on overhead lines, the second individual was located within a hedgerow.	
	Sand martin	*Riparia riparia*	0	32	Visit 1 No sand martins were recorded in the Study Area during the May 2023 survey. Visit 2 Numerous adults and at least three (3No.) juveniles were observed actively foraging and flying within the northeast portion of the Study Area.	Confirmed Breeding
	Starling	*Sturnus vulgaris*	18	37	Visit 1 Fifteen (15No.) starling were observed foraging within the improved grassland fields to the east of the farmyard within the Study Area. A further three (3No.) individuals were observed flying over the western portion of the Study Area. Visit 2 Multiple starlings were seen foraging in the northeast portion of the Study Area. One (1No.) starling was seen perching on the farmhouse roof with a food parcel.	Confirmed Breeding
	Barn Swallow	*Hirundo rustica*	10	14	Visit 1 Multiple individuals were recorded foraging and commuting across the Study Area. Visit 2 Numerous barn swallows were recorded flying and foraging over the improved agricultural grasslands within the Study Area.	Non-breeding*

*This species was later confirmed to be breeding in the farm outbuildings as per Section 3.2.4 below.

3.2.2.3 Barn Swallow Building Survey

Table 3-4 contains a summary of the results of the barn swallow surveys.

As previously mentioned, there were fifteen (15No.) buildings within the study area that were assessed for barn swallows. Of these buildings:

- Barn swallows were classified as '*confirmed breeding*,' in five (5No.) buildings – Buildings 2, 7, 8, 9, and 13;
- Barn swallows were classified as '*possibly breeding*,' in four (4No.) buildings – Buildings 5, 6, 11, and 12; and,
- No breeding activity was recorded in Buildings 1, 3, 4, 10, 14 or 15.

The results are presented in Figure 3-4 below. Also, please note that active starling nests were also identified as part of the barn swallow surveys. Records of starlings and other bird species identified during the barn swallow surveys have been included in Table 3-4 below.

Figure 3-3: Building Survey Results

Table 3-4: Barn Swallow Survey Results

Building No.	Presence / Absence of Barn Swallows	Notes	Breeding Status
1	9	Visit 1 No barn swallows were observed using this building during the survey. No active or disused nests were identified.	Non-breeding

Building No.	Presence / Absence of Barn Swallows	Notes	Breeding Status
		Visit 2 One (1No.) adult barn swallow was observed flying in this building during the survey. No active or disused nests were identified. Visit 3 No barn swallows were observed using this building during the survey. One (1No.) disused nest was noted along the central beam in the roof.	
2	Present	Visit 1 Three (3No.) barn swallows were observed roosting inside this building. Two (2No.) active nests were identified above the door and under the eaves. Visit 2 Three (3No.) starlings were identified, one (1No.) adult and two (2No.) juveniles. The same two (2No.) nests were identified by the surveyor. Visit 3 Two (2No.) adult and two (2No.) juvenile barn swallows were observed using this building during the survey. The same two (2No.) nests were identified by the surveyor	Confirmed Breeding
3	Present	Visits 1 & 2 No barn swallows were observed using this building during the survey. Visit 3 Part of the building remained inaccessible during the survey. One (1No.) adult barn swallow was observed flying within this building during the survey. No nests were identified.	Non-breeding
4	Absent	Visits 1, 2 & 3: No birds or nests were recorded within this building	Non-breeding
5	Present	Visit 1 One (1No.) barn swallow was observed roosting within this building. One (1No.) disused nest was identified. No active nests were recorded. Visit 2 Two (2No.) adult barn swallows were observed flying / calling in this building during the survey. No active nests were identified. Visit 3 No barn swallows were observed using this building during the survey. No active nests were identified.	Possible Breeding
6	Present	Visit 1 One (1No.) barn swallow was observed roosting within this building. One (1No.) disused nest was identified. Visit 2 Two (2No.) adult barn swallows were observed perching / calling in this building during the survey. The surveyor did not identify any active nests. Visit 3 No barn swallows were observed using this building during the survey. Whitewash was noted around the doorway and along the ground, but no nests were identified.	Possible Breeding

Building No.	Presence / Absence of Barn Swallows	Notes	Breeding Status
7	Present	Visit 1 Twenty-five (25No.) barn swallows were recorded within this building during the survey. Two (2No.) nests were identified; however, these were not active at the time of survey. Visit 2 Three (3No.) adult barn swallows were flushed out of this building during the survey. Five (5No.) nests were recorded in the eaves. The surveyor noted that these nests were potentially active, however, no chicks were heard or observed. Visit 2 No barn swallows were observed using this building during the survey. Three (3No.) disused nests were noted within the eaves.	Confirmed Breeding
8	Present	Visit 1 Four (4No.) barn swallows and seventeen (17No.) starlings were recorded roosting within this building. Three (3No.) nests were identified by the surveyor. These nests were not active at the time of survey. Visit 2 Five (5No.) adult barn swallows and three (3No.) starlings were observed perching / calling within this building during the survey. Two (2No.) more starlings were identified displaying territorial behaviour at the threshold of the building. One (1No.) active starling nest was identified by the surveyor. Although no barn swallow nests were identified directly, the surveyor noted the potential presence of additional nests within the roof. Visit 3 No barn swallows were observed using this building during the survey. One (1No.) disused nest was identified by the surveyor.	Confirmed Breeding
9	Absent	Visit 1 & 3 No barn swallows were observed using this building during the survey. No active or disused nests were identified. Visit 2 No barn swallows were observed using this building during the survey. Four (4No.) starlings, two (2No.) adults and two (2No.) juveniles were recorded in this building. One (1No.) active nest was recorded above the entrance into this building.	Confirmed Breeding
10	Absent	Visit 1, 2 & 3: No birds or nests were recorded within this building.	Non-breeding
11	Present	Visit 1 & 3 No birds or nests were recorded within this building. Visit 2 One (1No.) barn swallow was recorded showing highly territorial behaviour. Two (2No.) juveniles were also recorded within this building. No active nests were identified; however, the surveyor noted the potential presence of a nest in between Building 11 and 12.	Possible Breeding

Building No.	Presence / Absence of Barn Swallows	Notes	Breeding Status
12	Absent	Visit 1 No barn swallows were observed using this building during the survey. Ten (10No.) starling were identified roosting above the door to this building. No active nests were identified. Visit 2 No barn swallows were observed using this building during the survey. Three (3No.) starlings and one (1No.) wood pigeon were identified perching within this building at the time of survey. No active nests were identified. However, as mentioned above, the surveyor noted the potential presence of a nest in between Building 11 and 12. Visit 3 The presence of livestock in this building during the survey prohibited access.	Possible Breeding
13	Present	Visit 1 Four (4No.) starlings were identified roosting within this building during the survey. Visit 2 Three (3No.) adult barn swallows were observed carrying nesting material and food parcels into this building. Four (4No.) starlings, two (2No.) adults and two (2No.) juveniles were identified within this building. An active nest was identified within the back right corner of the building. Visit 2 No barn swallows were observed using this building during the survey. One (1No.) disused nest was noted in the back right-hand corner.	Confirmed Breeding
14	Present	Visit 1 & 3 No barn swallows were observed using this building during the survey. No active or disused nests were identified. Visit 2 Two (2No.) adult barn swallows were observed flying in this building during the survey. No active or disused nests were identified by the surveyor.	Non-breeding
15	Absent	Visit 1, 2 & 3: No birds or nests were recorded within this building	Non-breeding

4 IMPACT ASSESSMENT AND MITIGATION

No active peregrine falcon nests were identified within Kilmacow Quarry during the 2023 survey; however, active nests were identified in 2021 and 2022 along the western quarry face. No breeding activity has been recorded on the eastern quarry face nor in areas that are due to be disturbed by the Proposed Development.

The transect breeding bird surveys identified a total of twenty-four (24No.) species within the Study Area. However, as discussed in Section 3.2.2.2, only four (4No.) species were confirmed breeding – blackbird, robin, sand martin and starling – and fourteen (14No.) species were classified as possibly breeding – blackcap, blue tit, bullfinch, buzzard, chaffinch, chiffchaff, dunnock, goldfinch, great tit, house sparrow, jackdaw, willow warbler, wren and linnet. No Annex I species were recorded within the Study Area. Barn swallows, lesser black-backed gull, linnet, sand martin and starling were BoCCI Amber-listed species [13] whilst all other species have a green conservation status. Additionally, no BoCCI Red-listed species were recorded within the Study Area.

The barn swallow building surveys confirmed that barn swallows and starlings were breeding within Buildings 2, 7, 8, 9 and 13. In addition, these birds were classified as '*possibly breeding*' in Buildings 5, 6, 11, and 12. No barn swallows, starlings or other breeding birds were identified breeding within buildings 1, 3, 4, 10, 14 or 15. It should be noted that no breeding activity was recorded in Buildings 14 or 15, which will be removed as part of the Proposed Development.

4.1 Potential Impacts on Birds

The potential impacts of the Proposed Development on birds is discussed in the sections below.

4.1.1 Vegetation Removal

A total of ca.479m of hedgerows and hedgerows / treelines will be removed to facilitate the Proposed Development alongside ca.0.27ha of scrub. The breeding bird surveys identified a number of common countryside birds utilising the vegetation to be removed as outlined above.

The change of land use from improved agricultural grassland to an active quarry will also mean the loss of foraging areas for birds utilising the Study Area.

Therefore, the loss of grassland habitats and hedgerows / treelines has the potential to impact local bird populations. However, it should be noted that alternative habitats were located within the wider Study Area outside the Site boundary. Furthermore, the hedgerow / treelines outside the Site boundary supported the majority of bird species recorded during the breeding bird transect surveys. It is therefore considered that any birds utilising the habitats affected by the Proposed Development will be able to disperse into the retained habitats within the Study Area.

Nonetheless, as the Proposed Development will result in the loss of vegetation and breeding bird habitats, mitigation measures will be implemented in order to ensure no adverse effects occur to breeding birds as Section 4.2 below.

4.1.2 Building Demolition

No breeding birds were identified within the two (2No.) agricultural sheds nor the pumphouse to be demolished. However, barn swallows are opportunist species and have been recorded breeding within buildings in the wider farmyard. Precautionary mitigation measures are therefore required to ensure the Proposed Development does not impact these species or any other breeding birds utilising these structures.

4.1.3 Quarrying Activity

Raptors such as peregrine falcons are well adapted to quarry habitats. However, blasting can have an effect on peregrines if the appropriate buffers are not implemented. As outlined in Section 3.2.2, peregrine falcons were not recorded within the Study Area during the 2023 survey period, and previous breeding activity was not recorded in any areas that will be affected by the Proposed Development. However, mitigation measures will be implemented as a precautionary measure to ensure that the Proposed Development does not impact this Annex I species in the future.

In addition, sand martins were identified breeding within the Study Area during the 2023 survey period. The sand martin nest holes recorded by the surveyor were along the western boundary of the Study Area and will not be affected by the Proposed Development. However, given the presence of this opportunistic species within the Study Area, precautionary mitigation measures have been included in Section 4.2.3 below.

4.2 Mitigation

4.2.1 Breeding Birds

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

- 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 project ECoW and NPWS;
    - Prior to the vegetation removal, the ECoW will inspect the Site; and,
    - The project ECoW will inspect the Site during vegetation removal.
- All vegetation clearance works will be undertaken in a systematic way;
- In the unlikely event that a bird nests within the active working area during the works, all works will stop within the immediate area and the project ECoW will be consulted; and,
- Planted berms will be introduced onsite. These berms will have a combined length of ca.390m and will be ca.12m wide. As such, these berms will provide a wide planting area for vegetation. The planting of these berms will ensure a net increase in trees / shrub vegetation onsite and will compensate for the hedgerows / treelines removed to facilitate the Proposed Development. It is considered that these berms will provide habitat for breeding birds in the long term.

4.2.2 Barn Swallows / Breeding Birds in Buildings

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

- The demolition of the two (2No.) agricultural sheds and pumphouse 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.

4.2.3 Breeding Birds within the Quarry

To avoid potential impacts on peregrine falcons and sand martin as a result of the Proposed Development, the following measures will be implemented:

- All personnel operating onsite will be made aware of the legal protection afforded to peregrine falcons and sand martins;
- The previous peregrine falcon nest areas (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 martins 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 project ecologist; and,
- Should a peregrine falcon or sand martin nest be identified onsite, all personnel operating within the Site will be made aware of the presence and location of the nest.

5 CONCLUSIONS

A total of twenty-five (25No.) species were recorded during the surveys either within or flying over Study Area during the breeding bird, peregrine falcon, and barn swallow surveys. These surveys took place from 2021 - 2023.

The breeding bird surveys concluded the following:

- Peregrine Falcon Surveys
    - During the 2021 and 2022 peregrine falcon surveys, this species was confirmed breeding within the existing quarry, along the western quarry face.
    - No evidence of peregrine falcon were recorded during the 2023 survey.
- Transect Breeding Bird Surveys
    - Four (4No.) species were classified as '*confirmed breeding*,' as they were observed carrying food parcels or accompanying recently fledged young.
    - Fourteen (14No.) were observed displaying territorial behaviours in the Study Area and were classified as '*possible breeding*.'
- Barn Swallow Building Survey
    - Barn swallows and starlings were confirmed breeding within the farmyard adjacent to the Site.
    - No evidence of barn swallows or starlings was identified within the structures to be demolished.

Overall, the Proposed Development will result in the loss of potential breeding and foraging habitat for birds through the removal of hedgerows / treelines, the demolition of structures and the removal of agricultural grassland. However, it is considered that the mitigation measures presented within this report and the proposed planting measures will ensure that no significant impacts will occur on bird species within the Site or within the vicinity of the Site.

6 REFERENCES

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APPENDIX 7

APPENDIX 7-1

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

BLAST HOLE DRILLING LOG

WELL NUMBER: ND-01

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comefords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255680
NORTHING: 115642
ELEVATION: -14.42 mOD

Well Completion Description	Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
							-14.42	0		Ground Surface
										Weathered Bedrock Broken Limestone
						Solid rock to 0.6m, broken and air flushing at 0.8m, 1.5m wet but not flushing,mixed returns size,cone of dust from exhaust	-15.02			**Limestone Bedrock** Dark grey,solid, calcitic Limestone
	Dark grey	No	▽							
	Dark grey	No				Solid,steady drilling				
	Dark grey	No								
	Dark grey	No				Small fracture with small inflow/seep,returns damp for 1 minute				
						Hole abandoned due to collapsing and high water inflow at 1m with hammering at 5m	-19.42	5		Total Depth of Borehole

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

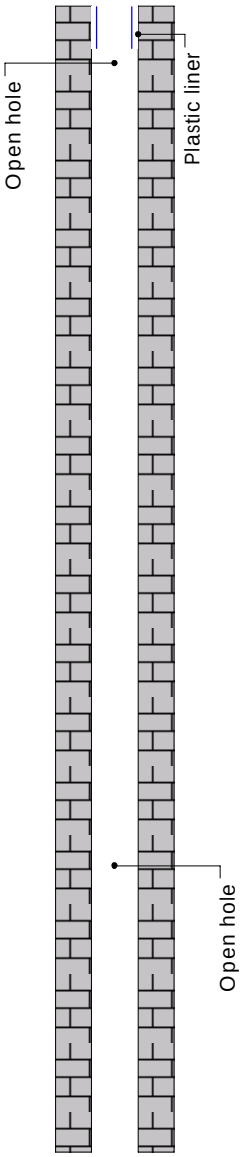
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-02

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comefords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255676
NORTHING: 115638
ELEVATION: -14.43 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
					Solid drilling, not broken like last hole, wet at 2m-small stream flowing beside hole dust at 3m,solid to 5m	-14.43	0		Ground Surface
Dark grey	No				Solid steady drilling, return slightly damp at start of rod				**Limestone Bedrock** Darkgrey,solid,calcitic limestone
					Steady drilling, some very infrequent rattling, blowing dust at 9m ,Rods run opened down hole at end of rod 2		5		
					Very small water flush at start of rod 3,slightly broken-mixed chips, no water		10		
					Solid rock,no water ,significant dust				
Dark grey	No				Solid drilling,heavy dust,no major fractures-no water		15		
					Solid drilling		20		
					Solid drilling with dust(no water)				
					Very little water or flush,solid to 28m then scraping and water strike(150-300		25		
Slightly brown	No	▽		150-300	gal/hr),slightly brown flush developed for 5mins				
					Then drilled on solid flush, slight scraping at 34m		30		
					Main inflow from from 27 mbgl flush approx 400-500				
Dark grey	No			400-500	gal/hr,slightly brown),Washed chipping was the same as previous drilling,steady drilling to solid rock		35		
					Scraping on bedding,hole staying open-solid rock-400-500 gal/hr	-54.43	40		Total Depth of Borehole
				400-500	EOH flushed well again at 27m where fracture is when pulling rods		45		

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

BLAST HOLE DRILLING LOG

WELL NUMBER: ND-03

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comefords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255674
NORTHING: 115633
ELEVATION: -14.44 mOD

Well Completion Description	Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
							-14.44	0		Ground Surface
										Weathered Bedrock Dark grey, calcitic Limestone bedrock, hole abandoned due to collapsing formation
						Broken rock,moved sideways				
							-17.44			Total Depth of Borehole
								5		

REMARKS: 110mm hole drilled with Titon 500 rig

SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

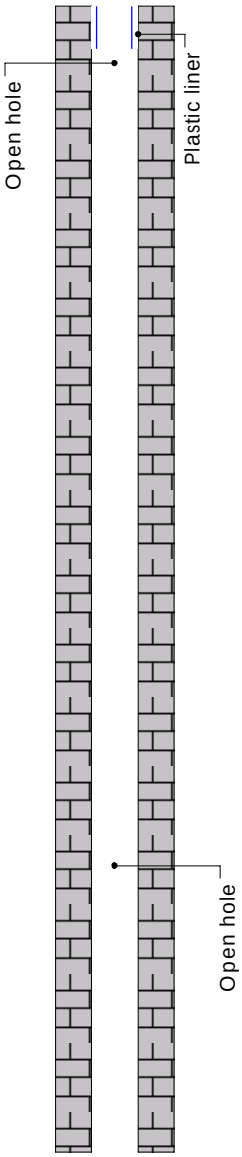
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-03A

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comefords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255686
NORTHING: 115637
ELEVATION: -14.45 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
					Moved sideways from ND-03	-14.45	0		Ground Surface
					Solid rock,damp dust,open hole solid,slightly damp dust				**Limestone Bedrock** Dark grey,solid,calcitic Limestone
Dark grey	No				Strong water flush with air on		5		
					Solid rock water flush from above,photo taken of steady drilling		10		
Black/grey	No				Same flow as at surface,solid rock,steady drilling and hammering,flush between black and grey				
					Water from above solid,dry rock		15		
					Water from above solid,dry rock		20		
					Water from above solid,dry rock		25		
					Heavy flush at change of rods(all from top of hole)		30		
Dark grey	No				Steady drilling and hammering-no rattling dust returns after intial flush has dried up		35		
						-54.45	40		Total Depth of Borehole
							45		

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

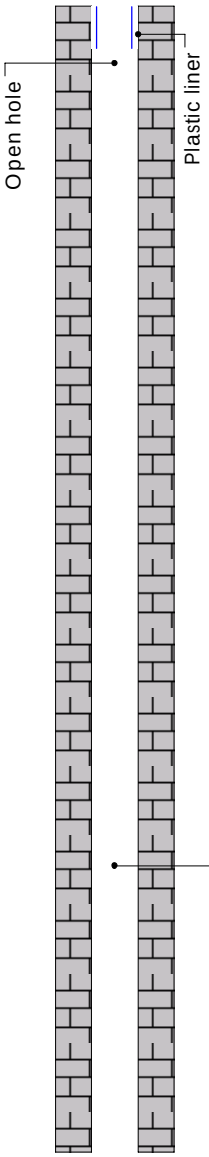
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-04

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR:

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255772.79
NORTHING: 115654.88
ELEVATION: -14.54 mOD

Well Completion Description	Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
	Grey dust Grey dust Grey dust Grey dust					Solid drilling,no water strikes,no evidence of weathering. Small flush of water at start of each rod but this was from surface inflows. Drilling overcame this intial water and mainly dust returns to 40mbgl	-14.54 -54.54	0 5 10 15 20 25 30 35 40 45		Ground Surface **Limestone Bedrock** Dark grey,solid, calcitic Llmestone Total Depth of Borehole

REMARKS: 110mm hole drilled with Titon 500 rig

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SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

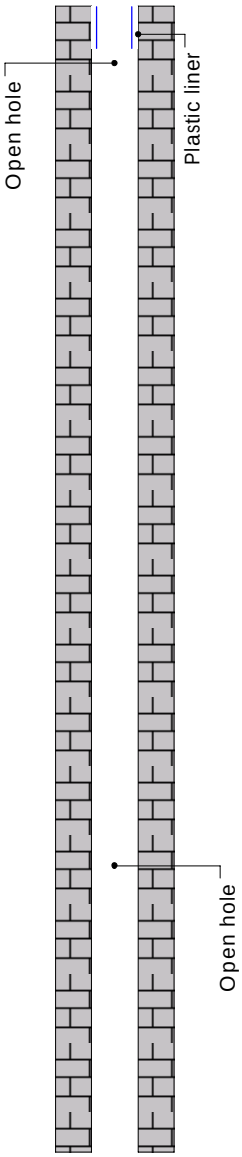
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-05

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comefords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255748.59
NORTHING: 115558.06
ELEVATION: -14.72 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						-14.72	0		Ground Surface
									Limestone Bedrock Dark grey,solid,calcitic Limestone
					Solid rock to 2m, large inflow of big,shallow water flush at each rod				
Dark grey	No						5		
Dark grey	No				Solid limestone,no additional water strikes		10		
Dark grey	No				Flush at start of rods but dried up thereafter		15		
	No						20		
					Solid drilling,no weathering, no water strikes				
Dark grey	No						25		
							30		
							35		
						-54.72	40		Total Depth of Borehole
							45		

REMARKS: 110mm hole drilled with Titou 500 rig

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SCALE As shown

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BLAST HOLE DRILLING LOG

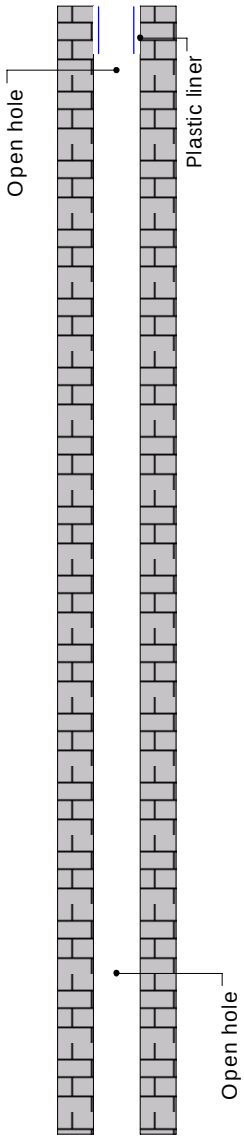
WELL NUMBER: ND-06

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255826
NORTHING: 115349
ELEVATION: -14.51mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
					Drilled on solid rock	-14.51	0		Ground Surface
Dark grey	No			100	Dry dust, solid drilling,water inflow at 4m, 100 gal/hr				**Limestone Bedrock** Dark grey,solid,calcitic Limestone
				100	Flush at rod change,solid dry drilling,100 gal/hr		5		
Dark grey	No								
					Same as last rod		10		
					Same as last rod		15		
Dark grey	No								
							20		
					27m-drilling, solid drilling, flush of shallow water,chips clean with little signs of weathering,100 gal/hr		25		
				100					
Dark grey	No			150	Same as before-solid rock no additional info,All water from top 4m, 150 gal/hr airlifting		30		
						-49.51	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

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SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

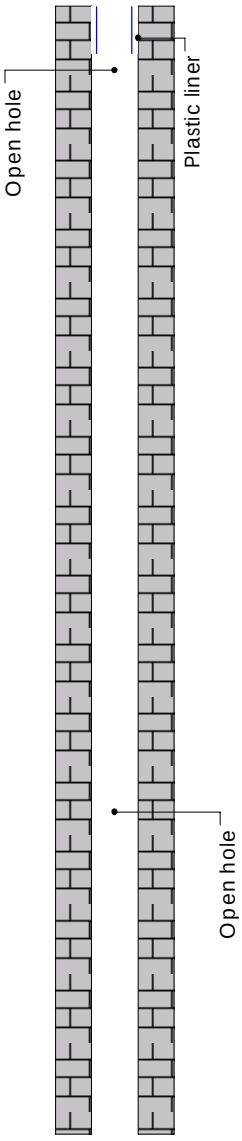
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-07

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 19/08/2015
DATE FINISHED: 19/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255788
NORTHING: 115278
ELEVATION: -14.65mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						-14.65	0		Ground Surface
Dark grey	No				Dust,solid limestone drilling,steady hammer with dust and chippings,very small water inflow at 2m,black dust,increased water 2.4m wet and dripping just enough water to keep the dust down,steady hammering,Brown	-17.45			**Limestone Bedrock** Dark grey,solid,calcitic Limestone
Brown	No					-19.55	5		**Weathered Bedrock** Brown clay and sand-very weathered bedrock
Brown	No				Large flush ,solid drilling ,flush just about keeping the dust down,Steady drilling in solid limestone,flush (50gal/hr),air flush in rock around well				**Limestone Bedrock** Dark grey,calcitic Limestone
Black	No				Black dust (9.0mbgl)		10		
					Light brown CLAY and broken rock-bone dry,flush as fine brown dust(soft)		15		
Dark/light grey	No				Solid drilling alternative dark to light grey flush,steady progress with main water inflow from large flush of water at rod change		20		
					Solid drilling		25		
					Solid drilling		30		
Light grey	No				Light grey flush				
						-49.65	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

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SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

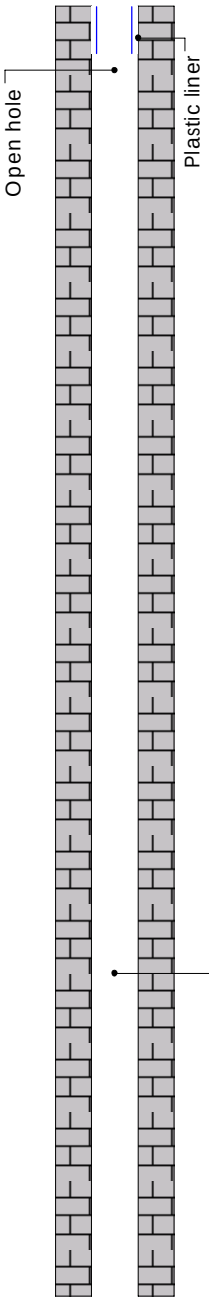
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-08

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comefords

DATE STARTED: 20/08/2015
DATE FINISHED: 20/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255762
NORTHING: 115328
ELEVATION: -14.68mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
					Solid,steady drilling all the way to bottom	-14.68	0		Ground Surface
Dark grey	No								**Limestone Bedrock** Dark grey,calcitic, solid Limestone
					Solid drilling no water strikes,no evidence of weathering,small flush of water at start of each rod but this was from surface inflows. Drilling overcame this intial water and mainly dust returns to 40mbgl		5		
Dark grey	No						10		
Dark grey	No						15		
							20		
Dark grey	No						25		
							30		
Dark grey	No					-49.68	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

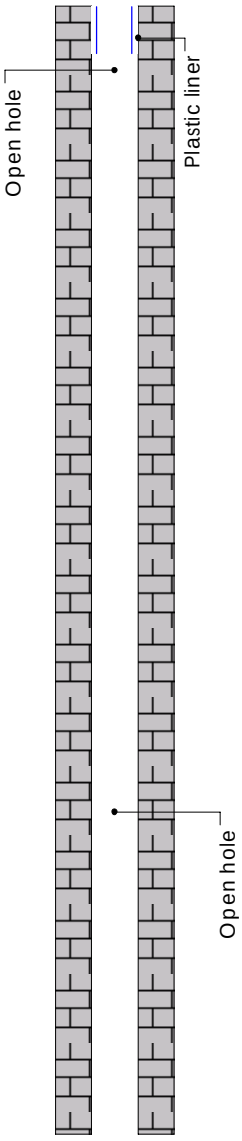
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-09

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 20/08/2015
DATE FINISHED: 20/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255779
NORTHING: 115241
ELEVATION: -14.51mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						-14.51	0		Ground Surface
Dark grey	No				Solid drilling no water strikes, no evidence of weathering, small flush of water at start of each rod but this was from surface inflows. Drilling overcame this intial water and mainly dust returns to 40mbgl		5		**Limestone Bedrock** Dark grey,solid ,calcitic Limestone
Dark grey	No						10		
							15		
							20		
Dark grey	No						25		
							30		
						-49.51	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

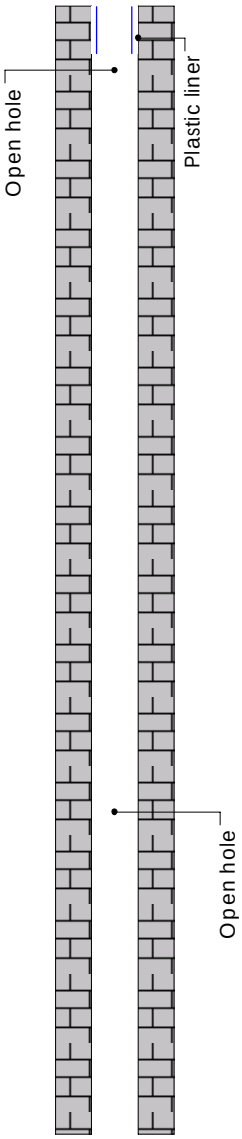
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-10

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 20/08/2015
DATE FINISHED: 20/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255756
NORTHING: 115493
ELEVATION: -14.73mOD

Well Completion Description	Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						Water strike at 4m Solid drilling Solid drilling Light flush at start, hammering in solid limestone,only shallow water Washed sample, no obvious sign of weathering or faulting. Solid limestone(air bubbling up as water falls down onto air in hole Solid limestone	-14.73 -49.73	0 5 10 15 20 25 30 35 40		Ground Surface **Limestone Bedrock** Dark grey,calcitic, solid Limestone Total Depth of Borehole

REMARKS: 110mm hole drilled with Titon rig

PAGE 1 of 1

SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

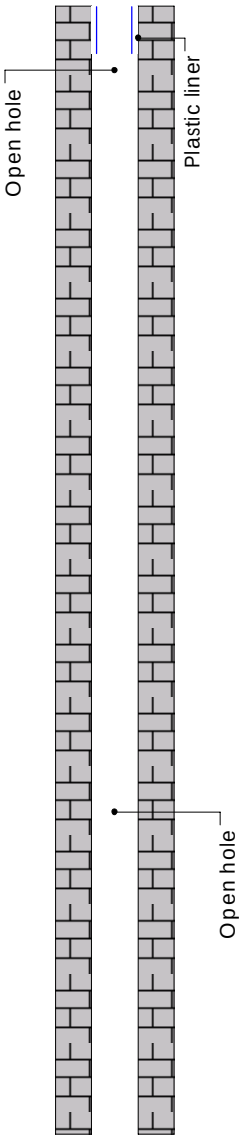
BLAST HOLE DRILLING LOG

WELL NUMBER: ND-11

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 22/08/2015
DATE FINISHED: 22/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255809.97
NORTHING: 115501.38
ELEVATION: -15.21mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						-15.21	0		Ground Surface
									Limestone Bedrock Dar grey,calcitic,solid Llimestone
Dark grey					Solid rock,dust		5		
							10		
Dark grey					Solid rock,dust		15		
							20		
							25		
Brown				50-600	50-600 gal/hr, Brown flush from water,dry above that	-41.21			**Clay** Possible narrow clay filled fracture
							30		
Dark grey					Solid rock	-50.21	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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BLAST HOLE DRILLING LOG

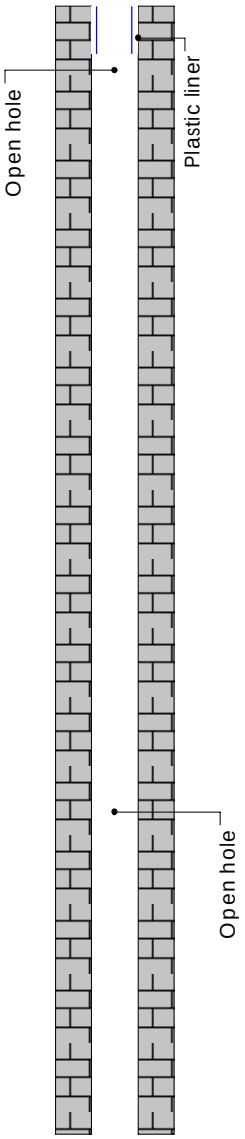
WELL NUMBER: ND-12

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 22/08/2015
DATE FINISHED: 22/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255864.67
NORTHING: 115552.31
ELEVATION: -14.54mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						-14.54	0		Ground Surface
									Limestone Bedrock Dark grey,calcitic,solid Limestone
Dark grey					Solid drilling to 5mbgl, Inflow at 5m		5		
Dark grey					5m to 12m surface water inflow				
Dark grey					Solid drilling with dust returns from 12m to 35mbgl,no fractures, no clay, no water strikes		10		
				Dry			15		
				Dry			20		
Dark grey					Solid to 35m		25		
				Dry			30		
						-49.54	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

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SCALE As shown

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BLAST HOLE DRILLING LOG

WELL NUMBER: ND-13

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 22/08/2015
DATE FINISHED: 22/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255753.57
NORTHING: 115628.59
ELEVATION: -14.32mOD

Well Completion Description	Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
Hole collapsed at 4m						Loose from 1m to 1.5 m Water at 4m(surface water) Spring at 17m(100-200 gal/hr) Solid to bottom of hole Surface fill in hole maybe blocked	-14.32 -49.32	0 5 10 15 20 25 30 35 40		Ground Surface **Limestone Bedrock** Dark grey,calcitic,solid Limestone Total Depth of Borehole

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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BLAST HOLE DRILLING LOG

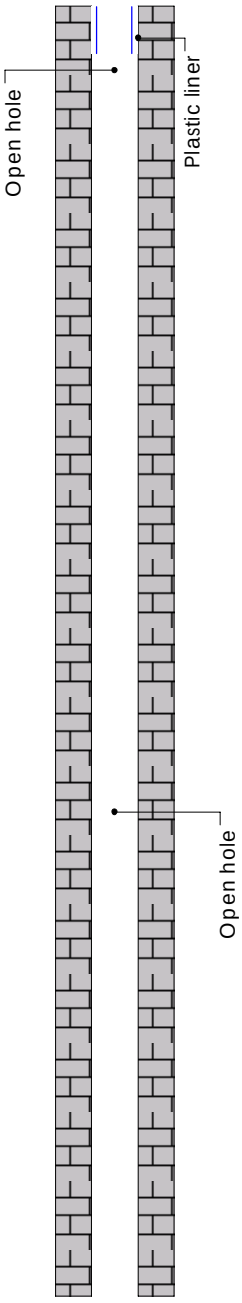
WELL NUMBER: ND-14

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 22/08/2015
DATE FINISHED: 22/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255716
NORTHING: 115611
ELEVATION: -15.0 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
					Solid rock	-15.00	0		Ground Surface **Weathered Bedrock** Dark grey ,broken, calcitic limestone
Dark grey	No	▽		100	Water at 4m(100 gal/hr) Ground lifting down along,broken rock to 35m		5		
Dark grey	No	▽		200	Stronger water at 13m(200gal/hr)		10		
							15		
							20		
Dark grey	No						25		
Dark grey	No				Same at end,broken rock with ground lifting at surface		30		
						-50.00	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

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SCALE As shown

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BLAST HOLE DRILLING LOG

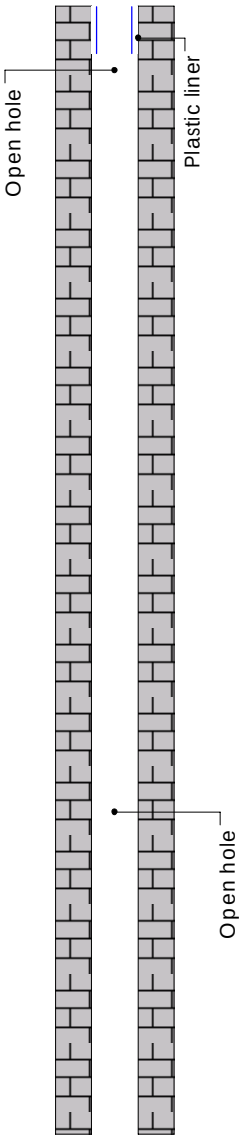
WELL NUMBER: ND-15

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 22/08/2015
DATE FINISHED: 22/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255689
NORTHING: 11564
ELEVATION: -14.18mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						-14.18	0		Ground Surface
Dark grey	No				Ground broken				**Weathered bedrock** Broken limestone
				500	Water at 1m(500gal/hr)				**Limestone bedrock** Dark,calcitic,solid Limestone
Dark grey	No				Good drilling from 0.5m to bottom		5		
							10		
Dark grey	No				2m of ground air lifting around hole when air turned on/off		15		
							20		
							25		
							30		
						-49.18	35		Total Depth of Borehole
							40		

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

BLAST HOLE DRILLING LOG

WELL NUMBER: ND-16

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords

DATE STARTED: 22/08/2015
DATE FINISHED: 22/08/2015
LOGGED BY: M.Gill
FLUSH: Air

EASTING: 255678
NORTHING: 115652
ELEVATION: -14.11mOD

Well Completion Description	Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
							-14.11	0		Ground Surface
										Weathered Bedrock Dark grey,broken,calcitic Limestone
			▽			All broken and water throughout				
						Water at 2m and 4m				
			▽			Abandoned hole at 5m due to collapsing formaion				
							-19.11	5		Total Depth of Borehole

REMARKS: 110mm hole drilled with Titon 500 rig

PAGE 1 of 1

SCALE As shown

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APPENDIX 7-2

AGL07419_01

REPORT ON THE GEOPHYSICAL SURVEY AT CLOHESSY'S QUARRY, KILMACOW, COUNTY KILKENNY FOR ROADSTONE PROVINCES LIMITED

5 March 2008

PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOSERVICES LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

AGL07419_01

PROJECT NUMBER	AGL07419		
AUTHOR	**CHECKED**	**REPORT STATUS**	**DATE**
SHANE O'ROURKE M.SC (GEOPHYSICS)	YVONNE O'CONNELL P.GEO., M.SC (GEOPHYSICS),	VERSION 1	5 MARCH 2008

5 March 2008

TABLE OF CONTENTS

1. INTRODUCTION

APEX Geoservices Ltd. was requested by Roadstone Provinces Limited to carry out a geophysical survey at a site adjacent to Clohessy's Quarry in Kilmacow, Co. Kilkenny to estimate the potential economic reserves available on the eastern side of the quarry.

1.1 Survey Objectives

The objectives of the survey were:

- To provide information on variations in the overburden thickness.
- To assess variations in rock type.
- To estimate gross resource volumes.
- To select locations for further investigation.

1.2 Survey Methodology

- 2-D Resistivity profiles at selected locations to investigate in greater detail variations in depth to rock and rock type and quality.
- Seismic Refraction profiling to investigate overburden thickness and to assess rock quality.

1.3 Site Background

The survey was carried out in grass fields in the area surrounding the north-west and north-east of Clohessy's Quarry, which is approximately 1.6km south-west of Kilmacow in County Kilkenny.

Resistivity profiles R1 to R3 on the eastern side of the quarry generally sloped from west to east from approximately 32 mOD to 23 mOD, and profile R4 on the western side of the quarry was generally flat at 36 mOD.

The geological map for the area (Geology of South Wexford, GSI, Sheet 23) indicates that the survey area is underlain by oolitic limestones of the Bullockpark Bay Member of the Ballysteen Formation. The map indicates a faulted north-south contact is present approximately 320m east of the current extent of the quarry between the Bullockpark Bay Member and Waulsortian Limestones.

Two previous geophysical surveys were carried out at the quarry, in 2002 and 1999. The 2002 survey was carried out over an area of 7.3 hectares (Map 1) which is approximately 200m south of the present survey area (Report on Geophysical Survey of Proposed Quarry Extension at Kilmacow, Co. Waterford for Roadstone Provinces Ltd., 18th June 2002). This survey outlined an area of a potential quarry extension (3.4 ha) adjacent to the existing quarry with overburden thickness of 2-6m and a probable gross resource of 5.1mt, with the remainder of the survey area to the east comprising overburden thickness of 10-15m. A transition from shallow bedrock to thick overburden due to a probable north-south fault was evident on profile R1 from this previous survey.

The 1999 survey was carried out in the northern corner of the 2002 survey area by BMA and outlined a zone of thin (<5m) overburden with Wenner constant separation resistivity and Wenner depth sounding data indicating an increase in overburden thickness to the south-east.

1.4 Report Outline

- The survey results are interpreted in Part 2.
- The results are summarized and recommendations made in Part 3.
- The locations of the geophysical readings are shown on Map 1.
- A summary map is shown on Map 2.
- The interpreted resistivity & seismic profiling results are plotted.
- Appendix I contains the survey methodology.
- Appendix II contains the seismic refraction plates.

2. INTERPRETED RESULTS

The objective of the survey was to delineate the extent of economic reserves on the eastern side of the quarry. The survey comprised resistivity and seismic refraction profiling with three resistivity and two seismic profiles located outside the north-western perimeter of the quarry (Map 1), and one resistivity profile located on the north-western edge of the quarry (Map 1) to provide information on overburden and rock type and rock profile in this area.

2.1 2D Resistivity Profiling

Four 2D resistivity profiles were recorded at the site (Map 1, Profiles R1 – R4). The resistivity data was interpreted as indicating the following overburden and rock types.

Resistivity (Ohm-m)	**Interpretation**
70-198	Silty gravelly Clay
198-330	Weathered Limestone
330-1250	Limestone

2.2 Seismic Refraction Profiling

Two seismic refraction spreads were recorded across the site (Map 1, S1 & S2) along 2D Resistivity Profile R1. The seismic data were interpreted as indicating the presence of three velocity layers for S1 and four layers for S2 as follows:

Seismic Velocity (m/s)	**Average Seismic Velocity (m/s)**	**Interpretation**	**Estimated Stiffness/ Rock Quality**
214-358	271	Overburden material	Loose/Soft
1179-1699	1411	Overburden material	Stiff/Dense
		Highly-Moderately Weathered Rock	Poor-Fair
1973-2077	2039	Overburden material	Very Stiff/very Dense
		Slightly Weathered Rock	Fair-Good
3059-4180	3408	Slightly Weathered-Fresh Rock	Good

2.3 Integrated Interpretation

Resistivity profile R1 and seismic profiles S1 and S2 may be combined to produce the following integrated interpretation.

Apparent Resistivity (ohm-m)	Seismic Velocity (m/s)	Average Seismic Velocity (m/s)	Interpretation	Estimated Stiffness/ Rock Quality
70-198	214-358	271	Silty gravelly Clay	Soft-very Stiff
	1179-1699	1411		
	1973-2077	2039		
198-330	1179-1699	1411	Highly-slightly weathered Limestone	Poor-Good
	1973-2077	2039		
330-1250	3059-4180	3408	Slightly weathered-Fresh Limestone	Good

Eastern Zone (R1-R3)

Overburden

Material with a resistivity of 70-198 ohm-m has been interpreted as silty gravelly clay. For R1-R3 the thickness of overburden has been interpreted to increase from west to east from 2.0m to a maximum of 27m on the eastern side of R2.

Interpreted results from seismic profile S1 indicate layer 1 comprises soft overburden material with a seismic velocity of 300-358 m/s. Results from S2 within the thicker overburden indicate that seismic layers 1, 2 and 3 comprise overburden material which has been interpreted as soft, stiff and very stiff silty gravelly clay respectively.

Weathered Bedrock

Resistivity values of 198-330 ohm-m have been interpreted as highly to slightly weathered limestone. This layer has been interpreted to range from 1.5-10.0m in thickness with the exception of the central area of profile R1 where a large zone of weathered material has been interpreted which may be associated with the fault to the east.

Seismic velocities within interpreted weathered limestone for profiles S1 and S2 range from 1257-2077 m/s which indicates this material should be marginally rippable to requiring breaking/blasting.

Bedrock

Bedrock resistivities have been interpreted to range from 330-1250 ohm-m. Profiles R1 and R2 have been interpreted to indicate a relatively steep bedrock drop-off is present in the southern portion of the survey area.

Profile R3 indicates that this drop-off is present further towards the east in the northern portion of the survey area, but lower bedrock resistivities on the eastern half of R3 (Map 2) indicates a decrease in bedrock quality (and possible increased clay/shale content) for the survey area comprising the eastern half of R3. A borehole (Map 2) is recommended in this area to further investigate bedrock composition.

Profile R4 indicates that bedrock shallows towards the north-east as noted above, however lower bedrock resistivities for the north-eastern side of R4 at depths of 20-30m bgl indicate possible shale at this location also.

Bedrock seismic velocities range from 3059-4179 m/s which are typical for fresh limestone.

Western Zone (R4)
The thickness of overburden for profile R4 has been interpreted to increase from 1.4 to 24.0m from north-east to south-west.

Profile R4 indicates that bedrock shallows towards the north-east of the profile as noted above however lower bedrock resistivities for the north-eastern side of R4 at depths of 20-30m bgl indicate possible shale at this location also.

2.4 Gross Resource Calculation

Map 2 shows the area of additional gross resource within the survey area on the eastern side of the quarry. The resource area assumes a 75m stand-off from the roadways as shown at the north of the area, and includes the area of probable decreased bedrock quality to the east as noted above. Three 15m benches have been included in the calculation with a stand-off of 20m between benches as shown.

The resource area is constructed based on the eastern extent of the quarry as interpreted from the aerial photograph extracted from the Environmental Protection Agency website. Areas on the eastern side of the resource with interpreted overburden of greater than 7.0m have been excluded from the resource.

The following table contains an estimated volume of overburden and an estimated gross resource for the area within each of the three benches. Average overburden thickness within the resource area is 3.0m, with interpreted weathered limestone included in the resource where applicable.

Table 1 Estimation of reserves - Clohessy's

Zone	Area	Area (at 2.47acres/ha)	Overb. thickness	Overb. volume	Overb. Tonnage (at 2.2t/cu.m)	Bench Height	Volume	Tonnage (at 2.5t/cu.m)
	(ha)	(acres)	(m)	(cu. m.)	(tonnes)	(m)	(cu. m.)	(m. tonnes)
Bench 1	7.26	17.93	3.00	217800.00	479160.00	15.00	1089000.00	2722500.00
Bench 2	5.41	13.36	0.00	0.00	0.00	15.00	811500.00	2028750.00
Bench 3	3.80	9.39	0.00	0.00	0.00	15.00	570000.00	1425000.00
TOTAL				217,800	479,160		2,470,500	6,176,250

Note: These figures are gross estimates based on the interpreted geophysical data. The figures should be refined following any further direct investigation and a draft operational plan for any future development.

3. CONCLUSIONS & RECOMMENDATIONS

The geophysical survey has outlined an area of limestone resource of 6.2 million tonnes over an area of 7.26 Ha assuming a 75m stand-off from roadway and 3x15m benches with a 20m standoff between benches.

Overburden has been interpreted as silty gravelly clay with an average overburden thickness of 3.0m for the resource area and a cut-off of 7.0m of overburden assumed for economic bedrock extraction, with overburden thickness increasing towards the east. A total of 0.5 million tonnes of overburden has been calculated for the resource area.

Surveying on the north-western side of the quarry indicates increasing overburden thickness of up to 20m towards the west and economic extraction in this area is unlikely.

Three boreholes are proposed to prove up the interpreted resource as follows:

	Easting	Northing	Purpose
PBH1	255931	115903	Prove up the northern portion of the resource area
PBH2	256142	115804	Assess the quality of the bedrock on the eastern side of R3
PBH3	256076	115556	Prove up the southern portion of the resource area

The resource area and the geophysical results should be re-appraised based on this or any other direct investigation.

4. REFERENCES

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'RES2DINV ver. 3.4 Users Manual', Birmingham, England.

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MAPS 1 and 2

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E: info@apexgeoservices.ie
www.apexgeoservices.ie

LEGEND:

- Resistivity Profile
- Seismic Profile
- Resistivity Profile (2002)
- 2-6m Overburden over Limestone (2002 survey)
- 6-10m Overburden over Limestone (2002 survey)
- 10-15m Overburden over Limestone/shale (2002 survey)
- Proposed Borehole (2002 survey)

PROJECT:	Clohessy's Quarry, Kilmacow, Co. Kilkenny
DRAWING No.:	Map 1: Geophysical Survey Location
DATE:	5 March 2008
CLIENT:	Roadstone Provinces Limited
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Version:	Date:	Drawn By:	Checked:
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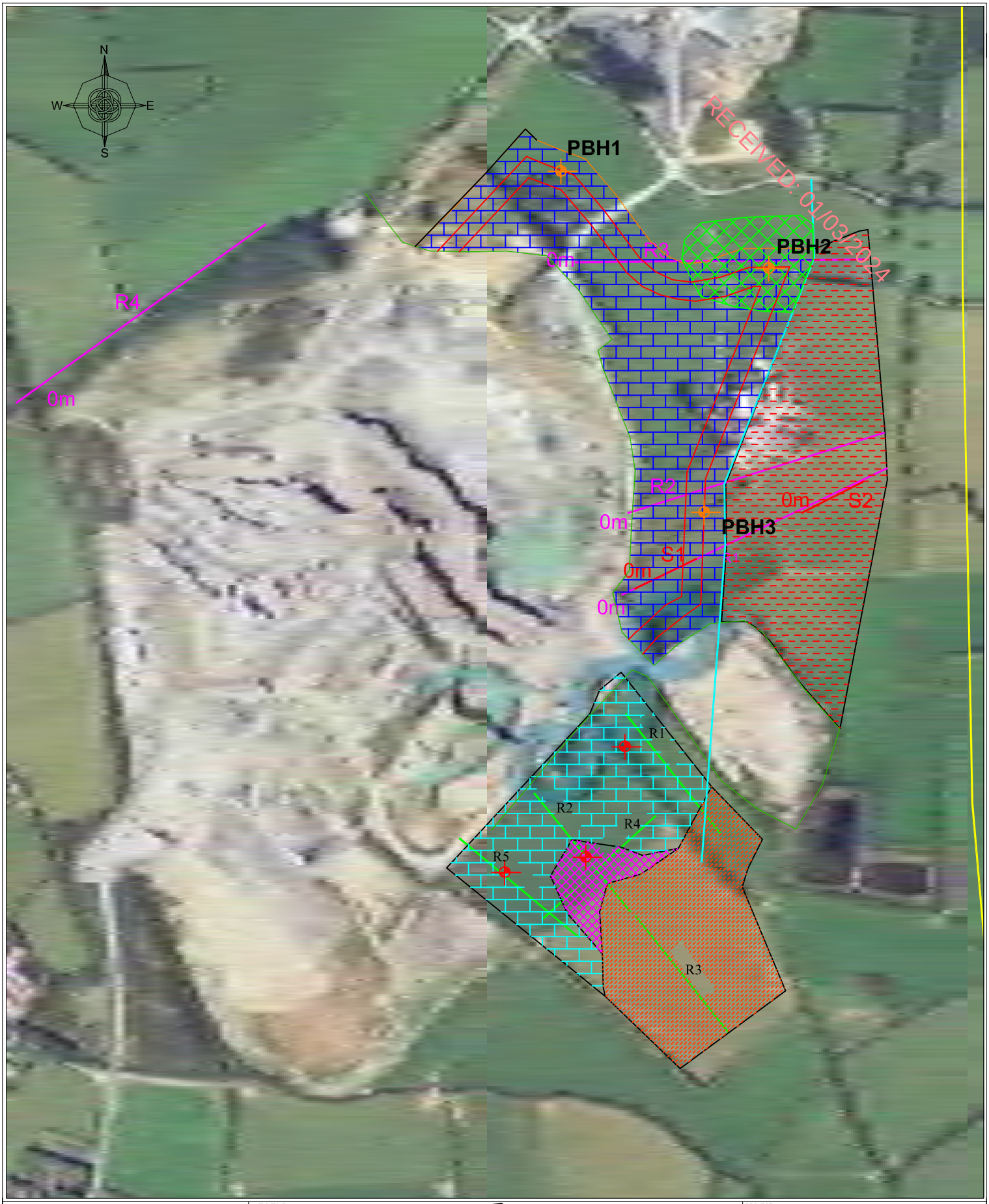

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LEGEND:

- Resistivity Profile
- Seismic Profile
- Resistivity Profile (2002)
- Proposed eastern extent of economic extraction
- Quarry perimeter (from EPA airphoto)
- 75m stand-off from roadway
- N-S Fault location from GSI
- 20m standoff between benches
- Proposed Borehole
- Proposed Additional Reserve (2-7m overburden)
- 7-27m Overburden over Limestone
- Area of probable decreased bedrock quality
- 2-6m Overburden over Limestone (2002 survey)
- 6-10m Overburden over Limestone (2002 survey)
- 10-15m Overburden over Limestone/shale (2002 survey)
- Proposed Borehole (2002 survey)

PROJECT:	Clohessy's Quarry, Kilmacow, Co. Kilkenny
DRAWING No.:	Map 2: Summary & Resource
DATE:	5 March 2008
CLIENT:	Roadstone Provinces Limited
SCALE:	1:5000 @A4

Version:	Date:	Drawn By:	Checked:
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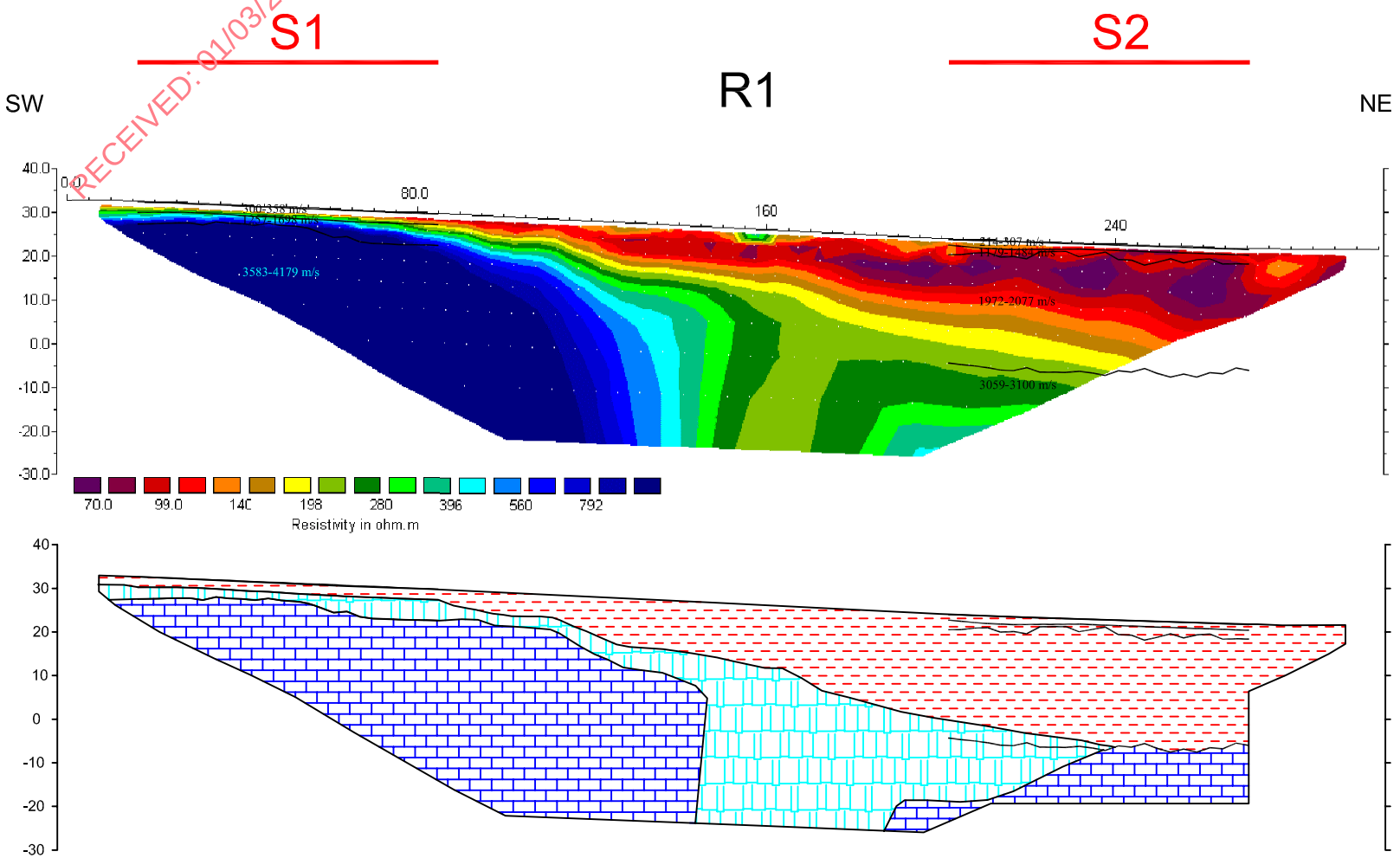
INTERPRETED PROFILES



LEGEND:

- Silty gravelly Clay
- Weathered Limestone
- Limestone

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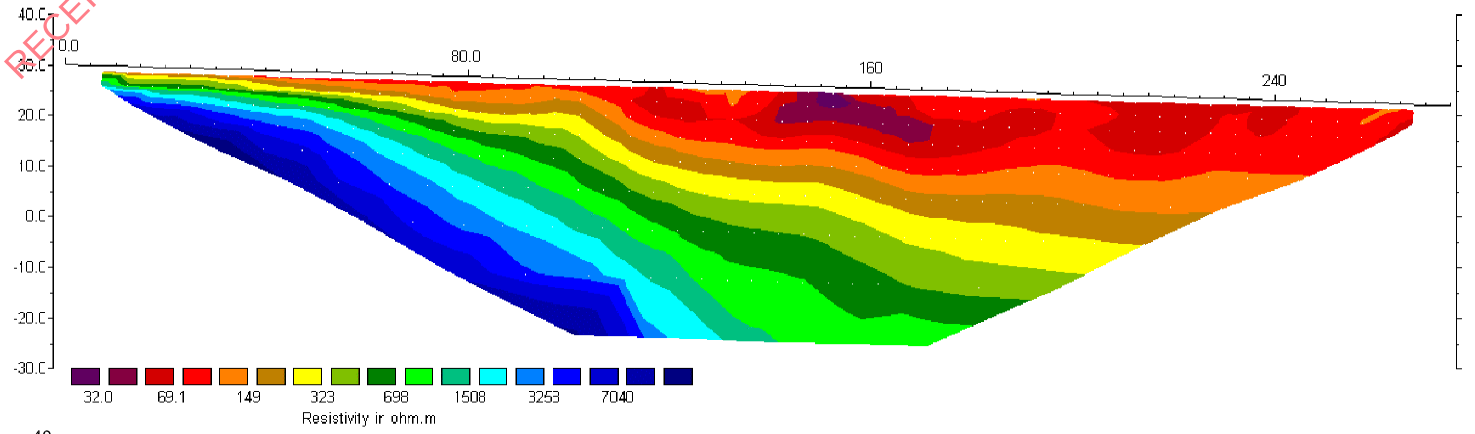
www.apexgeoservices.ie

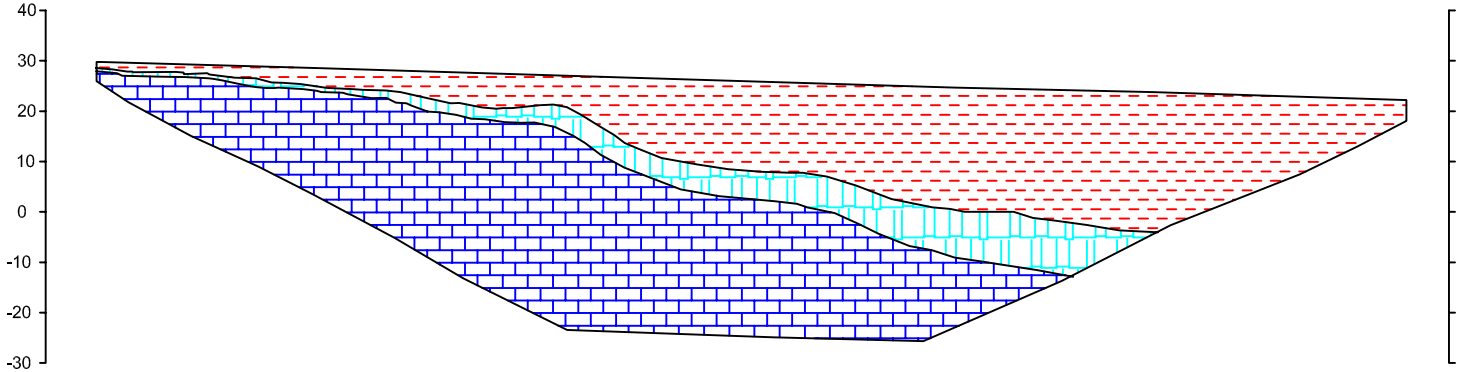
PROJECT:	Clohessy's Quarry, Kilmacow, Co. Kilkenny
DRAWING No.:	Profiles R1, S1 & S2
DATE:	5 March 2008
CLIENT:	Roadstone Provinces Limited
SCALE:	1:1500 @A4

Version:	Date:	Drawn By:	Checked:
1	5-03-08	SOR	YOC

R2

SW NE





LEGEND:

- Silty gravelly Clay
- Weathered Limestone
- Limestone

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PROJECT:	Clohessy's Quarry, Kilmacow, Co. Kilkenny
DRAWING No.:	Profile R2
DATE:	5 March 2008
CLIENT:	Roadstone Provinces Limited
SCALE:	1:1500 @A4

Version:	Date:	Drawn By:	Checked:
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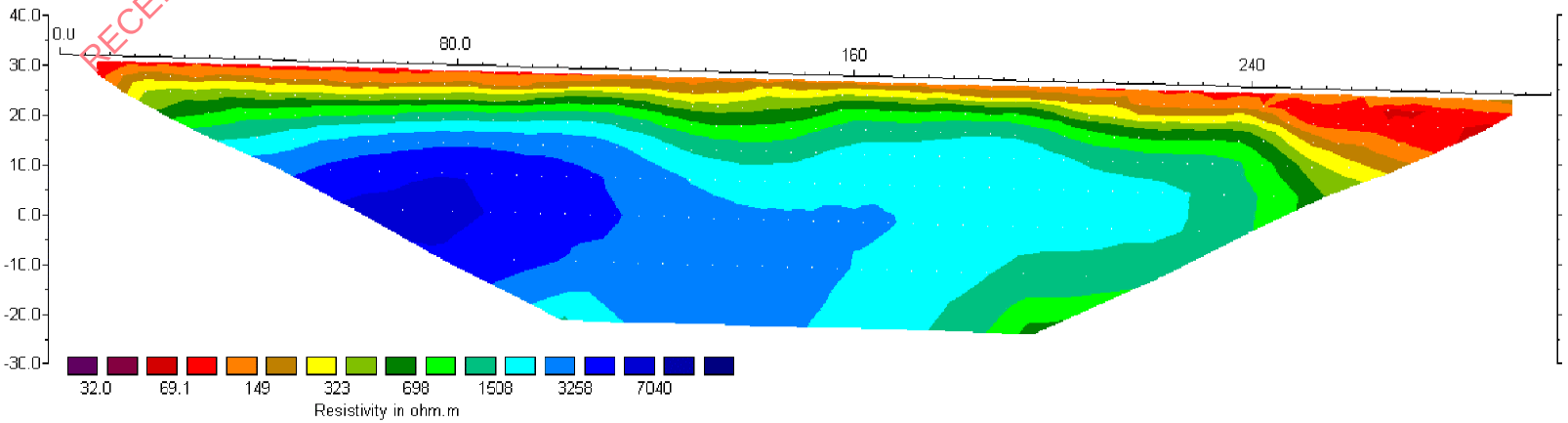
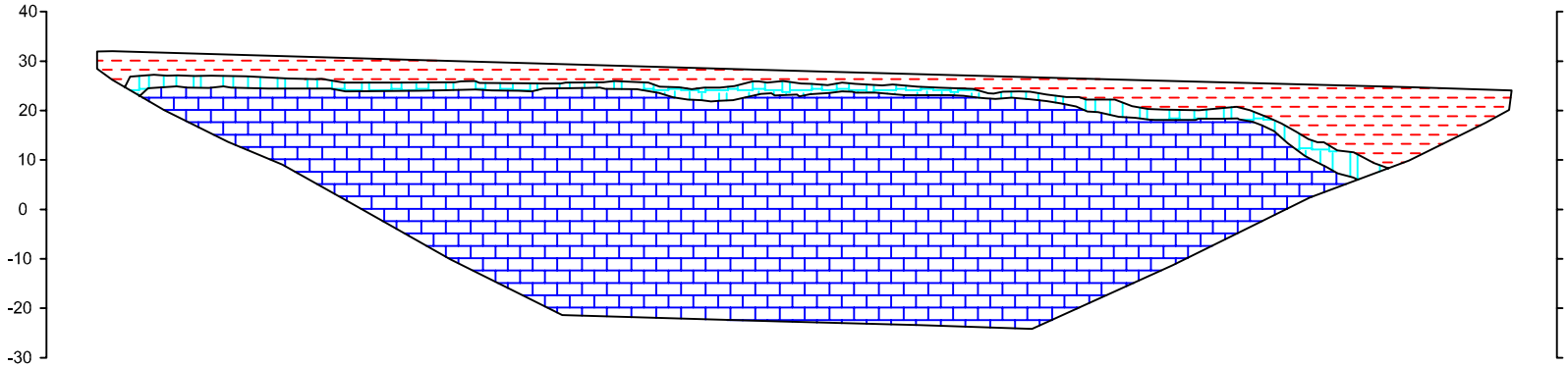
R3

W E





LEGEND:

- Silty gravelly Clay
- Weathered Limestone
- Limestone

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PROJECT:	Clohessy's Quarry, Kilmacow, Co. Kilkenny
DRAWING No.:	Profile R3
DATE:	5 March 2008
CLIENT:	Roadstone Provinces Limited
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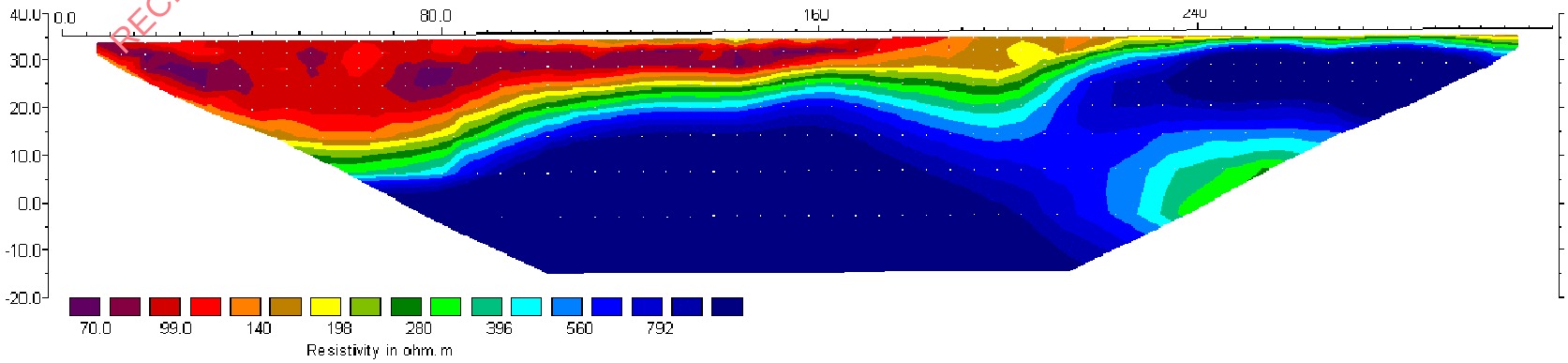
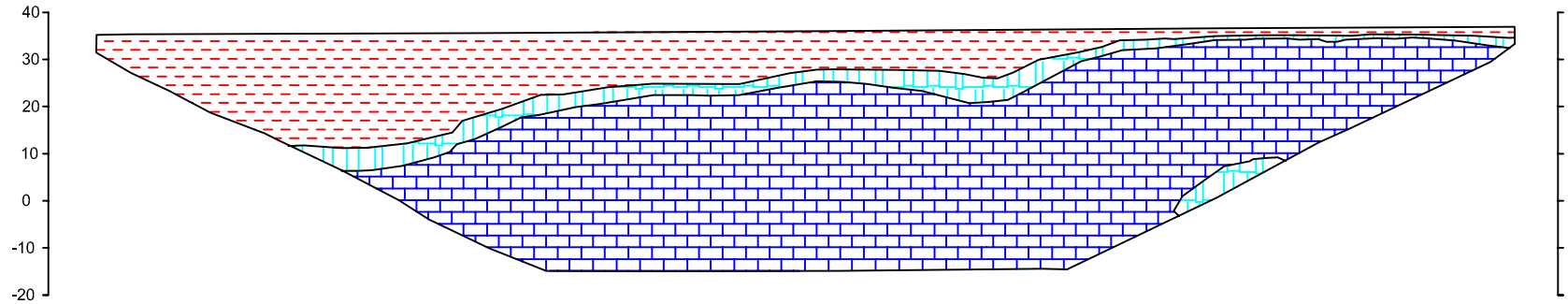
SW

R4

NE





LEGEND:

- Silty gravelly Clay
- Weathered Limestone
- Limestone

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PROJECT:	Clohessy's Quarry, Kilmacow, Co. Kilkenny
DRAWING No.:	Profiles R1, S1 & S2
DATE:	5 March 2008
CLIENT:	Roadstone Provinces Limited
SCALE:	1:1500 @A4

Version:	Date:	Drawn By:	Checked:
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APPENDIX I GEOPHYSICAL METHODOLOGY

M1. Methods Used

1.1 2D-Resistivity profiling

1.2 Refraction seismics

M2. Equipment Used

2.1 2D-Resistivity profiling

2.2 Refraction seismics

M3. Field Procedure

3.1 2D-Resistivity profiling

3.2 Refraction seismics

M4. Data Processing

4.1 2D-Resistivity profiling

4.2 Refraction seismics

M1. Methods Used

1.1 2D-Resistivity Profiling

The 2D Resistivity Profiling technique used for the survey makes use of the Wenner resistivity array whereby four electrodes are placed in a line in the ground and a current is passed through the two outer electrodes. The potential difference is measured across the two inner electrodes. The measured potential is divided by the current value to obtain the resistance. The resistivity is determined from the resistance using the following formula:

Resistivity = Resistance* 2 * Pi * Spacing.

The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. The 2D-resistivity profiling method involves the use of up to 101 electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

1.2 Seismic Refraction Profiling

This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

M2. Equipment Used

2.1 2D-Resistivity Profiling

The data were recorded using a Tigre resistivity meter, imaging software, two multicore cables and up to 64 stainless steel electrodes. The recorded data was processed and viewed immediately after the survey.

2.2 Seismic Refraction Profiling

The data were recorded using a Smartseis 24 channel digital seismograph with geophone spacings of 3m. The source of the seismic waves was a sledgehammer.

M3. Field Procedure

3.1 2D-Resistivity Profiling

Four resistivity profiles were recorded on the 20th and 21st December 2007. The profiles ranged in length from 275 to 315m and will have a depth of investigation of approximately 50m.

3.2 Seismic Refraction Profiling

Two seismic refraction profiles were recorded within the survey area. The profiles were 69m in length which will have a depth of investigation of approximately 23m depending on the seismic velocity of the subsurface material. The data was recorded on the 21st December 2007.

M4. Data Processing

4.1 2D-Resistivity Profiling

The field readings were stored in computer files and inverted using the RES2DINV package (Campus Geophysical Instruments, 1997) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-Depth model of the resistivities.

The inverted 2D-Resistivity models and corresponding interpreted geology are displayed as profiles R1 to R4. Elevation in mOD is indicated on the vertical axis. All profiles have been contoured using the same contour intervals and colour codes.

It is important to note that the data displayed on the 2D-Resistivity profiles is real physical data; however interpretation of the geophysical results is required to transform the resistivities directly into geological layers.

4.2 Seismic Refraction Profiling

First break picking in digital format was carried out using the FIRSTPIX software program to construct traveltime plots for each spread. Velocity phases were selected from these plots using the GREMIX software program and were used to calculate the thickness of individual velocity units. Topographic data were input using the supplied longitudinal sections as a guide. The interpreted profiles are displayed in Appendix II.

Approximate errors for velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

APPENDIX II SEISMIC REFRACTION PLATES

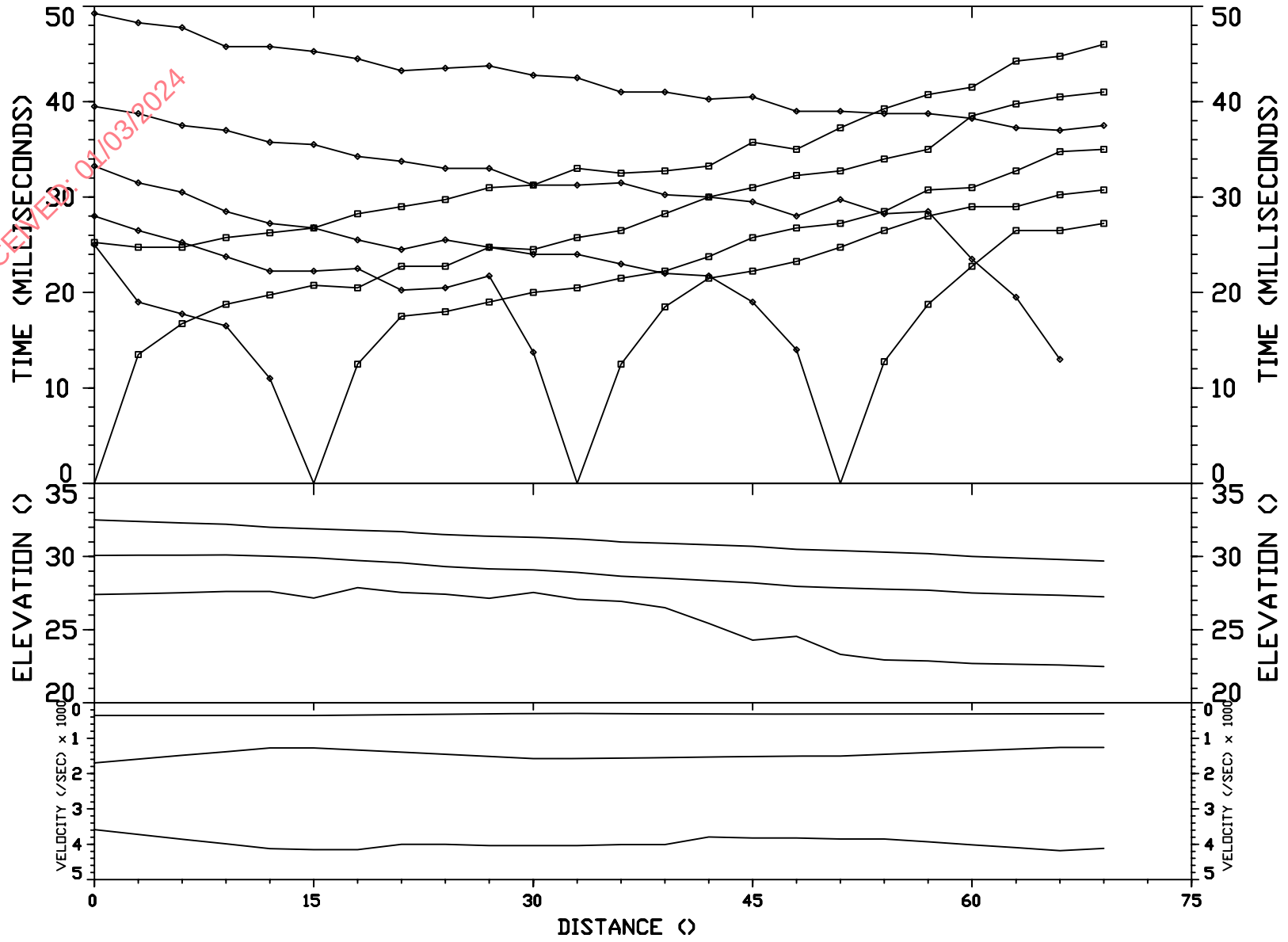


Plate: 10a

for: Roadstone Provinces	Clohessy's Quarry
by: APEX Geoservices Ltd.	Kilmacow Kilkenny
Data SetS1 / Date: 21/DEC/200	
Equipment: GEOMETRICS Sma / Spread: S1	Azimuth:

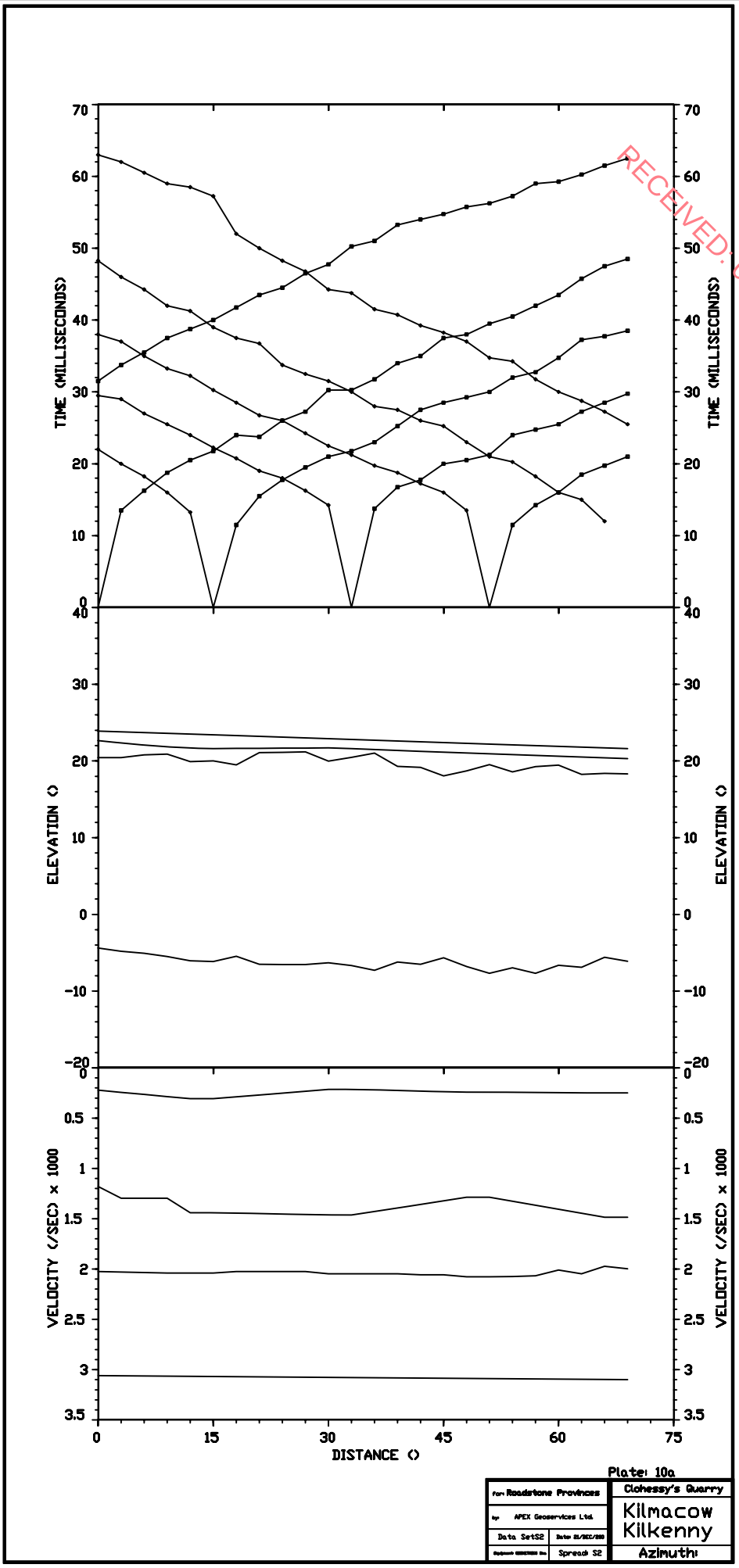


Plate: 10a

For: Roadstone Provinces	Clohessy's Quarry
by: APEX Geoservices Ltd.	Kilmacow Kilkenny
Data Set:S2	Azimuth:
Spread: S2	

APPENDIX 7-3

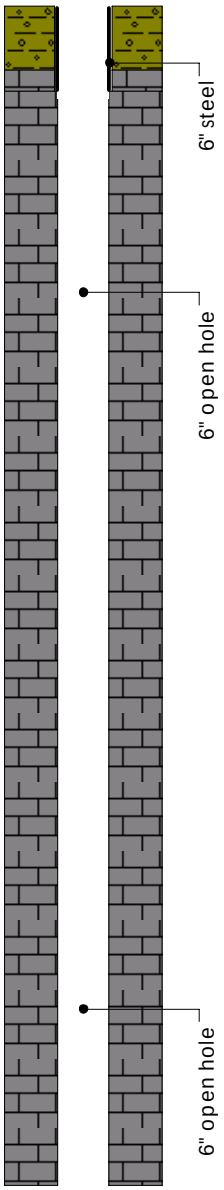
WATER WELL DRILLING LOG

WELL NUMBER: MW15-01

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords Drilling

DATE STARTED: 01/9/2015
DATE FINISHED: 01/9/2015
LOGGED BY: M.Gill
FLUSH: Water & Air

EASTING: 255699.27
NORTHING: 115853.67
ELEVATION: 34.94 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						34.94	0		Ground Surface
									Made Ground Made ground.
						30.44	5		**Glacial Till** Brown, damp, glacial till - rounded and subrounded gravels with occasional cobbles. Same as till in quarry face.
grey dust					Dust 5 - 9m. Black dust @ 5.5mbgl for 0.2m, grey dust after.		10		
grey dust					slightly samp at changeover of rod 4, but overcome by dust relatively quickly		15		
							20		**Limestone Bedrock** dry Limestone - 6" drilling. Solid grey calcarenitic Limestone bedrock with very occassional beds of soft black rock. Steady drilling with uniform drill returns.
						11.24	25		
grey dust					Rock above and below CLAY. No water in this clay zone.		30		broken rock with brown clayey drill returns and slight rattle of the drill rig
							35		Solid grey calcarenitic Limestone bedrock. Steady drilling with uniform drill returns.
damp		▽			Small water strike @40.2m.		40		
grey dust							45		
							50		
							55		
grey dust					Slightly damp at rod changeover between 24-70mbgl, but not enough water to overcome dust during subsequent drilling		60		
							65		
							70		
grey dust		▽			Small water stike at 74.98m, <50gal/hr.	-40.04	75		Broken limestone rock, no clay or change in flush colour.
damp									
damp					Not enough water in well to flush well at end of drilling. Filled well twice with clean water from bowser and flushed and cleaned well by airlifting this added water.	-47.36	80		Solid grey calcarenitic Limestone bedrock. Steady drilling with uniform drill returns.
							85		Total Depth of Borehole
							90		

REMARKS:

3m rods,
Odex drilling - 7.5" total hole diameter when drilling with steel & shoe
108mm rod diameter
Atlas Copco 4-F4 track mounted Mustang Drill Rig

PAGE 1 of 1

SCALE As shown

HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

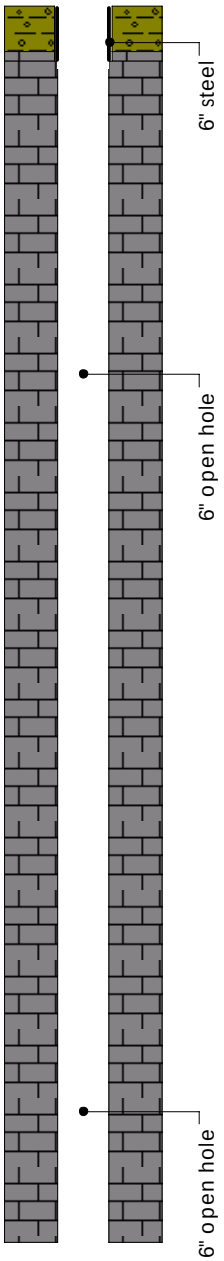
WATER WELL DRILLING LOG

WELL NUMBER: MW15-02

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords Drilling

DATE STARTED: 02/9/2015
DATE FINISHED: 02/9/2015
LOGGED BY: M.Gill
FLUSH: Water & Air

EASTING: 256041.196
NORTHING: 115363.596
ELEVATION: 29.58 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						29.58	0		Ground Surface
						27.28			**Broken Rock** Broken rock with clay infill and made ground
grey dust					dry dust returns to 36.6mbgl		5		**Limestone Bedrock** dry Limestone - slightly broken to begin with but quickly into solid rock. Solid grey calcarenitic Limestone bedrock with very occassional beds of soft black rock. Steady drilling with uniform drill returns.
					good drilling progress through broken rock		10		
grey dust							15		
							20		
					dry dust returns to 36.6mbgl		25		
grey dust							30		
						-2.12			dry, very broken limestone rock with brown clayey returns but no water encountered
grey black		∇			Small water strikes @36.6m.	-6.42	35		Solid grey calcarenitic Limestone bedrock. Steady drilling with uniform drill returns.
grey							40		Broken limestone rock, with clay infill and black and grey flush colour
		∇					45		
						-19.12			broken limestone rock
brown					alternating between grey and brown flush, with occassional dark grey/black flush		50		
grey						-25.22	55		Broken limestone rock, with clay infill and black and grey flush colour
						-28.32			Very broken limestone rock with clay infill and possible beds of blck shaly rock
brown black							60		
grey black							65		
					Airlifting at end of drilling ~1000gal/hr.	-37.52			Total Depth of Borehole
							70		

REMARKS:

3m rods,
Odex drilling - 7.5" total hole diameter when drilling with steel & shoe
108mm rod diameter
Atlas Copco 4-F4 track mounted Mustang Drill Rig
Well located beside RPL02

PAGE 1 of 1

SCALE As shown

HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie

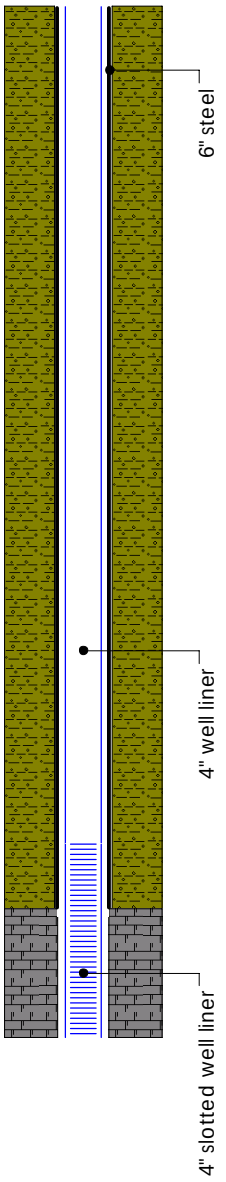
WATER WELL DRILLING LOG

WELL NUMBER: MW15-03

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords Drilling

DATE STARTED: 01/9/2015
DATE FINISHED: 02/9/2015
LOGGED BY: M.Gill
FLUSH: Water & Air

EASTING: 256331.93
NORTHING: 115086.23
ELEVATION: 22.27 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						22.27	0		Ground Surface
									Glacial Till Brown, damp, slightly sandy, gravelly SILT/CALY with gravels and cobbles of sandstone and limestone. Glacial till similar to that visible in the banks adjacent to the quarry face.
brown		▽			water strike @ 7.5mbgl, below this water was sealed off by the steel casing		5		
							10		
							15		
		▼			water level dipped at 19.98m at end of drilling		20		
						-2.13	25		**Glacial Till** Brown sticky CLAY with no water. No flush possible and needed water from bowser to flush the well at this level, also required to remove some rods and re-drill this zone when flushed with water
	Yes				Sticky brown CLAY, difficult drilling, water required to flush drilling returns				
	Yes								
	Yes								
grey brown		▽			water strike at top of broken rock	-5.77	30		**Limestone Bedrock** Broken grey calcarenitic Limestone bedrock with clay infill. Could not drill past 32mbgl.
brown					airlifting at ~1000gal/hr, brown flush water	-9.73	35		
							40		Total Depth of Borehole

REMARKS:

3m rods,
Odex drilling - 7.5" total hole diameter when drilling with steel & shoe
108mm rod diameter
Atlas Copco 4-F4 track mounted Mustang Drill Rig
Could not drill past 32 mbgl - very poor drilling conditions with broken limestone and clay infill

PAGE 1 of 1

SCALE As shown

HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie

ENVIRONMENTAL ENGINEERING
HYDROLOGY HYDROGEOLOGY

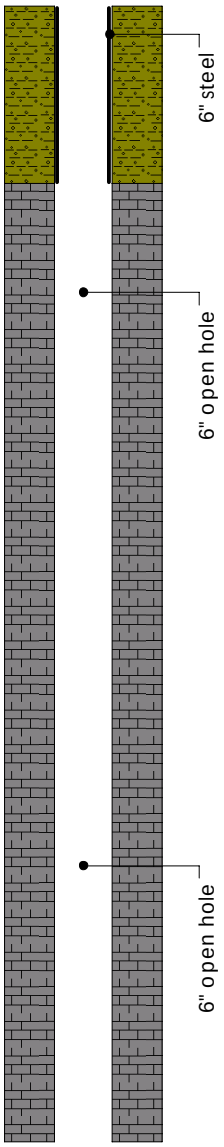
WATER WELL DRILLING LOG

WELL NUMBER: MW15-04

PROJECT NUMBER: P1281-1
SITE: Kilmacow Quarry
CLIENT: Roadstone Ltd
DRILLING CONTRACTOR: Comerfords Drilling

DATE STARTED: 03/9/2015
DATE FINISHED: 03/9/2015
LOGGED BY: M.Gill
FLUSH: Water & Air

EASTING: 255787.01
NORTHING: 114993.39
ELEVATION: 30.98 mOD



Flush Colour	H2O Inject.	Water Strikes	Fractures	Airlift Q (gal/hr)	Comments	Elevation	Meters Below Ground Surface	Lithology	Formation Description
						30.98	0		Ground Surface
grey dust					dry dust return to 79.24mbgl, with limited damp zones		5		**Glacial Till** Brown stoney CLAY. Slightly sandy, gravelly SILT/CALY with gravel and cobbles of sandstone and limstone. Same as in quarry face exposed to the east.
						21.28	10		Reported as gravel by driller
						18.78	15		**Limestone Bedrock** Top of bedrock
grey dust							20		Dry grey calcernitic Limestone, hard drilling, with thin zones of softer drilling and occassional black dust returns.
							25		
grey dust							30		@ 58.5mbgl - slightly broken rock with scrapping of hammer and rattling of rig, but no water strike, or change in dust colour.
							35		
grey dust							40		Solid grey limestone with uniform chip returns and grey dust from 58.5mbgl to base of well.
							45		
grey dust							50		
							55		
grey dust damp					very slightly damp		60		
							65		
							70		
							75		
grey dust damp grey dust					Very small water strikes @76.8m.	-48.26	80		Total Depth of Borehole
							85		
							90		

REMARKS:

3m rods,
Odex drilling - 7.5" total hole diameter when drilling with steel & shoe
108mm rod diameter
Atlas Copco 4-F4 track mounted Mustang Drill Rig
very dry well, with solid limestone - Well took 2-3 days to reach static water level.

PAGE 1 of 1

SCALE As shown

HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie

Petersen Drilling Services Ltd. on behalf of Roadstone — Rotary Drilling Log

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Firm brown TOPSOIL		RO		0.00	29.50		0000		100	brown											0.00	0.00
0.15	Firm brown silty CLAY																						
3.40	Firm grey silty CLAY																						
4.90	Firm to stiff brown sandy gravelly CLAY medium cobble content occasional very sandy gravely layers																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0805			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
1205	0.00		

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	29.50					Sim. Casing			
RO	154.00	0.00	29.50				DTH Button Bit		115	Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
0900	5.50	5.50	Very Slow	0.00	0.00	0.00	0.00	7.00

Backfill (m)

Type	From (m)	To (m)
Arisings	29.50	0.00

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
0805		CAT Scanned: Yes
0805		Permit Completed: Yes

SPT I.D. Number	PD1	Calibration Date	01/02/2021
SPT Rod Type	2 3/8 Regular	SPT Energy Ratio	0.00
Drilling Crew Details			CSCS No
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer	D Broderick		
Lead Driller's signature			

Project Title

Kilmacow Pit

Weather	Variable	Project No	37/22
Date	09/09/2022	Day	Friday
Rig type	Knebel HY79	Borehole Number	
Inclination		Orientation	MW 22-0
Sheet	1 of 1	Completed	Y

Petersen Drilling Services Ltd. on behalf of Roadstone — Rotary Drilling Log

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Firm brown TOPSOIL																						
0.15	Firm to stiff brown silty gravelly CLAY high cobble content occasional sandy gravelly lenses																						
18.40	Soft to firm brown silty sandy CLAY																						
21.60	Medium strong grey LIMESTONE																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
1205			
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1630	69.00	0.00	23.00

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	23.00					Sim. Casing			
RO	154.00	0.00	23.00				DTH Button Bit		115	Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
1135	19.00	19.00	**Slow**	0.00	0.00	0.00	0.00	23.00
1240	33.00	23.00	**Medium**	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1205		CAT Scanned: Yes
1205		Permit Completed: Yes
		DREM (33.00m - 35.00m): fractured rock zone, with some clay infill
		DREM (55.00m - 56.00m): minor fractured zone

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer	D Broderick		
Lead Driller's signature			

Project Title

Kilmacow Pit

Weather	Variable	**Project No**	37/22
Date	09/09/2022	**Day**	Friday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	MW 22-01
Sheet	1 of 2	**Completed**	Y

AGS

Petersen Drilling Services Ltd. on behalf of Roadstone — Rotary Drilling Log

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
			RO		0.00	80.00		0000		100	grey											0.00	0.00

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0815	69.00	0.00	23.00
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1355			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
RO	120.00	23.00	80.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1155	0045	DREM (74.00m - 76.00m): minor fractured zone soft mudstone layer Dayworks: Airlift development of well

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer	D Broderick		
Lead Driller's signature			

Project Title

Kilmacow Pit

Weather	Variable	**Project No**	37/22
Date	12/09/2022	**Day**	Monday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	MW 22-01
Sheet	2 of 2	**Completed**	Y

Petersen Drilling Services Ltd. on behalf of Roadstone — Rotary Drilling Log

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Firm brown TOPSOIL		RO		0.00	80.00		0000		100	brown											0.00	0.00
0.15	Firm brown sandy silty gravelly CLAY medium cobble content																						
12.80	Soft to firm brown silty gravelly CLAY																						
14.60	Extremely weak weathered brown orange and light grey LIMESTONE																						
54.00	Weak to Medium strong light brown greyish LIMESTONE frequent fractures																						
76.50	Medium strong dark grey LIMESTONE																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0755			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
2020			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	18.80					Sim. Casing			
RO	154.00	0.00	18.80				DTH Button Bit		115	Air	No
RO	120.00	18.80	80.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
0755		CAT Scanned: Yes
0755		Permit Completed: Yes
1520	0045	Dayworks: Airlift development of well

SPT I.D. Number	PD1	Calibration Date	01/02/2021
SPT Rod Type	2 3/8 Regular	SPT Energy Ratio	0.00
Drilling Crew Details		CSCS No	
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer	D Broderick		
Lead Driller's signature			

Project Title

Kilmacow Pit

Weather	Variable	Project No	37/22
Date	13/09/2022	Day	Tuesday
Rig type	Knebel HY79	Borehole Number	
Inclination		Orientation	MW 22-2
Sheet	1 of 1	Completed	Y

AGS

Petersen Drilling Services Ltd. on behalf of Roadstone — Rotary Drilling Log

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	brown clayey MADE GROUND		RO		0.00	87.00		0000		100	grey											0.00	0.00
0.40	Firm brown silty gravelly CLAY																						
2.50	Very weak brown highly weathered clayey LIMESTONE																						
5.20	Medium strong weathered grey LIMESTONE frequent clay filled voids																						
10.30	Strong grey LIMESTONE rare fractures																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0810			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
1730			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	11.00					Sim. Casing			
RO	154.00	0.00	11.00				DTH Button Bit		115	Air	No
RO	120.00	11.00	87.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
0920	57.00	11.00	Medium	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
0810		CAT Scanned: Yes
0810		Permit Completed: Yes
		DREM (24.00m - 24.50m): minor fractured zone
		DREM (33.50m - 34.00m): minor fractured zone
1925	0045	Dayworks: Airlift development of well

SPT I.D. Number	PD1	Calibration Date	01/02/2021
SPT Rod Type	2 3/8 Regular	SPT Energy Ratio	0.00
Drilling Crew Details		CSCS No	
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer	D Broderick		
Lead Driller's signature			

Project Title

Kilmacow Pit

Weather	Fine	Project No	37/22
Date	21/09/2022	Day	Wednesday
Rig type	Knebel HY79	Borehole Number	
Inclination		Orientation	MW 22-03
Sheet	1 of 1	Completed	Y

APPENDIX 8

APPENDIX 8-1

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co.Waterford
Ireland

tel: +353 (0)58 44122
fax: +353 (0)58 44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

PROPOSED QUARRY EXTENSION, KILMACOW, CO. KILKENNY

FLOOD RISK ASSESSMENT

FINAL REPORT

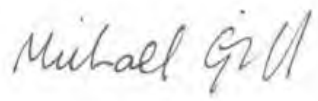
Prepared for:

ROADSTONE LTD

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

DOCUMENT INFORMATION

Document Title:	**Proposed Quarry Extension, Kilmacow, Co. Kilkenny - Flood Risk Assessment**
Issue Date:	**26th February 2024**
Project Number:	**P1281-4**
Project Reporting History:	**-**
Current Revision No:	**P1281-4 FINAL F0**
Author(s):	**Michael Gill** **David Broderick** **Jenny Law**
Signed:	 **Michael Gill B.A., B.A.I., M.Sc., MIEI** **Managing Director – Hydro-Environmental Services**

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) was engaged by Roadstone Ltd to undertake a Stage 2 Flood Risk Assessment (FRA) for a proposed quarry extension at Kilmacow, Co. Kilkenny. A site location map is attached as **Figure A.**

The proposed development site "the Site" is located within the townlands of Granny and Aglish North, in the south of County Kilkenny, approximately 5km north-west of Waterford City and 3km south of Kilmacow Village. The Site is part of a Roadstone Ltd operated quarry.

The total area of the existing quarry landholding area is ca. 84ha while the Site is 10.3ha.

The following assessment is carried out in accordance with '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (DoEHLG, 2009).

1.2 STATEMENT OF QUALIFICATIONS

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

Our core area of expertise and experience is hydrology and hydrogeology, including flooding assessment and surface water modelling. We routinely work on surface water monitoring and modelling, and prepare flood risk assessment reports.

Michael Gill P.Geo (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of quarries and renewable projects in Ireland, as well as accompanying Flood Risk Assessments. He has substantial experience in surface water drainage design and SUDs design and surface water/groundwater interactions.

David Broderick P.Geo (BSc, H. Dip Env Eng, MSc) is a Hydrogeologist with 17 years environmental consultancy experience in Ireland. David has completed numerous hydrological and hydrogeological assessments for various developments across Ireland. David has significant experience in surface water drainage issues, SUDs design, flood risk assessment and modelling.

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

1.3 REPORT LAYOUT

This FRA report has the following format:

- Section 2 describes the Site setting and details of the proposed development;
- Section 3 outlines the hydrological and geological characteristics of the local surface water catchments;

- Section 4 presents a site-specific flood risk assessment (FRA) undertaken for the proposed development which was carried out in accordance with the above-mentioned guidelines;
- Section 5 presents flood risk planning policy; and.
- Section 6 presents the FRA report conclusions.

As stated above, this FRA is carried out in accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (DoEHLG, 2009). The assessment methodology involves researching and collating flood related information from the following data sources:

- OPW Flood Studies Update (FSU) Web Portal;
- Geological Survey of Ireland (GSI) maps on superficial deposits;
- EPA hydrology maps;
- OPW National Indicative Fluvial Mapping (NIFM);
- EIAR scoping submissions;
- Kilkenny County Development Plan 2021 – 2027 (including Strategic Flood Risk Assessment);
- In-house water monitoring data provided by Roadstone (i.e. quarry discharge volumetric monitoring); and,
- Site walkovers and surveys conducted by HES.

2. BACKGROUND INFORMATION

2.1 INTRODUCTION

This section provides details on the topographical setting of the Site along with a description of the proposed development.

2.2 SITE DESCRIPTION AND TOPOGRAPHY

The total area of Roadstone's landholding area 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 comprises mainly 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 in a southerly direction to the established entrance via the weighbridge, wheel wash, carpark, office/welfare facilities as well as previously extracted areas. The Site includes 3.4ha of agricultural land.

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 extension area amounts to ca.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 existing 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 location map is shown as

Figure A.

2.3 PROPOSED DEVELOPMENT DETAILS

The Proposed Development comprises the lateral extension of existing extraction activities to the east of the current permitted extraction area. The estimated reserve is 2,920,000m^3 (7,592,000 tonnes).

The proposed extension lands, which are largely greenfield, will be reduced from a current level of ca. 28 - 32m OD down to -45m OD which is the maximum depth of the current extraction area. The extraction will be completed over 5 x 15m high benches.

The Proposed Development will also seek to use the existing quarry facilities for access, welfare and aggregate processing.

The existing water management (i.e. quarry dewatering pumps and water treatment) infrastructure will also be used. There is no requirement to review the current discharge licence (ENV/W82) which permits discharge (surface water and groundwater) to the Flemingstown Stream.

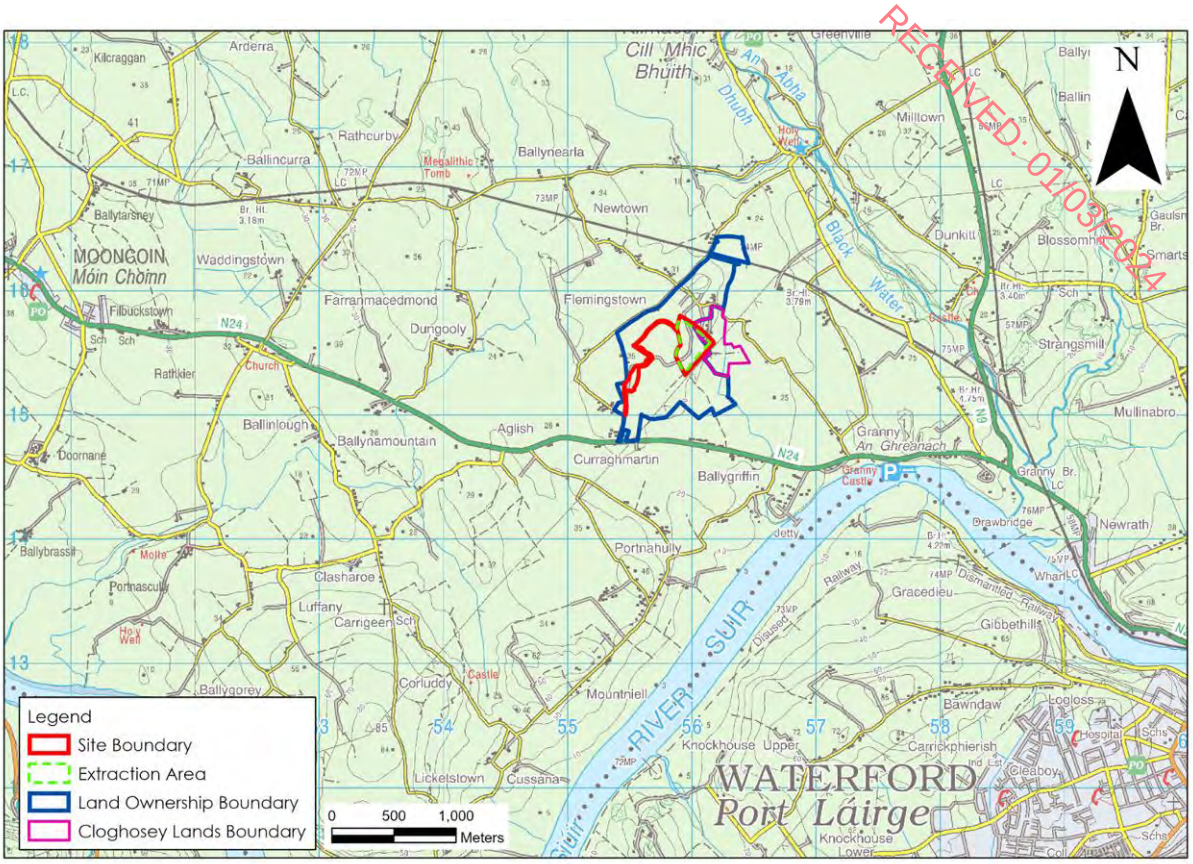

Figure A: Site Location Map

3. EXISTING ENVIRONMENT AND CATCHMENT CHARACTERISTICS

3.1 INTRODUCTION

This section gives an overview of the hydrological and geological characteristics of the region and Site.

3.2 HYDROLOGY

3.2.1 Regional and Local Hydrology

On a regional scale the quarry landholding is located in the River Suir surface water catchment within Hydrometric Area 16 of the South Eastern River Basin District.

The quarry landholding is mapped within 2 no. 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. The proposed Site as well as the current permitted extraction area are located in the Pil_SC_010.

On a local scale the quarry landholding exists within 3 no. river waterbody sub-basins. The proposed Site as well as the current permitted extraction area are located in the Flemingstown (Kilkenny)_010 sub-basin.

The Flemingstown Stream flows in a southerly direction 90m to the east of the proposed Site. This watercourse, into which the quarry currently discharges, flows into the Middle Suir Estuary approximately 1.3km downstream of the Site. Small sections on the north and west of the quarry landholding are mapped to lie within the Blackwater_Kilmacow _040 sub-basin and Ullid_010 sub-basin respectively. A local hydrology map is shown as **Figure B** below.

The Flemingstown Stream was observed on several occasions by HES 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.

A local hydrology map is attached as **Figure B**.

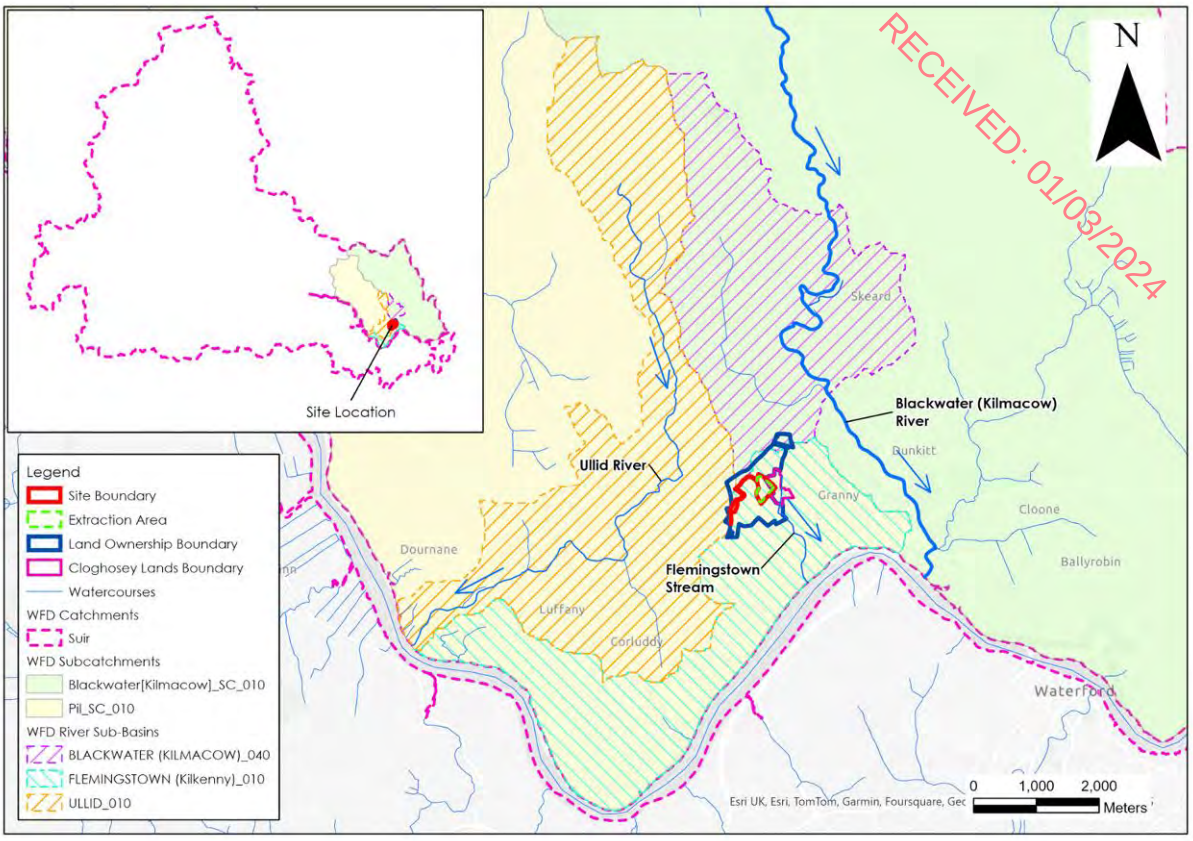

Figure B: Local Hydrology Map

3.2.2 Rainfall and Evaporation

The SAAR (Standard Average Annual Rainfall) recorded at Mooncoin, located 5.5km to the northeast of the Site, is the closest rainfall station to the Site with long term SAAR data of 1,050mm (www.met.ie).

The average potential evapotranspiration (PE) at Kikenny ~40km northeast of the Site is taken to be 458mm (www.met.ie). The actual evapotranspiration (AE) is calculated to be 435mm (95% PE). Using the above figures, the effective rainfall (ER)[1] for the area is calculated to be (ER = SAAR – AE) 615mm/year.

In addition to average rainfall data, extreme value rainfall depths are available from Met Eireann. **Table A** below presents return period rainfall depths for the area of the Site. These data are taken from https://www.met.ie/climate/services/rainfall-return-periods and they provide rainfall depths for various storm durations and sample return periods.

[1] *ER – Effective Rainfall is the excess rainfall after evaporation which produces overland flow and recharge to groundwater.*

Table A. Kilmacow – Return Period Rainfall Depths (mm)

	Return Period (Years)			
Duration	5	10	30	100
5 mins	6.7	8.4	11.6	16.3
15 mins	11.0	13.8	19.2	26.7
30 mins	14.1	17.5	23.9	33.0
1 hours	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

3.3 GEOLOGY

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

The GSI subsoils map (www.gsi.ie) for the area shows that the majority of the quarry landholding and proposed Site are mapped as bedrock outcrop or subcrop (i.e. bedrock close or at the ground surface). Local subsoils map is show below as **Figure C.**

The mapped bedrock type in the current extraction area is the same as the proposed extension (i.e. Bullock Park Bay Member) and is a 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 underlying bedrock within the proposed 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 proposed 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).

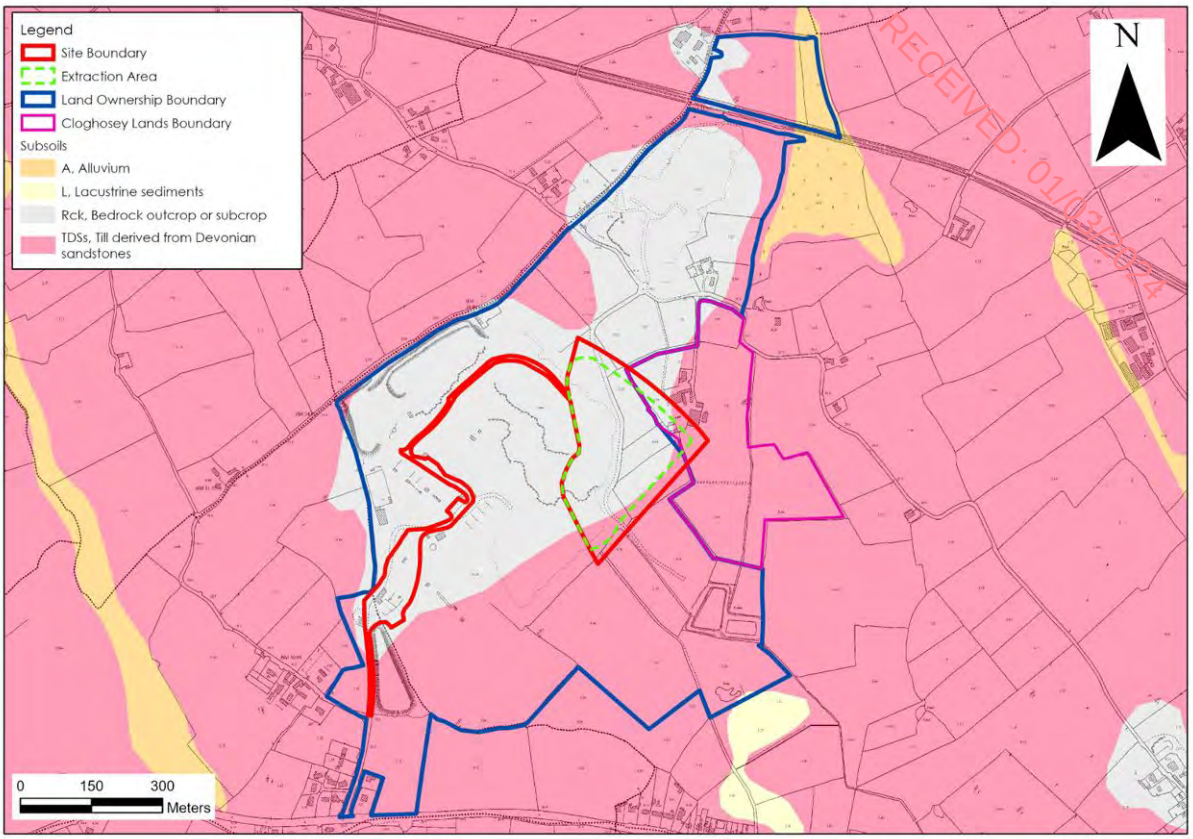

Figure C: Local Subsoil Map (www.gsi.ie)

3.4 DESIGNATED SITES & HABITATS

Within the Republic of Ireland designated sites include Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs).

The proposed 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.

4. SITE SPECIFIC FLOOD RISK ASSESSMENT

4.1 INTRODUCTION

The following flood risk assessment is carried out in accordance with '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (DoEHLG, 2009). The basic objectives of these guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and,
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

4.2 FLOOD RISK ASSESSMENT PROCEDURE

This section of the report details the site-specific flood risk assessment carried out for the proposed development and surrounding area. The primary aim of the assessment is to consider all types of flood risks and the potential impact on the development. As per the relevant guidance (DOEHLG, 2009), the stages of a flood risk assessment are:

- *Flood risk identification* – identify whether there are surface water flooding issues at a site;
- *Initial flood risk assessment* - confirm sources of flooding that may affect a proposed development; and,
- *Detailed flood risk assessment – quantitative appraisal of potential risk to a proposed development*.

As per the Guidelines, there are essentially two major causes of flooding:

Coastal flooding which is caused by higher sea levels than normal, largely as a result of storm surges, resulting in the sea overflowing onto the land. Coastal flooding is influenced by the following three factors, which often work in combination:

- High tide level;
- Storm surges caused by low barometric pressure exacerbated by high winds (the highest surges can develop from hurricanes); and,
- Wave action, which is dependent on wind speed and direction, local topography and exposure.

Inland flooding which is caused by prolonged and/or intense rainfall. Inland flooding can include a number of different types:

- Overland flow occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland, ponding in natural hollows and low-lying areas or behind obstructions. This occurs as a rapid response to intense rainfall and eventually enters a piped or natural drainage system.

- River flooding occurs when the capacity of a watercourse is exceeded or the channel is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying areas (the floodplain). This can occur rapidly in short steep rivers or after some time and some distance from where the rain fell in rivers with a gentler gradient.

- Flooding from artificial drainage systems results when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity and the system becomes blocked, and / or cannot discharge due to a high water level in the receiving watercourse. This mostly occurs as a rapid response to intense rainfall. Together with overland flow, it is often known as pluvial flooding. Flooding arising from a lack of capacity in the urban drainage network has become an important source of flood risk, as evidenced during recent summers.

- Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it, i.e. when the capacity of this underground reservoir is exceeded. Groundwater flooding tends to be very local and results from interactions of site-specific factors such as tidal variations. While water level may rise slowly, it may be in place for extended periods of time. Hence, such flooding may often result in significant damage to property rather than be a potential risk to life.

- Estuarial flooding may occur due to a combination of tidal and fluvial flows, i.e. interaction between rivers and the sea, with tidal levels being dominant in most cases. A combination of high flow in rivers and a high tide will prevent water flowing out to sea tending to increase water levels inland, which may flood over river banks.

The Flood Risk Management Guidelines provide direction on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management and the core principle of the guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for inland and coastal flooding.

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning.

There are three types or levels of flood zones defined within the guidelines:

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

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

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

Once a flood zone has been identified for a site, the guidelines set out the different types of development appropriate to each identified zone (pg 25, Table 3.1 of the Guidelines). Exceptions to the restriction of development due to potential flood risks are provided for through the application of a Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated by the applicant.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of particular developments that, for the reasons outlined above, are being considered in areas of moderate or high flood risk. The test is comprised of two processes:

- The first is the **Plan-making Justification Test** described in chapter 4 of the Guidelines and used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding. Plan making Justification Tests are made at Plan/Policy development stage such as County Development Plans, or Local Area Plans.

- The second is the **Development Management Justification Test** described in chapter 5 of the Guidelines and used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land. For example, application of Development Management Justification Test would be required at a site specific level, such as for this FRA assessment, if a Justification Test is required.

4.3 FLOOD RISK IDENTIFICATION

4.3.1 OPW National Past Flood Mapping

No recurring flood incidents within the Site or neighbouring lands were identified from OPW's past flood event mapping. 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".

OPW past flood event mapping is shown as **Figure D** below.

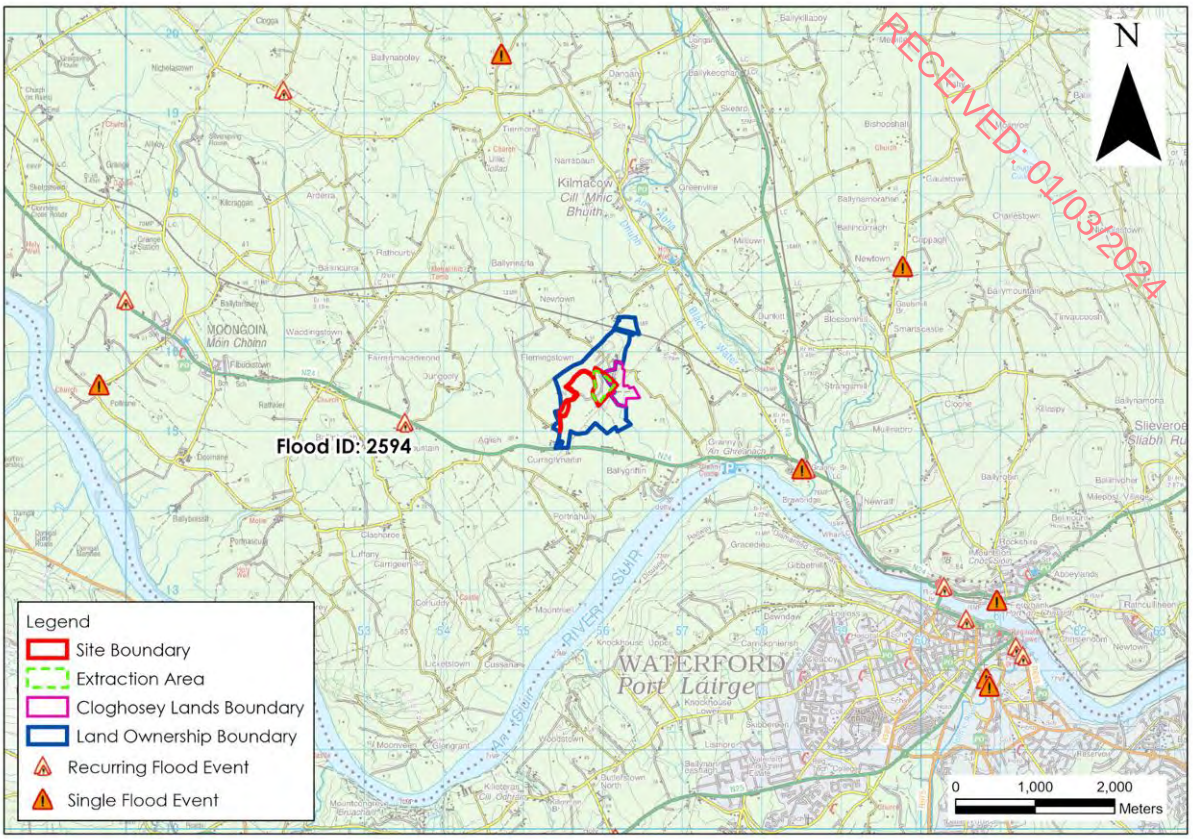

Figure D: OPW Past Flood Event Mapping

4.3.2 Soils Maps - Fluvial Maps

A review of the soil types in the vicinity of the Site was undertaken as soils can be a good indicator of past flooding in an area. Due to past flooding of rivers, deposits of transported silts/clays referred to as alluvium build up within the flood plain and hence the presence of these soils is a good indicator of potentially flood prone areas.

The Teagasc soils map (www.epa.ie) shows that shallow well drained mainly basic mineral soil (BminSW) is mapped over the majority of the quarry landholding (much of which has been removed at this stage due to extraction) and proposed Site. No alluvial soils are mapped at the Site.

4.3.3 Historical Mapping

To identify those areas as being at risk of flooding, historical mapping (*i.e.* 6" and 25" base maps) were consulted. There was no identifiable map text on local available historical 6" or 25" mapping for the quarry landholding or Site that would identify lands that are "liable to flood" within or in the vicinity of the Proposed Development.

4.3.4 CFRAM Flood Extent Mapping – Fluvial and Pluvial Flooding

Catchment Flood Risk Assessment and Management (CFRAM)[2] OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland.

CFRAM mapping has been completed downstream of the Site. The closest CFRAM mapping to the Site has been completed along the Middle Suir Estuary, 1.4km to the south, which does not affect the Site.

4.3.5 National Indicative Fluvial Mapping

The National Indicative Fluvial Mapping (www.floodinfo.ie) shows probabilistic fluvial flood zones for catchments greater than 5km^2 for which flood maps were not produced under the CFRAM Programme.

The Present Day Scenario has been generated using methodologies based on historic flood data and does not take into account the potential changes due to climate change. The potential effects of climate change on flooding have been separately modelled (see **Section 4.3.8** below.)

For the Present Day Scenario, there are no cases of medium (1 in 100) or low probability (1 in 1,000) fluvial flood zones mapped within the Site.

With all this information known, we can say that the entirety of the Site is within the Flood Zone C, where the probability of fluvial flooding is low (less than 0.1%).

A fluvial map showing the National Indicative Fluvial Mapping for the present-day scenario is included as **Figure E** below.

[2] *CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011 and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.*

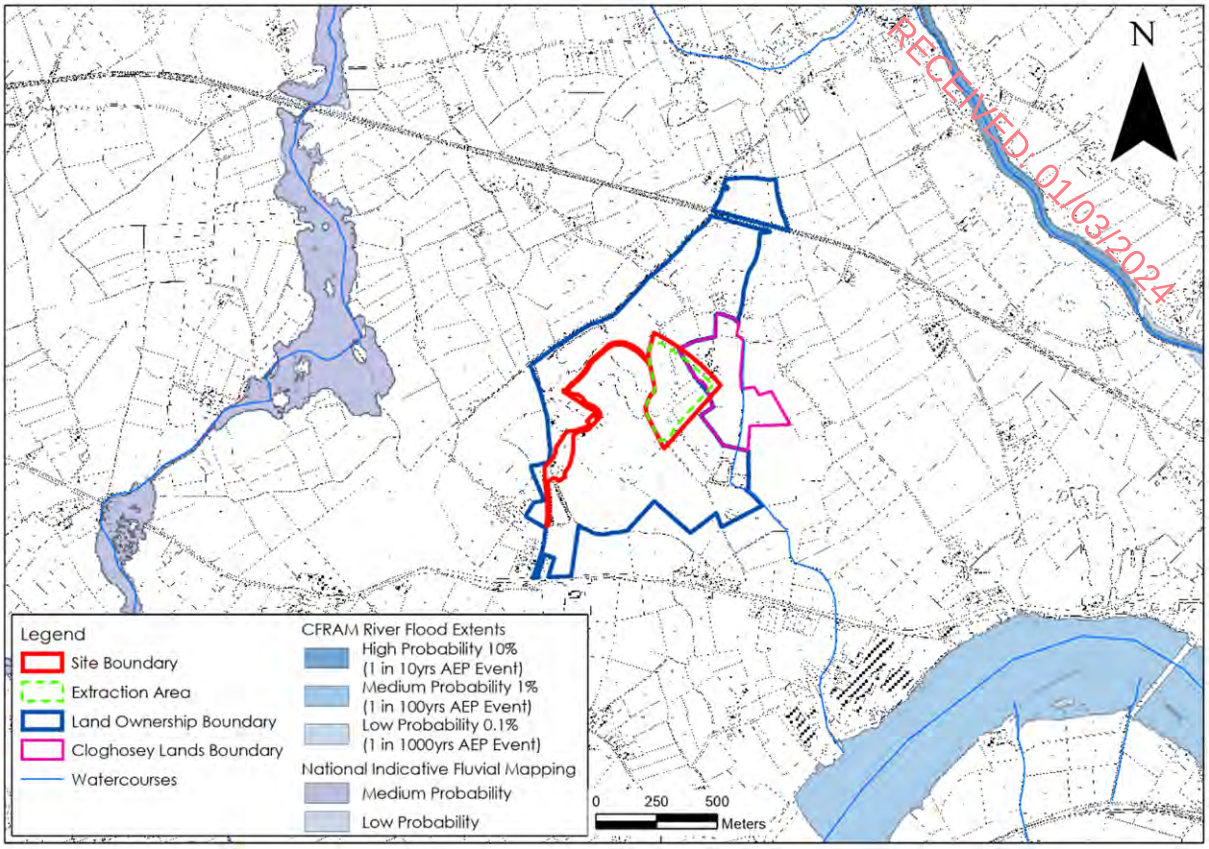

Figure E: OPW Flood Mapping

4.3.6 Groundwater Flooding

The GSI Historical Groundwater flood map and the modelled groundwater flood extents map (www.floodinfo.ie) do not show the occurrence of any groundwater flooding within the Site or surrounding lands.

4.3.7 Coastal Flooding

The Site is located approximately ~15km inland of the sea and at an elevation of approximately 30m OD. Therefore, the Site is not at risk of coastal (tidal) flooding.

4.3.8 Climate Change

Fluvial flood modelling has also been completed to consider future climate scenarios where the potential effects of climate change can increase rainfall.

The CFRAM Programme has modelled flooding associated with potential future climate change scenarios. These CFRAM flood zones have been modelled for 2 no. potential future climate change scenarios, with the Mid-Range Future Scenario (MRFS)and High-End Future Scenario (HEFS) flood extents generated using an increase in rainfall of 20% and 30% respectively.

CFRAM river modelled flood extents show similar flood zones along the Middle Suir Estuary to the Present Day Scenario discussed above in Section 4.3.4. Therefore, these flood zones remain remote from the site.

Similarly, the National Indicative Fluvial Flood Mapping Mid-Range Future Scenario models flood extents based on a 20% increase in rainfall. Similarly, the National Indicative Fluvial Mapping High-End Future Scenario models flood extents based on a 30% increase in rainfall. Both of these modelled flood extents show similar flood zones to the Present Day Scenario discussed above in **Section** Error! Reference source not found.. Therefore, flood zones at the Site are unlikely to be significantly impacted by future climate change.

4.3.9 Summary – Flood Risk Identification

Based on the information gained through the flood identification process, it is apparent that the entirety of the Site is located within Flood Zone C, where there is a low risk of flooding.

4.4 INITIAL FLOOD RISK ASSESSMENT

4.4.1 Site Drainage and Quarry Water Management

There are no natural drainage features within the quarry landholding or proposed 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 3 no. sump pumps located on the existing floor levels of the quarry. There are 2 no. sumps on the -28m OD floor level and 1 no. sump on the -45m OD floor level.

The water is pumped to 2 no. 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.

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.

4.4.2 Current 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 F** below.

These data shows that the maximum peak daily discharge was 8,190m³/day over this period which is significantly under the discharge licence limit of 13,000m³/day.

Pumping rates above 8,000m³/day only occurred on 3 no. occasions over this period. The majority of the peak wintered discharges were between 7,000 and 8,000m³/day. The average discharge was 3,230m³/day.

A flow duration curve of total daily discharge volumes is shown in **Figure G** 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. Discharge rates of 8,000m³/day were exceeded only 0.3% of the time. The 50%ile and 95% (dry weather flow) are 2,845 m³/day and 1,264m³/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. From the graph it can be seen that quarry discharge increases significantly in response to rainfall and declines in the dryer summer period. The 95% flow provided above (1,264m³/day) is likely to be groundwater dominated summer-time discharge.

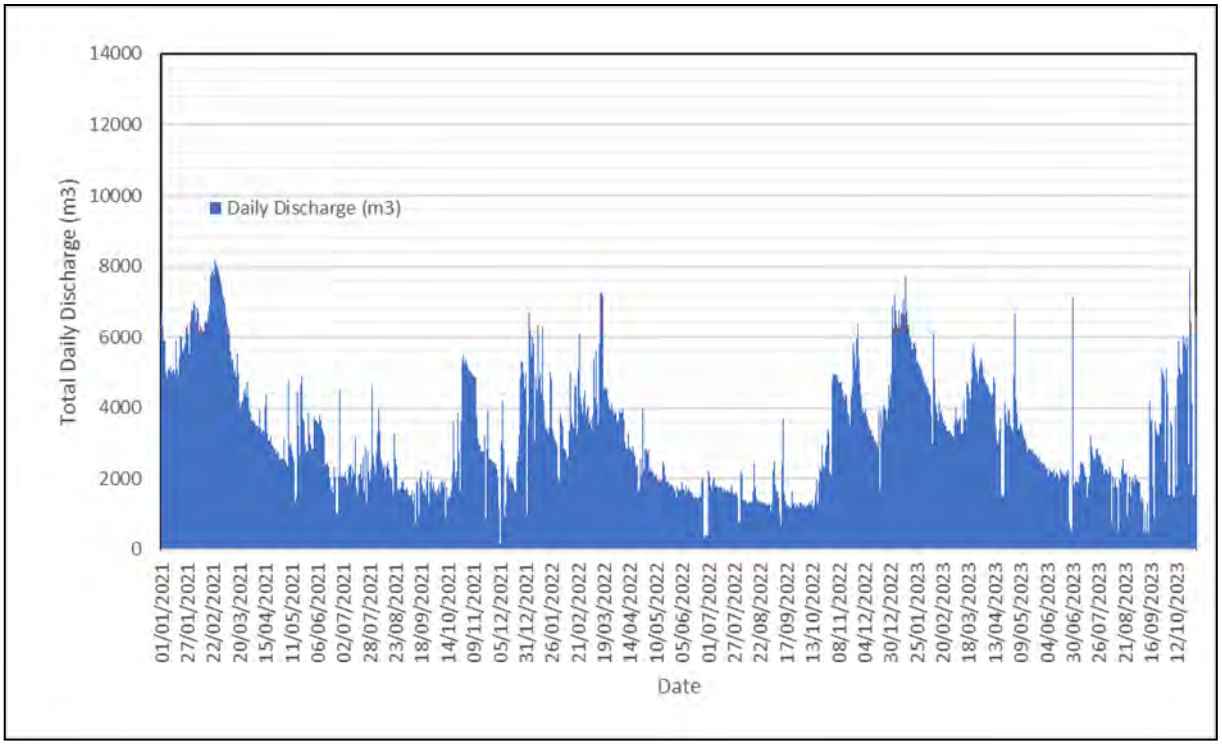

Figure F: Daily water discharge volumes and rainfall at Kilmacow Quarry (2021-2023)

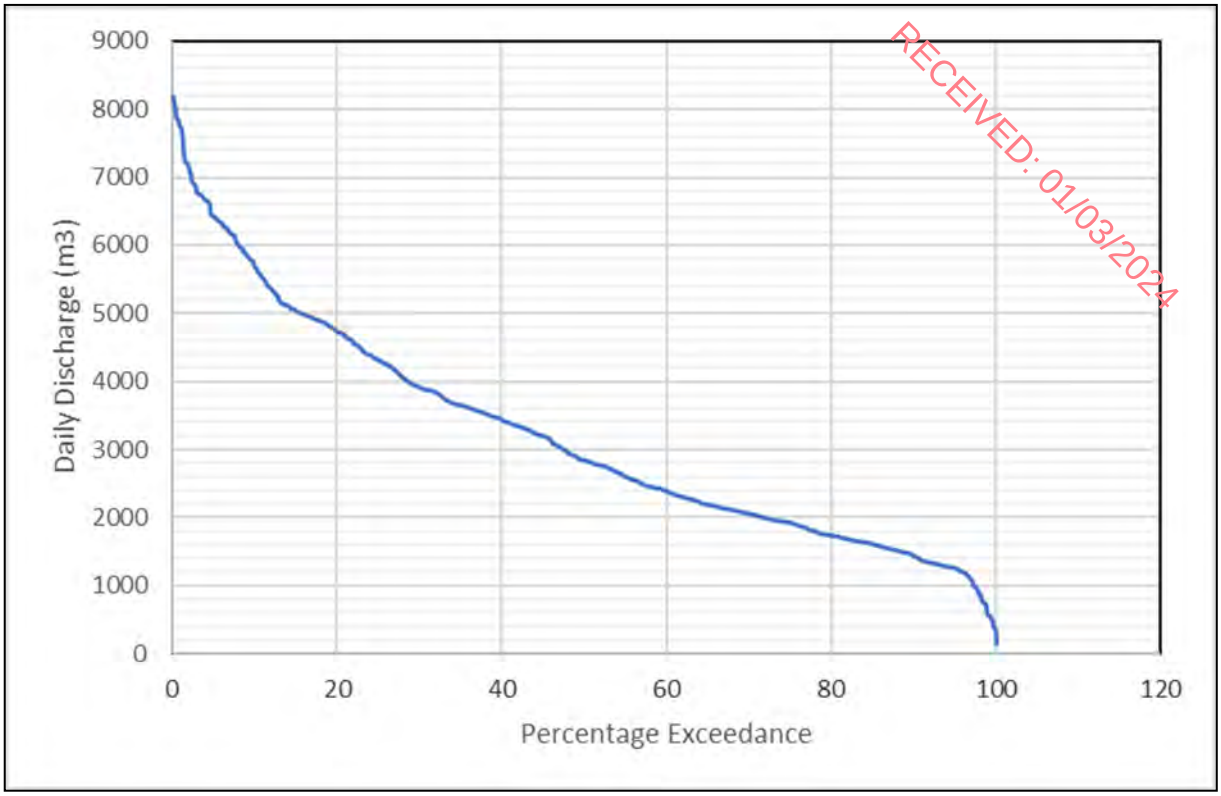

Figure G: Quarry Discharge (Daily Totals) Flow Duration Curve (2021-2023)

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.

4.4.3 Proposed Development Future Discharge Volumes

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 10-year 24hour return period rainfall depth (65.8mm), this gives a daily volume of 2,105m^3. This is a conservative volume for typical day to day workings at the quarry.

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 flow freeboard of over 2,700m^3/day which will be more than sufficient to account for any minor additional groundwater inflows that might occur.

There will be no requirement to undertake a review of the existing discharge licence.

In more extreme rainfall events (>10-year return period), water can be stored on the quarry floor and pumped out over several days at discharge rate not exceeding 13,000m³/day. This will prevent increased downstream flood risk.

4.4.4 Summary – Initial Flood Risk Assessment

Based on the information gained through the flood identification process and Initial Flood Risk Assessment process it would appear that fluvial flooding is unlikely to be a risk at the Site.

The potential sources of flood risk for the Site are outlined and assessed in **Table B**. The entirety of the Site along with the proposed extension area lies within Flood Zone C, where there is a low risk of flooding.

Table B. S-P-R Assessment of Flood Sources for the Kilmacow Quarry.

Source	Pathway	Receptor	Comment
Fluvial	Overbank flooding of the rivers and streams that are close to the Site.	Land & infrastructure	The entirety of the Quarry including the proposed extension area is located in Fluvial Flood Zone C where there is a low risk of fluvial flooding.
Pluvial	Ponding of rainwater on site	Land & infrastructure	All inflows to the quarry void are pumped and treated prior to discharge. Areas outside the void are elevated and not in risk of pluvial flooding.
Surface water	Surface ponding/ Overflow	Land & infrastructure	Same as above (pluvial).
Groundwater	Rising groundwater levels	Land & infrastructure	All groundwater inflows to the quarry void are pumped and treated prior to discharge. Areas outside the void are elevated and not in risk of groundwater flooding.
Coastal/tidal	Overbank flooding	Land, People, property	The Proposed Development Site is ~ 15km inland and stands at a 30m above sea level. Therefore, there is no risk of coastal/tidal flooding at the Site.
Quarry Discharge	Pumped outfall and Flemingstown Stream	Land, People, property	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. There will be no requirement to undertake a review of the existing discharge licence for increased discharge volumes.

5. PLANNING POLICY AND JUSTIFICATION TEST

5.1 PLANNING POLICY AND COUNTY DEVELOPMENT PLAN

The following policies (**Table C**) are defined in Kilkenny CDP 2021-2027 in respect of flooding, and we have outlined in the column to the right how these policies are provided for within the proposed development design:

Table C: Kilkenny County Council Planning Policy/Objective and Responses

No.	Policy/Objective	Development Design Response
10.2.6.2	Where flood risk may be an issue for any proposed development, a detailed flood risk assessment should be carried out appropriate to the scale and nature of the development and the risks arising. In particular, any area within or adjoining flood zone A or B, or flood risk area, shall be the subject of a site-specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This shall be undertaken in accordance with the Planning System and Flood Risk Management – Guidelines and the Strategic Flood Risk Assessment accompanying this Plan.	This document provides a site specific FRA for the proposed development. No development is proposed inside flood zones.
10.2.8	For developments adjacent to watercourses of a significant conveyance capacity any structures (including hard landscaping) must be set back a minimum of 5-10m from the edge of the watercourse to allow access for channel clearing/maintenance. Any required setback may be increased to provide for habitat protection. Development consisting of construction of embankments, wide bridge piers, or similar structures will not normally be permitted in or across flood plains or river channels.	No proposed structures are located within 5 – 10 metres of watercourses. No watercourse crossings are proposed.
10.2.6 to 10.2.8	The Council seeks to ensure the sustainable management of surface water discharges and to minimise the risk of flooding by requiring new development in the City through the incorporation of Sustainable Drainage Systems (SuDS) in new developments.	The proposed development will be consistent with best practice SUDs drainage design. Any additional water discharges from dewatering will be compliant with the existing discharge licence.
11.11 Energy Storage	The National Transmission Operator – EirGrid and the National Electricity Distribution Operator (ESBn) are required to upgrade their infrastructure to cater for the large increase in flexible renewable generation. This requires role out of storage facilities on the gas and electricity network over the coming decade. This will be supported at domestic scale (batteries in our homes) and commercially at large scale. The Council supports new technologies such as battery storage,	The proposed development will be consistent with the objective to support the roll out of storage facilities on the gas and electricity network over the coming decade.

	liquid air storage and synchronous condensers.	
10.2.6	Have regard to the EU Flood Risk Directive, the Flood Risk Regulations (S.I. No. 122/2010) and the Guidelines for Planning Authorities on the Planning System and Flood Risk Management and Circular PL2/2014, through the use of the sequential approach and application of the Justification Tests in Development Management.	The proposed development is in accordance with the sequential approach set out in the DoEHLG guidelines on Flood Risk and with the principles of development design outlined in Appendix B of these guidelines. A Justification Test is included in this site-specific FRA at **Section 5.2** below
9.2.2	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.	Any additional water discharges from dewatering will be compliant with the existing discharge licence.

5.2 REQUIREMENT FOR A JUSTIFICATION TEST

The matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test[3] is shown in **Error! Reference source not found.** below.

It may be considered that the proposed development can be categorised as "Highly Vulnerable Development". The entirety of the Site including the proposed extension area is located within Flood Zone C and therefore the proposed development is appropriate from a flood risk perspective.

Table D: Matric of Vulnerability versus Flood Zone

	Flood Zone A	**Flood Zone B**	**Flood Zone C**
Highly vulnerable development (including essential infrastructure)	Justification test	Justification test	**Appropriate**
Less vulnerable development	Justification test	Appropriate	Appropriate
Water Compatible development	Appropriate	Appropriate	Appropriate

Note: Taken from Table 3.2 (DoEHLG, 2009)
Bold: Applies to this project.

[3] *A 'Justification Test' is an assessment process designed to rigorously assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk, (DoEHLG, 2009).*

6. REPORT CONCLUSIONS

- A flood risk identification study was undertaken to identify existing potential flood risks associated with the proposed development at Kilmacow, Co. Kilkenny. From this study:
    - No instances of recurring or historic flooding were identified on OPW maps within the Site;
    - No instances of recurring flood incidents were identified on OPW maps immediately downstream of the Site;
    - The Site is not identified within any OPW/CFRAM Flood Zones;
    - The entirety of the Site is located within Flood Zone C; and,
    - There will be no requirement to review the existing discharge licence with regard future discharge volumes.
- The proposed extension will be compliant with the existing discharge licence and therefore no increased flood risk is foreseen downstream of the Site;
- The proposed development satisfies the criteria of the Justification Test required under the DoEHLG guidelines; and,
- As outlined above, the proposed development is consistent with the relevant planning objectives and standards from the Kilkenny County Development Plan 2021-2027.

* *

7. REFERENCES

DOEHLG	2009	The Planning System and Flood Risk Management.
Natural Environment Research Council	1975	Flood Studies Report (& maps).
Cunnane & Lynn	1975	Flood Estimated Following the Flood Studies Report
Cawley, A.	1990	*The Hydrological Analysis of a Karst Aquifer System*. B.E., National University of Ireland.
CIRIA	2004	Development and Flood Risk – Guidance for the Construction Industry.
OPW	Not Dated	Construction, Replacement or Alteration of Bridges and Culverts. A Guide to Applying for Consent under Section 50 of the Arterial Act, 1945.
Institute of Hydrology	1994	Flood Estimation in Small Catchments.
Fitzgerald & Forrestal	1996	Month and Annual Averages of Rainfall for Ireland 1961 – 1990.
Met Eireann	1996	Monthly and Annual Averages of Rainfall for Ireland 1961-1990.

APPENDIX 8-2

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

Client: **Hydro-Environmental Services**
22
Lower Main Street
Dungarvan
Co. Waterford.
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Certificate Code: **AR-23-M3-035653-01**
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Certificate of Analysis

Sample number	966-2023-00046571	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow GW1		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 10:02	EW175	0.06		<0.06	mg/l	C6
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		<5	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		<8	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:58	EW046	15		274	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:26	EW140	1		<1	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 10:02 [7D]	EW175	4.4		<4.4	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 10:02	EW175	1		26.3	mg/l	C6

Signed: 14/11/2023
Aoife De Barra - Organics & Instrumentation Team Lead

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Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

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Phosphate (Ortho/MRP) as P - Gallery [M300P]						
Phosphate (Ortho/MRP) as P - Gallery	06/11/23 10:02 [7D]	EW175	0.05	<0.05	mg/l	
Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 10:02	EW175	5	22.1	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 10:02 [7D]	EW175	1	<1	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 10:02 [7D]	EW175	0.033	<0.033	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 10:02	EW175	0.05	<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 10:02 [7D]	EW175	0.01	<0.01	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 10:02 [7D]	EW175	1	<1	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	3	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	09/11/23 09:31	EW010	1	0.00	mg/l	C6
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						

Signed: 14/11/2023
Aoife De Barra - Organics & Instrumentation Team Lead

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Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

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Page Number: **Page 3 of 28**
PO reference:

Copper (Cu)		07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]							
Iron (Fe)		07/11/23 11:45	EW188	5	66.303	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	27.855	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		22.851	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		0.975	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	2.506	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	13.05	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	2.18	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

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Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

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[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
YA: Accredited (External Subcontractor)

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PO reference:

Sample number	966-2023-00046572	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow GW2		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 10:02	EW175	0.06		<0.06	mg/l	
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		<5	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		20	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:57	EW046	15		386	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:26	EW140	1		4.51	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 10:02 [7D]	EW175	4.4		23.326	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 10:02	EW175	1		39.3	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		06/11/23 10:02 [7D]	EW175	0.05		<0.05	mg/l	

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Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 10:02	EW175	5	26.5	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 10:02 [7D]	EW175	1	5.27	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 10:02 [7D]	EW175	0.033	<0.033	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 10:02	EW175	0.05	<0.05	mg/l	
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 10:02 [7D]	EW175	0.01	<0.01	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 10:02 [7D]	EW175	1	5.269	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	2	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	09/11/23 09:31	EW010	1	-0.76	mg/l	
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						
Copper (Cu)	07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]						

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Certificate Code: **AR-23-M3-035653-01**
Page Number: **Page 7 of 28**
PO reference:

Iron (Fe)		07/11/23 11:45	EW188	5	<5	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	20.363	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		<1	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		1.326	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	4.871	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	13.385	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	9.65	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

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[4] Accreditiation Information

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PO reference:

Sample number	966-2023-00046573	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow GW3		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 10:02	EW175	0.06		<0.06	mg/l	C6
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		16	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		<8	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:57	EW046	15		397	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:26	EW140	1		4.87	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 10:02 [7D]	EW175	4.4		26.449	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 10:02	EW175	1		23.7	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		06/11/23 10:02 [7D]	EW175	0.05		<0.05	mg/l	

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Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 10:02	EW175	5	27.8	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 10:02 [7D]	EW175	1	5.98	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 10:02 [7D]	EW175	0.033	<0.033	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 10:02	EW175	0.05	<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 10:02 [7D]	EW175	0.01	<0.01	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 10:02 [7D]	EW175	1	5.974	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	<1	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	09/11/23 09:31	EW010	1	-1.10	mg/l	
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						
Copper (Cu)	07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]						

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Iron (Fe)		07/11/23 11:45	EW188	5	<5	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	15.6	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		6.922	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		0.697	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	3.063	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	14.03	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	4.69	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

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Certificate Code: **AR-23-M3-035653-01**
Page Number: **Page 13 of 28**
PO reference:

Sample number	966-2023-00046574	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow MW1504		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 10:02	EW175	0.06		<0.06	mg/l	
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		41	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		<8	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:57	EW046	15		210	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:50	EW140	1		2.17	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 10:02 [7D]	EW175	4.4		9.036	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 10:02	EW175	1		19.0	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		06/11/23 10:02 [7D]	EW175	0.05		<0.05	mg/l	

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Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 10:02	EW175	5	22.6	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 10:02 [7D]	EW175	1	2.04	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 10:02 [7D]	EW175	0.033	<0.033	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 10:02	EW175	0.05	<0.05	mg/l	
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 10:02 [7D]	EW175	0.01	<0.01	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 10:02 [7D]	EW175	1	2.041	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	1	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	10/11/23 10:46	EW010	1	0.12	mg/l	C6
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						
Copper (Cu)	07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]						

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Iron (Fe)		07/11/23 11:45	EW188	5	<5	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	14.94	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		1.951	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		1.949	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	0.53	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	12.853	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	8.83	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

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Certificate Code: **AR-23-M3-035653-01**

PO reference:

Sample number	966-2023-00046575	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow MW2202		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 10:02	EW175	0.06		<0.06	mg/l	C6
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		51	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		<8	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:58	EW046	15		344	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:50	EW140	1		1.70	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 10:02 [7D]	EW175	4.4		6.993	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 10:02	EW175	1		15.8	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		06/11/23 10:02 [7D]	EW175	0.05		<0.05	mg/l	

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Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 10:02	EW175	5	24.2	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 10:02 [7D]	EW175	1	1.63	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 10:02 [7D]	EW175	0.033	0.152	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 10:02	EW175	0.05	<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 10:02 [7D]	EW175	0.01	0.046	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 10:02 [7D]	EW175	1	1.58	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	<1	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	10/11/23 10:46	EW010	1	0.08	mg/l	C6
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						
Copper (Cu)	07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]						

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Page Number: **Page 19 of 28**
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Iron (Fe)		07/11/23 11:45	EW188	5	<5	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	10.52	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		24.594	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		1.51	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	1.787	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	12.849	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	5.04	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

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[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
YA: Accredited (External Subcontractor)

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Web: www.eurofins.ie
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Certificate Code: **AR-23-M3-035653-01**

PO reference:

Sample number	966-2023-00046576	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow MW2201		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 16:09	EW175	0.06		<0.06	mg/l	
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		524	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		<8	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:57	EW046	15		415	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:50	EW140	1		<1	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 16:09 [7D]	EW175	4.4		<4.4	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 16:09	EW175	1		73.5	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		06/11/23 16:09 [7D]	EW175	0.05		0.22	mg/l	

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PO reference:

Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 16:09	EW175	5	42.0	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 16:09 [7D]	EW175	1	<1	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 16:09 [7D]	EW175	0.033	<0.033	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 16:09	EW175	0.05	<0.05	mg/l	
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 16:09 [7D]	EW175	0.01	<0.01	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 16:09 [7D]	EW175	1	<1	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	1	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	10/11/23 13:40	EW010	1	0.00	mg/l	C6
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						
Copper (Cu)	07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]						

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Page Number: **Page 23 of 28**
PO reference:

Iron (Fe)		07/11/23 11:45	EW188	5	<5	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	29.329	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		58.832	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		2.98	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	2.143	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	19.09	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	1.73	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

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[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
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Certificate Code: **AR-23-M3-035653-01**

PO reference:

Sample number	966-2023-00046577	Received on	04/11/2023
		Analysis started on	05/11/2023
Your sample reference	Kilmacow Discharge		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	02/11/2023
Time Sampled	11:00		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Ammonia as NH3 (Calc) - Gallery [M3000]								
Ammonia as NH3 (Calc) - Gallery		06/11/23 10:02	EW175	0.06		<0.06	mg/l	C6
Suspended Solids [M3002]								
Suspended Solids		06/11/23 09:00	EW013	5		<5	mg/l	C6
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		06/11/23 10:51	EW094	8		<8	mg/l	C6
Total Dissolved Solids (TDS) [M3006]								
Total dissolved solids @ 180°C		06/11/23 08:58	EW046	15		341	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		09/11/23 09:26	EW140	1		5.16	mg/l	C6
Nitrate as NO3 (Calc) - Gallery [M300L]								
Nitrate as NO3 (Calc) - Gallery		06/11/23 10:02 [7D]	EW175	4.4		27.955	mg/l	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		06/11/23 10:02	EW175	1		104	mg/l	
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		06/11/23 10:02 [7D]	EW175	0.05		<0.05	mg/l	

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Cork
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Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

Client: **Hydro-Environmental Services**
22
Lower Main Street
Dungarvan
Co. Waterford.
Waterford
IRELAND

Certificate Code: **AR-23-M3-035653-01**

PO reference:

Chloride mg/L - Gallery [M300S]						
Chloride mg/L - Gallery	06/11/23 10:02	EW175	5	25.7	mg/l	C6
Total Oxidised Nitrogen (TON) as N - Gallery [M300U]						
Total Oxidised Nitrogen (TON) as N - Gallery	06/11/23 10:02 [7D]	EW175	1	6.33	mg/l	
Nitrite as NO2 (Calc) - Gallery [M300Y]						
Nitrite as NO2 (Calc) - Gallery	06/11/23 10:02 [7D]	EW175	0.033	0.047	mg/l	
Ammonia as N - Gallery [M300Z]						
Ammonia as N - Gallery	06/11/23 10:02	EW175	0.05	<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]						
Nitrite (as N) - Gallery	06/11/23 10:02 [7D]	EW175	0.01	0.014	mg/l	
Nitrate (as N) - Gallery [M301A]						
Nitrate (as N) - Gallery	06/11/23 10:02 [7D]	EW175	1	6.315	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]						
Biochemical oxygen demand (BOD) 5d by Robotic Method	05/11/23 15:19 [7A]	Ew001R	1	<1	mg/l	
Total Kjeldahl Nitrogen-TKN (CalcGallery) [M3128]						
Total Kjeldahl Nitrogen-TKN (CalcGallery)	09/11/23 09:31	EW010	1	-1.17	mg/l	
Cadmium - Dissolved [M3164]						
Cadmium (Cd)	07/11/23 11:45	EW188		<0.1	µg/l	C6
Chromium - Dissolved [M3166]						
Chromium (Cr)	07/11/23 11:45	EW188		<1	µg/l	C6
Copper - Dissolved [M3168]						
Copper (Cu)	07/11/23 11:45	EW188	0.003	<0.003	mg/l	C6
Iron - Dissolved [M3172]						

Signed: 14/11/2023
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

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6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
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Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

Client: **Hydro-Environmental Services**
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Certificate Code: **AR-23-M3-035653-01**
Page Number: **Page 27 of 28**
PO reference:

Iron (Fe)		07/11/23 11:45	EW188	5	<5	µg/l	C6
Lead - Dissolved [M3173]							
Lead (Pb)		07/11/23 11:45	EW188	0.51	<0.51	µg/l	C6
Magnesium - Dissolved [M3174]							
Magnesium (Mg)		07/11/23 11:45	EW188	1.11	19.856	mg/l	C6
Manganese - Dissolved [M3175]							
Manganese (Mn)		07/11/23 11:45	EW188		<1	µg/l	C6
Mercury - Dissolved [M3176]							
Mercury		07/11/23 11:45	EW188	0.03	<0.03	µg/l	C6
Nickel - Dissolved [M3178]							
Nickel (Ni)		07/11/23 11:45	EW188		3.961	µg/l	C6
Potassium - Dissolved [M3180]							
Potassium (K)		07/11/23 11:45	EW188	0.15	5.895	mg/l	C6
Sodium - Dissolved [M3184]							
Sodium (Na)		07/11/23 11:45	EW188	1.5	14.443	mg/l	C6
Zinc - Dissolved [M3194]							
Zinc (Zn)		07/11/23 11:45	EW188	1	<1	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]							
TPH >C10-C21	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C21-C40	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH >C6-C10	*	05/11/23 11:20		0.1	<0.1	µg/l	
TPH Total >C6-C40	*	05/11/23 11:20		10	<10	µg/l	YA

Signed: 14/11/2023

Aoife De Barra - Organics & Instrumentation Team Lead

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Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
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[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
YA: Accredited (External Subcontractor)

Signed: 14/11/2023
Aoife De Barra - Organics & Instrumentation Team Lead

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ALS Life Sciences Ltd trading as ALS
Carrigeen Business Park, Clonmel, Co. Tipperary
Telephone: +353 (0) 52 617 8100

Report No: HYDR-729100124
Document No: EF0011

CERTIFICATE OF ANALYSIS

Client **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

Date Submitted 10/01/2024
Date Reported 02/02/2024
Order Number P1506-2

For the Attention of: Hydro Environmental Services

Sample Reception 2 sample(s) received in good condition.

Comments N/A

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

Conditions:
1. Results in this report relate only to the items tested
2. Reports may not be reproduced except in full without the approval of ALS Life Sciences Ltd
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10. Statement of conformity made against the result does not take into account the uncertainty of measurement associated with the method

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Carrigeen Business Park, Clonmel, Co. Tipperary
Telephone: +353 (0) 52 617 8100

Report No: HYDR-729100124
Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Submitted 10/01/2024
Date Reported 02/02/2024
Order Number P1506-2

Sample Type Water
Client ID P1281-4 Kilmacow SW1 Discharge
Date Tested 11/01/2024
ALS ID 5930441

Test	Result	Unit	Method
Suspended Solids	<7	mg / l	P202
Phosphorus	0.10	mg/l P	P207
Fats Oils and Greases	<2.0	mg / l	P238*
BOD 5 day Total	<1	mg/l O2	P280
Ammonia	0.04	mg/l NH3-N	P281
Chloride	24.5	mg/l Cl	P281
Nitrate	30.0	mg/l NO3	P281
Nitrite	<0.05	mg/l NO2	P281
Orthophosphate	<0.02	mg/l P	P281
Total Oxidised Nitrogen	6.78	mg/L N	P281
Nitrogen (Total)	5.3	mg/L N	P285

Sample Type Water
Client ID P1281-4 Kilmacow SW2 Downstream
Date Tested 11/01/2024
ALS ID 5930442

Test	Result	Unit	Method
Suspended Solids	<7	mg / l	P202
Phosphorus	<0.10	mg/l P	P207
Fats Oils and Greases	<2.0	mg / l	P238*
BOD 5 day Total	<1	mg/l O2	P280
Ammonia	0.03	mg/l NH3-N	P281
Chloride	24.0	mg/l Cl	P281
Nitrate	28.7	mg/l NO3	P281
Nitrite	<0.05	mg/l NO2	P281
Orthophosphate	<0.02	mg/l P	P281
Total Oxidised Nitrogen	6.49	mg/L N	P281
Nitrogen (Total)	5.3	mg/L N	P285

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

APPENDIX 8-3

Table 1
Groundwater Sampling Results
Roadstone, Kilmacow, Co. Kilkenny

Parameter	Units	MW22-03 02/11/2023	MW15-02 02/11/2023	MW15-03 02/11/2023	MW15-04 02/11/2023	MW22-02 02/11/2023	MW22-01 02/11/2023	Discharge 02/11/2023	Drinking Water Regs (S.I. 99/2023)	Groundwater Regs (S.I. 366/2016)
Ammonia	mg/l NH3	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.5	0.175
Ammonia N	mg/l N	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-
BOD	mg/L	3	2	<1	1	<1	1	<1	-	-
Cadmium (Dissolved)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.005	-
Chloride	mg/L	22.1	*26.5*	*27.8*	22.6	*24.2*	*42*	*25.7*	250	24 - 187.5
Chromium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.025	0.0375
COD	mg/L	<8	20	<8	<8	<8	<8	<8	-	-
Conductivity at 20C	µs/cm	610	650	628	582	545	650	590	2500	800 - 1875
Copper (Dissolved)	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	2	-
Iron (Dissolved)	mg/L	0.066303	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.2	-
Lead (Dissolved)	mg/L	<0.00051	<0.00051	<0.00051	<0.00051	<0.00051	<0.00051	<0.00051	0.005	0.0075
Magnesium (Dissolved)	mg/L	27.855	20.363	15.6	14.94	10.52	29.329	7.9	-	-
Manganese (Dissolved)	mg/L	0.022851	<0.001	0.006922	0.001951	0.024594	0.058832	<0.0035	0.05	-
Mercury (Dissolved)	mg/L	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00002	0.001	0.00075
Nickel (Dissolved)	mg/L	0.000975	0.001326	0.0006969	0.001949	0.00151	0.00298	0.003961	0.02	-
Nitrate	mg/L as NO3	<4.4	23.326	26.449	9.036	6.993	<4.4	27.955	50	37.5
Nitrate	mg/l as N	<1	5.269	5.974	2.041	1.58	<1	6.315	-	-
Nitrite	mg/L as NO2	<0.033	<0.033	<0.033	<0.033	0.152	<0.033	0.047	0.5	0.375
Nitrite	mg/l as N	<0.01	<0.01	<0.01	<0.1	0.046	<0.1	0.014	-	-
pH	pH Units	7.2	7.3	7.3	7.3	7.5	7.5	7.4	6.5 - 9.5	-
Phosphate (Ortho)	mg/L as P	<0.05	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	-	0.035
Potassium (Dissolved)	mg/L	2.506	4.871	3.063	0.53	1.787	2.143	5.895	-	-
Sodium (Dissolved)	mg/L	13.05	13.385	14.03	12.853	12.849	19.09	14.443	200	150
Sulphate	mg/L as SO4	26.3	39.3	23.7	19	15.8	73.5	104	250	187.5
Total Dissolved Soilds	mg/L	274	386	397	210	344	415	341	-	-
Total Kjeldahl Nitrogen	mg/L	0	-0.76	-1.1	0.12	0.08	0	-1.17	-	-
Total Nitrogen	mg/L	<1	4.51	4.87	2.17	1.7	<1	5.16	-	-
Total Oxidised Nitrogen	mg/L as N	<1	5.27	5.98	2.04	1.63	<1	8.4	-	-
Total Suspended Solids	mg/L	<5	<5	16	41	51	524	<5	-	-
Total TPH >C6-C40	µg/L	<10	<10	<10	<10	<10	<10	<10	-	75
TPH > C21-C40	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
TPH > C10-C21	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
TPH > C6-C10	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Zinc	mg/L	0.00218	0.00965	0.00469	0.00883	0.00504	0.00173	<0.001	-	0.075

Bold and italics - exceeds GW Regs (SI 366/2016) T Value
Bold Underlined - exceeds Drinking Water Reg (SI 99/2023) T Value

APPENDIX 8-4

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co.Waterford
Ireland

tel: +353 (0)58 44122
fax: +353 (0)58 44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

WATER FRAMEWORK DIRECTIVE ASSESSMENT
KILMACOW QUARRY EXTENSION, CO. KILKENNY

FINAL REPORT

Prepared for:

ROADSTONE LTD

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

DOCUMENT INFORMATION

Document Title:	**WATER FRAMEWORK DIRECTIVE ASSESSMENT KILMACOW QUARRY EXTENSION, CO. KILKENNY**
Issue Date:	**26th February 2024**
Project Number:	**P1281-4**
Project Reporting History:	**P1281-1/3**
current revision no:	**FINAL_REV F0**
Author:	**MICHAEL GILL DAVID BRODERICK JOHN TWOMEY**
Signed:	 **Michael Gill B.A., B.A.I., M.Sc., MIEI Managing Director – Hydro-Environmental Services**

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FIGURES (IN TEXT)

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by Roadstone Ltd, to complete a Water Framework Directive (WFD) Compliance Assessment for a planning application for a proposed quarry extension at Kilmacow, Co. Kilkenny.

The proposed development site "the Site" is located within the townlands of Granny and Aglish North, in the south of County Kilkenny, approximately 5.5km north-west of Waterford City and 3km south of Kilmacow Village. The Site is part of a Roadstone Ltd operated quarry.

The total area of the existing quarry landholding area is ca. 84ha while the Site is 10.3ha.

The purpose of this WFD assessment is to determine if any specific components or activities associated with the proposed development will compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status. This assessment will determine the water bodies with the potential to be impacted, describe the proposed mitigation measures and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the EIAR submitted as part of the planning application.

1.2 STATEMENT OF AUTHORITY

Hydro-Environmental Services (HES) are a specialist hydrological, hydrogeological and environmental practice that delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford. We routinely complete impact assessments for hydrology and hydrogeology for a large variety of project types including the aggregate industry.

This WFD assessment was prepared by Michael Gill and David Broderick.

Michael Gill (P. Geo., B.A.I., MSc, Dip. Geol., MIEI) is an Environmental Engineer with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIAR assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions.

David Broderick P.Geo (BSc, H. Dip Env Eng, MSc) is a Hydrogeologist with 17 years environmental consultancy experience in Ireland. David has completed numerous hydrological and hydrogeological assessments for various developments across Ireland. David has significant experience in surface water drainage issues, SUDs design, flood risk assessment and modelling.

John Twomey (BSc) is a recent graduate of Earth and Ocean Science from UG and is in the process of training to become an Environmental Scientist. He has recently helped in the completion of hydrogeological and hydrological impact assessments on quarries, windfarms and industrial developments.

1.3 WATER FRAMEWORK DIRECTIVE

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 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.

The Department of Housing, Local Government and Heritage are currently reviewing the submissions made on the Draft River Basin Management Plan (2022 - 2027) 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.

2. WATERBODY IDENTIFICATION & CLASSIFICATION

2.1 INTRODUCTION

This section identifies those surface water, groundwater bodies and protected areas with potential to be affected by the Proposed Development and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

On a regional scale the quarry landholding is located in the River Suir surface water catchment within Hydrometric Area 16 of the South Eastern River Basin District.

On a more local scale, the Site is located within 2 no. WFD Sub-catchments: the Pil_SC_010 and the Blackwater[Kilmacow]_SC_010. The majority of the Site is located within the Pil_SC_010.

Locally, the Site is located within 3 no. WFD river sub basins: the Flemingstown (Kilkenny)_010, Blackwater (Kilmacow)_040 and the Ullid_010. The majority of the Site is located within the Flemingstown (Kilkenny)_010 (east and centre of the Site). To the north of the Site, the Blackwater (Kilmacow)_040 occupies a very small part of the Site, while the Ullid_010 to the west also occupies a very small part of the Site.

Within the Flemingstown (Kilkenny)_010, the Flemingstown_16 surface waterbody (SWB) runs in a southerly direction 90m to the east of the Site. This watercourse, which the quarry currently discharges into, flows into the Middle Suir Estuary approximately 1.3km downstream of the Site.

Within the Blackwater (Kilmacow)_040, the closest SWB to the Site is the Narrabaun_south, located 650m to the northeast. This SWB is a tributary of the Blackwater (Kilmacow), which flows southeast to discharge into the Middle Suir Estuary (IE_SE_100_0550).

Within the Ullid_010, the closest surface waterbody to the Site is the Ullid_16, located 740m to the west. The Ullid_16 SWB flows south and discharges into the Upper Suir Estuary (IE_SE_100_0600).

Downstream of the Site, the Middle Suir Estuary (IE_SE_100_0550) continues to flow east, passing Waterford City, to then feeds into the Lower Suir Estuary (IE_SE_100_0500), which in turn transitions into the Barrow Suir Nore Estuary (IE_SE_100_0100) near Cheekpoint village. Further downstream, this transitional waterbody discharges into the Waterford Harbour coastal waterbody (IE_SE_100_0000) and then into the Eastern Celtic Sea (HAs 13;17).

Error! Reference source not found. below is a local hydrology map of the area.

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the Site are shown in **Table A**. The overall status of SWBs is based on the ecological, chemical and quantitative status of each SWB.

Local Groundwater Body (GWB) and Surface water Body (SWB) status information is available from (www.catchments.ie).

As stated above the majority of the Site is located in the Flemingstown (Kilkenny)_010, with smaller sections located in the Ullid_010 and Blackwater (Kilmacow)_040 river sub-basins. The

Flemingstown (Kilkenny)_010 SWB deteriorated in status from the 2013-2018 WFD cycle, when it achieved "Moderate" status, to the 2016-2021 WFD cycle where it has been assigned "Poor" status. The Ullid_010 SWB has also deteriorated in status from the 2013-2018 WFD cycle when it achieved "Good" status, to the 2016-2021 WFD cycle where it has been assigned "Moderate" status. The Blackwater (Kilmacow)_040 and Blackwater (Kilmacow)_050 SWB's both achieved "Moderate" status in the latest 2016-2021 WFD cycle.

In terms of transitional waterbodies downstream of the Site, the Upper Suir Estuary and the Middle Suir Estuary achieved "Bad" and "Moderate" status from the 2016-2021 WFD cycle, respectively. Further downstream, both the Lower Suir Estuary and the Barrow Nore Suir Estuary achieved "Moderate" status. For the coastal waters, the Waterford Harbour and the Eastern Celtic Sea (HAs 13;17) coastal waterbodies achieved "Moderate" and "High" status respectively.

The Blackwater (Kilmacow)_040 has been deemed to be "at risk" by the Risk 3rd Cycle, with agriculture & domestic wastewater acting as significant pressures. The remaining river sub basins in the vicinity of the Site (Flemingstown (Kilkenny)_010, Ullid_010 and Blackwater (Kilmacow)_050) are all under review with regards their risk status.

All transitional waterbodies downstream of the Site are deemed to be "at risk" of failing to meet their WFD objectives by 2027. Agricultural activities are impacting negatively on these transitional waterbodies. The Waterford Harbour coastal waterbody is also "at risk" with agricultural activities and urban runoff listed as being the significant pressures on the SWB. The Eastern Celtic Sea (HAs 13;17) is deemed to be "Not at risk".

According to the 3rd Cycle Draft Suir Catchment Report (EPA, 2021), the main impacts and pressures driving the change between Cycle 2 and Cycle 3 are increases in nutrient pollution particularly from agricultural sources. There has also been a notable increase in organic and sediment issues. All four transitional waterbodies in the catchment are "At Risk" and are impacted by eutrophication. Agriculture is the significant pressure. The SWB status for the 2016-2021 WFD cycle are shown on

Figure B**.**

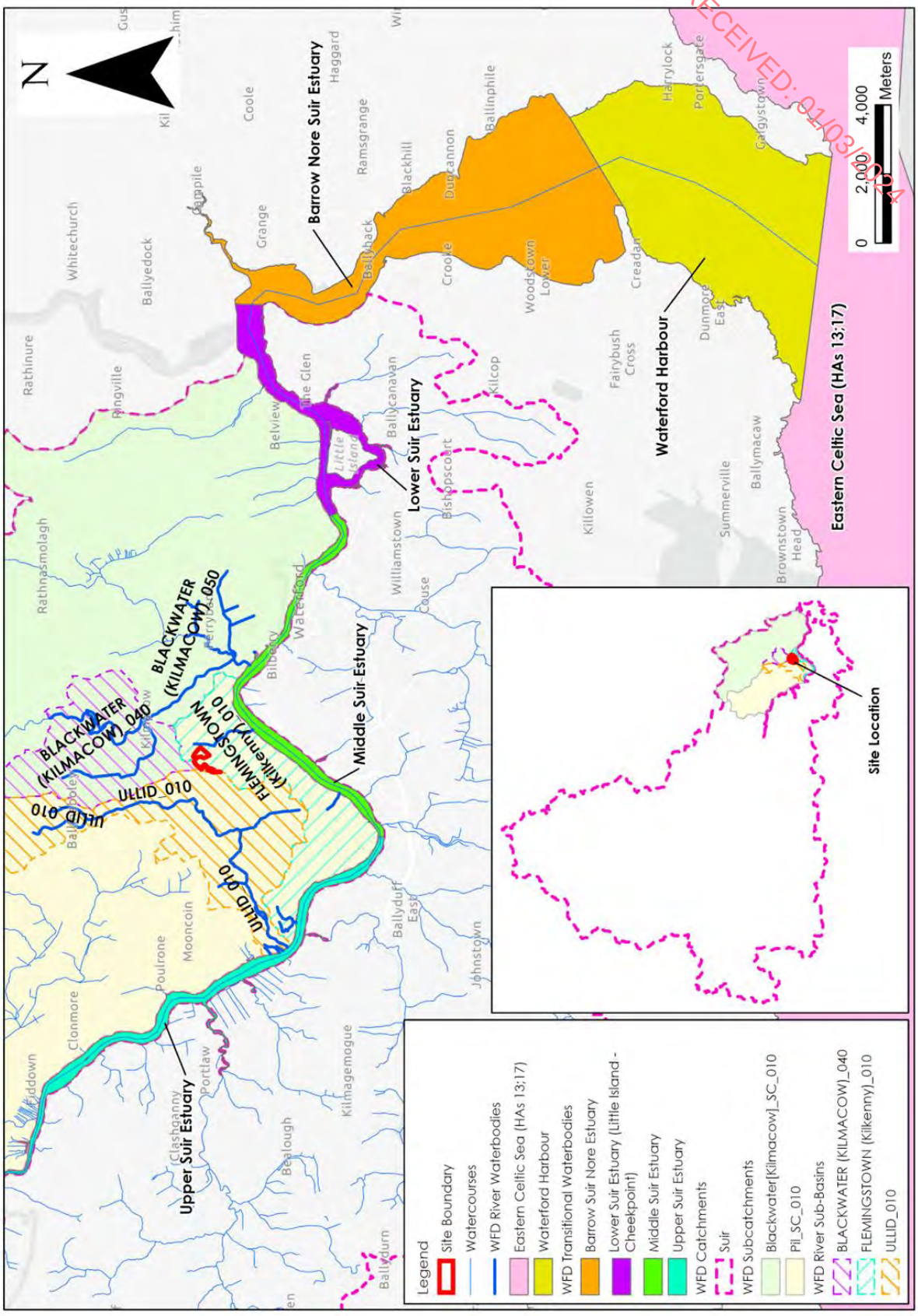


Figure A: Local Hydrology Map

Table A: Summary WFD Information for Surface Water Bodies

SWB	Overall Status (2010-2015)	Risk Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk Status (2013-2018)	Pressures
Flemingstown (Kilkenny)_010	Unassigned	Under Review	Moderate	Poor	Under Review	
Ullid_010	Unassigned	Under Review	Good	Moderate	Under Review	-
Blackwater (Kilmacow)_040	Good	Not at risk	Moderate	Moderate	At risk	Agriculture & domestic wastewater
Blackwater (Kilmacow)_050	Unassigned	Under review	Moderate	Moderate	Under Review	-
	Transitional Waterbodies					
Upper Suir Estuary	Moderate	At risk	Poor	Bad	At risk	Agriculture
Middle Suir Estuary	Poor	At risk	Poor	Moderate	At risk	Agriculture
Lower Suir Estuary	Moderate	At risk	Good	Moderate	At risk	Agriculture
Barrow Nore Suir Estuary	Good	Not at risk	Moderate	Moderate	At risk	Agriculture
	Coastal Waterbodies					
Waterford Harbour	Good	Under Review	Moderate	Moderate	At risk	Agriculture and Urban Runoff
Eastern Celtic Sea (HAs 13;17)	Unassigned	Not at risk	Good	High	Not at risk	-

2.4 GROUNDWATER BODY IDENTIFICATION

The Site is underlain by the Clonmel Groundwater Body (GWB) (IE_SE_G_040). It is reported that most of the groundwater in this area moves relatively rapidly along short flow paths and discharges into the streams which cross the aquifers (GSI, 2004). However, due to the lack of significant streams in the area of the Site, the overall flow direction is expected to be in a south-easterly direction towards the Middle Suir Estuary.

The majority of the Site is underlain by the Bullockpark Bay Member, which is of Dinantian Pure Bedded Limestone (DPBLs). The GSI (www.gsi.ie) maps that the aquifer under the Site is a "Locally Important Aquifer – bedrock which is generally moderately productive" (Lm).

2.5 GROUNDWATER BODY CLASSIFICATION

The Clonmel GWB (IE_SE_G_040) that underlies the Site achieved "Good" status in all 3 no. WFD cycles (2010-2015, 2013-2018 and 2016-2021) which is defined based on the quantitative status and chemical status of the GWB. In terms of risk status, the Clonmel GWB is currently "under review".

The GWB status for the 2016 - 2021 WFD cycles are shown on **Figure B.**

Table B: Summary WFD Information for Groundwater Bodies

GWB	Overall Status (2010-2015)	Risk Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk Status (2013-2018)	Pressures
Clonmel	Good	Under review	Good	Good	Under review	-

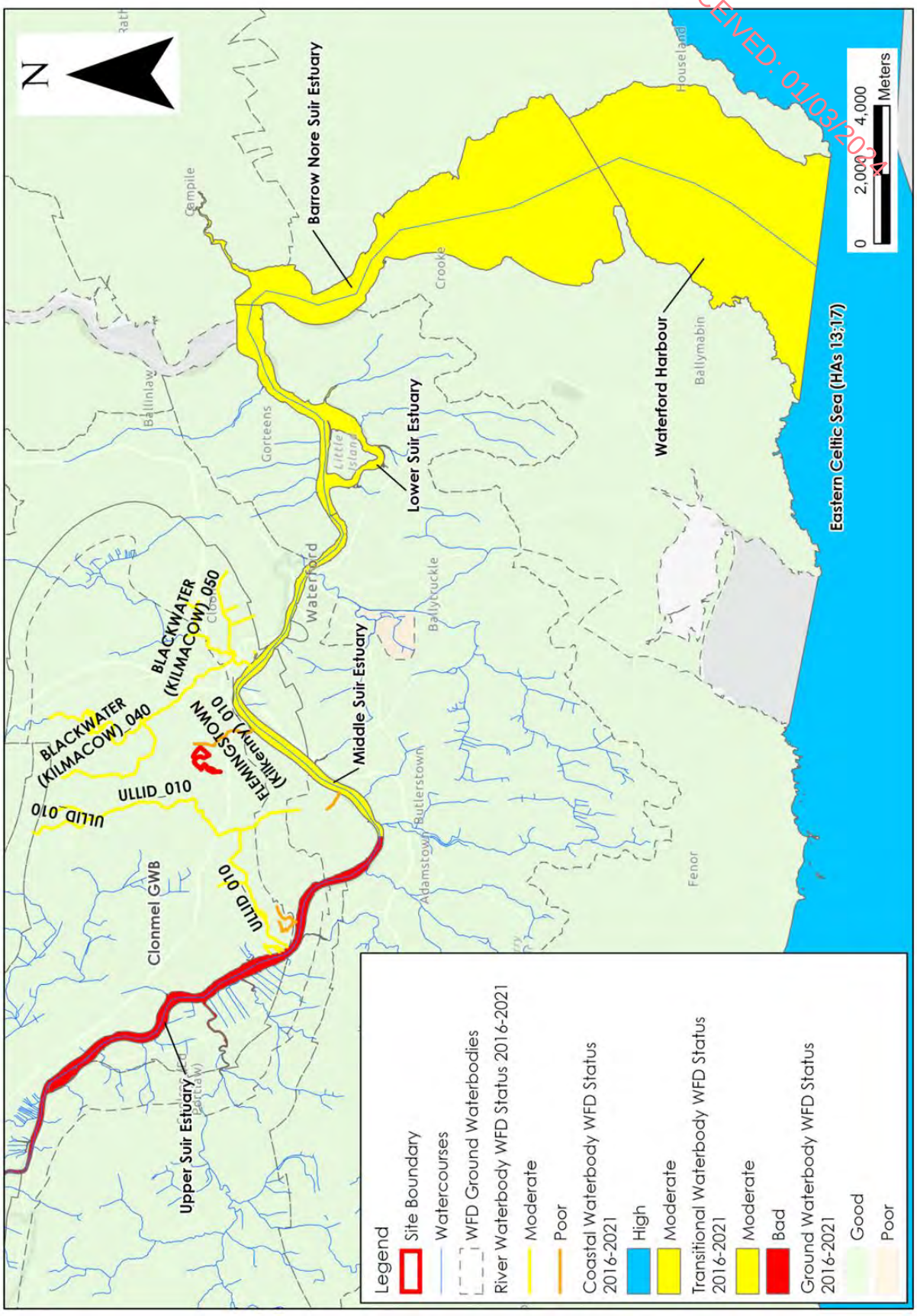


Figure B: WFD Groundwater and Surface Waterbody Status (2016 - 2021)

2.6 PROTECTED AREA IDENTIFICATION

The WFD requires that activities are also in compliance with other relevant legislation, as considered below. Nature conservation designations, bathing waters, nutrient Sensitive areas (NSA), shellfish areas and drinking water protected area's (DWPA) are looked at as part of the assessment.

2.6.1 Nature Conservation Designations

Within the Republic of Ireland 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).

Ramsar sites are wetlands of international importance designated under the Ramsar Convention (adopted in 1971 and came into force in 1975), providing a framework for the conservation and wise use of wetlands and their resources.

The Site is not located within any designated site. The nearest designated site to the Site is the Lower River Suir SAC (002137), located 1.3km downstream of the Site and hydrologically connected to the Site as this is the SWB that the quarry discharges into via the Flemingstown Stream.

The Kings Channel pNHA (001702) is located within the Lower River Suir, downstream of the Site.

The River Barrow and River Nore SAC (002162) lies downstream of the Site and is mapped within the lower reach of the Lower Suir Estuary and the Barrow Suir Nore Estuary.

2.6.2 Bathing Waters

Bathing waters are those designated under the Bathing Water Directive (76/160/EEC) or the later revised Bathing Water Directive (2006/7/EC).

There are no bathing water sites located in the vicinity of the Site.

Duncannon Beach (IESEBWT100_0100_0100) is located 23km downstream of the Site.

The Site is ~15km north of Tramore Beach (IESEBWC110_0000_0100), the nearest coastline/ bathing water site (as the crow flies).

2.6.3 Nutrient Sensitive Areas

Nutrient Sensitive Areas (NSA) comprise Nitrate Vulnerable Zones and polluted waters designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive areas under the Urban Wastewater Treatment Directive (UWWTD)(91/271/EEC). Sensitive areas under the UWWTD are water bodies affected by eutrophication associated with elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

There are no NSAs downstream of the Site or within the vicinity of the Site.

2.6.4 Shellfish Area

The Shellfish Waters Directive (2006/113/EC) aims to protect or improve shellfish waters in order to support shellfish life and growth.

The Waterford Harbour (Cheekpoint/Arthurstown/Creadan)(IE_SE_100_0100) shellfish area is located ~14km downstream of the Site within the Lower Suir Estuary (Little Island – Cheekpoint) (IE_SE_100_0500).

2.6.5 Drinking Water

According to the 3rd Cycle Draft Catchment Report (EPA, 2021) there are 21 no. surface waterbodies in the catchment identified as Drinking Water Protected Areas (DWPA).

There are no DWPAs within the vicinity of the Site or downstream of the Site.

All GWBs are deemed to be DWPAs.

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 4 no. river water bodies that are located in the vicinity or downstream of the Site. In addition, there are 4 no. transitional waterbodies and 2 no. coastal waterbody located downstream of the Site. Furthermore, the Site is underlain by 1 no. groundwater body. In addition, there are protected areas downstream from the Site.

3.1 SURFACE WATER BODIES

As shown in Error! Reference source not found. above, there are 4 no. SWBs located in the vicinity or downstream of the proposed development site.

With consideration for the proposed extension works at the Site, it is considered that the Flemingstown (Kilkenny)_010, Ullid_010 and Blackwater (Kilmacow)_040 be screened into the WFD Impact Assessment due to the Site being located in these river sub basins. The Ullid_010 and the Blackwater (Kilmacow)_040 are not hydrologically connected to the Site, but they will be included for precautionary measures. The Flemingstown_16 SWB situated within the Flemingstown (Kilkenny)_010 is hydrologically connected to the Site. The Blackwater (Kilmacow)_050 will not be screened in due to its distant location from the Site and the fact that it is not hydrologically connected to the Site.

The Middle Suir Estuary (IE_SE_100_0550) will be screened into the WFD Impact Assessment due to its proximal location to the Site and the fact that it is hydrologically connected to the Site. It is very unlikely that the quality of the Middle Suir Estuary will deteriorate as a result of the works at the Site, but it will be included for precautionary measures.

Nothing downstream of the Middle Suir Estuary will be included into the WFD Impact Assessment as the large volume of saline water and large tidal movements will dilute possible contaminants from the Site. There is no potential for the deterioration of quality in any SWBs downstream of the Middle Suir Estuary as a result from the Site.

3.2 GROUNDWATER BODIES

With respect to groundwater bodies, the Clonmel GWB has been screened into the WFD Impact Assessment due to its location directly underlying the Site. The Proposed Development works must not in any way result in a deterioration in the status of these GWB and/or prevent them from meeting their required characteristics in order to achieve good status in the future.

3.3 PROTECTED AREAS

The Lower River Suir SAC (002137) will be brought through to the WFD Impact Assessment as it is hydrologically connected to and located in proximity to the Site. This protected site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (both Margaritifera margaritifera and M. margaritifera subsp. durrovensis occur), White-clawed Crayfish, Salmon, Twaite Shad (Alosa fallax fallax), three species of Lampreys - Sea Lamprey, Brook Lamprey and River Lamprey, and Otter.

Further downstream the Kings Channel pNHA (001702) and the River Barrow And River Nore SAC (002162) have been screened out due to their distal location from the Site. The Site has no potential to cause a deterioration in status of these protected areas.

The bathing waters of Tramore Beach and Duncannon Beach will not be screened in as they are located distally from the Site where there is no potential for deterioration of the bathing waters, as they are located too far downstream from the Site.

The shellfish area of Waterford Harbour (Cheekpoint/Arthurstown/Creadan) is located ~15km downstream of the Site within the Lower Suir Estuary and the Barrow Suir Nore Estuary transitional waterbodies. The shellfish area has been screened out due to its distal location from the Site. The Site has no potential to cause a deterioration in status of this protected area due to the large amounts of saline water and strong tidal currents.

3.4 WFD SCREENING SUMMARY

A summary of WFD Screening discussed above is shown in **Table C**.

Table C: Screening of WFD water bodies located within the study area

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	River	Flemingstown (Kilkenny)_010	**Yes**	The Site is located within the Flemingstown (Kilkenny)_010 river sub-basin. The Flemingstown Stream receives discharge from the Site. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Ullid_010	**Yes**	The Site is located within the Ullid_010 river sub-basin. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Blackwater (Kilmacow)_040	**Yes**	The Site is located within the Blackwater (Kilmacow)_040 river sub-basin. Therefore, an assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Blackwater (Kilmacow)_050	No	There are no direct drainage pathways that exist between the site and any mapped surface watercourses within the Blackwater (Kilmacow)_040 SWB and the downstream Blackwater (Kilmacow)_050 SWB. Therefore, the Site has no potential to impact the status of this SWB.
	Transitional			
	Transitional	Upper Suir Estuary	No	There are no direct drainage pathways that exist between the Site and any mapped surface watercourses within the Ullid_010 SWB and the downstream Upper Suir Estuary. Therefore, the Site has no potential to impact the status of this SWB.
	Transitional	Middle Suir Estuary	**Yes**	The Middle Suir Estuary SWB has been screened in due to its proximity immediately downstream of the Flemingstown_16 SWB that receives direct discharge from the Site. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	Transitional	Lower Suir Estuary	No	The Lower Suir Estuary SWB has been screened out due to its distant location from the Site, the saline nature of its waters and the large volumes of water within this SWB. The Site has no potential to impact the status of this SWB.
	Transitional	Barrow Nore Suir Estuary	No	The Barrow Nore Suir Estuary SWB has been screened out due to its distant location from the Site, the saline nature of its waters and the large volumes of water within this SWB. The Site has no potential to impact the status of this SWB.
	Coastal			
	Coastal	Waterford Harbour	No	The Waterford Harbour coastal waterbody has been screened out due to the saline nature of its waters and the large volumes of water within this SWB. The Site has no potential to impact the status of this SWB.
	Coastal	Eastern Celtic Sea (HAs 13;17)	No	The Eastern Celtic Sea coastal waterbody has been screened out due to the saline nature of its waters and the large volumes of water within this SWB. The Site has no potential to impact the status of this SWB.

Groundwater Body	Groundwater	Clonmel	**Yes**	The proposed development site overlies the Clonmel GWB. An assessment is required to consider potential impacts of the proposed development on this GWB.
	Protected Areas			
Protected Areas	Nature Conservation Designations	Lower River Suir SAC	**Yes**	The Lower River Suir SAC is within 2km of the existing Site and hydrologically linked to the Site via the Flemingstown_16 SWB. An assessment is required to consider the potential impacts of the Site on this protected area.
		Kings Channel pNHA	No	The Kings Channel pNHA has been screened out due to its distant location from the Site. The Site has no potential to impact the status of this pNHA.
		River Barrow And River Nore SAC	No	The River Barrow And River Nore SAC has been screened out due to its distant location from the Site. The Site has no potential to impact the status of this SAC.
	Bathing Waters	Tramore Beach	No	Tramore Beach bathing waters have been screened out due to its distal location from the Site (>15km). The Site has no potential to impact these Bathing Waters.
		Duncannon Beach	No	Duncannon Beach bathing waters have been screened out due to its distal location from the Site (>15km). The Site has no potential to impact these Bathing Waters.
	Shellfish Areas	Waterford Harbour (Cheekpoint/Arthurstown/Creadan)	No	The Waterford Harbour (Cheekpoint/Arthurstown/Creadan) shellfish protected area has been screened out due to its distant location from the Site. The Site has no potential to impact the status of this protected area.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The proposed development comprises the lateral extension of existing extraction activities to the east of the current permitted extraction area at Kilmacow Quarry. The estimated reserve is 2,920,000m^3 (7,592,000 tonnes).

The proposed extraction lands (~6ha), which contain ca.2.6ha of greenfield lands, will be reduced from a current level of ca. 28 - 32m OD down to -45m OD which is the permitted depth of the current extraction area. The extraction will be completed over 5 x 15m high benches.

The Proposed Development will also seek to use the existing quarry facilities for access, welfare, aggregate processing and water management.

The existing water management (i.e. quarry dewatering pumps and water treatment) infrastructure will also be used. There is no requirement to review the current discharge licence (ENV/W82) which permits discharge (surface water and groundwater) to the Flemingstown Stream.

The primary risk to surface waters will be entrained suspended sediments and pollutants such as oils and fuels in licenced quarry discharge water and contamination of groundwater by oils and fuels during the operational phase of the Proposed Development. Groundwater quantity affects (i.e. levels and flows) may also arise due to increased quarry dewatering requirements.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Surface Water Quality Effects due to Construction/Site Preparation Works

Construction phase activities including vegetation removal and soil/subsoil removal will require earthworks. A total of 2.2ha of agricultural land will be stripped of all vegetation, soils and subsoils.

The main risk is earthworks and the stripping of soil/subsoil and the stockpiling of such material which will be a potential source of sediment laden water. Such activities can result in the release of suspended solids to surface waters which could affect the water quality of downstream receptors including the Flemingstown Stream and the Middle Suir Estuary and their associated aquatic ecosystems.

Removal of vegetation and soil/subsoil stripping will be completed using machinery. Such machinery are powered by diesel engines and operate using hydraulics. Unless carefully managed such plant and machinery have the potential to leak hydraulic oils or cause fuel leaks. The accidental release of these compounds into the environment have the potential to negatively impact the groundwater quality in the underlying bedrock aquifer and the downstream surface watercourse which are linked to the proposed extraction area via groundwater flowpaths.

There is no direct hydraulic connection between the Site and the Ullid_010 and Blackwater (Kilmacow)_040. Due to the bowl-shaped nature of the quarry site, overland flow will be in the direction of the lowest ground within the quarry void, not in the direction of the SWBs. As stated above water accumulating in the quarry void will be discharged to the Flemingstown_10 SWB.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the Proposed Development in the unmitigated scenario are outlined in **Table D**.

Table D: Surface Water Quality Impacts during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Flemingstown(Kilkenny)_010	IE_SE_16F170700	Poor	Bad*
Ullid_010	IE_SE_16U010850	Moderate	Moderate
Blackwater (Kilmacow)_040	IE_SE_16B020450	Moderate	Moderate
Middle Suir Estuary	IE_SE_15N012200	Moderate	Moderate

***Worst case scenario**

4.2.1.2 Potential Protected Area Impacts

There is no potential for the deterioration of the protected areas downstream of the Site. Due to the large volume of saline water in the River Suir and the strong tidal currents within the estuary, the dilution factors are very high, meaning that any possible contaminants that flow downstream from the Site will be diluted in the estuary. The Lower River Suir SAC is brought through to the Site for precautionary measures, as the Flemingstown_010 is connected to the SAC. There will be no potential for the deterioration of the Lower River Suir SAC due to the Flemingstown_010.

4.2.2 Operational Phase (Unmitigated)

4.2.2.1 Increased Quarry Discharge Volumes and Downstream Surface Water Quality Effects

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, the additional volumes will not result in an exceedance of 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 River Suir.

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.

A summary of potential status change to SWBs arising from increased runoff during the operation stage of the proposed development in the unmitigated scenario are outlined in **Table E**.

Table E: Increased Quarry Discharge Volumes and Downstream Surface Water Quality Effects

SWB	WFD Code	Current Status	Assessed Potential Status Change
Flemingstown(Kilkenny)_010	IE_SE_16F170700	Poor	Poor
Ullid_010	IE_SE_16U010850	Moderate	Moderate
Blackwater (Kilmacow)_040	IE_SE_16B020450	Moderate	Moderate
Middle Suir Estuary	IE_SE_15N012200	Moderate	Moderate

4.2.2.2 Groundwater Quantity/Level Effects (Increase in the Groundwater Zone of Contribution)

The Proposed Development will extend the quarry 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 extension.

Table F: Groundwater Quantity Effects During Operational Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Clonmel	IE_SE_G_040	Good	Good

4.2.2.3 Groundwater Quality and Surface Water Effects from Oils and Fuels

The removal of the protective layer of soil and subsoil will increase the vulnerability of the underlying bedrock to contamination. During the operational stage of the Proposed Development, groundwater vulnerability in the extraction areas will be 'Extreme' with exposed bedrock at the surface.

Once quarrying extends below the groundwater table, the risk of contamination is reduced, as groundwater surrounding the quarry drains into the excavation footprint, acting as a hydraulic trap.

The greatest risk to surface quality is the risk of oils and fuels in discharge waters following a contamination incident such as a spill or leak on the quarry floor.

No hydrocarbons have been detected in the quarry groundwater monitoring wells to-date.

Table G: Groundwater Quantity Effects During Operational Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Clonmel	IE_SE_G_040	Good	Good

4.2.2.4 Potential Protected Area Impacts

There is no potential for the deterioration of the protected areas downstream of the Site. Due to the large volume of saline water in the River Suir and the strong tidal currents within the estuary, the dilution factors are very high, meaning that any possible contaminants that flow downstream from the Site will be diluted in the estuary. The Lower River Suir SAC is brought through to the Site for precautionary measures, as the Flemingstown_010 is connected to the SAC. There will be no potential for the deterioration of the Lower River Suir SAC due to the Flemingstown_010.

4.3 MITIGATION MEASURES

In order to mitigate against the potential negative effects on surface and groundwater quality, quantity and flow patterns, mitigation measures will be implemented during the construction and operational phases of the Proposed Development. These are outlined below.

4.3.1 Construction Phase

4.3.1.1 Surface Water Quality Effects due to Construction/Site Preparation Works

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 existing 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 (dry weather) 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 the monitoring and discharge requirements of the Discharge License (ENV/W82).

4.3.2 Operational Phase

4.3.2.1 Increased Quarry Discharge Volumes and Downstream Surface Water Quality Effects

No additional mitigation proposed as the current discharge limit will not be exceeded. Also, the discharge quality is 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.

4.3.2.2 Groundwater Quantity/Level Effects (Increase in the Groundwater Zone of Contribution)

Due to the non-significant, localised groundwater level effects which are contained with the quarry landholding, no additional mitigation other than on-going groundwater level monitoring of the internal and external monitoring wells is proposed.

4.3.2.3 Groundwater Quality and Surface Water Effects from Oils and Fuels

The operation of the existing 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 surface and groundwater contamination.

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

- 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 License (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 quarry development.

4.3.2.4 Mitigation Measures to Protect Protected Areas

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 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.

4.3.3 Potential Effects with the Implementation of Mitigation

In all instances, the mitigation measures described in **Section 0** are sufficient to meet the WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in **Table H** below.

Table H: Summary of WFD Status for Unmitigated and Mitigated Scenarios

SWB	WFD Code	Current Status	Assessed Potential Status Change- Unmitigated	Assessed Potential Status Change
Flemingstown(Kilkenny)_010	IE_SE_16F170700	Poor	Bad	Poor
Ullid_010	IE_SE_16U010850	Moderate	Moderate	Moderate
Blackwater (Kilmacow)_040	IE_SE_16B020450	Moderate	Moderate	Moderate
Middle Suir Estuary	IE_SE_15N012200	Moderate	Moderate	Moderate
Clonmel	IE_SE_G_040	Good	Good	Good

5. WFD ASSESSMENT CONCLUSION

WFD status for SWBs (Surface Water Bodies), GWBs (Groundwater Bodies) and Protected Areas hydraulically linked to the Proposed Development Site are defined in **Section 2** above.

The existing water management (i.e. quarry dewatering pumps and water treatment) infrastructure will be used during the construction and operational phase of the proposed extension. There is no requirement to review the current discharge licence (ENV/W82) which permits discharge (surface water and groundwater) to the Flemingstown Stream.

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.

There will be no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the Site. There will be no change in quantitative (volume) or qualitative (chemical) status, and the underlying GWB and downstream SWBs are protected from any potential deterioration.

As the Flemingstown_010 and the Middle Suir Estuary transitional waterbody are of "Poor" and "Moderate" status respectively, the proposed development will not prevent this waterbody from achieving 'Good' Status in the future as demonstrated by the quarry discharge water quality monitoring.

As such, the Proposed Development:

- will not cause a deterioration in the status of all surface and groundwater bodies assessed;
- will not jeopardise the objectives to achieve 'Good' surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater quantity status;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- is compliant with the requirements of the Water Framework Directive (2000/60/EC); and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC).

* * * * * * * * * * * * * *

APPENDIX 9

Appendix 9-1

Appendix 9-1

Mineral Dust Risk Assessment

Roadstone Ltd

Fortunestown, Dublin 24, Co. Dublin

Contents

FIGURES

TABLES

1 DISAMENTIY DUST RISK ASSESSMENT

The IAQM Guidance aims to provide advice on robust and consistent good-practice approaches that can be used to assess the operational phase dust impacts from quarry activities. [1]

1.1 Identification of Sensitive Receptors

For the sensitivity of people and their property to dust soiling, the IAQM recommends the use of professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies. The following classification was used to define a receptor with High, Medium or Low sensitivity to dust soiling:

High Sensitive Receptor

- Users can reasonably expect enjoyment of a high level of amenity; and,
- the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Indicative examples of a high sensitivity receptor included dwellings, medium- and long-term carparks and car showrooms.

Medium Sensitive Receptor:

- users would expect a to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
- The appearance, aesthetics or value of their property could be diminished by soiling; and,
- the people or property wouldn't reasonably be expected a to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.

Indicative examples include parks, and places of work.

Low Sensitivity Receptor

- the enjoyment of amenity would not reasonably be expected ;
- there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; and,
- there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

1.2 Determining the Residual Source of Emissions

The following examples show the residual source emissions for a number of activities, illustrating the factors that may be considered when determining the potential impact.

Figure 1-1: Site Preparation/ Restoration

An example of a large potential dust magnitude from site preparation/restoration may include factors such as a working area >10ha, bunds >8 m in height, >100,000 m^3 material movement, >10 heavy plant simultaneously active, bunds un-seeded, fine grained and friable material. Conversely, a small potential dust magnitude may include a site with a working area <2.5ha, bunds <4m in height, <20,000 m^3 material movement, <5 heavy plant simultaneously active, all bunds seeded, material with a high moisture content.

Figure 1-2:Mineral Extraction

An example of a large potential dust magnitude from mineral extraction may include a working area >100 ha, drilling and blasting frequently used, dusty mineral of small particle size and/or low moisture content, 1,000,000 tpa extraction rate. A small potential magnitude may include working area <20 ha, hydraulic excavator, coarse material and/or high moisture content, <200,000 tpa extraction rate.

Figure 1-3: Materials Handling

An example of a large potential dust magnitude from materials handling may include factors such as >10 loading plant within 50m of a site boundary, transferring material of a high dust potential and/or low moisture content on dry, poorly surfaced ground. Conversely, a small potential dust magnitude may include <5 plant, more than 100 m of a site boundary, within the quarry void or clean hardstanding, transferring material of low dust potential and/or high moisture content.

Figure 1-4: Onsite Transportation

An example of a large potential dust magnitude from on-site transportation could include >250 movements in any one day on unpaved surfaces of potentially dusty material. A small potential magnitude may include the employment of covered conveyors used for the majority of the on-site transportation of material, <100 movements of vehicles per day, with surface materials of compacted aggregate, <500 m in length and a maximum speed of 15 mph.

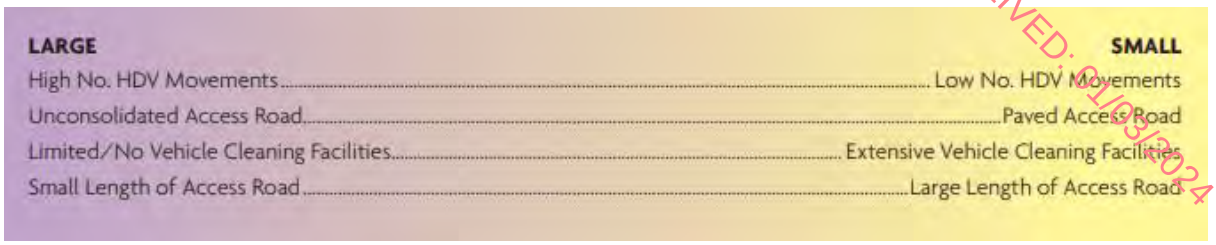
Figure 1-5:Mineral Processing

An example of a large potential dust magnitude from mineral processing may include factors such as a mobile crusher and screener with concrete batching plant on-site, processing >1,000,000 tpa of material with a high dust potential and/or low moisture content e.g. hard rock. Conversely, a small potential dust magnitude may include a site with a fixed screening plant with effective design in dust control, processing <200,000 tpa of material with a low dust potential and/or high moisture content e.g. wet sand and gravel.

Figure 1-6: Stockpiles/Exposed Surfaces

An example of a large potential dust magnitude from stockpiles and exposed surfaces could include a stockpile with a total exposed area >10 ha in an area exposed to high wind speeds located <50 m of the site boundary. Daily transfer of material with a high dust potential and/or low moisture content. Stockpile duration >12 months and quarry production >1,000,000 tpa. A small potential magnitude may include stockpile duration of <1 month with a total area <2.5 ha in an area of low wind speeds, located >100 m from the site boundary. Weekly transfers of material with a low dust potential and/or high moisture content. Quarry production <200,000 tpa.

Figure 1-7: Offsite Transportation



An example of a large potential dust magnitude from off-site transportation could include total HDV >200 movements in any one day on unsurfaced site access road <20 m in length with no HDV cleaning facilities. No road sweeper available. A small potential magnitude may include <25 HDV movements per day, paved surfaced site access road >50 m in length, with effective HDV cleaning facilities and procedures, the employment of an effective road sweeper.

1.3 Estimation of the Pathway Effectiveness

The site-specific factors considered to determine the Effectiveness of the Pathway were distance and direction of receptors relative to prevailing wind directions. Receptors were identified within 400m of the dust emission source. Table 1-1 shows the categorisation of the frequency of potentially dust winds, based on the meteorological data from a nearby weather station.

Table 1-1: Categorisation of Frequency of Potentially Dust Winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are less than 5%
Moderately Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table 1-2 below shows the categorisation of receptors, based on their distance to the dust emission source.

Table 1-2:Categorisation of Receptor Distance from Source

Distance Category	Criteria
Distant	Receptor is between 200m and 400m from the dust source
Intermediate	Receptor is between 100m and 200m from the dust source
Close	Receptor is less than 100m from the dust source

Table 1-3 below shows the determination of the Pathway Effectiveness based on the frequency of potentially dusty winds and the distance of the receptor from the dust emission source.

Table 1-3: Classification of the Pathway Effectiveness

Receptor Distance Category	Frequency of Potentially Dusty Winds			
	Infrequent	Moderately Frequent	Frequent	Very Frequent
Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

1.4 Estimation of the Dust Impact Risk and Effects

Table 1-4 shows the estimation of the Dust Impact Risk based on the Residual Source of Emission and Pathway Effectiveness classifications

Table 1-4: Estimation of Dust Impact Risks

Pathway Effectiveness	Residual Source Emission		
	Small	Medium	Large
Highly Effective Pathway	Low Risk	Medium Risk	High Risk
Moderate Effective Pathway	Negligible Risk	Low Risk	Medium Risk
Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

Table 1-5 below dhows the estimate of the likely magnitude of Disamenity Effects based on the receptor sensitivity and the risk of dust impacts.

Table 1-5: Descriptors for magnitude of Dust Effects

Receptor Distance Category	Receptor Sensitivity		
	Low	Medium	High
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible effect	Negligible effect	Slight Adverse Effect
Negligible Risk	Negligible effect	Negligible effect	Negligible effect

2 REFERENCES

[1] IAQM, "Guidance on the Assessment of Mineral Dust Impacts for Planning," Institute of Air Quality Management, London, 2016.

APPENDIX 10

APPENDIX 10-1

1 CHARACTERISING CLIMATE HAZARDS

1.1 Frequency of Climate Hazards according to Annex B [1]

Table 1-1: Classifying the frequency of climate hazards

Frequency	Frequency Occurrence in a Year	Description
Very Frequent	>100%	Occurs several times in a single year
Frequent	50 to 100%	Occurs once in a 1-to-2-year period
Common	10 to 50%	Occurs once in a 2-to-10-year period
Occasional	1 to 10%	Occurs once in a 10–100-year period
Rare	<1%	occurs once in over 100 years

1.2 Vulnerability Types

Table 1-2: Description of different vulnerability types [1]

Vulnerability Type	Frequency Occurrence in a Year
Physical Vulnerability	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 the construction of building, provision of active cooling. **or;** Ability of a population/persons to access equipment or resources that can exacerbate/reduce the impacts before, during, or after a hazard event.

1.3 Level of Impacts

Table 1-3:Description of level of impacts [1]

Impact	Description	Level of Impact
Catastrophic	Widespread service failure with services unable to cope with wide-scale impacts	5
Major	Services seen to be in danger of failing completely with sever/widespread decline in service provision	4
Moderate	Service provision under severe pressure. Appreciable decline in	3

	service provision at a community level	
Minor	Isolated but noticeable examples of service declines	2
Negligible	Appearance or threat but no actual impact on service provision	1

1.4 Magnitude of Impact for Asset Damage Category

Table 1-4: Magnitude of impact relating to Asset Damage [1]

Risk Area	Negligible	Minor	Moderate	Major	Catastrophic
Asset Damage	Impact can be absorbed through normal activity	An adverse event that can be absorbed by taking business continuity action	A serious event that requires additional emergency business continuity	A critical event that requires extraordinary/emergency business continuous actions	Disaster with the potential to lead to shutdown or collapse or loss of assets network

2 IDENTIFICATION OF CLIMATE HAZARDS

2.1 Kilkenny County Council Climate Change Adaption Strategy

The Kilkenny County Council Climate Change Adaption Strategy has evaluated the risks due to climate change using the following scale (Table 2-1 below) [2] The Risk is measured as a product of the Consequence and Likelihood relating to hazards

Table 2-1:Kilkenny County Council Risk Scale

Consequence Description	Consequence Score	Likelihood Description	Likelihood Score
Critical	5	Almost Certain	5
Major	4	Likely	4
Moderate	3	Possible	3
Minor	2	Unlikely	2
Negligible	1	Rare	1

2.2 ThinkHazard

ThinkHazard is a web-based tool enabling non-specialists to consider the impacts of disasters on new development projects, commissioned by the Global Facility for Disaster Reduction and Recovery [3]. Hazards are provided at a local administrative resolution and is based on the following scale (Table 2-2).

Table 2-2:Hazard Classification provided by ThinkHazard

Scale	Description
High	Users should be highly aware of potential severe damage from this hazard for the project location. Without taking measures to mitigate the hazard and risk, high levels of damage can be expected to occur within the project or human lifetime
Medium	Users should be aware of potentially damaging effects of this hazard for the project location. Potentially damaging events can be expected to occur within the project or human lifetime and measures to mitigate the hazard and risk should be considered.
Low	Potentially damaging events are less likely to occur within the project or human lifetime but are still possible. Measures to mitigate the hazard and risk would be prudent at critical locations.
Very Low	Available data suggests that potentially damaging effects are unlikely to occur, on average, in the project or human lifetime.

2.3 Climate Change Adapt (European Commission)

The Climate -ADAPT platform is maintained by the European Commission and the European Environment Agency. Climate -ADAPT aims to support Europe in adapting to climate change, helping users to access and share data. The platform includes a database that contains quality checked information and country level reports [4].

At the time of writing, the Climate ADAPT platform does not provide a quantitative assessment on the level of risks associated with the potential hazards to a country.

2.4 Climate Hazards associate with the Proposed Development

Table 2-3 below highlights the hazards identified through desk-based research.

Table 2-3:Hazards identified as relevant from available resources

Source	Hazards Identified	Category of Risk (if applicable)
Kilkenny County Council Climate Action Plan [2]	• Heatwaves; • Cold weather; • Dry Spells; • Wind speeds; • Flooding; • Extreme Rainfall	• Major; • Minor; • Moderate; • Major; • Critical
ThinkHazard [3]	• Wildfire; • River Flood; • Urban Flood; and; • Extreme Heat.	• Medium; • Low • Low; • Low
Climate-ADAPT [4]	• Temperature (extreme highs and lows, wildfires); • Winds (Storms); • Water (Drought, Floods, Extreme Rainfall; and, • Solid Mass.	**Not Identifiable**

3 REFERENCES

[1] GOI, "Technical Annex B Climate Change Risk Assessment," Government of Ireland , Dublin, 2023.

[2] KCC, "Kilkenny County Council, Climate Change Adaption Strategy 2019-2024," Kilkenny County Council, Kilkenny, 2019.

[3] GFDRR, "Think Hazard," Global Facility for Disaster Reduction and Recovery, 30 June 2020. [Online]. Available: https://thinkhazard.org/en/about. [Accessed 16 February 2023].

[4] EC, "Climate Adapt," European Commission , 2023. [Online]. Available: https://climate-adapt.eea.europa.eu/#t-countries. [Accessed 16 08 2023].

APPENDIX 11

APPENDIX 11-1

Glossary of Acoustic Terminology

Abbreviation / Description Descriptor	
A Weighted	A time weighting given to noise values to amend the values to suit the human ear response to the various frequency components of the sound.
Acoustic environment	Sound from all sound sources as modified by the environment (BS ISO 12913-1:2013).
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. *Note: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, L_a = $L_{Aeq,\,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T. *Note: the ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound level, $L_{A90,\,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
dB (decibel)	A relative unit of measurements, based on a logarithmic scale to describe the ratio between the measured level and a reference or threshold level of 0dB. Unless otherwise stated 0dB within this report is $2x10^{-5}$ pascals (Pa).
Day	A 24 hour period from midnight to midnight.
Daytime	A 12 hour period between 07:00 – 19:00 hours, as per NG4
Evening-Time	A 4 hour period between 19:00 – 23:00 hours, as per NG4
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,\,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T=t_2-t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given the following equation: $L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2}[p_A(t)^2/p_0^2]dt\right\}$ where: p_0 is the reference sound pressure (20 μPa); and $p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t *Note: The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.*
$L_{AN,T}$	The Fast interval, A-Weighted noise level in the for the 'N' percentile of the sampling interval 'T'.
$L_{A10,T}$	The A-Weighted noise level for the 10%ile of the sampling interval 'T', typically utilised to represent peak noise events such as intermittent passing traffic.
$L_{A90,T}$	The A-Weighted noise level in the lower 90 percentile of the sampling interval 'T', excludes intermittent features typical of traffic. See also background sound level.
$L_{A95,T}$	The A-Weighted noise level for the 95%ile of the sampling interval 'T'. Representative of steady noise events at a monitoring location.

$L_{Aeq,T}$	The equivalent continuous sound level, used to describe the fluctuating noise in terms of a single noise level over the same sampling time period (T). Also see ambient sound.
L_{den}	Day-evening-night equivalent level, calculated as: $Lden = 10Log\frac{1}{24}\left(12*10^{\frac{Lday}{10}}+4*10^{\frac{Levening+5}{10}}+8*10^{\frac{Lnight+10}{10}}\right)$ Where the L_{day}, $L_{evening}$ and L_{night} are as defined in ISO1996-2:1987, and for the duration of 12 hours, 4 hours and 8 hours respectively, are A-weighted long term Leq sound level.
L_{day}	Day equivalent level. A-weighted Leq sound level measured over the 12 hour period from 07:00 hours to 19:00 hours.
$L_{evening}$	Evening equivalent level. A-weighted Leq sound level measured during the evening period of 19:00 hours to 23:00 hours.
L_{Amax}	The maximum RMS A-Weighted sound pressure level occurring within a specified time period.
L_{night}	Night equivalent level. A-weighted Leq sound level measured during the night period of 23:00 hours to 07:00 hours.
Measurement time interval, T_m	total time over which measurements are taken. *Note: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Rating level, $L_{Ar,\,Tr}$	specific sound level plus any adjustment for the characteristic features of the sound.
Reference time interval, T_r	specified interval over which the specific sound level is determined. *Note: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h*
Residual sound	ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, L_r = $L_{Aeq,T}$	equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Specific sound level, L_s = $L_{Aeq,Tr}$	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source	sound source being assessed.
Night-Time	An 8 hour period between 23:00 – 07:00 hours, as per NG4
Noise Ambient	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. Also see ambient sound.
Noise Background	The steady existing noise level present without contribution from any intermittent sources, The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, 'T' ($L_{AF90,T}$). Also see background sound level, $L_{A90,\,T}$.
Noise Specific	The sound arising from the source under investigation, disregarding all external and residual sources. Also see specific sound source.
NSR	Noise Sensitive Receptor - an identified dwelling, amenity area, recreational zone or other such place where a change in noise may result in a nuisance impact.
RMS	Root Mean Squared, mathematical method to account for swells and troughs within wave forms, such as sound.

Sound Power Level (L_W)	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m2. Utilised to express the intensity at source of a noise emission.
Sound Pressure Level (L_P)	Fluctuations in air pressure caused by the passage of a sound wave. The measurement of sound/noise through the use of a sound level meter, is a representation of these fluctuations in air pressure as they pass the instrument microphone.
Time Weighting	One of the averaging time for noise monitoring instrumentation: F – Fast, instrument samples every 125 milliseconds; S – Slow, instrument samples every 1 second; I – Impulsive, instrument samples every 35 milliseconds.

Note:

Unless otherwise stated all broadband noise values are A-weighted with a fast response.

Where 0dB is referenced it refers to the threshold of hearing – $2x10^{-5}$Pa.

All 1/3 octave values are unweighted/linear. (z-weighted on the Bruel and Kjaer software)

APPENDIX 11-2-1

E2189 Sources and Receivers

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - LimA - ISO 9613

Name	Desc.	ISO H	ISO Terr.	HDef.	Weighting	Flow(D)	Flow(E)	Flow(N)	Avg.speed
Bulldozer		0.75	15.00	Relative	A	70	--	--	10
Out	Trucks departing Site	0.75	--	Relative	A	70	--	--	10
In	Trucks going onsite	0.75	--	Relative	A	--	--	--	10
Art. Dump	Articulated Dump truck 1	0.75	--	Relative	A	70	--	--	10
Art. Dump	Articulated Dump truck 2	0.75	--	Relative	A	70	--	--	10

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - LimA - ISO 9613

Name	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 63	Red 125	Red 250	Red 500
Bulldozer	84.80	92.90	95.40	101.80	110.00	99.20	94.00	84.90	0.00	0.00	0.00	0.00
Out	79.10	87.80	91.90	96.50	100.20	97.50	90.50	83.60	0.00	0.00	0.00	0.00
In	--	--	--	--	--	--	--	--	0.00	0.00	0.00	0.00
Art. Dump	101.80	108.90	107.40	108.80	110.00	109.20	106.00	94.90	0.00	0.00	0.00	0.00
Art. Dump	101.80	108.90	107.40	108.80	110.00	109.20	106.00	94.90	0.00	0.00	0.00	0.00

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - LimA - ISO 9613

Name	Red 1k	Red 2k	Red 4k	Red 8k
Bulldozer	0.00	0.00	0.00	0.00
Out	0.00	0.00	0.00	0.00
In	0.00	0.00	0.00	0.00
Art. Dump	0.00	0.00	0.00	0.00
Art. Dump	0.00	0.00	0.00	0.00

E2189 Sources and Receivers

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz
Excav	Tracked excavator with breaker - C.9.11	2.00	15.00	Relative	Normal point source	none	0
Crusher	Semi mobile crusher - C.9.14	2.00	15.00	Relative	Normal point source	none	0
Loader	Wheeled loader - C.9.7	2.00	15.00	Relative	Normal point source	none	0
Drilling	Tracked mobile drilling rig - C.9.2	2.00	21.18	Relative	Normal point source	none	0

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	DI_Vert	DI(0)	DI(10)	DI(20)	DI(30)	DI(40)	DI(50)	DI(60)	DI(70)	DI(80)	DI(90)	DI(100)	DI(110)
Excav	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crusher	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loader	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drilling	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

E2189 Sources and Receivers

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	DI(120)	DI(130)	DI(140)	DI(150)	DI(160)	DI(170)	DI(180)	Ca(D)	Ca(E)	Ca(N)	Weighting	No refl.
Excav	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No
Crusher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No
Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No
Drilling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No

E2189 Sources and Receivers

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	No building	No ind.site	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 63
Excav	No	No	92.80	100.90	104.40	113.80	115.00	116.20	113.00	106.90	0.00
Crusher	No	No	92.80	102.90	107.40	111.80	113.00	112.20	107.00	94.90	0.00
Loader	No	No	89.80	99.90	106.40	109.80	114.00	112.20	106.00	96.90	0.00
Drilling	No	No	95.80	106.90	109.40	115.80	115.00	114.20	109.00	99.90	0.00

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613

Name	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
Excav	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crusher	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drilling	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Model: Model 0B
version of Area - Area
Group: (main group)
Listing of: Receivers, for method Industrial noise - LimA - ISO 9613

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F
Rx01	NSR01	25.00	Relative	1.50	--	--	--	--	--
Rx02	NSR02	24.67	Relative	1.50	--	--	--	--	--
Rx03	NSR03	30.44	Relative	1.50	--	--	--	--	--
Rx04	NSR04	32.64	Relative	1.50	--	--	--	--	--
Rx05	NSR05	31.44	Relative	1.50	--	--	--	--	--
Rx06	NSR06	30.95	Relative	1.50	--	--	--	--	--
Rx07	NSR07	25.67	Relative	1.50	--	--	--	--	--

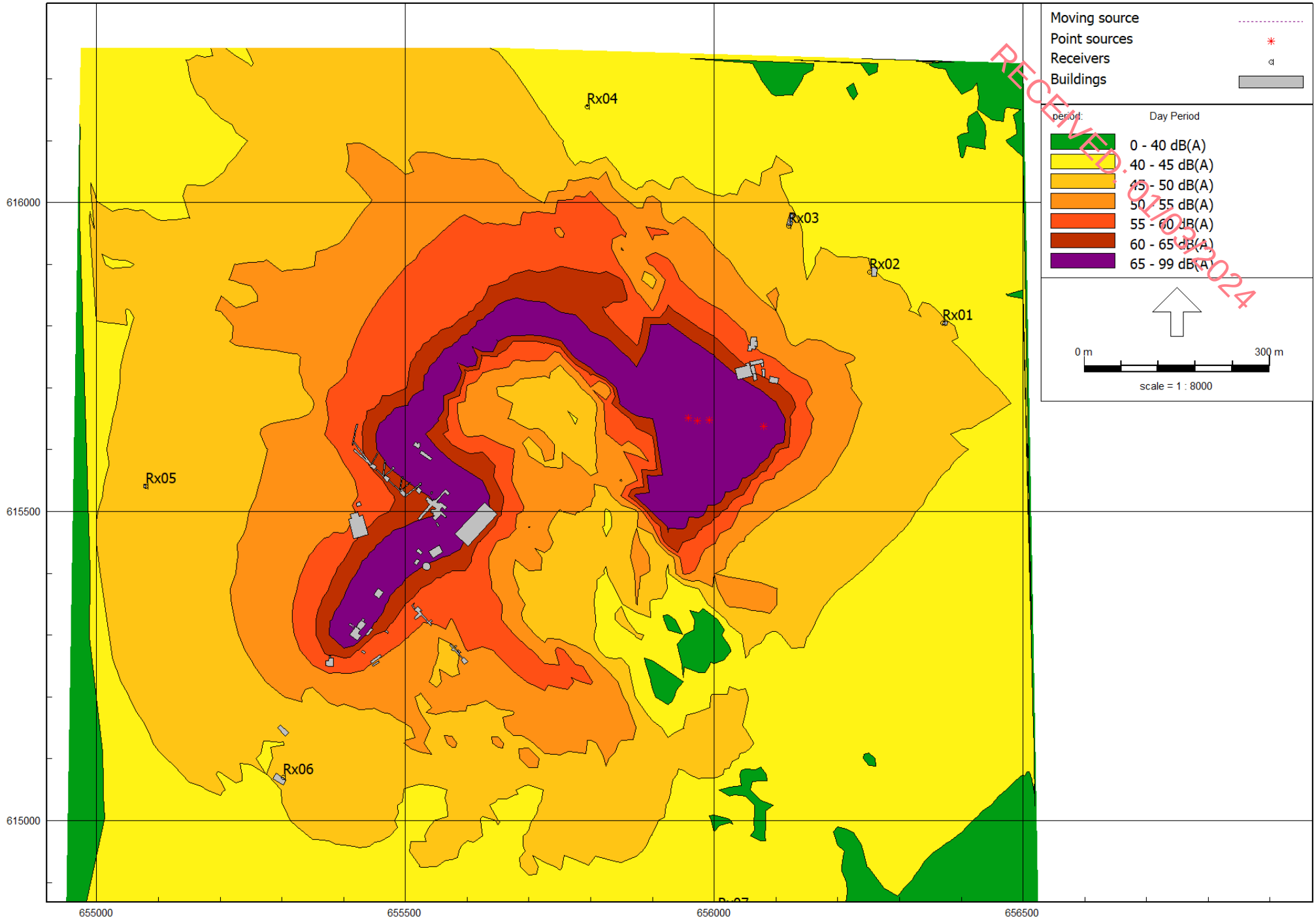
APPENDIX 11-2-2

Report: Table of Results
Model: Model 0B
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	X	Y	Height	Day
Rx01_A	NSR01	656370.55	615804.46	1.50	43.9
Rx02_A	NSR02	656251.46	615886.78	1.50	45.8
Rx03_A	NSR03	656120.28	615961.94	1.50	44.8
Rx04_A	NSR04	655794.78	616155.30	1.50	40.6
Rx05_A	NSR05	655080.23	615540.53	1.50	45.6
Rx06_A	NSR06	655302.62	615069.89	1.50	45.5
Rx07_A	NSR07	656007.06	614852.69	1.50	39.0

All shown dB values are A-weighted

APPENDIX 11-2-3



Model 0B - Lday
8 Jan 2024, 10:06

Malone O'Regan Environmental Ltd., Ireland

LimA - ISO 9613, [version of Area - Model 0B] , Predictor V2023 Licensed to Malone O'Regan Environmental Ltd., Ireland

APPENDIX 11-3

NOISE CHARTS AND PLATES

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INTRODUCTION

Malone O'Regan Environmental (MOR) were commissioned by Roadstone Ltd. to prepare a Noise Monitoring Report in respect of the operation of the Roadstone Kilmacow facility, referred to as 'the Facility.' The survey was undertaken on the 25th October 2023. This document supplies the Frequency Analysis Charts for each monitoring event.

CALIBRATION OF SOUND LEVEL METER

The sound level meters used was:

- A NTi XL3 Audio Acoustic Hand-held Analyser SLM.

The SLM is Type 1 and equipped with Frequency Analysis Software.
The monitoring equipment was calibrated prior to and following the measurement period using a:

- Larson Davis CAL 200 Sound Level Calibrator SN 20830.

Broadband noise levels were measured using the A-weighted network, and a fast-sampling interval, unless otherwise stated.

Table 1: Calibration of the Sound Level Meter

SLM	Calib. Time	Calib. Input	Calib. Type	Sensitivity [mV/Pa]	dB Range]	Calibrator Used
NTI	25/10/2023 08:45	Top Socket	External reference	42.59	0-100	Larson Davis

NM1

Plate 1: NM1 Location

Chart 1: NM1 Run 1 1/3 Octave Frequency Analysis

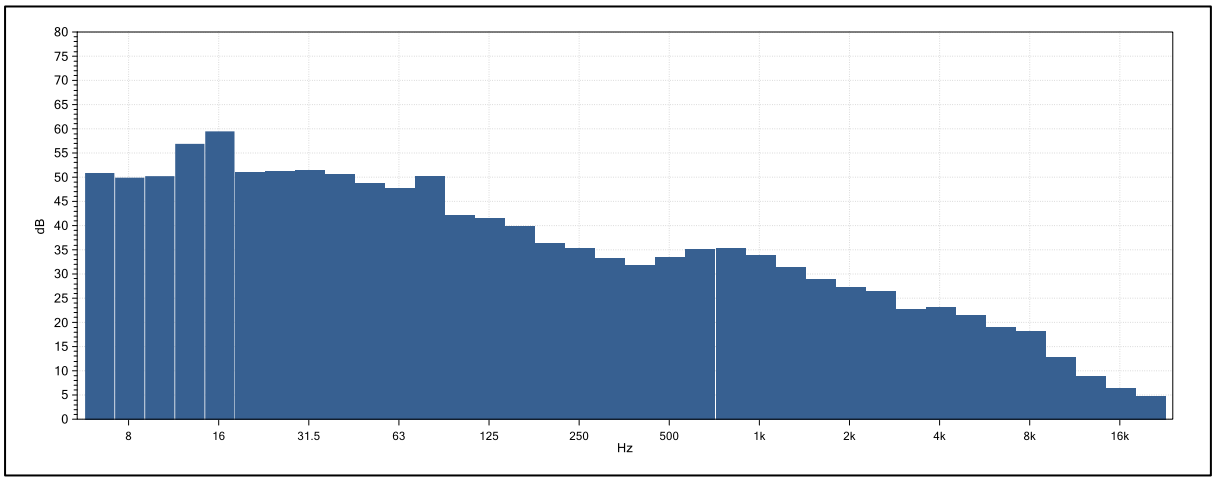
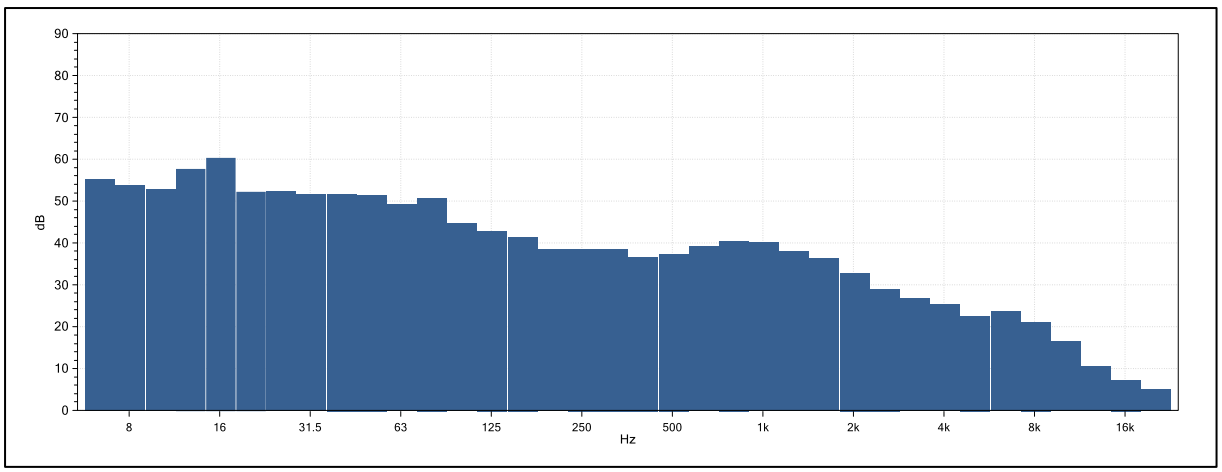


Chart 2- NM1 Run 2 1/3 Octave Frequency Analysis



NM2

Plate 2: NM2 Location

Chart 3: NM2 Run 1 1/3 Octave Frequency Analysis

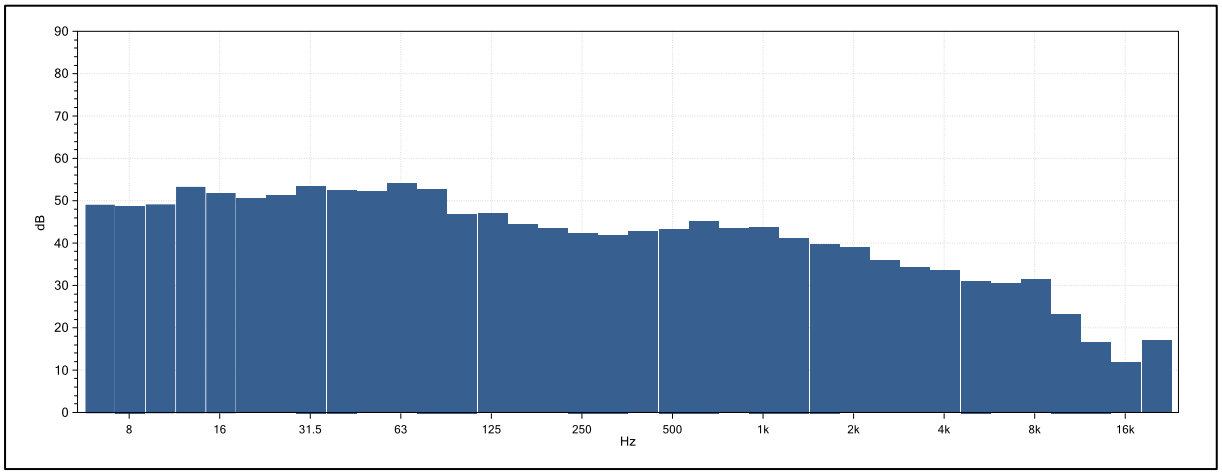
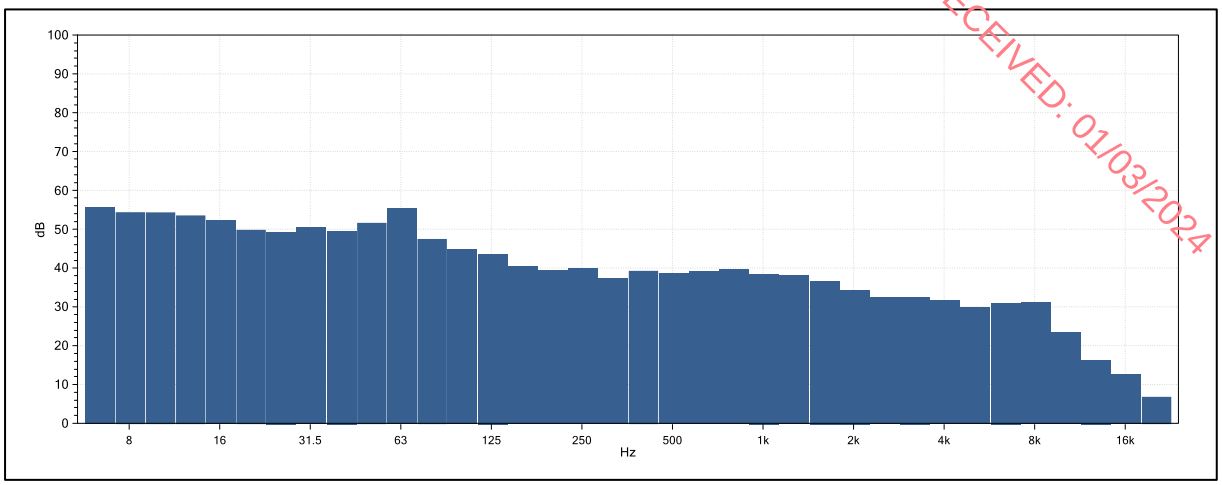


Chart 4- NM2 Run 2 1/3 Octave Frequency Analysis



NM3

Plate 3: NM3 Location

Chart 5: NM3 Run 1 1/3 Octave Frequency Analysis

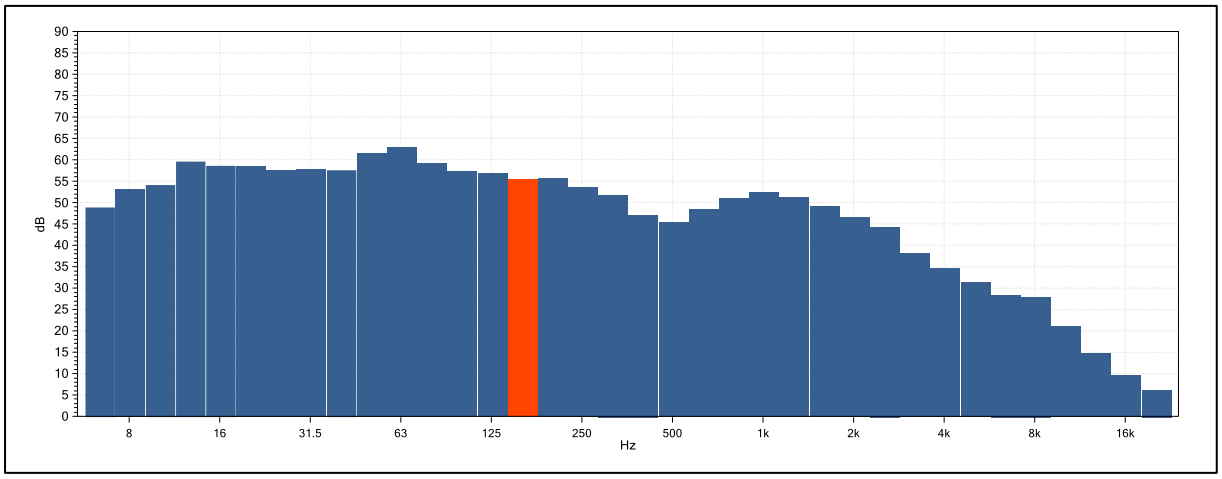
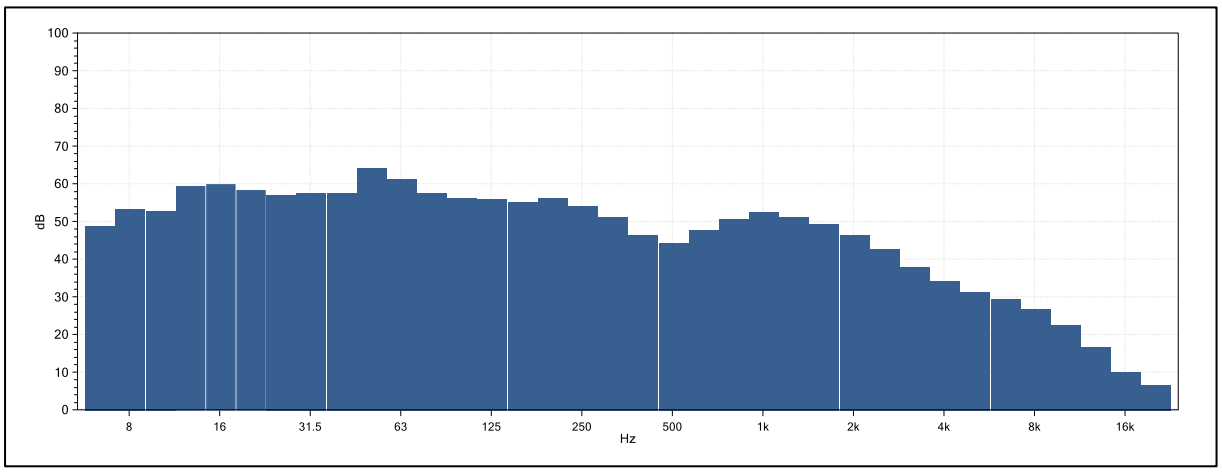


Chart 6- NM3 Run 2 1/3 Octave Frequency Analysis



NM4

Plate 4: NM4 Location

Chart 7: NM4 Run 1 1/3 Octave Frequency Analysis

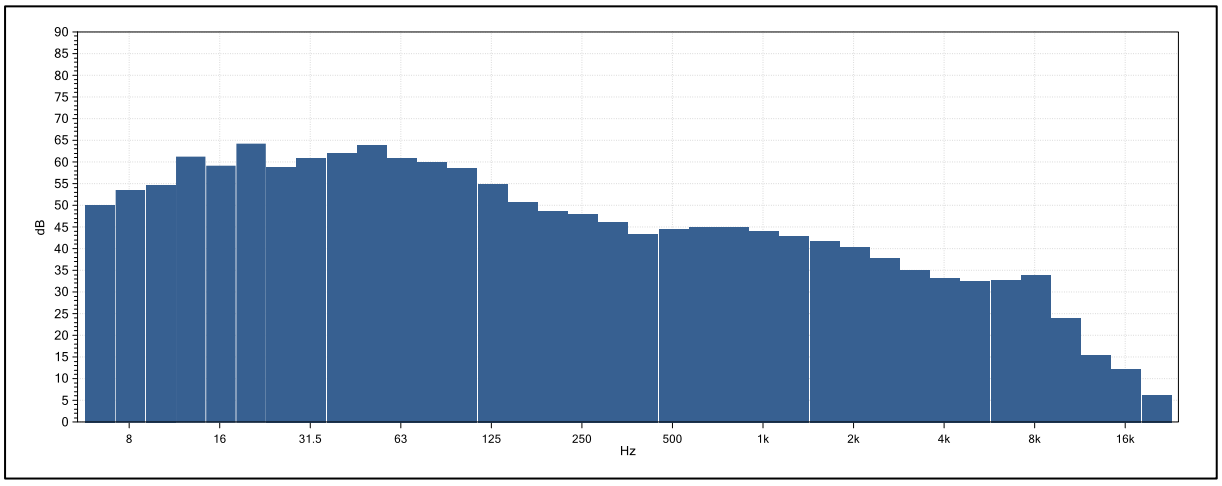
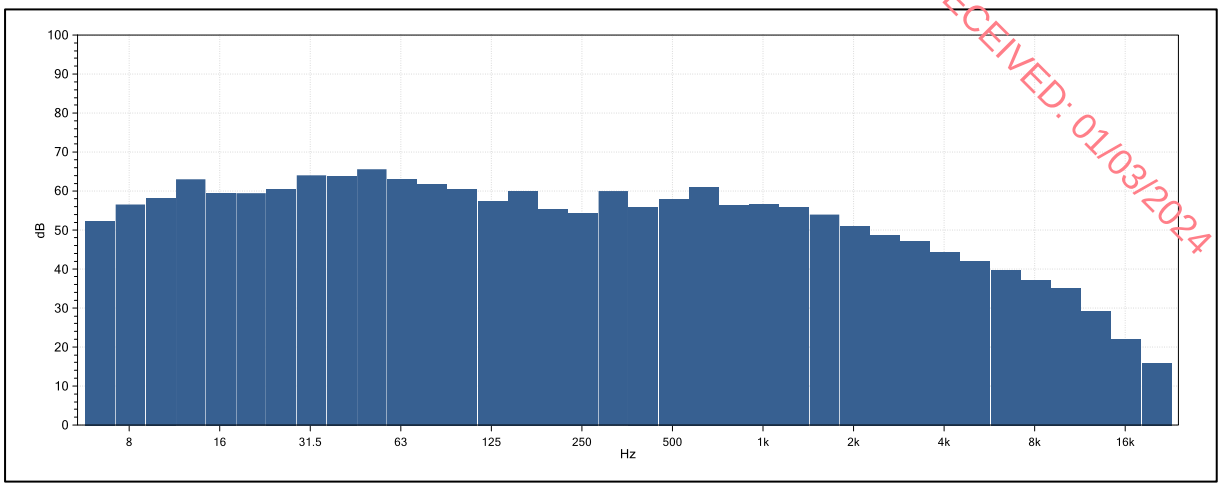


Chart 8- NM4 Run 2 1/3 Octave Frequency Analysis



APPENDIX 11-4

Kilmacow vibration results 2022 & 2023								
Date	Quarry	Blast No.	Monitoring Position	Distance (m)	Air Pressure (dbL)	Peak Particle Velocity (mm/sec)		
						Trans	Vert	Long
Tuesday 11 January 2022	Kilmacow	1	V2	405	109	1.624	2.294	1.561
			V1	182	116.4	4.39	7.243	5.407
Thursday 20 January 2022	Kilmacow	2	V2	487	113	1.632	2.625	1.371
			V1	430	119.5	1.868	3.066	2.358
Friday 4 February 2022	Kilmacow	3	V2	748	112.1	0.867	0.623	0.615
			V1	503	124	1.529	1.182	1.348
Friday 4 February 2022	Kilmacow	4	V2	399	108.1	1.734	1.923	1.466
			V1	181	112.5	4.65	7.874	5.36
Thursday 10 February 2022	Kilmacow	5	V2	500	114	0.953	1.561	1.207
			V1	445	123.2	1.524	1.27	1.905
Monday 28 February 2022	Kilmacow	6	V2	785	112.9	0.52	0.331	0.418
			V1	516	116.5	0.906	1.001	0.725
			V4	555	116.5	0.851	0.497	0.859
Monday 28 February 2022	Kilmacow	7	V2	903	Monitor	Did	Not	Trigger
			V1	485	102.5	0.962	0.473	0.883
			V4	415	116.5	1.285	0.772	0.686
Wednesday 9 March 2022	Kilmacow	8	V2	387	107.9	1.829	2.097	1.293
			V1	181	117.6	3.444	4.343	3.326
Wednesday 16 March 2022	Kilmacow	9	V2	509	117.1	1.174	1.821	1.033
			V1	443	117	2.041	1.687	2.199
Wednesday 20 April 2022	Kilmacow	10	V2	759	115.4	0.938	0.646	0.686
			V1	514	121.7	0.969	1.261	1.364
Tuesday 26 April 2022	Kilmacow	11	V2	377	117.1	2.688	2.617	2.128
			V1	181	112.9	4.571	6.928	6.116
Thursday 12 May 2022	Kilmacow	12	V2	523	112.4	1.316	1.994	1.9
			V1	338	111.2	3.295	4.39	3.72
Friday 20 May 2022	Kilmacow	13	V2	799	113.2	0.567	0.426	0.386
			V1	533	122.3	0.717	0.875	0.812

Kilmacow vibration results 2022 & 2023								
Date	Quarry	Blast No.	Monitoring Position	Distance (m)	Air Pressure (dbL)	Peak Particle Velocity (mm/sec)		
						Trans	Vert	Long
Wednesday 8 June 2022	Kilmacow	14	V2	855	Monitor	Did	Not	Trigger
			V1	543	120.1	0.615	1.064	0.993
			V4	525	107.9	1.348	1.127	1.245
Wednesday 8 June 2022	Kilmacow	15	V2	540	106	2.301	2.325	2.278
			V1	333	108.7	2.483	5.32	4.193
			V4	819	115.7	0.733	0.552	0.623
Friday 24 June 2022	Kilmacow	16	V2	329	107.9	1.474	1.655	1.269
			V1	529	113.8	2.869	3.972	3.98
Friday 15 July 2022	Kilmacow	17	V2	771	112.2	0.686	0.363	0.339
			V1	528	119.3	1.025	0.749	0.709
Friday 15 July 2022	Kilmacow	18	V2	534	107.4	2.049	1.931	1.348
			V1	380	119.2	1.781	2.979	2.325
Wednesday 3 August 2022	Kilmacow	19	V2	836	111.7	0.323	0.575	0.292
			V1	556	119.5	0.489	0.78	0.654
Wednesday 3 August 2022	Kilmacow	20	V2	531	110.3	1.844	1.632	1.513
			V1	320	111.5	5.604	5.691	4.603
Monday 8 August 2022	Kilmacow	21	V2	518	108.3	0.922	1.466	1.119
			V1	316	109.8	2.191	2.026	2.372
Wednesday 31 August 2022	Kilmacow	22	V2	525	112.7	1.797	2.451	1.647
			V1	388	114.4	2.601	2.254	2.664
Wednesday 31 August 2022	Kilmacow	23	V2	518	110.9	0.922	1.316	1.245
			V1	306	106.6	4.225	4.753	3.239
Friday 23 September 2022	Kilmacow	24	V2	508	105.9	1.529	2.089	1.963
			V1	305	108	2.964	4.374	4.209
Friday 23 September 2022	Kilmacow	25	V2	761	Monitor	Did	Not	Trigger
			V1	512	Monitor	Did	Not	Trigger

Kilmacow vibration results 2022 & 2023								
Date	Quarry	Blast No.	Monitoring Position	Distance (m)	Air Pressure (dbL)	Peak Particle Velocity (mm/sec)		
						Trans	Vert	Long
Monday 3 October 2022	Kilmacow	26	V2	871	Monitor	Did	Not	Trigger
			V1	543	121	0.757	0.465	0.646
			V4	518	105.1	0.891	0.82	1.048
Monday 3 October 2022	Kilmacow	27	V2	898	Monitor	Did	Not	Trigger
			V1	477	105.3	1.088	0.828	1.789
			V4	387	109.7	1.009	0.772	1.884
Monday 3 October 2022	Kilmacow	28	V2	844	Monitor	Did	Not	Trigger
			V1	407	106.4	1.245	1.048	3.176
			V4	467	107.1	0.662	0.418	1.088
Friday 14 October 2022	Kilmacow	29	V2	497	104.1	1.742	2.428	2.081
			V1	307	108.2	2.979	4.201	4.154
Monday 24 October 2022	Kilmacow	30	V2	508	110.5	1.442	2.42	1.726
			V1	398	121	1.71	2.309	1.963
Monday 24 October 2022	Kilmacow	31	V2	876	Monitor	Did	Not	Trigger
			V1	542	117.9	0.654	0.481	0.567
Wednesday 2 November 2022	Kilmacow	32	V2	370	113.3	2.081	2.238	1.75
			V1	181	113.8	4.012	5.691	4.146
Thursday 17 November 2022	Kilmacow	33	V2	509	109.5	1.663	2.491	1.86
			V1	406	120.7	3.255	3.09	2.514
Thursday 17 November 2022	Kilmacow	34	V2	518	104.7	0.93	1.293	1.592
			V1	271	105.2	3.074	2.672	2.617
Monday 5 December 2022	Kilmacow	35	V2	461	107.6	1.245	1.301	1.111
			V1	268	102.6	1.978	3.657	3.909
Monday 5 December 2022	Kilmacow	36	V2	825	Monitor	Did	Not	Trigger
			V1	394	103.2	1.545	1.545	2.656
Thursday 8 December 2022	Kilmacow	37	V2	280	107.8	3.176	5.21	5.06
			V1	242	117.2	3.302	2.246	2.514

Kilmacow vibration results 2022 & 2023								
Date	Quarry	Blast No.	Monitoring Position	Distance (m)	Air Pressure (dbL)	Peak Particle Velocity (mm/sec)		
						Trans	Vert	Long
Tuesday 10 January 2023	Kilmacow	1	V2	486	124.8	1.332	2.16	2.333
			V1	310	111.6	2.601	2.483	2.885
Wednesday 25 January 2023	Kilmacow	2	V2	419	114.3	2.294	2.956	2.664
			V1	502	106.2	1.419	2.546	1.624
Tuesday 31 January 2023	Kilmacow	3	V2	267	120.2	2.703	4.666	2.877
			V1	254	111.4	2.711	5.336	4.579
Tuesday 7 February 2023	Kilmacow	4	V2	479	109.1	2.499	2.893	2.877
			V1	313	110.3	1.324	2.27	1.419
Tuesday 14 February 2023	Kilmacow	5	V2	504	115.8	1.151	1.679	0.946
			V1	433	117.5	1.884	1.797	1.434
Tuesday 28 February 2023	Kilmacow	6	V2	516	109.2	1397	1.334	1.016
			V1	446	118	1.4	1.8	1
Friday 10 March 2023	Kilmacow	7	V2	440	111.5	2.477	2.286	0.064
			V1	326	115	2.731	3.112	3.429
Wednesday 22 March 2023	Kilmacow	8	V2	225	122.6	4.826	5.398	3.747
			V1	207	122.4	2.223	3.239	2.223
Tuesday 11 April 2023	Kilmacow	9	V2	459	112.7	1.679	2.483	1.758
			V1	320	116.5	2.38	3.444	4.619
Tuesday 11 April 2023	Kilmacow	10	V2	560	112	1.348	1.143	1.632
			V1	312	108	5.628	3.957	4.059
Thursday 20 April 2023	Kilmacow	11	V2	898	Monitor	Did	Not	Trigger
			V1	467	95.5	0.962	1.072	1.419
Thursday 20 April 2023	Kilmacow	12	V2	523	103.6	1.269	1.277	1.434
			V1	298	99.8	3.704	3.381	2.238
Wednesday 3 May 2023	Kilmacow	13	V2	256	119.1	2.467	3.704	2.987
			V1	286	117.3	2.01	2.475	1.482

APPENDIX 12

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LVIA PHOTOMONTAGES

Proposed Quarry Extension
Granny, Kilmacow, Co. Kilkenny

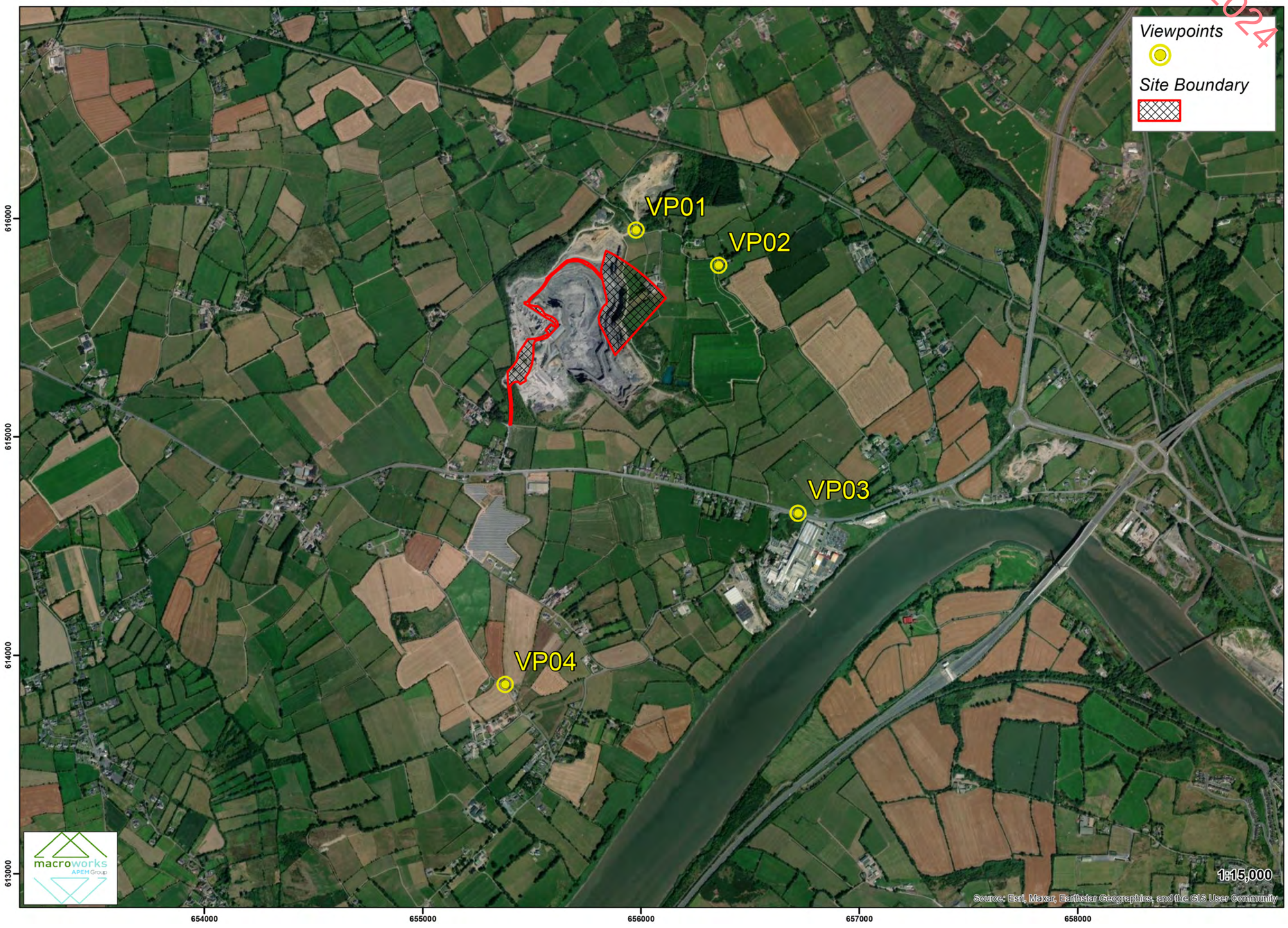
This book contains imagery for the viewpoints chosen for the LVIA study

November 2023

LVIA I TVIA I Landscape Design I Visibility Analysis I Glint and Glare I Verified Photomontages I CGI I Shadow Flicker Analysis

INDEX

LVIA viewpoint locations selected for the Kilmacow Quarry Extension project



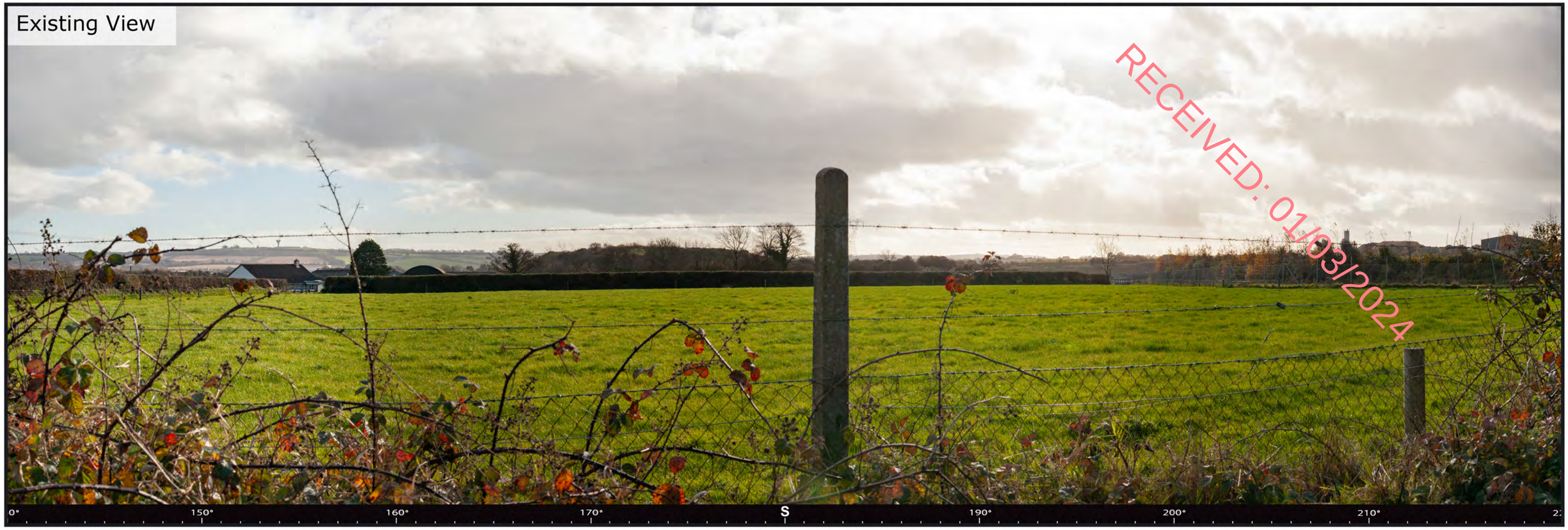
Kilmacow Quarry Exension

Imagery depicting the view towards the site (Existing and Outline)

Local road east of Planning Application Boundary in Granny

VP1

Existing View



Outline View

indicating physical position and scale of Quarry irrespective of screening

These are 80° panoramic montages captured and presented in accordance with the guidance set by the British Landscape Institute 2011 - Advice Note 01/11.

To view these panoramas on a flat surface one must move from left to right along its length whilst maintaining a perpendicular viewing direction and the specified correct viewing distance of 30cm. To see this entire panoramic scene in reality would necessitate turning one's head through 40°.

Easting (ITM):	655976	Lens:	50mm / Full Frame Sensor	Date:	14/11/2023
Northing (ITM):	615947	Camera:	Canon 1-D Mark II digital SLR	Time:	13:21
Direction of View 180°	S of Grid North	Camera Height:	1.7m Above Ground Level		
Angle of View:	80°				

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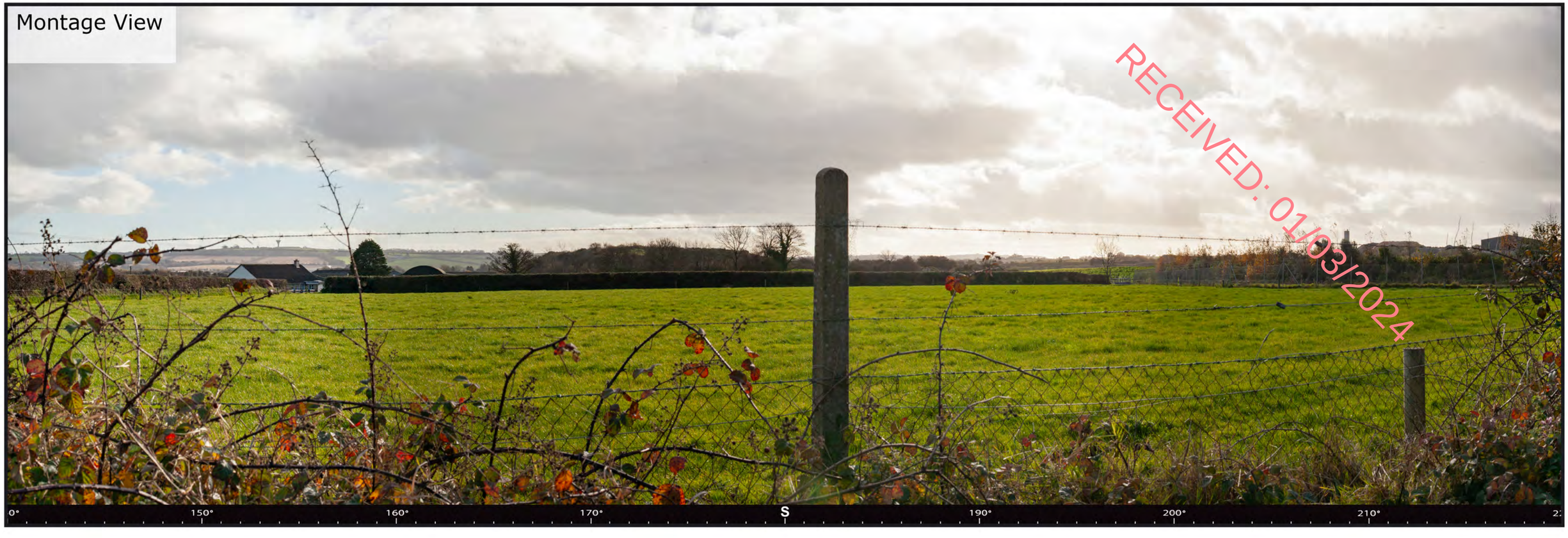
Kilmacow Quarry Exension

Imagery depicting the view towards the site

Local road east of Planning Application Boundary in Granny VP1



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To view these panoramas on a flat surface one must move from left to right along its length whilst maintaining a perpendicular viewing direction and the specified correct viewing distance of 30cm. To see this entire panoramic scene in reality would necessitate turning one's head through 40°.

Easting (ITM):	655976	Lens:	50mm / Full Frame Sensor	Date:	14/11/2023
Northing (ITM):	615947	Camera:	Canon 1-D Mark II digital SLR	Time:	13:21
Direction of View 180°	S of Grid North	Camera Height:	1.7m Above Ground Level		
Angle of View:	80°				

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Kilmacow Quarry Exension

Imagery depicting the view towards the site (Existing and Outline)

Local road north of Planning Application Boundary in Granny

VP2

Existing View

Outline View

indicating physical position and scale of Quarry irrespective of screening

These are 80° panoramic montages captured and presented in accordance with the guidance set by the British Landscape Institute 2011 - Advice Note 01/11.

To view these panoramas on a flat surface one must move from left to right along its length whilst maintaining a perpendicular viewing direction and the specified correct viewing distance of 30cm. To see this entire panoramic scene in reality would necessitate turning one's head through 40°.

Easting (ITM):	656356	Lens:	50mm / Full Frame Sensor	Date:	14/11/2023
Northing (ITM):	615785	Camera:	Canon 1-D Mark II digital SLR	Time:	13:14
Direction of View	20° N of Grid North	Camera Height:	1.7m Above Ground Level		
Angle of View:	80°				

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Kilmacow Quarry Exension

Imagery depicting the view towards the site

Local road north of Planning Application Boundary in Granny VP2

Montage View

These are 80° panoramic montages captured and presented in accordance with the guidance set by the British Landscape Institute 2011 - Advice Note 01/11.

To view these panoramas on a flat surface one must move from left to right along its length whilst maintaining a perpendicular viewing direction and the specified correct viewing distance of 30cm. To see this entire panoramic scene in reality would necessitate turning one's head through 40°.

Easting (ITM):	656356	Lens:	50mm / Full Frame Sensor	Date:	14/11/2023
Northing (ITM):	615785	Camera:	Canon 1-D Mark II digital SLR	Time:	13:14
Direction of View	20° N of Grid North	Camera Height:	1.7m Above Ground Level		
Angle of View:	80°				

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Kilmacow Quarry Exension

Imagery depicting the view towards the site (Existing and Outline)

N24 national road in Ballygriffin VP3

These are 80° panoramic montages captured and presented in accordance with the guidance set by the British Landscape Institute 2011 - Advice Note 01/11.

To view these panoramas on a flat surface one must move from left to right along its length whilst maintaining a perpendicular viewing direction and the specified correct viewing distance of 30cm. To see this entire panoramic scene in reality would necessitate turning one's head through 40°.

Easting (ITM):	656720	Lens:	50mm / Full Frame Sensor	Date:	14/11/2023
Northing (ITM):	614651	Camera:	Canon 1-D Mark II digital SLR	Time:	14:06
Direction of View	320°NW of Grid North	Camera Height:	1.7m Above Ground Level		
Angle of View:	80°				

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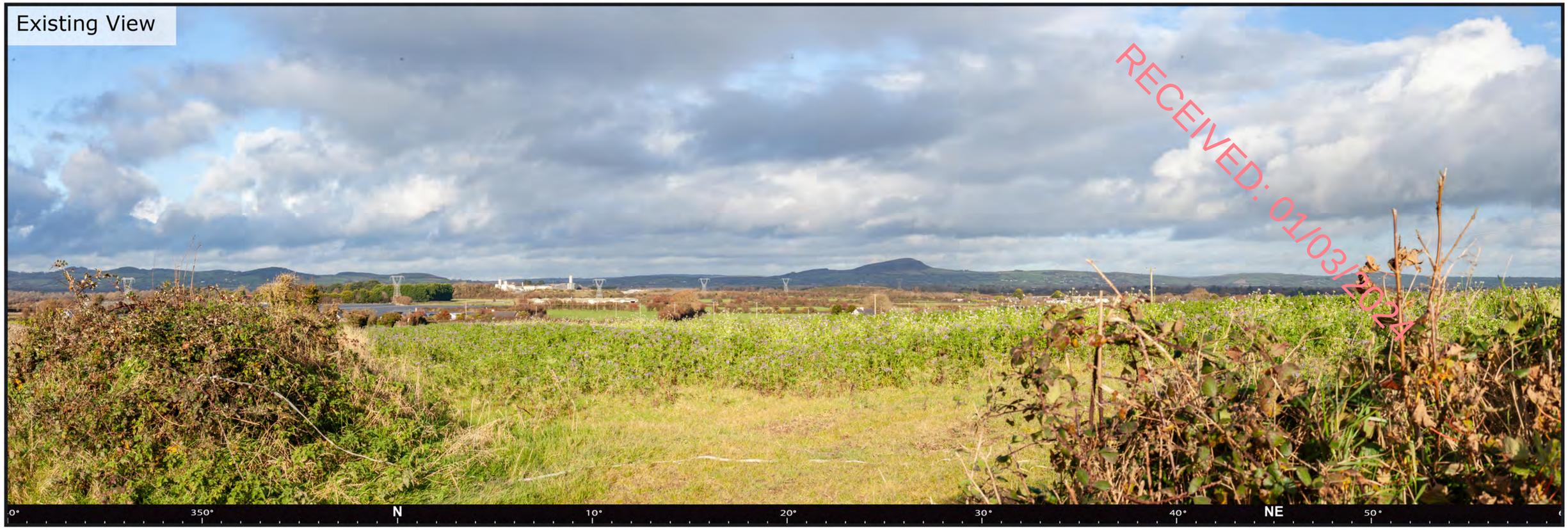
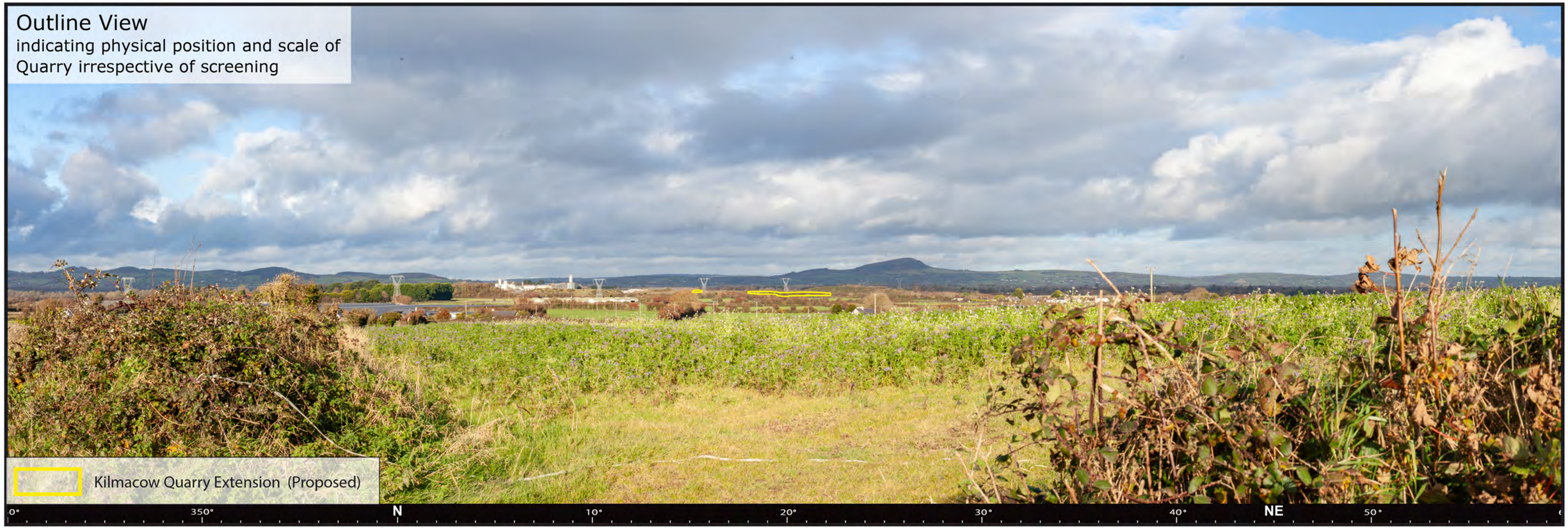
Kilmacow Quarry Exension

Imagery depicting the view towards the site (Existing and Outline)

Local road in Portnahully VP4





These are 80° panoramic montages captured and presented in accordance with the guidance set by the British Landscape Institute 2011 - Advice Note 01/11.

To view these panoramas on a flat surface one must move from left to right along its length whilst maintaining a perpendicular viewing direction and the specified correct viewing distance of 30cm. To see this entire panoramic scene in reality would necessitate turning one's head through 40°.

Easting (ITM):	655376	Lens:	50mm / Full Frame Sensor	Date:	14/11/2023
Northing (ITM):	613867	Camera:	Canon 1-D Mark II digital SLR	Time:	13:47
Direction of View 245°SW of Grid North		Camera Height:	1.7m Above Ground Level		
Angle of View:	80°				

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