

MINUTES- Murrindindi Environment Advisory Committee					File: 58/03/16	
Date	9 th April	Time	1:30pm	Location	Saleyards, Yea.	
Attendance:	David Wakefield, Steve Meacher, Robert Chaffe, Roger Cook, Judy Watts, John Coyne, Michael Chesworth (General Manager of Sustainability MSC), Cr. John Kennedy, Sue McNair, Zoe Stephens			Apologies:	Nigel Waterhouse, Ann Jelinek, Rita Seethaler, Cr. Cris Ruhr	
Item	Description of Issue			Time	Who	When
	Minutes of Meeting held: 19 February 2013 Amendments were requested and have subsequently been made.			Accept minutes- Seconded -	Roger Cook	
1.	<u>Welcome and Update From General Manager</u>			1.30 – 1.40 pm	Michael C.	
2.	<u>Members update.</u> <ul style="list-style-type: none"> ➤ UGLN investigating opportunity to develop a regional project that will focus on establishing a bushland crew that are dedicated to managing the environmental values of the rail trail through initiatives such as weed control and revegetation, signage etc. Partnerships would be established with the Rail Trail Committee, Local Government, and Landcare Networks. (Judy W). ➤ Planned Fuel Reduction Burn (Toolangi Bushland Reserve) (Steve M) issues between DSE and Toolangi residents – concerns around community consultation and assessment of fire hazard risk. ➤ New Approved Survey Standards (Steve M). There are concerns that the Standards are not supportive of the Flora and Fauna Guarantee Act. Key concerns relate to the fact that the recommendations made by the Leadbeater’s Possum Recovery (the expert panel convened under the Federal Recovery Plan Team) have been ignored. There are also concerns around the scientific rigour of the new standards with over forty scientific references cited in the draft (proposed) survey standards deleted. (Steve M) ➤ Firewood collection issue on private and public land – what advice is provided by Council departments, is this consistent across each department, what are the can and can’t do’s. (John Coyne) ➤ Large Old Trees – noticeable stress due to dry summers and warmer temperatures. Delicate balance between managing hazardous trees to reduce public safety risk vs. retain for habitat value. (Robert C). ➤ DSE Team currently surveying Macquarie Perch in King Parrot Creek. Environmental volunteers in Strath Creek/Kinglake area are involved. (David W). ➤ Goulburn Valley Community Energy has received a large scale grant under the Federal Government’s Energy Efficiency Program to run a program to help improve energy use in low income households. This Program may be a good one to lever off when promoting Council’s work 			1.40 – 2.00 pm	Zoe S.	N/A

	in energy management (i.e. current energy audits and documentary being created under the Sustainability Fund Program). (Robert C.)			
3.	<p><u>Draft Weed and Pest Animal Control Plan</u></p> <p>Sue presented the draft Plan and discussed with Committee.</p> <ul style="list-style-type: none"> ➤ Sue walked Committee through Plan to explain context and approach. Questions to the Committee were raised and a request was asked for each member to prepare a response back to us which outlines their concerns or feedback on what areas of the draft need revision. ➤ Concerns around funding constraints were raised. Best approach would be to utilise DPI funds on contractors for works, and run a community educational program in parallel with other initiatives e.g. Council's Environmental Communications Strategy. 	2.00 –3.00 pm	Committee members	23 rd of April.
4.	<p><u>Native Vegetation Offsets Policy</u></p> <p>Zoe presented a working draft of internal policy and process as a first step towards dealing with native vegetation management in-house. Members to discuss and provide feedback.</p> <ul style="list-style-type: none"> ➤ Concerns expressed around not confusing the policy with procedure and process driven statements (should be less around implementation and more about statements/commitments of the organisations position on how native vegetation will be managed). 	3.00-3.30pm	Committee members	7 th of May.
	Next Meeting: 11th of June (not 12th), 1.30pm – 3.30pm, Alexandra Main Meeting Room.			
	The meeting closed at: 3.20pm			

FocusCDS Consultants

Ref No: 2513L01
17th December 2012

MURRINDINDI SHIRE COUNCIL	DIST. LIST
RECEIVED	RHG
20 DEC 2012	
File No. 1999/75	DC 10525

Ms Karen Girvan
Planning Officer
Murrindindi Shire Council
PO Box 138
ALEXANDRA VIC 3714

Dear Karen,

**PLANNING PERMIT No. 1999/75 – EXTRACTIVE INDUSTRY
LOT 1 LP131016 & LOT2 LP213004 MELBA HIGHWAY, CASTELLA
CASTELLA QUARRIES PTY LTD**

As you are aware, Focus CDS Consultants acts for Castella Quarries Pty Ltd who operates a hard rock quarry at Melba Highway, Castella. This quarry is operated pursuant to the above planning permit.

Recently the quarry has been the subject of complaints by the residents of 2 properties in nearby Moore Court with respect to noisy trucks and the commencement of operations outside of permitted operating hours.

Existing approvals allow extractive and cartage activities to occur at the quarry from 7.00 am to 6.00 pm Monday to Friday and 7.00 am to 1.00 pm Saturday. Due to the commercial imperative of having to be able to deliver rock products on-site prior to 7.00 am, there is the need for the quarry to have its permitted operating hours modified.

Request for consent

On behalf of the quarry we are seeking the Responsible Authority's consent to allow:

1. Trucks to enter the site and undertake loading activities from 5.30 am till 6.00 pm Monday to Friday inclusive and from 5.30 am till 1.00 pm Saturdays
2. All other extractive operations including excavation, drilling, crushing etc, to be conducted from 6.00 am till 6.00 pm Monday to Friday inclusive and from 6.00 am till 1.00 pm Saturdays

Existing approvals

Condition 21.1 on Work Authority 522 states:

"Working hours must be in accordance with the approved work plan and any requirements imposed by the Planning Scheme or caused by application of noise emission limits set by the Environment Protection Authority. However, an Inspector may authorise temporary work to occur outside of such working hours with the agreement of the relevant Responsible Authority and the landowner."

town planners / project managers / environmental consultants / development consultants

In relation to hours of operation, the work plan states:

"Extractive and cartage operations within the site will be between the hours of 7.00 am to 6.00 pm Monday to Friday and 7.00 am to 1.00 pm on Saturdays. Other activities will be between the hours of 6.00 am to 6.00 pm Monday to Friday and 6.00 am to 1.00 pm Saturday.

Work on site outside these hours would only be for essential maintenance."

Early in the life of the quarry, approximately 1998/99, the quarry operator sought authority from the then Inspector of Quarries to allow, on occasions, operations to commence prior to 7.00am. This was apparently agreed to and the operator has worked on this basis since then. There are times when customer requirements dictate that trucks enter and leave the quarry before 7.00am.

Operations at the quarry generally don't commence before 7.00 am, however increasingly there has been a requirement by customers to have rock product delivered on-site prior to 7.00am. This has meant that the quarry has had to begin operating before 7.00am more frequently to meet this demand.

Condition Q on the planning permit for the quarry states:

"The operator must ensure that unless authorised otherwise in writing by the responsible authority, no operation including excavation, drilling, blasting, loading, crushing and cartage of stone or other material or access to the site by cartage trucks shall take place outside the hours of 7.00am and 6.00pm Monday to Friday inclusive, and 7.00am to 1.00pm on Saturdays and no works, other than essential maintenance, shall occur outside the hours of 6.00am and 6.00pm Monday to Friday inclusive, and 6.00am to 4.00pm on Saturdays, or on a Sunday or a Public Holiday."

Due to the commercial imperative of having to be able to deliver rock products on-site prior to 7.00 am, there is the need for the quarry to have its permitted operating hours modified.

Noise emissions assessment

We engaged Neville Goddard of Watson Moss Growcott acoustics pty ltd (WMG) to undertake a noise emissions assessment of the quarry to ascertain whether activities at the quarry were conforming to the EPA's noise guidelines. WMG were also asked to assess whether quarry operations would enable compliance with the EPA's noise guidelines prior to 7.00 am. A copy of the report detailing the noise emission assessment accompanies this request. This report is titled "Noise Emission Assessment Conducted at 49 Moore Court, Castella (28 August 2012).

The assessment framework for noise in regional Victoria is "NOISE FROM INDUSTRY IN REGIONAL VICTORIA – Recommended Maximum Noise Levels from Commerce, Industry and Trade Premises in Regional Victoria (NIRV).

The WMG report states:

"It has previously been established, and remains the case, that the only component of noise emission from the quarry that requires consideration is that due to trucks traveling along the access road, the quarry itself being well attenuated by distance and topography."

Monitoring of background noise levels at 49 Moore Court was undertaken over a 2 week period in July 2012 in order to determine the Recommended Maximum Noise Level (RMNL) under NIRV.

NIRV specifies different periods of the day for noise guidelines. Of relevance in this instance are the Day period (7.00 am to 6.00 pm Mon – Fri & 7.00 am to 1.00 pm Sat) and the Night period (10.00 pm to 7.00 am all days). The currently permitted operating hours fall within the Day period. The earlier operating times would fall within the Night period for which a lower RMNL is applicable.

Derivation of the RMNLs for 49 Moore Court takes into account the planning scheme zonings and the ambient background noise which includes the noise from the Melba Highway. The RMNLs have been determined to be:

Day Period: 52 dB(A)

Night Period: 45 dB(A)

Measurements of noise levels resulting from truck movements along the quarry access road were undertaken at 49 Moore Court over a 2 hour period on 20th July 2012. WMG report that:

"Noise due to frogs and traffic on the Melba Hwy provided the background against which noise from trucks traversing the quarry access road had to be measured. Measurements had to be frequently paused in order to exclude extraneous noise. Despite this, there were a number of truck movements along the access road that were clearly audible and measurable, while other truck movements were barely audible, and not effectively measurable as they were 'lost' in the ambient background."

"Trucks on the access road varied from barely audible to clearly audible, with those clearly audible being due to engine/exhaust brake usage going downhill rather than going uphill. Some trucks travelling down the hill were barely perceptible, while others were clearly audible with a tonal characteristic."

From their measurements, WMG determined an effective noise level at 49 Moore Court for the trucks using the quarry access road to be 50dB(A).

The effective noise level of 50 dB(A) complies with the RMNL of 52 dB(A) for the day period of 7.00 am to 6.00 pm. It does not however meet the RMNL of 45 dB(A) determined for the period prior to 7.00 am.

Noise measurements were also conducted beside the quarry access road in order to investigate further the variations in truck noise levels that had been observed at 49 Moore Court. The noise of trucks travelling both up (empty) and down (loaded) the access road was measured. There was quite a variation in the noise levels emitted by the different trucks.

WMG found that the trucks with a high noise level combined with an engine/exhaust brake with a strong tonal characteristic were the ones causing the audible and identifiable noise at the residential locations at Moore Court. These would also result in noise above the RMNL for the period prior to 7.00 am.

WMG stated:

"The key to achieving noise levels at the residential receptor location within the Recommended Maximum Noise Levels for the period 6-7am is to reduce the level and tonal characteristic exhibited by some trucks while descending the access road."

They identified two strategies for doing this. The first is to require trucks descending the access road to not use their exhaust / engine brake and only use mechanical brakes prior to 7.00 am. The second was to ensure the use of effective exhaust mufflers to reduce engine / exhaust noise.

The noise emission assessment concluded as follows:

"Measurement of noise levels arising from trucks operating on the Castella Quarries access road has indicated compliance with the Recommended Maximum Noise Levels determined in accordance with the EPA's recently released document NOISE FROM INDUSTRY IN REGIONAL VICTORIA Recommended Maximum Noise Levels from Commerce, Industry and Trade Premises in Regional Victoria for the day period from 7am, but not for the period 6-7am.

The limitation on compliance with the Recommended Maximum Noise Level prior to 7am was found to be the level and character of engine/exhaust brake noise on some but not all of the trucks operating out of the site.

Operation of trucks on the access road between 6am and 7am will require those trucks that had 'noisy' exhausts, particularly in terms of engine/exhaust brake operation while descending the access road loaded, to either have more effective mufflers fitted, or to avoid the use of engine/exhaust brakes prior to 7am."

Since the completion of the WMG assessment, Castella Quarries have terminated the use of one of the three noisiest trucks identified in the assessment. They have had the owners of the next two noisiest trucks replace their exhaust muffler systems with new quieter systems.

Subsequent noise emissions assessment

WMG have undertaken further noise testing on the two trucks with the new exhaust systems. Truck noise measurements were conducted at the quarry site on Tuesday 20 November 2012. The results of these tests are reported in the accompanying report titled "Follow-up to Noise Emission Assessment Conducted at 49 Moore Court, Castella (10 December 2012)".

Truck noise levels were measured in two ways:

- A stationary test in general accordance with the National Stationary Exhaust Noise Test Procedures for In-Service Motor Vehicles in relation to the exhaust noise levels specified in the Victorian Environment Protection (Vehicle Emissions) Regulations 2003.
- Noise measurements taken while trucks were travelling along the quarry access road to enable comparison with similar measurements conducted prior to installation of the new mufflers.

The stationary tests recorded the maximum noise level from the exhausts of each truck to be in the range of 82 to 86 dB(A) which is well below the limit of 99 dB(A) specified in the Regulations.

Noise testing was undertaken adjacent to the quarry access road in the same location as the testing undertaken in the previous assessment. The trucks were tested going both uphill and downhill, although the trucks going downhill were not loaded. The testing results showed noise reductions of 3-6 dB(A) for truck going uphill due to the new mufflers. A change in the subjective noise character was also detected. WMG state that it would be reasonable to

expect a similar noise reduction when the trucks are travelling downhill under normal circumstances.

WMG conclude that:

"The combined effects of a direct noise level reduction of 3-6 dB(A) in the level of the noisier truck contributors and a secondary benefit in terms of the duration adjustment could reasonably be expected to reduce the resultant 30-minute effective Leq level at 49 Moore Court from the highest measured/calculated level of 50dB(A) to 45dB(A), and hence comply with the Recommended Maximum Noise Levels from 6am to 7am."

Rational for pre-7.00 am commencement

To meet the requirements of their customers in the construction industry, Castella Quarries must be able to deliver quarry products to construction sites prior to 7.00 am. In order to meet this need, the quarry must be able to have loaded trucks leave the quarry between 6.00 am and 6.30 am depending on the distance from the quarry to the construction site. To achieve this, trucks must be able to enter the quarry and be loaded prior to 6.00 am.

Therefore our client is seeking consent to allow transport and loading activities to occur from 5.30 am and extractive activities to commence from 6.00 am.

Future compliance

To provide Council and the local residents with confidence that the RMNL for the period prior to 7.00 am will be continually complied with, our client proposes the following:

1. Monitoring of the quarry's compliance with the derived RMNL to be undertaken annually. If compliance is demonstrated for two years then this monitoring would cease. This monitoring would be undertaken by a Council appointed consultant and done at a time nominated by Council (without our client's knowledge). It would be paid for by Castella Quarries on the basis of a pre-approved quote.
2. Place a large sign at the entrance to the quarry advising truck drivers to keep their use of exhaust / engine breaks to the minimum necessary to ensure an acceptable noise environment for neighbours.
3. To develop a Code of Conduct for Drivers and as part of the normal quarry induction, educate drivers regarding the importance of making no more noise than necessary when on the access road as it is important to the viability of the quarry. Also advise drivers that as the date and time of their travel along the access road is recorded and it will be possible to identify those drivers who threaten the viability of the business by making unnecessary noise, and
4. To locate signs regularly spaced along the access road to reinforce the need for drivers to keep noise levels down

Denial of consent consequences

It is essential for our client to remain competitive in the market place and to do so they must be able to deliver quarry products to construction site prior to 7.00 am when necessary. Its competitors such as the quarry at Woori Yallock have this ability.

The inability of our client to remain competitive in this manner threatens their on-going viability. It also poses a real risk of a reduction in competition in the market place and a consequent rise in the cost of quarry products to the consumer and ultimately the community. The long term impact of our client's lack of competitiveness is likely to be a loss of local employment, income, industry output and household consumption from the Shire of Murrindindi. The quarry stimulus to economic activity would most likely be transferred to the Yarra Ranges Shire.

Compliance with planning policies and controls

The noise assessment undertaken by WMG has demonstrated that the quarry can operate within NIRV's Recommended Maximum Noise Level for the residences in Moore Court for the period prior to 7.00 am. Therefore the operation of the quarry before 7.00 am is consistent with all relevant planning policies and controls within the Murrindindi Planning Scheme.

Net community benefit

On the basis that the quarry operates within the RMNL derived for the period prior to 7.00 am on weekdays and Saturdays and that the extension of hours maintains or enhances the quarry's competitiveness in the market place, the proposal will give rise to a net community benefit.

Conclusion

The preceding discussion demonstrates that the quarry can operate prior to 7.00 am within the required noise limits, therefore not impacting on the amenity of nearby residents.

The ability to operate as requested will at least maintain the quarry's competitiveness and viability, if not improve it.

In view of this we submit that the request by Castella Quarries to obtain consent to enable transport and loading activities to begin from 5.30 am and extractive activities to begin from 6.00 am should be supported.

Please find enclosed a cheque for \$126.50 being the fee for the consent request.

If you wish to discuss this request, please do not hesitate to contact me.

Yours sincerely,



Jack Kraan
Director

Email – jkraan@focuscds.com.au

Encl.



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**CASTELLA QUARRIES
MELBA HWY, CASTELLA VIC 3777**

**Noise Emission Assessment
Conducted at
49 Moore Court, Castella**

Prepared for
Castella Quarries
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Narre Warren, Victoria 3805

Ref. 11250-1ng.docx
28 August 2012



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1. INTRODUCTION

This report presents the results of measurements of operational noise levels conducted in relation to truck movements along the Castella Quarries access road. These noise levels have been assessed in terms of *NOISE FROM INDUSTRY IN REGIONAL VICTORIA Recommended Maximum Noise Levels from Commerce, Industry and Trade Premises in Regional Victoria (NIRV)*. NIRV was introduced in October 2011 and is now the assessment framework for noise in regional Victoria.

The noise assessment has been conducted in order to consider operation of the quarry between 6.00am and 7.00am.

Compliance of the quarry operations after 7.00am with the guideline noise limit under the previously applicable assessment procedures has previously been established, but operation prior to 7.00am is within the EPA-defined 'night' period, for which a lower guideline maximum recommended noise level is applicable.

It has previously been established, and remains the case, that the only component of noise emission from the quarry that requires consideration is that due to trucks traveling along the access road, the quarry itself being well attenuated by distance and topography.

Noise measurements were conducted at 49 Moore Court, Castella and beside the quarry access road.

This report covers the following aspects:

- Monitoring of background noise levels at 49 Moore Court in order to determine the recommended maximum noise level under NIRV;
- Determination of EPA guideline maximum noise levels for noise emission to residential premises in regional Victoria for the period 6.00am to 7.00am;
- Measurement of noise levels at 49 Moore Court resulting from truck movements along the Castella Quarries access road;
- Consideration of appropriate noise mitigation strategies in order to achieve compliance with the guideline maximum noise levels between 6.00am and 7.00am.

2. NOISE ASSESSMENT TERMINOLOGY

The following terms are used in this report:

dB(A) Decibels recorded on a sound level meter, which has had its frequency response modified electronically to an international standard, to quantify the average human loudness response of different character.

L₉₀ the level exceeded for 90% of the measurement period, which is representative of the typical lower levels in a varying noise environment. It is the noise measure defined by the EPA as the measure of the background sound level to use in determining noise limits.

L_{eq} the equivalent continuous level that would have the same total acoustic energy over the measurement period as the actual varying noise level under consideration. It is the noise measure defined by the EPA as the measure of the noise to use in assessing compliance with noise limits.

In short, L₉₀ is the measure of background sound (in the absence of industrial noise) used in determining noise limits, and L_{eq} is the measure of industrial noise used in assessing compliance with noise limits. L₉₀ can also be of assistance in identifying the level of a constant industrial noise amongst varying extraneous noise.



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3. BACKGROUND NOISE MONITORING IN RELATION TO NIRV

For much of Victoria, there is now no need to monitor the existing ambient background noise environment as part of determining Recommended Maximum Noise Levels in accordance with NIRV. However, locations in the vicinity of highways are among the sites where the ambient background level is taken into account in determining Recommended Maximum Noise Levels.

An Acoustic Research Laboratories Type EL 316 noise logger was used to measure the ambient noise environment at 49 Moore Ct to provide the information necessary to determine the NIRV Recommended Maximum Noise Levels. The noise monitoring was conducted during July 2012.

The noise logger was located to the east of the dwelling at 49 Moore Ct Castella, at a location representative of the ambient noise exposure of the dwelling, on the side of the dwelling that faces the highway and the quarry access road. This location is indicated on an aerial plan of the area attached at Appendix One.

Weather monitoring records from the Coldstream Automatic Weather Station have been included at Appendix Two for the period of unattended monitoring. These have been colour-coded for wind speed, which shows wind speeds less than 10 kph for much of the monitoring period, as well as for rainfall.

Graphical results of the noise monitoring are included at Appendix Three. The ambient L_{90} and L_{eq} levels have both been included. The derived guideline L_{eq} recommended maximum noise levels set out in section 4 below for the proposed periods of operation have been superimposed over the ambient noise levels in order to put them in context.

The proposed hours are 6am to 6pm Monday to Friday and 6am to 1pm Saturday. The majority of this is within the EPA-defined 'day' period [7am to 6pm Mon-Fri and 7am to 1pm Sat], but 6am to 7am is within the EPA-defined 'night' period [10pm to 7am], for which a lower recommended maximum noise level is applicable.

Ambient L_{90} noise levels averaged over those components of the EPA-defined day and night periods have been tabulated below.

Table One: Summary of Average Monitored Ambient Background Noise Levels

Day and date	Ambient background L_{90} noise levels averaged over the day period and 6am-7am in the night period as defined by the EPA, dB(A)	
	6am-7am in the 'Night' period	'Day' 7am-6pm M-F, 7am-1pm Sat
Fri 6 July		46
Sat 7 July	45	48
Sun 8 July	44	48
Mon 9 July	45	48
Tue 10 July	44	50
Wed 11 July	48	48
Thu 12 July	46	47
Fri 13 July	51	48



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Day and date	Ambient background L ₉₀ noise levels averaged over the day period and 6am-7am in the night period as defined by the EPA, dB(A)	
	6am-7am in the 'Night' period	'Day' 7am-6pm M-F, 7am-1pm Sat
Sat 14 July	46	48
Sun 15 July	43	49
Mon 16 July	45	47
Tue 17 July	48	51
Wed 18 July	46	45
Thu 19 July	41	44
Fri 20 July	41	

The results for Sundays are not relevant, as operation on Sundays does not occur and is not sought.

Conventional EPA practice when a spread of results are obtained during a monitoring period is to use the lowest of the averaged background noise levels obtained during a monitoring period for the purpose of determining recommended maximum noise levels, on the basis that if it can occur during any given period then it is reasonable to expect it to occur again.

On that basis, the background noise levels to be used in determining the recommended maximum noise levels for 49 Moore Ct are 44dB(A) L₉₀ for the period 7am-6pm Mon-Fri and 7am-1pm Sat, and 41dB(A) L₉₀ for the period 6am-7am Mon-Sat.

The application of the measured and assumed background noise levels in determining guideline recommended maximum noise levels is discussed in section 4 below.



4. NOISE LEVEL GUIDELINES

In October 2011, the Victorian EPA introduced a new guideline for noise in regional Victoria: *NOISE FROM INDUSTRY IN REGIONAL VICTORIA Recommended Maximum Noise Levels from Commerce, Industry and Trade Premises in Regional Victoria* (NIRV). The recommended maximum noise levels under the guideline are just that, guideline recommendations.

The recommended levels only gain a higher status than recommendations if adopted as Conditions in a Planning Permit of operating Licence, which is the case in this instance.

Under the noise assessment procedures set out in this document, recommended maximum noise levels are set using State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1) within the Urban Centre Boundaries of major urban centres in Victoria (defined as a population greater than 7000).

In areas outside Urban Centre Boundaries, NIRV sets out specific procedures for determining the Recommended Maximum Noise Levels (RMNLs) for General Commerce Industry and Trade, with a separate procedure for Earth Resources, which is applicable for the quarry under consideration.

Derivation of the RMNLs for this site, which is subject to noise from the nearby Melba Highway, takes into account planning scheme zonings and ambient background noise, with a final check related to the traffic noise environment. The recommended maximum noise level derivations for 49 Moore Ct Castella are set out in the attached Appendix Four.

Table Two: Summary of Derived Recommended Maximum Noise Levels

RESIDENTIAL LOCATION/S	NIRV RECOMMENDED MAXIMUM NOISE LEVELS, dB(A)	
	'Day' 7am-6pm Mon-Fri, 7am-1pm Sat	6am-7am Mon-Fri
49 Moore Ct Castella.	52	45

Note that the assessment of noise emission from the quarry is made using the L_{eq} noise measure. The ambient L_{eq} due to the Melba Highway traffic noise is at times higher than the derived recommended maximum noise level at 49 Moore Ct, as indicated in the graphical noise monitoring results included in Appendix Two.

This indicates a high level of protection of residential amenity by the NIRV RMNLs, but also indicates that assessment of compliance with the RMNLs would be difficult in the ambient noise environment. This is consistent with the objective of noise criteria, which is to have an industrial noise 'blend in with' and not dominate the ambient noise environment.

Compliance with the RMNLs could not be assessed by means of unattended noise measurements, measurements need to be conducted while in attendance at the site to discriminate between sound sources.

Noise of trucks operating within the boundaries of the site would also be assessable in terms of the NIRV RMNLs.



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5. NOISE MEASUREMENT DETAILS

Date/time:

- 20 July 2012, 7.00am – 11.45am.

Instrumentation:

- Rion type NA27 precision sound level meter and frequency analyser.
- Bruel & Kjaer type 4230 acoustic calibrator.

Measurement locations

- East side of the dwelling at 49 Moore Ct, representative of noise exposure of the dwelling to noise due to highway traffic and trucks on the quarry access road.
- Adjacent to the quarry access road to assess the noise levels of trucks using the access road.
- The measurement locations are indicated on the aerial photo included at Appendix One.

Weather conditions:

- Conditions were dry throughout the attended measurements at 49 Moore Court, while some very fine rain fell during the measurements adjacent to the quarry access road, but this did not impact on the noise measurements. Conditions varied from calm to a light breeze at times just enough to stir the trees.

6. MEASUREMENT RESULTS AND DISCUSSION

6.1 AT 49 MOORE COURT

Noise due to frogs and traffic on the Melba Hwy provided the background against which noise from trucks traversing the quarry access road had to be measured. Measurements had to be frequently paused in order to exclude extraneous noise. Despite this, there were a number of truck movements along the access road that were clearly audible and measureable, while other truck movements were barely audible, and not effectively measurable as they were 'lost' in the ambient background.

Over 40 measurements varying in duration from a few seconds to 5 minutes were taken over approximately two hours from 7.00am to 9.00am with results of the samples ranging from 43 to 53 dB(A) L_{eq} in attempting to separate noise due to trucks on the quarry access road from other extraneous noise.

Trucks on the access road varied from barely audible to clearly audible, with those clearly audible being due to engine/exhaust brake usage going downhill rather than going uphill. Some trucks travelling down the hill were barely perceptible, while others were clearly audible with a tonal characteristic.

The noise measure that is to be compared with the Recommended Maximum Noise Levels is the L_{eq} level over a 30 minute period, adjusted if necessary to account for the proportion of the 30 minute assessment period that the noise is audible if it is not continually audible, plus noise character adjustments for tonality, impulsiveness and intermittency.

The applicable adjustments in this case were for duration as the noise from the trucks was not continuously audible for a 30 minute period and for tonality associated with the distinctive noise character generated by the engine/exhaust brakes on some (but not all) of the trucks as they descended the access road loaded.

Taking all of the measurements together, which added to a combined total of 27 minutes of sampling, the overall L_{eq} level during periods of audible noise from trucks on the quarry access road was 50.4dB(A).



A slightly higher level of L_{eq} 51dB(A) was obtained during the 30 minutes from 7.08am to 7.38am. During this period noise due to trucks on the quarry access road was audible for 50% of the time, and the tonal adjustment was +2dB(A). Therefore the effective level was $51-3+2=50$ dB(A) during this period.

An effective level of 50dB(A) complies with the Recommended Maximum Noise Level the day period from 7.00am, but not with the Recommended Maximum Noise Level for the period from 6.00am to 7.00am.

The effective level over a 30 minute period will vary, essentially dependent upon the number and mix of trucks operating on the access road, and in particular whether they are trucks with 'noisy' exhaust brakes or not.

6.2 ADJACENT TO QUARRY ACCESS ROAD

Noise measurements were conducted adjacent to the quarry access road in order to investigate further the variations in truck noise level that had been observed. The measurement point is indicated on the aerial photo in Appendix One, and was located 14m from loaded trucks descending the access road, and 10m from unloaded trucks ascending the access road.

The table below summarises the results obtained.

Table Three: Summary of truck noise levels measured adjacent to quarry access road.

Truck Travelling Up or Down Access Road	Notes	Measured Short Term L_{eq} Level, dB(A)
Down	'Lofts Quarries' single dumper with engine/exhaust brake	79
	Truck & dog with engine/exhaust brake	76
	'Lofts Quarries' single dumper with engine/exhaust brake	80
	'Cartage Australia' Volvo double dumper	70
	'Aranmore Constructions' Kenworth single dumper 'sounded OK'	75
	'Castella Quarries' single dumper not using engine/exhaust brake	66
	'Dandy Premix' Western Star double	78
	Castella Quarries single dumper using mechanical brakes	76
	'Aranmore Constructions' Kenworth not using engine/exhaust brake	78
	'Fineridge Constructions' using mechanical brakes	77
Up	'Aranmore Constructions' truck & dog	79
	'Castella Quarries' single dumper	81



Truck Travelling Up or Down Access Road	Notes	Measured Short Term L_{eq} Level, dB(A)
	'Dandy premix' double	79
	'Castella Quarries' Western Star single	80
	'Aranmore Constructions' Kenworth single dumper	79
	'Fineridge Constructions' single	76
	'Aranmore Constructions' single	74

It was evident that it was the trucks with a high noise level, in the order of 80dB(A) at 14m, combined with an engine/exhaust brake with a strong tonal characteristic that would be causing the audible and identifiable noise at the residential receptor location and also resulting in noise above the Recommended Maximum Noise Level.

Noise levels due to trucks ascending the access road were not significantly different from those descending, but at the residential receptor location trucks ascending the access road were not a significant contributor to exceedance of the Recommended Maximum Noise Levels.

The key to achieving noise levels at the residential receptor location within the Recommended Maximum Noise Levels for the period 6-7am is to reduce the level and tonal characteristic exhibited by some trucks while descending the access road.

The drivers of some trucks chose while the noise measurements were being conducted adjacent to the access road to use mechanical brakes rather than engine/exhaust brakes. This resulted in significantly lower noise levels and no tonal characteristic. This finding indicates that one strategy to achieve compliance with the Recommended Maximum Noise Level for 6-7am would be to require trucks to only use mechanical brakes during this period.

Effective exhaust mufflers can also effectively reduce engine/exhaust noise and it was evident that there was significant variation in the effectiveness of mufflers in use on the trucks operating to and from the quarry on the day of the testing.

7. RECOMMENDATIONS

In order to be able to operate in a manner that achieves compliance with the Recommended Maximum Noise Levels for the period 6-7am, it is recommended that trucks either provide evidence to the quarry that they comply with the in-service noise requirements set out below, or be required to not use engine/exhaust brakes within the quarry boundaries.

The in-service noise requirements are measured as a stationary or mobile test (standard vehicle noise test procedures and requirements):

- Comply with 80dB(A) @ 7.5m from the vehicle centre line, tested while accelerating in accordance with the ADR 83/00 test procedures.
- Comply with 99dB(A) @ 0.5m from the exhaust outlet, tested in accordance with the 'National Stationary Exhaust Noise Test Procedures for In-Service Motor Vehicles'. This test is conducted with the engine operating at defined rpm, specified by the procedures.

Accredited test facilities are located in both metropolitan and country centres.



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8. SUMMARY

Measurement of noise levels arising from trucks operating on the Castella Quarries access road has indicated compliance with the Recommended Maximum Noise Levels determined in accordance with the EPA's recently released document *NOISE FROM INDUSTRY IN REGIONAL VICTORIA Recommended Maximum Noise Levels from Commerce, Industry and Trade Premises in Regional Victoria* for the day period from 7am, but not for the period 6-7am.

The limitation on compliance with the Recommended Maximum Noise Level prior to 7am was found to be the level and character of engine/exhaust brake noise on some but not all of the trucks operating out of the site.

Operation of trucks on the access road between 6am and 7am will require those trucks that had 'noisy' exhausts, particularly in terms of engine/exhaust brake operation while descending the access road loaded, to either have more effective mufflers fitted, or to avoid the use of engine/exhaust brakes prior to 7am.

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APPENDIX ONE: NOISE MEASUREMENT LOCATIONS





APPENDIX TWO: WEATHER RECORDS FROM COLDSTREAM AUTOMATIC WEATHER STATION DURING THE PERIOD OF UNATTENDED NOISE MONITORING

Latest Weather Observations for Coldstream AWS										
Station Details			ID: 086383	Lat: -37.72		Lon: 145.41				
						Wind speed <= 10kph				
Rainfall during that half hour						10kph < Wind speed < 20kph				
						Wind speed >= 20kph				
Date/Time	Tmp	Dew Point	Rel Hum	Wind					Rain since 9 am	Rain during the half hour
				Dir	Spd	Gust	Spd	Gust		
EST	°C	°C	%		km/h	km/h	kts	kts	mm	mm
20/12:00pm	12.3	10.2	87	NE	6	11	3	6	0	0
20/11:30am	11.6	9.7	88	NNE	9	13	5	7	0	0
20/11:00am	11.1	9.5	90	N	11	13	6	7	0	0
20/10:30am	10.7	9.5	92	NNE	9	11	5	6	0	0
20/10:00am	10.1	8.9	92	NE	2	7	1	4	0	0
20/09:30am	10.2	8.1	87	NNE	4	7	2	4	0	0
20/09:00am	10.1	7.9	86	N	9	15	5	8	0.4	0
20/08:30am	9.4	7.7	89	NNE	6	9	3	5	0.4	0
20/08:00am	8.9	7.4	90	NNE	7	11	4	6	0.4	0
20/07:30am	8.4	7.3	93	CALM	0	4	0	2	0.4	0
20/07:00am	8	6.8	92	ENE	6	9	3	5	0.4	0
20/06:30am	8.3	7.1	92	NNE	4	9	2	5	0.4	0
20/06:00am	8.4	7.3	93	NE	7	13	4	7	0.4	0
20/05:30am	8.5	7.6	94	NE	7	13	4	7	0.4	0
20/05:00am	8.6	7.5	93	NE	7	13	4	7	0.4	0.2
20/04:30am	8.8	7.4	91	NNE	9	15	5	8	0.2	0.2
20/04:00am	9	7	87	NE	7	11	4	6	0	0
20/03:30am	9.5	6.4	81	NNE	9	13	5	7	0	0
20/03:00am	9.7	5.9	77	N	9	13	5	7	0	0
20/02:30am	9.8	5.8	76	NE	6	9	3	5	0	0
20/02:00am	10	5.6	74	NNE	9	13	5	7	0	0
20/01:30am	10	5.6	74	NNE	11	19	6	10	0	0
20/01:00am	10.2	5.4	72	NE	7	11	4	6	0	0
20/12:30am	10.1	5.3	72	NE	9	15	5	8	0	0
20/12:00am	10.2	5.2	71	NNE	11	19	6	10	0	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	



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					km/h	km/h	kts	kts		
19/11:30pm	10.1	5.3	72	N	11	17	6	9	0	0
19/11:00pm	10.2	5.2	71	N	11	15	6	8	0	0
19/10:30pm	10.2	5.2	71	N	11	17	6	9	0	0
19/10:00pm	10.3	5.1	70	N	11	17	6	9	0	0
19/09:30pm	10.5	4.9	68	N	13	20	7	11	0	0
19/09:00pm	10.2	5	70	N	9	13	5	7	0	0
19/08:30pm	10.4	5.2	70	NNE	9	13	5	7	0	0
19/08:00pm	10.2	5.4	72	N	11	17	6	9	0	0
19/07:30pm	10	5.8	75	N	7	11	4	6	0	0
19/07:00pm	10.2	5.6	73	N	6	9	3	5	0	0
19/06:30pm	10.2	5.8	74	NNE	7	13	4	7	0	0
19/06:00pm	10.5	6.1	74	NNE	7	13	4	7	0	0
19/05:30pm	10.6	6	73	N	11	13	6	7	0	0
19/05:00pm	11	6	71	N	11	19	6	10	0	0
19/04:30pm	11.5	4.9	64	NNW	9	15	5	8	0	0
19/04:00pm	11.8	4.8	62	NNW	13	20	7	11	0	0
19/03:30pm	12.3	5	61	NNW	13	19	7	10	0	0
19/03:00pm	12.2	4.7	60	NW	13	20	7	11	0	0
19/02:30pm	12.3	4.3	58	NW	9	20	5	11	0	0
19/02:00pm	12.6	4.6	58	WNW	11	17	6	9	0	0
19/01:30pm	12.8	4.8	58	NW	15	28	8	15	0	0
									0	0
									0	0
									0	0
19/11:30am	12.4	4.9	60	NNW	13	20	7	11	0	0
19/11:00am	11.4	5.5	67	NNW	15	22	8	12	0	0
19/10:30am	10.4	6	74	N	13	19	7	10	0	0
19/10:00am	8.2	6.5	89	NNE	9	15	5	8	0	0
19/09:30am	5.8	5.7	99	CALM	0	2	0	1	0	0
19/09:00am	2.5	2.4	99	CALM	0	0	0	0	0.6	0
19/08:30am	1.5	1.4	99	ESE	0	0	0	0	0.6	0
19/08:00am	0.5	0.4	99	CALM	0	0	0	0	0.6	0
19/07:30am	0.4	0.3	99	SSE	2	7	1	4	0.6	0
19/07:00am	0.5	0.4	99	S	2	7	1	4	0.6	0
19/06:30am	0.8	0.7	99	CALM	0	0	0	0	0.6	0
19/06:00am	0.9	0.8	99	CALM	0	0	0	0	0.6	0
19/05:30am	0.9	0.6	98	SE	2	6	1	3	0.6	0
19/05:00am	1.6	1.5	99	CALM	0	0	0	0	0.6	0
19/04:30am	1	0.9	99	S	6	9	3	5	0.6	0
19/04:00am	0.4	0.1	98	SSW	2	7	1	4	0.6	0
19/03:30am	0.4	0.1	98	SSE	2	6	1	3	0.6	0
19/03:00am	0.6	0.3	98	S	2	7	1	4	0.6	0
19/02:30am	1	0.7	98	CALM	0	0	0	0	0.6	0



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19/02:00am	2	1.7	98	CALM	0	0	0	0	0.6	0
19/01:30am	2.1	1.8	98	S	4	9	2	5	0.6	0
19/01:00am	3.1	2.8	98	CALM	0	0	0	0	0.6	0
19/12:30am	2.3	2	98	S	7	11	4	6	0.6	0
19/12:00am	1.7	1.3	97	S	0	0	0	0	0.6	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
18/11:30pm	1.6	1.2	97	CALM	0	4	0	2	0.6	0
18/11:00pm	1.9	1.3	96	S	2	7	1	4	0.6	0
18/10:30pm	2.4	1.7	95	CALM	0	0	0	0	0.6	0
18/10:00pm	3.4	2.7	95	CALM	0	6	0	3	0.6	0
18/09:30pm	4.3	3.6	95	SSE	2	7	1	4	0.6	0
18/09:00pm	5.1	4.5	96	S	4	7	2	4	0.6	0
18/08:30pm	4.2	3.6	96	WSW	2	6	1	3	0.6	0
18/08:00pm	3.2	1.9	91	CALM	0	0	0	0	0.6	0
18/07:30pm	4.5	2.8	89	CALM	0	0	0	0	0.6	0
18/07:00pm	6.5	3.8	83	W	2	6	1	3	0.6	0
18/06:30pm	8.2	4.4	77	W	7	9	4	5	0.6	0
18/06:00pm	9.3	4.5	72	W	13	19	7	10	0.6	0
18/05:30pm	9.6	4.2	69	SW	19	32	10	17	0.6	0
18/05:00pm	9.3	2.4	62	NW	4	7	2	4	0.6	0
18/04:30pm	10.2	2.1	57	WNW	6	9	3	5	0.6	0
18/04:00pm	11.8	2.8	54	WNW	11	19	6	10	0.6	0
18/03:30pm	10.7	5	68	WSW	11	17	6	9	0.6	0.6
18/03:00pm	13.1	3.2	51	W	15	39	8	21	0	0
18/02:30pm	12.2	2.9	53	WNW	15	24	8	13	0	0
18/02:00pm	12.8	5	59	W	13	20	7	11	0	0
18/01:30pm	11.6	4.8	63	WNW	11	19	6	10	0	0
18/01:00pm	11.2	4.9	65	WNW	13	19	7	10	0	0
18/12:30pm	12.4	6	65	WNW	13	24	7	13	0	0
18/12:00pm	11.2	4.9	65	NNW	11	20	6	11	0	0
18/11:30am	11.3	6.8	74	N	11	17	6	9	0	0
18/11:00am	9.6	6.5	81	N	9	15	5	8	0	0
18/10:30am	8.9	7	88	N	7	9	4	5	0	0
18/10:00am	8.3	7.1	92	N	9	17	5	9	0	0
18/09:30am	7.8	7.1	95	N	6	9	3	5	0	0
18/09:00am	7.6	7	96	NNE	7	13	4	7	3.4	0.2
18/08:30am	7.5	6.9	96	NNE	11	17	6	9	3.2	0.8
18/08:00am	7.7	6.6	93	CALM	0	0	0	0	2.4	1
18/07:30am	7.9	6.5	91	NW	6	11	3	6	1.4	1.2



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18/07:00am	9	5.6	79	W	13	20	7	11	0.2	0.2
18/06:30am	9.8	4.8	71	N	19	26	10	14	0	0
18/06:00am	9.9	4.9	71	N	17	24	9	13	0	0
18/05:30am	10.2	4.8	69	N	17	24	9	13	0	0
18/05:00am	9.8	5.2	73	N	15	22	8	12	0	0
18/04:30am	9.7	5.3	74	N	13	24	7	13	0	0
18/04:00am	9.1	5.3	77	N	17	24	9	13	0	0
18/03:30am	9.5	5.5	76	N	17	22	9	12	0	0
18/03:00am	9.4	5.6	77	N	11	13	6	7	0	0
18/02:30am	9.7	5.5	75	N	13	19	7	10	0	0
18/02:00am	10.1	5.7	74	N	13	17	7	9	0	0
18/01:30am	10.1	5.5	73	N	11	22	6	12	0	0
18/01:00am	10.2	5.8	74	N	15	20	8	11	0	0
18/12:30am	10.1	5.7	74	N	13	19	7	10	0	0
18/12:00am	10.6	5.8	72	N	15	22	8	12	0	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
17/11:30pm	10.8	5.8	71	N	19	30	10	16	0	0
17/11:00pm	10.6	6	73	NNW	15	22	8	12	0	0
17/10:30pm	11	6	71	N	17	22	9	12	0	0
17/10:00pm	10.7	5.9	72	N	13	19	7	10	0	0
17/09:30pm	11.5	6	69	N	19	28	10	15	0	0
17/09:00pm	10.2	5.8	74	NNW	9	15	5	8	0	0
17/08:30pm	10.3	5.9	74	NNW	11	20	6	11	0	0
17/08:00pm	11	6	71	N	11	20	6	11	0	0
17/07:30pm	11.1	6	71	N	11	15	6	8	0	0
17/07:00pm	11.8	6.1	68	N	15	28	8	15	0	0
17/06:30pm	12	6.3	68	N	15	24	8	13	0	0
17/06:00pm	12.5	6.1	65	N	20	33	11	18	0	0
17/05:30pm	12.7	6.3	65	N	20	32	11	17	0	0
17/05:00pm	13.4	6.3	62	N	22	37	12	20	0	0
17/04:30pm	13.3	6.2	62	N	22	33	12	18	0	0
17/04:00pm	13.9	5.8	58	N	28	41	15	22	0	0
17/03:30pm	14	5.9	58	N	24	39	13	21	0	0
17/03:00pm	14.9	6.7	58	N	26	37	14	20	0	0
17/02:30pm	14.6	6.4	58	N	28	43	15	23	0	0
17/02:00pm	15.2	6.2	55	N	30	43	16	23	0	0
17/01:30pm	14.3	5.9	57	N	28	46	15	25	0	0
17/01:27pm	14.6	6.2	57	N	28	46	15	25	0	0
17/01:00pm	14.6	6.9	60	N	26	39	14	21	0	0



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17/12:30pm	14.5	6.1	57	N	32	50	17	27	0	0
17/12:21pm	14.5	6.1	57	N	28	48	15	26	0	0
17/12:00pm	14.8	6.9	59	N	28	41	15	22	0	0
17/11:30am	14.9	7.9	63	N	24	35	13	19	0	0
17/11:00am	14.5	7.5	63	N	24	39	13	21	0	0
17/10:30am	14	7.1	63	N	24	35	13	19	0	0
17/10:00am	13.7	7.2	65	N	22	35	12	19	0	0
17/09:30am	13.2	7.6	69	N	20	30	11	16	0	0
17/09:00am	12.3	7.8	74	N	20	30	11	16	0	0
17/08:30am	11.2	7.7	79	N	17	24	9	13	0	0
17/08:00am	11.1	7.8	80	N	15	22	8	12	0	0
17/07:30am	11.6	8.3	80	N	17	24	9	13	0	0
17/07:00am	11.9	8.6	80	N	15	22	8	12	0	0
17/06:30am	12	8.8	81	N	15	22	8	12	0	0
17/06:00am	12	9	82	N	13	17	7	9	0	0
17/05:30am	11.9	9.1	83	N	11	15	6	8	0	0
17/05:00am	12.1	8.9	81	N	15	20	8	11	0	0
17/04:30am	12.6	9.2	80	N	15	20	8	11	0	0
17/04:00am	12.7	9.3	80	N	15	22	8	12	0	0
17/03:30am	12.6	9.4	81	N	17	24	9	13	0	0
17/03:00am	12.5	9.3	81	N	15	20	8	11	0	0
17/02:30am	12.4	9.2	81	N	15	20	8	11	0	0
17/02:00am	12.3	9.3	82	N	15	20	8	11	0	0
17/01:30am	12.2	9.4	83	N	13	17	7	9	0	0
17/01:00am	12.5	9.5	82	N	13	19	7	10	0	0
17/12:30am	12.6	9.6	82	N	15	20	8	11	0	0
17/12:00am	12.9	9.7	81	N	15	22	8	12	0	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
16/11:30pm	12.8	10	83	NNW	13	19	7	10	0	0
16/11:00pm	12.9	9.9	82	N	17	24	9	13	0	0
16/10:30pm	12.8	10	83	N	13	19	7	10	0	0
16/10:00pm	11.9	9.8	87	N	9	17	5	9	0	0
16/09:30pm	11.7	9.4	86	N	9	20	5	11	0	0
16/09:00pm	12.1	9.8	86	NNE	9	15	5	8	0	0
16/08:30pm	12.2	9.8	85	NNE	13	19	7	10	0	0
16/08:00pm	10.9	9.2	89	NNE	6	11	3	6	0	0
16/07:30pm	11.7	9.6	87	NNE	7	11	4	6	0	0
16/07:00pm	11.7	9.3	85	NNE	6	7	3	4	0	0
16/06:30pm	12.1	9.7	85	N	11	19	6	10	0	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

16/06:00pm	12.3	9.7	84	N	19	30	10	16	0	0
16/05:30pm	12.6	9.6	82	N	17	28	9	15	0	0
16/05:00pm	13.4	9.6	78	N	24	35	13	19	0	0
16/04:30pm	13.8	9.6	76	N	24	37	13	20	0	0
16/04:00pm	14	9.8	76	N	22	32	12	17	0	0
16/03:30pm	14.1	9.7	75	N	20	35	11	19	0	0
16/03:00pm	14.9	10.3	74	N	26	39	14	21	0	0
16/02:30pm	14.7	10.1	74	N	26	44	14	24	0	0
16/02:00pm	15.3	10.5	73	N	24	35	13	19	0	0
16/01:30pm	15.5	10.9	74	N	24	35	13	19	0	0
16/01:00pm	14.4	10.6	78	N	20	32	11	17	0	0
16/12:30pm	13.7	9.9	78	N	26	35	14	19	0	0
16/12:00pm	13.6	10	79	N	26	35	14	19	0	0
16/11:30am	13.4	10.2	81	N	19	28	10	15	0	0
16/11:00am	13.2	9.6	79	N	19	28	10	15	0	0
16/10:30am	13	9.6	80	N	22	35	12	19	0	0
16/10:00am	12.9	9.7	81	N	19	28	10	15	0	0
16/09:30am	12.4	9.6	83	N	19	26	10	14	0	0
16/09:00am	11.7	9.8	88	N	9	17	5	9	0.4	0
16/08:30am	9.7	9.6	99	N	7	11	4	6	0.4	0
16/08:00am	6.8	6.4	97	CALM	0	0	0	0	0.4	0
16/07:30am	7.1	6.5	96	CALM	0	0	0	0	0.4	0
16/07:00am	8	7.4	96	CALM	0	0	0	0	0.4	0
16/06:30am	8.7	8.3	97	CALM	0	0	0	0	0.4	0
16/06:00am	9.2	8.6	96	W	0	0	0	0	0.4	0
16/05:30am	9.3	8.5	95	CALM	0	0	0	0	0.4	0
16/05:00am	9.9	9	94	SSE	0	0	0	0	0.4	0
16/04:30am	10.7	9.5	92	CALM	0	0	0	0	0.4	0
16/04:00am	11.2	9.8	91	W	2	7	1	4	0.4	0
16/03:30am	11.3	9.7	90	W	7	17	4	9	0.4	0
16/03:00am	11.1	9.4	89	CALM	0	0	0	0	0.4	0
16/02:30am	11.4	9.5	88	CALM	0	6	0	3	0.4	0
16/02:00am	11.6	9.3	86	SW	2	11	1	6	0.4	0
16/01:30am	11.2	9.3	88	N	2	9	1	5	0.4	0
16/01:00am	11.4	9.3	87	N	11	17	6	9	0.4	0.2
16/12:30am	11.6	9.3	86	NNE	6	13	3	7	0.2	0
16/12:00am	11.4	9.1	86	NW	7	13	4	7	0.2	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
15/11:30pm	11.6	9	84	N	11	15	6	8	0.2	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

15/11:00pm	11.6	9	84	N	11	19	6	10	0.2	0
15/10:30pm	12.6	8.9	78	N	11	17	6	9	0.2	0
15/10:00pm	12.5	9	79	NNW	13	20	7	11	0.2	0
15/09:30pm	11.7	9.4	86	N	15	20	8	11	0.2	0
15/09:00pm	12.2	9.6	84	NNW	13	22	7	12	0.2	0
15/08:30pm	11.4	9	85	N	19	30	10	16	0.2	0
15/08:00pm	11.3	8.9	85	N	19	28	10	15	0.2	0
15/07:30pm	11.1	8.7	85	N	22	32	12	17	0.2	0.2
15/07:00pm	11.4	8.1	80	N	20	32	11	17	0	0
15/06:30pm	11.2	7.9	80	N	20	32	11	17	0	0
15/06:00pm	11.2	7.7	79	N	19	26	10	14	0	0
15/05:30pm	11.1	7.6	79	N	20	32	11	17	0	0
15/05:00pm	11.2	7.3	77	N	24	37	13	20	0	0
15/04:30pm	11.1	7.4	78	N	20	32	11	17	0	0
15/04:00pm	11.2	7.3	77	N	20	33	11	18	0	0
15/03:30pm	11.7	7.2	74	N	22	37	12	20	0	0
15/03:00pm	11.7	7	73	N	28	43	15	23	0	0
15/02:30pm	11	6.4	73	N	24	33	13	18	0	0
15/02:00pm	11.2	6.3	72	N	24	35	13	19	0	0
15/01:30pm	11.8	6.5	70	N	19	32	10	17	0	0
15/01:00pm	12.1	5.7	65	N	24	35	13	19	0	0
15/12:30pm	11.1	5.4	68	N	24	35	13	19	0	0
15/12:00pm	10.9	5.9	71	N	22	33	12	18	0	0
15/11:30am	10.4	5.6	72	N	20	30	11	16	0	0
15/11:00am	10.2	5.2	71	N	19	32	10	17	0	0
15/10:30am	10	5	71	N	17	28	9	15	0	0
15/10:00am	9.5	5.5	76	N	17	24	9	13	0	0
15/09:30am	9.1	4.3	72	N	11	19	6	10	0	0
15/09:00am	8.6	4.4	75	NNW	7	13	4	7	3.4	0
15/08:30am	7.9	4.3	78	N	9	13	5	7	3.4	0
15/08:00am	7.6	4	78	N	9	15	5	8	3.4	0
15/07:30am	7	4.5	84	N	7	9	4	5	3.4	0
15/07:00am	6.7	4.5	86	NNE	6	9	3	5	3.4	0
15/06:30am	6.7	4.5	86	N	7	11	4	6	3.4	0
15/06:00am	6	5.1	94	N	6	7	3	4	3.4	0
15/05:30am	5.5	4.8	95	CALM	0	0	0	0	3.4	0
15/05:00am	4.7	3.5	92	CALM	0	2	0	1	3.4	0
15/04:30am	6.2	4.4	88	NNW	6	7	3	4	3.4	0
15/04:00am	6.9	5.1	88	NNW	7	11	4	6	3.4	0
15/03:30am	7.6	5.7	88	NW	9	13	5	7	3.4	0
15/03:00am	8	6.1	88	WNW	9	15	5	8	3.4	0
15/02:30am	8.4	6.7	89	W	13	17	7	9	3.4	0
15/02:00am	8.4	6.4	87	WSW	26	37	14	20	3.4	0
15/01:30am	8.4	7.6	95	WSW	26	35	14	19	3.4	0.2



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

15/01:00am	8.8	8.4	97	W	22	33	12	18	3.2	1.2
15/12:30am	8.7	8.4	98	NW	7	15	4	8	2	1.2
15/12:00am	8.5	7.9	96	N	6	9	3	5	0.8	0.2
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
14/11:30pm	8.4	7.6	95	NNE	6	7	3	4	0.6	0
14/11:00pm	8.3	7.4	94	N	6	7	3	4	0.6	0
14/10:30pm	8.2	7.1	93	N	7	11	4	6	0.6	0
14/10:00pm	8.3	7.1	92	NNW	2	11	1	6	0.6	0.2
14/09:30pm	8.5	6.8	89	NNW	6	9	3	5	0.4	0
14/09:00pm	8.8	6.4	85	NW	13	20	7	11	0.4	0
14/08:30pm	8.9	6.7	86	N	13	20	7	11	0.4	0
14/08:00pm	8.9	6.5	85	N	11	15	6	8	0.4	0
14/07:30pm	8.7	6.5	86	N	13	20	7	11	0.4	0
14/07:00pm	8.1	5.9	86	N	9	13	5	7	0.4	0
14/06:30pm	8.8	5.7	81	N	13	19	7	10	0.4	0
14/06:00pm	9.1	5.7	79	N	13	20	7	11	0.4	0
14/05:30pm	8.9	5.5	79	N	13	19	7	10	0.4	0
14/05:00pm	9.6	5.6	76	N	15	26	8	14	0.4	0
14/04:30pm	11	6.2	72	N	17	24	9	13	0.4	0
14/04:00pm	10.4	7.3	81	N	13	20	7	11	0.4	0
14/03:30pm	9.6	6.7	82	NW	15	22	8	12	0.4	0.2
14/03:00pm	9.3	6.4	82	WNW	15	22	8	12	0.2	0.2
14/02:30pm	11.3	6.6	73	N	19	28	10	15	0	0
14/02:00pm	11.6	7.3	75	N	13	19	7	10	0	0
14/01:30pm	11.7	6.6	71	N	22	32	12	17	0	0
14/01:00pm	12.5	6.1	65	N	22	30	12	16	0	0
14/12:30pm	13.4	7.2	66	N	20	32	11	17	0	0
14/12:00pm	12.9	7.1	68	N	24	35	13	19	0	0
14/11:30am	12.4	7.3	71	N	24	35	13	19	0	0
14/11:00am	12.2	7.1	71	N	22	32	12	17	0	0
14/10:30am	12.5	7.2	70	N	19	28	10	15	0	0
14/10:00am	12.2	7.5	73	N	19	32	10	17	0	0
14/09:30am	10.9	6.6	75	N	17	30	9	16	0	0
14/09:00am	10.5	7.2	80	N	13	20	7	11	5.2	0
14/08:30am	10.2	7.6	84	NNE	11	17	6	9	5.2	0
14/08:00am	9.7	7.5	86	NNE	13	20	7	11	5.2	0
14/07:30am	9.8	7.9	88	N	11	15	6	8	5.2	0
14/07:00am	10.3	8.7	90	N	9	13	5	7	5.2	0
14/06:30am	10.3	8.9	91	N	17	24	9	13	5.2	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

14/06:00am	10	8.8	92	N	6	9	3	5	5.2	0
14/05:30am	10.3	8.9	91	N	7	9	4	5	5.2	0
14/05:00am	10.5	8.6	88	N	13	22	7	12	5.2	0
14/04:30am	10.4	9.3	93	N	9	17	5	9	5.2	0
14/04:00am	9.4	8.6	95	NNE	2	9	1	5	5.2	0
14/03:30am	9.8	8.7	93	N	2	6	1	3	5.2	0
14/03:00am	10.5	9.1	91	N	7	11	4	6	5.2	0
14/02:30am	10.8	9.7	93	NNE	11	19	6	10	5.2	0
14/02:00am	9.9	9.3	96	CALM	0	0	0	0	5.2	0
14/01:30am	10.4	9.6	95	CALM	0	0	0	0	5.2	0
14/01:00am	10.8	9.6	92	CALM	0	7	0	4	5.2	0
14/12:30am	10.9	9.7	92	N	6	9	3	5	5.2	0
14/12:00am	11	9.8	92	N	6	11	3	6	5.2	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
13/11:30pm	11.1	10.2	94	NNE	11	17	6	9	5.2	0
13/11:00pm	10.7	10.5	99	NE	7	11	4	6	5.2	0
13/10:30pm	9.8	9.5	98	CALM	0	0	0	0	5.2	0.2
13/10:00pm	10.3	10.1	99	E	6	7	3	4	5	0.2
13/09:30pm	10.4	10.1	98	CALM	0	0	0	0	4.8	0
13/09:00pm	10.6	10.3	98	WSW	2	7	1	4	4.8	0.4
13/08:30pm	10.7	10.4	98	CALM	0	0	0	0	4.4	2.2
13/08:00pm	10.5	10.2	98	CALM	0	0	0	0	2.2	0
13/07:30pm	10.2	9.7	97	CALM	0	0	0	0	2.2	0
13/07:00pm	10.4	9.8	96	CALM	0	0	0	0	2.2	0
13/06:30pm	10.8	10	95	CALM	0	0	0	0	2.2	0
13/06:00pm	11	10.1	94	CALM	0	0	0	0	2.2	0
13/05:30pm	11.3	10.2	93	CALM	0	0	0	0	2.2	0
13/05:00pm	11.9	10.5	91	CALM	0	0	0	0	2.2	0
13/04:30pm	12.2	10.3	88	CALM	0	0	0	0	2.2	0
13/04:00pm	12.3	10	86	CALM	0	0	0	0	2.2	0
13/03:30pm	12.2	9.9	86	CALM	0	0	0	0	2.2	0
13/03:00pm	12.2	10.1	87	CALM	0	0	0	0	2.2	0
13/02:30pm	12.3	9.9	85	CALM	0	0	0	0	2.2	0
13/02:00pm	12.1	10	87	SSW	0	0	0	0	2.2	0
13/01:30pm	12	9.9	87	W	0	6	0	3	2.2	0
13/01:00pm	11	9.4	90	CALM	0	0	0	0	2.2	0
13/12:30pm	10.9	10.1	95	WNW	7	9	4	5	2.2	0
13/12:00pm	10.6	10	96	WNW	4	9	2	5	2.2	0.2
13/11:30am	10.2	9.9	98	CALM	0	0	0	0	2	0



13/11:00am	10	9.9	99	CALM	0	0	0	0	2	0
13/10:30am	9.6	9.5	99	W	2	6	1	3	2	0.4
13/10:00am	9.7	9.6	99	W	7	9	4	5	1.6	0.6
13/09:30am	9.6	9.5	99	W	7	11	4	6	1	0
13/09:00am	9.6	9.5	99	W	4	6	2	3	6.8	0.2
13/08:30am	9.5	9.4	99	CALM	0	0	0	0	6.6	0.8
13/08:00am	9.4	9.3	99	CALM	0	0	0	0	5.8	0.2
13/07:30am	9.4	9.3	99	CALM	0	0	0	0	5.6	0.4
13/07:00am	9.4	9.3	99	CALM	0	0	0	0	5.2	0.2
13/06:30am	9.4	9.3	99	CALM	0	0	0	0	5	0.2
13/06:00am	9.4	9.3	99	WNW	0	0	0	0	4.8	0
13/05:30am	9.4	9.3	99	CALM	0	0	0	0	4.8	1.2
13/05:00am	9.4	9.3	99	NW	6	9	3	5	3.6	0
13/04:30am	9.4	9.3	99	NW	7	9	4	5	3.6	0
13/04:00am	9.5	9.4	99	WNW	7	11	4	6	3.6	0
13/03:30am	9.6	9.5	99	NW	7	9	4	5	3.6	0
13/03:00am	9.6	9.5	99	NW	2	6	1	3	3.6	0
13/02:30am	9.7	9.6	99	W	6	9	3	5	3.6	0
13/02:00am	9.7	9.6	99	N	7	11	4	6	3.6	0
13/01:30am	9.3	9.2	99	ESE	2	6	1	3	3.6	0
13/01:00am	9.1	9	99	CALM	0	0	0	0	3.6	0
13/12:30am	9	8.9	99	CALM	0	0	0	0	3.6	0
13/12:00am	8.3	8.2	99	SSE	0	0	0	0	3.6	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
12/11:30pm	7.9	7.6	98	ESE	6	7	3	4	3.6	0
12/11:00pm	8.6	8.3	98	WSW	7	11	4	6	3.6	0
12/10:30pm	8.7	8.4	98	S	2	7	1	4	3.6	0
12/10:00pm	9	8.7	98	CALM	0	0	0	0	3.6	0
12/09:30pm	8.8	8.4	97	S	2	7	1	4	3.6	0
12/09:00pm	8.7	8.3	97	CALM	0	6	0	3	3.6	0
12/08:30pm	8.9	8.3	96	CALM	0	0	0	0	3.6	0
12/08:00pm	9.2	8.6	96	S	7	11	4	6	3.6	0
12/07:30pm	9.3	8.5	95	SE	2	7	1	4	3.6	0.4
12/07:00pm	9.5	8.7	95	SE	11	15	6	8	3.2	0
12/06:30pm	9.6	8.8	95	S	6	9	3	5	3.2	0.2
12/06:00pm	9.7	8.8	94	SE	11	13	6	7	3	0.2
12/05:30pm	9.8	8.7	93	SE	7	11	4	6	2.8	0.2
12/05:00pm	10	8.8	92	S	9	15	5	8	2.6	0
12/04:30pm	10.1	8.9	92	SE	11	17	6	9	2.6	0.2



12/04:00pm	10.3	8.6	89	SE	19	24	10	13	2.4	0.6
12/03:30pm	10.6	8.7	88	SE	17	24	9	13	1.8	0.2
12/03:00pm	11.4	9	85	ESE	15	17	8	9	1.6	0.4
12/02:30pm	11.6	9.3	86	ESE	7	9	4	5	1.2	0
12/02:00pm	11.5	9.9	90	ESE	9	11	5	6	1.2	0
12/01:30pm	11.6	9.9	89	SSE	9	13	5	7	1.2	1.2
12/01:00pm	12.9	9	77	NNW	2	7	1	4	0	0
12/12:30pm	13.3	8.2	71	NNE	6	9	3	5	0	0
12/12:00pm	13.6	8	69	NNE	9	15	5	8	0	0
12/11:30am	13.8	8.4	70	ENE	9	19	5	10	0	0
12/11:00am	13.1	7.8	70	ENE	9	17	5	9	0	0
12/10:30am	13	8.1	72	NE	6	11	3	6	0	0
12/10:00am	12.7	8	73	NNE	11	19	6	10	0	0
12/09:30am	12.2	7.9	75	NNE	13	24	7	13	0	0
12/09:00am	10.7	8.6	87	NNE	4	9	2	5	0	0
12/08:30am	9.2	7.6	90	SSW	4	7	2	4	0	0
12/08:00am	8.6	6.9	89	CALM	0	0	0	0	0	0
12/07:30am	9.6	7	84	CALM	0	2	0	1	0	0
12/07:00am	11.6	8.1	79	N	9	13	5	7	0	0
12/06:30am	11.6	7.7	77	NNW	6	13	3	7	0	0
12/06:00am	10.8	6.6	75	N	2	7	1	4	0	0
12/05:30am	11.1	6.5	73	E	7	11	4	6	0	0
12/05:00am	11.8	7.3	74	W	7	9	4	5	0	0
12/04:30am	12.3	7.4	72	N	20	32	11	17	0	0
12/04:00am	12.1	7.6	74	N	19	32	10	17	0	0
12/03:30am	12.4	7.9	74	N	24	43	13	23	0	0
12/03:00am	12.7	8	73	N	30	43	16	23	0	0
12/02:46am	12.8	8.3	74	N	28	46	15	25	0	0
12/02:30am	12.5	8.6	77	NNW	13	26	7	14	0	0
12/02:00am	12.6	8.7	77	N	19	32	10	17	0	0
12/01:30am	12.5	9	79	N	13	20	7	11	0	0
12/01:00am	12.4	8.9	79	N	15	22	8	12	0	0
12/12:30am	12.7	8.8	77	N	22	33	12	18	0	0
12/12:00am	11.6	8.6	82	NNW	11	19	6	10	0	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
11/11:30pm	9.7	7.8	88	WNW	2	7	1	4	0	0
11/11:00pm	9.4	7.3	87	CALM	0	6	0	3	0	0
11/10:30pm	9.8	7.6	86	CALM	0	0	0	0	0	0
11/10:00pm	9.5	7.6	88	N	4	7	2	4	0	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

11/09:30pm	8.4	6.9	90	CALM	0	7	0	4	0	0
11/09:00pm	8.7	6.2	84	CALM	0	0	0	0	0	0
11/08:30pm	9.9	6.6	80	N	6	9	3	5	0	0
11/08:00pm	10.9	6.8	76	N	13	15	7	8	0	0
11/07:30pm	11.4	7.3	76	N	13	17	7	9	0	0
11/07:00pm	12.1	7.2	72	N	20	28	11	15	0	0
11/06:30pm	11.8	7.9	77	N	11	15	6	8	0	0
11/06:00pm	11.5	8.5	82	N	9	15	5	8	0	0
11/05:30pm	11.8	8.6	81	N	13	17	7	9	0	0
11/05:00pm	12	8.3	78	N	13	22	7	12	0	0
11/04:30pm	12.1	8.2	77	N	15	24	8	13	0	0
11/04:00pm	12.6	8.1	74	N	17	26	9	14	0	0
11/03:30pm	12.6	8.1	74	N	17	24	9	13	0	0
11/03:00pm	12.4	8.3	76	N	22	33	12	18	0	0
11/02:30pm	12.6	8.7	77	N	32	43	17	23	0	0
11/02:00pm	13.9	9.5	75	N	26	43	14	23	0	0
11/01:30pm	13.4	8.3	71	N	24	39	13	21	0	0
11/01:00pm	13.6	9.1	74	N	26	39	14	21	0	0
11/12:30pm	14.1	9.1	72	N	28	44	15	24	0	0
11/12:00pm	14.1	9.5	74	N	28	39	15	21	0	0
11/11:40am	13.2	9.3	77	N	28	46	15	25	0	0
11/11:30am	13.1	9.5	79	N	32	43	17	23	0	0
11/11:00am	13.5	9.7	78	N	30	39	16	21	0	0
11/10:30am	12.4	9.1	80	N	24	37	13	20	0	0
11/10:00am	12	9	82	N	22	30	12	16	0	0
11/09:30am	11.6	9.2	85	N	17	26	9	14	0	0
11/09:00am	11.2	8.9	86	N	19	28	10	15	2.6	0
11/08:30am	11.2	8.8	85	N	19	28	10	15	2.6	0
11/08:00am	11.1	8.7	85	N	20	30	11	16	2.6	0
11/07:30am	10.8	8.7	87	N	20	28	11	15	2.6	0
11/07:00am	10.8	8.7	87	N	19	28	10	15	2.6	0
11/06:30am	10.8	8.7	87	N	19	26	10	14	2.6	0
11/06:00am	11	8.8	86	N	17	26	9	14	2.6	0
11/05:30am	11.3	8.7	84	N	20	28	11	15	2.6	0
11/05:00am	11.2	8.8	85	N	17	22	9	12	2.6	0
11/04:30am	11.1	9	87	N	17	24	9	13	2.6	0
11/04:00am	10.8	9.1	89	N	19	24	10	13	2.6	0
11/03:30am	10.8	9.2	90	N	17	24	9	13	2.6	0.2
11/03:00am	10.7	9.5	92	N	15	20	8	11	2.4	0.2
11/02:30am	10.9	9.3	90	N	19	24	10	13	2.2	0.4
11/02:00am	11	9.4	90	N	19	28	10	15	1.8	0.4
11/01:30am	11.1	9.4	89	N	20	28	11	15	1.4	0.4
11/01:00am	11.3	9	86	N	19	28	10	15	1	0.2
11/12:30am	11.5	8.4	81	N	20	30	11	16	0.8	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

11/12:00am	11.6	8.3	80	N	15	33	8	18	0.8	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
10/11:30pm	11.7	8.6	81	N	19	30	10	16	0.8	0
10/11:00pm	12	8.7	80	N	15	26	8	14	0.8	0
10/10:30pm	11.5	9.2	86	NNW	13	22	7	12	0.8	0
10/10:00pm	11.9	8.4	79	N	17	28	9	15	0.8	0
10/09:40pm	12.1	8	76	N	28	46	15	25	0.8	0
10/09:30pm	12.1	8	76	N	32	46	17	25	0.8	0
10/09:04pm	12.4	8.3	76	N	28	46	15	25	0.8	0
10/09:00pm	12.2	8.7	79	N	26	41	14	22	0.8	0
10/08:56pm	12.4	8.9	79	N	28	44	15	24	0.8	0
10/08:30pm	12.6	8.5	76	N	15	22	8	12	0.8	0
10/08:00pm	12.8	8.9	77	N	9	15	5	8	0.8	0
10/07:30pm	13.2	9.1	76	N	19	26	10	14	0.8	0
10/07:00pm	12.6	9.1	79	SSW	4	9	2	5	0.8	0
10/06:30pm	12.9	9	77	NNE	9	13	5	7	0.8	0
10/06:00pm	13.4	9.1	75	NNE	9	15	5	8	0.8	0
10/05:30pm	13.3	9	75	NNE	11	22	6	12	0.8	0
10/05:00pm	13.6	8.7	72	NNE	6	19	3	10	0.8	0
10/04:30pm	14.2	8.6	69	NNE	11	24	6	13	0.8	0
10/04:00pm	14.1	8.7	70	N	6	17	3	9	0.8	0
10/03:30pm	14.1	8.9	71	N	7	13	4	7	0.8	0
10/03:00pm	14.6	9.2	70	E	4	11	2	6	0.8	0
10/02:30pm	14.8	9.2	69	E	6	13	3	7	0.8	0
10/02:00pm	14.6	9.4	71	NNE	4	9	2	5	0.8	0
10/01:30pm	14	8.8	71	ENE	11	17	6	9	0.8	0
10/01:00pm	13.5	8.4	71	E	15	26	8	14	0.8	0
10/12:30pm	13.2	8.7	74	E	19	33	10	18	0.8	0
10/12:00pm	12.6	8.7	77	ENE	19	32	10	17	0.8	0.2
10/11:30am	12.1	9.3	83	E	19	26	10	14	0.6	0.2
10/11:00am	12	8.7	80	E	17	24	9	13	0.4	0.2
10/10:30am	12.9	7.8	71	NE	11	28	6	15	0.2	0.2
10/10:00am	14.1	6.5	60	NNE	19	33	10	18	0	0
10/09:30am	14.8	5.9	55	NNE	22	37	12	20	0	0
10/09:00am	9.9	7.2	83	CALM	0	0	0	0	0	0
10/08:30am	10.7	6.6	76	CALM	0	0	0	0	0	0
10/08:00am	11.4	6.5	72	CALM	0	7	0	4	0	0
10/07:30am	9.9	7.2	83	SW	2	9	1	5	0	0
10/07:00am	10.1	7.2	82	CALM	0	0	0	0	0	0



10/06:30am	8.6	6.9	89	ESE	4	7	2	4	0	0
10/06:00am	8.5	7	90	N	6	9	3	5	0	0
10/05:30am	8.5	7.1	91	ESE	4	9	2	5	0	0
10/05:00am	8.4	7.3	93	NE	4	9	2	5	0	0
10/04:30am	8	6.8	92	CALM	0	2	0	1	0	0
10/04:00am	8.9	7	88	SSW	6	7	3	4	0	0
10/03:30am	8.8	7.3	90	SE	6	9	3	5	0	0
10/03:00am	8.7	7.3	91	CALM	0	0	0	0	0	0
10/02:30am	8.9	7.4	90	CALM	0	2	0	1	0	0
10/02:00am	8.1	7	93	S	6	9	3	5	0	0
10/01:30am	7.2	6.3	94	S	2	9	1	5	0	0
10/01:00am	6.9	6.2	95	SSW	4	11	2	6	0	0
10/12:30am	6.1	5.2	94	CALM	0	0	0	0	0	0
10/12:00am	6.6	5.4	92	SE	0	0	0	0	0	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
09/11:30pm	6.9	5.4	90	SE	2	6	1	3	0	0
09/11:00pm	7.4	5.7	89	NNW	6	7	3	4	0	0
09/10:30pm	8.1	6.1	87	CALM	0	0	0	0	0	0
09/10:00pm	9.8	6.5	80	ESE	11	15	6	8	0	0
09/09:30pm	7.7	5.8	88	SSE	4	7	2	4	0	0
09/09:00pm	7.2	5.8	91	CALM	0	0	0	0	0	0
09/08:30pm	6.9	5.1	88	CALM	0	0	0	0	0	0
09/08:00pm	6.7	4.9	88	SSE	2	7	1	4	0	0
09/07:30pm	7.4	5.4	87	CALM	0	0	0	0	0	0
09/07:00pm	7.9	5.2	83	ESE	4	9	2	5	0	0
09/06:30pm	8.3	5.4	82	ESE	6	11	3	6	0	0
09/06:00pm	9.5	5.1	74	ENE	6	7	3	4	0	0
09/05:30pm	12.7	5.8	63	NE	4	9	2	5	0	0
09/05:00pm	13.2	6.1	62	NE	7	13	4	7	0	0
09/04:30pm	13.5	6.6	63	NE	7	11	4	6	0	0
09/04:00pm	13.8	6.7	62	NE	9	17	5	9	0	0
09/03:30pm	14	6.6	61	NE	7	11	4	6	0	0
09/03:00pm	14	6.4	60	ENE	13	19	7	10	0	0
09/02:30pm	15.2	6.7	57	NE	11	17	6	9	0	0
09/02:00pm	15.9	6.6	54	NE	11	19	6	10	0	0
09/01:30pm	15.9	7.4	57	ENE	11	17	6	9	0	0
09/01:00pm	16	6.7	54	N	13	24	7	13	0	0
09/12:30pm	16.3	6.4	52	NNE	15	26	8	14	0	0
09/12:00pm	15.6	7.6	59	N	13	19	7	10	0	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

09/11:30am	14.4	7.7	64	NNE	6	15	3	8	0	0
09/11:00am	12.5	8.2	75	CALM	0	0	0	0	0	0
09/10:30am	11.6	7.7	77	ESE	6	7	3	4	0	0
09/10:00am	11.3	7.2	76	NNE	6	11	3	6	0	0
09/09:30am	9.8	7.9	88	SSW	2	7	1	4	0	0
09/09:00am	8.1	6.9	92	SE	6	11	3	6	0.2	0
09/08:30am	7.2	6.1	93	S	7	11	4	6	0.2	0.2
09/08:00am	7	5.6	91	CALM	0	0	0	0	0	0
09/07:30am	7.1	5.6	90	SSE	2	9	1	5	0	0
09/07:00am	6.9	5.5	91	ESE	2	6	1	3	0	0
09/06:30am	6.9	5.2	89	CALM	0	7	0	4	0	0
09/06:00am	6.6	5.1	90	CALM	0	0	0	0	0	0
09/05:30am	6.6	5.1	90	CALM	0	6	0	3	0	0
09/05:00am	6.8	5	88	S	2	7	1	4	0	0
09/04:30am	6.7	4.5	86	S	4	9	2	5	0	0
09/04:00am	6.6	4.1	84	SSE	7	9	4	5	0	0
09/03:30am	6.4	4.2	86	S	7	11	4	6	0	0
09/03:00am	6.3	4.3	87	SSE	4	7	2	4	0	0
09/02:30am	6.2	4.4	88	SE	9	11	5	6	0	0
09/02:00am	5.7	4.3	91	CALM	0	7	0	4	0	0
09/01:30am	5.5	4.5	93	S	7	11	4	6	0	0
09/01:00am	4.9	4.6	98	SSE	6	7	3	4	0	0
09/12:30am	3.3	3	98	CALM	0	0	0	0	0	0
09/12:00am	2.8	2.5	98	S	6	9	3	5	0	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
08/11:30pm	1.6	1.2	97	CALM	0	6	0	3	0	0
08/11:00pm	1.9	1.3	96	CALM	0	6	0	3	0	0
08/10:30pm	3.3	3	98	SE	2	7	1	4	0	0
08/10:00pm	3.1	2.7	97	CALM	0	0	0	0	0	0
08/09:30pm	2.4	1.8	96	SSE	2	7	1	4	0	0
08/09:00pm	3.1	2.4	95	SSE	4	9	2	5	0	0
08/08:30pm	3.1	2.5	96	SE	4	7	2	4	0	0
08/08:00pm	3.4	2.8	96	SSE	2	7	1	4	0	0
08/07:30pm	3.2	2.3	94	SE	2	9	1	5	0	0
08/07:00pm	3.7	2.5	92	E	2	6	1	3	0	0
08/06:30pm	5.3	3.8	90	E	7	11	4	6	0	0
08/06:00pm	5.4	3.9	90	E	4	9	2	5	0	0
08/05:30pm	6.7	4.2	84	CALM	0	0	0	0	0	0
08/05:00pm	9.6	4.4	70	NE	2	7	1	4	0	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

08/04:30pm	12.3	5	61	NNE	7	13	4	7	0	0
08/04:00pm	13.1	5	58	N	11	17	6	9	0	0
08/03:30pm	13.6	5.5	58	N	9	17	5	9	0	0
08/03:00pm	13.8	5.4	57	NNE	9	15	5	8	0	0
08/02:30pm	13.5	4.9	56	NE	6	9	3	5	0	0
08/02:00pm	12.2	6.7	69	E	4	9	2	5	0	0
08/01:30pm	11.1	5.6	69	SSE	4	7	2	4	0	0
08/01:00pm	10.2	5.6	73	CALM	0	6	0	3	0	0
08/12:30pm	9.5	5.1	74	CALM	0	0	0	0	0	0
08/12:00pm	9	4.8	75	CALM	0	0	0	0	0	0
08/11:30am	8.2	5.5	83	CALM	0	0	0	0	0	0
08/11:00am	7.5	5.8	89	CALM	0	0	0	0	0	0
08/10:30am	6.2	5.6	96	S	2	7	1	4	0	0
08/10:00am	4.8	4.7	99	SE	0	0	0	0	0	0
08/09:30am	2.1	2	99	CALM	0	0	0	0	0	0
08/09:00am	0.2	0.1	99	ESE	2	7	1	4	0.2	0
08/08:30am	-2.1	-2.4	98	CALM	0	0	0	0	0.2	0
08/08:00am	-3.7	-4.1	97	CALM	0	0	0	0	0.2	0
08/07:30am	-3.8	-4.2	97	CALM	0	0	0	0	0.2	0
08/07:00am	-3.1	-3.4	98	N	0	9	0	5	0.2	0
08/06:30am	-3.2	-3.5	98	CALM	0	6	0	3	0.2	0
08/06:00am	-3.7	-4.1	97	SSE	2	6	1	3	0.2	0
08/05:30am	-3.7	-4.1	97	CALM	0	0	0	0	0.2	0
08/05:00am	-3	-3.3	98	CALM	0	6	0	3	0.2	0
08/04:30am	-3.1	-3.4	98	CALM	0	0	0	0	0.2	0
08/04:00am	-2.5	-2.8	98	CALM	0	6	0	3	0.2	0
08/03:30am	-2.7	-3	98	CALM	0	0	0	0	0.2	0
08/03:00am	-2.5	-2.8	98	CALM	0	0	0	0	0.2	0
08/02:30am	-2.7	-3	98	CALM	0	0	0	0	0.2	0
08/02:00am	-2.2	-2.5	98	CALM	0	0	0	0	0.2	0
08/01:30am	-1.7	-2	98	CALM	0	0	0	0	0.2	0
08/01:00am	-2	-2.3	98	CALM	0	0	0	0	0.2	0
08/12:30am	-1.9	-2.2	98	CALM	0	0	0	0	0.2	0
08/12:00am	-1.8	-2.1	98	SE	0	0	0	0	0.2	0
Date/Time	Tmp	Dew	Rel	Wind					Rain	
EST		Point	Hum						since	
	°C	°C	%						9 am	
				Dir	Spd	Gust	Spd	Gust	mm	
					km/h	km/h	kts	kts		
07/11:30pm	-1.5	-1.8	98	CALM	0	0	0	0	0.2	0
07/11:00pm	-1	-1.3	98	CALM	0	0	0	0	0.2	0
07/10:30pm	-1.4	-1.8	97	SSE	0	0	0	0	0.2	0
07/10:00pm	-0.8	-1.2	97	CALM	0	0	0	0	0.2	0



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CONSULTANTS: ACOUSTICS, NOISE AND VIBRATION CONTROL

07/09:30pm	-0.2	-0.6	97	CALM	0	0	0	0	0.2	0
07/09:00pm	0.3	-0.1	97	CALM	0	0	0	0	0.2	0
07/08:30pm	0.9	0.3	96	CALM	0	0	0	0	0.2	0
07/08:00pm	1.1	0.4	95	S	4	7	2	4	0.2	0
07/07:30pm	2.4	1.8	96	SSE	2	6	1	3	0.2	0
07/07:00pm	1.4	0.5	94	S	2	6	1	3	0.2	0
07/06:30pm	2.5	1.2	91	CALM	0	0	0	0	0.2	0
07/06:00pm	3.4	1.4	87	SSW	2	7	1	4	0.2	0
07/05:30pm	5.5	2.5	81	CALM	0	0	0	0	0.2	0
07/05:00pm	9.1	3.3	67	N	2	7	1	4	0.2	0
07/04:30pm	11.6	3.6	58	NNW	7	11	4	6	0.2	0
07/04:00pm	11.7	3.2	56	N	9	13	5	7	0.2	0
07/03:30pm	11.9	2.9	54	N	15	20	8	11	0.2	0
07/03:00pm	12.3	3.5	55	N	13	20	7	11	0.2	0
07/02:30pm	12.4	2.8	52	N	13	19	7	10	0.2	0
07/02:00pm	12.6	3.8	55	N	15	22	8	12	0.2	0
07/01:30pm	12.2	2.6	52	N	17	24	9	13	0.2	0
07/01:00pm	11.8	2.5	53	N	17	24	9	13	0.2	0
07/12:30pm	12.1	4.3	59	N	17	26	9	14	0.2	0
07/12:00pm	11.6	4.8	63	N	11	15	6	8	0.2	0
07/11:30am	10.7	4.6	66	N	7	11	4	6	0.2	0
07/11:00am	10.1	6.3	77	CALM	0	7	0	4	0.2	0
07/10:30am	7.2	5.8	91	SE	2	7	1	4	0.2	0
07/10:00am	5.4	5.3	99	CALM	0	0	0	0	0.2	0.2
07/09:30am	3.5	3.4	99	CALM	0	6	0	3	0	0
07/09:00am	1.4	1.3	99	S	2	9	1	5	0	0
07/08:30am	-0.7	-0.8	99	CALM	0	0	0	0	0	0
07/08:00am	-1.9	-2	99	SSE	4	7	2	4	0	0
07/07:30am	-1.8	-1.9	99	CALM	0	0	0	0	0	0
07/07:00am	-2.3	-2.4	99	CALM	0	0	0	0	0	0
07/06:30am	-2.2	-2.3	99	CALM	0	0	0	0	0	0
07/06:00am	-2.1	-2.2	99	CALM	0	0	0	0	0	0
07/05:30am	-1.9	-2	99	CALM	0	0	0	0	0	0
07/05:00am	-1.6	-1.7	99	CALM	0	0	0	0	0	0
07/04:30am	-1.8	-2.1	98	CALM	0	0	0	0	0	0
07/04:00am	-1.5	-1.8	98	CALM	0	0	0	0	0	0
07/03:30am	-1.1	-1.4	98	CALM	0	0	0	0	0	0
07/03:00am	-1	-1.3	98	CALM	0	0	0	0	0	0
07/02:30am	-0.3	-0.4	99	CALM	0	0	0	0	0	0
07/02:00am	0	-0.1	99	CALM	0	0	0	0	0	0
07/01:30am	-0.1	-0.2	99	CALM	0	0	0	0	0	0
07/01:00am	-0.3	-0.6	98	CALM	0	0	0	0	0	0
07/12:30am	-0.3	-0.6	98	CALM	0	0	0	0	0	0
07/12:00am	0.1	-0.2	98	CALM	0	0	0	0	0	0



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Date/Time	Tmp	Dew	Rel	Wind						Rain
EST		Point	Hum							since
	°C	°C	%							9 am
				Dir	Spd	Gust	Spd	Gust		mm
					km/h	km/h	kts	kts		
06/11:30pm	0.7	0.4	98	CALM	0	0	0	0	0	0
06/11:00pm	1	0.7	98	S	4	7	2	4	0	0
06/10:30pm	0.3	-0.1	97	CALM	0	2	0	1	0	0
06/10:00pm	0.8	0.4	97	CALM	0	6	0	3	0	0
06/09:30pm	1.6	1.2	97	CALM	0	0	0	0	0	0
06/09:00pm	2	1.4	96	CALM	0	0	0	0	0	0
06/08:30pm	2.2	1.5	95	CALM	0	0	0	0	0	0
06/08:00pm	2.9	2	94	CALM	0	0	0	0	0	0
06/07:30pm	3.6	2.3	91	CALM	0	0	0	0	0	0
06/07:00pm	5.8	3.8	87	CALM	0	0	0	0	0	0
06/06:30pm	7.5	4.6	82	CALM	0	7	0	4	0	0
06/06:00pm	9	5.7	80	S	6	7	3	4	0	0
06/05:30pm	9.6	5.4	75	S	7	11	4	6	0	0
06/05:00pm	10	5.8	75	S	7	11	4	6	0	0
06/04:30pm	10.6	6	73	S	7	11	4	6	0	0
06/04:00pm	11	5.3	68	S	7	11	4	6	0	0
06/03:30pm	11.3	5.4	67	S	7	11	4	6	0	0
06/03:00pm	11.6	4.8	63	S	7	11	4	6	0	0
06/02:30pm	11.7	5.1	64	S	9	15	5	8	0	0
06/02:00pm	11.3	4.5	63	SSE	7	11	4	6	0	0
06/01:30pm	11.3	6.6	73	WSW	6	9	3	5	0	0
06/01:00pm	11.6	7.5	76	WSW	7	13	4	7	0	0
06/12:30pm	12.5	5.9	64	ESE	11	15	6	8	0	0
06/12:00pm	11.7	7.6	76	SW	6	13	3	7	0	0
06/11:30am	10.4	7.3	81	W	6	7	3	4	0	0
06/11:00am	9.2	7	86	ESE	4	9	2	5	0	0
06/10:30am	7.6	6.1	90	E	6	7	3	4	0	0
06/10:00am	6.9	6.6	98	NNE	2	6	1	3	0	0
06/09:30am	6.1	6	99	N	2	7	1	4	0	0
06/09:00am	4.6	4.5	99	CALM	0	0	0	0	0	0
06/08:30am	4.2	4.1	99	CALM	0	0	0	0	0	0
06/08:00am	4	3.9	99	CALM	0	0	0	0	0	0
06/07:30am	3.8	3.7	99	CALM	0	0	0	0	0	0
06/07:00am	3.7	3.6	99	CALM	0	0	0	0	0	0

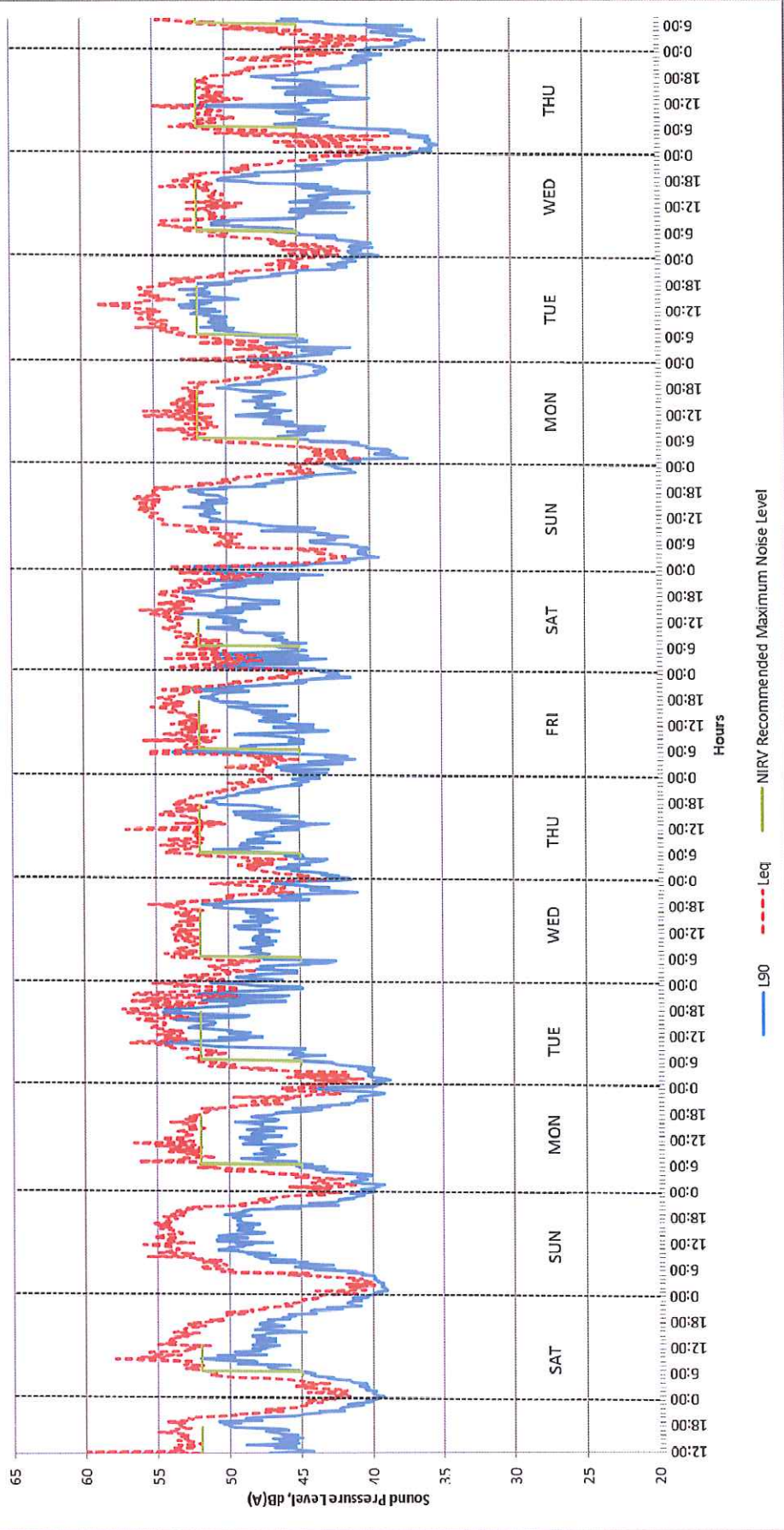


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APPENDIX THREE: NOISE MONITORING GRAPHICAL RESULTS

AMBIENT NOISE MONITORING AT 49 MOORE COURT CASTELLA, FRIDAY 6 JULY TO FRIDAY 20 JULY 2012





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APPENDIX FOUR: DERIVATION OF RECOMMENDED MAXIMUM NOISE LEVELS IN ACCORDANCE WITH NOISE FROM INDUSTRY IN REGIONAL VICTORIA - RECOMMENDED MAXIMUM NOISE LEVELS FROM COMMERCE, INDUSTRY AND TRADE PREMISES IN REGIONAL VICTORIA (NIRV).

PROJECT: Castella Quarries, Melba Hwy Castella.....

RECEIVER LOCATION: 49 Moore Court, Castella.....

EARTH RESOURCES STEP E1 — Earth resources levels

Use the following levels where the noise receiver is in a GWAZ, RCZ or RLZ (consult Table 1 for full zone terms):

Day	Evening	Night
45 dB(A)	38 dB(A)	33 dB(A)

Use the following levels where the noise receiver is in an IN3Z or SUZ (only where accommodation, other than caretaker's house, is prohibited in the SUZ):

Day	Evening	Night
51 dB(A)	46 dB(A)	41 dB(A)

Use the following levels where the noise receiver is in an IN1Z, IN2Z, B3Z or B4Z:

Day	Evening	Night
56 dB(A)	51 dB(A)	46 dB(A)

Use the following levels in all other situations:

Day	Evening	Night
46 dB(A)	41 dB(A)	36 dB(A)

No distance adjustment applies in any of the above situations.

Receiver Zoning: LDRZ

STEP ONE LEVELS: Day - 46 Evening - 41 Night - 36 dB(A).

EARTH RESOURCES STEP E2 — Background levels check and adjustment

Conduct a background level assessment in 'background -relevant areas.' Otherwise, apply the relevant earth resources levels as the recommended levels, considering the variations for mines, quarries and landfilling in Part 4. 'Background -relevant area' means a noise -sensitive area where background levels may be higher than usual for a rural area. This includes areas where freeway or highway traffic is a significant audible background noise source. It also includes coastal areas, where representative background levels are elevated by surf.



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Take the earth resources levels from Step E1 and compare them to the background levels, adopting the following for each period:

Day — the greater of —

- the step E1 noise level, or
- the day background level plus 8

Evening — the greater of —

- the step E1 noise level, or
- the evening background level plus 5

Night — the greater of —

- the step E1 noise level, or
- the night background level plus 5.

For existing earth resources, and new earth resources where Step E3 does not apply, the results of the above comparison become the recommended levels

See NIRV document for detailed rules.

Measured Background Level: Day – 44 Evening - Night – 41 (only 6-7am relevant)
dB(A) L_{90} .

Background Checked Level: Day – 52 Evening - Night - 46 dB(A).

Earth resources Step E3 — High traffic -noise areas

This step applies to background-relevant areas affected by high traffic-noise levels. It applies where the noise-sensitive area is not in an IN1Z, IN2Z, IN3Z, B3Z, B4Z or an SUZ (with accommodation a prohibited use in that SUZ). Compare the Earth resources Step E 2 level(s) against the following reference values.

Day	Evening	Night
55 dB(A)	50 dB(A)	45dB(A)

Consult Table 3 (over) to determine the recommended levels, considering each period separately (with consideration for the Mines, Quarries and Landfilling variations in Part 4).



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Table 3: Determining recommended levels for high traffic noise areas for earth resources sites

Result of comparing Step 4 level to reference value	Figure to apply as recommended level
Step E2 level is lower than the reference value	The Step E2 level
Step E2 level is equal to or greater than the reference value	The reference value
Step E2 level is greater than the reference value, and traffic noise LA_{vq} equals or is greater than the reference value +10	The lower of <ul style="list-style-type: none"> • The Step E2 level • The traffic noise LA_{vq} level -10

FINAL RECOMMENDED MAXIMUM NOISE LEVELS:

Day - **52** Evening - Night - **45** dB(A).



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**CASTELLA QUARRIES
MELBA HWY, CASTELLA VIC 3777**

**Follow-up to Noise Emission Assessment Conducted at
49 Moore Court, Castella:
Measurement of Truck Noise Levels Following Installation of New Exhaust Mufflers**

Prepared for
Castella Quarries
C/- FOCUS Creative Development Solutions
9-10 Garden Court
Narre Warren, Victoria 3805

Ref. 11250-2ng.docx
10 December 2012



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1. INTRODUCTION

This report follows on from a previous report, WMG Ref 11250-1ng, 28 August 2012, setting out the findings of an assessment of noise emission from trucks on the quarry access road conducted at 49 Moore Court Castella, and should be read in conjunction with that report.

The noise assessment concluded that noise due to a small number of trucks that were noisier than the majority of trucks accessing the quarry site was responsible for noise levels in excess of the Recommended Maximum Noise Level for the period 6am, to 7am under the NIRV guidelines, detected at 49 Moore Court. The limitation on compliance with the Recommended Maximum Noise Level prior to 7am was found to be the level and character of engine/exhaust brake noise on some but not all of the trucks operating out of the site.

Three trucks were identified as being the major contributors to the noise levels in excess of the Recommended Maximum Noise Levels at 49 Moore Court prior to 7.00am. Of these trucks, one is no longer operating out of the quarry site and the other two have had new exhaust mufflers fitted.

This report presents the results of noise measurements conducted in relation to the two trucks that have been fitted with new exhaust mufflers.

2. NOISE ASSESSMENT TERMINOLOGY

The following terms are used in this report:

dB(A) Decibels recorded on a sound level meter, which has had its frequency response modified electronically to an international standard, to quantify the average human loudness response of different character.

L₉₀ the level exceeded for 90% of the measurement period, which is representative of the typical lower levels in a varying noise environment. It is the noise measure defined by the EPA as the measure of the background sound level to use in determining noise limits.

L_{eq} the equivalent continuous level that would have the same total acoustic energy over the measurement period as the actual varying noise level under consideration. It is the noise measure defined by the EPA as the measure of the noise to use in assessing compliance with noise limits.

In short, L₉₀ is the measure of background sound (in the absence of industrial noise) used in determining noise limits, and L_{eq} is the measure of industrial noise used in assessing compliance with noise limits. L₉₀ can also be of assistance in identifying the level of a constant industrial noise amongst varying extraneous noise.

3. TRUCK NOISE TESTING

Truck noise measurements were conducted at the quarry site on Tuesday 20 November 2012. Truck noise levels were measured in two ways:

- A stationary test in general accordance with the National Stationary Exhaust Noise Test Procedures for In-Service Motor Vehicles in relation to the exhaust noise levels specified in the Victorian Environment Protection (Vehicle Emissions) Regulations 2003.
- Noise measurements taken while trucks were travelling along the quarry access road to enable comparison with similar measurements conducted prior to installation of the new mufflers.

Date/time:

- 20 November 2012 between approximately 2.30 and 3.30 pm.



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Instrumentation:

- Rion type NA27 precision sound level meter and frequency analyser.
- Bruel & Kjaer type 4230 acoustic calibrator.

Measurement locations

- Open area north of quarry offices.
- Adjacent to the quarry access road to assess the noise levels of trucks using the access road.

Weather conditions:

- Conditions were dry and suitable for conducting outdoor noise measurements throughout the testing.

4. MEASUREMENT RESULTS AND DISCUSSION

4.1 STATIONARY TESTING

The stationary exhaust noise test involves placing the sound level meter microphone 500mm horizontally from the exhaust outlet and recording the maximum noise level as the engine is reduced suddenly from three quarters of the engine speed at maximum power to idle. The test is repeated three times.

The truck operators were not able to advise the engine speed at maximum power, so the engine was operated at 1500 rpm, which is just under three quarters of the engine governed speed of 2100 rpm. Therefore it is likely that the engine was actually operating at higher revs than required by the test procedure. Subsequent research has revealed that the engine speed at maximum power for a CAT C12 engine is 1600rpm, so three quarters of that would be 1200rpm.

The table below sets out the details of the two trucks tested and the test results.

TRUCK	TRUCK DETAILS	MAXIMUM NOISE LEVEL 500mm FROM EXHAUST OUTLET, dB(A)
Aranmore Constructions XWR230	1982 Kenworth, Detroit D-Deck 2 engine, 6 cylinders, 12.5 l, single high-level exhaust, left side of vehicle.	86, 86, 85
Castella Quarries SWE308	2004 Western Star, CAT C12 engine, 6 cylinders, 12 l, 317 kW, single high-level exhaust, left side of vehicle.	82, 82, 83

The Victorian Environment Protection (Vehicle Emissions) Regulations 2003 require that the noise level when tested in this way be below 99 dB(A). Both trucks clearly complied with this requirement.

4.2 ADJACENT TO QUARRY ACCESS ROAD

Noise measurements were conducted adjacent to the quarry access road in order to check the truck noise level in actual operation. The measurement point was the same as used during previous work at the site, located 14m from trucks descending the access road, and 10m from trucks ascending the access road.



The table below summarises the results obtained.

Table Three: Summary of truck noise levels measured adjacent to quarry access road.

Truck	Truck Travelling Up or Down Access Road and Notes	Measured Short Term L_{eq} Level, dB(A)
Aranmore Quarries Kenworth XWR230	Down	67
	Up	76
	Down	69
	Up	76
Castella Quarries Western Star SWE308	Down	68
	Up	74
	Down	68
	Up	75

The trucks were empty at the time of the testing and it was evident that the trucks were not using engine/exhaust brakes on the way down. This means that the very low noise levels obtained while the trucks were going downhill may not be representative of when they are loaded and using engine/exhaust brakes.

The most valid basis for comparison with the previous measurements of the exhaust noise levels was for the trucks going uphill. A review of the file notes from the previous measurements conducted in July 2012 revealed uphill journeys for which the registration number had been recorded, which allows a direct comparison.

The Western Star SWE308 recorded 74 and 75 dB(A) with the new muffler, and in July 2012 with the old muffler was 80dB(A).

The Kenworth XWR230 recorded two runs of 76dB(A) with the new muffler, and in July 2012 with the old muffler was 79dB(A).

These results represent noise reductions of 3-6 dB(A) due to the new mufflers, and a change in subjective noise character was also detected. It is reasonable to expect a similar noise reduction when the trucks are travelling down the hill under normal circumstances.

A reduction in truck noise emission would directly reduce the resultant L_{eq} noise level at the 49 Moore Court measurement point at which the noise assessment was conducted in July 2012, plus have a secondary benefit in relation to the effective level over a 30minute period as it would reduce the proportion of time for which noise from the quarry access road is audible.

The combined effects of a direct noise level reduction of 3-6 dB(A) in the level of the noisier contributors and the secondary benefit in terms of the duration adjustment could reasonably be expected to reduce the resultant 30-minute effective L_{eq} level at 49 Moore Court from the highest measured/calculated level of 50dB(A) to 45dB(A), and hence comply with the Recommended Maximum Noise Levels from 6am to 7am.



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5. SUMMARY

Further to the noise assessment reported in WMG Ref 11250-1ng, 28 August 2012, action has been taken by Castella Quarries to reduce truck noise emission on the access road.

Of the three noisiest trucks identified during the previous site work in July 2012, one of these trucks is now no longer operating out of the site. Two other trucks have been fitted with new exhaust mufflers, and noise level testing has been conducted in order to quantify the noise reductions achieved.

A stationary exhaust noise test has been conducted, and both trucks were found to comply with the Victorian Environment Protection (Vehicle Emissions) Regulations 2003 exhaust noise limits.

Noise level testing on the quarry access road found the truck noise levels to have reduced by 3-6dB(A) when travelling up the hill under the same circumstances as the July measurements. More substantial noise reductions were found during the testing travelling downhill, but the testing was conducted with the trucks unloaded. It is reasonable to expect similar noise reductions with the trucks descending the hill under normal operating conditions as were found with the trucks travelling uphill.

The combined effects of a direct noise level reduction of 3-6 dB(A) in the level of the noisier truck contributors and a secondary benefit in terms of the duration adjustment could reasonably be expected to reduce the resultant 30-minute effective L_{eq} level at 49 Moore Court from the highest measured/calculated level of 50dB(A) to 45dB(A), and hence comply with the Recommended Maximum Noise Levels from 6am to 7am.

The onus will remain on the quarry to ensure that trucks using the quarry access road are operated in a manner that complies with the NIRV Recommended Maximum Noise Levels.

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