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Aus-10 Rhyolite Pty Ltd

ENVIRONMENTAL NOISE MONITORING

Tinda Creek Quarry

FINAL

May 2017

Aus-10 Rhyolite Pty Ltd

ENVIRONMENTAL NOISE MONITORING

Tinda Creek Quarry

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Aus-10 Rhyolite Pty Ltd

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Report No.	1731/R40/FINAL
Date:	May 2017

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This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

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1.0 Introduction

1.1 Background

Aus-10 Rhyolite Pty Ltd, trading as Hy-Tec Concrete and Aggregates (Hy-Tec) operates Tinda Creek Quarry, a sand quarry located approximately 67 kilometres north of Windsor along Putty Road, NSW (refer to **Figure 1.1**). Quarrying activities have been undertaken at Tinda Creek Quarry for approximately 30 years with the quarry currently producing up to 125,000 tonnes of product per year. Hy-Tec has recently been granted approval by the NSW Department of Planning and Environment (DP&E) under development consent SSD_4978 to increase production levels from Tinda Creek Quarry from approximately 125,000 tonnes per annum (tpa) up to 300,000 tpa by increasing the area subject to sand extraction to include additional identified resource domains (the Project). The duration of the Project is expected to be approximately 30 years.

The development consent (SSD 4978) allows for continued operations of the Tinda Creek Quarry across a broader area which will enable the extraction of additional sand resources (refer to **Figure 1.2**).

1.2 Scope

This Noise Monitoring report has been prepared by Umwelt (Australia) Pty Limited (Umwelt), on behalf of Hy-Tec. The noise monitoring and reporting requirements for operations at Tinda Quarry are outlined in the development consent SSD_4978 and the Environment Protection Licence (EPL) 12007.

This report presents the results of attended noise monitoring undertaken in March 2017 to address both the requirements of the DP&E and the Environment Protection Authority (EPA).

This Noise Monitoring Report has been prepared in accordance with the *NSW Industrial Noise Policy* (INP) (Environment Protection Authority (EPA), 2000) and the *Application Notes – NSW Industrial Noise Policy* (EPA, 2012).

A glossary of terms and abbreviations used in this report is provided in **Appendix 1.**

Image Source: Google Earth (2014)

0 0.5 1.0 2.0km
1:35 000

Legend

Project Area

FIGURE 1.1

Locality Map

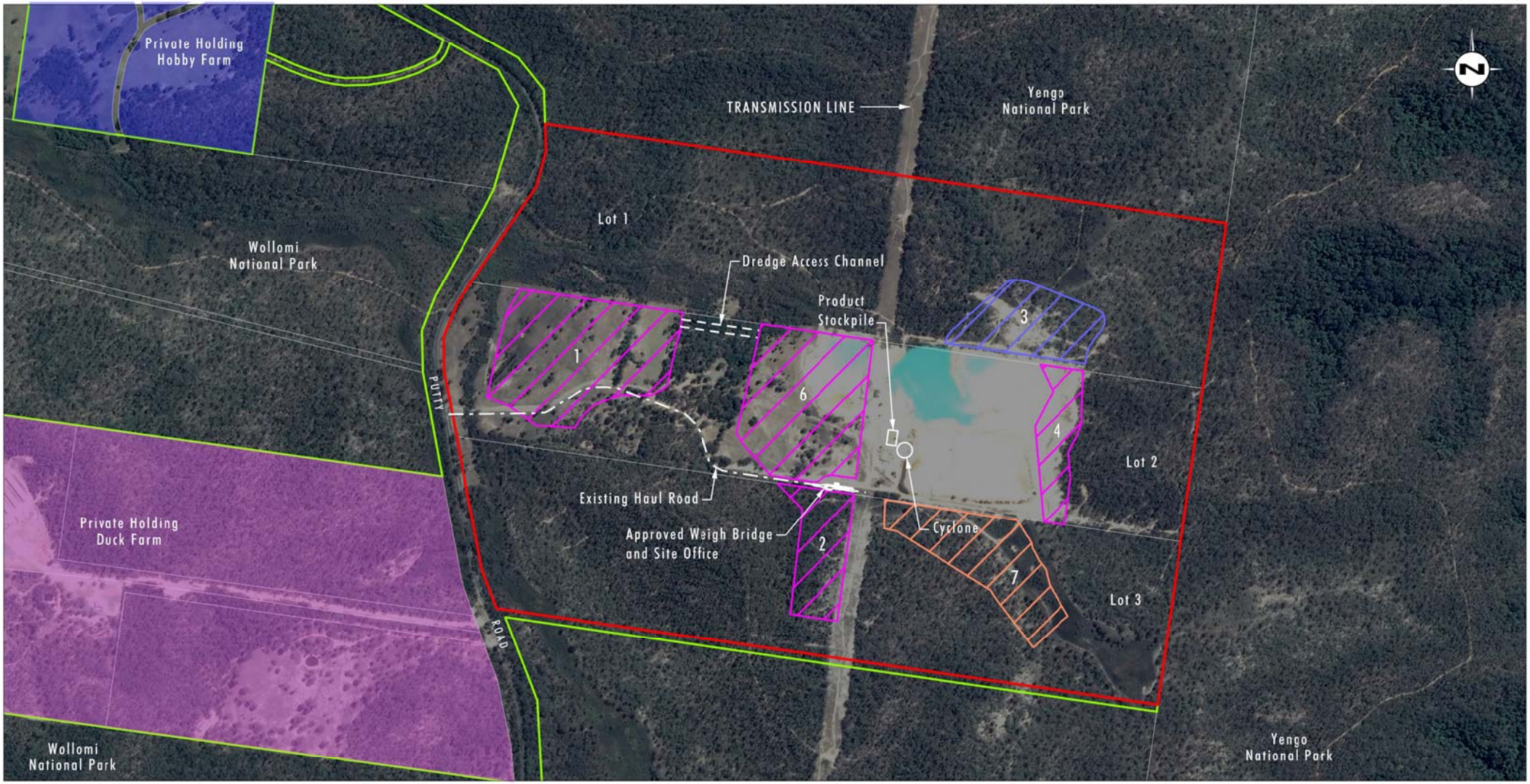

Image Source: Google Earth (2016)
Data Source: LPI NSW (2007)

0 250 500 750m
1:15 000

Legend

- Project Area
- Proposed Extraction Area
- Domain 3 Extraction Area
- Domain 7 Extraction Area
- Private Holding Duck Farm
- Private Holding Hobby Farm
- National Park Boundary

FIGURE 1.2

Tinda Creek Sand Quarry Project

File Name (A4): R40/1731_566.dgn
20170426 11.29

2.0 Assessment Criteria

The noise criteria for Tinda Creek Quarry, as outlined in the development approval SSD_4978 and EPL 12007, are presented in **Table 2.1.**.

Noise monitoring and noise sensitive receiver locations are show on **Figure 2.1.**

Table 2.1 Noise Criteria, dB(A)

Receiver	Day/Evening	Night	
	LAeq, 15 min	LAeq, 15 min	LA1, 1 min
All receivers (DP&E)/ Monitoring Point 1 (EPA)	35	35	45

Note: Day time is defined as 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 6:00 pm Sundays and Public Holidays, evening is 6:00 pm to 10:00 pm and night time is 10:00 pm to 7:00 am Monday to Saturday and 10:00 pm to 8:00 am Sundays and Public Holidays (EPA, 2000).

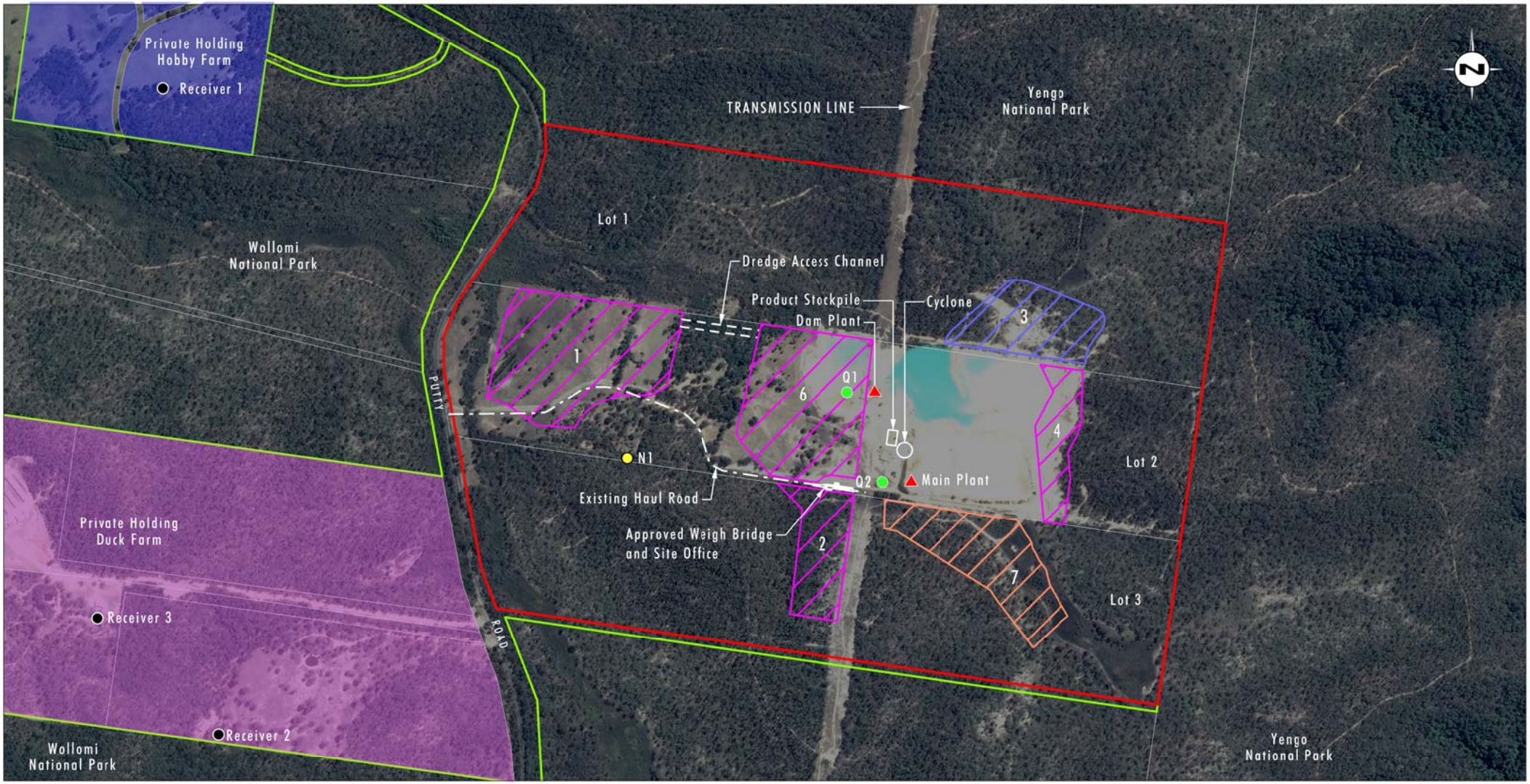

Image Source: Google Earth (2016)
Data Source: LPI NSW (2007)

0 250 500 750m
1:15 000

Legend

- Project Area
- Proposed Extraction Area
- Domain 3 Extraction Area
- Domain 7 Extraction Area
- Private Holding Duck Farm
- Private Holding Hobby Farm
- National Park Boundary
- Background Noise Monitoring Location
- Noise Receiver Location
- Sound Power Monitoring Location
- Equipment Location

FIGURE 2.1

Noise Monitoring and Noise Sensitive Receiver Locations

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3.0 Assessment Methodology

3.1 Compliance Assessment

Attended noise surveys are used to quantify and describe the acoustic environment around a site. Typically the results are compared with the noise criteria defined in the relevant project approvals to assess compliance. Attended monitoring is often considered the preferred method for determining compliance with prescribed limits because it allows for an accurate assessment of the contribution, if any, from an industrial noise source to measured ambient noise levels.

The methodology usually involves the following activities:

- attended noise monitoring surveys to measure the ambient noise levels in the surrounding region and to assess the sand extraction operation's contribution to measured noise levels

- comparison of the attended noise monitoring results with the relevant noise impact assessment criteria to assess compliance of the sand extraction operations with the relevant project approval and EPL criteria.

To assess compliance with the noise limits specified within EPL 12007 attended noise monitoring is required to be undertaken at Receiver 1 on a yearly basis, for a minimum duration of 1 hour within the assessment period. The location of Receiver R1 is shown in **Figure 2.1**.

3.2 Revised DP&E Methodology

Following an email from DP&E dated 20 January 2017 (refer to **Appendix 2**) and subsequent discussions with DP&E in January 2017, it was agreed that monitoring at the nearest residential receiver (Receiver 1) to Tinda Creek Quarry had previously been problematic due to the location of Putty Road between the quarry operations and the residence. The road is a source of traffic noise and, combined with noise generated by wind in the surrounding trees, has generally masked any noise generated by the quarry.

As an alternative, DP&E recommended that noise monitoring is carried out at two locations close to the quarry, where the quarry is the dominant noise source, for two 15-minute periods at each site. Using this data the expected contribution of quarry noise to the noise environment at each of the residential receivers can then be calculated. During this monitoring DP&E has stipulated that the quarry should be operating under a worst-cast noise scenario in terms of the number of items of equipment generating noise (such as the number of haul trucks in use) and under calm meteorological conditions. The location of each piece of quarry equipment at the time of monitoring is also to be recorded and reported.

Therefore, attended monitoring in addition to that described in **Section 3.1** above is required to be undertaken at two quarry locations, for a minimum of two separate 15-minute periods within the assessment period.

Should the results of this monitoring be low, then DP&E would only require this process to be repeated for each stage of the quarry that brings the operations closer to residences or if the production rate (and therefore the use of noise generating equipment) were to be increased from that initially measured.

The locations of the noise monitoring points within the quarry (Q1 and Q2) and approximate locations of respective equipment (Dam Plant and Main Plant) are shown in **Figure 2.1**.

4.0 Monitoring Program

4.1 Attended Monitoring

Attended noise measurements were undertaken on 27 March 2017 between 9:11 am and 10:17 am with a Larson Davis Model 831 Class 1 Sound Level Meter, Serial Number 0004379. During the attended noise surveys, the noise meter was calibrated using a Pulsar Model 106 Acoustic Calibrator, Serial Number 57364. The noise monitor was run using three measurement profiles (Z- (linear), C- and A- weighting) and recorded A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period. Meteorological data was collected during each of the attended monitoring periods using a Kestrel 4500 weather monitor, Serial Number 658027, positioned within 5 metres and at a corresponding height to the noise monitoring microphone.

Attended noise monitoring was conducted in accordance with the *Industrial Noise Policy* (INP) (EPA, 2000), *Application Notes – NSW Industrial Noise Policy* (EPA, 2012) and Australian Standard *AS1055-1989, 'Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures'.*

4.2 Assessable Meteorological Conditions

In accordance with the methodology outlined in Section 3.4 of the INP (EPA, 2000), if any of the data in a 15 minute period was affected by the following meteorological conditions, noise monitoring for compliance with the criteria provided in **Table 2.1** would not apply:

- Affected by rain or hail; or
- Wind speeds in excess of 5 m/s at microphone height; or
- Wind speeds greater than 3 m/s measured at 10 metres above ground level; or
- Temperature inversion conditions greater than $3^{o}C$/100 metres.

4.3 Monitoring Results

The monitoring results shown in **Figure A3-1** to **Figure A3-4** in **Appendix 3** and **Table 4.1** to

Table 4.2 include:

- the recorded overall A-weighted noise levels at 1 second intervals over a 15 minute measurement period
- the results of a 1000 Hz low pass filter at 1 second intervals over the 15 minute measurement period
- an assessment of the maximum $L_{A1,1minute}$ noise level recorded over the 15 minute measurement period for night period measurements
- the $L_{Aeq,15minute}$ and $L_{A90,15minute}$ noise levels for the 15 minute measurement period.

Comments regarding the noise sources contributing to the ambient noise levels are also presented on **Figure A3-1** to **Figure A3-4**.

Table 4.1 Summary of Attended Noise Monitoring at Receiver R1 – 27 March 2017, dB(A)

Monitoring period	Measure	Measured noise level	Estimated contribution from Tinda Creek Quarry	Meteorological conditions
Day (9:11 am – 9:26 am)	$L_{A90, 15 min}$	26.6	-	20°C, 88% RH, calm wind conditions, 2 octa cloud cover
	$L_{Aeq, 15 min}$	40.7	Barely Audible, not measurable.	
	$L_{A1, 1 min}$	68.5	-	
Day (9:27 am – 9:42 am)	$L_{A90, 15 min}$	27.4	-	22°C, 83% RH, calm wind to SSE gusts at 0.7 m/s, 2 octa cloud cover
	$L_{Aeq, 15 min}$	38.6	Not Audible	
	$L_{A1, 1 min}$	64.6	-	
Day (9:45 am – 10:00 am)	$L_{A90, 15 min}$	30.1	-	22°C, 80% RH, wind NNE to E at 0.0 to 0.5 m/s, gusting to 1.2 m/s, 2 octa cloud cover
	$L_{Aeq, 15 min}$	40.7	Barely Audible, not measurable.	
	$L_{A1, 1 min}$	58.0	-	
Day (10:02 am – 10:17 am)	$L_{A90, 15 min}$	28.1	-	21°C, 79% RH, wind SSE to WNW at 0.5 to 0.9 m/s, gusting to 1.3 m/s, 1 octa cloud cover
	$L_{Aeq, 15 min}$	40.6	Barely Audible, not measurable.	
	$L_{A1, 1 min}$	59.4	-	

Table 4.2 Summary of Attended Noise Monitoring at Quarry – 27 March 2017, dB(A)

Location	Monitoring period	Measured sound power level dB(A)	Meteorological conditions	Operating conditions
Q1 (Dam Plant)	11:33 am – 11:43 am[1]	112	Calm meteorological conditions; No rain	• Caterpillar D8R Dozer. Dam earthworks, repeatedly working back (including broadband reverse alarm) and forth • Floating Dredge. Continuous operation of the diesel dredge.
Q2 (Main Plant)	11:56 am – 12:04 am[2]	110	Calm meteorological conditions; No rain	• Diesel generator (continuous)/sand washer • Hyundai 320 Excavator • HL770-9 Front End Loader • Volvo BM A35 articulated dump truck

Note 1, 2: Noise monitoring was carried out at the two separate locations close to the quarry, where the quarry is the dominant noise source, for 10 minutes and 8 minutes respectively. Although not the 15-minute period requested at each site by the DP&E, the measurement durations were limited to 8 to 10 minutes to provide a measurement of maximum operational usage of noise generating equipment, thereby providing worst case noise emissions..

5.0 Assessment

5.1 Attended Noise Monitoring Compliance Assessment

During the attended noise monitoring program, the ambient noise levels at noise monitoring location NM1 were recorded with particular attention paid to the contribution of the quarry. Throughout the noise monitoring program, the quarry was found to either be inaudible at the monitoring location, or when audible, was not loud enough for a determination to be made on its contribution to the noise environment. Based on the monitoring data the contribution of the quarry was likely to be much less than 20 dB(A) at the time of monitoring which is below the SSD_4978 and EPL 12007 criteria of $L_{Aeq,\ 15minute}$ 35 dB(A).

5.2 Revised DP&E Methodology – Quarry Noise Contribution

The combined sound power level (SWL) of the measured quarry operation on 27 March 2017 (refer to **Table 4.2**) is 114 dB(A). It is noted that the measured combined sound power level on the 27 March 2017 is consistent within the normal margins of error with the modelling undertaken as part of the Environmental Impact Statement in support of SSD_4978.

A basic distance attenuation calculation over 2 km would provide an attenuation of 74 dB. This would provide an estimation of quarry noise impacts at the nearest receivers of 40 dB(A) which is above the noise criteria for the site of $L_{Aeq,\ 15minute}$ 35 dB(A). However, the topography surrounding the quarry provides significant shielding to the three closest receivers as shown in **Figures 5.1** to **5.3**.

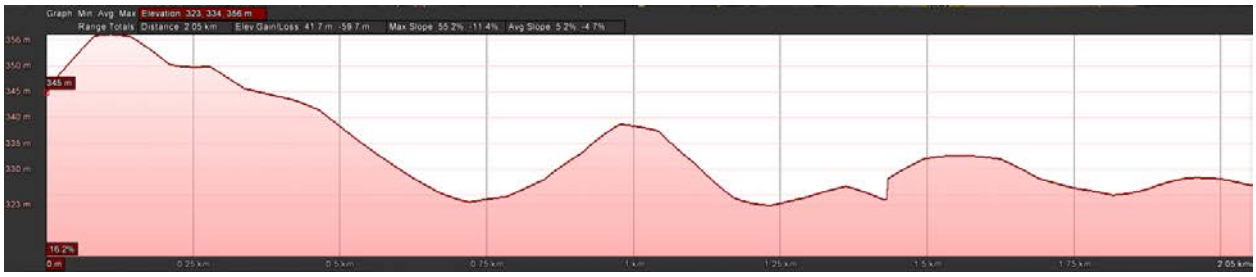
Using the information from the cross sectional data shown in **Figures 5.1** to **5.3**, and the barrier attenuation calculation methodology from Section K p. 228-1 in the *Environmental Noise Control Manual* (EPA, 1993), it can be conservatively assumed that a barrier attenuation of at least 18 dB could also be applied in addition to the distance attenuation. The estimation of noise impacts from the quarry to the nearest receivers is shown in **Table 5.1**. The estimated quarry noise impacts at Receiver 1 are consistent with the attended noise monitoring compliance assessment and indicate that the assumptions involved in the calculation process are likely to be conservative and that the quarry is operating well within the relevant noise criteria.

Table 5.1 Estimation of Quarry Noise Impacts

Receiver	Quarry Combined Measured SWL, dB(A)	Approximate Distance Quarry to Receiver, m	Distance Attenuation, dB	Attenuation Due to Terrain induced Barrier Effects[1], dB	Estimated Quarry Noise Impacts at Receiver, dB(A)
1	114	2050	74	18	22
2	114	2210	75	18	21
3	114	2030	74	18	22

Calculated Attenuation using methodology from Section 228-1 of the *Environmental Noise Control Manual* (EPA, 1993)

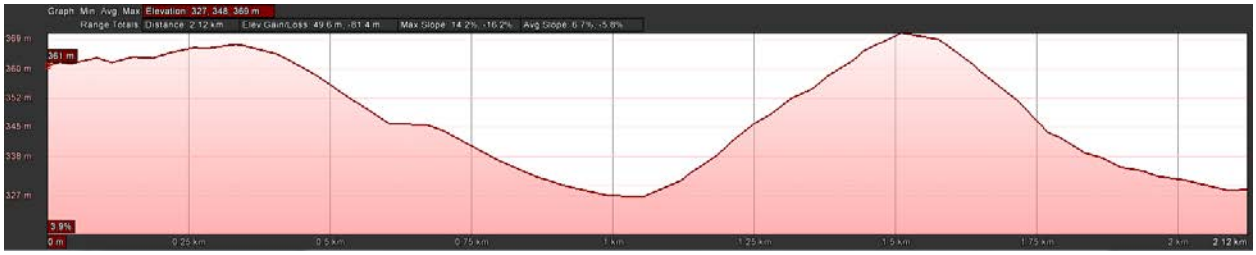
Figure 5.1 Receiver 1 to Quarry Cross Section



Source: Google Earth

Note: Figure is orientated from the left – west/receiver to the right – east/quarry.

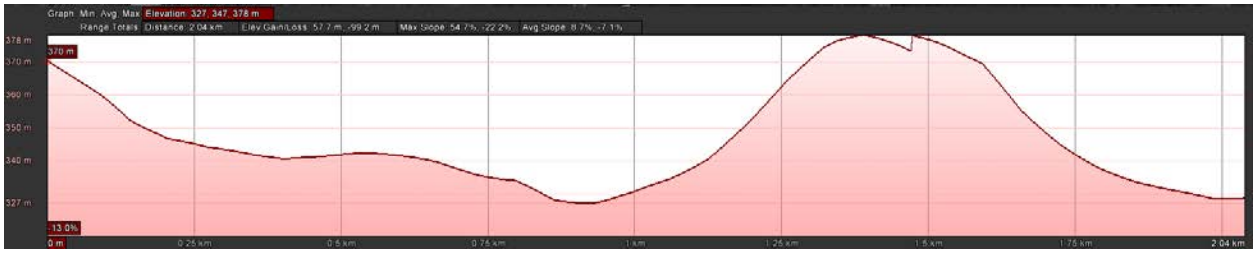
Figure 5.2 Receiver 2 to Quarry Cross Section



Source: Google Earth

Note: Figure is orientated from the left – west/receiver to the right – east/quarry.

Figure 5.3 Receiver 3 to Quarry Cross Section



Source: Google Earth

Note: Figure is orientated from the left – west/receiver to the right – east/quarry.

6.0 Conclusion

The results of the attended noise monitoring program (refer to **Table 4.1**) on 27 March 2017 indicate that the quarry was complying with the day time noise assessment criteria of SSD_4978 and EPL 12007 at location NM1 under the meteorological conditions at the time of monitoring.

The results of the Revised DP&E Compliance Methodology calculations indicate that the quarry has a low risk of exceeding the noise assessment criteria of SSD_4978 and EPL 12007 at the nearest residential receivers based on:

- shielding from quarry noise provided by the surrounding topographical relief
- distance from the quarry noise sources to the residential receivers.

The results of the Revised DP&E Compliance Methodology indicate that the calculated quarry noise contribution is low compared to the relevant criteria. In accordance with the email from DP&E dated 20 January 2017 (refer to **Appendix 2**), Hy-Tec proposes to undertake noise monitoring at Tinda Creek Quarry under the following circumstances:

- annually in accordance with EPL 12007 requirements
- in response to a community noise complaint
- after production commences on a stage of the quarry that brings the operations closer to the nearest residential receivers
- if the production rate (i.e. use of noise generating equipment) were to be increased from that measured in this or subsequent reports.

7.0 References

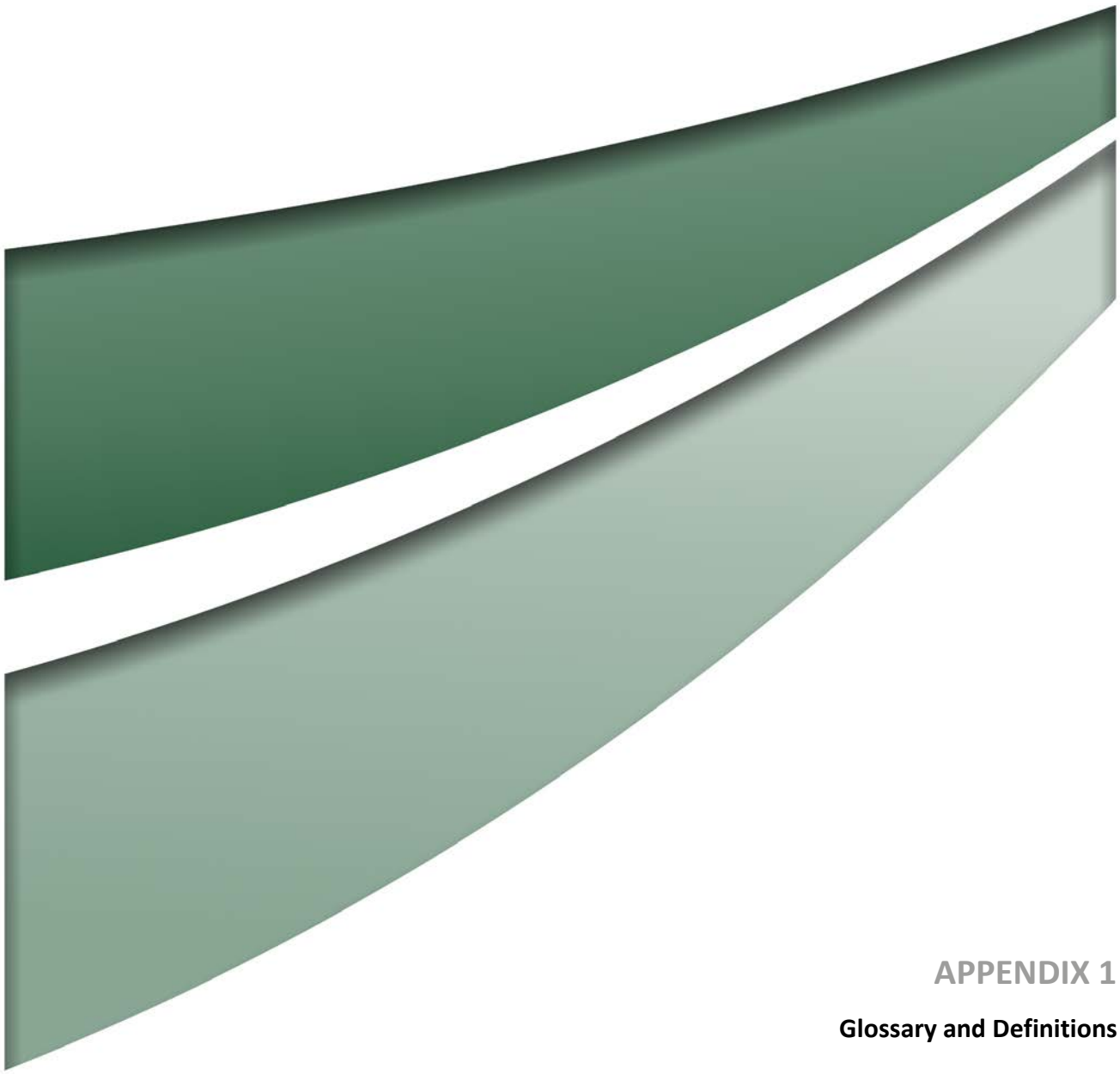
NSW Environment Protection Authority 1993. *Environmental Noise Control Manual*.

NSW Environment Protection Authority 2000. *New South Wales Industrial Noise Policy.*

NSW Environment Protection Authority 2012. *Application Notes – NSW Industrial Noise Policy*

Standards Australia 1989. *Australian Standard AS1055-1989 Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures.*

Umwelt (Australia) Pty Limited 2013. *Environmental Impact Statement for Aus-10 Rhyolite Pty Ltd – Proposed Expansion of Tinda Creek Sand Quarry.*



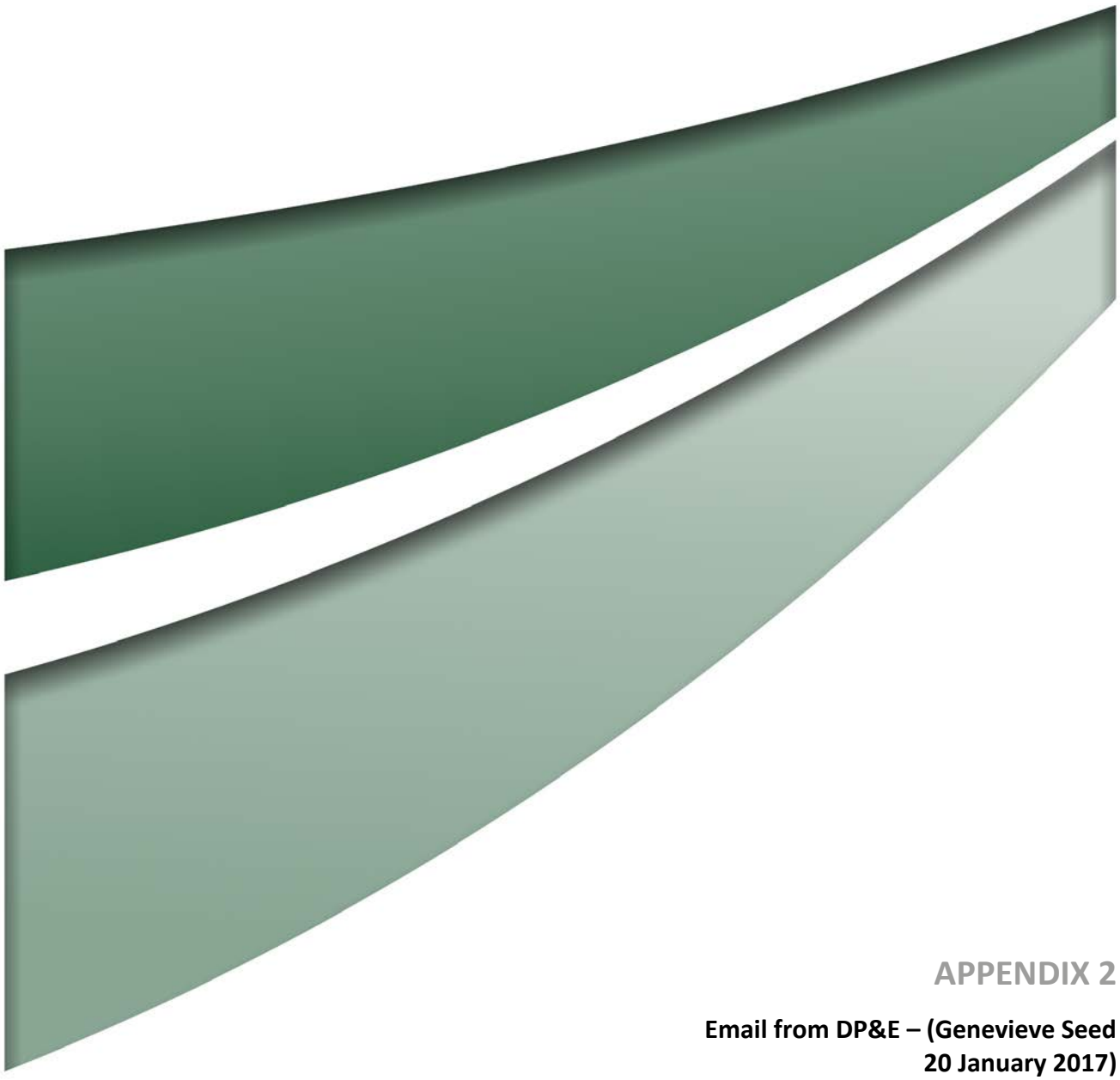
APPENDIX 1

Glossary and Definitions

Appendix 1 – Glossary and Definitions – Acoustics

1/3 Octave	Single octave bands divided into three parts.
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment background level – A single-figure background noise level representing each assessment period – day, evening and night (that is, three assessment background levels are determined for each 24 hour period of the monitoring period). It is determined by taking the lowest 10th percentile of the L90 level for each assessment period.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dB(A), dBA	Decibels A-weighted.
dB(L), dB(Lin)	Decibels Linear or decibels Z-weighted.
Decibel (dB)	The units of sound level and noise exposure measurement where a step of 10 dB is a ten-fold increase in intensity or sound energy and actually sounds a little more than twice as loud.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second – one oscillation per second equals 1 hertz.
L_{A10}	The percentile sound pressure level exceeded for 10 per cent of the measurement period with 'A' frequency weighting calculated by statistical analysis. Typically used to assess the impact of an existing operation on a receiver area and is referred to as the cumulative noise levels at the receiver attributable to the noise source.
L_{A90}	Background Noise Level. The percentile sound pressure level exceeded for 90 per cent of the measurement period with 'A' frequency weighting calculated by statistical analysis.
L_{Amax}	The maximum of the sound pressure levels recorded over an interval of one second.
$L_{A1,1minute}$	The measure of the short duration high-level noises that cause sleep arousal. The noise level is measured as the percentile sound pressure level that is exceeded one per cent of measurement period with 'A' frequency weighting calculated by statistical analysis during a measurement time interval of one minute.

$L_{Aeq,t}$	Equivalent continuous sound pressure level – The value of the sound pressure level of a continuous steady noise that, a measurement interval of time (t), has the same mean square sound pressure as the sound under consideration whose level varies with time. Usually measured in dB with 'A' weighting.
L_{An}	Percentile level – A measure of the fluctuation of the sound pressure level which is exceeded 'n' per cent of the observation time.
RBL	Rating background level – The overall single figure background level representing each assessment period over the whole monitoring period determined by taking the median of the ABLs found for each assessment period.
SPL (dBA)	Noise: Sound pressure level – The basic measure of noise loudness. The level of the root-mean-square sound pressure in decibels given by: $SPL = 10.\log10 (p/p_0)2$ where p is the rms sound pressure in pascals and po is the sound reference pressure at 20 µPa. decibels.
SWL	Sound power level – a measure of the energy emitted from a source as sound and is given by: $SWL = 10.\log10 (W/W_0)$ where W is the sound power in watts and Wo is the sound reference power at 10-12 watts.



APPENDIX 2

Email from DP&E – (Genevieve Seed 20 January 2017)

From: genevieve.seed@planning.nsw.gov.au
To: Peter Jamieson
Cc: Colin.Phillips@planning.nsw.gov.au
Subject: Tinda Creek Management Plans
Date: Friday, 20 January 2017 1:20:12 PM

Hi Peter

I left a message with your officer just before but I thought I would send you an email either way.

I have had discussions with Colin Phillips and our noise expert Jeff Parnell regarding the proposed Tinda Creek MP variations. The Department's position is outlined below.

Noise Monitoring Requirements

In respect of attended noise monitoring, it was agreed that monitoring at the nearest residential receiver is difficult. Putty Road lies between the quarry operations and the residential receivers. It is a source of traffic noise. In addition, it seems that the attended monitoring was picking up a lot of noise from wind in the trees. Such monitoring is not going to help us much in working out how much noise the quarry is making and how much of that noise would reach the residences. It is likely to be low, but what we want is a measurement of the actual noise impact of the quarry.

This can be achieved by conducting noise monitoring at location(s) that are close to the quarry where the quarry noise is dominant. The expected quarry noise contribution at the residential receivers can then be calculated.

The Noise MP should set out the location(s) where the noise will be measured, that the quarry should be operating under the worst-case conditions in terms of the use of numbers of items of equipment generating noise (such as the number of haul trucks in use). The measurements should be undertaken when the winds are calm and we don't encounter the wind in the trees type of interference with getting noise values form the quarry.

Monitoring at one site should be enough, as the residences are in the same general direction, but two sites would be a nice check and shouldn't cost much more as the consultant would be on site. I suggest two sites each monitored for 15 minutes and then repeated. The location of each piece of quarry equipment should be recorded and reported.

The calculated quarry noise contribution for each of the residential receivers should then be calculated.

If these values are low, then the Department would only require this process to be repeated for each stage of the quarry that either brings the operations closer to residences OR if the production rate (ie use of noise generating equipment) were to be increased form that initially measured.

In addition attended noise monitoring should be retained for use in the investigation of any received noise complaints

Landscape and Water MP Amendments

Considering the background of the Tinda Creek proposal and that we can expect close scrutiny of all our work on this project, there is a need for very clear information on the reasons for our decisions. As such, we require all comments that have been raised by the Department to be addressed in the revised management plans.

Submission of Management Plans
The Department accepts an extension of the time to submit all management plans by 3 February 2017, with the exception of the Noise Management Plan which is to be submitted by 24 February 2017, to allow time to conduct the initial round of attended noise monitoring.

I am happy to discuss any of the matters above.

Kind regards,

Gen

Genevieve Seed
Planning Officer
Resource Assessments
Level 22, 320 Pitt Street | GPO Box 39 | Sydney NSW 2001
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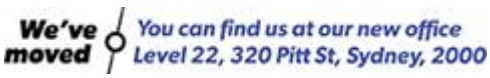

From: Colin Phillips
Sent: Friday, 20 January 2017 12:14 PM
To: Gen Seed <genevieve.seed@planning.nsw.gov.au>
Subject: Tinda Creek Noise

Gen,

I had a very fruitful discussion with Jeff Parnell this morning and discussed the background of the Tinda Creek proposal and that we can expect close scrutiny of all our work on this project. In particular there is a need for very clear information on the reasons for our decisions.

In respect of attended noise monitoring, Jeff and I agree that monitoring at the nearest residential receiver is difficult. The Putty Road lies between the quarry operations and the residential receivers. It is a source of traffic noise. In addition, it seems that the attended monitoring was picking up a lot of noise from wind in the trees. Such monitoring is not going to

help us much in working out how much noise the quarry is making and how much of that noise would reach the residences. It is likely to be low, but what we want is a measurement of the actual noise impact of the quarry.

This can be achieved by conducting noise monitoring at location(s) that are close to the quarry where the quarry noise is dominant. The expected quarry noise contribution at the residential receivers can then be calculated using mathematical formulas. (sometimes referred to as a point calculation).

The Noise MP should set out the location(s) where the noise will be measured, that the quarry should be operating under the worst-case conditions in terms of the use of numbers of items of equipment generating noise (such as the number of haul trucks in use). The measurements should be undertaken when the winds are calm and we don't encounter the wind in the trees type of interference with getting noise values form the quarry.

I think one monitoring site should be enough, as the residences are in the same general direction, but two sites would be a nice check and shouldn't cost much more as the consultant would be on site. I suggest two sites each monitored for 15 minutes and then repeated. The location of each piece of quarry equipment should be recorded and reported.

The calculated quarry noise contribution for each of the residential receivers should then be calculated.

If these values are low, then the Department would only require this process to be repeated for each stage of the quarry that either brings the operations closer to residences OR if the production rate (ie use of noise generating equipment) were to be increased form that initially measured.

In addition attended noise monitoring should be retained for use in the investigation of any received noise complaints.

Colin Phillips
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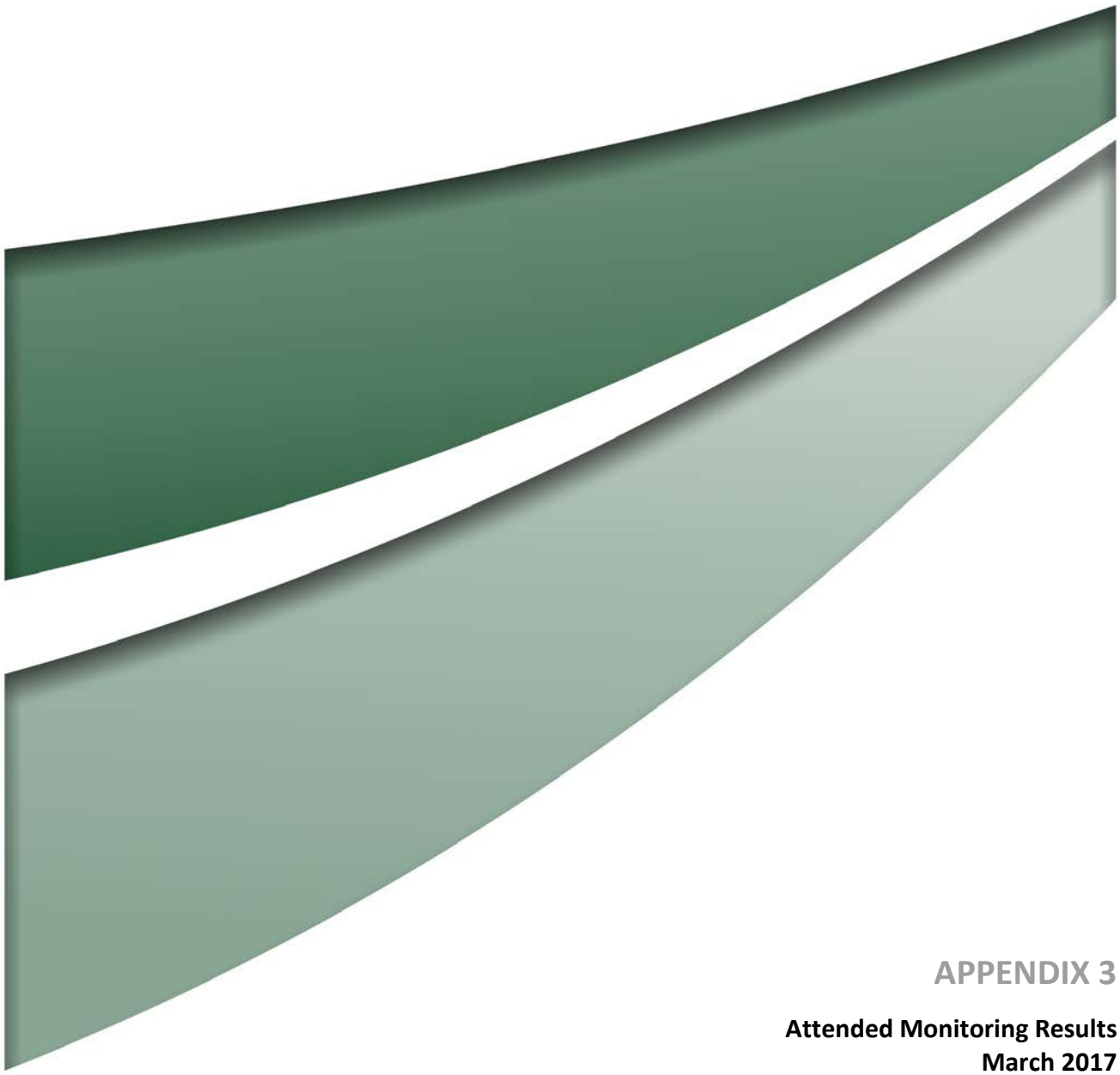

APPENDIX 3

Attended Monitoring Results
March 2017

Appendix 3 – Attended Monitoring Results

Autumn – March 2017

The results of the attended noise monitoring session are presented graphically as run charts in **Figure A3-1** to **Figure A3-4**.

Day Period Compliance Assessment

During the day period attended noise monitoring, the results indicated that under the meteorological conditions at the time of monitoring, Tinda Creek Quarry was complying with the $L_{Aeq,\ 15minute}$ noise impact assessment criteria at R1 (based on the monitoring results from R1).

The estimated quarry noise contributions measured during the day period at R1 comply with the site's Environment Protection Licence $L_{Aeq,\ 15\ minute}$ criterion of 35 dB(A). It is considered that Tinda Creek Quarry was operating within its licensing and development consent requirements at the time of monitoring.

Day Monitoring Results for R1 – 6255 Putty Road, Mellong

Date and Time: 27 March 2017, 09:11 to 09:26

Observations:

The ambient noise environment at the monitoring location consisted of dominant contributions from the near continuous bird calls and intermittent road traffic noise from Putty Road. Other noise contributions resulted from insect noise.

The LAeq, 15 minute noise contribution from the Quarry resulted from only a few seconds of barely audible low-frequency (< 160 Hz) noise and was negligible.

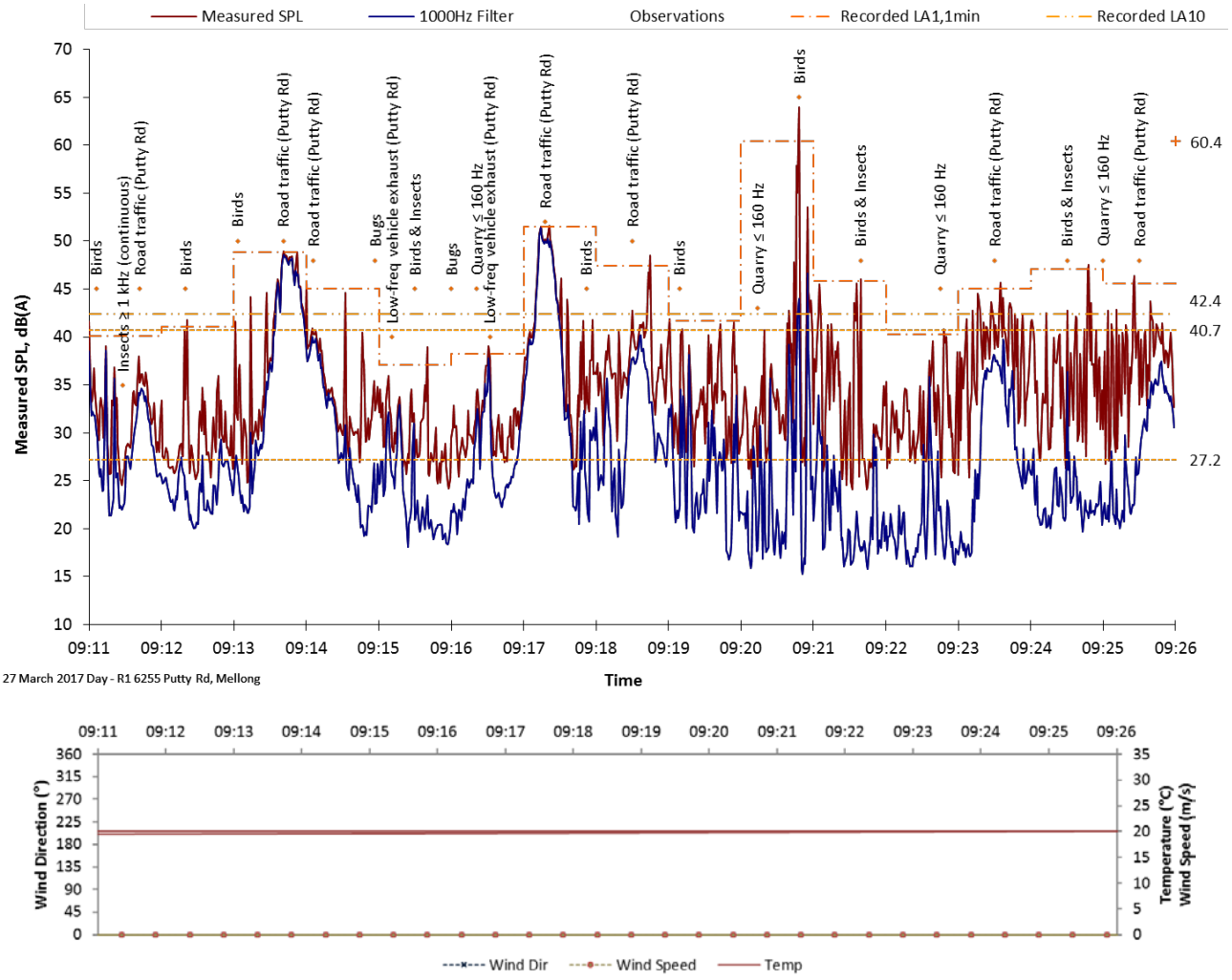

Figure A3-1

Day run chart for R1, 27 March 2017, 09:11 to 09:26

Day Monitoring Results for R1 – 6255 Putty Road, Mellong

Date and Time: 27 March 2017, 09:27 to 09:42

Operator Comments:

The ambient noise environment at the monitoring location consisted of dominant contributions from the near continuous bird calls and intermittent road traffic noise from Putty Road. Other noise contributions resulted from insect noise.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the Quarry resulted from only a few seconds of barely audible low-frequency (< 160 Hz) noise and was negligible.

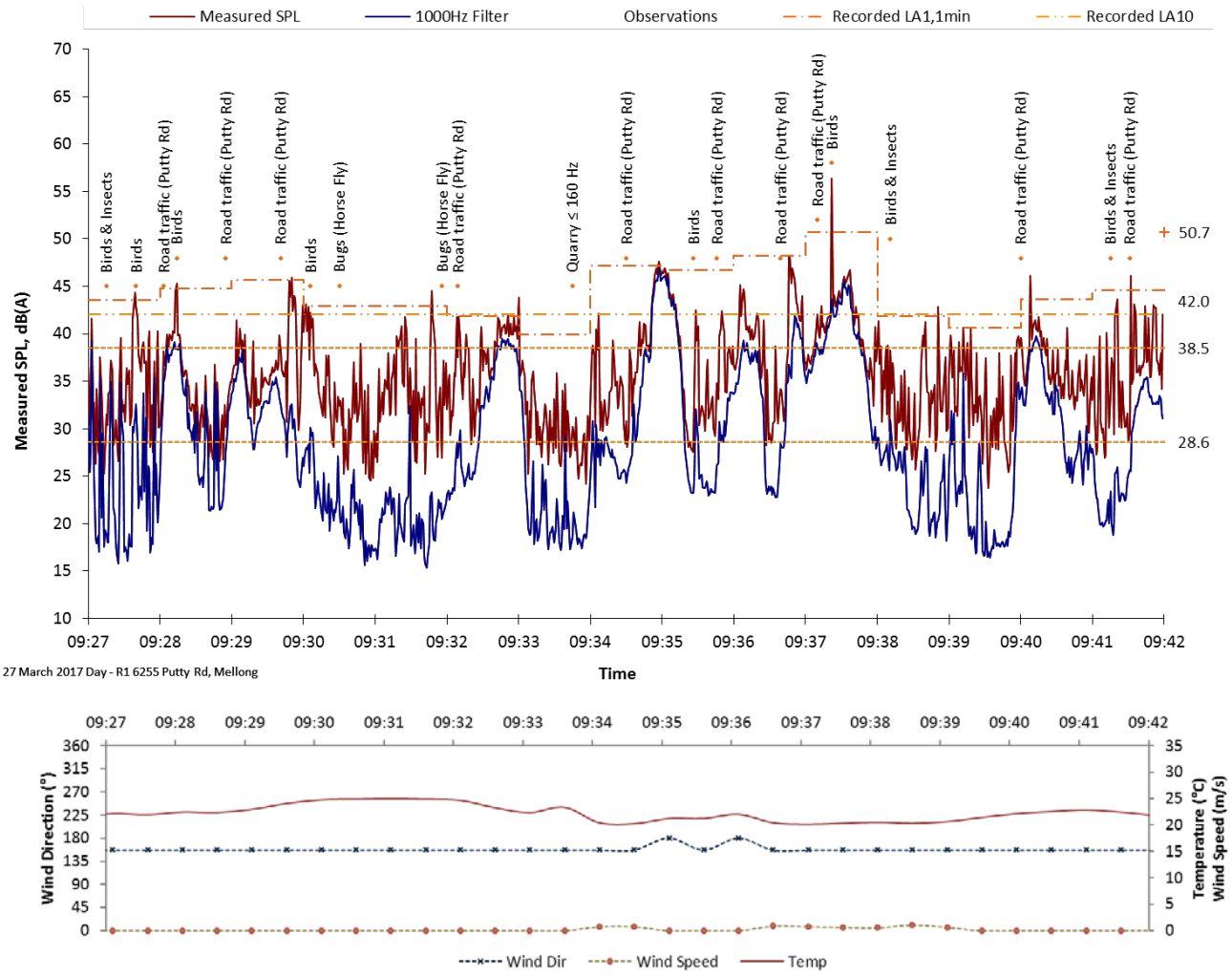

Figure A3-2

Night run chart for R1, 27 March 2017, 09:27 to 09:42

Day Monitoring Results for R1 – 6255 Putty Road, Mellong

Date and Time: 27 March 2017, 09:45 to 10:00

Operator Comments:

The ambient noise environment at the monitoring location consisted of dominant contributions from the near continuous bird calls and intermittent road traffic noise from Putty Road. Other noise contributions resulted from insect noise.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the Quarry was inaudible and not measurable.

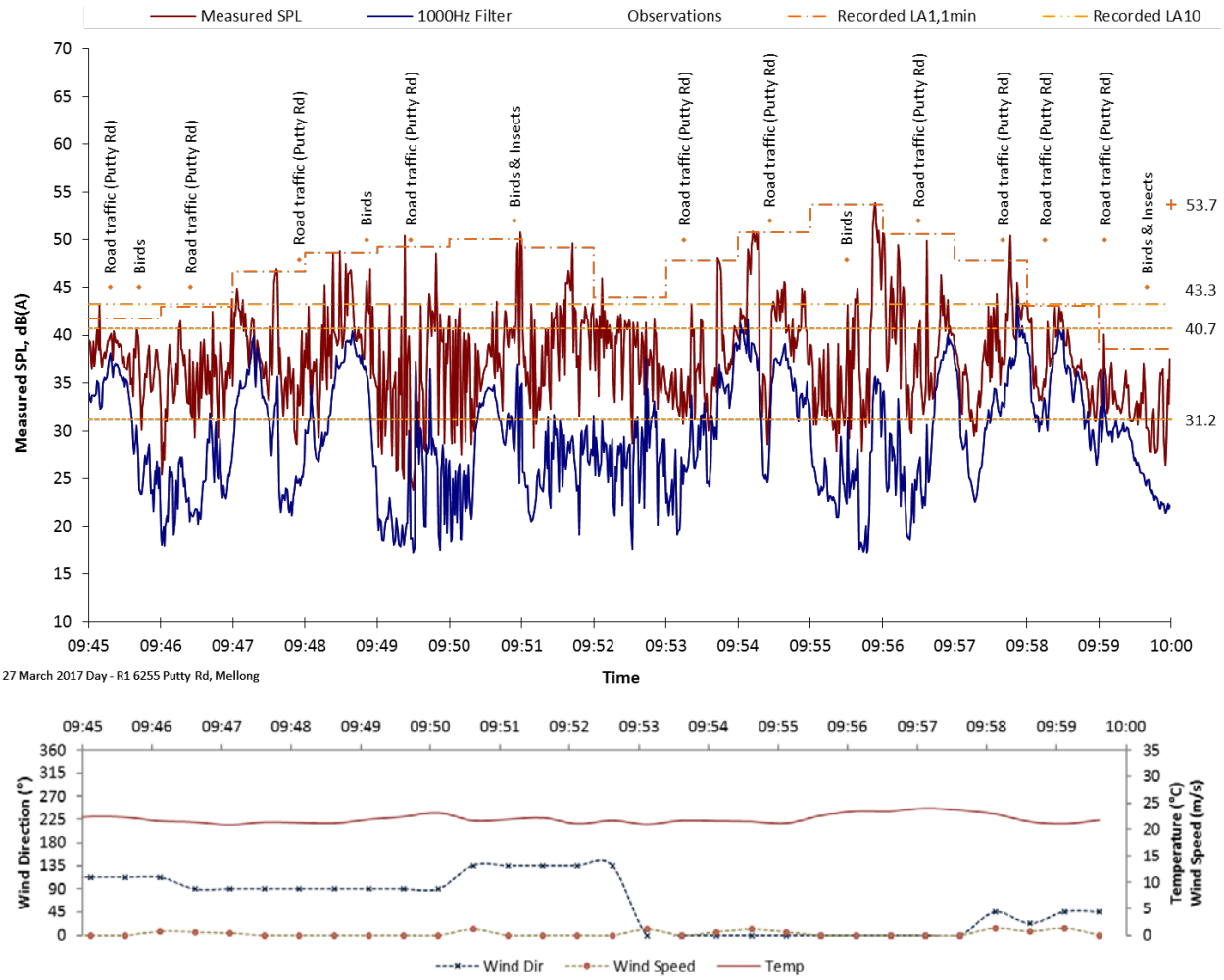

Figure A3-3

Day run chart for R1, March 2017, 09:45 to 10:00

Day Monitoring Results for R1 – 6255 Putty Road, Mellong

Date and Time: 27 March 2017, 10:02 to 10:17

Operator Comments:

The ambient noise environment at the monitoring location consisted of dominant contributions from the near continuous bird calls, and aircraft flyover and intermittent road traffic noise from Putty Road. Other noise contributions resulted from insect noise.

The $L_{Aeq,\ 15\ minute}$ noise contribution from the Quarry resulted from only a few seconds of barely audible low-frequency (< 160 Hz) noise and was negligible.

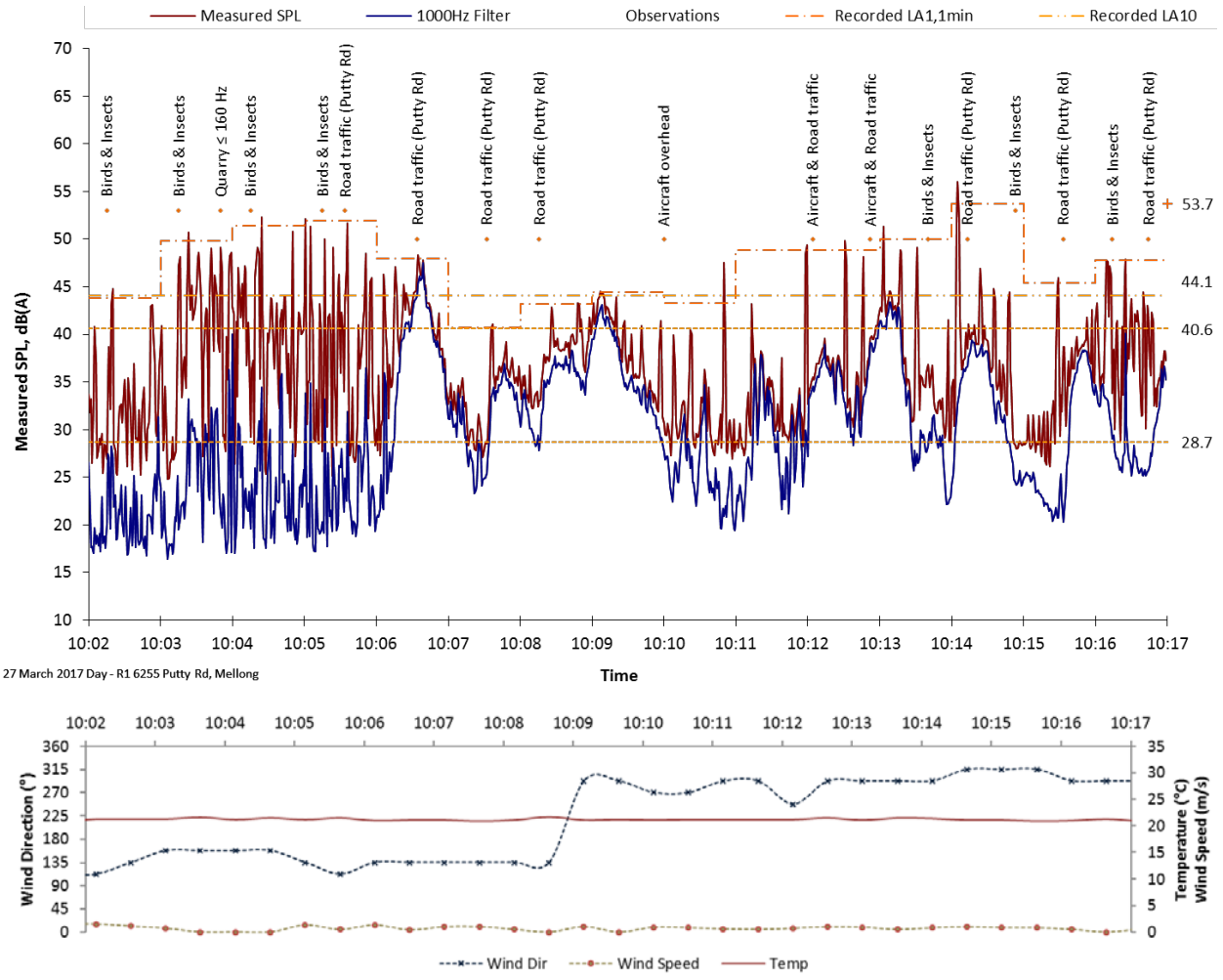

Figure A3-4

Night run chart for R1, 27 March 2017, 10:02 to 10:17

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