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EIAR Addendum Response to Reasons for Refusal

PRESENTED TO

**Milford Quarries Limited
Proposed Quarry**

DATE

March 2024

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Environmental Consultancy Services

DOCUMENT CONTROL SHEET

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Project Title	Proposed Quarry – Bannagagole, Old Leighlin, County Carlow
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1 INTRODUCTION

Enviroguide Consulting was engaged by Milford Quarries Limited to respond to Carlow County Council's decision on the 7th of February 2024 to refuse the planning application for a proposed quarry at Bannagagole, Old Leighlin, County Carlow. The planning application was accompanied by an Environmental Impact Assessment Report (EIAR) (hereinafter referred to as the March 2023 EIAR).

This report sets out further clarification information to support the conclusions made in the March 2023 EIAR.

2 CARLOW COUNTY COUNCIL REASONS FOR REFUSAL

The following reasons for refusal were cited in the 7th February 2024 planning decision by Carlow County Council.

1. *It is considered that the submitted Environmental Impact Assessment Report and subsequent addendums to the EIAR provided as further information are both deficient in information with respect to an evaluation of potential cumulative impacts between the proposed development and other plans and projects, including the existing operational quarry adjoining the site, and with respect to an assessment of potential environmental impacts including from blasting as a method of extraction and proposals to crush and process aggregate on site. Therefore, to permit the proposed development in the absence of such assessments would present a risk of significant negative environmental impacts in the area, which would be contrary to the proper planning and sustainable development of the area.*

2. *Having regard to the nature and extent of the proposed development, the Planning Authority is not satisfied on the basis of the Appropriate Assessment carried out on the information contained in the planning application, the Environmental Impact Assessment Report and Natura Impact Statement, that appropriate or adequate consideration has been given to the effects of the development on the environment, in accordance with Article 6(3) of the EU Habitats Directive, or that the integrity of Special Area of Conservation (River Barrow and River Nore SAC) would not be adversely affected by the proposed development. In these circumstances, the proposed development would contravene Policies NS. P1 and NS P2 of the Carlow County Development Plan 2022-2028, which seek to support the conservation and protection of Natura 2000 sites and would therefore be contrary to the proper planning and sustainable development of the area.*

Further commentary is set out to support the EIAR's conclusion that there will be no likely significant cumulative effects in combination with the adjoining quarry from activities, blasting and on-site processing activities, focusing on the following topics raised in the Carlow County Council planning report.

- Noise and vibration;
- Dust production;
- Blasting and on-site crushing and processing; and
- Groundwater and surface water effects.

2.1 Response to Refusal Reason No. 1

Noise and vibration

The EIAR concluded there would be no likely significant noise and vibration effects from in-combination effects. To further support this conclusion, a detailed breakdown of the in-combination noise impacts are presented in Appendix 1. The noise and vibration impacts assessment considered the noise impacts from the adjacent quarry, the proposed development and the cumulative scenario of both quarries operating at the same time on nearby noise sensitive locations (NSL).

Noise levels from operations at the adjoining quarry are controlled by planning condition which stipulates noise levels shall not exceed 55 decibels (dB)(A) LAeq over a measured interval of one hour.

Based on a worst case scenario cumulative assessment, the highest cumulative noise levels experienced by nearby sensitive noise receptors are predicted at location NSL 15 (the nearest receptor) with noise levels reaching 55dB which is considered to be compliant with acceptable noise limits, as set by the planning conditions for the adjoining quarry.

Figure 1 Noise Sensitive Receptors Location Plan relative to the Proposed Development and Adjoining Quarry



Table 1 Predicted cumulative noise effects at nearest (most affected) Noise Sensitive Location

Location	Noise Limit	Predicted Noise level	Compliance
NSL 15 (70m west)	55	55	55

Noise and vibration - blasting and onsite crushing and processing

The noise and vibration assessment also considered the potential impact of blasting and onsite crushing and processing at the site.

Table 11 within Appendix 1 noise impact assessment provides noise levels at estimated at the nineteen noise sensitive locations identified within the EIAR. It is predicted there will be no significant adverse noise and vibration cumulative effects at noise sensitive receptors as a result of in-combination effects

Based on audited information for the adjoining site, blasting at the site achieved vibration accepted levels.

Mitigation measures will be deployed to avoid significant noise impacts. The following measures will be strictly will be undertaken within the quarry to minimise disturbance during blasting when it takes place:

- Air overpressure is minimised through proper blast design, avoiding the detonation of large unconfined charges, and by consideration of atmospheric conditions before blasting.
- A siren is sounded for one minute ten minutes before the blast and for another 30 seconds one minute before the blast. The siren is sounded for another one minute after the inspection just before the blast.
- Regular monitoring of blast and blasting practice is carried out to ensure strict adherence to the present standards. All drilling, blasting, and shot firing is carried out by Irish Industrial Explosives.

The following measures will be undertaken to minimise cumulative blasting impacts include:

- No blasting will take place during the same time as the adjoining quarry;
- The use of delayed blasting techniques;
- All shot holes will be drilled to exact specifications by specialist contractors;
- Drilling information to be passed to shot firer to allow for the correct charge to be selected;
- Provide advance notice to local neighbours; and
- Keep complaints log.

Whilst any blasting at the site will be infrequent, any occasions will be agreed and timed in advance to make sure there are no in-combination and cumulative noise or vibration effects through taking blasting activities taking place at the same time as the adjoining quarry.

Cumulative dust impacts

Dust emissions from extractive industries are site specific and broadly dependent on:

1. The material extracted;
2. Site operations; and
3. Local meteorology and topography.

Meteorological conditions greatly affect the level of dust emissions and subsequent deposition downwind of the source; the most predominant being rainfall and wind speed. Adverse impacts can occur in any direction from a site, however they are more likely to occur downwind of the prevailing wind direction and/or close to the site. Relatively high levels of moisture in the

surrounding air, soils, and precipitation helps to suppress dust due to the cohesive properties of water between dust particles.

The least favourable meteorological conditions for dust generation would typically be warm days with strong winds and low precipitation. Due to the variability of weather, it is impossible to predict the conditions that will occur during the operational phase of the proposed development. The March 2023 EIA included a Disamenity Dust Assessment. For this assessment, the frequencies of wind in each direction, in conjunction with the number of dry days were calculated based on meteorological data at Oak Park Weather Station. Moderate to high windspeeds (above 5m/s (7-10 knots) were utilised in this assessment as these conditions are most likely to result in fugitive dust emissions. The data showed the south as the prevailing wind direction.

According to Institute of Air Quality Management Guidance on the Assessment of Mineral Dust Impacts for Planning (IAQM, 2016), the experience of the IAQM Working Group together with published studies and anecdotal evidence on the change in both airborne concentrations and the rate of deposition with distance, suggests that dust impacts will occur mainly within 400m of the operation, even at the dustiest of sites. Adverse impacts from dust generating activities are uncommon beyond 250m, and continuous or stark concerns about dust are most likely to be experienced within 100m of the dust source; the greatest potential for high rates of dust deposition and elevated PM₁₀ concentrations occurs within this distance.

As part of the Disamenity Dust Assessment, all sensitive receptors positioned within a 400m radius of the site were identified. Any receptors beyond this distance are unlikely to be impacted by dust. The closest receptor is 70 away to the west. The River Barrow and River Nore Special Area of Conservation (SAC) is located 1.1km from the site and therefore is far beyond the 400m distance and unlikely to experience dust impacts from the proposed development.

The Disamenity Dust Assessment concluded that there will be an overall negligible impact on sensitive receptors as a result of the proposed development. It is likely that the local terrain and natural features between the source and the receptors will variously act as barriers, reduce airborne concentrations due to impaction, lengthen pathways, affect air flow, and increase or inhibit dispersion and dilution. Appropriate mitigation measures will be incorporated as this will substantially reduce any likelihood of fugitive emissions causing an impact on sensitive receptors in the vicinity of the proposed development. Dust control through the implementation of the proposed mitigation measures is the key method of controlling dust emissions from extractive industries.

A dust deposition monitoring programme has been established at the adjoining quarry using three Bergerhoff-Type Dust Deposit Gauges at the following locations:

- D1 – located at the north-east corner of the site;
- D2 - located at the south-east corner of the site; and
- D3 - located at the south-west corner of the site.

Figure 2 Location of dust monitoring locations at the adjoining quarry



The environmental monitoring at the above locations for years 2021 and 2022 has found that the facility is compliant with emission limit values for air quality, i.e., the total particulate emission arising from the onsite operations associated with the facility does not exceed 350 milligrams per square metres per day, averaged over a continuous period of 30 days, when measured as deposition of insoluble particulate matter at any position along the boundary of the site.

The measured dust deposition results at D1, D2, and D3 comply with the specified dust deposition values of 350 mg/m²/day for all years, and are summarized in Table 2 (the total dust is expressed as deposition of insoluble particulate matter (mg/m²/day)).

Table 2 Dust Deposition Monitoring Results at Existing Adjoining Quarry

Dust Deposition Monitoring 2022				
Monitoring Period		Deposition (mg/m ² /day)		
From	To	D1	D2	D3
2021				
28/05/2021	25/06/2021	100	152	114

Dust Deposition Monitoring 2022				
Monitoring Period		Deposition (mg/m ² /day)		
From	To	D1	D2	D3
25/06/2021	12/08/2021	183	80	160
12/08/2021	23/09/2021	44	*	254
2022				
22/04/2022	26/05/2022	2	193	*
26/05/2022	08/07/2022	152	55	399***
08/07/2022	03/08/2022	143	158	587**
03/08/2022	02/09/2022	47	19	97
02/09/2022	03/10/2022	3	108	11

*Damaged Sample ** Contained high quantity of organic matter

At location D3, samples show high organic matter over the summer months. This monitoring location is situated near vegetation and under trees. It was recommended that in 2023 the location is audited and if necessary, relocated away from vegetation.

The Disamenity Dust Assessment carried out as part of the EIAR concluded that there will be an overall negligible impact on sensitive receptors as a result of the Proposed Development, therefore, dust deposition levels from the proposed developed are not expected to exceed the criterion of less than 350 mg/m²/day at and beyond the site boundary (as per the German TA Luft Air Quality Standards (TA Luft, 1986).

Previous monitoring carried out at the adjoining quarry have found no exceedances in emission limit values at dust monitoring locations around the site during regular site operations. The highest potential cumulative effect would be Location D2. The highest dust levels recorded was 158 mg/m²/day. Due to the mitigation measures that will be followed, it is not considered that there would be no in-combination effect that would exceed 350 mg/m²/day at any of the sensitive receptors.

It is considered that likely significant adverse cumulative impacts from dust suspension and or/deposition are not expected to occur with the following mitigation measures set out in the EIAR:

- Regular dust monitoring at site boundaries with corrective actions set out if dust levels reaches the limit;
- All plant and machinery are to be regularly maintained;
- Existing site boundary hedgerows/stone walls are to be retained. These minimise migration of dust beyond the site boundary;
- Perimeter screening berms are in place to minimise dust blows and migration of dust beyond the site boundary;
- Internal haul roads are to be maintained to minimise dust generation;
- Vehicle speeds will be controlled on all internal haul roads;

- A wheel wash facility is provided within the existing quarry. All trucks exiting the site leaving via the wheel wash;
- The internal road between the wheel wash and the existing quarry entrance will be surfaced;
- Vehicle speeds are controlled on the access road;
- Water sprays and water bowsers are used for dust suppression during dry weather;
- In the event of material being spilled on the public road, the operator will ensure that spilled material is removed from the road surface in a timely manner as soon as they notice or are notified that a spillage has arisen.

2.2 Refusal Reason No. 2 – Appropriate Assessment

The Natura Impact Statement (NIS) has been reviewed in response to the Carlow County Council's reason for refusal No.2. To provide clarification, the NIS report has been updated with the mitigation measures set out in the EIAR and Further Information responses to provide further evidence relating to the mitigation measures to support the conclusions that likely significant effects will be avoided at Natura 2000 sites. The updated NIS is provided in Appendix 2.

It should be noted that the information added to the NIS is new or different mitigation measures to those included in the EIAR and RFI submission documents. The predicted effects and conclusions of the NIS also remain unchanged from the submitted NIS as part of the Request for Further Information (RFI) submission. Further clarification on the matters raised in the reasons for refusal are summarised below.

In-combination effects on Natura 2000 sites

Regarding in-combination dust effects, the Natura Impact Statement highlighted that studies have found that "95% of dust particles from mineral workings have a relatively high mass and generally deposit within 100m of the point of release, with the remainder being deposited within 200 – 500 m of source" (IAQM, 2016). Due to the nature and localised scale of the works, emissions to air during the construction phase, will be limited to dust generation within 100m of the site (based on TII assessment criteria for major-sized construction sites), and emissions from construction machinery and vehicles (NRA, 2011).

The distance of 1.1km between the site and the River Barrow and River Nore Special Area of Conservation (SAC) (002162) is considered enough to exclude any effects propagated via air or land pathways such as dust deposition of leaves and root systems of the vegetation of qualifying interests (QI) habitats associated with River Barrow and River Nore SAC (002162) during construction and operational phases of the Proposed Development, in-combination with any other plans or projects, including the adjacent quarry.

In-combination blasting impacts on Natura 2000 sites

In addition, in compliance with Condition 6(c) of the continuance of use of the existing permitting quarry site (Planning Ref. No. 1764) adjacent to the Proposed Development as set out by Carlow County Council, "the number of blasting(s) per annum shall not exceed 2/3". Blasting on-site will be carried out with notice to the adjacent quarry to coordinate blasting activities to minimise noise and dusts impacts to the surrounding environment.

Along with the noise and vibration mitigation measures set out in the Construction and Environmental Management Plan (CEMP) and the Noise and Vibration Chapter of the EIAR accompanying this application, the potential for in-combination impacts to occur are not foreseen on any European site, including River Barrow and River Nore SAC (002162).

In-combination surface water and groundwater effects on Natura 2000 sites

Even encompassing the infrequent blasting technique that will take place, the proposed development does not include any untreated discharge to ground or surface waters. The primary discharge from the proposed development is a surface water discharge and this discharge will arise from the main settlement pond.

Treatment by settlement of suspended solids and removal of hydrocarbons via hydrocarbon interceptor is included in the site design and discharge will also be attenuated and discharged at greenfield runoff rates, and this will protect downstream watercourses from flooding.

The only proposed discharge to ground will occur at the proposed soakaways which will treat runoff from the proposed site roads and site entrance. The drainage regime in these areas (French drains and soakaways) has been designed in accordance with sustainable drainage principles and there will be no deterioration in groundwater quality. Water will be treated by filtration (filter media in French drain) and water will also pass through a hydrocarbon interceptor prior to discharge locally to ground.

No discharge to ground will occur within the quarry void. The quarry will be a sink from which water will be pumped.

Based on site investigation data collected at the site the bedrock in the extraction area has been found to be competent and no significant karst features were recorded.

As a result of these recorded geological conditions, no preferential groundwater flowpaths exist which could transfer poor quality water from the quarry to nearby wells or to the downstream watercourses (Maudlin River and Barrow River).

Extraction at the adjacent Old Leighlin Quarry is currently permitted to a depth of 21m above ordnance datum (aOD) and is operating well below the groundwater table. However, little groundwater inflow has been noted in that quarry void due to the absence of any solutionally enlarged joints or cavities (i.e. the absence of any karst features).

No wastewater discharge is proposed at the site. All wastewater arising from welfare facilities will be collected in a holding tank, and from there will be transferred to a local WWTP for treatment and discharge.

3 CONCLUSION

In response to the refusal notice issued by Carlow County Council on 7th February 2024, this report sets out further clarification information to justify the conclusions set out in the March 2023 EIAR.

It is considered that with mitigation measures adopted, there will be no likely significant cumulative effects due to in-combination effects with the adjoining quarry. Further description of the mitigation measures have been set out in the Natura Impact Statement to justify the conclusions that there will be no significant effects on the Natura 2000 sites.

APPENDIX 1 NOISE AND VIBRATION ASSESSMENT

APPENDIX 2 MARCH 2024 NATURA IMPACT STATEMENT



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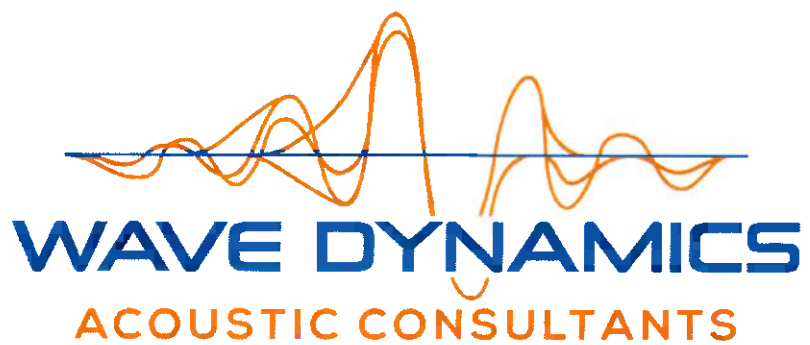
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**Proposed Quarry – Bannagagole,
Old Leighlin, County Carlow**

Noise Impact Assessment
05 March 2024

WDA240221RP_C_01

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Executive Summary

Wave Dynamics were engaged by Milford Quarries Limited as the acoustic consultants to undertake a noise impact assessment for a Proposed Quarry – Bannagagole, Old Leighlin, County Carlow.

We understand that the development was recently rejected at planning stage (Carlow County Council Ref 23/60042). CCC felt that the noise impact from the adjacent and proposed quarries including the cumulative noise impact had not been adequately assessed. The development description is as follows:

The proposed quarry void will be extracted to a depth of 2 no. benches of c. 10m from top of bedrock, with a final floor level of c. 56.5m above Ordnance Datum (AOD) with a proposed rate of rock extraction of c.30,000 cubic metres (84,000 tonnes) per annum. A proposed working area of c. 1.2 hectares to the south of the extraction zone will provide for the crushing and processing of the unusable stone and storage of dimensional stone and will include machinery storage shed, staff welfare facilities, wastewater holding tank, weighbridge and parking area.

The proposed development will also include for earthen screening berms to a height of c. 3 m, a wheel wash facility; installation of surface water attenuation and settlement ponds for the treatment of suspended solids in the floor of the quarry; soil storage area with an average storage depth of c. 4 m and all other site development works above and below ground including the restoration of the final quarry void (extractive area).

Access to the proposed development will be facilitated by a heavy goods vehicle (HGV) site entrance from the Local Road to the east of the proposed site via a proposed access haul road.

Noise Impact Assessment

A noise impact assessment was undertaken to predict the noise impact from the development when it was in operation. The assessment considered the noise from activities from the adjacent quarry operations, proposed operations and the cumulative noise impact from the proposed and adjacent quarries in operation simultaneously. The proposed operations were assessed on a "worst case" scenario basis. This included predicting a worst-case scenario noise impact including assessing the development for more equipment than will be used in practice. Consideration was also given to proposed developments in the area and the noise impact as part of the cumulative assessment.

The noise sources from the adjacent development, proposed development, in-combination noise impacts (from both the proposed and adjacent quarries in operation simultaneously), and the cumulative noise impacts (with other developments) were considered and modelled. The assessment predicted that **the project criteria will be achieved** at the noise sensitive receptors for all scenarios.

The noise impact from the additional traffic on the roads due to the expansion of the development was considered. Based on the predicted traffic impact it is not expected the additional traffic will have a negative noise impact.

Other Considerations

Other considerations on the proposed development included the review of the vibration impact from blasting and general operational activities. We understand that blasting will be very infrequent on the project. A review of the previous monitoring conducted for blasting at the adjacent quarry indicated that the project criteria was achieved during the blasting with the levels measured below the maximum levels allowable. It is recommended that the same measures including, monitoring, delay blasting are incorporated into measures for the proposed development.

Vibration from operational sources was considered, it is predicted that the vibration from the operational sources at the development will not provide a significant vibration impact however it is recommended that precautionary vibration monitoring is conducted on the boundary as part of the monitoring program for the proposed development.

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1 Introduction

Wave Dynamics were engaged by Milford Quarries Limited as the acoustic consultants for the noise impact assessment for the quarrying works at the Proposed Quarry – Bannagagole, Old Leighlin, County Carlow.

We understand that the proposed development was rejected at planning stage by CCC (Carlow County Council Ref 23/60042). One of the items highlighted as part of the determination was that CCC felt that the noise impact from the adjacent quarry and proposed development including the cumulative noise impact had not been adequately assessed.

This report outlines the project criteria, baseline survey results, and assessment for:

- Noise impact from the proposed quarrying and associated works.

Appendix A outlines a glossary of the acoustic terminology used in this report.

1.1 Site Description and Layout

The site is located within the townland of Bannagagole, approximately 0.7km south of the village of Old Leighlin, and c.2.5km west of Leighlinbridge and c.4.5km northwest of Bagenalstown. The county border between Carlow and Kilkenny is located c.2km to the south of the site (See Figure 1 below).

The overall landholding (c.12.4 hectares) is located entirely within the townland of Bannagagole, Co. Carlow; refer to Figure 2- Environmental Monitoring Plan. The entire landholding is in the ownership of Old Leighlin Quarry Limited (part of the group of quarries operated by Kilkenny Limestone Quarries Limited, with an address in Kellymount, Paulstown, Co. Kilkenny). We understand that the operating hours of the quarry will be 08:00 – 18:00 Monday to Friday.

Access to the site is via a minor county road c.3km west of the R448 Regional Road (the former N9 National Primary Road). The M9 motorway passes in a north — south direction c.800m to the east of the site. A site location map is shown below as Figure 1.



Figure 1: Site Location, NSLs and Locations.

2 Project Criteria

Threshold noise levels considered applicable for the or the project are set out in this section; the purpose of the criteria is to ensure reasonable:

- Noise impact from the quarrying and associated works on the development.

To provide adequate conditions, Wave Dynamics has developed the project criteria for the following:

- Operational noise impact.

Acoustic Standards

The criteria for the project have been developed based on the following industry standards:

- ✓ Quarries and Ancillary Activities: Guidelines for Planning Authorities: April 2004
- ✓ British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise
- ✓ BS 5228:2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2 Vibration.
- ✓ BS 7385-2:1993 Evaluation and measurement for vibration in buildings Guide to damage levels from groundborne vibration
- ✓ EPA NG4 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).
- ✓ Carlow County Council Noise Action Plan
- ✓ ProPG Professional Practice Guidance on Planning & Noise.
- ✓ ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures
- ✓ Previous experience on similar projects.

2.1 Assessment Criteria

The criteria for the project has been developed from EPA NG4 and Quarries and Ancillary Activities: Guidelines for Planning Authorities: April 2004

EPA NG4

EPA NG4 outlines that noise attributable solely to onsite activities from a licenced premises should not exceed the following limits:

- Daytime (07:00hrs – 19:00hrs) – 55dB $L_{A,r,T}$
- Evening (19:00hrs – 23:00hrs) – 50dB $L_{A,r,T}$
- Night time (23:00hrs – 07:00hrs) – 45dB $L_{Aeq,T}$

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive locations. A penalty of 5dB for tonal and/or impulsive elements is to be applied to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level ($L_{A,r,T}$). In all cases, an assessment by a competent person will be required.

During the night-time period no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

The low background noise screening has been conducted by Enviroguide as part of the EIAR and screened out.

Quarries and Ancillary Activities: Guidelines for Planning Authorities: April 2004

The primary regulation and guidance for the activities of Quarries and Ancillary in Ireland include the Environmental Protection Agency (EPA) Quarries and Ancillary Activities: Guidelines for Planning Authorities, 2004.

The guidelines are intended to offer guidance to planning authorities on planning for the quarrying industry through the development plan and determining applications for planning permission for quarrying and ancillary activities (Part A) and to be a practical guide to the implementation of section 261 of the Planning and Development Act, 2000 (Part B).

Chapter 3 of the guidelines provides the following recommendations for emission limit values (ELVs):

"Noise from the activities on site shall not exceed the following noise ELVs at the nearest noise-sensitive receptor."

- 55 dBA LAeq (1hr) for Daytime: 08:00hrs - 20:00hrs
- 45 dBA LAeq (1hr) for Night-time: 20:00hrs - 08:00hrs

Table 1 below outlines the project criteria in tabular form.

Table 1: Quarries and Ancillary Activities: Guidelines for Planning Authorities: April 2004 Emission Limit Levels

Assessment Category and Threshold Value Period	Threshold Value dB (LAeq)
Daytime (08:00 hrs. – 20:00 hrs.) and Saturdays (07:00 – 14:00)	55
Nighttime (20:00hrs : 08:00hrs)	45

Planning Conditions

Condition no. 3 imposed for the adjacent quarry under Section 261 of the Planning and Development Act, 2000 (Quarry Ref. QY 13), as amended by ABP Ref. No. 01.QC.2173 which states that:

"The noise levels associated with day-to-day quarrying activity when measured from the nearest sensitive noise receptor, shall not exceed 55 dB(A) LAeq Over a measured time interval of one hour by day time (0800 hours to 2000 hours) and shall not exceed 45 dB(A) LAeq Over a measured time of 15 minutes by night-time (2000 hours to 0800 hours). 95 per cent of all noise levels shall comply with the specified limit values. No noise level shall exceed the limit value by more than two dBA. These levels may be exceeded to allow temporary but exceptionally noisy phases in the extraction process or for a short- term construction activity which is required to bring long term environmental benefits following written agreement by the planning authority."

And condition no. 22 under Planning Permission 17/64 which states that:

"The proposed development shall not give rise to noise levels off site, at noise sensitive locations which exceed the following sound pressure limits (Leq, 15 minute): Daytime (08.00 hours and 18.00 hours): 55 dB(A) Night-time (all other times): 45 dB(A). There shall be no clearly audible tonal or impulsive component in the noise emission from the development at any noise sensitive location. Low noise emitting plant shall be used at the development where possible and all plant and machinery shall be maintained as to minimise noise emissions."

The planning requirements align with Quarries and Ancillary Activities: Guidelines for Planning Authorities: April 2004 and NG4 guidelines and have been adopted as the project criteria for this project.

3 Existing Noise Environment

For the purpose of the assessment WDA have relied on the data from the previous annual audits on the adjacent quarry site undertaken by SLR.

3.1 Noise Measurement Results

This section outlines the results of the noise measurements conducted by SLR from the years 2021 – 2022.

Attended Measurement Results - 2021

Table 2: SLR noise monitoring results conducted in 2021

Measured Noise Levels						
Location	Date	Start (Hrs)	Finish (Hrs)	L _{Aeq, 1hr} dB	L _{A10, 1hr} dB	L _{A90, 1hr} dB
N1 (831)	28/05/2021	09:12	10:12	53.9	55.2	48.1
		09:12	09:27	54.2	55.5	50.3
		09:27	09:42	53.6	55.3	49.5
		09:42	09:57	53.8	55.2	48.8
		09:57	10:12	53.9	54.5	46.3
N2 (831)	28/05/2021	10:37	11:37	51.4	53.6	47.4
		10:37	10:52	50.1	52.2	47.2
		10:52	11:07	51.8	55.6	48.8
		11:07	11:22	52.8	55.6	48.8
		11:22	11:37	49.5	51.4	47.5
N3 (831)	28/05/2021	11:49	12:49	66	69.2	55
		11:49	12:04	65.3	68.2	56.2
		12:04	12:19	66.4	69.1	55.5
		12:19	12:34	67.5	71.1	55.6
		12:34	12:49	64	68.3	53.8
N1 (831)	12/08/2021	11:50	12:50	57.8	54.2	45.6
		11:50	12:05	63.2	56.1	46.3
		12:05	12:20	50.7	53.6	45
		12:20	12:35	49.9	52.5	45.2
		12:35	12:50	51.1	53.7	46.3
N2 (831)	12/08/2021	09:37	10:37	53.3	55.7	47.1
		09:37	09:52	54.2	56.1	48.4
		09:52	10:07	52.4	55.8	46.6
		10:07	10:22	53.4	55.8	48.1
		10:22	10:37	53.2	54.5	46.1
N3 (831)	12/08/2021	10:42	11:42	53.3	55.3	46.5
		10:42	10:57	53.8	57	46.2
		10:57	11:12	52.9	55.2	46.4
		11:12	11:27	53.4	54.4	46.2
		11:27	11:42	53.2	54.9	47.4

Measured Noise Levels						
Location	Date	Start (Hrs)	Finish (Hrs)	L _{Aeq, 1hr} dB	L _{A10, 1hr} dB	L _{A90, 1hr} dB
N1 (831)	23/09/2021	09:37	10:37	48.5	53.1	36
		09:37	09:52	48.1	50.2	36.2
		09:52	10:07	44.1	45.4	35.1
		10:07	10:22	49.8	54.2	41.7
		10:22	10:37	50	54	42.8
N2 (831)	23/09/2021	10:43	11:43	50.5	54	42.8
		10:43	10:58	51.6	55.3	44.1
		10:58	11:13	49.9	52.6	45.1
		11:13	11:28	49.8	53.4	40.9
		11:28	11:43	50.3	53.9	43.1
N3 (831)	23/09/2021	11:46	12:46	56.6	59.3	44.4
		11:46	12:01	57.4	61.6	47
		12:01	12:16	57.5	60.3	47.6
		12:16	12:34	56.2	58.3	42.8
		12:31	12:46	54.6	56.1	44.1

Attended Measurement Results - 2022

Table 3: SLR noise monitoring results conducted in 2022

Measured Noise Levels						
Location	Date	Start (Hrs)	Finish (Hrs)	L _{Aeq, 1hr} dB	L _{A10, 1hr} dB	L _{A90, 1hr} dB
N1 (831)	07/02/2022	12:04	13:04	55.1	54.2	41.7
		12:04	12:19	51.5	54.7	45.7
		12:19	12:34	52.3	55	45.6
		12:34	12:49	52	55.3	45.1
		12:49	13:04:00	46.5	48.2	39.7
N2 (831)	07/02/2022	09:50	10:50	50.4	53.1	45.3
		09:50	10:05	48.7	51.5	45.1
		10:05	10:20	49.4	52.7	43.8
		10:20	10:35	51.9	54.5	47.2
		10:35	10:50	51	53.7	46.1
N3 (831)	07/02/2022	10:55	11:55	57.6	59.9	46.1
		10:55	11:10	62.2	65.6	47.1
		11:10	11:25	54.1	58.4	45.7
		11:25	11:40	53.1	55.4	46.9
		11:40	11:55	53.6	58.1	45.8
N1 (831)	22/04/2022	12:51	13:51	50.7	52.4	45.3
		12:51	13:06	50	52.1	45.7
		13:06	13:21	49.6	52.4	45.3

Measured Noise Levels						
Location	Date	Start (Hrs)	Finish (Hrs)	L _{Aeq, 1hr} dB	L _{A10, 1hr} dB	L _{A90, 1hr} dB
		13:21	13:36	51.9	52.5	46
		13:36	13:51	50.8	52.8	44.4
N2 (831)	22/04/2022	10:38	11:38	53	55.2	48.2
		10:38	10:53	52.7	54.9	48.6
		10:53	11:08	50.9	52.8	47.6
		11:08	11:23	54.5	56.5	48.3
		11:23	11:38	53.3	56.1	48.7
N3 (831)	22/04/2022	11:43	12:43	63.1	67.7	54.1
		11:43	11:58	61.9	65.3	54.1
		11:58	12:13	62.7	66.8	54.2
		12:13	12:28	62.7	67.4	53.9
		12:28	12:43	64.6	70	54.2
N1 (831)	08/07/2022	11:14	12:14	47.7	46.4	39.1
		11:14	11:29	45.4	46.4	41.4
		11:29	11:44	50.9	54	38.9
		11:44	11:59	44.5	46.3	42
		11:59	12:14	47	48.2	42.1
N2 (831)	08/07/2022	09:03	10:03	46.9	47.8	37.7
		09:03	09:18	48.5	48.8	41.9
		09:18	09:33	47.5	50.3	40.7
		09:33	09:48	47.7	48.6	41.3
		09:48	10:03	42	44.4	36.9
N3 (831)	08/07/2022	10:07	11:07	58.5	60.2	49.7
		10:07	10:22	57	58.9	49.2
		10:22	10:37	60.1	63.9	54.3
		10:37	10:52	56.8	59.5	53.2
		10:52	11:07	59.2	62.7	53

Discussion of Measurement Results

The measurements by SLR were taken on the boundary of the development then attenuated for distance to the nearest noise sensitive receptors. Based on the findings of the SLR annual audits the adjacent quarry is compliant with the noise emission criteria set out as part of the planning conditions. These measurements will be used to calibrate the model for the adjacent development.

4 Noise Impact Assessment

This section outlines the predicted noise impact for the operational phase of the development including:

- Existing noise levels from the adjacent quarry operations.
- Noise impact from the proposed development.
- Cumulative noise impact from the combined operations.

For the purposes of the assessment, the predictions have been undertaken to the nearest noise sensitive receptors. It is expected that all noise sensitive receptors further away will have lower onset noise levels compared to the nearest noise sensitive receptors, context has also been considered.

A model of the development using SoundPLAN 9.0 modelling software was developed to establish the noise levels from the development in a worst-case scenario. The software implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

- Distance attenuation,
- Source and receptor locations,
- Barrier effects (buildings, walls etc)
- Topographical elevations,
- Ground effects and absorption,
- Source sound power levels,
- Directivity and orientation of the source, and
- Atmospheric attenuation and meteorological effects.

The acoustic model for the site has been developed based on the attended noise survey, the information provided the site location and predicted noise sources. A worst-case scenario has been developed predicting the noise impact from the unauthorised development ie all equipment operating at the same time. As the works are dynamic across the site assumed locations have been chosen based on our knowledge of the site. All predicted values are free field façade noise levels rounded to the nearest whole number.

4.1 Noise Impact for The Adjacent Operations

The noise sources relied on for the assessment are based on Table 9-4 of the EIAR report provided by Enviroguide Consulting.

The percentage on times for the equipment was based on our understanding of the project. The noise from HGV movements and the proposed truck wash was considered as part of the assessment. The noise impact has been predicted to each of the NSLs based on the information provided to WDA. The predictions include the calibration of the model with the measurements undertaken by SLR consulting.

Table 4 summarises the predicted noise impact at each of the NSLs based on the adjacent operations, modelling predictions and the noise measurements undertaken during the annual audits.

Table 4: Predicted noise impact from the adjacent operations.

Location	Noise Limit $L_{Aeq, 10 \text{ hour}}$ (08:00-18:00) dB	Predicted Noise Development Impact $L_{Aeq, 10 \text{ hour}}$ (08:00-18:00) dB	Compliance
NSL1	55	41	Compliant
NSL2	55	42	Compliant
NSL3	55	44	Compliant
NSL4	55	43	Compliant
NSL5	55	41	Compliant
NSL6	55	47	Compliant
NSL7	55	42	Compliant
NSL8	55	44	Compliant
NSL9	55	45	Compliant
NSL10	55	42	Compliant
NSL11	55	40	Compliant
NSL12	55	38	Compliant
NSL13	55	38	Compliant
NSL14	55	44	Compliant
NSL15	55	50	Compliant
NSL16	55	43	Compliant
NSL17	55	45	Compliant
NSL18	55	44	Compliant
NSL19	55	52	Compliant

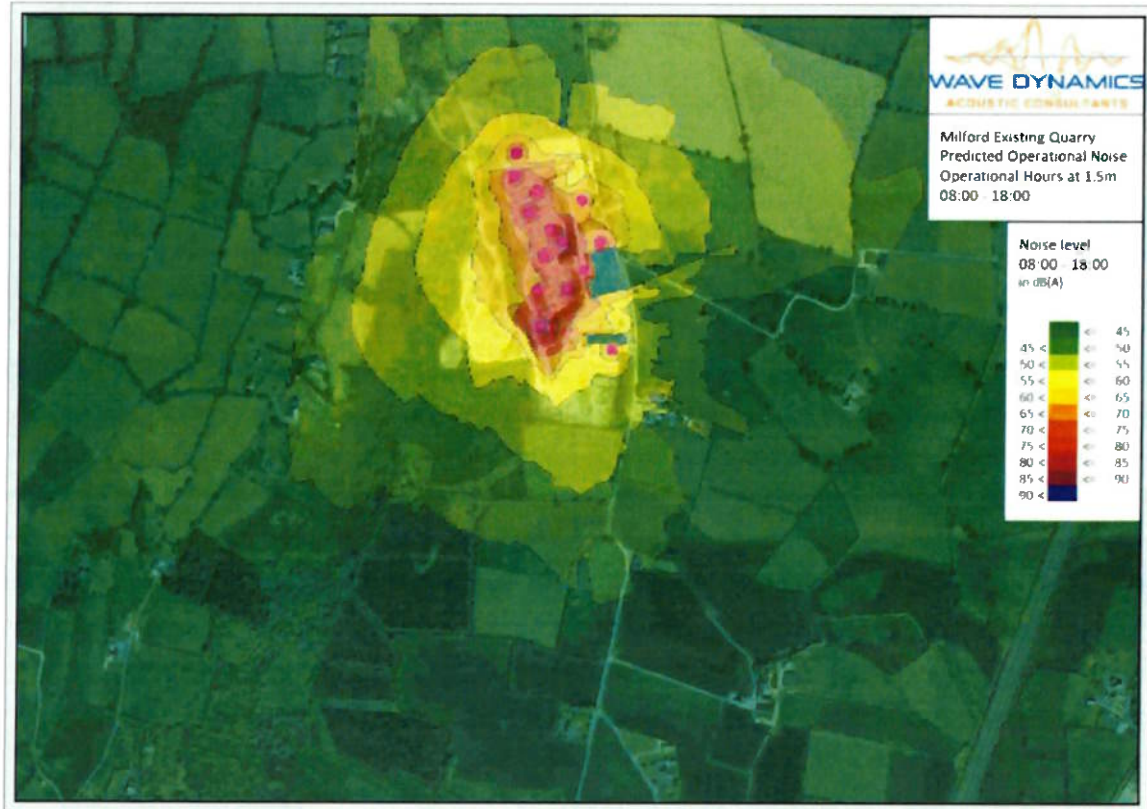


Figure 2: Grid noise map of the adjacent quarry at 1.5m during operational hours

4.2 Noise Impact for The Proposed Quarry

The noise sources relied on for the assessment are based on Table 9-4 of the EIAR report provided by Enviroguide Consulting. The percentage on times for the equipment was based on our understanding of the project. The noise from HGV movements and the proposed truck wash was considered as part of the assessment. The noise impact has been predicted to each of the NSLs based on the information provided to WDA.

Table 5 summarises the predicted noise impact at each of the NSLs based on the proposed operations, modelling predictions and the noise measurements undertaken during the annual audits.

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05 MAR 2024

LTR DATED _____ FROM Appellat

LDG- _____

ABP- 819198-24

Table 5: Predicted noise impact from the proposed development

Location	Noise Limit $L_{Aeq, 10 \text{ hour}}$ (08:00-18:00) dB	Predicted Noise Development Impact $L_{Aeq, 10 \text{ hour}}$ (08:00-18:00) dB	Compliance
NSL1	55	37	Compliant
NSL2	55	40	Compliant
NSL3	55	42	Compliant
NSL4	55	42	Compliant
NSL5	55	43	Compliant
NSL6	55	51	Compliant
NSL7	55	44	Compliant
NSL8	55	50	Compliant
NSL9	55	52	Compliant
NSL10	55	50	Compliant
NSL11	55	44	Compliant
NSL12	55	45	Compliant
NSL13	55	46	Compliant
NSL14	55	54	Compliant
NSL15	55	53	Compliant
NSL16	55	47	Compliant
NSL17	55	55	Compliant
NSL18	55	37	Compliant
NSL19	55	45	Compliant

As indicated in Figure 3 on the next page, noise screening berms have been proposed based on the site plans made available to Wave Dynamics. It is understood that the berms will be 3m high.



Figure 3: Grid noise map of the proposed quarry at 1.5m during operational hours.

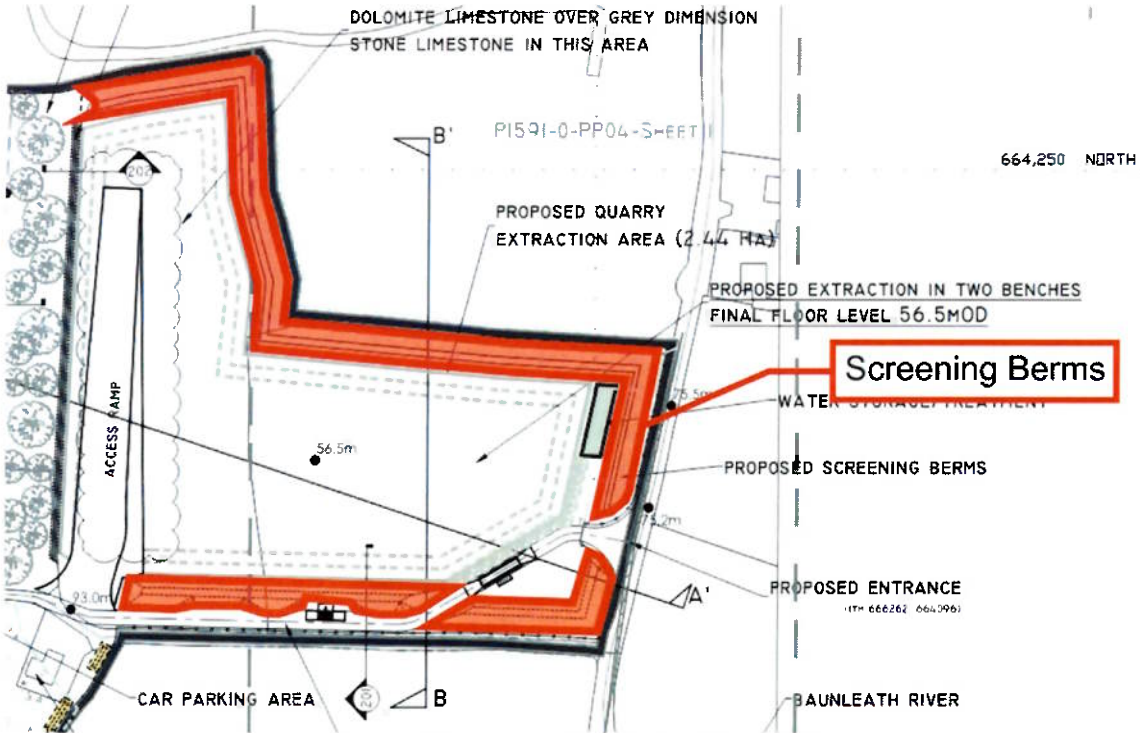


Figure 4: Proposed screening earth berms to 3m height.

4.2.1 Impact of the Additional Traffic Noise

Following a review of the additional traffic noise impact from the EIAR provided with the planning application the expected traffic volumes are expected to increase slightly. Table 6 below reproduced from the EIAR outlines the projected traffic increase for the Do Something years 2024, 2029 and 2039.

Table 6: Predicted traffic increase (Do something)

Year	Total AADT	Of which, HV	%HV
2024	415	35	8.47%
2029	447	41	9.23%
2039	477	48	10.15%

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 7 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2011).

Table 7: Magnitude of Impacts

Noise Change, dB	Magnitude of Impact
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

From Table 6, it can be seen that a predicted increase in traffic of circa 477 vehicles is expected for year 2039 with the proposed quarry in operation. A doubling of traffic volumes will lead to a 3 dB increase in noise levels, therefore a <20% increase would be expected to have an impact on the noise levels of <1dB which is considered negligible. It is not predicted that the increase in traffic on the local roads will have any negative noise impact on the development.

4.3 In-Combination and Cumulative Noise Impact

The noise sources relied on for the assessment are based on Table 9-4 of the EIAR report provided by Enviroguide Consulting. The percentage on times for the equipment was based on our understanding of the project. The noise from HGV movements and the proposed truck wash was considered as part of the assessment. The noise impact has been predicted to each of the NSLs based on the information provided to WDA. The predictions include the calibration of the model for the adjacent quarry with the measurements undertaken by SLR consulting. For the cumulative noise impact a "worst case" scenario prediction has been undertaken. This includes an assumption that the sources will be doubled on the site therefore all of the noise sources in table 9-4 of the EIAR were duplicated it also assumes all equipment is operational on the same day. The client has confirmed that this scenario is unlikely however for the purpose of the "worst case" predictions it has been considered in this instance. The percentage on time was based on our understanding of the works.

Table 8 summarises the predicted noise impact at each of the NSLs based on the adjacent operations, modelling predictions and the noise measurements undertaken during the annual audits.

Table 8: Predicted noise impact from the cumulative operations.

Location	Noise Limit $L_{Aeq, 10 \text{ hour}}$ (08:00-18:00) dB	Predicted Noise Development Impact $L_{Aeq, 10 \text{ hour}}$ (08:00-18:00) dB	Compliance
NSL1	55	46	Compliant
NSL2	55	46	Compliant
NSL3	55	48	Compliant
NSL4	55	48	Compliant
NSL5	55	47	Compliant
NSL6	55	53	Compliant
NSL7	55	48	Compliant
NSL8	55	52	Compliant
NSL9	55	53	Compliant
NSL10	55	51	Compliant
NSL11	55	47	Compliant
NSL12	55	46	Compliant
NSL13	55	47	Compliant
NSL14	55	54	Compliant
NSL15	55	55	Compliant
NSL16	55	49	Compliant
NSL17	55	55	Compliant
NSL18	55	47	Compliant
NSL19	55	54	Compliant

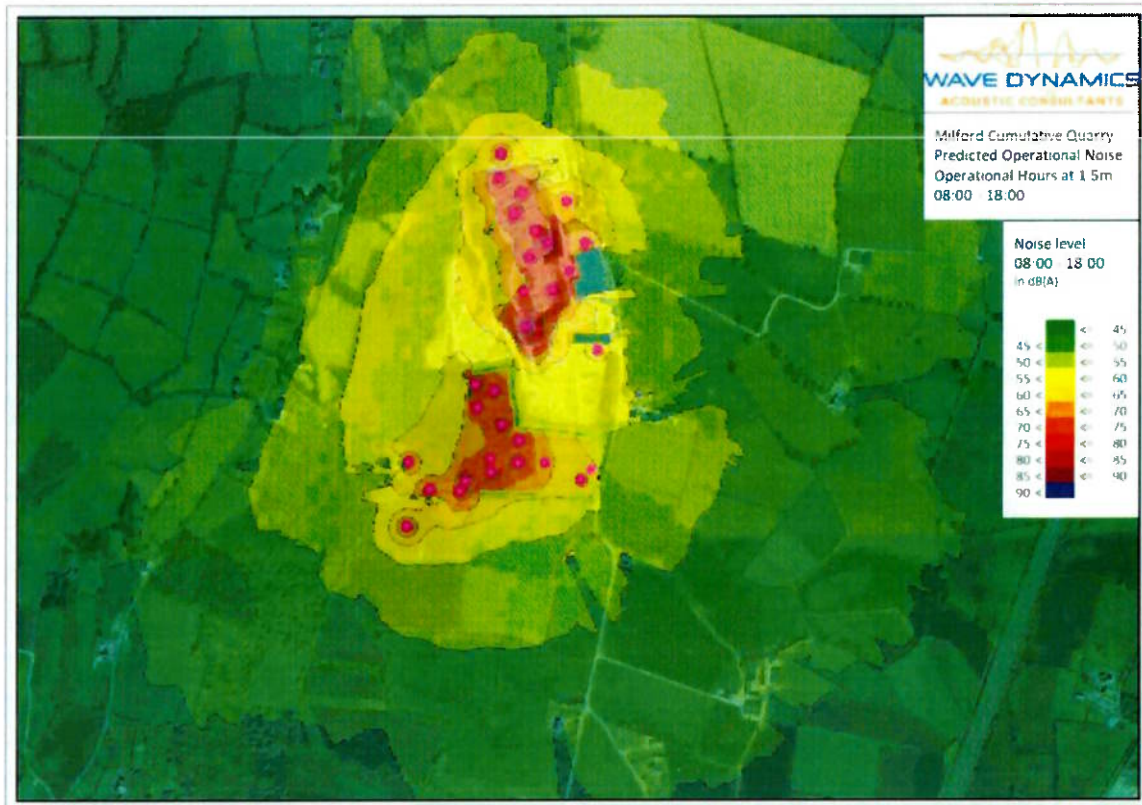


Figure 5: Grid noise map of the adjacent and proposed quarry at 1.5m during daytime hours.

Table 9 below outlines the developments with planning in the area.

Table 9: Developments with existing planning within the wider area.

Application Reg. Ref	Applicant	Development Proposal	Decision
Reg. Ref. 1764 Carlow CC	Old Leighlin Quarry Ltd.	Continuance of use of the existing permitted quarry site and existing ancillary facilities, regularised by the previous grant of substitute consent (PL01.SU0024); Lateral extension of the existing quarry void from the existing area of c.3.4 ha(ha.)increasing to total extraction area of c.4.5 ha; Deepening of the existing quarry void from the existing floor level at c.42-45m AOD to a final floor depth of c.21m AOD; Buffer zone of c.20m between the eastern extraction boundary and the public road, with construction of an earthen screening berm (1.5m high) along the eastern extraction boundary; Relocation of the employee car parking spaces (39no.) ; demolition of the existing processing factory to allow for the lateral quarry extension ; Improvements to the existing dedicated HGV site entrance to meet the necessary site line requirements Provision of a wheel wash facility ; Installation of surface water attenuation and settlement ponds for the treatment of suspended solids in the floor of the quarry; Existing rate of rock extraction to remain at c.30000 cubic metres per year	Grant permission on 26/02/18 subject to 32no. planning conditions

Application Reg. Ref	Applicant	Development Proposal	Decision
Reg. Ref. 18450 Carlow CC	Old Leighlin Quarry Ltd.	Erection of a 32-tonne gantry crane and the relocation of an existing 25-tonne gantry crane with all associated site development works	Grant permission on 22/01/19 subject to 7no. planning conditions
Reg. Ref. 15239 Carlow CC	Old Leighlin Quarry Ltd.	Construction of an office/reception building, wastewater treatment system with polishing filter, proposed carpark area, proposed weighbridge with wheel wash and underground water storage tanks, boundary fencing, new splayed entrance with all associated site development works	Grant permission on 16/03/16 subject to 32no. planning conditions
Reg. Ref. 2260 Carlow CC	Michael Meaney	Change of use from agricultural land to a domestic home and garden, the development will consist of a two storey and single storey dwelling house and a single storey garage, a new entrance and driveway, the boring of a well, the installation of a Septic tank and percolation area and all associated site works	Grant permission on 12/04/2022 subject to 15no. planning conditions
Reg. Ref. 15249 Carlow CC	Mary McDowall	Alterations to house design of previous planning permission ref 14/350 and associated site works	Grant permission on 18/11/2015
Ref. Reg. 14350 Carlow CC	Mary McDowall	Alterations and extension to existing dwelling to include the following: alterations to existing dwelling to a 2no. bedroom granny flat with internal connection to new extension of a 3no. bedroom dwelling, with new garage, widening of existing entrance, new agricultural entrance and agricultural barn and associated site works	Grant permission on 11/05/2015
Ref. Reg. 22326 Carlow CC	Martin and Chloe Cummins	Construction of a storey and a half style dwelling with domestic garage, new entrance, bored well, proprietary wastewater treatment system and all associated site works	Grant permission on 21/11/22
Ref. Reg. 17140 Carlow CC	George Gahan	Erect milking parlour with collection area, slatted tank, dairy, powerhouse, race, crush, silo, and all associated site works.	Grant permission on 23/06/17 subject to 12no. planning conditions
Ref. Reg. 20277 Carlow CC	Philip Kavanagh	For an extension to an existing domestic shed and all ancillary works	Grant permission on 01/10/20 subject to 6no. planning applications
Ref. Reg 1949 Carlow CC	Aidan Nolan & Carina Tighe	Provision of one new dwelling house with detached domestic garage, new vehicular access from public road, domestic wastewater treatment system & polishing filter, private well and all associated site works	Grant permission on 10/04/19 subject to 16no. planning conditions
Ref. Reg. 21354 Carlow CC	Adrian Lennon	Construction of a Single Storey Dwelling, detached garage, on-site wastewater treatment system, bored well, new splayed entrance and all associated site development works	Grant permission on 09/06/22 subject to 15no. planning conditions
Ref. Reg. 18111 Carlow CC	Ballyknockan Homes Ltd.	The construction of 39no. new dwellings to include; 25no. Terraced two storey houses (2 & 3 beds), 4no. Semi-Detached bungalow houses (2 beds) and 10no. Semi-	Refused on 21/03/19 subject to

Application Reg. Ref	Applicant	Development Proposal	Decision
		detached two storey houses (2 & 3 beds); with the provision of rear access into terraced houses for bin storage, and associated parking; together with the completion of all previously granted landscaped areas, roads, footpaths and site development works associated with the previously granted development under PL Reg. no. 03/430 (PL01.206855)	3no. planning reasons
Ref. Reg. 16152 Carlow CC	Drive Forecourt Services Ltd.	Internal layout alterations for the provision of an off licence within existing retail store along with some minor elevational changes to front and side elevations including new shop signage	Granted on 13/07/16 subject to 6no. planning conditions
Ref. Reg. 21171 Carlow CC	Drive Forecourt Services Ltd.	Permission for alterations / extension to existing retail shop at ground floor level. Demolition of 1no. existing domestic garage and connection to existing mains services and all associated and ancillary site works	Granted on 15/09/21 subject to 10no. planning conditions
Reg. Reg. 21444 Carlow CC	Paddy Maher	Construction of (a) a slatted cubicle house, (b) an unroofed slatted tank, (c) a calf house, (d) a new milking parlour, (e) a collecting yard with slatted tanks and associated site works	Granted on 18/01/22 subject to 12no. planning conditions

The potential for cumulative and in-combination effects on the designated sites in the zone of influence were fully considered. The assessments carried out as part of the developments in the wider area were consulted.

4.4 Results Conclusion

The assessment considered the noise from activities from the adjacent operations, proposed operations, in-combination noise impacts (from both the proposed and adjacent quarries in operation simultaneously), and the cumulative noise impacts (with other developments). The assessment predicted that **the project criteria will be achieved at** the noise sensitive receptors for all scenarios.

The development has been assessed based on the same criteria applied at planning ie 10 hour L_{Aeq} . Typically these developments are assessed over a 12 hour period in line with the Quarry and Ancillary Guidelines. In addition to the assessment vs the planning conditions on the adjacent permitted development. WDA have considered the noise impact over the 12 hour period. It is predicted that the noise impact from the development will achieve both the 10hour L_{Aeq} and 12hour L_{Aeq} criteria based on the information provided.

The noise impact from the additional traffic on the roads due to the expansion of the development has also been considered. Based on the predicted traffic impact it is not expected the additional traffic will have a negative noise impact.

5 Other Considerations

This section outlines other conditions for the project including groundbourne vibration and overpressure from blasting.

5.1 Vibration Impact from Blasting

We understand that blasting on the site is very infrequent. The vibration impact from blasting has been conditioned as part of the planning conditions for the site, planning condition No. 7a of the P. Reg. Ref. No. 17/64 states:

- a) *"Vibrations levels from blasting shall not exceed a peak particle velocity of 12 millimetres /second when measured in any three mutually orthogonal directions at any sensitive location. The peak particle velocity relates to low frequency vibration of less than 40 hertz. Blasting shall not give rise to air overpressure values at sensitive locations which are in excess of 125 dB (Lin) max peak with a 95 per cent confidence limit. No individual air overpressure value shall exceed the limit value by more than 5 dB (Lin)."*

Although air overpressure can be controlled largely at source by careful attention to blast design and implementation, once detonation occurs the prevailing atmospheric conditions play a significant role in determining air overpressure values at distance from the blast site. As air overpressure is transmitted through the atmosphere, meteorological conditions such as wind speed and direction, temperature, cloud cover and humidity will all affect the intensity of the air overpressure experienced at a distance from a blast.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above.

BS7385 also provides further context with regards to air overpressure:

"Windows are generally the weakest parts of a structure exposed to air overpressure. Research by the United States Bureau of Mines has shown that a poorly mounted window that is pre-stressed can crack at around 150 dB(lin), with most windows cracking at around 170 dB(lin). Structural damage would not be expected at air overpressure levels below 180 dB(lin)."

Data from blasting has been provided to WDA for review from 2017 and 2021 are represented in Table 10 below. Appendix B includes the blast records relied on.

Table 10: Results from onsite blasting.

Location	Date	Peak Particle Velocity (mm/sec)			Air Over Pressure (dBA)
		Tran	Vert	Radial	
Quarry office	24/02/2021	8.573	11.811	11.303	118.5
Quarry office	28/08/2021	7.493	9.906	9.398	123
Brennans	22/11/2016	1.600	2.104	0.733	116.7
Quarry Bungalow	08/06/2017	2.5400	2.8575	1.5875	111.2

From the measurement results the vibration impact from blasting has not exceeded the planning requirements at the measurement location previously.

We understand that the following precautions are undertaken within the quarry to minimise disturbance during blasting when it takes place:

- Air overpressure is minimised through proper blast design, avoiding the detonation of large unconfined charges, and by consideration of atmospheric conditions before blasting.
- A siren is sounded for one minute ten minutes before the blast and for another 30 seconds one minute before the blast. The siren is sounded for another one minute after the inspection just before the blast.
- Regular monitoring of blast and blasting practice is carried out to ensure strict adherence to the present standards. All drilling, blasting, and shot firing is carried out by Irish Industrial Explosives.

Other recommendations to minimise blasting impact include:

- The use of delayed blasting techniques.
- All shot holes will be drilled to exact specifications by specialist contractors.
- Drilling information to be passed to shot firer to allow for the correct charge to be selected.
- Provide advance notice to local receptors.
- Keep complaints log.

It is recommended to ensure that the vibration impact from blasting does not exceed the project criteria for both the adjacent development and the proposed development that the recommendations outlined in this report are incorporated. Regular monitoring from blasting must be undertaken to confirm compliance with project criteria.

5.2 Operational Vibration

The typical vibration generating activities on the development include rock breaking HGVs travelling on uneven surfaces can also generate transient vibrations. No piling or ground improvement methods such as dynamic consolidation are proposed.

Prediction of vibration levels at the sensitive receptors is complex and dependent on several variables such as the excavation method, the nature of the used equipment, the properties of the subsoil, the heterogeneity of the soil, rock etc, the distance to the receptor and the dynamic characteristic of the adjacent structures.

Best practice guidance is taken from British Standard BS 5228:2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2 Vibration.

The standard recommends that for a soundly constructed residential property and similar structures (in good repair), the threshold for minor or cosmetic (i.e. non- structural) damage should be taken as a Peak Particle Velocity (PPV) (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:

Table 11: Transient Vibration Guide Values for Cosmetic Damage

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:			
Building Type	Less than 15Hz	15 to 40Hz	40Hz and above
Light framed structures/ residential buildings	12 mm/s	20 mm/s	50 mm/s

Table 12: Vibration Impact on Humans

Vibration Level mm/sec PPV	Effect
0.14	Vibration might just be perceptible in the most sensitive in the most sensitive situations for most vibration frequencies.
0.3	Vibration might just be perceptible in residential environments.
1	A vibration level of this magnitude is likely to cause complaint.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

As can be seen from Table 12 the limits for humans are much lower than for cosmetic damage to buildings.

With regard to physical damage to properties, extensive research has been carried out, the most prominent review undertaken by the United States Bureau of Mines (USBM) concluded that damage to a structure could occur if the dynamic stresses induced in a structure exceed the allowable design stress for the specific building material ie take into consideration the suitability of the receiving building. Classifications of building damage range from very fine plaster cracking up to major cracking of structural elements. When defining damage to buildings, the following classification is used:

- Cosmetic – the formation of hairline cracks or the growth of existing cracks in plaster, dry wall surfaces or mortar joints.
- Minor – the formation of large cracks or loosening or falling of plaster on dry wall surfaces, or cracks through bricks/concrete blocks.
- Major or Structural – damage to structural elements of the building

Studies by USBM concluded that vibration levels more than 50 mm/sec PPV are required to form structural damage. The onset of cosmetic damage can be associated with lower levels. Based on the study vibration levels between 19 mm/sec PPV and 50 mm/sec PPV are generally considered safe. It should be noted that these limits are for the worst-case structure conditions and that they are independent of the number of blasting events and their durations.

BS5228-2 provides some historic data on vibration levels measured on sites from different types of piling equipment under specific conditions e.g. soil type, however there is no data for other types of equipment. Taking account of the distances to nearby receptors. From the line of the proposed road and notwithstanding ground conditions present, it is not anticipated that the vibration criteria in Tables 9-1817 and 9-19 will not be exceeded.

Nevertheless, precautionary vibration monitoring at the boundary should be undertaken as part of the monitoring as proposed to ensure compliance with the limits or threshold values outlined will be achieved.

6 Conclusion

Wave Dynamics were engaged by Milford Quarries Limited as the acoustic consultants to undertake a noise impact assessment for the Proposed Quarry – Bannagagole, Old Leighlin, County Carlow.

We understand that the development was recently rejected at planning stage (Carlow County Council Ref 23/60042). CCC felt that the cumulative noise impact from the adjacent quarry and proposed development had not been adequately assessed. The development description is as follows:

The proposed quarry void will be extracted to a depth of 2 no. benches of c. 10m from top of bedrock, with a final floor level of c. 56.5m above Ordnance Datum (AOD) with a proposed rate of rock extraction of c.30,000 cubic metres (84,000 tonnes) per annum. A proposed working area of c. 1.2 hectares to the south of the extraction zone will provide for the crushing and processing of the unusable stone and storage of dimensional stone and will include machinery storage shed, staff welfare facilities, wastewater holding tank, weighbridge and parking area.

The proposed development will also include for earthen screening berms to a height of c. 3 m, a wheelwash facility; installation of surface water attenuation and settlement ponds for the treatment of suspended solids in the floor of the quarry; soil storage area with an average storage depth of c. 4 m and all other site development works above and below ground including the restoration of the final quarry void (extractive area).

Access to the proposed development will be facilitated by a heavy goods vehicle (HGV) site entrance from the Local Road to the east of the proposed site via a proposed access haul road.

Noise Impact Assessment

A noise impact assessment was undertaken to predict the noise impact from the development when it was in operation. The assessment considered the noise from activities from the adjacent operations, proposed operations and the cumulative noise impact from the proposed and adjacent quarries in operation simultaneously. The proposed operations were assessed on a “worst case” scenario basis. This included predicting a worst-case scenario noise impact including assessing the development for more equipment than will be used in practice. Consideration was also given to proposed developments in the area and the noise impact as part of the cumulative assessment.

The noise sources from the adjacent development, proposed development, in-combination noise impacts (from both the proposed and adjacent quarries in operation simultaneously), and the cumulative noise impacts (with other developments) were considered and modelled. The assessment predicted that **the project criteria will be achieved** at the noise sensitive receptors for all scenarios.

The noise impact from the additional traffic on the roads due to the expansion of the development was considered. Based on the predicted traffic impact it is not expected the additional traffic will have a negative noise impact.

Other Considerations

Other considerations on the development included the review of the vibration impact from blasting and general operational activities. We understand that blasting will be very infrequent on the project. A review of the previous monitoring conducted for blasting at the adjacent quarry indicated that the project criteria was achieved during the blasting with the levels measured below the maximum levels allowable. It is recommended that the same measures including, monitoring, delay blasting etc are incorporated for the proposed development.

Vibration from operational sources was considered, it is predicted that the vibration from the operational sources on the development will not provide a significant vibration impact however it is recommended that precautionary vibration monitoring is conducted on the boundary as part of the monitoring program for the proposed development.

Appendix A- Glossary of Terms

Ambient Noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from all the noise sources in the area.
Background Noise	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}).
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'-weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L _{A90}	A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L _{Aeq}	A-weighted, equivalent continuous sound level.
L _{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak
L _{den}	day-evening-night noise level, the A-weighted, L _{eq} (equivalent noise level) over a whole day, but with a penalty of 10 dB(A) for night-time noise (23:00-07:00) and 5 dB(A) for evening noise (19:00-23:00), also known as the day evening night noise indicator.
PPV	Peak Particle Velocity (PPV) is defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position and is measured in mm/s.

Appendix B- Blast Records

Date/Time Vert at 15:30:59 November 22, 2016
 Trigger Source Geo: 0.500 mm/s, Mic: 135.0 dB(L)
 Range Geo: 254.0 mm/s
 Record Time 5.0 sec at 2048 sps
 Operator/Setup: Sean Ward/Exsol 1 MMB

Serial Number UM8058 V 10-82 Micromate (SEE)
 Battery Level 3.8 Volts
 Unit Calibration October 31, 2016 by Datum Monitoring
 File Name UM8058_20161122153059.IDFW
 Scaled Distance 47.0 (420.0 m, 80.0 kg)

Notes

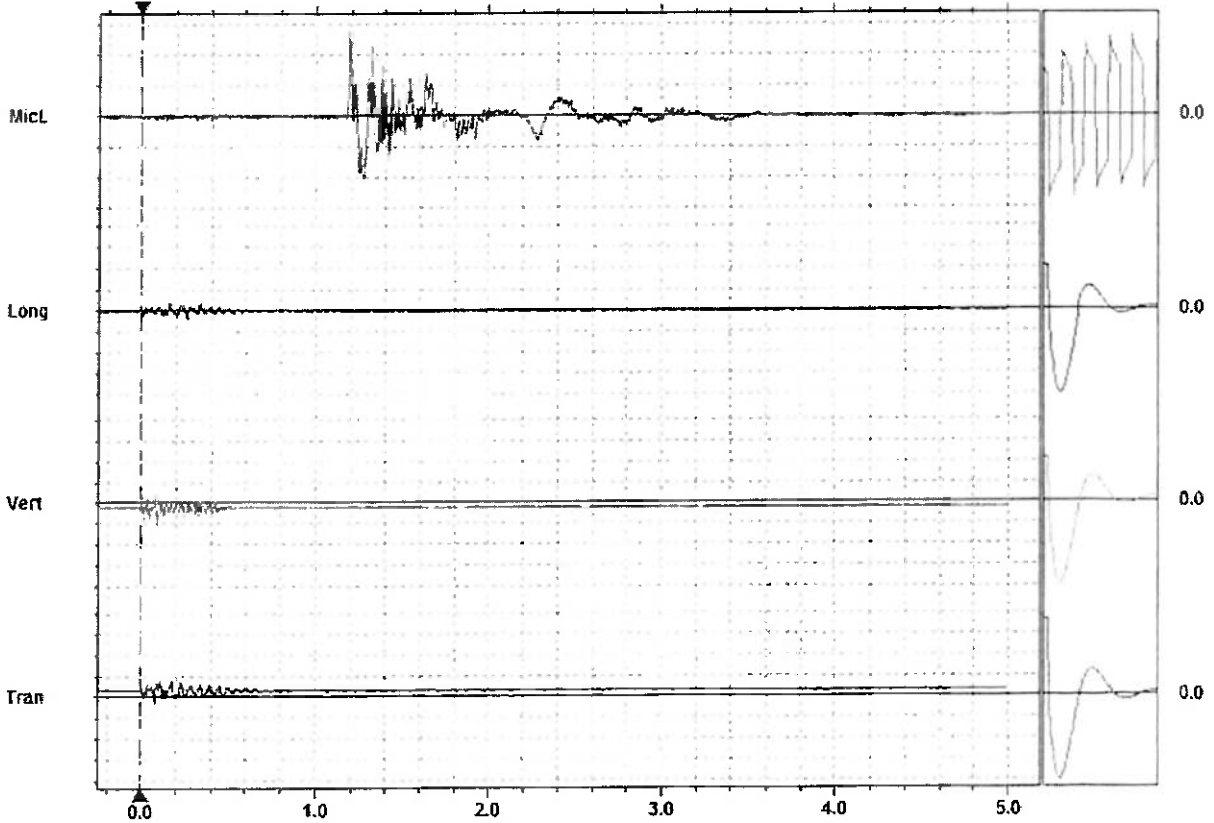
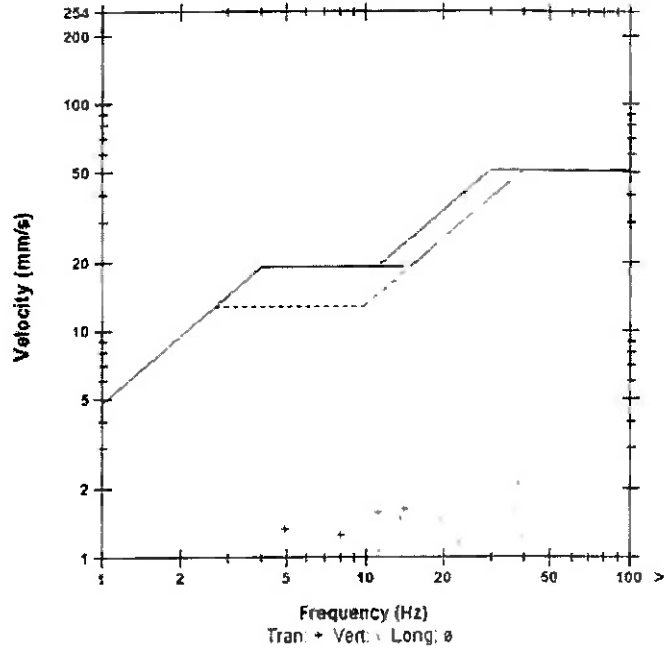
Location: Brennans
 Client: Old Leighlin Quarnes
 User Name: Exsol Ltd
 General:

Microphone: Linear Weighting
 PSPL: 118.7 dB(L) at 1.185 sec
 ZC Freq: 15.5 Hz
 Channel Test: Passed (Freq = 19.7 Hz, Amp = 1487 mv)

	Tran	Vert	Long	
PPV	1.600	2.104	0.733	mm/s
PPV	55.08	57.46	48.30	dB
ZC Freq	14.0	38	30	Hz
Time (Rel. to Trig)	0.110	0.093	0.258	sec
Peak Acceleration	0.031	0.076	0.026	g
Peak Displacement	0.081	0.056	0.006	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.9	Hz
Overswing Ratio	3.5	3.3	3.8	

Peak Vector Sum: 2.535 mm/s at 0.093 sec

USBM RI8507 And OSMRE



Time Scale: 0.20 sec/div Amplitude Scale: Geo: 2.000 mm/s/div Mic: 5.000 ba.(L)/div

Sensor Check

SuperGraphics - Report

Company: **KILKENNY LST OLD LEIGHGLIN**

Unit #: 4043

28-Sep-21 at 16:04:46 Event # 13

Location: **QUARRY OFFICE**

Operator: **CK**

Notes: **HSM AT 349DEGREES**

Record Duration: 3.0 sec
 Sample Rate: 1024/sec
 Last Calibration: 15Jun21

Distance: N Wgt. Per Delay: N Scaled Distance: 0.0

Seismic

Channel	Radial	Transverse	Vertical
Velocity (mm/s)	9.398	7.493	9.906
Frequency (Hz)	28.40	46.50	42.60
Displacement (mm)	0.0527	0.0256	0.0370
Acceleration (g's)	0.171	0.223	0.270
Trigger >>> Peak	405.3	328.1	409.2

Gain: 2 Trigger: .572 mm/s Vector Sum: 12.57 mm/s @ 42.67 Hz

Air

Measurement	Value	Trigger >>> Peak
kPa	.02922	592.8
dBL	123	
Hz	9.3	

Gain: 1 Trigger: 116 dBL

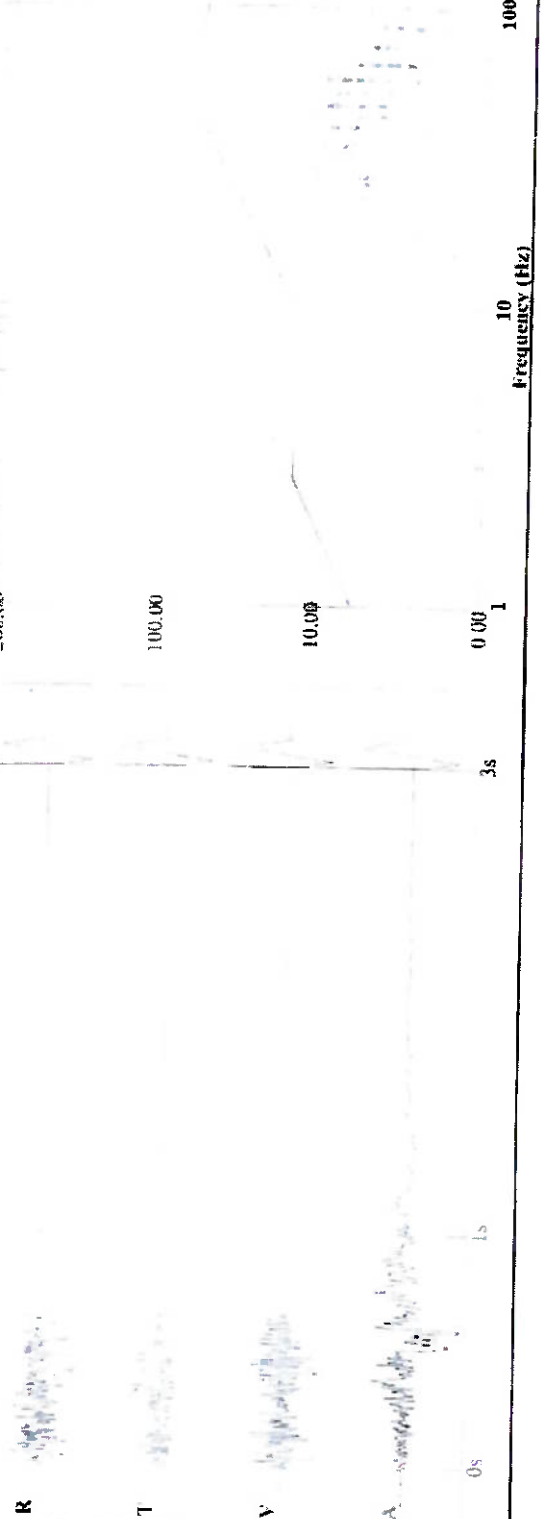
Waveform Analysis / Frequency Plot

Seismic Scale: 16.26 mm/s/div

Air Scale: .03176 kPa/div

USBM Limits (RI 8507, 1980)

Velocity (mm/s)





**IRISH INDUSTRIAL EXPLOSIVES LTD.
BLAST VIBRATION REPORT**

Company:	Kilkenny Limestone
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Date:	24th February 2021
Reference #:	1087-21

BLAST DATA

# of Holes	Hole size	Inclination	Depth	Burden	Spacing	Total Charge	# of Delays	M.I.C.	Notes	Blast Time
	mm	Degrees	m	m	m	Kg		Kg		
40	72	0 - 27°	13.5	3.4	1.8	1,050	76	25		Blast @ 15:34

VIBROGRAPH DATA

	Residence	Nomis	Plan Distance	Bearing	H	T	V	AOP
		unit #	m	degrees	mm/sec	mm/sec	mm/sec	dB
Nomis #1	Quarry Office	4219	120	318°	11.30	8.57	11.81	118.5
Nomis #2								
Nomis #3								
Nomis #4								
Nomis #5								
Nomis #6								
Nomis #7								

A print-out of the vibration and AOP levels is not available when the Nomis unit is not triggered.

Signature: 

SuperGraphics - Report

Company: **KILKENNY LST OLD LEIGHGLIN Q.**

Telephone: (205)592-2488 x 23

24/02/2021 at 15:34:49 Event # 3

Unit #: 4219

Location: **QUARRY OFFICE**

Operator: CK

Notes: **120M AT 318 DEGREES**

Record Duration: 3.0 sec
Sample Rate: 1024/sec
Last Calibration: 04Feb21

Distance: N Wgt. Per Delay: N Scaled Distance: 0.0

Seismic

Gain: 2 Trigger: .572 mm/s Vector Sum: 15.02 mm/s @ 51.20 Hz

Channel	Radial	Transverse	Vertical
○ Velocity (mm/s)	11.303	8.573	11.811
Frequency (Hz)	42.60	46.50	36.50
Trigger >>> Peak	635.7	39.1	107.4

Air

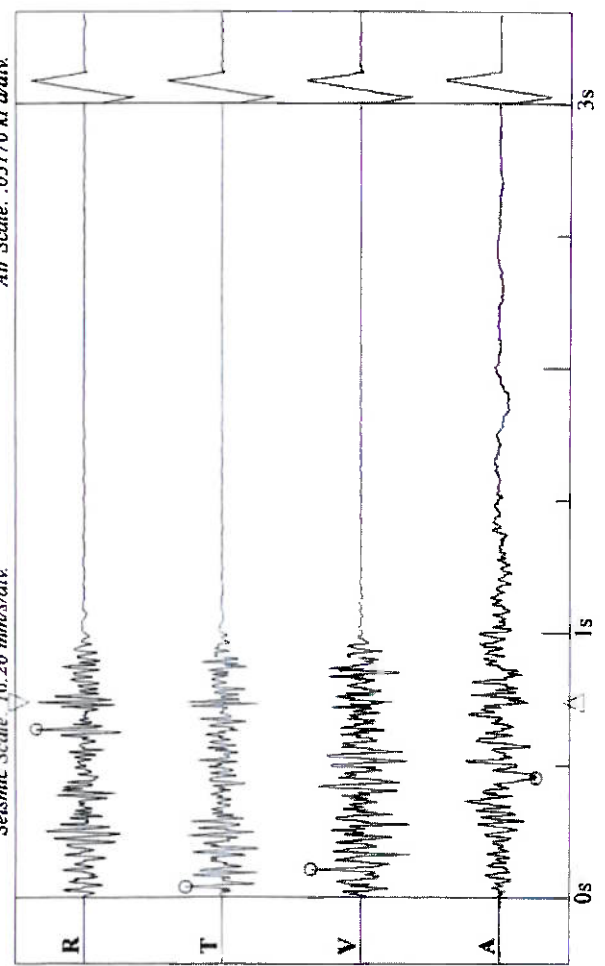
Gain: 1 Air Trigger: N

Measurement	Value	Trigger >>> Peak
kPa	.0167	453.1
dBIL	118.5	
Hz	10.8	

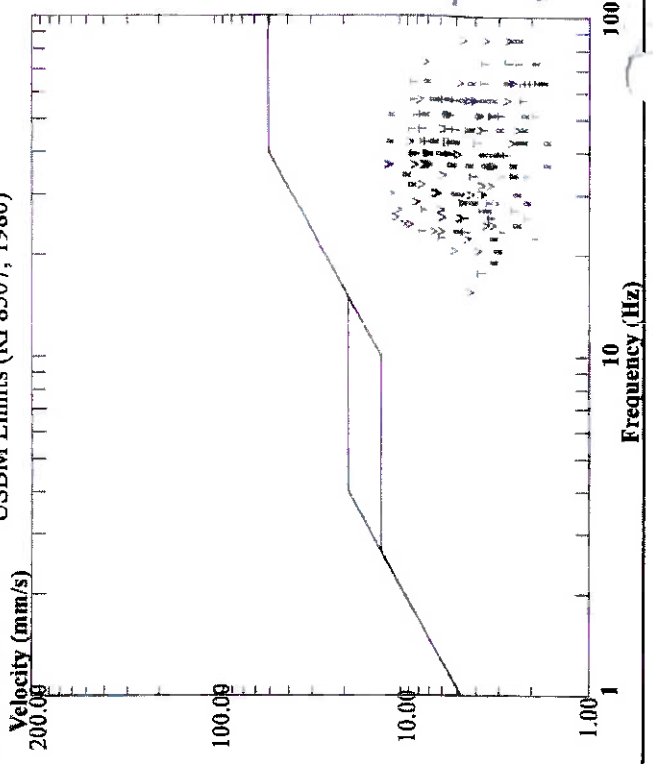
Waveform Analysis / Frequency Plot

Air Scale: .03176 kPa/div.

Seismic Scale: 16.26 mm/s/div.



USBM Limits (RI 8507, 1980)



IRISH INDUSTRIAL EXPLOSIVES LTD.

VIBROGRAPH REPORT

Company: Old Leighlin Quarry, Old Leighlin, Co. Carlow

Date	8th June 2017
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Reference No.	1173-17
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BLAST DATA

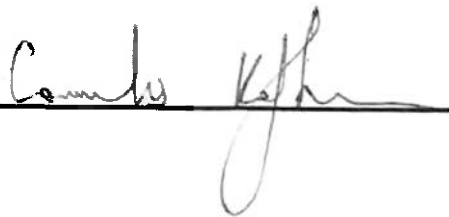
No. of Holes	Diam. mm	Inclination °	Depth m	Burden m	Spacing m	Total Charge kg	No. of Delays	Max. Inst. Charge kg	Period No.	Remarks
95	72	0°	4.6	2.1	2	525	95	8		

VIBROGRAPH DATA

	Location 1	Location 2	Location 3
Type of Instrument	4085		
Plan Distance from Blast (m)	170		
Relative Position to Blast	206°		

	Particle Velocity mm/sec	Frequency Hz	Amplitude mm	Air Over-pressure dBL
Location 1 Quarry Bungalow	Horizontal Comp	1.59		111.2
	Transverse Comp	2.54		
	Vertical Comp	2.86		
Location 2	Horizontal Comp			
	Transverse Comp			
	Vertical Comp			
Location 3	Horizontal Comp			
	Transverse Comp			
	Vertical Comp			

Signature: _____



NOMIS

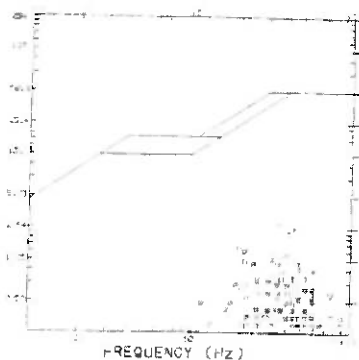
SUPERGRAPH

EVENT: 0134
08-JUN-17 15:50:58
INSTRUMENT: 4065
WAVEFORM MODE
BATTERY VOLTAGE: 8.08
COPY: 1/1
NOTES:
SANDBAG
COMPANY: OLD LEIGHOLIN QUARRY
LOCATION: QUARRY BUNGLOW
DISTANCE TO SOURCE: N
WEIGHT PER DELAY: N
OPERATOR: CK
SEIS TRIG: (mm/s) 0.5080
AIR TRIG: (dB) 100
SAMPLE RATE: 1024
SENSOR TYPE: X2 - 260.10 mm/s
SENSITIVITY: HIGH
RECORD TIME: (secs) 5

RESULTS

	R	T	V
PPV(mm/s):	1.5875	2.5400	2.8575
FRQ(Hz):	20.4	39.9	32.0
DISP(mm):	0.0124	0.0103	0.0142
ACC(g):	0.0207	0.0839	0.0585
PE IR:	111.2dB	6.0Hz	

USB/OSMRE REPORT



GRAPHICAL RECORD

TIME = 0.500 sec/div
AIR = 0.15884 mbar/div
R, T, V = 4.06 mmbs/div





Event Report



Date/Time Vert at 15:30:59 November 22, 2016
 Trigger Source Geo: 0.500 mm/s, Mic: 135.0 dB(L)
 Range Geo: 254.0 mm/s
 Record Time 5.0 sec at 2048 sps
 Operator/Setup: Sean Ward/Exsol 1 MME

Serial Number UM8058 V 10-82 Micromate (SEE)
 Battery Level 3.8 Volts
 Unit Calibration October 31, 2016 by Datum Monitoring
 File Name UM8058_20161122153059 (DFW)
 Scaled Distance 47.0 (420.0 m, 80.0 kg)

Notes

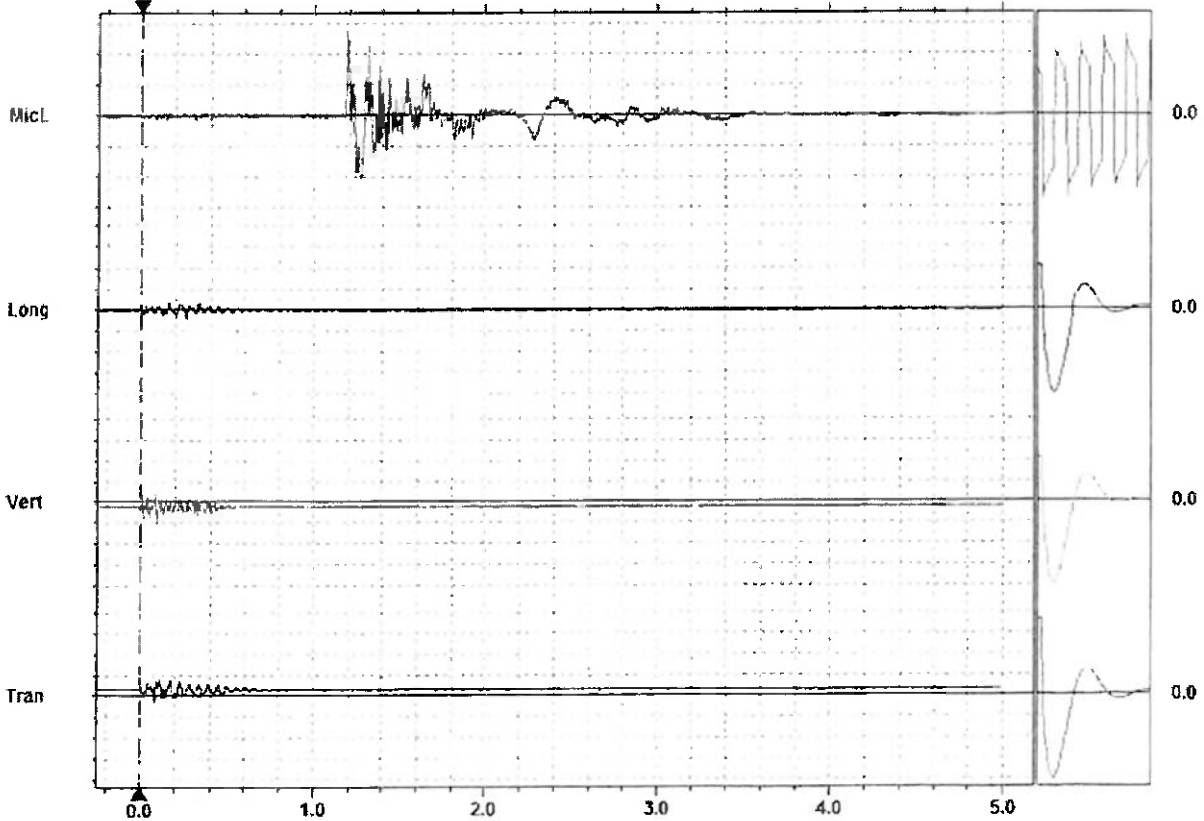
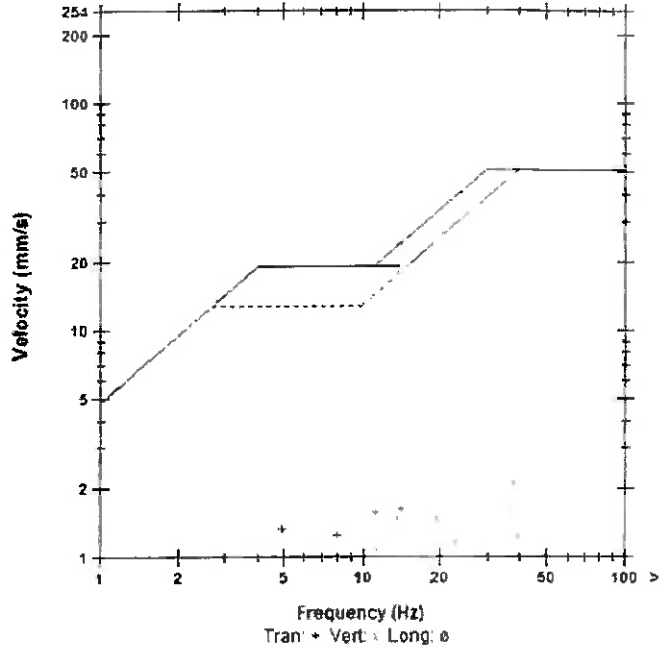
Location: Brennans
 Client: Old Leighlin Quames
 User Name: Exsol Ltd
 General:

Microphone: Linear Weighting
 PSPL: 116.7 dB(L) at 1.185 sec
 ZC Freq: 15.5 Hz
 Channel Test: Passed (Freq = 19.7 Hz Amp = 1487 mv)

	Tran	Vert	Long	
PPV	1.600	2.104	0.733	mm/s
PPV	55.08	57.46	48.30	dB
ZC Freq	14.0	38	30	Hz
Time (Rel. to Trig)	0.110	0.093	0.250	sec
Peak Acceleration	0.031	0.076	0.026	g
Peak Displacement	0.081	0.058	0.066	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.9	Hz
Overswing Ratio	3.5	3.3	3.8	

Peak Vector Sum: 2.535 mm/s at 0.093 sec

USBM RI8507 And OSMRE



Sensor Check

SuperGraphics - Report

Company: **KILKENNY LST OLD LEIGHGLIN**

Telephone: 1205592-2488 x.23

Unit #: 4043 28-Sep-21 at 16:04:46 Event # 13

Location: **QUARRY OFFICE**

Operator: **CK**

Notes: **11SM AT 349DEGREES**

Record Duration: 3.0 sec
 Sample Rate: 1024/sec
 Last Calibration: 15Jun21

Distance: N Wgt. Per Delay: N Scaled Distance: 0.0

Seismic

Channel	Radial	Transverse	Vertical
Velocity (mm/s)	9.398	7.493	9.906
Frequency (Hz)	28.40	46.50	42.60
Displacement (mm)	0.0527	0.0256	0.0370
Acceleration (g's)	0.171	0.223	0.270
Trigger >>> Peak	405.3	328.1	409.2

Gain: 2 Trigger: .573 mm/s Vector Sum: 12.57 mm/s @ 42.67 Hz

Air

Measurement	Value	Trigger >>> Peak
kPa	.02922	592.8
dB	123	
Hz	9.3	

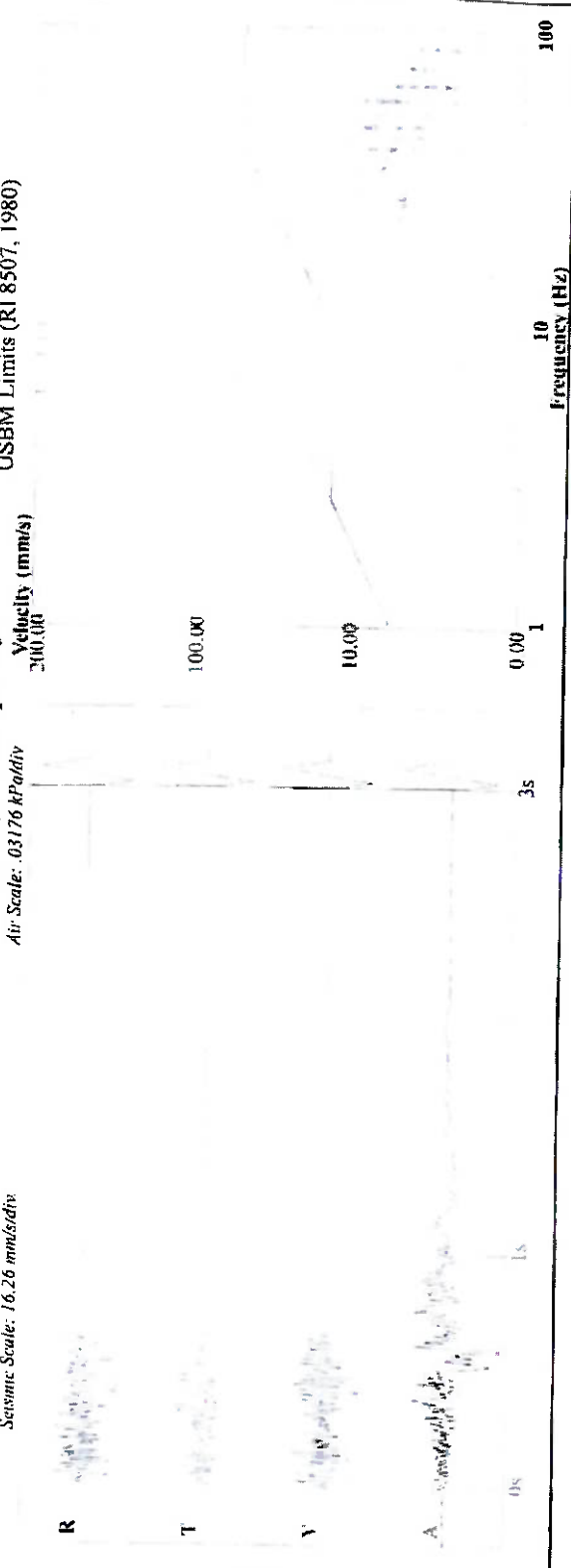
Gain: 1 Trigger: 116 dB

Waveform Analysis / Frequency Plot

Seismic Scale: 16.26 mm/sec/div

Air Scale: 0.3176 kPa/div

USBM Limits (RI 8507, 1980)





**IRISH INDUSTRIAL EXPLOSIVES LTD.
BLAST VIBRATION REPORT**

Company:	Kilkenny Limestone
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Date:	24th February 2021
Reference #:	1087-21

BLAST DATA

# of Holes	Hole size	Inclination	Depth	Burden	Spacing	Total Charge	# of Delays	M.I.C.	Notes	Blast Time
	mm	Degrees	m	m	m	Kg		Kg		
40	72	0 - 27°	13.5	3.4	1.8	1,050	76	25		Blast @ 15:34

VIBROGRAPH DATA

	Residence	Nomis	Plan Distance	Bearing	H	T	V	AOP
		unit #	m	degrees	mm/sec	mm/sec	mm/sec	dB
Nomis #1	Quarry Office	4219	120	318°	11.30	8.57	11.81	118.5
Nomis #2								
Nomis #3								
Nomis #4								
Nomis #5								
Nomis #6								
Nomis #7								

A print-out of the vibration and AOP levels is not available when the Nomis unit is not triggered.

Signature: 

SuperGraphics - Report

Company: **KILKENNY LST OLD LEIGHGLIN Q.**

Unit #: 4219

24/02/2021 at 15:34:49 Event # 3

Location: **QUARRY OFFICE**

Operator: CK

Notes: 120M AT 318 DEGREES

Record Duration: 3.0 sec
Sample Rate: 102.4/sec
Last Calibration: 04Feb21

Distance: N Wgt. Per Delay: N Scaled Distance: 0.0

Seismic

Channel	Radial	Transverse	Vertical
○ Velocity (mm/s)	11.303	8.573	11.811
Frequency (Hz)	42.60	46.50	36.50
Trigger >>> Peak	635.7	39.1	107.4

Gain: 2 Trigger: .572 mm/s Vector Sum: 15.02 mm/s @ 51.20 Hz

Air

Measurement	Value	Air Trigger: N
kPa	.0167	Trigger >>> Peak
dBL	118.5	453.1
Hz	10.8	

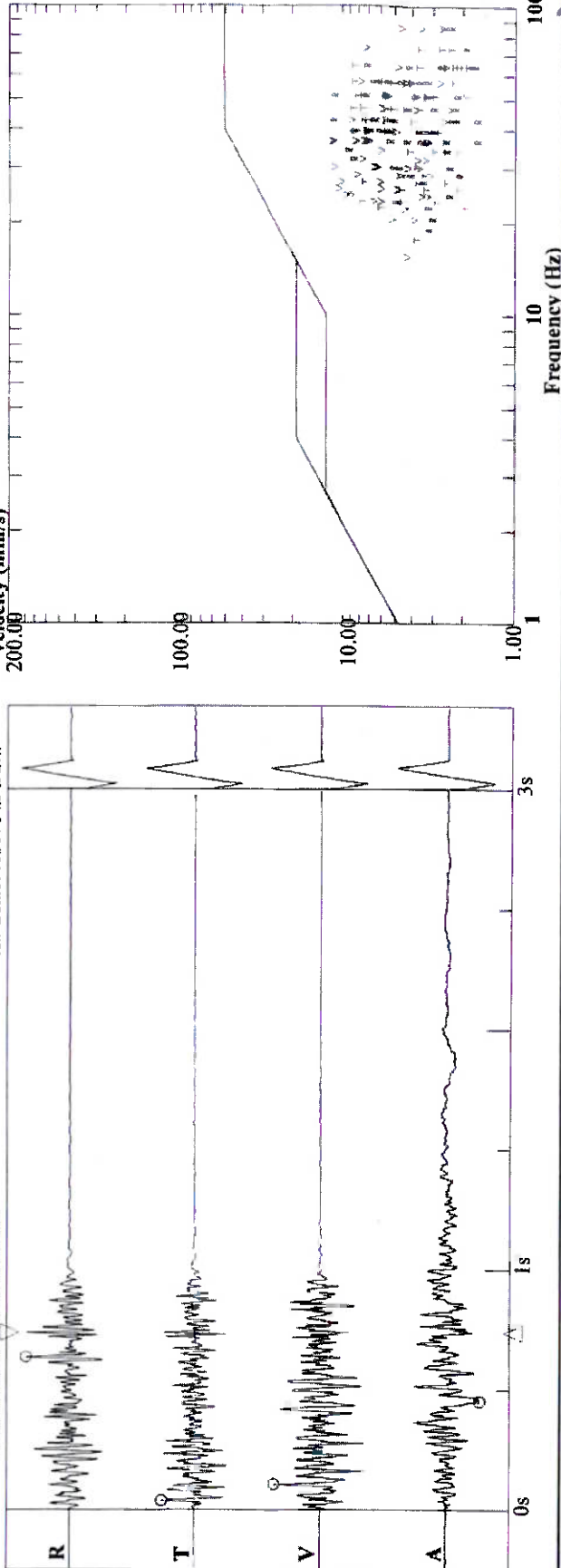
Gain: 1

Waveform Analysis / Frequency Plot

Seismic Scale: 16.26 mm/s/div

Air Scale: .03176 kPa/div

USBM Limits (RI 8507, 1980)



IRISH INDUSTRIAL EXPLOSIVES LTD.

VIBROGRAPH REPORT

Company: Old Leighlin Quarry, Old Leighlin, Co. Carlow

Date	8th June 2017
------	---------------

Reference No.	1173-17
---------------	---------

BLAST DATA

No. of Holes	Diam. mm	Inclination °	Depth m	Burden m	Spacing m	Total Charge kg	No. of Delays	Max. Inst. Charge kg	Period No.	Remarks
95	72	0°	4.6	2.1	2	525	95	8		

VIBROGRAPH DATA

	Location 1	Location 2	Location 3
Type of Instrument	4085		
Plan Distance from Blast (m)	170		
Relative Position to Blast	206°		

	Particle Velocity mm/sec	Frequency Hz	Amplitude mm	Air Over-pressure dBL
Location 1 Quarry Bungalow	Horizontal Comp	1.59		111.2
	Transverse Comp	2.54		
	Vertical Comp	2.86		
Location 2	Horizontal Comp			
	Transverse Comp			
	Vertical Comp			
Location 3	Horizontal Comp			
	Transverse Comp			
	Vertical Comp			

Signature: _____

NOMIS

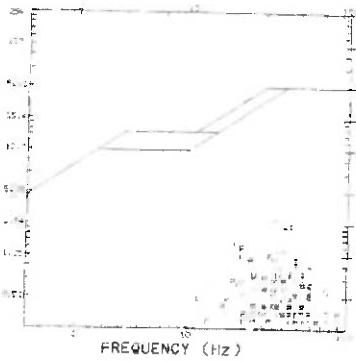
SUPERGRAPH

EVENT: C134
 DB-JUN-17 15:50:50
 INSTRUMENT: 4085
 WAVEFORM MODE
 BATTERY VOLTAGE: 6.08
 COPY: 1/1
 NOTES:
 SANDBAG
 COMPANY: OLD LEIGHLIN QUARRY
 LOCATION: QUARRY BUNGLOW
 DISTANCE TO SOURCE: N
 WEIGHT PER DELAY: N
 OPERATOR: CK
 SEIS TRIG: (mm/s) 0.508C
 AIR TRIG: (dB) 100
 SAMPLE RATE: 1024
 SENSOR TYPE: X2 - 260.10 mm/s
 SENSITIVITY: HIGH
 RECORD TIME: (secs) 6

RESULTS

	R	T	V
PPV(mm/s):	1.5675	2.5400	2.8575
FRQ(Hz):	20.4	39.3	32.0
DISP(mm):	0.0124	0.0103	0.0142
ACC(g):	0.0207	0.0339	0.0585
PE	IR: 111.2dB	6.0Hz	

USBM/OSPRE REPORT



GRAPHICAL RECORD

TIME = 0.500 sec/div
 AIR = 0.15884 mbar/div
 R.T.V = 4.06 mm/s/div

