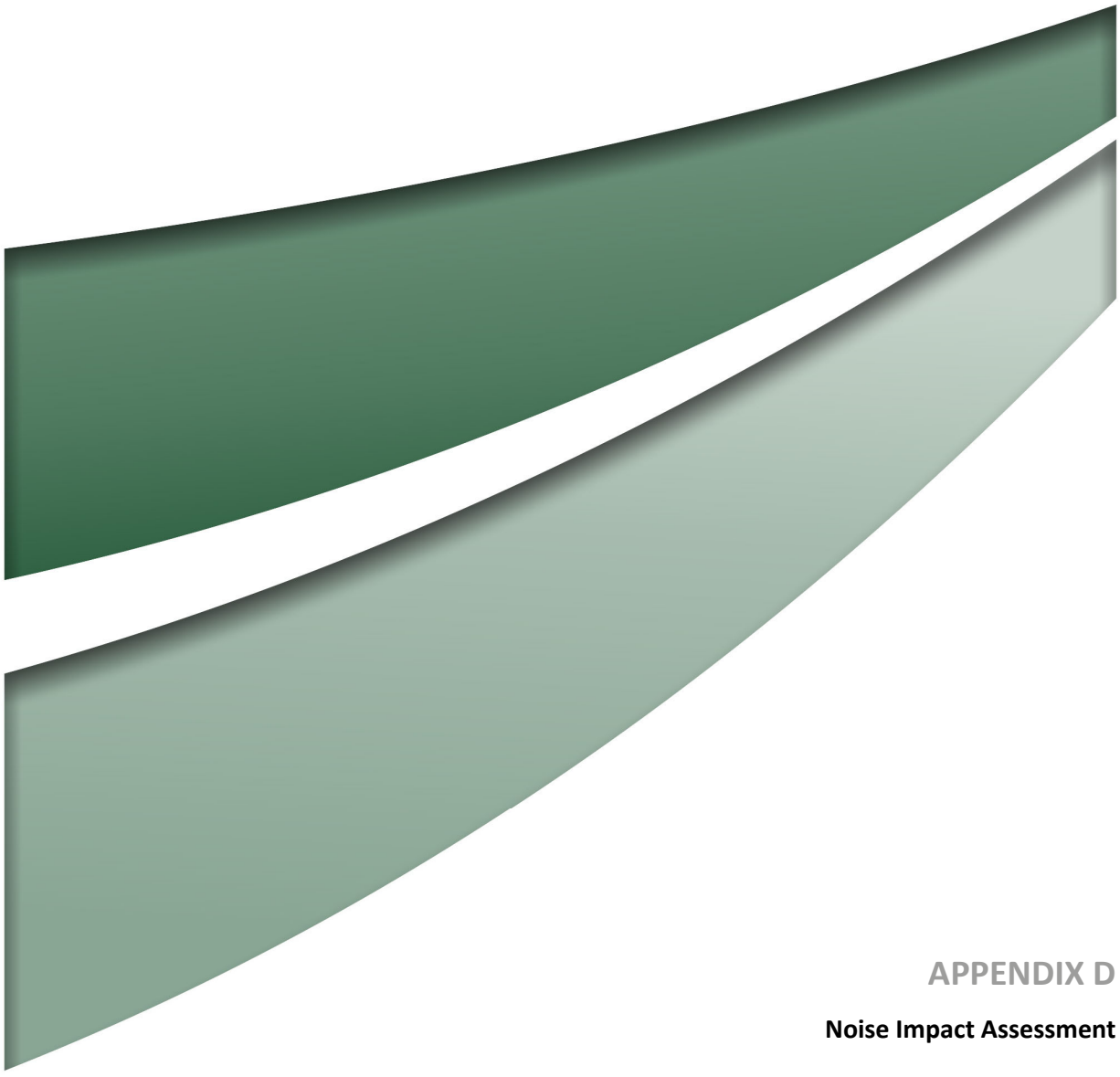

APPENDIX D

Noise Impact Assessment

umwelt
Environmental & Social Consultants

NOISE IMPACT ASSESSMENT

Martins Creek Quarry Extension
– Revised Project

FINAL

May 2021

NOISE IMPACT ASSESSMENT

Martins Creek Quarry Extension
– Revised Project

FINAL

Prepared by
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on behalf of
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Report No. 3957/R04
Date: May 2021

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	Tim Procter	30 April 2021	Barbara Crossley	4 May 2021

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Glossary

Abbreviation	Description
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 L_{90} 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.
Recommended Amenity Noise Level	Recommended noise levels scaled to reflect the perceived differential expectations and ambient noise environments of rural, suburban and urban communities for sensitive receivers.
Assessment Background Level (ABL)	The single-figure background 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). Its determination is by the methods described in Fact Sheet B.
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(C), dBC	Decibels C-weighted.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Day	The period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
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.
Evening	Refers to the period from 6 pm to 10 pm.
Evening Shoulder Period	Refers to the period from 6 pm to 7 pm
Hertz (Hz)	The measure of the frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
L_{A10}	The percentile sound pressure level exceeded for 10% 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% 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 1 second.

Abbreviation	Description
$L_{A1,1minute}$	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 1% of measurement period with 'A' frequency weighting calculated by statistical analysis during a measurement time interval of 1 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' percent of the observation time.
Night	The period between 10 am and 7 pm
Project Noise Trigger Levels (PNTL)	Target noise levels for a particular noise-generating facility. They are based on the most stringent of the project intrusiveness noise level or the project amenity noise level.
Project Amenity Noise Levels	The project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Calculated as the recommended amenity noise level less 5 decibels and refers to the day, evening and night periods.
Project Intrusive Noise Levels	The project intrusiveness noise level aims to protect against significant changes in noise levels. Calculated as rated background level plus 5 decibels and refers to a 15-minute period.
Receiver	The noise-sensitive land use at which noise from a development can be heard.
Rating Background Noise level (RBL)	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.
Sleep Disturbance	Awakenings and disturbance to sleep stages.
Sound Pressure Level (dBA)	The basic measure of noise loudness. The level of the root-mean-square sound pressure in decibels given by: $SPL = 10.\log10\ (p/po)^2$ where p is the rms sound pressure in pascals and po is the sound reference pressure at 20 μPa db.
Sound Power Level	A measure of the energy emitted from a source as sound and is given by: $SWL = 10.\log10\ (W/Wo)$ where W is the sound power in watts and W_o is the sound reference power at 10^{-12} watts.
Temperature Inversion	An atmospheric condition in which temperature increases with height above the ground.

Executive Summary

The Martins Creek Quarry (the Quarry) is licensed by Buttai Gravel Pty Ltd, which is part of the Daracon Group (Daracon). The Quarry is an existing hard rock quarry situated within the Dungog Local Government Area, approximately 7 kilometres north of Paterson, New South Wales.

In 2014, Daracon submitted a development application for the Martins Creek Quarry Extension Project. This application sought approval for the consolidation of the existing development approvals and the expansion of the Quarry into new areas to extract and haul by road transport up to 1.5 million tonnes of material per annum over a 30 year period (the Original Project). During public exhibition of the Environmental Impact Statement (EIS) in 2016 a number of key issues were raised in submissions, related to traffic and transport (including the volume and frequency of truck movements and road safety), noise, blasting and vibration impacts and social amenity impacts. Furthermore, some of the government agencies requested further information and/or revised impact assessments to adequately address the assessment requirements for a number of technical studies.

Following a detailed analysis of the EIS submissions, Daracon committed to key design changes and additional mitigation and management measures to minimise the Project's environmental and social amenity impacts (the Revised Project 2018). This included reductions in the proposed extraction limits, Quarry operating hours and truck movements. Further community engagement led to Daracon undertaking further quarry planning and design activities to optimise the use of the existing resource and minimise environmental and community impacts. As a result, the Revised Project includes a number of additional amendments including further reductions in road transportation volumes, peak hourly truck movements, and operational hours.

This Noise Impact Assessment (NIA) has been prepared by Umwelt in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the original Project and relevant noise guidelines. The NIA considers matters raised by the government agencies in respect to noise following the exhibition of the 2016 EIS and feedback from the community engagement, including the Noise Collaborative Assessment Forum (CAF).

In 2015, Dungog Shire Council (DSC) brought action against the lessee of the quarry land (Hunter Industrial Rental Equipment Pty Ltd) and the operator of the quarry (Buttai Gravel Pty Ltd) for breaching section 76A (now section 4.2) of the EP&A Act. In 2019, the Court of Appeal ordered that the quarry operator is restrained from:

a) using the land otherwise than as a quarry primarily for the purposes of winning railway ballast;

b) excavating rock on Lot 6 DP 242210 without consent; and

c) permitting the transport of greatly more than 30% of the quarry products derived from rock excavated from the land by public road on an annual basis, without the approval of DSC.

The SEARs for the Original Project makes reference to the *Industrial Noise Policy* (EPA 2000), however, in accordance with the transitional arrangements, and with consideration to the date of issue of the SEARs the provisions of the *Noise Policy for Industry* (NPfI) (EPA, 2017) and other relevant guidelines, have been applied to this assessment. As an existing industrial noise source, the NIA has taken into account both the historical operational aspects of Martins Creek Quarry and the proposed expansion of the quarry operations.

The key features of the Revised Project includes: an increase in the rate of extraction and processing of hard rock material; an increase in the rate of road haulage of Quarry product; capping the maximum number of laden trucks dispatched per hour and per day; construction and use of a new access road; the extension of the rail spur to facilitate train loading; and noise mitigation works including new noise barriers and cladding of processing infrastructure.

The privately-owned residential receivers in the different receiver areas that could potentially be affected by noise from the Revised Project have been described as Noise Assessment Groups (NAGs). The allocation of the NAGs is based on the similarity of the acoustic environments and project noise trigger levels (PNTL) identified for individual receivers. The acoustic environment was measured using noise loggers placed at four locations in the region surrounding the Quarry. The PNTL for each receiver was based on the project intrusiveness noise level and project amenity noise level for each particular location as defined by the NPfI. For a new development, the PNTL is the most stringent of the project intrusiveness noise level or project amenity noise level. The NPfI also provides a process for assessing changes to an existing development that differs from new developments. As an existing industrial site planning on upgrading and expanding the site, Section 6 of the NPfI has been considered in the setting of PNTLs for the NAGs adjacent to the East Pit processing area (NAGs 1, 2, 3 and 4).

The final PNTLs for the existing industrial operation and the expansion of the quarry area provide a benchmark/objective for assessing the Revised Project and is not intended for use as a mandatory noise limit but rather, if exceeded, indicate a potential noise impact on the community. Potential exceedances of a PNTL require further consideration of reasonable and feasible noise mitigation measures.

Where the noise impacts with the implementation of reasonable and feasible noise mitigation measures cannot achieve the PNTLs, both the NPfI and NSW government *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (VLAMP) (NSW Government, 2018) provide guidelines for the assessment of the residual noise impacts. The VLAMP does not apply to construction noise impacts, or noise impacts from public roads or the rail network. Additionally, the VLAMP does not apply to the 'modification' of existing developments with legacy noise issues, where the modification would have beneficial or negligible noise impacts'.

The computer-based modelling software package Environmental Noise Model (ENM) was used to predict the operational noise levels produced by the Revised Project within the surrounding environment. The software uses terrain data, source and receptor locations and heights, source sound power levels and input meteorological conditions to predict noise levels. The noise modelling process incorporated:

- a comprehensive suite of noise control measures to minimise noise emissions
- iterative revision of the quarry progression and processing plant area to optimise the pit geometry, extraction sequence and production planning
- several internal haul route variants for each stage of the Revised Project
- redesign of the East Pit sections of the processing plant area including the extension of the rail spur to move loading operations further from receivers.

The ENM model of the Revised Project included:

- a 4-metre noise barrier adjacent to the ROM dump hopper pad and part of the internal haul road between the West Pit and East Pit
- a noise barrier adjacent to the primary crusher and primary feed bin

- noise attenuation of the primary surge bin
- an 8-metre noise barrier around the southern boundary of the existing East Pit processing plant area to overlap an augmented landform adjacent to the existing wheel wash bay
- new cladding of the secondary screen and crusher building including a mass layer for the roof, northern, southern and western walls. Additionally, cladding of the existing open areas at the base of the building for the northern, western and southern facades
- attenuated replacement of the tertiary crusher and tertiary surge bin
- a 3-metre noise barrier along the southern boundary of the Southern Stockpile Area
- installation of a fence between the western boundary of the Southern Stockpile Area and adjacent rail siding
- no in-pit mobile crushing in the West Pit (Lots 5 and 6 DP 242210)
- the use of three new smaller quieter trucks operating in the West Pit
- an extension to the rail spur within the northern end of the East Pit, approximately 10 metres below the current ground level and relocation of the train loading activities to the northern end of the rail spur
- construction of a dedicated access road onto Dungog Road removing trucks off Station Street (except for emergency purposes), following Dungog Shire Council and ARTC approval for detailed design plans and construction of a new rail crossing. The access road will be commissioned as early as possible, and by the end of Year 4, from project approval.

The sound power levels (SWL) utilised in the noise modelling are based primarily on measurements undertaken onsite. Additional data was sourced from measurements of similar plant, product specifications, estimated from noise source data in published literature or from published noise impact reports for similar projects.

All key items of plant and equipment modelled incorporate reasonable and feasible noise control measures. The actual performance of the Revised Project as a whole, determined by monitoring the environmental noise levels over the life of the project, will dictate equipment selection criteria and the need for additional equipment SWL attenuation.

The NPfI's approach to accounting for noise-enhancing weather conditions based on the analysis of the meteorological data was used in the NIA. A probabilistic noise modelling approach was used to help design the operating parameters of the Revised Project and assess the effectiveness, reasonableness and feasibility of different mitigation measures. The probabilistic noise modelling approach allows the impact of the temporal variations in the meteorological conditions on the propagation of sound from the source to the receiver to be considered. This approach includes the iterative implementation of the noise control strategies to determine the percentage of the time each strategy, such as machine relocation or shut down, need to be implemented and enables the Proponent to determine whether particular measures are reasonable or feasible based on their cost and/or effect on production. Feasible and reasonable noise mitigation measures identified through the probabilistic modelling were incorporated into the modelling of the Revised Project under the NPfI noise enhancing meteorological conditions.

The NIA for the Revised Project also includes an assessment of:

- modifying factors for noise source contains characteristics such as tonality, intermittency, irregularity or dominant low-frequency content
- the potential for sleep disturbance from maximum noise level events
- the loading of up to 10 road trucks during the evening shoulder period from 6:00 pm to 7:00 pm Monday to Friday
- construction activities that could potentially generate higher noise levels than those of the industrial operation including the construction of the new access road and the construction of the noise mitigation measures within the East Pit processing area
- non-network rail-related activities associated with the rolling stock on the rail spur within the East Pit processing area
- the dispatch rate of up to 600,000 tonnes per annum of product via rail on the North Coast Line and the Main Northern Rail Line
- road traffic noise from the proposed primary road haul route from the Revised Project to Melbourne Street, East Maitland based on a dispatch rate of up to 500,000 tonnes per annum of product with a cap of no more than 140 laden trucks dispatched per day and no more than 20 laden trucks dispatched per hour. This includes an investigation into the reduction in road traffic noise on Station Street and Grace Avenue following the completion of the new access road to Dungog Road.

The NIA assessed Year 2 separately to Years 6, 10, 15 and 20. Year 2 is representative of the four year transition period during which not all the noise controls would be in place. For the Year 2 operating scenario, it was assumed the existing rail loading facility would still be in place and being used as the construction of the new rail spur will not be complete. It is also assumed the construction of the new access road through Lot 5 would not be complete and trucks will be using the existing entrance on Station Street.

The predicted noise levels for this transitional period consider two operating scenarios, one with and one without the operation of the existing rail loading facility. Both operating scenarios include rock extraction from both the West Pit and East Pit, operation of the processing plant and dispatch of the capped peak hourly truck movements modelled as 20 laden truck movements per hour up to 3:00 pm and 15 laden truck movements per hour after 3:00 pm. For operating conditions where the existing rail loading facility is not operating, the maximum predicted $L_{Aeq,15minute}$ exceeds the PNTL by more than 5 dB at one (1) receiver location. The noise impact at this property is primarily driven by operational noise from the West Pit. For operating conditions where the existing rail loading facility is operating, the maximum predicted $L_{Aeq,15minute}$ greater than or equal to 3 dB above, but less than or equal to 5 dB above the PNTL could occur at fifteen (15) receiver locations. It is noted that the predicted impacts are for a transitional arrangement and the noise levels will be further reduced following the completion of the new rail loading facilities and new access road.

The NIA assessment of operational noise in Years 6, 10, 15 and 20 included rock extraction from the West Pit, operation of the processing plant, dispatch of the capped peak hourly truck movements modelled as 20 laden truck movements per hour along the new access road and train loading at the northern extension of the rail spur. It was found noise impacts associated with trucks using the new access road was a key driver of noise impacts at a number of receivers to the west of the Quarry. The results associated with operating at the capped maximum hourly dispatch rate of 20 laden truck movements per hour indicate the maximum predicted $L_{Aeq,15minute}$ exceeds the PNTL by more than 5 dB at one (1) receiver location. The predicted noise impact is primarily associated with activities in the West Pit and the new access road.

At a rate of 20 laden truck movements per hour during Years 6, 10, 15 and 20 the maximum predicted $L_{Aeq,15minute}$ could exceed the PNTL by between 3 to 5 dB at eleven (11) receiver locations.

The peak operating condition modelled of 20 laden trucks per hour represents short term operating conditions which only occur when the Quarry is supplying material to large infrastructure projects. These rates cannot be maintained over the whole days or for extended periods without exceeding the daily cap on truck movements or the annual cap of road haulage volumes. To enable residents impacted by the Project to understand the impacts likely to occur under more usual operating conditions, an assessment of historical operating conditions was also undertaken. This analysis indicated product dispatch rates of up to 12 laden truck movements per hour is more likely and the noise level at the most affected receiver location under these usual conditions would be reduced by 4 dB to a maximum of 44 dB(A) (i.e. between 3 to 5 dB above the PNTL). Under these more usual operating conditions, only six (6) properties were predicted to exceed the PNTL by between 3 to 5 dB.

The probabilistic noise modelling approach was used in the NIA to assess the operability of the Revised Project under noise-enhancing and very noise-enhancing meteorological conditions. In particular, there was a focus on the operability of the quarrying activities within the West Pit under noise-enhancing conditions, as these activities are mobile and transient in operation. The assessment indicated that work on the higher, more exposed benches in the West Pit yields the lowest machine utilisation, particularly in Years 6 and 10. As a result, quarrying activity on the higher benches would need to be prioritised during suitable weather conditions. It was found that as the pit deepens by Years 15 and 20 the utilisation of the higher benches could, with appropriate management, be increased**.**

The exception to the typical day-time operating scenario is the campaign use of a large bulldozer to pre-strip the extraction area in the West Pit. The pre-strip activity lasts for approximately three (3) weeks each year and makes the working area safe for the drill, excavator and trucks to access. The pre-strip process is integral to unlocking the resource for extraction and could result in the bulldozer operating during noise-enhancing meteorological conditions to complete the required pre-strip. Under adverse weather conditions that enhance the propagation of the noise, the noise impacts could exceed the daytime PNTL at up to 30 receiver locations, noting that these activities will only occur periodically for a few days at a time.

The predicted noise levels from the arrival and loading (but not dispatch) of up to 10 road trucks during the evening shoulder period during the transition period (i.e. the first 4 years until all mitigation measures are implemented) under calm and enhancing meteorological conditions (6:00 pm to 7:00 pm Monday to Friday) could exceed the shoulder PNTL at two (2) receiver locations by more than 5 dB. Five (5) receiver locations could exceed the shoulder PNTL by between 3 to 5 dB during this period as a result of the arrival and loading (but not dispatch) of 10 additional road trucks during this period. The completion of the new access road to Dungog Road by the end of Year 4 will result in a reduction of up to 5 dB in the maximum predicted noise levels at five (5) of the properties.

The evening and night-time periods of Years 6, 10, 15 and 20 under calm and enhancing meteorological conditions includes the loading of rail wagons with rock product using front end loaders in the northern section of the East Pit processing area and locomotives at idle within the property. The predicted noise levels could exceed the PNTL by more than 5 dB during the evening at one (1) receiver location and at three (3) receiver locations during the night.

The $L_{A1,1minute}$ noise levels associated with sleep disturbance were predicted to be less than the sleep disturbance criteria at all receivers.

The assessment of the construction activities during recommended standard hours indicates up to 64 properties could experience $L_{Aeq,15minute}$ construction noise levels above 45 dB(A) during the construction of the new access road into the Quarry from Dungog Road. It is anticipated the majority of the construction will occur during 'standard times' (Monday to Friday 7:00 am to 6:00 pm and Saturday morning from 8:00 am to 1:00 pm) as defined by the ICNG. To assess worst-case noise levels the construction noise levels were based on full machine utilisation of multiple machines operating simultaneously during the noise-enhancing conditions. Some construction outside of recommended standard hours would likely be required during the construction of the bridge over the North Coast Railway Line due to track possession requirements imposed by ARTC. Further short term construction impacts could also occur at up to 31 properties, during the construction of the noise mitigation measures in and around the East Pit processing plant area.

To mitigate rail noise impacts from trains on the non-network rail spur line the Revised Project will move these activities into the northern section of the East Pit processing area through the extension of the rail spur. This removes locomotives from opposite the residential properties on Station Street during the loading activity and enables the trains to park within the property boundary to the north of the current quarry entrance at the northern end of Station Street. The predicted rail noise impacts from trains on the non-network rail spur line will still include impacts associated with trains entering and leaving the quarry premises along the rail spur opposite the residential properties on Station Street. The L_{Aeq} for a pass-by event equates to a $L_{Aeq,15minute}$ noise level of 57 dB(A). There is no exceedance of the Recommended Acceptable L_{Aeq} noise level at the closest receivers on Station Street during the daytime period. Over the four hour evening period, only one pass-by event is possible before the Recommended Acceptable L_{Aeq} noise level at the receivers on Station Street is exceeded. However, three pass-by events could occur without exceeding the Recommended Maximum L_{Aeq} noise level. During the night-time period, a single pass-by event would result in the Recommended Acceptable L_{Aeq} noise level at the receivers on Station Street being exceeded, but two pass-by events could occur before the Recommended Maximum L_{Aeq} noise level is exceeded.

Network constraints limit the number and timing of train movements that can service the Quarry. These constraints currently limit the existing approved operations in terms of daily train movements and the time of train movements. As a result of these constraints, there would be no increase in the period based $L_{Aeq,Day\text{-}time}$ or $L_{Aeq,Night\text{-}time}$ noise levels due to train movements from Martins Creek Quarry on network rail lines.

Road traffic noise levels with and without quarry trucks have been calculated for the road traffic noise receivers along the proposed primary haul route using the software package CoRTN. The modelling results indicate that baseline/existing road traffic noise levels without the quarry trucks present exceed the NSW *Road Noise Policy* (RNP) (DECCW, 2011) criteria for some receivers due to existing traffic rates and proximity to the road. The addition of quarry trucks at the capped maximum of 140 laden trucks per day (plus the return trip) and the capped maximum of 20 laden trucks per hour only results in an exceedance of the RNP Criteria at one receiver where it was not already calculated to exceed the criteria with the baseline traffic levels. Where the RNP criteria are already exceeded or is predicted to be exceeded the predicted increase in road traffic noise due to the quarry trucks is predicted to be less than 2 dB. The RNP states that noise level increases of up to 2 dB are considered barely perceptible to the average person.

The modelled scenarios with the addition of quarry trucks at the capped maximum of 140 laden trucks per day (plus the return trip) and the capped maximum of 20 laden trucks per hour represent worst-case traffic conditions. During usual operating conditions, road noise impacts would be lower than the levels predicted for the maximum operating scenarios.

The road traffic noise modelling also investigated the reduction in the road traffic noise levels for properties in Station Street, the northern end of Cory Street and Grace Avenue once the new access road is constructed and the road haul trucks no longer access the Quarry via Station Street. The results of this analysis show a 9 to 13 dB reduction in the road traffic noise levels for properties in Station Street, the northern end of Cory Street and Grace Avenue. This represents a significant improvement relative to existing approved conditions at these locations

The identification and assessment of reasonable and feasible operational and engineered noise controls have been considered throughout the design process for the Revised Project. The incorporation of these reasonable and feasible noise control measures has reduced the noise affectation area and related noise impacts associated with the Revised Project as far as practicable. The probabilistic noise modelling indicated machine management was a key aspect to managing the ongoing noise impacts, especially during noise-enhancing meteorological conditions.

To facilitate the ongoing management of the noise impacts a Noise Management Plan (NMP) will be prepared to detail the implementation of management and monitoring controls to be utilised to manage residual noise impacts associated with the Quarry operations. Key aspects of the NMP would include:

- the integration of predictive forecasting of adverse weather conditions into day to day operations
- real-time monitoring as a performance management tool
- a trigger action response plan
- an incident investigation and response process
- a change management process
- a review process and
- compliance/performance management noise monitoring.

1.0 Introduction

1.1 Project Background

The Martins Creek Quarry (the Quarry) is licensed by Buttai Gravel Pty Ltd, which is part of the Daracon Group (Daracon). The Quarry is an existing hard rock quarry situated within the Dungog Local Government Area (LGA), approximately 7 kilometres (km) north of Paterson and 28 km north of Maitland, New South Wales (NSW) (refer to **Figure 1.1**).

In 2014, Daracon submitted a development application for the Martins Creek Quarry Extension Project. This application sought approval for the consolidation of the existing development approvals and the expansion of the Quarry into new areas to extract and haul by road transport up to 1.5 million tonnes of material per annum over a 30 year period (the Original Project). The development application is being assessed as a State Significant Development (SSD) (application number SSD 6612), requiring approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

During public exhibition of the Environmental Impact Statement (EIS) in 2016 a number of key issues were raised in submissions, related to traffic and transport (including the volume and frequency of truck movements and road safety), noise, blasting and vibration impacts and social amenity impacts. Furthermore, some of the government agencies requested further information and/or revised impact assessments to adequately address the assessment requirements for a number of technical studies.

Following detailed analysis of the EIS submissions, Daracon committed to key design changes and additional mitigation and management measures to minimise the Project's environmental and social amenity impacts (the Revised Project 2018). This included reductions in the proposed extraction limits, Quarry operating hours and truck movements.

Further community engagement during 2018 and 2019 and the change to Quarry operations in September 2019, led to Daracon undertaking further quarry planning and design activities to optimise the use of the existing resource and minimise environmental and community impacts. As a result, the Revised Project now includes a number of additional amendments including further reductions in: road transportation volumes, peak hourly truck movements, and operational hours.

This Noise Impact Assessment (NIA) has been prepared by Umwelt to assess the noise impacts associated with the Revised Project.

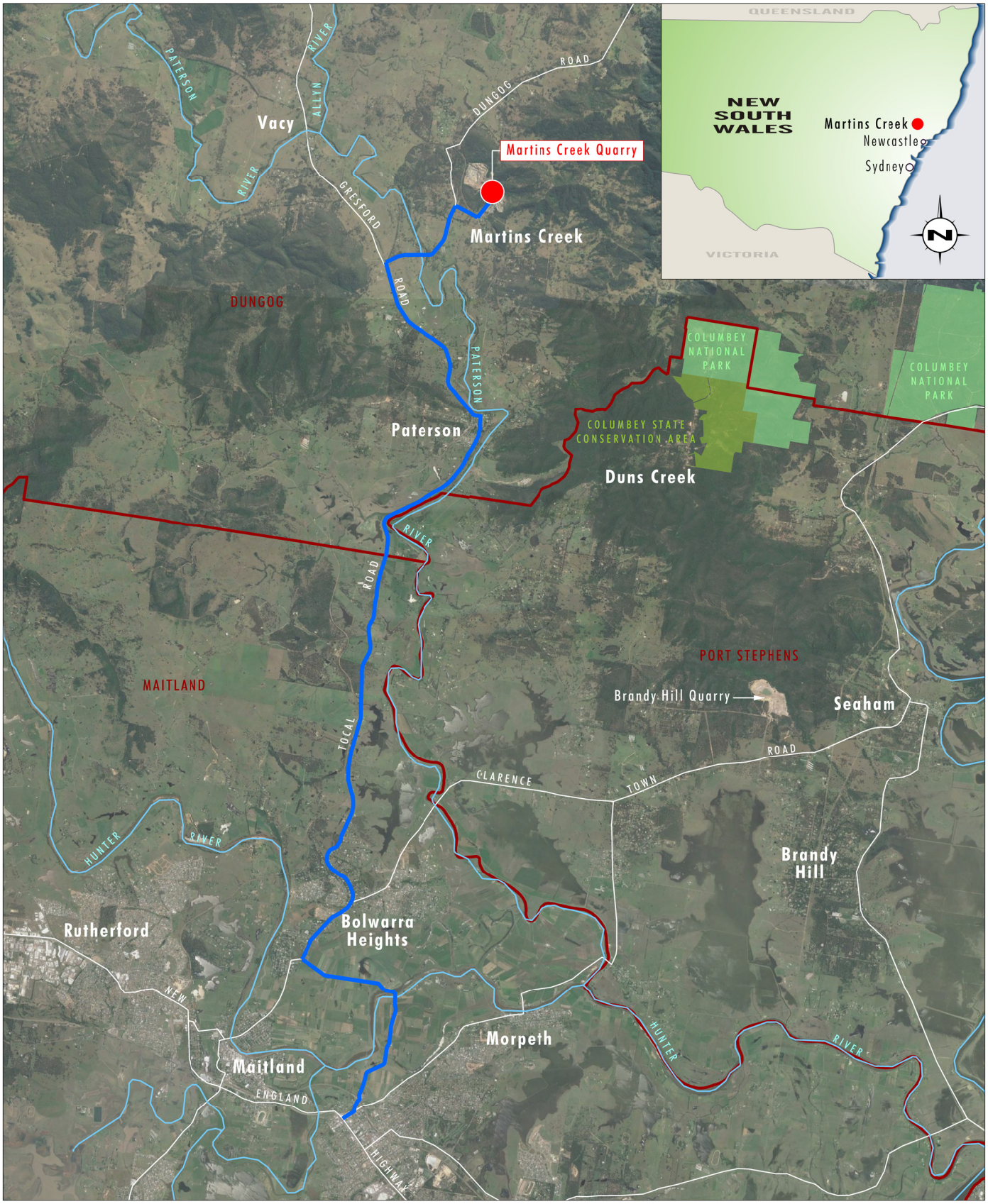

Image Source: Google Earth (2016)
Data Source: LPI (2019),
NSW National Parks and Wildlife Service (NPWS) Estate (Jan 2018)

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Legend

- Martins Creek Quarry
- Local Government Area Boundary
- Proposed Primary Haul Route

FIGURE 1.1

Locality Plan

1.2 Existing Approvals

In 2015, Dungog Shire Council (DSC) brought action against the lessee of the quarry land (Hunter Industrial Rental Equipment Pty Ltd) and the operator of the quarry (Buttai Gravel Pty Ltd) for breaching section 76A (now section 4.2) of the EP&A Act. In 2019, the Court of Appeal ordered that the quarry operator is restrained from:

d) using the land otherwise than as a quarry primarily for the purposes of winning railway ballast;

e) excavating rock on Lot 6 DP 242210 without consent; and

f) permitting the transport of greatly more than 30% of the quarry products derived from rock excavated from the land by public road on an annual basis, without the approval of DSC.

The Court of Appeal also set aside a variation to the EPL 1378 that permitted an increase in the maximum extraction of product at the quarry from 500,000 tpa to 2 Mtpa. The effect of this order was that the EPL restricts the extraction of more than 500,000 tpa of quarry product.

With respect to noise, EPL 1378 does not specify any limits or monitoring requirements, however it does specify the following operating conditions:

> *L4 Noise limits*
>
> *L4.1 Where a noise limits has not been prescribed, all operations and activities occurring on the premises must be conducted in a manner that does not cause offensive noise.*
>
> *…*
>
> *L6 Hours of operation*
>
> *L6.1 In accordance with development consent 171/90/79 hours of operations for the western portion of the premises, being Lot 5 and Lot 6 DP 242210, are restricted to 7 am to 5 pm Monday to Saturday with no operations allowed on Sundays and public holidays.*
>
> *Note: the development consent allows operations outside these hours on a short term emergency basis.*
>
> *L6.2 Hours of operation for the eastern portion of the premises, being Lot 1 DP 1006375 and Lot 1 DP 204377, are restricted to 6 am to 6 pm Monday to Saturday with no operations allowed on Sundays and public holidays. It is permissible to operate outside these hours for activities like maintenance provided such activities are not audible at the nearest or most affected residential receiver.*
>
> *L6.3 Operations outside the abovementioned hours are permissible on a short term basis for emergency situations.*

1.3 Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) for the Original Project were issued on 4 August 2016 (as amended) and required the preparation of an EIS including the following, with respect to noise:

> *Noise – including a quantitative assessment of potential:*
>
> – *construction, operational and off-site transport noise impacts in accordance with the Interim Construction Noise Guideline, NSW Industrial Noise Policy and the NSW Road Noise Policy respectively;*
>
> – *reasonable and feasible mitigation measures to minimise noise emissions; and*
>
> – *monitoring and management measures, in particular real-time and attended noise monitoring.*

This NIA has been prepared in accordance with the SEARs summarised above, as confirmed with the Department of Planning Industry and Environment (DPIE) as part of the Amended Development Application process. The reference to relevant guidelines was updated to specifically include more recent and/or more specific reference to the following relevant guidelines:

- *Noise Policy for Industry* (EPA 2017)
- *NSW Road Noise Policy* (2011)
- *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (2018) (VLAMP)
- *Rail Infrastructure Noise Guideline* (EPA 2013).

In addition, the NIA considers matters raised by the government agencies in respect to noise following the exhibition of the 2016 EIS, as set out in **Table 1.1**. It should be noted that some of the submissions relate to specific details within the previous noise assessment undertaken as part of the EIS for the Original Project (RCA Acoustics, 2016). This NIA has been undertaken as a new, standalone assessment of the Revised Project, and therefore some of the submissions previously raised are not applicable to the Revised Project and/or this new NIA.

Table 1.1 Agency Submissions Relating to Noise

Organisation Name	Submission	Section where addressed
DPIE	The Department requests clarification and further information on the following matters:	-
	a) a description of all treatments proposed to be implemented to minimise noise from processing plant and the timing of implementing these treatments;	Section 4.2 discusses the treatments included in the Revised Project Section 4.3 discusses the timing
	b) clarify that the rail noise assessment has considered the use of longer trains, as identified in the Department's SEARs, to make rail transport viable (as opposed to shorter ballast trains);	Sections 4.5, 5.3, 5.5 and 5.6 discuss trains and rail noise

Organisation Name	Submission	Section where addressed
	c) a more detailed discussion of measures that may be applied to minimise, or mitigate noise emissions (e.g. construction of temporary noise bunds to shield potentially affected receivers from stripping activities);	Sections 4.2 and 4.3 discuss treatments options, Section 5.1.3 operational design and Section 6.1 mitigation measures
	d) provide an impact assessment of sleep disturbance levels on potentially affected receivers, including predicted levels taking into consideration the different stages of the proposed development;	Section 5.3 discusses sleep disturbance from operational activities and Section 5.5 rail noise
	e) provide a revised road noise impact assessment, which considers trucks travelling through Paterson and Bolwarra (and any other affected urban areas) from before 5:30 am (based on the identification in the NIA that consumables are supplied to the pug mill from this time);	Section 2 discusses the change in operating hours, Section 4.6 the model parameters used in the NIA, and Section 5.7 the road traffic noise assessment
	f) clarify the statement "The quarry generally remains inaudible at all other receivers" in section 6.4.2 in relation to which receivers, under what operating conditions/stages and in noise assessment periods;	As stated above, a new noise impact assessment has been completed which assesses noise levels at all relevant receivers under relevant stages and operating conditions. Section 5.1.3 notes that not all meteorological conditions enhance the propagation of noise
	g) revise predictions in section 6.5.1.2 to reflect noise levels from current approved truck volumes and then assess the incremental road noise impact from the proposed additional truck volumes (see above);	Section 5.7 considers the incremental increase from a 'no build option' i.e. no development
	h) revise noise contour drawings to provide finer resolution that enables identification of receivers and existing and proposed monitoring locations and with an improved legend;	Appendix 6 provides single point calculated noise levels at each receiver in addition to noise contours for noise-enhancing meteorological condition
	i) provide additional noise contour drawings to reflect all stages of the proposed development (e.g. there is no noise contour drawing that depicts noise levels from stripping and extraction in the northern part of Lot 6 and associated emissions to receivers and vacant land to the north).	Section 5 provides outer envelop noise contour for each stage of the Revised Project Appendix 6 provides contours for noise-enhancing meteorological conditions for each stage of the Revised Project
	Table 14 in the Acoustic Report does not include haul trucks, which based on the proposed volumes during peak hours, are expected to contribute to noise generated at the site.	Section 5.1 and 5.7 considers the impact of the road haul truck as sources contributing to the industrial noise in accordance with the NPfI and as road traffic in accordance with the RNP
	The NIA seeks to characterise the existing quarry as a legacy noise source. However, the past and existing operation of the quarry within its development consent is disputed by Council. The Department is, at this time, not satisfied that the EIS provides sufficient evidence to justify that existing operations are consistent with extant development consents (see 1 above). Accordingly, this	This new NIA has taken account of the approved development, as defined by the recent Court of Appeal judgement. The East Pit processing area of the Revised Project has been assessed under Section 6 of the NPfI (refer to Section 3.1.2 and 3.1.5). The West Pit and

Organisation Name	Submission	Section where addressed
	justification for not considering further measures to avoid, minimise and mitigate significant exceedances to project specific noise levels (PSNLs) determined in accordance with the NSW Industrial Noise Policy is not accepted. Please provide a revised assessment that considers further measures to avoid, minimise and mitigation noise impacts.	proposed new access road to Dungog Road have been assessed using the methodology outline in the NPfI for new developments.
	The NIA states "…secondary haulage routes such as Butterwick Road were not identified as being potentially significantly affected by changes in the proposed quarry operations". Provide justification in support of this statement.	Section 6.3.1 assesses the proposed primary road haul route from the Revised Project to Melbourne Street, East Maitland
	The Department requests drawings of all proposed noise walls and/or bunds prepared to scale, with dimensions to Australian Height Datum AHD and identifying any relevant nearby features e.g. privately-owned properties and residences.	Refer to Section 4.2 and Figure 4.1. The updated Noise Management Plan will provide further detailed drawings of these structural noise controls, subject to project approval.
EPA	The EPA's primary area of concern relates to the degree to which noise levels predicted for various activity scenarios in the Acoustic Assessment exceeds the project-specific noise levels derived in the assessment.	This is addressed in Sections 5 and 7 and Appendix 6
	Many of the predicted noise levels from the various activity scenarios are significantly higher than both the PSNLs and the proposed alternative license noise limits.	The Revised Project includes substantial re-design and additional noise controls in order to minimise noise impacts, as far as reasonable and feasible. The revised residual noise impacts are presented in Sections 5 and 7 and Appendix 6
	The proponent needs to provide a clear set of tables showing predicted noise levels at each receiver together with the applicable noise criteria, clearly highlighting any exceedances. This information needs to be provided for EPA to develop noise license limits.	Section 7 provides detailed tables on the residual impacts that can be use to develop noise license limits
Dungog Shire Council	The concept of the application for the proposed expansion is based upon noise levels that already give rise to significant exceedances of appropriate noise criteria (due to the unlawful operations), upon which then the applicant seeks to create a further increase under EPA policies based upon the existing excessive noise.	Project noise trigger levels have been derived in accordance with Section 6 of the NPfI (refer to Sections 3.1.2 and 3.1.5) based on the approved operation of the existing quarry. This results in a reduction of the noise impacts from previous operations (refer to Section 5)
	No contemplation or consideration has been given to what the noise levels would be if the quarry was operating in accordance with the 1991 Development consent and related EIS (that stated full compliance with the general background + 5 dB(A) limit at residential receivers)	Section 3.1.5 discusses the noise levels of the existing operations and how these are considered in deriving project noise trigger levels for the Revised Project
The Acoustic Group (Prepared for Dungog Shire Council)	General issues and discrepancies in noise level data, criterion, and identification of noise contribution (see pages 4-10).	This NIA provides a comprehensive and transparent analysis of the noise impact of the Revised Project

Organisation Name	Submission	Section where addressed
	Not all relevant aspects of the proposed expansion project for the Martins Creek Quarry have been identified- there is a lack of acoustic information with respect to the approved development.	This NIA has sought to address all aspects of the Revised Project as described in Section 1
	The Expansion EIS acoustic assessment identifies that currently there is a significant acoustic impact occurring in Martins Creek, of which there is now a proposal to provide an alternative road to address that impact which should have occurred as a result of the unapproved intensification of the quarry.	The Revised Project incorporates substantial noise control measures to reduce the impact of the Quarry on the surrounding region.
Maitland City Council	The number of complaints regarding noise from existing road pavement has been reduced by the resurfacing and reconstruction of the pavement wearing course by Council. This will need to be strictly monitored to maintain the current pavement noise levels and may require more regular resurfacing treatments, should the pavement deteriorate and noise levels increase. Council, with a suitable contribution from Buttai Gravel, should be able to provide a reasonable road surface over the life of the quarry to reduce road pavement noise. This however is subject to negotiation of an acceptable Voluntary Planning Agreement, of which little detail has yet been forthcoming.	The condition of road pavement is outside the scope of the noise assessment and addressed in a separate specialist report. Daracon is seeking to establish an agreement with Maitland City Council for an appropriate road maintenance contribution.
	The road pavement improvements should improve noise generated by empty trailers, however vehicle maintenance should also be extended to the trailer, bogey and tailgate to possibly be fitted with dampeners to reduce noise.	The Revised Project includes a commitment to the maintenance of all the equipment owned or managed by the Proponent to minimise the generation of noise (refer to Section 6.1)
Port Stephens Council	Council considers the dispatch of road transportation from 5:30am to 7:00pm excessive.	The Revised Project includes a commitment to not allow product dispatch from the site by road prior to 7:00am (refer to Section 2)
	Council requests that the Department consider limiting the use of compression braking for haulage trucks in residential and rural areas, particularly along Paterson Road, Butterwick Road and Brandy Hill Drive.	Limiting the use of compression brakes will be managed through the Driver Code of Conduct and is outside the scope of the NIA
	The EIS advises that the Quarry has an internal policy and code of conduct for their drivers however a copy of these documents was not supplied in the EIS for review.	The Drivers Code of Conduct is referenced in Section 6. A current version of the document is maintained on Daracon's website at: https://daracon.com.au/storage/app/media/Enviro%20and%20Quarries%20Documents/Martins%20Creek/Martins-Creek-Code-of-Conduct.pdf
Hunter New England Health	The EIS advises that the applicant proposes to operate the project including quarrying and processing operations between 0430 hrs to 2000 hrs Monday to Saturday and train loading 24 hrs per day, seven days per week.	Refer to the project description for the Revised Project in Section 2, noting substantially changed operating hours.

Organisation Name	Submission	Section where addressed
	The EIS review of noise monitoring data for the existing operations have highlighted concerns with excessive emissions associated with the extraction activities at the quarry floor, primary and secondary crushing operations, operational truck movements within the quarry area and rail loading. In addition noise generated by truck movements through local communities is an issue to residents. The EIS has outlined mitigation and management measures to address the impact from these noise emitters.	This NIA provides a comprehensive description of proposed noise management and assessment for the Revised Project
	In respect to the above mitigation measures there are many issues that need to be continuously evaluated and managed to control noise emissions. The approval needs to demonstrate that the proposed mitigation and management measures on the existing and predicted noise impacts are satisfactory and ensure compliance with all the regulatory criteria.	This NIA provides comprehensive details on the noise management and monitoring program incorporated into the Revised Project

1.4 Noise Assessment Pathway

The *Noise Policy for Industry* (NPfI) (NSW EPA, 2017) replaced the *NSW Industrial Noise Policy* (INP) (NSW EPA, 2000) in October 2017. The NPfI includes a recognition of existing activities that have been established based on agreed performance requirements and allows established industries to adapt to changes in the noise expectations of the community, where needed. Many existing industrial sources, like the Martins Creek Quarry, were designed for higher noise emission levels than the contemporary project noise trigger levels outlined in the NPfI, or may have been in existence before neighbouring noise-sensitive developments and even before noise control legislation was introduced. The NPfI recognises that the range of mitigation measures available for these sites can be limited or costly.

Transitional arrangements for the implementation of the NPfI state that:

> *…Where SEARs were issued before the release of the new policy, and have not been modified, the assessment requirements referenced in the SEARs will apply for a period of two (2) years from the date of issue of the SEARs consistent with the provisions in the Environmental Planning and Assessment Regulation 2000, Schedule 2, Part 2, 3 (7).*

The SEARs for the Original Project make reference to the INP, however, in accordance with the transitional arrangements, and with consideration to the date of issue of the SEARs (4 August 2016), the provisions of the NPfI and other relevant guidelines, have been applied to this assessment. For the purposes of this assessment, the project noise criteria have been developed with consideration to the NPfI.

The assessment has also considered road and rail traffic impacts associated with Revised Project as well as the noise impacts from construction activities in accordance with the NPfI, the NSW Road Noise Policy (DECCW, 2011) (RNP), the Rail Infrastructure Noise Guideline (RING) (NSW EPA, 2013) and the Interim Construction Noise Guideline (ICNG) (DECC, 2009). The Voluntary Land Acquisition and Mitigation Policy (VLAMP) - for State Significant Mining, Petroleum and Extractive Industry Developments (2018) has also been taken into account in considering residual noise impacts and potential mitigation options.

2.0 Revised Project Description

The key features of the Revised Project are:

- Extraction and processing of up to 1.1 million tonnes per annum (Mtpa) of hard rock material over 25 years.
- Hours of operation between 7.00 am to 6.00 pm Monday to Saturday, except for:
    - road haulage of Quarry product which will only occur Monday to Friday (no Quarry product road haulage on Saturday)
    - provision for up to 10 unladen Daracon trucks (not contractors) to return to the Quarry between 6.00 pm and 7.00 pm Monday to Friday to park in the Quarry overnight and be loaded during this time in readiness for departure from 7.00 am the following morning. (Note: in the case of trucks loaded on Friday evening, departure will be no earlier than 7.00 am Monday morning)
    - train loading and rail haulage potentially 24 hours a day, 7 days a week
    - blasting of Quarry material between 11.00 am and 3.00 pm Monday to Friday only
    - general maintenance and environmental management 24 hours a day, 7 days a week as required, including vehicles/trucks moving in and out of the site for maintenance purposes.
- Transportation reduced to 500,000 tonnes per annum (tpa) of Quarry product via public roads, with up to 600,000 tpa transported via rail. Subject to market requirements at a later date, Daracon may seek DPIE approval to increase the amount transported by rail, on a campaign basis.
- Revision of Quarry footprint to minimise disturbed areas by avoiding approximately 15.3 ha of native vegetation in the former East Pit (Lot 21 DP 773220).
- Maximum of 140 loaded trucks (280 movements) per day, between 7.00 am and 6.00 pm Monday to Friday with a peak of:
    - 20 laden trucks per hour (40 movements), Monday to Friday between 7.00am and 3.00pm
    - 15 laden trucks per hour (30 movements), Monday to Friday between 3.00pm and 6.00pm
- Use of one primary haulage route i.e. Haul Route 1 (via Dungog Road, Gresford Road, Tocal Road, Paterson Road, Flat Road, Pitnacree Road, Melbourne Street, to the New England Highway) as shown on **Figure 1.1**.
- Construction and use of a new access road and bridge crossing from Dungog Road, over the North Coast Rail Line, to allow for all heavy vehicle movements via a new site access. The construction program is estimated to be completed within 50 weeks of obtaining relevant road and rail approvals for the works, which is expected to be by the end of Year 4 after the Revised Project has commenced following approval.
- Ongoing use of the existing site access via Station Street and Grace Avenue until the new access road is constructed. Thereafter Station Street will only be used for emergency access.
- Extension of the rail spur into part of the existing East Pit, to facilitate longer trains to transport more Quarry product.

- Road improvements at the Dungog Road/Gresford Road intersection, the King Street/Duke Street intersection (within the village of Paterson) and an upgrade to the Gostwyck Bridge approach.
- Additional noise mitigation works including new noise barriers and cladding of processing infrastructure to reduce noise and air emissions (refer to **Section 6.0**).
- Progressive rehabilitation of the site.

Table 2.1 provides a summary of the key Project changes since the original EIS was submitted.

Table 2.1 Key Project Parameters

Key Feature	Original Project (exhibited 2016)	Revised Project 2020
Extraction and transport limits		
Quarry operation approval term	30 years	25 years
Quarry extent	Proposed additional disturbance 38.8ha	Proposed additional disturbance area 22 ha – a reduction of 16.8 ha
Extraction limit	1.5 Mtpa	1.1 Mtpa
Road transport limit	Up to 1.45 Mtpa by road	Maximum 500,000 tpa by road
Rail transport limit	Up to 50,000 tpa by rail	Up to 600,000 tpa by rail. Subject to market requirements at a later date, Daracon may seek DPIE approval to increase the amount transported by rail, on a campaign basis.
Truck limits per day	Maximum 215 laden trucks per day	Maximum 140 laden trucks per day
Truck limits per hour	Maximum 40 laden trucks per hour	• Maximum of 20 loaded product trucks (40 movements) per hour between 7.00am and 3.00pm • Maximum of 15 loaded product trucks (30 movements) per hour between 3.00pm and 6.00pm
Hours of operation		
In pit quarry operations	6.00 am to 6.00 pm Monday to Saturday	7.00 am to 6.00 pm Monday to Saturday No in-pit mobile crushing in the West Pit
Evening/night crushing and processing activities	6.00 am to 10.00 pm	No operations during evening period (6.00 pm to 10.00 pm) No operations during night period (10.00 pm to 7.00 am) No crushing or processing prior to 7.00 am Monday to Saturday
Sales loading and stockpiling for road transport	5.30 am to 7.00 pm Monday to Saturday	No loading of product trucks prior to 7.00 am Monday to Friday No Quarry trucks through Paterson prior to 6.45 am Monday to Friday No road haulage of Quarry product on Saturday

Key Feature	Original Project (exhibited 2016)	Revised Project 2020
Loading and overnight parking	Loading and parking of trucks on site overnight	Provision for up to 10 unladen Daracon trucks (not contractors) to return to the Quarry between 6.00 pm and 7.00 pm Monday to Friday to park in the Quarry overnight and be loaded during this time in readiness for departure from 7.00 am the following morning. (Note: in the case of trucks loaded on Friday evening, departure will be no earlier than 7.00 am Monday morning.)
Train loading and rail transport	24 hours/7 days per week	No change
General maintenance and environmental management controls	Not specified	24 hours/7 days per week as required, including vehicles/trucks moving in and out of the site for maintenance purposes, as required

3.0 Assessment Methodology

3.1 Operational Noise Assessment

The NPfI documents the principles and approaches to be used to assess the noise from industrial noise sources scheduled under the *Protection of the Environment Operations Act 1997* (POEO Act). The process for applying the NPfI involves:

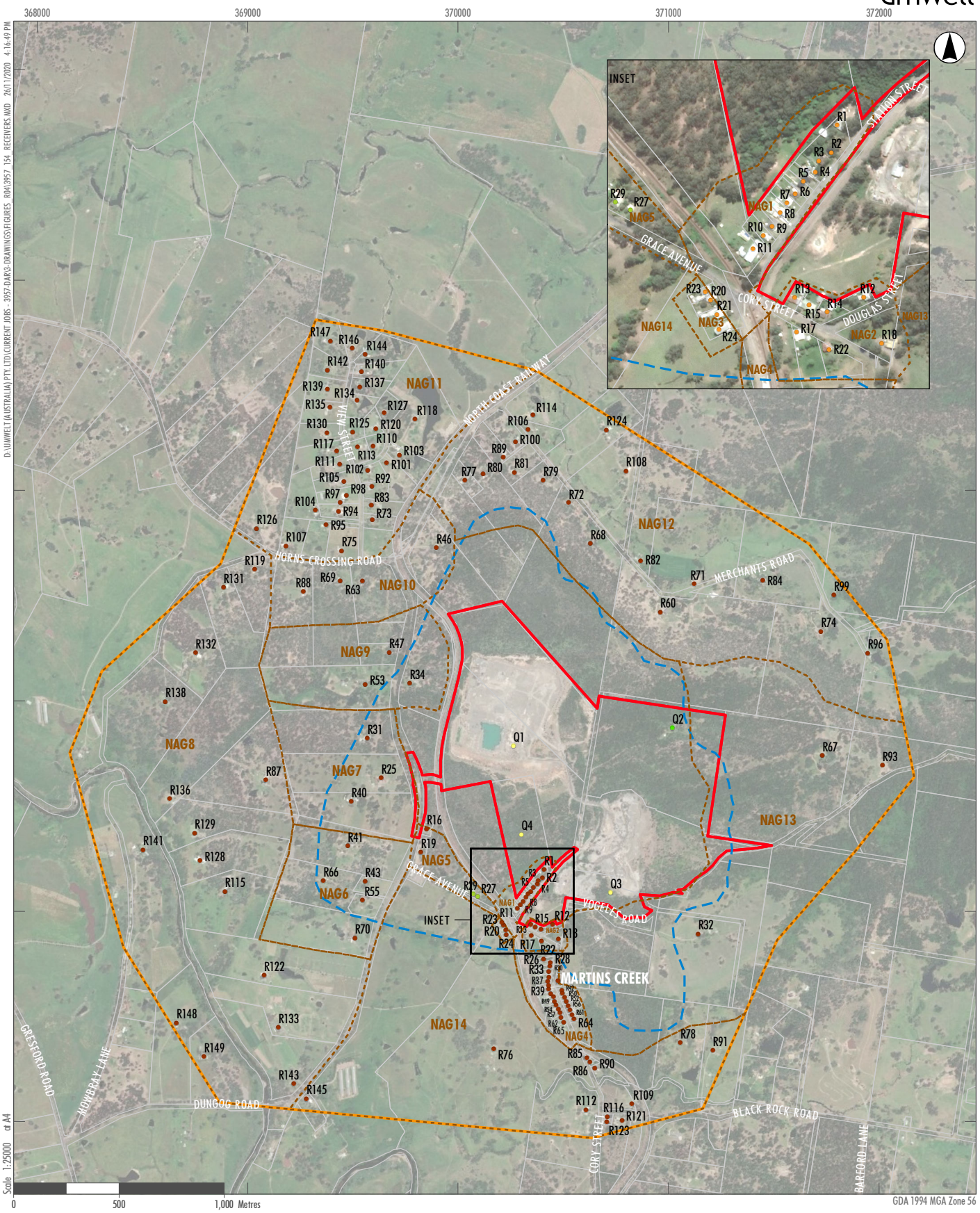
- Identifying potentially affected noise receivers.
- Establish relevant project noise trigger levels for each noise receiver being assessed. These are the benchmark levels above which noise management measures are required to be considered.
- Predict the noise levels produced by the source in question, having regard to meteorological effects such as wind and temperature inversions.
- Compare the measured/predicted noise level with the project noise trigger levels. Where the project noise trigger levels may be exceeded, feasible and reasonable noise mitigation strategies should be evaluated.
- Develop and refine achievable noise limits that will become goals for the site in consultation with the regulator and the community, considering technical practicalities, costs, time frames and environmental consequences of exceeding the project noise trigger levels.
- Monitor compliance with the noise reduction program, and review and amend the program as required.

The following sections summarise the assessment methodology for the operational noise assessment based on the above process.

3.1.1 Quarry Noise Receivers

A comprehensive review of land ownership and receiver locations was undertaken as part of the NIA process. The privately-owned residential receivers that could potentially be affected by noise from the Revised Project are shown on **Figure 3.1**. The description of the receiver areas used for modelling and allocation of Noise Assessment Groups (NAGs) is presented in **Table 3.1** and the NAGs are also shown on **Figure 3.1**.

The allocation of Noise Assessment Groups (NAGs) is based on the project noise trigger levels identified for individual receivers. The process for determining what project noise trigger levels apply to different receivers is discussed in **Sections 3.1.2** to **3.1.6** below.



Legend

- Project Area
- Noise Receiver Modelling Area
- Indicative Noise Management Zone
- Noise Assessment Groups

Modelled Noise Receivers

- Quarry General
- Quarry Receiver
- Proponent Owned/Managed
- Sensitive Receiver

Image Source: ESRI (2020) Data source: DSFI (2020)

FIGURE 3.1

Privately Owned Residential Receivers

Table 3.1 Receiver Areas and Noise Assessment Groups

Receiver Area	Description
NAG 1	Station Street – located immediately to the south-west of the processing plant area
NAG 2	The northern section of Cory Street and the western end of Douglas Steet – located immediately to the south of the processing plant area
NAG 3	Grace Avenue – located immediately to the south-west of the processing plant area on the western side of the North Coast Railway Line
NAG 4	The southern section of Cory Street to the south of the processing plant
NAG 5	Grace Avenue between Martins Creek and Dungog Road
NAG 6	West of Dungog Road to the south-west of the Revised Project
NAG 7	West of Dungog Road to the west of the Revised Project and immediately to the west of the proposed new access road
NAG 8	Mowbray Lane to the west of the Revised Project
NAG 9	West of Dungog Road immediately to the north-west of the quarry area
NAG 10	Horns Crossing Road the north-west of the quarry area
NAG 11	Vacy the north-west of the quarry area
NAG 12	Merchants Road to the north and north-east of the Revised Project
NAG 13	Vogeles Road to the east of the Revised Project
NAG 14	The area to the south of the Revised Project including Black Rock Road, Cook Street, and the area south of Grace Avenue east of Dungog Road

3.1.2 Establishing Project Noise Trigger Levels

The first step in the application of the NPfI involves determining the project noise trigger levels for the development. Project noise trigger levels are not limits but instead are triggers against which the impacts of a project can be assessed. Project noise trigger levels are based on the project intrusiveness noise level and project amenity noise level for a particular location as defined by the NPfI.

The project intrusiveness noise level protects against significant changes in noise levels and is established by reference to existing background noise levels. The project amenity noise level is set based on the approved use of the land and is designed to manage cumulative noise impacts from industry thereby protecting the amenity for particular land uses. As different areas within a landscape can have different approved land uses and different background noise conditions, different areas in the vicinity of a proposed development will generally have different project noise trigger levels.

In residential, rural and semi-rural areas such as that surrounding the Quarry, background noise levels are typically low. However, the project amenity noise levels are a function of the approved land use and independent of the existing acoustic environment. Generally speaking, in an area such as surrounds the Quarry the intrusiveness noise levels are usually lower than the project amenity noise level as defined by the NPfI.

For new developments, the project noise trigger level is the most stringent of the project intrusiveness noise level or project amenity noise level. The process for assessing changes to an existing development differs from new developments. Section 6 of the NPfI defines the process for assessing noise impacts associated with changes to existing operations and has the overall objective to improve the environmental performance of existing industrial sites. The assessment process outlined in Section 6 of the NPfI is based on the guiding principles of Section 45 of the POEO Act Part 3.1 which provides that consideration should be given to practical measures that could be taken ‘to prevent, control, abate or mitigate pollution’.

The Revised Project is a change to an existing operation and Section 6 of the NPfI provides the process for identifying project noise trigger levels for upgrades or expansion of an existing industrial site[1]:

> *For an industry that has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations.*

Section 3.1.3 outlines the project noise amenity levels applicable to the noise receivers identified in **Figure 3.1**. **Section 3.1.4** describes the project intrusive noise levels for the receivers based on the monitoring of the existing acoustic environment in the region surrounding the Quarry. The application of Section 6 of the NPfI for the setting of project noise trigger levels for the existing operation at the Quarry, is discussed in **Section 3.1.5. Section 3.1.6** summarises the resulting project noise trigger levels adopted for the assessment of operational noise impacts.

3.1.3 Project Amenity Noise Levels

The establishment of the project amenity noise levels is required for setting the project noise trigger levels. The project amenity noise levels are based on the recommended amenity noise levels applicable to each designated land use.

The area surrounding much of the Quarry is predominantly zoned RU1 Primary Production and is typical of a rural environment. The Vacy area to the northwest of the Quarry is zoned R5 – Large Residential, as is the area to the south of Martins Creek. The township of Martins Creek and the area immediately to the south (around Station Street, Grace Avenue, Vogeles Road and Cory Street) is zoned RU5 Village. Based on Table 2.3 of the NPfI, the following land use categories apply:

- Rural Residential land use category for the designated RU1/R5 land.
- Suburban Residential land use category for the designated RU5 land[2].

The project amenity noise level for industrial developments is nominally set at the recommended amenity noise level (NPfI Table 2.2) minus 5 dB. Exceptions to this method can be applied if the area is subject to high traffic noise levels, or forms part of a major industrial cluster, or is a region with high existing industrial noise levels, or no other industries are present in the area. As the Revised Project is the only industrial development in the region, the exception in the NPfI is applicable, and therefore the Project Amenity Noise Level can be set at the recommended amenity noise level.

The project amenity noise levels for all receivers surrounding the Quarry are provided in **Table 3.2**.

[1] If the upgrade or expansion of an existing industrial site involves a discrete process, the NPfI provides that a separate project noise trigger level for noise from new/modified components (not the whole site) of the operation can be established which is set at 10 dB or more below existing site noise levels or requirements. This scenario does not specifically apply to the Revised Project as the project components are integrated as part of a single operation and therefore this approach in Section 6 of the NPfI has not been adopted in this assessment.

[2] Receiver R11 is located on Lot 3 DP 242210. This lot is zoned RU1 however the residence itself is located immediately adjacent to other residences in Station Street and is part of the broader Martins Creek Village. This Receiver has therefore been assessed as a Suburban Residential Land Use for consistency with other receivers within the Martins Creek Village Area. It is noted that this characterisation does not affect the outcomes against the assessment of impacts on privately-owned land under the Voluntary Land Acquisition and Mitigation Policy (refer to **Section 3.7**).

Table 3.2 Project Amenity Noise Levels, dB(A)

Receiver/land use category	Time of day [1]	Recommended amenity noise level $L_{Aeq,period}$	Project amenity [2] noise level $L_{Aeq,period}$	Project amenity [3] noise level $L_{Aeq,15\ minute}$
Rural Residential	Day Period	50	50	53
	Evening Period	45	45	48
	Night Period	40	40	43
Suburban	Day	55	55	58
	Evening	45	45	48
	Night	40	40	43
School Classroom – Internal	Noisiest 1-hour period when in use	35 (internal) 45 (external)	35 (internal) 45 (external)	38 (internal) 48 (external)
Community Buildings - Active recreation area	When in use	55	55	58

Note: [1] Day period is 7.00 am-6.00 pm Monday-Saturday and 8.00 am-6.00 pm Sunday and Public Holidays, evening period is 6.00 pm-10.00 pm and night period is 10.00 pm to commencement of day period.

[2] The project amenity noise level is set at the recommended amenity noise level if the Revised Project is the only source of industrial noise in the region.

[3] The $L_{Aeq,period}$ project amenity noise level is represented as a 15-minute L_{Aeq} by the addition of 3 dB.

3.1.4 Project Intrusiveness Noise Levels

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source, measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.

The project intrusiveness noise level ($L_{Aeq,15minute}$) is defined as the rated background noise level (RBL) plus 5 decibels. The RBL is determined by measurement of the long-term background L_{A90} noise level and calculated in accordance with the NPfI Fact Sheets A and B.

Table 3.1 has grouped residences in the region surrounding the Revised Project into localities or areas, referred to as Noise Assessment Groups (NAGs), that have similar acoustic environments. These areas have been defined giving consideration to topographical features that may enhance or attenuate the transmission of noise, the relative location of other noise sources (such as rail and road traffic) and the relative location to the Revised Project. The RBLs for the Revised Project have been derived from noise loggers placed at four locations in the region surrounding the Quarry. The location of the noise loggers, monitoring period and the defined receiver areas they represent is provided in **Table 3.3**.

The analysis of the monitoring data and supporting attended monitoring results is presented in **Appendix 1**.

Table 3.3 Unattended Noise Monitoring Locations

ID	Address	Receiver Area	Monitoring Period
ML A	9 Station Street	NAG 1/2	02/07/2019-05/07/2019 10/07/2019-18/07/2019
ML B	16 Cory Street	NAG 3/4	01/07/2019-09/07/2019 10/07/2019-18/07/2019
ML C	253 Dungog Road	NAG 5/6/7/8	01/07/2019-09/07/2019 10/07/2019-15/07/2019
ML D	9 Horns Crossing Road	NAG 9/10/11	01/07/2019-09/07/2019 10/07/2019-17/07/2019

The monitoring data was filtered for appropriate meteorological conditions as per the procedures outlined in the NPfI Fact Sheet B to determine the RBLs. The first step of this procedure is to determine the Assessment Background Level (ABL) using the 10th percentile method for each period. The second step is to derive the Rating Background Level (RBL) as the median ABL value for each period. The derived project intrusiveness noise levels based on the RBLs are shown in **Table 3.4.**

Table 3.4 Derived Project Intrusiveness Noise Levels, $L_{Aeq\ 15\ minute}$, dB(A)

Unit ID/ Receiver Area	Rating Background Level			Project Intrusiveness Noise Level		
	Day [1]	Evening [1]	Night [1]	Day [1]	Evening [1]	Night [1]
ML A - NAG 1/2	36	31	30 (25) [3]	41	36	35
ML B – NAG 3/4	35 (32) [2]	30 (24)	30 (21) [3]	40	35	35
ML C – NAG 5/6/7/8	35 (30) [2]	30	30 (27) [3]	40	35	35
ML D – NAG 9/10/11	35 (34) [2]	30 (25) [3]	30 (22) [3]	40	35	35

Note: [1] Day period is 7.00 am-6.00 pm Monday-Saturday and 8.00 am-6.00 pm Sunday and Public Holidays, evening period is 6.00 pm-10.00 pm and night period is 10.00 pm to commencement of day period.

[2] Where the day RBLs are less than 35 dB(A) then RBL is set at 35 dB(A).

[3] Where the evening or night RBLs are less than 30 dB(A) then RBL is set at 30 dB(A).

For NAGs 12, 13 and 14 not covered in **Table 3.4** the approach taken is to use the default minimum rating background levels of 35 dB(A) day, 30 dB(A) evening and 30 dB(A) night. This results in project intrusiveness noise levels of 40 dB(A) day, 35 dB(A) evening and 35 dB(A) night.

3.1.5 Application of Section 6 of the NPfI

As an existing industrial site planning on upgrading and expanding the site, Section 6 of the NPfI has been considered in the setting of project noise trigger levels.

The noise levels from the existing operations are presented in **Appendix 2**. These are based on a combination of noise modelling and attended monitoring of operations identified as being covered by the existing development approval for the site (refer to **Section 1.2**). Detailed noise contours of day time impacts under NPfI assessed conditions are provided for NAGs 1, 2, 3 and 4. For dynamic operations with mobile noise sources the contours are a representation of what is happening when all the noise sources within the Project Area related to the development, including vehicles, are operating. As product haulage along Station Street and Grace Avenue occurs on public roads, the noise impacts associated with this haulage has not been considered as part of the noise impacts from existing operational noise (but is taken into account in the assessment of existing traffic noise).

Train movements on the rail siding associated with the loading of rail wagons are included as an industrial noise source in the assessment of the existing approved operations.

Based on the results of the noise modelling, the noise impacts from the existing approved operations are identified as being a primary contributor to existing background noise levels at receivers in NAGs 1, 2, 3 and 4. These modelled noise levels from the existing approved operations exceed the project amenity noise level during day time periods for some receivers in this area and the project intrusive noise level at most residences, particularly those in NAGs 1, 2 and 3.

It is proposed that the project noise trigger levels adopted for receivers in NAGs 1, 2, 3 and 4 are therefore established based on the guiding principles of Section 6 of the NPfI for existing industrial developments. The approach taken for setting the project noise triggers levels for receivers located in NAGs 1, 2, 3 and 4 is described below and shown conceptually in **Chart 3.1**.

It should be noted that **Chart 3.1** is conceptual only and does not reflect noise levels associated with either the Revised Project or the existing approved operations.

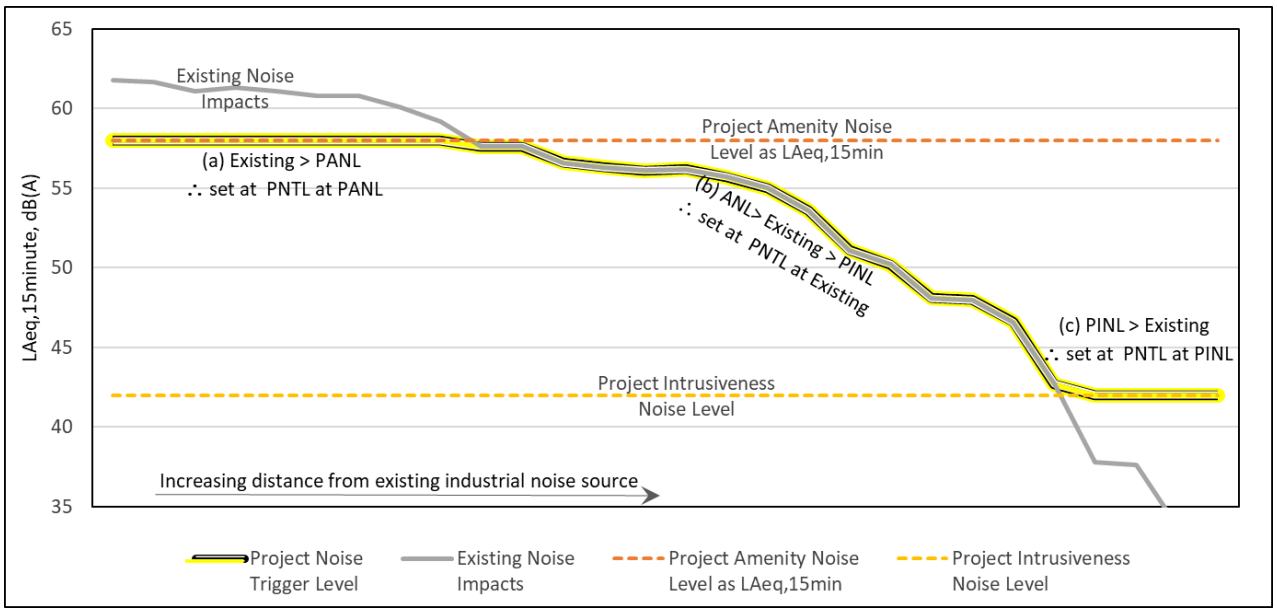


Chart 3.1 Application of NPfI Section 6 to an Existing Industrial Premise

Notes: (a) Where the noise level from the existing industrial noise source exceeds the relevant project amenity noise level (PANL), the project amenity noise level can be adopted as the project noise trigger level (PNTL). The LAeq,15minute project amenity noise level is represented as a 15-minute LAeq by the addition of 3dB to the period based project amenity noise.

(b) Where the noise level from an existing industrial source is less than the project amenity noise level (PANL) but greater than the project intrusiveness noise level (PINL), it is proposed the noise level from the existing industrial source is adopted as the project noise trigger level (PNTL).

(c) Where the project intrusiveness noise level (PINL) is greater than the noise level from the existing industrial source the project intrusiveness noise level is set as the project noise trigger level (PNTL) in accordance with the method described in Figure 1 of the NPfI.

Based on the application of the NPfI for the existing industry represented in **Chart 3.1,** the project noise triggers levels have been set for the existing components of the Revised Project (i.e. not the West Pit or new access road elements of the project) as follows:

- Where the noise levels from the existing processing plant area are above the relevant project amenity noise level, the project noise triggers levels will be set at the project amenity noise level. This is consistent with the approach described for receivers in Section (a) of **Chart 3.1**.
- Where the noise levels from the existing processing plant are below the project amenity noise level but above the project intrusiveness noise level, the project noise triggers levels will be set at the existing noise levels from the existing approved operations. This is consistent with the approach described for receivers in Section (b) of **Chart 3.1**.
- Where the noise levels from the existing processing plant are at or below the relevant project intrusiveness noise level, the project noise triggers levels will be set at the project intrusiveness noise level. This is consistent with the approach described for receivers in Section (c) of **Chart 3.1** which is consistent with the process outlined for new developments described in Section 2 of the NPfI.

The project amenity noise levels for NAGs 1, 2, 3 and 4 are the recommended amenity noise levels for the Suburban Residential land use category. The relevant project amenity noise levels are presented in **Section 3.1.3**.

The project intrusiveness noise levels are based on the measurement of the existing acoustic environment. The relevant project intrusiveness noise levels are presented in **Section 3.1.4**.

Appendix 2 sets out the derived project noise trigger levels for each of the receivers in NAGs 1, 2 3 and 4 based on the noise levels from the existing approved operations. It is noted that the process outlined in Section 6 of the NPfI only applies to the day time operating conditions as the existing approved operations are not predicted to exceed the relevant project amenity noise criteria during the evening or night-time periods. The project noise trigger levels for each receiver within each NAG, including the adopted project noise trigger levels for NAGs 1, 2 3 and 4 are discussed in the following section.

3.1.6 Project Noise Trigger Levels

The project noise trigger level provides a benchmark or objective for assessing a proposal or site and is not intended for use as a mandatory requirement (NPfI, 2017). The project noise trigger level, if exceeded, indicates a potential noise impact on the community and so triggers a management response e.g. further investigation of mitigation measures.

The project noise trigger levels for each NAG are shown in **Table 3.5.** The project noise trigger levels for the non-residential receivers are shown in **Table 3.6**. The project noise trigger levels for each receiver within each NAG is presented in **Appendix 3**.

Table 3.5 Project Noise Trigger Levels – Residential Receivers

Receiver Area	Period	Intrusiveness Noise Level [1] $L_{Aeq,15min}$ dB(A)	Amenity Noise Level [2] $L_{Aeq,period}$ dB(A)	Project Noise Trigger Level [3] $L_{Aeq,15min}$ dB(A)
NAG 1/2	Day	**Derived for each property in Appendix 2**		
	Evening	36	48	**36**
	Night	35	43	**35**
NAG 3/4	Day	**Derived for each property in Appendix 2**		
	Evening	35	48	**35**
	Night	35	43	**35**
NAG 5/6/7/8	Day	40	53	**40**
	Evening	35	48	**35**
	Night	35	43	**35**
NAG 9/10/11	Day	40	53	**40**
	Evening	35	48	**35**
	Night	35	43	**35**
NAG 12/13/14	Day	40	53	**40**
	Evening	35	48	**35**
	Night	35	43	**35**

Notes: [1] The intrusiveness noise levels are based on the minimum assumed RBLs from the NPfI plus 5 dB.

[2] The amenity noise levels are based on the recommended amenity noise levels for rural residential (RU1/R5) and suburban residential (RU5) areas from Table 2.2 of the NPfI plus 3 dB to convert from a period level to a 15-minute level.

[3] The project noise trigger levels are the most stringent value of the intrusiveness and amenity noise levels.

Table 3.6 Project Noise Trigger Levels For Non-Residential Receivers, $L_{Aeq,15minute}$ dB(A)

Receiver Area/ID	Period	Amenity Noise Level $L_{Aeq,period}$ dB(A)	Project Noise Trigger Level $L_{Aeq,15min}$ dB(A)
NAG 2 Martins Creek Fire Shed	Day	55	58
	Evening	55	58
	Night	55	58
NAG 4 Martins Creek Community Hall	Day	55	58
	Evening	55	58
	Night	55	58
NAG14 Martins Creek School	Day	45	48
	Evening	45	48
	Night	45	48

The Revised Project includes the loading of up to 10 road trucks during the evening shoulder period from 6:00 pm to 7:00 pm Monday to Friday. The NPfI allows for the negotiation of appropriate PNTLs with the regulatory/consent authority where operations outside of daytime hours can be justified. The use of the evening shoulder period will offset the proposed change in the currently approved morning start time of 6:00 am to the new start time of 7:00 am. It is proposed the trucks would be loaded in the evening with a product that can stand in the trucks overnight. This would only occur when there is an order for the product. This will streamline the morning activities following the loss of the 6:00 am to 7:00 am operational window that would have included the loading of the trucks. The evening loading of up to 10 road trucks will minimise community impacts by providing a viable alternative to truck loading and transport in the early morning during the relinquished 6:00 am to 7:00 am operational window. The PNTLs for the evening shoulder period between 6:00 pm and 7:00 pm Monday to Friday are proposed to be set at 38 dB(A) for NAGs 1 and 2; midway between the project intrusiveness noise level in **Table 3.4** of 41 dB(A) and the evening PNTL in **Table 3.4** of 36 dB(A). The PNTLs for the evening shoulder period for NAGs 3 to 14 are proposed to be set at 37 dB(A); midway between the project intrusiveness noise levels in **Table 3.4** of 40 dB(A) and the evening PNTLs in **Table 3.5** of 35 dB(A).

3.1.7 Correction Factors

Where a noise source contains characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. Conversely, some noise sources may cause less annoyance where only a single event occurs for a limited duration.

Fact Sheet C of the NPfI outlines how correction factors should be applied to source noise levels at the receiver before comparison with the respective project noise trigger levels. These correction factors account for the additional annoyance caused by the factors that modify the noise.

The assessment of modifying factors and application of correction factors for annoying noise characteristics are discussed in **Section 5**.

3.2 Maximum Noise Level Event (Sleep Disturbance) Criteria

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. According to the NPfI, where the development's night-time noise levels at a residential location exceed:

- $L_{Aeq,15minute}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater; and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

The sleep disturbance noise goal for each defined receiver area is provided in **Table 3.7** and for individual receivers in **Appendix 3**. The assessment of maximum noise level events is discussed in **Section 5**.

Table 3.7 Sleep Disturbance Noise Goal For Residential Receiver Areas, $L_{Aeq,15minute}$ and L_{AFmax} dB(A)

Receiver Area	Sleep Disturbance Noise Goal			
	$L_{Aeq,15minute}$		L_{AFmax}	
	RBL +5	Max 40 or RBL + 5	RBL + 15	Max 52 or RBL + 15
NAG 1/2	35	40	45	52
NAG 3/4	35	40	45	52
NAG 5/6/7/8	35	40	45	52
NAG 9/10/11	35	40	45	52
NAG 12/13/14	35	40	45	52

3.3 Cumulative Noise Criteria

The NIA does not need to consider cumulative operational noise impacts as there are no other industries present in the locality, or likely to be introduced into the locality in the future. The nearest quarry is Brandy Hill Quarry, located approximately 20 km southeast from Martins Creek Quarry.

Additionally, the recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location. Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future, the recommended amenity noise level (from Table 2.2 of the NPfI) is assigned as the project amenity noise level. This is the case for the Revised Project as the quarry is the only industrial noise source in the area.

3.4 Construction Noise Criteria

As described in **Section 2.0**, the Revised Project will require construction activities. Construction activities will generally be undertaken within standard construction hours (7:00 am to 6:00 pm Monday to Friday, 8:00 am to 1:00 pm Saturday). However, work would likely be required outside of standard hours for the construction of the new access road to meet ARTC requirements for track possession.

The EPA recognises that construction activities could potentially generate higher noise levels than those of an industrial operation. The ICNG provides noise management criteria for construction activities. The criteria are intended to guide the need for, and the selection of, feasible and reasonable work practices to minimise construction noise impacts.

The ICNG notes that a residential receiver is 'noise affected' if the $L_{Aeq,15minute}$ construction noise level exceeds the rating background noise level by more than 10 dB during recommended standard hours. A residential receiver is 'highly noise affected' if the $L_{Aeq,15minute}$ construction noise level exceeds 75 dB(A).

Outside recommended standard hours a residential area is 'noise affected' if the $L_{Aeq,15minute}$ construction noise level exceeds the rating background noise level by more than 5 dB.

The construction noise goals goal for each defined receiver area is provided in **Table 3.8** and for individual receivers in **Appendix 3**. The assessment of construction noise levels is discussed in **Section 5**.

Table 3.8 Construction Noise Management Levels For Residential Receivers

Receiver Area	RBL Day/Evening/Night	Recommended [1] Standard Hours, RBL + 10	Outside recommended standard hours RBL + 5
NAG 1/2	36/31/30	46	36/35
NAG 3/4	35/30/30	45	35
NAG 5/6/7/8	35/30/30	45	35
NAG 9/10/11	35/30/30	45	35
NAG 12/13/14	35/30/30	45	35

Notes: [1] Recommended Standard Hours: Monday to Friday 7.00 am - 6.00 pm; Saturday 8.00 am - 1.00 pm; No work on Sundays or Public Holidays.

[2] Evening and night.

The ICNG noise management levels for sensitive land uses (other than residences) are shown in **Table 3.9**.

Table 3.9 ICNG Noise Management Levels For Sensitive Land Uses (Other Than Residences)

Land use	Management level, $L_{Aeq(15min)}$ (applies when properties are being used)
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Active recreation	External noise level 65 dB(A)
Passive recreation	External noise level 60 dB(A)
Community centres	Depends on the internal use of the centre. Refer to the recommended 'maximum' internal noise levels in AS2107 for specific uses.

3.5 Rail Noise Criteria

3.5.1 Non-network Rail Line

Two components of non-network rail-related activities need to be considered in the NIA.

The first is the industrial activities associated with the rolling stock on the rail spur within the East Pit processing area. The existing railing loading activities use the section of track opposite the Station Street receivers to shunt wagons during the loading process. The Revised Project will extend the rail spur into the East Pit processing area to remove the industrial activities from the section of track opposite the Station Street receivers. Within the East Pit processing area, the movement of rolling stock on the rail spur forms part of the industrial development and is assessed as part of the industrial premises using the NPfI. This includes all activities associated with the rail spur such as rail loading, wagon shunting and idling locomotives.

The second is the movement of rolling stock beyond the boundary of the industrial complex on a non-network rail line (the rail spur) that is used exclusively to service an industrial site. The Revised Project will extend the rail spur to move the rail loading and wagon shunting activities into the northern section of the East Pit processing area. This will move the locomotives off the section of the rail spur line opposite the Station Street receivers except when the trains enter and leave the premises.

The noise from the section of track opposite the Station Street receivers is assessed against the recommended acceptable LAeq noise levels in Appendix 3 of the RING for non-network rail lines (the relevant section of the RING is reproduced in **Table 3.10**).

Table 3.10 Recommended Noise Level from Non-network Rail Lines Servicing an Industrial Site, dB(A)

Receiver/land use category	Time of day [1]	Amenity LAeq Noise Level from Non-network Rail LIne, LAeq,period		Pass-by noise level [2], LAmax, 95th%ile
		Acceptable	Recommended Maximum	
Suburban	Day	55	60	85
	Evening	45	50	85
	Night	40	45	85
Community Buildings - Active recreation area	When in use	55	55	85

Note: [1] Day period is 7.00 am-6.00 pm Monday-Saturday and 8.00 am-6.00 pm Sunday and Public Holidays, evening period is 6.00 pm-10.00 pm and night period is 10.00 pm to commencement of day period.

[2] Based on the technical note 10 under tables 1, 2 and 3 of the RING

3.5.2 Network Rail Line

Noise emissions from the North Coast Line and the Main Northern Rail Line are regulated via ARTC's EPL (EPL 3142). Section L2 of EPL 3142 does not nominate specific environmental noise limits but notes that:

> *It is an objective of this Licence to progressively reduce noise impacts from railways systems activities to the noise level goals of 65 dB(A) Leq,(day and evening time from 7am – 10pm), 60 dB(A) Leq,(night time from 10pm – 7am) and 85dB(A) (24 hr) max pass-by noise, at one metre from the facade of affected residential properties.*

Appendix 2 of the RING specifies similar rail noise assessment trigger levels for rail traffic generating developments (the relevant section of the RING is reproduced in **Table 3.11**).

Table 3.11 Noise Criteria for Rail Traffic due to the Project, dB(A)

Type of Development	Noise trigger levels dB(A) External [1]	
	Day (7 am - 10 pm)	Night (10 pm - 7 am)
Rail traffic-generating development	Development increases existing LAeq, period rail noise levels by greater than 0.5 dB and predicted rail noise levels exceed:	
	65 LAeq, day-time 15 hour OR 85 LAmax (95th%ile)	60 LAeq, night-time 9 hour OR 85 LAmax (95th%ile)

Source: Rail Infrastructure Noise Guideline (EPA 2013)

Notes: [1] Refer to RING technical notes for further definition of terms

3.6 Road Traffic Noise Assessment

3.6.1 Road Traffic Noise Receivers

The proposed primary road haul route from the Revised Project to Melbourne Street, East Maitland has been divided into five (5) zones base on the road characteristics and commuter use. These zones were used to calculate the road traffic noise levels with and without quarry trucks based on existing traffic flow rates and speed zones. The five (5) zones of the proposed primary road haul route are shown on **Figure 3.2** and described in **Table 3.12**.

Table 3.12 Traffic Count Locations

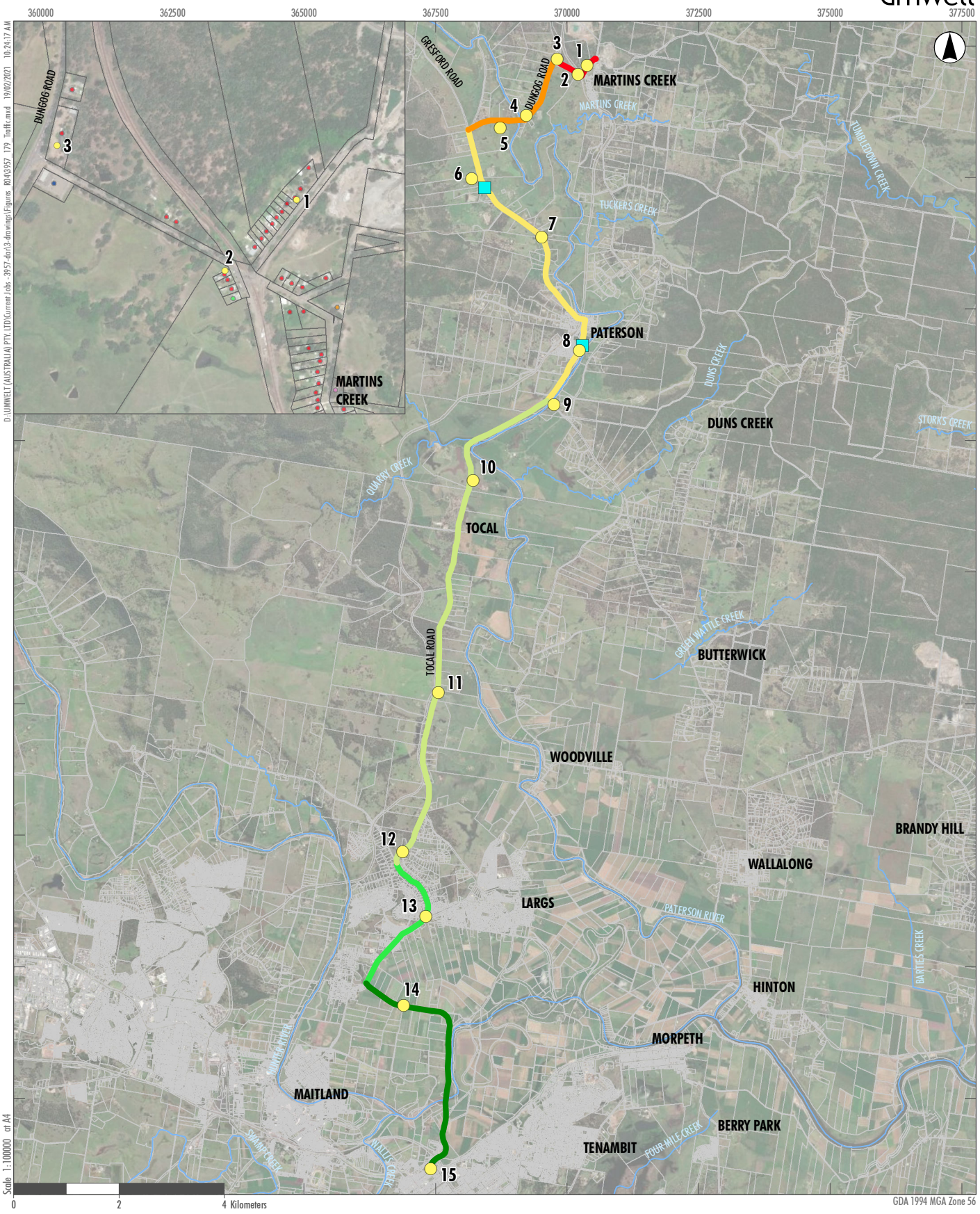
Traffic count number	Zone number	Description
Location 1	Zone 1	Dungog Road, between Grace Avenue and Gresford Road
Location 2	Zone 2	Gresford Road, between Dungog Road and Paterson Township (Tocal Road)
Location 3	Zone 3	Tocal Road, between Paterson township and Bolwarra Heights
Location 4	Zone 4	Paterson Road, between Bolwarra Heights and Flat Road
Location 5	Zone 5	Flat Road / Glenarvon Road / Pitnacree Road

Traffic counts were undertaken in each of the five (5) zones in April to May 2018 by Seca Solutions. Two noise loggers were also deployed along Gresford Road and Maitland Road, Paterson between 11 May and 18 May 2018 to record the road traffic noise levels. The results from both monitoring programs are presented in **Appendix 9**.

The road traffic noise assessment also investigated the reduction in road traffic noise on Station Street and Grace Avenue (referred to as Zone 0 in **Figure 3.2**) following the completion of the new access road to Dungog Road. Quarry truck movements have historically constituted the dominant road noise source on Station Street and Grace Avenue due to the generally low levels of non-quarry related traffic. Existing approved quarry truck movements were used to calculate the reduction in road traffic noise levels for receivers on Station Street and Grace Avenue when quarry trucks commence using the new access road to Dungog Road.

Receivers along the proposed road haul route were selected to assess the impact of proposed truck movements generated by the Revised Project. The nearest residential receivers in each speed limit area in each of the five zones were included in the assessment. Sensitive receivers, as defined in the RNP, were also identified along the route and included in this assessment. The location of loggers installed to measure road traffic noise levels were also assessed as receivers, to validate the modelling methodology.

The road traffic noise receivers included in this assessment are shown on **Figure 3.2** and described in **Table 3.13**.



Legend

- Residential Receivers
- Noise Logging Locations
- Cadastre
- Drainage Line

Zones

- Zone 0
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 5

Residence

- Commercial
- Martins Creek Community Hall
- Martins Creek Rural Fire Brigade
- Private

FIGURE 3.2

Road Traffic Measurement and Noise Assessment Locations

Image Source: ESRI (2020) Data source: DFSI (2020)

Table 3.13 Road Traffic Noise Receivers

Receiver	Description	Zone	Speed zone (km/hr)	Setback to edge of road (m)
Noise Measurement Location 1	Traffic Noise Measurement - 341 Gresford Road, Paterson	2	80	13
Noise Measurement Location 2	Traffic Noise Measurement - 35 Maitland Road, Paterson	2	50/40 [1]	12
Nearest Receiver 1	Nearest receiver for this zone and speed limit	0	20 [2]	10
Nearest Receiver 2	Nearest receiver for this zone and speed limit	0	50	10
Nearest Receiver 3	Nearest receiver for this zone and speed limit	0	80	47
Nearest Receiver 4	Nearest receiver for this zone and speed limit	1	40	35
Nearest Receiver 5	Nearest receiver for this zone and speed limit	1	80	143
Nearest Receiver 6	Nearest receiver for this zone and speed limit	2	100	163
Nearest Receiver 7	Nearest receiver for this zone and speed limit	2	80	8
Nearest Receiver 8	Nearest receiver for this zone and speed limit	2	50/40[1]	3
Nearest Receiver 9	Nearest receiver for this zone and speed limit	3	100	156
Nearest Receiver 10	Nearest receiver for this zone and speed limit	3	80	51
Nearest Receiver 11	Nearest receiver for this zone and speed limit	3	100	23
Nearest Receiver 12	Nearest receiver for this zone and speed limit	3	80	36
Nearest Receiver 13	Nearest receiver for this zone and speed limit	4	60	3
Nearest Receiver 14	Nearest receiver for this zone and speed limit	4	60	20
Nearest Receiver 15	Nearest receiver for this zone and speed limit	5	60	16
Sensitive Receiver 1	Church (Duke Street, Paterson)	2	50/40[1]	24
Sensitive Receiver 2	John Tucker Park, Paterson	2	50/40[1]	2
Sensitive Receiver 3	Tillys Play and Development Centre, Bolwarra	4	50/40[1]	19
Sensitive Receiver 4	Allan Fairhall Reserve, Paterson	2	50/40[1]	12
Sensitive Receiver 5	Tocal College, Tocal	3	80	27
Sensitive Receiver 6	Tocal Homestead, Tocal	3	100	310
Sensitive Receiver 7	Church (King Street, Paterson)	2	50/40[1]	2
Sensitive Receiver 8	Kings Wharf Park, Paterson	2	50/40[1]	2

Notes: [1] Quarry trucks assessed as travelling through Paterson at 40 km/hr, and all other traffic assessed as travelling at 50 km/hr

[2] Quarry trucks assessed as travelling on Station Street at 20 km/hr

3.6.2 Road Traffic Noise Criteria

The EPA's *NSW Road Noise Policy* (RNP) (DECCW, 2011) sets out criteria for road traffic noise through the provision of a framework that addresses traffic noise issues associated with new developments, new or upgraded road developments, or planned building developments.

During the early stages of the Revised Project, before the new access road to Dungog Road is constructed, the primary access to and from Dungog Road to the Quarry will continue to be along Station Street and Grace Avenue. Following the completion of the new access road, the primary road haul route to and from the Quarry will be Dungog Road, Gresford Road to Paterson township, Tocal Road to Bolwarra Heights, Paterson Road between Bolwarra Heights and Flat Road, Glenarvon Road and Pitnacree Road to Melbourne Street, East Maitland. **Table 3.14** outlines the road traffic noise criteria for the Revised Project for residential land uses along the primary road haul route. Under the road category definitions provided in Table 2 of the RNP, Dungog Road is considered as an arterial road while Station Street and Grace Avenue are considered as local roads.

Table 3.14 Road Traffic Noise Assessment Criteria For Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria dB(A)	
		Day 7am to 10pm	Night 10pm to 7am
Freeway/arterial/ sub-arterial road	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq, (15\ hour)}$ 60 (external)	$L_{Aeq, (9\ hour)}$ 55 (external)
Local road	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)

Source: NSW Road Noise Policy (DECCW 2011)

Table 3.15 outlines the road traffic noise criteria for the Revised Project for non-residential land uses along the primary road haul route.

Section 3.4 of the RNP notes that where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, the RNP considers an increase of up to 2 dB as a minor impact that is barely perceptible to the average person.

Table 3.15 Road Traffic Noise Assessment Criteria For Non-residential Land Uses

Existing sensitive land use	Assessment Criteria dB(A)		Additional considerations
	Day 7am to 10pm	Night 10pm to 7am	
1. School classrooms	$L_{Aeq, (1\ hour)}$ 40 (internal) when in use	-	In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the 'maximum' levels shown in Australian Standard 2107:2000 (Standards Australia, 2000).
3. Places of worship	$L_{Aeq, (1\ hour)}$ 40 (internal)	$L_{Aeq, (1\ hour)}$ 40 (internal)	The criteria are internal, i.e. the inside of a church. Areas outside the place of worship, such as a churchyard or cemetery, may also be a place of worship. Therefore, in determining appropriate criteria for such external areas, it should be established what in these areas may be affected by road traffic noise. For example, if there is a church car park between a church and the road, compliance with the internal criteria inside the church may be sufficient. If, however, there are areas between the church and the road where outdoor services may take place such as weddings and funerals, external criteria for these areas are appropriate. As issues such as speech intelligibility may be a consideration in these cases, the passive recreation criteria (see point 5) may be applied.
5. Open space (passive use)	$L_{Aeq, (15\ hour)}$ 55 (external) when in use	-	
8. Child care facilities	Sleeping rooms $L_{Aeq, (1\ hour)}$ 35 (internal) Indoor play areas $L_{Aeq, (1\ hour)}$ 40 (internal) Outdoor play areas $L_{Aeq, (1\ hour)}$ 55 (external)	-	Multi-purpose spaces, e.g. shared indoor play/sleeping rooms should meet the lower of the respective criteria. Measurements for sleeping rooms should be taken during designated sleeping times for the facility, or if these are not known, during the highest hourly traffic noise level during the opening hours of the facility.

Source: NSW Road Noise Policy (DECCW 2011)

3.7 Voluntary Land Acquisition and Mitigation Policy Criteria

In September 2018, the NSW government published the revised *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (NSW Government, 2018) (VLAMP). This document describes the NSW Government's policy for voluntary mitigation and land acquisition to address noise impacts from state significant mining, petroleum and extractive industry developments.

A consent authority can apply voluntary mitigation and voluntary land acquisition rights to reduce operational noise impacts of a development on privately-owned land and rail noise impacts of a development on privately owned land near a non-network rail line that is on, or exclusively servicing, an industrial site. The VLAMP does not apply to construction noise impacts, or noise impacts from public roads or the rail network.

Additionally, the VLAMP does not apply to the 'modification' of existing developments with legacy noise issues, where the modification would have beneficial or negligible noise impacts'. This does not preclude noise issues from an existing development being addressed through site-specific pollution reduction programs.

Where the noise impacts cannot achieve the project trigger noise levels, both the NPfI and VLAMP provide guidelines for the assessment of the residual noise impacts. It should be noted that the method of assessing residual noise impact differs slightly between the NPfI and the VLAMP. Both assessment tables are reproduced below as **Table 3.16** and **Table 3.17**.

Table 3.16 Significance of Residual Noise Impacts – NPfI

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Then the significance of residual noise level is:
≤ 2 dB(A)	Not applicable	**Negligible**
≥ 3 but ≤ 5 dB(A)	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	**Marginal**
≥ 3 but ≤ 5 dB(A)	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	**Moderate**
> 5 dB(A)	≤ recommended amenity noise level	**Moderate**
> 5 dB(A)	> recommended amenity noise level	**Significant**

Source: NPfI, Table 4.1 (EPA, 2017)

The NPfI notes that guidance contained in **Table 3.16** is designed for new and substantially-modified developments and should not be routinely applied to existing situations without proper consideration of the specific circumstances, that is, within the context of what is achievable and feasible. It is also noted that **Table 3.16** does not cover all permutations of the residual noise level when assessing the noise impacts from a modification to an existing development.

Table 3.17 Characterisation of Noise Impacts – VLAMP

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Characterisation of impacts:	Potential treatment:
All time periods **0-2 dB(A)**	Not applicable	Impacts are considered to be **negligible**	The exceedances would not be discernible by the average listener and therefore would not warrant receiver based treatments or controls
All time periods **3-5 dB(A)**	≤ recommended amenity noise levels in Table 2.2 of the NPfI; or > recommended amenity noise levels in Table 2.2 of the NPfI, but the increase in total cumulative industrial noise level resulting from the development is ≤ 1 dB	Impacts are considered to be **marginal**	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity
All time periods **3-5 dB(A)**	> recommended amenity noise level in Table 2.2 of the NPfI, and the increase in total cumulative industrial noise level resulting from the development is > 1 dB	Impacts are considered to be **moderate**	As for marginal impacts but also upgraded façade elements like windows, doors or roof insulation, to further increase the ability of the building façade to reduce noise levels
Day and evening **>5 dB(A)**	≤ recommended amenity noise levels in Table 2.2 of the NPfI	Impacts are considered to be **moderate**	As for marginal impacts but also upgraded façade elements like windows, doors or roof insulation, to further increase the ability of the building façade to reduce noise levels
Day and evening **>5 dB(A)**	> recommended amenity noise levels in Table 2.2 of the NPfI	Impacts are considered to be **significant**	Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above
Night **>5 dB(A)**	Not applicable	Impacts are considered to be **significant**	Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above

Source: Table 1 of VLAMP, NSW Government 2018

4.0 Noise Prediction

4.1 Model Parameters

The computer-based modelling software package Environmental Noise Model (ENM), developed by RTA Technology Pty Ltd, was used to predict the noise levels produced by the Project within the surrounding environment. ENM is recognised and accepted by the EPA as a computer modelling program suited to predicting noise impacts from industrial noise sources.

The software utilises terrain data, source and receptor locations and heights, source sound power levels and input meteorological conditions to predict noise levels. The software accounts for ground effects, geometric spreading, air absorption, acoustic shielding and meteorological enhancement in its predictions. The ENM noise models were based on machine and plant sound power level (SWL) data provided by the proponent or collected by Umwelt from the existing quarry operations; digital terrain maps of the region surrounding the Project Area prepared by Umwelt; and quarry plans provided by the proponent, which include the number and type of machines and representative positioning based on each quarry plan. The noise modelling process incorporated several internal haul route variants for each stage (see **Section 4.3.1**), based on the proposed work areas identified on the stage plans. Each haul route variant was modelled independently.

The details of the noise sources modelled within each quarry plans are presented in **Appendix 4**.

4.2 Incorporated Noise Control Measures

Daracon has committed to a comprehensive suite of noise control measures to minimise noise emissions. The noise control measures have been incorporated into the modelling process.

Throughout the development of the conceptual quarry plan, an iterative noise modelling process has been used to identify, design and optimise the operational and engineered noise controls that can be implemented. This process was undertaken to inform the operational constraints to the Revised Project that may be required for each quarry stage to meet noise criteria. This process included revisions to the quarry progression and processing plant area including:

- optimisation of pit geometry and sequencing to enable placement of quarrying equipment lower in the landscape (thus in more shielded locations) during adverse meteorological conditions
- redesign of the East Pit (processing plant area) to incorporate a noise bund and walls
- the extension of the rail spur to move loading operations further from receivers and remove the industrial activities from the section of track opposite the Station Street receivers
- detailed review of production planning and sequencing to enable the incorporation of required operational controls (such as slow-down in quarry progression, provision of lower shielded areas and, where required, selective equipment shutdowns) during periods of adverse weather conditions.

In addition to the design controls above, the following feasible controls (illustrated on **Figure 4.1**) have been committed to as reasonable by Daracon for the life of the Revised Project.

Physical noise control measures:

- 4-metre noise barrier adjacent to the ROM dump hopper pad and part of the internal haul road between the West Pit and East Pit
- noise barrier adjacent to the primary crusher and primary feed bin
- noise attenuation of the primary surge bin
- 8-metre noise barrier around the southern boundary of the existing East Pit processing plant area to overlap an augmented landform adjacent the existing wheel wash bay
- new cladding of the secondary screen and crusher building including a mass layer for the roof, northern, southern and western walls. Additionally, cladding of the existing open areas at the base of the building for the northern, western and southern facades
- attenuated replacement of the tertiary crusher and tertiary surge bin
- 3-metre noise barrier along the southern boundary of the Southern Stockpile Area
- installation of a fence between the western boundary of the Southern Stockpile Area and adjacent rail siding. The existing section of the fence and proposed fence were not incorporated into the noise model.

Operational noise control measures:

- no in-pit mobile crushing in the West Pit (Lots 5 and 6 DP 242210)
- use of three new smaller quieter trucks operating in the West Pit
- rail spur extension within the northern end of the East Pit, approximately 10 metres below the current ground level and relocation of the train loading activities to the northern end of the rail spur
- construction of a dedicated access road onto Dungog Road removing trucks off Station Street (except for emergency purposes), following DSC and ARTC approval for detailed design plans and construction of a new rail crossing. The access road will be commissioned as early as possible, and by the end of Year 4, from project approval.

Additionally, reasonable and feasible noise attenuation measures consistent with current best practice have been incorporated into key items of plant and equipment and the day to day operation of the Quarry. This includes upgrading exhaust systems on mobile equipment, stockpile orientation, internal road maintenance, the management of the raw rock loading into haul truck bodies, reversing beepers and truck parking areas. Where relevant, these measures have been incorporated into the noise models.

Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 50 100 150m
1:3 000

Legend

- Project Area
- New Cladding to Roof and Walls
- Proposed Noise Bund (3m High)
- Proposed Concrete Wall (8m High)
- Proposed Concrete Wall (4m High)
- Proposed Earth Barrier
- Proposed Fence (4m High)

FIGURE 4.1

Proposed Physical Noise Control Measures

File Name (A4): R04/3957_182.dgn
20210219 9.43

4.3 Operational Noise Models

4.3.1 Quarry Stages and Extraction Progression

The assessment has been undertaken by modelling a scenario representative of reasonable worst-case noise emissions from quarry operations during five stages: Years 2, 6, 10, 15 and 20. Noise predictions were undertaken for the day, evening and night periods and incorporated the noise control and mitigation measures committed to by Daracon as described above in **Section 4.2.**

Descriptions of the modelled scenarios for each stage are provided below. The conceptual quarry stage plans for Years 2, 6, 10, 15 and 20 represent indicative key features of the proposed progression of the extraction area.

4.3.1.1 Stage 1 (Until the end of Year 2)

From project approval, until the end of Year 2, it is expected that quarrying will occur in the West Pit primarily along the eastern boundary (**Figure 4.2**). During this time, excavation work and quarrying will also commence in the East Pit in preparation for the construction of the rail spur extension, including a bench for trucks and excavators to traverse to load the rail wagons.

Rehabilitation will occur in a section of the West Pit where the proposed quarry floor has been reached, and along the top of the bench constructed in the East Pit.

Clearing vegetation to commence construction of the new quarry access road will also occur in Stage 1, as shown on **Figure 4.2**.

To reduce potential noise emissions, the following noise control measures will be constructed in the Processing Area, Southern Stockpile Area and along the haul road between the East and West Pits during Stage 1 of the Revised Project:

- 4-metre noise barrier adjacent to the primary dump hopper
- noise barrier along part of the internal haul road between the West Pit and East Pit
- noise barrier adjacent to the primary crusher
- noise attenuation of the primary surge bin
- 8-metre noise barrier around the northern boundary of the Southern Stockpile Area to overlap an augmented landform adjacent to the existing wheel wash
- 3-metre noise barrier around the southern boundary of the Southern Stockpile Area
- installation of a fence between the western boundary of the southern stockpile area and adjacent to the rail siding.

Stage 1 is modelled as Year 2 of the operation and considers two primary operational scenarios: one with and one without the existing rail loading facility operating. The source locations within the Year 2 quarry plan are presented in **Appendix 4**.

4.3.1.2 Stage 2 (Years 3 to 6)

During Years 3 to 6, quarrying will continue to progress inwards from the eastern boundary of the West Pit, as well as further south, including into some of the previously temporarily rehabilitated land. The lateral extent of the other previously quarried areas of the West Pit is not planned to increase during this time. However, quarrying will be undertaken deeper within the centre of the West Pit (**Figure 4.3**).

Rehabilitation will occur along the outer edge of the area on the eastern boundary of the West Pit and the first bench on the western edge of the West Pit.

Stage 2 is modelled as Year 6 of the operation and includes rail wagon loading on the new rail spur extension, decommissioning of the existing rail loading facility and use of the new access road through Lot 5 to Dungog Road. The source locations within the Year 6 quarry plan are presented in **Appendix 4**.

It is noted that the use of the new access road directly onto Dungog Road will replace haulage related impacts to residences along Station Street and Grace Avenue. This change brings the assessment of noise impacts associated with trucks accessing Dungog Road into the assessment of operational noise under the NPfI rather than being assessed as traffic noise under the RNP as was the case for the Stage 1 Model. This change results in an overall increase in the modelled noise impacts from the Revised Project to properties adjacent to the intersection of the new access road and Dungog Road. There are corresponding and significant practical reductions in noise impacts at receivers in Station Street, the northern end of Cory Street and Grace Avenue due to trucks moving to the new access road.

4.3.1.3 Stage 3 (Years 7 to 10)

Quarrying will continue in the West Pit, including in the northern portion, progressing further to the northwest. During this time, quarrying will also occur along the existing southern boundary of the West Pit, progressing further south through previous temporary rehabilitation areas, and towards the western boundary of the disturbance area (**Figure 4.4**).

Rehabilitation will be extended on the eastern side of the West Pit.

Stage 3 includes the continued operation of the processing plant, rail spur extension and use of the new access road through Lot 5 to Dungog Road.

The source locations in the Year 10 quarry plan presented in **Appendix 4** represent Stage 3 of the Revised Project.

4.3.1.4 Stage 4 (Years 11 to 15)

By Year 15, quarrying will be undertaken in the majority of the West Pit, continuing to progress in the north towards the northwest and towards the west along the southern boundary of the West Pit (**Figure 4.5**).

Rehabilitation will be extended along the western and northeast boundaries of the West Pit and will commence along the southern boundary.

Stage 4 includes the continued operation of the processing plant, rail spur extension and use of the new access road through Lot 5 to Dungog Road.

The source locations in the Year 15 quarry plan presented in **Appendix 4** represent Stage 4 of the Revised Project.

4.3.1.5 Stage 5 (Years 16 to 20)

By Year 20, extraction will continue deeper within the West Pit and continue to progress toward the west in both the northern and southern sections of the pit, reaching the maximum lateral extent of extraction (**Figure 4.6**).

Rehabilitation will continue around the quarry benches in the north of the West Pit.

Stage 5 includes the continued operation of the processing plant, rail spur extension and use of the new access road through Lot 5 to Dungog Road.

The source locations in the Year 20 quarry plan presented in **Appendix 4** represent Stage 5 of the Revised Project.

4.3.1.6 Stage 6 (Years 21 to 25)

From Year 21 until the end of the quarry life, quarrying will be undertaken in the East Pit only, both progressing deeper and further south. This will include areas that were previously used for processing and product stockpiling (**Figure 4.7**).

Stage 4 includes the continued operation of the rail spur extension and use of the access road through Lot 5 to Dungog Road.

Noise-generating activities in the West Pit will be limited to rehabilitation activities and involve significantly less intensity of noise generating activities than earlier modelled stages. The quarrying in the East Pit and progressive decommissioning and removal of the processing plant will also reduce the noise-generating activities in the East Pit.

The predicted noise levels generated by activities in the East Pit will be, at most, equivalent to but generally less than the predicted noise levels for the other modelled stages of the Revised Project. As a result, a dedicated noise model has not been prepared for Stage 6 of the Revised Project.

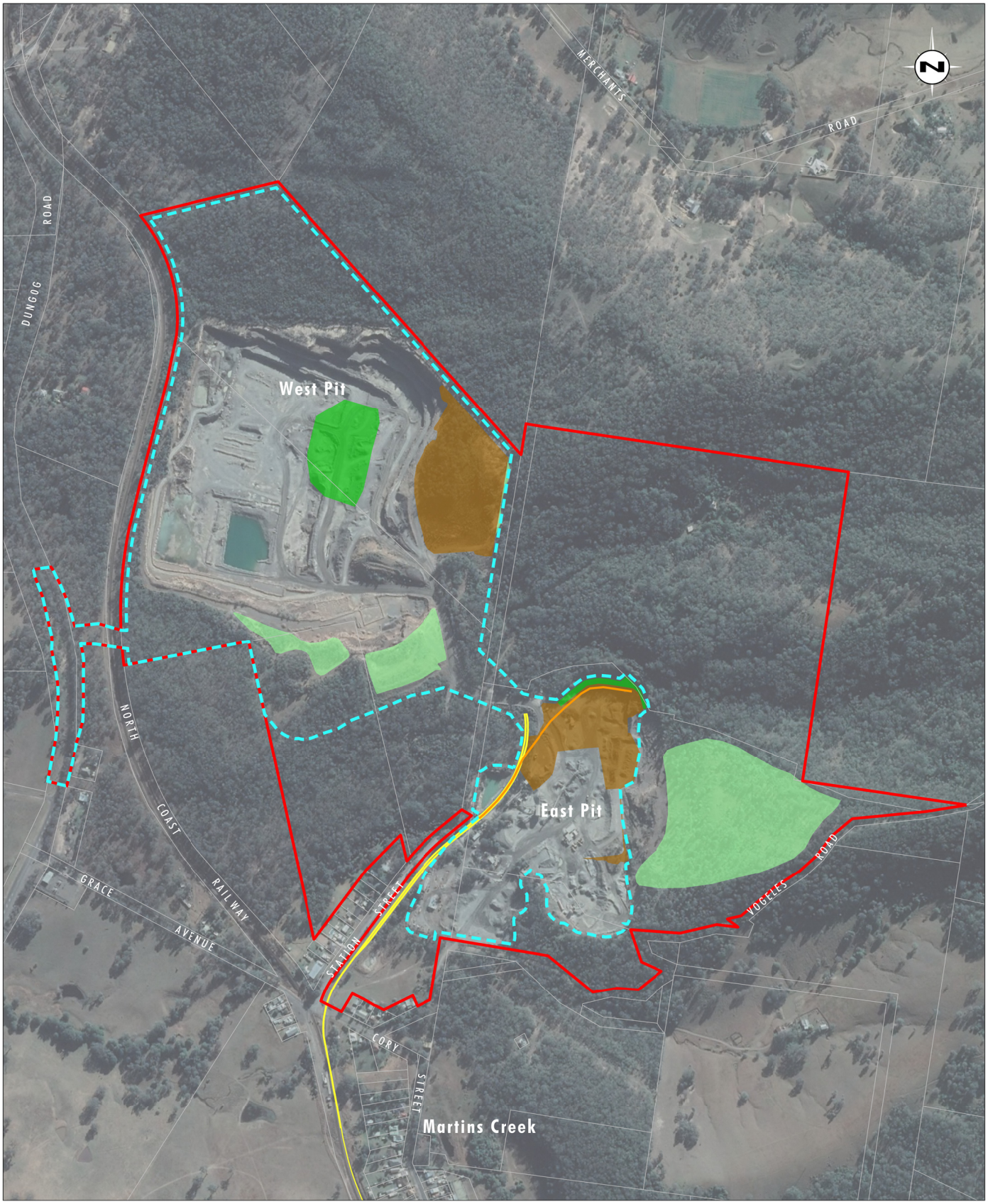


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 250 500m
1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area

FIGURE 4.2

Conceptual Quarry Plan Year 2

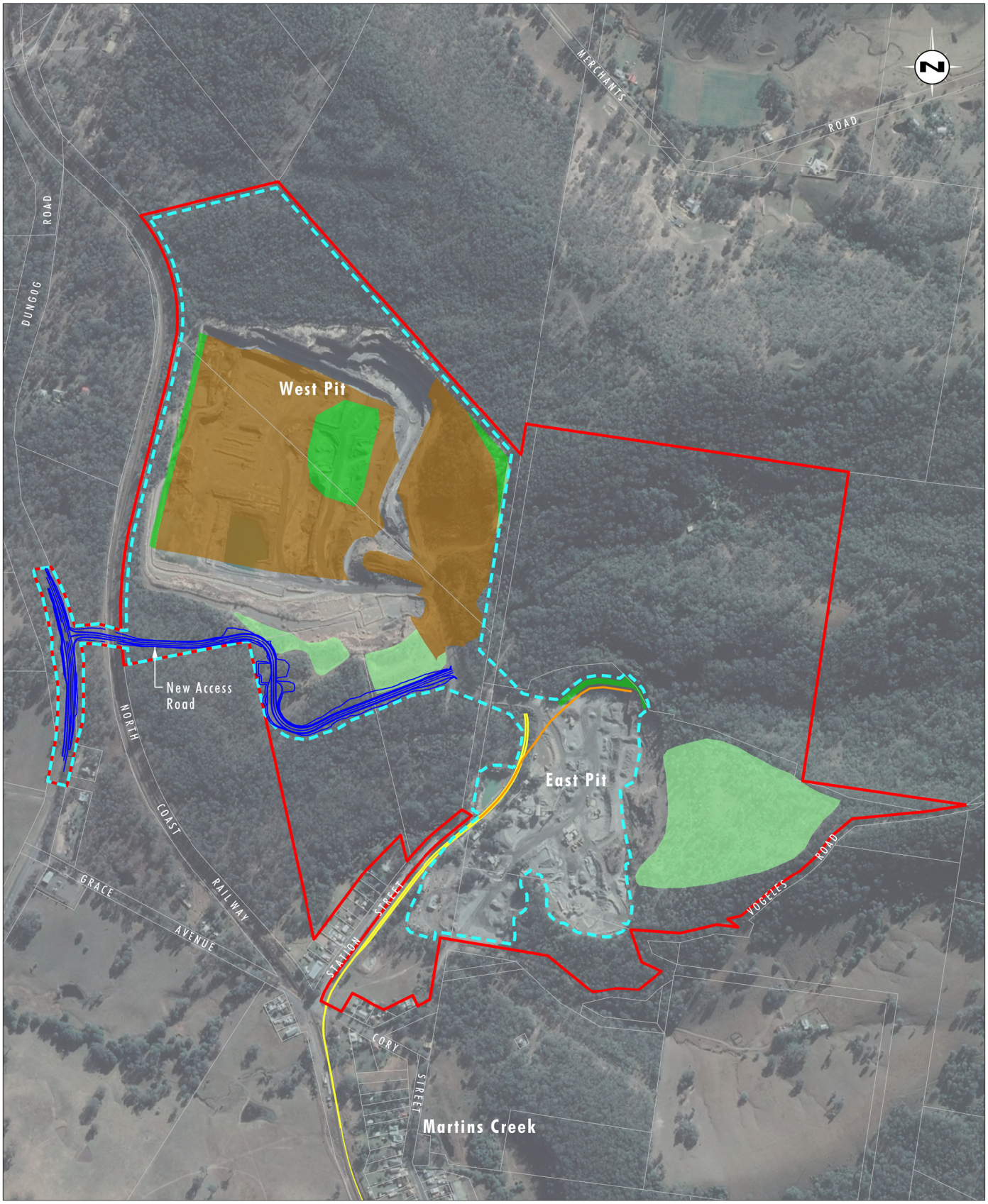


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 250 500m
1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road

FIGURE 4.3

Conceptual Quarry Plan Year 6

File Name (A4): R04/3957_141.dgn
20201026 11.25

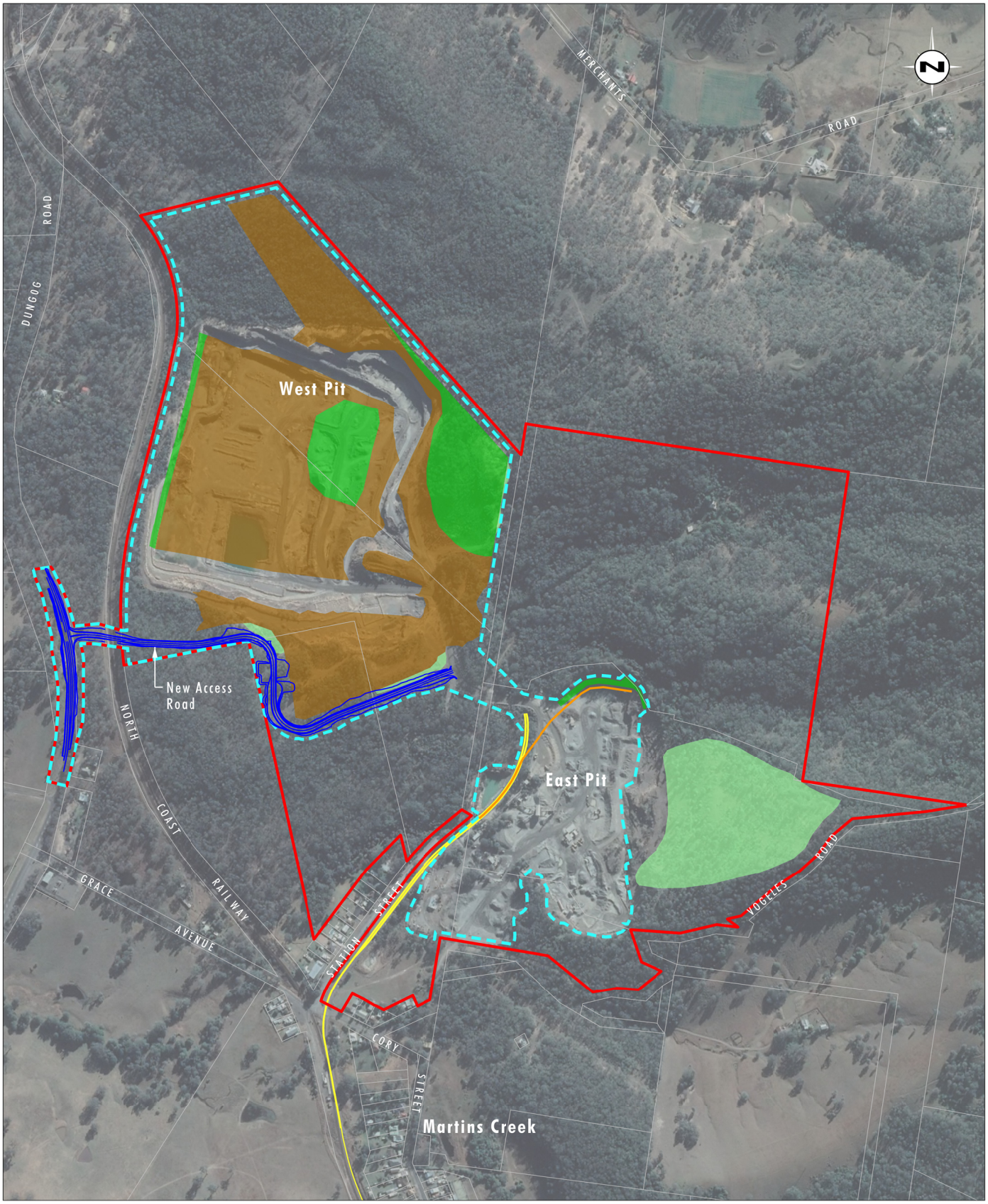


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 250 500m
1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road

FIGURE 4.4

Conceptual Quarry Plan Year 10

File Name (A4): R04/3957_142.dgn
20201026 11.26

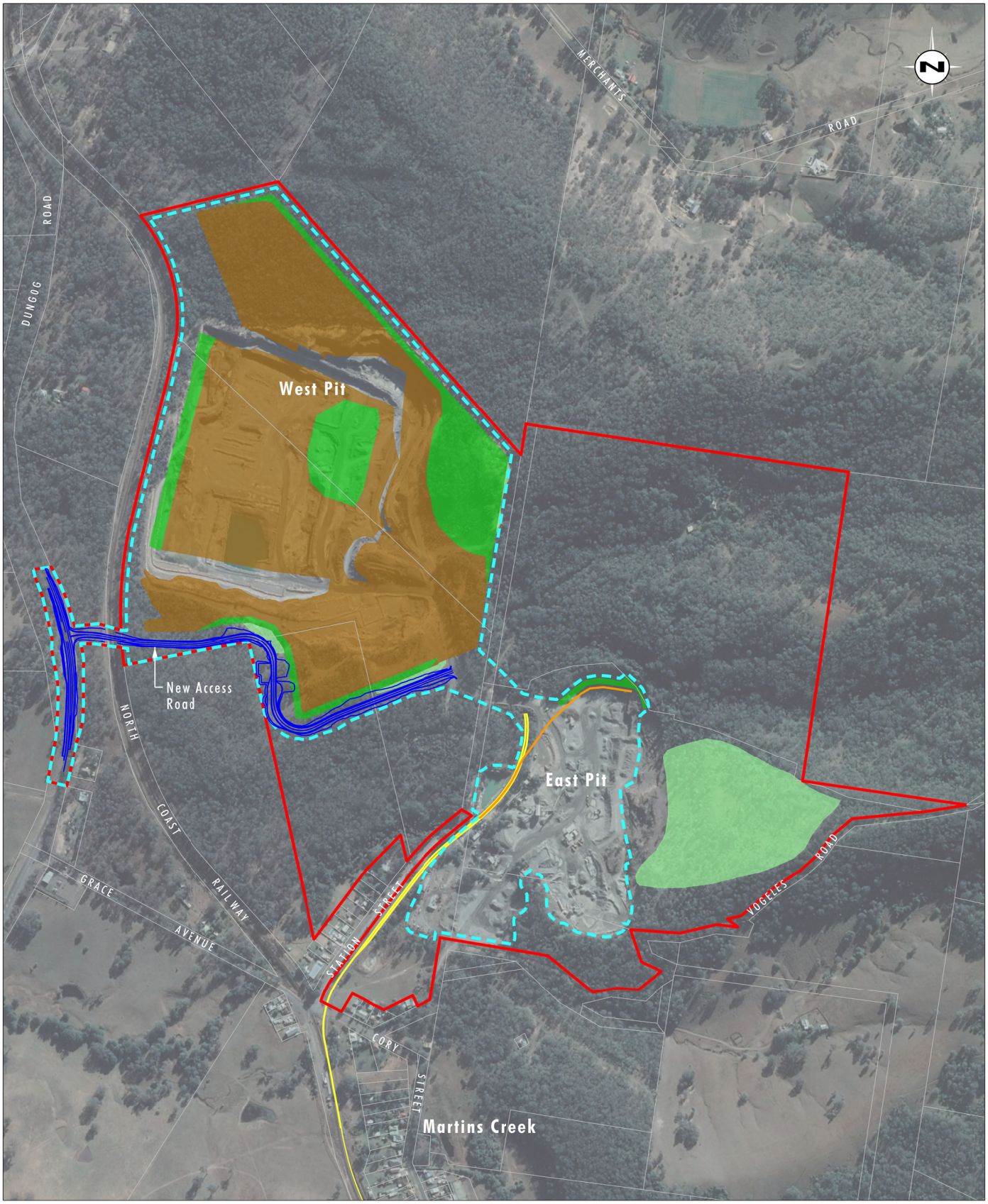


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 250 500m
1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road

FIGURE 4.5

Conceptual Quarry Plan Year 15

File Name (A4): R04/3957_143.dgn
20201026 11.27

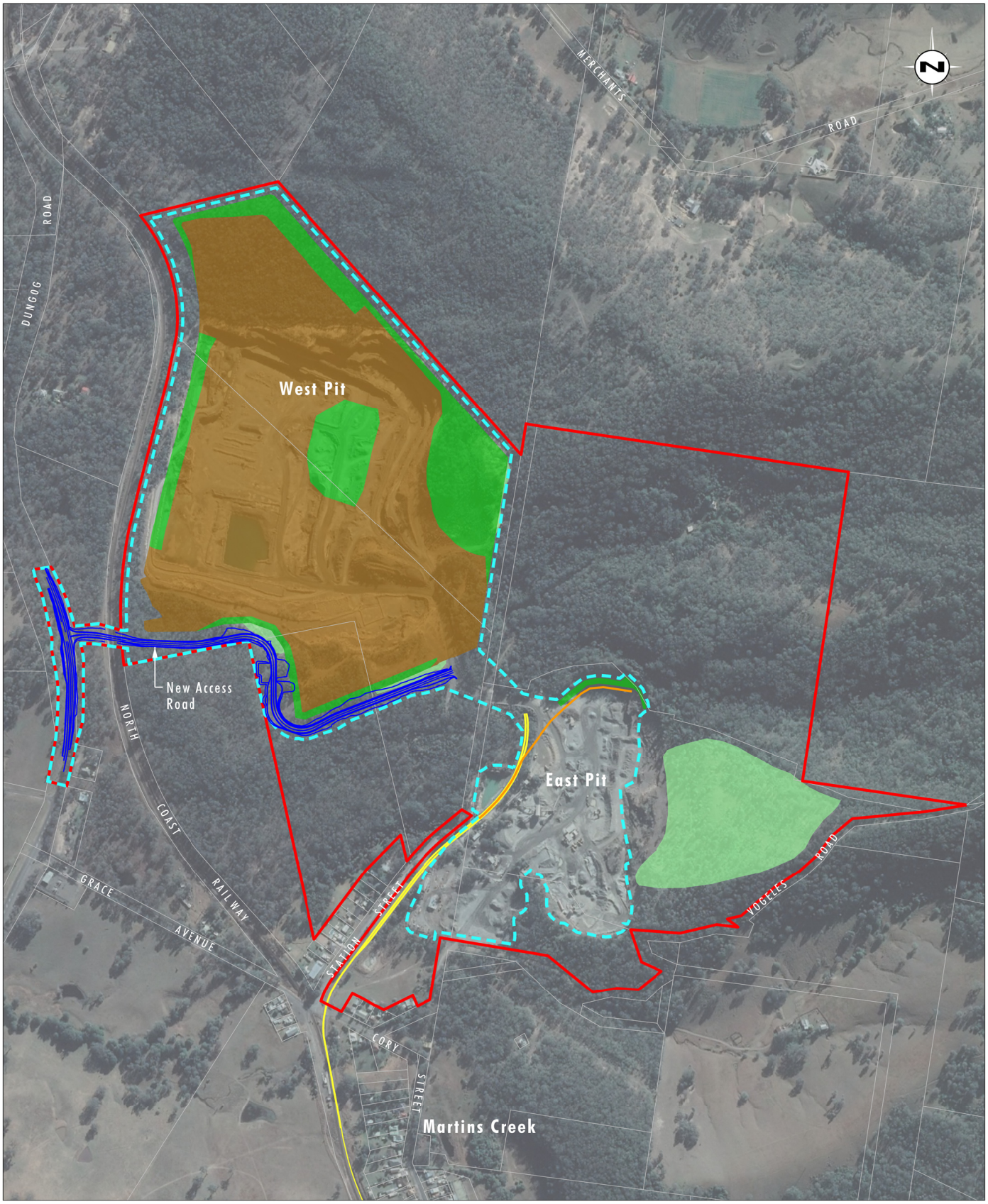


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 250 500m
1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road

FIGURE 4.6

Conceptual Quarry Plan Year 20

File Name (A4): R04/3957_144.dgn
20201026 11.27

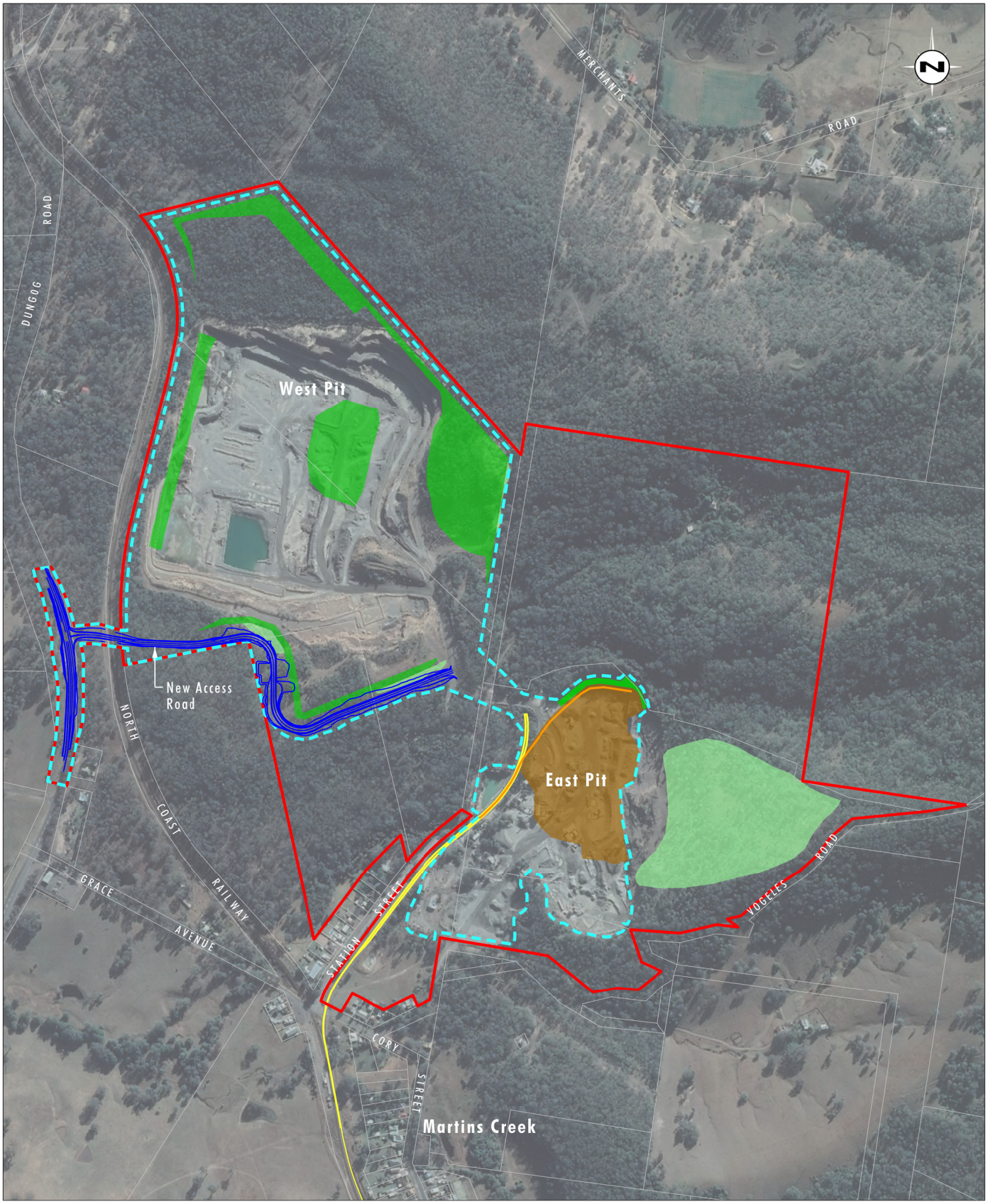


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 250 500m
1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road

FIGURE 4.7

Conceptual Quarry Plan Year 25

File Name (A4): R04/3957_145.dgn
20201026 11.28

4.3.2 Modelled Plant and Equipment

The indicative schedule of equipment (or their equivalent) that will nominally be available for use by the Revised Project is given in **Table 4.1**.

The sound power levels utilised in the noise modelling are based primarily on measurements undertaken onsite by Umwelt. Additional data has been sourced from measurements of similar plant by Umwelt, product specifications, estimated from noise source data in published literature or from published noise impact reports for similar projects. The sound power levels, including mitigation, of equipment modelled for the Revised Project are provided in **Table 4.1**.

Table 4.1 Noise Source Sound Power Levels

Work Area	Item of Equipment	Sound Power Level (SWL)	
		dB(A)	dB(lin)
Processing Area	Backhoe	98	106
Processing Area	Bobcat	104	116
Processing Area	Conveyor (x19)	83 (per metre)	92
Processing Area	Tertiary Crusher	109	116
Processing Area	Tertiary Surge Bin	106	108
West Pit	Rock Drill	113	118
Processing Area	Forklift	110	118
Rail	Locomotive (x2)	104	116
All	New Access Road – sales truck passby	110	118
Processing Area	Pre-coat Plant	105	120
Processing Area	Primary Crusher and Hopper	112	120
Processing Area	Secondary Crusher and Primary Screen Building- Roof, North, West, South East facades	106	117
Processing Area	Secondary Crusher and Primary Screen Building- East open area	122	123
Processing Area	Pug Mill	92	99
Rail	Existing Rail Loader	119	120
Rail	Front-end Loader loading train wagons	107	126
Processing Area	Re-Entry Bin	107	126
Processing Area	Front-end Loader loading sales trucks	107	126
Processing Area	Sand Wash Plant	110	116
Processing Area	Secondary and Tertiary Screens	105	115

Work Area	Item of Equipment	Sound Power Level (SWL)	
		dB(A)	dB(lin)
Processing Area	Primary Surge Bin (located between Primary and Secondary Crushers)	87	106
West Pit and Haul Road	Haul Truck (Komatsu HD405) (x3)	107 (Downhill unloaded) 109 (Uphill loaded)	113 (Downhill unloaded) 114 (Uphill loaded)
West Pit	Front-end Loader loading haul trucks	114	121
Processing Area	Hopper Dump events	113 (event)	121
Processing Area	Sales Truck drive off at despatch	112	115
Processing Area	Sales Truck parked at idle	92	96
All	Water Truck	103	113

The equipment listed in **Table 4.1** may change during the life of the Revised Project to meet operational demands and reflect changes in technology. Notwithstanding this, all key items of plant and equipment will incorporate reasonable and feasible noise control measures. The level of equipment attenuation, as indicated by the SWL's presented in **Table 4.1,** are considered indicative rather than mandatory. The actual performance of the Revised Project as a whole will be determined by monitoring the environmental noise levels over the life of the project and will dictate equipment selection criteria.

4.3.3 Meteorological Conditions

Certain meteorological conditions may increase noise levels by focusing soundwave propagation paths at a single point. Such refraction of sound waves will occur during temperature inversions (i.e. atmospheric conditions where temperatures increase with height above ground level) and where there is a wind gradient (i.e. wind velocities increasing with height above ground level) and there is a supporting wind from the source to the receiver.

The NPfI approach to account for noise-enhancing weather conditions is to state the meteorological conditions under which the project noise trigger levels and limits will apply, rather than stipulating the noise modelling parameters that must be used. Standard meteorological conditions and noise-enhancing meteorological conditions have been defined in Table D1 of the NPfI (reproduced in **Table 4.2** below).

Table 4.2 Standard and Noise-Enhancing Meteorological Conditions

Meteorological conditions	Meteorological parameters [1]
Standard meteorological conditions	Day/evening/night: Stability categories A to D with wind speed up to 0.5 m/s at 10m above ground level.
Noise-enhancing meteorological conditions	Day/evening: Stability categories A to D with light winds (up to 3 m/s at 10m above ground level) Night: Stability categories A to D with light winds (up to 3 m/s at 10m above ground level) and/or stability category F with winds up to 2 m/s at 10m above ground level.

Notes: [1] Where a range of conditions is nominated, the meteorological condition delivering the highest predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from the process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant.

The NPfI provides two options for the assessment of meteorological effects:

1. Adopt the **noise-enhancing meteorological conditions** for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur – a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night.

2. Determine the **significance of noise-enhancing conditions**. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the NPfI provisions. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.

In this Noise Impact Assessment Option 2 was used. The analysis of the meteorological data is provided in **Appendix 5**.

In addition, for this Project, the NPfI meteorological assessment method (Option 2 described above) was then developed further through the use of a probabilistic modelling approach to help design the operating parameters of the Revised Project.

The probabilistic noise modelling approach allows the impact of the temporal variations in the meteorological conditions on the propagation of sound from the source to the receiver to be considered. The probabilistic modelling approach includes the iterative implementation of the noise control strategies to determine the percentage of the time each strategy, such as machine relocation or shut down, need to be implemented.

The probabilistic noise model uses a detailed set of meteorological conditions that are representative of the meteorological conditions that would be expected during the life of the quarry (refer to **Appendix 5**). The modelling approach involves analysing the local meteorological conditions to determine the percentage of occurrence of inversions and wind effects in the region for each respective season and time period. The predictive noise model is then run for each set of meteorological conditions described by the wind speed interval, wind direction interval and temperature gradients representing A to G class stability conditions for each noise source model receiver transmission path. The proportion of time each of these combinations applies is then combined with the resulting predicted sound pressure level to determine the noise level at the receiver location.

It is important to note that the aim of the probabilistic approach is not to simply model a preferred operational alternative, but rather to investigate operational alternatives that are available to allow operations to continue during a range of meteorological conditions while still maintaining the same noise management envelope or area of affectation.

The results of the probabilistic noise modelling approach is discussed in **Section 6** and **Appendix 8**.

4.4 Construction Noise Model

Noise models were prepared to assess the impacts of the noise associated with the construction of the new access road and the noise mitigation measures to be constructed within the East Pit processing area. The two activities that are likely to generate noise at the nearest receivers to those activities are the construction of the new access road and the construction of the noise attenuation bund/barrier. The noise model of the new access road construction included multiple noise sources distributed along the new road alignment. The noise bund/barrier scenario included multiple noise sources grouped within the processing area.

The typical construction equipment likely to be utilised for each phase of construction was included in the construction noise models. The sound power levels (SWL) of this equipment are outlined in **Table 4.3**.

Table 4.3 Construction Equipment Sound Power Levels

Scenario	Item of Equipment	Sound Power Level (SWL)	
		dB(A)	dB(lin)
New Access Road Construction	Grader	112	119
	Dump Truck	109	113
	Roller	109	116
	Water Cart	102	113
	Excavator	110	112
	Dozer	116	122
Bund/Barrier Construction	Crane	98	102
	Concrete truck	109	113
	Dump Truck	109	113
	Water Cart	102	113
	Excavator	110	112

The assessment of the predicted construction noise levels against the construction noise management levels was then undertaken in accordance with the ICNG (DECC 2009). The results of this investigation are presented in **Section 6**. The prediction of construction noise levels takes into account the noise sources that may reasonably be expected to be in use during the construction activities. The assessment of the construction noise does not include construction activities related to the establishment of quarrying activities as these are covered in the operational noise model.

The construction noise models provide an indication of the expected noise levels from construction activities associated with the Revised Project. It is anticipated the majority of the construction will occur during 'standard times' (Monday to Friday 7:00 am to 6:00 pm and Saturday morning from 8:00 am to 1:00 pm) as defined by the ICNG. To assess worst-case noise levels the construction noise levels were based on full machine utilisation of multiple machines operating simultaneously during the noise-enhancing conditions identified in **Appendix 5**.

Construction of the major items associated with the Revised Project may occur during 'non-standard times' as defined by the ICNG. The construction scenario modelled for the work during 'non-standard times' (evening/night-times from 6:00 pm to 7:00 am, Saturdays before 8:00 am or after 1:00 pm and any time on Sundays) includes activities associated with site preparation prior to construction activities that would occur during 'standard hours'. An example would be the preparative work before taking track possession when constructing the road bridge over the North Coast Railway.

ENM's Single Point Calculation feature was used to determine the $L_{Aeq,15minute}$ construction noise levels at the nearest residential receiver locations under the four day-time meteorological scenarios identified in **Appendix 5**. The predicted noise impacts, (refer to **Section 5.4**), are representative of the noise levels that could be experienced when the construction activities are at the closest location to the receivers shown on **Figure 3.1**. That is, the predicted noise impacts are the maximum likely noise levels over any given 15-minute period.

4.5 Rail Noise from Trains on Non-network and Network Rail Lines

ARTC have historically managed the 30 to 35 rail-ballast trains that frequent the Quarry each year. The 330-metre long, 22 wagon trains account for an average of 32,000 tonnes of rail-ballast dispatched by train per annum.

The proposed changes to the rail spur will enable the full range of quarry products produced by the Revised Project, not just rail-ballast, to be loaded onto trains. It is anticipated the ARTC demand for rail-ballast will remain relatively constant at an average of 32,000 tonnes per annum. To achieve the balance of the projected 600,000 tonnes of product dispatched by train per annum (approximately 562,000 tonnes per annum) the site would need to be frequented by between 330 x 400-metres long trains per annum to 220 x 600-metre long trains per annum. It is proposed these trains will be managed by Daracon.

The Plateway Report on the *Review of Aggregate Distribution by Rail and Rail Logistics Options for Martins Creek Quarry* (2021) indicates the North Coast Line has sufficient network capacity to support the current and possible increased use of rail transport of rail-ballast and quarry products from Martins Creek Quarry. The Plateway Report indicated that the quarry can support the loading of three trains per day if loading during the night is permitted. The report indicates it would be possible for Martins Creek Quarry to load two trains during the period from 8:00 pm to 5:00 am and one during the period 9:00 am to 3:00 pm. The limitation during the day time is due to limited access to the Main Northern Line and Hunter Valley Coal Network at Maitland. The capacity to load and dispatch up to three trains per day exceeds the requirements of the Revise Project.

The Plateway Report indicates the cycle time over short delivery distances to locations in the Newcastle area is less than 24 hours. However, to achieve a rail dispatch rate of 600,000 tonnes per annum the Revised Project would have to develop a market within the Sydney basin. A train cycle time into the greater Sydney Region of less than 24 hours cannot be achieved due to passenger priority and the peak hour curfews for freight trains over a long section of the journey.

Based on the access to the North Coast Line during the day and the train cycle time into the greater Sydney Region it is anticipated the Revised Project would only load a maximum of two trains over a 24 hour period, one during the day and one during the evening/night period. A third train could also be loaded during a 24 hour period, however, the likely occurrence of three trains being loaded in a 24 hour period is low.

The evaluation of product dispatch by rail by Plateway indicates any increase in rail activity would not result in an intensification of the daytime or night-time rail traffic from Martins Creek Quarry. The increased throughput would be associated with a reduction in the cycle time and an increase in the number of day-times and night-times where trains enter or leave the Martins Creek Quarry.

4.6 Road Traffic Noise Model

Road traffic noise calculations were performed using CoRTN (Calculation of Road Traffic Noise (CoRTN) algorithms[3]) for four scenarios, as described in **Table 4.4**.

Table 4.4 Road Traffic Noise Modelling Scenarios

Scenario	Annual tonnage	Operating hours	Truck Movements	
			Per day	Per hour
1. No quarry Baseline traffic	-	-	-	-
2. Revised Project Capped Maximum	No more than 500,000 tonnes per annum by road in any 12 month period	No truck loading before 7am. All trucks entering and leaving the quarry to observe a reduced speed limit of 40 km/hr through Paterson. No trucks passing through Paterson before 6.45am. Operating hours 7am to 6pm Monday to Friday. No operations Sundays or Public Holidays.	No more than 140 laden trucks dispatched	No more than 20 laden trucks dispatched [1]
3. Revised Project Upper rate for 80% of product dispatched			89 laden trucks dispatched	12 laden trucks dispatched [2]
4. Revised Project Annual Average			65 laden trucks dispatched	

Notes: [1] Representing the peak 'capped' hourly truck movements

[2] Representing the peak hourly truck movements for 89 laden trucks movement which is representative of the upper range in the dispatch of 80% of the 500,000 tonnes per annum by road per day

Scenario 1, described by the RNG as the 'no build option', represents the baseline option without traffic generated by the Quarry. Scenario 2 to 4 consider the capped maximum rates, the upper rate in the range of truck movements rates that accounts for 80% of the product dispatched by road and the annual average rate. The analysis of the historical weighbridge data to establish the relationship between the per day and per hour rate is presented in **Appendix 9**.

Existing road traffic noise levels were based on traffic count data from Seca Solution. Automatic tube count units were installed at five locations along the route proposed to be utilised by the Revised Project. The tube count units were installed on Dungog Road, Gresford Road, Tocal Road, Paterson Road and Flat Road between 28 April and 18 May 2018. The units recorded data continuously over the three-week period. The summary of the traffic count data from Seca Solution is presented in **Appendix 9**.

[3] The CoRTN model has been specifically validated under Australian conditions by the NAASRA Working Group (Saunders, Samuels, Leach & Hall, 1983). The correction from LA10 to LAeq is based on Kean (2008) for corrections to non-motorway roads.

During the period that the tube count data was being collected, quarry trucks were utilising four main routes to deliver product to customers. Quarry personnel kept records between 1 May and 22 May 2018 to tally how many laden trucks were utilising each of the four routes. Three of those routes were travelling south on Dungog Road towards Paterson, while the fourth route was travelling north on Dungog Road towards Vacy. This information was used to estimate, on a daily basis, non-quarry heavy vehicles at each tube count location (i.e. the daily baseline heavy vehicle volume), allowing for a return trip along the same route for each quarry truck.

The daily baseline heavy vehicle volumes for Mondays to Fridays were averaged to determine a weekday average heavy vehicle baseline at each tube count location. Weekday averages of the total light-vehicle volumes were used in the road traffic noise calculations to assess the total traffic volume using the route.

Additional tube counters were installed to the north of Church Street in Paterson for the week starting Monday 17 February 2020, when no operational activities were undertaken at the Martins Creek Quarry. The survey data showed that there was an 8% decrease in the morning peak traffic flows (8:00 am to 9:00 am) and a 6% decrease in the afternoon (4:00 pm to 5:00 pm) peak traffic flows during this period, when compared to the analysis of the April to May 2018 survey data when the Quarry was not in limited operation.

The baseline traffic volume at each tube count location was used to calculate the baseline noise levels at the nearest residential receiver in each speed zone along the route, as well as at sensitive receivers identified along the route. As the Quarry is seeking to transport product via a maximum of 140 laden trucks per day, 280 heavy vehicle movements were added to the baseline traffic volume and noise levels were calculated to the nearest residential receiver and to each of the sensitive receivers. This allowed the difference between the baseline traffic noise level (no Quarry trucks) and the noise level from the trucking level that the Quarry is seeking approval for, to be calculated and compared.

Under the RNP, some sensitive receivers have criteria in terms of a one-hour period or a worst-case hour. For calculations of noise levels for these receivers, 40 quarry truck movements were assumed to pass each receiver to represent 20 laden trucks leaving the quarry and the same number travelling to the quarry.

5.0 Results

5.1 Operational Noise: Day-time

5.1.1 Operational Noise for Year 2

The predicted noise levels at each receiver identified in **Appendix 3** is presented in **Appendix 6** for each of the five (5) modelled operating stages described in **Section 4** under calm and enhancing meteorological conditions**.**

The NIA assesses Year 2 separately to Years 6, 10, 15 and 20 as not all the noise controls will be in place by Year 2. For the Year 2 operating scenario, it is assumed the existing rail loading facility is still in place and being used as the construction of the new rail spur will not be complete. It is also assumed the construction of the new access road through Lot 5 will not be complete and trucks will be using the existing entrance on Station Street.

The residential receivers where the predicted noise levels for Year 2 (refer to **Appendix 6 Table A6.1**) could exceed the relevant day-time project noise trigger levels (PTNL) are identified in **Table 5.1**. The predicted noise levels for Year 2 consider two operating scenarios, one with and one without the operation of the existing rail loading facility. Both operating scenarios include rock extraction from Lots 5 and/or 6, operation of the processing plant and dispatch of the capped peak hourly truck movements modelled as 20 laden truck movements per hour.

Table 5.1 Maximum Predicted Year 2 Day-time $L_{Aeq,15minute}$ Noise Levels with and without the Existing Rail Loading Facility Operating for Capped Peak Hourly Truck Movements Modelled as 20 Laden Truck Movement per Hour, dB(A)

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL Year 2 With Rail Loading			Exceed PNTL Year 2 Without Rail Loading		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R001	23 Station St	NAG01	58	-	-	64	-	-	-
R002	21 Station St	NAG01	58	-	-	66	-	-	-
R003	19 Station St	NAG01	58	-	-	66	-	-	-
R004	17 Station St	NAG01	58	-	-	67	-	-	-
R005	15 Station St	NAG01	58	-	-	64	-	-	-
R006	13 Station St	NAG01	58	-	62	-	-	-	-
R007	11 Station St	NAG01	58	60	-	-	-	-	-
R008	9 Station St	NAG01	58	60	-	-	-	-	-
R009	7 Station St	NAG01	58	59	-	-	-	-	-
R036	23 Cory St	NAG04	50	51	-	-	-	-	-
R042	29 Cory St	NAG04	50	51	-	-	-	-	-
R045	31 Cory St	NAG04	50	51	-	-	-	-	-
R050	33 Cory St	NAG04	49	51	-	-	-	-	-
R052	35 Cory St	NAG04	50	51	-	-	-	-	-
R054	34 Cory St	NAG04	49	50	-	-	-	-	-
R056	37 Cory St	NAG04	49	51	-	-	-	-	-
R057	36 Cory St	NAG04	49	50	-	-	-	-	-

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL Year 2 With Rail Loading			Exceed PNTL Year 2 Without Rail Loading		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R058	39 Cory St	NAG04	47	-	51	-	-	-	-
R059	38 Cory St	NAG04	48	50	-	-	-	-	-
R061	41 Cory St	NAG04	47	-	50	-	-	-	-
R062	40 Cory St	NAG04	47	48	-	-	-	-	-
R064	43 Cory St	NAG04	46	-	49	-	-	-	-
R065	44 Cory St	NAG04	46	-	49	-	-	-	-
R019	1-3 Grace Ave	NAG05	40	-	-	46	-	-	-
R041	249 Dungog Rd	NAG06	40	-	-	46	-	43	-
R043	231 Dungog Rd	NAG06	40	-	44	-	-	-	-
R055	221 Dungog Rd	NAG06	40	-	-	47	-	43	-
R066	223 Dungog Rd	NAG06	40	-	-	48	-	44	-
R070	199 Dungog Rd	NAG06	40	-	-	48	-	44	-
R025	281 Dungog Rd	NAG07	40	-	45	-	-	44	-
R031	303 Dungog Rd	NAG07	40	-	44	-	-	44	-
R040	279 Dungog Rd	NAG07	40	-	45	-	-	43	-
R115	257 Dungog Rd	NAG08	40	-	43	-	41	-	-
R122	181 Dungog Rd	NAG08	40	-	44	-	41	-	-
R129	261 Dungog Rd	NAG08	40	41	-	-	-	-	-
R133	147 Dungog Rd	NAG08	40	-	44	-	41	-	-
R141	80 Mowbray Ln	NAG08	40	41	-	-	-	-	-
R143	121 Dungog Rd	NAG08	40	-	43	-	-	-	-
R145	120 Dungog Rd	NAG08	40	42	-	-	-	-	-
R148	51 Dungog Rd	NAG08	40	41	-	-	-	-	-
R149	83 Dungog Rd	NAG08	40	41	-	-	-	-	-
R034	338 Dungog Rd	NAG09	40	-	-	47	-	-	47
R047	341 Dungog Rd	NAG09	40	-	45	-	-	45	-
R053	333 Dungog Rd	NAG09	40	-	44	-	-	44	-
R046	406 Dungog Rd	NAG10	40	42	-	-	42	-	-
R063	9 Horns Crossing Rd	NAG10	40	42	-	-	42	-	-
R069	29 Horns Crossing Rd	NAG10	40	41	-	-	41	-	-
R075	24 Horns Crossing Rd	NAG10	40	41	-	-	-	-	-
R073	16 View St	NAG11	40	41	-	-	41	-	-
R083	24 View St	NAG11	40	41	-	-	41	-	-
R092	32 View St	NAG11	40	41	-	-	41	-	-
R098	27 View St	NAG11	40	41	-	-	-	-	-
R102	4 Wakaya Cl	NAG11	40	41	-	-	41	-	-
R067	159 Vogeles Rd	NAG13	40	41	-	-	41	-	-
R076	170 Dungog Rd	NAG14	40	-	-	47	41	-	-
R112	94 Cory St	NAG14	40	42	-	-	-	-	-
	Total			29	15	12	12	9	1

Predicted Noise Impacts greater than 5 dB above the PNTL for Year 2

By Year 2 all the noise controls will be in place except the decommissioning of the existing rail loading facility and completion of the new access road through Lot 5 to Dungog Road.

For operating conditions where the existing rail loading facility is operating, the maximum predicted $L_{Aeq,15minute}$ exceeds the PNTL by more than 5 dB at twelve (12) receiver locations. Theoretically, with the other noise controls discussed in **Section 4.2** in place under the VLAMP, there is a reduction in the noise impacts from 'an existing development with a legacy noise issue'. As a result, no additional mitigation measures are proposed at the effected receivers due to this specific component of the NIA. However, this is a transitional noise impact that will be further reduced following the completion of the new rail loading facilities and new access road.

For operating conditions where the existing rail loading facility is not operating, the maximum predicted $L_{Aeq,15minute}$ exceeds the PNTL by more than 5 dB at one (1) receiver location (R034 338 Dungog Rd). The noise impacts at this property (R34) is primarily driven by operational noise from the West Pit and is largely unaffected by the rail loading facilities.

Predicted Noise Impacts greater than or equal to 3 dB above, but less than or equal to 5 dB above the PNTL for Year 2

For operating conditions where the existing rail loading facility is operating, the maximum predicted $L_{Aeq,15minute}$ greater than or equal to 3 dB above, but less than or equal to 5 dB above the PNTL could occur at fifteen (15) receiver locations. As noted above, under the VLAMP, as an existing development with a legacy noise issue, no additional mitigation measures are proposed at the effected receivers due to this specific component of the NIA. However, as above, these are transitional noise levels and will be further reduced following the completion of the new rail loading facilities and new access road. It is noted that the noise impacts in NAGs 7 and 9 remain similar under both Year 2 operating scenarios indicating it is operational noise from the West Pit driving these impacts.

5.1.2 Operational Noise for Years 6, 10, 15 and 20

The residential receivers where the predicted noise levels in Years 6, 10, 15 and 20 could exceed the relevant day-time project noise trigger levels (PTNL) is presented in **Table 5.2** (also refer to **Appendix 6 Table A6.3**). These are the maximum predicted day-time noise levels for capped peak hourly truck movements modelled as 20 laden truck movements per hour.

Table 5.2 Predicted Maximum Years 6, 10, 15 and 20 Day-time $L_{Aeq,15minute}$ Noise Levels for Capped Peak Hourly Truck Movements Modelled as 20 Laden Truck Movement per Hour, dB(A)

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R016	256 Dungog Rd	NAG05	40	-	45	-
R019	1-3 Grace Ave	NAG05	40	-	44	-
R041	249 Dungog Rd	NAG06	40	-	43	-
R043	231 Dungog Rd	NAG06	40	42	-	-
R055	221 Dungog Rd	NAG06	40	-	43	-
R066	223 Dungog Rd	NAG06	40	42	-	-
R070	199 Dungog Rd	NAG06	40	-	44	-
R025	281 Dungog Rd	NAG07	40	-	-	48

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R031	303 Dungog Rd	NAG07	40	-	44	-
R040	279 Dungog Rd	NAG07	40	-	45	-
R034	338 Dungog Rd	NAG09	40	-	45	-
R047	341 Dungog Rd	NAG09	40	-	43	-
R053	333 Dungog Rd	NAG09	40	42	-	-
R046	406 Dungog Rd	NAG10	40	-	44	-
R063	9 Horns Crossing Rd	NAG10	40	42	-	-
R069	29 Horns Crossing Rd	NAG10	40	42	-	-
R075	24 Horns Crossing Rd	NAG10	40	41	-	-
R088	55 Horns Crossing Rd	NAG10	40	42	-	-
R073	16 View St	NAG11	40	42	-	-
R083	24 View St	NAG11	40	42	-	-
R094	19 View St	NAG11	40	41	-	-
R097	21 View St	NAG11	40	41	-	-
R098	27 View St	NAG11	40	41	-	-
R105	35 View St	NAG11	40	41	-	-
R067	159 Vogeles Rd	NAG13	40	-	43	-
R093	197 Vogeles Rd	NAG13	40	41	-	-
	Total			14	11	1

Noise impacts associated with trucks using the new access road are a key driver of noise impacts at a number of receivers to the west of the Quarry. The results presented in **Table 5.2** represents the noise impacts associated with operating at the capped maximum hourly dispatch rate of product from the Revised Project of 20 laden truck movements per hour. These predictions identify modelled worst-case noise levels assuming the 20 laden truck movements (40 movements/hour in total) were occurring throughout the entire day period. However, in reality, these conditions would only occur on days when the Quarry is supplying a large project. These operating conditions will not occur every day nor would they occur for an entire day period as total truck movements in a day are also limited (of example, the 20 laden truck movement/ hour rate of output could only occur for 7 hours in the 11 hour day period before the 140 laden truck movement cap would be exceeded; in this scenario, there would be no laden truck movements for the remaining 4 hours of the day period).

An analysis of historical truck movements from the site was undertaken to identify more usual peak truck numbers from the operations (i.e. on days when the Project is not supplying a large project) to understand peak noise levels from the Project that would be experienced on the vast bulk of the operating days at the quarry. This analysis, contained in **Appendix 9**, indicates that for the days of historical operations covering 80% of the annual approved production rate, total laden truck movements were less than 89 per day and the maximum hourly laden truck movements did not exceed 12 laden movements per hour (pro-rata to an annual production of 500,000). It is noted that this rate is only slightly lower than if the 140 truck movement/day limit was averaged over the entire day. In the discussion below, this rate of 89 trucks per day with a peak of 12 laden movements per hour is referred to as the 'usual' day.

The effect of the reduction in modelled truck numbers has on the modelled maximum noise levels experienced at receivers identified in **Table 5.2** has been investigated to enable residents to better understand the peak noise levels that would occur on a usual day of operations. The modelled noise levels the results for 20 (peak) and 12 (usual) laden truck movements per hour in Year 10 are presented in **Table 5.3**.

Table 5.3 Predicted Maximum Year 10 $L_{Aeq,15minute}$ Noise Levels for the Peak and Usual Average Maximum Daily Movement, dB(A)

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL 20 Laden Trucks			Exceed PNTL 12 Laden Trucks		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R016	256 Dungog Rd	NAG05	40	-	45	-	-	44	-
R019	1-3 Grace Ave	NAG05	40	-	44	-	42	-	-
R041	249 Dungog Rd	NAG06	40	-	43	-	41	-	-
R043	231 Dungog Rd	NAG06	40	42	-	-	-	-	-
R055	221 Dungog Rd	NAG06	40	42	-	-	41	-	-
R066	223 Dungog Rd	NAG06	40	42	-	-	41	-	-
R070	199 Dungog Rd	NAG06	40	42	-	-	41	-	-
R025	281 Dungog Rd	NAG07	40	-	-	48	-	44	-
R031	303 Dungog Rd	NAG07	40	-	44	-	-	43	-
R040	279 Dungog Rd	NAG07	40	-	45	-	-	43	-
R034	338 Dungog Rd	NAG09	40	-	45	-	-	45	-
R047	341 Dungog Rd	NAG09	40	-	43	-	-	43	-
R053	333 Dungog Rd	NAG09	40	42	-	-	41	-	-
R046	406 Dungog Rd	NAG10	40	42	-	-	42	-	-
R063	9 Horns Crossing Rd	NAG10	40	42	-	-	42	-	-
R069	29 Horns Crossing Rd	NAG10	40	42	-	-	42	-	-
R075	24 Horns Crossing Rd	NAG10	40	41	-	-	-	-	-
R088	55 Horns Crossing Rd	NAG10	40	42	-	-	41	-	-
R067	159 Vogeles Rd	NAG13	40	-	43	-	42	-	-
R093	197 Vogeles Rd	NAG13	40	41	-	-	41	-	-
	Total			11	8	1	12	6	0

Predicted Noise Impacts greater than 5 dB above the PNTL for Years 6, 10, 15 and 20

At a rate of 20 laden truck movements per hour the maximum predicted $L_{Aeq,15minute}$ exceeds the PNTL by more than 5 dB at one (1) receiver location (R025: refer to in **Table 5.2**). The predicted noise level at R025 is primarily associated with activities in the West Pit and the new access road. Under the VLAMP this would be considered equivalent to the impact from new development and is in the assessment band of moderate impact.

The analysis of weighbridge data for 2013 to 2019 (refer to **Appendix 9**) indicates 80% of the product dispatched by road occurs on days where the truck movements range from 5 to 89 laden trucks per day. The modelled peak rate of laden truck movements during this period is 12 laden truck movements per hour.

Table 5.3 indicates that the dispatch of product under more usual operating conditions (i.e. at a peak rate of 12 laden truck movements per hour) would reduce the noise level at R025 in Year 10 by approximately 4 dB to a maximum of 44 dB(A). The reduction in truck movements from 20 to 12 laden truck movements per hour would equate to moving R025 into the marginal impact assessment band under the VLAMP. The reduction in noise impacts associated with the reduction in truck movements demonstrated for Year 10 in **Table 5.3** is consistent with the other years modelled in the NIA.

Predicted Noise Impacts greater than or equal to 3 dB above, but less than or equal to 5 dB above the PNTL for Years 6, 10, 15 and 20

At a rate of 20 laden truck movements per hour the maximum predicted $L_{Aeq,15minute}$ greater than or equal to 3 dB above, but less than or equal to 5 dB above the PNTL could occur at eleven (11) receiver locations. These receivers are all located within NAG05, NAG 06, NAG07 and NAG09. Under the VLAMP this would be considered equivalent to the impacts from new development and is in the assessment band of marginal impact.

Table 5.3 indicates that under more usual operating conditions (i.e. up to 12 laden truck movements per hour in Year 10) a total of six (6) properties are in this assessment band of marginal impact, meaning five properties that are predicted to potentially experience moderate impacts under peak operating conditions would experience only marginal impacts on usual operating days.

Summary of Typical Day-time Noise Impacts

The typical day-time operating scenario includes rock extraction from Lot 5 and 6, operation of the processing plant, train loading, truck loading and the dispatch of laden trucks along the new access road in Lot 5. The properties where the noise levels are predicted to exceed the PNTL by more than 5 dB (that is, they are characterised as having a moderate impact and will require ongoing monitoring and management (on request)) at the property are:

- Property R025 (281 Dungog Rd) at a product dispatch rate of 20 laden truck movements per hour (refer to **Table 5.2**)
- No properties at a product dispatch rate of 12 laden trucks per hour (refer to **Table 5.3**)

The residual impacts for the day-time operations based on the predicted noise impacts in **Tables 5.2** and **5.3** and the VLAMP characterisation of the impacts are presented in **Section 7**.

Noise contours for each of the meteorological conditions modelled are presented in **Appendix 6** for the operating stages modelled: Years 2, 6, 10, 15 and 20 under peak conditions (i.e. 20 laden truck movements per hour). Noise contours are presented as amalgamated outer-envelopes for each of the five (5) operating stages modelled in **Figures 5.1** to **5.6**.

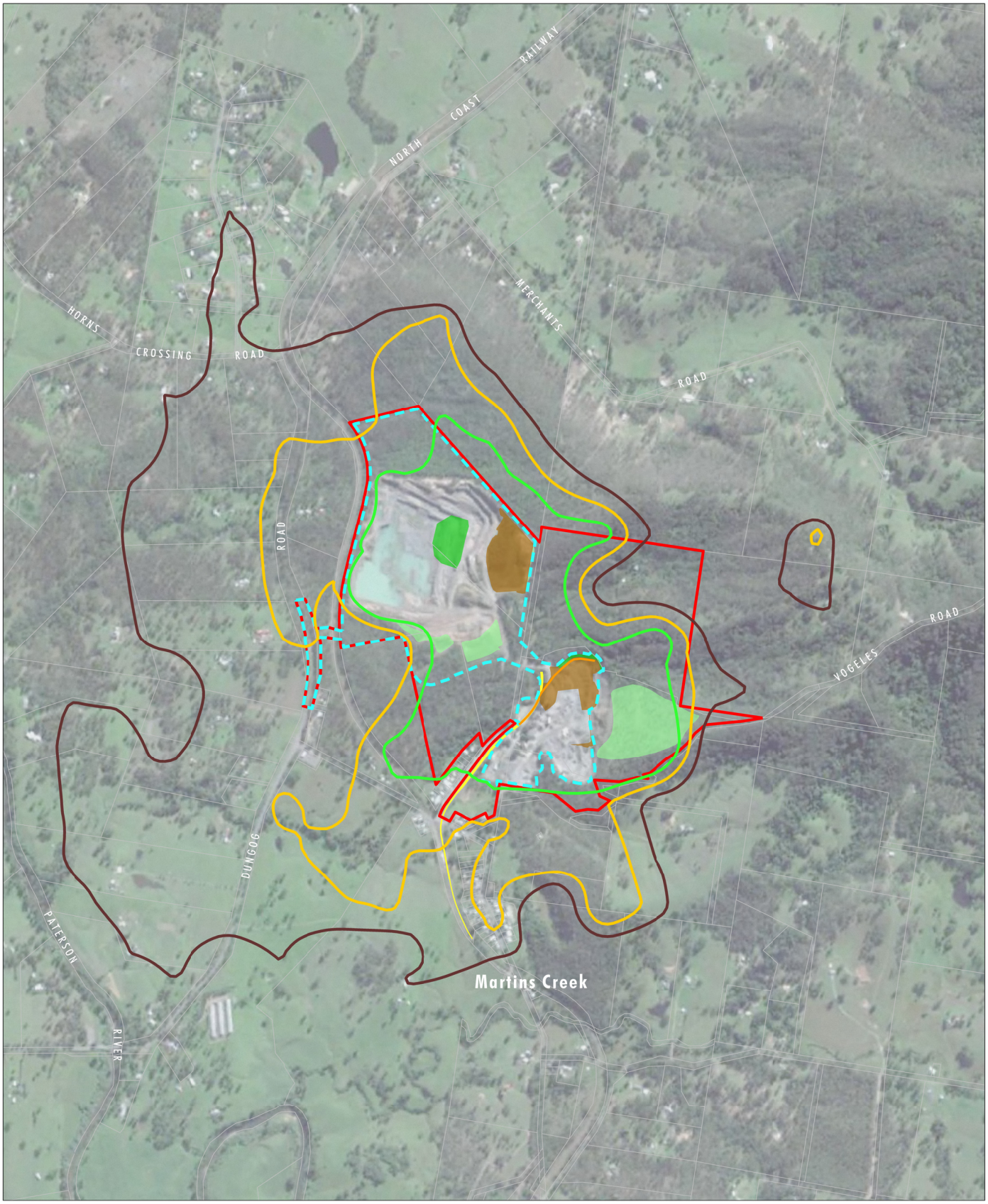


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE 5.1

Conceptual Quarry Plan Year 2
Predicted Noise Contours Amalgamated
Excluding the Existing Train Loadout Facility

File Name (A4): R04/3957_154.dgn
20210219 11.12

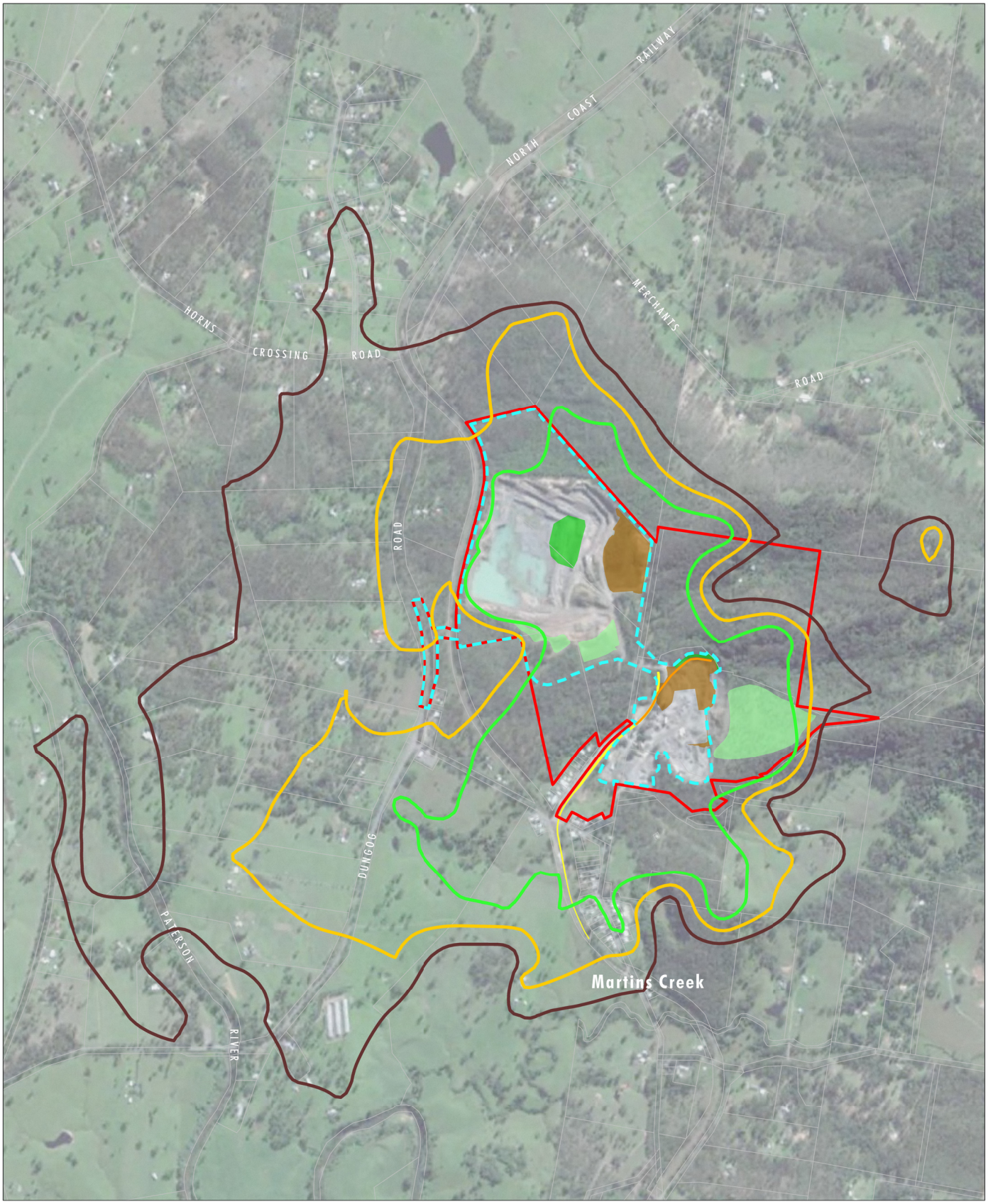


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE 5.2

Conceptual Quarry Plan Year 2
Predicted Noise Contours Amalgamated
Including the Existing Train Loadout Facility

File Name (A4): R04/3957_158.dgn
20210219 11.11

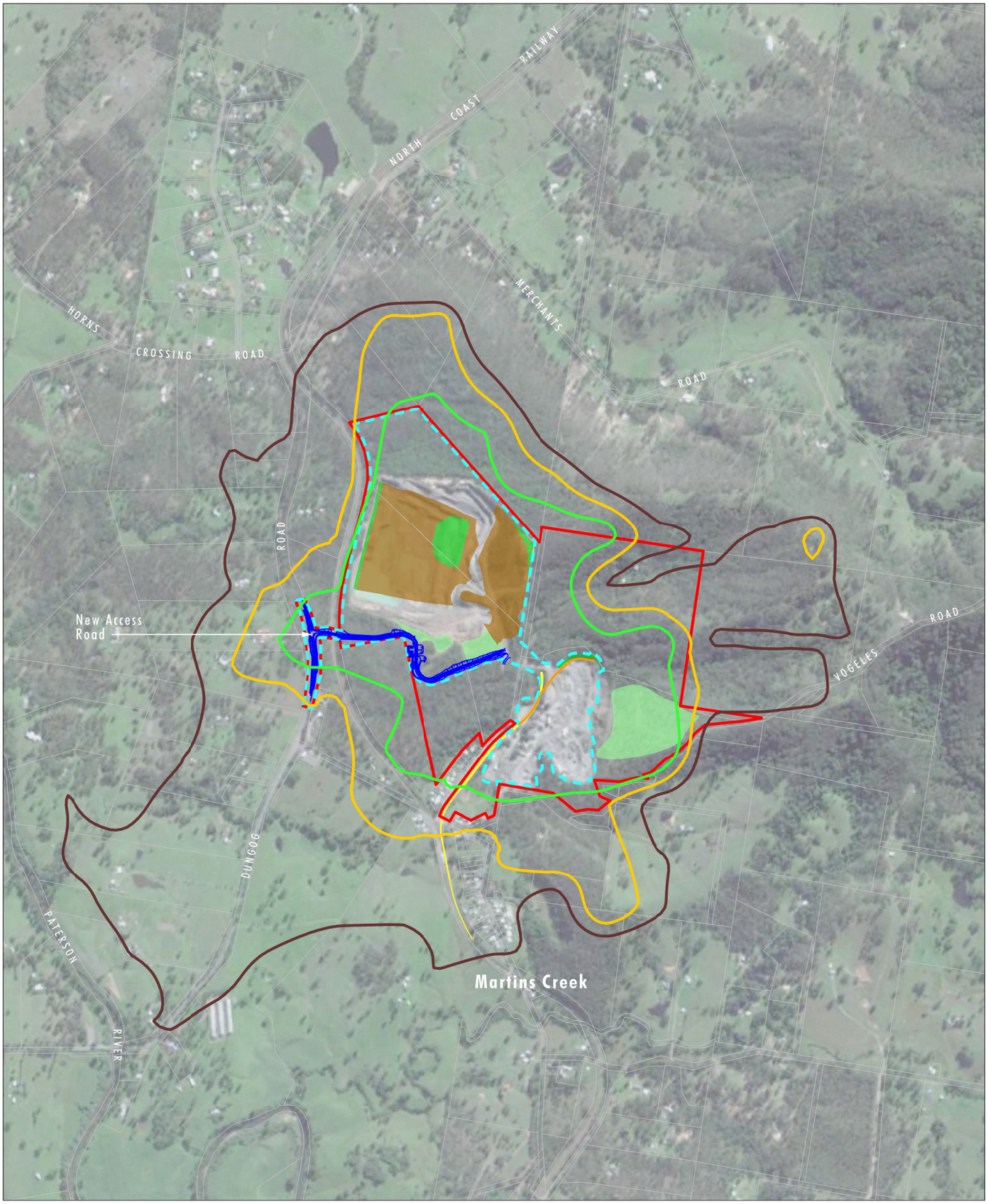


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE 5.3

Conceptual Quarry Plan Year 6
Predicted Noise Contours
Amalgamated

File Name (A4): R04/3957_155.dgn
20210219 11.14

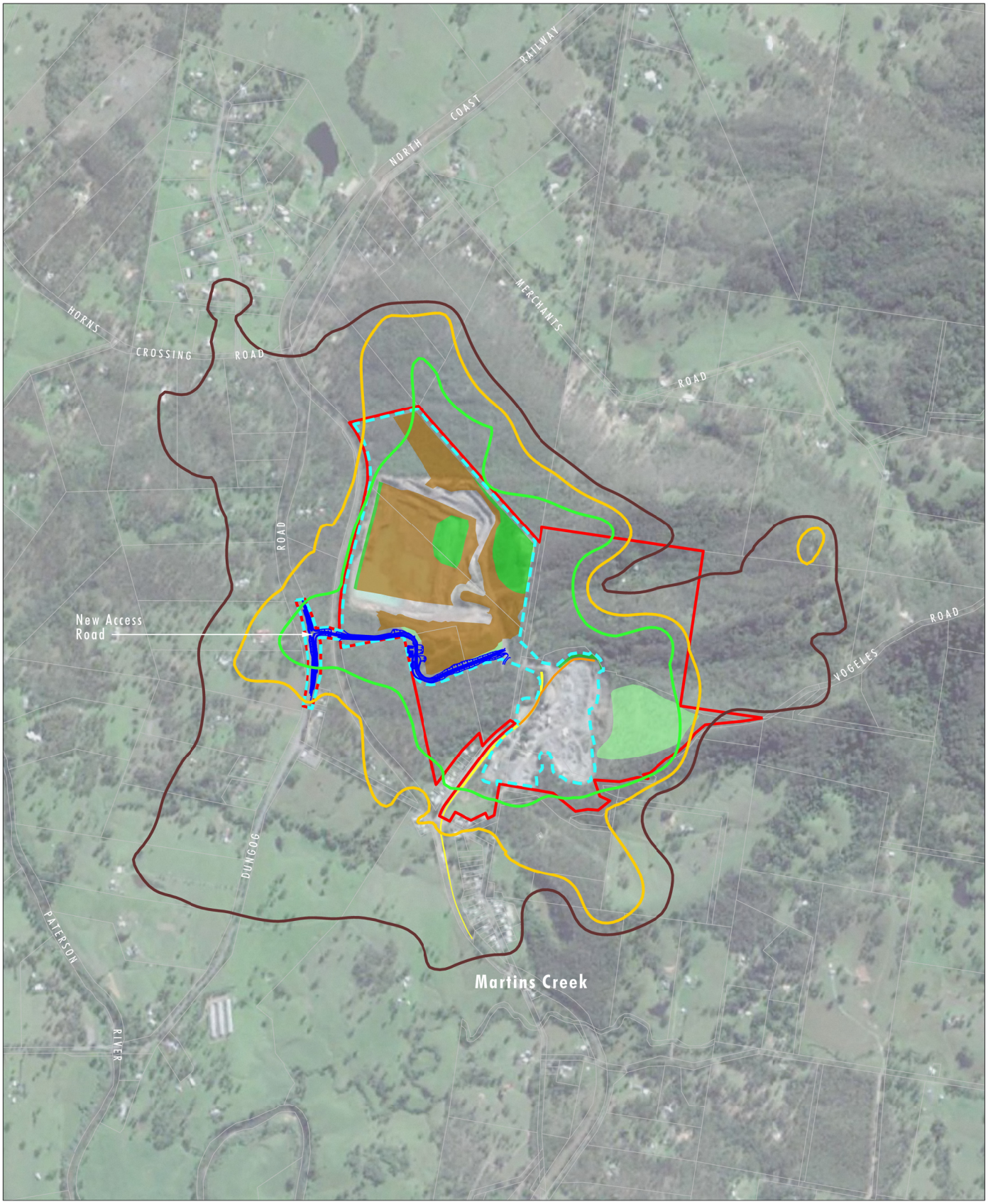


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE 5.4

Conceptual Quarry Plan Year 10
Predicted Noise Contours
Amalgamated

File Name (A4): R04/3957_152.dgn
20210219 11.15

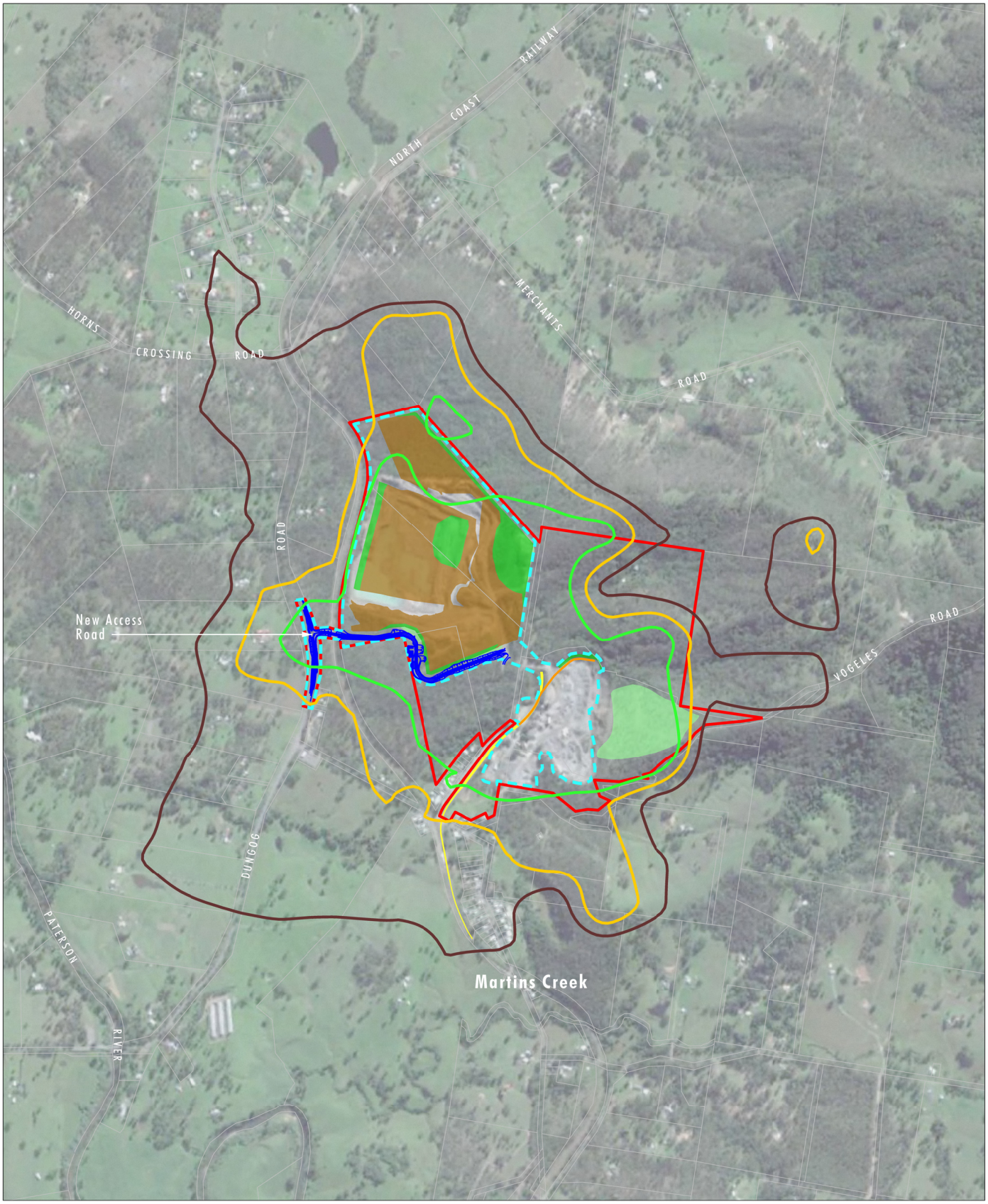


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE 5.5

Conceptual Quarry Plan Year 15
Predicted Noise Contours
Amalgamated

File Name (A4): R04/3957_156.dgn
20210219 11.16

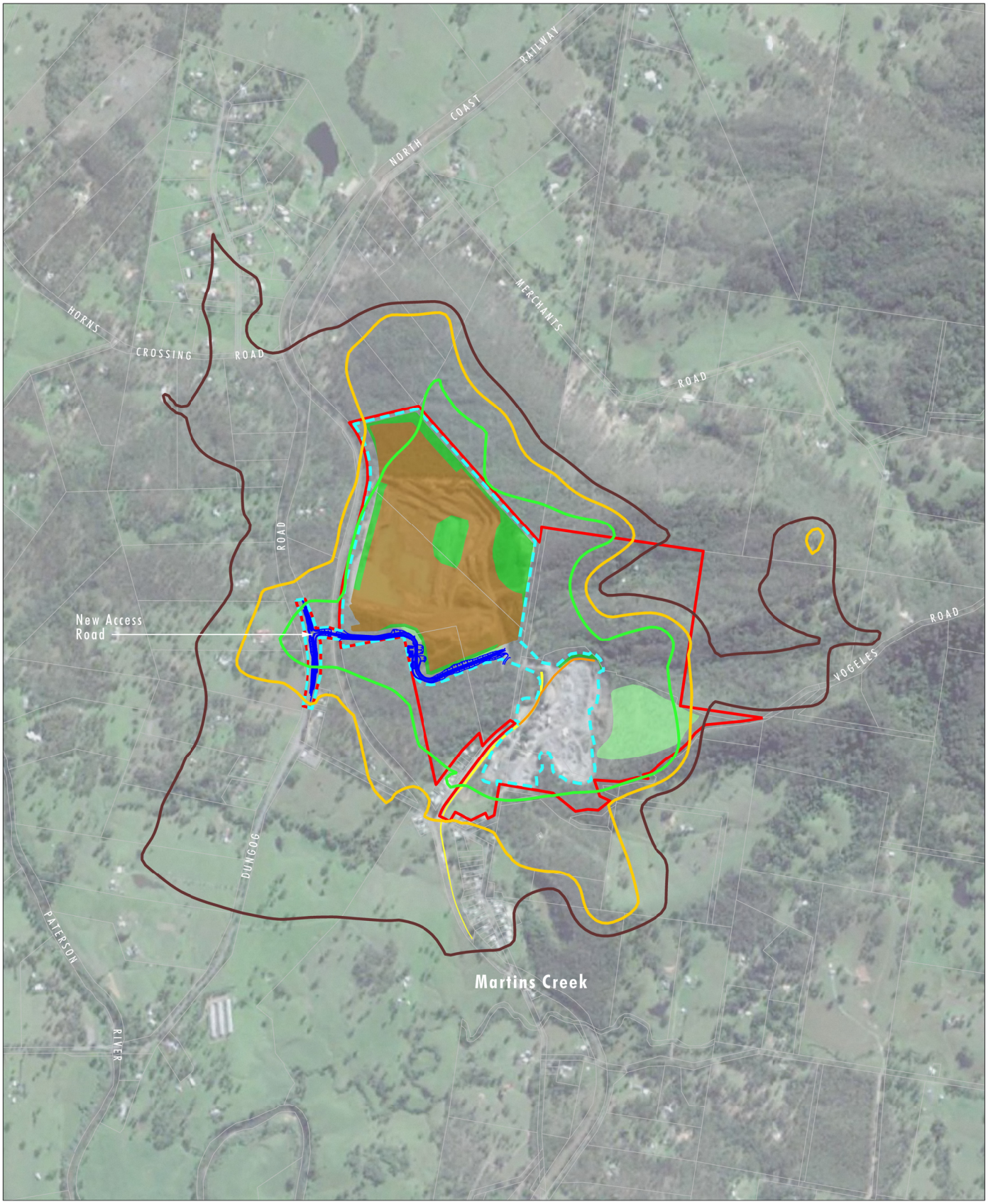


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE 5.6

Conceptual Quarry Plan Year 20
Predicted Noise Contours
Amalgamated

File Name (A4): R04/3957_157.dgn
20210219 11.17

Non-typical Day-time Noise Impacts

The exception to the typical day-time operating scenario is the campaign use of a large bulldozer to pre-strip the extraction area in the West Pit. A pre-strip campaign removes vegetation and recovers topsoil from an area of approximately one (1) hectare before excavation of the underlying rock can commence. The pre-strip activity lasts for approximately three (3) weeks each year and makes the working area safe for the drill, excavator and trucks to access. The bulldozer is only transported to site for the pre-strip campaign. As a campaign activity, the bulldozer could be required to work during noise-enhancing meteorological conditions to complete the required pre-strip.

An example of the maximum predicted $L_{Aeq,15minute}$ noise levels during pre-strip is presented in **Appendix 6**. The noise impacts are a function of the bulldozer location, the bulldozer activity and the prevailing meteorological conditions at the time. In the example in **Appendix 6 Table A6.5**, the noise impacts could exceed the daytime PNTL at up to 30 receiver locations under adverse weather conditions that enhance the propagation of the noise.

The pre-strip process is integral to unlocking the resource for extraction. As a short term activity, the pre-strip campaigns need to minimise any adverse impacts on neighbouring receivers. The management of the pre-strip activity is discussed in **Section 6**.

5.1.3 Operational Design using Probabilistic Noise Modelling

The probabilistic noise modelling was used in the design of the Revised Project. Probabilistic noise modelling considers the effect noise-enhancing and very noise-enhancing meteorological conditions have on the operability of a project. These are conditions that are not specifically identified by NPfI Fact Sheet D Table D1 but could occur over the life of the Project. The likely occurrence of these conditions has been identified in **Appendix 5**. While such conditions are not included in the NPfI modelling approach, there is an expectation that the noise controls that would be implemented under noise-enhancing meteorological conditions would also be in place during very noise-enhancing conditions.

The results of the probabilistic noise modelling approach presented in **Appendix 8** focus on the operability of the quarrying activities within the West Pit as these activities are mobile and transient in operation. The assessment in **Appendix 8** indicates that work on the higher, more exposed benches in the West Pit yields the lowest machine utilisation, particularly in Years 6 and 10. Based on the results presented in **Appendix 8**, the quarrying activity on the higher benches has to be prioritised during suitable weather conditions i.e. when the wind is blowing from the north, north-west or west. As the progression of the West Pit deepens, the utilisation of the higher benches in Years 15 and 20 could, with appropriate management, increase, as shown in the results in **Appendix 8.**

The duration machines can operate in the West Pit during noise-enhancing and very noise-enhancing meteorological conditions can also be increased through the strategic design of the extraction area. The quarry plans and associated noise models consider the placement of machines within the quarry area to shield affected receivers from the machines. The results of the probabilistic noise modelling approach presented in **Appendix 8** incorporates the relocation of machines to less exposed areas during noise-enhancing and very noise-enhancing meteorological conditions.

The probabilistic noise modelling also found the operability of the West Pit increases when the meteorological conditions retard the propagation of noise from the source to the receiver. The single-point modelling results presented in **Appendix 6** indicate there will be periods during retarding conditions where the predicted noise levels from the Revised Project are less than 30 dB(A). For conditions where the predicted noise levels are more than 10 dB below the ambient noise levels the Revised Project would appear inaudible.

5.2 Evening Shoulder Period

The Revised Project includes the loading of up to 10 road trucks during the evening shoulder period from 6:00 pm to 7:00 pm Monday to Friday.

The predicted noise levels at each receiver identified in **Appendix 3** is presented in **Appendix 6** for the loading of trucks during the evening shoulder periods of Years 2, 6, 10, 15 and 20 under calm and enhancing meteorological conditions**.** The residential receivers where the predicted noise levels in **Appendix 6 Table A6.7** could exceed the relevant evening shoulder PTNL are presented in **Table 5.4**.

Table 5.4 Predicted Maximum Year 2, 6, 10, 15 and 20 $L_{Aeq,15minute}$ Noise Levels for Truck Loading during the Evening Shoulder Period from 6:00 pm to 7:00 pm, dB(A)

Rec ID	Location	Ass. Grp	Shoulder PNTL	Exceed the relevant evening shoulder period project noise trigger levels		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R001	23 Station St	NAG01	38	-	43 [1]	-
R002	21 Station St	NAG01	38	-	-	44 [1]
R003	19 Station St	NAG01	38	-	-	44 [1]
R004	17 Station St	NAG01	38	-	43 [1]	-
R005	15 Station St	NAG01	38	-	41 [1]	-
R016	256 Dungog Rd	NAG05	37	-	40	-
R070	199 Dungog Rd	NAG06	37	38	-	-
R025	281 Dungog Rd	NAG07	37	-	42	-
R040	279 Dungog Rd	NAG07	37	39	-	-
	Total			2	5	2

Notes: [1] Maximum predicted noise levels in NAG01 occur during Stage 1 (modelled as Year 2) prior to completion of the new access road to Dungog Road through Lot 5.

The predicted noise levels from the arrival and loading of up to 10 trucks during the 1 hour evening shoulder period from 6:00 pm to 7:00 pm Monday to Friday could exceed the shoulder PNTL at two (2) receiver locations by more than 5 dB. Five (5) receiver locations could exceed the shoulder PNTL by between 3 dB and 5 dB. The exceedances at the five (5) properties in NAG01 (including the two (2) by more than 5 dB) occur only during Stage 1 (modelled as Year 2) of the Revised Project prior to completion of the new access road to Dungog Road through Lot 5. The completion of the new access road will result in a reduction of up to 5 dB in the maximum predicted noise levels for the five (5) properties in NAG01 identified in **Table 5.4**.

The residual impacts for the day/evening shoulder period operation based on the predicted noise impacts in **Table 5.4** and the VLAMP characterisation of the impacts are presented in **Section 7**.

5.3 Operational Noise: Evening and Night-time

5.3.1 Predicted Noise Levels

The proposed dispatch of 600,000 tonnes of product by train per annum under the Revised Project will require trains to be loaded during the evening and night-time period. The loading of trains during the evening and night-time periods would not commence until the new rail spur has been completed and rail wagon loading can occur in the northern section of the East Pit processing area. Additionally, the Proponent has committed to not commence train loading during the evening and night-time period until the noise impacts from the activity are confirmed by measurement of actual daytime rail loading using the new rail spur extension.

The predicted indicative noise levels at each receiver identified in **Appendix 3** is presented in **Appendix 6** for the loading of trains during the evening and night-time periods of Years 6, 10, 15 and 20 under calm and enhancing meteorological conditions**.** The residential receivers where the predicted noise levels in **Appendix 6 Table A6.7** could exceed the relevant evening and night-time PTNL are presented in **Table 5.5**.

Table 5.5 Receivers where the Maximum Predicted Evening and Night-time Noise Levels could exceed the PNTL or exceed the Night-time $L_{A1,1min}$ Sleep Disturbance Criteria, dB(A)

Rec ID	Location	Ass. Grp	PNTL Evening and Night	Exceed Evening PNTL			Exceed Night PNTL			
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	$L_{A1,1min}$ > 45 dB(A)
R001	23 Station St	NAG01	36/35	-	-	43	-	-	44	-
R002	21 Station St	NAG01	36/35	-	40	-	-	-	41	-
R003	19 Station St	NAG01	36/35	-	40	-	-	-	41	-
R004	17 Station St	NAG01	36/35	37	-	-	-	38	-	-
R005	15 Station St	NAG01	36/35	37	-	-	-	38	-	-
R006	13 Station St	NAG01	36/35	-	-	-	37	-	-	-
R007	11 Station St	NAG01	36/35	-	-	-	37	-	-	-
R008	9 Station St	NAG01	36/35	-	-	-	37	-	-	-
R009	7 Station St	NAG01	36/35	-	-	-	36	-	-	-
R010	5 Station St	NAG01	36/35	-	-	-	36	-	-	-
R011	3 Station St	NAG01	36/35	-	-	-	36	-	-	-
R013	1 Cory St	NAG02	36/35	-	-	-	36	-	-	-
R014	5 Cory St	NAG02	36/35	-	-	-	37	-	-	-
R015	3 Cory St	NAG02	36/35	-	-	-	37	-	-	-
R017	2 Cory St	NAG02	36/35	-	-	-	-	38	-	-
R035	20 Cory St	NAG04	35/35	-	-	-	36	-	-	-
R037	22 Cory St	NAG04	35/35	-	-	-	36	-	-	-
R038	24 Cory St	NAG04	35/35	-	-	-	36	-	-	-
R057	36 Cory St	NAG04	35/35	-	-	-	37	-	-	-
R070	199 Dungog Rd	NAG06	35/35	37	-	-	37	-	-	-
R122	181 Dungog Rd	NAG08	35/35	37	-	-	37	-	-	-
R133	147 Dungog Rd	NAG08	35/35	37	-	-	37	-	-	-
Total				6	2	1	16	3	3	0

The evening and night-time operating scenario modelled includes the loading of rail wagons with rock product using front end loaders in the northern section of the East Pit processing area and locomotives at idle within the property. The locomotives have been modelled in the area to the north of the current quarry entrance at the northern end of Station Street. The properties where the evening and night-time noise levels are predicted to exceed the PNTL by more than 5 dB are those located close to these loading operations, being R001 (23 Station St), R002 (21 Station St) and R003 (19 Station St).

The predicted noise impacts in **Table 5.5** are indicative of the likely impact based on anticipated sound power levels for loading equipment and the predicted effectiveness of the proposed attenuation measures. These indicative impacts will be quantified following the completion of the rail spur extension through the measurement of daytime noise levels. Predicted evening and night-time noise levels from the rail loading activities would be remodelled based on the measured noised levels during day time operations. Should measured noise levels and updated modelling indicate higher than expected noise levels, additional attenuation measure will be considered to ensure relevant noise criteria can be met before evening and night time loading operations using the new equipment is undertaken.

The residual impacts for the evening and night-time operations based on the predicted indicative noise impacts in **Table 5.5** and the VLAMP characterisation of the impacts are presented in **Section 7**.

5.3.2 Maximum Noise Events (Sleep Disturbance)

Noise sources that could lead to sleep disturbance are typically transient noises and often have tonal characteristics. No rock excavation or processing activities will occur during the evening or night-time period. Activities that could lead to sleep disturbance include:

- loading of rail wagons using front end loaders
- reversing beepers on the front-end loaders used to load the rail wagons

ENM's Single Point Calculation feature was used to determine noise levels from sleep disturbance events at the nearest residential receiver locations under calm and noise-enhancing meteorological conditions. The $L_{A1,1minute}$ noise levels associated with these activities when added to the respective predicted $L_{Aeq,15minute}$ noise level are predicted to be less than the sleep disturbance criteria at all receivers (refer to **Table 5.4** and **Appendix 6 Tables A6.6** and **A6.7**).

5.4 Construction Noise

The predicted construction noise levels at each receiver identified in **Appendix 3** is presented in **Appendix 6** for the two (2) modelled construction activities described in **Section 4** under calm and noise-enhancing meteorological conditions**.**

The number of potential exceedances of the construction noise management level at private properties during worst-case conditions from construction activities associated with the Revised Project is summarised in **Table 5.6**. The assessment of the worst-case noise levels from the construction activities is based on full machine utilisation with the construction activities occurring at the closest location to the receivers during the noise-enhancing conditions identified in **Appendix 5**. It is reasonable to assume the construction activities could occur in close proximity to the receiver locations during noise-enhancing conditions due to time constraints or safety-related issues which would make shut-down or equipment relocation neither feasible nor reasonable. Time constraints could occur during the preparation for the construction of the bridge over the North Coast Railway Line and track possession from ARTC. Safety-related issues would relate to completing construction activities to render them safe.

Table 5.6 Summary of Predicted Construction Noise Impacts

Scenario	New Access Road	Noise Bund/Barriers
No. properties exceeding criteria	64	31
Maximum noise level, dB(A)	57	58

The $L_{Aeq,15minute}$ construction noise management levels for all the residential receivers in NAGs 1 to 14 during recommended standard hours is 45 dB(A). It is predicted that up to 64 properties could experience $L_{Aeq,15minute}$ construction noise management levels above 45 dB(A) during the construction of the new access road into the Quarry from Dungog Road. This assessment is based on the worst-case conditions described above. The potential for exceedance of the construction noise management level at private properties can be reduced through the implementation of management strategies discussed in **Section 6.2**.

It is predicted 31 properties could experience $L_{Aeq,15minute}$ construction noise management levels above 45 dB(A) during the construction of noise mitigation measures in and around the East Pit processing plant area. These construction activities would be during recommended standard hours.

The construction of the new access road could also occur outside recommended standard hours during the construction of the bridge over the North Coast Railway Line. This would likely occur when the construction activities include track possession from ARTC of the North Coast Railway Line and would be addressed in the associated construction management plan.

5.5 Rail Noise from Trains on a Non-network Rail Line

The predicted noise levels in **Table 5.1** and **5.2** and **Appendix 6** includes rail loading using front end loaders, wagon shunting and idling locomotives that occur within the property boundary. To mitigate the noise levels from these activities the Revised Project will move these activities into the northern section of the East Pit processing area through the extension of the rail spur. Locomotives will no longer shunt wagons through the ballast rail loading facilities to be loaded. This removes locomotives from opposite the residential properties on Station Street during the loading activity. The extended rail spur will also enable the trains to park within the property boundary to the north of the current quarry entrance at the northern end of Station Street.

The one event that will still occur is trains entering and leaving the quarry premises along the rail spur opposite the residential properties on Station Street. The actual noise level generated by a train on the rail spur has been measured and is presented as a run-chart in **Chart 5.1**.

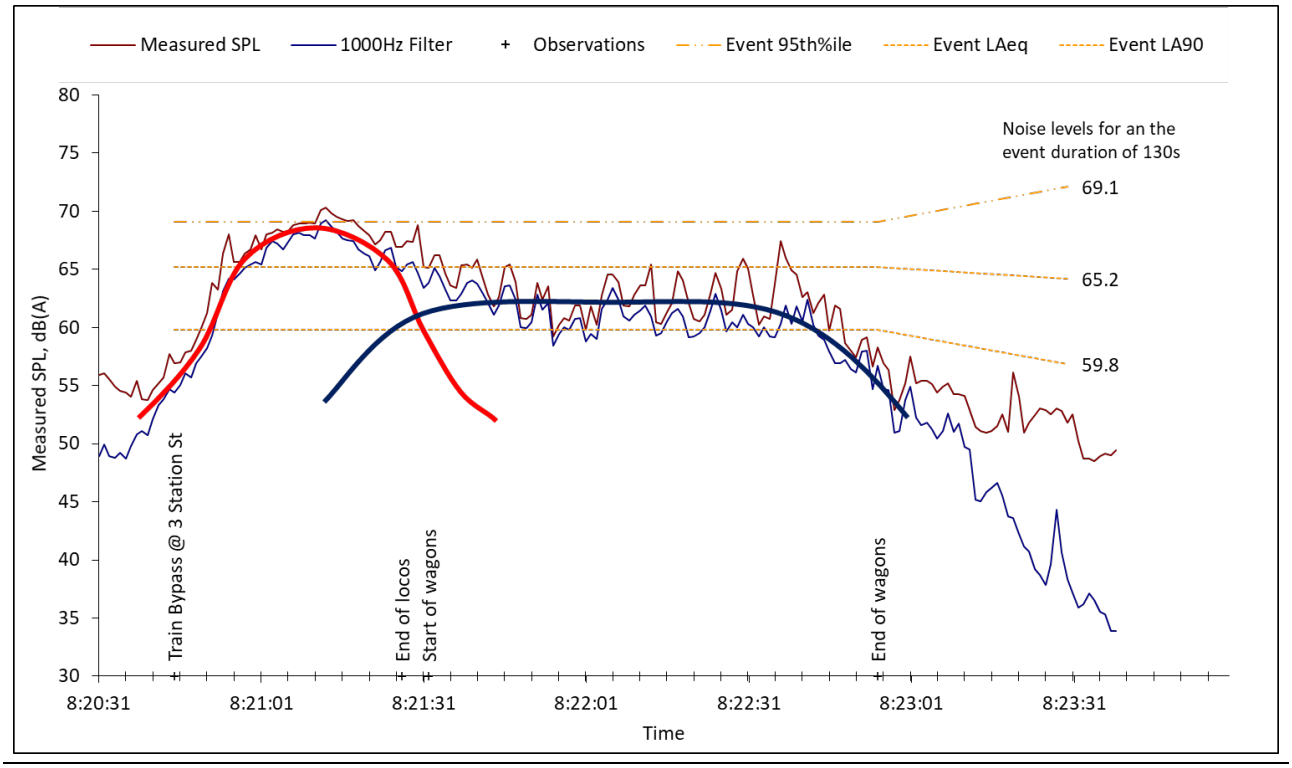


Chart 5.1 - Measured Noise Level at 3 Station Street of a Train Entering Martins Creek Quarry

The pass-by event in **Chart 5.1** has been used to assess the potential noise impacts from trains on the spur-line against the Pass-by Event noise level and Recommended Acceptable period based amenity level for non-network rail lines in Appendix 3 of the RING (reproduced in **Section 3 Table 3.10**). Appendix 3 of the RING also provides Recommended Maximum period-based amenity levels for non-network rail lines (reproduced in **Section 3 Table 3.10**).

The L_{Aeq} for the 130-second pass-by event in **Chart 5.1** is 65 dB(A). This equates to a $L_{Aeq,15minute}$ noise level of 57 dB(A). The maximum noise level 'not exceed by 95 per cent of the pass-by event' is 69 dB(A). The recommended 95th percentile noise level from non-network rail lines servicing an industrial site is 85 dB(A).

Each pass-by event adds to the period based (i.e. day, evening or night) L_{Aeq} noise level at the receivers on Station Street, the northern end of Cory Street, Douglas Street and the western end of Grace Avenue. There is a maximum number of train pass-by events that can occur before the recommended acceptable and maximum period-based amenity levels for non-network rail lines are exceeded.

The maximum number of pass-by events for the properties on Station Street, the northern end of Cory Street, Douglas Street and the western end of Grace Avenue before the recommended acceptable and maximum period-based amenity levels are exceeded is presented in **Table 5.7**.

Table 5.7 Predicted Number of Train Pass-by Events that can occur before exceeding RING Appendix 3 LAeq Noise Levels

Rec ID	Location	Ass. Grp	Number of Train Pass-by Event to not exceed Recommended Acceptable LAeq noise level			Number of Train Pass-by Event to not exceed Recommended Maximum LAeq noise level		
			Day	Evening	Night	Day	Evening	Night
R001	23 Station St	NAG01	> 20	1	< 1	> 20	3	2
R002	21 Station St	NAG01	> 20	1	< 1	> 20	3	2
R003	19 Station St	NAG01	> 20	1	< 1	> 20	3	2
R004	17 Station St	NAG01	> 20	1	< 1	> 20	3	2
R005	15 Station St	NAG01	> 20	1	< 1	> 20	3	2
R006	13 Station St	NAG01	> 20	1	< 1	> 20	3	2
R007	11 Station St	NAG01	> 20	1	< 1	> 20	3	2
R008	9 Station St	NAG01	> 20	1	< 1	> 20	3	2
R009	7 Station St	NAG01	> 20	1	< 1	> 20	3	2
R010	5 Station St	NAG01	> 20	1	< 1	> 20	3	2
R011	3 Station St	NAG01	> 20	1	< 1	> 20	3	2
R012	5 Douglas St	NAG02	> 20	4	3	> 20	13	9
R013	1 Cory St	NAG02	> 20	1	< 1	> 20	4	3
R014	5 Cory St	NAG02	> 20	3	2	> 20	8	6
R015	3 Cory St	NAG02	> 20	2	1	> 20	6	4
R017	2 Cory St	NAG02	> 20	2	2	> 20	7	5
R018	9 Cory St	NAG02	> 20	6	4	> 20	19	13
R022	8 Cory St	NAG02	> 20	3	2	> 20	11	8
R026	12 Cory St	NAG02	> 20	6	4	> 20	20	14
R020	54 Grace Ave	NAG03	> 20	2	2	> 20	7	5
R021	56 Grace Ave	NAG03	> 20	2	2	> 20	8	5
R023	52 Grace Ave	NAG03	> 20	3	2	> 20	9	6

During the daytime period, more than twenty pass-by events could occur without exceeding the Recommended Acceptable L_{Aeq} noise level at the closest receivers on Station Street. Over the four hour evening period, only one pass-by event is possible before the Recommended Acceptable L_{Aeq} noise level at the receivers on Station Street is exceeded. During the night-time period, a single pass-by event would result in the recommended acceptable L_{Aeq} noise level at the receivers on Station Street being exceeded.

During the evening period three pass-by events could occur without exceeding the Recommended Maximum L_{Aeq} noise level at the closest receivers on Station Street. Over the night-time period two pass-by events could occur before the Recommended Maximum L_{Aeq} noise level at the receivers on Station Street is exceeded.

5.6 Rail Noise from Trains on Network Rail Lines

Over the life of the quarry it is understood trains have been dispatched during both the day and night-time periods.

The maximum dispatch of 600,000 tonnes per annum would require the loading of two trains per 24-hour day. Due to the limitation of available train paths and train cycle times it is likely the two trains would be spread between the day and night period with only one train per period. As noted in **Section 4.5**, a third train could also be loaded during a 24 hour period.

The increase in rail activity would not result in an intensification of day and night period rail traffic from Martins Creek Quarry on network rail lines. The proposed increase in the dispatch of product by rail would be associated with a reduction in the cycle time resulting in trains being loaded more regularly. This increase in loading would not increase the number of trains during the day-time or night-time periods but increase the number of day-time and night-time periods that trains are dispatched from Martins Creek Quarry. Therefore, there would be no increase in the period based $L_{Aeq,Day\text{-}time}$ or $L_{Aeq,Night\text{-}time}$ noise levels due to train movements from Martins Creek Quarry on network rail lines. Additionally, there would be no increase in the L_{Amax} (95^{th}%ile) noise level from train pass-by events on network rail lines.

5.7 Road Traffic Noise

Daytime noise levels (L_{Aeq}) at the road traffic noise logger locations would likely be dominated by traffic noise. Using total traffic counts from the survey period, a total traffic noise level could be calculated using CoRTN. These results are presented in **Table 5.8.**

Table 5.8 Comparison of Measured Noise Levels to Predicted Traffic Noise Levels Using CoRTN

Measurement location	Measured Average Day Period LAeq in dB(A)	Calculated Traffic Noise Day Period LAeq in dB(A)
Traffic Noise Measurement Location 1	62	64
Traffic Noise Measurement Location 2	60	62

Results in **Table 5.8** show a 2 dB difference between measured and predicted day period road traffic noise levels at Traffic Noise Measurement Locations 1 and 2. At Location 1 the levels were calculated based on a speed limit of 100 km/hr, however the speed limit changes to 80 km/hr near to this location so vehicles may not have been travelling at full speed. When using a speed of 80 km/hr, the calculated daytime LAeq is 63 dB(A) which correlates well with the measured noise level. At Location 2 the levels were calculated based on a speed limit of 50 km/hr. The monitoring location was opposite the Prince Street intersection where traffic slows for a 'dog-leg' in the road. When using a speed of 40 km/hr, the calculated daytime LAeq is 61 dB(A).

The modelling results for the Traffic Noise Measurement Locations in **Table 5.8** indicate CoRTN is potentially over predicting the road traffic noise levels by 1 to 2 dB. These over predictions do not affect the assessment of the relative change in noise levels as a result of the additional quarry related traffic.

5.7.1 Worst Case Traffic Noise Impacts

Road traffic noise levels with and without quarry trucks have been calculated for the road traffic noise receivers along the proposed primary haul route (refer to **Table 3.13**). **Table 5.9** presents the results for the assessment of road noise impacts on nearest receivers. This assessment is based on the maximum daily vehicle movements of 140 laden trucks per day. **Table 5.10** presents the assessment of road noise impacts on Sensitive Receivers which is based on 20 laden truck movements per hour (being the maximum hourly truck laden movements). Results and applicable criteria for each receiver are presented in **Tables 5.9** and **5.10**. Predicted exceedances of the RNP criteria are shown in bold.

The results are rounded to one decimal place to enable the relative increase in noise levels to be shown.

Table 5.9 Calculated L_{Aeq} Road Traffic Noise Levels Without and With Proposed Quarry Trucks at Residential Receiver Locations

Modelled as: Capped Maximum of 140 Laden Trucks per day plus the return trip

Residential Receiver Zones 1 to 5	RNP criteria, dB(A)	Baseline road traffic noise level, dB(A)	Road traffic noise level including proposed Quarry trucks, dB(A)	Increase in [1] noise level, dB(A)	RNP assessment period
Nearest Receiver 4	60	55.0	58.2	3.2	Day period
Nearest Receiver 5	60	54.0	56.3	2.3	Day period
Nearest Receiver 6	60	57.3	58.2	0.9	Day period
Nearest Receiver 7	60	**62.9**	**63.9**	1.0	Day period
Nearest Receiver 8	60	**62.7**	**64.0**	1.3	Day period
Nearest Receiver 9	60	57.9	58.7	0.8	Day period
Nearest Receiver 10	60	59.5	**60.4**	0.9	Day period
Nearest Receiver 11	60	**62.4**	**63.2**	0.8	Day period
Nearest Receiver 12	60	**60.3**	**61.2**	0.9	Day period
Nearest Receiver 13	60	**66.4**	**66.8**	0.4	Day period
Nearest Receiver 14	60	**64.4**	**64.8**	0.4	Day period
Nearest Receiver 15	60	**62.8**	**63.4**	0.6	Day period

Notes: [1] The results are shown to one decimal point in accordance with the requirements of the RNP

Table 5.10 Calculated L_{Aeq} Road Traffic Noise Levels Without and With Proposed Quarry Trucks at Sensitive Receiver Locations

Modelled as: Capped Maximum of 140 Laden Trucks per day plus the return trip
Peak 1 hour Capped Maximum of 20 Laden Trucks per day plus the return trip

Sensitive Receiver	RNP criteria, dB(A)	Baseline road traffic noise level, dB(A)	Road traffic noise level including proposed Quarry trucks, dB(A)	Increase in [1] noise level, dB(A)	RNP assessment period
Sensitive Receiver 1	50	**60.1**	**61.6**	1.5	1 hour
Sensitive Receiver 2	55	**63.3**	**64.3**	1.0	Day period
Sensitive Receiver 3	45	**64.4**	**64.9**	0.5	Worst hour
Sensitive Receiver 4	55	**60.6**	**61.6**	1.0	Day period
Sensitive Receiver 5	50	**62.0**	**63.2**	1.2	1 hour
Sensitive Receiver 6	60	56.3	57.1	0.8	Day period
Sensitive Receiver 7	50	**64.0**	**65.5**	1.5	1 hour
Sensitive Receiver 8	55	**63.3**	**64.3**	1.0	Day period

Notes: [1] The results are shown to one decimal point in accordance with the requirements of the RNP

The results in **Table 5.9** show that baseline/existing road traffic noise levels exceed the RNP criteria for some receivers due to existing traffic rates without the quarry trucks present. The addition of quarry trucks does not result in an exceedance of the RNP criteria where it was not already calculated to exceed the criteria with the baseline traffic levels except at *Nearest Receiver 10*. Where the RNP criteria are already exceeded the predicted increase in road traffic noise due to the quarry trucks is predicted to be less than 2 dB. The increase in predicted noise levels at *Nearest Receiver 10* due to the addition of quarry trucks is 0.9dB. The RNP states that noise level increases of up to 2 dB are considered barely perceptible to the average person.

The results in **Table 5.10** show that baseline/existing road traffic noise levels exceed the RNP criteria for all the sensitive receivers (except Receiver 6) due to the proximity of the receiver to the road carriageway and existing traffic rates. Sensitive Receiver 6 complies with the RNP criteria with and without the quarry trucks. The addition of quarry trucks will increase the road traffic noise levels at all the sensitive receivers assessed. However, the maximum traffic generation scenario modelled will not increase the road traffic noise levels at any sensitive receiver by more than 2 dB and therefore meet the relevant RNP criteria for new developments.

5.7.2 Non-Peak Traffic Noise Impacts

Tables 5.9 and **5.10** show the increase in road traffic noise levels for the capped maximum of 140 laden trucks per day (plus the return trip) and the capped maximum of 20 laden trucks per hour. These modelled scenarios represent worst-case traffic conditions. Based on the analysis of the historical weighbridge data presented in **Appendix 9,** these road traffic scenarios are not, and cannot, be sustained on a daily basis. This is because of the maximum cap on truck movements and cap on annual tonnages. Accordingly, the results presented in **Tables 5.9** and **5.10** represent peak operating conditions only.

Appendix 9 includes an assessment of modelled road noise impacts from non-peak operating conditions; that is, road noise impacts associated with lower truck numbers. These modelled scenarios in **Appendix 9** are based on the review of historical traffic generation from Martins Creek Quarry. As would be expected, the analysis of non-peak traffic noise shows that road noise impacts would be lower than during peak operating conditions.

5.7.3 Reduced Road Noise Impacts in Martins Creek Due to Access Changes

There will be a reduction in the road traffic noise levels for properties in Station Street, the northern end of Cory Street and Grace Avenue once the new access road is constructed and the road haul trucks no longer access the Quarry via Station Street. The results of this analysis and applicable criteria for each receiver are presented in **Table 5.11.**

Table 5.11 Calculated L_{Aeq} Road Traffic Noise Levels from Quarry Trucks on Station Street, dB(A)

Modelled as: Capped Maximum of 140 Laden Trucks per day plus the return trip
Peak 1 hour Capped Maximum of 20 Laden Trucks per day plus the return trip

Receivers Zone 0	RNP criteria, dB(A)	Road traffic noise level including Quarry trucks, dB(A)	Estimated baseline road traffic noise level, dB(A)	Estimated decrease in road traffic noise level, dB	RNP assessment period
Nearest Receiver 1	55	64	50	- 13	Worst hour
	- [1]	63	50	- 12	Day Period
Nearest Receiver 2	55	63	52	- 11	Worst hour
	- [1]	62	52	- 10	Day Period
Nearest Receiver 3	55	60	50	- 10	Worst hour
	- [1]	59	50	- 9	Day Period

Notes: [1] No day -period criterion for local roads.

The results in **Table 5.11** show a 9 to 13 dB reduction in the road traffic noise levels for properties in Station Street, the northern end of Cory Street and Grace Avenue once the new access road is constructed and the quarry trucks no longer access the Quarry via Station Street.

6.0 Noise Mitigation Measures

6.1 Operational Noise

The noise control measures detailed in **Section 4.2** represent a level of commitment by Daracon to ensure the Revised Project is operable within the existing noise limits. Daracon has committed to the implementation of these controls over the life of the Revised Project as will be detailed as part of a revised Noise Management Plan (NMP).

As outlined in **Section 4.2**, the identification and assessment of reasonable and feasible operational and engineered noise controls has been considered throughout the design process for the Revised Project and incorporated into the detailed noise modelling. The incorporation of these reasonable and feasible controls has reduced the noise affectation area and related noise impacts associated with the Revised Project as far as practicable.

Daracon will continue to manage operations to achieve the approved operation's noise limits throughout the life of the Revised Project through the continued implementation of an adaptive management approach, focused on implementing appropriate operational controls and management strategies to minimise noise impacts. The approach will vary during different quarry stages and weather conditions and will also consider evolving technology and associated equipment noise levels. Following is a range of controls and strategies that may be adopted as required to meet noise performance requirements:

Quarry operations:

Probabilistic noise modelling has been used to investigate both the design and operability of the West Pit extraction area as it relates to the design and operation of the Revised Project. This modelling approach considers the effect noise-enhancing and very noise-enhancing meteorological conditions have on machine location, machine utilisation and how one set of activities can be modified or even shut down to allow another set of activities to proceed. The results of the probabilistic noise modelling approach are presented as an estimate of the percentage of time different activities can proceed within different areas of the Quarry (refer to **Section 5** and **Appendix 8**). The focus of the probabilistic noise modelling results presented in **Appendix 8** is on the operability of the quarrying activities within the West Pit. The assessment in **Appendix 8** indicates:

- that machines working on the higher, more exposed benches in the West Pit yield the lowest machine utilisation and will need to be relocated during periods of noise-enhancing meteorological conditions

- the quarrying activity on the higher benches will need to be scheduled for times when the dominant prevailing weather conditions do not enhance the noise propagation towards the receivers to the west and north of the West Pit. Quarrying activity on the higher benches would then need to be prioritised when the appropriate conditions occur

- during weather conditions that enhance the noise propagation towards sensitive receiver locations the 'mix and match' of machines and activities can be offset by the relocation of activities away from exposed area. This may include reducing the number of machines operating in the West Pit, moving a specific machine into a location that is acoustically shielded so that other machines can continue to operate, or the complete shut down of the West Pit

- manage the West Pit activities to compliment the truck movements on the access road through Lot 5 to Dungog Road. During periods of high truck movement and weather conditions that enhance the noise propagation, this may include shutting down some or all activities within the West Pit.

Bulldozer operations for pre-strip in the West Pit:

The progress of the quarry footprint is relatively slow with pre-strip activities occurring before extraction commencing in the respective area. Pre-strip occurs over a period of approximately three (3) weeks. However, the bulldozer used in the pre-strip campaigns to remove vegetation and recover topsoil before excavation of the underlying rock can commence may need to work during noise-enhancing meteorological conditions to complete the pre-strip and/or make the pre-strip area safe. To minimise adverse noise impacts the pre-strip campaigns should:

- delay start times in the morning to not coincide with peak road truck movements
- cease bulldozer operations in exposed locations during adverse weather conditions
- have the bulldozer use low gear when reversing
- where practical, work on the eastern side of stockpiles so the stockpiles act as noise barriers
- schedule topsoil pre-stripping to avoid periods of the year where the dominant prevailing weather conditions enhance the noise propagation towards the receivers to the west and north of the West Pit
- implement a notification letterbox drop or equivalent to provide advanced warning of pre-strip activities, times over which these will occur, impacts and mitigation measures.

Excavator and front-end loader operations:

- use ‘silent horns’ or UHF radios to communicate with trucks if appropriate and does not compromise safety
- manage the drop of the first load into truck bodies to minimise impact noise from the material.

Drilling operations:

- re-schedule drilling in exposed locations for periods when the weather conditions do not enhance the noise impacts

In addition to the implementation of noise mitigation strategies during periods of adverse weather conditions, Daracon will implement the following general noise mitigation measures as part of the Revised Project:

- use of smart broadband ‘Quacker' reversing alarms
- regular inspection and maintenance of noise attenuation systems
- implement a process for periodic review of the noise performance of the equipment fleet
- adherence to the internal policy and code of conduct for drivers
- implement work area-specific controls for high-risk areas such as pre-strip in the West Pit.

The implementation of these controls to meet the approved noise criteria over the life of the Revised Project will be detailed as part of the revised NMP for the Quarry (refer to **Section 8.1**).

Central to the management of noise impacts where performance management is integral to the ongoing operation of the development is the implementation of a continuous noise monitoring system that enables the proactive and real-time management of operations during noise enhancing conditions. Performance-based noise management relies on:

- the feedback of information on the contribution of the noise source to the acoustic environment at the monitoring location
- the design of control options that can be implemented by the Quarry during adverse weather conditions
- an audit process that assesses the effectiveness of the control options
- consent and license conditions that support the implementation of performance-based noise management.

The installation of a continuous noise monitoring system will initially be required to facilitate the implementation and management of the noise controls within the West Pit. The long term requirement for a continuous noise monitoring system will be based on the demonstrated performance of the Revised Project to meet the approved noise criteria.

6.2 Construction Noise

The construction noise and vibration impacts have been assessed in accordance with DECC *Interim Construction Noise Guideline* (ICNG). Mitigation measures will be required where the predicted construction noise levels exceed the construction noise management levels for residential receivers.

Prior to the commencement of works, a Construction Noise Management Plan (CNMP) would be prepared and implemented in accordance with the requirements of the ICNG. The CNMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable. The CNMP would also outline the mitigation measures required to reduce the noise and vibration impact from construction activities. Reasonable and feasible noise and vibration mitigation measures that would be considered, include:

- regularly training workers and contractors (such as site induction and toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise and vibration
- avoiding any unnecessary noise when operating plant, handling material and the simultaneous operation of noisy plant and equipment within discernible range of sensitive receivers
- keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site
- maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances
- using the most suitable equipment necessary for the construction works at any one time
- directing noise-emitting plant away from sensitive receivers
- regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc

- using non-tonal reversing/ movement alarms such as broadband (non-tonal) alarms or ambient noise-sensing alarms for all plant used regularly onsite (greater than one day), and for any out of hours works
- use of quieter and less vibration emitting construction methods where feasible and reasonable
- managing the commencement time and duration of operation of equipment for vibration compactions of roadbase and construction foundations
- planning construction activities with special audible characteristics (high noise impact, intensive vibration, impulsive or tonal noise emissions) to not starting earlier than 8:00 am; and be limited to continuous blocks not exceeding three hours each with respite between each block of activity.

Where standard mitigation measures have been implemented and the noise levels still exceed the noise management levels, the following additional mitigation measures can be adopted:

- Notification letterbox drop or equivalent to provide advanced warning of detailed work activities, times over which these will occur, impacts and mitigation measures.
- Specific notification to identified stakeholders to provide additional relevant and informative information than is covered in general letterbox drops.
- Phone calls and individual briefings to inform stakeholders about the impacts of high noise-generating activities and the mitigation measures that will be implemented. Provide stakeholders with the opportunity to comment on the specific aspects of the project. Where the resident cannot be contacted/met with individually, then an alternative form of engagement should be used.
- Respite offers should be considered where there are high noise-generating activities near receivers.
- Verification measurement to check noise levels and follow up on reasonable complaints.

A Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where practicable. The Community Liaison Plan would also include contact details for a 24-hour construction response line, Project Infoline and email address for ongoing stakeholder contact throughout the construction phase. The community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan.

7.0 Residual Noise Impacts

Residual noise impacts occur when the best achievable noise levels predicted for a private residential receiver are greater than the relevant project noise trigger levels, and all feasible and reasonable source and pathway noise mitigation measures have been considered. The significance of any residual impact can be used to assess the need for receptor-based treatment options. In extreme cases, significant levels of residual noise impact may lead to the triggering of voluntary acquisition rights under the VLAMP.

The Quarry has been in operation on a continual basis since 1914. There is an expectation within Section 6 of the NPfI that an approved modification to an existing development would include achievable noise limits that are less than the noise levels generated by the operation prior to the modification. For the purpose of this assessment, the existing noise emissions from the Quarry (based on the monitoring and noise modelling results) have been used to establish the project noise trigger levels for the assessment of the day-time operation of the East Pit processing area of the Revised Project.

For new developments, the project noise trigger level is established as the most stringent of the project intrusiveness noise level and project amenity noise level. The return and loading of road trucks during the day/evening shoulder period, train loading during the evening and night-time period, the expansion of the West Pit extraction area and use of the new access road to Dungog Road through Lot 5 have all been assessed as new development.

Day-time Operations

Where the noise impacts cannot achieve the project trigger noise levels, both the NPfI (refer to **Table 3.16**) and VLAMP (refer to **Table 3.17**) provide guidelines for the assessment of the residual noise impacts. The method of assessing residual noise impact differs between the NPfI and the VLAMP. However, the VLAMP has been specifically developed as the policy to be applied for the assessment of residual impacts for quarry and mining operations.

The residual impacts for the daytime operations and the VLAMP characterisation of the impacts are provided in **Table 7.1**.

Table 7.1 Residual Impact Assessment

Assessment Description	Receiver Location(s)	Residual Impact, dB			VLAMP Characterisation of Impacts
		PNTL	Predicted	Difference	
Day-time Operational Noise - Year 2					
Without rail loading	R034	40	47	> 5 dB	Moderate
	R041, R055, R040	40	43	≥ 3 but ≤ 5 dB	Marginal
	R066, R070, R025, R031, R053	40	44		
	R047	40	45		

Assessment Description	Receiver Location(s)	Residual Impact, dB			VLAMP Characterisation of Impacts
		PNTL	Predicted	Difference	
With rail loading	R001	58	64	> 5 dB	Moderate
	R002, R003	58	66		
	R004	58	67		
	R005	58	64		
	R019, R041	40	46		
	R055, R034, R076	40	47		
	R066, R070	40	48		
	R006	58	62	≥ 3 but ≤ 5 dB	Marginal
	R058	47	51		
	R061	47	50		
	R064, R065	46	49		
	R043, R031 R122, R053, R133	40	44		
	R025, R040, R047	40	45		
	R115, R143	40	43		
Day-time Operational Noise - Years 6, 10, 15 and 20					
Typical operations with 20 laden trucks per hour	R025	40	48	> 5 dB	Moderate
	R016, R040, R034	40	45	≥ 3 but ≤ 5 dB	Marginal
	R019, R070, R031, R046		44		
	R041, R055, R047, R067		43		
Typical operations with 12 laden trucks per hour	R034	40	45	≥ 3 but ≤ 5 dB	Marginal
	R016, R025		44		
	R031, R040, R047		43		

Day-time activities will also include the use of a pre-strip bulldozer over a period of approximately three weeks annually. The residual noise impacts of the pre-strip campaign is a temporary impact that could be significant if the bulldozer activities are not carefully managed.

Day/Evening Shoulder Period

The Revised Project includes substituting the 6:00 am to 7:00 am operational window for the loading of up to 10 road trucks during the day/evening shoulder period from 6:00 pm to 7:00 pm Monday to Friday. The residual impacts following completion of the new access road to Dungog Road for the day/evening shoulder period and the VLAMP characterisation of the impacts are provided in **Table 7.2**.

Table 7.2 Residual Day/Evening Shoulder Impact Assessment

Assessment Description	Receiver Location(s)	Residual Impact, dB			VLAMP Characterisation of Impacts
		PNTL	Predicted	Difference	
Day/Evening Shoulder Period Operational Noise - Years 6, 10, 15 and 20 [1]					
Return and loading of up to 10 road trucks	R016 R025	37 37	40 42	≥ 3 but ≤ 5 dB	Marginal

Notes: [1] The predicted maximum noise levels in **Table 5.4** for NAG01 occur during Stage 1 (modelled as Year 2) prior to completion of the new access road to Dungog Road through Lot 5. As a transitional impact, these impacts have not been included in the residual impact assessment.

Evening and Night-time Operations

To achieve the proposed dispatch of 600,000 tonnes of product by train per annum the Revised Project will need to load trains during the evening and night-time period. The commitment from the Proponent is to not commence train loading during the evening and night-time period until the noise impacts from the activity can be quantified. The predicted noise impacts in **Section 5.3** are indicative of the likely impact but would be quantified following the completion of the rail spur extension. The quantification of the evening and night-time rail loading activities would then be based on the measured day-time noise levels.

The indicative (based on modelling) residual impacts for the evening and night-time operations and the VLAMP characterisation of the impacts are provided in **Table 7.3**.

Table 7.3 Residual Evening and Night-time Impact Assessment

Assessment Description	Receiver Location(s)	Residual Impact, dB			VLAMP Characterisation of Impacts
		PNTL	Predicted	Difference	
Evening Operational Noise - Years 6, 10, 15 and 20					
Train loading	R001	36	43	> 5 dB	Moderate
	R002, R003	36	40	≥ 3 but ≤ 5 dB	Marginal
Night-time Operational Noise - Years 6, 10, 15 and 20					
Train loading	R001 [1] R002, R003 [2]	35 35	44 41	> 5 dB	Significant
	R004, R005, R017	35	38	≥ 3 but ≤ 5 dB	Marginal

Note: [1] Characterised as significant under the NPfI

. [2] Characterised as moderate under the NPfI at the predicted maximum noise level is less than equivalent 15-minute amenity noise level (where the equivalent 15-minute amenity noise level is calculated as amenity noise level plus 3dB)

8.0 Monitoring and Management

8.1 Noise Management Plan

The Revised Project will require an updated Noise Management Plan (NMP). The NMP will detail the implementation of monitoring and management controls to be utilised to manage residual noise impacts associated with site operations. The NMP would include:

- noise objectives and targets consistent with the Development Consent
- noise management measures in place at the site
- provision of general noise awareness training for key operational staff
- noise monitoring processes implemented at the site to provide for ongoing noise management, including performance-based noise monitoring (refer to **Section 8.2**)
- monitoring and determination of compliance with relevant noise criteria provided in the Development Consent
- stakeholder consultation
- complaint/enquiry handling process including maintenance of a 24-hour community contact line
- a roles and responsibilities matrix, with responsibilities being clearly defined through all levels within the operation.

8.2 Performance-based Noise Management

8.2.1 Predictive forecasting system

During adverse weather conditions, Daracon will initiate changes to operations to mitigate potential noise impacts. Daracon will incorporate predictive forecasting of adverse weather conditions into day to day operations to identify when and where management measures are likely to be required as a result of an adverse weather event. A typical response to the prediction of an adverse weather event could include:

- key operational personnel alerted by the environmental forecast system, or other similar system(s) that operations may need to be modified to avoid noise impact at sensitive receivers
- monitoring the noise levels recorded by the real-time noise monitoring network to assess when the noise levels are approaching predefined noise conditions and the modification of operations to adapt to the situation as required
- temporarily ceasing or modifying part of the operations, if required, to prevent noise criteria being exceeded
- recording the actions taken when management measures are implemented

The meteorological monitoring site will be linked to a real time monitoring system allowing access to real time weather conditions and the effective management of operations during periods of adverse weather.

Continuous noise monitors will allow noise levels and local meteorological data to be analysed and compared against the Development Consent and EPL conditions providing information on the ongoing performance of the quarry. The minimum requirements for the real-time noise monitoring network will include SMS alarming to key operational personnel if a trigger noise condition has been reached. The SMS alerts will be set below the statutory noise criteria, allowing action to be taken before compliance limits are reached.

Following an alarm, a review of operations and current meteorological conditions will be undertaken by key operational personnel in order to identify if the site operations are contributing to the recorded noise levels. If elevated noise levels are deemed to be as a result of site activities, mitigation measures will be undertaken to achieve compliance. This may include modifications to operations, such as those outlined in **Section 6**.

Data collected by the continuous noise monitoring units will be reviewed on a regular basis to establish any correlation between meteorological conditions and elevated noise levels from the Quarry. This data can then be used to proactively manage noise impacts and mitigate the potential for noise enhancement as a result of meteorological conditions. Specifically, the data will be reviewed to identify if the recorded noise levels are trending towards non-compliance with noise criteria.

8.2.2 Real-time Noise Monitoring

Real-time monitoring is used as an on-site monitoring tool to assist with the investigation of complaints or noise-related issues and to inform sites that noise levels are elevated and are nearing compliance limits. Real-time noise monitoring units are designed to send alerts advising operational personnel that noise at the monitor is approaching performance criteria. Action can then be taken to modify operations where appropriate.

Real-time noise monitors are set up to record directional, low-frequency noise sources. Alarms can be set up to trigger if the noise source from the area of influence (direction of the operation) exceeds the predetermined level for six 5-minute periods (noted as two 15-minute recordings). Noise alarms are not triggered in wet weather or when wind speed is greater than 3 m/s (that is, when noise criteria do not apply due to meteorological conditions). The alarms are generally set to be at least 2 dB below the compliance criteria at the location of the monitor or the modelled limit at the monitor that would be representative of the nearest sensitive receiver. The alarms continue to be triggered every 15 minutes if the noise from the area of interest continues above the trigger limit. In the event an alarm is triggered, the site will record actions taken in response to the alarms in accordance with site procedures.

It is proposed real-time noise monitors are set up at the two (2) locations to the west of the Quarry. Two possible locations are identified in **Table 8.1**. The alarms would be triggered if the noise source from the area of influence (direction of the operation) exceeds the predetermined level during the hours of operation from 7:00am to 6:00 pm.

Table 8.1 Real-time Noise Monitor Location and Adopted Noise Monitoring Criteria

Receiver Area/Residences represented by monitoring location	Possible real-time noise monitor location [1]	Closest privately-owned residence	Proposed Noise Monitoring Criteria for the Revised Project, dB(A)	
			Day/Evening/Night LAeq,15minute	Night LA1,1minute
NAG 5/6	249 Dungog Road	R041	44/35/35	45
NAG 9/10	9 Horns Crossing Road	R063	42/35/35	45

Note: [1] Alternate location will be sought if consent for the monitor(s) is not granted by the property owner

8.2.3 Trigger Action Response Plan

It is recommended that the NMP include the development of a Trigger Action Response Plan (TARP) that includes an Incident Investigation and Response process that:

- is implemented following notification of elevated noise levels through SMS Alarm or complaint
- records the actions taken by site personnel following notification of elevated noise levels including mitigation measures undertaken to achieve compliance
- in the event that an exceedance of the noise impact assessment criteria is identified, guides the notification process for relevant government agencies and any affected landowners within the statutory timeframe.

If a non-compliance is identified or a request for installation of noise impact mitigation measures is received, the NMP will document the corrective or preventative actions to be implemented in accordance with the Development Consent. The NMP will also document the review process required to assess the effectiveness of the corrective/preventative action taken and specify the timeframe for the review following the implementation of the corrective action.

8.3 Review Process

It is recommended that the NMP include a review process so that:

- Data collected by the continuous noise monitoring units is reviewed on a regular basis to establish any correlation between meteorological conditions and elevated noise levels. This information could then be used to proactively manage noise impacts and mitigate the potential for noise enhancement as a result of the meteorological conditions.
- Data collected by the continuous noise monitoring units is reviewed to identify if the recorded noise levels are trending towards non-compliance with site noise criteria.

8.4 Change Management Process

During the operational phase of the Revised Project, it is recommended the NMP include a change management process that is implemented, at a minimum, in the following instances:

- when significant changes are made to the number of equipment items or type of equipment utilised on the site, providing for evolving technology and equipment changes, to ensure the potential risk of noise criteria being exceeded is minimised

- prior to the purchase or rental of equipment that, by its size or capacity, has the potential to result in exceedance of noise criteria.

The change management process should consider the noise performance of the Revised Project and the impact the proposed changes may have on the operational noise levels. It is also recommended the NMP include a trigger to initiate noise modelling of the predicted noise emissions from operational changes that may result in non-compliance with the relevant statutory approval(s).

8.5 Incident investigation and response

In the event that an exceedance of the noise criteria is identified, Daracon will notify the relevant government agencies, report within the statutory timeframes and liaise with any affected landowners.

8.6 Monitoring

Noise monitoring at the Quarry will take the form of either compliance monitoring or performance management monitoring, in accordance with the approved NMP. Compliance monitoring is via attended monitoring at defined locations, at regular intervals as set out in the statutory requirements. Performance management monitoring utilises real-time noise monitoring systems on a continuous basis and allows operations to be managed to reduce noise where necessary. Should compliance monitoring identify noise levels which are at, or above the relevant criteria this will trigger further performance management monitoring at additional sites over a wider area to allow Daracon to gauge the level of noise and its audibility in the wider environment. Further details on each type of monitoring are provided in the sections below and suggested monitoring locations are shown on **Figure 8.1**.

8.6.1 Performance Management Monitoring

To ensure ongoing compliance with the noise criteria, Daracon will actively manage the operations by controlling the placement and use of equipment, particularly during unfavourable meteorological conditions, as detailed in the NMP.

To assess the effectiveness of the control measures and when they should be implemented, Daracon will implement a performance monitoring program based around continuous noise monitors including:

- measurement and reporting against criteria using the $L_{Aeq,15minute}$ descriptor and when appropriate the $L_{Aeq, period}$ descriptor

- measurement and reporting against the cumulative industrial noise level criteria using the $L_{Aeq,period}$ as the descriptor

- identification and reporting of transient impact noise levels against the $L_{A1,1minute}$ sleep disturbance descriptor

- the establishment and regular review of alarm triggers for each of the descriptors.

The response to reports and alarms from the continuous noise monitors will be documented in the NMP.

8.6.2 Compliance Noise Monitoring

It is recommended that attended monitoring for compliance assessment is completed at five (5) locations surrounding the Quarry that are considered to be representative of the most sensitive noise receivers. The monitoring locations shown in **Figure 8.1** will be reviewed periodically to ensure monitoring is undertaken at appropriate representative locations. Any changes will be reflected in amendments to the NMP prior to being implemented.

At each compliance noise monitoring location, the nearest privately-owned residence has been used to determine proposed noise monitoring criteria (refer to **Table 8.2**). The proposed noise monitoring criteria are based on the noise modelling results presented in **Appendix 6** and consider noise propagation under standard and noise-enhancing meteorological conditions. If the adopted noise criteria at the compliance noise monitoring location are exceeded, it will be considered that the noise criteria at any of the residences in the defined receiver area may also have been exceeded.

Table 8.2 Adopted Compliance Noise Monitoring Locations and Criteria

Receiver Area/Residences represented by monitoring location	Possible Attended monitoring location	Closest privately-owned residence	Proposed Noise Monitoring Criteria for the Revised Project, dB(A)	
			Day/Evening/Night LAeq,15minute	Night LA1,1minute
NAG 1	19 Stations Street	R003	41/40/40	45
NAG 2/3/4	14 Cory Street	R028	45/35/35	45
NAG 5/6	249 Dungog Road	R041	44/35/35	45
NAG 7	281 Dungog Road	R025	49/35/35	45
NAG 9/10	9 Horns Crossing Road	R063	42/35/35	45

8.6.3 Validation Monitoring

The proposed noise monitoring program includes a check process to validate the results from the real-time noise monitoring network with the attended monitoring results. The real-time noise monitoring network is an integral component of the performance-based noise management system and the validation monitoring enables the real-time noise units to be used as an indicator of compliance and as trigger/alarm indicating the need to implement management actions or for further attended monitoring.

As part of the continuous improvement process, the validation program aims to assess the accuracy of the measurements of the real-time monitors and provide the Quarry with an improvement process to calibrate the real-time noise monitoring alarms to facilitate the provision of accurate and effective data. This will be achieved by monitoring adjacent to relevant real-time noise monitoring units. The reported noise level from the real-time noise monitor will then be compared with the attended monitoring results.

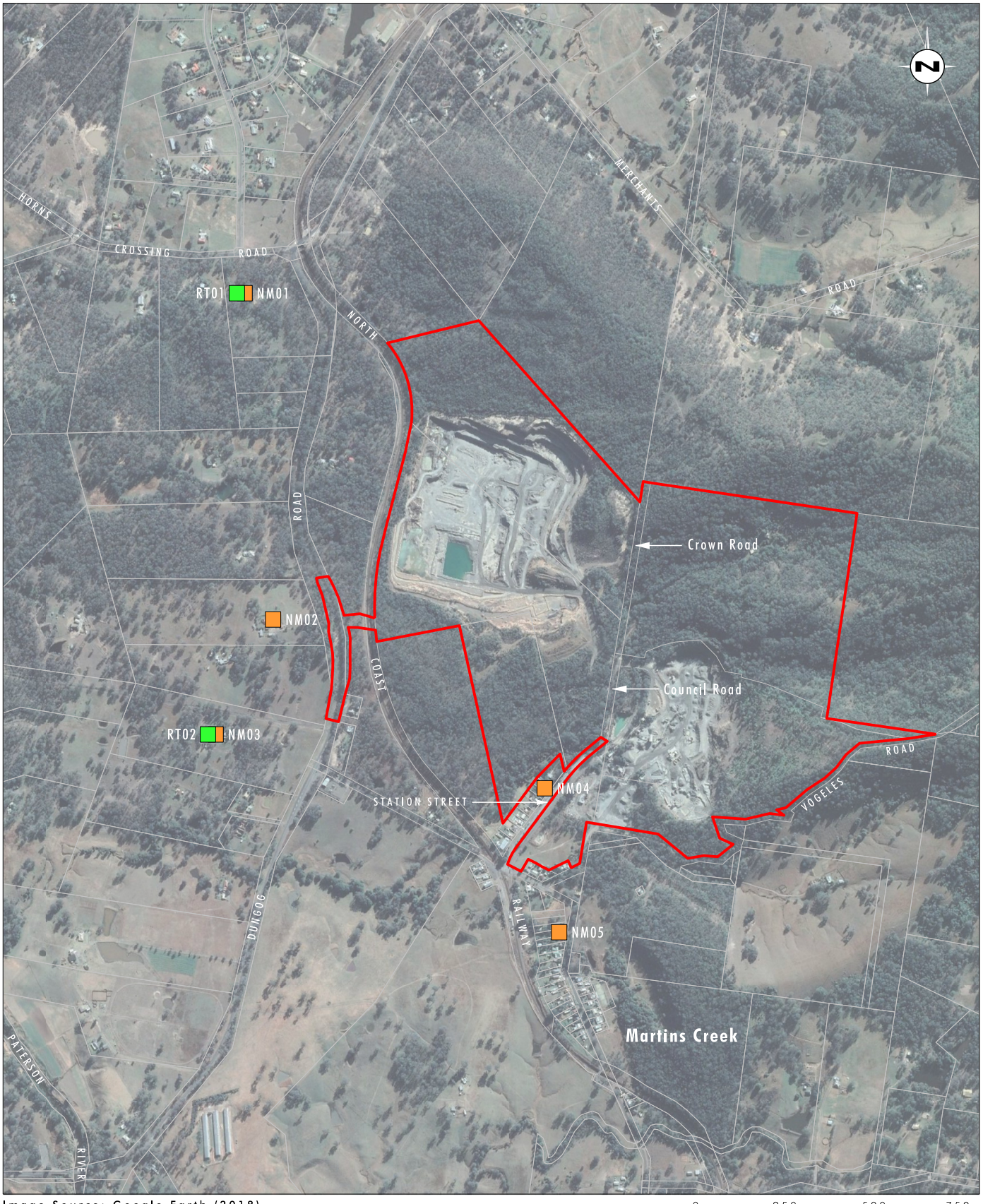


Image Source: Google Earth (2018)
Data Source: Daracon (2019), Department of Finance, Services & Innovation (2019)

0 250 500 750m
1:15 000

Legend

- Project Area
- Attended Noise Monitoring Location
- Realtime Noise Monitoring Location

FIGURE 8.1

Proposed Noise Monitoring Locations

9.0 References

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APPENDIX 1

Assessment of Existing Acoustic Environment

Appendix 1 – Assessment of the Existing Acoustic Environment

Introduction

A program of attended and unattended background noise monitoring was undertaken in the region surrounding the Martins Creek Quarry. The background noise monitoring, used to establish the underlying ambient level of the acoustic environment of the region, was undertaken in accordance with Fact Sheet A of the *Noise Policy for Industry* (NPfI) (EPA 2017). The noise monitoring locations are shown on **Figure A1.1**.

Attended Monitoring Program

A series of attended noise level measurements have been undertaken at multiple locations to the south and west of the quarry (refer to **Figure A1.1**). These locations include adjacent to Dungog Road to the west of the West Pit and within the village of Martins Creek. The measurements provide an indication of the contribution of the quarry operation to the acoustic environment.

It should also be noted that the operation of the quarry includes a variety of mobile and static machines. Additionally, the configuration of the processing plant can be variable in its operation depending on the production requirements. This ultimately means that the emissions from the West Pit of the quarry and the East Pit processing area can be variable across a typical day's operation. Further to this, variable weather conditions also result in enhancement or retardation of noise levels received at a given location. Therefore, the combination of the variable operational activity and the variable weather conditions mean that the noise levels received at a given location are not necessarily consistently at that level across a typical day's operation or from one day to the next.

The attended noise level locations and measurements are summarised in **Table A1.1.** The detailed run charts are provided in **Figure A1.2** to **A1.13**

Image Source: Google Earth (2018)
Data Source: Daracon (2019), Department of Finance, Services & Innovation (2019)

0 250 500 750m
1:15 000

Legend

- Project Area
- Attended Noise Monitoring Location
- Un-attended Noise Monitoring Location

FIGURE A1.1

Monitoring of Existing Noise Levels

Table A1.1 Attended Noise Level Measurements

ID	Address	Approx. Easting	Approx. Northing	Date Time	Weather Conditions	Observed MCQ operational activity	Indicative noise level range from MCQ	Figure ref.
ML 1	333 Dungog Road	369693	6398051	29/11/17 14:41	~2m/s E	Typical operation, no mobile crusher	40 - 50 dBA	A1.2
ML 1	333 Dungog Road	369693	6398051	29/11/17 15:14	~2m/s E	Typical operation, no mobile crusher	40 - 45 dBA	A1.3
ML 1	333 Dungog Road	369693	6398051	29/11/17 16:20	~2m/s SE	Typical operation with mobile crusher	45 - 55 dBA	A1.4
ML 2	23 Station Street	370459	6397203	29/01/18 07:18	Calm	Typical operation processing area	57 - 60 dBA (Filling rail hopper 70 dBA)	A1.5
ML 2	23 Station Street	370459	6397203	17/01/18 11:00	~3m/s SE	Typical operation processing area	53 - 60 dBA	A1.6
ML 2	23 Station Street	370459	6397203	17/01/18 14:58	~2m/s SE	Tertiary plant only	38 - 40 dBA	A1.7
ML 2	23 Station Street	370459	6397203	18/01/18 16:46	~2m/s E	Typical operation processing area	55 - 57 dBA	A1.8
ML 2	23 Station Street	370459	6397203	18/01/18 08:42	Calm	Typical operation processing area	45 - 50 dBA	A1.9
ML 2	23 Station Street	370459	6397203	15/11/17 16:20	~2m/s SE	Typical operation processing area	57 - 60 dBA	A1.10
ML 3	3 Station Street	370309	6397007	17/01/18 11:58	~3m/s S	Typical operation processing area	40 - 45 dBA	A1.11
ML 4	Cory Street	370368	6396885	17/01/18 12:30	~2m/s S	Typical operation processing area	35 - 40 dBA	A1.12
ML 4	Cory Street	370368	6396885	17/01/18 16:37	~2m/s SE	Typical operation processing area	35 - 40 dBA	A1.13

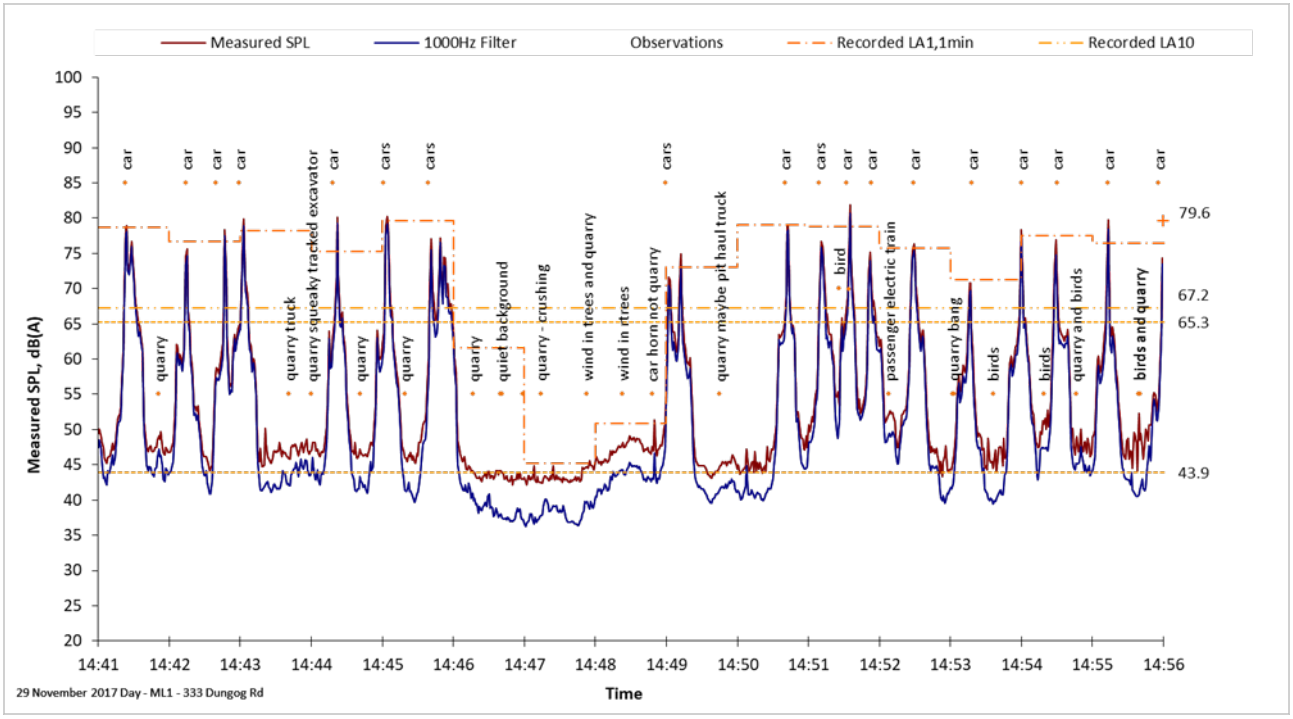


Figure A1.2 Attended noise measurement at ML 1

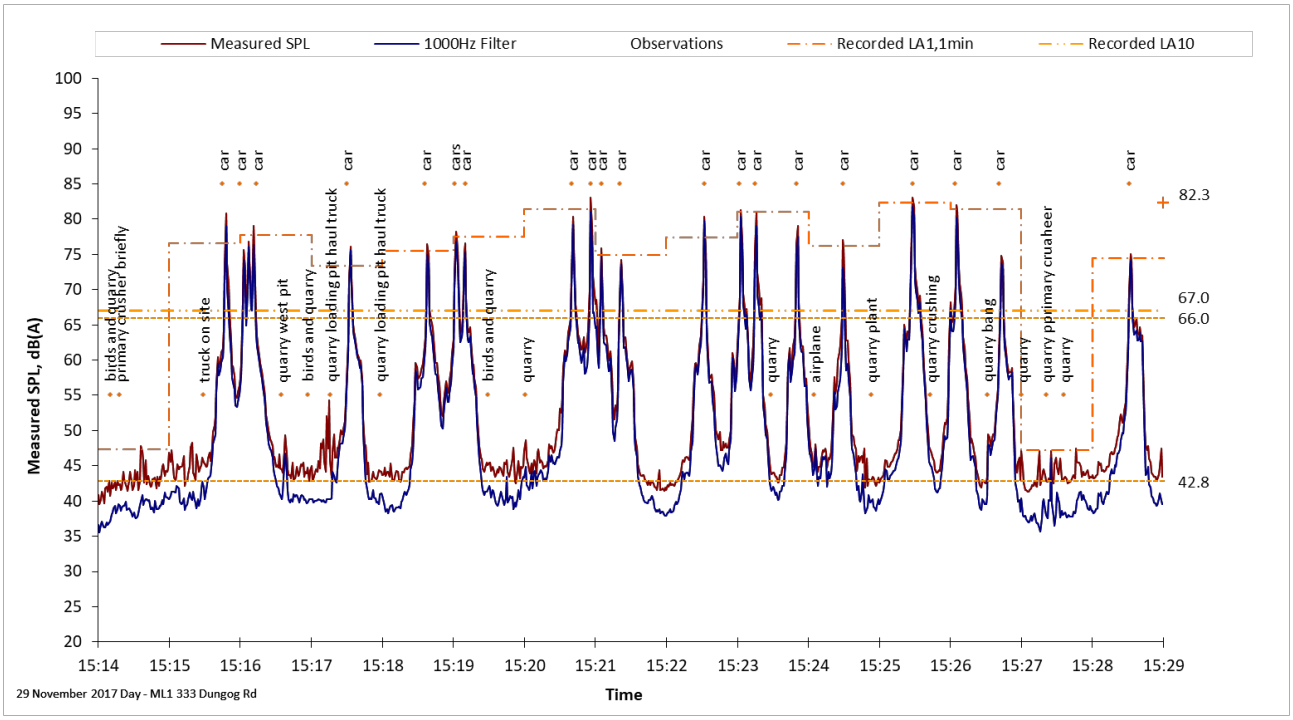


Figure A1.3 Attended noise measurement at ML 1

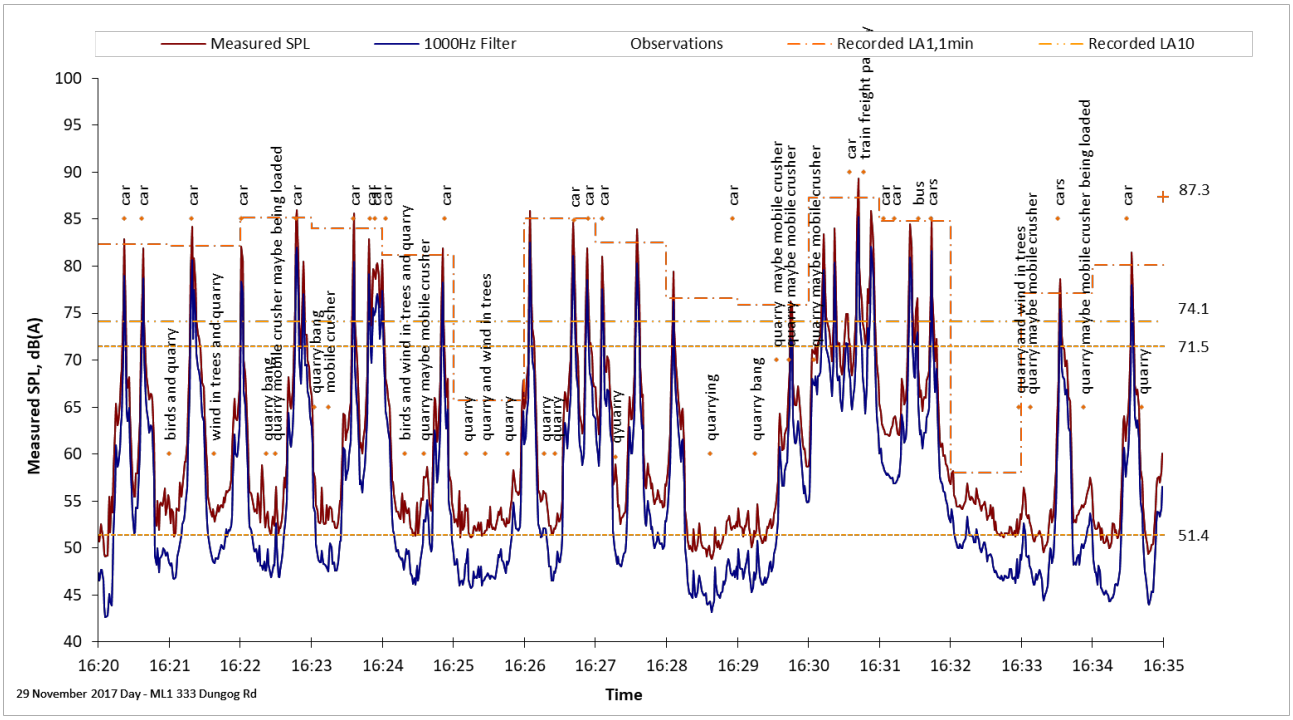


Figure A1.4 Attended noise measurement at ML 1

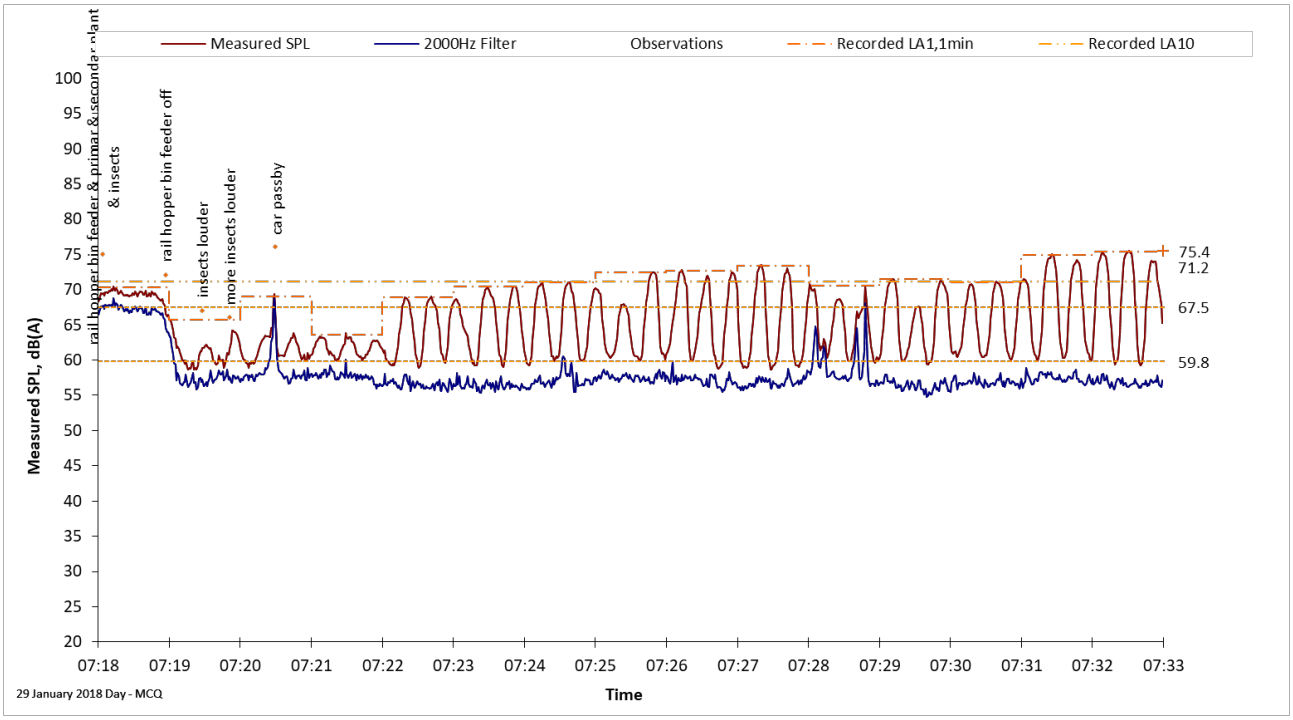


Figure A1.5 Attended noise measurement at ML 2

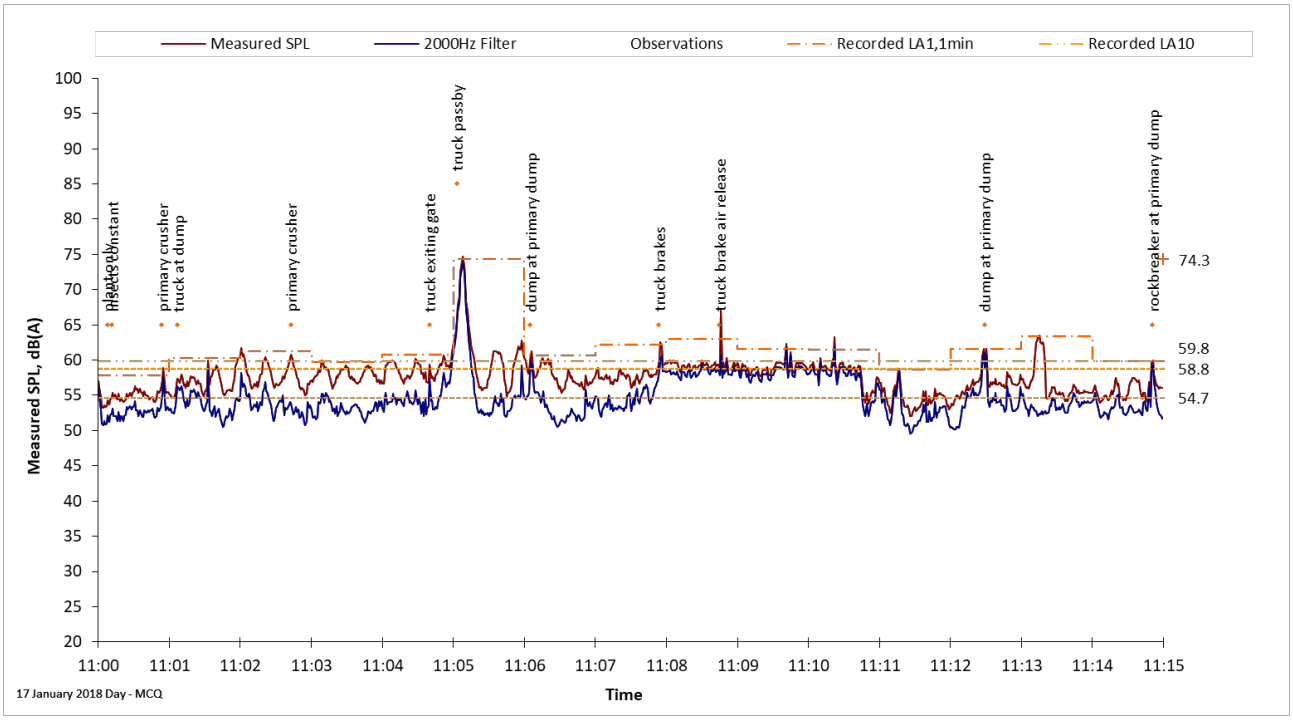


Figure A1.6 Attended noise measurement at ML 2

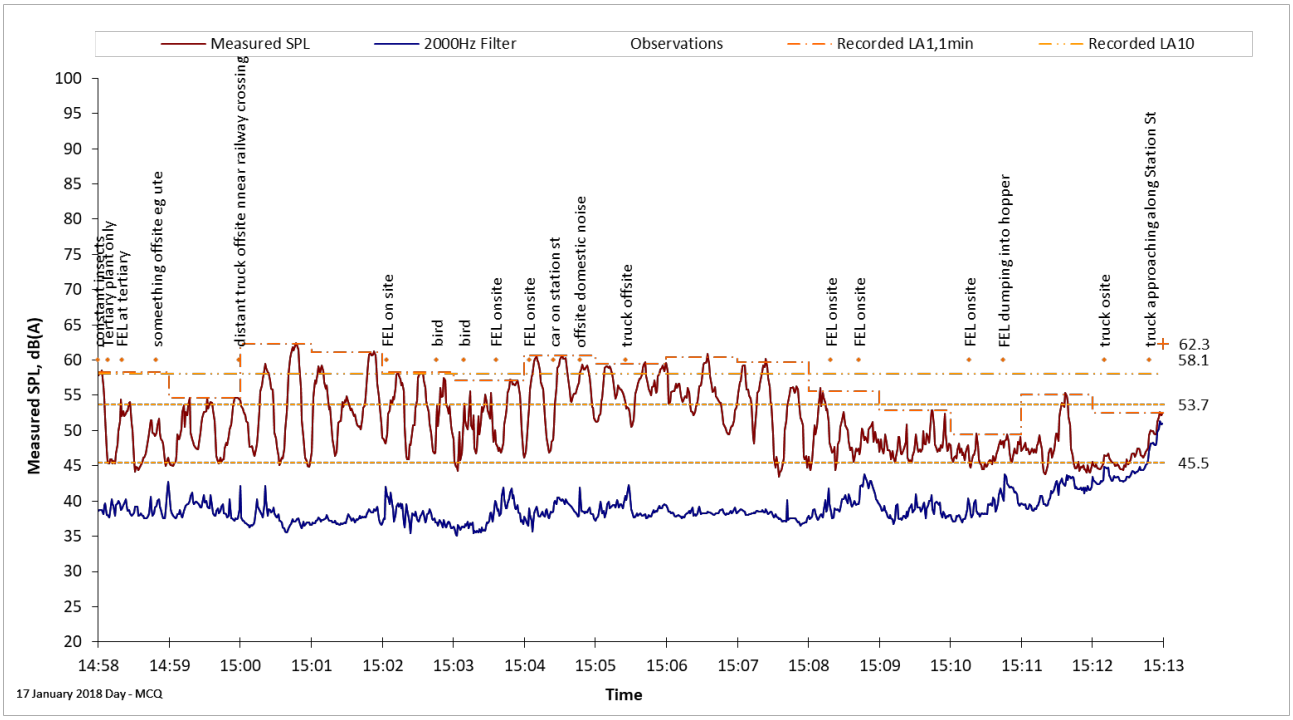


Figure A1.7 Attended noise measurement at ML 2

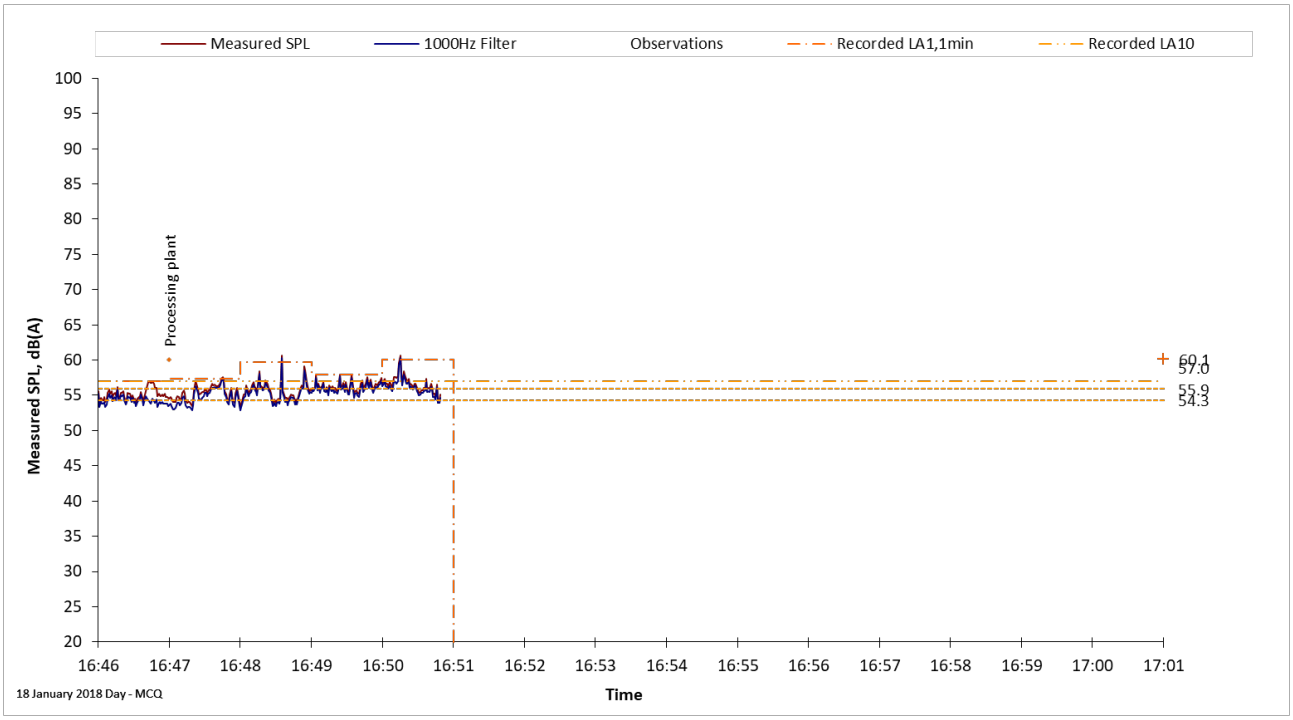


Figure A1.8 Attended noise measurement at ML 2

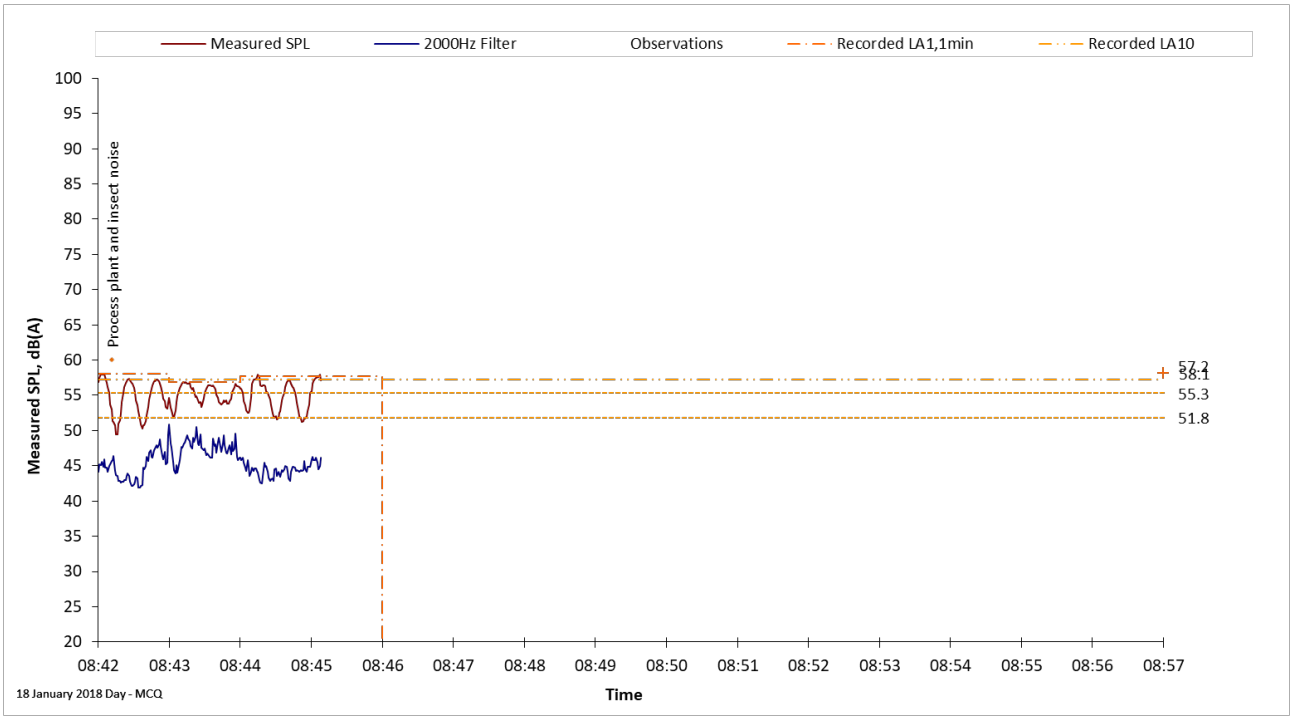


Figure A1.9 Attended noise measurement at ML 2

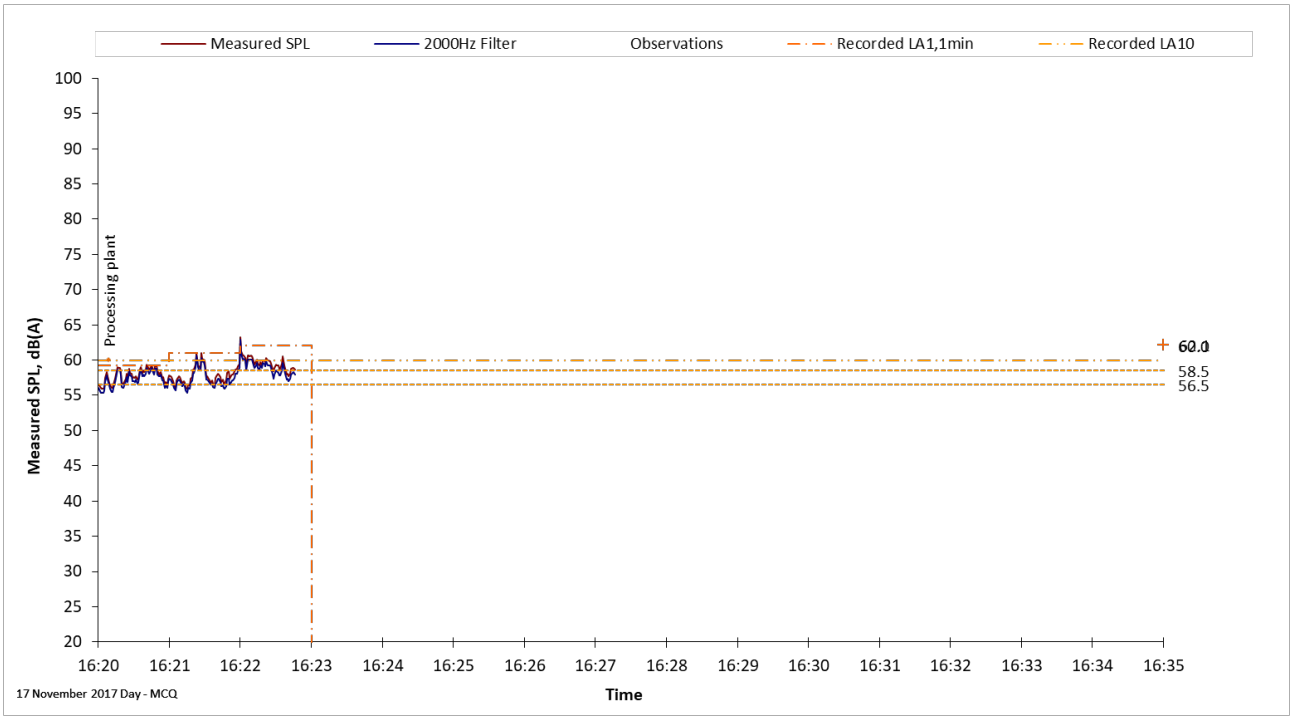


Figure A1.10 Attended noise measurement at ML 2

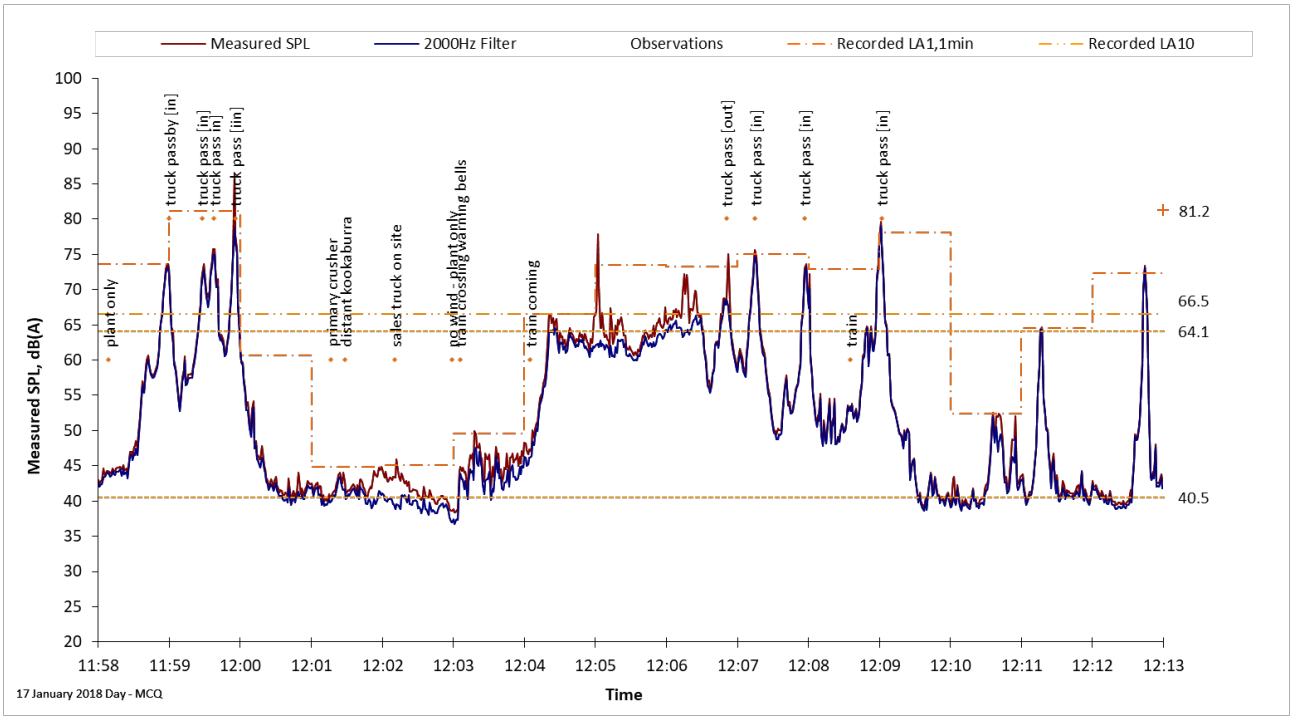


Figure A1.11 Attended noise measurement at ML 3

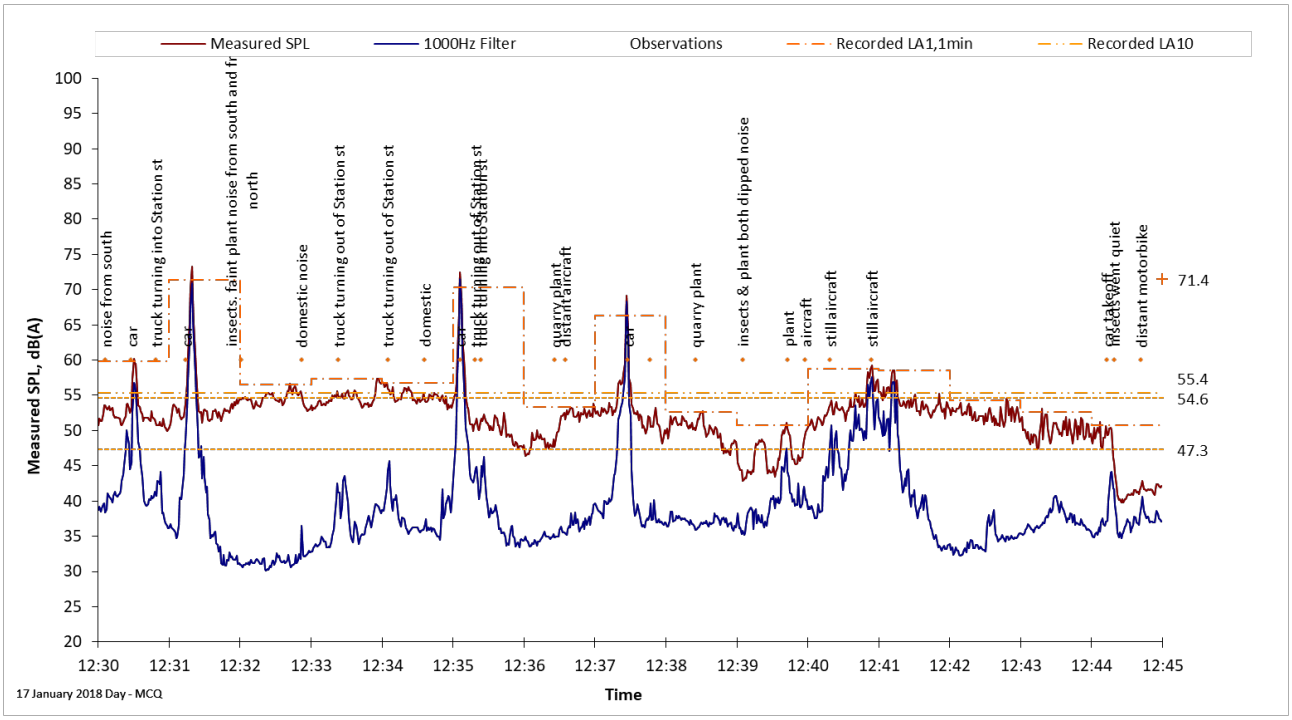


Figure A1.12 Attended noise measurement at ML 4

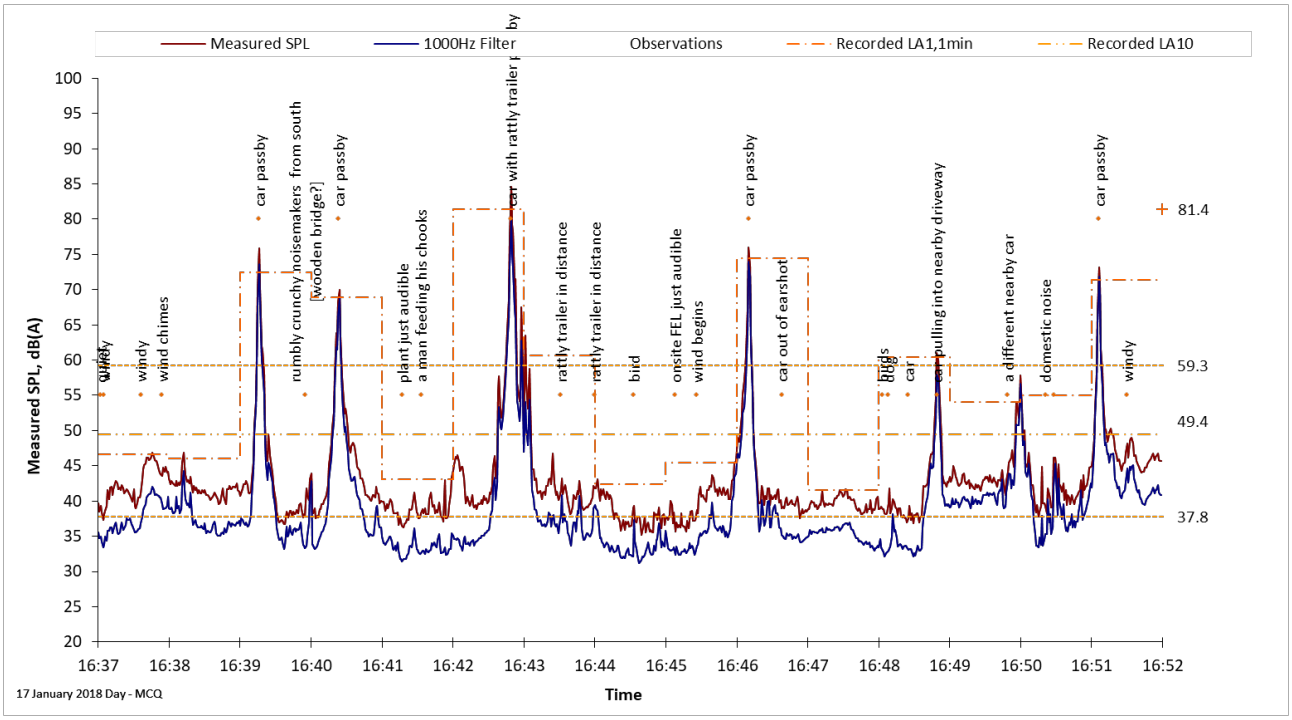


Figure A1.13 Attended noise measurement at ML 4

Assessment of Background Noise Levels

Unattended noise monitoring was undertaken at four locations surrounding the existing quarry. These locations are presented in **Table A1.2** and shown on **Figure A1.1.** The noise monitoring was conducted in accordance with the requirements of the NPfI. Field calibration checks were undertaken for the instruments per and post logging and were found to be within 1 dB of the reference signal. Periods of poor weather (rain and high wind) have been excluded from the analysis.

Table A1.2 Unattended Noise Monitoring Locations

ID	Address	Easting	Northing	Monitoring Period	Figure Ref.
ML A	9 Station Street	370341	6397053	02/07/2019-05/07/2019 10/07/2019-18/07/2019	A1.13-A1.16 A1.17-A1.25
ML B	16 Cory Street	370452	6396729	01/07/2019-09/07/2019 10/07/2019-18/07/2019	A1.26-A1.34 A1.35-A1.43
ML C	253 Dungog Road	369163	6397451	01/07/2019-09/07/2019 10/07/2019-15/07/2019	A1.44-A1.52 A1.53-A1.58
ML D	9 Horns Crossing Road	369516	6398600	01/07/2019-09/07/2019 10/07/2019-17/07/2019	A1.59-A1.67 A1.68-A1.75

The results of the full monitoring period are summarised for each location in **Tables A1.3** to **A1.6** and presented graphically in **Figures A1.14 to A1.76**. The L_{Aeq} for each period (Day, Evening and Night) has been calculated. Similarly, the Assessment Background Level (ABL) using the lowest 10th percentile method has been determined for each period (Day, Evening and Night) during each day. The Rating Background Level (RBL) has been evaluated as the median value of the ABL in each period (Day, Evening and Night).

Table A1.3 Unattended Noise Monitoring Summary for ML A - 9 Station Street

	Leq,period dBA			ABL, dBA		
Date	Day	Evening	Night	Day	Evening	Night
03/07/2019	59.5	42.1	45.5	36.8	26.2	20.6
04/07/2019	60.9	44.8	44.0	33.2	25.4	22.5
05/07/2019	-	-	-	-	-	-
06/07/2019	-	-	-	-	-	-
07/07/2019	-	-	-	-	-	-
08/07/2019	-	-	-	-	-	-
09/07/2019	-	-	-	-	-	-
10/07/2019	-	39.9	41.8	-	26.8	25.8
11/07/2019	60.3	52.6	46.8	41.4 [1]	36.6	23.4
12/07/2019	63.9	47.7	47.3	38.3	32.8	26.1
13/07/2019	58.1	65.6	49.6	37.1	33.8	31.6
14/07/2019	52.4	54.6	49.6	33.6	37.1	25.9
15/07/2019	61.8	47.9	51.6	38.1	28.4	28.2
16/07/2019	59.7	49.9	48.9	34.8	28.5	24.2
17/07/2019	59.9	50.3	51.4	35.3	33.8	22.8
18/07/2019	-	-	48.4	-	-	-
Period Average	**60.4**	**56.5**	**48.6**	**-**	**-**	**-**
RBL	**-**	**-**	**-**	**36.0**	**30.6**	**25.0**

Note: [1] Day-time background noise levels wind effected

Table A1.4 Unattended Noise Monitoring Summary for ML B - 16 Cory Street

Date	Leq,period dBA			ABL, dBA		
	Day	Evening	Night	Day	Evening	Night
02/07/2019	53.7	48.4	46.4	33.8	22.9	20.9
03/07/2019	53.4	48.0	44.8	31.6	23.1	20.0
04/07/2019	53.3	47.9	44.0	30.5	22.0	21.3
05/07/2019	54.2	47.9	46.3	29.7	22.0	20.9
06/07/2019	52.2	46.2	42.3	26.8	21.1	20.9
07/07/2019	51.6	46.8	42.1	25.4	22.3	19.8
08/07/2019	52.7	47.6	44.6	30.5	26.4	19.8
09/07/2019	-	-	-	-	-	-
10/07/2019	-	43.9	45.4	-	-	-
11/07/2019	55.0	50.9	47.3	41.6 [1]	37.4	25.4
12/07/2019	54.9	48.8	45.7	40.1	31.8	27.0
13/07/2019	54.7	47.2	48.1	36.1	34.2	35.0
14/07/2019	52.2	49.8	46.2	30.8	37.0	24.8
15/07/2019	52.9	46.9	46.8	34.8	24.4	29.3
16/07/2019	53.2	46.5	46.3	32.9	23.3	21.5
17/07/2019	52.5	49.3	46.9	34.0	35.3	22.4
18/07/2019	-	-	39.4	-	-	-
Period Average	**53.5**	**48.0**	**45.6**	**-**	**-**	**-**
RBL	**-**	**-**	**-**	**31.6**	**23.9**	**21.4**

Note: [1] Day-time background noise level wind effected

Table A1.5 Unattended Noise Monitoring Summary for ML C – 253 Dungog Road

Date	Leq,period dBA			ABL, dBA		
	Day	Evening	Night	Day	Evening	Night
02/07/2019	42.2	38.0	35.7	30.1	26.2	21.9
03/07/2019	44.5	36.2	36.5	28.9	25.9	22.0
04/07/2019	42.3	42.8	35.6	29.6	35.5 [1]	24.3
05/07/2019	43.9	40.1	38.6	30.2	33.1	29.9
06/07/2019	43.0	38.3	39.7	29.4	32.9	28.0
07/07/2019	42.6	39.5	36.1	25.9	33.1	24.5
08/07/2019	43.8	36.8	36.6	29.2	30.4	27.2
09/07/2019	41.7	-	37.3	28.6	-	26.5
10/07/2019	-	36.3	37.6	-	29.0	28.1
11/07/2019	51.6	49.1	42.4	38.2 [2]	37.5 [2]	25.9
12/07/2019	51.3	44.5	41.3	35.8	34.1 [2]	29.3
13/07/2019	52.3	46.2	50.3	36.8	36.6 [2]	37.0
14/07/2019	49.5	50.3	45.7	37.1	39.0 [2]	30.8
15/07/2019	-	-	-	-	-	-
Period Average	**47.7**	**44.3**	**42.3**			
RBL				**29.6**	**30.4**	**27.2**

Note: [1] Audio files indicate increased background noise levels due to insect noise following rain.

[2] Audio files indicate background noise levels is wind effected

Table A1.6 Unattended Noise Monitoring Summary for ML D - 9 Horns Crossing Road

	Leq,period dBA			ABL, dBA		
Date	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
02/07/2019	49.2	42.1	42.9	31.8	21.9	20.7
03/07/2019	50.4	40.8	39.6	33.3	24.8	20.5
04/07/2019	51.2	44.7	38.3	34.4	26.0	21.3
05/07/2019	50.6	44.1	41.3	35.6	28.0	22.4
06/07/2019	50.6	39.7	38.4	31.5	24.7	23.0
07/07/2019	49.4	41.6	44.3	28.5	25.9	21.6
08/07/2019	48.4	39.9	42.3	32.2	24.4	21.2
09/07/2019	-	-	40.5	-	-	22.3
10/07/2019	-	43.2	38.4	-	24.9	28.0
11/07/2019	53.4	46.9	43.2	38.9 [1]	33.4	22.9
12/07/2019	51.5	45.9	42.3	36.9	30.8	27.9
13/07/2019	52.5	44.4	51.2	36.6	32.7	31.2
14/07/2019	49.2	49.7	42.1	36.2	35.4	25.9
15/07/2019	49.3	42.2	46.7	33.5	23.7	25.1
16/07/2019	48.0	42.7	41.3	33.5	22.4	21.3
17/07/2019	-	-	40.3	-	-	-
Period Average	**50.6**	**44.4**	**43.7**	**-**	**-**	**-**
RBL	**-**	**-**	**-**	**33.5**	**25.4**	**22.4**

Note: [1] Day-time background noise level wind effected

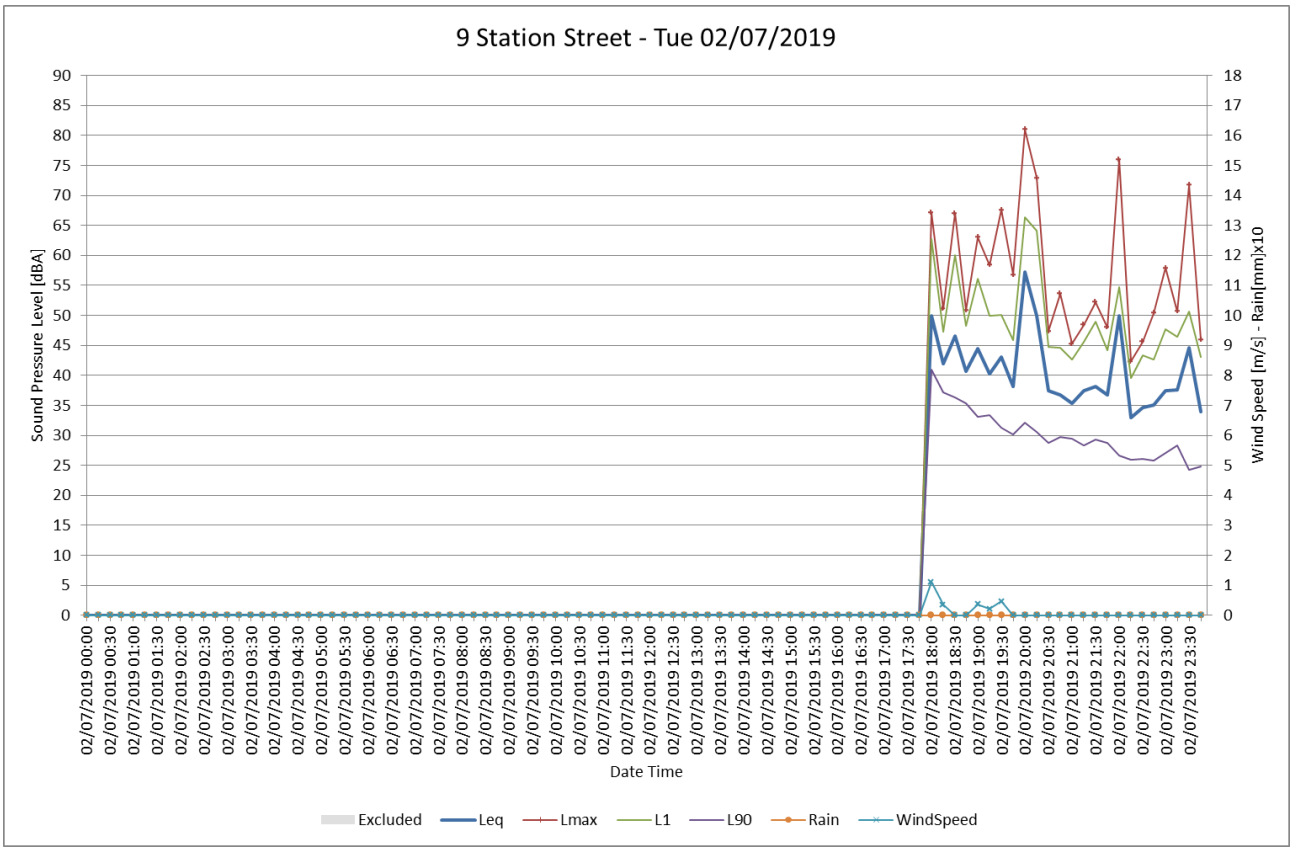


Figure A1.14 Unattended noise measurement at ML A

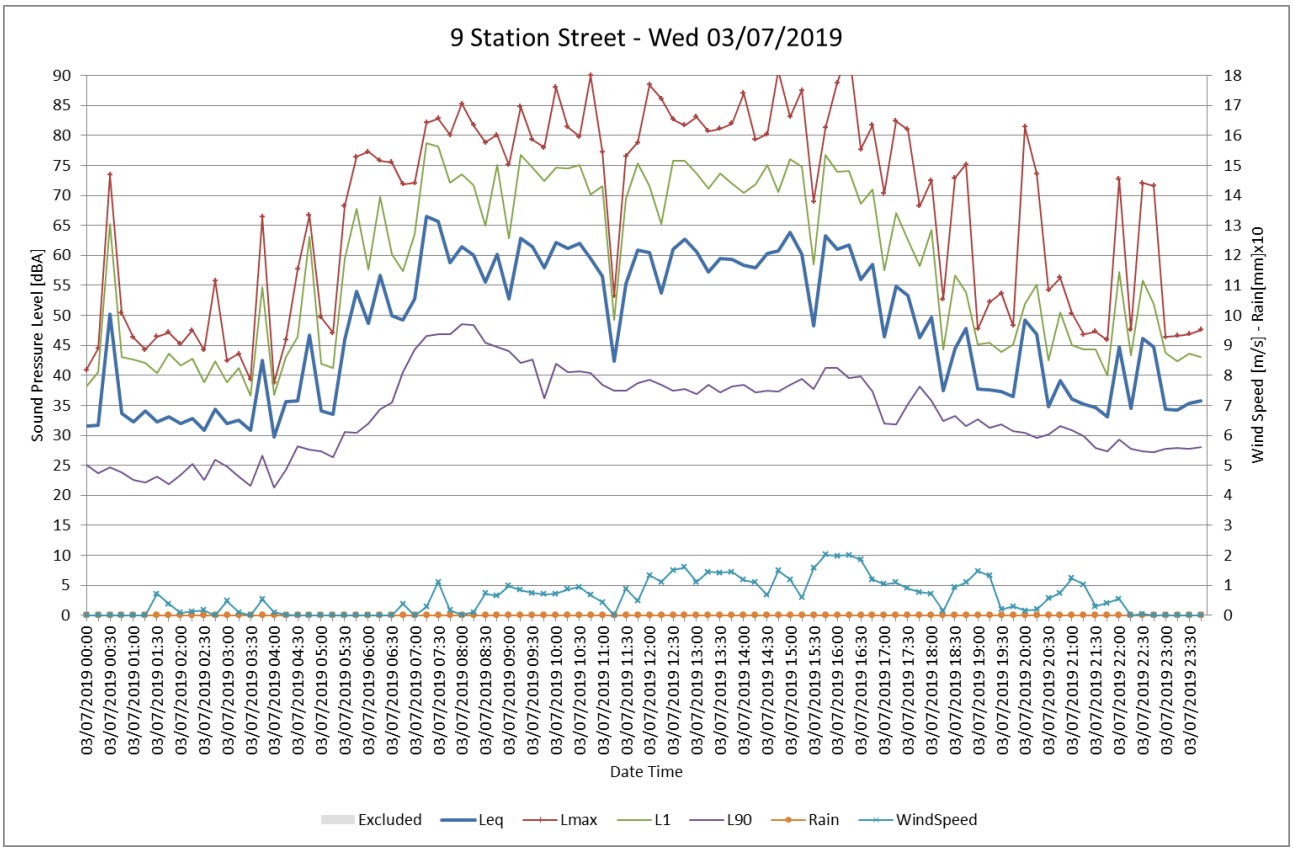


Figure A1.15 Unattended noise measurement at ML A

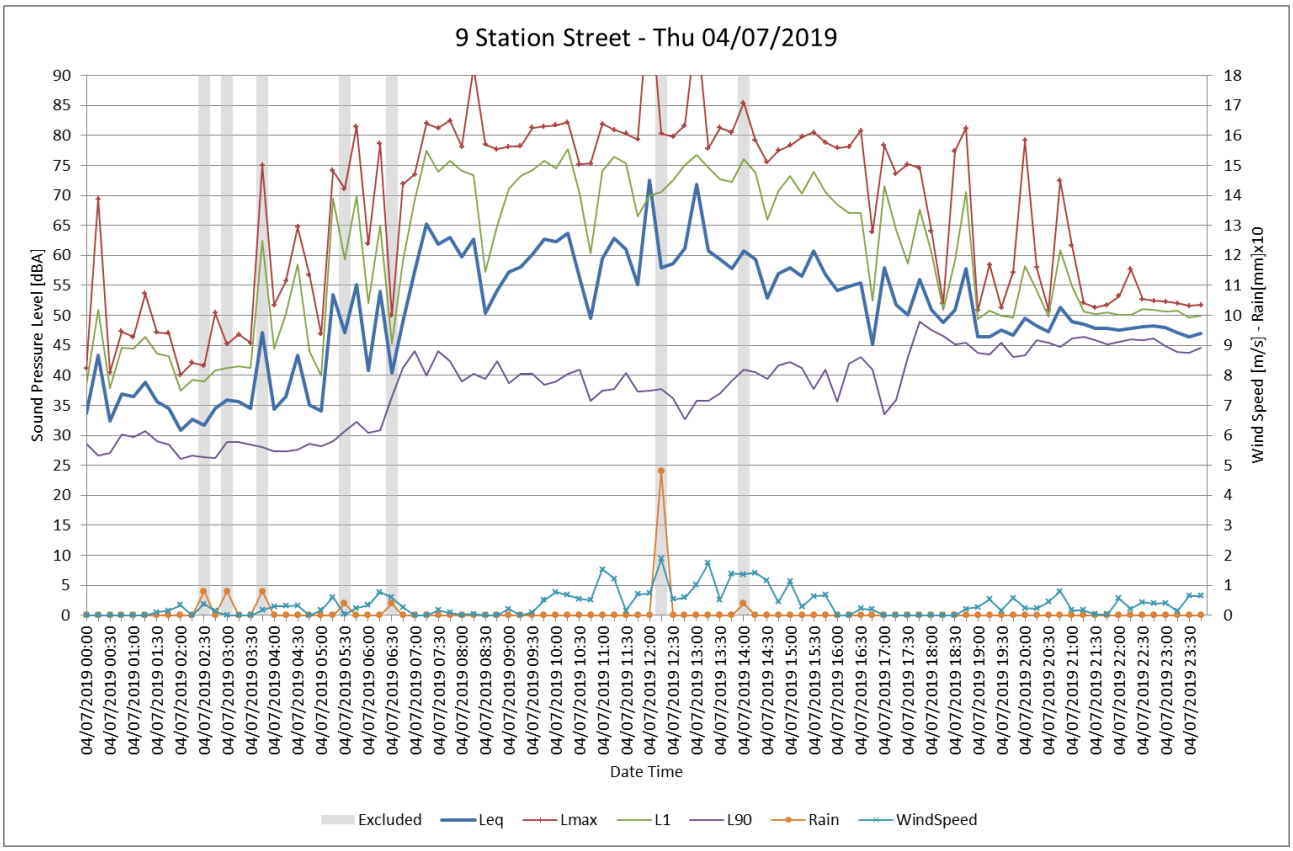


Figure A1.16 Unattended noise measurement at ML A

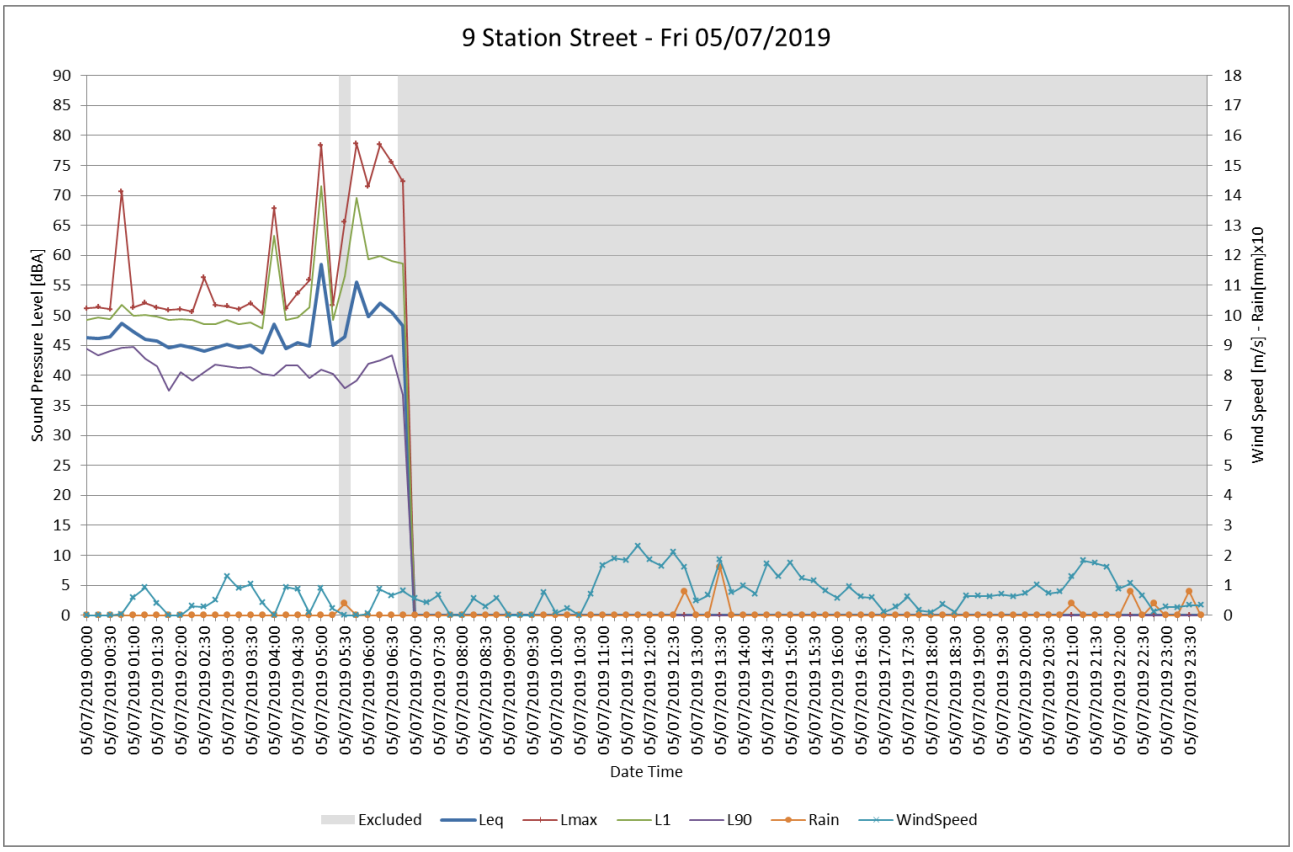


Figure A1.17 Unattended noise measurement at ML A

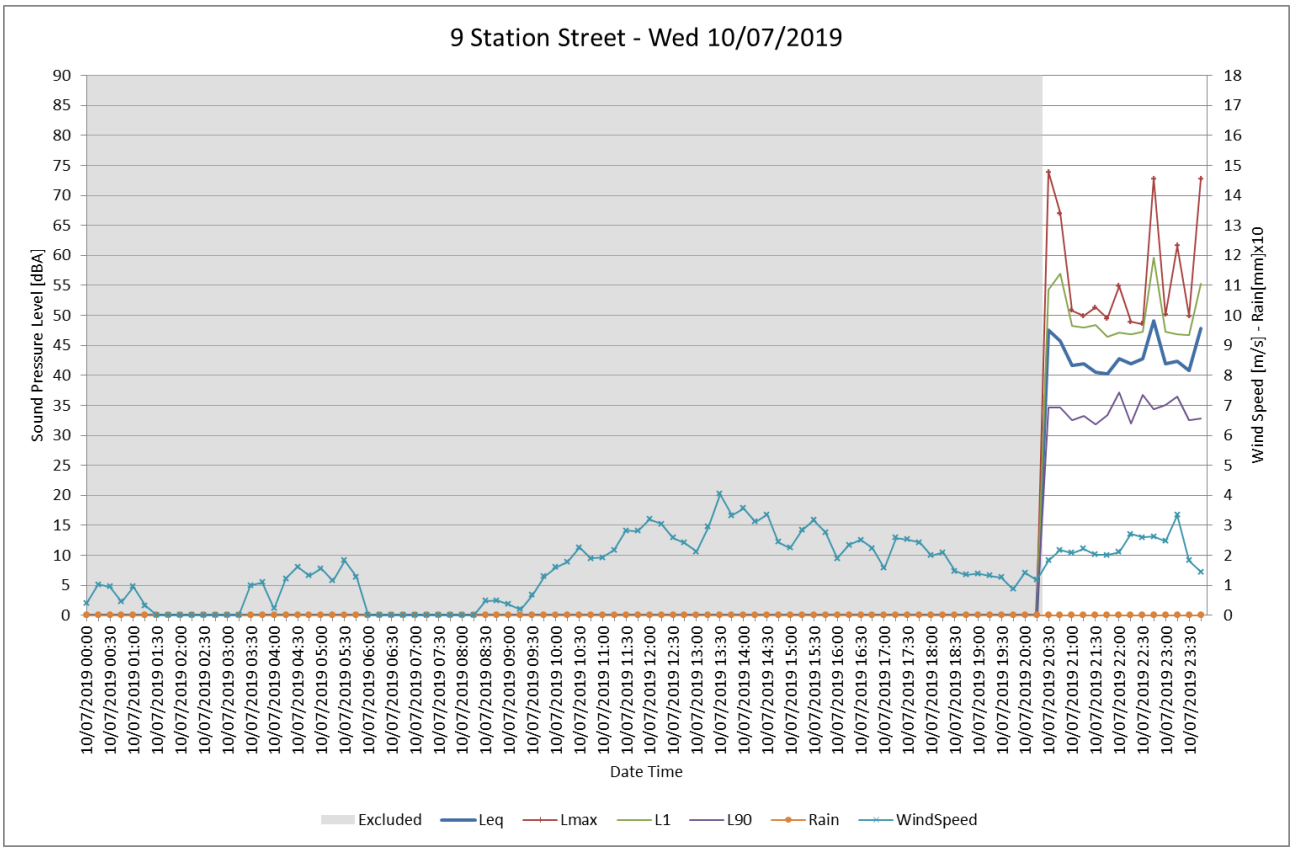


Figure A1.18 Unattended noise measurement at ML A

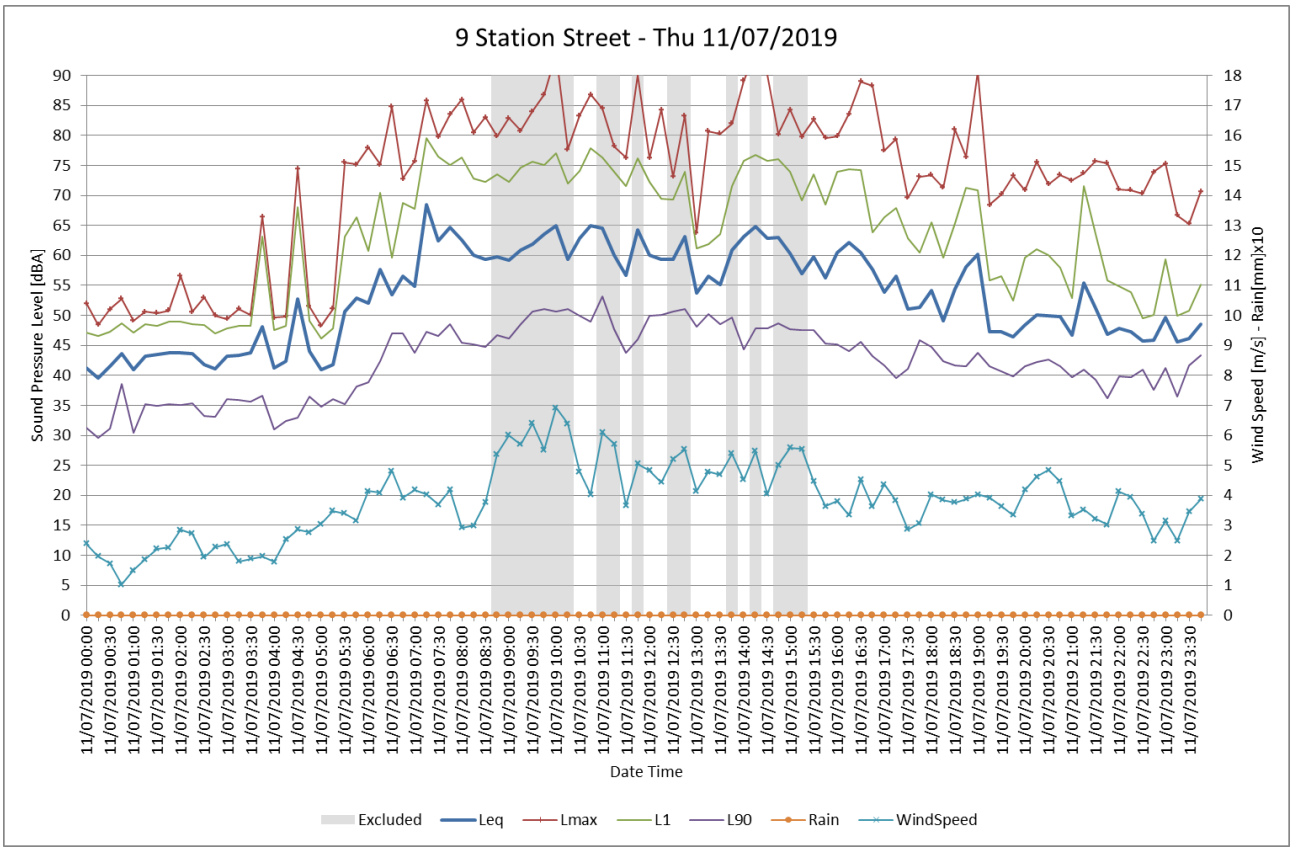


Figure A1.19 Unattended noise measurement at ML A

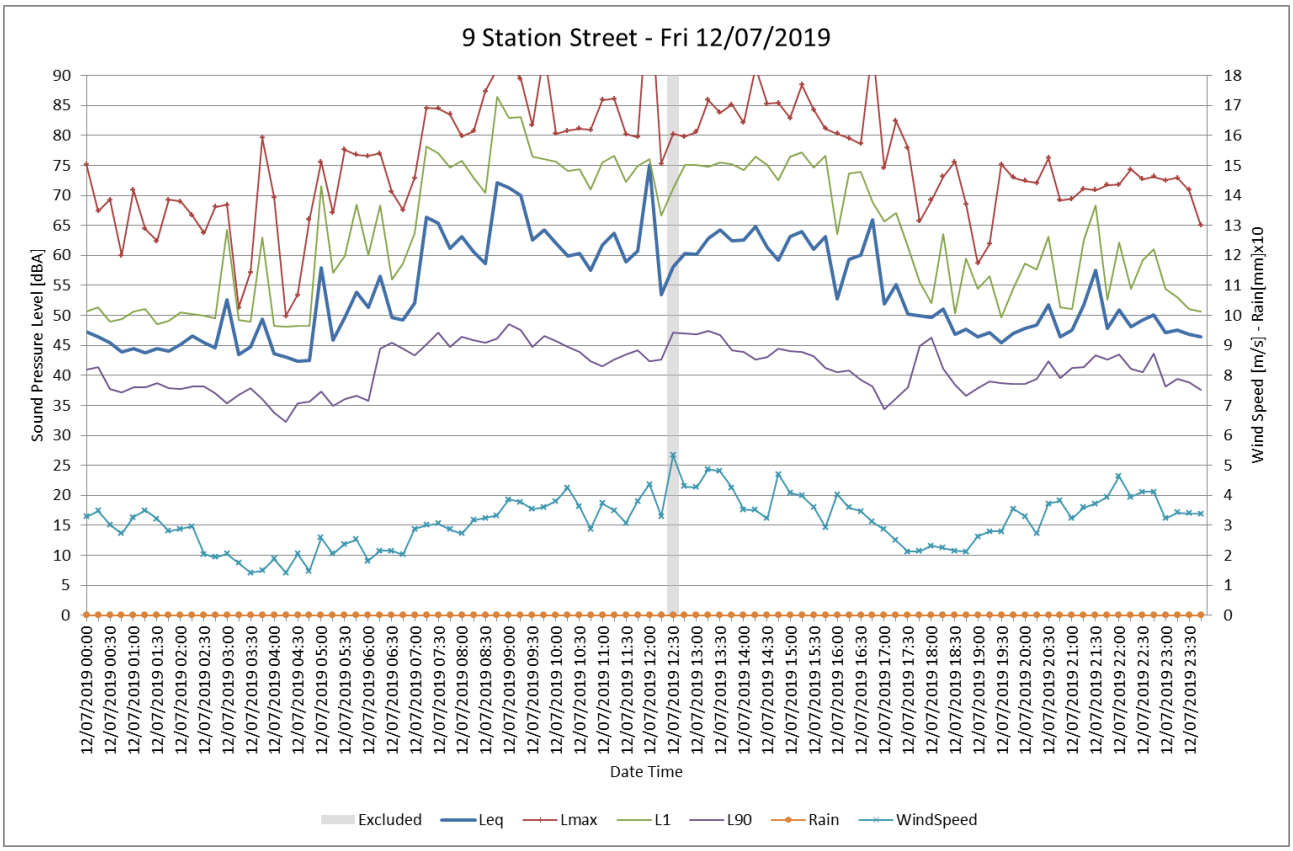


Figure A1.20 Unattended noise measurement at ML A

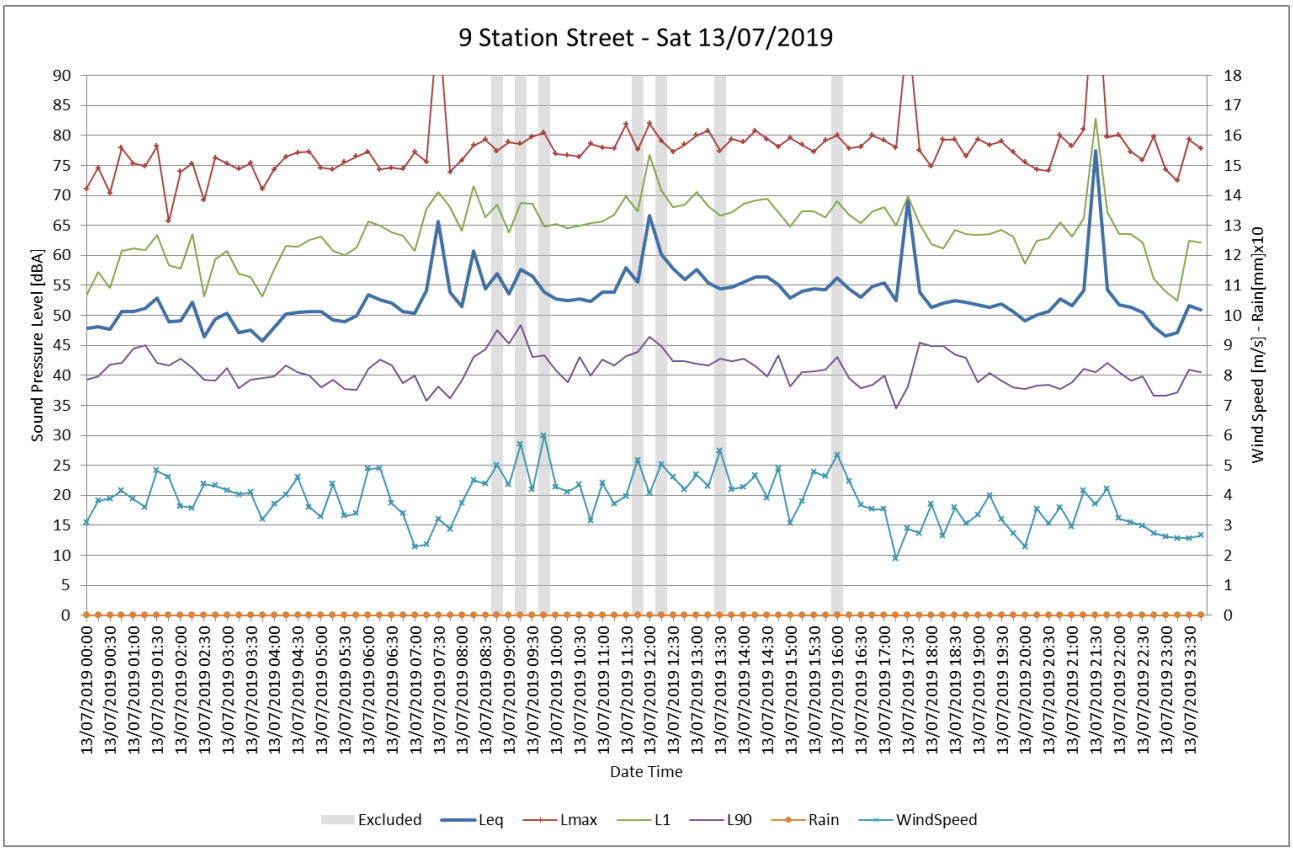


Figure A1.21 Unattended noise measurement at ML A

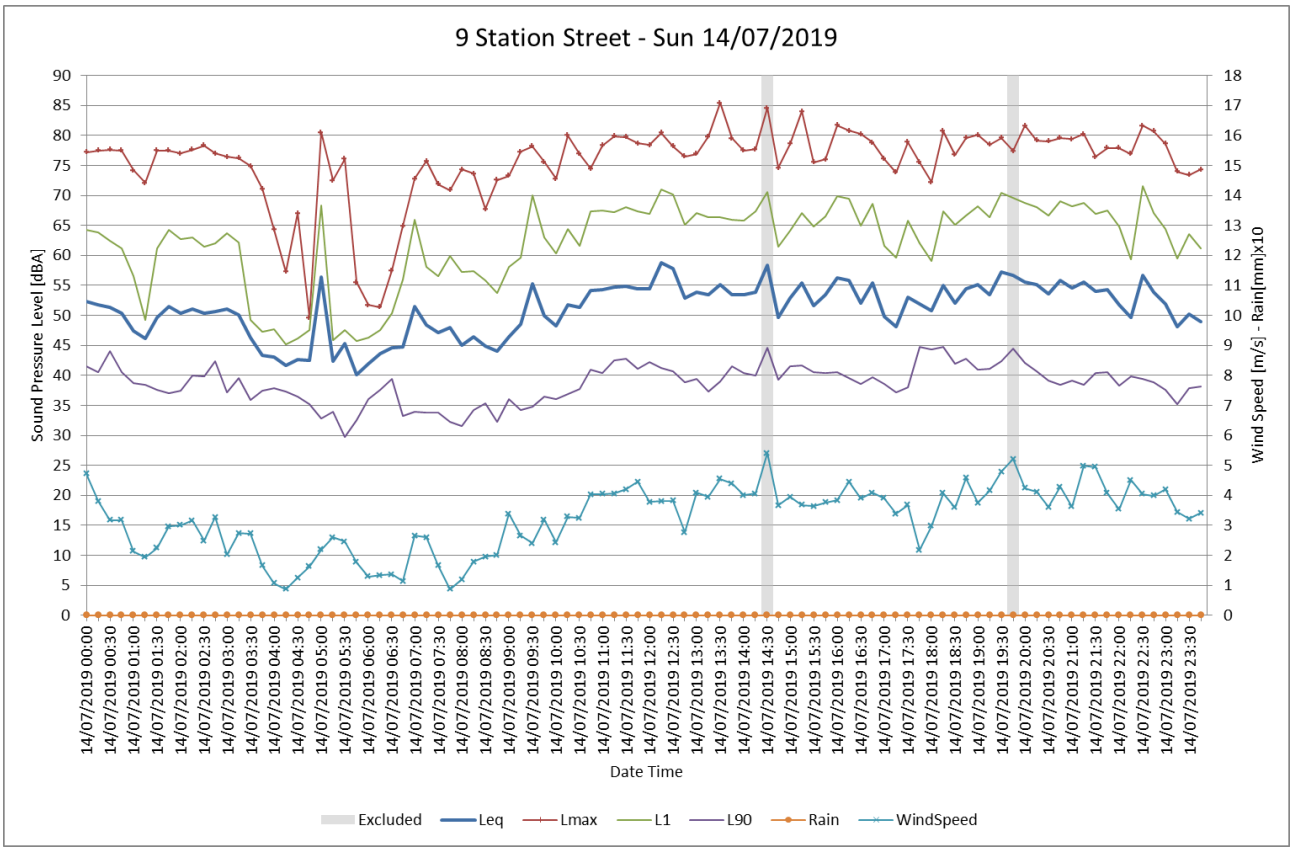


Figure A1.22 Unattended noise measurement at ML A

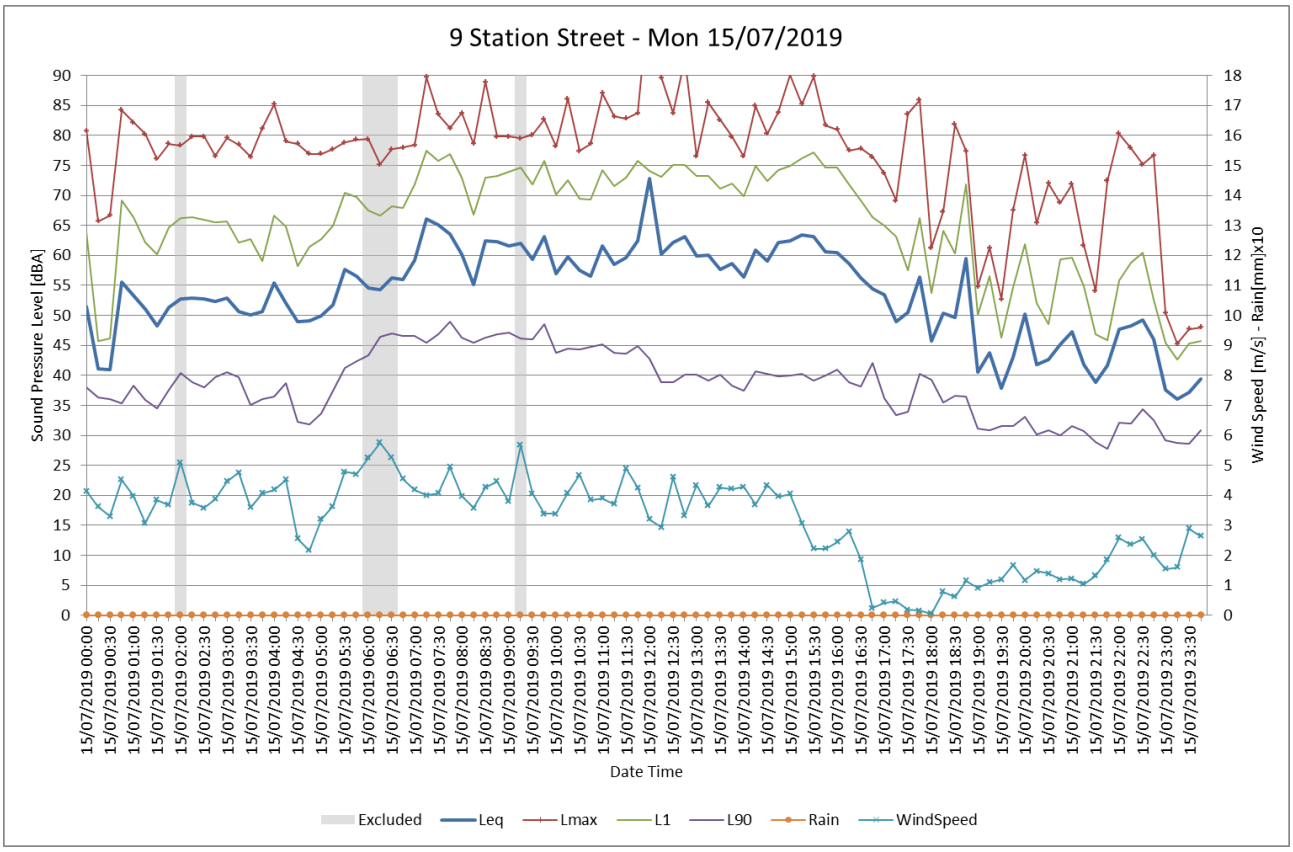


Figure A1.23 Unattended noise measurement at ML A

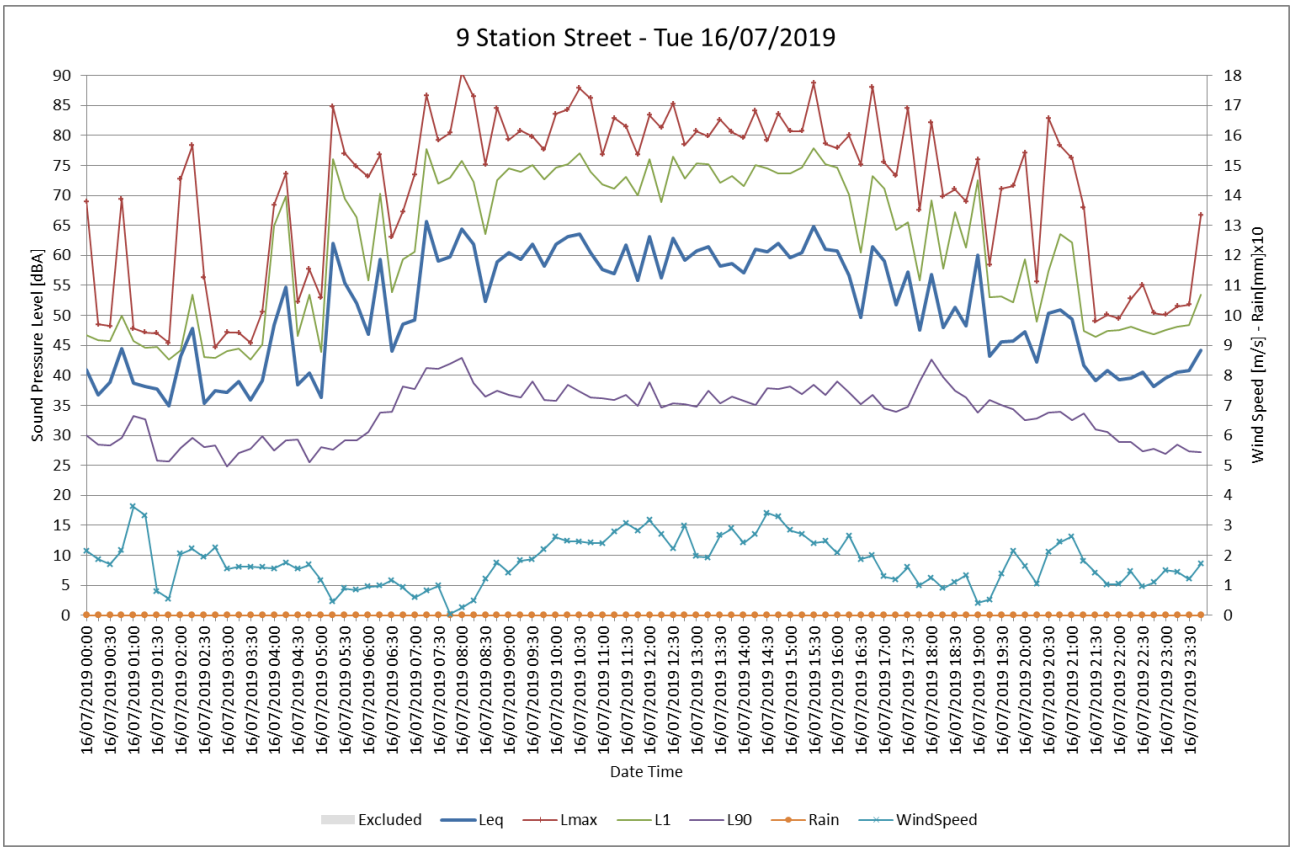


Figure A1.24 Unattended noise measurement at ML A

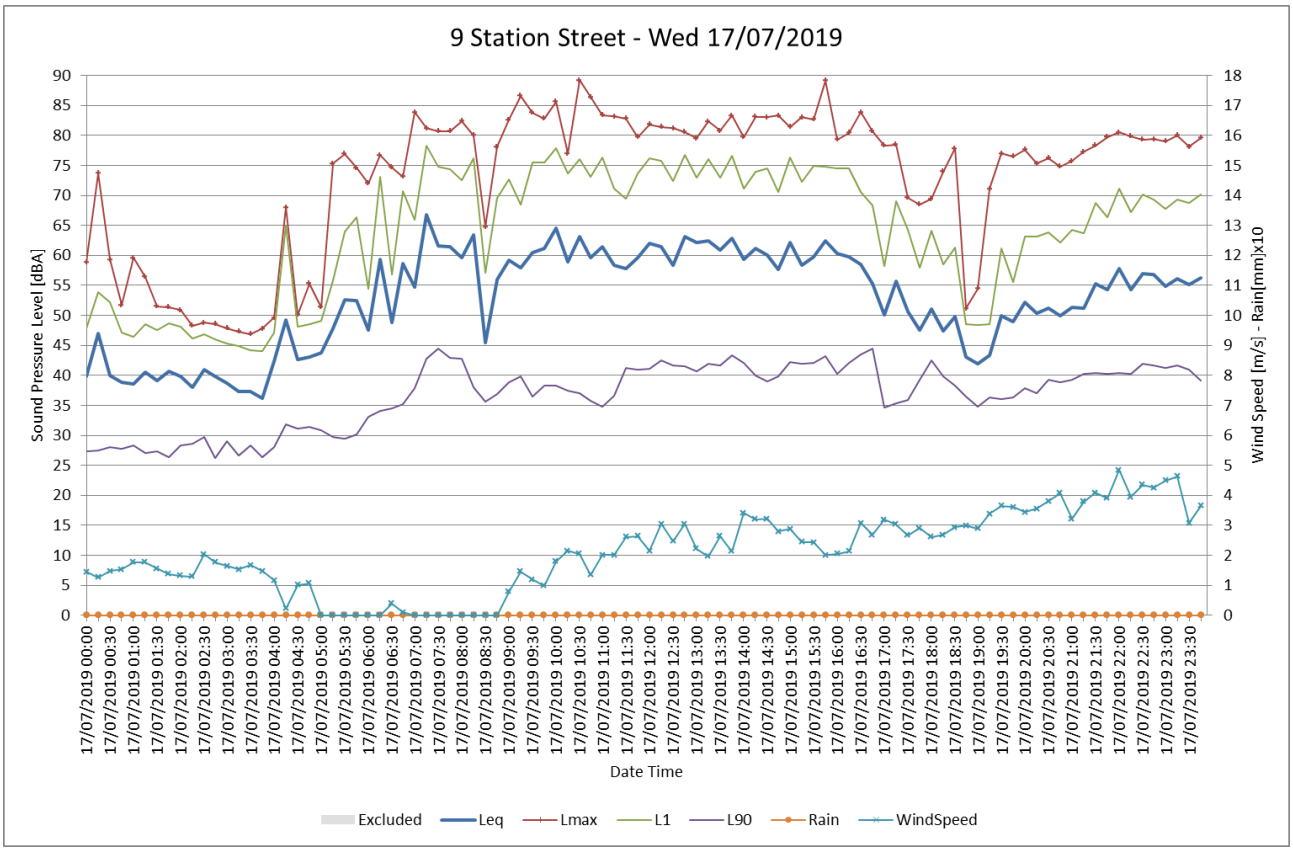


Figure A1.25 Unattended noise measurement at ML A

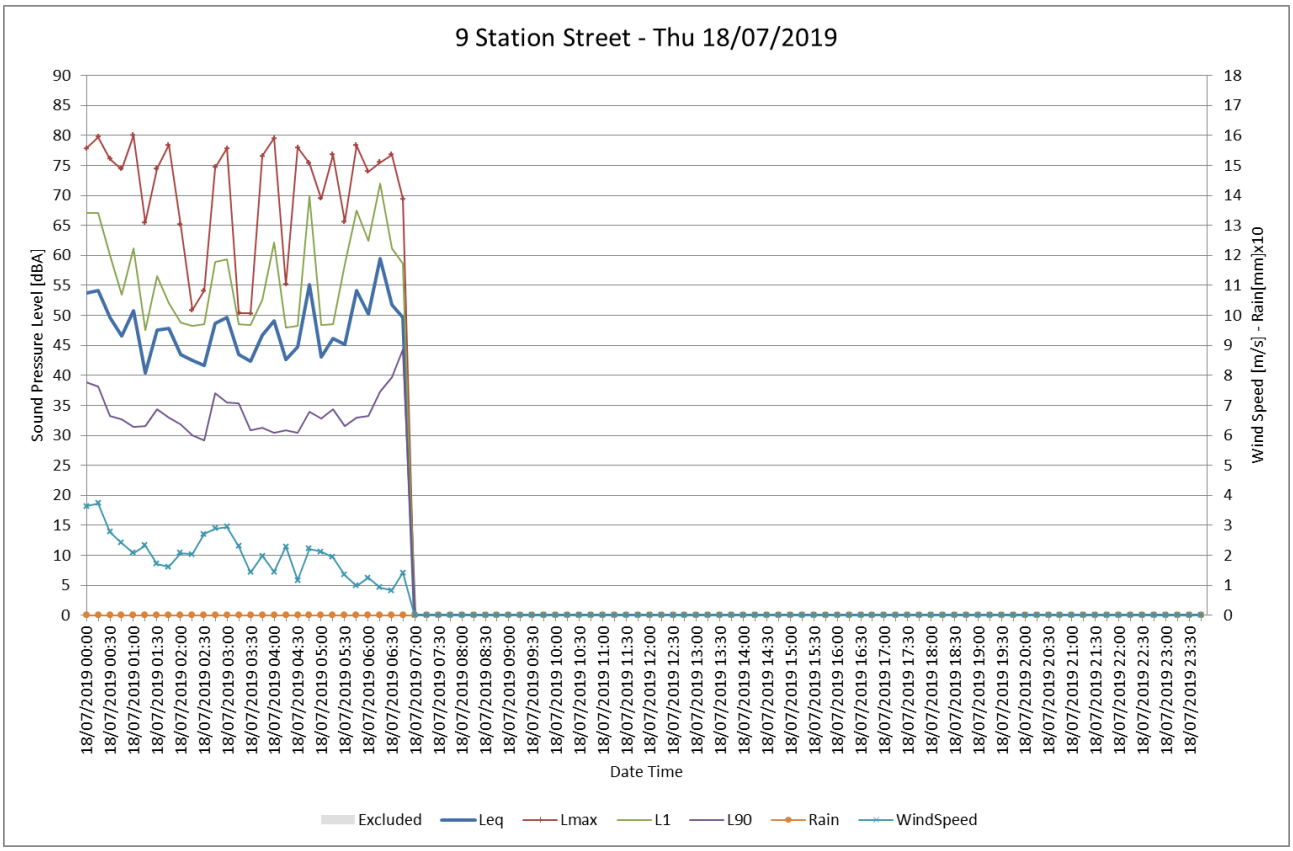


Figure A1.26 Unattended noise measurement at ML A

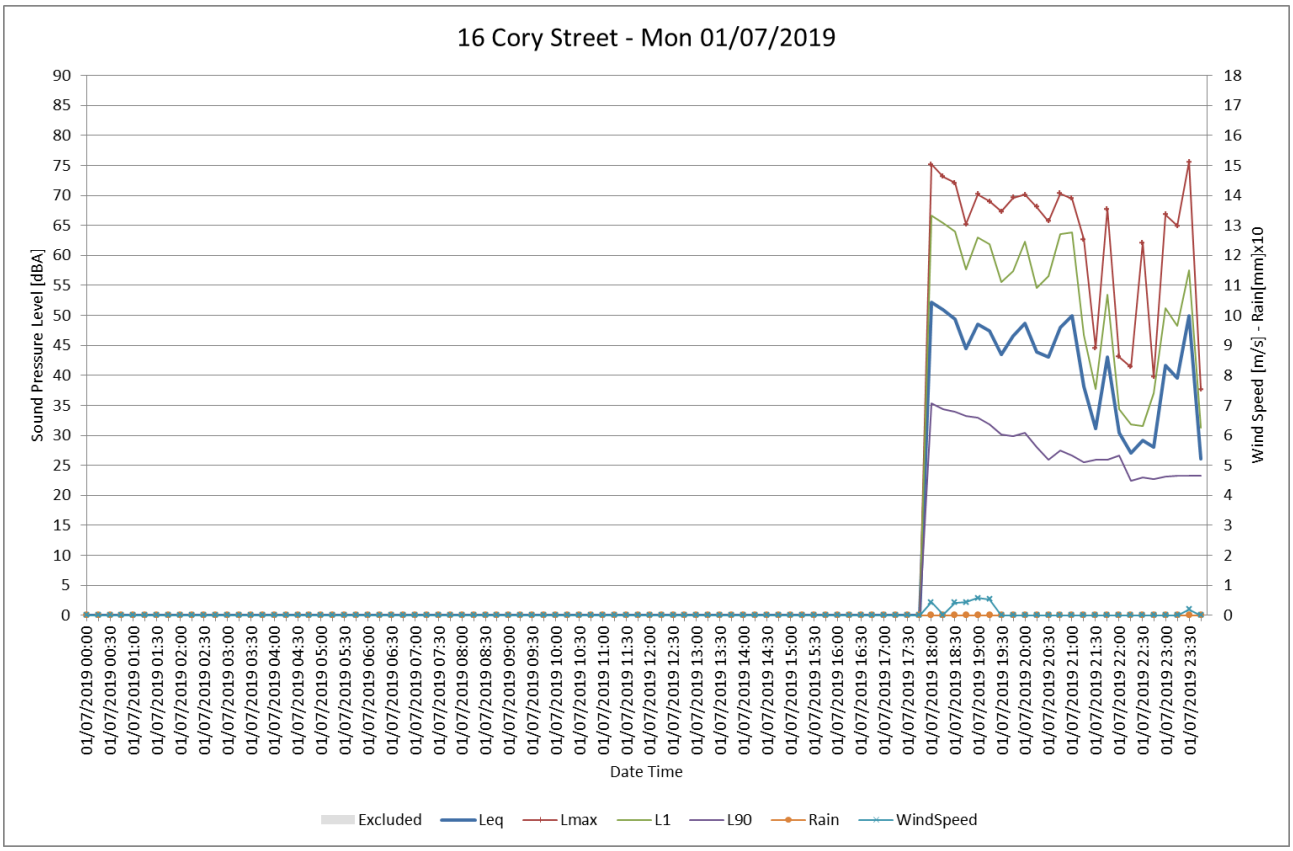


Figure A1.27 Unattended noise measurement at ML B

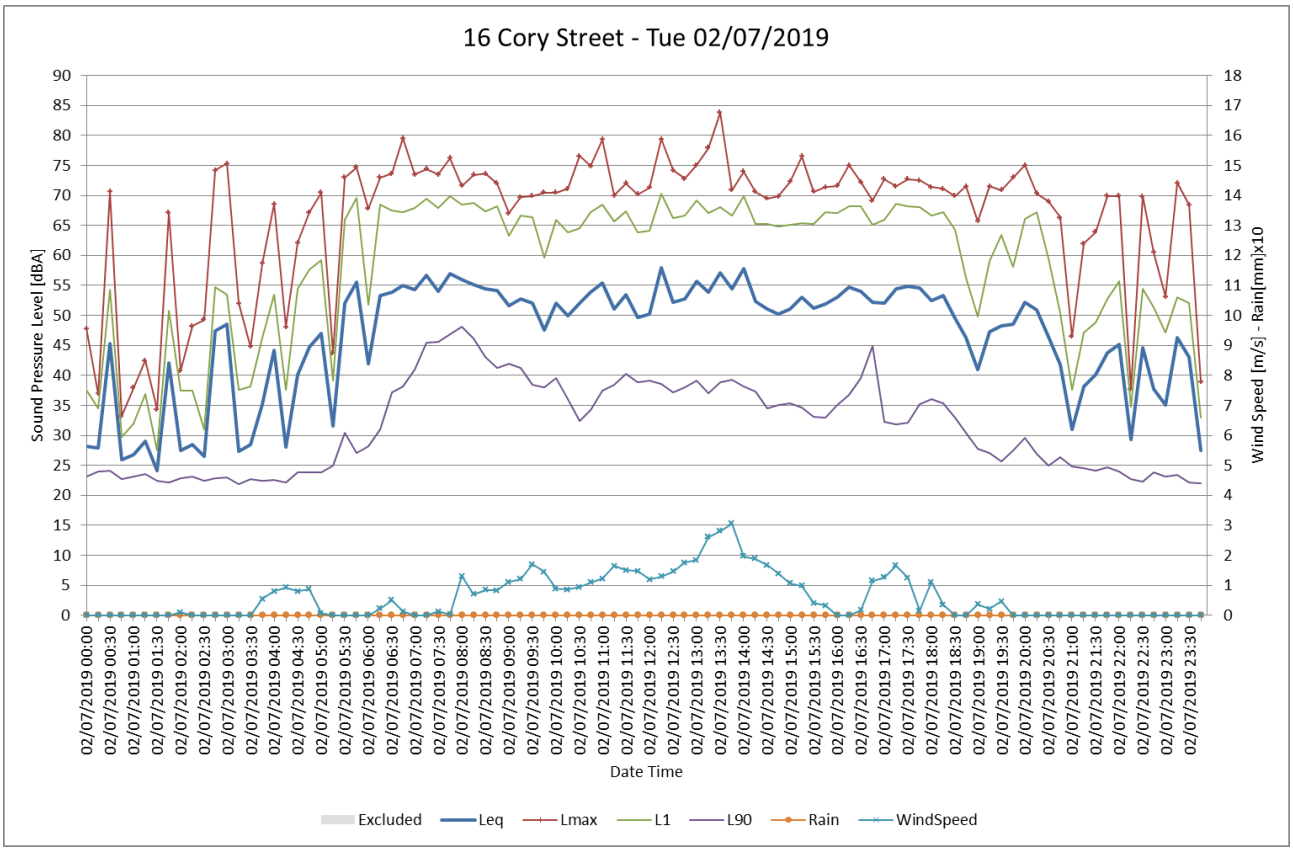


Figure A1.28 Unattended noise measurement at ML B

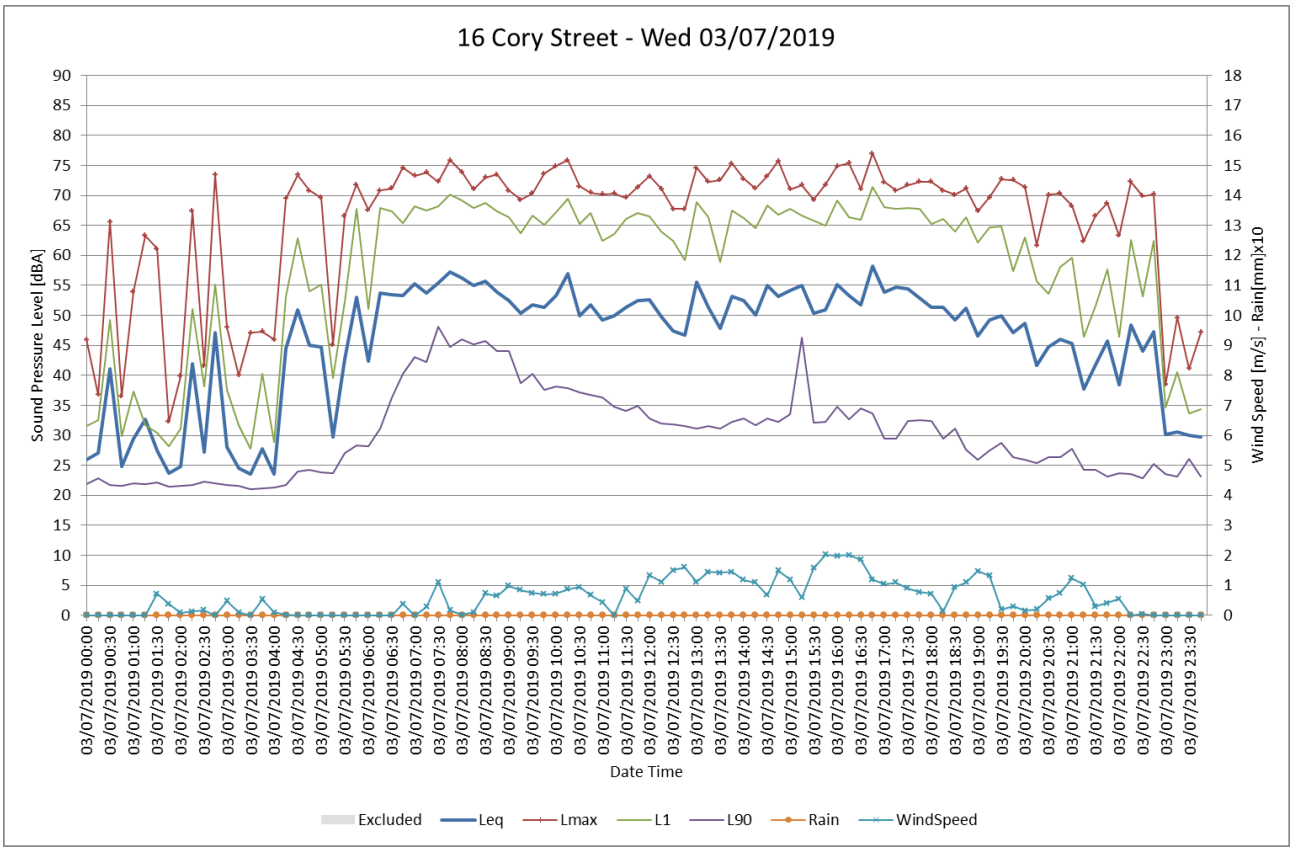


Figure A1.29 Unattended noise measurement at ML B

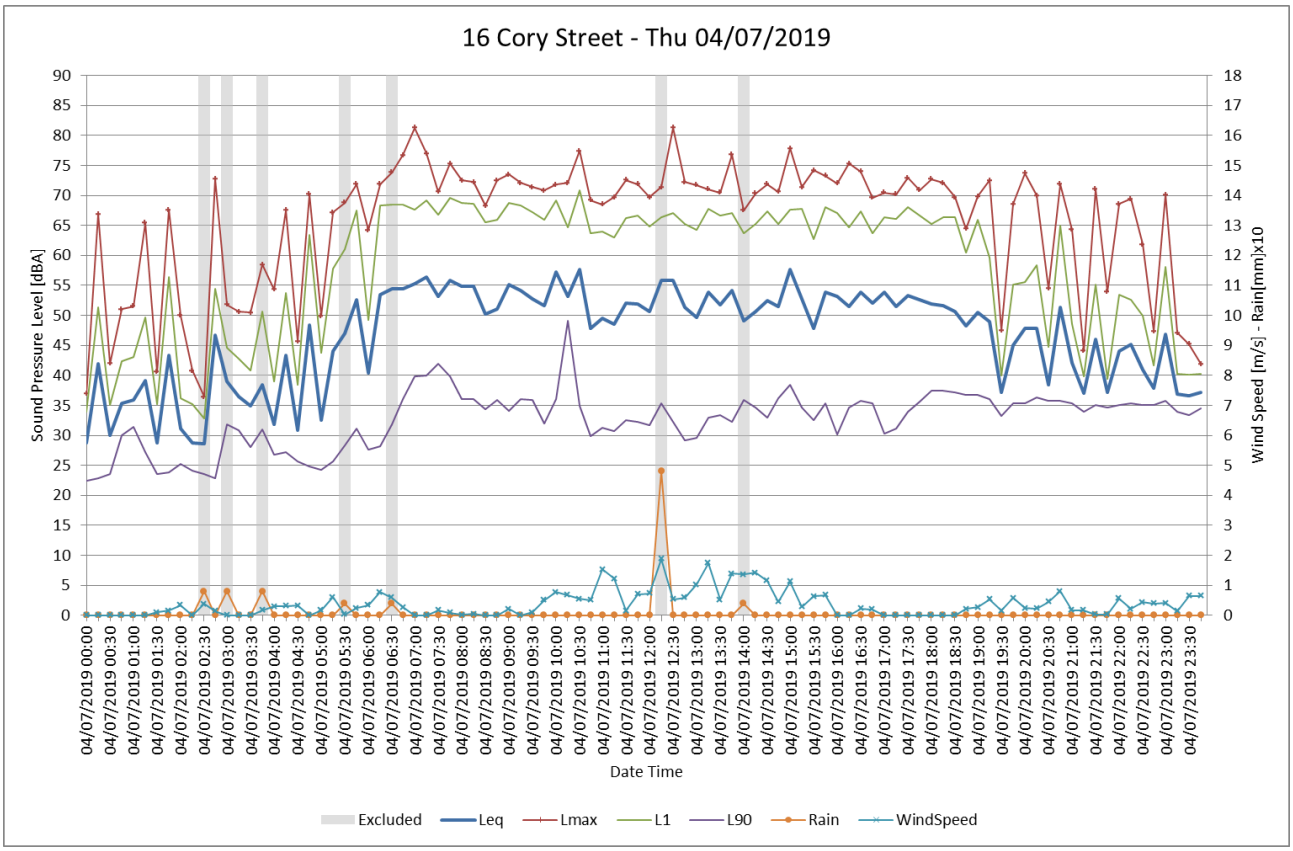


Figure A1.30 Unattended noise measurement at ML B

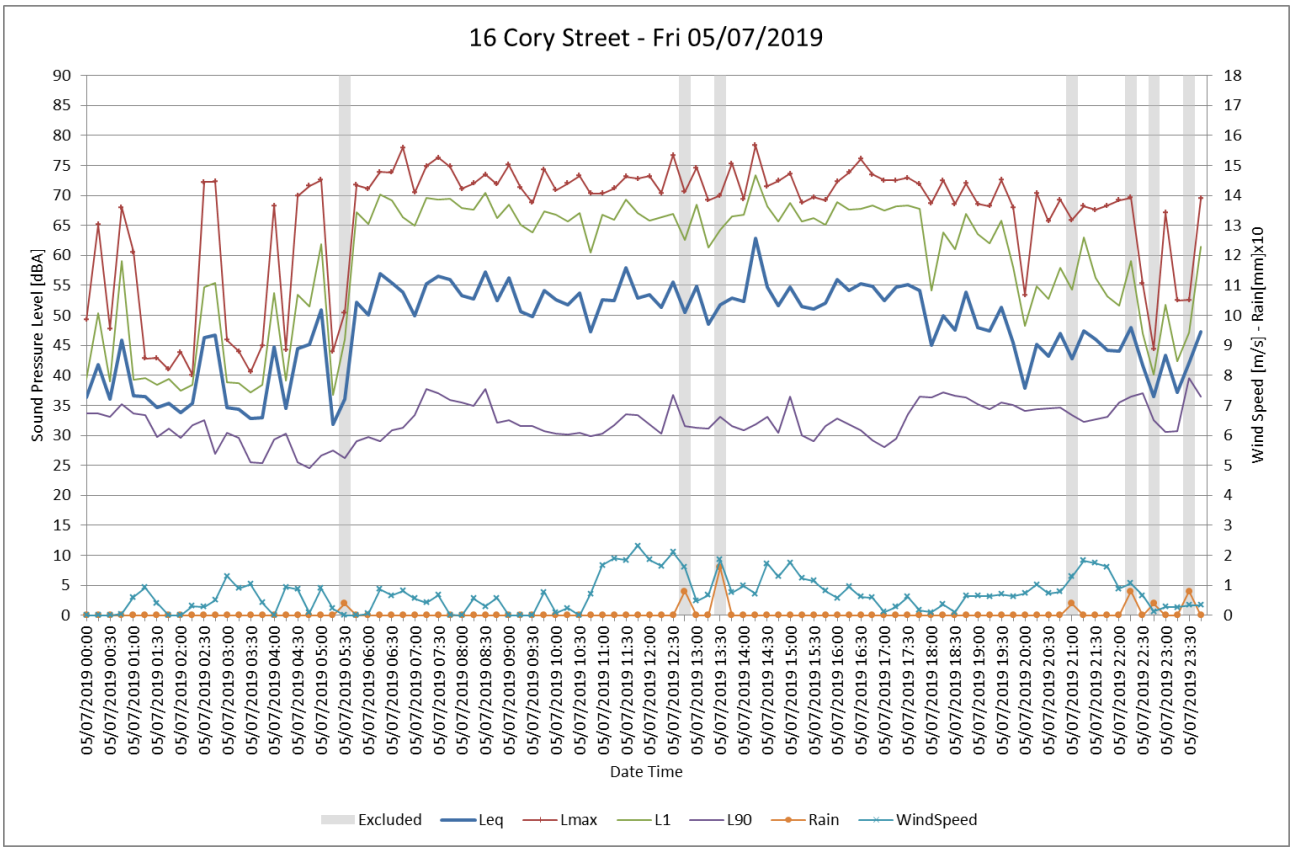


Figure A1.31 Unattended noise measurement at ML B

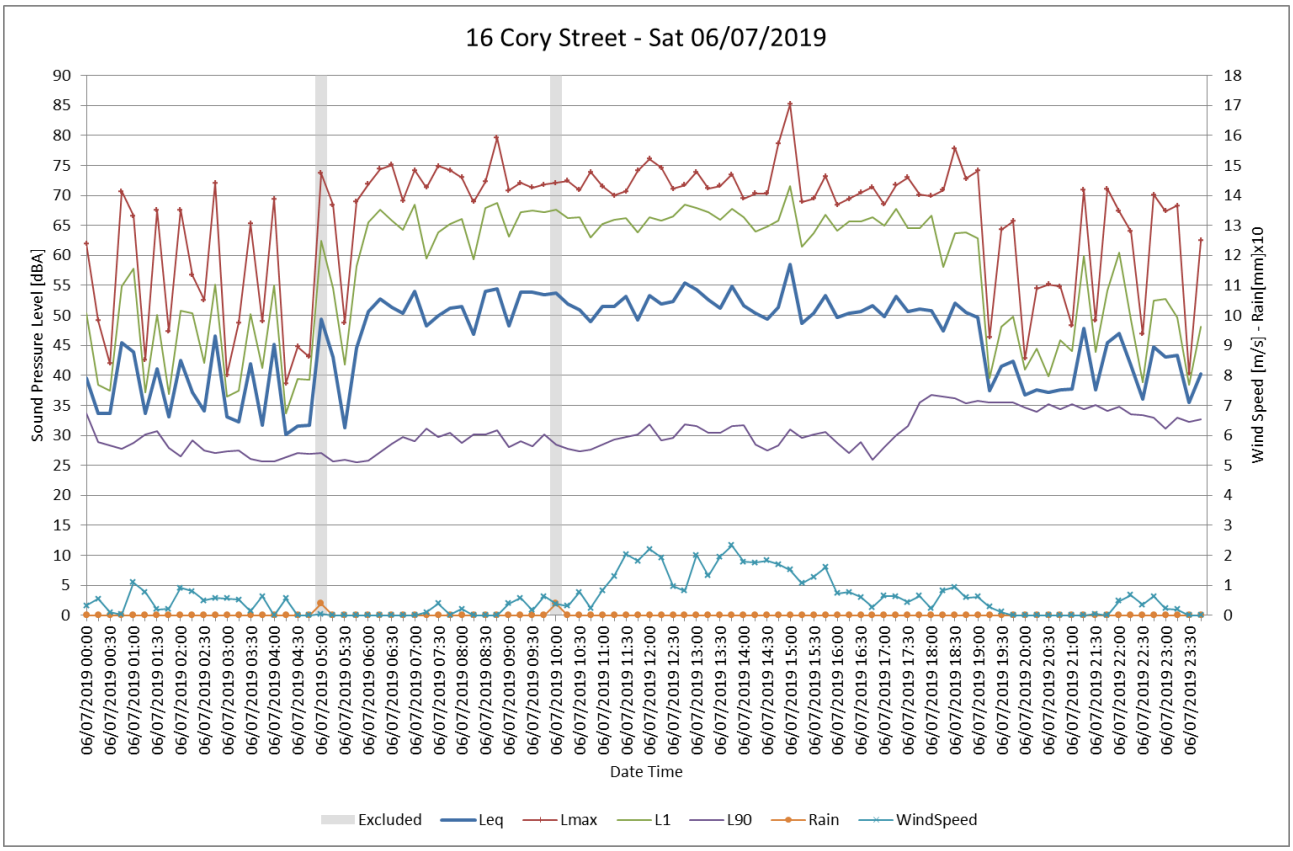


Figure A1.32 Unattended noise measurement at ML B

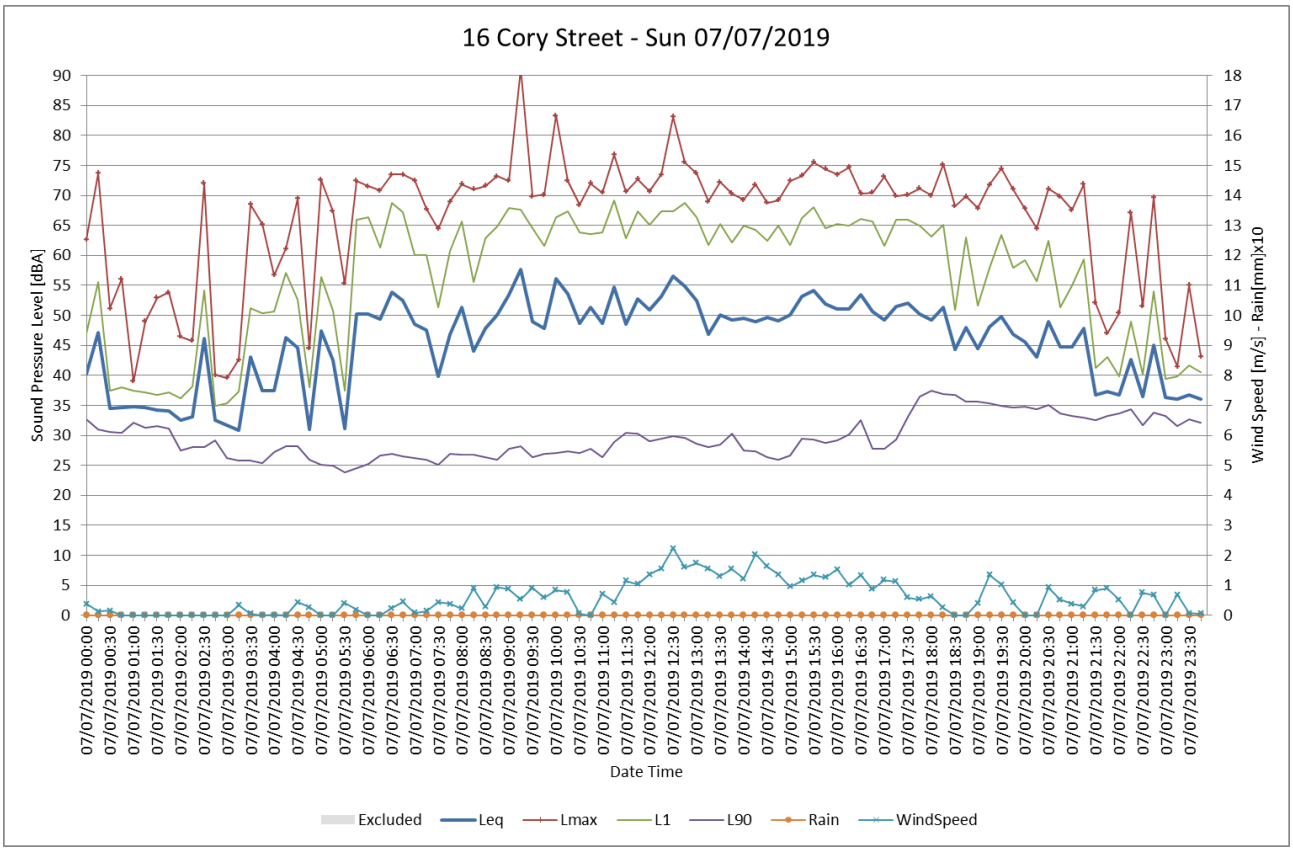


Figure A1.33 Unattended noise measurement at ML B

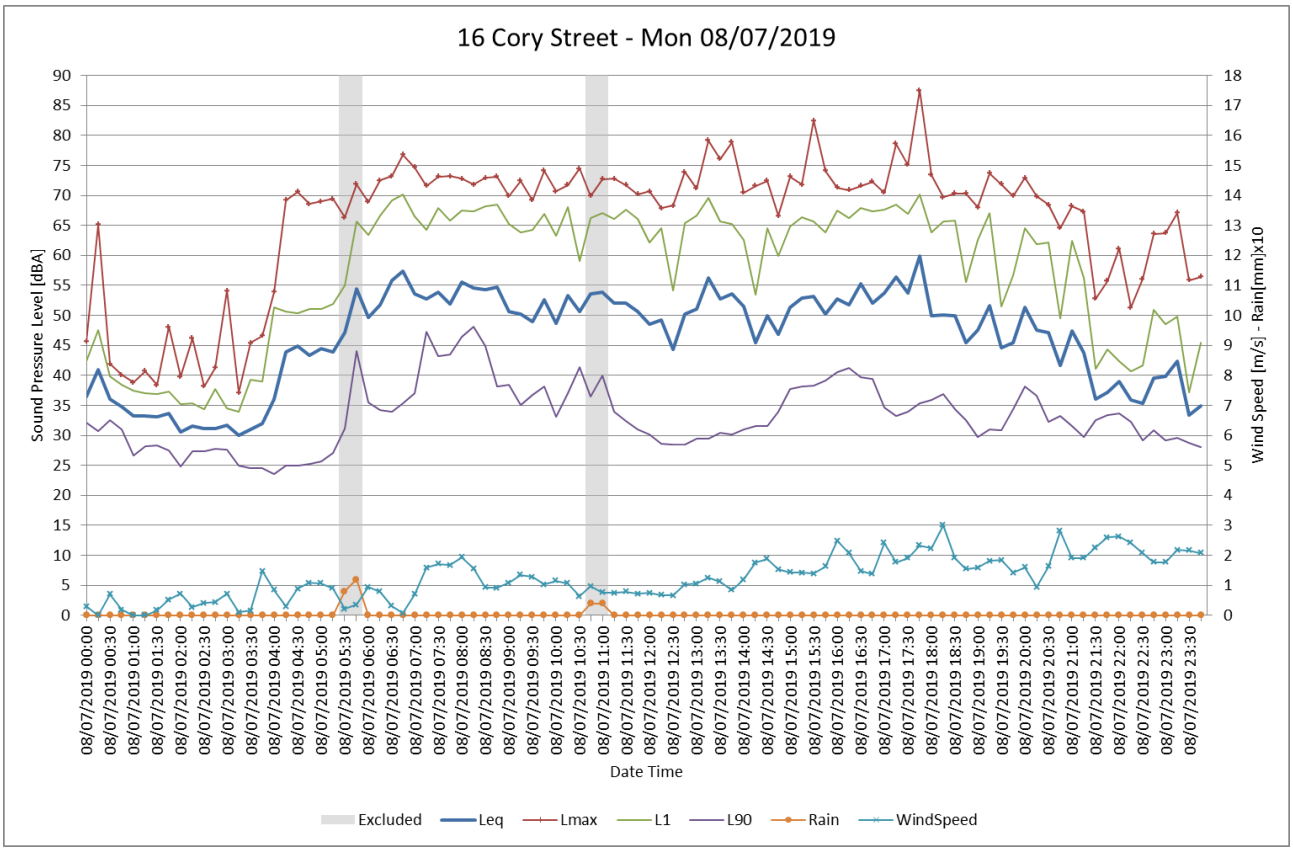


Figure A1.34 Unattended noise measurement at ML B

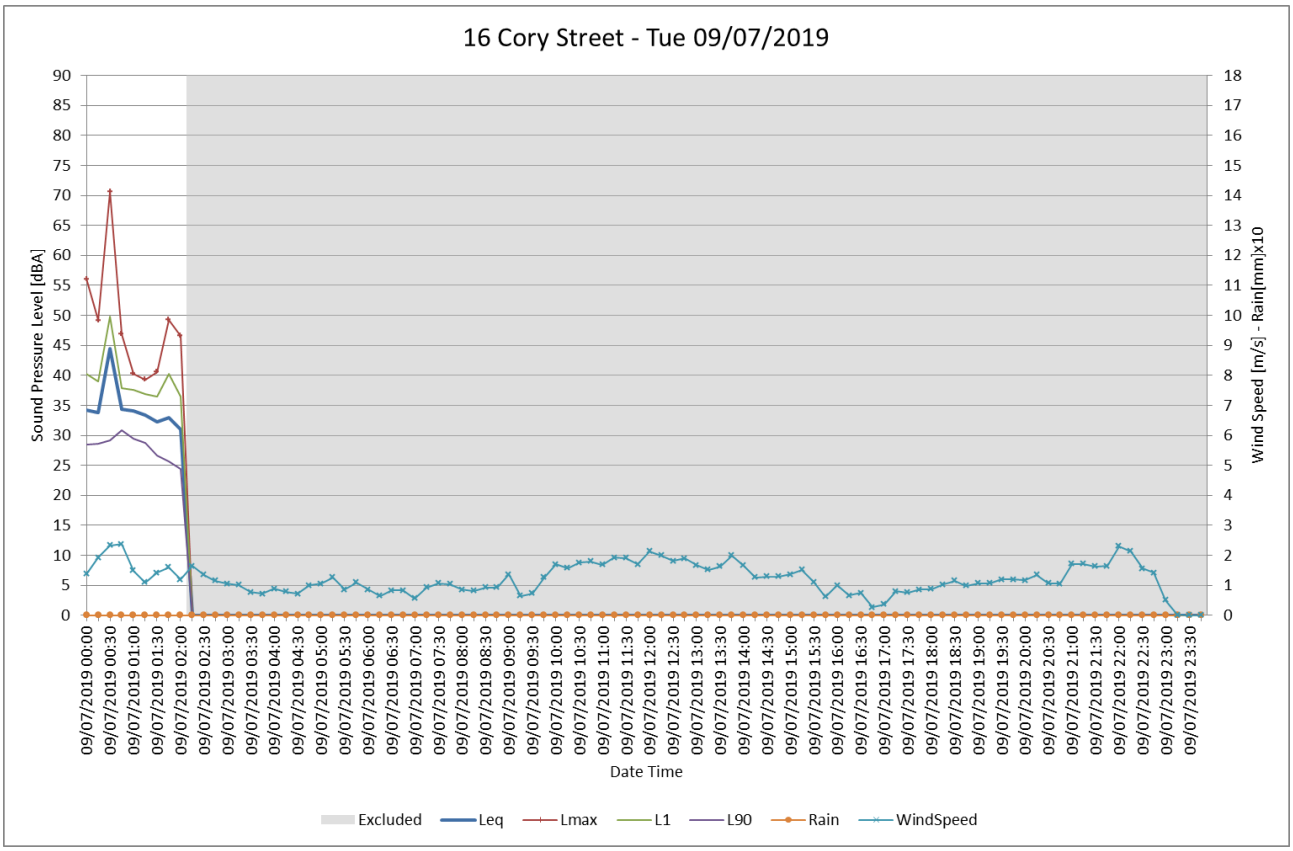


Figure A1.35 Unattended noise measurement at ML B

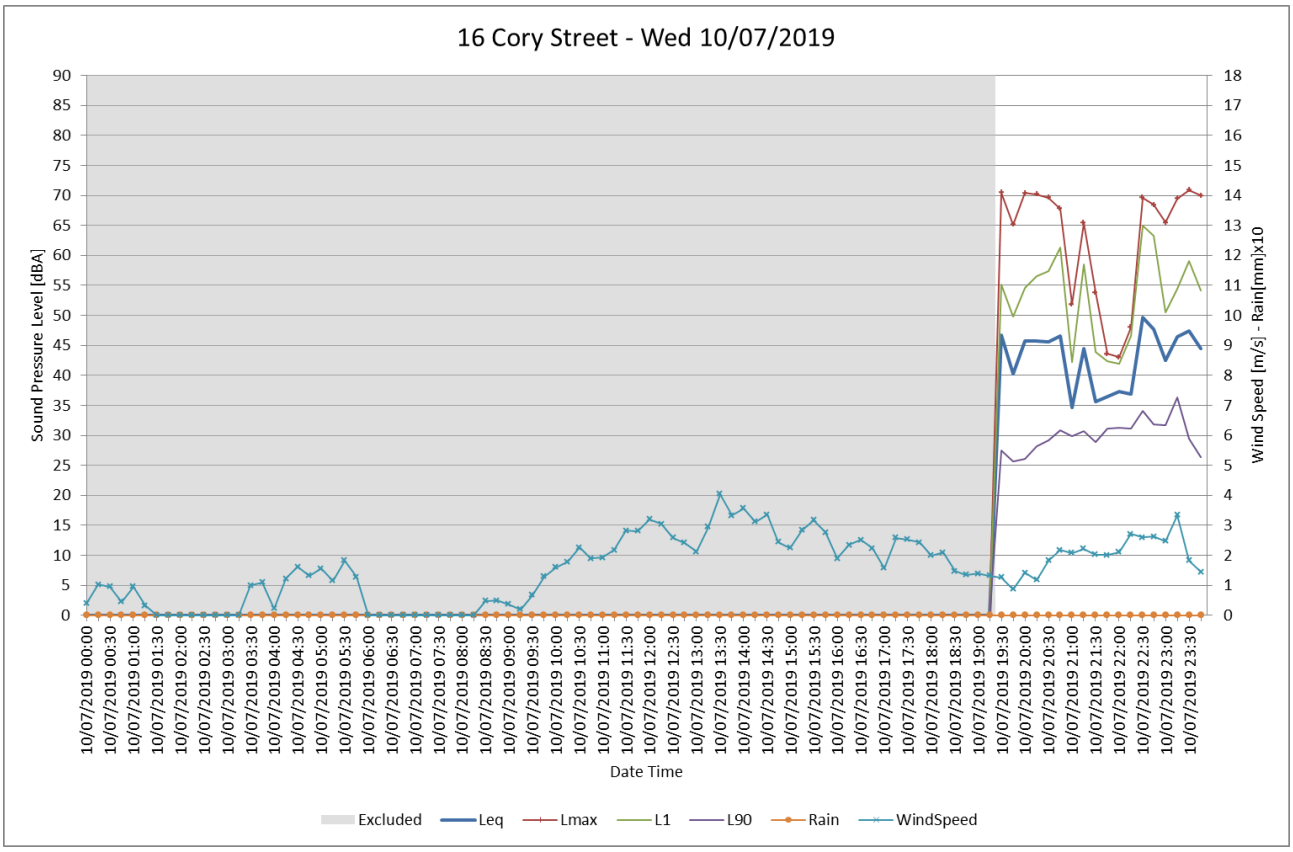


Figure A1.36 Unattended noise measurement at ML B

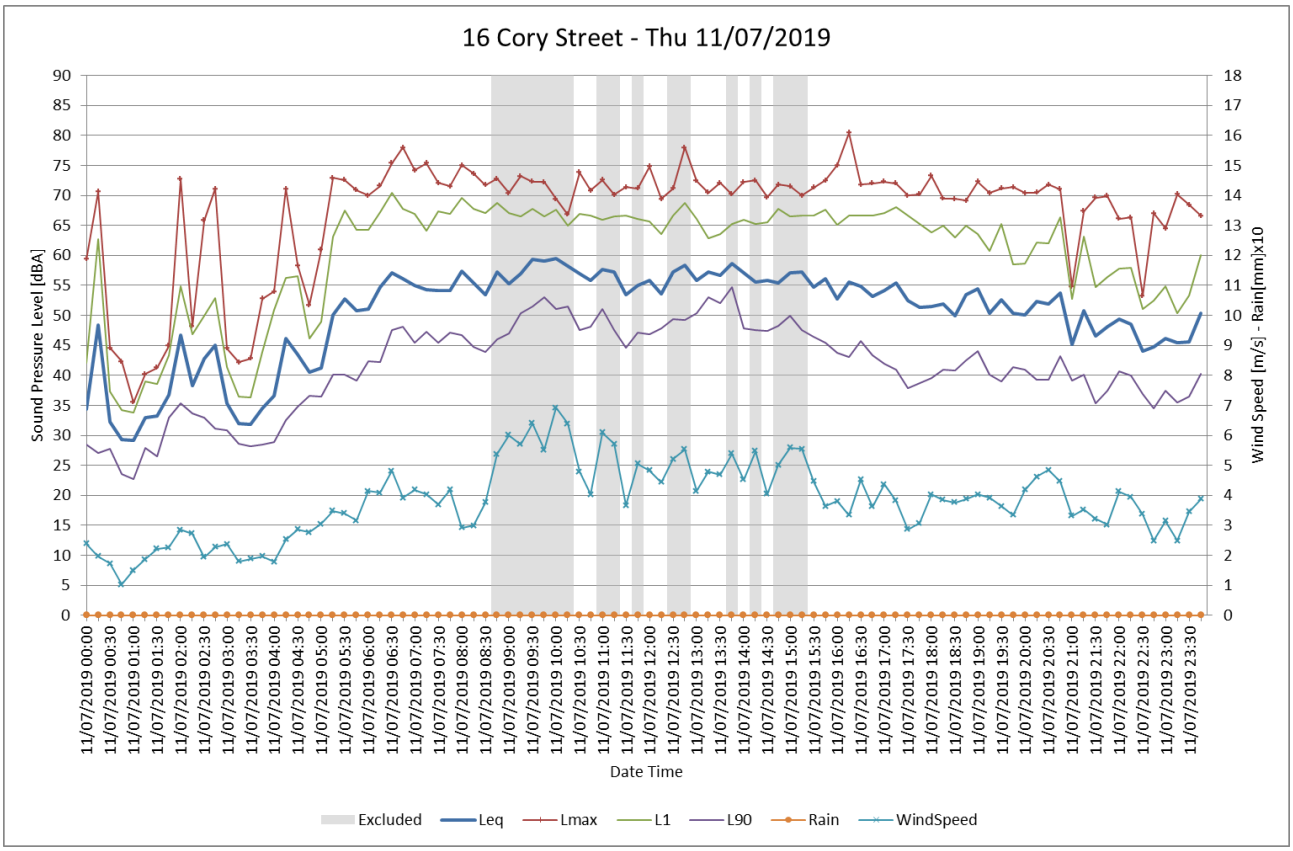


Figure A1.37 Unattended noise measurement at ML B

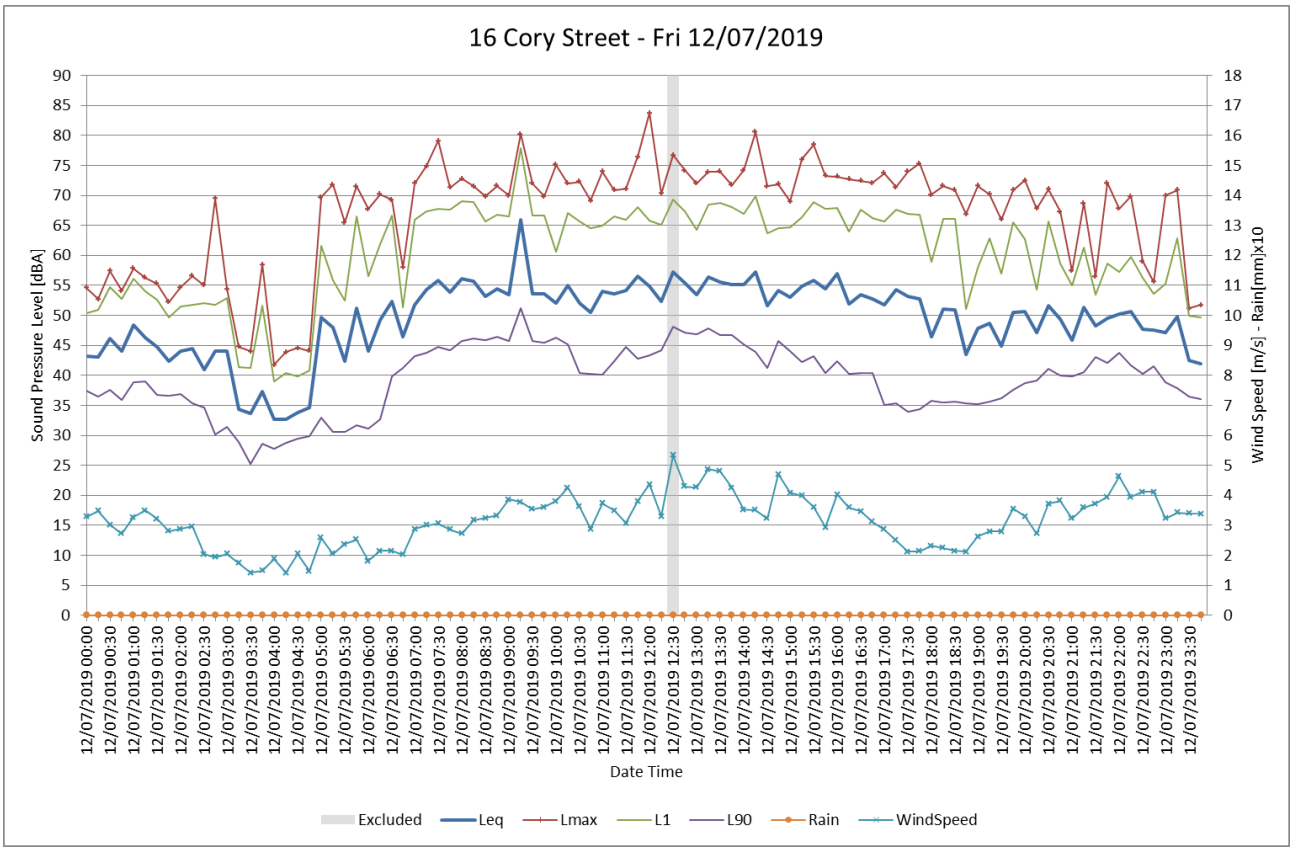


Figure A1.38 Unattended noise measurement at ML B

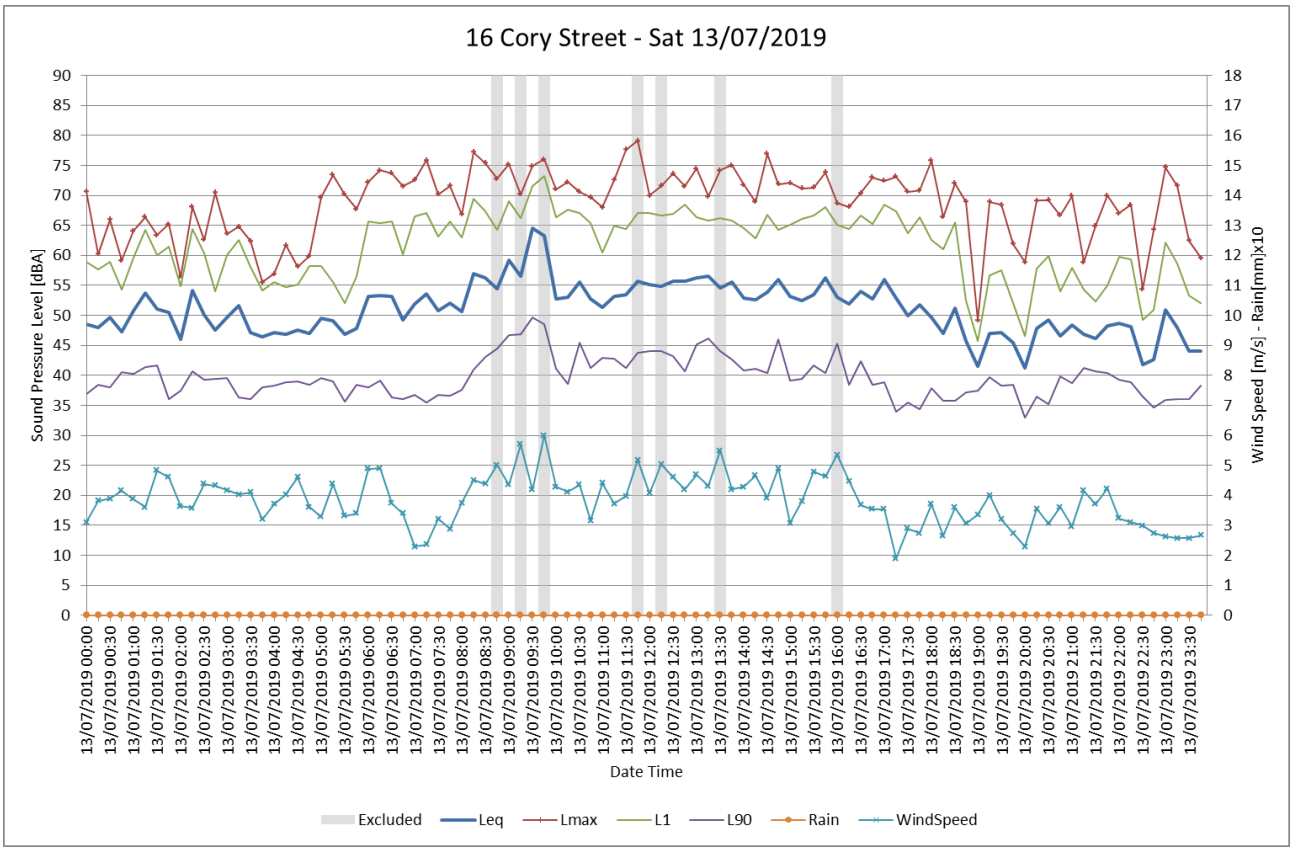


Figure A1.39 Unattended noise measurement at ML B

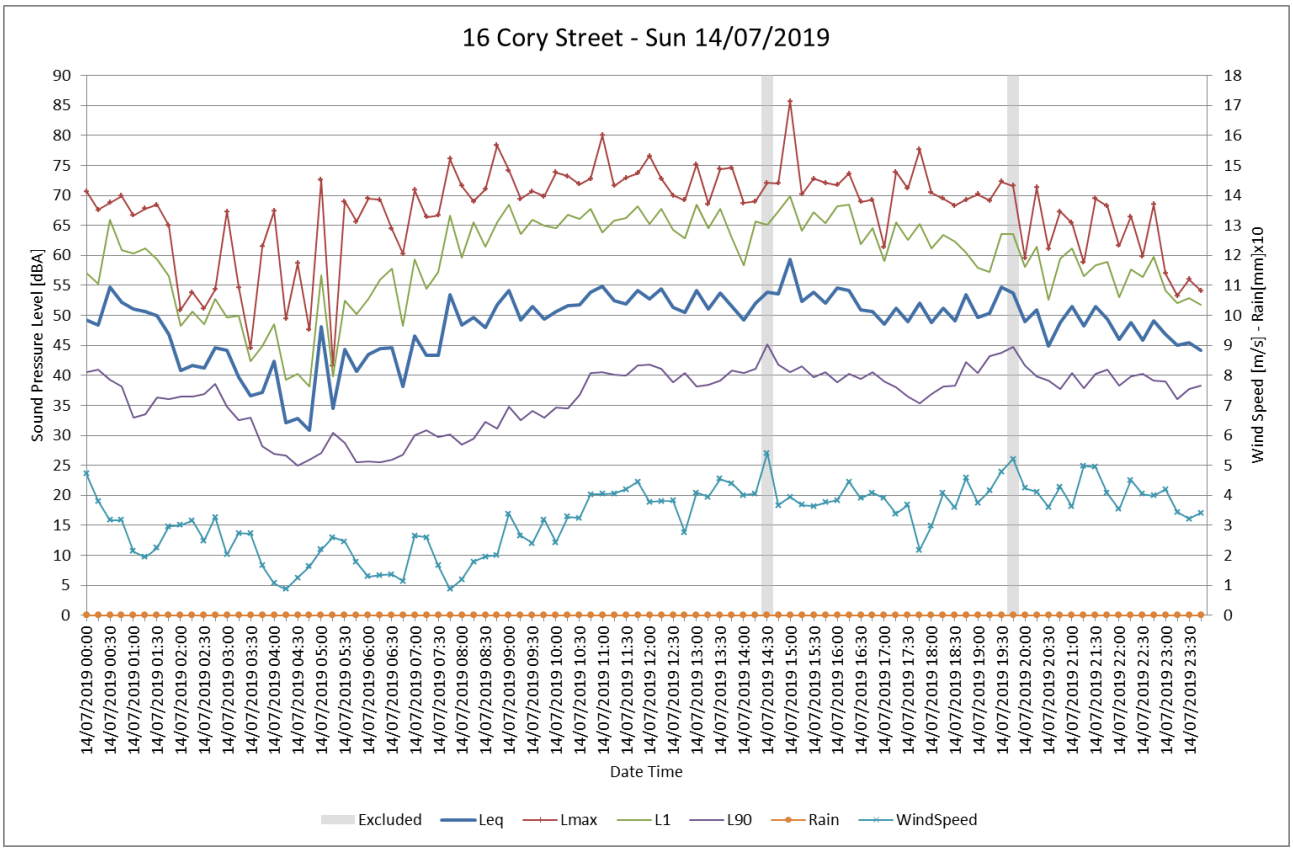


Figure A1.40 Unattended noise measurement at ML B

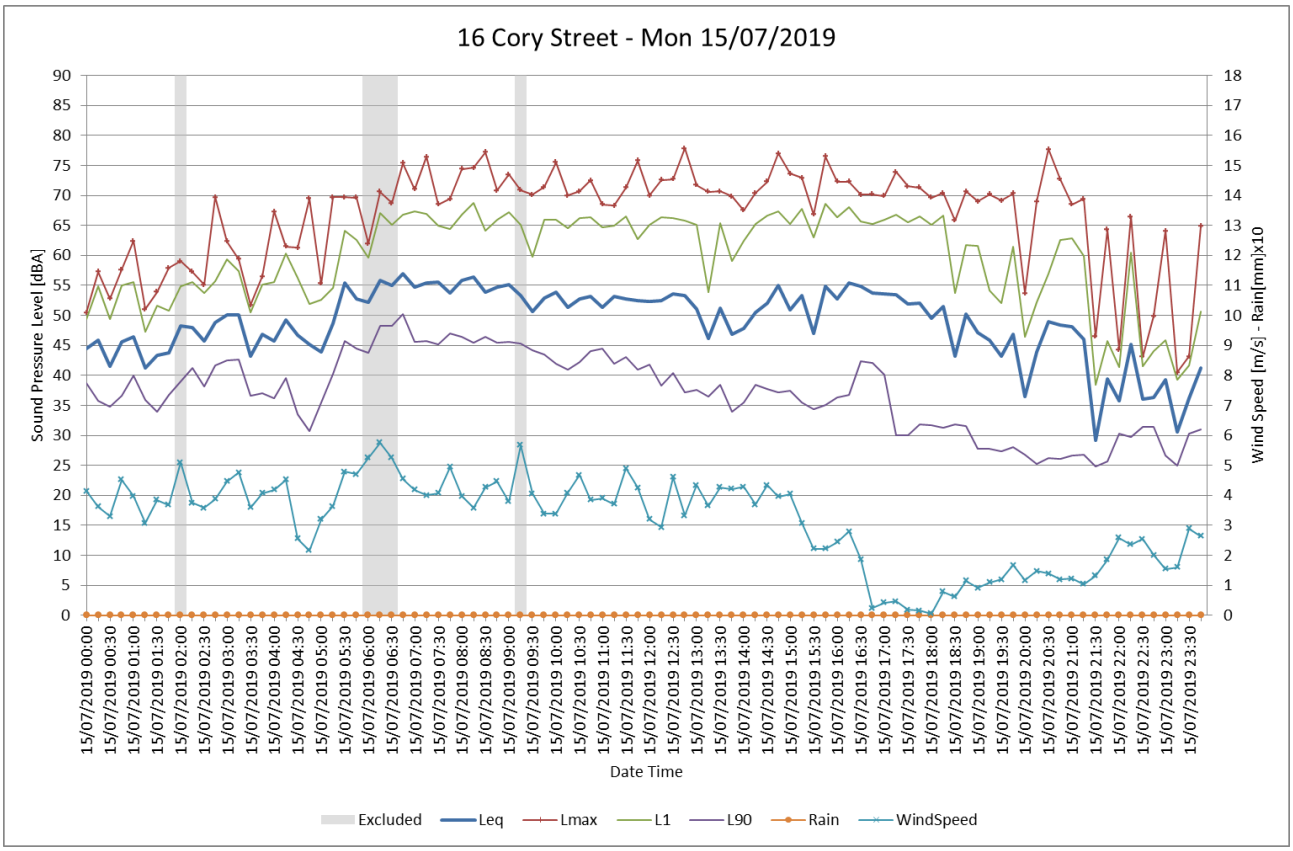


Figure A1.41 Unattended noise measurement at ML B

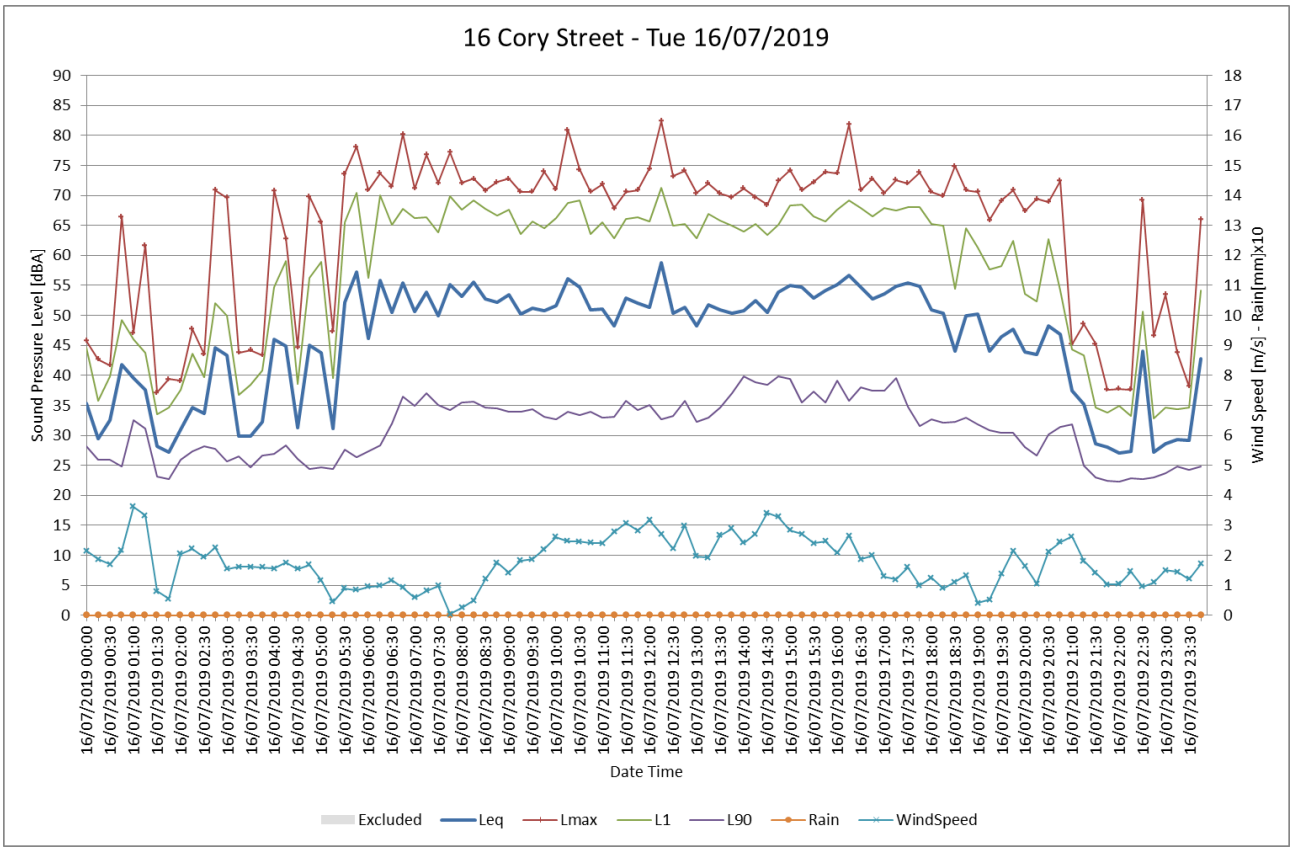


Figure A1.42 Unattended noise measurement at ML B

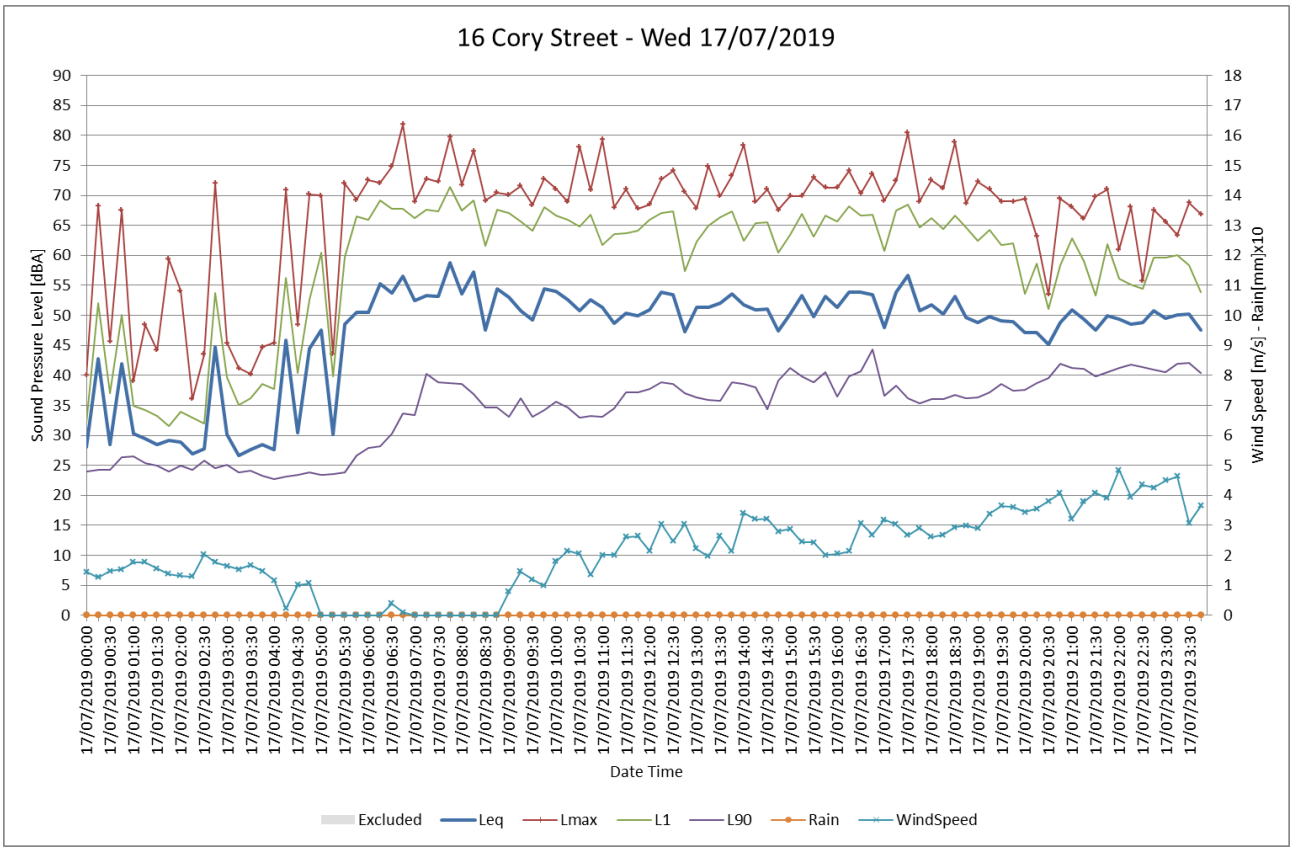


Figure A1.43 Unattended noise measurement at ML B

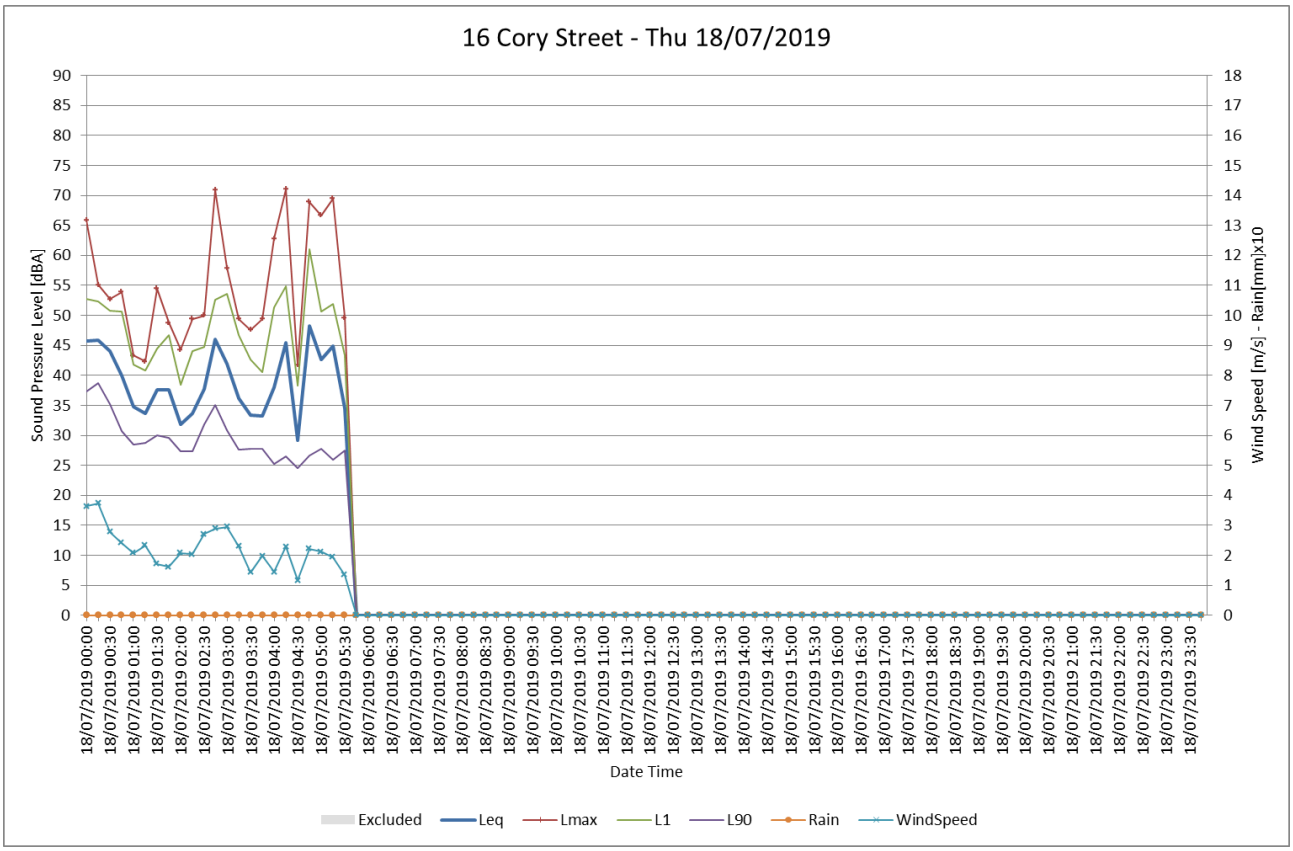


Figure A1.44 Unattended noise measurement at ML B

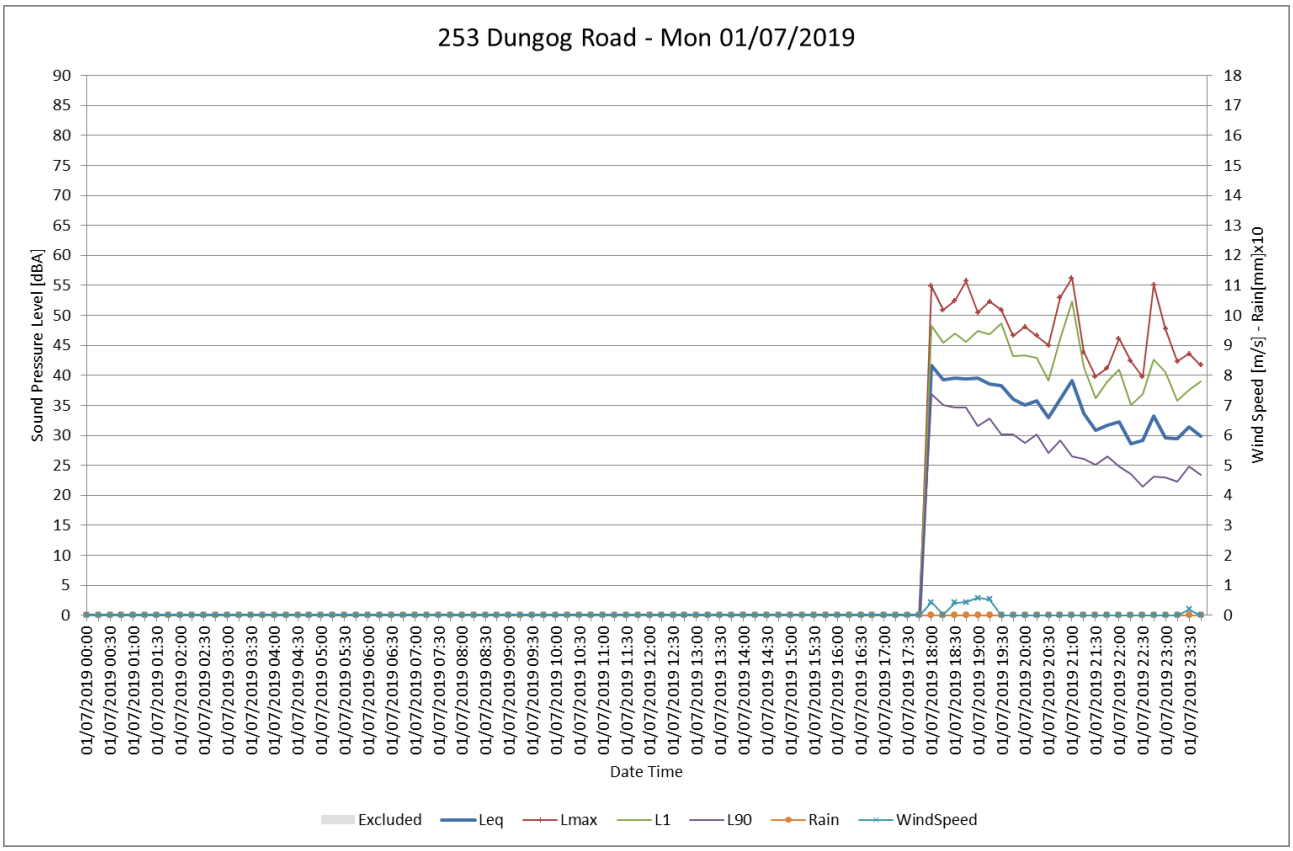


Figure A1.45 Unattended noise measurement at ML C

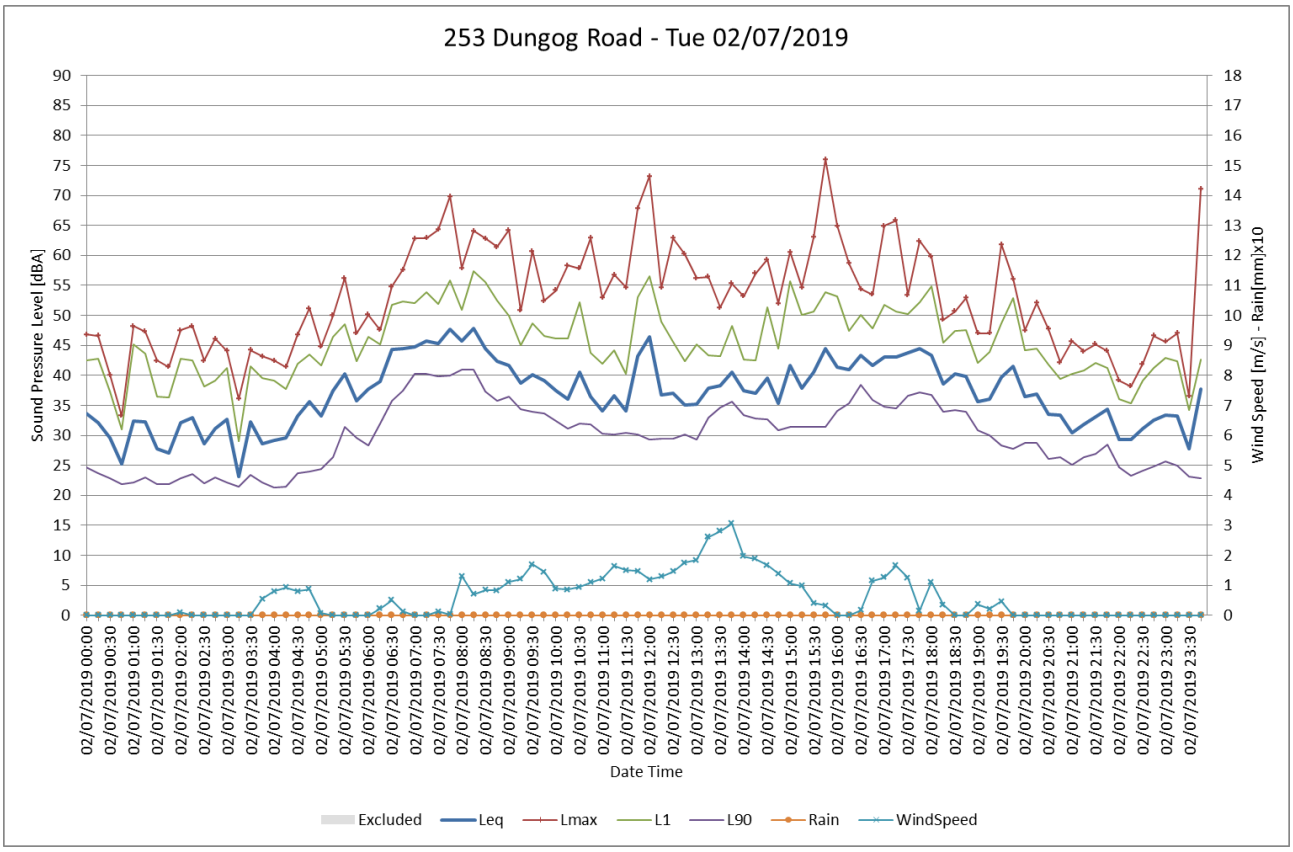


Figure A1.46 Unattended noise measurement at ML C

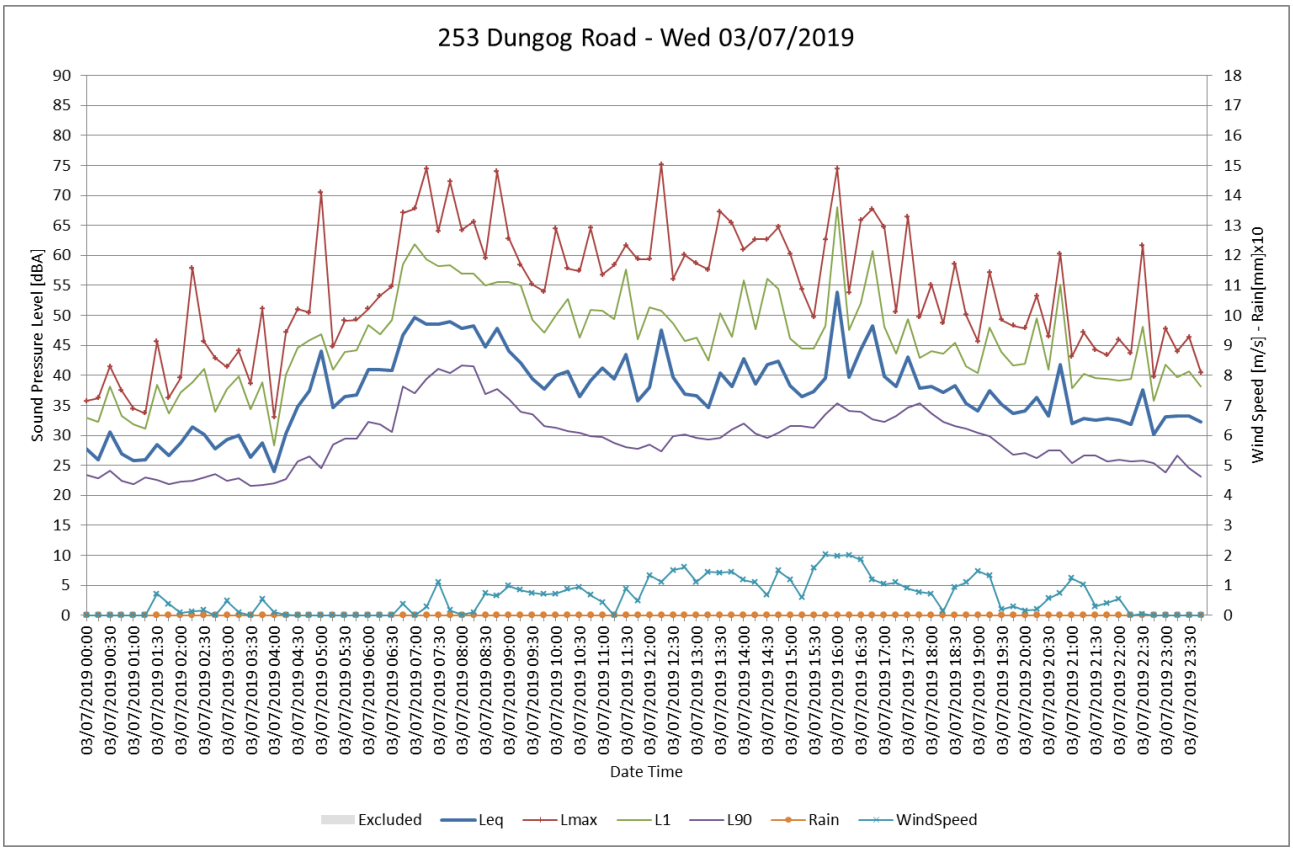


Figure A1.47 Unattended noise measurement at ML C

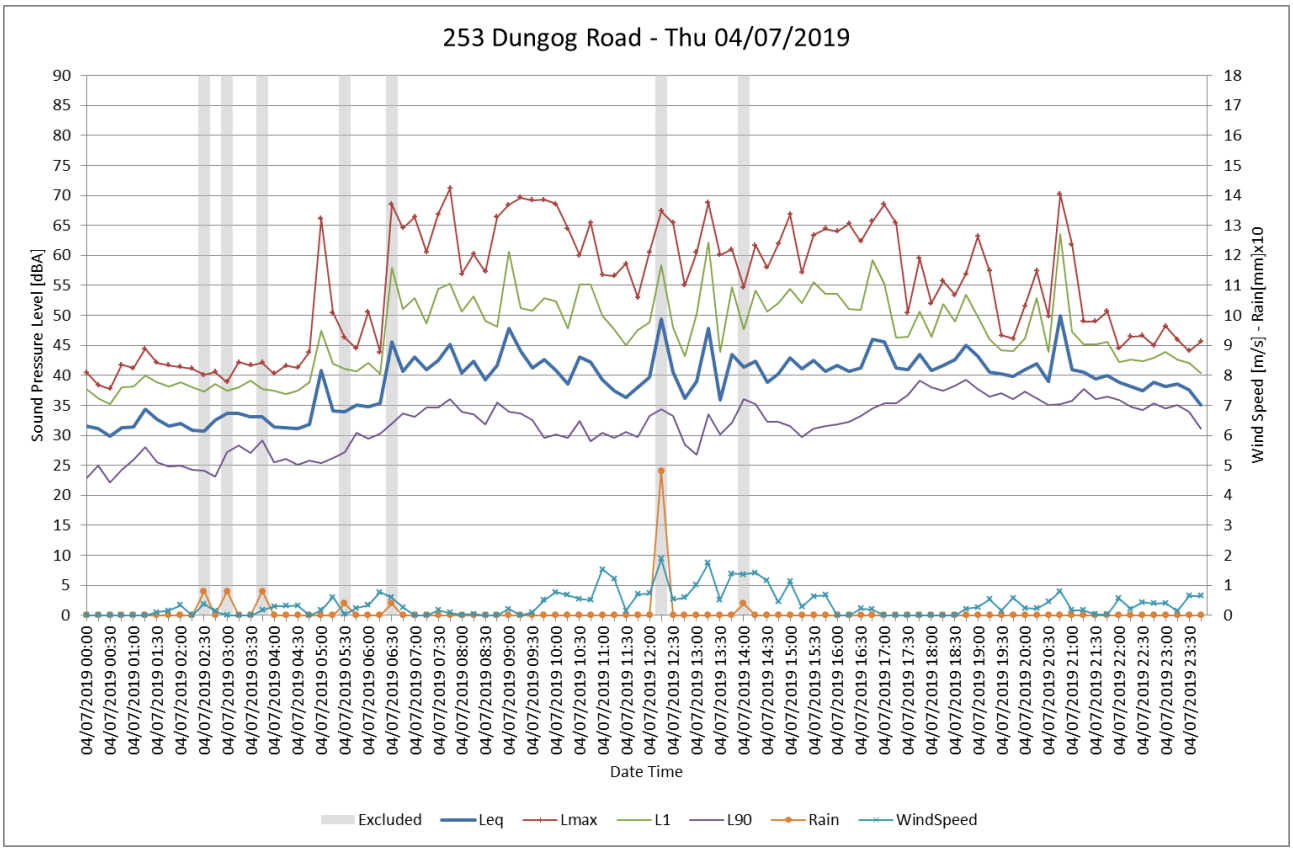


Figure A1.48 Unattended noise measurement at ML C

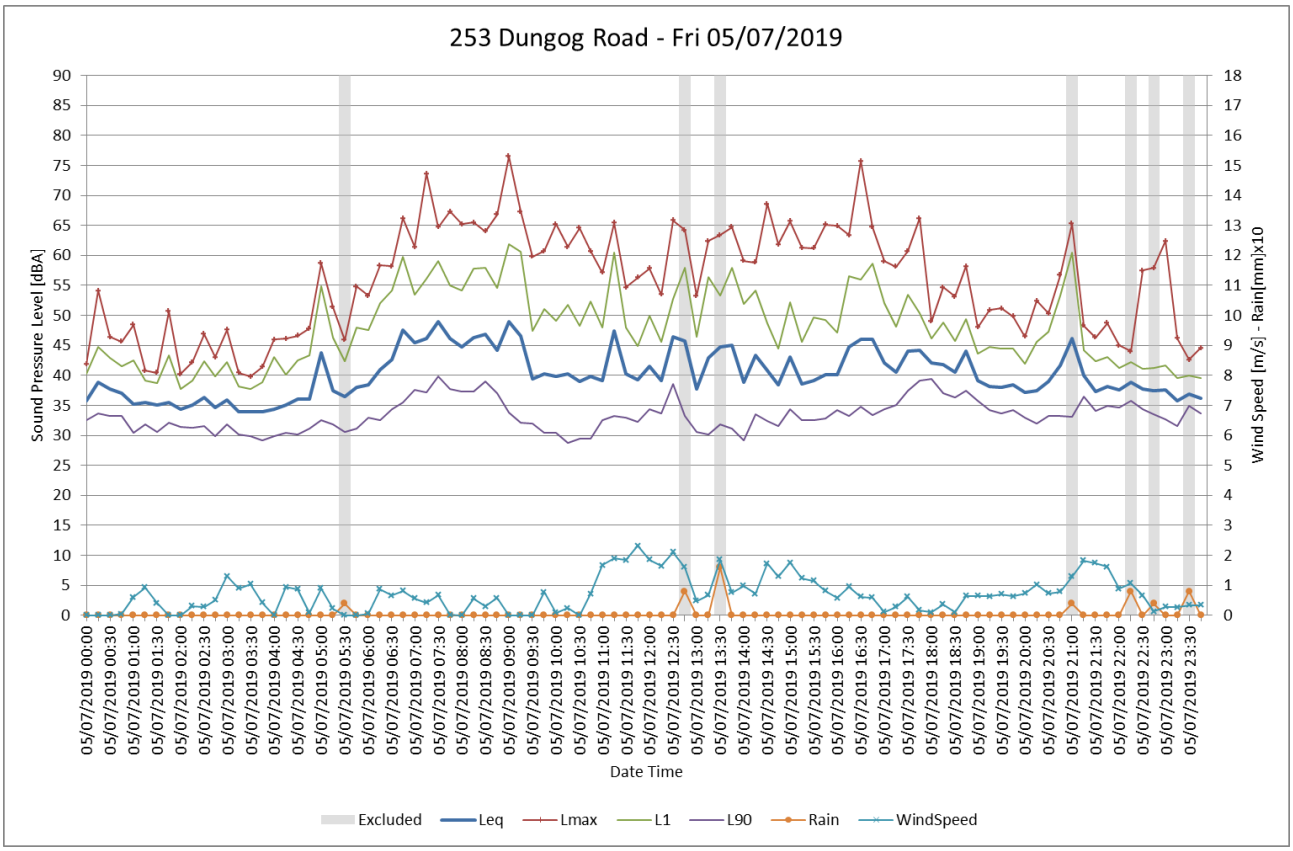


Figure A1.49 Unattended noise measurement at ML C

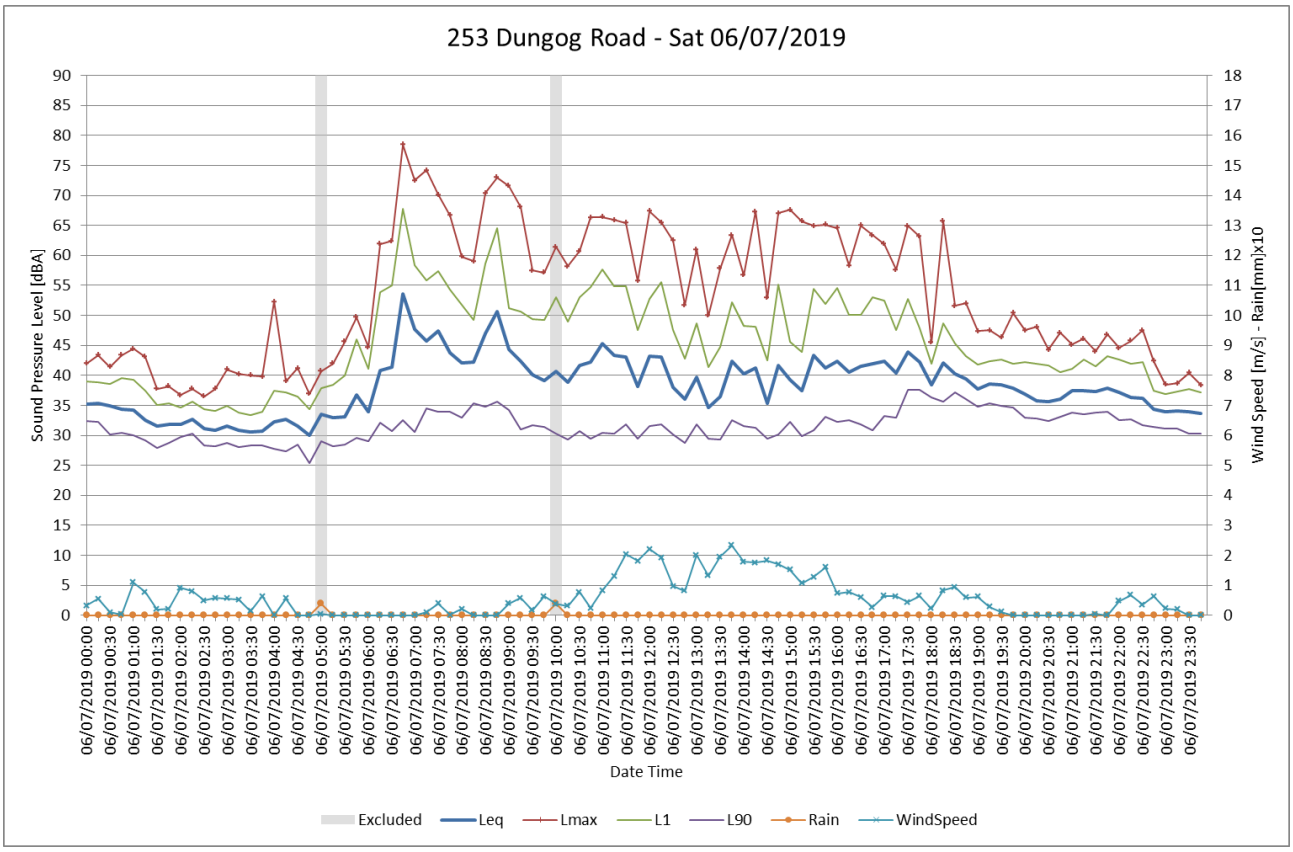


Figure A1.50 Unattended noise measurement at ML C

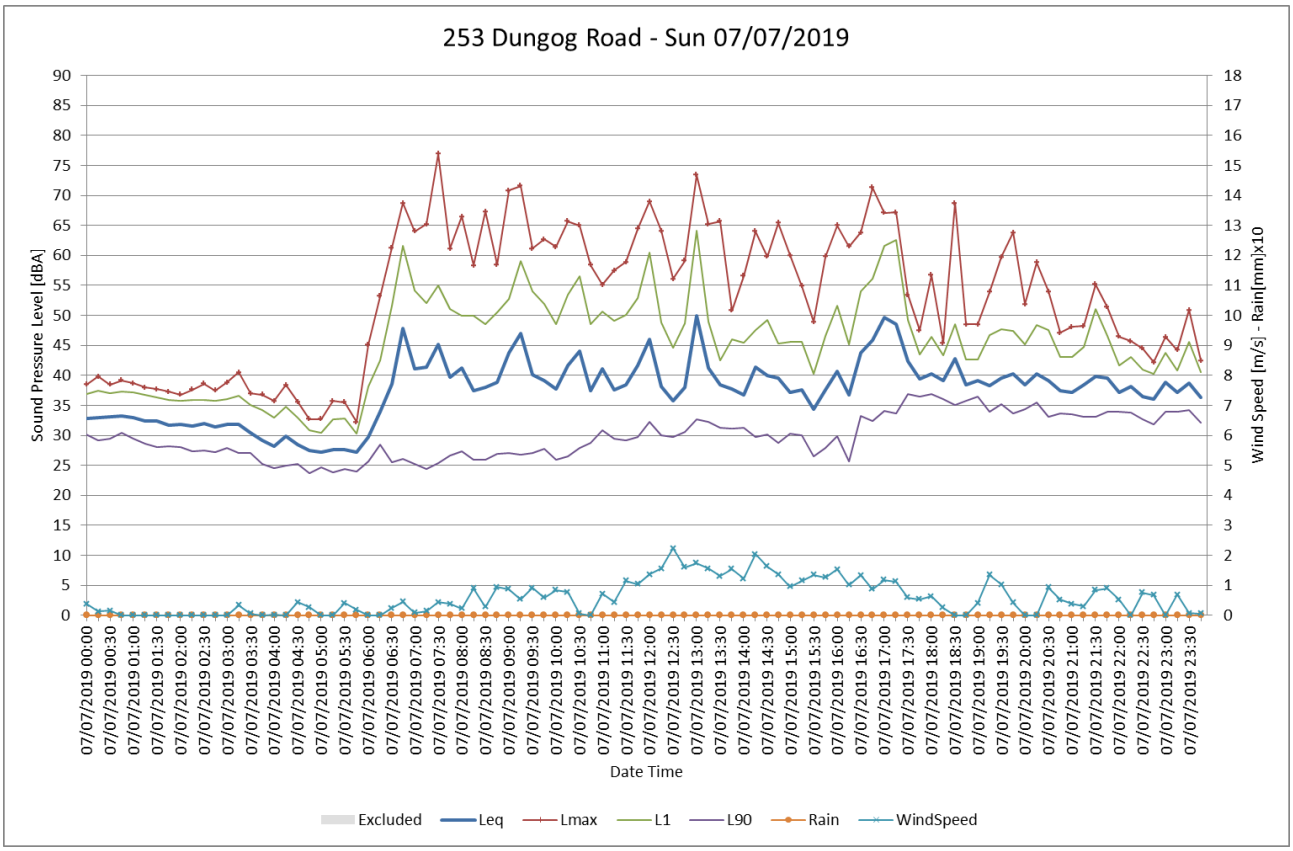


Figure A1.51 Unattended noise measurement at ML C

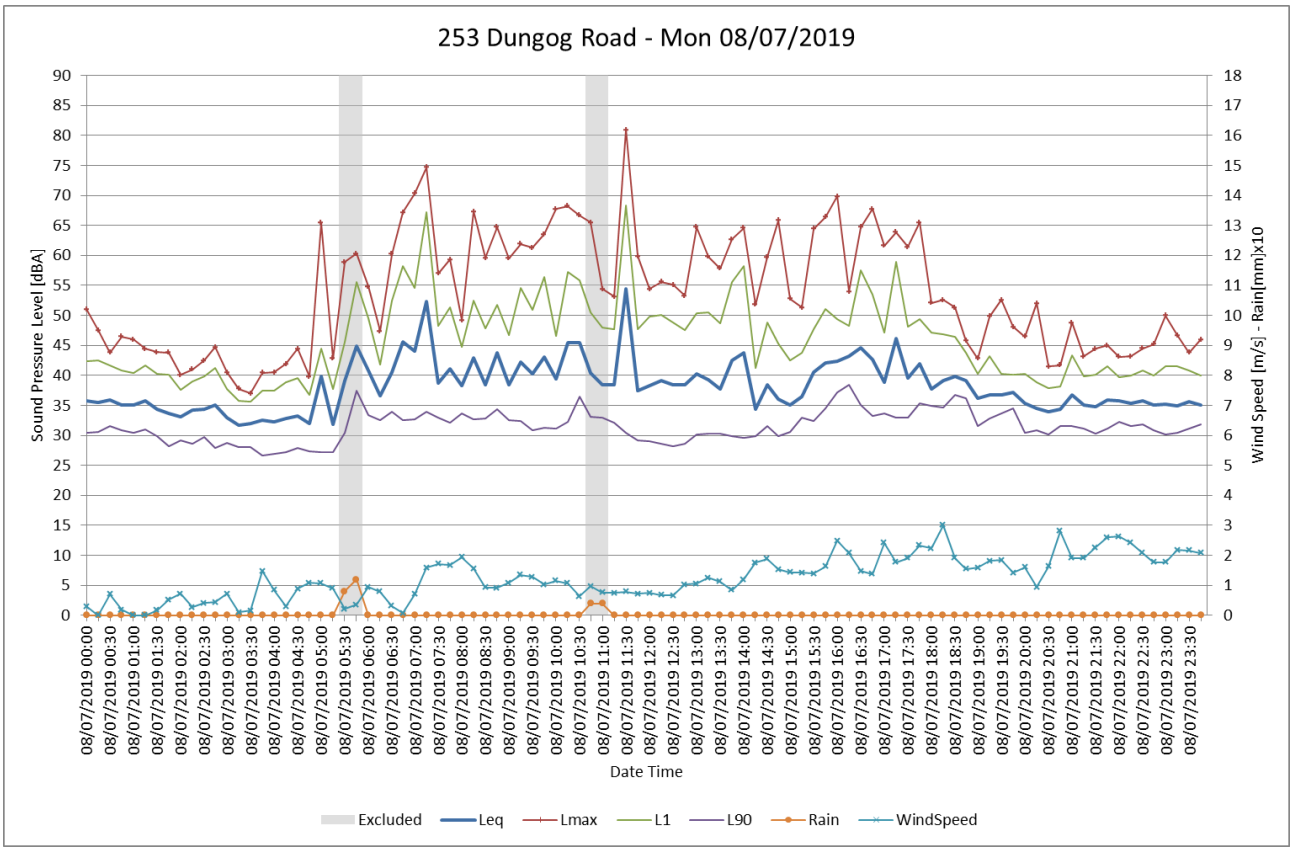


Figure A1.52 Unattended noise measurement at ML C

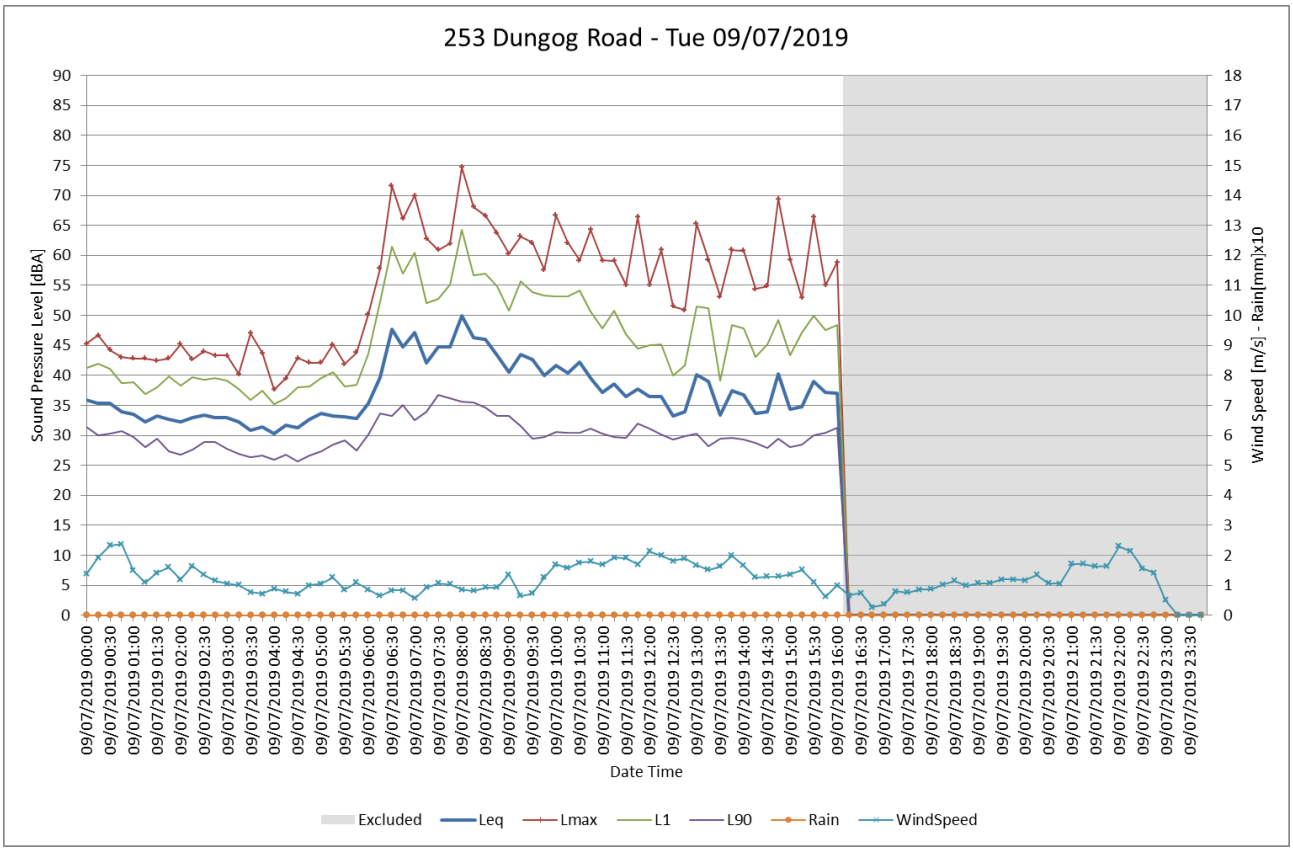


Figure A1.53 Unattended noise measurement at ML C

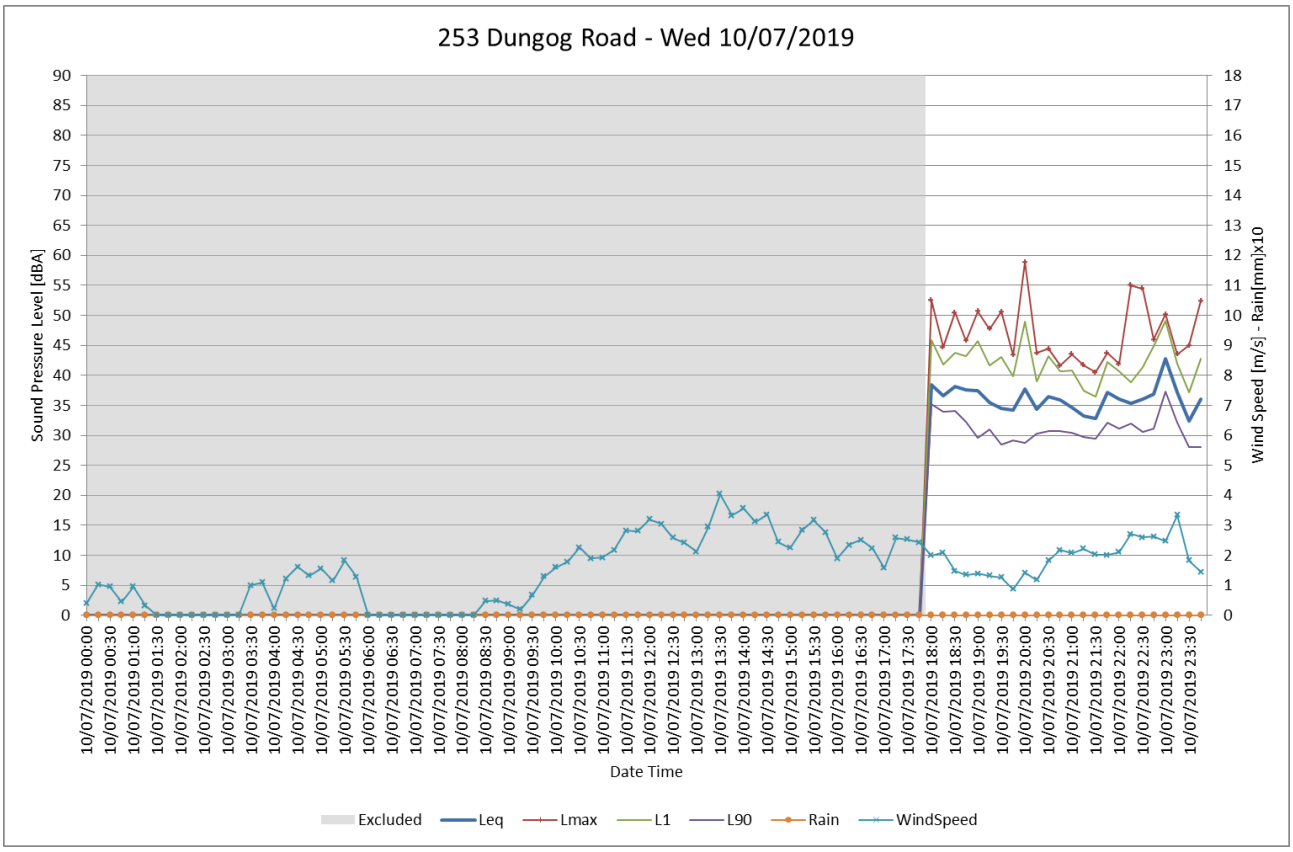


Figure A1.54 Unattended noise measurement at ML C

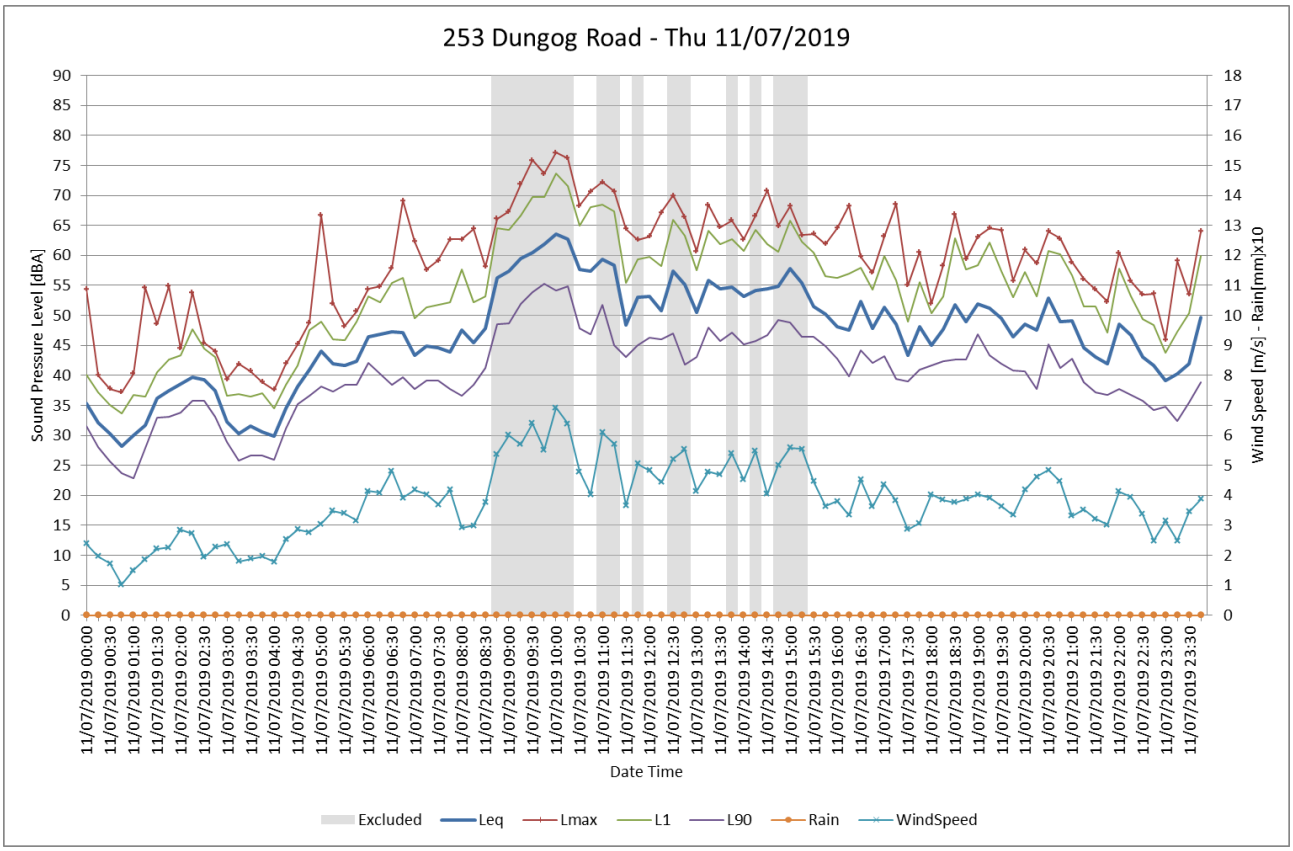


Figure A1.55 Unattended noise measurement at ML C

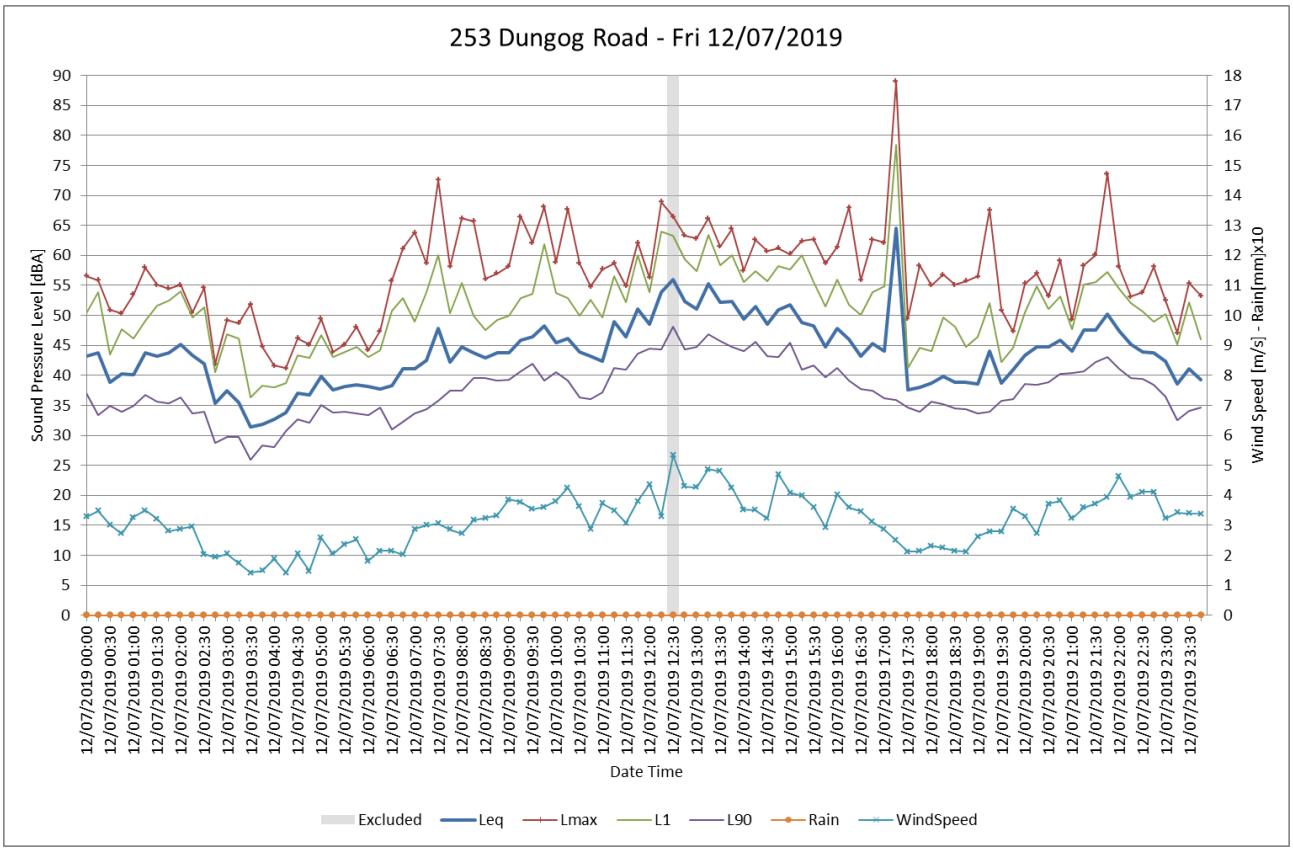


Figure A1.56 Unattended noise measurement at ML C

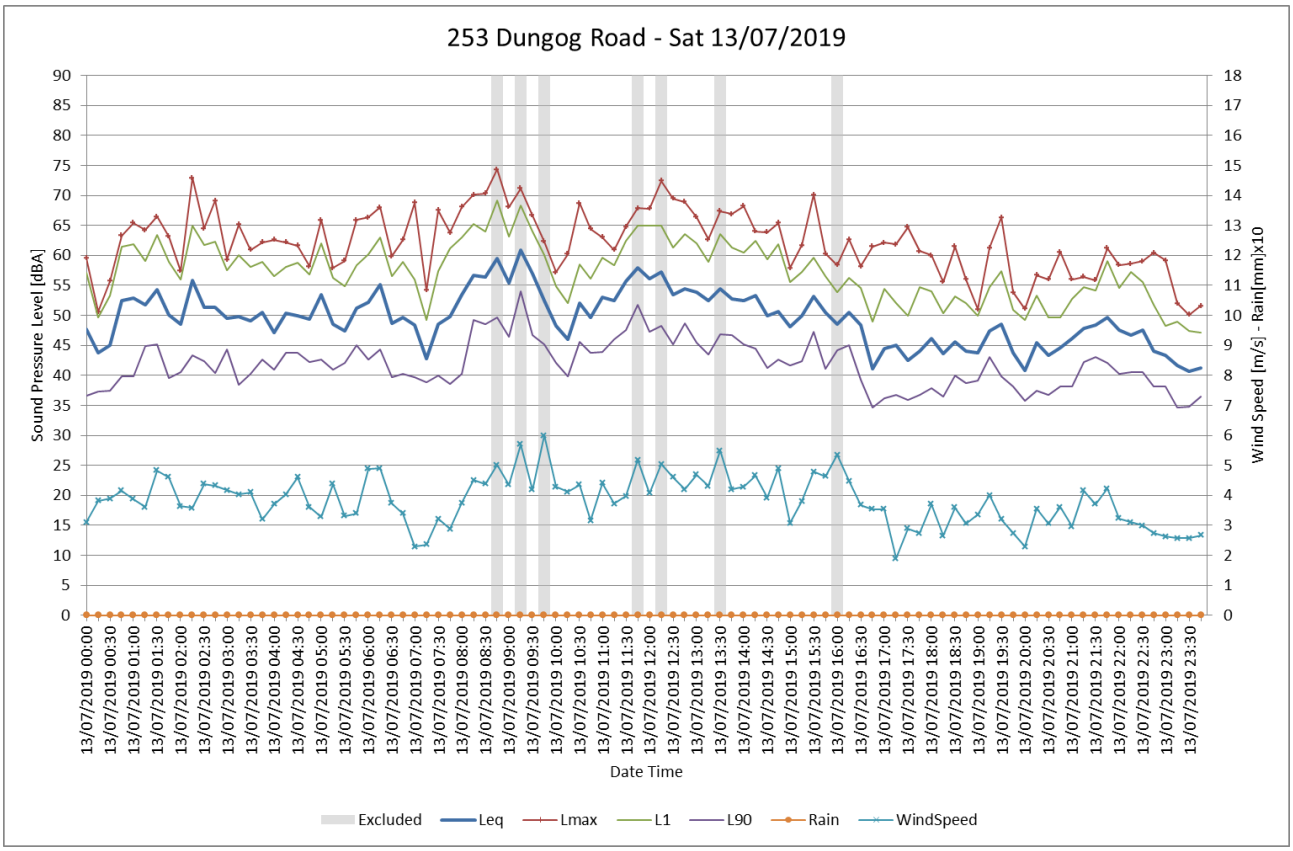


Figure A1.57 Unattended noise measurement at ML C

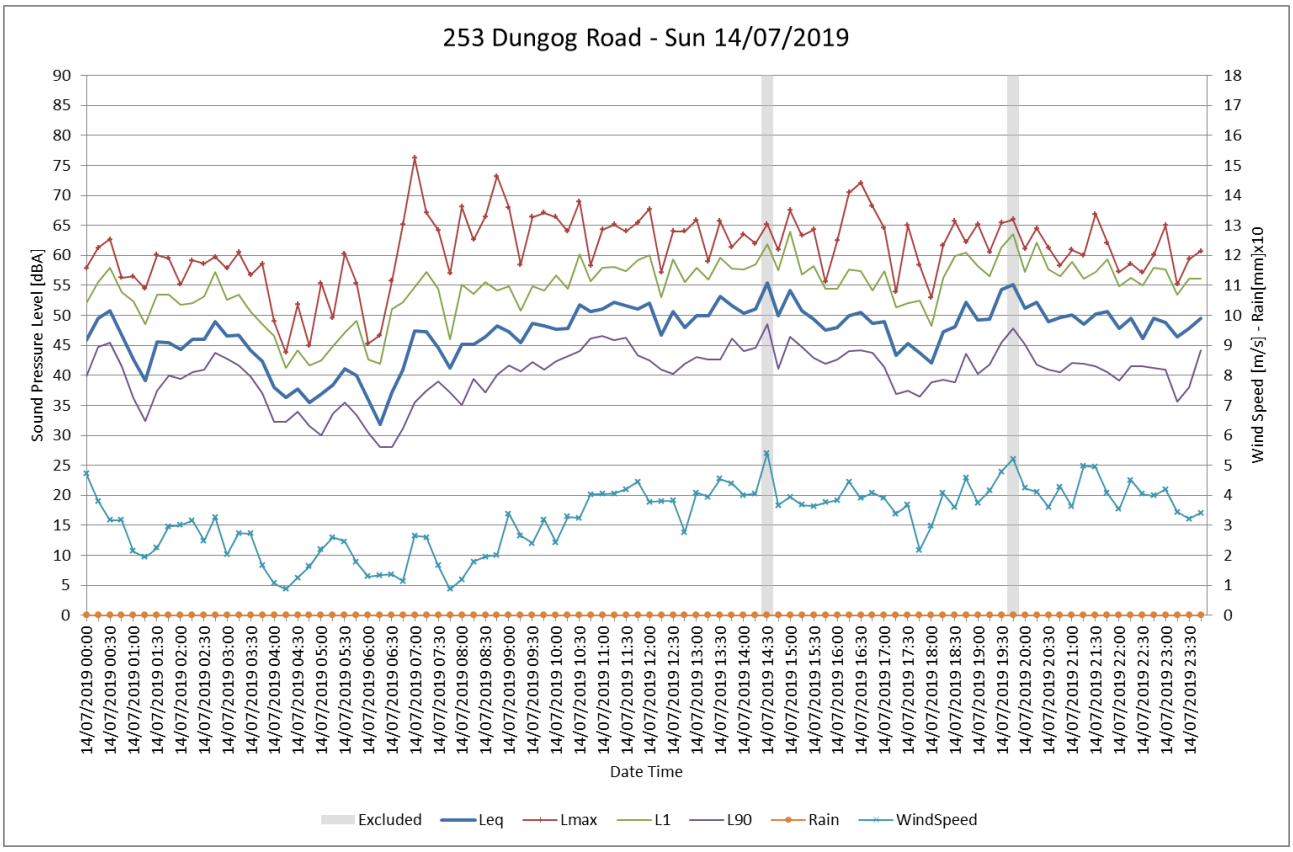


Figure A1.58 Unattended noise measurement at ML C

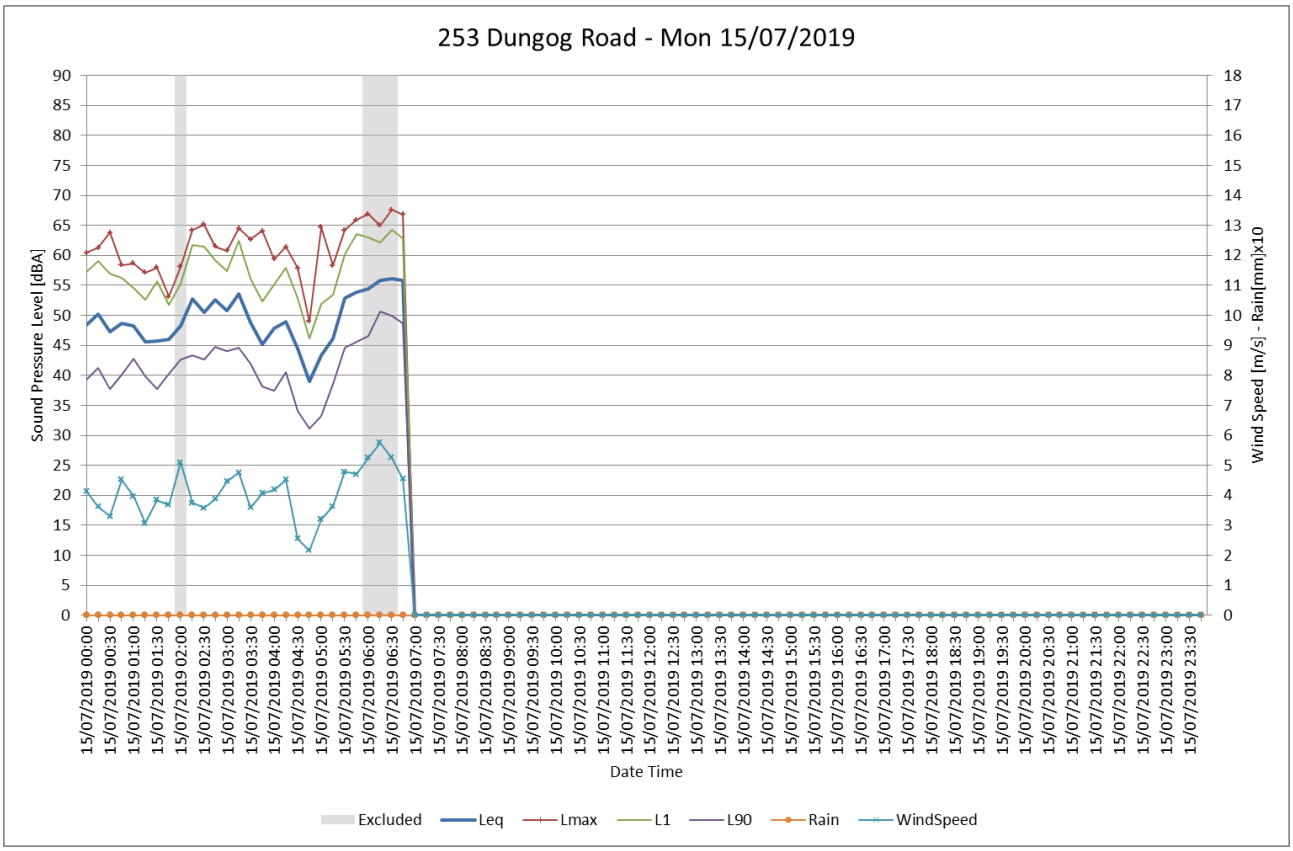


Figure A1.59 Unattended noise measurement at ML C

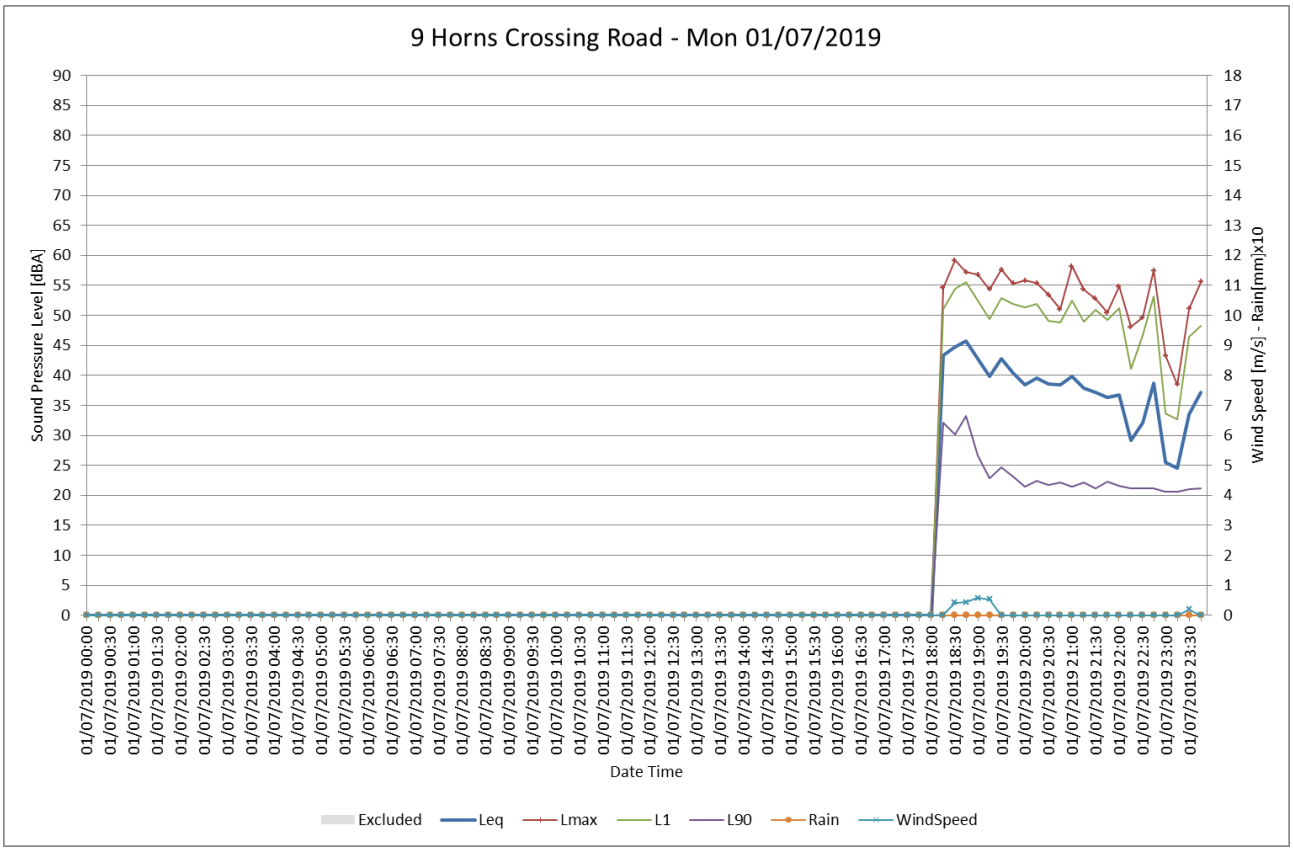


Figure A1.60 Unattended noise measurement at ML D

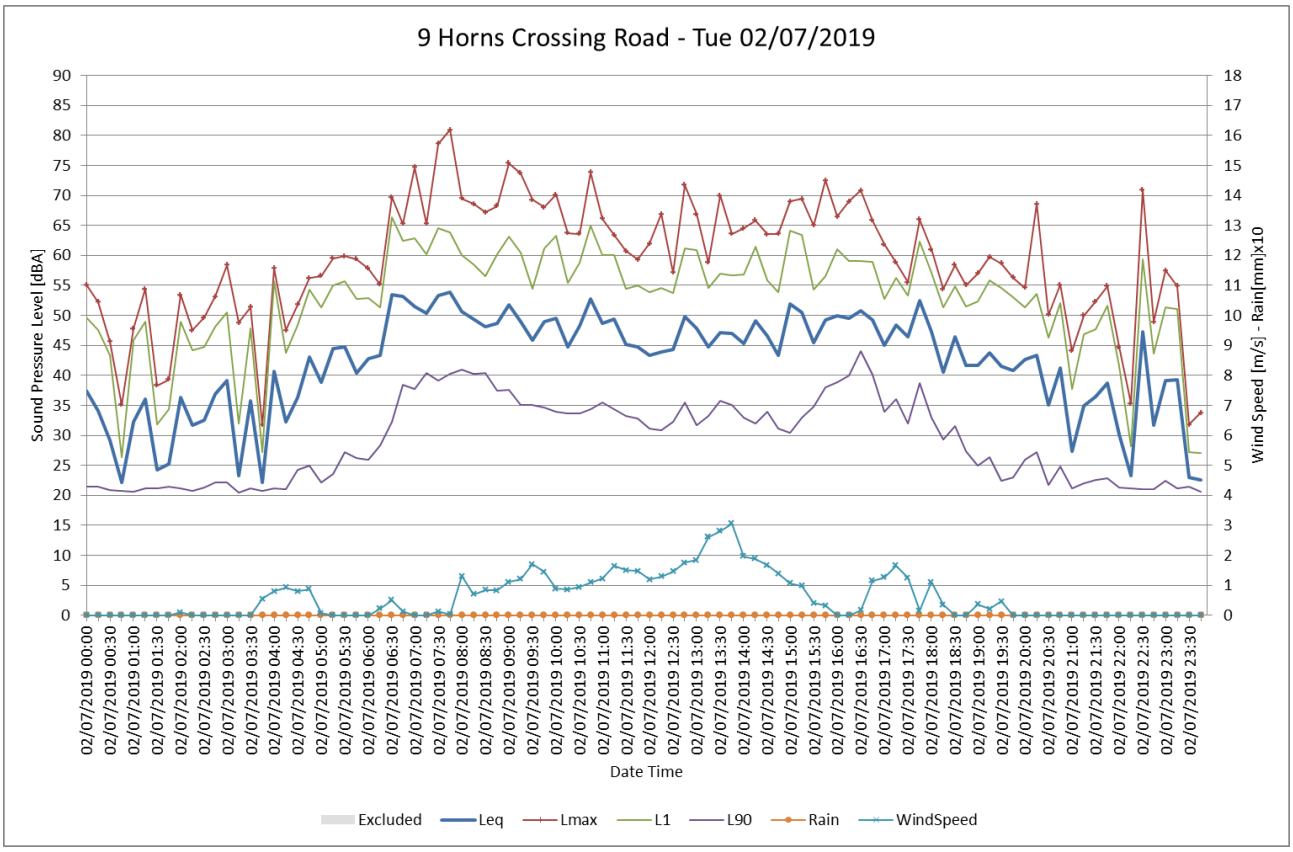


Figure A1.61 Unattended noise measurement at ML D

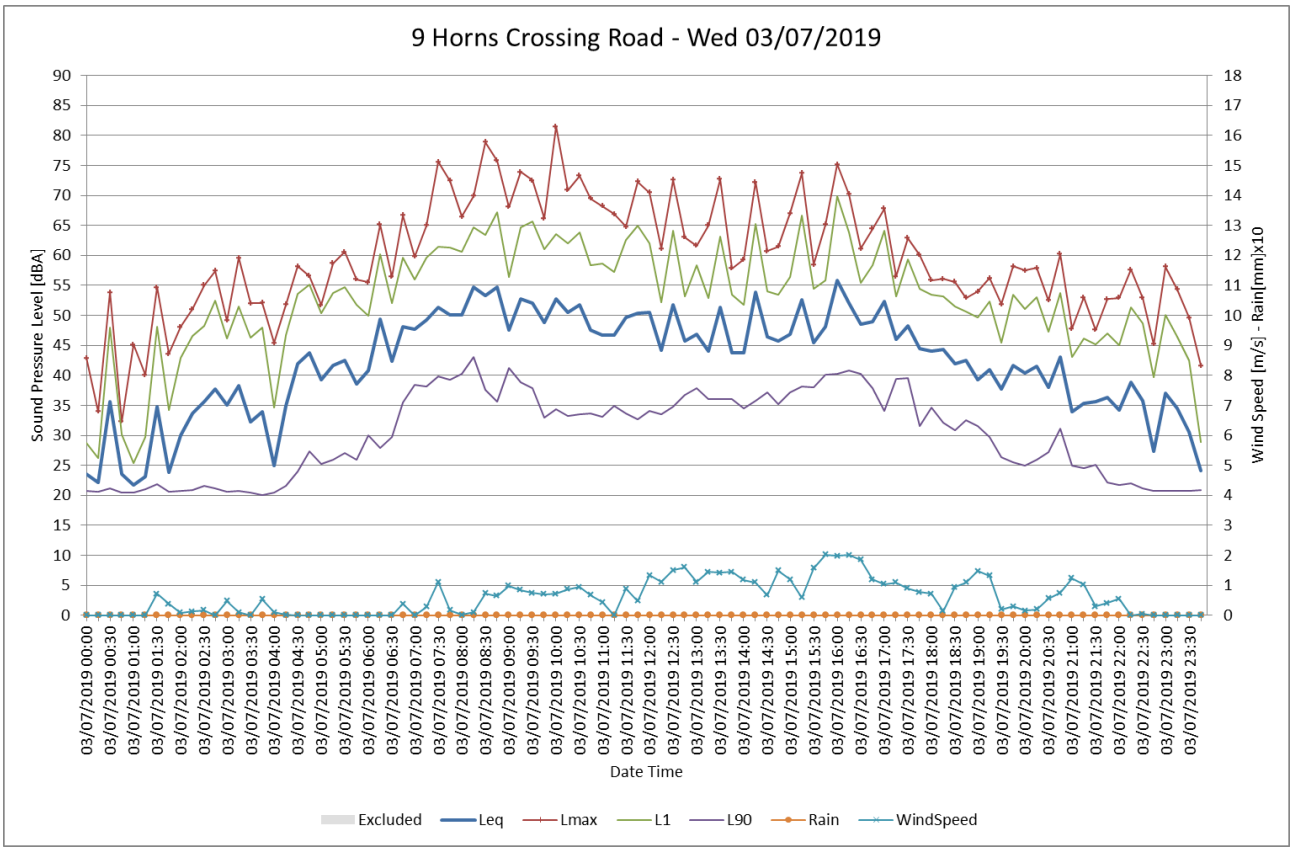


Figure A1.62 Unattended noise measurement at ML D

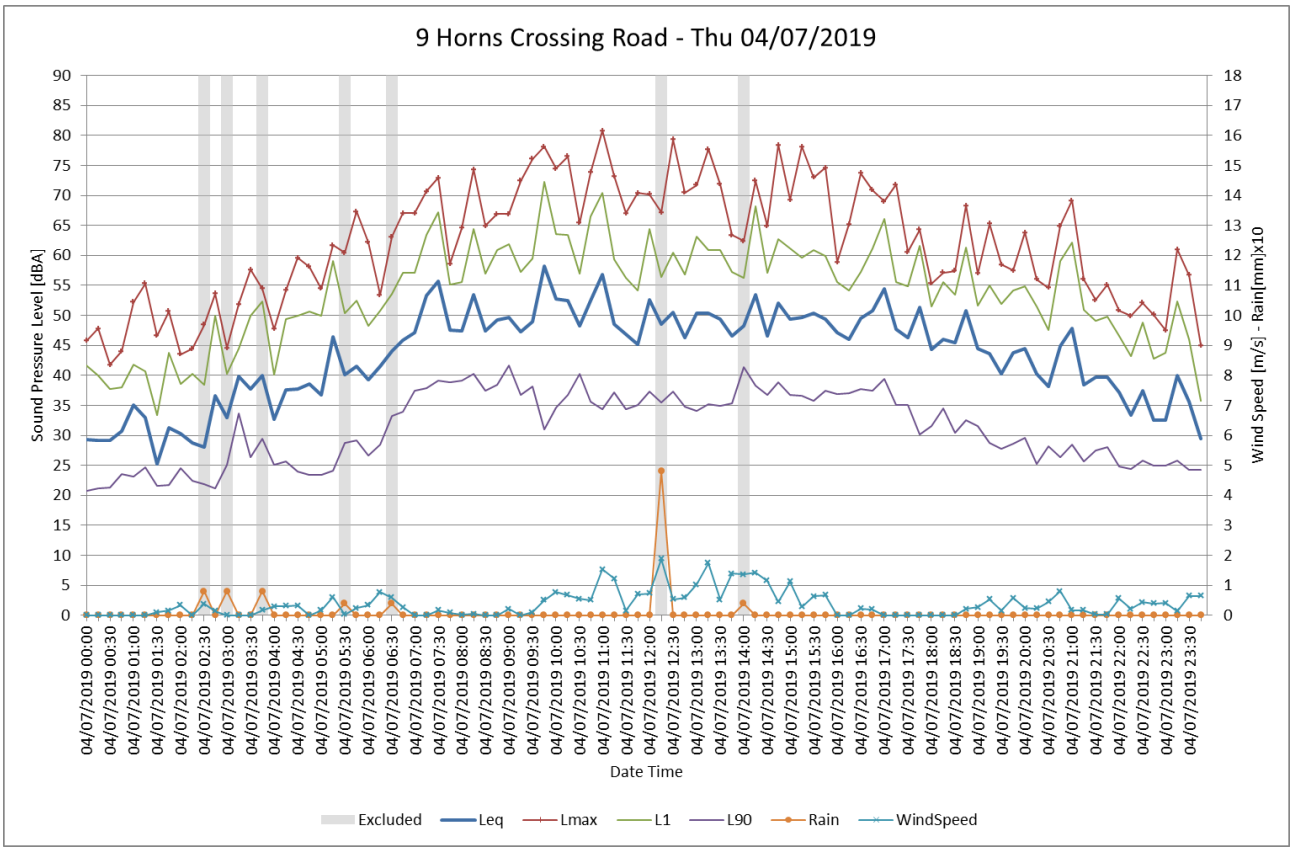


Figure A1.63 Unattended noise measurement at ML D

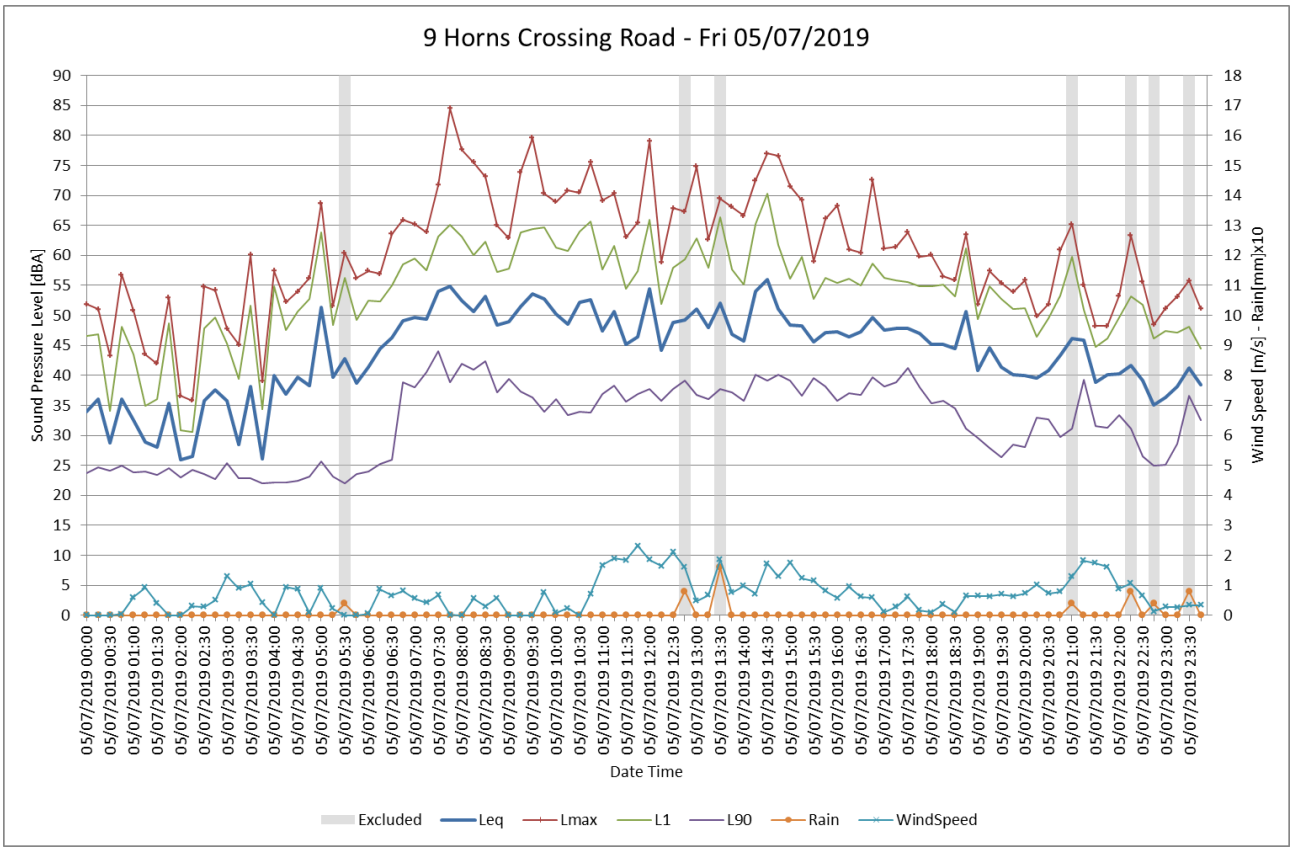


Figure A1.64 Unattended noise measurement at ML D

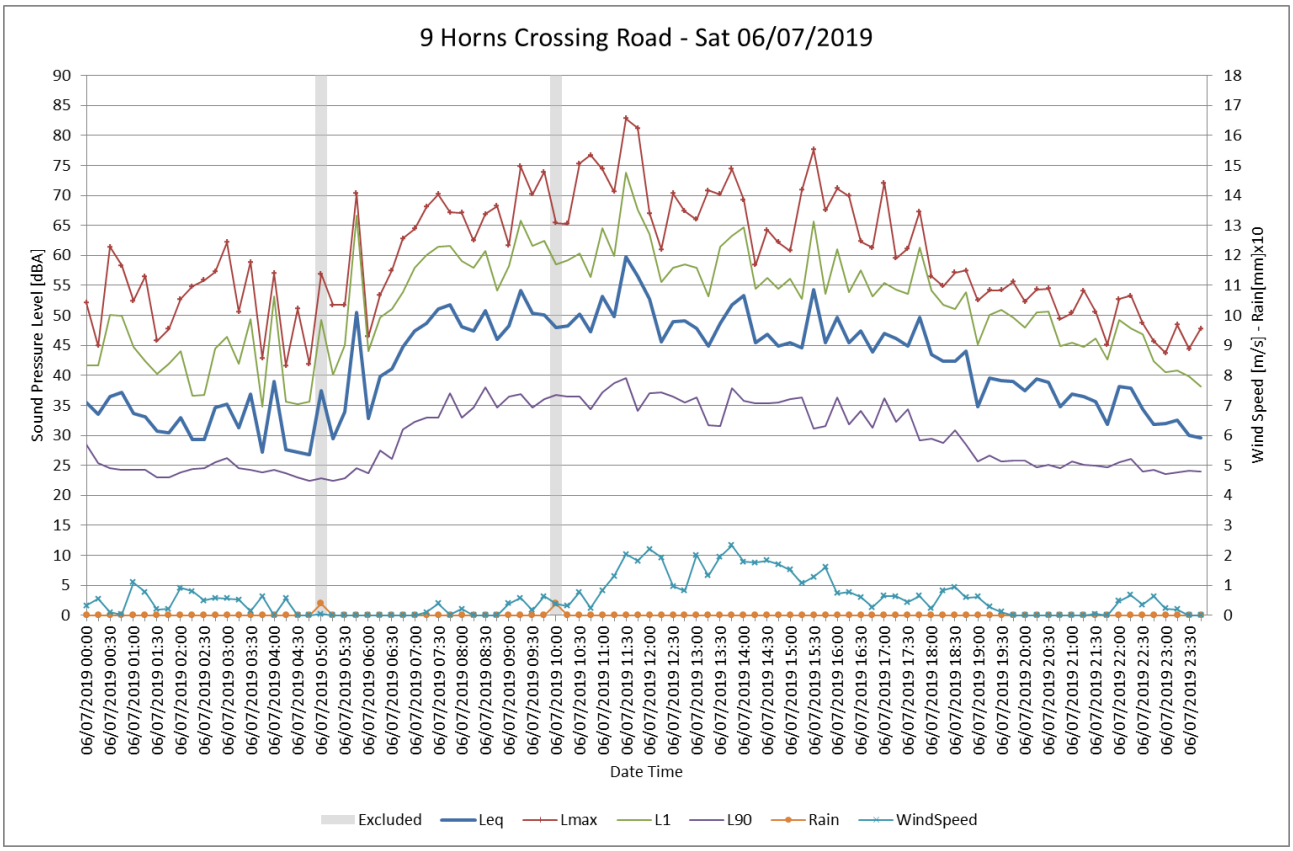


Figure A1.65 Unattended noise measurement at ML D

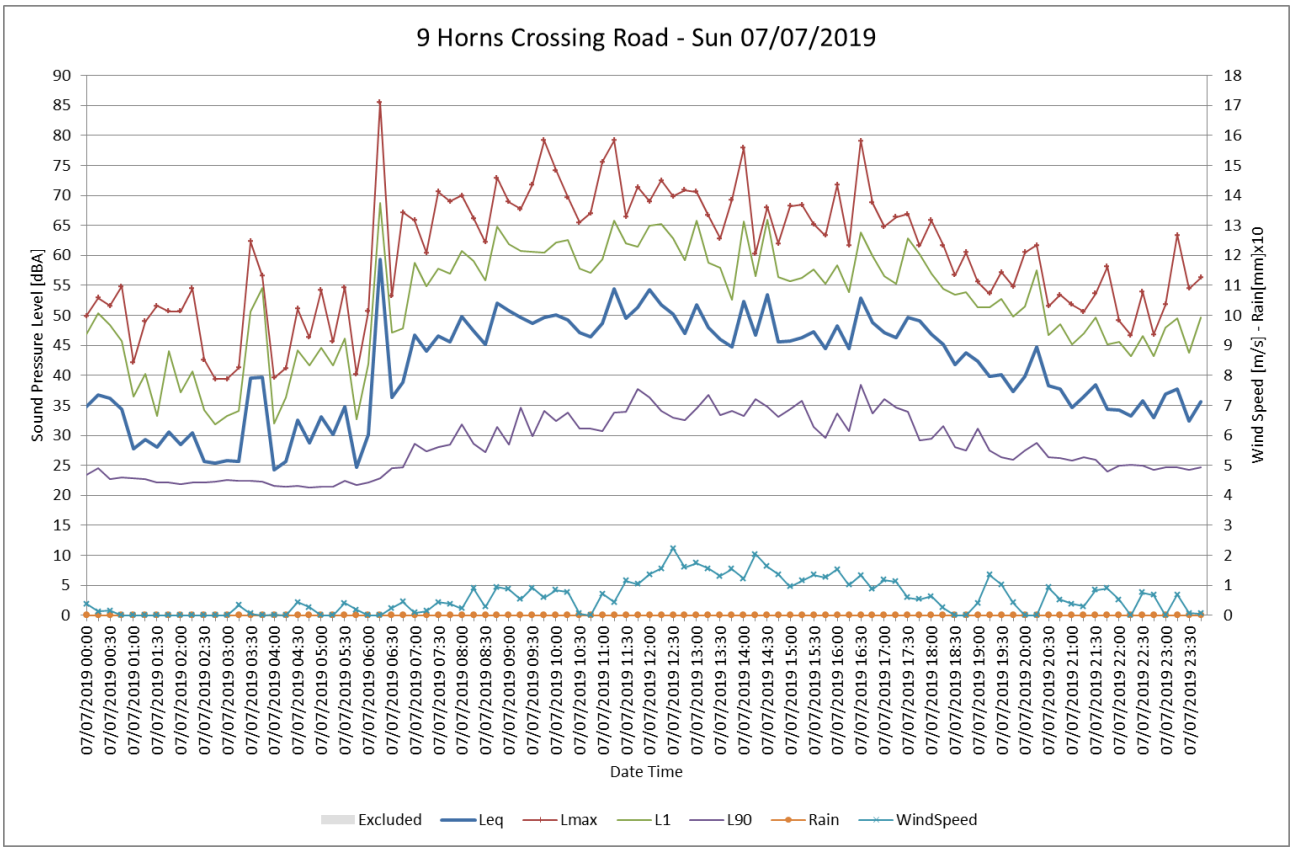


Figure A1.66 Unattended noise measurement at ML D

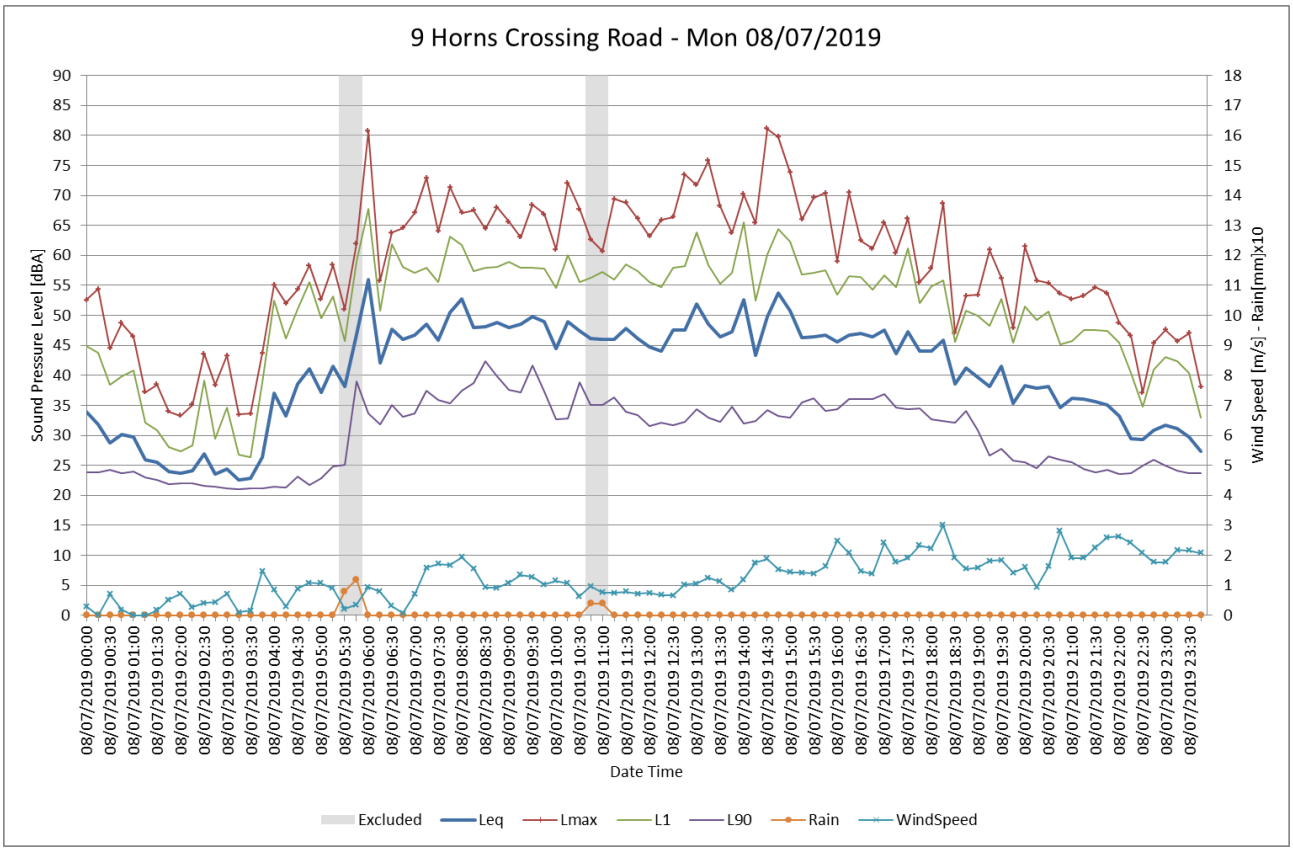


Figure A1.67 Unattended noise measurement at ML D

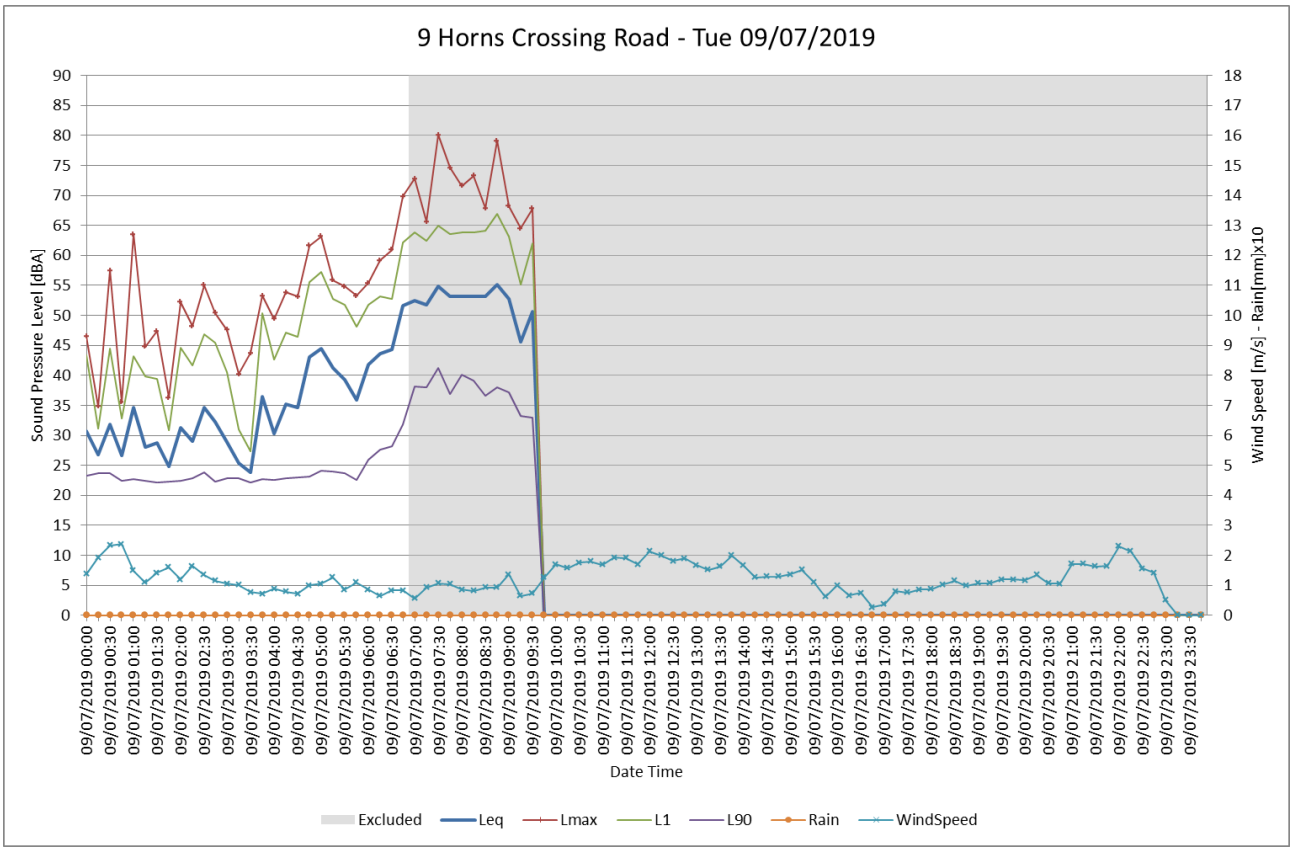


Figure A1.68 Unattended noise measurement at ML D

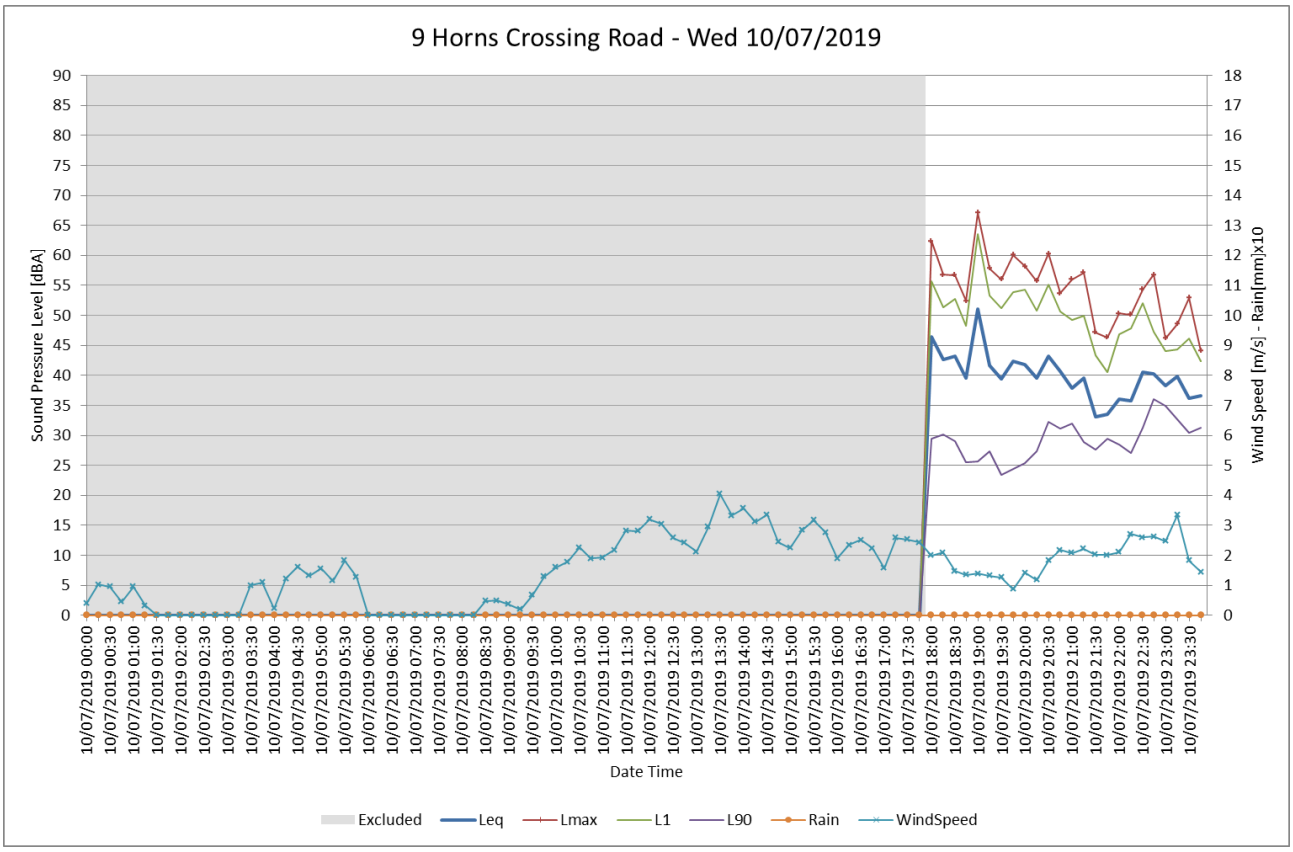


Figure A1.69 Unattended noise measurement at ML D

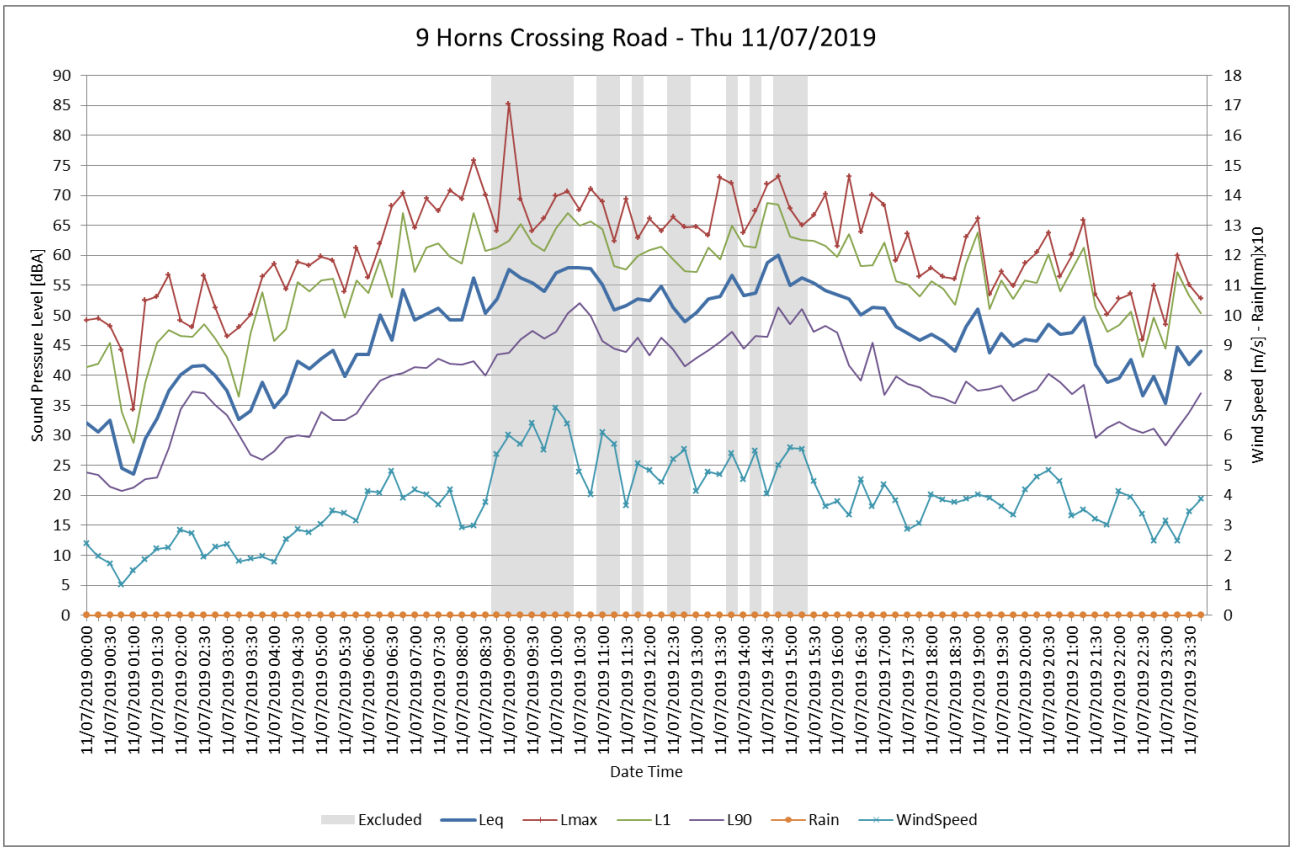


Figure A1.70 Unattended noise measurement at ML D

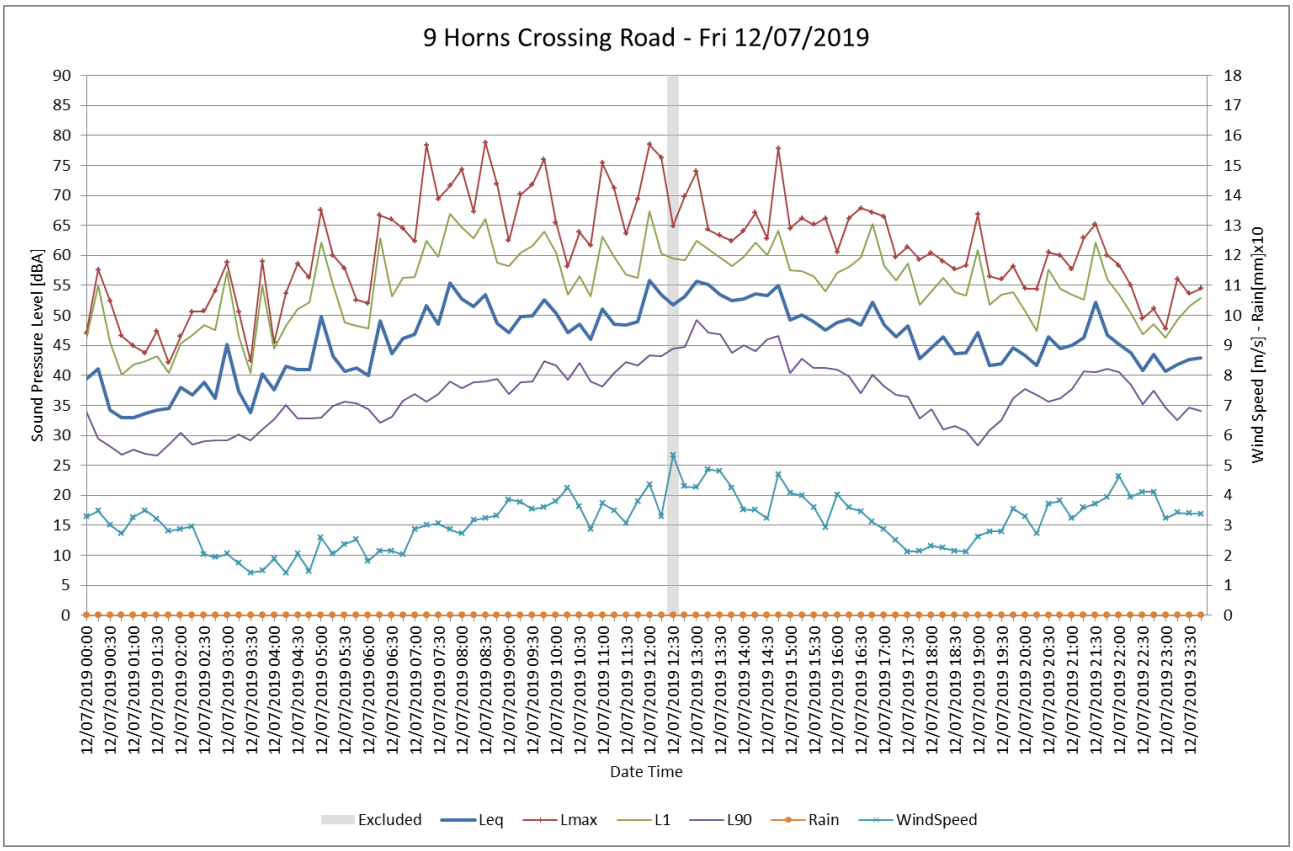


Figure A1.71 Unattended noise measurement at ML D

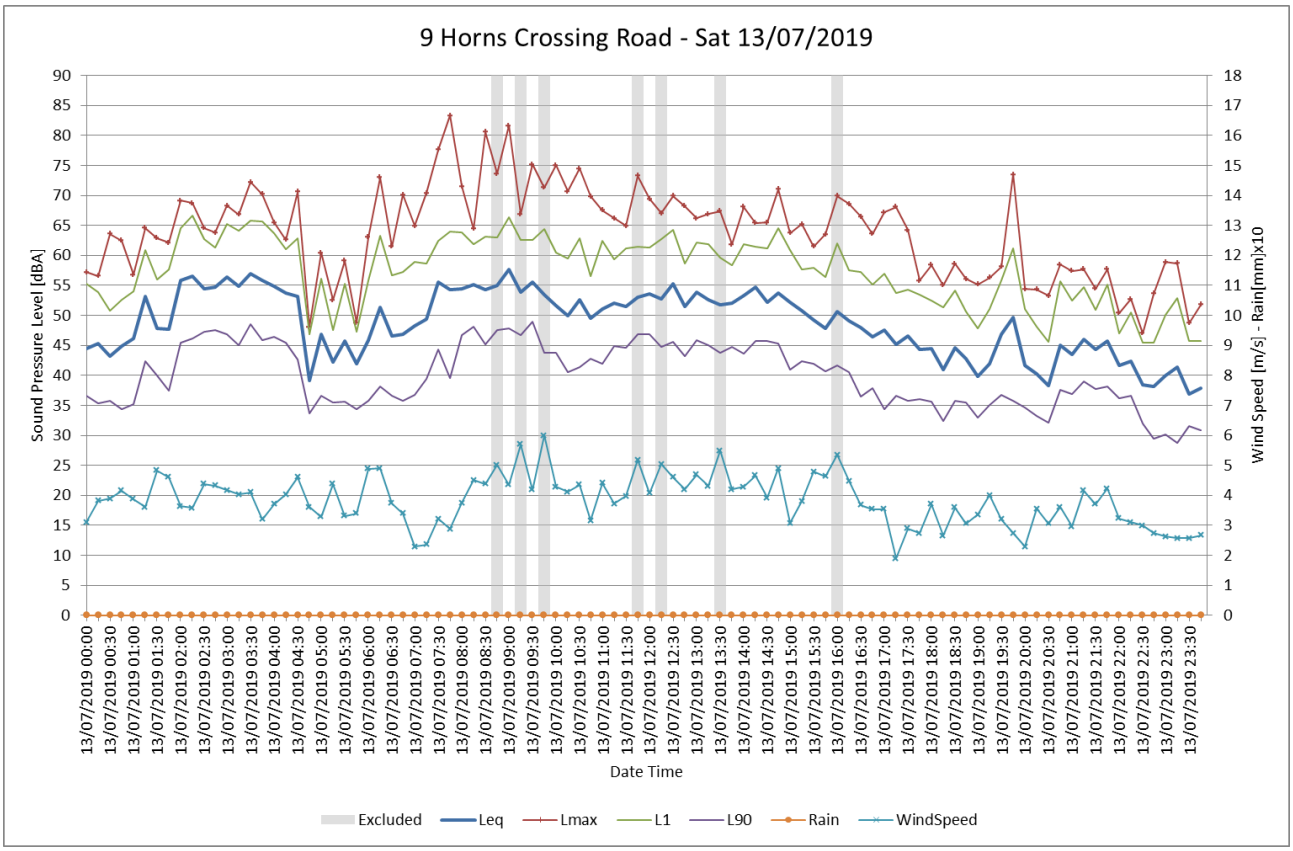


Figure A1.72 Unattended noise measurement at ML D

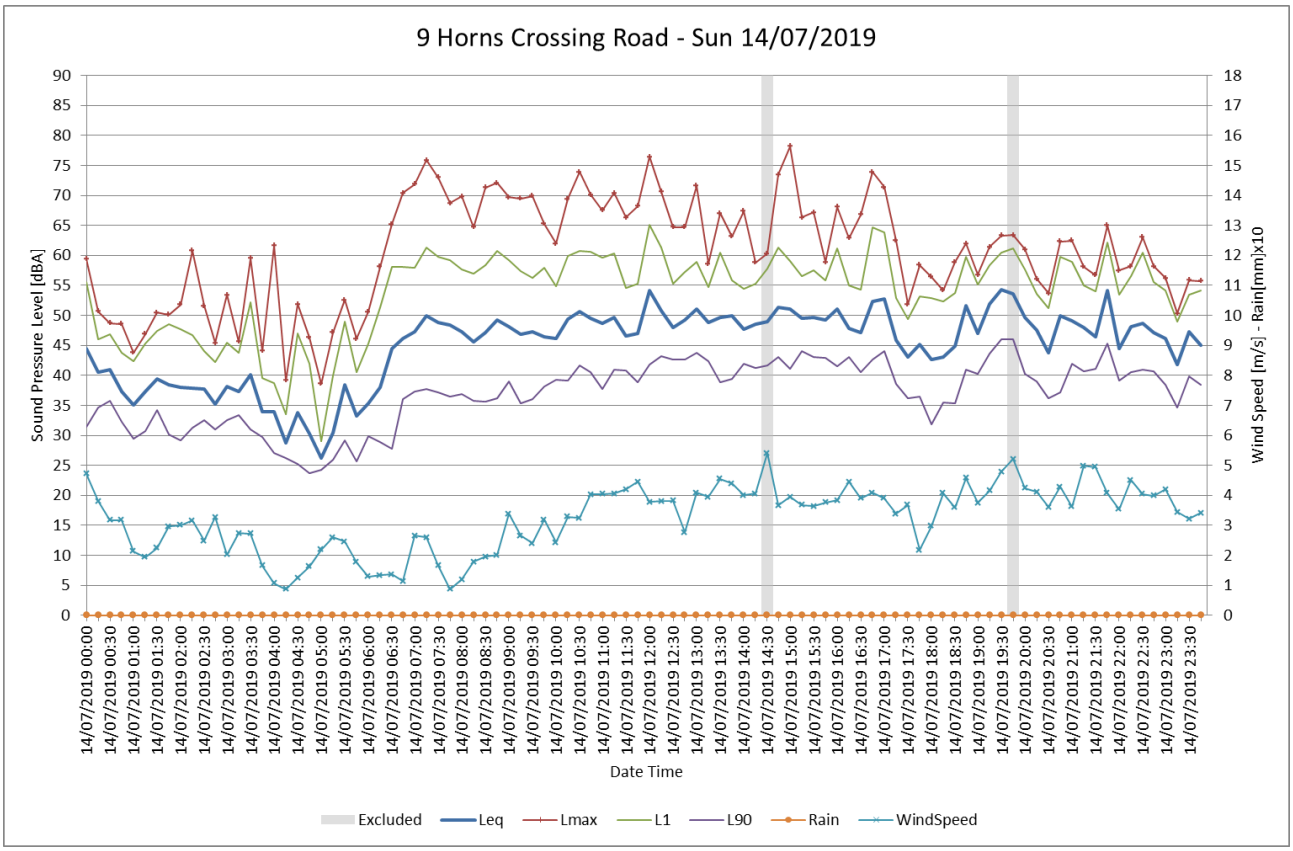


Figure A1.73 Unattended noise measurement at ML D

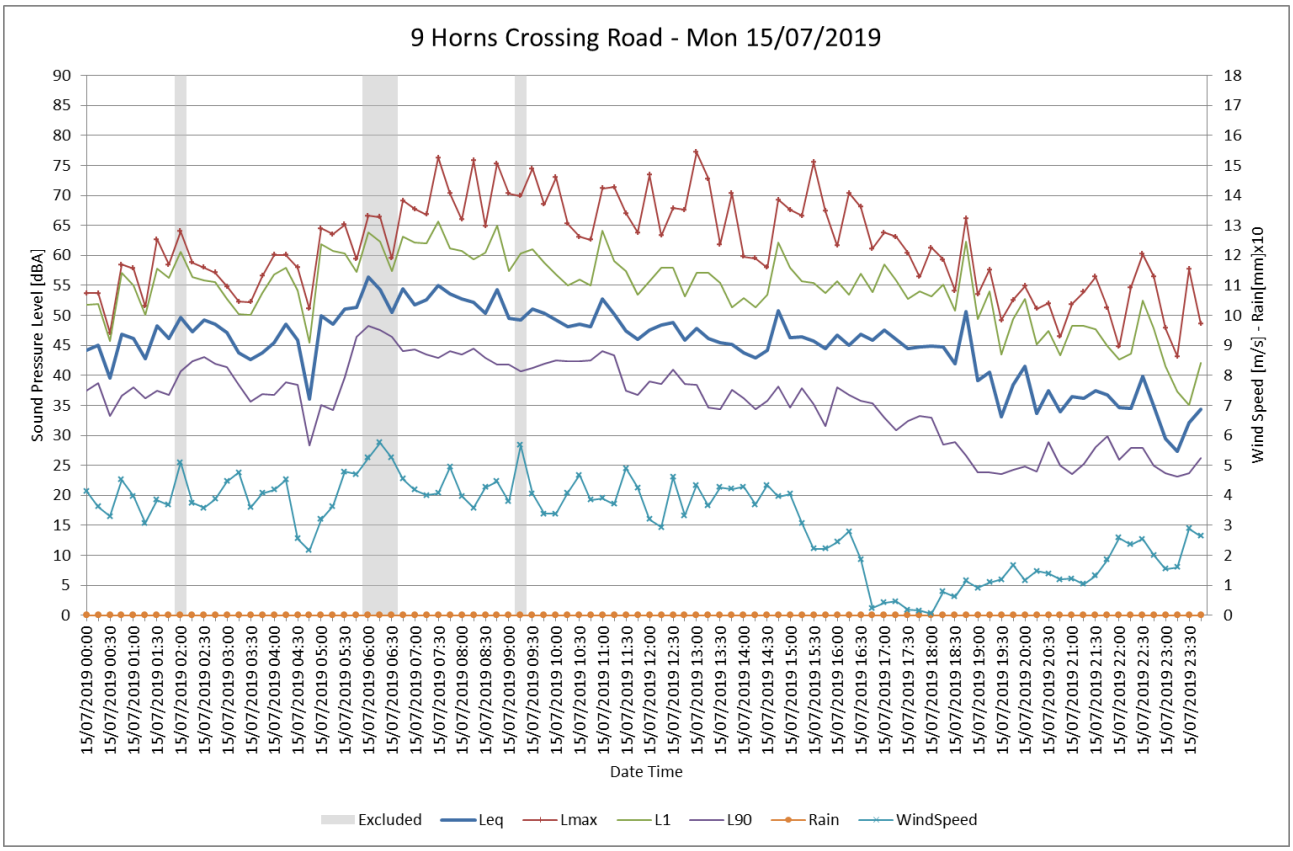


Figure A1.74 Unattended noise measurement at ML D

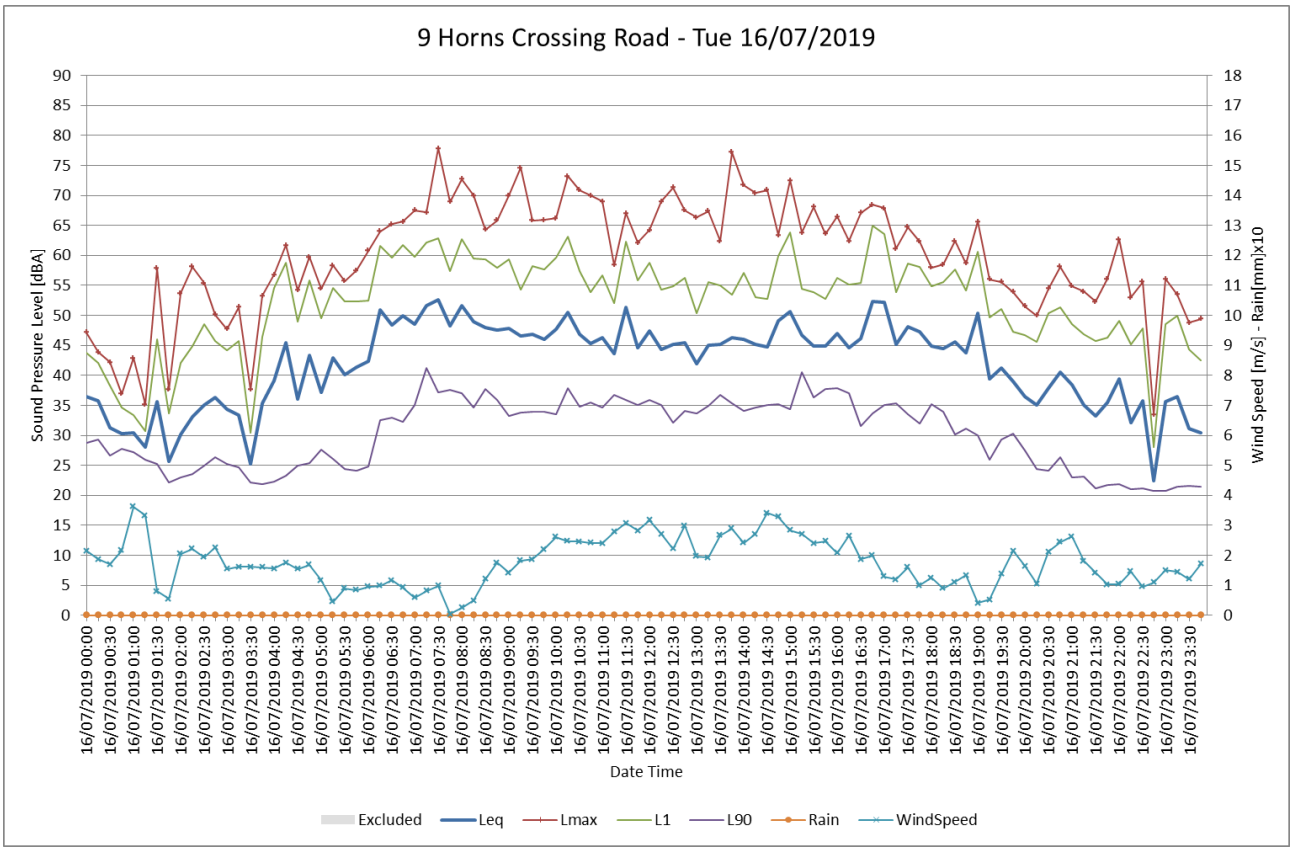


Figure A1.75 Unattended noise measurement at ML D

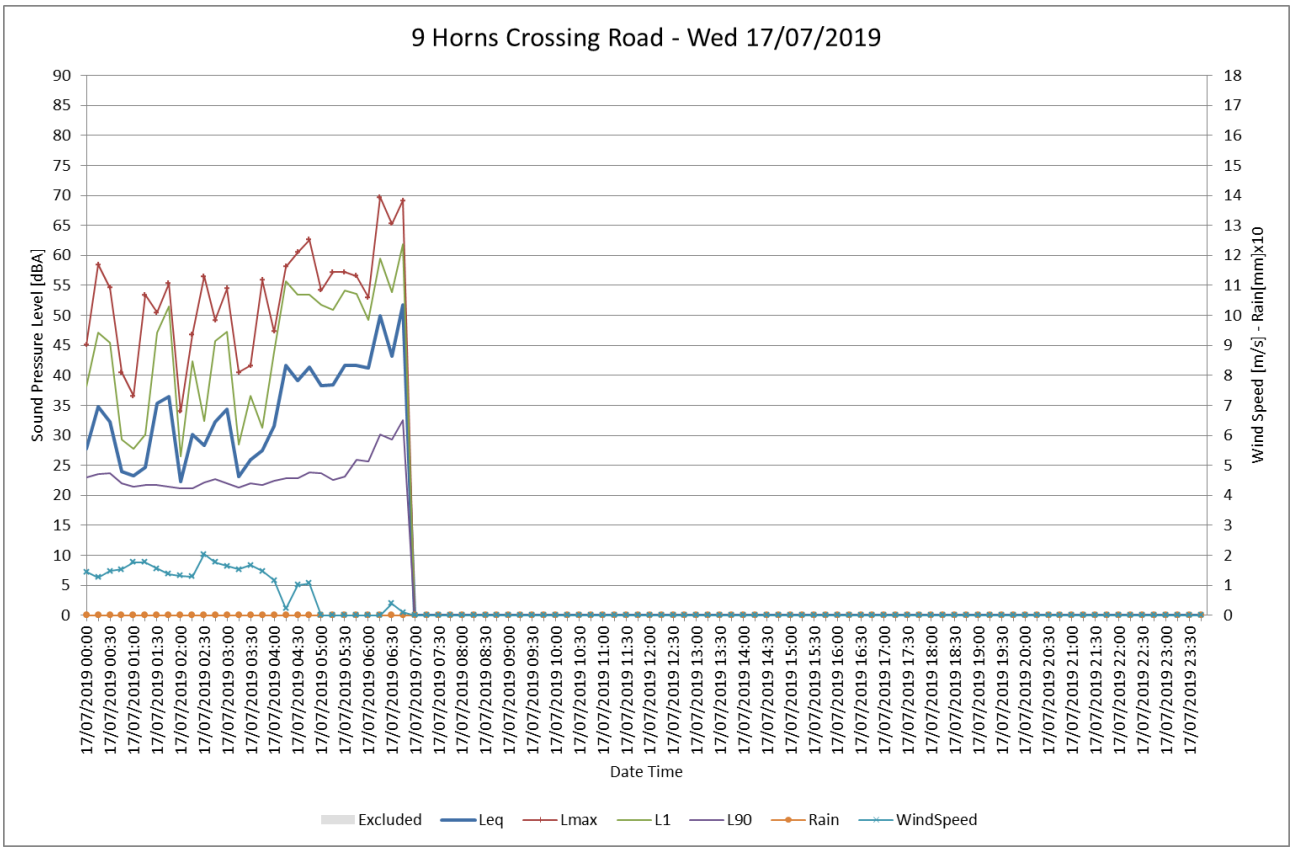


Figure A1.76 Unattended noise measurement at ML D

APPENDIX 2

Noise Levels from the Existing Operation

Appendix 2 – Noise Levels from the Existing Operation

For an existing operation Section 6 of the *Noise Policy for Industry* (NPfI) (EPA 2017) notes that where the noise level from the existing industrial noise source is greater than the project amenity noise level (PANL), the project amenity noise level can be used to set the project noise trigger level (PNTL). For those locations where the noise level from the existing industrial noise source is less than the PANL but greater than the project intrusiveness noise level (PINL), it is proposed the noise level from the existing industrial source is used to set the PNTL. Finally, if the noise level from the existing industrial source is less than the project intrusiveness noise level (PINL) the project intrusiveness noise level is used to set PNTL.

To understand how this applies to the Revised Project the following information is provided:

- The analysis of the noise levels from the existing operations relates to the East Pit processing area plant and associated activities and not the proposed activities in the West Pit extraction area or the new access road.
- The analysis of the noise levels from the existing operations has only been applied to Noise Assessment Groups (NAGs) 1, 2, 3 and 4.
- The project amenity noise levels for NAGs 1, 2, 3 and 4 are the recommended amenity noise levels for the Suburban Residential land use category.
- The analysis of the noise levels from the existing operations is based on a combination of modelled and attended monitoring results. The supporting attended noise monitoring results are provided in **Appendix 1**.
- As a dynamic operation with mobiles noise sources, the noise modelled prepared to represent the existing processing plant and surrounding activities includes all the noise sources related to the processing plant, including road vehicles and train loading. The noise model is based on the source location shown in **Figure A2.1**.

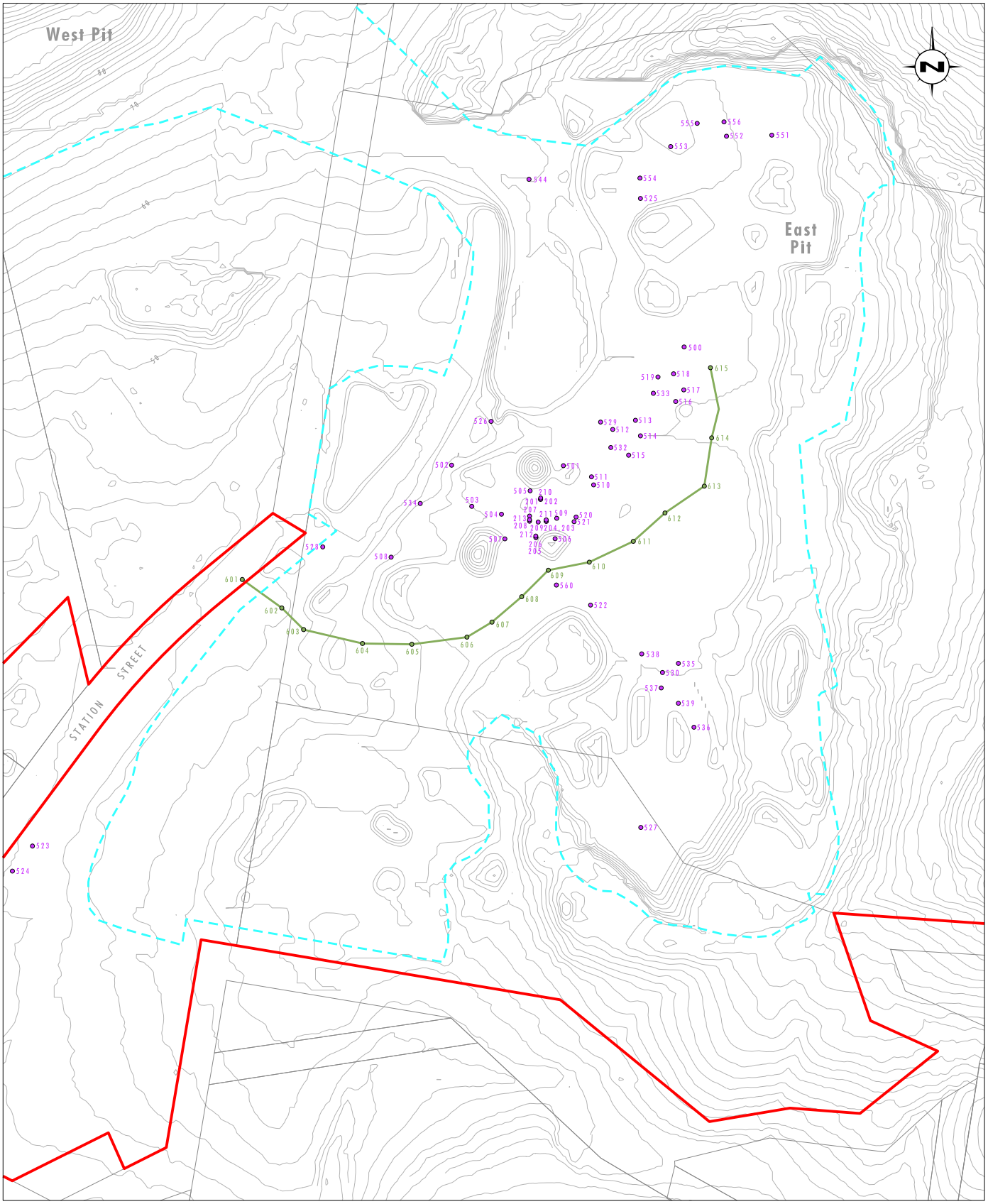
The modelling results for the existing operations are presented in **Figures A2.2** and **A2.3** as 1 dB noise contours. The noise contours are a representation of the existing operations under calm and noise enhancing meteorological conditions identified in **Appendix 5**. It is noted the same modelling approach is used for the Revised Project when incorporating both existing and new components of the development to show the change in the noise levels generated by the development.

Figure A2.2 shows the noise levels for the existing operations with the rail loading facility running. **Figure A2.2** shows the noise levels at Receiver R001 from the existing operations at 68 to 70 dB(A) with the rail loading facility running. The noise level from the existing operations drops to 56 to 57 dB(A) once the rail loading activities stop.

Figure A2.3 shows the noise levels for the existing operations without the rail loading facility running. **Figure A2.3** shows the $L_{Aeq,15minute}$ noise level at Receiver R001 from the existing at 59 dB(A).

Based on the comparison between the modelling and monitoring results, the modelling results can be considered representative of the existing operations.

The proposed project noise trigger levels for each of the receivers in NAGs 1, 2, 3 and 4 based on the noise levels from the existing operations with the rail loading facility running, are presented in **Table A2.1**.



Data Source: Daracon (2020)
Note: Contour Interval 2m

0 50 100 150m
1:3 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Access Road
- Ancillary Locaitons

FIGURE A2.1

Existing Operations Noise Model Source Locations

File Name (A4): R04/3957_228.dgn
20201203 13.46

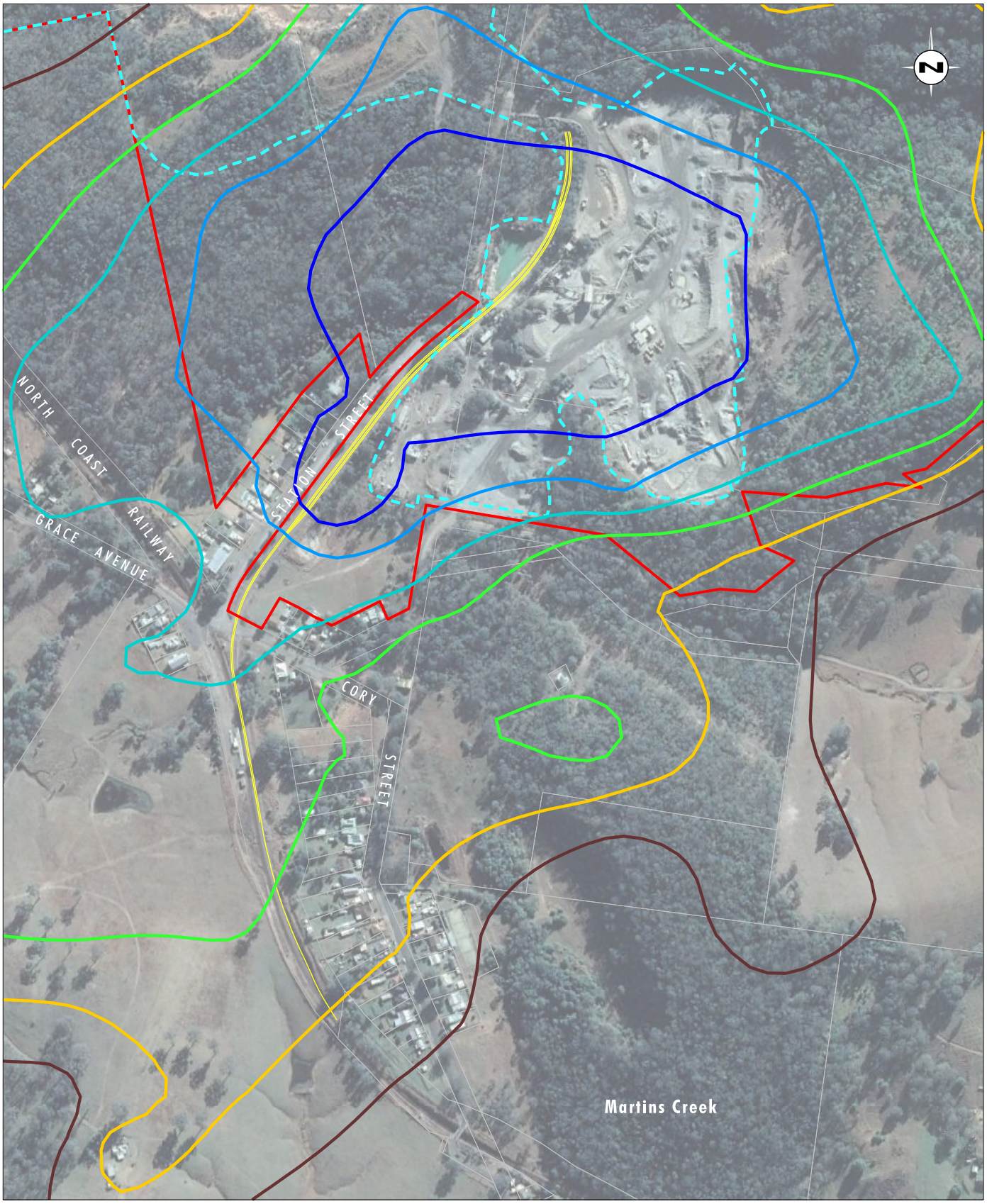


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 200 300m
1:6 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour
- 55 dB(A) Contour
- 60 dB(A) Contour
- 65 dB(A) Contour

FIGURE A2.2

Noise Levels for the Existing Operations with the Rail Loading Facility Running

File Name (A4): R04/3957_229.dgn
20201203 13.15

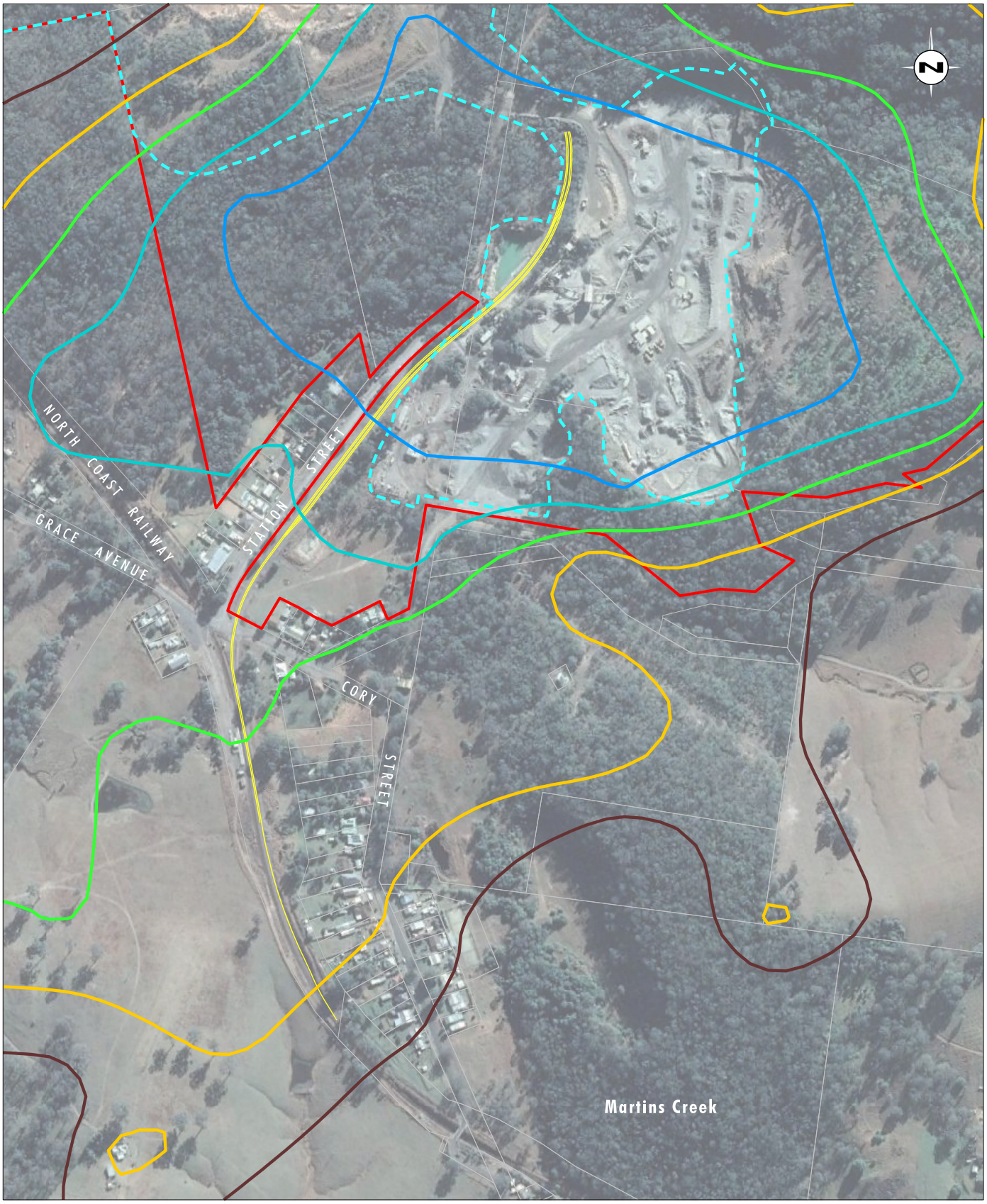


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 100 200 300m
1:6 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour
- 55 dB(A) Contour
- 60 dB(A) Contour

FIGURE A2.3

Noise Levels for the Existing Operations without the Rail Loading Facility Running

File Name (A4): R04/3957_230.dgn
20201203 13.15

Table A2.1 – Day-time Project Noise Trigger Levels derived from Noise Levels from the Existing Operations with the Rail Loading Facility Operating, dB(A)

Rec ID	Location	Ass. Group	Existing Noise Levels, $L_{Aeq,15min}$	Project Amenity Noise Level		Project Intrusiveness Noise Level, $L_{Aeq,15min}$	Project Noise Trigger Level, $L_{Aeq,15min}$
				$L_{Aeq,Day}$	As $L_{Aeq,15min}$		
R001	23 Station St	NAG01	65	55	58	41	58
R002	21 Station St	NAG01	66	55	58	41	58
R003	19 Station St	NAG01	67	55	58	41	58
R004	17 Station St	NAG01	67	55	58	41	58
R005	15 Station St	NAG01	64	55	58	41	58
R006	13 Station St	NAG01	62	55	58	41	58
R007	11 Station St	NAG01	61	55	58	41	58
R008	9 Station St	NAG01	60	55	58	41	58
R009	7 Station St	NAG01	59	55	58	41	58
R010	5 Station St	NAG01	59	55	58	41	58
R011	3 Station St	NAG01	58	55	58	41	58
R012	5 Douglas St	NAG02	54	55	58	41	54
R013	1 Cory St	NAG02	57	55	58	41	57
R014	5 Cory St	NAG02	54	55	58	41	54
R015	3 Cory St	NAG02	55	50	58	41	55
R017	2 Cory St	NAG02	53	55	58	41	53
R018	9 Cory St Martins Creek Fire Shed	NAG02	49	55 [1]	58	41	58
R022	8 Cory St	NAG02	49	55	58	41	49
R020	54 Grace Ave	NAG03	55	55	58	40	55
R021	56 Grace Ave	NAG03	57	55	58	40	57
R023	52 Grace Ave	NAG03	52	55	58	40	52
R024	58 Grace Ave	NAG03	56	55	58	40	56
R026	12 Cory St	NAG04	51	55	58	40	51
R028	14 Cory St	NAG04	51	55	58	40	51
R030	16 Cory St	NAG04	51	55	58	40	51
R033	18 Cory St	NAG04	51	55	58	40	51
R035	20 Cory St	NAG04	51	55	58	40	51
R036	23 Cory St	NAG04	50	55	58	40	50
R037	22 Cory St	NAG04	51	55	58	40	51
R038	24 Cory St	NAG04	51	55	58	40	51
R039	26 Cory St	NAG04	50	55	58	40	50
R042	29 Cory St	NAG04	50	55	58	40	50

Rec ID	Location	Ass. Group	Existing Noise Levels, $L_{Aeq,15min}$	Project Amenity Noise Level		Project Intrusiveness Noise Level, $L_{Aeq,15min}$	Project Noise Trigger Level, $L_{Aeq,15min}$
				$L_{Aeq,Day}$	As $L_{Aeq,15min}$		
R044	28 Cory St	NAG04	50	55	58	40	50
R045	31 Cory St	NAG04	50	55	58	40	50
R049	30 Cory St	NAG04	50	55	58	40	50
R050	33 Cory St	NAG04	49	55	58	40	49
R051	32 Cory St	NAG04	50	55	58	40	50
R052	35 Cory St	NAG04	50	55	58	40	50
R054	34 Cory St	NAG04	49	55	58	40	49
R056	37 Cory St	NAG04	49	55	58	40	49
R057	36 Cory St	NAG04	49	55	58	40	49
R058	39 Cory St	NAG04	47	55	58	40	47
R059	38 Cory St	NAG04	48	55	58	40	48
R061	41 Cory St	NAG04	47	55	58	40	47
R062	40 Cory St	NAG04	47	55	58	40	47
R064	43 Cory St	NAG04	46	55	58	40	46
R065	44 Cory St	NAG04	46	55	58	40	46

Notes: [1] Project Amenity Noise Level for Active Recreation Area

APPENDIX 3

Operational and Construction Noise - Sensitive Receivers

Appendix 3 – Operational and Construction Noise - Sensitive Receivers

Table A3.1 provides details on the location of sensitive receivers relevant to site operational and construction noise, allocated Noise Assessment Group, project noise trigger levels (PTNL) for the day, evening and night-time, sleep disturbance criterion, and construction noise management levels.

Table A3.1 – Sensitive Receivers, NAG allocation and Relevant Criteria

Rec ID	Location	Ass. Grp	PNTL, LAeq,15minute			Sleep LA1,1min	Construction	
			Day	Evening	Night	Night	Standard	Non-standard
R001	23 Station St	NAG01	58	35	35	52	47	35
R002	21 Station St	NAG01	58	35	35	52	47	35
R003	19 Station St	NAG01	58	35	35	52	47	35
R004	17 Station St	NAG01	58	35	35	52	47	35
R005	15 Station St	NAG01	58	35	35	52	47	35
R006	13 Station St	NAG01	58	35	35	52	47	35
R007	11 Station St	NAG01	58	35	35	52	47	35
R008	9 Station St	NAG01	58	35	35	52	47	35
R009	7 Station St	NAG01	58	35	35	52	47	35
R010	5 Station St	NAG01	58	35	35	52	47	35
R011	3 Station St	NAG01	58	35	35	52	47	35
R012	5 Douglas St	NAG02	54	35	35	52	47	35
R013	1 Cory St	NAG02	57	35	35	52	47	35
R014	5 Cory St	NAG02	54	35	35	52	47	35
R015	3 Cory St	NAG02	55	35	35	52	47	35
R017	2 Cory St	NAG02	53	35	35	52	47	35
R018	9 Cory St Martins Ck Fire Shed	NAG02	58	58	58	-	60 [1]	60 [1]
R022	8 Cory St	NAG02	49	35	35	52	47	35
R020	54 Grace Ave	NAG03	55	35	35	52	47	35
R021	56 Grace Ave	NAG03	57	35	35	52	47	35
R023	52 Grace Ave	NAG03	52	35	35	52	47	35
R024	58 Grace Ave	NAG03	58	58	58	52	60 [1]	60 [1]
R026	12 Cory St	NAG04	51	35	35	52	47	35
R028	14 Cory St	NAG04	51	35	35	52	47	35
R030	16 Cory St	NAG04	51	35	35	52	47	35
R033	18 Cory St	NAG04	51	35	35	52	47	35
R035	20 Cory St	NAG04	51	35	35	52	47	35
R036	23 Cory St	NAG04	50	35	35	52	47	35
R037	22 Cory St	NAG04	51	35	35	52	47	35
R038	24 Cory St	NAG04	51	35	35	52	47	35
R039	26 Cory St	NAG04	50	35	35	52	47	35
R042	29 Cory St	NAG04	50	35	35	52	47	35
R044	28 Cory St	NAG04	50	35	35	52	47	35
R045	31 Cory St	NAG04	50	35	35	52	47	35
R049	30 Cory St	NAG04	50	35	35	52	47	35
R050	33 Cory St	NAG04	49	35	35	52	47	35
R051	32 Cory St	NAG04	50	35	35	52	47	35
R052	35 Cory St	NAG04	50	35	35	52	47	35
R054	34 Cory St	NAG04	49	35	35	52	47	35

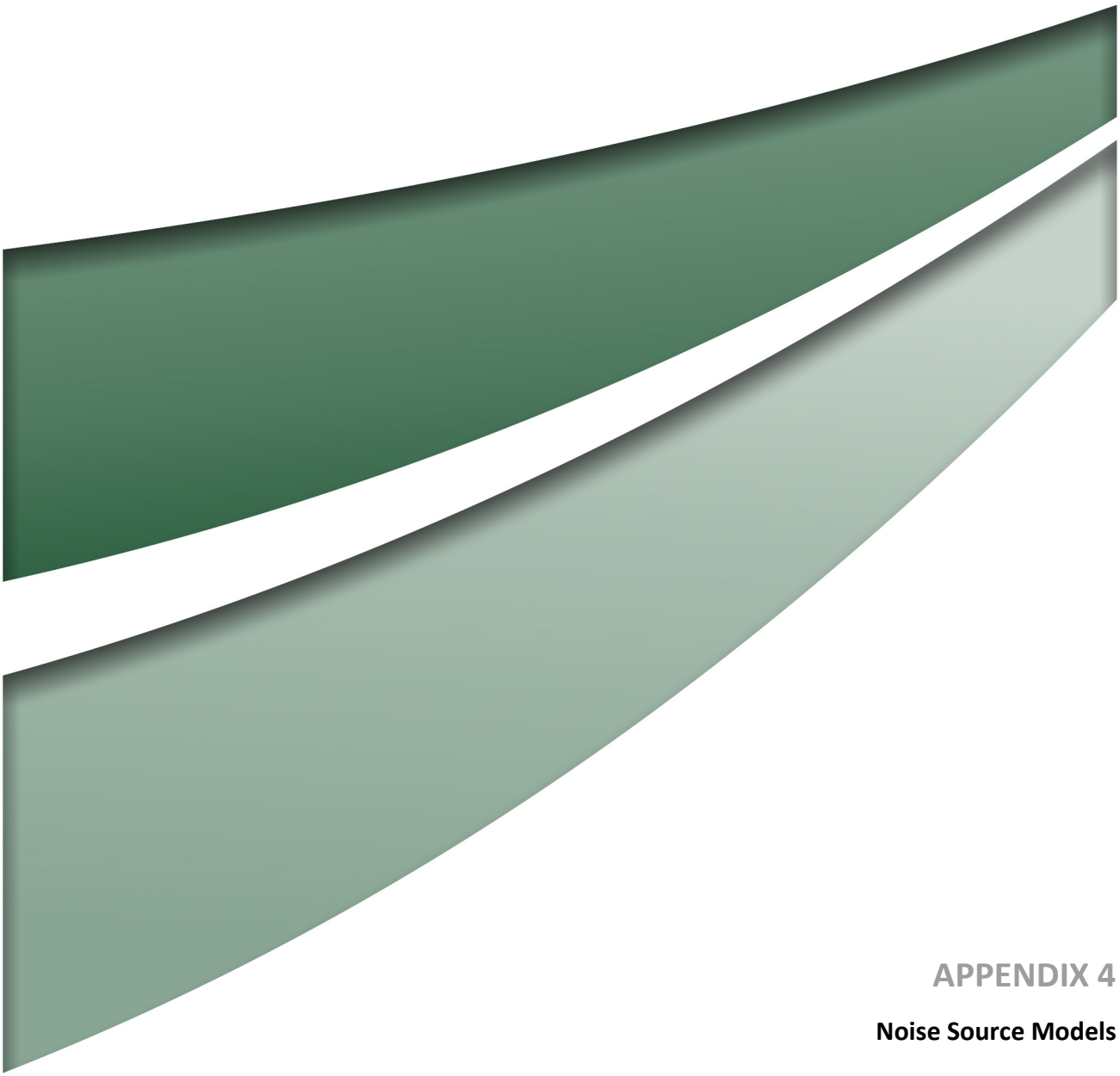
Rec ID	Location	Ass. Grp	PNTL, LAeq,15minute			Sleep LA1,1min	Construction	
			Day	Evening	Night	Night	Standard	Non-standard
R056	37 Cory St	NAG04	49	35	35	52	47	35
R057	36 Cory St	NAG04	49	35	35	52	47	35
R058	39 Cory St	NAG04	47	35	35	52	47	35
R059	38 Cory St	NAG04	48	35	35	52	47	35
R061	41 Cory St	NAG04	47	35	35	52	47	35
R062	40 Cory St	NAG04	47	35	35	52	47	35
R064	43 Cory St	NAG04	46	35	35	52	47	35
R065	44 Cory St	NAG04	46	35	35	52	47	35
R016	256 Dungog Rd	NAG05	40	35	35	52	45	35
R019	1-3 Grace Ave	NAG05	40	35	35	52	45	35
R041	249 Dungog Rd	NAG06	40	35	35	52	45	35
R043	231 Dungog Rd	NAG06	40	35	35	52	45	35
R055	221 Dungog Rd	NAG06	40	35	35	52	45	35
R066	223 Dungog Rd	NAG06	40	35	35	52	45	35
R070	199 Dungog Rd	NAG06	40	35	35	52	45	35
R025	281 Dungog Rd	NAG07	40	35	35	52	45	35
R031	303 Dungog Rd	NAG07	40	35	35	52	45	35
R040	279 Dungog Rd	NAG07	40	35	35	52	45	35
R087	253 Dungog Rd	NAG08	40	35	35	52	45	35
R115	257 Dungog Rd	NAG08	40	35	35	52	45	35
R119	9 Mowbray Ln	NAG08	40	35	35	52	45	35
R122	181 Dungog Rd	NAG08	40	35	35	52	45	35
R128	259 Dungog Rd	NAG08	40	35	35	52	45	35
R129	261 Dungog Rd	NAG08	40	35	35	52	45	35
R131	25 Mowbray Ln	NAG08	40	35	35	52	45	35
R132	57 Mowbray Ln	NAG08	40	35	35	52	45	35
R133	147 Dungog Rd	NAG08	40	35	35	52	45	35
R136	255 Dungog Rd	NAG08	40	35	35	52	45	35
R138	76 Mowbray Ln	NAG08	40	35	35	52	45	35
R141	80 Mowbray Ln	NAG08	40	35	35	52	45	35
R143	121 Dungog Rd	NAG08	40	35	35	52	45	35
R145	120 Dungog Rd	NAG08	40	35	35	52	45	35
R148	51 Dungog Rd	NAG08	40	35	35	52	45	35
R149	83 Dungog Rd	NAG08	40	35	35	52	45	35
R034	338 Dungog Rd	NAG09	40	35	35	52	45	35
R047	341 Dungog Rd	NAG09	40	35	35	52	45	35
R053	333 Dungog Rd	NAG09	40	35	35	52	45	35
R046	406 Dungog Rd	NAG10	40	35	35	52	45	35
R063	9 Horns Crossing Rd	NAG10	40	35	35	52	45	35
R069	29 Horns Crossing Rd	NAG10	40	35	35	52	45	35
R075	24 Horns Crossing Rd	NAG10	40	35	35	52	45	35
R088	55 Horns Crossing Rd	NAG10	40	35	35	52	45	35
R107	52 Horns Crossing Rd	NAG10	40	35	35	52	45	35
R073	16 View St	NAG11	40	35	35	52	45	35
R083	24 View St	NAG11	40	35	35	52	45	35
R092	32 View St	NAG11	40	35	35	52	45	35
R094	19 View St	NAG11	40	35	35	52	45	35
R095	15 View St	NAG11	40	35	35	52	45	35

Rec ID	Location	Ass. Grp	PNTL, LAeq,15minute			Sleep LA1,1min	Construction	
			Day	Evening	Night	Night	Standard	Non-standard
R097	21 View St	NAG11	40	35	35	52	45	35
R098	27 View St	NAG11	40	35	35	52	45	35
R101	14 Wakaya Cl	NAG11	40	35	35	52	45	35
R102	4 Wakaya Cl	NAG11	40	35	35	52	45	35
R103	18 Wakaya Cl	NAG11	40	35	35	52	45	35
R104	17 View St	NAG11	40	35	35	52	45	35
R105	35 View St	NAG11	40	35	35	52	45	35
R110	11 Wakaya Cl	NAG11	40	35	35	52	45	35
R111	45 View St	NAG11	40	35	35	52	45	35
R113	7 Wakaya Cl	NAG11	40	35	35	52	45	35
R117	55 View St	NAG11	40	35	35	52	45	35
R118	24 Wakaya Cl	NAG11	40	35	35	52	45	35
R120	29 Wakaya Cl	NAG11	40	35	35	52	45	35
R125	58 View St	NAG11	40	35	35	52	45	35
R126	80 Horns Crossing Rd	NAG11	40	35	35	52	45	35
R127	28 Wakaya Cl	NAG11	40	35	35	52	45	35
R130	59 View St	NAG11	40	35	35	52	45	35
R134	76 View St	NAG11	40	35	35	52	45	35
R135	71 View St	NAG11	40	35	35	52	45	35
R137	84 View St	NAG11	40	35	35	52	45	35
R139	83 View St	NAG11	40	35	35	52	45	35
R140	90 View St	NAG11	40	35	35	52	45	35
R142	87 View St	NAG11	40	35	35	52	45	35
R144	94 View St	NAG11	40	35	35	52	45	35
R146	95 View St	NAG11	40	35	35	52	45	35
R147	93 View St	NAG11	40	35	35	52	45	35
R060	126 Merchants Rd	NAG12	40	35	35	52	45	35
R068	60 Merchants Rd	NAG12	40	35	35	52	45	35
R071	145 Merchants Rd	NAG12	40	35	35	52	45	35
R072	60 Merchants Rd	NAG12	40	35	35	52	45	35
R074	218 Merchants Rd	NAG12	40	35	35	52	45	35
R077	448 Dungog Rd	NAG12	40	35	35	52	45	35
R079	46 Merchants Rd	NAG12	40	35	35	52	45	35
R080	462 Dungog Rd	NAG12	40	35	35	52	45	35
R081	26 Merchants Rd	NAG12	40	35	35	52	45	35
R082	97 Merchants Rd	NAG12	40	35	35	52	45	35
R084	168 Merchants Rd	NAG12	40	35	35	52	45	35
R089	24 Merchants Rd	NAG12	40	35	35	52	45	35
R096	221 Merchants Rd	NAG12	40	35	35	52	45	35
R099	215 Merchants Rd	NAG12	40	35	35	52	45	35
R100	22 Merchants Rd	NAG12	40	35	35	52	45	35
R106	17 Merchants Rd	NAG12	40	35	35	52	45	35
R108	73 Merchants Rd	NAG12	40	35	35	52	45	35
R114	9 Merchants Rd	NAG12	40	35	35	52	45	35
R124	43 Merchants Rd	NAG12	40	35	35	52	45	35
R032	14 Vogeles Rd	NAG13	40	35	35	52	45	35
R048	12 Vogeles Rd	NAG13	40	35	35	52	45	35
R067	159 Vogeles Rd	NAG13	40	35	35	52	45	35

Rec ID	Location	Ass. Grp	PNTL, LAeq,15minute			Sleep LA1,1min	Construction	
			Day	Evening	Night	Night	Standard	Non-standard
R093	197 Vogeles Rd	NAG13	40	35	35	52	45	35
R076	170 Dungog Rd	NAG14	40	35	35	52	45	35
R078	73 Black Rock Rd	NAG14	40	35	35	52	45	35
R085	65 Cory St	NAG14	40	35	35	52	45	35
R086	67 Cory St	NAG14	40	35	35	52	45	35
R090	69 Cory St	NAG14	40	35	35	52	45	35
R091	75 Black Rock Rd	NAG14	40	35	35	52	45	35
R109	11 Cook St	NAG14	40	35	35	52	45	35
R112	94 Cory St	NAG14	40	35	35	52	45	35
R116	95 Cory St	NAG14	40	35	35	52	45	35
R121	10 Cook St Martins Creek School	NAG14	48	48	48	55 [2]	45	35
R123	97 Cory St	NAG14	40	35	35	52	45	35

Notes [1] Set as passive recreation

[2] Calculated as internal 45 dB(A) plus 10 dB



APPENDIX 4

Noise Source Models

Appendix 4 – Noise Source Models

The ENM models of the staged quarry plans include a full suite of equipment operating in and around the quarry. In addition to the quarry activities the noise models include:

- primary, secondary and tertiary rock processing facilities
- the locomotives on the Martins Creek rail spur line.

The models of the East Pit processing plant area incorporating the conveyor systems, mobile equipment working in and around the plant and rail spur were based on the representative equipment list and topographical layout of the facility. It was assumed that the processing activities would remain basically unchanged over the life of the Project, with the exception of the rail loading facilities, which will involve the construction of a new rail spur.

Many of the machines and items of equipment presented in the following tables are represented as multiple point sources to simulate:

- the possible alternate locations of the machine e.g. the use of multiple excavator locations to represent a single unit that works within the whole quarry area
- a fleet of quarry trucks as a continuous circuit
- conveyors as line sources.

The predicted day-time noise levels including capped peak hourly truck movements modelled as 20 laden truck movement/hour. The predicted 1 hour day to evening shoulder period noise levels including 10 empty trucks returning to the Quarry over a 1 hour period.

The sound power levels of the equipment modelled over the life of the mine are presented in **Tables A4.1** to **A4.5** for Year 2, 6, 10, 15 and 20 respectively. The probabilistic noise modelling incorporated all the equipment identified in **Tables A4.1** to **A5.5**. The equipment incorporated into the noise models of the prevailing meteorological conditions are marked with an 'X' in **Tables A4.1** to **A5.5**. The actual performance of the Quarry operation will be determined by monitoring the environmental noise levels over the life of the Project. That is, while the representative sound power levels provide a guide to equipment selection, the actual performance of the quarry as a whole will dictate equipment selection criteria.

The representative locations of the equipment within each stage of the Quarry operation are shown in **Figures A4.1** to **A4.5**.

Table A4.1 Modelled Equipment List for Stage Year 2

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Including Rail Loading				Excluding Rail Loading			
								Calm	1.7 m/s E	3 m/s S	3 m/s NW	Calm	1.7 m/s E	3 m/s S	3 m/s NW
341	PScreen_Bld - North_Cladding	100	106.2	96.0	370701	6397311	57	x	x	x	x	x	x	x	x
342	PScreen_Bld - North_Opening	100	119.4	117.9	370701	6397311	57	-	-	-	-	-	-	-	-
343	PScreen_Bld - East_Cladding	100	110.2	100.0	370704	6397299	57	x	x	x	x	x	x	x	x
344	PScreen_Bld - East_Opening	100	123.4	121.9	370704	6397299	57	x	x	x	x	x	x	x	x
345	PScreen_Bld - South_Cladding	100	106.2	96.0	370698	6397290	57	x	x	x	x	x	x	x	x
346	PScreen_Bld - South_Opening	100	119.4	117.9	370698	6397290	57	-	-	-	-	-	-	-	-
347	PScreen_Bld - West_Cladding	100	110.7	100.5	370695	6397302	57	x	x	x	x	x	x	x	x
348	PScreen_Bld - West_Opening	100	122.0	120.5	370695	6397299	57	-	-	-	-	-	-	-	-
349	PScreen_Bld - Roof	100	108.8	98.6	370699	6397299	57	x	x	x	x	x	x	x	x
350	PScreen_Bld - North_Clad_Opening	100	102.8	92.6	370701	6397312	57	x	x	x	x	x	x	x	x
351	PScreen_Bld - East_Clad_Opening	100	106.8	96.6	370704	6397300	57	-	-	-	-	-	-	-	-
352	PScreen_Bld - South_Clad_Opening	100	102.8	92.6	370698	6397291	57	x	x	x	x	x	x	x	x
353	PScreen_Bld - West_Clad_Opening	100	105.4	95.2	370695	6397300	57	x	x	x	x	x	x	x	x
641	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370534	6397267	47	x	x	x	x	x	x	x	x
642	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370556	6397251	48	x	x	x	x	x	x	x	x
643	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370568	6397239	50	x	x	x	x	x	x	x	x
644	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370601	6397231	53	x	x	x	x	x	x	x	x
645	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370629	6397230	56	x	x	x	x	x	x	x	x
646	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370660	6397234	58	x	x	x	x	x	x	x	x
647	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370674	6397243	58	x	x	x	x	x	x	x	x
648	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370690	6397257	58	x	x	x	x	x	x	x	x
649	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370705	6397272	58	x	x	x	x	x	x	x	x
650	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370728	6397276	57	x	x	x	x	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Including Rail Loading				Excluding Rail Loading			
								Calm	1.7 m/s E	3 m/s S	3 m/s NW	Calm	1.7 m/s E	3 m/s S	3 m/s NW
651	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370753	6397288	58	x	x	x	x	x	x	x	x
652	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370770	6397304	58	x	x	x	x	x	x	x	x
653	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370792	6397319	58	x	x	x	x	x	x	x	x
654	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370797	6397346	58	x	x	x	x	x	x	x	x
655	Current Access Rd - 40 trips/hour (20 Trucks in/out)	6	106.0	97.6	370796	6397385	58	x	x	x	x	x	x	x	x
800	Backhoe	100	106.0	98.0	370781	6397397	58	-	-	-	-	-	-	-	-
801	Bobcat	100	115.5	104.1	370714	6397330	57	-	-	-	-	-	-	-	-
802	C01 - Conveyor	100	108.6	100.2	370651	6397331	55	x	x	x	x	x	x	x	x
803	C02 - Conveyor	100	108.7	100.3	370662	6397308	58	x	x	x	x	x	x	x	x
804	C03 - Conveyor	100	105.5	97.1	370679	6397303	58	x	x	x	x	x	x	x	x
805	C04 - Conveyor	100	105.8	97.4	370695	6397316	57	x	x	x	x	x	x	x	x
806	C05 - Conveyor	100	105.3	96.9	370709	6397289	57	x	x	x	x	x	x	x	x
807	C06 - Conveyor	100	106.8	98.4	370681	6397289	59	x	x	x	x	x	x	x	x
808	C07 - Conveyor	100	108.8	100.4	370617	6397279	54	x	x	x	x				
809	C08 - Conveyor	100	105.1	96.7	370710	6397301	57	x	x	x	x	x	x	x	x
810	C09 - Conveyor	100	106.7	98.3	370731	6397320	57	x	x	x	x	x	x	x	x
811	C10 - Conveyor	100	108.0	99.6	370729	6397324	57	x	x	x	x	x	x	x	x
812	C12 - Conveyor	100	101.9	93.5	370741	6397351	61	x	x	x	x	x	x	x	x
813	C13 - Conveyor	100	106.1	97.7	370754	6397356	58	x	x	x	x	x	x	x	x
814	C14 - Conveyor	100	104.5	96.1	370757	6397347	58	x	x	x	x	x	x	x	x
815	C15 - Conveyor	100	104.1	95.7	370750	6397336	60	x	x	x	x	x	x	x	x
816	C16 - Conveyor	100	104.3	95.9	370776	6397366	58	x	x	x	x	x	x	x	x
817	C17 - Conveyor	100	104.5	96.1	370781	6397373	58	x	x	x	x	x	x	x	x
818	C18 - Conveyor	100	104.5	96.1	370775	6397382	58	x	x	x	x	x	x	x	x
819	C19 - Conveyor	100	104.9	96.5	370767	6397380	58	x	x	x	x	x	x	x	x
820	Canica Crusher	100	115.9	109.4	370721	6397302	57	x	x	x	x	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Including Rail Loading				Excluding Rail Loading			
								Calm	1.7 m/s E	3 m/s S	3 m/s NW	Calm	1.7 m/s E	3 m/s S	3 m/s NW
821	Canica Surge Bin	100	108.2	105.8	370720	6397299	57	x	x	x	x	x	x	x	x
822	Forklift	100	118.1	110.1	370729	6397252	58	-	-	-	-	-	-	-	-
823	Locomotive	100	116.4	103.6	370417	6397118	45	x	x	x	x	-	-	-	-
824	Locomotive	100	116.4	103.6	370406	6397104	45	x	x	x	x	-	-	-	-
825	Pre-coat plant	100	119.7	105.2	370757	6397480	50	x	x	x	x	x	x	x	x
826	Primary Crusher	100	119.6	112.3	370673	6397355	54	x	x	x	x	x	x	x	x
827	Pug Mill	100	99.1	92.2	370757	6397128	61	x	x	x	x	x	x	x	x
828	Rail Feeder	100	119.8	119.0	370579	6397285	48	x	x	x	x	-	-	-	-
829	Re-Entry Bin	100	125.4	106.9	370734	6397355	58	x	x	x	x	x	x	x	x
830	Sales Face Loader Filling Truck	100	125.4	106.9	370769	6397215	60	x	x	x	x	x	x	x	x
831	Sand Wash Plant	100	116.3	110.3	370092	6398091	50	-	-	-	-	-	-	-	-
832	Schenck Screen 2	100	114.8	104.7	370740	6397340	58	x	x	x	x	x	x	x	x
833	Schenck Screen 3	100	114.8	104.7	370764	6397371	58	x	x	x	x	x	x	x	x
834	Surge Bin	100	114.0	109.7	370634	6397309	54	-	-	-	-	-	-	-	-
835	Truck Driveoff at Despatch	100	115.3	112.0	370778	6397220	58	x	x	x	x	x	x	x	x
836	Truck Parked Idle	100	95.5	92.2	370787	6397184	61	x	x	x	x	x	x	x	x
837	Truck Parked Idle	100	95.5	92.2	370768	6397206	60	x	x	x	x	x	x	x	x
838	Truck Parked Idle	100	95.5	92.2	370757	6397225	59	x	x	x	x	x	x	x	x
839	Truck Parked Idle	100	95.5	92.2	370778	6397197	61	x	x	x	x	x	x	x	x
840	W1_Power Rock Drill (low)	100	117.7	112.6	370068	6397809	40	-	-	-	-	-	-	-	-
841	W2_Power Rock Drill (high)	100	117.7	112.6	370511	6397900	88	-	-	-	-	-	-	-	-
843	WaterTruck1	50	109.5	99.3	370534	6397880	88	x	x	x	x	x	x	x	x
844	WaterTruck2	50	109.5	99.3	370694	6397490	54	x	x	x	x	x	x	x	x
857	Loader	100	125.4	106.9	370566	6397109	57	x	x	x	x	-	-	-	-
858	Road Truck	100	95.5	92.2	370571	6397116	57	x	x	x	x	-	-	-	-
859	Haultruck 50%	50	109.9	106.4	370571	6397121	57	x	x	x	x	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Including Rail Loading				Excluding Rail Loading			
								Calm	1.7 m/s E	3 m/s S	3 m/s NW	Calm	1.7 m/s E	3 m/s S	3 m/s NW
860	Haultruck 50%	50	109.9	106.4	370710	6397264	58	x	x	x	x	-	-	-	-
861	Surge Bin_Attenuated	100	106.4	87.1	370634	6397309	54	x	x	x	x	x	x	x	x
1900	TH1_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370022	6397794	41	x	-	-	-	x	-	-	-
1901	TH1_W_OPT3_West Pit Haul Truck - A	15	104.7	101.1	370084	6397791	40	x	-	-	-	x	-	-	-
1902	TH1_W_OPT3_West Pit Haul Truck - B	30	107.7	104.1	370415	6397724	70	x	-	-	-	x	-	-	-
1903	TH1_W_OPT3_West Pit Haul Truck - C	30	107.7	104.1	370530	6397624	77	x	-	-	-	x	-	-	-
1904	TH1_W_OPT3_West Pit Haul Truck - D	20	105.9	102.4	370713	6397437	53	x	-	-	-	x	-	-	-
1905	TH1_W_OPT3_West Pit Haul Truck - E position	20	105.9	102.4	370697	6397385	62	x	-	-	-	x	-	-	-
1906	TH1_W_OPT3_Dump Truck - Dumping at Hopper	15	112.5	104.8	370690	6397376	62	x	-	-	-	x	-	-	-
1907	TH1_W_OPT3_West Pit Haul Truck - F	20	106.7	100.4	370637	6397508	60	x	-	-	-	x	-	-	-
1908	TH1_W_OPT3_West Pit Haul Truck - G	30	107.7	104.1	370528	6397624	77	x	-	-	-	x	-	-	-
1909	TH1_W_OPT3_West Pit Haul Truck - H	15	105.5	99.1	370413	6397715	70	x	-	-	-	x	-	-	-
1910	TH1_W_OPT3_West Pit Haul Truck - I	15	105.5	99.1	370082	6397780	40	x	-	-	-	x	-	-	-
2900	TH2_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370427	6397764	80	-	-	-	-	-	-	-	-
2901	TH2_W_OPT3_West Pit Haul Truck - A	14	104.3	100.8	370501	6397738	80	-	-	-	-	-	-	-	-
2902	TH2_W_OPT3_West Pit Haul Truck - B	21	106.1	102.6	370530	6397624	77	-	-	-	-	-	-	-	-
2903	TH2_W_OPT3_West Pit Haul Truck - C	28	107.4	103.8	370713	6397437	53	-	-	-	-	-	-	-	-
2904	TH2_W_OPT3_West Pit Haul Truck - D position	28	107.4	103.8	370697	6397386	62	-	-	-	-	-	-	-	-
2905	TH2_W_OPT3_Dump Truck - Dumping at Hopper	21	113.9	106.3	370690	6397376	62	-	-	-	-	-	-	-	-
2906	TH2_W_OPT3_West Pit Haul Truck - E	28	108.2	101.8	370637	6397508	60	-	-	-	-	-	-	-	-
2907	TH2_W_OPT3_West Pit Haul Truck - F	21	106.1	102.6	370528	6397624	77	-	-	-	-	-	-	-	-
2908	TH2_W_OPT3_West Pit Haul Truck - G	14	105.2	98.8	370505	6397703	79	-	-	-	-	-	-	-	-
3900	TH3_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370332	6398119	54	-	-	-	-	-	-	-	-
3901	TH3_W_OPT3_West Pit Haul Truck - A	23	106.5	103.0	370429	6398014	63	-	-	-	-	-	-	-	-
3902	TH3_W_OPT3_West Pit Haul Truck - B	15	104.8	101.2	370427	6397797	70	-	-	-	-	-	-	-	-
3903	TH3_W_OPT3_West Pit Haul Truck - C	31	107.8	104.3	370530	6397624	77	-	-	-	-	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Including Rail Loading				Excluding Rail Loading			
								Calm	1.7 m/s E	3 m/s S	3 m/s NW	Calm	1.7 m/s E	3 m/s S	3 m/s NW
3904	TH3_W_OPT3_West Pit Haul Truck - D	21	106.0	102.5	370713	6397437	53	-	-	-	-	-	-	-	-
3905	TH3_W_OPT3_West Pit Haul Truck - E position	21	106.0	102.5	370697	6397386	62	-	-	-	-	-	-	-	-
3906	TH3_W_OPT3_Dump Truck - Dumping at Hopper	15	112.6	104.9	370690	6397377	62	-	-	-	-	-	-	-	-
3907	TH3_W_OPT3_West Pit Haul Truck - F	21	106.8	100.5	370637	6397509	60	-	-	-	-	-	-	-	-
3908	TH3_W_OPT3_West Pit Haul Truck - G	31	107.8	104.3	370528	6397624	77	-	-	-	-	-	-	-	-
3909	TH3_W_OPT3_West Pit Haul Truck - H	15	105.6	99.2	370394	6397867	63	-	-	-	-	-	-	-	-
3910	TH3_W_OPT3_West Pit Haul Truck - I	15	105.6	99.2	370366	6398027	55	-	-	-	-	-	-	-	-
4900	TH4_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370203	6398416	83	-	-	-	-	-	-	-	-
4901	TH4_W_OPT3_West Pit Haul Truck - A	55	110.3	106.7	370387	6398208	90	-	-	-	-	-	-	-	-
4902	TH4_W_OPT3_West Pit Haul Truck - B	27	107.3	103.7	370538	6397619	77	-	-	-	-	-	-	-	-
4903	TH4_W_OPT3_West Pit Haul Truck - C	18	105.5	102.0	370718	6397436	54	-	-	-	-	-	-	-	-
4904	TH4_W_OPT3_West Pit Haul Truck - D position	18	105.5	102.0	370698	6397380	62	-	-	-	-	-	-	-	-
4905	TH4_W_OPT3_Dump Truck - Dumping at Hopper	14	112.1	104.4	370691	6397371	62	-	-	-	-	-	-	-	-
4906	TH4_W_OPT3_West Pit Haul Truck - E	18	106.3	99.9	370639	6397509	60	-	-	-	-	-	-	-	-
4907	TH4_W_OPT3_West Pit Haul Truck - F	27	107.3	103.7	370537	6397618	77	-	-	-	-	-	-	-	-
4908	TH4_W_OPT3_West Pit Haul Truck - G	41	109.8	103.5	370506	6398060	85	-	-	-	-	-	-	-	-
5900	TH5_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370517	6398007	88	-	x	x	x	-	x	x	x
5901	TH5_W_OPT3_West Pit Haul Truck - A	26	107.0	103.5	370473	6397960	85	-	x	x	x	-	x	x	x
5902	TH5_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370531	6397626	77	-	x	x	x	-	x	x	x
5903	TH5_W_OPT3_West Pit Haul Truck - C	23	106.5	103.0	370715	6397438	54	-	x	x	x	-	x	x	x
5904	TH5_W_OPT3_West Pit Haul Truck - D position	23	106.5	103.0	370699	6397379	62	-	x	x	x	-	x	x	x
5905	TH5_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370692	6397373	62	-	x	x	x	-	x	x	x
5906	TH5_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370638	6397504	59	-	x	x	x	-	x	x	x
5907	TH5_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370530	6397625	77	-	x	x	x	-	x	x	x
5908	TH5_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370467	6397875	82	-	x	x	x	-	x	x	x
7021	Processing_Area_Haul_Truck - A	50	109.9	106.4	370695	6397381	62	-	-	-	-	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Including Rail Loading				Excluding Rail Loading			
								Calm	1.7 m/s E	3 m/s S	3 m/s NW	Calm	1.7 m/s E	3 m/s S	3 m/s NW
7022	Processing_Area_Haul_Truck - B	50	109.9	106.4	370731	6397454	55	-	-	-	-	-	-	-	-
7023	Processing_Area_Haul_Truck - C	50	109.9	106.4	370688	6397419	50	-	-	-	-	-	-	-	-
7024	Processing_Area_Haul_Truck - D	50	109.9	106.4	370715	6397468	50	-	-	-	-	-	-	-	-
7025	Processing_Area_Haul_Truck - E	50	109.9	106.4	370761	6397470	50	-	-	-	-	-	-	-	-
7026	Processing_Area_Haul_Truck - F	50	109.9	106.4	370794	6397497	50	-	-	-	-	-	-	-	-

Table A4.2 Modelled Equipment List for Stage Year 6

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
341	PScreen_Bld - North_Cladding	100	106.2	96.0	370701	6397311	57	x	x	x	x
342	PScreen_Bld - North_Opening	100	119.4	117.9	370701	6397311	57	-	-	-	-
343	PScreen_Bld - East_Cladding	100	110.2	100.0	370704	6397299	57	x	x	x	x
344	PScreen_Bld - East_Opening	100	123.4	121.9	370704	6397299	57	x	x	x	x
345	PScreen_Bld - South_Cladding	100	106.2	96.0	370698	6397290	57	x	x	x	x
346	PScreen_Bld - South_Opening	100	119.4	117.9	370698	6397290	57	-	-	-	-
347	PScreen_Bld - West_Cladding	100	110.7	100.5	370695	6397302	57	x	x	x	x
348	PScreen_Bld - West_Opening	100	122.0	120.5	370695	6397299	57	-	-	-	-
349	PScreen_Bld - Roof	100	108.8	98.6	370699	6397299	57	x	x	x	x
350	PScreen_Bld - North_Clad_Opening	100	102.8	92.6	370701	6397312	57	x	x	x	x
351	PScreen_Bld - East_Clad_Opening	100	106.8	96.6	370704	6397300	57	-	-	-	-
352	PScreen_Bld - South_Clad_Opening	100	102.8	92.6	370698	6397291	57	x	x	x	x
353	PScreen_Bld - West_Clad_Opening	100	105.4	95.2	370695	6397300	57	x	x	x	x
800	Backhoe	100	106.0	98.0	370781	6397397	58	-	-	-	-
801	Bobcat	100	115.5	104.1	370714	6397330	57	-	-	-	-
802	C01 – Conveyor	100	108.6	100.2	370651	6397331	55	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
803	C02 – Conveyor	100	108.7	100.3	370662	6397308	58	x	x	x	x
804	C03 – Conveyor	100	105.5	97.1	370679	6397303	57	x	x	x	x
805	C04 – Conveyor	100	105.8	97.4	370695	6397316	57	x	x	x	x
806	C05 – Conveyor	100	105.3	96.9	370709	6397289	57	x	x	x	x
807	C06 – Conveyor	100	106.8	98.4	370681	6397289	58	x	x	x	x
808	C07 – Conveyor	100	108.8	100.4	370617	6397279	54	-	-	-	-
809	C08 – Conveyor	100	105.1	96.7	370710	6397301	57	x	x	x	x
810	C09 – Conveyor	100	106.7	98.3	370731	6397320	57	x	x	x	x
811	C10 – Conveyor	100	108.0	99.6	370729	6397324	57	x	x	x	x
812	C12 – Conveyor	100	101.9	93.5	370741	6397351	61	x	x	x	x
813	C13 – Conveyor	100	106.1	97.7	370754	6397356	58	x	x	x	x
814	C14 – Conveyor	100	104.5	96.1	370757	6397347	58	x	x	x	x
815	C15 – Conveyor	100	104.1	95.7	370750	6397336	60	x	x	x	x
816	C16 – Conveyor	100	104.3	95.9	370776	6397366	58	x	x	x	x
817	C17 – Conveyor	100	104.5	96.1	370781	6397373	58	x	x	x	x
818	C18 – Conveyor	100	104.5	96.1	370775	6397382	58	x	x	x	x
819	C19 – Conveyor	100	104.9	96.5	370767	6397380	58	x	x	x	x
820	Canica Crusher	100	115.9	109.4	370721	6397302	57	x	x	x	x
821	Canica Surge Bin	100	108.2	105.8	370720	6397299	57	x	x	x	x
822	Forklift	100	118.1	110.1	370729	6397252	58	-	-	-	-
823	Locomotive	100	116.4	103.6	370417	6397118	45	-	-	-	-
824	Locomotive	100	116.4	103.6	370406	6397104	44	-	-	-	-
825	Pre-coat plant	100	119.7	105.2	370757	6397480	50	x	x	x	x
826	Primary Crusher	100	119.6	112.3	370673	6397355	54	x	x	x	x
827	Pug Mill	100	99.1	92.2	370757	6397128	61	x	x	x	x
828	Rail Feeder	100	119.8	119.0	370579	6397285	48	-	-	-	-
829	Re-Entry Bin	100	125.4	106.9	370734	6397355	58	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
830	Sales Face Loader Filling Truck	100	125.4	106.9	370769	6397215	60	x	x	x	x
831	Sand Wash Plant	100	116.3	110.3	370092	6398091	28	-	-	-	-
832	Schenck Screen 2	100	114.8	104.7	370740	6397340	58	x	x	x	x
833	Schenck Screen 3	100	114.8	104.7	370764	6397371	58	x	x	x	x
834	Surge Bin	100	114.0	109.7	370634	6397309	54	-	-	-	-
835	Truck Driveoff at Despatch	100	115.3	112.0	370778	6397220	58	x	x	x	x
836	Truck Parked Idle	100	95.5	92.2	370787	6397184	61	x	x	x	x
837	Truck Parked Idle	100	95.5	92.2	370768	6397206	60	x	x	x	x
838	Truck Parked Idle	100	95.5	92.2	370757	6397225	59	x	x	x	x
839	Truck Parked Idle	100	95.5	92.2	370778	6397197	61	x	x	x	x
840	W1_Power Rock Drill (low)	100	117.7	112.6	370068	6397809	28	-	-	-	-
841	W2_Power Rock Drill (high)	100	117.7	112.6	370511	6397899	76	-	-	-	-
843	WaterTruck1	50	109.5	99.3	370534	6397880	76	x	x	x	x
844	WaterTruck2	50	109.5	99.3	370694	6397490	54	x	x	x	x
851	FEL_load_train 1	100	120.6	113.8	370830	6397515	50	x	x	x	-
852	FEL_load_train 2	100	125.4	106.9	370805	6397514	50	x	x	x	-
853	FEL_load_train 3	100	120.6	113.8	370774	6397509	50	-	-	-	-
854	FEL_load_train 4	100	125.4	106.9	370756	6397491	50	x	x	x	-
855	Loco_new_spur_1	100	116.4	103.6	370788	6397522	50	x	x	x	-
856	Loco_new_spur_2	100	116.4	103.6	370803	6397522	50	x	x	x	-
857	Loader	100	125.4	106.9	370566	6397109	57	x	x	x	-
858	Road Truck	100	95.5	92.2	370571	6397116	57	x	x	x	-
859	Haultruck 50%	50	109.9	106.4	370571	6397121	57	x	x	x	-
860	Haultruck 50%	50	109.9	106.4	370710	6397264	58	x	x	x	-
861	Surge Bin_Attenuated	100	106.4	87.1	370634	6397309	54	x	x	x	-
1900	TH1_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370022	6397794	28	-	x	x	X
1901	TH1_W_OPT3_West Pit Haul Truck - A	15	104.7	101.1	370084	6397791	28	-	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
1902	TH1_W_OPT3_West Pit Haul Truck - B	30	107.7	104.1	370407	6397722	69	-	x	x	x
1903	TH1_W_OPT3_West Pit Haul Truck - C	30	107.7	104.1	370515	6397604	76	-	x	x	x
1904	TH1_W_OPT3_West Pit Haul Truck - D	20	105.9	102.4	370718	6397435	53	-	x	x	x
1905	TH1_W_OPT3_West Pit Haul Truck - E position	20	105.9	102.4	370697	6397378	62	-	x	x	x
1906	TH1_W_OPT3_Dump Truck - Dumping at Hopper	15	112.5	104.8	370690	6397369	62	-	x	x	x
1907	TH1_W_OPT3_West Pit Haul Truck - F	20	106.7	100.4	370637	6397508	60	-	x	x	x
1908	TH1_W_OPT3_West Pit Haul Truck - G	30	107.7	104.1	370513	6397604	76	-	x	x	x
1909	TH1_W_OPT3_West Pit Haul Truck - H	15	105.5	99.1	370405	6397713	69	-	x	x	x
1910	TH1_W_OPT3_West Pit Haul Truck - I	15	105.5	99.1	370082	6397780	28	-	x	x	x
2900	TH2_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370427	6397767	76	x	-	-	-
2901	TH2_W_OPT3_West Pit Haul Truck - A	14	104.3	100.8	370472	6397740	76	x	-	-	-
2902	TH2_W_OPT3_West Pit Haul Truck - B	21	106.1	102.6	370517	6397598	76	x	-	-	-
2903	TH2_W_OPT3_West Pit Haul Truck - C	28	107.4	103.8	370719	6397436	53	x	-	-	-
2904	TH2_W_OPT3_West Pit Haul Truck - D position	28	107.4	103.8	370697	6397379	62	x	-	-	-
2905	TH2_W_OPT3_Dump Truck - Dumping at Hopper	21	113.9	106.3	370690	6397370	62	x	-	-	-
2906	TH2_W_OPT3_West Pit Haul Truck - E	28	108.2	101.8	370637	6397508	60	x	-	-	-
2907	TH2_W_OPT3_West Pit Haul Truck - F	21	106.1	102.6	370515	6397597	76	x	-	-	-
2908	TH2_W_OPT3_West Pit Haul Truck - G	14	105.2	98.8	370507	6397697	76	x	-	-	-
3900	TH3_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370332	6398119	54	-	-	-	-
3901	TH3_W_OPT3_West Pit Haul Truck - A	23	106.5	103.0	370391	6397992	57	-	-	-	-
3902	TH3_W_OPT3_West Pit Haul Truck - B	15	104.8	101.2	370429	6397797	70	-	-	-	-
3903	TH3_W_OPT3_West Pit Haul Truck - C	31	107.8	104.3	370515	6397604	76	-	-	-	-
3904	TH3_W_OPT3_West Pit Haul Truck - D	21	106.0	102.5	370719	6397435	53	-	-	-	-
3905	TH3_W_OPT3_West Pit Haul Truck - E position	21	106.0	102.5	370697	6397380	62	-	-	-	-
3906	TH3_W_OPT3_Dump Truck - Dumping at Hopper	15	112.6	104.9	370690	6397370	62	-	-	-	-
3907	TH3_W_OPT3_West Pit Haul Truck - F	21	106.8	100.5	370637	6397509	60	-	-	-	-
3908	TH3_W_OPT3_West Pit Haul Truck - G	31	107.8	104.3	370513	6397604	76	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
3909	TH3_W_OPT3_West Pit Haul Truck - H	15	105.6	99.2	370393	6397829	59	-	-	-	-
3910	TH3_W_OPT3_West Pit Haul Truck - I	15	105.6	99.2	370373	6398026	55	-	-	-	-
4900	TH4_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370203	6398416	83	-	-	-	-
4901	TH4_W_OPT3_West Pit Haul Truck - A	55	110.3	106.7	370387	6398208	90	-	-	-	-
4902	TH4_W_OPT3_West Pit Haul Truck - B	27	107.3	103.7	370538	6397619	76	-	-	-	-
4903	TH4_W_OPT3_West Pit Haul Truck - C	18	105.5	102.0	370718	6397436	54	-	-	-	-
4904	TH4_W_OPT3_West Pit Haul Truck - D position	18	105.5	102.0	370698	6397380	62	-	-	-	-
4905	TH4_W_OPT3_Dump Truck - Dumping at Hopper	14	112.1	104.4	370691	6397371	62	-	-	-	-
4906	TH4_W_OPT3_West Pit Haul Truck - E	18	106.3	99.9	370639	6397509	60	-	-	-	-
4907	TH4_W_OPT3_West Pit Haul Truck - F	27	107.3	103.7	370537	6397618	76	-	-	-	-
4908	TH4_W_OPT3_West Pit Haul Truck - G	41	109.8	103.5	370506	6398060	76	-	-	-	-
5900	TH5_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370515	6398015	76	-	-	-	-
5901	TH5_W_OPT3_West Pit Haul Truck - A	26	107.0	103.5	370506	6397916	76	-	-	-	-
5902	TH5_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370538	6397619	76	-	-	-	-
5903	TH5_W_OPT3_West Pit Haul Truck - C	23	106.5	103.0	370720	6397437	54	-	-	-	-
5904	TH5_W_OPT3_West Pit Haul Truck - D position	23	106.5	103.0	370698	6397373	62	-	-	-	-
5905	TH5_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370692	6397366	62	-	-	-	-
5906	TH5_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370638	6397504	59	-	-	-	-
5907	TH5_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370537	6397619	76	-	-	-	-
5908	TH5_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370481	6397867	76	-	-	-	-
8041	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	369852	6397613	52	-	-	-	-
8042	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	369999	6397611	61	-	-	-	-
8043	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370131	6397624	74	-	-	-	-
8044	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370194	6397570	79	-	-	-	-
8045	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370268	6397453	78	-	-	-	-
8046	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370424	6397515	73	-	-	-	-
8047	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370537	6397560	66	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
8048	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370574	6397530	64	-	-	-	-
8049	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370622	6397510	61	-	-	-	-
8050	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370718	6397481	50	-	-	-	-
8051	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370761	6397468	50	-	-	-	-
8052	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370801	6397440	50	-	-	-	-
8053	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370826	6397376	55	-	-	-	-
8054	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370803	6397327	58	-	-	-	-
8055	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370765	6397338	58	-	-	-	-
8141	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369852	6397613	52	x	x	x	x
8142	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369999	6397611	61	x	x	x	x
8143	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370131	6397624	74	x	x	x	x
8144	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370194	6397570	79	x	x	x	x
8145	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370268	6397453	78	x	x	x	x
8146	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370424	6397515	73	x	x	x	x
8147	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370537	6397560	66	x	x	x	x
8148	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370574	6397530	64	x	x	x	x
8149	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370622	6397510	61	x	x	x	x
8150	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370718	6397481	50	x	x	x	x
8151	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370761	6397468	50	x	x	x	x
8152	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370801	6397440	50	x	x	x	x
8153	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370826	6397376	55	x	x	x	x
8154	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370803	6397327	58	x	x	x	x
8155	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370765	6397338	58	x	x	x	x

Table A4.3 Modelled Equipment List for Stage Year 10

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
341	PScreen_Bld - North_Cladding	100	106.2	96	370701	6397311	57	x	x	x	x
342	PScreen_Bld - North_Opening	100	119.4	117.9	370701	6397311	57	-	-	-	-
343	PScreen_Bld - East_Cladding	100	110.2	100	370704	6397299	57	x	x	x	x
344	PScreen_Bld - East_Opening	100	123.4	121.9	370704	6397299	57	x	x	x	x
345	PScreen_Bld - South_Cladding	100	106.2	96	370698	6397290	57	x	x	x	x
346	PScreen_Bld - South_Opening	100	119.4	117.9	370698	6397290	57	-	-	-	-
347	PScreen_Bld - West_Cladding	100	110.7	100.5	370695	6397302	57	x	x	x	x
348	PScreen_Bld - West_Opening	100	122	120.5	370695	6397299	57	-	-	-	-
349	PScreen_Bld - Roof	100	108.8	98.6	370699	6397299	57	x	x	x	x
350	PScreen_Bld - North_Clad_Opening	100	102.8	92.6	370701	6397312	57	x	x	x	x
351	PScreen_Bld - East_Clad_Opening	100	106.8	96.6	370704	6397300	57	-	-	-	-
352	PScreen_Bld - South_Clad_Opening	100	102.8	92.6	370698	6397291	57	x	x	x	x
353	PScreen_Bld - West_Clad_Opening	100	105.4	95.2	370695	6397300	57	x	x	x	x
800	Backhoe	100	106	98	370781	6397397	58	-	-	-	-
801	Bobcat	100	115.5	104.1	370714	6397330	57	-	-	-	-
802	C01 – Conveyor	100	108.6	100.2	370651	6397331	55	x	x	x	x
803	C02 – Conveyor	100	108.7	100.3	370662	6397308	58	x	x	x	x
804	C03 – Conveyor	100	105.5	97.1	370679	6397303	57	x	x	x	x
805	C04 – Conveyor	100	105.8	97.4	370695	6397316	57	x	x	x	x
806	C05 – Conveyor	100	105.3	96.9	370709	6397289	57	x	x	x	x
807	C06 – Conveyor	100	106.8	98.4	370681	6397289	59	x	x	x	x
808	C07 – Conveyor	100	108.8	100.4	370617	6397279	54	-	-	-	-
809	C08 – Conveyor	100	105.1	96.7	370710	6397301	57	x	x	x	x
810	C09 – Conveyor	100	106.7	98.3	370731	6397320	57	x	x	x	x
811	C10 – Conveyor	100	108	99.6	370729	6397324	57	x	x	x	x
812	C12 – Conveyor	100	101.9	93.5	370741	6397351	61	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
813	C13 – Conveyor	100	106.1	97.7	370754	6397356	58	x	x	x	x
814	C14 – Conveyor	100	104.5	96.1	370757	6397347	58	x	x	x	x
815	C15 – Conveyor	100	104.1	95.7	370750	6397336	60	x	x	x	x
816	C16 – Conveyor	100	104.3	95.9	370776	6397366	58	x	x	x	x
817	C17 – Conveyor	100	104.5	96.1	370781	6397373	58	x	x	x	x
818	C18 – Conveyor	100	104.5	96.1	370775	6397382	58	x	x	x	x
819	C19 – Conveyor	100	104.9	96.5	370767	6397380	58	x	x	x	x
820	Canica Crusher	100	115.9	109.4	370721	6397302	57	x	x	x	x
821	Canica Surge Bin	100	108.2	105.8	370720	6397299	57	x	x	x	x
822	Forklift	100	118.1	110.1	370729	6397252	58	-	-	-	-
823	Locomotive	100	116.4	103.6	370417	6397118	45	-	-	-	-
824	Locomotive	100	116.4	103.6	370406	6397104	44	-	-	-	-
825	Pre-coat plant	100	119.7	105.2	370757	6397480	50	x	x	x	x
826	Primary Crusher	100	119.6	112.3	370673	6397355	54	x	x	x	x
827	Pug Mill	100	99.1	92.2	370757	6397128	61	x	x	x	x
828	Rail Feeder	100	119.8	119	370579	6397285	48	-	-	-	-
829	Re-Entry Bin	100	125.4	106.9	370734	6397355	58	x	x	x	x
830	Sales Face Loader Filling Truck	100	125.4	106.9	370769	6397215	60	x	x	x	x
831	Sand Wash Plant	100	116.3	110.3	370092	6398091	21	-	-	-	-
832	Schenck Screen 2	100	114.8	104.7	370740	6397340	58	x	x	x	x
833	Schenck Screen 3	100	114.8	104.7	370764	6397371	58	x	x	x	x
834	Surge Bin	100	114	109.7	370634	6397309	54	-	-	-	-
835	Truck Driveoff at Despatch	100	115.3	112	370778	6397220	58	x	x	x	x
836	Truck Parked Idle	100	95.5	92.2	370787	6397184	61	x	x	x	x
837	Truck Parked Idle	100	95.5	92.2	370768	6397206	60	x	x	x	x
838	Truck Parked Idle	100	95.5	92.2	370757	6397225	59	x	x	x	x
839	Truck Parked Idle	100	95.5	92.2	370778	6397197	61	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
840	W1_Power Rock Drill (low)	100	117.7	112.6	370068	6397809	19	-	-	-	-
841	W2_Power Rock Drill (high)	100	117.7	112.6	370510	6397887	76	-	-	-	-
843	WaterTruck1	50	109.5	99.3	370534	6397880	76	x	x	x	x
844	WaterTruck2	50	109.5	99.3	370694	6397490	54	x	x	x	x
851	FEL_load_train 1	100	120.6	113.8	370830	6397515	50	x	-	x	-
852	FEL_load_train 2	100	125.4	106.9	370805	6397514	50	x	-	x	-
853	FEL_load_train 3	100	120.6	113.8	370774	6397509	50	-	-	-	-
854	FEL_load_train 4	100	125.4	106.9	370756	6397491	50	x	-	x	-
855	Loco_new_spur_1	100	116.4	103.6	370788	6397522	50	x	-	x	-
856	Loco_new_spur_2	100	116.4	103.6	370803	6397522	50	x	-	x	-
857	Loader	100	125.4	106.9	370566	6397109	57	x	-	x	-
858	Road Truck	100	95.5	92.2	370571	6397116	57	x	-	x	-
859	Haultruck 50%	50	109.9	106.4	370571	6397121	57	x	-	x	-
860	Haultruck 50%	50	109.9	106.4	370710	6397264	58	x	-	x	-
861	Surge Bin_Attenuated	100	106.4	87.1	370634	6397309	54	x	-	x	-
1900	TH1_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370048	6397819	16	-	-	x	x
1901	TH1_W_OPT3_West Pit Haul Truck - A	15	104.7	101.1	370087	6397815	21	-	-	x	x
1902	TH1_W_OPT3_West Pit Haul Truck - B	30	107.7	104.1	370407	6397722	69	-	-	x	x
1903	TH1_W_OPT3_West Pit Haul Truck - C	30	107.7	104.1	370515	6397604	76	-	-	x	x
1904	TH1_W_OPT3_West Pit Haul Truck - D	20	105.9	102.4	370718	6397435	53	-	-	x	x
1905	TH1_W_OPT3_West Pit Haul Truck - E position	20	105.9	102.4	370697	6397378	62	-	-	x	x
1906	TH1_W_OPT3_Dump Truck - Dumping at Hopper	15	112.5	104.8	370690	6397369	62	-	-	x	x
1907	TH1_W_OPT3_West Pit Haul Truck - F	20	106.7	100.4	370637	6397508	60	-	-	x	x
1908	TH1_W_OPT3_West Pit Haul Truck - G	30	107.7	104.1	370513	6397604	76	-	-	x	x
1909	TH1_W_OPT3_West Pit Haul Truck - H	15	105.5	99.1	370405	6397713	69	-	-	x	x
1910	TH1_W_OPT3_West Pit Haul Truck - I	15	105.5	99.1	370086	6397805	21	-	-	x	x
2900	TH2_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370427	6397767	76	x	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
2901	TH2_W_OPT3_West Pit Haul Truck - A	14	104.3	100.8	370472	6397740	76	x	-	-	-
2902	TH2_W_OPT3_West Pit Haul Truck - B	21	106.1	102.6	370517	6397598	76	x	-	-	-
2903	TH2_W_OPT3_West Pit Haul Truck - C	28	107.4	103.8	370719	6397436	53	x	-	-	-
2904	TH2_W_OPT3_West Pit Haul Truck - D position	28	107.4	103.8	370697	6397379	62	x	-	-	-
2905	TH2_W_OPT3_Dump Truck - Dumping at Hopper	21	113.9	106.3	370690	6397370	62	x	-	-	-
2906	TH2_W_OPT3_West Pit Haul Truck - E	28	108.2	101.8	370637	6397508	60	x	-	-	-
2907	TH2_W_OPT3_West Pit Haul Truck - F	21	106.1	102.6	370515	6397597	76	x	-	-	-
2908	TH2_W_OPT3_West Pit Haul Truck - G	14	105.2	98.8	370507	6397697	76	x	-	-	-
3900	TH3_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370332	6398119	54	-	-	-	-
3901	TH3_W_OPT3_West Pit Haul Truck - A	23	106.5	103	370391	6397992	57	-	-	-	-
3902	TH3_W_OPT3_West Pit Haul Truck - B	15	104.8	101.2	370421	6397803	68	-	-	-	-
3903	TH3_W_OPT3_West Pit Haul Truck - C	31	107.8	104.3	370515	6397604	76	-	-	-	-
3904	TH3_W_OPT3_West Pit Haul Truck - D	21	106	102.5	370719	6397435	53	-	-	-	-
3905	TH3_W_OPT3_West Pit Haul Truck - E position	21	106	102.5	370697	6397380	62	-	-	-	-
3906	TH3_W_OPT3_Dump Truck - Dumping at Hopper	15	112.6	104.9	370690	6397370	62	-	-	-	-
3907	TH3_W_OPT3_West Pit Haul Truck - F	21	106.8	100.5	370637	6397509	60	-	-	-	-
3908	TH3_W_OPT3_West Pit Haul Truck - G	31	107.8	104.3	370513	6397604	76	-	-	-	-
3909	TH3_W_OPT3_West Pit Haul Truck - H	15	105.6	99.2	370389	6397828	58	-	-	-	-
3910	TH3_W_OPT3_West Pit Haul Truck - I	15	105.6	99.2	370373	6398026	55	-	-	-	-
4900	TH4_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370203	6398416	76	-	-	-	-
4901	TH4_W_OPT3_West Pit Haul Truck - A	55	110.3	106.7	370387	6398208	76	-	-	-	-
4902	TH4_W_OPT3_West Pit Haul Truck - B	27	107.3	103.7	370538	6397619	76	-	-	-	-
4903	TH4_W_OPT3_West Pit Haul Truck - C	18	105.5	102	370718	6397436	54	-	-	-	-
4904	TH4_W_OPT3_West Pit Haul Truck - D position	18	105.5	102	370698	6397380	62	-	-	-	-
4905	TH4_W_OPT3_Dump Truck - Dumping at Hopper	14	112.1	104.4	370691	6397371	62	-	-	-	-
4906	TH4_W_OPT3_West Pit Haul Truck - E	18	106.3	99.9	370639	6397509	60	-	-	-	-
4907	TH4_W_OPT3_West Pit Haul Truck - F	27	107.3	103.7	370537	6397618	76	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
4908	TH4_W_OPT3_West Pit Haul Truck - G	41	109.8	103.5	370506	6398060	76	-	-	-	-
5900	TH5_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370515	6398015	76	-	-	-	-
5901	TH5_W_OPT3_West Pit Haul Truck - A	26	107	103.5	370506	6397916	76	-	-	-	-
5902	TH5_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370538	6397619	76	-	-	-	-
5903	TH5_W_OPT3_West Pit Haul Truck - C	23	106.5	103	370720	6397437	54	-	-	-	-
5904	TH5_W_OPT3_West Pit Haul Truck - D position	23	106.5	103	370698	6397373	62	-	-	-	-
5905	TH5_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370692	6397366	62	-	-	-	-
5906	TH5_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370638	6397504	59	-	-	-	-
5907	TH5_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370537	6397619	76	-	-	-	-
5908	TH5_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370481	6397867	76	-	-	-	-
6900	TH6_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370240	6397603	64	-	x	-	-
6901	TH6_W_OPT3_West Pit Haul Truck - A	26	107	103.5	370332	6397618	65	-	x	-	-
6902	TH6_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370486	6397604	76	-	x	-	-
6903	TH6_W_OPT3_West Pit Haul Truck - C	23	106.5	103	370714	6397437	53	-	x	-	-
6904	TH6_W_OPT3_West Pit Haul Truck - D position	23	106.5	103	370692	6397373	62	-	x	-	-
6905	TH6_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370686	6397366	62	-	x	-	-
6906	TH6_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370632	6397504	60	-	x	-	-
6907	TH6_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370485	6397603	75	-	x	-	-
6908	TH6_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370378	6397597	66	-	x	-	-
8041	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	369852	6397613	52	-	-	-	-
8042	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	369999	6397611	61	-	-	-	-
8043	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370131	6397624	74	-	-	-	-
8044	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370194	6397570	79	-	-	-	-
8045	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370268	6397453	78	-	-	-	-
8046	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370424	6397515	73	-	-	-	-
8047	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370537	6397560	66	-	-	-	-
8048	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370574	6397530	64	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
8049	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370622	6397510	61	-	-	-	-
8050	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370718	6397481	50	-	-	-	-
8051	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370761	6397468	50	-	-	-	-
8052	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370801	6397440	50	-	-	-	-
8053	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370826	6397376	55	-	-	-	-
8054	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370803	6397327	58	-	-	-	-
8055	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96	370765	6397338	58	-	-	-	-
8141	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369852	6397613	52	x	x	x	x
8142	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369999	6397611	61	x	x	x	x
8143	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370131	6397624	74	x	x	x	x
8144	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370194	6397570	79	x	x	x	x
8145	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370268	6397453	78	x	x	x	x
8146	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370424	6397515	73	x	x	x	x
8147	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370537	6397560	66	x	x	x	x
8148	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370574	6397530	64	x	x	x	x
8149	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370622	6397510	61	x	x	x	x
8150	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370718	6397481	50	x	x	x	x
8151	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370761	6397468	50	x	x	x	x
8152	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370801	6397440	50	x	x	x	x
8153	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370826	6397376	55	x	x	x	x
8154	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370803	6397327	58	x	x	x	x
8155	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370765	6397338	58	x	x	x	x
8141	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369852	6397613	52	x	x	x	x

Table A4.4 Modelled Equipment List for Stage Year 15

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
341	PScreen_Bld - North_Cladding	100	106.2	96.0	370701	6397311	57	x	x	x	x
342	PScreen_Bld - North_Opening	100	119.4	117.9	370701	6397311	57	-	-	-	-
343	PScreen_Bld - East_Cladding	100	110.2	100.0	370704	6397299	57	x	x	x	x
344	PScreen_Bld - East_Opening	100	123.4	121.9	370704	6397299	57	x	x	x	x
345	PScreen_Bld - South_Cladding	100	106.2	96.0	370698	6397290	57	x	x	x	x
346	PScreen_Bld - South_Opening	100	119.4	117.9	370698	6397290	57	-	-	-	-
347	PScreen_Bld - West_Cladding	100	110.7	100.5	370695	6397302	57	x	x	x	x
348	PScreen_Bld - West_Opening	100	122.0	120.5	370695	6397299	57	-	-	-	-
349	PScreen_Bld - Roof	100	108.8	98.6	370699	6397299	57	x	x	x	x
350	PScreen_Bld - North_Clad_Opening	100	102.8	92.6	370701	6397312	57	x	x	x	x
351	PScreen_Bld - East_Clad_Opening	100	106.8	96.6	370704	6397300	57	-	-	-	-
352	PScreen_Bld - South_Clad_Opening	100	102.8	92.6	370698	6397291	57	x	x	x	x
353	PScreen_Bld - West_Clad_Opening	100	105.4	95.2	370695	6397300	57	x	x	x	x
800	Backhoe	100	106.0	98.0	370781	6397397	58	-	-	-	-
801	Bobcat	100	115.5	104.1	370714	6397330	57	-	-	-	-
802	C01 – Conveyor	100	108.6	100.2	370651	6397331	55	x	x	x	x
803	C02 – Conveyor	100	108.7	100.3	370662	6397308	58	x	x	x	x
804	C03 – Conveyor	100	105.5	97.1	370679	6397303	58	x	x	x	x
805	C04 – Conveyor	100	105.8	97.4	370695	6397316	57	x	x	x	x
806	C05 – Conveyor	100	105.3	96.9	370709	6397289	57	x	x	x	x
807	C06 – Conveyor	100	106.8	98.4	370681	6397289	59	x	x	x	x
808	C07 – Conveyor	100	108.8	100.4	370617	6397279	54	-	-	-	-
809	C08 – Conveyor	100	105.1	96.7	370710	6397301	57	x	x	x	x
810	C09 – Conveyor	100	106.7	98.3	370731	6397320	57	x	x	x	x
811	C10 – Conveyor	100	108.0	99.6	370729	6397324	57	x	x	x	x
812	C12 – Conveyor	100	101.9	93.5	370741	6397351	61	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
813	C13 – Conveyor	100	106.1	97.7	370754	6397356	58	x	x	x	x
814	C14 – Conveyor	100	104.5	96.1	370757	6397347	58	x	x	x	x
815	C15 – Conveyor	100	104.1	95.7	370750	6397336	60	x	x	x	x
816	C16 – Conveyor	100	104.3	95.9	370776	6397366	58	x	x	x	x
817	C17 – Conveyor	100	104.5	96.1	370781	6397373	58	x	x	x	x
818	C18 – Conveyor	100	104.5	96.1	370775	6397382	58	x	x	x	x
819	C19 – Conveyor	100	104.9	96.5	370767	6397380	58	x	x	x	x
820	Canica Crusher	100	115.9	109.4	370721	6397302	57	x	x	x	x
821	Canica Surge Bin	100	108.2	105.8	370720	6397299	57	x	x	x	x
822	Forklift	100	118.1	110.1	370729	6397252	58	-	-	-	-
823	Locomotive	100	116.4	103.6	370417	6397118	45	-	-	-	-
824	Locomotive	100	116.4	103.6	370406	6397104	44	-	-	-	-
825	Pre-coat plant	100	119.7	105.2	370757	6397480	50	x	x	x	x
826	Primary Crusher	100	119.6	112.3	370673	6397355	54	x	x	x	x
827	Pug Mill	100	99.1	92.2	370757	6397128	61	x	x	x	x
828	Rail Feeder	100	119.8	119.0	370579	6397285	48	-	-	-	-
829	Re-Entry Bin	100	125.4	106.9	370734	6397355	58	x	x	x	x
830	Sales Face Loader Filling Truck	100	125.4	106.9	370769	6397215	60	x	x	x	x
831	Sand Wash Plant	100	116.3	110.3	370092	6398091	21	-	-	-	-
832	Schenck Screen 2	100	114.8	104.7	370740	6397340	58	x	x	x	x
833	Schenck Screen 3	100	114.8	104.7	370764	6397371	58	x	x	x	x
834	Surge Bin	100	114.0	109.7	370634	6397309	54	-	-	-	-
835	Truck Driveoff at Despatch	100	115.3	112.0	370778	6397220	58	x	x	x	x
836	Truck Parked Idle	100	95.5	92.2	370787	6397184	61	x	x	x	x
837	Truck Parked Idle	100	95.5	92.2	370768	6397206	60	x	x	x	x
838	Truck Parked Idle	100	95.5	92.2	370757	6397225	59	x	x	x	x
839	Truck Parked Idle	100	95.5	92.2	370778	6397197	61	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
840	W1_Power Rock Drill (low)	100	117.7	112.6	370068	6397809	19	-	-	-	-
841	W2_Power Rock Drill (high)	100	117.7	112.6	370510	6397887	73	-	-	-	-
843	WaterTruck1 50%	50	109.5	99.3	370534	6397880	74	x	x	x	x
844	WaterTruck2 50%	50	109.5	99.3	370694	6397490	54	x	x	x	x
851	FEL_load_train 1	100	120.6	113.8	370830	6397515	50	x	-	x	-
852	FEL_load_train 2	100	125.4	106.9	370805	6397514	50	x	-	x	-
853	FEL_load_train 3	100	120.6	113.8	370774	6397509	50	-	-	-	-
854	FEL_load_train 4	100	125.4	106.9	370756	6397491	50	x	-	x	-
855	Loco_new_spur_1	100	116.4	103.6	370788	6397522	50	x	-	x	-
856	Loco_new_spur_2	100	116.4	103.6	370803	6397522	50	x	-	x	-
857	Loader	100	125.4	106.9	370566	6397109	57	x	-	x	-
858	Road Truck	100	95.5	92.2	370571	6397116	57	x	-	x	-
859	Haultruck 50%	50	109.9	106.4	370571	6397121	57	x	-	x	-
860	Haultruck 50%	50	109.9	106.4	370710	6397264	58	x	-	x	-
861	Surge Bin_Attenuated	100	106.4	87.1	370634	6397309	54	x	-	x	-
1900	TH1_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370048	6397819	16	-	-	x	x
1901	TH1_W_OPT3_West Pit Haul Truck - A	15	104.7	101.1	370087	6397815	21	-	-	x	x
1902	TH1_W_OPT3_West Pit Haul Truck - B	30	107.7	104.1	370407	6397722	52	-	-	x	x
1903	TH1_W_OPT3_West Pit Haul Truck - C	30	107.7	104.1	370515	6397604	64	-	-	x	x
1904	TH1_W_OPT3_West Pit Haul Truck - D	20	105.9	102.4	370718	6397435	53	-	-	x	x
1905	TH1_W_OPT3_West Pit Haul Truck - E position	20	105.9	102.4	370697	6397378	62	-	-	x	x
1906	TH1_W_OPT3_Dump Truck - Dumping at Hopper	15	112.5	104.8	370690	6397369	62	-	-	x	x
1907	TH1_W_OPT3_West Pit Haul Truck - F	20	106.7	100.4	370637	6397508	60	-	-	x	x
1908	TH1_W_OPT3_West Pit Haul Truck - G	30	107.7	104.1	370513	6397604	64	-	-	x	x
1909	TH1_W_OPT3_West Pit Haul Truck - H	15	105.5	99.1	370405	6397713	52	-	-	x	x
1910	TH1_W_OPT3_West Pit Haul Truck - I	15	105.5	99.1	370086	6397805	21	-	-	x	x
2900	TH2_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370427	6397767	64	x	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
2901	TH2_W_OPT3_West Pit Haul Truck - A	14	104.3	100.8	370472	6397740	64	x	-	-	-
2902	TH2_W_OPT3_West Pit Haul Truck - B	21	106.1	102.6	370517	6397598	64	x	-	-	-
2903	TH2_W_OPT3_West Pit Haul Truck - C	28	107.4	103.8	370719	6397436	53	x	-	-	-
2904	TH2_W_OPT3_West Pit Haul Truck - D position	28	107.4	103.8	370697	6397379	62	x	-	-	-
2905	TH2_W_OPT3_Dump Truck - Dumping at Hopper	21	113.9	106.3	370690	6397370	62	x	-	-	-
2906	TH2_W_OPT3_West Pit Haul Truck - E	28	108.2	101.8	370637	6397508	60	x	-	-	-
2907	TH2_W_OPT3_West Pit Haul Truck - F	21	106.1	102.6	370515	6397597	64	x	-	-	-
2908	TH2_W_OPT3_West Pit Haul Truck - G	14	105.2	98.8	370507	6397697	64	x	-	-	-
3900	TH3_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370332	6398119	54	-	-	-	-
3901	TH3_W_OPT3_West Pit Haul Truck - A	23	106.5	103.0	370391	6397992	57	-	-	-	-
3902	TH3_W_OPT3_West Pit Haul Truck - B	15	104.8	101.2	370421	6397803	64	-	-	-	-
3903	TH3_W_OPT3_West Pit Haul Truck - C	31	107.8	104.3	370515	6397604	64	-	-	-	-
3904	TH3_W_OPT3_West Pit Haul Truck - D	21	106.0	102.5	370719	6397435	53	-	-	-	-
3905	TH3_W_OPT3_West Pit Haul Truck - E position	21	106.0	102.5	370697	6397380	62	-	-	-	-
3906	TH3_W_OPT3_Dump Truck - Dumping at Hopper	15	112.6	104.9	370690	6397370	62	-	-	-	-
3907	TH3_W_OPT3_West Pit Haul Truck - F	21	106.8	100.5	370637	6397509	60	-	-	-	-
3908	TH3_W_OPT3_West Pit Haul Truck - G	31	107.8	104.3	370513	6397604	64	-	-	-	-
3909	TH3_W_OPT3_West Pit Haul Truck - H	15	105.6	99.2	370389	6397828	58	-	-	-	-
3910	TH3_W_OPT3_West Pit Haul Truck - I	15	105.6	99.2	370373	6398026	55	-	-	-	-
4900	TH4_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370203	6398416	64	-	-	-	-
4901	TH4_W_OPT3_West Pit Haul Truck - A	55	110.3	106.7	370387	6398208	64	-	-	-	-
4902	TH4_W_OPT3_West Pit Haul Truck - B	27	107.3	103.7	370538	6397619	64	-	-	-	-
4903	TH4_W_OPT3_West Pit Haul Truck - C	18	105.5	102.0	370718	6397436	54	-	-	-	-
4904	TH4_W_OPT3_West Pit Haul Truck - D position	18	105.5	102.0	370698	6397380	62	-	-	-	-
4905	TH4_W_OPT3_Dump Truck - Dumping at Hopper	14	112.1	104.4	370691	6397371	62	-	-	-	-
4906	TH4_W_OPT3_West Pit Haul Truck - E	18	106.3	99.9	370639	6397509	60	-	-	-	-
4907	TH4_W_OPT3_West Pit Haul Truck - F	27	107.3	103.7	370537	6397618	64	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
4908	TH4_W_OPT3_West Pit Haul Truck - G	41	109.8	103.5	370506	6398060	73	-	-	-	-
5900	TH5_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370515	6398015	75	-	-	-	-
5901	TH5_W_OPT3_West Pit Haul Truck - A	26	107.0	103.5	370506	6397916	74	-	-	-	-
5902	TH5_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370538	6397619	64	-	-	-	-
5903	TH5_W_OPT3_West Pit Haul Truck - C	23	106.5	103.0	370720	6397437	54	-	-	-	-
5904	TH5_W_OPT3_West Pit Haul Truck - D position	23	106.5	103.0	370698	6397373	62	-	-	-	-
5905	TH5_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370692	6397366	62	-	-	-	-
5906	TH5_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370638	6397504	59	-	-	-	-
5907	TH5_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370537	6397619	64	-	-	-	-
5908	TH5_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370481	6397867	72	-	-	-	-
6900	TH6_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370240	6397603	52	-	x	-	-
6901	TH6_W_OPT3_West Pit Haul Truck - A	26	107.0	103.5	370332	6397618	52	-	x	-	-
6902	TH6_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370486	6397604	62	-	x	-	-
6903	TH6_W_OPT3_West Pit Haul Truck - C	23	106.5	103.0	370714	6397437	53	-	x	-	-
6904	TH6_W_OPT3_West Pit Haul Truck - D position	23	106.5	103.0	370692	6397373	62	-	x	-	-
6905	TH6_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370686	6397366	62	-	x	-	-
6906	TH6_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370632	6397504	60	-	x	-	-
6907	TH6_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370485	6397603	62	-	x	-	-
6908	TH6_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370378	6397597	52	-	x	-	-
8041	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	369852	6397613	52	-	-	-	-
8042	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	369999	6397611	61	-	-	-	-
8043	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370131	6397624	74	-	-	-	-
8044	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370194	6397570	79	-	-	-	-
8045	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370268	6397453	78	-	-	-	-
8046	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370424	6397515	73	-	-	-	-
8047	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370537	6397560	64	-	-	-	-
8048	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370574	6397530	64	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
8049	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370622	6397510	61	-	-	-	-
8050	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370718	6397481	50	-	-	-	-
8051	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370761	6397468	50	-	-	-	-
8052	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370801	6397440	50	-	-	-	-
8053	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370826	6397376	55	-	-	-	-
8054	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370803	6397327	58	-	-	-	-
8055	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370765	6397338	58	-	-	-	-
8141	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369852	6397613	52	x	x	x	x
8142	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369999	6397611	61	x	x	x	x
8143	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370131	6397624	74	x	x	x	x
8144	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370194	6397570	79	x	x	x	x
8145	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370268	6397453	78	x	x	x	x
8146	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370424	6397515	73	x	x	x	x
8147	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370537	6397560	64	x	x	x	x
8148	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370574	6397530	64	x	x	x	x
8149	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370622	6397510	61	x	x	x	x
8150	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370718	6397481	50	x	x	x	x
8151	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370761	6397468	50	x	x	x	x
8152	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370801	6397440	50	x	x	x	x
8153	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370826	6397376	55	x	x	x	x
8154	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370803	6397327	58	x	x	x	x
8155	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370765	6397338	58	x	x	x	x

Table A4.5 Modelled Equipment List for Stage Year 20

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
341	PScreen_Bld - North_Cladding	100	106.2	96.0	370701	6397311	57	x	x	x	x
342	PScreen_Bld - North_Opening	100	119.4	117.9	370701	6397311	57	-	-	-	-
343	PScreen_Bld - East_Cladding	100	110.2	100.0	370704	6397299	57	x	x	x	x
344	PScreen_Bld - East_Opening	100	123.4	121.9	370704	6397299	57	x	x	x	x
345	PScreen_Bld - South_Cladding	100	106.2	96.0	370698	6397290	57	x	x	x	x
346	PScreen_Bld - South_Opening	100	119.4	117.9	370698	6397290	57	-	-	-	-
347	PScreen_Bld - West_Cladding	100	110.7	100.5	370695	6397302	57	x	x	x	x
348	PScreen_Bld - West_Opening	100	122.0	120.5	370695	6397299	57	-	-	-	-
349	PScreen_Bld - Roof	100	108.8	98.6	370699	6397299	57	x	x	x	x
350	PScreen_Bld - North_Clad_Opening	100	102.8	92.6	370701	6397312	57	x	x	x	x
351	PScreen_Bld - East_Clad_Opening	100	106.8	96.6	370704	6397300	57	-	-	-	-
352	PScreen_Bld - South_Clad_Opening	100	102.8	92.6	370698	6397291	57	x	x	x	x
353	PScreen_Bld - West_Clad_Opening	100	105.4	95.2	370695	6397300	57	x	x	x	x
800	Backhoe	100	106.0	98.0	370781	6397397	58	-	-	-	-
801	Bobcat	100	115.5	104.1	370714	6397330	57	-	-	-	-
802	C01 – Conveyor	100	108.6	100.2	370651	6397331	55	x	x	x	x
803	C02 – Conveyor	100	108.7	100.3	370662	6397308	58	x	x	x	x
804	C03 – Conveyor	100	105.5	97.1	370679	6397303	58	x	x	x	x
805	C04 – Conveyor	100	105.8	97.4	370695	6397316	57	x	x	x	x
806	C05 – Conveyor	100	105.3	96.9	370709	6397289	57	x	x	x	x
807	C06 – Conveyor	100	106.8	98.4	370681	6397289	59	x	x	x	x
808	C07 – Conveyor	100	108.8	100.4	370617	6397279	54	-	-	-	-
809	C08 – Conveyor	100	105.1	96.7	370710	6397301	57	x	x	x	x
810	C09 – Conveyor	100	106.7	98.3	370731	6397320	57	x	x	x	x
811	C10 – Conveyor	100	108.0	99.6	370729	6397324	57	x	x	x	x
812	C12 – Conveyor	100	101.9	93.5	370741	6397351	61	x	x	x	x

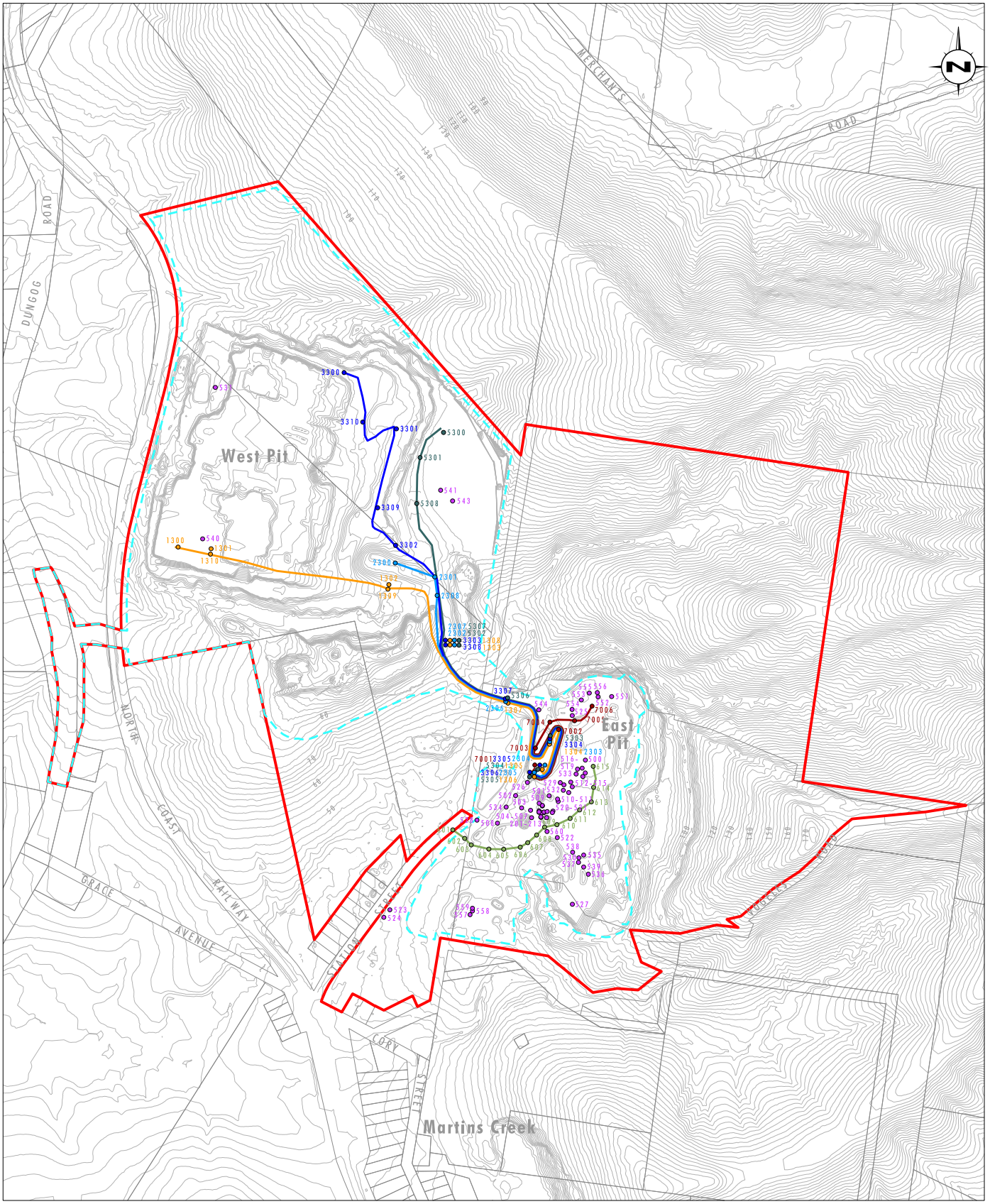
Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
813	C13 – Conveyor	100	106.1	97.7	370754	6397356	58	x	x	x	x
814	C14 – Conveyor	100	104.5	96.1	370757	6397347	58	x	x	x	x
815	C15 – Conveyor	100	104.1	95.7	370750	6397336	60	x	x	x	x
816	C16 – Conveyor	100	104.3	95.9	370776	6397366	58	x	x	x	x
817	C17 – Conveyor	100	104.5	96.1	370781	6397373	58	x	x	x	x
818	C18 – Conveyor	100	104.5	96.1	370775	6397382	58	x	x	x	x
819	C19 – Conveyor	100	104.9	96.5	370767	6397380	58	x	x	x	x
820	Canica Crusher	100	115.9	109.4	370721	6397302	57	x	x	x	x
821	Canica Surge Bin	100	108.2	105.8	370720	6397299	57	x	x	x	x
822	Forklift	100	118.1	110.1	370729	6397252	58	-	-	-	-
823	Locomotive	100	116.4	103.6	370417	6397118	45	-	-	-	-
824	Locomotive	100	116.4	103.6	370406	6397104	44	-	-	-	-
825	Pre-coat plant	100	119.7	105.2	370757	6397480	50	x	x	x	x
826	Primary Crusher	100	119.6	112.3	370673	6397355	54	x	x	x	x
827	Pug Mill	100	99.1	92.2	370757	6397128	61	x	x	x	x
828	Rail Feeder	100	119.8	119.0	370579	6397285	48	-	-	-	-
829	Re-Entry Bin	100	125.4	106.9	370734	6397355	58	x	x	x	x
830	Sales Face Loader Filling Truck	100	125.4	106.9	370769	6397215	60	x	x	x	x
831	Sand Wash Plant	100	116.3	110.3	370092	6398091	21	-	-	-	-
832	Schenck Screen 2	100	114.8	104.7	370740	6397340	58	x	x	x	x
833	Schenck Screen 3	100	114.8	104.7	370764	6397371	58	x	x	x	x
834	Surge Bin	100	114.0	109.7	370634	6397309	54	-	-	-	-
835	Truck Driveoff at Despatch	100	115.3	112.0	370778	6397220	58	x	x	x	x
836	Truck Parked Idle	100	95.5	92.2	370787	6397184	61	x	x	x	x
837	Truck Parked Idle	100	95.5	92.2	370768	6397206	60	x	x	x	x
838	Truck Parked Idle	100	95.5	92.2	370757	6397225	59	x	x	x	x
839	Truck Parked Idle	100	95.5	92.2	370778	6397197	61	x	x	x	x

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
840	W1_Power Rock Drill (low)	100	117.7	112.6	370068	6397809	19	-	-	-	-
841	W2_Power Rock Drill (high)	100	117.7	112.6	370510	6397887	73	-	-	-	-
843	WaterTruck1	50	109.5	99.3	370534	6397880	74	x	x	x	x
844	WaterTruck2	50	109.5	99.3	370694	6397490	54	x	x	x	x
851	FEL_load_train 1	100	120.6	113.8	370830	6397515	50	x	-	x	-
852	FEL_load_train 2	100	125.4	106.9	370805	6397514	50	x	-	x	-
853	FEL_load_train 3	100	120.6	113.8	370774	6397509	50	-	-	-	-
854	FEL_load_train 4	100	125.4	106.9	370756	6397491	50	x	-	x	-
855	Loco_new_spur_1	100	116.4	103.6	370788	6397522	50	x	-	x	-
856	Loco_new_spur_2	100	116.4	103.6	370803	6397522	50	x	-	x	-
857	Loader	100	125.4	106.9	370566	6397109	57	x	-	x	-
858	Road Truck	100	95.5	92.2	370571	6397116	57	x	-	x	-
859	Haultruck 50%	50	109.9	106.4	370571	6397121	57	x	-	x	-
860	Haultruck 50%	50	109.9	106.4	370710	6397264	58	x	-	x	-
861	Surge Bin_Attenuated	100	106.4	87.1	370634	6397309	54	x	-	x	-
1900	TH1_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370048	6397819	16	-	-	x	x
1901	TH1_W_OPT3_West Pit Haul Truck - A	15	104.7	101.1	370087	6397815	21	-	-	x	x
1902	TH1_W_OPT3_West Pit Haul Truck - B	30	107.7	104.1	370407	6397722	54	-	-	x	x
1903	TH1_W_OPT3_West Pit Haul Truck - C	30	107.7	104.1	370515	6397604	64	-	-	x	x
1904	TH1_W_OPT3_West Pit Haul Truck - D	20	105.9	102.4	370718	6397435	53	-	-	x	x
1905	TH1_W_OPT3_West Pit Haul Truck - E position	20	105.9	102.4	370697	6397378	62	-	-	x	x
1906	TH1_W_OPT3_Dump Truck - Dumping at Hopper	15	112.5	104.8	370690	6397369	62	-	-	x	x
1907	TH1_W_OPT3_West Pit Haul Truck - F	20	106.7	100.4	370637	6397508	60	-	-	x	x
1908	TH1_W_OPT3_West Pit Haul Truck - G	30	107.7	104.1	370513	6397604	64	-	-	x	x
1909	TH1_W_OPT3_West Pit Haul Truck - H	15	105.5	99.1	370405	6397713	53	-	-	x	x
1910	TH1_W_OPT3_West Pit Haul Truck - I	15	105.5	99.1	370086	6397805	21	-	-	x	x
2900	TH2_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370427	6397767	59	x	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
2901	TH2_W_OPT3_West Pit Haul Truck - A	14	104.3	100.8	370472	6397740	58	x	-	-	-
2902	TH2_W_OPT3_West Pit Haul Truck - B	21	106.1	102.6	370517	6397598	64	x	-	-	-
2903	TH2_W_OPT3_West Pit Haul Truck - C	28	107.4	103.8	370719	6397436	53	x	-	-	-
2904	TH2_W_OPT3_West Pit Haul Truck - D position	28	107.4	103.8	370697	6397379	62	x	-	-	-
2905	TH2_W_OPT3_Dump Truck - Dumping at Hopper	21	113.9	106.3	370690	6397370	62	x	-	-	-
2906	TH2_W_OPT3_West Pit Haul Truck - E	28	108.2	101.8	370637	6397508	60	x	-	-	-
2907	TH2_W_OPT3_West Pit Haul Truck - F	21	106.1	102.6	370515	6397597	64	x	-	-	-
2908	TH2_W_OPT3_West Pit Haul Truck - G	14	105.2	98.8	370507	6397697	52	x	-	-	-
3900	TH3_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370332	6398119	48	-	-	-	-
3901	TH3_W_OPT3_West Pit Haul Truck - A	23	106.5	103.0	370391	6397992	57	-	-	-	-
3902	TH3_W_OPT3_West Pit Haul Truck - B	15	104.8	101.2	370421	6397803	62	-	-	-	-
3903	TH3_W_OPT3_West Pit Haul Truck - C	31	107.8	104.3	370515	6397604	64	-	-	-	-
3904	TH3_W_OPT3_West Pit Haul Truck - D	21	106.0	102.5	370719	6397435	53	-	-	-	-
3905	TH3_W_OPT3_West Pit Haul Truck - E position	21	106.0	102.5	370697	6397380	62	-	-	-	-
3906	TH3_W_OPT3_Dump Truck - Dumping at Hopper	15	112.6	104.9	370690	6397370	62	-	-	-	-
3907	TH3_W_OPT3_West Pit Haul Truck - F	21	106.8	100.5	370637	6397509	60	-	-	-	-
3908	TH3_W_OPT3_West Pit Haul Truck - G	31	107.8	104.3	370513	6397604	64	-	-	-	-
3909	TH3_W_OPT3_West Pit Haul Truck - H	15	105.6	99.2	370389	6397828	58	-	-	-	-
3910	TH3_W_OPT3_West Pit Haul Truck - I	15	105.6	99.2	370373	6398026	55	-	-	-	-
4900	TH4_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370203	6398416	64	-	-	-	-
4901	TH4_W_OPT3_West Pit Haul Truck - A	55	110.3	106.7	370387	6398208	64	-	-	-	-
4902	TH4_W_OPT3_West Pit Haul Truck - B	27	107.3	103.7	370538	6397619	52	-	-	-	-
4903	TH4_W_OPT3_West Pit Haul Truck - C	18	105.5	102.0	370718	6397436	54	-	-	-	-
4904	TH4_W_OPT3_West Pit Haul Truck - D position	18	105.5	102.0	370698	6397380	62	-	-	-	-
4905	TH4_W_OPT3_Dump Truck - Dumping at Hopper	14	112.1	104.4	370691	6397371	62	-	-	-	-
4906	TH4_W_OPT3_West Pit Haul Truck - E	18	106.3	99.9	370639	6397509	60	-	-	-	-
4907	TH4_W_OPT3_West Pit Haul Truck - F	27	107.3	103.7	370537	6397618	52	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
4908	TH4_W_OPT3_West Pit Haul Truck - G	41	109.8	103.5	370506	6398060	73	-	-	-	-
5900	TH5_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370515	6398015	75	-	-	-	-
5901	TH5_W_OPT3_West Pit Haul Truck - A	26	107.0	103.5	370506	6397916	74	-	-	-	-
5902	TH5_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370538	6397619	52	-	-	-	-
5903	TH5_W_OPT3_West Pit Haul Truck - C	23	106.5	103.0	370720	6397437	54	-	-	-	-
5904	TH5_W_OPT3_West Pit Haul Truck - D position	23	106.5	103.0	370698	6397373	62	-	-	-	-
5905	TH5_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370692	6397366	62	-	-	-	-
5906	TH5_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370638	6397504	59	-	-	-	-
5907	TH5_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370537	6397619	52	-	-	-	-
5908	TH5_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370481	6397867	72	-	-	-	-
6900	TH6_W_OPT3_West Pit Haul Truck - FEL Loading Truck	100	120.6	113.8	370240	6397603	52	-	x	-	-
6901	TH6_W_OPT3_West Pit Haul Truck - A	26	107.0	103.5	370332	6397618	52	-	x	-	-
6902	TH6_W_OPT3_West Pit Haul Truck - B	34	108.3	104.7	370486	6397604	62	-	x	-	-
6903	TH6_W_OPT3_West Pit Haul Truck - C	23	106.5	103.0	370714	6397437	53	-	x	-	-
6904	TH6_W_OPT3_West Pit Haul Truck - D position	23	106.5	103.0	370692	6397373	62	-	x	-	-
6905	TH6_W_OPT3_Dump Truck - Dumping at Hopper	17	113.1	105.4	370686	6397366	62	-	x	-	-
6906	TH6_W_OPT3_West Pit Haul Truck - E	23	107.3	100.9	370632	6397504	60	-	x	-	-
6907	TH6_W_OPT3_West Pit Haul Truck - F	34	108.3	104.7	370485	6397603	62	-	x	-	-
6908	TH6_W_OPT3_West Pit Haul Truck - G	17	106.1	99.7	370378	6397597	52	-	x	-	-
8041	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	369852	6397613	52	-	-	-	-
8042	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	369999	6397611	61	-	-	-	-
8043	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370131	6397624	74	-	-	-	-
8044	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370194	6397570	79	-	-	-	-
8045	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370268	6397453	78	-	-	-	-
8046	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370424	6397515	73	-	-	-	-
8047	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370537	6397560	64	-	-	-	-
8048	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370574	6397530	64	-	-	-	-

Source ID	Equipment Name	Acoustic Utilisation Factor	SWL, dB(Z)	SWL, dB(A)	Easting, MGA	Northing, MGA	Ground Elevation, m AHD	Calm	1.7 m/s E	3 m/s S	3 m/s NW
8049	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370622	6397510	61	-	-	-	-
8050	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370718	6397481	50	-	-	-	-
8051	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370761	6397468	50	-	-	-	-
8052	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370801	6397440	50	-	-	-	-
8053	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370826	6397376	55	-	-	-	-
8054	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370803	6397327	58	-	-	-	-
8055	New Access Rd - 10 trips/hour (10 Trucks in only)	4	104.4	96.0	370765	6397338	58	-	-	-	-
8141	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369852	6397613	52	x	x	x	x
8142	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	369999	6397611	61	x	x	x	x
8143	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370131	6397624	74	x	x	x	x
8144	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370194	6397570	79	x	x	x	x
8145	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370268	6397453	78	x	x	x	x
8146	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370424	6397515	73	x	x	x	x
8147	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370537	6397560	64	x	x	x	x
8148	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370574	6397530	64	x	x	x	x
8149	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370622	6397510	61	x	x	x	x
8150	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370718	6397481	50	x	x	x	x
8151	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370761	6397468	50	x	x	x	x
8152	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370801	6397440	50	x	x	x	x
8153	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370826	6397376	55	x	x	x	x
8154	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370803	6397327	58	x	x	x	x
8155	New Access Rd - 40 trips/hour (20 Trucks in/out)	13	109.6	101.2	370765	6397338	58	x	x	x	x



Data Source: Daracon (2020)
Note: Contour Interval 2m

0 100 250 500m
1:10 000

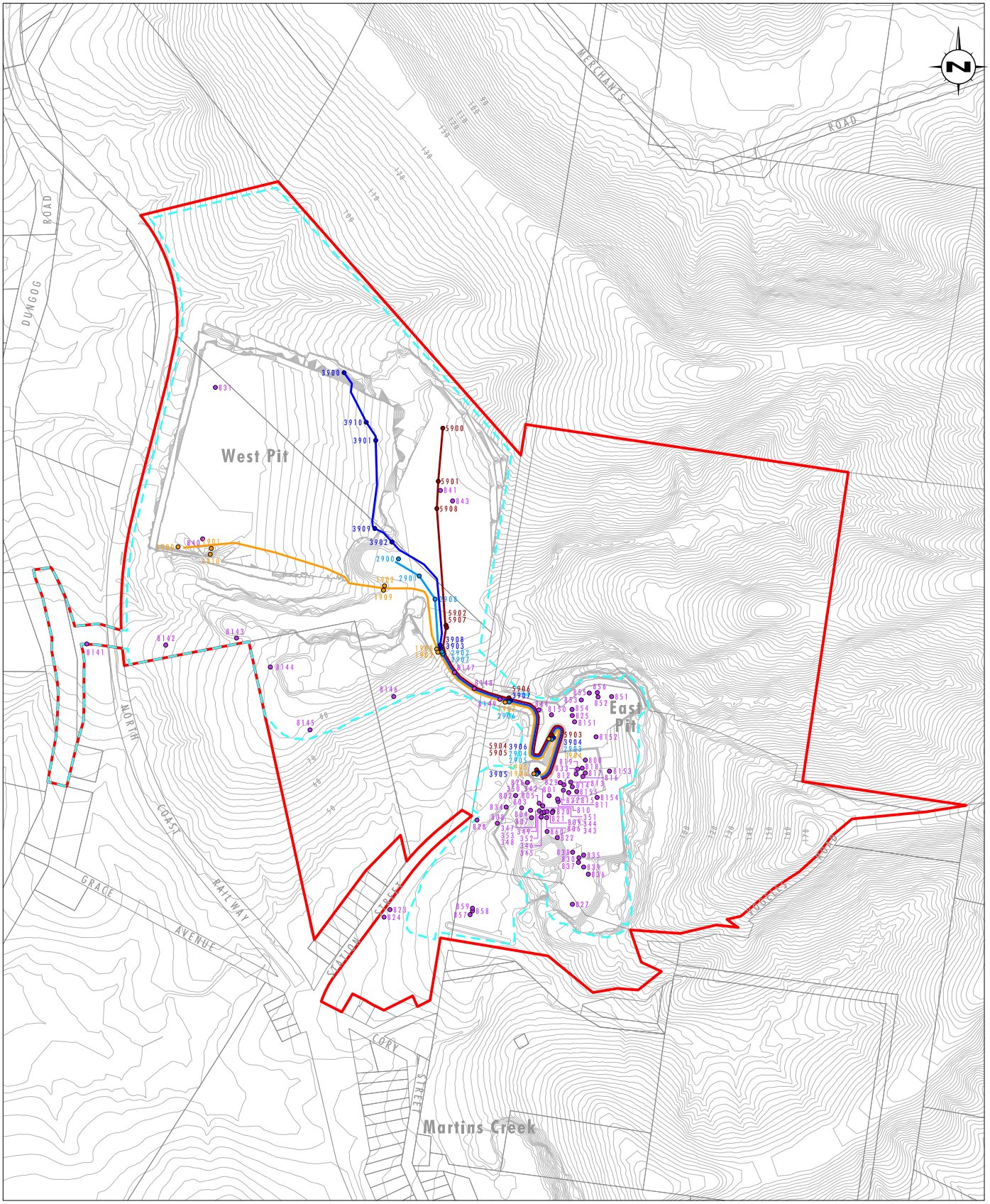
Legend

- Project Area
- Proposed Disturbance Area
- Haul Route 1
- Haul Route 2
- Haul Route 3
- Haul Route 4
- Haul Route 5
- Existing Access Road
- Ancillary Locations

FIGURE A4.1

Year 2 Noise Model Source Locations

File Name (A4): R04/3957_187.dgn
20210219 12.59



Data Source: Daracon (2020)
Note: Contour Interval 2m

0 100 250 500m
1:10 000

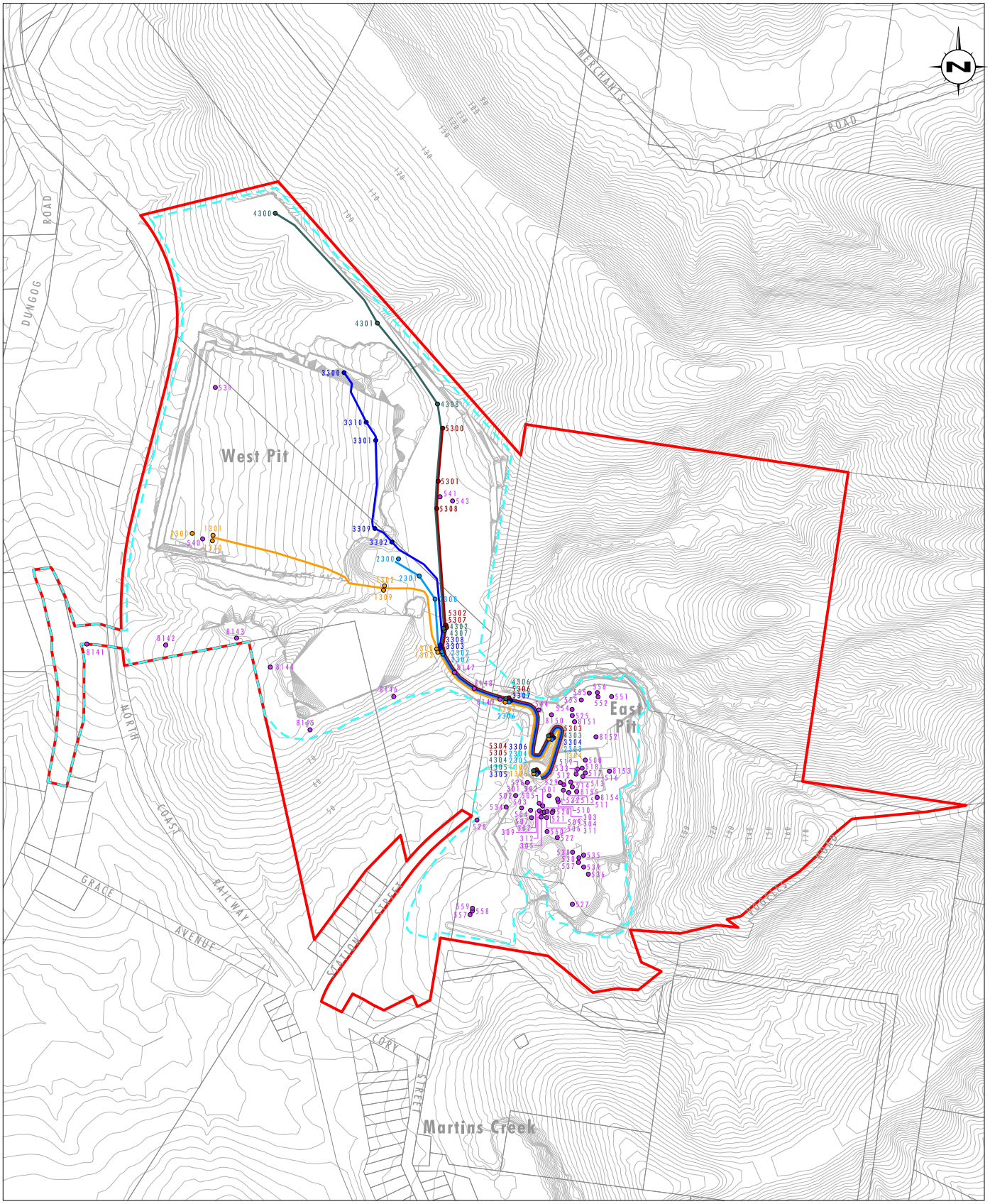
Legend

- Project Area
- Proposed Disturbance Area
- Haul Route 1
- Haul Route 2
- Haul Route 3
- Haul Route 4
- Ancillary Locations

FIGURE A4.2

Year 6 Noise Model Source Locations

File Name (A4): R04/3957_188.dgn
20210219 13.06



Data Source: Daracon (2020)
Note: Contour Interval 2m

0 100 250 500m
1:10 000

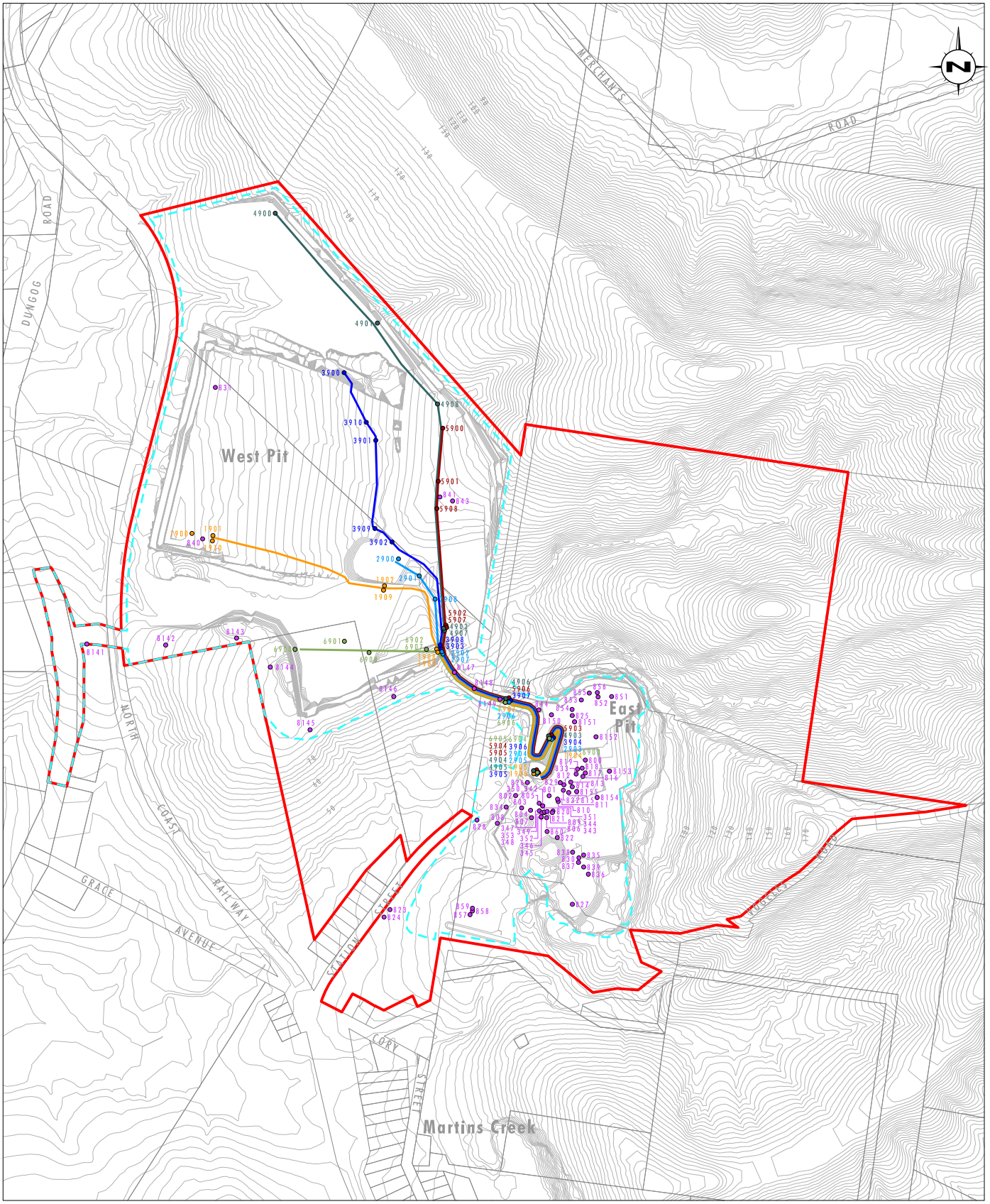
Legend

- Project Area
- Proposed Disturbance Area
- Haul Route 1
- Haul Route 2
- Haul Route 3
- Haul Route 4
- Haul Route 5
- Ancillary Locations

FIGURE A4.3

Year 10 Noise Model Source Locations

File Name (A4): R04/3957_189.dgn
20210219 13.23



Data Source: Daracon (2020)
Note: Contour Interval 2m

0 100 250 500m
1:10 000

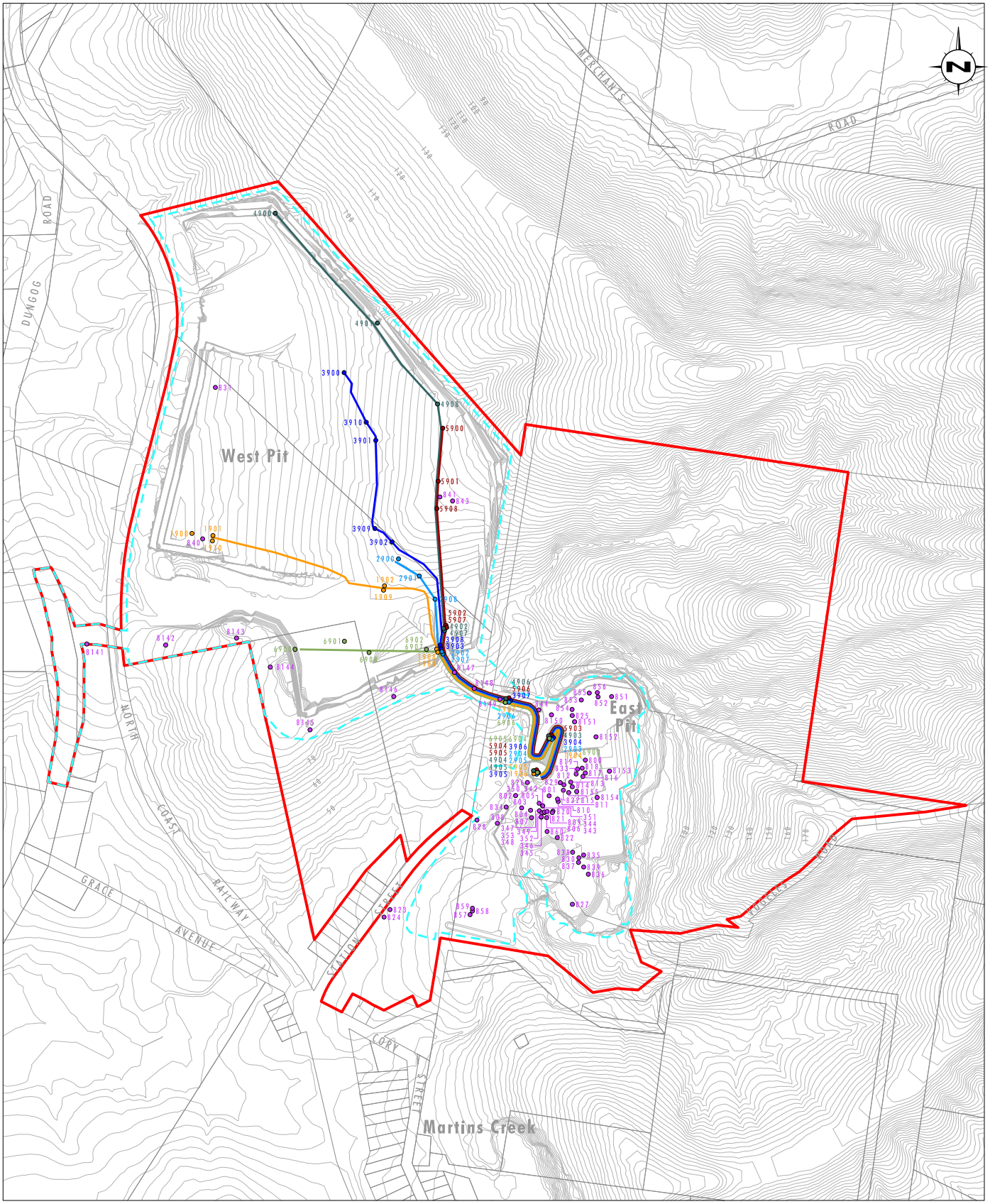
Legend

- Project Area
- Proposed Disturbance Area
- Haul Route 1
- Haul Route 2
- Haul Route 3
- Haul Route 4
- Haul Route 5
- Haul Route 6
- Ancillary Locations

FIGURE A4.4

Year 15 Noise Model Source Locations

File Name (A4): R04/3957_190.dgn
20210219 13.25



Data Source: Daracon (2020)
Note: Contour Interval 2m

0 100 250 500m
1:10 000

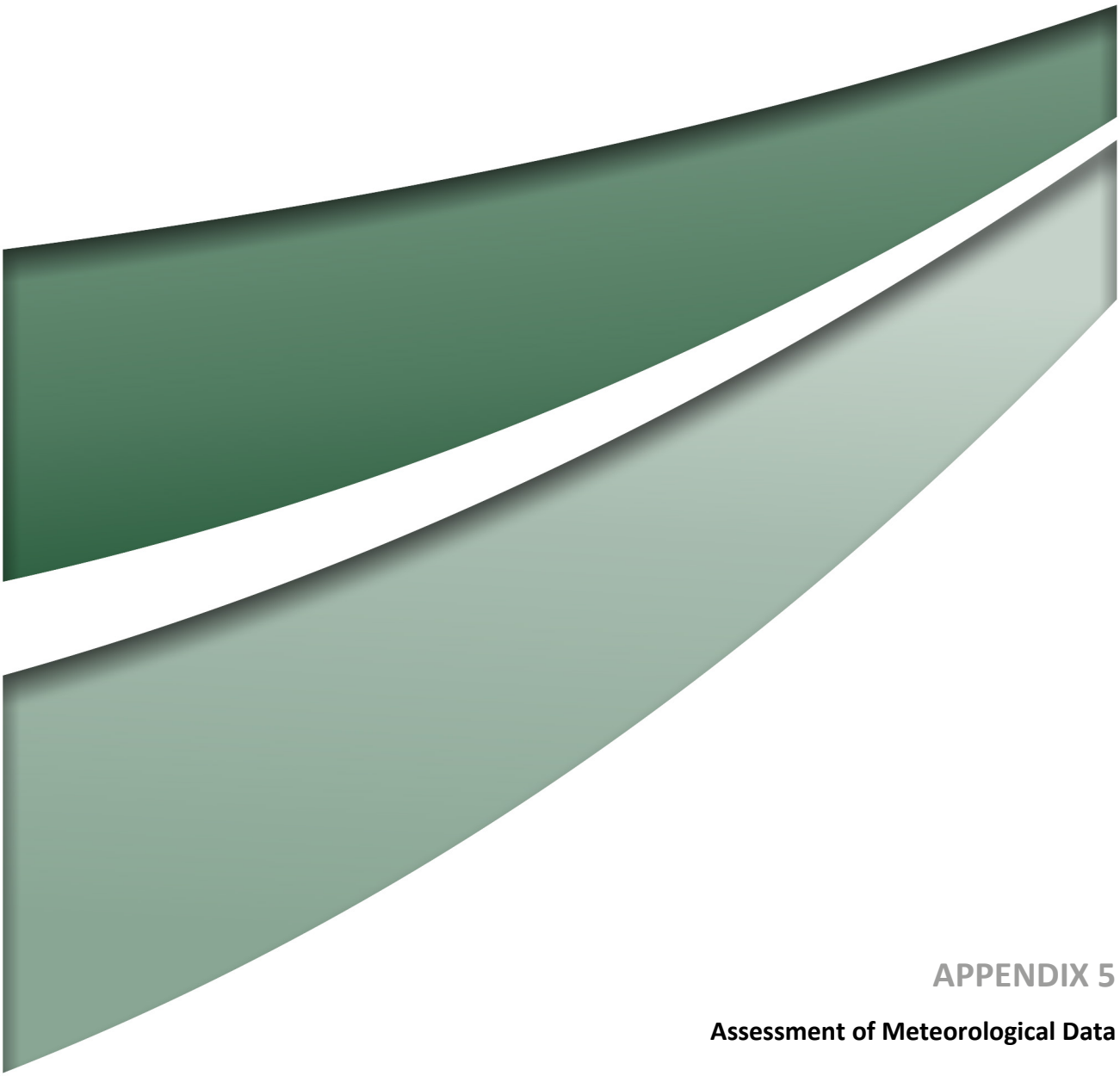
Legend

- Project Area
- Proposed Disturbance Area
- Haul Route 1
- Haul Route 2
- Haul Route 3
- Haul Route 4
- Haul Route 5
- Haul Route 6
- Ancillary Locations

FIGURE A4.5

Year 20 Noise Model Source Locations

File Name (A4): R04/3957_191.dgn
20201109 16.08



APPENDIX 5

Assessment of Meteorological Data

Appendix 5 - Assessment of Meteorological Data

Fact Sheet D of the *Noise Policy for Industry* (NPfI) (EPA 2017) requires that noise impacts be assessed under weather conditions that would be expected to occur at a particular site for a significant period of time.

The NPfI notes that there are two approaches for the assessment of meteorological effects, such as gradient winds and temperature inversions, on propagating the noise from the source to the receiver. The simple method is to adopt the noise-enhancing meteorological conditions for all assessment periods outlined in the NPFI. Alternatively, local meteorological data can be used to determine weather conditions that would be expected to occur at a particular site for a significant period of time.

Hourly meteorological data from Martins Creek Quarry for the years 2015 to 2019 was sourced. As part of the Air Quality Impact Assessment for the Revised Project, (Jacobs 2020), the data sets from these 5 years was analysed for completeness and representativeness. The 2015 calendar year was identified as being most suitable for the assessment based on the data capture rate (i.e. greater than 90% complete and containing representative meteorological conditions to other years considered. The 2015 data set was analysed to determine the prevailing meteorological conditions (frequency of occurrence of prevailing winds and temperature inversions) for the area surrounding the Project.

Wind

The NPfI requires that wind effects need to be assessed when wind is considered a feature of the area. Wind is considered a feature of the area where source-to-receiver winds of 3 m/s occur for 30 per cent of the time in any assessment period.

Fact Sheet D of the NPfI requires that noise impacts be assessed under weather conditions that would be expected to occur at a particular site for a significant period of time.

The collated meteorological data for the 2015 period, provided in **Tables A5.1** to **A5.4** and **Figures A5.1** to **A5.4**, was analysed to determine prevailing wind conditions likely to influence the propagation of noise at the project site.

Table A5.1 –Prevailing Wind Analysis, Summer

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
Day						
N	10.3%	0.5%	1.5%	0.3%	-	0.1%
NNE		0.6%	2.2%	0.3%	-	-
NE		0.2%	3.0%	0.7%	-	-
ENE		0.8%	2.5%	0.6%	-	-
E		0.8%	7.2%	2.7%	0.1%	-
ESE		1.7%	6.9%	0.9%	-	0.1%
SE		1.2%	4.1%	0.2%	-	-
SSE		1.4%	5.5%	1.8%	-	-
S		1.6%	5.5%	2.0%	-	-
SSW		2.2%	6.3%	0.6%	-	-
SW		1.8%	3.1%	0.5%	-	-
WSW		0.7%	1.9%	1.1%	-	-
W		0.4%	0.9%	1.7%	0.2%	-

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
WNW		0.7%	1.9%	1.7%	0.3%	-
NW		0.9%	1.9%	0.7%	-	-
NNW		1.0%	1.5%	0.3%	-	-
Evening						
N	18.3%	0.6%	1.1%	0.3%	-	-
NNE		1.1%	0.6%	-	-	-
NE		1.4%	1.4%	0.6%	0.3%	-
ENE		5.6%	7.8%	3.3%	-	-
E		5.8%	10.8%	4.2%	-	-
ESE		5.0%	7.5%	0.8%	-	-
SE		3.6%	1.4%	-	-	-
SSE		4.2%	6.1%	0.6%	-	-
S		1.1%	2.5%	-	-	-
SSW		-	1.1%	-	-	-
SW		-	-	0.6%	-	-
WSW		-	-	-	-	-
W		-	0.8%	-	-	-
WNW		-	0.3%	0.3%	-	-
NW		-	0.6%	-	-	-
NNW		0.6%	-	-	-	-
Night						
N	59.6%	0.5%	1.1%	0.1%	-	-
NNE		0.9%	0.6%	0.1%	-	-
NE		1.4%	1.0%	0.9%	0.2%	-
ENE		3.8%	1.5%	1.4%	0.2%	-
E		4.9%	2.3%	0.1%	-	-
ESE		5.6%	3.1%	0.2%	-	-
SE		2.5%	0.5%	0.2%	-	-
SSE		2.7%	1.7%	1.0%	-	-
S		0.9%	0.4%	0.1%	-	-
SSW		-	-	-	-	-
SW		-	-	-	-	-
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	-	-	-	-
NW		-	-	-	-	-
NNW		0.2%	-	0.1%	-	-

Table A5.2 –Prevailing Wind Analysis, Autumn

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
Day						
N	18.4	2.3%	1.4%	0.2%	-	0.1%
NNE		1.2%	1.4%	0.2%	-	-
NE		0.6%	1.5%	1.2%	-	-
ENE		0.8%	0.8%	0.2%	-	-
E		0.6%	2.3%	1.4%	-	-
ESE		1.3%	1.4%	0.3%	-	-
SE		1.2%	1.5%	1.1%	-	-
SSE		1.4%	2.4%	0.5%	-	-
S		1.7%	4.8%	1.1%	0.2%	-
SSW		1.6%	2.9%	1.4%	0.1%	-
SW		0.6%	1.7%	1.1%	0.1%	-
WSW		0.7%	1.3%	1.4%	-	-
W		1.1%	2.9%	2.6%	0.4%	-
WNW		1.6%	2.7%	4.2%	1.5%	-
NW		1.7%	4.0%	1.5%	0.5%	-
NNW		4.4%	4.7%	0.4%	-	0.1%
Evening						
N	31.3	2.4%	3.5%	0.3%	-	2.4%
NNE		2.4%	0.3%	-	-	2.4%
NE		5.7%	1.4%	0.5%	0.8%	5.7%
ENE		8.4%	2.2%	1.4%	0.3%	8.4%
E		1.9%	4.1%	3.5%	-	1.9%
ESE		1.9%	1.6%	1.4%	-	1.9%
SE		1.9%	1.6%	1.1%	-	1.9%
SSE		3.8%	3.3%	0.8%	-	3.8%
S		0.8%	3.0%	0.8%	-	0.8%
SSW		-	-	-	-	-
SW		0.3%	0.3%	0.3%	-	0.3%
WSW		-	-	-	-	-
W		0.3%	0.3%	-	-	0.3%
WNW		-	0.3%	-	-	-
NW		0.3%	1.6%	0.3%	-	0.3%
NNW		-	1.9%	1.4%	0.3%	-
Night						
N	49.3	4.2%	6.6%	0.1%	-	0.2%
NNE		4.0%	3.7%	-	-	-
NE		5.3%	1.8%	1.9%	-	-
ENE		4.3%	1.9%	2.4%	-	-
E		1.1%	0.1%	-	-	-
ESE		0.6%	0.4%	1.1%	-	-
SE		0.2%	-	0.1%	-	-
SSE		1.9%	1.8%	1.8%	-	-
S		0.4%	0.2%	0.1%	0.1%	-
SSW		-	0.1%	-	0.1%	-
SW		-	-	-	-	-

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	-	-	0.1%	-
NW		0.2%	0.1%	1.0%	0.1%	-
NNW		0.7%	0.6%	0.8%	-	-

Table A5.3 –Prevailing Wind Analysis, Winter

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
Day						
N		1.7%	1.7%	0.1%	-	-
NNE		1.6%	0.7%	-	-	-
NE		1.8%	1.1%	-	-	-
ENE		1.9%	0.4%	-	-	-
E		1.1%	0.7%	-	-	-
ESE		1.1%	0.4%	-	-	-
SE		0.4%	0.2%	-	-	-
SSE		0.9%	0.3%	-	-	-
S		1.5%	2.4%	0.1%	-	-
SSW		1.4%	3.6%	0.3%	-	-
SW		1.4%	3.1%	1.1%	-	-
WSW		1.4%	1.7%	1.2%	-	-
W		1.0%	1.8%	3.0%	0.1%	-
WNW		1.6%	2.5%	9.0%	1.6%	-
NW		3.0%	4.7%	3.4%	0.9%	-
NNW		2.7%	4.0%	1.4%	-	-
Evening						
N		1.4%	6.0%	0.8%	-	-
NNE		3.3%	3.0%	-	-	-
NE		14.7%	5.2%	-	-	-
ENE		8.2%	4.9%	-	-	-
E		3.5%	1.1%	0.3%	-	-
ESE		1.9%	0.5%	-	-	-
SE		0.5%	-	-	-	-
SSE	29.9	1.4%	0.3%	-	-	-
S		0.5%	0.8%	-	-	-
SSW		-	-	-	-	-
SW		-	-	-	-	-
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	0.5%	0.8%	-	-
NW		1.9%	0.3%	1.4%	0.3%	-
NNW		0.5%	3.3%	3.0%	-	-
Night						
N		2.9%	4.3%	1.7%	-	-
NNE	46.6	6.0%	3.6%	-	-	-
NE		9.9%	5.3%	-	-	-

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
ENE		5.9%	1.0%	0.2%	-	-
E		0.7%	0.1%	-	-	-
ESE		0.6%	-	-	-	-
SE		-	-	-	-	-
SSE		-	-	-	-	-
S		0.5%	0.5%	-	-	-
SSW		0.1%	-	-	-	-
SW		-	-	-	-	-
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	-	-	-	-
NW		0.6%	1.0%	1.2%	-	-
NNW		1.2%	3.1%	2.7%	0.1%	-

Table A5.4 –Prevailing Wind Analysis, Spring

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
Day						
N	11.7	1.1%	1.1%	-	-	0.1%
NNE		0.7%	1.1%	-	-	-
NE		0.4%	2.1%	0.5%	-	-
ENE		0.3%	2.0%	0.3%	-	-
E		0.9%	5.3%	2.1%	-	-
ESE		0.3%	4.0%	0.5%	-	-
SE		0.8%	1.6%	0.2%	-	-
SSE		1.0%	3.5%	2.1%	-	-
S		2.3%	5.2%	2.5%	0.1%	-
SSW		1.4%	5.6%	1.3%	0.1%	-
SW		1.4%	2.4%	0.6%	0.2%	-
WSW		1.2%	1.5%	0.8%	-	-
W		1.0%	2.3%	2.0%	0.1%	-
WNW		0.8%	4.5%	4.6%	0.3%	-
NW		1.2%	3.8%	3.1%	0.5%	-
NNW		1.9%	3.6%	0.1%	-	-
Evening						
N	15.1%	1.6%	0.8%	0.3%	-	-
NNE		3.8%	1.1%	-	-	-
NE		5.8%	3.3%	-	-	-
ENE		8.2%	8.2%	1.9%	-	-
E		8.0%	9.3%	1.6%	-	-
ESE		5.2%	2.7%	-	-	-
SE		4.9%	3.3%	-	-	-
SSE		2.7%	3.8%	0.8%	-	-
S		0.3%	1.6%	0.8%	-	-
SSW		-	0.5%	-	-	-
SW		0.3%	-	-	-	-
WSW		-	-	0.3%	-	-

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
W		-	-	-	-	-
WNW		-	0.5%	-	-	-
NW		-	0.3%	-	-	-
NNW		0.3%	1.9%	0.3%	-	-
Night						
N	52.5%	2.0%	1.8%	-	-	0.1%
NNE		2.7%	1.8%	0.7%	-	-
NE		5.9%	2.0%	0.2%	-	-
ENE		7.6%	1.2%	0.7%	0.4%	-
E		2.0%	1.3%	0.4%	-	-
ESE		3.5%	0.9%	-	-	-
SE		2.0%	0.5%	-	-	-
SSE		2.0%	2.0%	0.4%	-	-
S		2.2%	2.2%	-	-	-
SSW		-	-	-	-	-
SW		0.1%	-	-	-	-
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	-	-	-	-
NW		0.4%	-	-	-	-
NNW		0.1%	0.6%	-	-	-

Figure A5.1 – Wind Speed Analysis, Summer

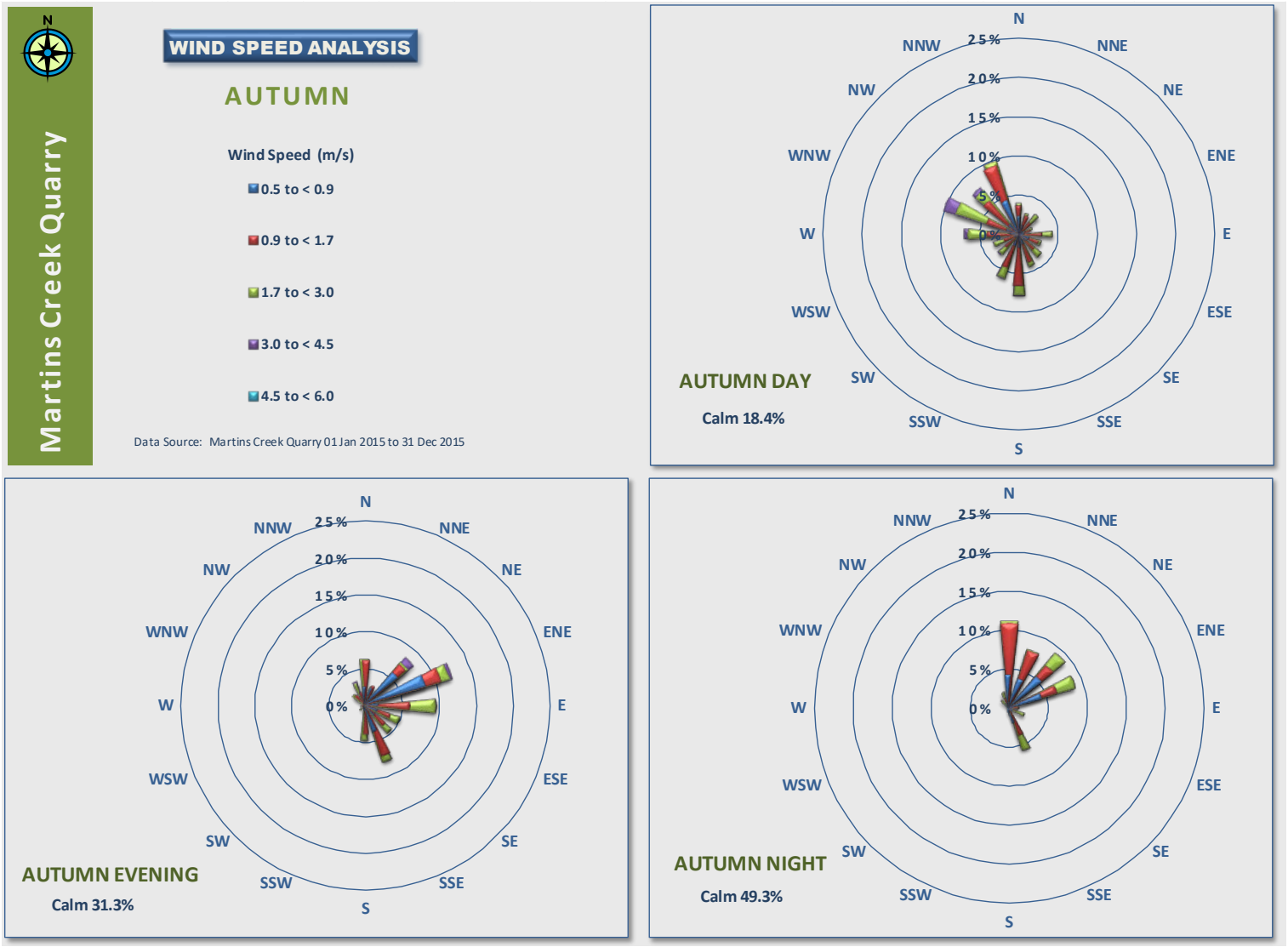


Figure A5.2 – Wind Speed Analysis, Autumn

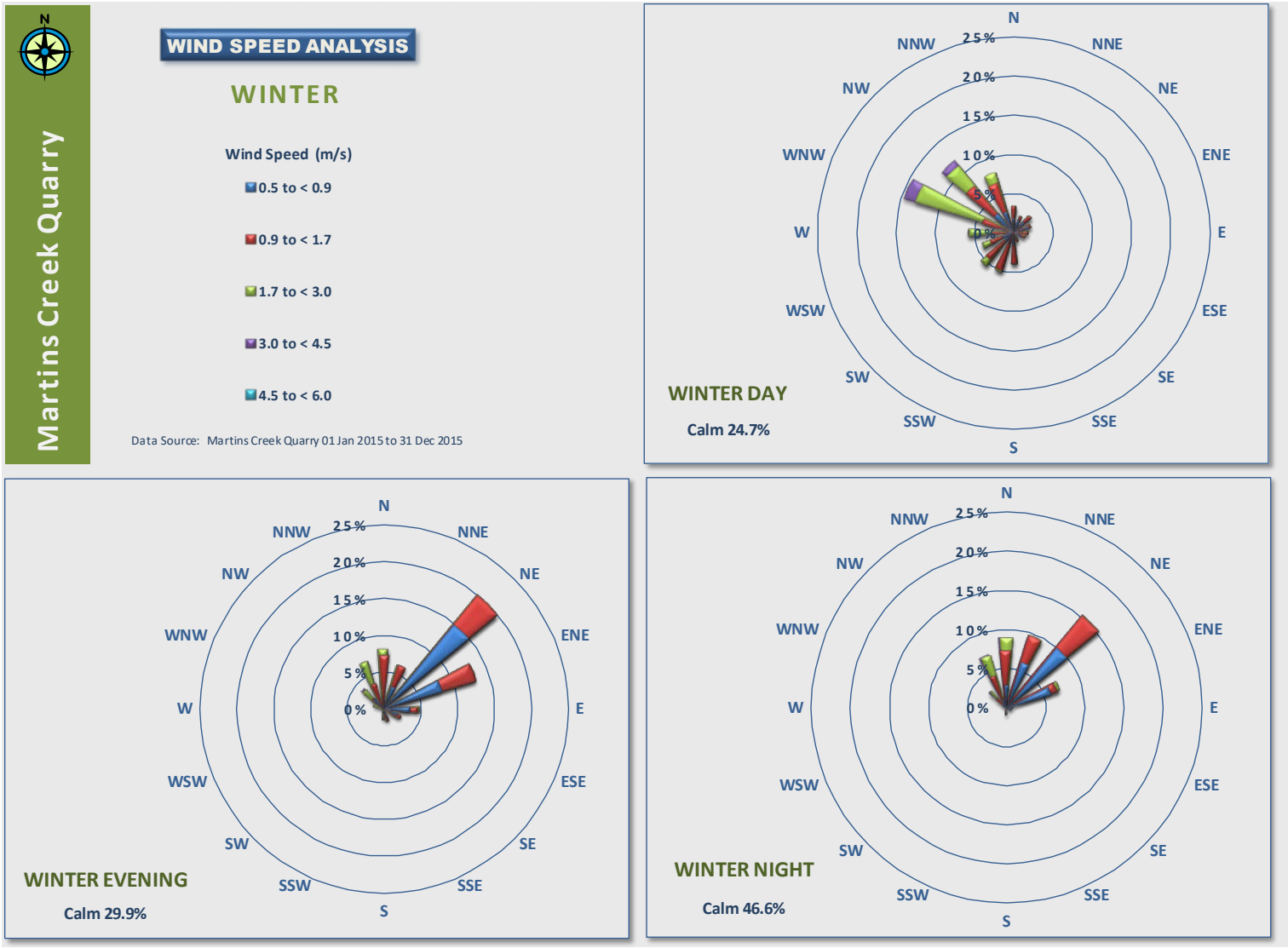


Figure A5.3 – Wind Speed Analysis, Winter

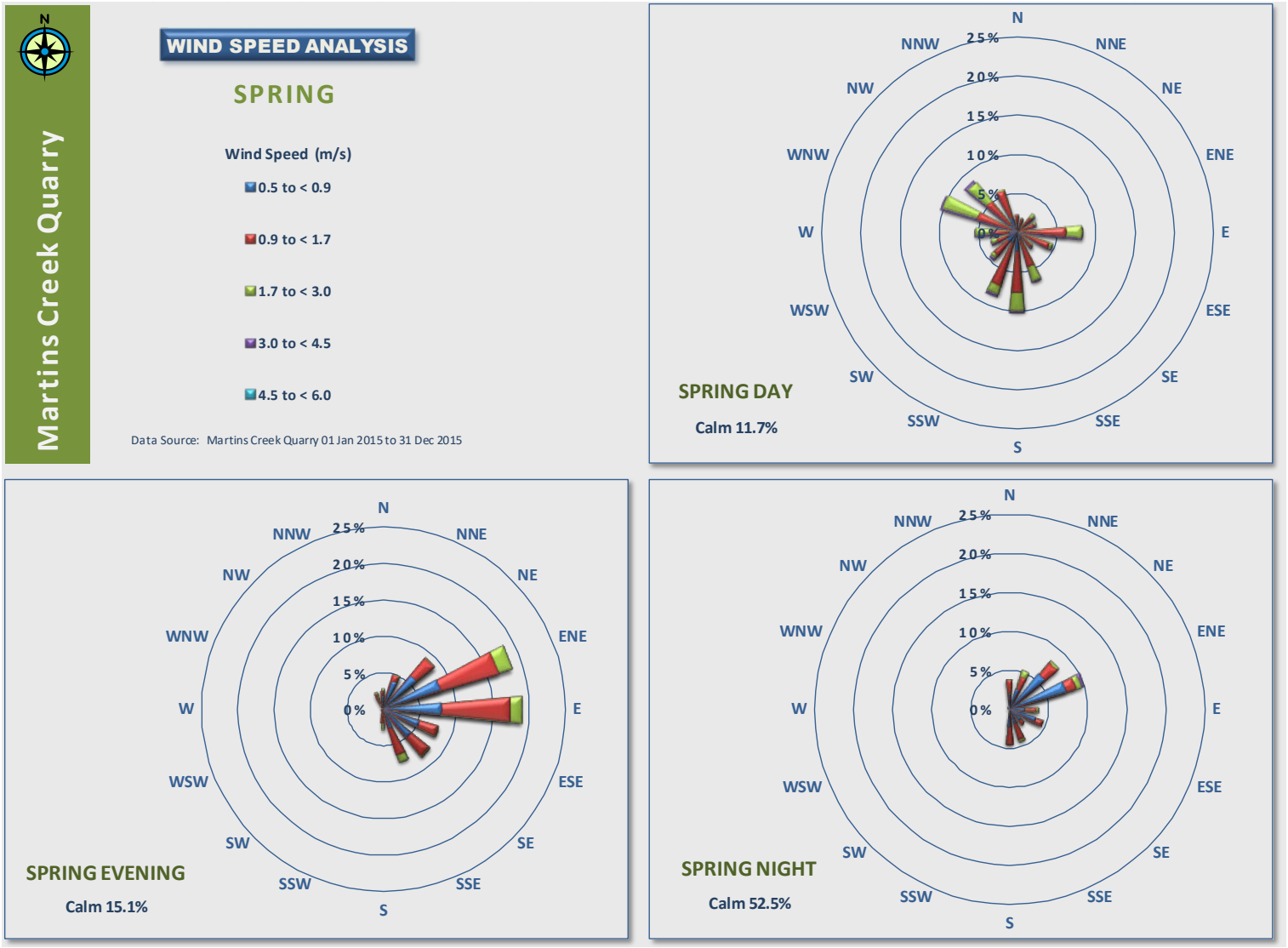


Figure A5.4 – Wind Speed Analysis, Spring

Temperature Inversions

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30 per cent of the total night time (i.e. the evening and night-time periods) during winter or about two nights per week.

Meteorological data was assessed in accordance with NPFI methodology to determine the likelihood of temperature inversions during the winter evening and night time periods. The results of the analysis of the meteorological data for 2015 are presented in **Table A5.5** and **Figure A5.5**.

Table A5.5 – Stability Class Wind Analysis, Winter Evening and Night (6.00 pm to 7.00 am)

	< 0.5	0.5 to < 0.9	0.9 to < 1.7	1.7 to < 3.0	3.0 to < 4.5	≥ 4.5
Non-Inversion Conditions – < 1%						
N		-	-	-	-	-
NNE		-	-	-	-	-
NE		-	-	-	-	-
ENE		-	0.1%	-	-	-
E		-	-	-	-	-
ESE		-	-	-	-	-
SE		-	-	-	-	-
SSE		-	-	-	-	-
S		-	-	0.1%	-	-
SSW		-	-	-	-	-
SW		-	-	-	-	-
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	-	-	-	-
NW		-	-	-	-	-
NNW		-	-	-	-	-
Inversion Conditions – > 99%						
N	42.5	2.7%	4.9%	1.0%	-	-
NNE		5.0%	3.2%	-	-	-
NE		9.7%	4.0%	0.2%	-	-
ENE		6.7%	1.8%	0.3%	-	-
E		1.7%	0.4%	0.1%	-	-
ESE		1.0%	0.2%	-	-	-
SE		0.4%	0.1%	-	-	-
SSE		1.1%	0.5%	-	-	-
S		1.2%	1.3%	-	-	-
SSW		0.1%	-	-	-	-
SW		0.1%	-	-	-	-
WSW		-	-	-	-	-
W		-	-	-	-	-
WNW		-	0.1%	0.2%	0.1%	-
NW		0.9%	0.7%	1.0%	0.1%	-
NNW		0.9%	2.5%	2.0%	0.1%	-

Figure A5.5 – Wind Speed Analysis, Winter Night (6.00 pm to 7.00 am)

NPfI Modelling Parameters

In accordance with NPfI Fact Sheet D, the detailed approach to the analysis of the meteorological data was used to determine if specific wind effects and/or inversion conditions warranted further analysis. The vectored wind analysis and review of the wind roses, undertaken following the requirements of the NPfI, identified the presence of a range of conditions that could enhance the propagation of noise from the Project towards sensitive noise receivers. The conditions identified from the analysis of the 2015 meteorological dataset and the corresponding meteorological modelled parameter used in the predictive noise model are presented in **Table A5.6**.

Table A5.6 – Proposed Modelling Parameters

Season	Period	Conditions	% Occ.	Modelling Parameters
Summer	Day	E to SSE 0.5 to 1.7 m/s	29%	1.7 m/s E wind
	Day	SSE to SW 0.5 to 2.0 m/s	32%	2.3 m/s S wind
	Evening	ENE to E 0.5 to 1.9 m/s	37%	1.9 m/s E wind
Autumn	Evening	NE to E 0.5 to 1.9 m/s	29%	1.9 m/s NE wind
	Night	N to ENE 0.5 to 1.9m/s	36%	1.9 m/s NE wind
Winter	Day	W to NNW 0.5 to 3.0m/s	38%	3.0 NW wind
	Evening	NNE to ENE 0.5 to 1.7 m/s	39%	1.7 m/s NE wind
	Night	NNE to ENE 0.5 to 1.7 m/s [1]	31%	F class Calm - Station and Cory Streets, Grace Avenue and Vogeles Road F class 1.7m/s NNW – Other areas
Spring	Day	SSE to SSW 0.5 to 2.3 m/s	32%	2.3 m/s S wind
	Evening	NE to E 0.5 to 1.7 m/s	43%	1.7 m/s NE wind

Notes: [1] The analysis of the stability data indicated inversion condition can occur during winter nights (taken to be 6.00 pm to 7.00 am) for the majority of the winter night-time period. The analysis of meteorological data indicates the wind conditions would be calm for 42.5% of the time inversion conditions are present. The analysis also indicates the presence of a drainage flow predominantly from the northeast. However, it is noted that the Paterson River valley runs from the northwest to the south-southeast immediately to the west of the Project area. This would support drainage flow from the northwest to the south-southeast. The presence of localised drainage flow from the northwest from the quarry processing area to Martins Creek would occur but the wind condition in associations with F class stability conditions in the local area would be predominantly calm.

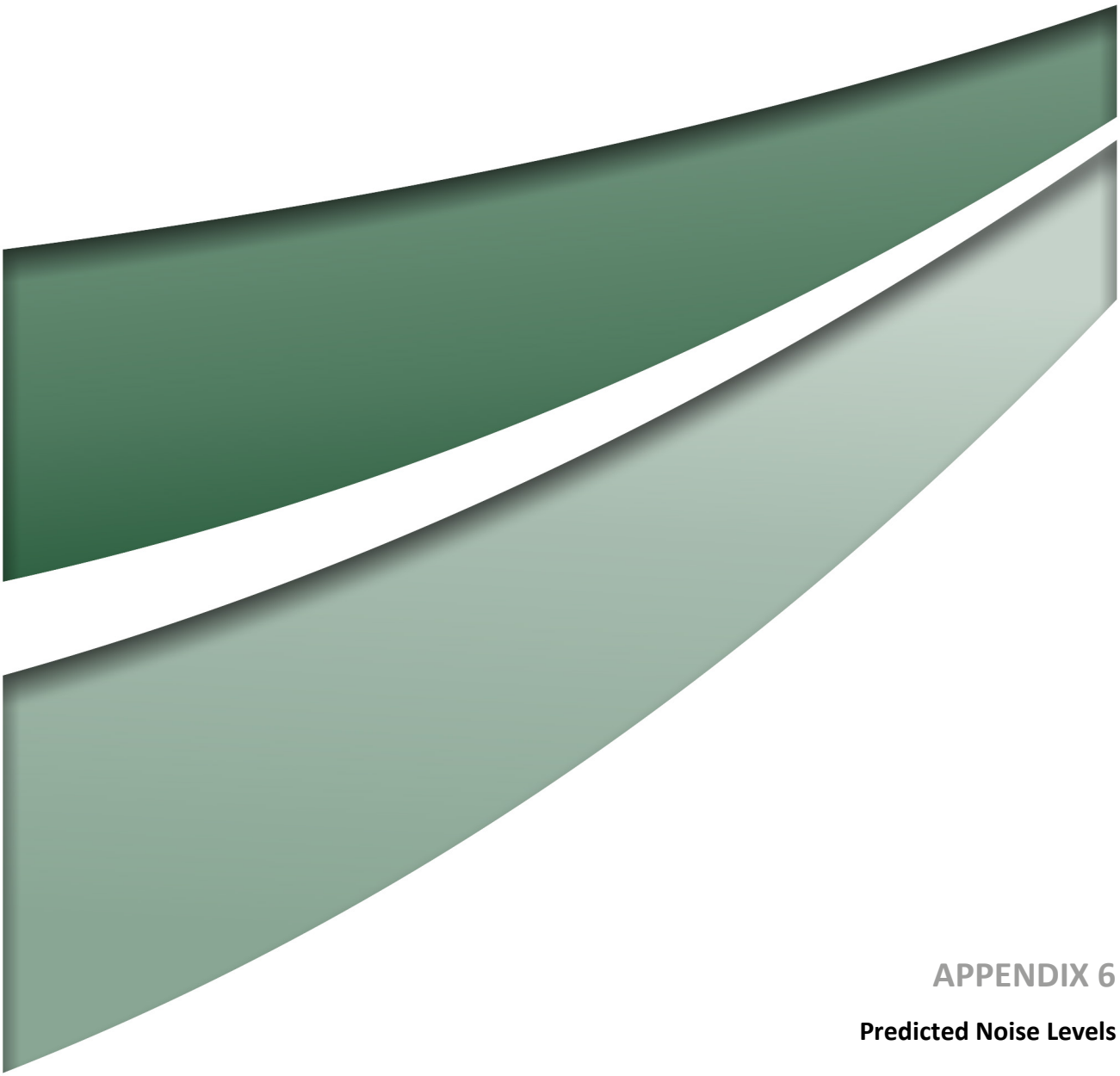
Implementation of Control Measures

The feasibility of reasonable control measures requires an assessment of time these control measure would likely be implemented. This is supported through probabilistic noise modelling that is used to predict the noise impacts during meteorological conditions that could occur over the life of the Project.

The full set of modelling parameters considered in the probabilistic modelling are presented in **Table A5.7**. The assessment of the day time noise levels considers 105 combinations of meteorological conditions and multiple operational scenarios over four representative years of the operation. Each combination of meteorological conditions is modelled and the predicted noise levels are compared to target noise levels. Operationally, the Project has been designed to meet the target noise levels under adverse meteorological conditions. During periods when the meteorological conditions do not enhance the noise propagation the level of activity at the Project could increase. The objective of the probabilistic modelling is to identify the period of time the operations can be expanded to 'win' or process additional material.

Table A5.7 – Modelling Parameters for Day, Evening and Night-time Assessment

Stability Class	Temperature Gradient, º/100m	Wind Direction	Windspeed, m/s	No. of Calm Conditions	Total No. Conditions Modelled
A to D E F G	0º/100m 1.5 2.25 3 4 6	N NE E SE S SW W NW	0.3 0.7 0.9 1.2 1.4 1.7 1.9 2.3 2.8 3.3 3.9 4.3 4.8	6	464
		Total	**470**		



APPENDIX 6

Predicted Noise Levels

Appendix 6 – Predicted Noise Levels

Day-Time Operational Noise Levels

ENM's Single Point calculation feature was used to determine noise levels from the Revised Project at the nearest residential receivers during calm neutral conditions and the three (3) significant noise-enhancing meteorological conditions identified in accordance with Fact Sheet D of the *Noise Policy for Industry* (NPfI) (EPA 2017). The predicted day-time noise levels at the residential receiver locations during Years 2, 6, 10, 15 and 20 of the Revise Project are presented:

- calm neutral conditions
- 1.7 m/s wind from the east (a vectored wind condition that can occur greater than 30% of the time during the Summer day-time)
- 2.3 m/s wind from the south (a wind/vectored wind condition that can occur up to 30% of the time during the Spring and Summer day-time)
- 3.0 m/s wind from the north-west (a wind/vectored wind condition that can occur up to 30% of the time during the Winter day-time)

For the Year 2 operating scenario is assumed the existing rail loading facility is still in place and being used as the new rail spur will not be completed. It is also assumed the new access road through Lot 5 will not be completed and trucks will be using the existing entrance on Station Street. **Table A6.1** presents the predicted Year 2 day-time noise levels with and without the operation of the existing rail loading facility.

A summary of residential receivers where the predicted noise levels could exceed the relevant day-time project noise trigger levels (PTNL) during Year 2 of the Revised Project with and without the operation of the existing rail loading facility is presented in **Table A6.2**. Day-time noise contours for the two (2) operating scenarios and four (4) meteorological conditions presented for Year 2 in **Table A6.1** are presented in **Figures A6.1** to **A6.8**.

By Year 6 the new rail spur will be completed and the existing rail loading facility will be decommissioned. By Year 6 the new access road through Lot 5 will be completed and trucks will no longer use the existing entrance on Station Street. **Table A6.3** presents the predicted Year 6, 10, 15 and 20 day-time noise levels with the operation using rail loading facility in the northern section of the East Pit processing area and the peak hourly movements of 20 laden truck using the new access road onto Dungog Road via Lot 5.

A summary of the residential receivers where the predicted noise levels could exceed the relevant day-time project noise trigger levels (PTNL) under this operating procedure is identified in **Table A6.4.** Day-time noise contours for the four (4) years modelled and four (4) meteorological conditions and operating scenario presented in **Tables A6.3** are presented in **Figures A6.9** to **A6.24**.

The predicted day-time noise levels in **Tables A6.1** to **A6.4** including capped peak hourly truck movements modelled as 20 laden truck movement per hour. The maximum cap on daily truck movements and the annual cap on road haulage tonnages mean the 20 laden trucks per hour limit cannot be maintained for more than 5 hours a day. In reality, this operating scenario will only occur for several hours on some days when the quarry is supplying a large project. On most days, hourly truck movements would be typically lower for most, if not all hours of the day. **Table A6.5** summarises the predicted exceedances of day-time PNTLS for operating conditions with 12 laden

truck movement per hour. This scenario represents the peak hourly movement of trucks for the upper range in the dispatch of 80% of the annual production by road per day at a rate of 89 laden trucks dispatched by road per day. The peak hourly movement is based on the historical average operating conditions for the quarry adjusted to match the proposed production rate.

Table A6.5 also summarises the potential exceedance of the day-time PNTLS for operating conditions when the pre-strip bulldozer is in use in the West Pit.

Shoulder, Evening and Night-time Operational Noise Levels

ENM's Single Point calculation feature was used to determine noise levels from truck loading during the 1 hour day to evening shoulder period and the new train loading activities of the Revised Project at the nearest residential receivers during calm neutral conditions and the three (3) significant noise-enhancing conditions identified in accordance with the NPfI.

The predicted evening and night-time noise levels at the residential receiver locations during Years 2, 6, 10, 15 and 20 of the Revise Project are presented in **Table A6.6** for:

- calm neutral conditions during day-evening shoulder, evening and night-times
- 1.7 m/s wind from the northeast (a vectored wind condition that can occur greater than 30% of the time during the Winter and Spring evenings)
- 1.9 m/s wind from the east (a vectored wind condition that can occur greater than 30% of the time during the Summer evening)
- 1.9 m/s wind from the northeast (a vectored wind condition that can occur greater than 30% of the time during the Autumn evening and night-time)
- F class calm neutral conditions during the Winter evening and night-time for the NAGS 1, 2, 3 and 4
- F class with 1.7 m/s drainage flow from the north-west during the Winter evening and night-time for NAGS 5 to 14

The residential receivers where the predicted noise levels could exceed the relevant day-evening shoulder, evening and night-time PTNL are presented in **Table A6.7**.

Sleep Disturbance Noise Levels

The assessment of sleep disturbance noise levels was based on the noise-enhancing meteorological conditions identified in accordance with NPfI Fact Sheet D. ENM's Single Point Calculation feature was used to determine the maximum sleep disturbance noise levels at receiver locations for each of the conditions identified above.

The predicted received $L_{A1,1minute}$ noise levels associated with these activities that could result in sleep disturbance are presented in **Tables A6.6** and **6.7**.

Construction Noise Levels

The predicted noise levels associated with construction activities are presented in **Table A6.8**. The results are presented for each of the four metrological scenarios and both the access road and noise bund construction scenarios. Those locations which are predicted to exceed the day-time construction noise management level of 45 dBA $L_{eq,15min}$ are summarised in **Table 6.9**.

Table A6.1 – Predicted Year 2 Day-time Noise Levels with and without the Existing Rail Loading Facility Operating, dB(A)

Rec ID	Location	Ass. Grp	PNTL	Year 2 With Rail Loading				Year 2 Without Rail Loading			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R001	23 Station St	NAG01	58	64	64	63	62	53	55	51	52
R002	21 Station St	NAG01	58	65	66	65	64	53	55	51	53
R003	19 Station St	NAG01	58	66	66	66	65	52	54	50	52
R004	17 Station St	NAG01	58	67	67	66	66	48	50	46	48
R005	15 Station St	NAG01	58	63	64	63	63	47	49	44	47
R006	13 Station St	NAG01	58	61	62	60	60	45	47	43	45
R007	11 Station St	NAG01	58	59	60	58	59	45	47	42	45
R008	9 Station St	NAG01	58	59	60	56	59	45	47	42	45
R009	7 Station St	NAG01	58	58	59	55	57	44	47	42	45
R010	5 Station St	NAG01	58	57	58	54	57	44	47	41	45
R011	3 Station St	NAG01	58	56	58	52	55	43	46	41	44
R012	5 Douglas St	NAG02	54	53	53	49	54	43	44	39	46
R013	1 Cory St	NAG02	57	54	56	50	55	45	50	42	47
R014	5 Cory St	NAG02	54	53	54	49	54	42	44	39	44
R015	3 Cory St	NAG02	55	53	55	50	54	45	48	40	46
R017	2 Cory St	NAG02	53	51	53	47	52	42	44	38	44
R018	9 Cory St Martins Ck Fire Shed	NAG02	58	48	48	45	50	40	42	37	45
R022	8 Cory St	NAG02	49	47	49	44	49	39	42	36	43
R020	54 Grace Ave	NAG03	55	50	54	46	50	42	46	38	42
R021	56 Grace Ave	NAG03	57	53	56	48	53	44	50	41	44
R023	52 Grace Ave	NAG03	52	49	51	45	48	41	44	38	41
R024	58 Grace Ave	NAG03	58	52	55	48	53	44	49	41	45
R026	12 Cory St	NAG04	51	48	49	44	51	41	43	37	45
R028	14 Cory St	NAG04	51	48	49	44	51	42	43	38	46
R030	16 Cory St	NAG04	51	47	49	44	51	41	43	38	46
R033	18 Cory St	NAG04	51	47	48	42	50	41	43	38	46
R035	20 Cory St	NAG04	51	46	48	41	50	41	43	36	46
R036	23 Cory St	NAG04	50	46	47	41	51	40	42	37	46
R037	22 Cory St	NAG04	51	46	47	41	50	40	42	36	45
R038	24 Cory St	NAG04	51	46	47	41	50	40	42	37	45
R039	26 Cory St	NAG04	50	46	47	42	50	40	42	37	45
R042	29 Cory St	NAG04	50	46	46	42	51	39	41	35	46
R044	28 Cory St	NAG04	50	46	47	42	50	40	42	37	45
R045	31 Cory St	NAG04	50	46	47	42	51	39	41	36	46
R049	30 Cory St	NAG04	50	45	46	42	50	39	41	36	45
R050	33 Cory St	NAG04	49	46	46	42	51	40	41	37	46
R051	32 Cory St	NAG04	50	45	46	42	50	39	41	36	45
R052	35 Cory St	NAG04	50	46	46	42	51	39	41	36	46
R054	34 Cory St	NAG04	49	45	45	40	50	38	40	35	45
R056	37 Cory St	NAG04	49	45	45	41	51	39	40	35	45
R057	36 Cory St	NAG04	49	44	45	39	50	38	40	35	45
R058	39 Cory St	NAG04	47	43	44	38	51	37	39	34	44
R059	38 Cory St	NAG04	48	43	44	38	50	38	39	34	45
R061	41 Cory St	NAG04	47	42	43	38	50	37	38	34	44
R062	40 Cory St	NAG04	47	42	43	38	48	38	40	35	44

Rec ID	Location	Ass. Grp	PNTL	Year 2 With Rail Loading				Year 2 Without Rail Loading			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R064	43 Cory St	NAG04	46	41	41	37	49	35	37	33	43
R065	44 Cory St	NAG04	46	41	42	37	49	36	38	34	44
R016	256 Dungog Rd	NAG05	40	35	39	36	31	32	35	30	28
R019	1-3 Grace Ave	NAG05	40	39	46	40	35	34	40	34	32
R041	249 Dungog Rd	NAG06	40	38	46	39	36	33	43	34	33
R043	231 Dungog Rd	NAG06	40	37	44	36	33	34	40	32	30
R055	221 Dungog Rd	NAG06	40	39	47	38	36	35	43	34	33
R066	223 Dungog Rd	NAG06	40	36	48	36	33	33	44	32	31
R070	199 Dungog Rd	NAG06	40	41	48	39	39	36	44	35	35
R025	281 Dungog Rd	NAG07	40	38	45	41	40	38	44	40	40
R031	303 Dungog Rd	NAG07	40	37	44	38	35	36	44	37	35
R040	279 Dungog Rd	NAG07	40	36	45	41	38	34	43	38	38
R087	253 Dungog Rd	NAG08	40	29	40	32	30	28	39	31	30
R115	257 Dungog Rd	NAG08	40	36	43	35	32	31	41	32	30
R119	9 Mowbray Ln	NAG08	40	23	27	25	18	21	26	24	17
R122	181 Dungog Rd	NAG08	40	40	44	39	38	36	41	35	34
R128	259 Dungog Rd	NAG08	40	31	40	32	29	29	37	30	28
R129	261 Dungog Rd	NAG08	40	31	41	33	30	28	40	31	30
R131	25 Mowbray Ln	NAG08	40	22	32	26	18	21	32	25	17
R132	57 Mowbray Ln	NAG08	40	27	33	28	23	25	33	27	22
R133	147 Dungog Rd	NAG08	40	40	44	39	39	36	41	34	35
R136	255 Dungog Rd	NAG08	40	28	39	33	31	26	38	32	31
R138	76 Mowbray Ln	NAG08	40	28	39	33	26	26	38	30	26
R141	80 Mowbray Ln	NAG08	40	30	41	33	31	27	39	31	30
R143	121 Dungog Rd	NAG08	40	38	43	36	38	32	39	30	32
R145	120 Dungog Rd	NAG08	40	35	42	32	35	31	38	28	32
R148	51 Dungog Rd	NAG08	40	36	41	34	34	33	38	32	32
R149	83 Dungog Rd	NAG08	40	37	41	35	36	33	38	32	32
R034	338 Dungog Rd	NAG09	40	36	47	44	36	35	47	44	36
R047	341 Dungog Rd	NAG09	40	32	45	41	32	31	45	41	32
R053	333 Dungog Rd	NAG09	40	33	44	41	34	32	44	41	34
R046	406 Dungog Rd	NAG10	40	35	38	42	28	35	38	42	27
R063	9 Horns Crossing Rd	NAG10	40	30	42	42	35	30	42	42	35
R069	29 Horns Crossing Rd	NAG10	40	30	41	41	34	29	41	40	34
R075	24 Horns Crossing Rd	NAG10	40	29	40	41	34	28	40	40	34
R088	55 Horns Crossing Rd	NAG10	40	30	40	40	33	30	40	39	33
R107	52 Horns Crossing Rd	NAG10	40	23	38	34	23	22	38	34	23
R073	16 View St	NAG11	40	29	40	41	28	28	40	41	28
R083	24 View St	NAG11	40	28	39	41	27	28	39	41	26
R092	32 View St	NAG11	40	28	38	41	25	28	37	41	25
R094	19 View St	NAG11	40	27	39	40	30	27	39	40	30
R095	15 View St	NAG11	40	27	39	40	29	26	39	40	29
R097	21 View St	NAG11	40	27	39	40	29	27	39	40	29
R098	27 View St	NAG11	40	27	39	41	28	27	39	40	28
R101	14 Wakaya Cl	NAG11	40	26	32	36	22	26	31	36	22
R102	4 Wakaya Cl	NAG11	40	28	37	41	24	27	37	41	24
R103	18 Wakaya Cl	NAG11	40	25	26	31	19	24	26	31	19
R104	17 View St	NAG11	40	25	33	34	23	24	33	34	23
R105	35 View St	NAG11	40	27	38	40	26	27	38	40	26

Rec ID	Location	Ass. Grp	PNTL	Year 2 With Rail Loading				Year 2 Without Rail Loading			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R110	11 Wakaya Cl	NAG11	40	26	33	39	23	26	32	38	22
R111	45 View St	NAG11	40	26	38	40	25	26	38	40	25
R113	7 Wakaya Cl	NAG11	40	26	34	40	23	25	34	40	23
R117	55 View St	NAG11	40	26	37	38	24	25	37	38	24
R118	24 Wakaya Cl	NAG11	40	22	21	27	15	21	20	27	14
R120	29 Wakaya Cl	NAG11	40	24	29	36	20	24	29	36	20
R125	58 View St	NAG11	40	25	33	38	23	25	33	38	22
R126	80 Horns Crossing Rd	NAG11	40	22	37	36	23	21	37	36	23
R127	28 Wakaya Cl	NAG11	40	25	25	31	18	25	24	31	17
R130	59 View St	NAG11	40	25	36	38	23	25	36	38	23
R134	76 View St	NAG11	40	24	29	37	19	24	29	37	19
R135	71 View St	NAG11	40	24	34	40	22	23	34	39	21
R137	84 View St	NAG11	40	24	26	33	18	23	26	33	17
R139	83 View St	NAG11	40	24	35	39	21	23	35	39	20
R140	90 View St	NAG11	40	23	25	33	17	23	25	33	16
R142	87 View St	NAG11	40	23	32	39	20	22	32	38	19
R144	94 View St	NAG11	40	22	24	36	15	22	24	36	15
R146	95 View St	NAG11	40	23	25	35	16	22	25	35	15
R147	93 View St	NAG11	40	22	28	37	17	21	28	36	17
R060	126 Merchants Rd	NAG12	40	23	23	28	23	22	23	27	23
R068	60 Merchants Rd	NAG12	40	20	22	26	19	19	21	25	19
R071	145 Merchants Rd	NAG12	40	21	21	26	21	20	21	25	21
R072	60 Merchants Rd	NAG12	40	19	20	25	17	18	19	24	17
R074	218 Merchants Rd	NAG12	40	20	19	23	21	19	18	23	21
R077	448 Dungog Rd	NAG12	40	19	20	23	15	19	19	22	14
R079	46 Merchants Rd	NAG12	40	18	20	24	16	17	19	23	16
R080	462 Dungog Rd	NAG12	40	18	19	22	15	17	18	21	14
R081	26 Merchants Rd	NAG12	40	18	19	23	15	17	18	22	15
R082	97 Merchants Rd	NAG12	40	21	22	26	20	20	21	26	20
R084	168 Merchants Rd	NAG12	40	21	20	25	21	20	20	24	21
R089	24 Merchants Rd	NAG12	40	17	19	22	15	16	18	21	14
R096	221 Merchants Rd	NAG12	40	19	18	22	21	19	17	21	20
R099	215 Merchants Rd	NAG12	40	19	18	22	20	18	17	22	19
R100	22 Merchants Rd	NAG12	40	17	18	22	14	16	17	21	14
R106	17 Merchants Rd	NAG12	40	17	18	22	14	16	17	21	13
R108	73 Merchants Rd	NAG12	40	19	19	24	17	17	18	23	16
R114	9 Merchants Rd	NAG12	40	16	18	22	14	15	17	21	13
R124	43 Merchants Rd	NAG12	40	18	18	24	16	16	17	23	15
R032	14 Vogeles Rd	NAG13	40	34	31	31	38	31	29	29	36
R048	12 Vogeles Rd	NAG13	40	34	33	30	38	29	29	25	32
R067	159 Vogeles Rd	NAG13	40	36	33	40	41	36	32	39	41
R093	197 Vogeles Rd	NAG13	40	33	32	35	39	32	32	34	38
R076	170 Dungog Rd	NAG14	40	42	46	36	47	36	40	32	41
R078	73 Black Rock Rd	NAG14	40	25	24	23	29	23	22	22	28
R085	65 Cory St	NAG14	40	33	33	29	40	29	29	26	36
R086	67 Cory St	NAG14	40	32	32	29	39	28	29	26	36
R090	69 Cory St	NAG14	40	31	31	29	37	27	28	24	33
R091	75 Black Rock Rd	NAG14	40	24	23	21	29	23	22	20	28
R109	11 Cook St	NAG14	40	26	25	22	32	22	22	19	27

Rec ID	Location	Ass. Grp	PNTL	Year 2 With Rail Loading				Year 2 Without Rail Loading			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R112	94 Cory St	NAG14	40	31	32	28	42	27	28	24	37
R116	95 Cory St	NAG14	40	29	29	26	39	24	25	22	35
R121	10 Cook St Martins Creek School	NAG14	48	28	27	24	38	23	24	20	33
R123	97 Cory St	NAG14	40	29	29	25	39	24	25	22	35

Table A6.2 –Receivers Predicted to Exceed the Day-time Project Noise Trigger Levels with and without the Existing Rail Loading Facility Operating

Rec ID	Location	Ass. Grp	PNTL	Year 2 With Rail Loading			Year 2 Without Rail Loading		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R001	23 Station St	NAG01	58	-	-	64	-	-	-
R002	21 Station St	NAG01	58	-	-	66	-	-	-
R003	19 Station St	NAG01	58	-	-	66	-	-	-
R004	17 Station St	NAG01	58	-	-	67	-	-	-
R005	15 Station St	NAG01	58	-	-	64	-	-	-
R006	13 Station St	NAG01	58	-	62	-	-	-	-
R007	11 Station St	NAG01	58	60	-	-	-	-	-
R008	9 Station St	NAG01	58	60	-	-	-	-	-
R009	7 Station St	NAG01	58	59	-	-	-	-	-
R036	23 Cory St	NAG04	50	51	-	-	-	-	-
R042	29 Cory St	NAG04	50	51	-	-	-	-	-
R045	31 Cory St	NAG04	50	51	-	-	-	-	-
R050	33 Cory St	NAG04	49	51	-	-	-	-	-
R052	35 Cory St	NAG04	50	51	-	-	-	-	-
R054	34 Cory St	NAG04	49	50	-	-	-	-	-
R056	37 Cory St	NAG04	49	51	-	-	-	-	-
R057	36 Cory St	NAG04	49	50	-	-	-	-	-
R058	39 Cory St	NAG04	47	-	51	-	-	-	-
R059	38 Cory St	NAG04	48	50	-	-	-	-	-
R061	41 Cory St	NAG04	47	-	50	-	-	-	-
R062	40 Cory St	NAG04	47	48	-	-	-	-	-
R064	43 Cory St	NAG04	46	-	49	-	-	-	-
R065	44 Cory St	NAG04	46	-	49	-	-	-	-
R019	1-3 Grace Ave	NAG05	40	-	-	46	-	-	-
R041	249 Dungog Rd	NAG06	40	-	-	46	-	43	-
R043	231 Dungog Rd	NAG06	40	-	44	-	-	-	-
R055	221 Dungog Rd	NAG06	40	-	-	47	-	43	-
R066	223 Dungog Rd	NAG06	40	-	-	48	-	44	-
R070	199 Dungog Rd	NAG06	40	-	-	48	-	44	-
R025	281 Dungog Rd	NAG07	40	-	45	-	-	44	-
R031	303 Dungog Rd	NAG07	40	-	44	-	-	44	-
R040	279 Dungog Rd	NAG07	40	-	45	-	-	43	-
R115	257 Dungog Rd	NAG08	40	-	43	-	41	-	-
R122	181 Dungog Rd	NAG08	40	-	44	-	41	-	-
R129	261 Dungog Rd	NAG08	40	41	-	-	-	-	-
R133	147 Dungog Rd	NAG08	40	-	44	-	41	-	-

Rec ID	Location	Ass. Grp	PNTL	Year 2 With Rail Loading			Year 2 Without Rail Loading		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R141	80 Mowbray Ln	NAG08	40	41	-	-	-	-	-
R143	121 Dungog Rd	NAG08	40	-	43	-	-	-	-
R145	120 Dungog Rd	NAG08	40	42	-	-	-	-	-
R148	51 Dungog Rd	NAG08	40	41	-	-	-	-	-
R149	83 Dungog Rd	NAG08	40	41	-	-	-	-	-
R034	338 Dungog Rd	NAG09	40	-	-	47	-	-	47
R047	341 Dungog Rd	NAG09	40	-	45	-	-	45	-
R053	333 Dungog Rd	NAG09	40	-	44	-	-	44	-
R046	406 Dungog Rd	NAG10	40	42	-	-	42	-	-
R063	9 Horns Crossing Rd	NAG10	40	42	-	-	42	-	-
R069	29 Horns Crossing Rd	NAG10	40	41	-	-	41	-	-
R075	24 Horns Crossing Rd	NAG10	40	41	-	-	-	-	-
R073	16 View St	NAG11	40	41	-	-	41	-	-
R083	24 View St	NAG11	40	41	-	-	41	-	-
R092	32 View St	NAG11	40	41	-	-	41	-	-
R098	27 View St	NAG11	40	41	-	-	-	-	-
R102	4 Wakaya Cl	NAG11	40	41	-	-	41	-	-
R067	159 Vogeles Rd	NAG13	40	41	-	-	41	-	-
R076	170 Dungog Rd	NAG14	40	-	-	47	41	-	-
R112	94 Cory St	NAG14	40	42	-	-	-	-	-
	Total			29	15	12	12	9	1

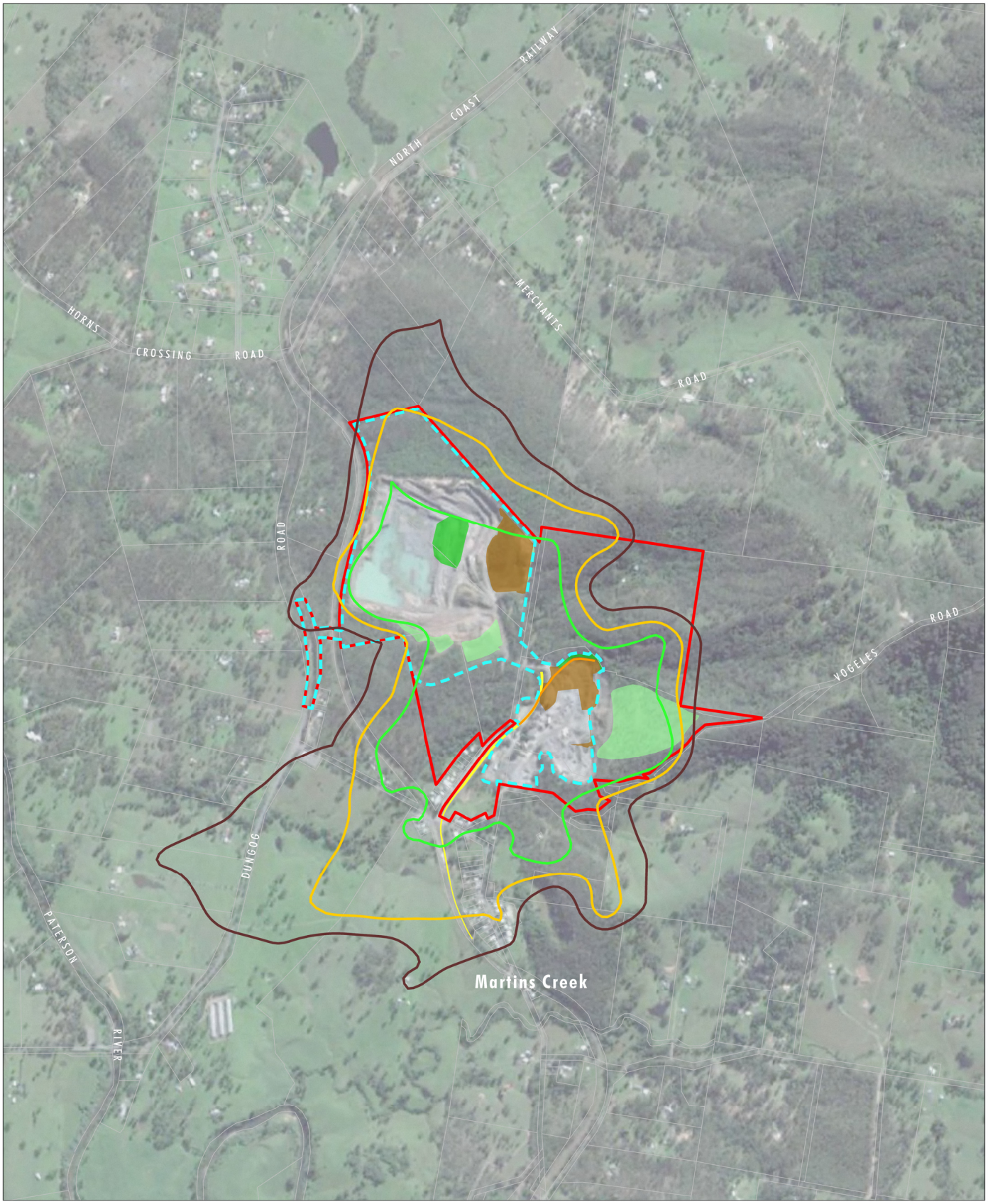


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.1

Conceptual Quarry Plan Year 2
Predicted Noise Level - Calm Neutral
Including the Existing Train Loadout Facility

File Name (A4): R04/3957_159.dgn
20201113 15.09

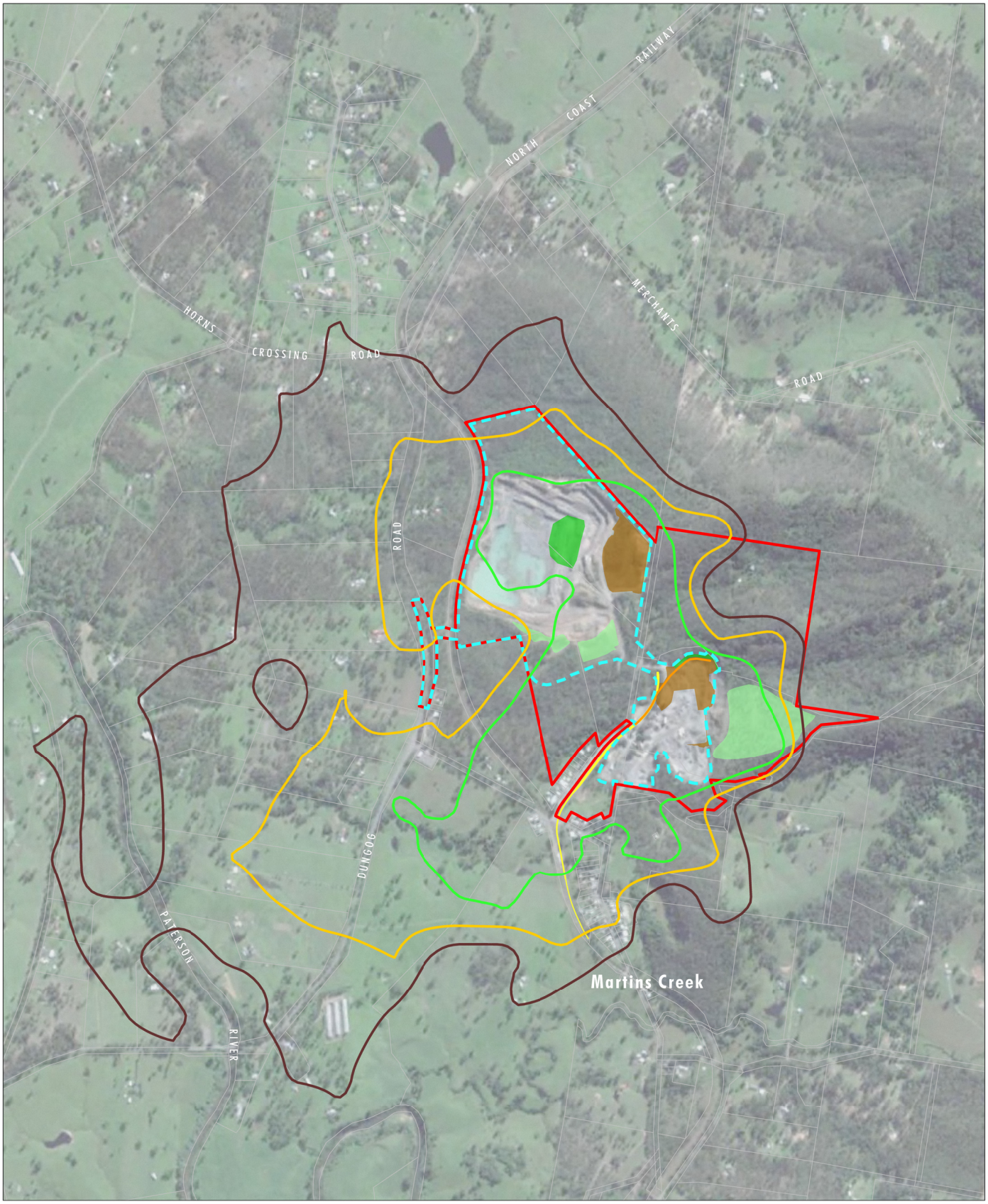


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.2

Conceptual Quarry Plan Year 2
Predicted Noise Level - Easterly 1.7 m/s
Including the Existing Train Loadout Facility

File Name (A4): R04/3957_160.dgn
20201113 15.11

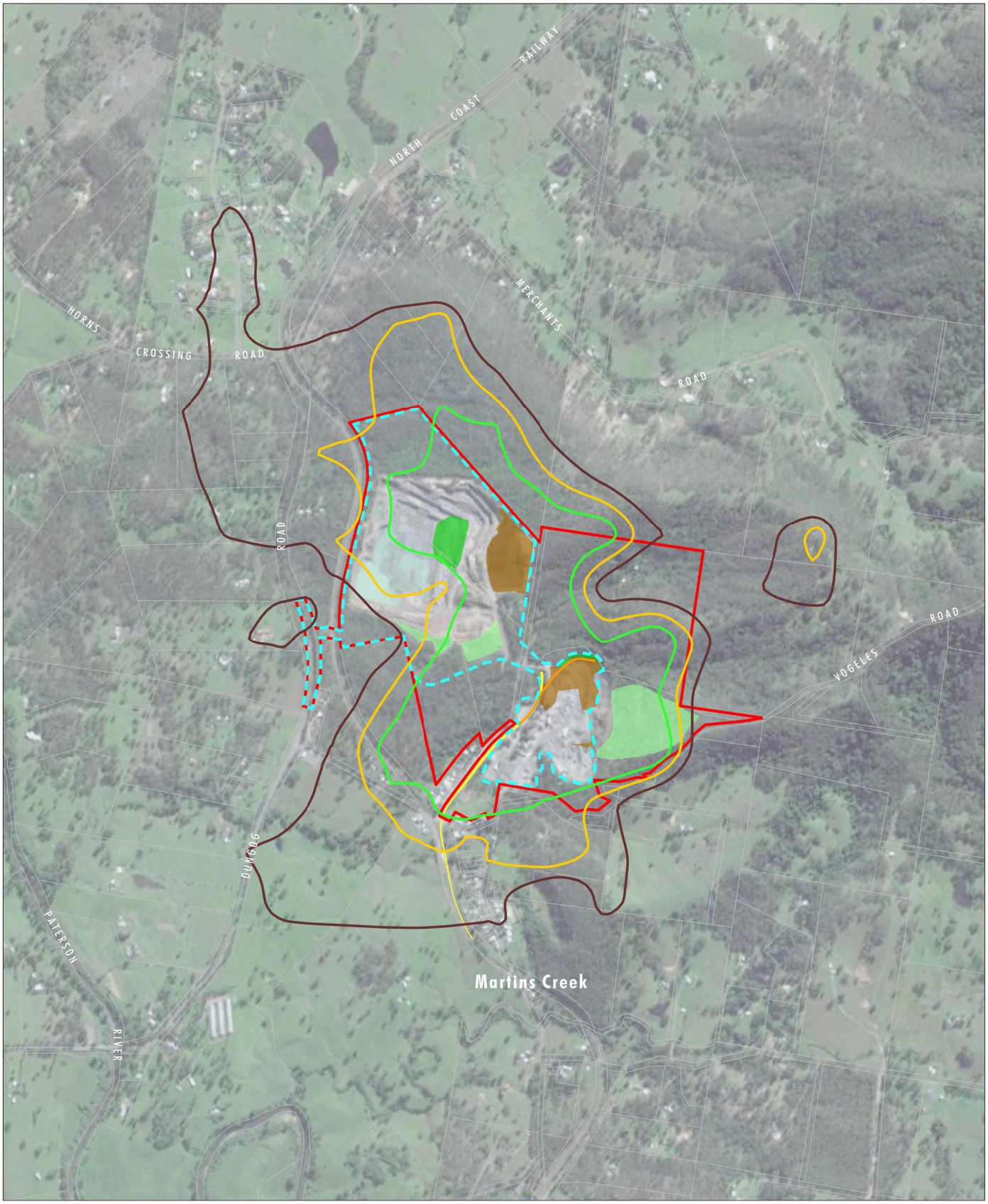


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.3

Conceptual Quarry Plan Year 2
Predicted Noise Level - Southerly 2.3 m/s
Including the Existing Train Loadout Facility

File Name (A4): R04/3957_161.dgn
20201113 15.21

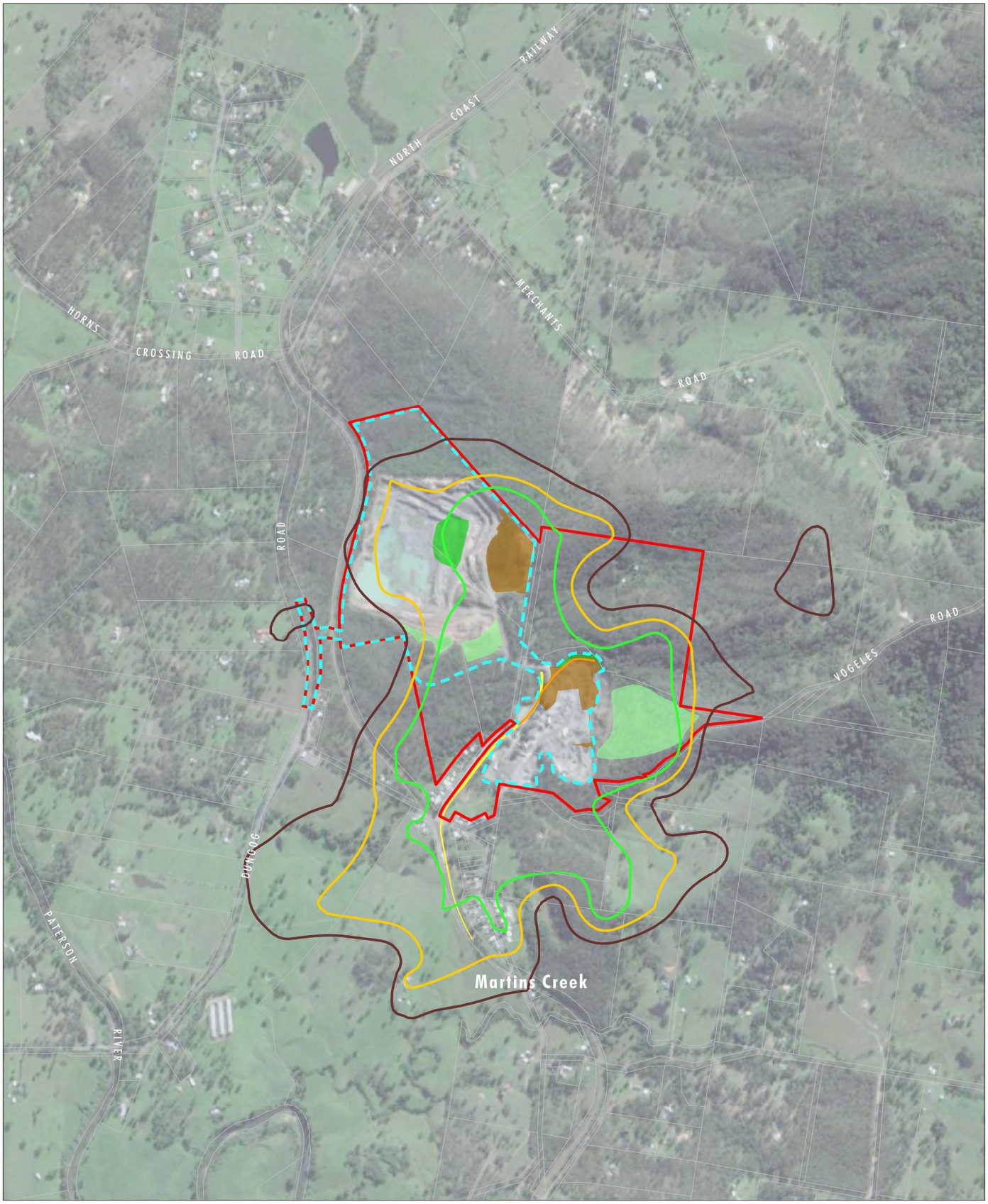


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.4

Conceptual Quarry Plan Year 2
Predicted Noise Level - North-westerly 3.0 m/s
Including the Existing Train Loadout Facility

File Name (A4): R04/3957_162.dgn
20201113 15.22

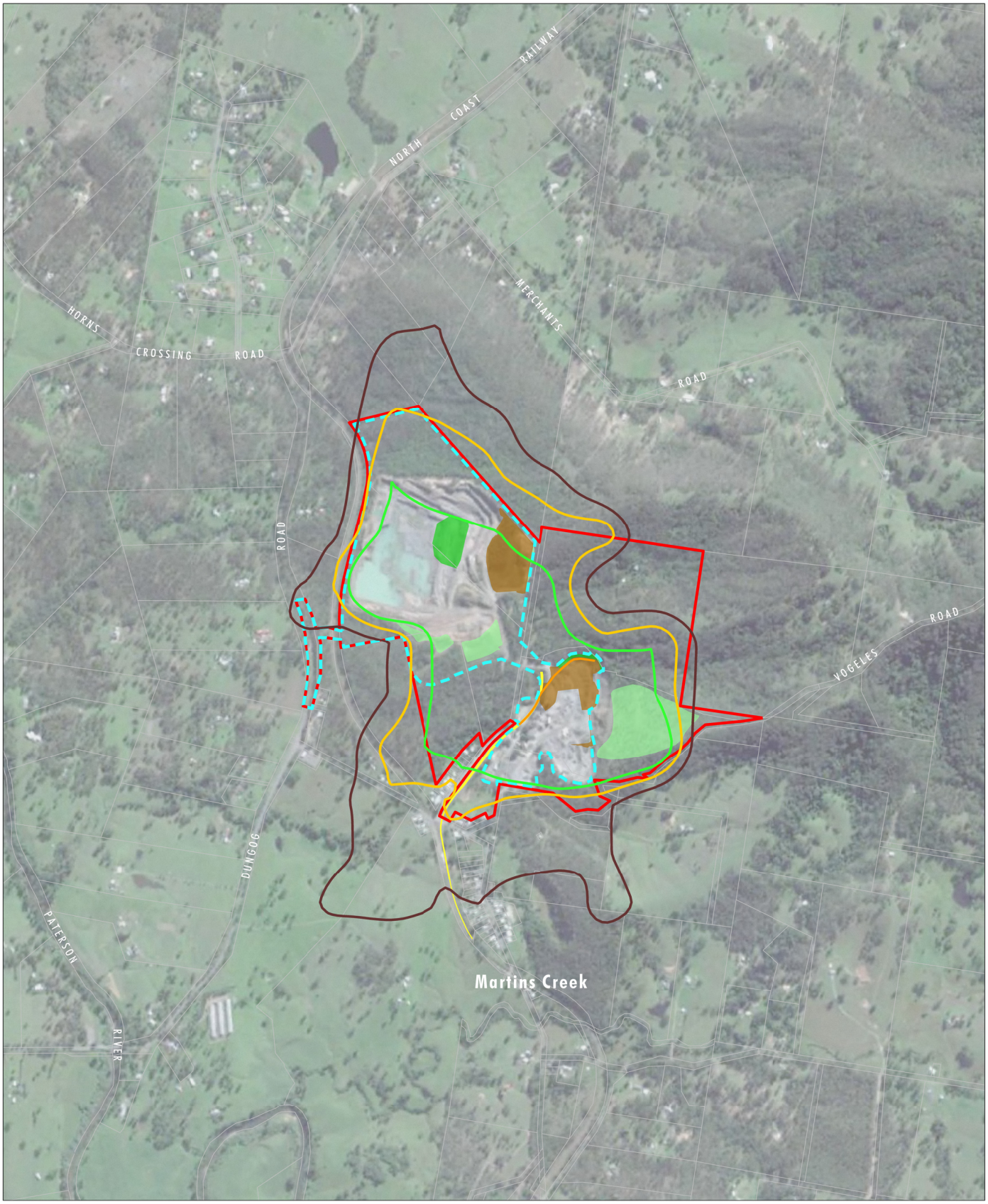


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.5

Conceptual Quarry Plan Year 2
Predicted Noise Level - Calm Neutral
Excluding the Existing Train Loadout Facility

File Name (A4): R04/3957_163.dgn
20201113 15.24

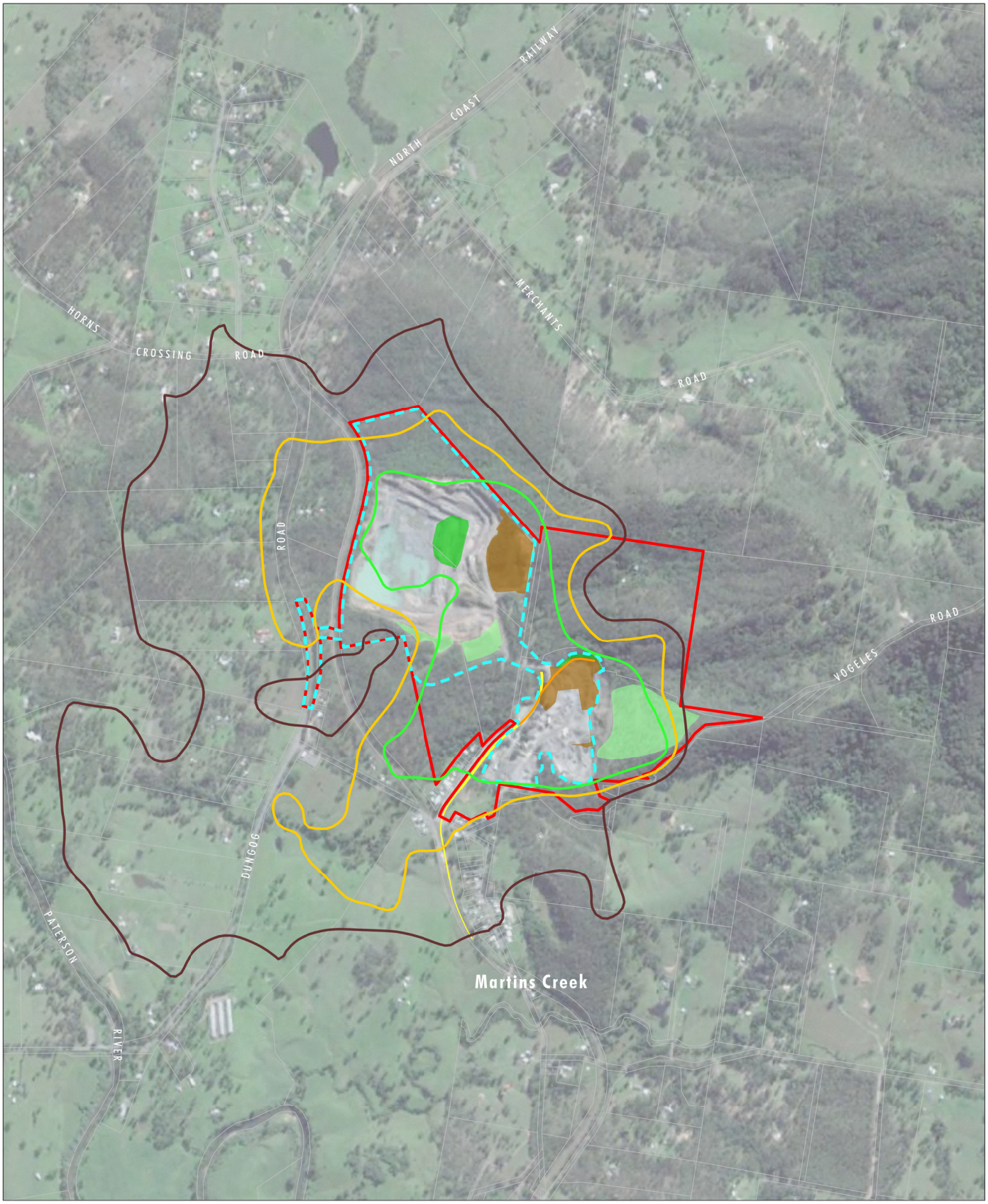


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.6

Conceptual Quarry Plan Year 2
Predicted Noise Level - Easterly 1.7 m/s
Excluding the Existing Train Loadout Facility

File Name (A4): R04/3957_164.dgn
20201113 15.25

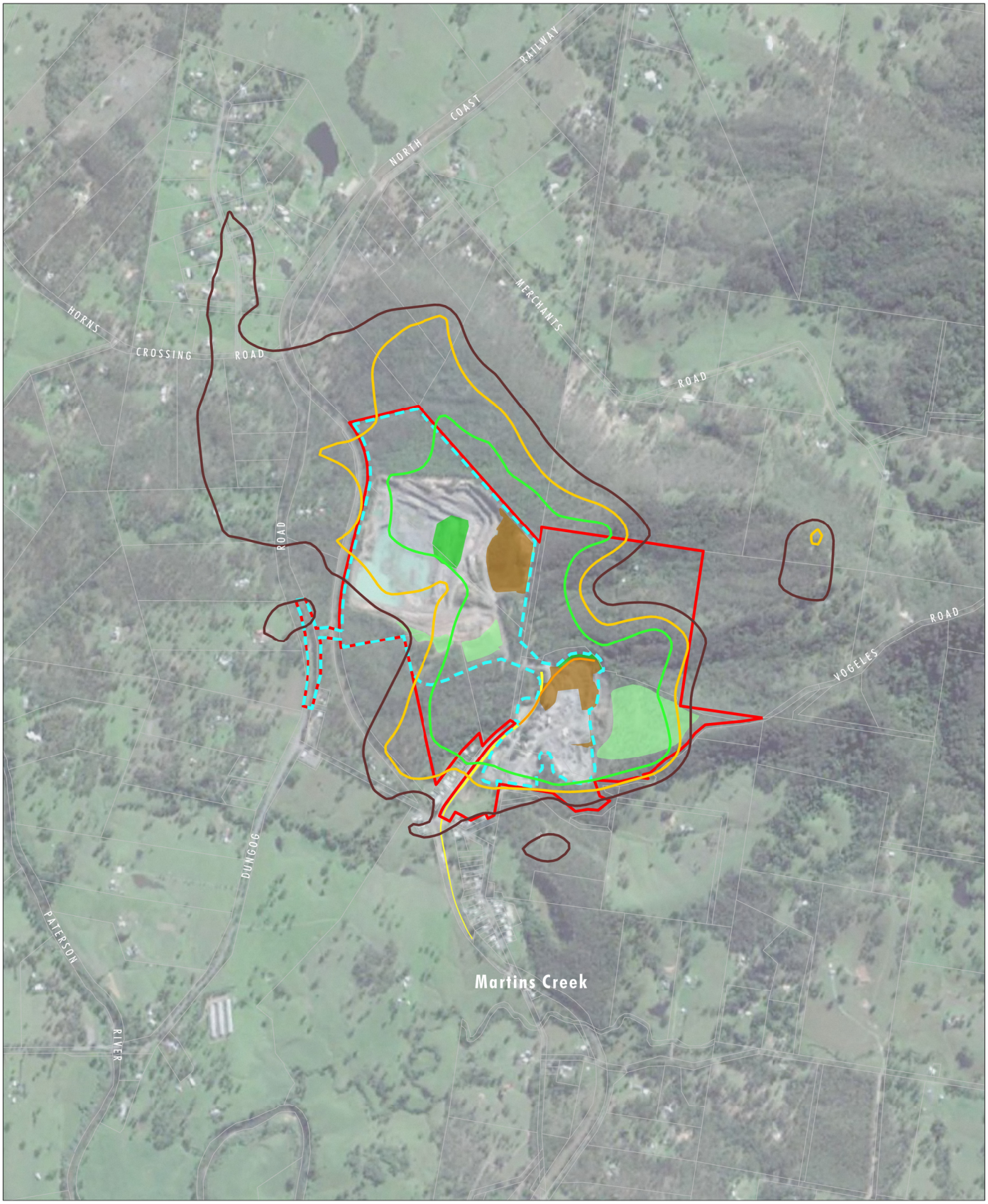


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.7

Conceptual Quarry Plan Year 2
Predicted Noise Level - Southerly 2.3 m/s
Excluding the Existing Train Loadout Facility

File Name (A4): R04/3957_165.dgn
20201019 10.48

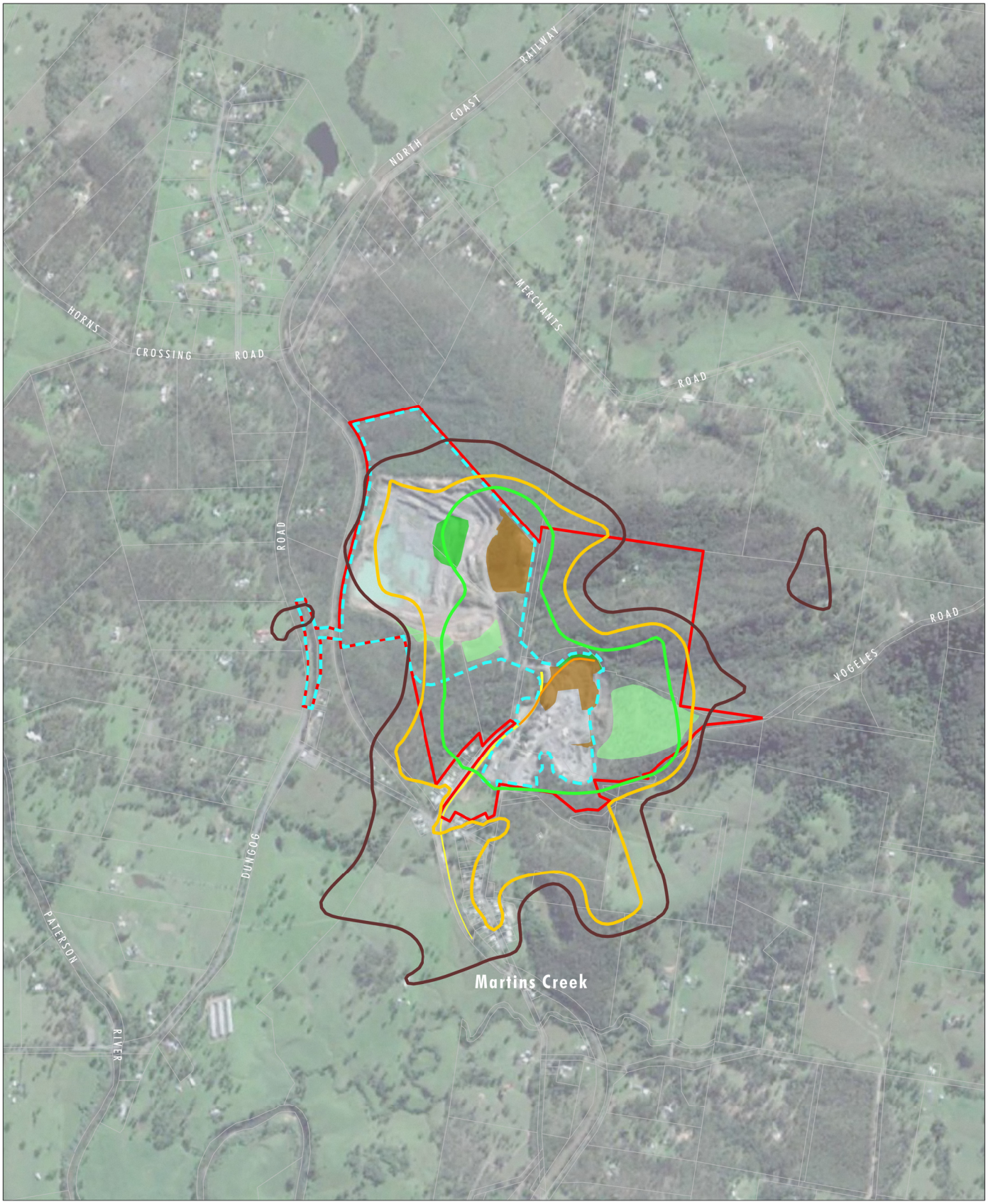


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.8

Conceptual Quarry Plan Year 2
Predicted Noise Level - North-westerly 3.0 m/s
Excluding the Existing Train Loadout Facility

File Name (A4): R04/3957_166.dgn
20201113 15.28

Table A6.3 – Predicted Day-time Noise Levels Years 6, 10, 15 and 20, dB(A)

(Modelled with 20 laden truck movement per hour to represent the capped peak daily truck movements of 140 laden trucks)

Rec ID	Location	Ass. Grp	PNTL	Year 6				Year 10				Year 15				Year 20			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R001	23 Station St	NAG01	58	52	53	52	50	52	49	52	50	52	49	51	48	52	49	51	48
R002	21 Station St	NAG01	58	52	53	51	49	52	48	51	49	52	48	51	48	52	48	51	48
R003	19 Station St	NAG01	58	51	53	50	49	51	48	50	49	51	48	50	47	51	48	50	47
R004	17 Station St	NAG01	58	52	53	51	48	52	48	51	48	51	48	50	47	51	48	50	47
R005	15 Station St	NAG01	58	51	52	50	48	51	47	50	48	51	47	50	46	51	47	50	46
R006	13 Station St	NAG01	58	51	49	50	47	51	46	50	47	51	47	50	46	51	47	50	46
R007	11 Station St	NAG01	58	51	48	50	47	51	46	50	47	51	46	50	45	51	46	50	45
R008	9 Station St	NAG01	58	50	48	49	47	50	46	49	47	50	46	49	45	50	46	49	45
R009	7 Station St	NAG01	58	50	47	48	46	50	46	48	46	50	46	49	45	50	46	49	45
R010	5 Station St	NAG01	58	48	48	46	46	48	46	46	46	48	46	46	45	48	46	46	45
R011	3 Station St	NAG01	58	47	47	45	46	47	46	45	46	47	46	45	44	47	46	45	44
R012	5 Douglas St	NAG02	54	46	44	44	46	46	43	44	46	46	43	43	44	46	43	43	44
R013	1 Cory St	NAG02	57	46	46	43	46	46	45	43	46	45	45	42	45	45	45	42	45
R014	5 Cory St	NAG02	54	45	45	43	46	45	43	42	46	45	43	42	44	45	43	42	44
R015	3 Cory St	NAG02	55	46	45	43	46	46	45	43	46	45	44	42	45	45	44	42	45
R017	2 Cory St	NAG02	53	45	44	41	45	45	44	41	45	44	43	41	44	44	43	41	44
R018	9 Cory St Martins Ck Fire Shed	NAG02	58	44	41	42	45	45	41	42	45	44	40	42	43	44	40	42	43
R022	8 Cory St	NAG02	49	43	41	41	43	43	41	41	43	43	40	40	42	43	40	40	42
R020	54 Grace Ave	NAG03	55	46	46	41	44	46	45	41	44	45	45	41	43	45	45	41	43
R021	56 Grace Ave	NAG03	57	45	46	41	44	45	45	41	45	44	45	41	44	44	45	41	44
R023	52 Grace Ave	NAG03	52	45	46	41	43	45	44	41	44	45	44	41	43	45	44	41	43
R024	58 Grace Ave	NAG03	58	44	45	41	44	44	45	42	45	44	45	41	44	44	45	41	44
R026	12 Cory St	NAG04	51	43	42	40	44	43	41	40	44	43	41	40	43	43	41	40	43
R028	14 Cory St	NAG04	51	43	42	40	44	43	41	40	44	43	41	40	43	43	41	40	43
R030	16 Cory St	NAG04	51	43	42	40	44	43	41	40	44	43	41	39	43	43	41	39	43
R033	18 Cory St	NAG04	51	43	41	40	44	43	40	40	44	42	40	39	43	42	40	39	43
R035	20 Cory St	NAG04	51	42	41	39	44	42	40	39	44	42	40	39	42	42	40	39	42
R036	23 Cory St	NAG04	50	42	40	39	44	42	39	39	44	42	39	39	43	42	39	39	43

Rec ID	Location	Ass. Grp	PNTL	Year 6				Year 10				Year 15				Year 20			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R037	22 Cory St	NAG04	51	42	41	39	43	42	40	39	43	42	39	38	42	42	39	38	42
R038	24 Cory St	NAG04	51	42	41	39	43	42	40	39	43	42	39	38	42	42	39	38	42
R039	26 Cory St	NAG04	50	42	40	38	43	42	39	38	43	41	39	38	42	41	39	38	42
R042	29 Cory St	NAG04	50	42	40	39	44	42	39	39	44	42	39	38	43	42	39	38	43
R044	28 Cory St	NAG04	50	42	40	38	43	42	39	38	43	41	39	38	42	41	39	38	42
R045	31 Cory St	NAG04	50	42	40	39	44	42	39	39	44	41	39	38	43	41	39	38	43
R049	30 Cory St	NAG04	50	41	40	38	43	42	39	38	43	41	39	38	42	41	39	38	42
R050	33 Cory St	NAG04	49	42	40	39	44	42	39	39	44	41	39	38	43	41	39	38	43
R051	32 Cory St	NAG04	50	41	40	38	43	41	39	38	43	41	38	37	42	41	38	37	42
R052	35 Cory St	NAG04	50	41	40	38	43	42	39	38	43	41	38	38	43	41	38	38	43
R054	34 Cory St	NAG04	49	41	39	38	43	41	38	38	43	40	38	37	42	40	38	37	42
R056	37 Cory St	NAG04	49	41	39	38	44	41	38	38	44	41	38	37	43	41	38	37	43
R057	36 Cory St	NAG04	49	41	39	37	43	41	38	37	43	40	38	37	43	40	38	37	43
R058	39 Cory St	NAG04	47	41	39	37	43	41	38	37	43	40	37	37	42	40	37	37	42
R059	38 Cory St	NAG04	48	41	39	37	43	41	38	37	43	40	37	37	42	40	37	37	42
R061	41 Cory St	NAG04	47	40	38	37	43	41	37	37	43	40	36	37	42	40	36	37	42
R062	40 Cory St	NAG04	47	40	38	36	42	40	37	36	42	40	37	35	41	40	37	35	41
R064	43 Cory St	NAG04	46	40	37	35	42	40	36	35	42	40	36	35	41	40	36	35	41
R065	44 Cory St	NAG04	46	40	37	35	42	40	37	35	42	40	36	35	41	40	36	35	41
R016	256 Dungog Rd	NAG05	40	44	45	42	45	44	45	42	45	44	45	42	45	44	45	42	45
R019	1-3 Grace Ave	NAG05	40	43	44	41	44	43	44	41	44	43	44	41	44	43	44	41	44
R041	249 Dungog Rd	NAG06	40	41	43	40	38	41	43	40	38	41	43	40	38	41	43	40	38
R043	231 Dungog Rd	NAG06	40	39	42	38	38	39	42	38	38	39	42	38	38	39	42	38	38
R055	221 Dungog Rd	NAG06	40	39	43	37	38	39	42	37	38	40	42	37	38	40	42	37	38
R066	223 Dungog Rd	NAG06	40	38	42	36	34	38	42	36	34	38	42	36	34	38	42	36	34
R070	199 Dungog Rd	NAG06	40	40	44	38	37	40	42	38	37	40	42	38	37	40	42	38	37
R025	281 Dungog Rd	NAG07	40	46	48	46	40	47	48	46	40	47	48	46	40	47	48	46	40
R031	303 Dungog Rd	NAG07	40	43	44	43	37	43	44	43	36	43	44	43	36	42	44	43	36
R040	279 Dungog Rd	NAG07	40	42	45	41	38	44	45	41	38	43	45	41	38	43	45	41	38
R087	253 Dungog Rd	NAG08	40	33	37	31	26	33	36	31	26	32	36	31	26	31	36	31	26
R115	257 Dungog Rd	NAG08	40	35	39	33	30	35	39	33	30	35	39	33	30	35	39	33	30

Rec ID	Location	Ass. Grp	PNTL	Year 6				Year 10				Year 15				Year 20			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R119	9 Mowbray Ln	NAG08	40	23	25	26	17	24	28	27	18	24	26	27	18	24	26	27	18
R122	181 Dungog Rd	NAG08	40	37	41	35	34	37	39	35	34	37	39	35	34	37	39	35	34
R128	259 Dungog Rd	NAG08	40	32	34	31	26	32	34	30	26	32	34	31	26	31	34	31	26
R129	261 Dungog Rd	NAG08	40	32	37	31	27	35	36	31	27	32	37	31	27	32	37	31	27
R131	25 Mowbray Ln	NAG08	40	23	25	25	17	23	26	26	17	23	26	25	17	23	26	26	17
R132	57 Mowbray Ln	NAG08	40	28	30	29	21	28	31	30	22	28	31	30	22	28	31	30	22
R133	147 Dungog Rd	NAG08	40	36	42	34	34	36	38	34	34	36	38	34	34	36	38	34	34
R136	255 Dungog Rd	NAG08	40	33	37	31	25	33	37	31	25	32	36	31	25	31	36	31	25
R138	76 Mowbray Ln	NAG08	40	31	36	34	24	32	36	34	25	32	36	34	24	32	36	34	24
R141	80 Mowbray Ln	NAG08	40	32	37	30	26	34	36	30	26	32	36	30	26	32	36	30	26
R143	121 Dungog Rd	NAG08	40	35	40	32	34	35	37	32	34	35	37	32	33	35	37	32	33
R145	120 Dungog Rd	NAG08	40	34	40	30	33	34	37	30	33	34	37	30	33	34	37	30	33
R148	51 Dungog Rd	NAG08	40	34	39	32	30	34	37	32	30	34	36	32	30	34	36	32	30
R149	83 Dungog Rd	NAG08	40	34	39	32	31	34	36	32	31	34	36	32	31	34	36	32	31
R034	338 Dungog Rd	NAG09	40	44	42	43	36	45	45	44	37	41	42	43	35	41	44	43	35
R047	341 Dungog Rd	NAG09	40	41	38	41	30	41	43	42	31	37	39	41	29	36	42	41	29
R053	333 Dungog Rd	NAG09	40	41	41	41	33	41	41	42	33	39	40	40	31	38	40	40	31
R046	406 Dungog Rd	NAG10	40	40	37	42	30	40	41	42	30	39	41	44	29	37	42	44	30
R063	9 Horns Crossing Rd	NAG10	40	39	36	39	29	39	42	41	30	39	42	41	29	37	42	41	30
R069	29 Horns Crossing Rd	NAG10	40	38	36	38	28	39	42	41	30	39	39	41	29	39	42	41	31
R075	24 Horns Crossing Rd	NAG10	40	37	35	38	26	38	41	40	26	37	41	40	27	37	41	41	28
R088	55 Horns Crossing Rd	NAG10	40	37	36	38	28	38	42	40	29	38	39	40	29	38	39	41	30
R107	52 Horns Crossing Rd	NAG10	40	25	26	27	18	26	29	29	19	25	28	29	19	25	29	29	19
R073	16 View St	NAG11	40	37	35	39	26	37	40	40	26	37	40	42	26	37	40	42	28
R083	24 View St	NAG11	40	36	34	39	25	36	39	40	25	34	40	41	26	34	40	42	27
R092	32 View St	NAG11	40	33	31	36	25	33	37	36	25	33	35	37	25	32	35	38	26
R094	19 View St	NAG11	40	36	34	38	24	36	39	40	25	36	40	41	25	37	40	41	27
R095	15 View St	NAG11	40	32	33	37	24	33	39	39	24	33	38	39	25	33	38	40	25
R097	21 View St	NAG11	40	36	34	38	24	36	39	40	24	36	39	41	25	36	39	41	27
R098	27 View St	NAG11	40	36	33	38	24	36	39	39	25	36	39	41	26	36	39	41	27
R101	14 Wakaya Cl	NAG11	40	29	30	35	23	29	33	35	23	29	31	35	23	28	32	36	23

Rec ID	Location	Ass. Grp	PNTL	Year 6				Year 10				Year 15				Year 20			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R102	4 Wakaya Cl	NAG11	40	32	33	38	24	32	38	38	24	32	34	37	25	32	35	38	25
R103	18 Wakaya Cl	NAG11	40	26	27	34	20	26	31	34	20	26	29	34	20	26	29	35	20
R104	17 View St	NAG11	40	27	28	30	21	27	31	31	21	28	31	31	21	27	31	31	21
R105	35 View St	NAG11	40	35	34	38	24	35	38	39	24	36	39	40	25	36	39	41	26
R110	11 Wakaya Cl	NAG11	40	30	32	36	23	30	36	35	23	30	33	35	23	29	33	36	23
R111	45 View St	NAG11	40	33	33	38	23	33	36	38	23	32	36	40	24	32	37	40	25
R113	7 Wakaya Cl	NAG11	40	31	30	35	24	31	36	36	24	32	33	36	24	31	34	37	24
R117	55 View St	NAG11	40	31	29	33	23	31	33	33	23	31	33	33	24	31	34	35	24
R118	24 Wakaya Cl	NAG11	40	21	23	32	17	22	24	32	17	21	24	31	16	22	24	31	16
R120	29 Wakaya Cl	NAG11	40	28	30	34	21	28	33	34	21	27	30	34	21	27	33	35	22
R125	58 View St	NAG11	40	30	30	33	23	30	32	34	23	30	31	33	23	29	32	35	23
R126	80 Horns Crossing Rd	NAG11	40	24	26	28	17	25	29	29	18	24	28	29	17	24	29	30	18
R127	28 Wakaya Cl	NAG11	40	25	26	32	20	25	29	32	19	25	27	33	20	24	27	34	20
R130	59 View St	NAG11	40	30	29	32	22	30	33	32	22	30	33	33	23	30	33	35	23
R134	76 View St	NAG11	40	26	29	33	20	26	31	33	20	26	29	33	20	25	29	34	20
R135	71 View St	NAG11	40	29	28	34	22	29	34	33	21	29	31	34	22	29	32	34	22
R137	84 View St	NAG11	40	25	29	33	19	25	31	33	19	25	28	33	19	25	31	34	19
R139	83 View St	NAG11	40	29	30	34	21	29	34	34	21	29	31	34	21	28	32	35	21
R140	90 View St	NAG11	40	24	27	32	19	25	32	33	18	24	30	33	18	24	30	34	18
R142	87 View St	NAG11	40	29	29	34	21	29	33	34	21	28	31	34	21	27	31	35	21
R144	94 View St	NAG11	40	23	26	32	17	23	30	32	17	23	29	33	18	23	29	33	18
R146	95 View St	NAG11	40	24	27	34	18	24	33	32	18	23	30	33	18	23	30	33	18
R147	93 View St	NAG11	40	26	28	33	19	26	33	33	19	25	30	33	19	25	31	33	19
R060	126 Merchants Rd	NAG12	40	24	23	27	21	24	21	28	21	24	21	28	21	24	21	28	21
R068	60 Merchants Rd	NAG12	40	22	22	25	18	22	19	25	18	22	19	25	18	22	19	26	18
R071	145 Merchants Rd	NAG12	40	23	22	26	19	23	20	26	20	23	20	26	20	23	20	26	20
R072	60 Merchants Rd	NAG12	40	20	20	24	16	20	18	24	16	20	18	24	16	20	18	24	16
R074	218 Merchants Rd	NAG12	40	21	20	24	20	21	18	24	20	21	18	24	20	21	18	24	20
R077	448 Dungog Rd	NAG12	40	20	21	25	16	20	20	25	16	20	19	25	16	20	19	25	16
R079	46 Merchants Rd	NAG12	40	19	20	24	15	19	18	24	15	19	18	24	15	20	18	24	15
R080	462 Dungog Rd	NAG12	40	19	20	23	15	19	18	23	15	19	18	23	15	19	18	23	15

Rec ID	Location	Ass. Grp	PNTL	Year 6				Year 10				Year 15				Year 20			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R081	26 Merchants Rd	NAG12	40	19	19	23	15	19	18	23	15	19	18	23	15	19	18	23	15
R082	97 Merchants Rd	NAG12	40	22	21	26	18	22	19	26	18	22	19	26	18	22	19	26	18
R084	168 Merchants Rd	NAG12	40	22	21	25	20	22	19	25	20	22	19	25	20	22	19	25	20
R089	24 Merchants Rd	NAG12	40	18	19	22	14	18	17	23	14	18	17	22	14	18	17	23	14
R096	221 Merchants Rd	NAG12	40	20	19	22	20	20	17	22	20	20	17	22	20	20	17	22	20
R099	215 Merchants Rd	NAG12	40	20	18	23	19	20	17	23	19	20	17	23	19	20	17	23	19
R100	22 Merchants Rd	NAG12	40	18	19	22	14	18	17	22	14	18	16	22	14	18	17	22	14
R106	17 Merchants Rd	NAG12	40	18	18	22	13	18	16	22	13	18	16	22	13	18	16	22	13
R108	73 Merchants Rd	NAG12	40	20	19	24	16	20	17	24	16	20	17	24	15	20	17	24	16
R114	9 Merchants Rd	NAG12	40	17	18	22	13	17	16	22	13	17	16	22	13	17	16	22	13
R124	43 Merchants Rd	NAG12	40	19	18	24	14	19	17	24	14	19	17	24	14	19	17	24	14
R032	14 Vogeles Rd	NAG13	40	33	30	31	36	33	29	31	36	33	29	31	36	33	29	31	36
R048	12 Vogeles Rd	NAG13	40	32	31	29	36	32	30	29	36	32	30	29	36	32	30	29	36
R067	159 Vogeles Rd	NAG13	40	38	33	40	43	38	33	40	43	37	33	40	42	37	33	40	42
R093	197 Vogeles Rd	NAG13	40	35	33	36	41	35	33	36	41	35	33	36	41	34	33	36	41
R076	170 Dungog Rd	NAG14	40	37	38	34	40	37	38	34	40	37	38	34	39	37	38	34	39
R078	73 Black Rock Rd	NAG14	40	25	24	24	28	25	22	24	28	25	22	24	28	25	22	24	28
R085	65 Cory St	NAG14	40	32	30	28	38	33	30	28	38	32	29	28	36	32	29	28	36
R086	67 Cory St	NAG14	40	32	29	28	38	32	29	28	38	32	29	28	36	32	29	28	36
R090	69 Cory St	NAG14	40	31	29	28	36	31	28	28	36	31	28	28	35	31	28	28	35
R091	75 Black Rock Rd	NAG14	40	25	23	21	28	25	22	21	28	25	22	21	28	25	22	21	28
R109	11 Cook St	NAG14	40	26	24	23	32	26	24	23	32	26	23	23	32	26	23	23	32
R112	94 Cory St	NAG14	40	31	29	27	38	32	29	27	38	31	28	27	36	31	28	27	36
R116	95 Cory St	NAG14	40	29	27	25	37	30	27	25	37	29	26	25	36	29	26	25	36
R121	10 Cook St Martins Creek School	NAG14	48	28	26	25	36	29	25	25	36	28	25	25	35	28	25	25	35
R123	97 Cory St	NAG14	40	29	27	25	37	30	27	25	37	29	26	25	36	29	26	25	36

Table A6.4 – Receivers where the Predicted Day-time Noise Levels exceeds the PNTL, dB(A)

(Modelled with 20 laden truck movement per hour to represent the capped peak daily truck movements of 140 laden trucks)

Rec ID	Location	Ass. Grp	PNTL	Year 6			Year 10			Year 15			Year 20		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R016	256 Dungog Rd	NAG05	40	-	45	-	-	45	-	-	45	-	-	45	-
R019	1-3 Grace Ave	NAG05	40	-	44	-	-	44	-	-	44	-	-	44	-
R041	249 Dungog Rd	NAG06	40	-	43	-	-	43	-	-	43	-	-	43	-
R043	231 Dungog Rd	NAG06	40	42	-	-	42	-	-	42	-	-	42	-	-
R055	221 Dungog Rd	NAG06	40	-	43	-	42	-	-	42	-	-	42	-	-
R066	223 Dungog Rd	NAG06	40	42	-	-	42	-	-	42	-	-	42	-	-
R070	199 Dungog Rd	NAG06	40	-	44	-	42	-	-	42	-	-	42	-	-
R025	281 Dungog Rd	NAG07	40	-	-	48	-	-	48	-	-	48	-	-	48
R031	303 Dungog Rd	NAG07	40	-	44	-	-	44	-	-	44	-	-	44	-
R040	279 Dungog Rd	NAG07	40	-	45	-	-	45	-	-	45	-	-	45	-
R122	181 Dungog Rd	NAG08	40	41	-	-	-	-	-	-	-	-	-	-	-
R133	147 Dungog Rd	NAG08	40	42	-	-	-	-	-	-	-	-	-	-	-
R034	338 Dungog Rd	NAG09	40	-	44	-	-	45	-	-	43	-	-	44	-
R047	341 Dungog Rd	NAG09	40	41	-	-	-	43	-	41	-	-	42	-	-
R053	333 Dungog Rd	NAG09	40	41	-	-	42	-	-	-	-	-	-	-	-
R046	406 Dungog Rd	NAG10	40	42	-	-	42	-	-	-	44	-	-	44	-
R063	9 Horns Crossing Rd	NAG10	40	-	-	-	42	-	-	42	-	-	42	-	-
R069	29 Horns Crossing Rd	NAG10	40	-	-	-	42	-	-	41	-	-	42	-	-
R075	24 Horns Crossing Rd	NAG10	40	-	-	-	41	-	-	41	-	-	41	-	-
R088	55 Horns Crossing Rd	NAG10	40	-	-	-	42	-	-	-	-	-	41	-	-
R073	16 View St	NAG11	40	-	-	-	-	-	-	42	-	-	42	-	-
R083	24 View St	NAG11	40	-	-	-	-	-	-	41	-	-	42	-	-
R094	19 View St	NAG11	40	-	-	-	-	-	-	41	-	-	41	-	-
R097	21 View St	NAG11	40	-	-	-	-	-	-	41	-	-	41	-	-
R098	27 View St	NAG11	40	-	-	-	-	-	-	41	-	-	41	-	-
R105	35 View St	NAG11	40	-	-	-	-	-	-	-	-	-	41	-	-
R067	159 Vogeles Rd	NAG13	40	-	43	-	-	43	-	42	-	-	42	-	-
R093	197 Vogeles Rd	NAG13	40	41	-	-	41	-	-	41	-	-	41	-	-
	Total			8	9	1	11	8	1	15	7	1	17	7	1

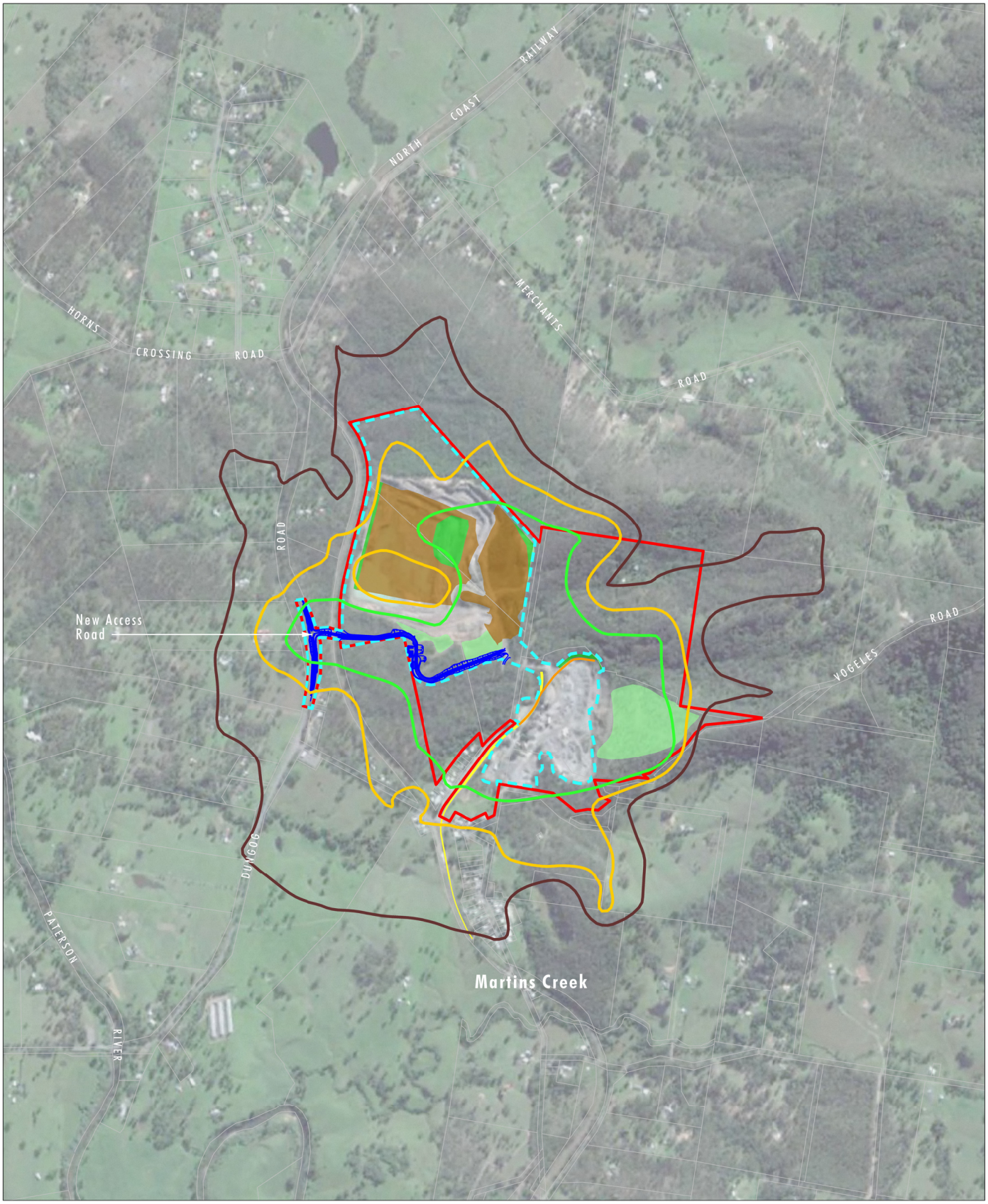


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.9

Conceptual Quarry Plan Year 6
Predicted Noise Level
Calm Neutral

File Name (A4): R04/3957_167.dgn
20201113 15.29

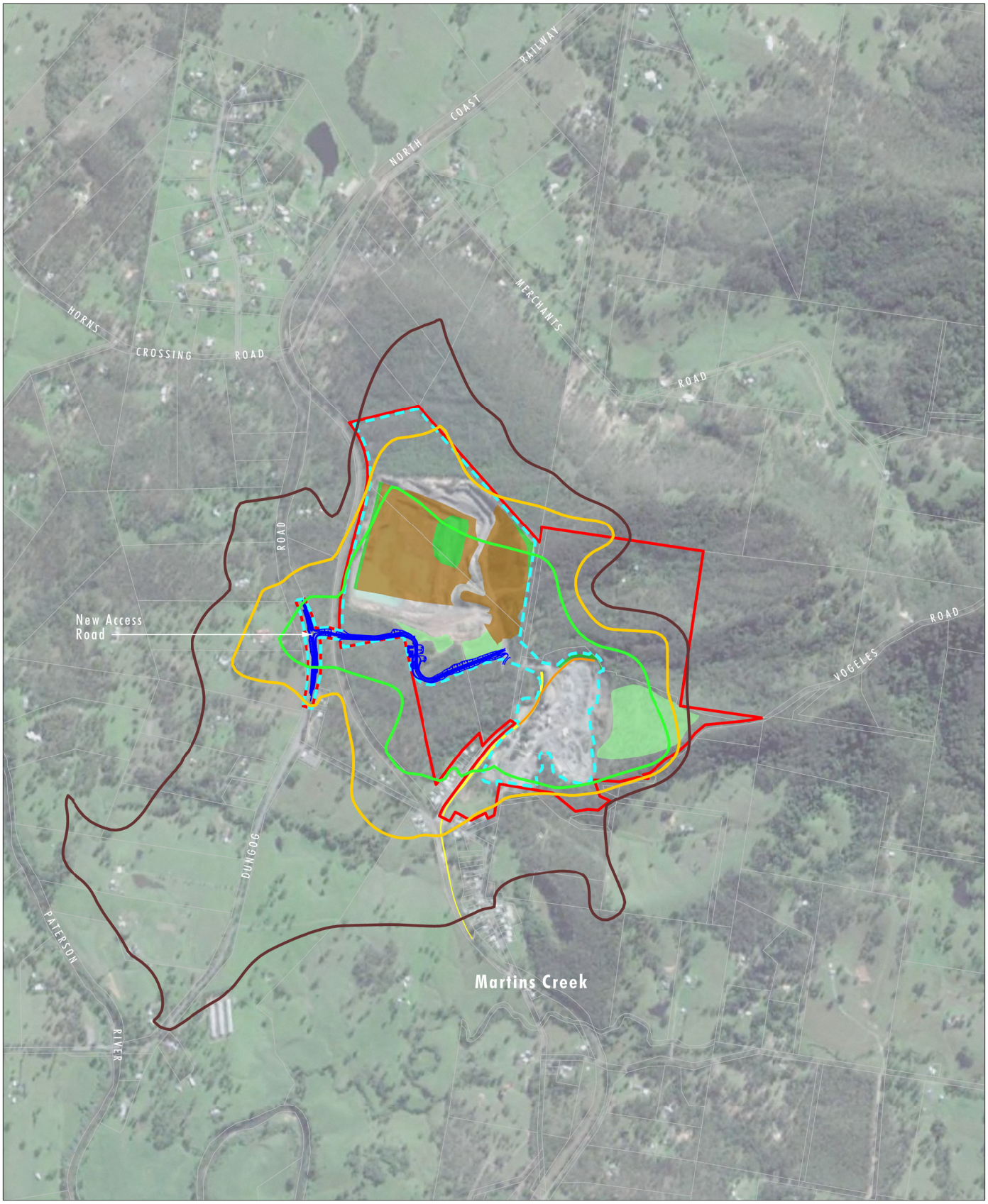


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.10

Conceptual Quarry Plan Year 6
Predicted Noise Level
Easterly 1.7 m/s

File Name (A4): R04/3957_168.dgn
20201113 15.30

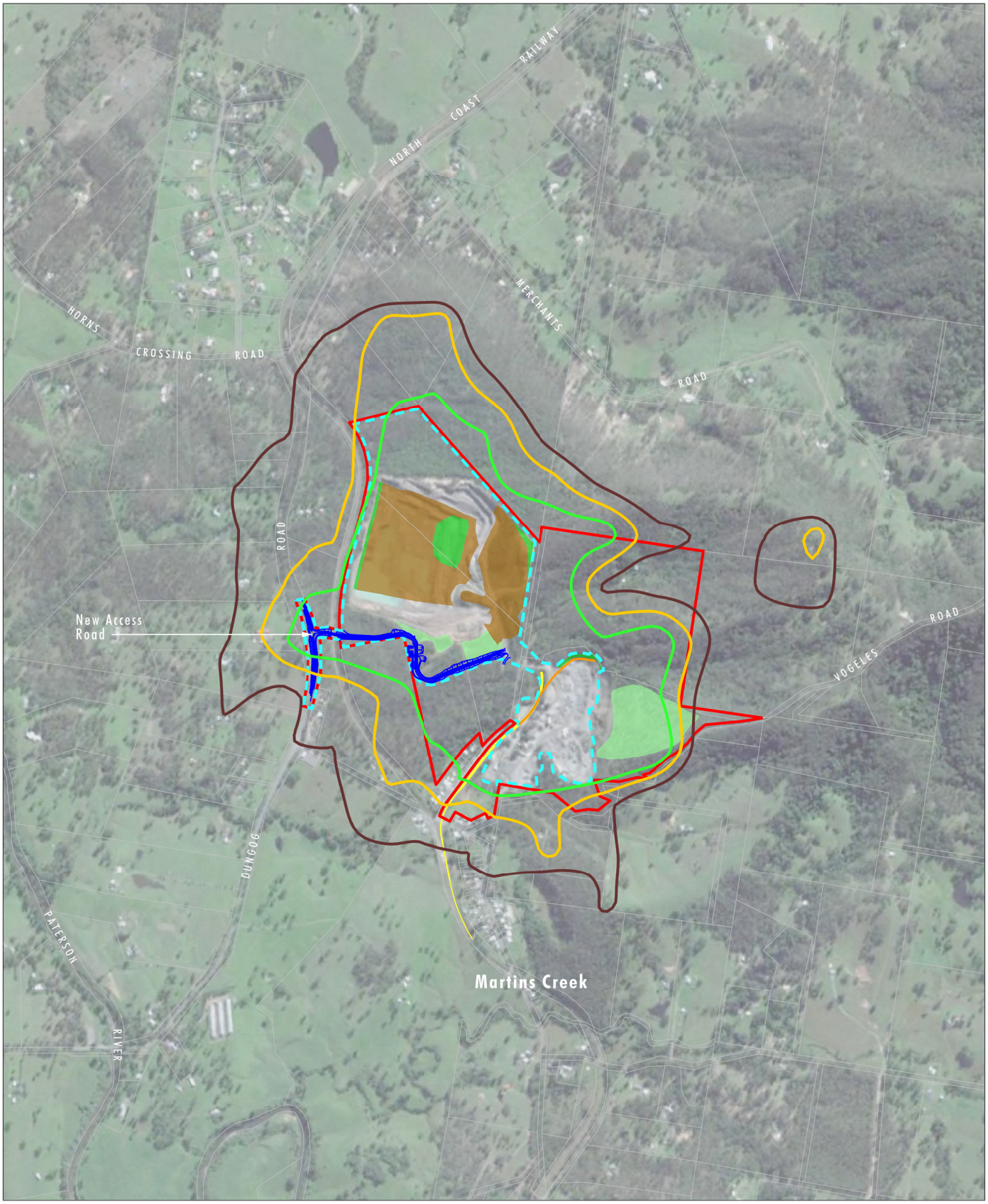


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.11

Conceptual Quarry Plan Year 6
Predicted Noise Level
Southerly 2.3 m/s

File Name (A4): R04/3957_169.dgn
20201113 15.31

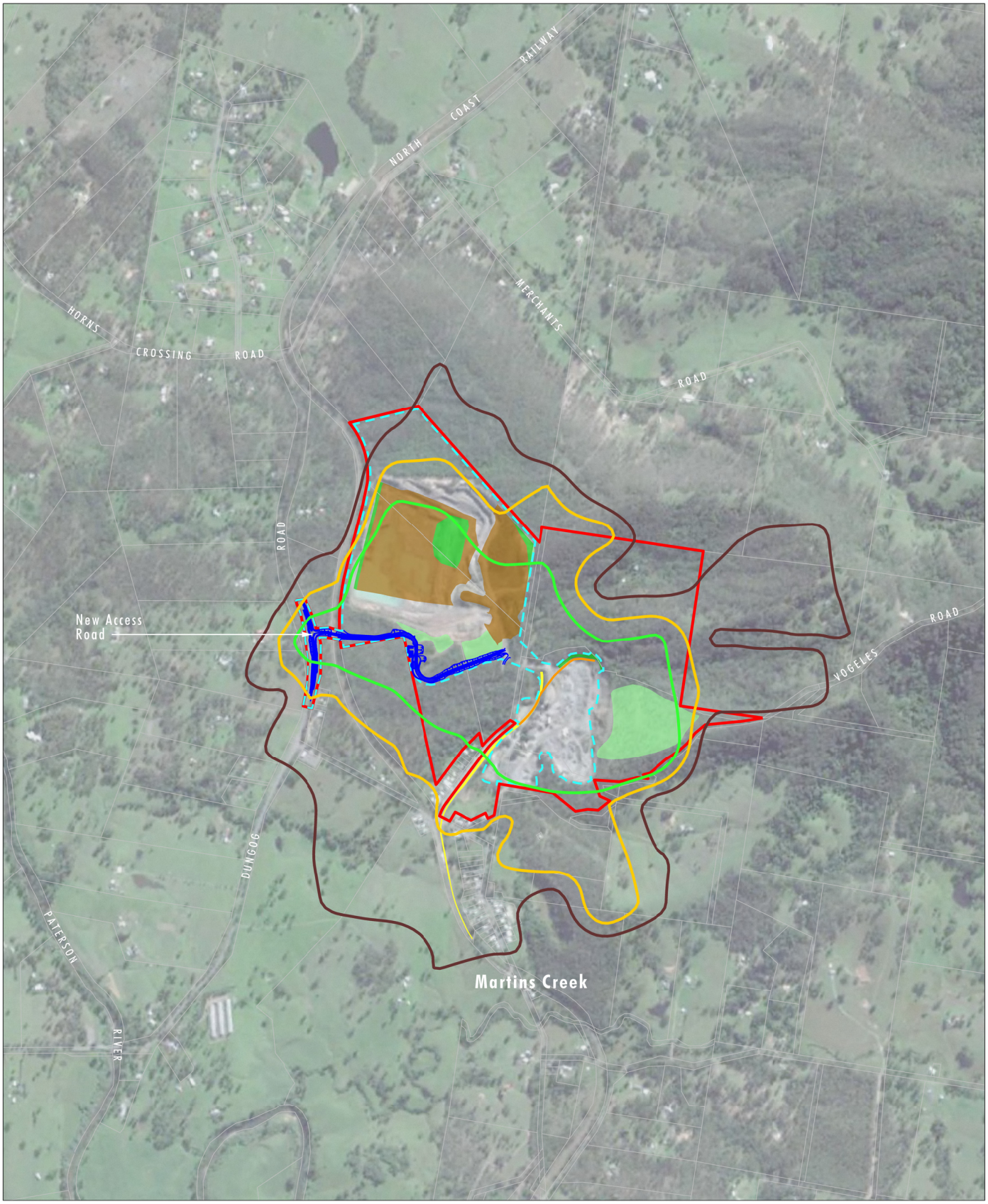


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.12

Conceptual Quarry Plan Year 6
Predicted Noise Level
North-westerly 3.0 m/s

File Name (A4): R04/3957_170.dgn
20201113 15.33

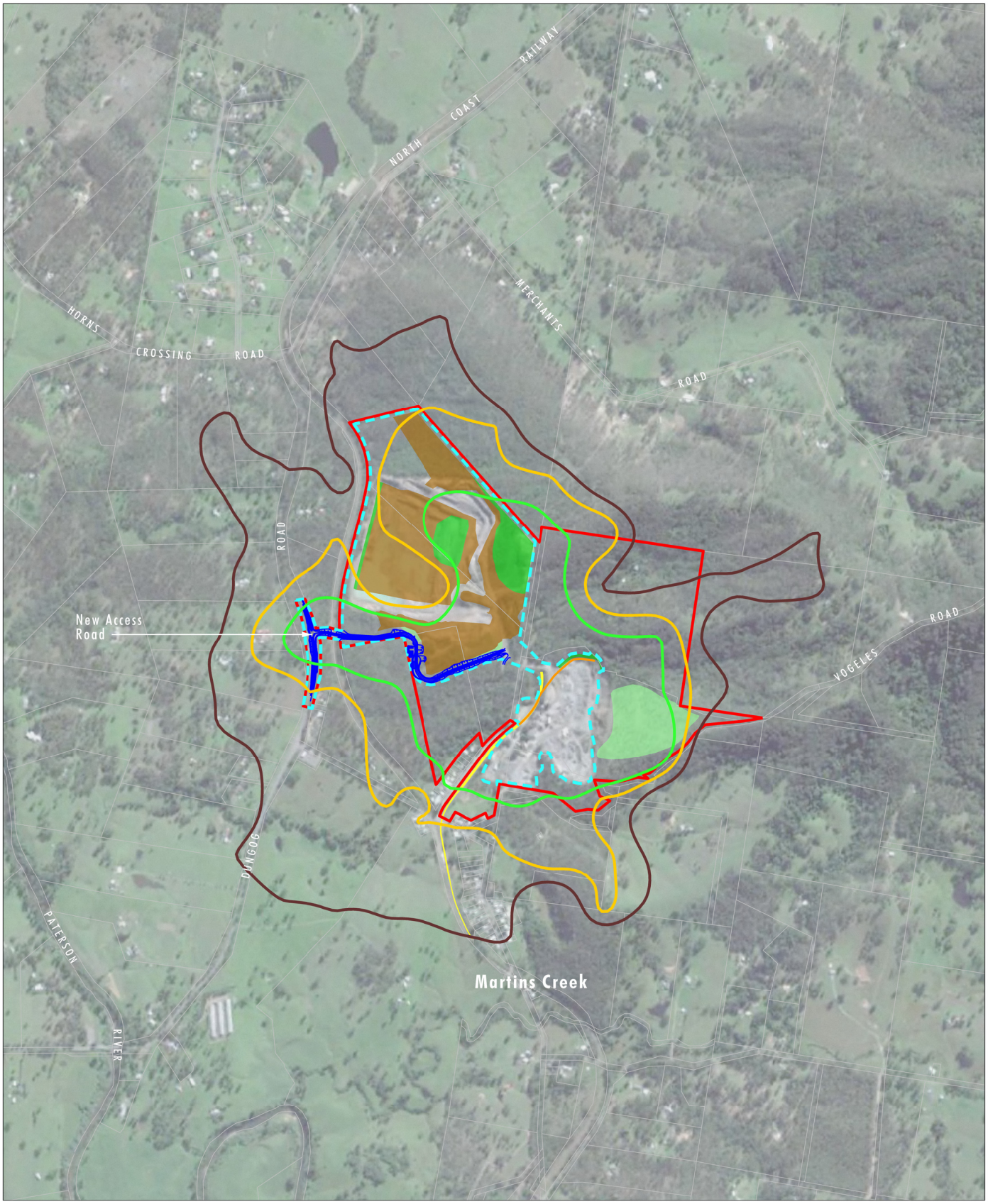


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.13

Conceptual Quarry Plan Year 10
Predicted Noise Level
Calm Neutral

File Name (A4): R04/3957_148.dgn
20201113 14.53

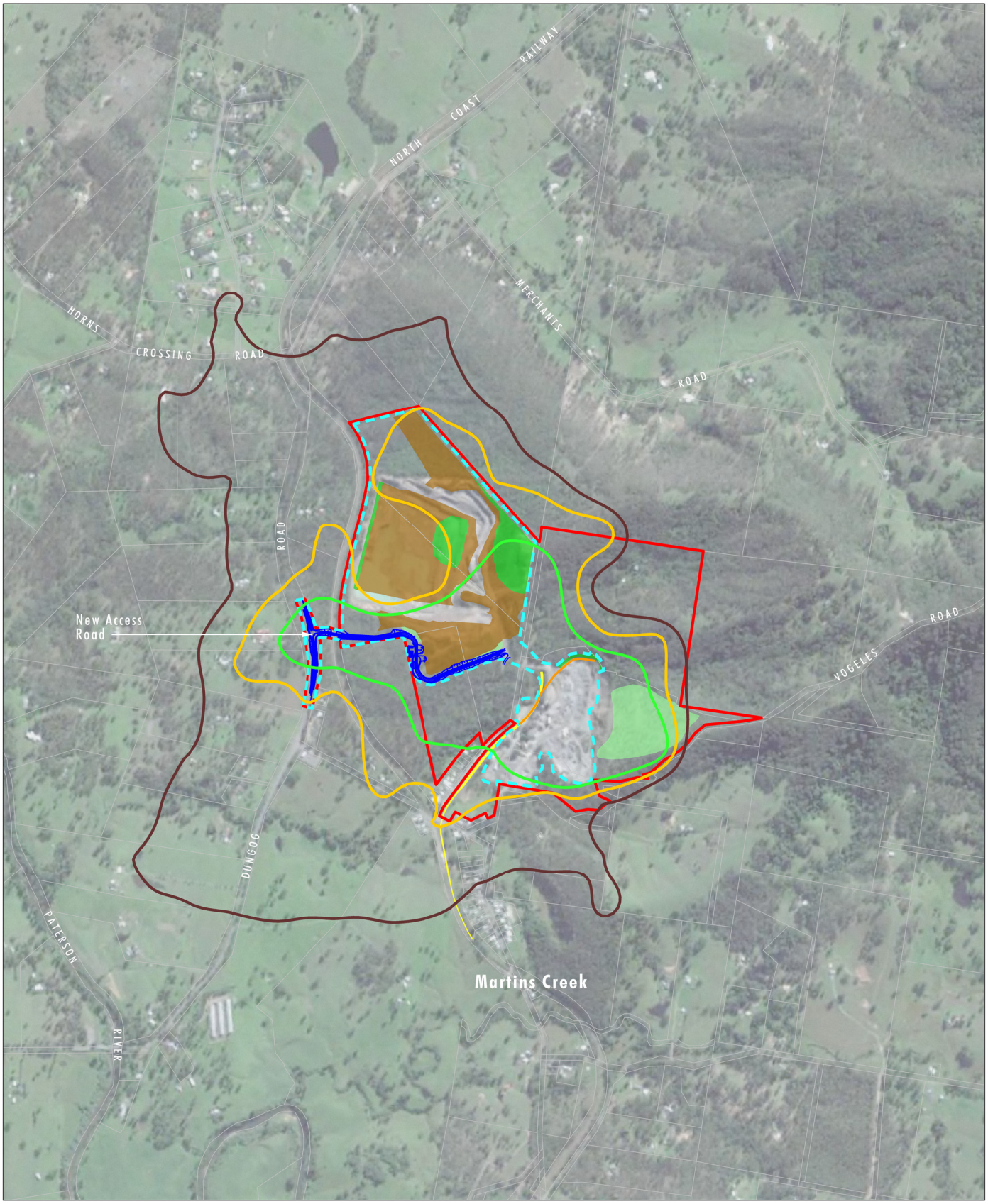


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.14

Conceptual Quarry Plan Year 10
Predicted Noise Level
Easterly 1.7 m/s

File Name (A4): R04/3957_149.dgn
20201113 14.57

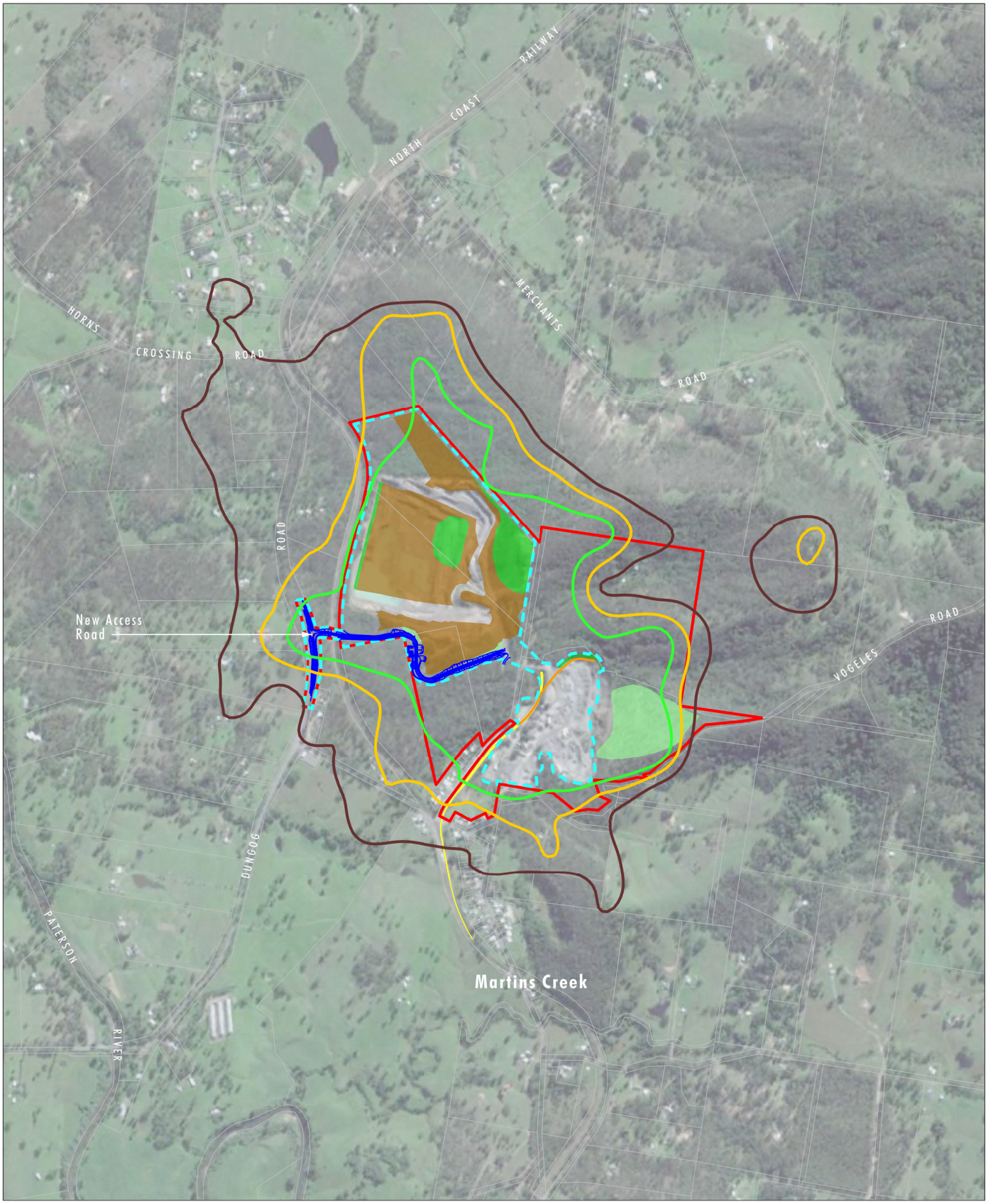


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.15

Conceptual Quarry Plan Year 10
Predicted Noise Level
Southerly 2.3 m/s

File Name (A4): R04/3957_150.dgn
20201113 14.59

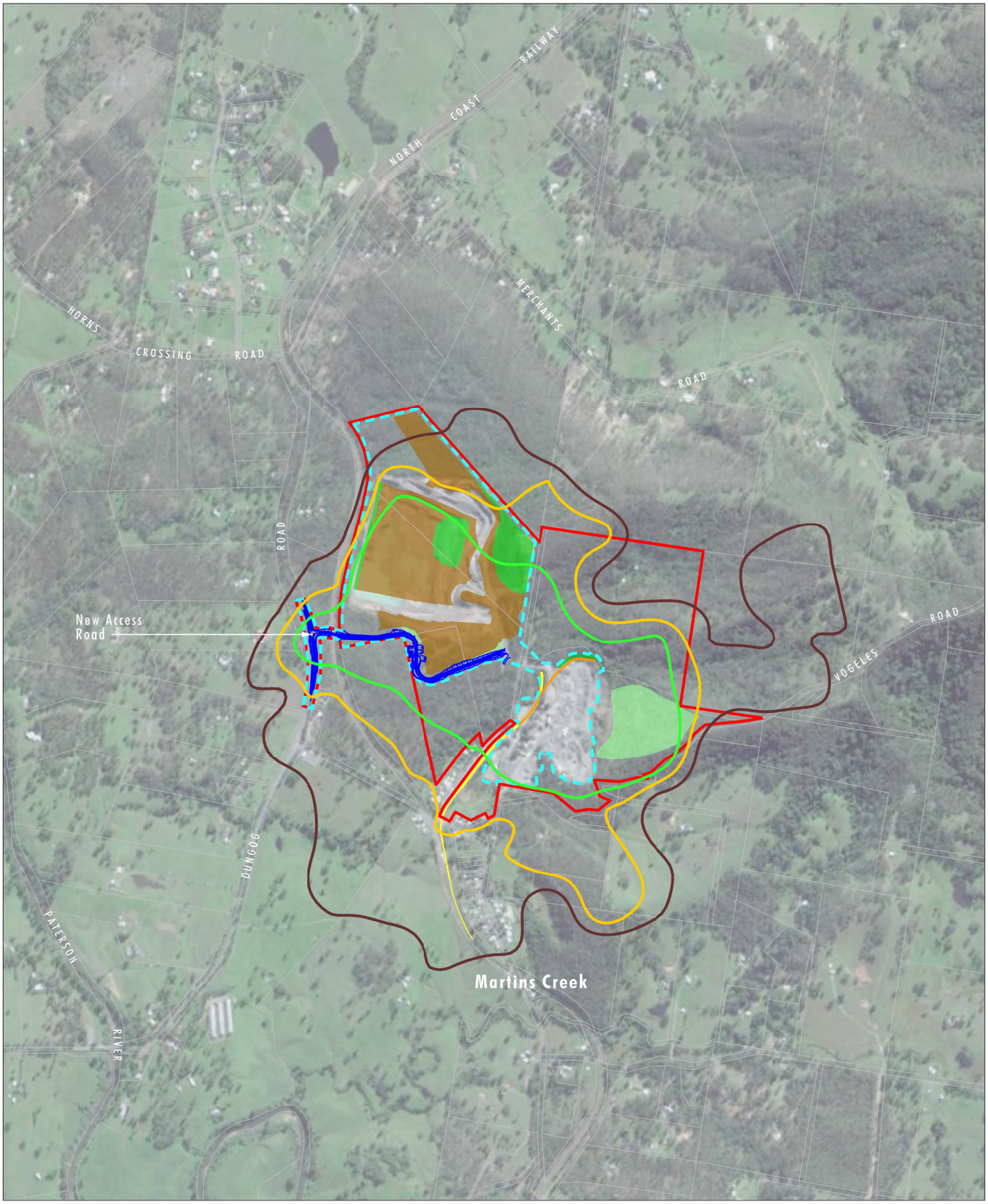


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.16

Conceptual Quarry Plan Year 10
Predicted Noise Level
North-westerly 3.0 m/s

File Name (A4): R04/3957_151.dgn
20201113 15.01

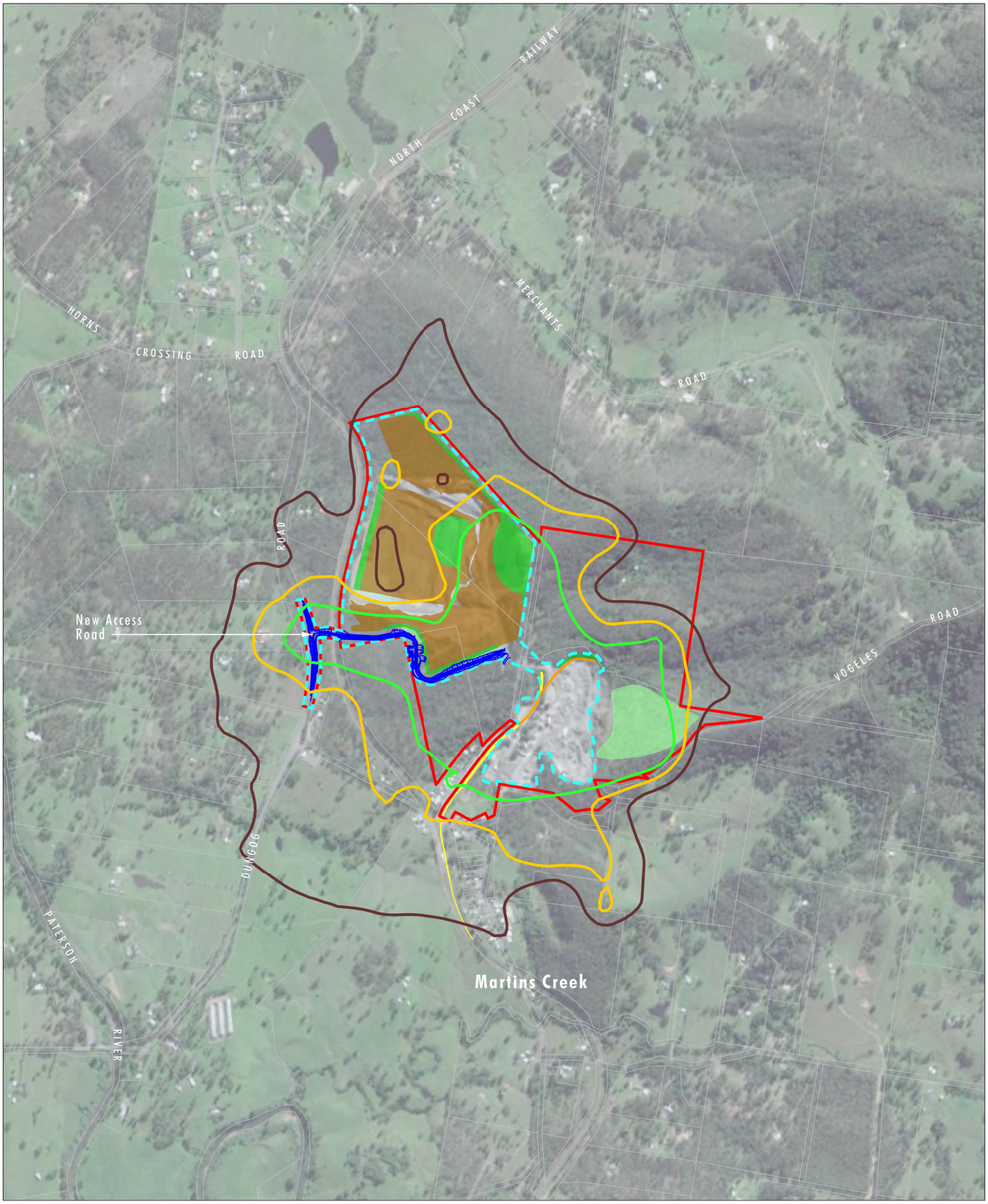


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.17

Conceptual Quarry Plan Year 15
Predicted Noise Level
Calm Neutral

File Name (A4): R04/3957_171.dgn
20201113 15.35

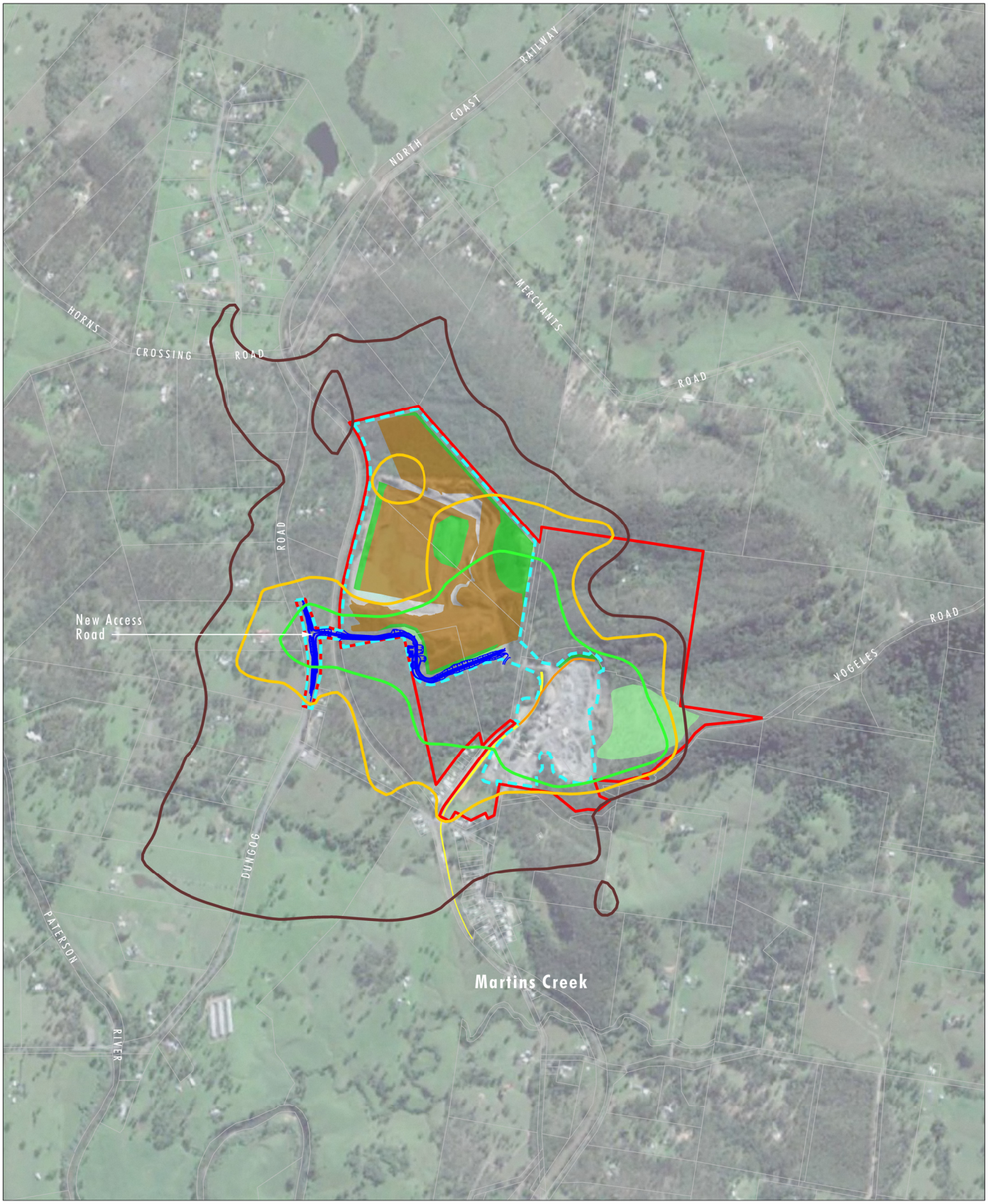


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.18

Conceptual Quarry Plan Year 15
Predicted Noise Level
Easterly 1.7 m/s

File Name (A4): R04/3957_172.dgn
20201113 15.36

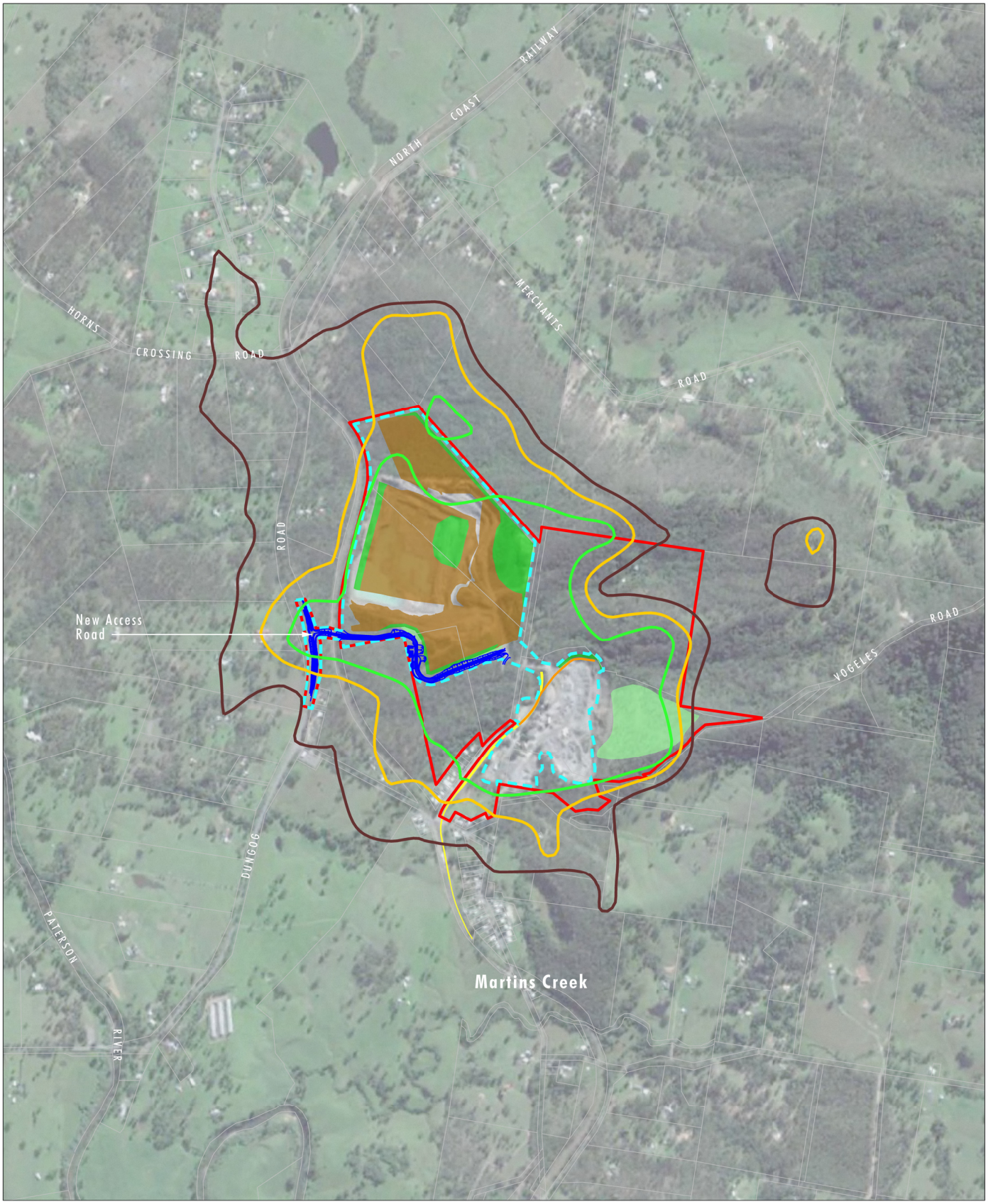


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.19

Conceptual Quarry Plan Year 15
Predicted Noise Level
Southerly 2.3 m/s

File Name (A4): R04/3957_173.dgn
20201113 15.37

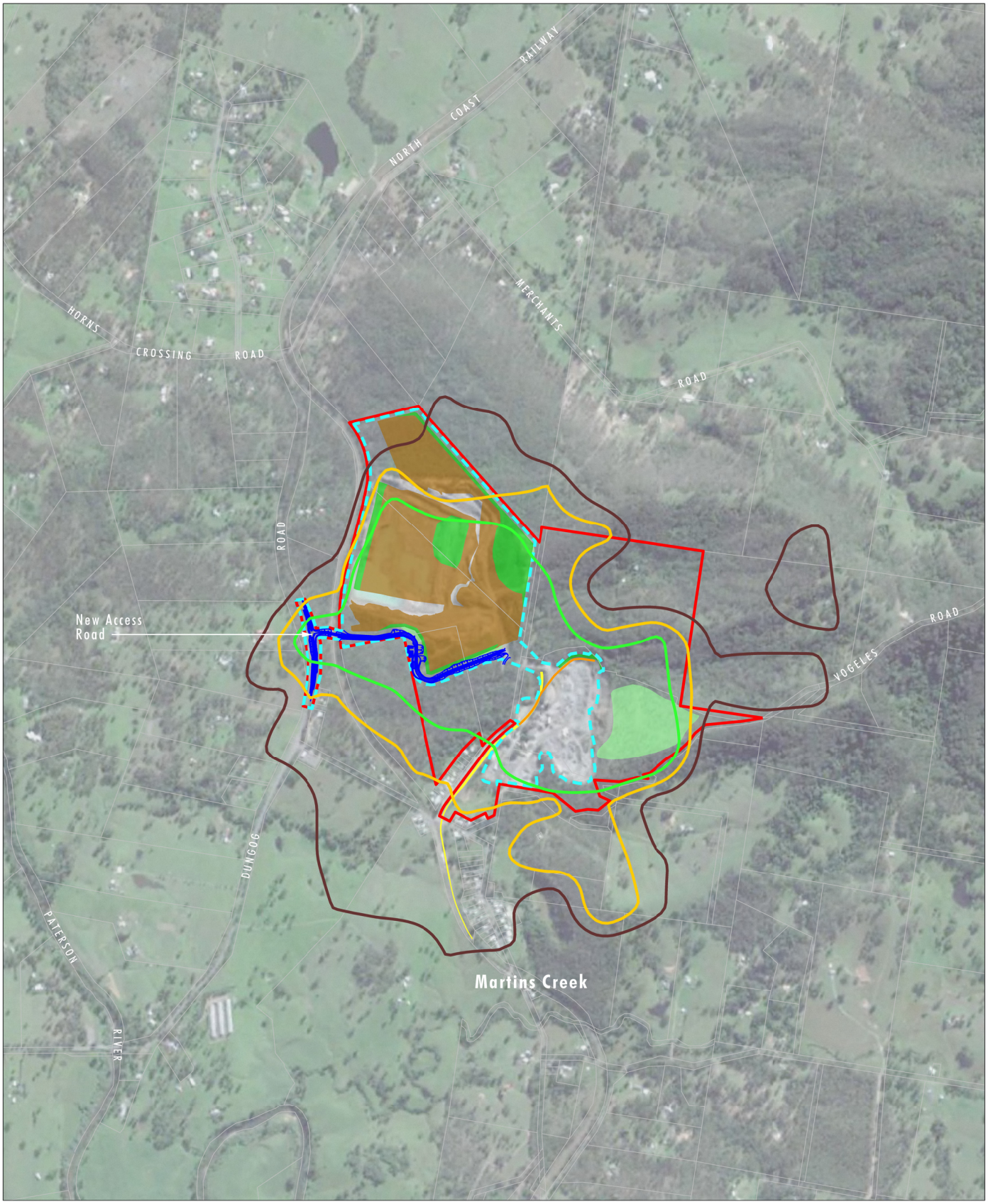


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.20

Conceptual Quarry Plan Year 15
Predicted Noise Level
North-westerly 3.0 m/s

File Name (A4): R04/3957_174.dgn
20201113 15.38

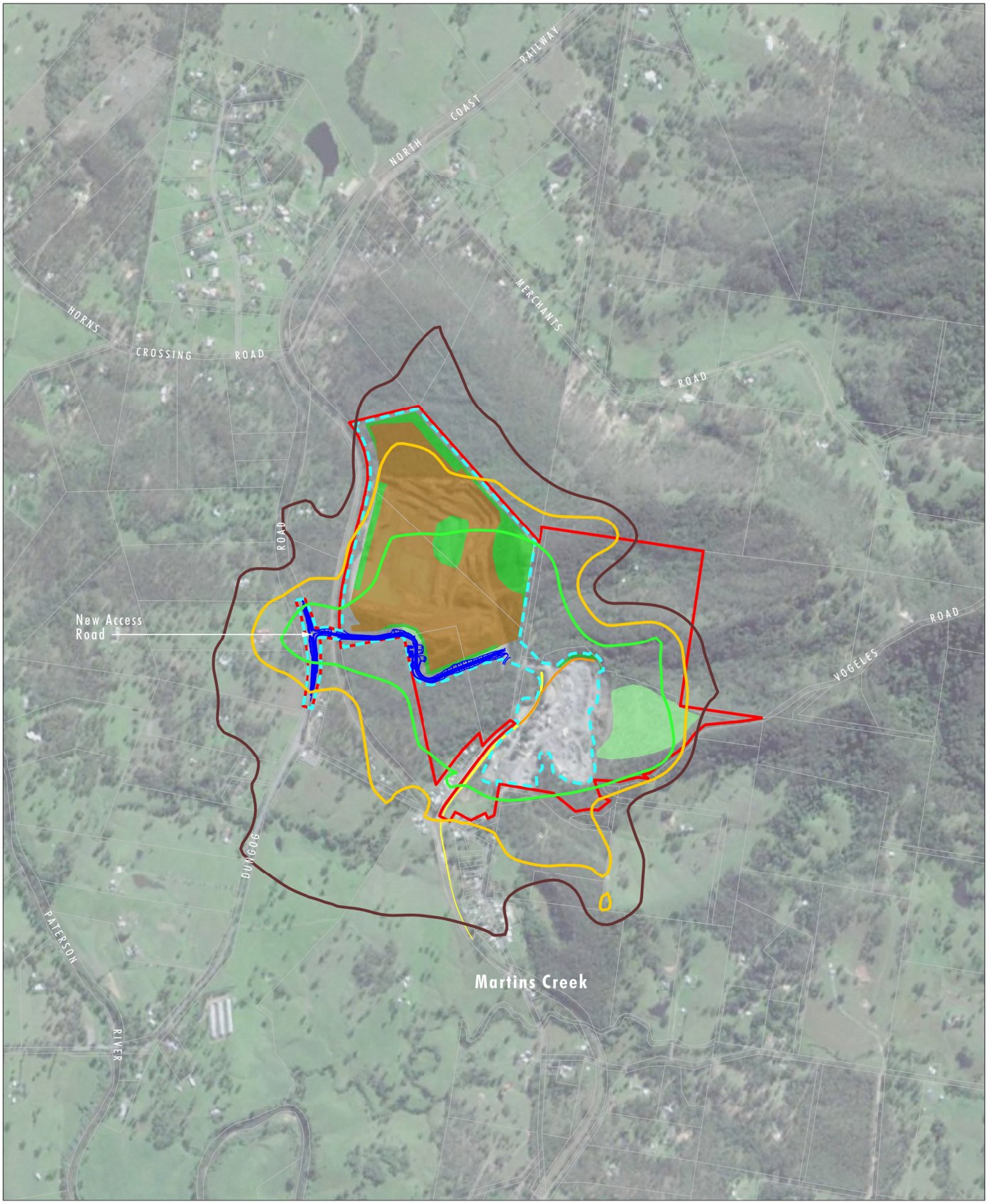


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.21

Conceptual Quarry Plan Year 20
Predicted Noise Level
Calm Neutral

File Name (A4): R04/3957_175.dgn
20201113 15.39

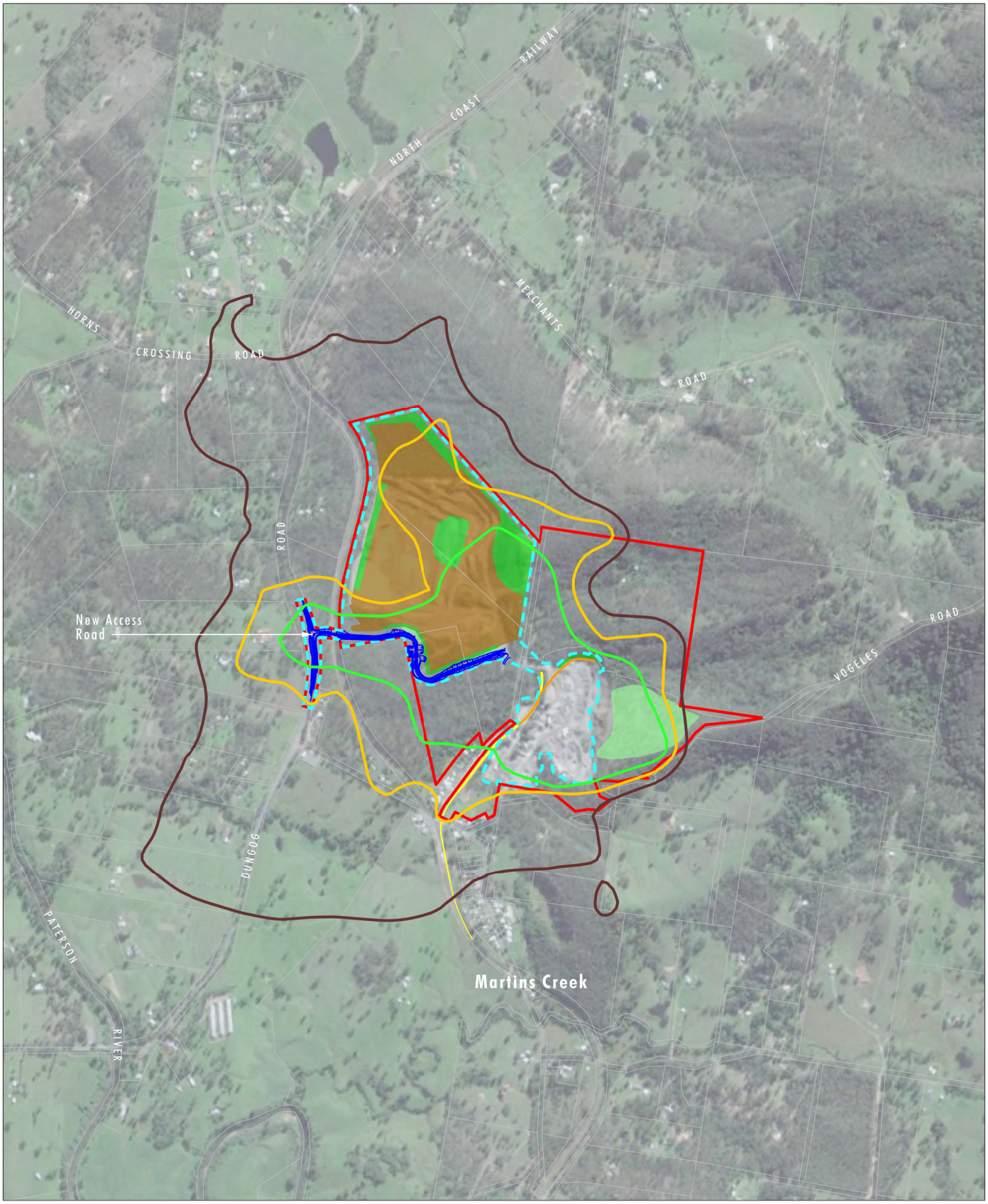


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.22

Conceptual Quarry Plan Year 20
Predicted Noise Level
Easterly 1.7 m/s

File Name (A4): R04/3957_176.dgn
20201113 15.41

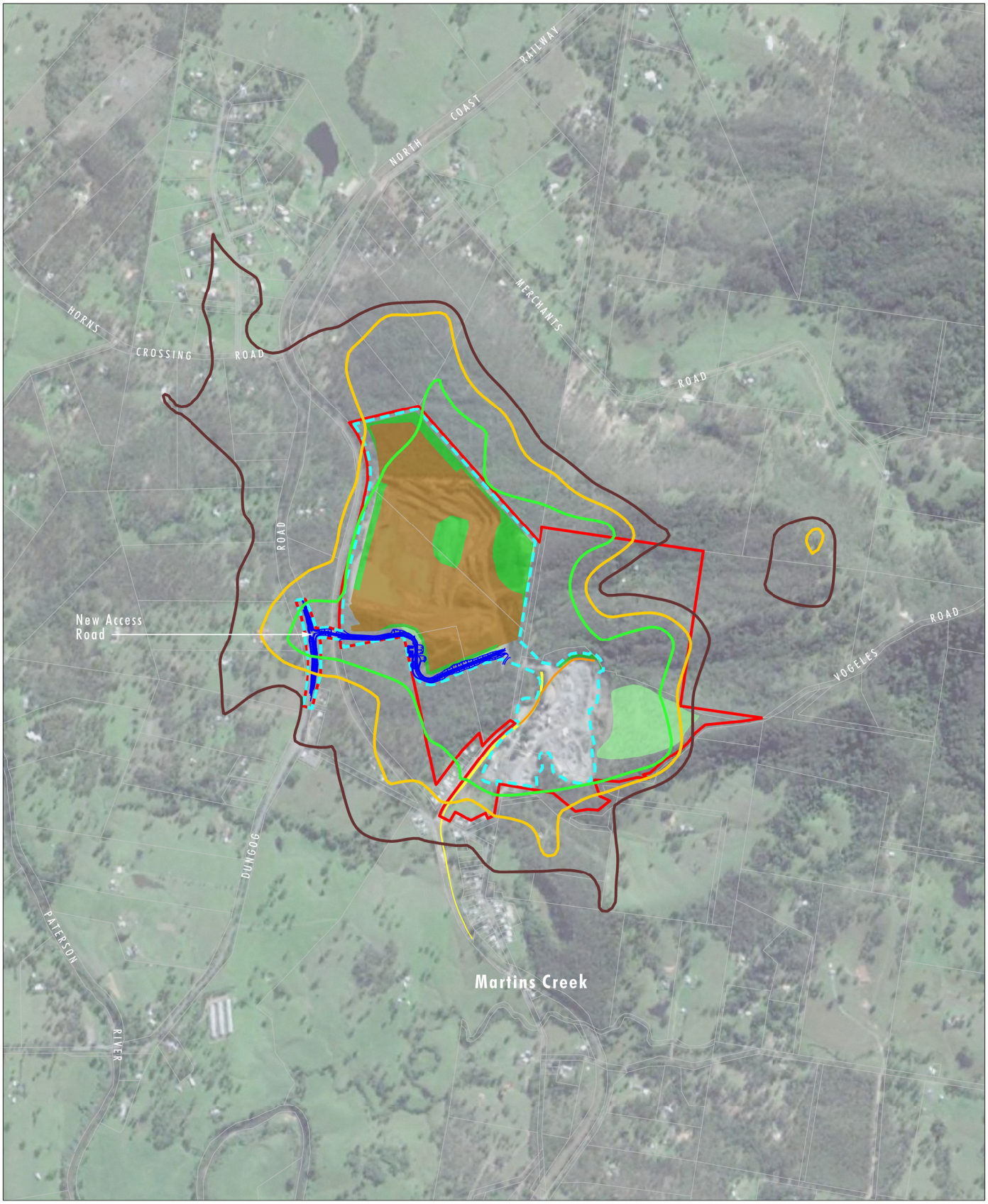


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.23

Conceptual Quarry Plan Year 20
Predicted Noise Level
Southerly 2.3 m/s

File Name (A4): R04/3957_177.dgn
20201113 15.42

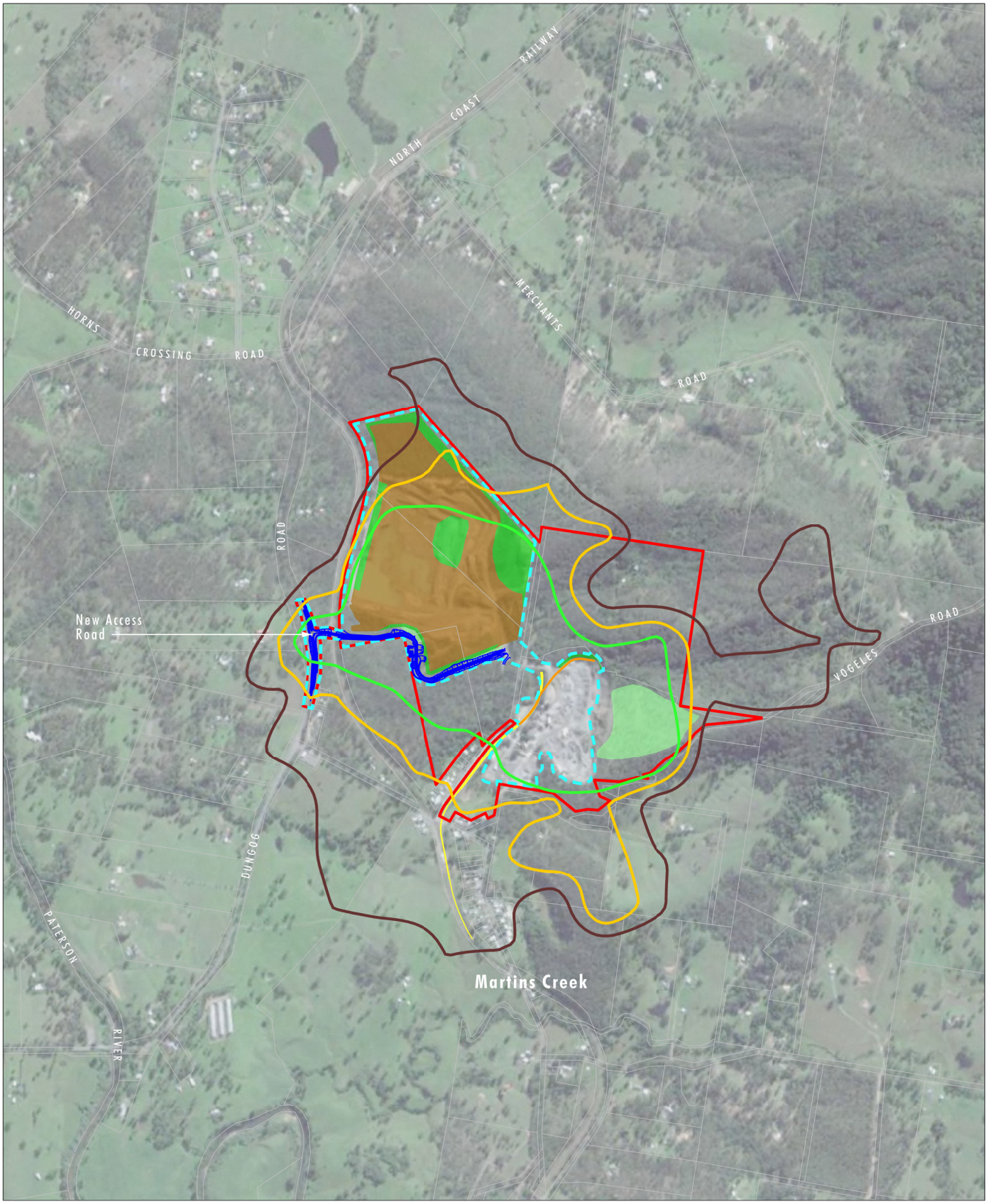


Image Source: Google Earth (2018)
Data Source: Daracon (2020)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Proposed Disturbance Area
- Existing Rail Siding
- Proposed Rail Siding Extension
- Active Quarry Area
- Rehabilitation Area
- Previous Rehabilitation Area
- New Access Road
- 40 dB(A) Contour
- 45 dB(A) Contour
- 50 dB(A) Contour

FIGURE A6.24

Conceptual Quarry Plan Year 20
Predicted Noise Level
North-westerly 3.0 m/s

File Name (A4): R04/3957_178.dgn
20201113 15.43

Table A6.5 –Receivers where the Year 10 Predicted Day-time Noise Levels exceed the PNTL, dB(A)

1. **For operating conditions with 12 laden truck movement per hour**
   (Modelled as 12 laden truck movement per hour to represent the average maximum daily truck movements of 89 laden trucks)

2. **For operating conditions including the pre-strip bulldozer**

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL 12 Laden Trucks per Hour			Exceed PNTL With Prestrip Dozer		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R016	256 Dungog Rd	NAG05	40	-	44	-	-	-	46
R019	1-3 Grace Ave	NAG05	40	42	-	-	-	-	46
R041	249 Dungog Rd	NAG06	40	41	-	-	-	45	-
R043	231 Dungog Rd	NAG06	40	-	-	-	-	43	-
R055	221 Dungog Rd	NAG06	40	41	-	-	-	43	-
R066	223 Dungog Rd	NAG06	40	41	-	-	42	-	-
R070	199 Dungog Rd	NAG06	40	41	-	-	-	43	-
R025	281 Dungog Rd	NAG07	40	-	44	-	-	-	50
R031	303 Dungog Rd	NAG07	40	-	43	-	-	-	49
R040	279 Dungog Rd	NAG07	40	-	43	-	-	-	47
R087	253 Dungog Rd	NAG08	40	-	-	-	-	44	-
R115	257 Dungog Rd	NAG08	40	-	-	-	42	-	-
R122	181 Dungog Rd	NAG08	40	-	-	-	41	-	-
R129	261 Dungog Rd	NAG08	40	-	-	-	41	-	-
R136	255 Dungog Rd	NAG08	40	-	-	-	41	-	-
R138	76 Mowbray Ln	NAG08	40	-	-	-	42	-	-
R034	338 Dungog Rd	NAG09	40	-	45	-	-	-	54
R047	341 Dungog Rd	NAG09	40	-	43	-	-	-	54
R053	333 Dungog Rd	NAG09	40	41	-	-	-	-	51
R046	406 Dungog Rd	NAG10	40	42	-	-	-	-	56
R063	9 Horns Crossing Rd	NAG10	40	42	-	-	-	-	52
R069	29 Horns Crossing Rd	NAG10	40	42	-	-	-	-	50
R075	24 Horns Crossing Rd	NAG10	40	-	-	-	-	-	50
R088	55 Horns Crossing Rd	NAG10	40	41	-	-	-	-	49
R107	52 Horns Crossing Rd	NAG10	40	-	-	-	-	45	-
R073	16 View St	NAG11	40	-	-	-	-	-	50
R083	24 View St	NAG11	40	-	-	-	-	-	50
R092	32 View St	NAG11	40	-	-	-	-	-	50
R094	19 View St	NAG11	40	-	-	-	-	-	48
R095	15 View St	NAG11	40	-	-	-	-	-	48
R097	21 View St	NAG11	40	-	-	-	-	-	48
R098	27 View St	NAG11	40	-	-	-	-	-	48
R101	14 Wakaya Cl	NAG11	40	-	-	-	-	-	49
R102	4 Wakaya Cl	NAG11	40	-	-	-	-	-	49
R103	18 Wakaya Cl	NAG11	40	-	-	-	-	44	-
R105	35 View St	NAG11	40	-	-	-	-	-	48
R110	11 Wakaya Cl	NAG11	40	-	-	-	-	-	49
R111	45 View St	NAG11	40	-	-	-	-	-	47
R113	7 Wakaya Cl	NAG11	40	-	-	-	-	-	48
R117	55 View St	NAG11	40	-	-	-	-	-	46
R120	29 Wakaya Cl	NAG11	40	-	-	-	-	-	47
R125	58 View St	NAG11	40	-	-	-	-	-	47

Rec ID	Location	Ass. Grp	PNTL	Exceed PNTL 12 Laden Trucks per Hour			Exceed PNTL With Prestrip Dozer		
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB
R126	80 Horns Crossing Rd	NAG11	40	-	-	-	-	44	-
R127	28 Wakaya Cl	NAG11	40	-	-	-	-	43	-
R130	59 View St	NAG11	40	-	-	-	-	45	-
R134	76 View St	NAG11	40	-	-	-	-	45	-
R135	71 View St	NAG11	40	-	-	-	-	45	-
R137	84 View St	NAG11	40	-	-	-	-	45	-
R139	83 View St	NAG11	40	-	-	-	-	-	46
R140	90 View St	NAG11	40	-	-	-	-	44	-
R142	87 View St	NAG11	40	-	-	-	-	44	-
R144	94 View St	NAG11	40	-	-	-	-	44	-
R146	95 View St	NAG11	40	-	-	-	-	43	-
R147	93 View St	NAG11	40	-	-	-	-	43	-
R067	159 Vogeles Rd	NAG13	40	42	-	-	-	45	-
R093	197 Vogeles Rd	NAG13	40	41	-	-	-	44	-
R112	94 Cory St	NAG14	40	-	-	-	41	-	-
Total				12	6	0	7	20	30

Table A6.6 – Predicted 1 Hour Evening Shoulder Period, Evening and Night-time Noise Levels, dB(A)

Rec ID	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm				Evening and Night PNTL	Evening				Night			
				Calm	1.7m/s NE	1.9m/s NE	1.9m/s E		Calm	1.7m/s NE	1.9m/s NE	1.9m/s E	Calm	1.9m/s NE	Class F DrainageFlow	$L_{A1,1min}$ All Cond'ns
R001	23 Station St	NAG01	38	41 [1]	40 [1]	43 [1]	43 [1]	36/35	38	42	43	42	38	43	44	45
R002	21 Station St	NAG01	38	43 [1]	43 [1]	44 [1]	44 [1]	36/35	35	40	40	39	35	40	41	44
R003	19 Station St	NAG01	38	42 [1]	42 [1]	44 [1]	43 [1]	36/35	34	40	40	39	34	40	41	43
R004	17 Station St	NAG01	38	41 [1]	41 [1]	43 [1]	42 [1]	36/35	32	36	37	36	32	37	38	41
R005	15 Station St	NAG01	38	40 [1]	40 [1]	41 [1]	41 [1]	36/35	32	36	37	35	32	37	38	40
R006	13 Station St	NAG01	38	35	36	38	36	36/35	31	35	36	34	31	36	37	40
R007	11 Station St	NAG01	38	35	35	38	36	36/35	31	35	35	34	31	35	37	38
R008	9 Station St	NAG01	38	34	35	37	36	36/35	31	35	35	34	31	35	37	38
R009	7 Station St	NAG01	38	34	35	37	36	36/35	30	34	34	33	30	34	36	38
R010	5 Station St	NAG01	38	34	35	38	36	36/35	30	34	34	33	30	34	36	38
R011	3 Station St	NAG01	38	33	34	38	36	36/35	29	34	34	33	29	34	36	38
R012	5 Douglas St	NAG02	38	32	34	35	32	36/35	28	31	31	30	28	31	33	35
R013	1 Cory St	NAG02	38	33	34	37	35	36/35	29	33	34	32	29	34	36	38
R014	5 Cory St	NAG02	38	33	35	37	35	36/35	30	34	35	33	30	35	37	39
R015	3 Cory St	NAG02	38	33	34	37	35	36/35	30	34	35	33	30	35	37	39
R017	2 Cory St	NAG02	38	32	34	37	34	36/35	29	34	35	33	29	35	38	40
R018	9 Cory St Martins Ck Fire Shed	NAG02	58	30	33	34	32	58/58	28	31	32	30	28	32	34	36
R022	8 Cory St	NAG02	38	30	31	34	32	36/35	28	32	33	31	28	33	35	37
R020	54 Grace Ave	NAG03	37	32	33	36	34	35/35	29	33	34	32	29	34	35	37
R021	56 Grace Ave	NAG03	37	32	34	**38**	36	35/35	27	32	33	31	27	33	35	37
R023	52 Grace Ave	NAG03	37	31	32	35	33	35/35	29	31	32	31	29	32	33	36
R024	58 Grace Ave	NAG03	58	32	34	38	36	58/58	27	33	33	31	27	33	35	38
R026	12 Cory St	NAG02	37	31	34	35	32	35/35	29	33	33	31	29	33	35	38
R028	14 Cory St	NAG04	37	30	33	34	31	35/35	27	31	32	29	27	32	35	37
R030	16 Cory St	NAG04	37	30	33	35	31	35/35	27	31	32	29	27	32	35	37
R033	18 Cory St	NAG04	37	29	32	34	31	35/35	26	30	31	28	26	31	34	36

Rec ID	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm				Evening and Night PNTL	Evening				Night			
				Calm	1.7m/s NE	1.9m/s NE	1.9m/s E		Calm	1.7m/s NE	1.9m/s NE	1.9m/s E	Calm	1.9m/s NE	Class F DrainageFlow	$L_{A1,1min}$ All Cond'ns
R035	20 Cory St	NAG04	37	29	32	34	31	35/35	27	31	32	29	27	32	36	37
R036	23 Cory St	NAG04	37	28	32	32	29	35/35	26	31	31	28	26	31	35	37
R037	22 Cory St	NAG04	37	29	32	34	30	35/35	26	31	32	29	26	32	36	37
R038	24 Cory St	NAG04	37	29	32	34	30	35/35	26	31	32	29	26	32	36	38
R039	26 Cory St	NAG04	37	29	32	33	30	35/35	25	30	30	27	25	30	34	36
R042	29 Cory St	NAG04	37	29	32	33	29	35/35	26	30	31	27	26	31	34	36
R044	28 Cory St	NAG04	37	29	31	34	29	35/35	25	30	30	27	25	30	34	36
R045	31 Cory St	NAG04	37	29	32	33	29	35/35	26	30	31	27	26	31	35	37
R049	30 Cory St	NAG04	37	29	31	33	29	35/35	26	31	31	28	26	31	35	37
R050	33 Cory St	NAG04	37	29	32	33	29	35/35	28	30	31	29	28	31	34	36
R051	32 Cory St	NAG04	37	28	31	32	29	35/35	25	29	30	27	25	30	34	36
R052	35 Cory St	NAG04	37	29	32	33	29	35/35	28	31	31	29	28	31	34	36
R054	34 Cory St	NAG04	37	28	31	33	28	35/35	25	30	30	27	25	30	35	37
R056	37 Cory St	NAG04	37	29	32	33	29	35/35	27	31	31	28	27	31	34	36
R057	36 Cory St	NAG04	37	28	31	33	28	35/35	25	31	32	27	25	32	37	39
R058	39 Cory St	NAG04	37	28	32	32	28	35/35	26	30	30	27	26	30	33	35
R059	38 Cory St	NAG04	37	28	31	32	28	35/35	27	29	30	28	27	30	33	35
R061	41 Cory St	NAG04	37	28	32	32	27	35/35	26	29	30	27	26	30	33	35
R062	40 Cory St	NAG04	37	27	31	31	27	35/35	26	29	30	28	26	30	33	35
R064	43 Cory St	NAG04	37	26	31	31	26	35/35	25	27	28	26	25	28	31	33
R065	44 Cory St	NAG04	37	27	31	31	27	35/35	26	30	31	28	26	31	34	36
R016	256 Dungog Rd	NAG05	37	**38**	**39**	**40**	**39**	35/35	22	24	25	25	22	25	23	27
R019	1-3 Grace Ave	NAG05	37	36	37	**39**	38	35/35	24	26	27	27	24	27	25	28
R041	249 Dungog Rd	NAG06	37	34	33	37	37	35/35	20	23	23	25	20	23	20	25
R043	231 Dungog Rd	NAG06	37	32	33	37	36	35/35	24	28	29	29	24	29	25	31
R055	221 Dungog Rd	NAG06	37	31	31	36	35	35/35	25	30	31	31	25	31	26	33
R066	223 Dungog Rd	NAG06	37	30	28	36	36	35/35	20	28	29	31	20	29	22	32
R070	199 Dungog Rd	NAG06	37	31	31	38	37	35/35	29	36	37	37	29	37	32	40

Rec ID	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm				Evening and Night PNTL	Evening				Night			
				Calm	1.7m/s NE	1.9m/s NE	1.9m/s E		Calm	1.7m/s NE	1.9m/s NE	1.9m/s E	Calm	1.9m/s NE	Class F DrainageFlow	$L_{A1,1min}$ All Cond'ns
R025	281 Dungog Rd	NAG07	37	40	37	41	42	35/35	19	21	22	23	19	22	19	23
R031	303 Dungog Rd	NAG07	37	34	31	35	37	35/35	22	24	24	25	22	24	21	26
R040	279 Dungog Rd	NAG07	37	35	33	39	39	35/35	18	21	22	23	18	22	18	24
R087	253 Dungog Rd	NAG08	37	22	19	29	31	35/35	14	17	18	20	14	18	14	20
R115	257 Dungog Rd	NAG08	37	26	24	32	35	35/35	17	26	27	30	17	27	19	30
R119	9 Mowbray Ln	NAG08	37	13	10	13	17	35/35	11	11	11	13	11	11	10	13
R122	181 Dungog Rd	NAG08	37	29	28	37	37	35/35	27	36	37	37	27	37	31	40
R128	259 Dungog Rd	NAG08	37	23	21	26	27	35/35	21	24	18	19	21	18	21	26
R129	261 Dungog Rd	NAG08	37	22	20	29	30	35/35	15	20	21	24	15	21	15	23
R131	25 Mowbray Ln	NAG08	37	12	9	13	16	35/35	11	11	11	13	11	11	10	13
R132	57 Mowbray Ln	NAG08	37	17	15	19	23	35/35	14	15	15	16	14	15	13	16
R133	147 Dungog Rd	NAG08	37	28	28	36	36	35/35	27	36	37	36	27	37	32	39
R136	255 Dungog Rd	NAG08	37	22	19	28	29	35/35	13	17	18	20	13	18	13	20
R138	76 Mowbray Ln	NAG08	37	21	18	26	28	35/35	14	18	18	21	14	18	15	20
R141	80 Mowbray Ln	NAG08	37	22	19	27	29	35/35	14	21	22	24	14	22	15	24
R143	121 Dungog Rd	NAG08	37	25	26	33	31	35/35	23	33	33	32	23	33	29	37
R145	120 Dungog Rd	NAG08	37	24	26	33	30	35/35	20	31	33	30	20	33	28	37
R148	51 Dungog Rd	NAG08	37	26	25	33	33	35/35	25	33	34	33	25	34	29	36
R149	83 Dungog Rd	NAG08	37	26	25	34	33	35/35	25	34	34	34	25	34	31	37
R034	338 Dungog Rd	NAG09	37	34	31	32	35	35/35	18	19	19	21	18	19	18	21
R047	341 Dungog Rd	NAG09	37	28	25	26	31	35/35	17	18	18	20	17	18	16	19
R053	333 Dungog Rd	NAG09	37	31	28	31	34	35/35	16	17	17	19	16	17	16	19
R046	406 Dungog Rd	NAG10	37	26	23	23	27	35/35	14	13	13	16	14	13	13	17
R063	9 Horns Crossing Rd	NAG10	37	26	24	25	28	35/35	15	15	15	17	15	15	14	17
R069	29 Horns Crossing Rd	NAG10	37	26	23	25	28	35/35	14	14	14	17	14	14	13	16
R075	24 Horns Crossing Rd	NAG10	37	21	18	20	26	35/35	13	13	13	15	13	13	12	14
R088	55 Horns Crossing Rd	NAG10	37	25	22	25	29	35/35	14	15	15	18	14	15	14	17
R107	52 Horns Crossing Rd	NAG10	37	13	10	13	15	35/35	11	11	11	13	11	11	10	13

Rec ID	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm				Evening and Night PNTL	Evening				Night			
				Calm	1.7m/s NE	1.9m/s NE	1.9m/s E		Calm	1.7m/s NE	1.9m/s NE	1.9m/s E	Calm	1.9m/s NE	Class F DrainageFlow	$L_{A1,1min}$ All Cond'ns
R073	16 View St	NAG11	37	23	20	21	25	35/35	11	11	11	14	11	11	11	14
R083	24 View St	NAG11	37	21	18	20	24	35/35	11	11	11	13	11	11	10	13
R092	32 View St	NAG11	37	20	17	19	23	35/35	11	11	11	13	11	11	10	14
R094	19 View St	NAG11	37	21	17	19	25	35/35	11	11	11	13	11	11	10	13
R095	15 View St	NAG11	37	18	15	17	23	35/35	12	12	12	14	12	12	11	14
R097	21 View St	NAG11	37	21	17	19	24	35/35	11	11	11	13	11	11	10	13
R098	27 View St	NAG11	37	21	18	19	24	35/35	11	11	11	13	11	11	10	13
R101	14 Wakaya Cl	NAG11	37	17	15	16	20	35/35	10	10	10	12	10	10	9	14
R102	4 Wakaya Cl	NAG11	37	20	16	17	23	35/35	10	10	10	12	10	10	10	13
R103	18 Wakaya Cl	NAG11	37	15	13	14	18	35/35	10	9	9	11	10	9	9	13
R104	17 View St	NAG11	37	15	12	15	18	35/35	10	10	11	12	10	11	10	13
R105	35 View St	NAG11	37	20	17	18	24	35/35	10	10	10	12	10	10	9	12
R110	11 Wakaya Cl	NAG11	37	17	14	15	21	35/35	10	9	9	11	10	9	9	13
R111	45 View St	NAG11	37	18	15	16	21	35/35	10	10	10	12	10	10	9	12
R113	7 Wakaya Cl	NAG11	37	18	15	16	22	35/35	10	9	9	11	10	9	9	13
R117	55 View St	NAG11	37	16	14	15	19	35/35	9	9	9	11	9	9	9	12
R118	24 Wakaya Cl	NAG11	37	13	10	11	14	35/35	8	8	8	10	8	8	8	10
R120	29 Wakaya Cl	NAG11	37	16	13	14	19	35/35	9	9	9	11	9	9	8	13
R125	58 View St	NAG11	37	16	14	15	19	35/35	9	9	9	11	9	9	9	13
R126	80 Horns Crossing Rd	NAG11	37	12	9	12	16	35/35	10	10	10	12	10	10	9	12
R127	28 Wakaya Cl	NAG11	37	14	11	12	16	35/35	8	8	8	10	8	8	8	11
R130	59 View St	NAG11	37	15	12	14	19	35/35	9	9	9	11	9	9	8	12
R134	76 View St	NAG11	37	14	11	12	17	35/35	8	8	8	10	8	8	8	11
R135	71 View St	NAG11	37	14	12	13	18	35/35	8	8	8	10	8	8	8	11
R137	84 View St	NAG11	37	14	11	12	17	35/35	8	7	7	9	8	7	7	11
R139	83 View St	NAG11	37	14	12	13	19	35/35	8	7	7	9	8	7	7	10
R140	90 View St	NAG11	37	14	11	12	18	35/35	7	7	7	9	7	7	7	10
R142	87 View St	NAG11	37	15	11	13	19	35/35	7	6	6	9	7	6	6	11

Rec ID	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm				Evening and Night PNTL	Evening				Night			
				Calm	1.7m/s NE	1.9m/s NE	1.9m/s E		Calm	1.7m/s NE	1.9m/s NE	1.9m/s E	Calm	1.9m/s NE	Class F DrainageFlow	$L_{A1,1min}$ All Cond'ns
R144	94 View St	NAG11	37	13	10	11	17	35/35	7	6	6	8	7	6	6	9
R146	95 View St	NAG11	37	14	11	12	18	35/35	7	6	6	8	7	6	6	9
R147	93 View St	NAG11	37	15	11	12	18	35/35	7	6	6	8	7	6	6	10
R060	126 Merchants Rd	NAG12	37	16	15	14	16	35/35	17	15	15	17	17	15	18	20
R068	60 Merchants Rd	NAG12	37	13	12	12	14	35/35	14	13	13	15	14	13	14	16
R071	145 Merchants Rd	NAG12	37	15	14	12	14	35/35	16	14	14	15	16	14	17	19
R072	60 Merchants Rd	NAG12	37	12	10	10	12	35/35	13	11	11	13	13	11	12	15
R074	218 Merchants Rd	NAG12	37	13	13	11	11	35/35	14	12	12	12	14	12	17	19
R077	448 Dungog Rd	NAG12	37	11	9	10	12	35/35	11	10	10	12	11	10	10	13
R079	46 Merchants Rd	NAG12	37	11	9	10	12	35/35	12	11	11	13	12	11	12	14
R080	462 Dungog Rd	NAG12	37	10	8	9	11	35/35	11	10	10	12	11	10	10	13
R081	26 Merchants Rd	NAG12	37	10	8	9	11	35/35	11	10	10	12	11	10	11	13
R082	97 Merchants Rd	NAG12	37	14	13	12	14	35/35	15	13	13	15	15	13	15	17
R084	168 Merchants Rd	NAG12	37	13	13	11	12	35/35	15	13	12	14	15	12	16	18
R089	24 Merchants Rd	NAG12	37	9	8	8	10	35/35	10	9	9	11	10	9	10	12
R096	221 Merchants Rd	NAG12	37	12	13	10	10	35/35	13	11	11	11	13	11	16	18
R099	215 Merchants Rd	NAG12	37	12	12	9	10	35/35	13	10	10	11	13	10	15	17
R100	22 Merchants Rd	NAG12	37	9	7	8	10	35/35	10	9	9	11	10	9	10	12
R106	17 Merchants Rd	NAG12	37	9	7	7	10	35/35	10	9	9	11	10	9	10	12
R108	73 Merchants Rd	NAG12	37	11	9	9	11	35/35	12	10	10	12	12	10	12	14
R114	9 Merchants Rd	NAG12	37	8	6	7	9	35/35	9	8	8	10	9	8	9	11
R124	43 Merchants Rd	NAG12	37	9	7	7	9	35/35	11	9	9	11	11	9	10	12
R032	14 Vogeles Rd	NAG13	37	20	23	21	19	35/35	21	22	22	21	21	22	26	29
R048	12 Vogeles Rd	NAG13	37	21	26	23	21	35/35	21	23	23	21	21	23	24	27
R067	159 Vogeles Rd	NAG13	37	24	28	20	20	35/35	21	18	18	18	21	18	24	26
R093	197 Vogeles Rd	NAG13	37	22	26	19	19	35/35	20	17	17	16	20	17	23	24
R076	170 Dungog Rd	NAG14	37	26	29	33	29	35/35	25	32	33	28	25	33	32	38
R078	73 Black Rock Rd	NAG14	37	14	17	16	14	35/35	16	18	18	16	16	18	21	23

Rec ID	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm				Evening and Night PNTL	Evening				Night			
				Calm	1.7m/s NE	1.9m/s NE	1.9m/s E		Calm	1.7m/s NE	1.9m/s NE	1.9m/s E	Calm	1.9m/s NE	Class F DrainageFlow	$L_{A1,1min}$ All Cond'ns
R085	65 Cory St	NAG14	37	20	24	24	20	35/35	19	21	22	19	19	22	23	26
R086	67 Cory St	NAG14	37	19	23	23	19	35/35	18	21	21	19	18	21	23	26
R090	69 Cory St	NAG14	37	18	22	21	18	35/35	18	20	20	18	18	20	22	24
R091	75 Black Rock Rd	NAG14	37	14	17	15	13	35/35	16	17	17	15	16	17	20	22
R109	11 Cook St	NAG14	37	15	21	18	15	35/35	14	16	16	14	14	16	19	22
R112	94 Cory St	NAG14	37	19	26	26	19	35/35	18	21	22	18	18	22	24	26
R116	95 Cory St	NAG14	37	18	25	23	17	35/35	15	18	18	15	15	18	21	23
R121	10 Cook St Martins Creek School	NAG14	48	17	24	21	16	48	14	16	17	15	14	17	19	22
R123	97 Cory St	NAG14	37	18	25	24	17	35/35	15	18	18	15	15	18	21	23

Table A6.7 – Receivers where the Maximum Predicted 1 Hour Evening Shoulder Period, Evening and Night-time Noise Levels exceed the respective PNTL, dB(A)

Rec Id	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm			Evening and Night PNTL	Evening			Night			
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB		≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	> 45 dB(A)
R001	23 Station St	NAG01	38	-	43 [1]	-	36/35	-	-	43	-	-	44	-
R002	21 Station St	NAG01	38	-	-	44 [1]	36/35	-	40	-	-	-	41	-
R003	19 Station St	NAG01	38	-	-	44 [1]	36/35	-	40	-	-	-	41	-
R004	17 Station St	NAG01	38	-	43 [1]	-	36/35	37	-	-	-	38	-	-
R005	15 Station St	NAG01	38	-	41 [1]	-	36/35	37	-	-	-	38	-	-
R006	13 Station St	NAG01	38	-	-	-	36/35	-	-	-	37	-	-	-
R007	11 Station St	NAG01	38	-	-	-	36/35	-	-	-	37	-	-	-
R008	9 Station St	NAG01	38	-	-	-	36/35	-	-	-	37	-	-	-
R009	7 Station St	NAG01	38	-	-	-	36/35	-	-	-	36	-	-	-
R010	5 Station St	NAG01	38	-	-	-	36/35	-	-	-	36	-	-	-
R011	3 Station St	NAG01	38	-	-	-	36/35	-	-	-	36	-	-	-

Rec Id	Location	Ass. Grp	Shoulder PNTL	1 Hour Evening Shoulder 6 to 7pm			Evening and Night PNTL	Evening			Night			
				≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB		≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	≤ 2 dB	≥ 3 but ≤ 5 dB	> 5 dB	> 45 dB(A)
R013	1 Cory St	NAG02	38	-	-	-	36/35	-	-	-	36	-	-	-
R014	5 Cory St	NAG02	38	-	-	-	36/35	-	-	-	37	-	-	-
R015	3 Cory St	NAG02	38	-	-	-	36/35	-	-	-	37	-	-	-
R017	2 Cory St	NAG02	38	-	-	-	36/35	-	-	-	-	38	-	-
R021	56 Grace Ave	NAG03	37	38 [1]	-	-	36/35	-	-	-	-	-	-	-
R035	20 Cory St	NAG04	37	-	-	-	35/35	-	-	-	36	-	-	-
R037	22 Cory St	NAG04	37	-	-	-	35/35	-	-	-	36	-	-	-
R038	24 Cory St	NAG04	37	-	-	-	35/35	-	-	-	36	-	-	-
R057	36 Cory St	NAG04	37	-	-	-	35/35	-	-	-	37	-	-	-
R016	256 Dungog Rd	NAG05	37	-	40	-	35/35	-	-	-	-	-	-	-
R019	1-3 Grace Ave	NAG05	37	39	-	-	35/35	-	-	-	-	-	-	-
R070	199 Dungog Rd	NAG06	37	38	-	-	35/35	37	-	-	37	-	-	-
R025	281 Dungog Rd	NAG07	37	-	42	-	35/35	-	-	-	-	-	-	-
R040	279 Dungog Rd	NAG07	37	39	-	-	35/35	-	-	-	-	-	-	-
R122	181 Dungog Rd	NAG08	37	-	-	-	35/35	37	-	-	37	-	-	-
R133	147 Dungog Rd	NAG08	37	-	-	-	35/35	37	-	-	37	-	-	-
Total				4	5	2		5	2	1	16	3	3	0

Note: [1] Occurs only during Year 2

Table A6.9 – Predicted Construction Noise Levels, dB(A)

Rec ID	Location	Ass. Grp	Mgmnt Level	Bund Construction				Access Road Construction			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R001	23 Station St	NAG01	45	56	58	55	54	50	50	46	52
R002	21 Station St	NAG01	45	55	57	54	54	49	49	42	51
R003	19 Station St	NAG01	45	55	56	53	53	48	48	41	51
R004	17 Station St	NAG01	45	54	55	52	53	48	48	41	50
R005	15 Station St	NAG01	45	53	55	51	52	48	48	42	50
R006	13 Station St	NAG01	45	52	54	48	50	47	48	41	50
R007	11 Station St	NAG01	45	49	53	45	47	47	47	44	49
R008	9 Station St	NAG01	45	49	53	45	47	47	47	43	49
R009	7 Station St	NAG01	45	49	52	44	47	46	47	43	49
R010	5 Station St	NAG01	45	50	53	44	48	46	46	43	48
R011	3 Station St	NAG01	45	49	52	43	47	45	46	42	48
R012	5 Douglas St	NAG02	45	42	44	38	44	44	44	39	48
R013	1 Cory St	NAG02	45	49	51	43	49	44	45	41	48
R014	5 Cory St	NAG02	45	41	44	37	42	44	44	38	48
R015	3 Cory St	NAG02	45	44	47	41	45	44	45	39	48
R017	2 Cory St	NAG02	45	43	45	39	44	43	44	37	47
R018	9 Cory St Martins Ck Fire Shed	NAG02	45	40	41	35	42	41	41	37	47
R022	8 Cory St	NAG02	45	38	41	34	40	40	40	36	46
R020	54 Grace Ave	NAG03	45	46	50	42	44	44	45	37	47
R021	56 Grace Ave	NAG03	45	48	50	41	45	44	44	37	47
R023	52 Grace Ave	NAG03	45	43	46	40	42	42	44	37	46
R024	58 Grace Ave	NAG03	45	47	49	45	47	43	44	40	47
R026	12 Cory St	NAG04	45	42	44	36	44	42	42	38	47
R028	14 Cory St	NAG04	45	42	43	36	44	42	42	38	47
R030	16 Cory St	NAG04	45	42	43	36	45	42	41	38	47
R033	18 Cory St	NAG04	45	41	43	36	44	41	41	36	47
R035	20 Cory St	NAG04	45	41	42	36	44	41	41	35	46
R036	23 Cory St	NAG04	45	42	43	36	47	40	40	35	46
R037	22 Cory St	NAG04	45	41	42	36	45	40	40	35	46
R038	24 Cory St	NAG04	45	41	42	36	45	40	40	35	46
R039	26 Cory St	NAG04	45	41	42	36	46	40	40	37	46
R042	29 Cory St	NAG04	45	41	42	37	48	40	40	37	46
R044	28 Cory St	NAG04	45	40	41	35	47	40	40	37	46
R045	31 Cory St	NAG04	45	41	42	37	49	40	40	37	46
R049	30 Cory St	NAG04	45	40	41	36	47	40	40	36	46
R050	33 Cory St	NAG04	45	41	42	37	48	40	39	36	47
R051	32 Cory St	NAG04	45	40	41	36	47	40	39	36	46
R052	35 Cory St	NAG04	45	40	43	35	48	39	39	36	46
R054	34 Cory St	NAG04	45	40	41	36	48	39	39	36	46
R056	37 Cory St	NAG04	45	40	40	34	47	39	39	36	46
R057	36 Cory St	NAG04	45	40	41	36	48	39	37	34	46
R058	39 Cory St	NAG04	45	38	39	32	45	39	39	36	46
R059	38 Cory St	NAG04	45	39	40	34	45	39	37	34	46

Rec ID	Location	Ass. Grp	Mgmnt Level	Bund Construction				Access Road Construction			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R061	41 Cory St	NAG04	45	37	38	31	44	39	37	34	46
R062	40 Cory St	NAG04	45	39	40	34	43	37	36	33	46
R064	43 Cory St	NAG04	45	34	35	30	43	37	36	33	46
R065	44 Cory St	NAG04	45	37	38	32	42	38	36	33	46
R016	256 Dungog Rd	NAG05	45	25	30	26	21	56	57	54	57
R019	1-3 Grace Ave	NAG05	45	32	41	32	27	53	54	50	54
R041	249 Dungog Rd	NAG06	45	31	42	32	27	49	52	48	48
R043	231 Dungog Rd	NAG06	45	30	37	29	26	49	51	46	49
R055	221 Dungog Rd	NAG06	45	35	43	34	32	46	49	43	47
R066	223 Dungog Rd	NAG06	45	31	40	30	27	47	50	41	42
R070	199 Dungog Rd	NAG06	45	40	43	39	38	44	47	42	45
R025	281 Dungog Rd	NAG07	45	21	29	25	17	53	56	54	49
R031	303 Dungog Rd	NAG07	45	18	25	23	14	51	53	53	47
R040	279 Dungog Rd	NAG07	45	24	36	27	20	50	53	49	48
R087	253 Dungog Rd	NAG08	45	18	24	20	14	37	46	37	32
R115	257 Dungog Rd	NAG08	45	33	36	31	28	41	44	39	39
R119	9 Mowbray Ln	NAG08	45	9	12	13	5	24	29	31	19
R122	181 Dungog Rd	NAG08	45	34	37	33	32	40	43	38	40
R128	259 Dungog Rd	NAG08	45	25	36	25	22	34	40	32	31
R129	261 Dungog Rd	NAG08	45	26	30	27	22	37	45	35	34
R131	25 Mowbray Ln	NAG08	45	9	12	12	4	22	28	28	18
R132	57 Mowbray Ln	NAG08	45	14	19	17	10	29	36	34	25
R133	147 Dungog Rd	NAG08	45	34	37	30	31	39	42	37	40
R136	255 Dungog Rd	NAG08	45	20	34	23	16	37	44	37	33
R138	76 Mowbray Ln	NAG08	45	14	32	22	10	36	42	39	31
R141	80 Mowbray Ln	NAG08	45	25	33	25	22	35	41	33	32
R143	121 Dungog Rd	NAG08	45	33	36	32	33	38	40	36	39
R145	120 Dungog Rd	NAG08	45	33	36	27	29	37	39	32	39
R148	51 Dungog Rd	NAG08	45	30	33	29	29	36	39	34	35
R149	83 Dungog Rd	NAG08	45	31	34	29	30	36	39	34	36
R034	338 Dungog Rd	NAG09	45	15	19	20	11	49	50	53	45
R047	341 Dungog Rd	NAG09	45	14	18	20	9	45	48	50	38
R053	333 Dungog Rd	NAG09	45	13	18	19	9	47	49	50	43
R046	406 Dungog Rd	NAG10	45	13	17	26	9	41	41	45	37
R063	9 Horns Crossing Rd	NAG10	45	13	19	24	9	41	43	46	38
R069	29 Horns Crossing Rd	NAG10	45	13	20	24	9	41	43	45	37
R075	24 Horns Crossing Rd	NAG10	45	12	18	25	8	35	41	44	31
R088	55 Horns Crossing Rd	NAG10	45	13	21	24	9	40	43	44	37
R107	52 Horns Crossing Rd	NAG10	45	9	12	13	5	22	26	29	18
R073	16 View St	NAG11	45	11	16	25	7	39	40	44	35
R083	24 View St	NAG11	45	11	16	25	6	35	39	43	31
R092	32 View St	NAG11	45	10	15	26	6	34	38	42	31
R094	19 View St	NAG11	45	11	17	26	7	36	39	42	30
R095	15 View St	NAG11	45	11	18	26	7	31	37	43	27
R097	21 View St	NAG11	45	10	16	26	6	36	39	42	30

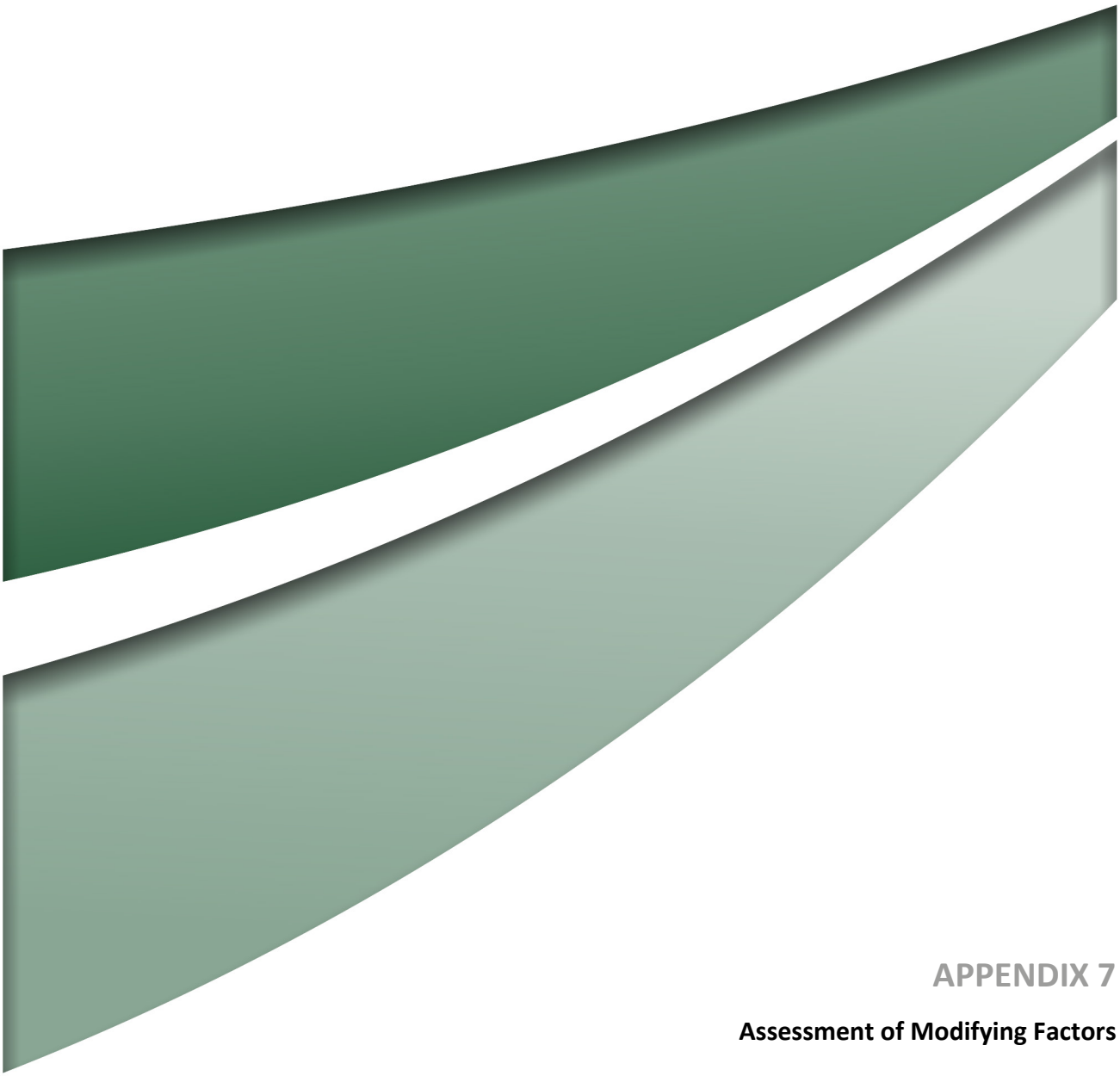
Rec ID	Location	Ass. Grp	Mgmnt Level	Bund Construction				Access Road Construction			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R098	27 View St	NAG11	45	10	16	25	6	36	39	42	31
R101	14 Wakaya Cl	NAG11	45	9	11	15	5	31	34	41	27
R102	4 Wakaya Cl	NAG11	45	10	15	26	6	34	38	42	29
R103	18 Wakaya Cl	NAG11	45	9	11	15	5	28	31	41	24
R104	17 View St	NAG11	45	10	12	14	6	27	31	37	23
R105	35 View St	NAG11	45	10	16	27	6	35	38	42	29
R110	11 Wakaya Cl	NAG11	45	9	14	27	5	32	37	41	28
R111	45 View St	NAG11	45	9	15	27	5	31	34	41	27
R113	7 Wakaya Cl	NAG11	45	9	15	27	5	32	37	41	28
R117	55 View St	NAG11	45	9	11	14	5	28	32	40	25
R118	24 Wakaya Cl	NAG11	45	8	9	15	4	25	27	40	21
R120	29 Wakaya Cl	NAG11	45	9	11	14	5	30	33	40	26
R125	58 View St	NAG11	45	9	10	13	5	29	32	39	25
R126	80 Horns Crossing Rd	NAG11	45	8	11	12	4	22	27	32	17
R127	28 Wakaya Cl	NAG11	45	8	10	14	4	27	29	37	23
R130	59 View St	NAG11	45	9	11	13	4	27	32	40	23
R134	76 View St	NAG11	45	8	9	12	4	26	31	39	23
R135	71 View St	NAG11	45	8	14	27	4	27	32	39	23
R137	84 View St	NAG11	45	8	10	14	4	27	31	39	24
R139	83 View St	NAG11	45	8	14	29	3	28	34	39	24
R140	90 View St	NAG11	45	7	9	14	3	27	31	38	23
R142	87 View St	NAG11	45	7	13	30	3	29	34	38	25
R144	94 View St	NAG11	45	7	9	14	3	27	31	39	23
R146	95 View St	NAG11	45	7	9	14	2	28	34	39	24
R147	93 View St	NAG11	45	6	12	30	2	29	33	37	24
R060	126 Merchants Rd	NAG12	45	12	12	17	10	19	17	22	19
R068	60 Merchants Rd	NAG12	45	10	10	14	7	18	17	22	16
R071	145 Merchants Rd	NAG12	45	10	9	14	8	16	15	20	16
R072	60 Merchants Rd	NAG12	45	8	9	13	5	16	16	21	14
R074	218 Merchants Rd	NAG12	45	9	7	12	9	14	12	16	15
R077	448 Dungog Rd	NAG12	45	7	8	11	4	19	19	27	16
R079	46 Merchants Rd	NAG12	45	8	8	13	5	15	15	19	13
R080	462 Dungog Rd	NAG12	45	7	8	12	4	17	17	22	14
R081	26 Merchants Rd	NAG12	45	7	8	12	4	15	15	20	13
R082	97 Merchants Rd	NAG12	45	10	10	14	8	17	16	21	16
R084	168 Merchants Rd	NAG12	45	9	9	13	9	15	13	18	15
R089	24 Merchants Rd	NAG12	45	7	7	11	3	16	16	21	13
R096	221 Merchants Rd	NAG12	45	8	6	11	9	12	10	14	14
R099	215 Merchants Rd	NAG12	45	7	6	11	7	13	12	16	15
R100	22 Merchants Rd	NAG12	45	6	7	12	3	15	15	20	12
R106	17 Merchants Rd	NAG12	45	6	6	13	3	14	14	19	12
R108	73 Merchants Rd	NAG12	45	7	7	12	4	16	15	21	14
R114	9 Merchants Rd	NAG12	45	6	6	14	3	14	13	19	11
R124	43 Merchants Rd	NAG12	45	6	6	12	3	14	13	20	12
R032	14 Vogeles Rd	NAG13	45	23	20	20	28	24	21	21	29

Rec ID	Location	Ass. Grp	Mgmnt Level	Bund Construction				Access Road Construction			
				Calm	1.7m/s E	3m/s S	3m/s NW	Calm	1.7m/s E	3m/s S	3m/s NW
R048	12 Vogeles Rd	NAG13	45	23	22	19	27	30	29	27	41
R067	159 Vogeles Rd	NAG13	45	28	24	34	35	35	31	36	42
R093	197 Vogeles Rd	NAG13	45	22	19	28	32	33	29	35	41
R076	170 Dungog Rd	NAG14	45	38	42	32	42	35	36	29	43
R078	73 Black Rock Rd	NAG14	45	15	14	14	20	16	16	15	21
R085	65 Cory St	NAG14	45	25	25	21	30	30	29	28	41
R086	67 Cory St	NAG14	45	23	23	19	29	29	28	27	40
R090	69 Cory St	NAG14	45	21	21	17	27	28	28	26	39
R091	75 Black Rock Rd	NAG14	45	14	13	11	19	16	14	13	22
R109	11 Cook St	NAG14	45	15	14	12	21	25	24	22	34
R112	94 Cory St	NAG14	45	22	22	18	34	30	29	26	44
R116	95 Cory St	NAG14	45	18	18	14	29	28	27	25	44
R121	10 Cook St Martins Creek School	NAG14	45	16	16	13	26	28	27	24	41
R123	97 Cory St	NAG14	45	18	18	15	30	28	27	25	44

Table A6.10 – Receivers where the Maximum Predicted Construction Noise Levels exceed the Management Level, dB(A)

Rec ID	Location	Ass. Grp	Management Level	Max. Predicted (Either Scenario)
R001	23 Station St	NAG01	45	58
R002	21 Station St	NAG01	45	57
R003	19 Station St	NAG01	45	56
R004	17 Station St	NAG01	45	55
R005	15 Station St	NAG01	45	55
R006	13 Station St	NAG01	45	54
R007	11 Station St	NAG01	45	53
R008	9 Station St	NAG01	45	53
R009	7 Station St	NAG01	45	52
R010	5 Station St	NAG01	45	53
R011	3 Station St	NAG01	45	52
R012	5 Douglas St	NAG02	45	48
R013	1 Cory St	NAG02	45	51
R014	5 Cory St	NAG02	45	48
R015	3 Cory St	NAG02	45	48
R017	2 Cory St	NAG02	45	47
R018	9 Cory St	NAG02	45	47
R022	8 Cory St	NAG02	45	46
R020	54 Grace Ave	NAG03	45	50
R021	56 Grace Ave	NAG03	45	50
R023	52 Grace Ave	NAG03	45	46
R024	58 Grace Ave	NAG03	45	49
R026	12 Cory St	NAG04	45	47
R028	14 Cory St	NAG04	45	47
R030	16 Cory St	NAG04	45	47
R033	18 Cory St	NAG04	45	47

Rec ID	Location	Ass. Grp	Management Level	Max. Predicted (Either Scenario)
R035	20 Cory St	NAG04	45	46
R036	23 Cory St	NAG04	45	47
R037	22 Cory St	NAG04	45	46
R038	24 Cory St	NAG04	45	46
R039	26 Cory St	NAG04	45	46
R042	29 Cory St	NAG04	45	48
R044	28 Cory St	NAG04	45	47
R045	31 Cory St	NAG04	45	49
R049	30 Cory St	NAG04	45	47
R050	33 Cory St	NAG04	45	48
R051	32 Cory St	NAG04	45	47
R052	35 Cory St	NAG04	45	48
R054	34 Cory St	NAG04	45	48
R056	37 Cory St	NAG04	45	47
R057	36 Cory St	NAG04	45	48
R058	39 Cory St	NAG04	45	46
R059	38 Cory St	NAG04	45	46
R061	41 Cory St	NAG04	45	46
R062	40 Cory St	NAG04	45	46
R064	43 Cory St	NAG04	45	46
R065	44 Cory St	NAG04	45	46
R016	256 Dungog Rd	NAG05	45	57
R019	1-3 Grace Ave	NAG05	45	54
R041	249 Dungog Rd	NAG06	45	52
R043	231 Dungog Rd	NAG06	45	51
R055	221 Dungog Rd	NAG06	45	49
R066	223 Dungog Rd	NAG06	45	50
R070	199 Dungog Rd	NAG06	45	47
R025	281 Dungog Rd	NAG07	45	56
R031	303 Dungog Rd	NAG07	45	53
R040	279 Dungog Rd	NAG07	45	53
R087	253 Dungog Rd	NAG08	45	46
R034	338 Dungog Rd	NAG09	45	53
R047	341 Dungog Rd	NAG09	45	50
R053	333 Dungog Rd	NAG09	45	50
R063	9 Horns Crossing Rd	NAG10	45	46
Total				64



APPENDIX 7

Assessment of Modifying Factors

Appendix 7 – Assessment of Modifying Factors

Fact Sheet C of the *Noise Policy for Industry* (NPfI) (EPA 2017) notes that noise sources containing characteristics such as tonality, impulsiveness, intermittency, irregularity or dominant low frequencies can cause greater annoyance than other noise at the same noise level.

Where the noise source contains annoying characteristics, the NPfI outlines the correction factors that should be applied to the noise from the source measured or predicted at the receiver before comparison with the Project Noise Trigger Level (PNTL).

The modifying factors that are potentially relevant to the assessment of the Project are:

- Tonal noises with a prominent frequency determined according to the following criteria:
    - Level of one-third octave band exceeds the level of the adjacent bands on both sides by:
        - 5 dB or more if the centre frequency of the band containing the tone is above 400 Hz;
        - 8 dB or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive;
        - 15 dB or more if the centre frequency of the band containing the tone is below 160 Hz.
- Low frequency determined according to the following criteria:
    - Compare the predicted dB(A) and dB(C), if the difference is more than 15 dB and
        - If the low-frequency threshold (NPfI Table C2) is exceeded by up to 5 dB and cannot be mitigated, a 2 dB penalty is applicable during the evening and night-time.
        - If the low-frequency threshold (NPfI Table C2) is exceeded by more than 5 dB and cannot be mitigated, a 5 dB penalty is applicable during the evening and night-time or a 2 dB penalty during the daytime.
- Intermittent noise applied to night-time only:
    - Subjectively assessed where the noise level varies by more than 5 dB.
- Duration:
    - Measured as a single-event noise where the duration may range from 1.5 minutes to 2.5 hours over any 24-hour period.

The NPfI states that the modifying factors are to be applied to the noise from the source measured or predicted at the receiver before comparison with the criteria. Where two or more modifying factors are present, the maximum correction is limited to 10 dB. However, the NPfI also notes that where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range.

Noise Modelling

The noise model for the Revised Project was prepared on the basis that equipment generating noise in the potentially audible range of 25 to 20,000 Hz range is well maintained. Failure to replace damaged mufflers, acoustic louvres and associated attenuation equipment could result in the generation of unacceptable tonal or low-frequency noises. Notwithstanding this, each item of equipment used in the ENM noise model of the Revised Project was assessed for tonal noise and low-

frequency noise in accordance with the procedure outlined in the NPfI. While the NPfI guides the assessment of tonal and low-frequency noise, two important additional factors need to be considered:

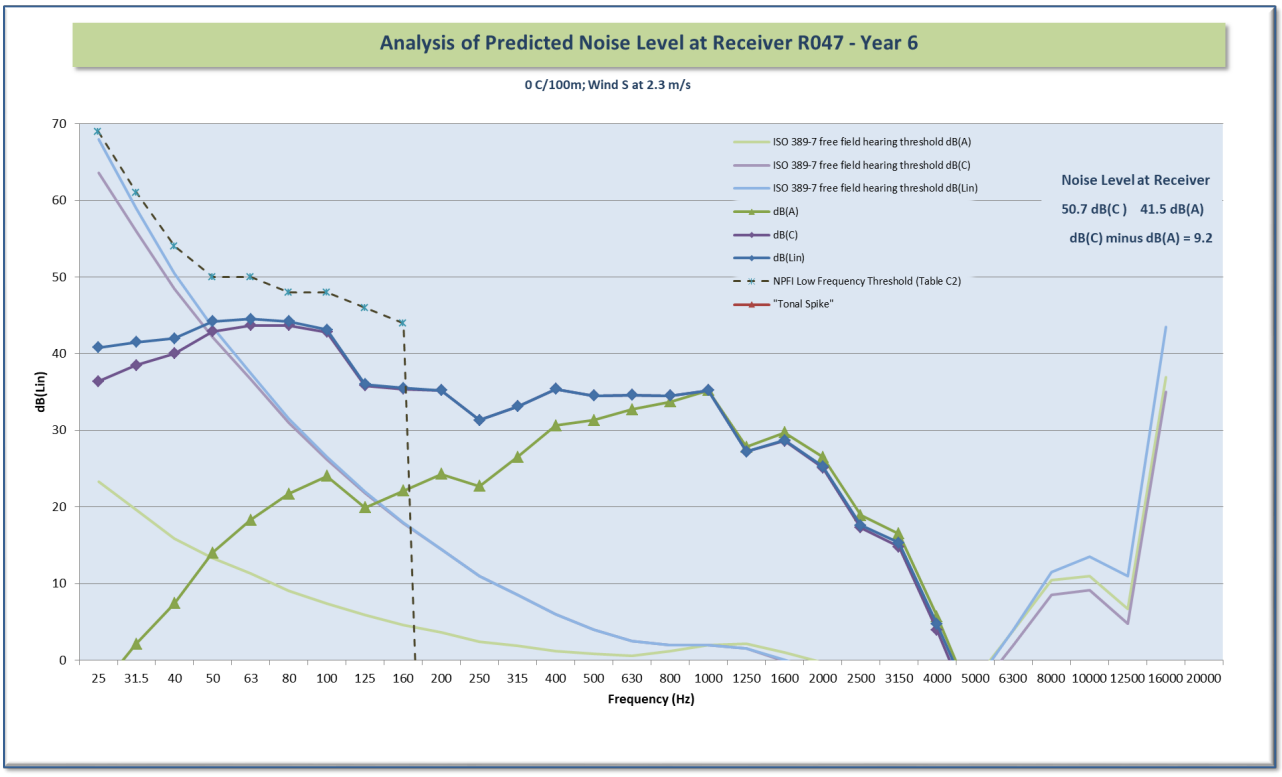
- Air attenuation over distance reduces the high-frequency noises. The contribution air makes to the absorption of high-frequency sound is a function of air temperature, humidity, and frequency. It is reasonable to conclude that if a high-frequency noise is inaudible due to the distance from the source then it should not be included in the tonal noise assessment described above.

- There is a threshold to the audibility of low-frequency noises that the human ear can detect. As with the high-frequency noises, if low-frequency noises are inaudible, it is reasonable to conclude that they should not be included in the low-frequency noise assessment described above. The threshold of audibility is defined in *AS ISO 389.7 2003 'Acoustics- Reference zero for the calibration of audiometric equipment Part 7: Reference threshold of hearing under free-field and diffuse field listening conditions'*.

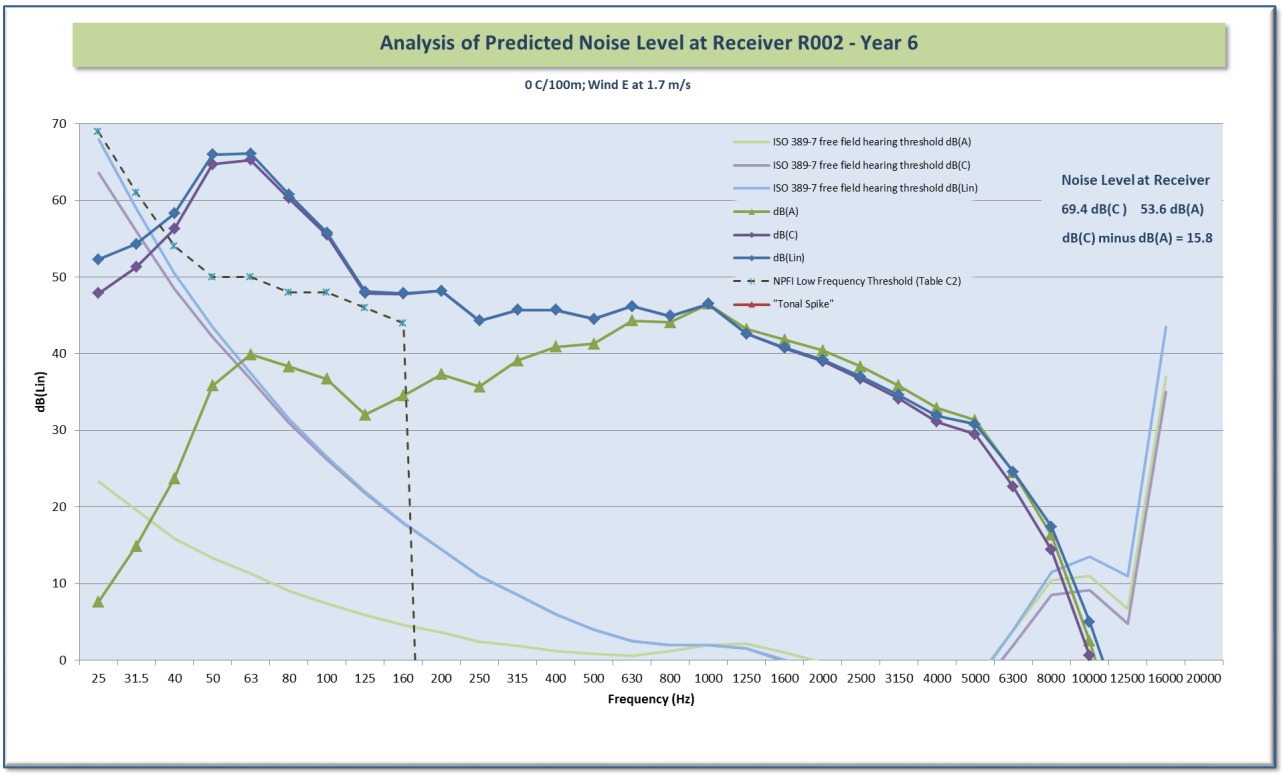
Based on the above, for each predicted noise result an analysis of audibility, as defined by AS ISO 389.7 2003, is made against each one-third octave band. Where the predicted noise result for an octave band was found to be inaudible the octave band noise result is excluded from the assessment of tonality and low-frequency noise.

Tonality Noise Assessment

To illustrate the application of the tonality and low-frequency assessment, the predicted noise levels at example receiver locations were assessed under the NPfI for the nominated meteorological conditions for the Year 6 model. Receiver locations R047 (341 Dungog Road) and R002 (21 Station Street) were chosen to represent a selection of the receivers most affected by tonal and low-frequency noise. The analysis is presented in **Figures A7.1** and **A7.2**.



FigureA7.1 Tonality Assessment for R047 (341 Dungog Road) in Year 6



FigureA7.2 Tonality Assessment for R0002 (21 Station Street) in Year 6

Analysis of these results indicates that penalties for tonality are not applicable to the modelling results for the Quarry.

Low-frequency Noise Assessment

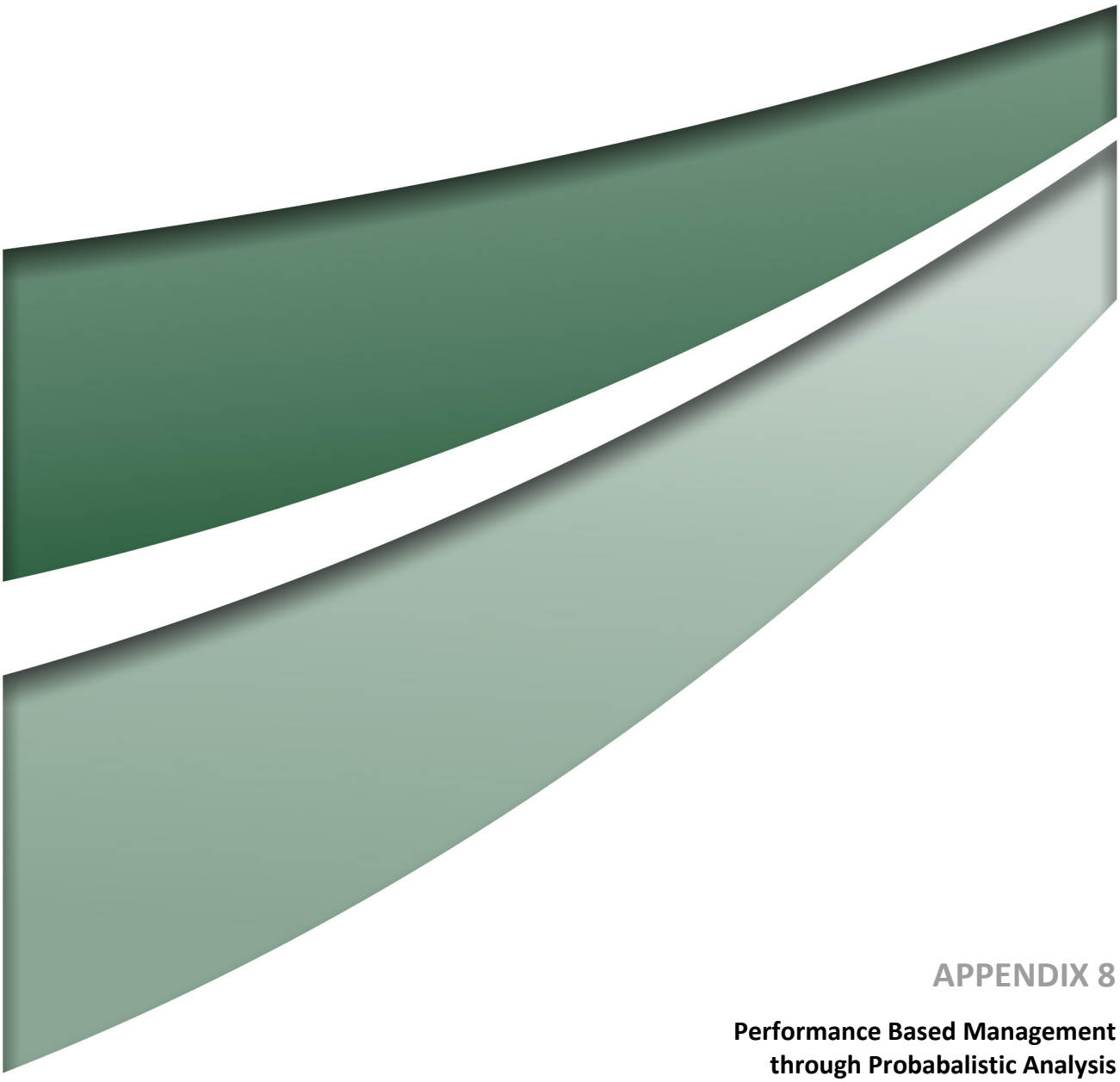
A low-frequency analysis of the noise levels at the receivers shows that the difference between C-weighted and A-weighted noise levels is greater than 15 dB at selected locations in Martins Creek Village. This is due to proximity to the processing area of the quarry.

As indicated in **Figure A7.2**, the dB(C) to dB(A) differential exceeds 15 dB and the low-frequency threshold is also exceeded, therefore a penalty for low-frequency content could be applied to some of the noise level predictions within the Martins Creek Village. However, further analysis of the predicted noise levels indicates that the low-frequency noise contributions indicate that the application of the penalty is directly related to the use of a front-end loader in the southern stockpile area of the processing area.

Through appropriate maintenance and use of noise controls (i.e. upgraded muffler/exhaust), the low-frequency noise emissions attributable to the loader can be managed/mitigated such that the application of the penalty is not necessary.

Summary

Based on this analysis, it is considered that the application of modifying factors for tonality and low-frequency noise emissions is not necessary, provided that there is an appropriate level of maintenance and management of the mobile machinery used at the Quarry.



APPENDIX 8

Performance Based Management through Probabalistic Analysis

Appendix 8 – Performance-based Management Through Probabilistic Analysis

The probabilistic modelling approach was used to help design the operating parameters of the Revised Project during the full range of potential standard, noise-enhancing and very noise-enhancing meteorological conditions. This includes conditions that are not identified by NPfI Fact Sheet D Table D1 of the *Noise Policy for Industry* (NPfI) (EPA 2017) but could occur over the life of the Project (refer to **Appendix 5** for a detailed analysis of modelled conditions). Importantly, the probabilistic modelling approach includes meteorological conditions that would be excluded by the NPfI modelling approach but are recognised by the NPfI as very noise-enhancing. While such conditions are not included in the NPfI modelling approach, there is an expectation that the noise controls that would be implemented under noise-enhancing conditions would also be in place during very noise-enhancing conditions.

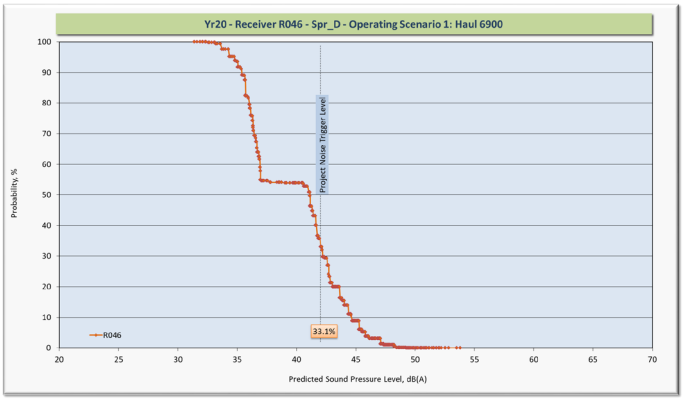
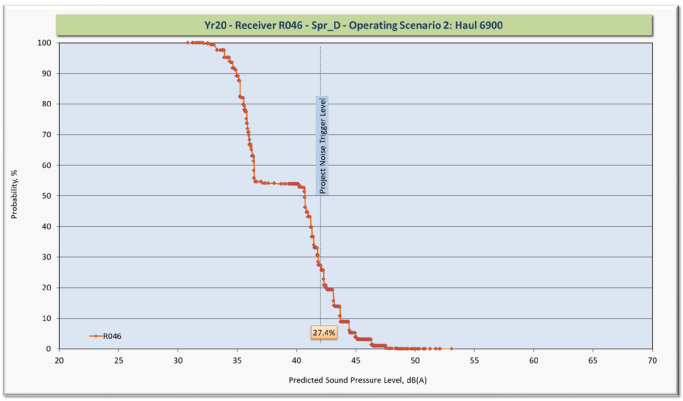
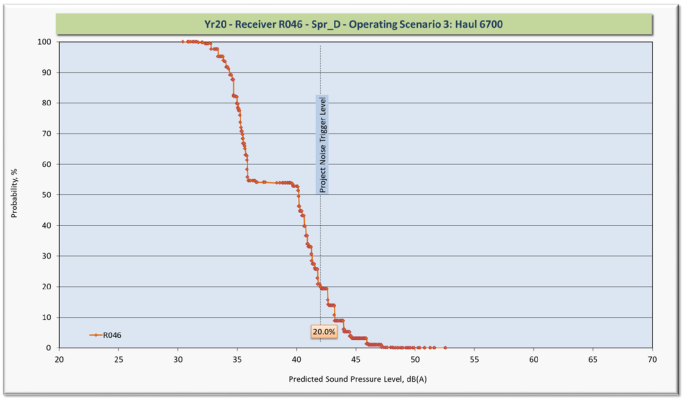
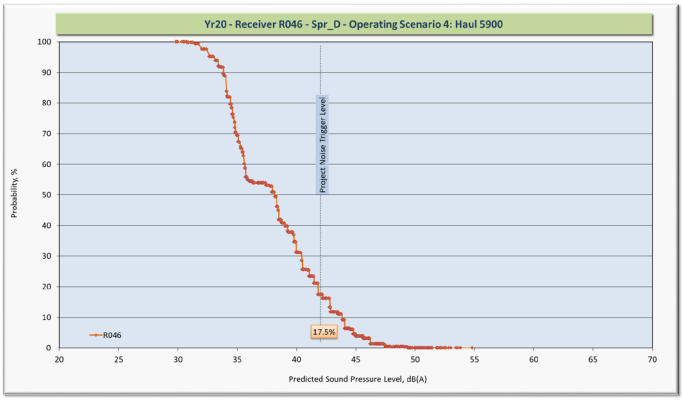
The probabilistic analysis has focussed on the quarrying activities within the West Pit as these activities are mobile and transient in operation. Due to the relatively static nature of the equipment/plant in the East Pit processing area, the probabilistic analysis yields less influence on the predicted outcomes for those private receivers adjacent to the processing area. However, the activity in the southern stockpile area can be managed to reduce noise emissions from the East Pit processing area. The southern stockpile area will be used for product storage and overflow management when specific products are being stored for later sale. This includes products that have specific quality assurance requirements to meet customer specifications.

A simple overview of the noise modelling results indicates that the potential noise emissions from the West Pit are highest when the loader and/or drill are operating in an exposed location such as on a high bench. The noise emissions are reduced as the loader and/or drill are relocated to more protected locations such as a lower bench in the West Pit. Additionally, the noise emissions from the West Pit are enhanced or reduced in the direction of the private receivers depending on the dominant wind conditions. On this basis, the activities in the West Pit can be managed based on the dominant weather conditions and received noise levels are the private receivers.

Several examples of the probabilistic analysis have been prepared to illustrate that performance-based noise management of the West Pit activities yields greater operability while managing noise levels at the sensitive locations. An example of the stepwise control strategy that could be implemented for managing noise emissions from the West Pit is as follows:

1. Operation of the loader and three haul trucks on a high bench in the West Pit, with the sand wash plant and drill in operation
2. Relocate the drill to a lower bench (or relocate the loader and trucks to a lower bench)
3. Turn off drill and sand wash plant
4. Relocate the loader to the lower bench
5. Reduce the haul trucks
6. Relocate the loader to the lowest bench
7. Reduce the haul trucks
8. Cease West Pit activity and operate from a stockpile in the East Pit processing area.

The results in **Figure A8.1** illustrate the effectiveness of the control strategies to reduce the predicted noise levels and the percentage of time these are likely to be required to meet the noise management level of 42 dB(A) at R046 (406 Dungog Road).

Description	Cumulative Distributions	Note
Figure A8.1a **Loader on a high bench** **3x haul truck** **Drill located on a high/low bench**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 33% of Spring day.
Figure A8.1b **Loader on a high bench** **3x haul truck** **Drill relocated lower bench**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 28% of Spring day.
Figure A8.1c **Loader on a high bench** **1x haul truck** **Drill off** **Sand wash plant off**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 20% of Spring day.
Figure A8.1d **Relocate loader to a lower bench** **3x haul truck** **Drill on** **Sand wash plant off**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 18% of Spring day.

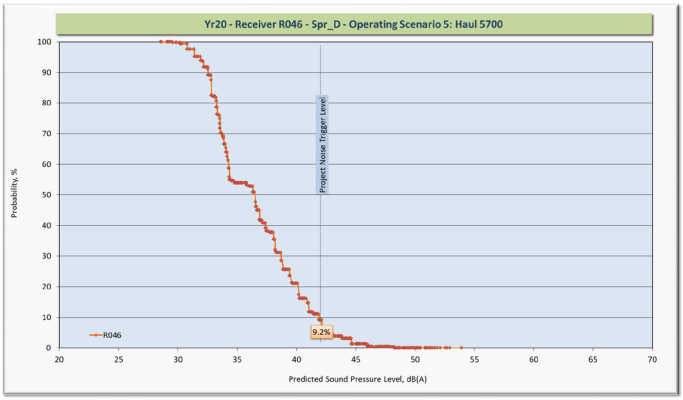
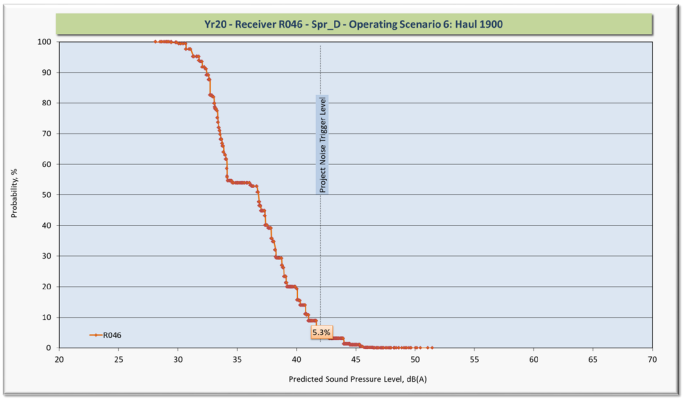
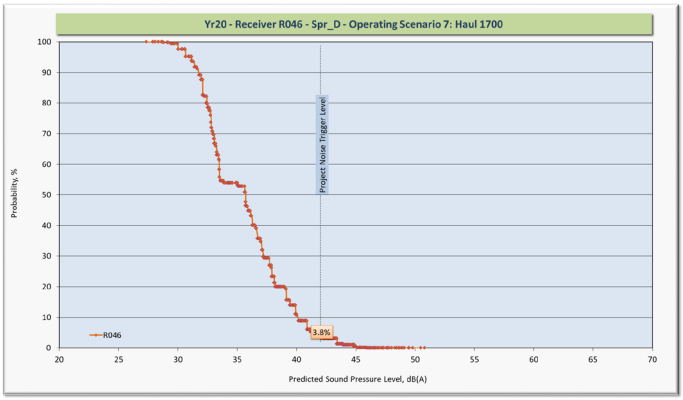
Description	Cumulative Distributions	Note
Figure A8.1e **Loader on a lower bench** **1x haul truck** **Drill off** **Sand wash plant off**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 9% of Spring day.
Figure A8.1f **Relocate loader to lowest bench** **3x haul truck** **Drill off** **Sand wash plant off**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 5% of Spring day.
Figure A8.1g **Loader on the lowest bench** **1x haul truck** **Drill off** **Sand wash plant off**		Under this operational scenario, the noise management level of 42 dB(A) is predicted to be exceeded 4% of Spring day.

Figure A8.1 Probabilistic results for stepwise noise control strategies in Year 20 at Receiver R046 – 406 Dungog Road

Further to the example of the noise control strategy discussed above, the probabilistic analysis has been used to evaluate the utilisation of the multiple haul routes within the West Pit. This analysis has considered the simultaneous management of the noise emissions from the West Pit to a noise management level of 42 dB(A) at both R046 (406 Dungog Road) and R047 (341 Dungog Road), and 45 dB(A) at R034 (338 Dungog Road). **Table A8.1** presents the results evaluated for each season of each stage year modelled.

The utilisation in **Table A8.1** is presented as a range where the first value indicates the percentage utilisation including three haul trucks, the drill located on a high bench and the sand wash plant. The second value indicates percentage utilisation including one haul truck, combined with the loader and having drill and sand wash plant shut down. **Table A8.1** presents an optimised priority order for each of the work areas to achieve the highest possible utilisation. The priority order indicates that work on the higher benches is the most constrained and should be prioritised first to maximise the quarrying opportunity during suitable meteorological conditions. While work deeper in the pit is the least constraint and should be assigned the lowest priority.

Table A8.1 West Pit Haul Route Utilisation Per Season to manage noise levels to 42 dB(A) at R046 and R047, and 45 dB(A) at R034

Year	Operating Activity	Season			
		Spring	Summer	Autumn	Winter
2 [1]	Haul 2900	20%-54%	19%-40%	19%-62%	27%-82%
	Haul 5900	23%-60%	23%-47%	24%-71%	32%-88%
	Haul 1900	26%-71%	25%-65%	26%-79%	34%-93%
	Haul 3900	29%-90%	29%-85%	29%-94%	36%-99%
	Drill (High)	26%	26%	26%	31%
	Drill (Low)	78%	67%	85%	93%
	Southern Stockpile	29%	29%	29%	36%
6	Haul 2900	48%-52%[2]	36%-39% [2]	54%-60%	65%-71%
	Haul 5900	65%-67%	55%-58%	71%-74%	77%-78%
	Haul 3900	67%-70%	58%-64%	74%-78%	78%-84%
	Haul 1900	77%-98%	73%-98%	81%-97%	87%-100%
	Drill	68%	61%	68%	73%
	Southern Stockpile	96%	96%	95%	94%
10	Haul 2900	39%-42%[2]	29%-34%[2]	38%-43%[2]	50%-55%
	Haul 4900	42%-47%[2]	34%-39%[2]	43%-48%[2]	55%-59%
	Haul 6900	53%-60%	42%-51%	62%-68%	72%-75%
	Haul 3900	60%-60%	51%-51%	68%-68%	75%-75%
	Haul 5900	60%-67%	51%-60%	68%-76%	75%-84%
	Haul 1900	74%-99%	71%-99%	79%-98%	86%-100%
	Drill	51%	44%	55%	66%
	Southern Stockpile	95%	96%	94%	93%
15	Haul 2900	50%-53%	37%-41%[2]	56%-59%	67%-69%
	Haul 5900	53%-57%	41%-43%[2]	59%-64%	69%-77%
	Haul 4900	57%-58%	43%-45%[2]	64%-67%	77%-79%
	Haul 6900	58%-62%	45%-50%[2]	67%-70%	79%-82%
	Haul 3900	65%-72%	53%-65%	73%-82%	82%-91%
	Haul 1900	74%-97%	69%-99%	83%-96%	92%-100%
	Drill	56%	44%	60%	68%
	Southern Stockpile	96%	94%	95%	96%

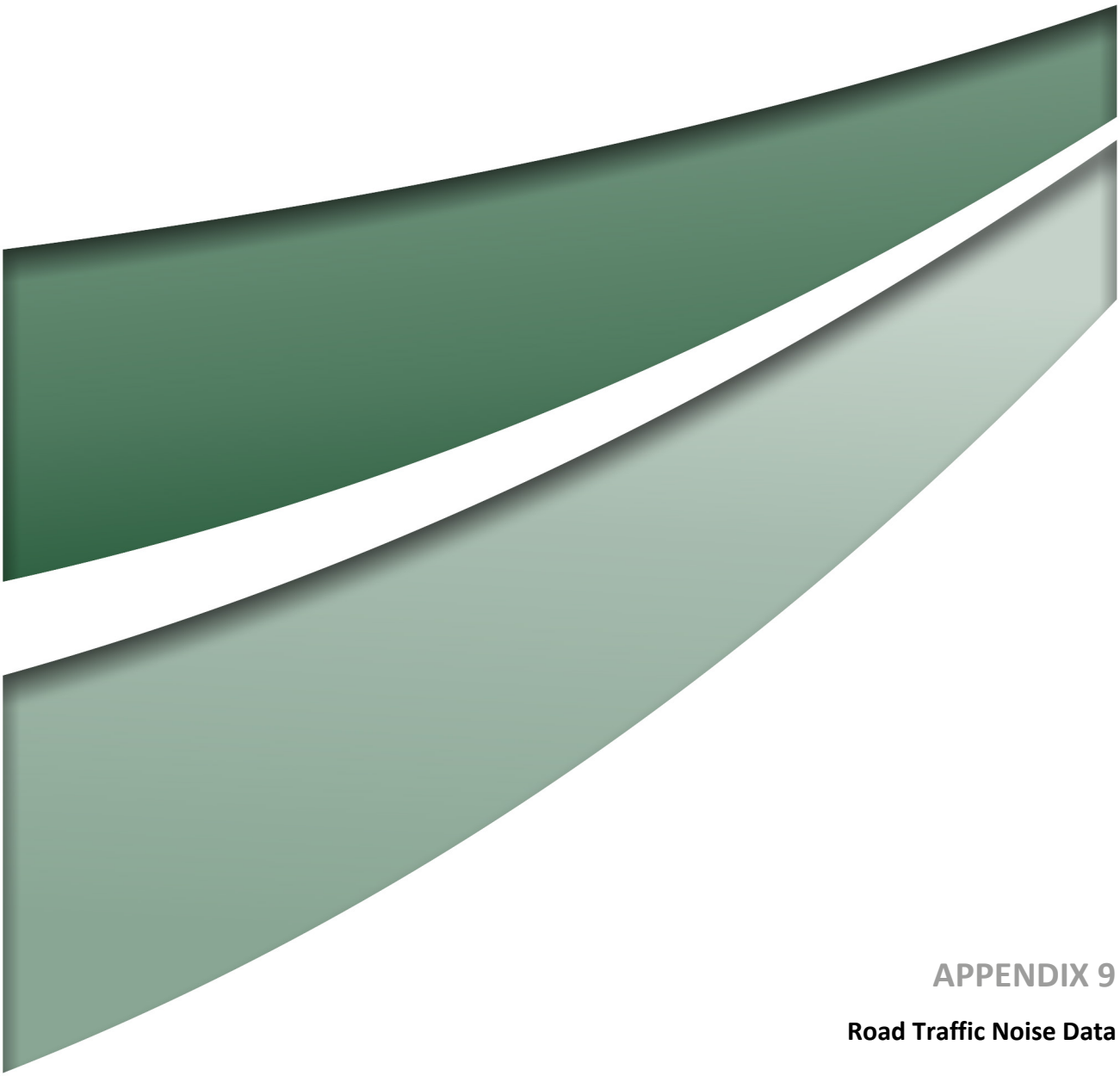
Year	Operating Activity	Season			
		Spring	Summer	Autumn	Winter
20	Haul 2900	52%-52%	40%-40%[2]	59%-59%	69%-69%
	Haul 5900	52%-56%	40%-43%[2]	59%-65%	69%-81%
	Haul 3900	56%-60%	43%-50%[2]	65%-70%	81%-85%
	Haul 6900	60%-71%	50%-65%	70%-80%	85%-91%
	Haul 4900	74%-74%	69%-69%	83%-83%	92%-92%
	Haul 1900	74%-97%	69%-99%	83%-96%	92%-100%
	Drill	55%	43%	62%	70%
	Southern Stockpile	97%	94%	96%	97%

Notes: [1] The operational constraint is being driven by the activity on the higher benches in the West Pit coupled with the Southern Stockpile area. Given the high constraint in all periods, this activity would need to be prioritised above others to maximise the opportunity to quarry in this area. An example would be controlling activity in the southern stockpile area to increase the loader and truck activity within the west pit.

[2] The operational constraint is being driven by the loader and truck activity on the high benches. Given the high constraint, work on the higher benches would need to be prioritised above others to maximise the opportunity to quarry in this area.

The utilisation percentages presented in **Table A8.1** generally indicate that work on the higher, more exposed benches yields the lowest machine utilisation, particularly in Years 2, 6 and 10. As the progression of the West Pit deepens, the utilisation of the higher benches increases, as shown in results for Years 15 and 20.

Based on the results presented in **Table A8.1**, the quarrying activity on the higher benches has to be prioritised during suitable weather conditions i.e. when the wind is blowing from the north, north-west or west.



APPENDIX 9

Road Traffic Noise Data

Appendix 9 – Road Traffic Noise Data

To facilitate the assessment of the road traffic noise a number of data sets have been collated and reviewed. The compiled data presented in this appendix includes:

- Traffic count data sources from SECA and Matrix Traffic and Transport Data to establish the traffic count on five (5) different zones of the main truck route to be used by road trucks dispatched from the quarry

  Table A9.1 shows an hourly breakdown of the traffic count data as a weekday average for each of the five (5) zones assessed for the three (3) week monitoring period

  Table A9.2 shows a breakdown of the traffic count data based on the Class Summary as a weekday average for each of the five (5) zones assessed for a three (3) week monitoring period

- Noise monitoring data from locations along the truck route to establish baseline noise levels for comparison with the road traffic noise modelling software. This is presented in **Table A9.3** and **Charts A9.1** and **A9.2**.

- Weighbridge data to establish the pattern in the road truck dispatch rate over the course of an average day. This is summarised in **Table A9.4** and **Charts A9.3** to **A9.5**.

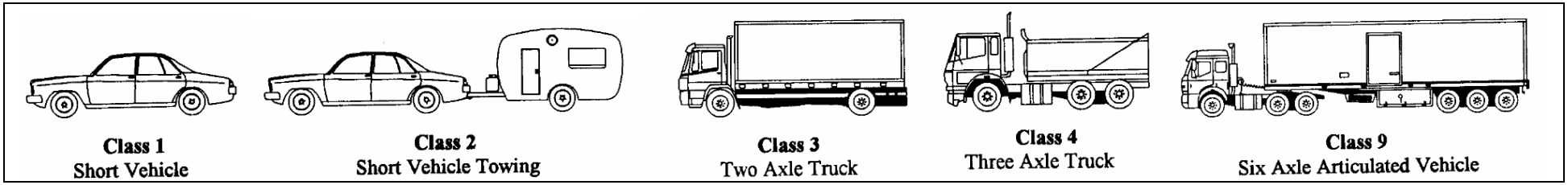
- Predicted road traffic noise levels for different operational traffic generation rates. This is provided in **Table A9.5**.

Table A9.1 Weekday Average Traffic Count (reported as week commencing)

Monitoring Site	Dungog Road			Gresford Road			Tocal Road			Paterson Road			Flat Road/Glenarvon Road/Pitnacree Road		
Hour Starting	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18
0:00	2	3	4	6	4	6	8	6	7	28	29	24	21	18	17
1:00	3	3	3	6	4	6	7	6	9	20	19	19	17	17	13
2:00	1	2	2	6	6	6	6	5	6	17	17	19	17	15	12
3:00	6	5	5	8	7	7	9	10	9	28	34	33	19	19	18
4:00	10	8	6	25	21	24	31	29	29	114	112	115	61	63	65
5:00	36	39	39	76	99	80	102	113	95	303	306	305	216	226	220
6:00	108	143	117	194	210	191	227	225	216	633	625	623	494	501	473
7:00	113	130	130	254	261	266	341	316	306	979	946	932	779	783	787
8:00	141	155	140	314	312	305	420	394	344	1227	1266	1166	896	921	880
9:00	119	123	121	262	252	253	378	367	277	944	951	872	687	673	648
10:00	111	116	110	235	230	224	337	269	234	811	744	695	560	554	530
11:00	104	107	98	217	215	205	305	301	237	782	767	711	559	559	533
12:00	105	111	106	221	229	225	335	332	246	795	796	717	569	576	554
13:00	101	111	100	221	218	203	350	269	248	821	712	708	577	548	529
14:00	116	113	111	249	234	251	392	296	285	951	866	841	681	679	680
15:00	125	121	107	311	293	277	452	352	320	1188	1119	1120	938	946	911
16:00	136	140	132	327	320	314	455	373	362	1253	1198	1175	1003	954	946
17:00	114	107	109	282	281	280	431	333	324	1243	1199	1168	981	987	965
18:00	60	61	59	175	181	174	214	206	210	789	758	793	617	634	615
19:00	32	30	34	83	80	83	110	107	107	416	414	421	328	335	334
20:00	21	22	23	60	58	55	83	74	75	304	286	298	250	241	254
21:00	16	18	20	39	54	47	53	64	66	184	195	202	181	184	187
22:00	10	8	11	25	25	25	35	32	29	105	103	102	100	95	101
23:00	4	5	5	10	12	11	14	16	16	49	49	55	46	40	41
Total	**1594**	**1679**	**1590**	**3607**	**3605**	**3516**	**5094**	**4492**	**4058**	**13987**	**13512**	**13114**	**10596**	**10566**	**10314**

Table A9.2 Weekday Class Summary (reported as week commencing)

Monitoring Site		Dungog Road			Gresford Road			Tocal Road			Paterson Road			Flat Road/Glenarvon Road/Pitnacree Road		
Class Summary		28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18	28/4/18	5/5/18	12/5/18
Light	C1	80 %	79 %	79 %	84 %	84 %	85 %	87 %	85 %	87 %	93 %	93 %	93 %	95 %	94 %	95%
	C2	3 %	2 %	2 %	3 %	3 %	3 %	3 %	3 %	3 %	2 %	2 %	2 %	2 %	2 %	2%
Medium	C3	4 %	3 %	4 %	4 %	3 %	3 %	3 %	3 %	3 %	2 %	2 %	2 %	2 %	2 %	2%
	C4	4 %	4 %	4 %	3 %	2 %	3 %	2 %	3 %	2 %	1 %	1 %	1 %	0 %	1 %	1%
	C5	0 %	0 %	0 %	0 %	0 %	0 %	0 %	1 %	0 %	0 %	0 %	0 %	0 %	0 %	0%
Heavy	C6	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%
	C7	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%
	C8	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%
	C9	7 %	8 %	7 %	3 %	4 %	4 %	2 %	3 %	3 %	1 %	1 %	1 %	1 %	1 %	1%
	C10	2 %	2 %	2 %	1 %	1 %	1 %	1 %	1 %	1 %	0 %	0 %	0 %	0 %	0 %	0%
	C11	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%
	C12	0 %	0 %	0 %	0 `%	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%
Unclassified		0%	0 %	0 %	0 %	1 %	1 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Total Count		**1594**	**1679**	**1590**	**3607**	**3605**	**3516**	**5094**	**4492**	**4058**	**13987**	**13512**	**13114**	**10596**	**10566**	**10314**



Source: Appendix B Austroads: Figure B 1: Vehicle Classifications

Traffic Noise Monitoring Data

Charts A9.1 and **A9.2** show the variability of the daily $L_{Aeq,15minute}$ noise levels measured adjacent to Gresford Road, Paterson at a setback of 13 metres from the northbound lane and Maitland Road, Paterson at a setback of 12 metres from the southbound lane. The period based (day, evening, night) L_{Aeq} noise levels are presented in **Table A9.3**.

Table A9.3 Measured $L_{Aeq,period\ (day,\ night)}$ Road Traffic Noise and Truck Movements

Location	Gresford Rd, Paterson, dB(A)		Maitland Road, Paterson, dB(A)		Laden Truck Numbers		
Date/Period	Day	Night	Day	Night	< 10t	10 to 20t	> 20t
11/05/2018	62	57	59	53	2	15	108
12/05/2018	61	50	59	48	0	1	19
13/05/2018	60	55	58	54	-	-	-
14/05/2018	62	55	60	54	1	0	107
15/05/2018	62	56	59	54	0	15	71
16/05/2018	62	55	60	54	7	46	115
17/05/2018	62	55	60	54	2	34	74
18/05/2018	62	-	60	-	8	14	82

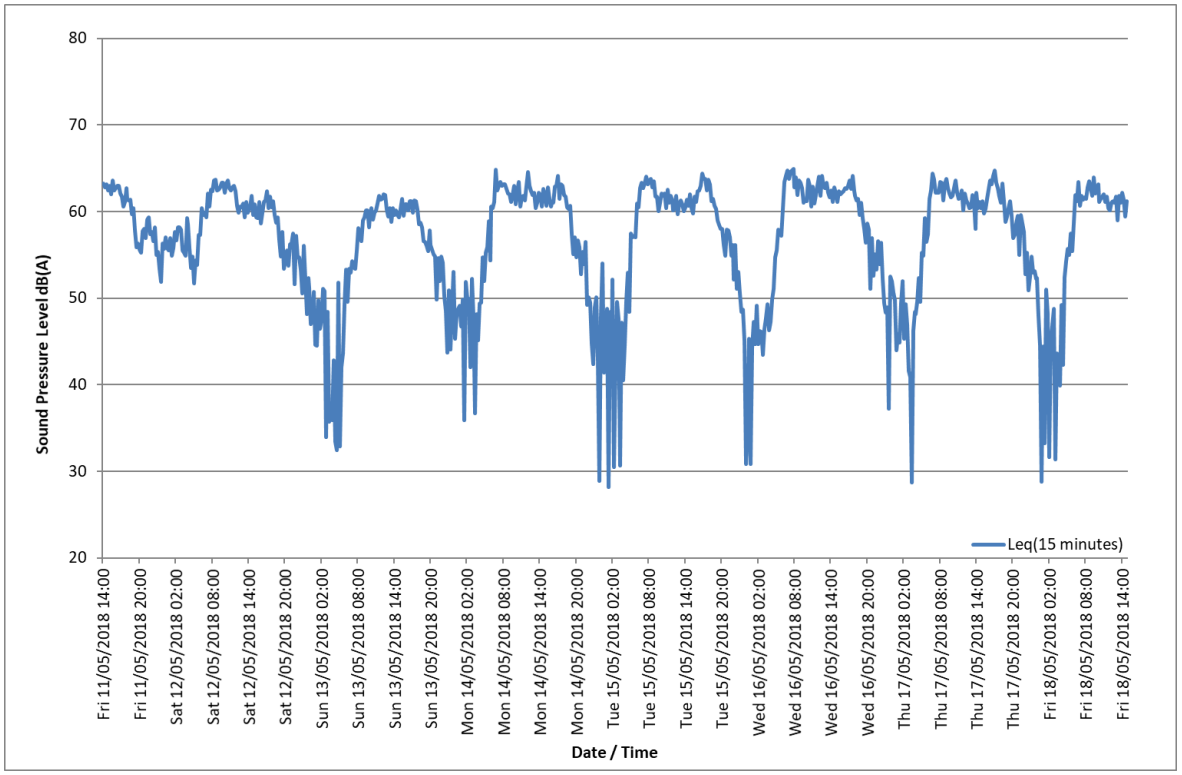


Chart A9.1
Measured $L_{Aeq,15minute}$ noise levels
Gresford Rd, Paterson 11 to 18 May 2018

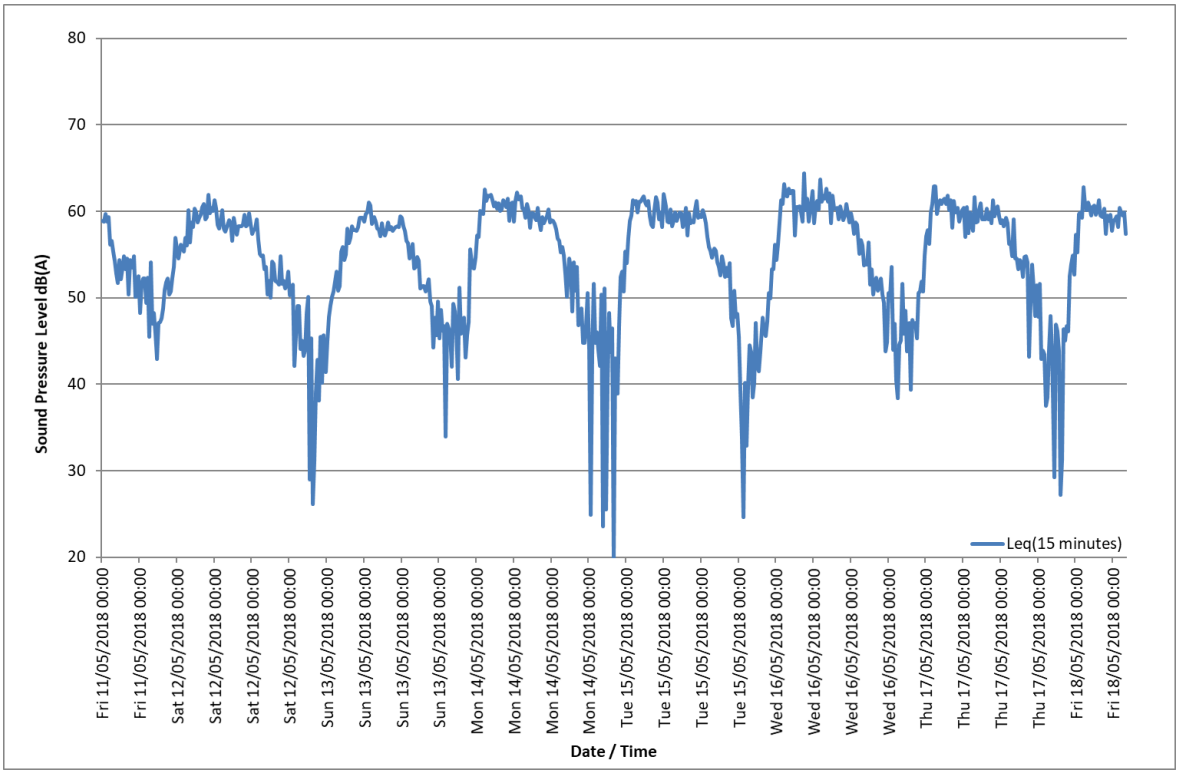


Chart A9.2
Measured $L_{Aeq,15minute}$ noise levels
Maitland Road, Paterson - 11 to 18 May 2018

Weighbridge Data Analysis

Product dispatch from Martins Creek Quarry via road over the course of a year is demand-driven. The variability in the resulting number of truck movements per hour and per day is captured in the weighbridge records. To forecast the likely variability in truck movements for the Revised Project, the weighbridge records have been analysed for the period from 2013 to 2019 (refer to **Table A9.4**).

Table A9.4 Weighbridge Records of the Annual Number of Road Trucks Dispatched from the Quarry

Hour	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18	FY18/19
6:00 - 7:00	4292	3934	2588	3122	3788	2400
7:00 - 8:00	3889	2973	2588	1887	1966	2205
8:00 - 9:00	3457	2741	2310	2174	2406	1548
9:00 - 10:00	3962	3310	3277	2469	2530	1676
10:00 - 12:00	3518	2874	3214	2193	2558	1889
11:00 - 12:00	3945	3125	2818	2459	2581	1622
12:00 - 12:00	3554	2877	2665	2061	2321	1448
13:00 - 13:00	3253	2555	2453	1727	2116	1283
14:00 - 15:00	3248	2693	2462	1760	1636	1103
15:00 - 16:00	2546	2073	1555	1067	1026	798
16:00 - 17:00	832	741	515	369	337	361
17:00 - 18:00	135	159	65	8	13	8
Total	32339	26121	23922	18174	19490	13941

The records in **Table A9.4** do not include the dispatch of product to support emergency railway repair work by ARTC at Tocal following the 2015 flood event.

To account for the proposed maximum quantity of product dispatch by road the weighbridge records in **Table A9.4** have been normalised to the equivalent of 500,000 tonnes per annum. The normalised truck movement data has then been used to forecast the breakdown in the average daily truck movements per hour (refer to **Chart A9.3**).

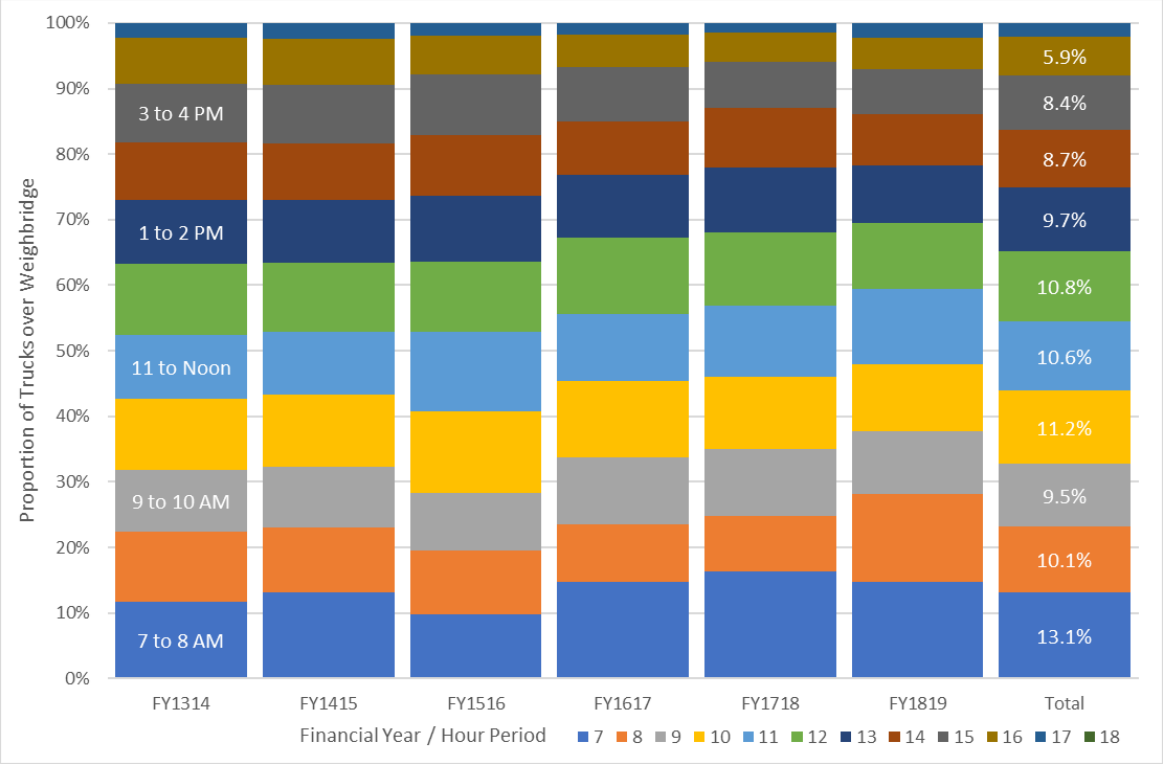


Chart A9.3
Forecast of the daily breakdown of truck movements per hour based on the breakdown of the normalised weighbridge data for 2013 to 2019

The Project has committed to not dispatch product via road during normal operations prior to 7:00. To account for this commitment for normal operations, the normalised truck movement data in **Chart A9.3** has been transposed one hour. For example, the 6:00 to 7:00 data has been used to represent the 7:00 to 8:00 period. It is noted that the dispatch of product via road during periods approved as an 'emergency' is not included in the analysis.

The normalised truck movement data can also be used to forecast the breakdown of daily truck movements per year. This is shown in **Chart A9.4**.

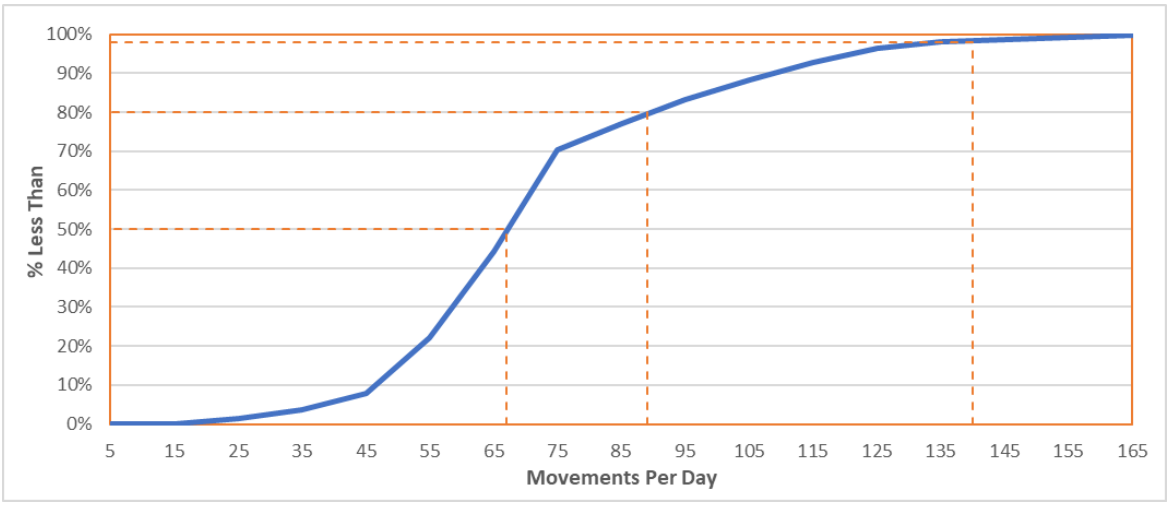


Chart A9.4
Breakdown of truck movements per day
based on the breakdown of weighbridge data for 2013 to 2019

Based on historical data, **Chart A9.4** shows the variability of the daily truck movement has ranged from 5 trucks per day to potentially greater than 140 trucks per day. The Revised Project commitment is to cap the dispatch of product via road during normal operations to a maximum of 140 trucks per day. The Revised Project has also committed to cap the dispatch of product via road during normal operations at a maximum of 20 laden trucks per hour up to 3 pm and 15 laden trucks per hour after 3:00.

This analysis of the daily truck movement data and forecast of product dispatch via road by the Revised Project provides the following information:

- 500,000 tonnes per annum at a rate of 32 tonnes per truck modelled over 48 weeks per year 5 days per week equates to an average of 65 laden trucks per day
- **Chart A9.4** indicates 80% of the product dispatched by road occurs on days where the truck movements range from 5 to 89 laden trucks per day
- The historical weighbridge records presented in **Chart 9.4** indicates the capped maximum dispatch by road of 140 laden trucks per day would occur infrequently

The forecasts from **Charts A9.3** and **A9.4** have been combined to provide a forecast of the breakdown of the possible daily laden truck movements for the Revised Project. This is shown in **Chart A9.5**.

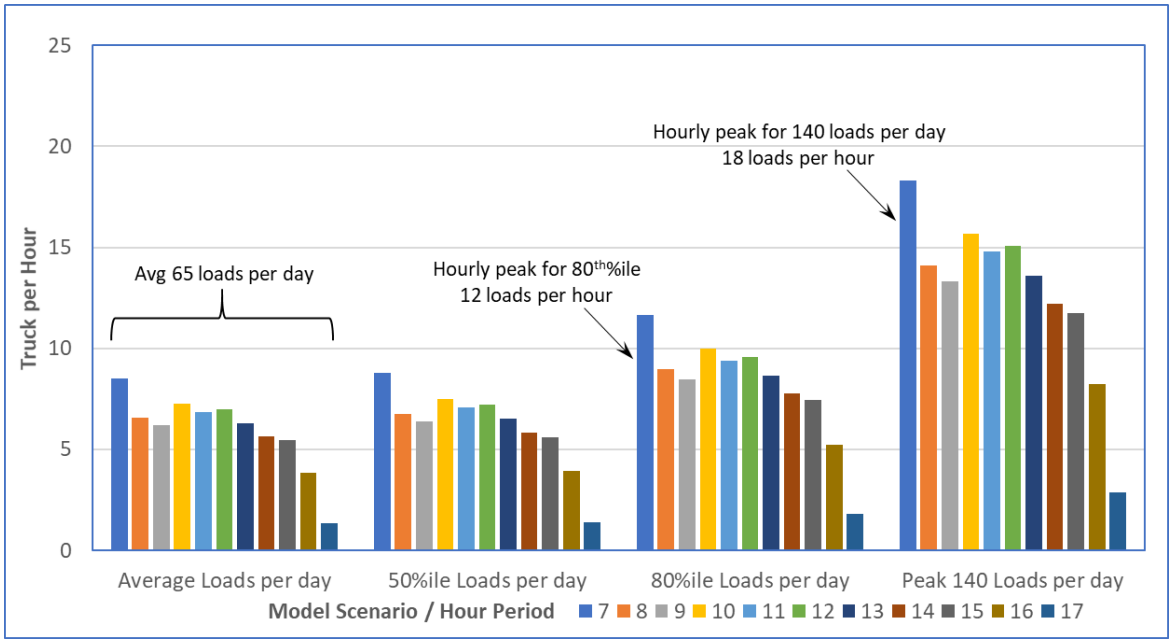


Chart A9.5
Breakdown of truck movements per hour for different daily rates
based on the breakdown of normalise weighbridge data for 2013 to 2019

To facilitate the assessment of the impact from the Revised Project on operational noise and road traffic noise the following truck movement numbers based on the analysis of **Chart A9.5** have been considered in the Noise Impact Assessment and Road Traffic Assessment:

- 140 laden trucks dispatched by road per day as the daily capped maximum
- 20 laden trucks dispatched by road per hour (40 movements) as the capped hourly maximum Monday to Friday between 7.00 am and 3.00 pm
- 15 laden trucks dispatched by road per hour (30 movements), Monday to Friday between 3.00 pm and 6.00 pm.
- a peak hourly rate of 12 laden trucks dispatched by road per hour is representative of the upper range in the dispatch of 80% of the 500,000 tonnes per annum by road per day at a rate of 89 laden trucks dispatched by road per day
- 65 laden trucks dispatched by road per day is the daily annual average

Table A9.5 shows the potential range in the traffic noise levels for each of the operational traffic generation rates discussed above.

Table A9.5 Calculated L_{Aeq} Road Traffic Noise Levels at Receiver Locations for different movement rates of Quarry trucks

Sensitive receiver	RNP criteria	Baseline [1] road traffic noise level	Road traffic noise level including proposed Quarry trucks			RNP assessment period
			Capped 140 trucks/day or peak rate of 20 trucks/hour	89 trucks/day or peak rate of 12 trucks/hour	65 trucks/day	
Nearest Receiver 4	60	55.0	58.2	57.4	57.0	Day period
Nearest Receiver 5	60	54.0	56.3	55.7	55.3	Day period
Nearest Receiver 6	60	57.3	58.2	57.9	57.8	Day period
Nearest Receiver 7	60	62.9	63.9	63.6	63.4	Day period
Nearest Receiver 8	60	62.7	64.0	63.6	63.4	Day period
Nearest Receiver 9	60	57.9	58.7	58.5	58.3	Day period
Nearest Receiver 10	60	59.5	60.4	60.1	60.0	Day period
Nearest Receiver 11	60	62.4	63.2	63.0	62.8	Day period
Nearest Receiver 12	60	60.3	61.2	61.0	60.8	Day period
Nearest Receiver 13	60	66.4	66.8	66.7	66.6	Day period
Nearest Receiver 14	60	64.4	64.8	64.6	64.6	Day period
Nearest Receiver 15	60	62.8	63.4	63.2	63.1	Day period
Sensitive Receiver 1	50	60.1	61.6	60.9	-	1 hour
Sensitive Receiver 2	55	63.3	64.3	63.9	63.6	Day period
Sensitive Receiver 3	45	64.4	64.9	64.7	-	Worst hour
Sensitive Receiver 4	55	60.6	61.6	61.2	60.9	Day period
Sensitive Receiver 5	50	62.0	63.2	62.8	-	1 hour
Sensitive Receiver 6	60	56.3	57.1	56.8	56.7	Day period
Sensitive Receiver 7	50	64.0	65.5	64.9	-	1 hour
Sensitive Receiver 8	55	63.3	64.3	63.9	63.6	Day period

Note: [1] Reported to one decimal point to allow the relative difference to be calculated

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