



CLIENT: Quarryplan / Lagan Materials Ltd. trading as Breedon Ireland.

PROJECT: Proposed extension to existing mineral extraction site at Aughnacliffe Quarry on lands directly to the south of the existing quarry, in the Townlands of Aghamore Upper and Derreenavoggy, County Longford.

Noise Impact Assessment Report.

Prepared by: AONA Environmental Consulting Ltd.

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Contents

7.0	NOISE AND VIBRATION	3
7.1	Author of the Report	3
7.2	Introduction	3
7.3	Methodology	4
7.3.1	Relevant Guidelines & Standards	4
7.3.2	CadnaA Noise Prediction Modelling Methodology	7
7.4	Assessment of Baseline Conditions	13
7.4.1	Baseline Noise Survey	13
7.5	Assessment of Impacts	17
7.5.1	Relevant Noise Limits	17
7.5.2	Noise Impact from Proposed Quarrying	17
7.6	Mitigation Measures	24
7.7	Residual Impacts	26
7.8	Conclusions	26

7.0 NOISE AND VIBRATION

7.1 Author of the Report

This Noise Impact Assessment has been prepared by AONA Environmental Consulting Ltd. AONA Environmental Consulting Ltd.'s areas of professional expertise are in Noise Control & Acoustics and Air Quality & Odour consultancy, including impact assessment and mitigation design. AONA Environmental Consulting Ltd. is a full member of the Institute of Acoustics, the Institute of Environmental Sciences and the Institute of Air Quality Management. The report author, Mervyn Keegan, has a Bachelor of Science Degree (Applied Sciences), a Master of Science Degree (Environmental Science) and a Diploma in Acoustics in Noise Control. AONA Environmental Consulting Ltd. is an independent consultancy specialising in Environmental Impact Assessment and Licensing and has prepared in excess of ten Noise & Vibration and Dust impact assessments annually for quarry developments in the Republic of Ireland, Northern Ireland and the UK over the last 15 years and is an expert in the awareness and understanding of the relevant legislation and guidance that pertains to best practise in such assessments.

7.2 Introduction

This Noise & Vibration Impact Assessment considers the potential noise impact of the proposed extension to existing mineral extraction site at Aughnacliffe Quarry on lands directly to the south of the existing quarry, at noise sensitive receiver locations in the Townlands of Aghamore Upper and Derreenavoggy, County Longford. A detailed Project Description of the proposed development is provided in Section 4 of the EIAR.

The proposed winning and working of the greywacke mineral resource, will be undertaken in a phased manner and will take place, as occurs at present, from 0700-1800 Monday to Friday and 0700-1300 Saturdays.

The Noise & Vibration Impact Assessment has considered that all the winning and working of the greywacke mineral resource will be undertaken in a phased manner. The greywacke mineral resource will be extracted via drill and blast methodology as

is the current, approved practice at the quarry. The mineral won will be processed at the quarry face via the use of mobile crushing and screening plant to produce a range of single size aggregates. The aggregate products will be stockpiled on the quarry floor, prior to being sold and transported off-site via HGV or used in the manufacturing plant on site.

The Noise & Vibration Impact Assessment has addressed the further development of the quarry including the extraction of the greywacke mineral resource using conventional drilling and blasting techniques and mineral reduction using mobile crushing and screening plant, as well as noise from the associated transport, structures and processes. The potential cumulative noise impact for other quarrying operations in the surrounding area has also been addressed.

There are a number of residential properties located sporadically throughout the local area within approximately 250m of the existing and proposed quarry boundary. The closest residential property is located c. 125m to the south of the proposed extension area at Aughnacliffe Quarry.

7.3 Methodology

7.3.1 Relevant Guidelines & Standards

The noise and vibration impact assessment has been undertaken with regard to the following established standards and guidelines to determine the impact of proposed site activities on the surrounding noise environment and assess for the potential for noise disturbance at existing noise sensitive receivers in the locality:

- Quarries and Ancillary Activities, Guidelines for Planning Authorities, April 2004, Department of the Environment, Heritage and Local Government. (DoEHLG Guidance)
- Environmental Management Guidelines Environmental Management in the Extractive Industry (Non-Scheduled Minerals), Environmental Protection Agency (2006)

- EPA publishes Guidelines on the information to be contained in Environmental Impact Assessment Reports (May 2022)

The Quarries and Ancillary Activities, Guidelines for Planning Authorities states that following with regard to the control of noise and blasting;

Control of noise: Noise-sensitive uses in the vicinity of a quarry, such as dwellings, schools, hospitals, places of worship or areas of high amenity, require that the amount of noise be minimised. The sensitivity to noise is usually greater at night-time (20.00 to 08.00) than during the day, by about 10 dB(A). Many quarries are situated in areas of low background noise and it is appropriate to consider this when setting noise limits. In general, it can be expected that complaints will result where the noise from quarrying and associated activities are between 5 to 10 dB above the background noise levels. In areas of higher background noise levels, the EPA recommends that ideally, if the total noise level from all sources is taken into account, the noise level at sensitive locations should not exceed a L_{Aeq} (1 hour) of 55 dB(A) by daytime and a L_{Aeq} (15 minutes) of 45 dB(A) by night-time. Audible tonal or impulsive components in noise emissions (e.g. the reversing siren on a lorry, required for safety reasons) can be particularly intrusive, and such components should be minimised at any noise-sensitive location.

It may be necessary to raise the noise limits to allow temporary but exceptionally noisy phases in the extraction process, or for short-term construction activity which cannot meet the limits set for routine operations, e.g. the construction of baffle mounds, which bring long-term environmental benefits.

The developer may be required to carry out noise surveys to measure noise levels at the site boundary near sensitive locations, as agreed in advance with the planning authority. Surveys should be carried out in accordance with the EPA's "Environmental Noise Survey – Guidance Document" (2003). Noise monitoring should be carried out on a quarterly basis (or as otherwise agreed), and commenced prior to the commencement of development. The results should be reported to the planning authority within 3 weeks (or as agreed). 95% of all noise measured shall comply with the specified limit values. No individual noise measurement should exceed the limit values by more than 2 dB(A).

Blasting will continue to be carried out on site. Therefore, the quarry operator will continue to carry out blast monitoring for groundborne vibration and air overpressure and the relevant blast vibration limits apply to the existing and proposed activities on site.

As outlined in the Environmental Management Guidelines Environmental Management in the Extractive Industry (Non-Scheduled Minerals), Environmental Protection Agency (2006), the Environmental Protection Agency (EPA) has produced a Guidance Note for Noise in Relation to Scheduled Activities (EPA, 1996). It deals in general terms with the approach to be taken in the measurement and control of noise, and provides advice in relation to the setting of noise Emission Limit Values (ELV) and compliance monitoring. In relation to quarry developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following noise ELVs at the nearest noise-sensitive receptor:

- Daytime: 08:00–20:00 h $L_{Aeq(1h)} = 55$ dB(A)
- Night-time: 20:00–08:00 h $L_{Aeq(1h)} = 45$ dB(A)

Note:

- 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dB(A).
- On-site activities should be permitted during night-time hours where they comply with the noise ELVs (e.g. heating up of asphalt plants, loading of materials).
- Where existing background noise levels are very low, lower noise ELVs may be appropriate.
- Audible tones or impulsive noise should be avoided at night.
- It is also appropriate to permit higher noise ELVs for short-term temporary activities such as construction of screening bunds, etc., where these activities will result in a considerable environmental benefit.

Condition 4 of Planning Reference Number 07/831 states that the noise level from within the premises shall not exceed:

- 55 dB(A) $L_{eq, 1 \text{ hour}}$ over a continuous one-hour period between the hours of 08.00 and 20.00, when measured at all sensitive locations in the vicinity of the site; and
- 45 dB(A) $L_{eq, 15 \text{ minutes}}$ at any other time. Audible tonal or impulsive components in noise emissions should be maintained at any noise sensitive locations.

On the basis of the above, the following noise limits are suggested as appropriate for the extraction of the greywacke mineral resource and associated activities;

The equivalent sound levels attributable to all on-site operations associated with the development shall not exceed 55 dB(A) L_{eq} over a continuous one hour period between 0700 hours and 1800 hours on Monday to Friday inclusive, and 0700 hours and 1300 hours on Saturday, when measured at any noise sensitive receptor. Sound levels shall not exceed 45 dB(A) at any other time.

7.3.2 CadnaA Noise Prediction Modelling Methodology

A CadnaA noise prediction model has been prepared to predict and assess a worst-case noise level that will occur due to the proposed mineral extraction and associated activities at the site. This noise model is based on the proposed scale of the greywacke mineral resource extraction operations and associated plant and equipment and HGV movements to and from the proposed mineral extraction area of the site. Thus, the noise prediction model provides an appropriate level of confidence when assessing specific noise impact from the proposed activities at the proposed site.

CadnaA has been developed to allow detailed noise predictions to be undertaken in accordance with:

- ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2 General methods of calculation.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise

The CadnaA noise prediction model allows for noise from all sources entered into the model to be undertaken simultaneously. The noise model can take topographical effects, ground absorption, screening effects, reflections and focusing effects, among others, into consideration. The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. The model calculates the propagation of the sound from each noise source and produces a noise level contour map and graphics in proximity to a facility with colour coded noise level contours. Model parameters, sources, and settings have been incorporated into the model as detailed in Table 7.1.

Table 7.1: Modelling Parameters, Sources and Assumptions

Parameter	Source	Details
Horizontal distances – Existing Site and surrounding area	Quarryplan	Scaled drawings in AutoCAD format.
Proposed mineral resource Dimensions	Quarryplan	Scaled drawings in AutoCAD format.
Receiver Locations	AONA Environmental	In outdoor amenity areas adjacent to nearest residential properties @ 1.5m height.
Plant types, location & Sound Power Level	Quarryplan / site operator.	Source noise measurements were undertaken in close proximity to proposed plant and equipment on site. This allowed for an accurate Sound Power Level L_w to be assigned to active plant.
Ground Absorbtion	AONA Environmental	A Ground Absorbtion Rate $G = 0.5$ has been used in the model, which is appropriate for the surrounding land type.

AONA Environmental has previously undertaken source specific noise level readings in close proximity to the main noise sources that operate on similar quarry sites. This allows for the generation of accurate sound power levels for all main existing noise sources on the site. For the purposes of noise impact assessment, the Sound Power level (L_w) was determined by measuring the Sound Pressure Level (L_p) at a specific distance from the noise source and assuming a Directivity Index (Q) of 2, i.e. hemispherical propagation, using the following equation;

$$L_w = L_p + 10 \cdot \log \left(\frac{Q}{4\pi \cdot r^2} \right)$$

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AONA Environmental has been advised of the specific noise sources that will operate on the proposed greywacke mineral resource site, as follows;

- Loading shovel – Volvo L120H
- Crushers – Jaw crusher & cone crusher
- 2 screen decks
- Stacker
- 360 excavator
- 30 ton Dumper
- Dozer
- Drill Rig

Therefore, an accurate noise prediction model has been prepared based on accurate source sound level data. The sound power level (L_w) used in the noise models to assess overburden removal and bund creation and greywacke mineral extraction during Phases 1 – 5 are presented in Table 7.2.

Table 7.2: Sound power levels (L_w) for plant and equipment associated with the proposed excavation of minerals.

Point Sources:

Plant	Overall SWL $L_{Aeq, T}$	Data Source
Jaw Crusher	118	Manufacturer
Screener	110	Manufacturer
Cat 6 Dozer	109	Manufacturer
Front End Loader Cat 996 x 2	112	Manufacturer
Excavator and loading of dump truck	116 dB L_w (Point Source) (~85 dB(A) at 10m)	On-site measurement
Haul Road HGVs movements – haul trucks	105 dB L_w (Line Source) – 20 trips per hour at 10 mph	On-site measurement
Drill Rig	115.0	On-site measurement

Moving Line Sources:

Name	Type	L _w dB(A)	Moving Pt. Src (Number per hour)	Speed (km/h)	Data Source
Haul Truck Movements	PWL-Pt	105	10	10.0	On-site measurement

The proposed operating hours are from 0700 – 1800 Monday to Friday and from 0700 – 1300 on Saturday. Therefore, there are no operations proposed at night-time or on Sunday.

Overburden removal will take place intermittently during Phases 1-4 in the proposed area of extraction. The noise levels due to dozer, excavator and haul truck activities during overburden removal works may periodically result in a noise level that exceeds the noise limit of 55 dB L_{Aeq, 1 hour}. However, as stated above, it is accepted that all operators will have some noisier short-term activities that cannot meet the limits set for normal operations such as overburden removal, noise bund construction, restoration works, etc. Overburden removal and noise bund construction will typically be carried out during a short-term period per annum and may result in short-term noise levels that are in excess of the relevant guidelines.

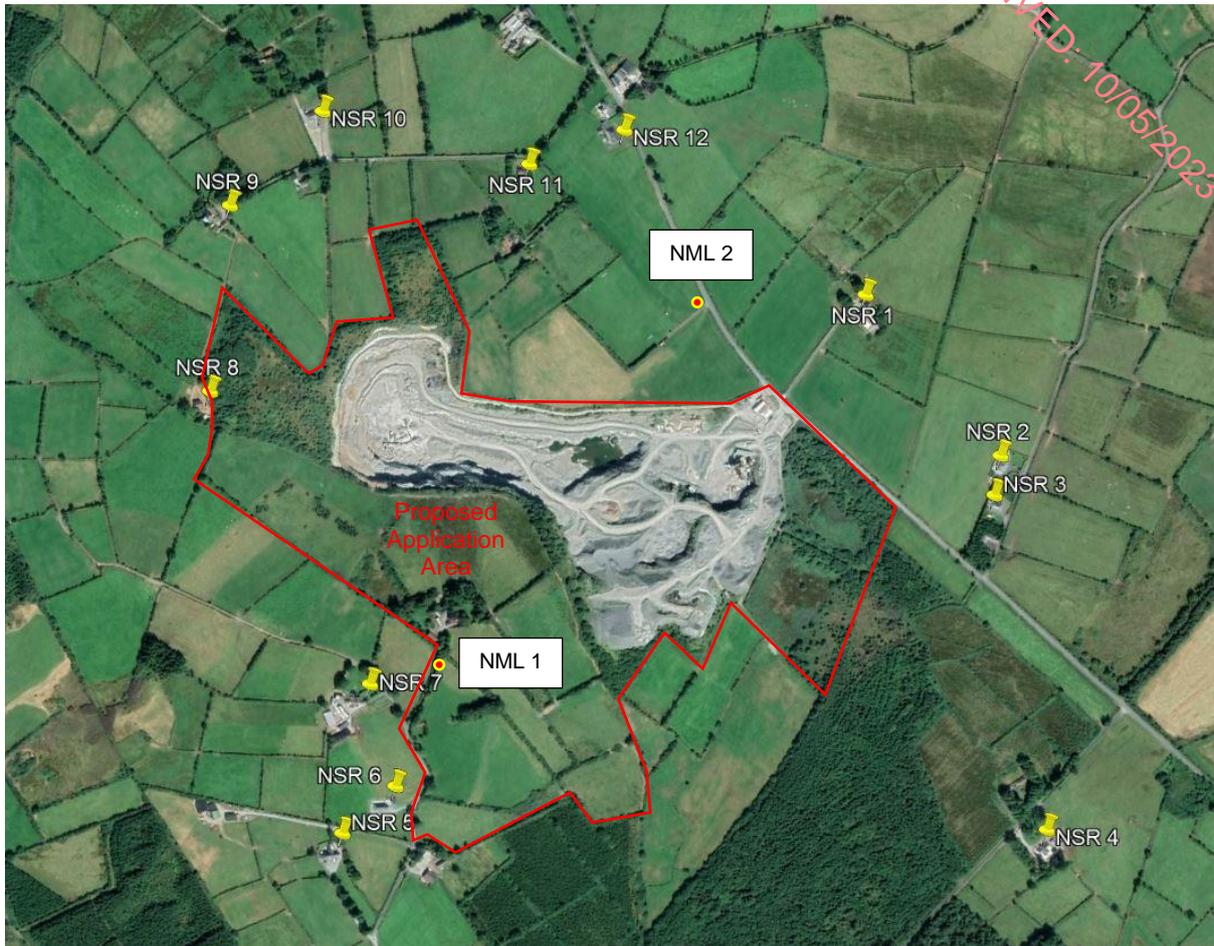
Extraction and processing of the mineral from Phases 1 – 5 will be undertaken using existing plant used at Aughnaclyffe Quarry including excavators, crushers, screeners and haul trucks (or similar). This activity will be subject to the noise limit of 55 dB L_{Aeq, 1 hour}.

The following noise sensitive receiver locations have been included in the CadnaA noise prediction model.

Table 7.3: Noise sensitive receiver locations included in the noise prediction model.

Reference	Address	Grid Coordinates	
NSR 1	L5081, Aghamore Upper	224388	286169
NSR 2	L5087, Aghacordrinan	224570	285952
NSR 3	L5087, Aghacordrinan	224562	285899
NSR 4	L5090, Aghacordrinan	224632	285449
NSR 5	Derreenavoggy	223690	285439
NSR 6	Derreenavoggy	223761	285503
NSR 7	Derreenavoggy	223727	285641
NSR 8	L50813, Aghamore Upper	223508	286033
NSR 9	L50813, Aghamore Upper	223530	286286
NSR 10	L50813, Aghamore Upper	223655	286415
NSR 11	L50813, Aghamore Upper	223935	286342
NSR 12	L50813, Aghamore Upper	224062	286389

Figure 7.1: Noise Monitoring Locations (NML) and Noise Sensitive Receiver locations (NSR 1 - 12) included in the noise prediction model.



7.4 Assessment of Baseline Conditions

7.4.1 Baseline Noise Survey

AONA Environmental has undertaken baseline noise monitoring in proximity to the nearest noise sensitive properties to the proposed greywacke mineral resource extraction site on Thursday 9th February 2023. The noise monitoring survey was conducted in accordance with *ISO 1996-1, 2016 Acoustics – Description, Measurement and Assessment of Environmental Noise*.

The proposed lateral extension area is located directly south of the existing Aughnacliffe Quarry void. On Thursday 9th February 2023, there was no extraction activity at the existing Aughnacliffe Quarry during the course of the survey. The quarry site was noted to be open for deliveries but had no notable yard activity and was not a significant noise source at the noise monitoring locations. The weather conditions during the noise survey were noted to be dry and cool with a light south-westerly breeze.

A Cirrus Optimus Green sound level meter was used during the survey. The sound level meter was at a height of ~1.3m off the ground. A wind shield was used on the microphone throughout the survey and the sound level meter was calibrated before and after the survey. The Time Weighting used was Fast and the Frequency Weighting was A-weighted. The principal noise measurement parameters recorded during the survey was the equivalent continuous A-Weighted Sound Pressure Level, $L_{Aeq, T}$ and the background noise level $L_{A90, T}$. A statistical analysis of the measurement results was also completed so that the percentile levels, $L_{AN, T}$, for $N = 90\%$ and 10% over specific measurement intervals were also recorded. The percentile levels represent the noise level in dB(A) exceeded for $N\%$ of the measurement time. The measurement parameters recorded during the baseline survey are defined as follows:

- L_{Aeq} is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.
- L_{Amax} is the maximum A-weighted sound level measured during the sample period.

- L_{Amin} is the minimum A-weighted sound level measured during the sample period.
- L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise in the absence of the main noise source.

The baseline noise monitoring locations on Thursday 9th February 2023 are outlined in Table 7.4 and Figure 7.1 and the recorded noise levels are reported in Table 7.5. The baseline noise monitoring results indicate a relatively quiet rural area. The noise monitoring data presented in Table 7.5 indicates that the existing noise level at NML 1 is approximately 35-40 dB(A) $L_{eq, 15min}$ / 30 dB(A) L_{90} and at NML 2 is approximately 45 dB(A) $L_{eq, 15min}$ / 35 dB(A) L_{90} .

Table 7.4: Baseline noise monitoring location on Thursday 9th February 2023.

Description	Location	Grid Coordinates
NML 1	To the south of the proposed extension area, at a derelict property, to represent nearest residential properties located to the south of the proposed quarry site.	223834, 285732
NML 2	Along the road to the north of the entrance to the existing quarry site to represent nearest residential properties located to the north and west of the proposed quarry site.	224174, 286173

Table 7.5: Noise monitoring survey results on Thursday 9th February 2023.

Location	Time	Duration	L_{Aeq} (dB)	L_{AFMax} (dB)	L_{AFMin} (dB)	L_{AF10} (dB)	L_{AF90} (dB)
NML 1	09:45	00:15:00	59.3	93	26.9	41.1	29.1
	10:00	00:15:00	41.2	63.3	25.6	43.7	28.8
	10:15	00:15:00	36.2	57.2	25.1	35.9	29.2
	10:30	00:15:00	35.6	59.7	25.8	36.4	29.4
	10:45	00:15:00	35.5	51.3	27.1	38.4	30.1
	11:00	00:15:00	37.2	58.7	29.1	37.6	30.6
NML 2	11:09	00:15:00	46.9	74.6	33.5	49.6	34.5
	11:15	00:15:00	42.3	59	28.1	44.8	34
	11:30	00:15:00	47.7	74.3	26.1	42.9	31.8
	11:45	00:03:13	36.6	55.9	27	40.3	29.6

Quarterly noise monitoring is undertaken at three locations along the boundary of the existing quarry site, as shown at Figure 7.2 overleaf. The noise monitoring surveys are

carried out in order to assess compliance with Condition 4 of Planning Reference Number 07/831 which states that the noise level from within the premises shall not exceed:

- 55 dB(A) $L_{eq, 1 \text{ hour}}$ over a continuous one-hour period between the hours of 08.00 and 20.00, when measured at all sensitive locations in the vicinity of the site; and
- 45 dB(A) $L_{eq, 15 \text{ minutes}}$ at any other time. Audible tonal or impulsive components in noise emissions should be maintained at any noise sensitive locations.

Figure 7.2: Quarterly Noise Monitoring Locations (N1 – N3).



Table 7.6: Quarterly Noise monitoring survey results 2021-present.

Location	Duration	Limit L _{ArT} (dB)	L _{Aeq} (dB)	L _{AF10} (dB)	L _{AF90} (dB)	L _{ArT} (dB)
N 1	Q3 2021	55	55	33	52	55
	Q4 2021	55	56	53	58	56
	Q1 2022	55	56	32	55	56
	Q2 2022	55	59	54	59	59
	Q3 2022	55	54	52	55	54
	Q4 2022	55	50	45	53	50
N 2	Q3 2021	55	35	29	38	35
	Q4 2021	55	37	29	39	37
	Q1 2022	55	40	29	38	40
	Q2 2022	55	38	33	40	38
	Q3 2022	55	42	39	44	42
	Q4 2022	55	48	46	48	48
N 3	Q3 2021	55	38	32	39	38
	Q4 2021	55	42	38	43	42
	Q1 2022	55	47	38	50	47
	Q2 2022	55	53	44	57	66
	Q3 2022	55	50	37	52	50
	Q4 2022	55	48	39	51	48

All reports state that the noise emissions levels due to site activities at all noise monitoring locations are within the limit value of 55 dB L_{Ar,T}, and that the existing quarry is operating within the Planning conditions and is not a source of noise nuisance at local sensitive receptors. The noise levels at N1 are impacted by passing traffic on the road.

7.5 Assessment of Impacts

The proposed operational activities at the site have the potential to generate a noise impact. The significance of the noise impact of the various activities depends on the duration of each activity, the particular items of plant used and the time at which the activity occurs. However, all practical measures will be taken to ensure that the noise emissions associated with the proposed development do not cause a noise impact upon the local residents. The proposed direction of extraction will allow for a working face to be in front of the extraction equipment which will naturally attenuate noise in the direction of the nearest noise sensitive receivers located to the south of the proposed extension area.

7.5.1 Relevant Noise Limits

Based on the relevant guidelines outlined above, the noise assessment indicates that the development must comply with a daytime noise limit of 55 dB $L_{Aeq, 1 \text{ hour}}$ from all quarrying and related activities within the premises, when measured at 'noise sensitive locations'.

7.5.2 Noise Impact from the Proposed Development

In order to establish and demonstrate that the proposed development will not exceed the noise limit of 55 dB $L_{Aeq, 1 \text{ hour}}$ from the proposed greywacke mineral resource extraction at noise sensitive locations, a noise prediction model for the proposed extraction area has been conducted according to *ISO 9613-2, 1996 Acoustics-Attenuation of sound propagation outdoors*. This noise impact assessment is based on actual measured sound power level data for the plant and equipment that will operate on the proposed extraction area.

Noise levels have been predicted during periods of proposed greywacke mineral resource extraction using associated plant and equipment and HGV movements within and to and from the site access area and the asphalt/batching plant on site. The following scenarios have been modelled in accordance with the description of activities

as described in Section 4 of the EIAR and as outlined in the phased planning application drawings.

Noise levels have also been predicted during the initial period of overburden removal at ground level over the proposed lateral extension area using associated plant and equipment and HGV movements within and to and from the overburden storage area. Overburden removal at ground level over the extension area has assumed one dozer, one tracked excavator and two HGVs in operation continuously for a 1-hour period. This activity allows for the construction of the perimeter noise bund to the south of the proposed extraction area at the beginning of the first phase of development.

The predicted noise levels are indicative of the worst-case on site activity over a 1 hour period. The EPA Guidelines require an assessment of the cumulative impacts with all existing or approved developments, this includes noise originating from other projects related to the proposed development. In this case, although separate planning units, the operation of the on-site Asphalt Plant and the Concrete Batching Plant approved by Longford Co. Co. in 2022 under Reference 22/79 are included within the assessment.

The predicted cumulative noise levels that will occur at noise sensitive receivers over a 1 hour period during each phase of extraction due to the following activities all on-going concurrently are presented in Table 7.8. This noise is based upon:

- Greywacke mineral extraction, using associated plant and equipment with mobile crushing and screening at quarry face;
- HGV movements on site haul roads to and from the site access, asphalt and concrete batching plant area;
- The operation of the asphalt and concrete batching plant;
- The operation of the drill rig at the quarry face;
- Overburden removal; and
- The placing of material on lands to the South East of the quarry void using a dozer, excavator and dump truck – 1 load every 2 hours.

The CadnaA noise model outputs are shown in Figures 7.3 – 7.8.

It is important to note that all such activities will typically not operate concurrently at any one time during each day of activity. If the worst case scenario of all activities operating concurrently does not result in a significant noise impact, it follows that the typical scenario of only some of the above referenced elements of the development operating at any one time, could only result in a reduced noise impacts and the nearest sensitive receptors.

Table 7.7: Predicted cumulative noise levels that will occur at noise sensitive receivers over a 1 hour period during each phase of extraction due to all activities on-going concurrently.

Receiver	Phase 1 (Fig 7.3)	Phase 2 (Fig 7.4)	Phase 3 (Fig 7.5)	Phase 4 (Fig 7.6)	Phase 5 (Fig 7.7)	Pre-Phase 1 Overburden Removal Only (Fig 7.8)
NSR 1	44.3	44.5	41.3	40.2	40.1	41.4
NSR 2	44.2	46.5	40.6	40.3	39.1	40.1
NSR 3	43.9	46.1	39.8	38.4	38	40.3
NSR 4	43.1	43.2	31.6	33.3	32	39.2
NSR 5	46.9	40.7	35.2	35	32.8	46.3
NSR 6	48.8	42.9	35.9	36.3	34.4	48.7
NSR 7	53	44.6	40.1	39.4	37.2	53.1
NSR 8	43.8	41.4	34.9	33.9	32.2	47.8
NSR 9	44.6	45.2	36.7	34.6	32.8	43.8
NSR 10	43.8	44.3	37.8	34.8	31.6	42.1
NSR 11	44.8	45.9	39.2	36	35.3	43.7
NSR 12	44.3	45.4	40.4	38.2	38.1	42.4
Max.	53	47	41	40	40	53
Limit Value	55 dB $L_{Aeq, 1 \text{ hour}}$					

As shown in Table 7.7, the predicted worst-case cumulative noise levels at the noise sensitive receiver locations due to the proposed mineral extraction and associated HGV transport activities, the operation of the asphalt and concrete batching plants, the operation of the drill rig, overburden removal and the placement of material are in accordance with noise limit of 55 dB(A). It is unlikely that all such activities will take place concurrently. It is noticeable that as overburden removal ceases and the depth of the excavation increases there is a significant drop in quarry noise levels. As the proposed greywacke mineral resource extraction moves in a vertical direction, this will bring additional noise attenuation due to the sides of the deepened pit area, and will

result in lower noise levels at the noise sensitive receivers in proximity to the mineral extraction activities.

It is accepted that all operators will have some noisier short term activities as distinct from normal operations such as overburden removal, noise bund construction, restoration works, etc. However, these works will be intermittent and short-term and may be ongoing as the proposed development progresses, i.e. overburden removal and noise bund construction will occur in the early stages of the development while restoration works will occur especially in the final phase of the works.

7.5.3 Noise Impact from Drilling & Blasting

The drill rig operations and blasting for the quarrying process will typically take place once per month. The preparatory drilling using an air drill and compressor which will operate for approximately two days every month. During previous on-site noise measurements in proximity to a drill rig in operation on a quarry face, AONA Environmental has measured a noise level of 97 dB(A) at 1m from source, which equates to a sound power level L_w of 112 dB(A). A worst-case assessment of drill rig noise at the top of the quarry face in closest proximity to the receivers to the south of the proposed quarry extension area is presented in Table 7.9. As shown in Table 7.9, the predicted noise levels at the noise sensitive receiver locations due to the proposed intermittent drill rig operations in the Aughnacliffe Quarry site are in accordance with suggested DoEHLG noise limit of 55 dB(A) and cumulatively with the normal day to day operations at the site will not add to the noise level experienced at the receiver locations.

Table 7.8: Predicted noise levels from the proposed intermittent Drill Rig operations at the Aughnacliffe Quarry site.

Name	Predicted Noise Level with Drill Rig operations at a location in closest proximity to the noise sensitive receivers to the south of the site (Fig 7.9)
NSR 1	35.7
NSR 2	35.8
NSR 3	36.2
NSR 4	35.5
NSR 5	41.6
NSR 6	46
NSR 7	51.2
NSR 8	40.5
NSR 9	34.2
NSR 10	31.8
NSR 11	38.3
NSR 12	37.3
Noise Limit	55 dB(A)

All neighbours are notified in advance of upcoming blasting dates and times. Blasting of the rock results in an instantaneous noise impact. However, this is a very short – term noise impact and results in an instantaneous increase in noise levels during daytime hours with immediate reversion back to preceding noise levels. A typical sound level from blasting, measured at 15 m from the source is 94 dB(A) (Hoover 1996). Table 7.10 outlines the predicted noise levels in the vicinity of an active blasting site. The accepted reduction in noise levels with distance from a blast is based on the assumption that the sound level drop off rate equates to 6 dB per doubling of distance. Blasting parameters including PPV and Air Overpressure have been set by the EPA for all quarrying proposed operations in Ireland.

Table 7.9: Estimated Blasting Noise in the vicinity of the quarry.

Distance to receiver (m)	Sound Level At Receiver Location dB(A)
15	~ 94
30	~ 88
60	~ 82
120	~ 76
240	~ 70
480	~ 64
960	~ 58

As indicated in Table 7.10, sensitive receivers within approximately 500m of the blasting site could be exposed to instantaneous noise levels of approximately 65 - 70 dB(A). However, these blasts result in very short – term instantaneous noise impact at all residential receivers in the vicinity of the quarry and will not constitute a significant impact, as the blast monitoring results will be required to be within the limits prescribed by the DoEHLG in their relevant guidance. Blast noise is characterised by containing a large proportion of its energy within a frequency that is below the normal hearing range and is therefore termed “air overpressure”. The EPA recommends that blasting should not give rise to air overpressure values at the nearest occupied dwelling in excess of $125 \text{ dB(Lin)}_{\text{max peak}}$ with a 95% confidence limit. Peak particle velocities to measure vibration levels and air-overpressure to measure noise levels will be monitored during blasting to ensure results are less than the limits prescribed. The operator of Aughnacliffe Quarry will carry out blast monitoring (ground-borne vibration and air overpressure) for each blast. Therefore, it is considered that there any potential noise and vibration impact in relation to the blasting will be negligible.

The following general blast design control measures will be undertaken to ensure compliance with recommended standards.

- The optimum blast ratio will be maintained and the maximum instantaneous charge is optimised.
- Explosive charges will be properly and adequately confined by a sufficient amount and quality of stemming.
- Accurate face surveys (profiling) will be undertaken to assist with blast design and specification..

- No blasting will be carried out outside 10:00 – 18.00 hours on working days (Monday to Friday). There will be no blasting carried out on Saturdays, Sundays or public holidays.
- All nearby dwellings will be given advance notice of blasting.

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7.5.4 Vibration Impact from Blasting

The results from recent blasting and vibration monitoring undertaken by Irish Industrial Explosives are presented below.

Table 7.10: Blast vibration monitoring results.

16th June 2021

VIBROGRAPH DATA

	Residence	Nomis	Plan Distance	Bearing	H	T	V	AOP
		unit #	m	degrees	mm/sec	mm/sec	mm/sec	dBL
Nomis #1	Murtagh residence	2864	420	220°	2.00	2.50	2.00	116.0
Nomis #2	Derlict house	3253	345	131°	1.80	2.30	4.70	116.0
Nomis #3	Reilly residence	4141	436	5°	1.52	1.33	1.27	115.0

2nd June 2022

VIBROGRAPH DATA

	Residence	Nomis	Plan Distance	Bearing	H	T	V	AOP
		unit #	m	degrees	mm/sec	mm/sec	mm/sec	dBL
Nomis #1	Reillys Residence	4084	290	12°	4.83	5.08	3.75	112.8
Nomis #2	Grays (derelict House)	4144	300	84°	1.40	1.59	1.27	119.9

15th November 2022

VIBROGRAPH DATA

	Residence	Nomis	Plan Distance	Bearing	H	T	V	AOP
		unit #	m	degrees	mm/sec	mm/sec	mm/sec	dBL
Nomis #1	Reilly's Residence	4084	290	003°	4.26	2.86	7.11	112.6
Nomis #2	Heatherton Residence	4005	490	16°	1.65	2.29	3.43	103.5
Nomis #3	Murtagh Residence	4085	410	227°	3.37	2.86	3.62	120.4

Table 1 in BS 6472:1992 - The Evaluation of Human Exposure to vibration in buildings (reproduced here as Table 7.12) provides magnitudes of vibration that are acceptable with respect to human response for up to three blast vibrations events per day.

Table 7.12: Maximum satisfactory magnitude of vibration with respect to human response for up to three blast vibration events per day

Place	Time	Satisfactory Magnitude, (mm/s)	PPV
Residential	Day – 08:00 to 18:00 Mon-Fri, 08:00 to 13:00 Saturdays	6.0 to 12.0	
	Night – 23:00 to 07:00	2.0	
	Other times	4.5	
Offices	Any time		
Workshops	Any time		

The vibration monitoring results shown in Table 7.11 indicate compliance with the relevant Air Overpressure limit of 125 dB(L) and the Peak Particle Velocity Limit of 12 mm/s.

7.6 Mitigation Measures

The following noise mitigation measures will be employed to minimise operational impacts;

- Working hours during site operations will be as outlined above:
0700-1800 Monday to Friday
0700-1300 Saturdays.
- An on-site speed limit will continue to be enforced for all traffic. Drivers of vehicles will be advised of the speed limits through the erection of signs i.e. a typically recommended on site speed limit of 10 kph.
- Where practicable the use of quiet working methods will continue to be selected and the most suitable plant will be selected for each activity, having due regard to the need for noise control.

- The site will continue to employ the best practicable means to minimise noise emissions and will comply with the general recommendations of BS 5228. To this end operators will use “*noise reduced*” plant and/or will modify their construction methods so that noisy plant is unnecessary.
- By positioning potentially noisy plant or operations as far as possible from noise sensitive receivers the transmission of sound will continue to be minimised. For example earth mounds and/or stacks of material on site can be used in such a way that they act as a physical barrier between the source and the receiver. Perimeter bunding will minimise noise breakout from this area of the site and the crushing and screening noise in the ‘plant area’ can be attenuated by the earth mounds and/or stacks of material.
- Mechanical plant used on site will continue to be fitted with effective exhaust silencers. Vehicle reverse alarms will continue to be silenced appropriately in order to minimise noise breakout from the site while still maintaining their effectiveness. All plant will continue to be maintained in good working order. Where practicable, machines will continue to be operated at low speeds and will continue to be shut down when not in use.
- Employees working on the site will continue to be informed about the requirement to minimise noise and will undergo training on the following aspects:
 - The proper use and maintenance of tools and equipment
 - The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receivers
 - Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment
 - The use and maintenance of sound reduction equipment fitted to power pressure tools and machines
- It is also recommended that should complaints be received from nearby residential properties, periodic noise monitoring be undertaken during operational works to determine noise levels at noise sensitive receivers. On the basis of the findings of such noise monitoring, appropriate noise mitigation

measures should be implemented to reduce noise impacts. Where excessive noise exposure levels are recorded, further mitigation measures should be employed which may include temporary screening of the nearest receiver to on-site activities.

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7.7 Residual Impacts

It is considered that subject to the implementation of the mitigation measures outlined above and the continued implementation of good operational practices at the site, that there will be no significant residual impacts upon the amenity of the nearest sensitive receptors in terms of noise disturbance from the proposed development.

7.8 Conclusions

Quarterly noise surveys in respect of Condition 4 of Planning Reference Number 07/831 have been undertaken since 2021 and a background noise survey was undertaken on 9th February 2023 in proximity to the site boundary and the nearest noise sensitive locations to establish the current ambient noise levels in the area with and without the existing quarry in operation. These surveys have established that the existing quarry operations are in compliance with Condition 4 of Planning Reference Number 07/831.

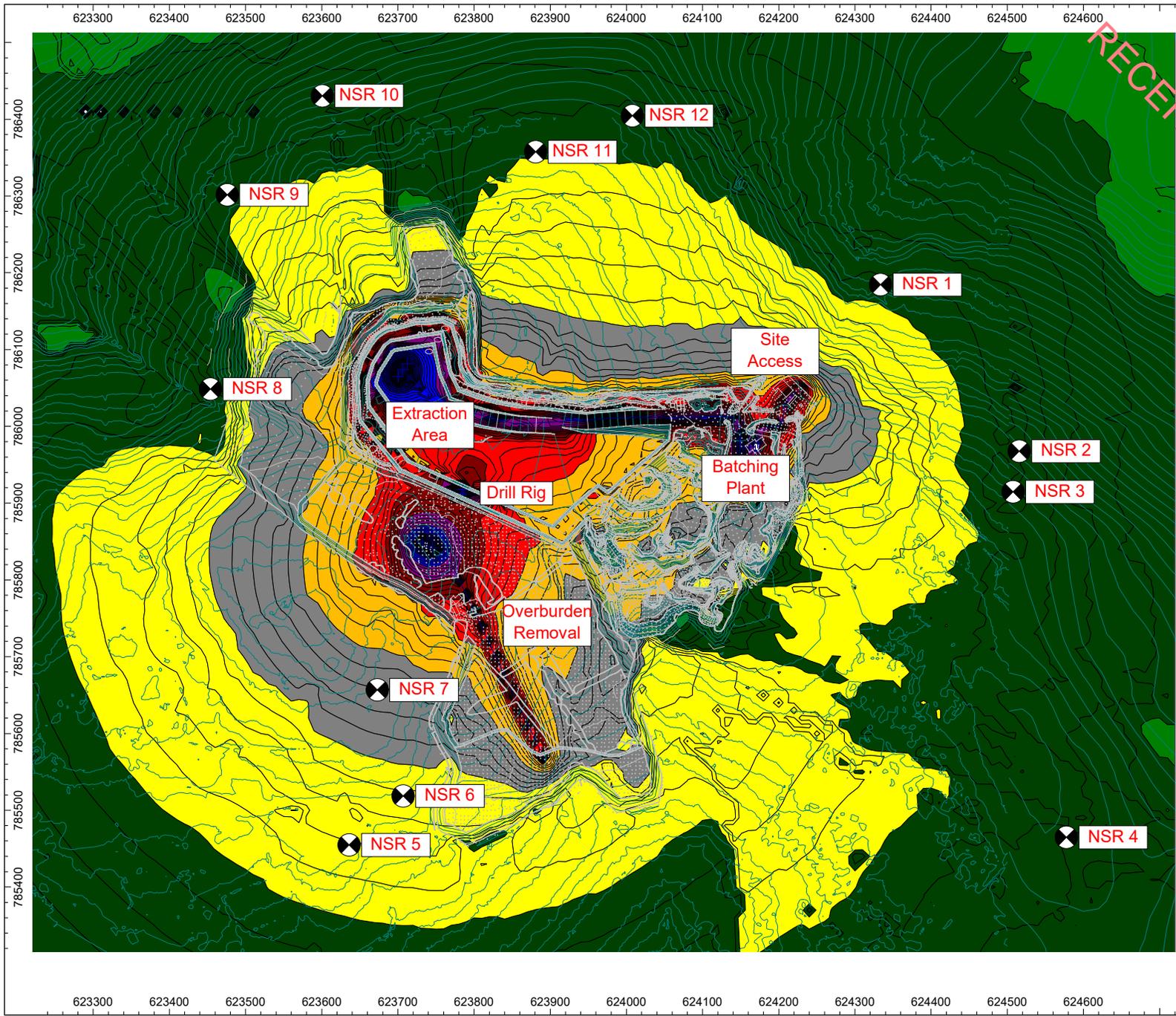
It is recommended that a daytime noise limit of 55 dB $L_{Aeq, 1 \text{ hour}}$ from mineral extraction and associated activities should continue to be the noise limit target at all properties.

The predicted worst-case 1-hour noise levels (dB L_{Aeq}) at Noise Sensitive Receivers resultant from the proposed development, in combination with other associated development are predicted to be in accordance with the daytime noise limit of 55 dB $L_{Aeq, 1 \text{ hour}}$.

The drill rig operations and blasting for the quarrying process will typically take place once per month. The preparatory drilling using an air drill and compressor will operate for approximately two days every month. Blasting parameters including PPV and Air

Overpressure have been set by the EPA for all quarrying proposed operations in Ireland. Blasts will continue to be appropriately designed and undertaken by competent experts. The operator will continue to carry out blast monitoring (ground-borne vibration and air overpressure) for each blast. Therefore, it is considered that there any potential noise and vibration impact in relation to the blasting will continue to be in compliance with the relevant Air Overpressure limit of 125 dB(L) and the Peak Particle Velocity Limit of 12 mm/s.

Given the above, subject to the implementation of the mitigation measures advance, the proposed development is not considered to have the potential to result in any significant effects upon the environment in terms of noise or vibration.



Client:
Breedon, Aughnaclyffe Quarry /
Quarryplan

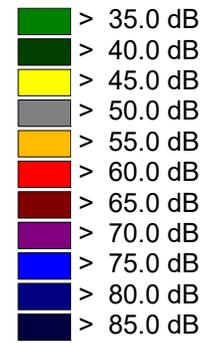
Project:
Noise Impact Assessment.
Proposed Aughnaclyffe Quarry
Extension.
(@ 1.5m Receiver Height)

Prepared by:
AONA Environmental
Consulting Ltd
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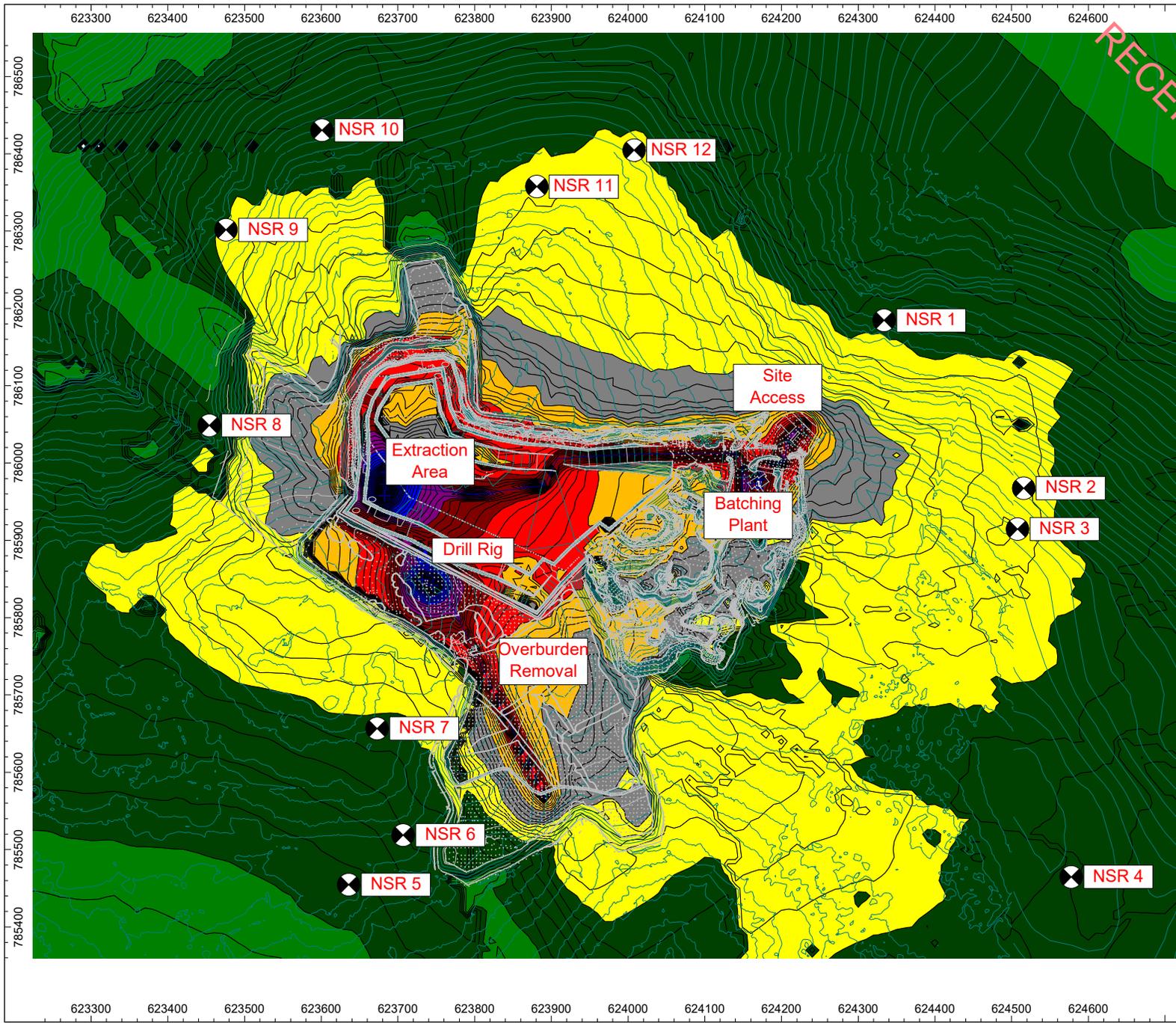
Project Number:
ENV-8018

Drawing Title / Scenario:
Predicted operational
noise levels -
Phase 1.

Drawing Number:
CadnaA Outputs -
Figure 7.3



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Client:
Breedon, Aughnaclyffe Quarry /
Quarryplan

Project:
Noise Impact Assessment.
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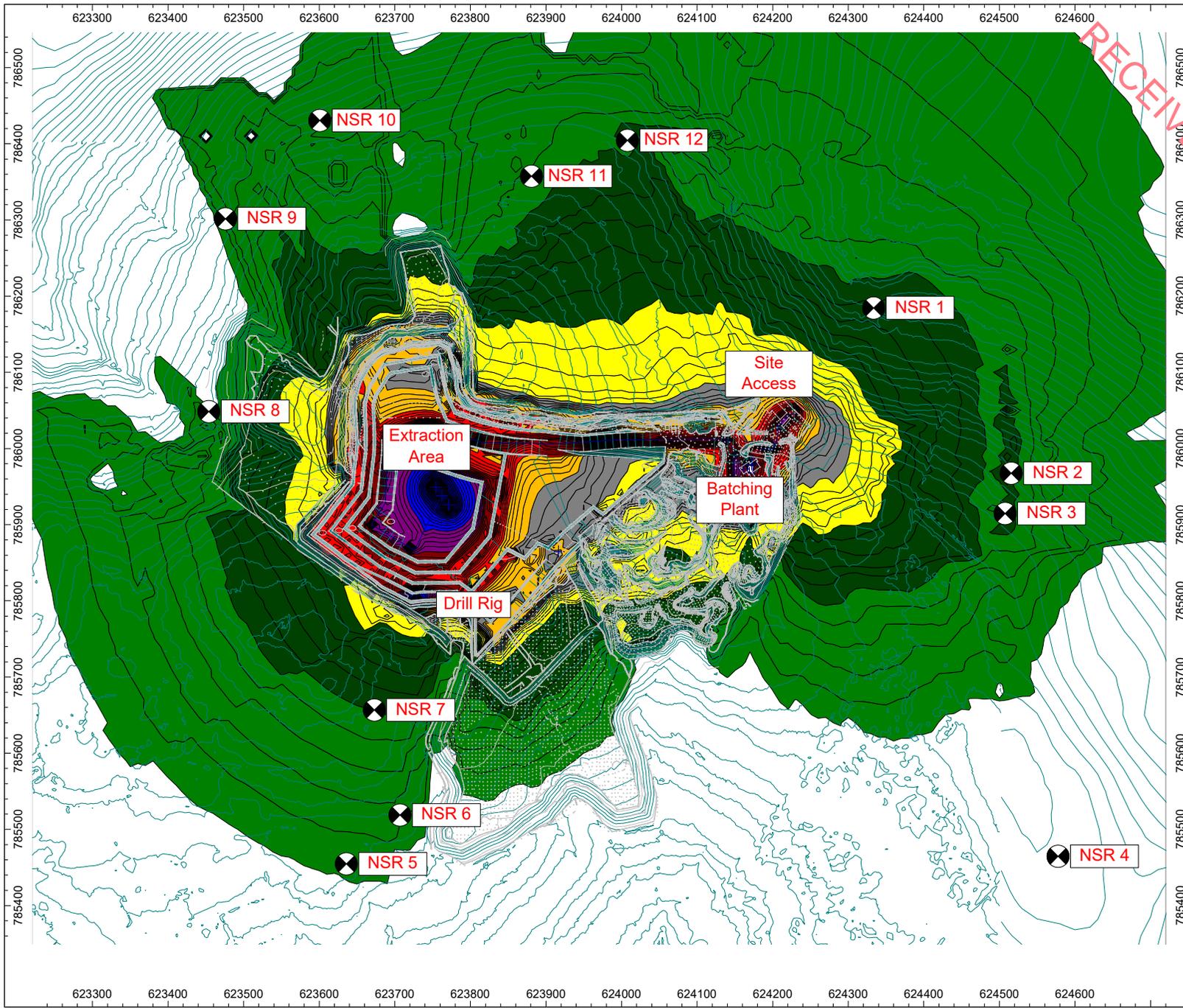
Project Number:
ENV-8018

Drawing Title / Scenario:
Predicted operational
noise levels -
Phase 2.

Drawing Number:
CadnaA Outputs -
Figure 7.4

- > 35.0 dB
- > 40.0 dB
- > 45.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB
- > 85.0 dB

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Client:
Breedon, Aughnaclyffe Quarry /
Quarryplan

Project:
Noise Impact Assessment.
Proposed Aughnaclyffe Quarry
Extension.
(@ 1.5m Receiver Height)

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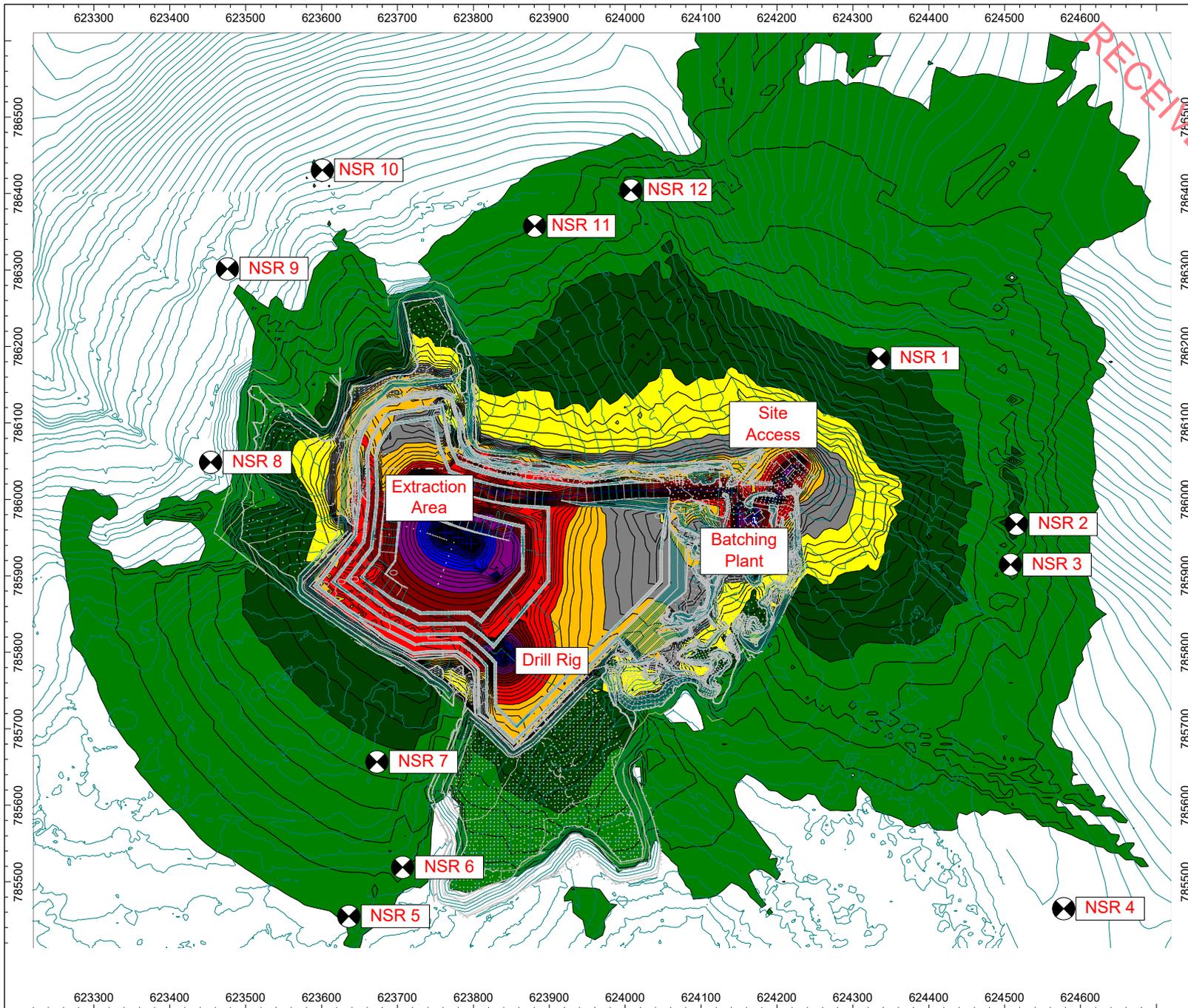
Project Number:
ENV-8018

Drawing Title / Scenario:
Predicted operational
noise levels -
Phase 3.

Drawing Number:
CadnaA Outputs -
Figure 7.5



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Client:
Bredon, Aughnaclyffe Quarry /
Quarryplan

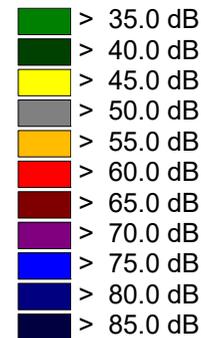
Project:
Noise Impact Assessment.
Proposed Aughnaclyffe Quarry
Extension.
(@ 1.5m Receiver Height)

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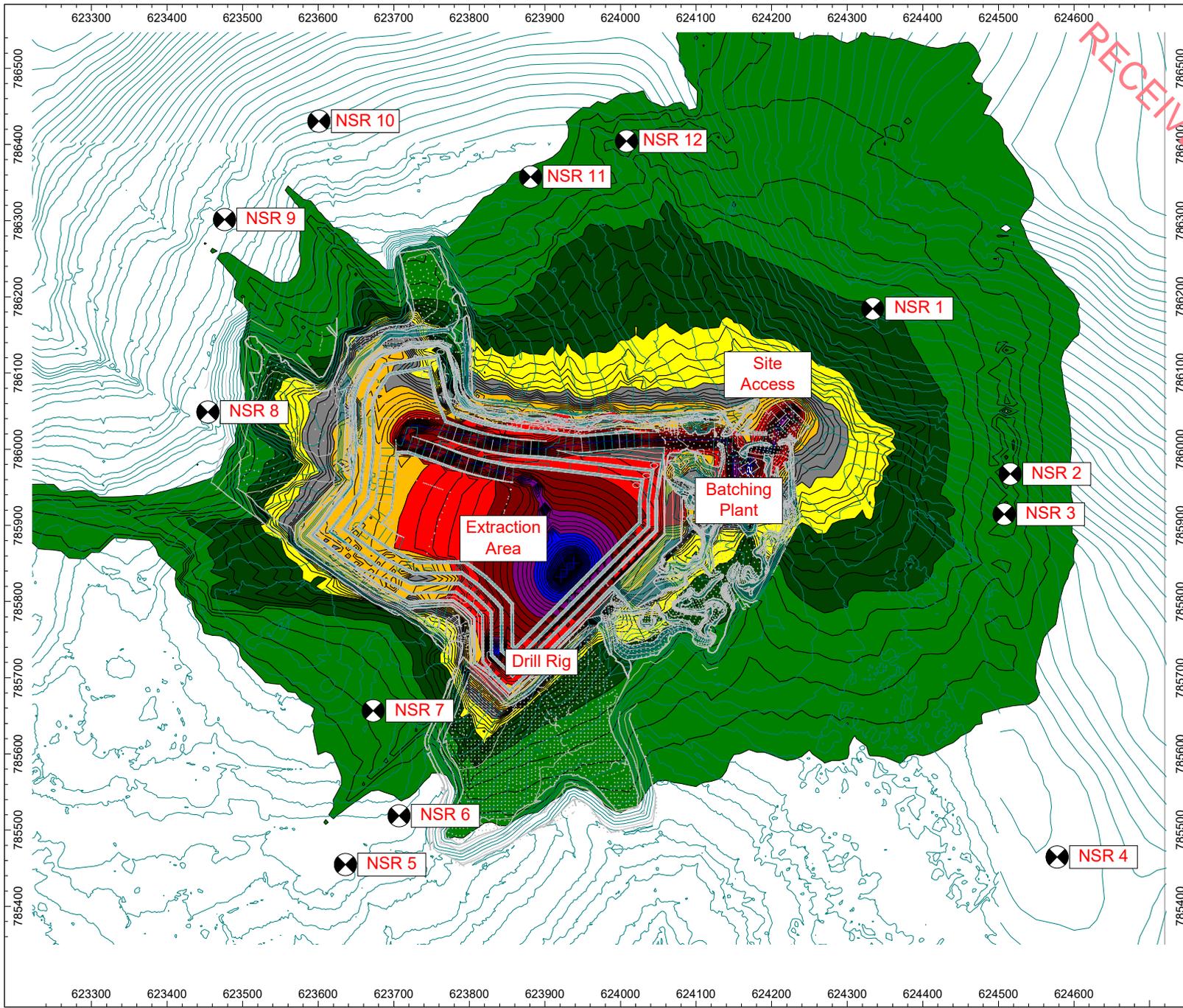
Project Number:
ENV-8018

Drawing Title / Scenario:
Predicted operational
noise levels -
Phase 4.

Drawing Number:
CadnaA Outputs -
Figure 7.6



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Client:
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Quarryplan

Project:
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Proposed Aughnaclyffe Quarry
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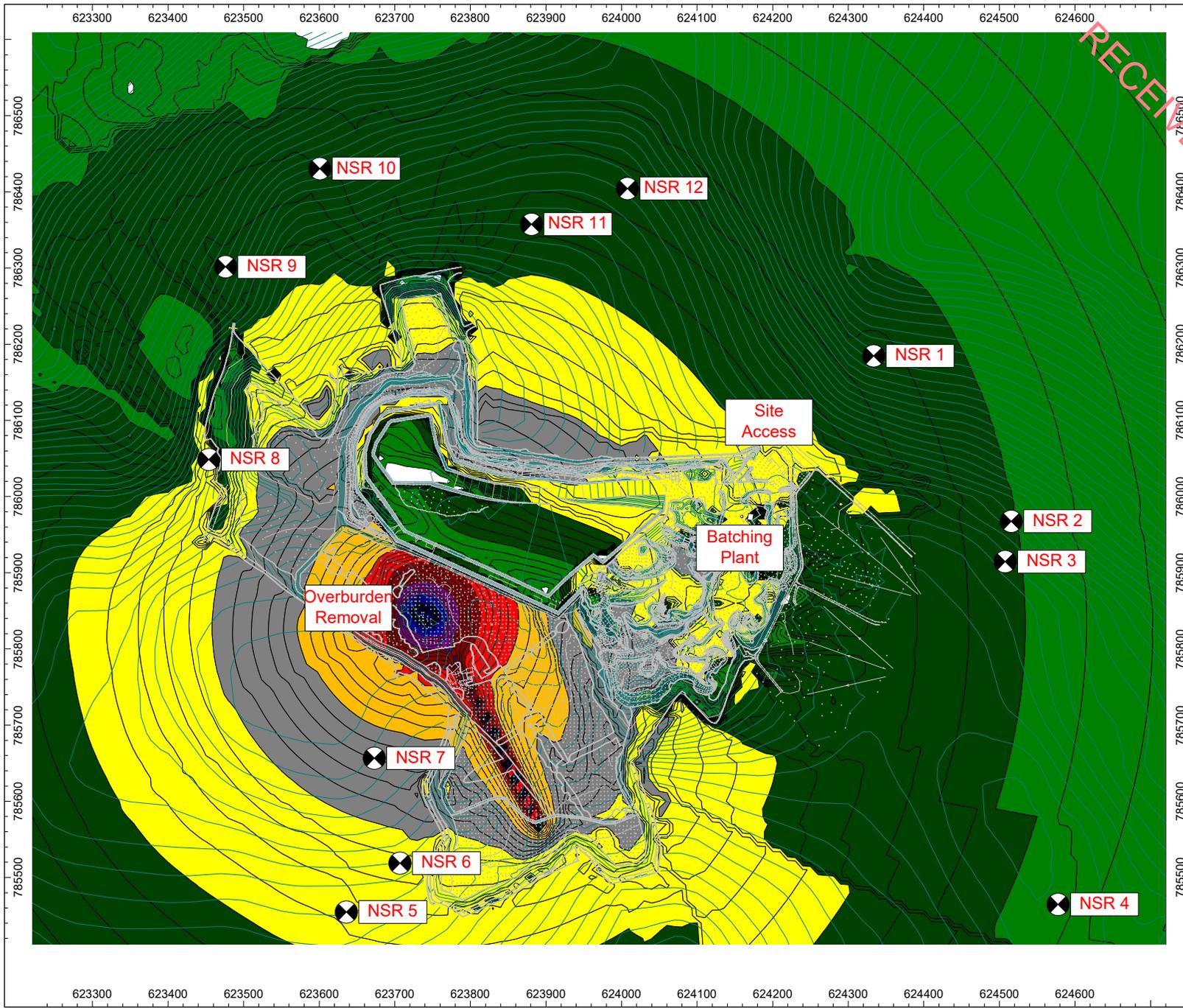
Project Number:
ENV-8018

Drawing Title / Scenario:
Predicted operational
noise levels -
Phase 5.

Drawing Number:
CadnaA Outputs -
Figure 7.7

- > 35.0 dB
- > 40.0 dB
- > 45.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB
- > 85.0 dB

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Client:
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Quarryplan

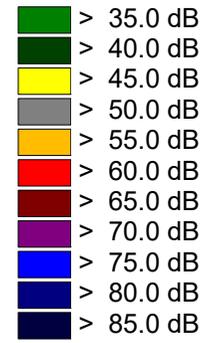
Project:
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Proposed Aughnaclyffe Quarry
Extension.
(@ 1.5m Receiver Height)

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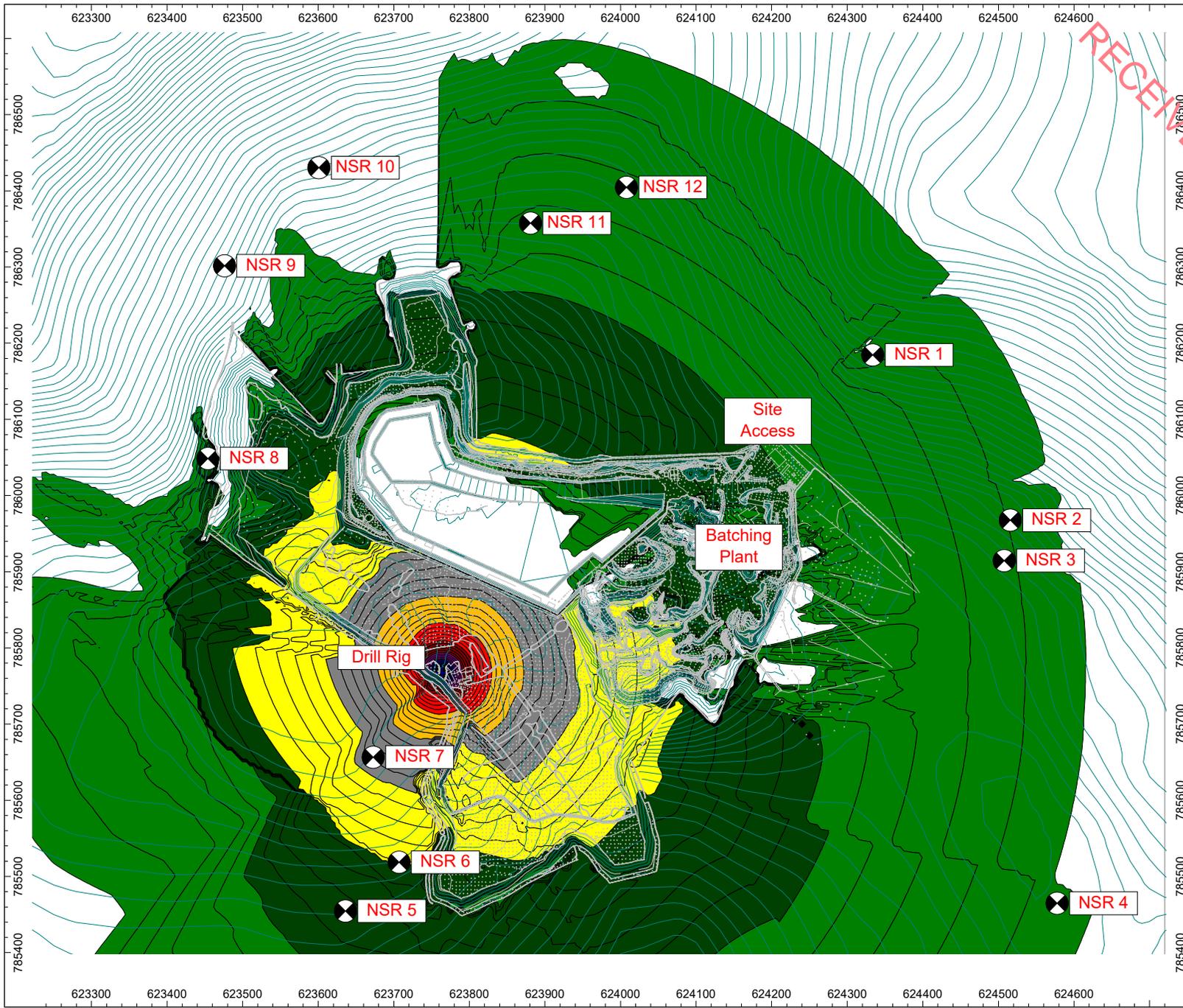
Project Number:
ENV-8018

Drawing Title / Scenario:
Predicted operational
noise levels -
Pre-Phase 1 Overburden
Removal.

Drawing Number:
CadnaA Outputs -
Figure 7.8



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Client:
Breedon, Aughnaclyffe Quarry /
Quarryplan

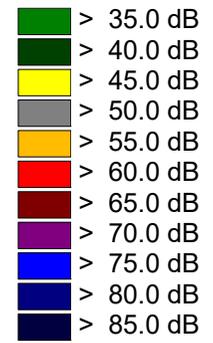
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Project Number:
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Drawing Title / Scenario:
Predicted operational
noise levels -
Pre-Phase 1 Drill Rig.

Drawing Number:
CadnaA Outputs -
Figure 7.9



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