Appendix 6

Acoustic Impact Assessment

ACOUSTICS AND AIR

MATERIALS RECYCLING FACILITY, MINTO

NOISE ASSESSMENT

REPORT NO. 12166-N
VERSION D

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PREPARED FOR

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D	Draft	18 December 2018	Brian Mendieta	Neil Gross
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Note

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Wilkinson Murray is an independent firm established 50 years ago originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. Today, with offices in Sydney, Newcastle, Wollongong, Queensland and Hong Kong, Wilkinson Murray services the entire Asia-Pacific region.

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

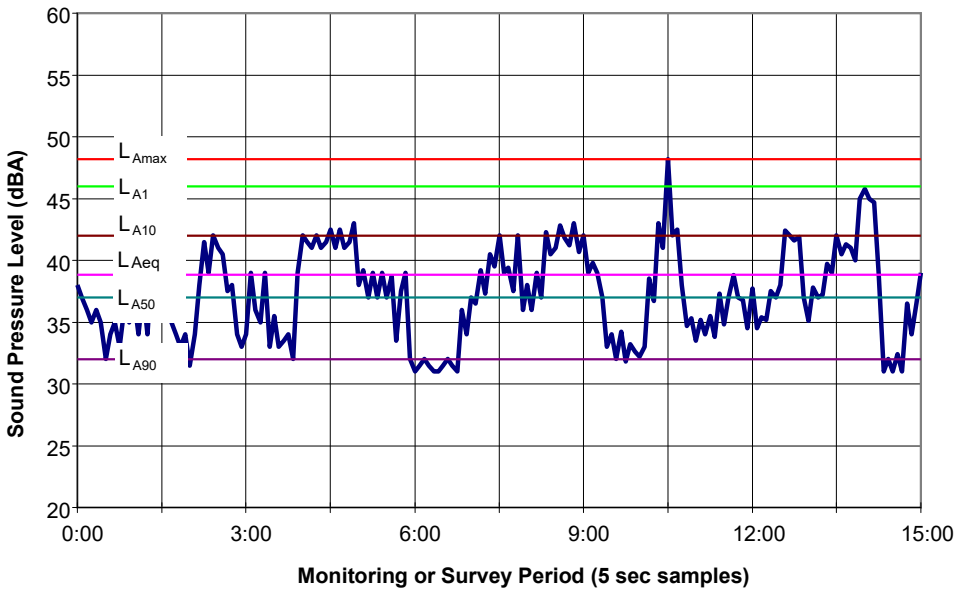
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Camolaw Pty Ltd proposes to construct and operate a materials recycling facility at 7 Montore Road, Minto. The site is located within an existing industrial area.

The general operation of the site will consist of raw material deliveries (building waste and sand) followed by crushing, screening, washing as required and then stockpiling of the different grades of product. The finished product will then be loaded on to trucks and transported off site.

This report presents the results of this noise assessment which has been conducted in accordance with the guidelines by the NSW Environment Protection Authority (EPA) in relation to operational noise and construction noise.

The site has access to the nearby major arterial road network via Airds Road, Ben Lomond Road and Rose Payten Drive without the need to pass by any residential receivers and for this reason potential impacts associated with traffic noise have not been assessed.

The assessment work on this project was commenced in 2012 and updated in 2016 and 2018.

2 SITE DESCRIPTION

2.1 Site Description

The site is located on the eastern side of Bow Bowing Creek with the closest residences located approximately 280 metres to the west in St Andrews on the other side of Campbelltown Road. Figure 2-1 shows the location of the site.

The residences are at a higher elevation (approx. RL 60-63) than the industrial area (RL 40-43). Most of the nearest affected residences along Campbelltown Road are single level and have solid fencing along the boundary that faces Campbelltown Road.

Figure 2-1 Aerial of Site

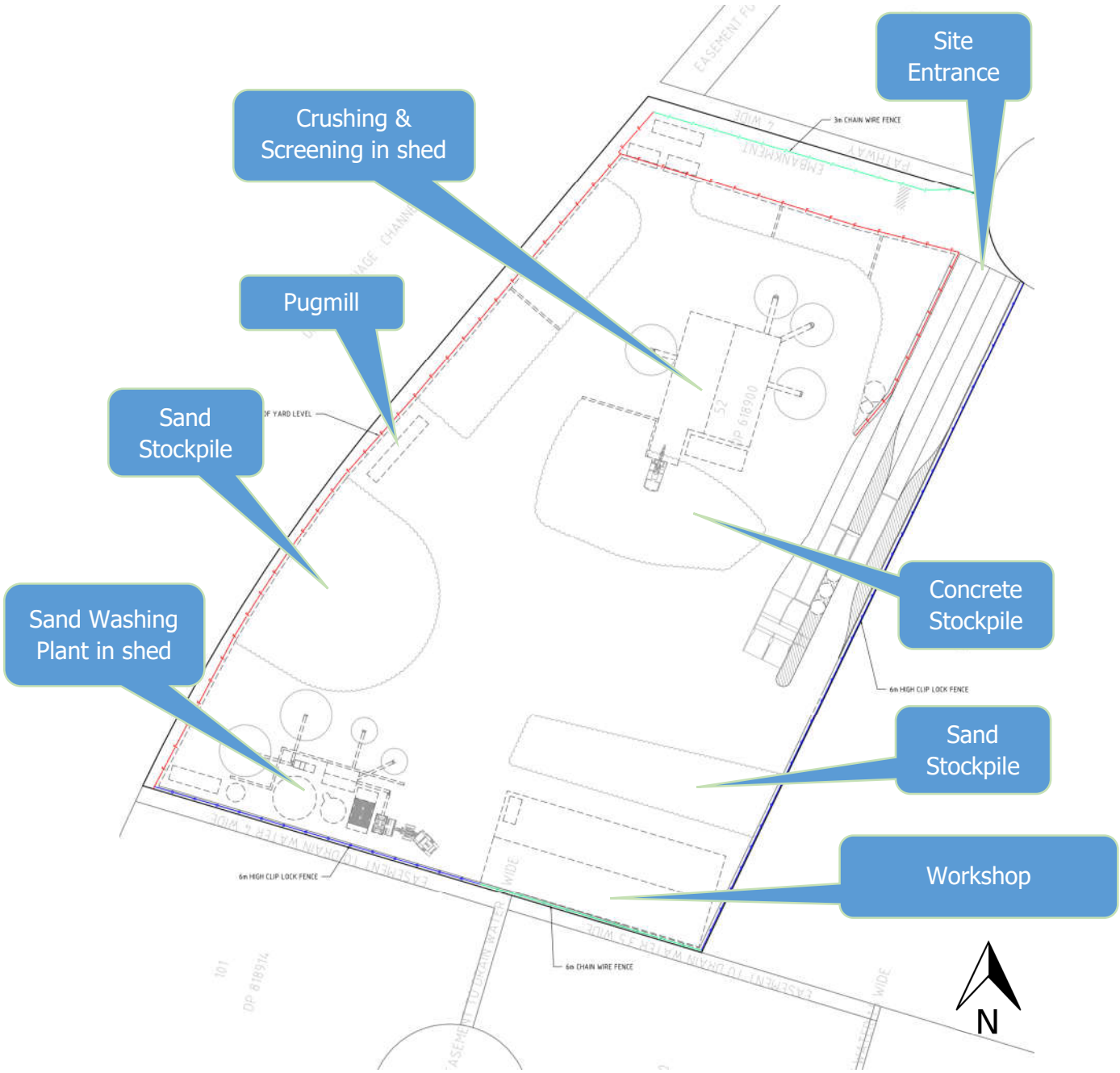
2.2 Proposed Operations

The proposed site layout is shown in Figure 2-2. The crusher and screen are located in a shed towards the northern boundary of the site and the sand washing plant, also within a smaller shed, is located on the southern end of the site. A pugmill will also be located on the western boundary.

A 6-metre-high noise barrier will be built on the northern and western boundary of the site.

The proposed resource recovery facility is intended to crush and process building waste material and wash sand. The site will have a total capacity of 450,000 tonnes per annum. The proposed facility will receive concrete, brick, asphalt, sandstone and sand from the building and construction industry.

Figure 2-2 Site Layout



2.3 Methodology

The general methodology of site operations is:

- Trucks with raw product (waste material and/or sand) would arrive on site through the industrial area and unload the raw product in the respective stockpile areas. Trucks would then leave the site.
- The oversize concrete waste material would be crushed using a pulveriser attachment on the excavator and then loaded by another excavator into the primary crusher. The crushing plant is enclosed in a 10-metre-high purpose-built building. Inside the buildings where the crusher and screen are housed, a fogging system would be employed to control dust. The initial processing stage would be conducted by a jaw crusher and conveyed to the cone crusher via the screen. From the screen, processed materials would be transferred by conveyor stackers to product stockpiles of maximum height 8 metres. Product would then be transferred by wheel loader to designated stockpile locations.
- The sand material would be placed in a feed hopper by a wheel loader and then conveyed to the screen located in a shed. Fines are pumped to the sand washing plant (M2500 – AGGMAX), while washed product would be sent to the stockpiles. Sand product would then be transferred by wheel loader to designated stockpile locations.
- The Pugmill will be used to mix sand and road base with cement binder products and/or water.
- Product would be loaded onto delivery trucks by a wheeled loader. The delivery trucks would travel onto the weighbridge and then leave the site.
- In a "typical" weekday, the Site would receive 1,600 tonnes and deliver 1,600 tonnes of material. This average is based on 250 weekdays per year. On 50 Saturdays per year, 1,000 tonnes would be processed. In a "maximum" day, the Site could receive 2,500 tonnes and deliver 2,500 tonnes of material.
- On busy days, 3 excavators and 3 front end loaders are required to operate on site..

Deliveries to and from the site will occur daily between (Monday to Saturday). Projected typical weekday inbound and outbound trucks are shown below with reduced numbers on Saturdays.

Product	In	Out
Raw waste materials	89 loaded	89 empty
Processed product from site	80 empty	80 loaded
Other materials for off-site recycling	1 loaded	1 loaded
Residual waste to landfill	1 loaded	1 loaded
Total	**171**	**171**

2.4 Operating Hours

Operations would be carried out between 6.00am and 7.00pm, weekdays and 7.00am to 4.00pm Saturdays. For typical weekdays the following operations would occur:

- Receiving waste: 6.00am-6.00pm
- Loading trucks and delivery, site cleaning: 6.00am-7.00pm
- Crushing and screening: 7.00am-6.00pm

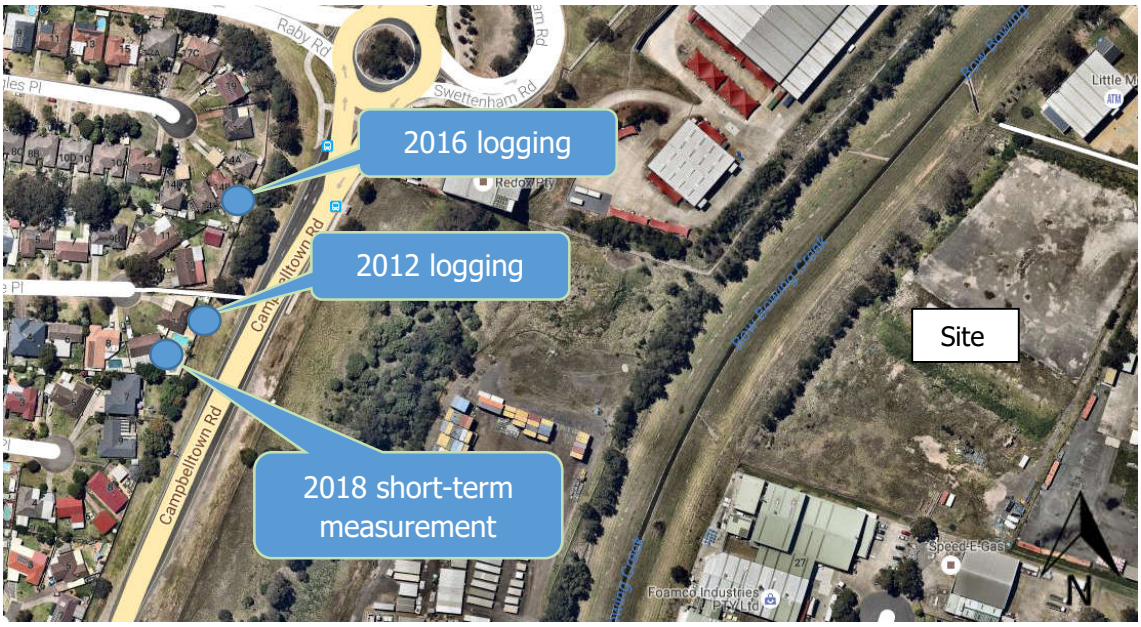
3 NOISE CRITERIA

Long-term unattended noise monitoring was initially performed in 2012 and then repeated in 2016 to determine any change in the background and ambient noise level in the area, primarily as a result of new industrial developments and/or changes in traffic volumes on Campbelltown Road. Further short-term monitoring was conducted in November 2018. The noise monitoring is described as follows:

- Period 1: between 14 and 26 June 2012 in the backyard of 12 Kintyre Place, St Andrews at approximately 3m from a 2m high Colorbond fence.
- Period 2: between 14 and 23 November 2016 in the backyard of 14B Gleneagles Place, St Andrews at approximately 5m from a 1.5m high timber fence.
- Period 3: 30 November 2018 in the backyard of 10 Kintyre Place, St Andrews at approximately 7m from a 2m high Colorbond fence.

The noise monitoring locations are shown in Figure 3-1. Additionally, attended monitoring was conducted next to the noise logger and at the top of the fence in order for us to ascertain background noise levels at receiver locations either shielded or unshielded from traffic noise.

Figure 3-1 Noise Monitoring Locations



3.1.1 Noise Logger Description

The unattended noise monitoring equipment used consists of an ARL EL-316 (2012) and ARL EL-215 (2016) Environmental Noise Loggers set to A-weighting and fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis.

The equipment has been calibrated at a NATA approved laboratory within the last two years in accordance with Australian standards and Wilkinson Murray's internal QS procedures. Current certificates for the device have been issued.

Noise loggers determine a variety of descriptors such as L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. The L_{A90} level is normally taken as the background noise level during the relevant period and is most appropriate for this project as it is used to develop the Rating Background Levels (RBLs).

Detailed results from noise monitoring are shown in graphical form in Appendix A. The graphs show measured values of L_{Aeq}, L_{A90}, L_{A10} and L_{A1} for each 15-minute monitoring period.

Table 3-1 and Table 3-2 present a summary of the background and ambient noise levels for the daytime, evening and night time as defined by the EPA *Noise Policy for Industry (NPfI)*. Additionally, the background noise levels for the 6.00am to 7.00am shoulder period has been included. Any data affected by adverse weather conditions has been discarded according to the requirements of the *NPfI*. The combined data measured in 2012 and 2016 has been considered representative of the background and equivalent sound pressure levels of the area and is therefore suitable for use in this noise impact assessment.

Table 3-1 Measured Rating Background Levels (RBL), dBA

Monitoring Year	Daytime (7am-6pm)	Evening Shoulder Period (6pm-7pm)	Evening (6pm-10pm)	Night Time (10pm-7am)	Early Morning Shoulder Period (6am-7am)
2012	48	48	45	40	49
2016	47	46	45	38	48
Combined Data	**48**	47	45	39	**48**

Note: bold value indicates relevant noise level in this assessment.

Table 3-2 Measured Ambient Noise Levels (L_{Aeq}), dBA

Monitoring	Daytime (7am-6pm)	Evening Shoulder Period (6pm-7pm)	Evening (6pm-10pm)	Night Time (10pm-7am)	Early Morning Shoulder Period (6am-7am)
2012	58	57	56	52	54
2016	57	62	63	51	56
Combined Data	58	60	60	52	55

Table 3-3 presents a summary of attended measurements carry out next to the noise loggers.

Table 3-3 Summary of Attended Measurements (dBA)

Date	Time	L_{A90}	L_{Aeq}	Comments
2012 14 June	5.15pm to 5.30pm	53	59	Measurement carried out next to the noise logger. Background noise levels influenced by traffic on Campbelltown Road.
2012 14 June	5.45pm to 6.00pm	56	64	Measurement carried out at the top of the fence. Background noise levels influenced by traffic on Campbelltown Road. Based on the measured noise levels, the fence provides a 3dB insertion loss at the logger location. **Hence, a conservative difference of 2 dB will be used for establishing criteria for any unshielded locations (top floor of 2-storey houses).**
2016 14 November	11.30am to 11:45am	49	56	Measurement carried out next to the noise logger Background noise levels influenced by traffic on Campbelltown Road.
2018 30 November	3.30pm to 3.45pm	52	57	Measurement carried out in the backyard of 10 Kintyre Place, St Andrews. Background noise levels influenced by traffic on Campbelltown Road.

According to the previous 2016 long-term noise measurement, the average hourly $L_{Aeq\ 1hr}$ noise level between 3.00pm and 4.00pm was 57dB. The 2018 short-term measurement is found to be the same. Therefore, the previous noise measurement is still considered valid.

3.2 Noise Levels from Existing Industry

Noise levels at the nearest residences were typical of a suburban residential area that borders a busy arterial road, and no continuous existing industrial noise was audible. The ambient noise levels were dominated by traffic noise from Campbelltown Road.

3.3 Operational Noise Criteria

The *NSW Noise Policy for Industry (NPfI)* recommends two noise criteria, "Intrusiveness" and "Amenity", both of which are relevant for the assessment of noise at residences. In most situations for continuous noise, one of these is more stringent than the other and is the controlling noise criteria for assessment purposes. The noise criteria are based on the L_{Aeq} descriptor, which is explained in the Glossary of Acoustic Terms.

3.3.1 Intrusiveness Noise Criteria

The intrusiveness criterion requires that the L_{Aeq} noise level from the source being assessed, when measured over 15 minutes, should not exceed the Rating Background Noise Level (RBL) by more than 5dBA. The RBL represents the 'background' noise in the area, and is determined from measurement of L_{A90} noise levels, in the absence of noise from the source. The definition of L_{A90} and the procedure for calculating the RBL is given in Glossary of Acoustic Terms.

The *NPfI* takes into account the need for assessing different periods. For example, where early morning periods are proposed (i.e. 6.00am-7.00am) it may be unduly stringent to assess such operations against night time criteria – especially if the existing background noise levels are steadily rising during the early hours of the morning.

3.3.2 Shoulder Period Noise Criteria

The *NPfI* states where early mornings (5.00am-7.00am) operations are proposed, it may be unreasonable to expect such operations to be assessed against the night-time project noise trigger levels. As a rule of thumb and for the purpose of deriving the intrusiveness noise level only, it may be appropriate to assign a shoulder period rating background noise level based on:

- The lowest 10th percentile of $L_{AF90,15min}$ dB measurements for the equivalent of one weeks' worth of valid data taken over the shoulder period (that is, all days included in a single data set of should period); or,
- The $L_{AF90(shoulder\ period)}$ dB value (that is, the lowest 10th percentile value of aggregate data for the equivalent of one week's worth of valid data taken over the shoulder period).

The objective of this methodology is to achieve environmental amenity in a feasible and reasonable manner. Because the site only operates one hour within the night time (10.00pm-7.00am), the night-time amenity criteria is considered unduly stringent as amenity criteria are derived from an average noise level of the whole night (9 hours). Therefore, intrusive noise criterion should only be considered to address noise within a shoulder period.

A similar approach is also applied to an evening shoulder period between 6.00pm and 7.00pm.

3.3.3 Amenity Noise Criteria

The amenity criteria set a limit on the total noise level from *all industrial noise sources* affecting a receiver. Different criteria apply for different types of receiver (e.g. residence, school classroom); different areas (e.g. rural, suburban); and different time periods, namely daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night time (10.00pm-7.00am).

The noise level to be compared with this criterion is the L_{Aeq} noise level, measured over the time period in question, due to all industrial noise sources, but excluding non-industrial sources, such as transportation.

Where a new noise source is proposed in an area with negligible existing industrial noise, the amenity criterion for that source may be taken as being equal to the overall amenity criterion.

However, if there is significant existing industrial noise, the criterion for any new source must be set at a lower value. If existing industrial noise already exceeds the relevant amenity criterion, noise from any new source must be set well below the overall criterion to ensure that any increase in noise levels is negligible. Methods for determining a source-specific amenity criterion where there is existing industrial noise are set out in the *NPfI.*

A summary of the $L_{Aeq,15min}$ daytime amenity noise level for the surrounding receivers is presented in Table 3-4.

Table 3-4 Amenity Noise Level (dBA)

Noise Amenity Area	Time of Day	Recommended Amenity Noise Level L_{Aeq} (dBA)
Residential – Suburban	Day	**53** (55 – 5 + 3)
Industrial	Day	70

3.3.4 Sleep Disturbance Noise Criterion

Noise sources of short duration and high level that may cause disturbance to sleep if occurring during the night time need to be considered.

The approach recommended by the *NPfI* is to apply the following initial screening noise levels:

- $L_{Aeq,15min}$ 40dBA or the prevailing RBL + 5dB, whichever is the greater; and/or
- L_{AFmax} 52dBA or the prevailing RBL + 15dB, whichever is the greater.

The sleep disturbance screening noise levels apply outside bedroom windows during the night time period. It should be noted that the sleep disturbance criteria do not apply to industrial receivers.

Where the screening noise levels cannot be met, a detailed maximum noise level event assessment should be undertaken. It may also be appropriate to consider other guidelines including the NSW *Road Noise Policy* (RNP) which contains additional guidance relating to potential sleep disturbance impacts.

A review of research on sleep disturbance in the *RNP* indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on currently available research results, the *RNP* concludes that:

- "Maximum internal noise levels below 50dBA to 55dBA are unlikely to cause awakening reactions."
- "One or two noise events per night, with maximum internal noise levels of 65dBA to 70dBA, are not likely to affect health and wellbeing significantly."

3.4 Site-Specific Noise Criteria

Table 3-5 presents the relevant noise criteria for this project for shielded and unshielded locations.

Table 3-5 Summary of Noise Criteria (dBA)

Time Period	Floor	RBL	Intrusiveness $L_{Aeq,15min}$	Amenity $L_{Aeq, period}$	Sleep Disturbance L_{Amax}
Daytime (7am–6pm)	Ground Floor (shielded)	48	53	Residences 53 Industrial 70	-
	First Floor (unshielded)	50	55	Residences 53 Industrial 70	-
Shoulder Period (6pm-7pm)	Ground Floor (shielded)	47	52	-	-
	First Floor (unshielded)	49	54	-	-
Shoulder Period (6am-7am)	Ground Floor	48	53*	-	63
	First Floor	50	55*	-	65

*The noise criteria are also considered to be the NPfI's sleep disturbance noise criteria for continuous noise from the site.

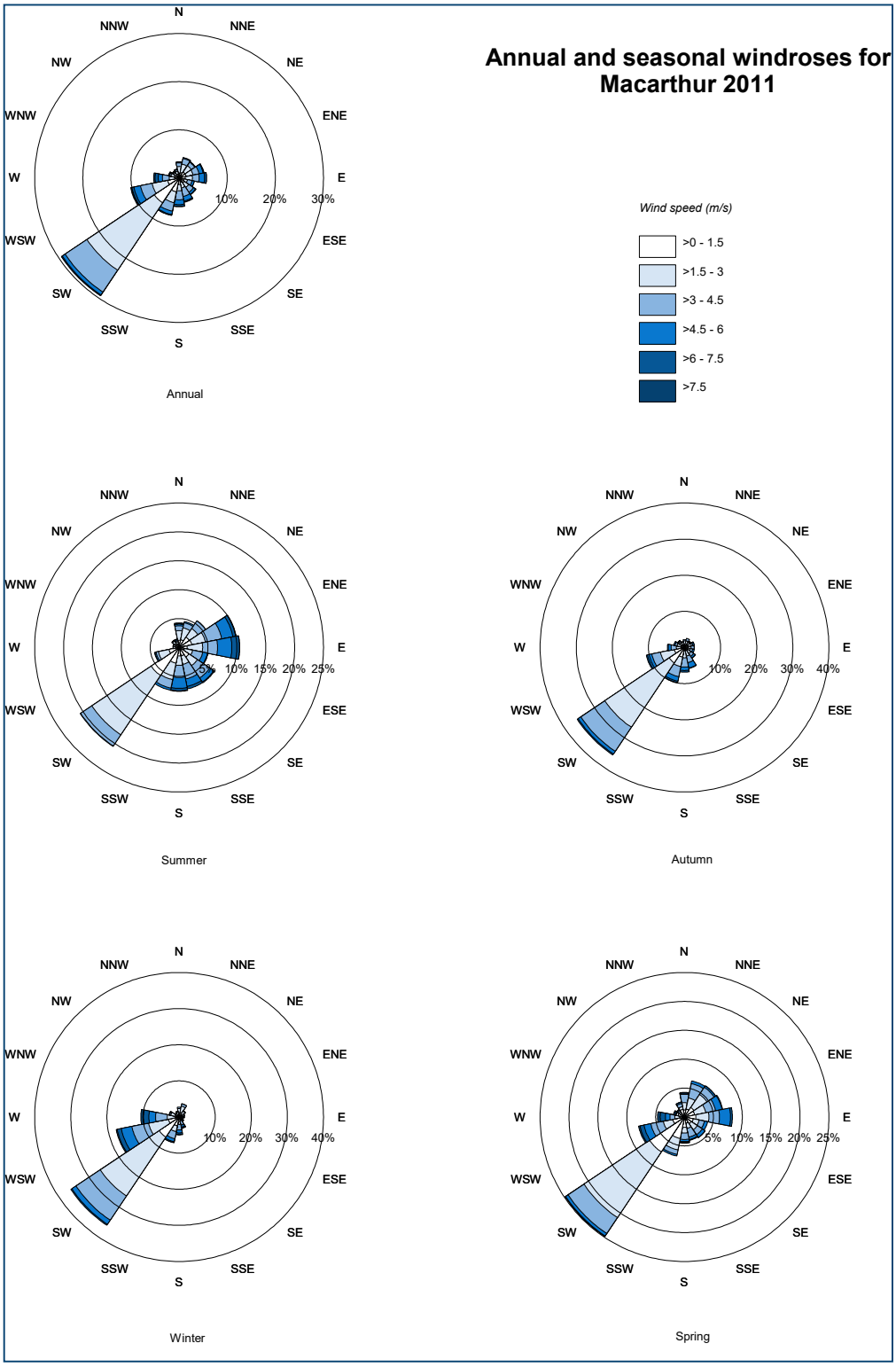
At all times, the intrusiveness criterion is the more stringent of the criteria when assessing over a 15-minute period. Hence the project-specific criteria would be 53dBA for typical worst-case 15-minute period at ground floor and 55dBA at any unshielded first floor locations.

As the only activity that falls into this category is the truck movements between 6.00am and 7.00am, the background noise levels from the shoulder period have been used to establish the sleep disturbance criterion. Hence the sleep disturbance criterion would be 63dBA at ground floor and 65dBA at the first floor.

4 ASSESSMENT OF OPERATIONAL NOISE LEVELS

4.1 Meteorological Conditions

Wind roses from a nearby weather station are shown below.

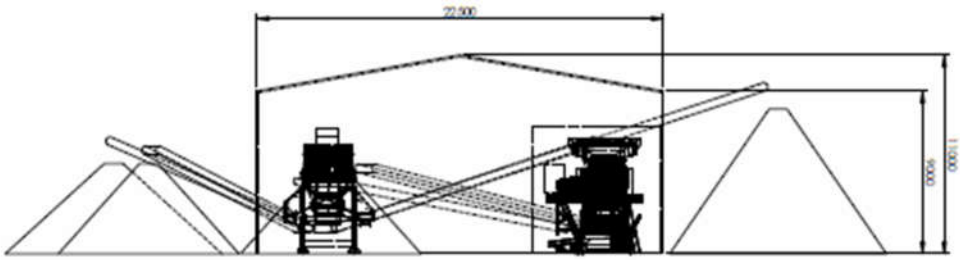


The potentially most affected residential receivers are in a westerly direction. Wind conditions likely to enhance noise propagation to the west only occur a small proportion of the time and less than 30% in any season so these adverse conditions are not required to be assessed under the *NPfI*. However, for completeness noise predictions have been presented under these adverse wind conditions.

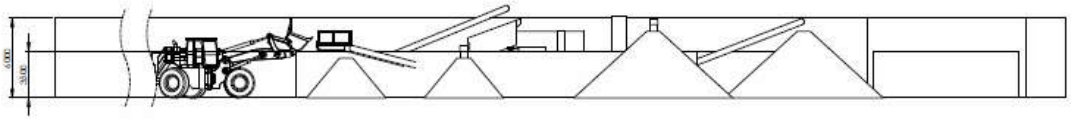
4.2 Operational Noise Sources

For assessment purposes, truck pick-ups & deliveries, crushing & screening, pugmill and sand washing operations are assumed to occur simultaneously.

The crushing plant is located within a shed, which has several conveyers protruding and 6m high openings on the eastern and southern facades. The opening on the southern façade is partially screened in the direction of residences by a 4m permanent bund which an excavator sits on to feed the crusher.



The sand washing plant is also within a shed and includes a generator, screens and a M2500 – AGGMAX unit, which has several external conveyors. A 6m high wall will be placed along the northern and western boundary.



Measurement of the existing crushing plant and noise from mobile plant was conducted at the existing Camellia Plant. Data of the sand washing plant was provided by the manufacturer (CDE) and the pugmill sound power level was provided by Concrete Recyclers Group Pty Ltd. The sound power levels used to predict noise levels of the operations of the proposed facility are shown in Table 4-1.

Table 4-1 Plant Sound Power Levels (SWL) – dBA

Plant	Description	Sound Power Level $L_{Aeq,15min}$ (dBA)
Crushing & Screening Shed	Internal Reverberant Level	95 (SPL)
3 External Conveyers	Associated with crushing plant	95 each
Sand Washing Plant	A frequency dependant insertion loss up to 15dB has been considered for shed effects resulting in SWL 97dBA.	107
3 External Conveyers	Associated with sand washing plant	90 each
1 Excavator	Loading primary crusher (20 tonne)	105
1 Excavator	Loading primary crusher (20 tonne)	105
1 Excavator	Pulveriser mounted in excavator (20 tonne)	105
1 Water Cart	-	107
1 Front End Loader	Feeding sand washing plant	108
1 Front End Loader	Near the north boundary of the site	108
1 Front End Loader	Loading trucks or managing stockpiles	108
Pugmill	Situated on the west boundary of the site	109
Trucks	4 deliveries including material tipping load and 4 pick-ups in a 15-minute period	108
Trucks	Tipping load (Maximum Noise Level)	L_{Amax} 117

The following two operational scenario were considered for this noise assessment:

- **Daytime 7.00am-6.00pm – Site fully operational**. Typical truck movements include 4 inbound trucks unloading recycling materials onto the stockpile and leaving the site, 4 outbound trucks transporting processed materials from the site, crushing and screening plant operational, pugmill, sand washing plant operational, 3 excavators, 3 front end loaders and 1 water cart.
- **Shoulder 6.00am-7.00am – Truck deliveries and pick-ups.** Typical truck movements include 4 inbound trucks unloading recycling materials onto the stockpile and leaving the site, 4 outbound trucks transporting processed materials from the site and 1 front end loader.

  The works between 6.00pm – 7.00pm will comprise of truck deliveries and tidying up of the Recycling Facility. Noise emissions are likely to have a lower impact compared to the scenarios outlined above. However, for the purpose of assessing the worst-case scenario, the operational scenario for the morning shoulder period is assessed against the evening shoulder period criteria as well.

4.3 Predicted Operational Noise Levels at Residences

4.3.1 Intrusiveness Assessment

Noise predictions were conducted using the 'ENM' implemented in Predictor noise model program. Noise predictions were made taking into consideration neutral meteorological conditions (as

required by the *NPfI*) and for information purposes only also with moderate wind conditions (Wind Speed at 3m/s) towards the receivers. Table 4-2 presents the predicted operational noise levels at the potentially most affected residences to the west of the site. These are presented for both a ground floor (shielded) location and a first floor (unshielded location) allowing for a conservative 1.5m Colorbond fence at the residential boundary.

Table 4-2 Predicted L_{Aeq} Operational Noise Levels at Residences – dBA

Residence	Period	Floor	Operational Noise Criterion, $L_{Aeq,15min}$	Predicted Operational Noise Level, $L_{Aeq,15min}$	
				Neutral Conditions	Easterly Wind
Campbelltown Road (between Troon Place & Gleneagles Place)	7am-6pm	Ground Floor	53	49	53
		First Floor	55	50	53
	Shoulder Period (6am-7am & 6pm-7pm)	Ground Floor	6am-7am: 53 6pm-7pm: 52	47	52
		First Floor	6am-7am: 55 6pm-7pm: 54	48	53

The predicted noise levels indicate compliance with the intrusiveness criterion at ground and first floors for both day time and evening and early morning shoulder period operations under neutral weather conditions. The noise levels are expected to increase up to 53dBA under an easterly wind blowing from the site towards residences.

4.3.2 Sleep Disturbance Assessment

Outbound and inbound truck movements will occur between 6.00am and 7.00am. Trucks will enter site, unload materials onto the stockpile then leave site. Trucks would also be loaded by a front end loader and leave the site. The maximum noise event is caused by the trucks tipping their load onto the stockpile. These noise levels have been used to predict possible sleep disturbance.

Table 4-3 presents the predicted maximum noise levels associated with trucks tipping their load which indicates compliance with the Sleep Disturbance Criteria. The L_{Aeq} noise contributrion from the site has also been added to the L_{Amax}.

Table 4-3 Predicted Maximum Operational Noise Levels (dBA)

Residence	Floor	Sleep Disturbance Criterion, L_{Amax} (dBA)	Predicted Maximum Noise Level, L_{Amax}	
			Neutral Conditions	Easterly Wind
Campbelltown Road (between Troon Place & Gleneagles Place)	Ground Floor	63	50	55
	First Floor	65	51	56

4.4 Predicted Operational Noise Levels at Industrial Receivers

As discussed above, noise from various parts of the site will be intermittent depending on operations that day. Allowing for the 6m high perimeter wall along the western boundary the following noise levels are predicted at neighbouring premises based on a typical busy 15-minute period, noting the *NPfI* criterion of 70dBA applies to an 11-hour assessment whereby noise levels 2-3dB lower would be expected.

- Northern 53dBA
- Eastern 67dBA
- Southern 70dBA
- Western 58dBA

5 NOISE FROM CONSTRUCTION ACTIVITIES

5.1 Noise Criteria for Construction Noise Activities

The NSW *EPA Interim Construction Noise Guideline (ICNG)* presents the process to assess construction in NSW. The guideline provides noise goals that assist in assessing the impact of construction noise.

For residences, the basic daytime construction noise goal is that the $L_{Aeq,15min}$ noise levels should not exceed the background noise by more that 10dBA. This for standard hours: Monday to Friday 7.00am-6.00pm and Saturday 8.00am-1.00pm. Table 5-1 details the *ICNG* noise goals.

Table 5-1 Construction Noise Goals at Residences using Quantitative Assessment

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10dBA	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences; 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

The *ICNG* presents the following noise management levels for non-residential premises:

- Active recreation areas (such as parks) external $L_{Aeq,15min}$ 65dBA
- Passive recreation areas external $L_{Aeq,15min}$ 60dBA
- Industrial premises external $L_{Aeq,15min}$ 75dBA
- Offices, retail outlets external $L_{Aeq,15min}$ 70dBA
- Classrooms, hospitals, places of worships external $L_{Aeq,15min}$ 45dBA

The construction noise criteria at the closest residences are listed in Table 5-2.

Table 5-2 Construction Noise Criteria

Residence	Level	Construction Noise Criteria $L_{Aeq,15min}$ (dBA)
Campbelltown Road (between Troon Place & Gleneagles Place)	Ground	58
	First	60

5.2 Predicted Construction Noise Levels

The construction stage of the proposed site will consist of 3 stages. The breakdown of plant for each stage is based on information that has been provided by Concrete Recyclers (Group) Pty Ltd.

The construction stages, construction plant that will be used for each stage along with the total L_{Aeq} sound power levels are presented in Table 5-3.

Table 5-3 Construction Stage Sound Power Levels (SWL – dBA)

Construction Stage	Plant	Total $L_{Aeq,15min}$ Sound Power Level
Earthworks / Drainage	15t Roller, 30t Excavator & Trucks	112
Foundation / Hardstand	Bored Pile, Concrete Truck	111
Superstructure	Franna Crane / Mobile Crane & Trucks	107

Predicted noise levels for each construction stage are summarised below in Table 5-4.

Table 5-4 Predicted Construction Noise Levels (dBA)

Residence	Noise Management Level	Predicted $L_{Aeq,15min}$ Noise Levels (dBA)		
		Earthworks	Foundation Works	Superstructure
Campbelltown Road (between Troon Place & Gleneagles Place)	58-60	48	47	43-47

The predicted noise levels clearly show that noise levels from construction will comply with the Noise Management Levels.

6 CONCLUSION

The proposed materials recycling facility within an existing industrial area at Minto has been assessed based on the relevant guidelines from the NSW Environment Protection Authority (EPA).

The predicted operational noise levels indicate noise from the proposed facility will comply with the L_{Aeq} and L_{Amax} criteria between 6.00am and 6.00pm under neutral weather conditions at all considered receivers.

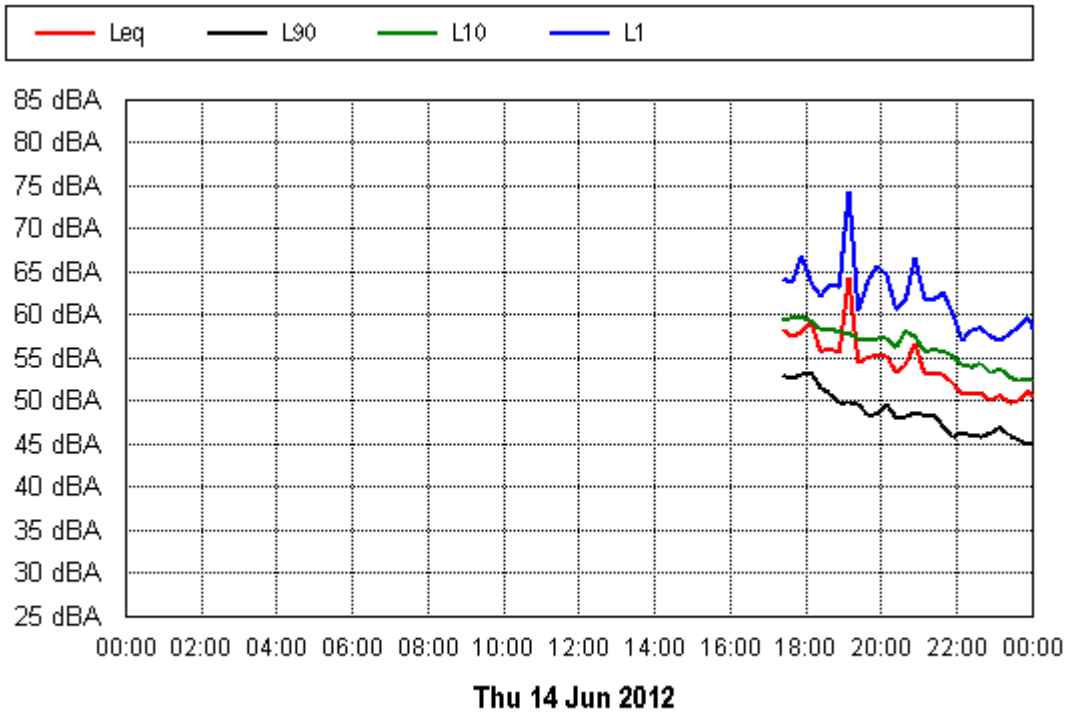
The predicted noise levels from the construction of the facility have been assessed against the NSW *Interim Construction Noise Guidelines*. The predicted noise levels indicate that the construction works will readily comply with the relevant criteria.

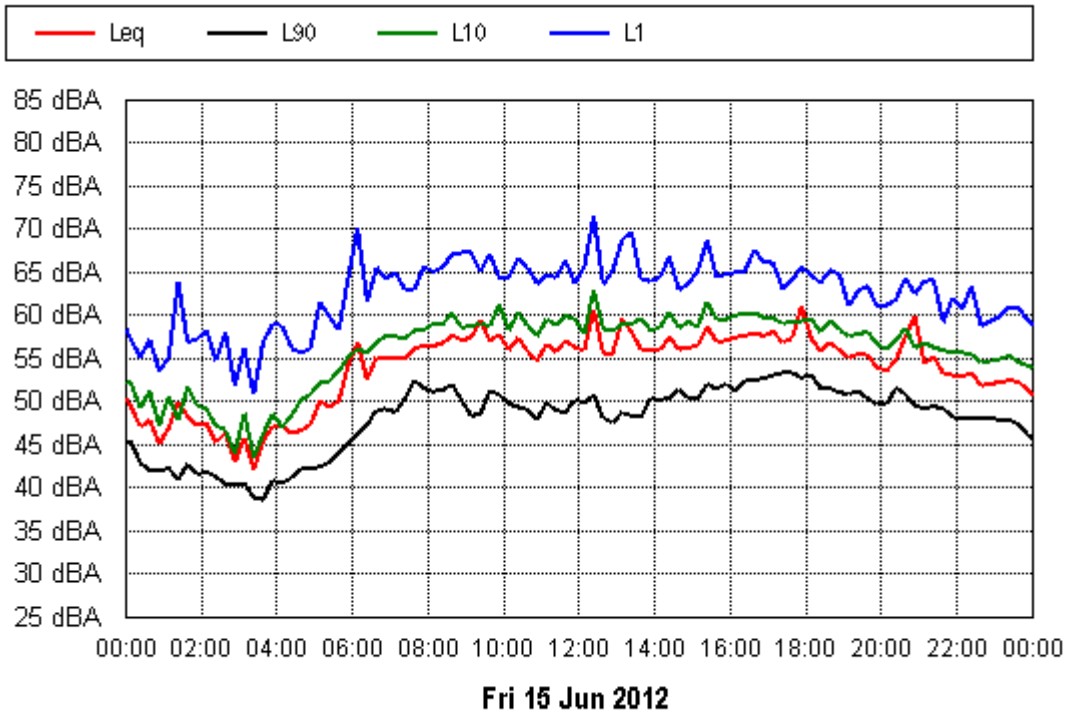
Trucks from the proposed facility would access the major arterial road network via Airds Road, Ben Lomond Road and Rose Payten Drive. None of these sub-arterial roads have residential receivers. No traffic noise impact is therefore expected.

APPENDIX A

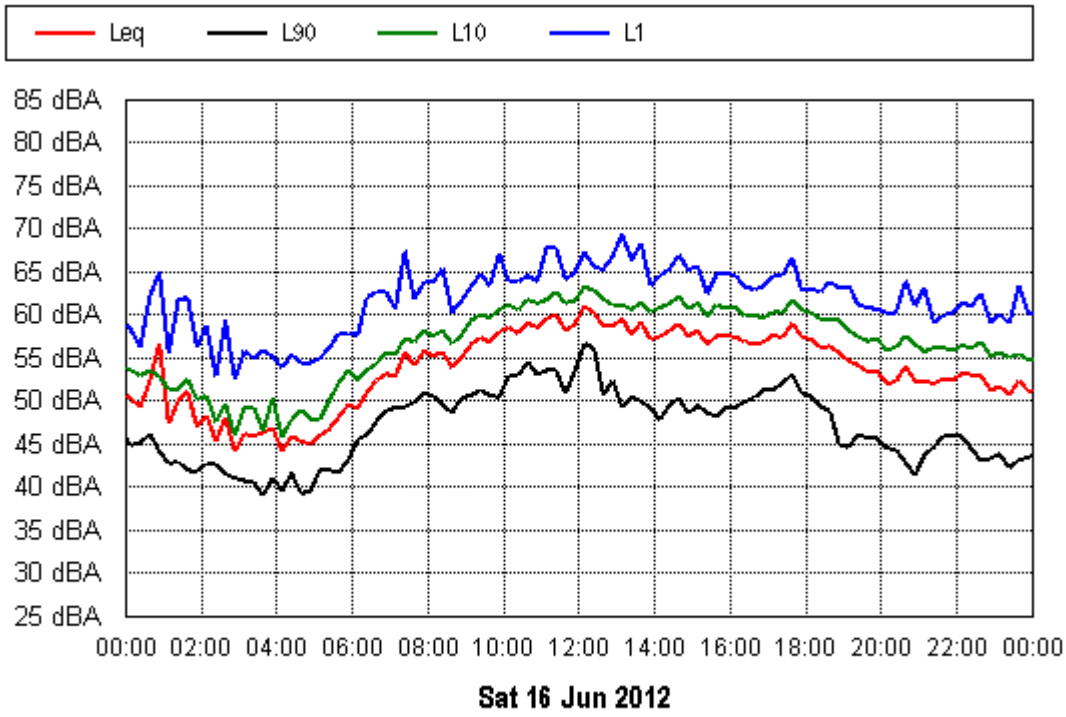
NOISE MEASUREMENT RESULTS 2012 & 2016

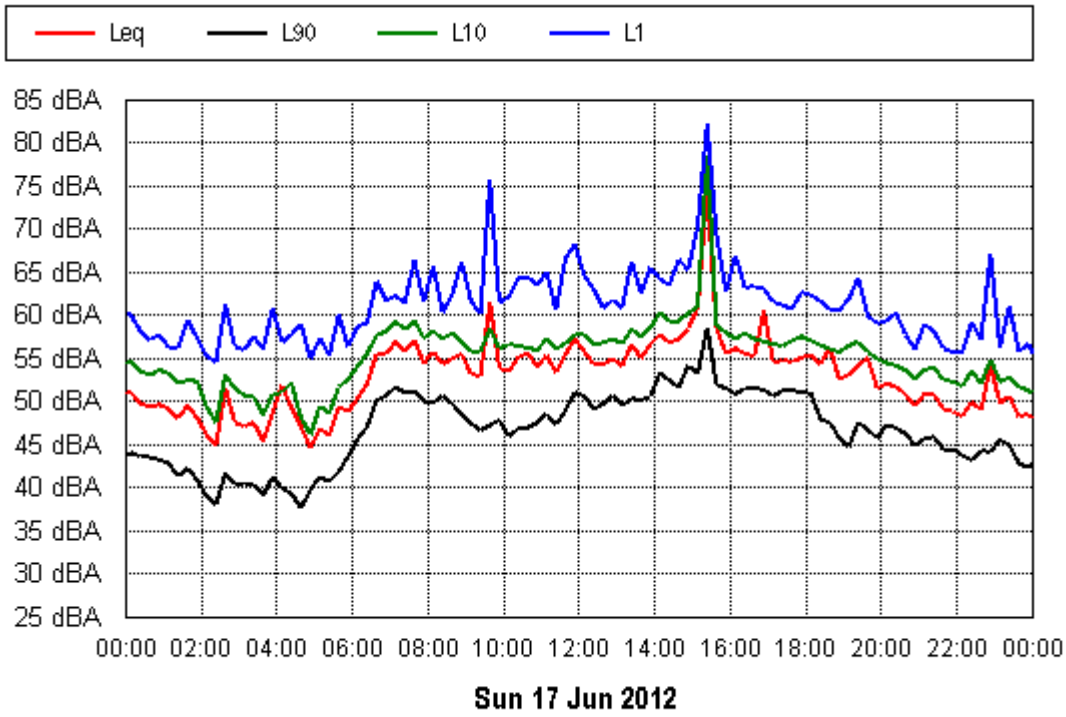
Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place



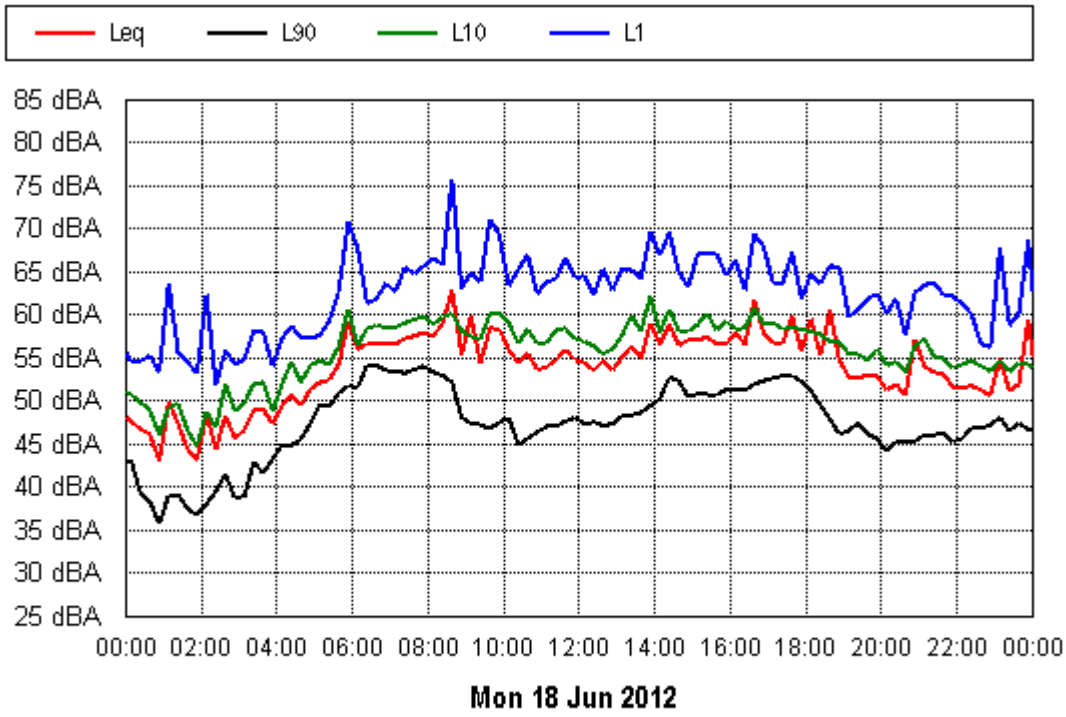


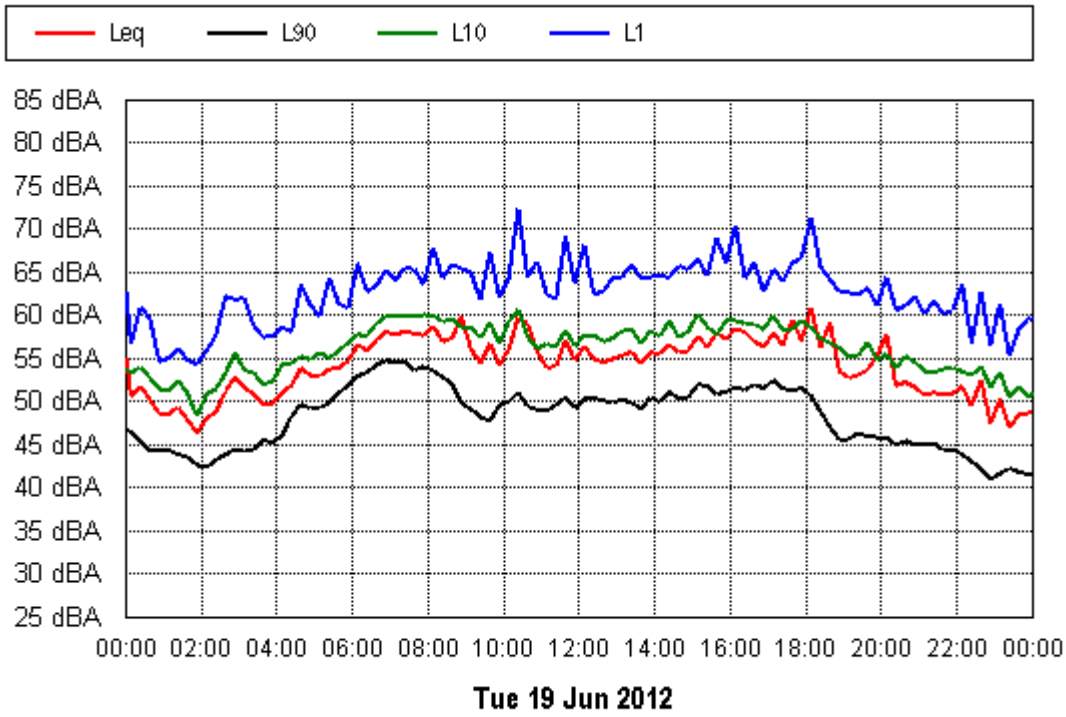
Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place



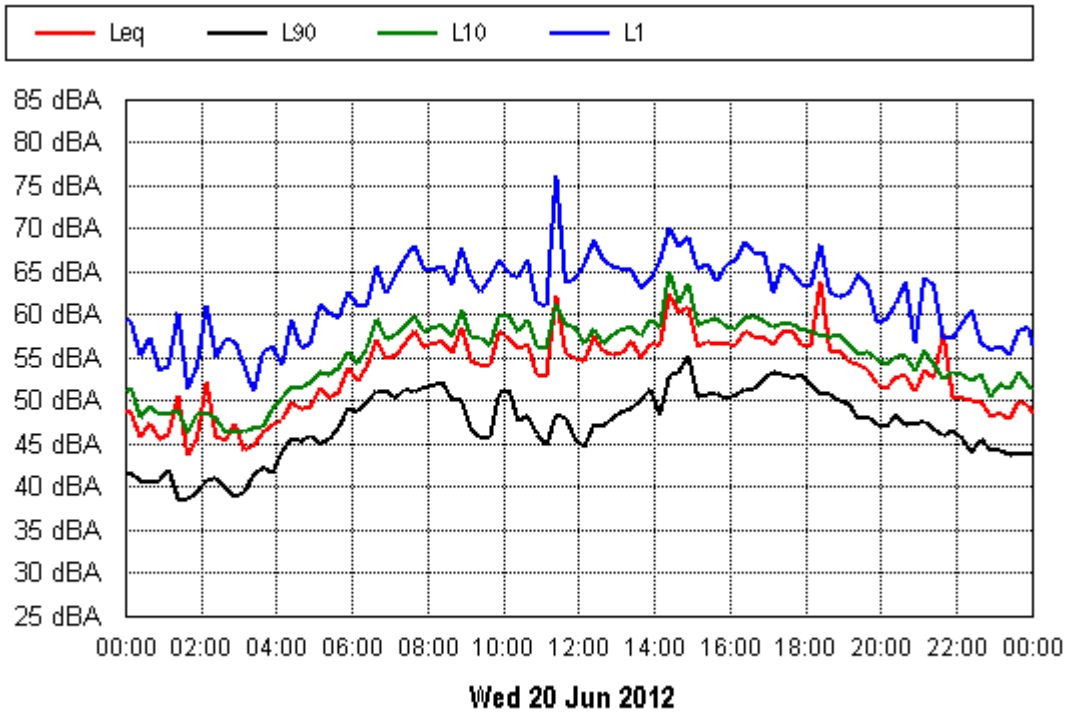


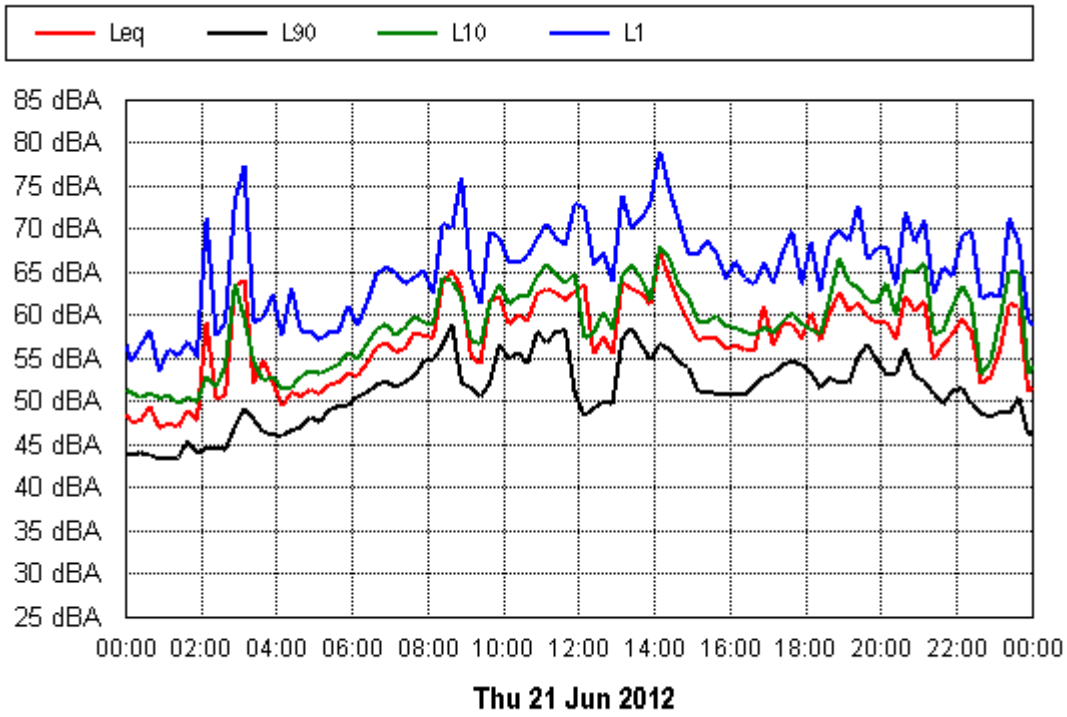
Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place



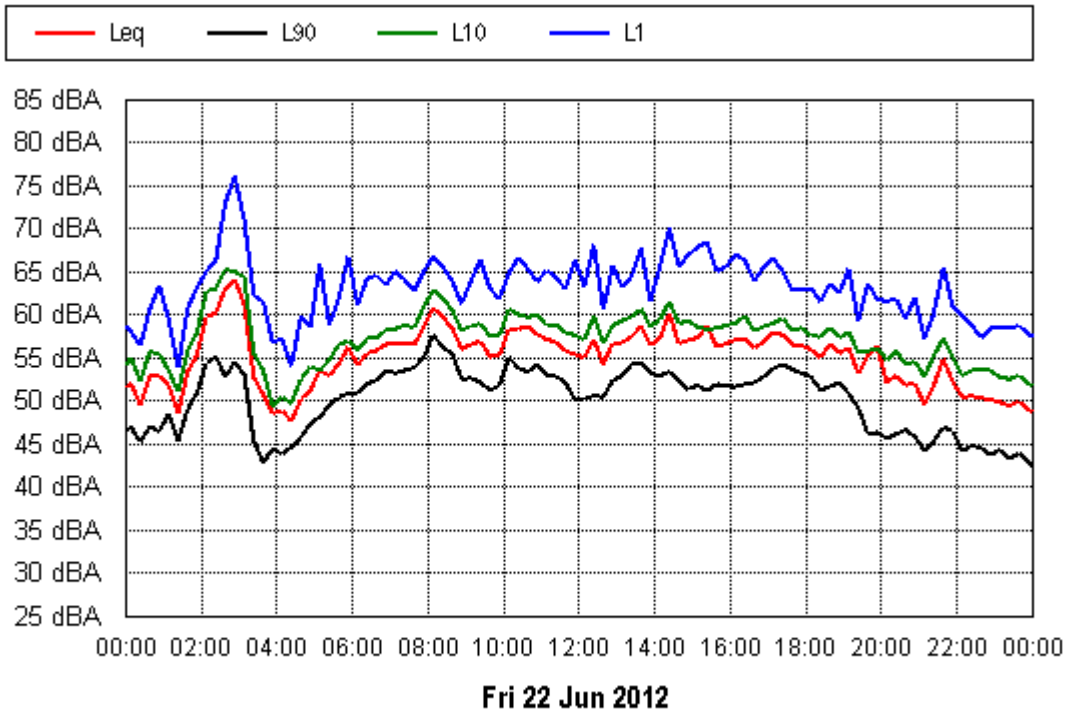


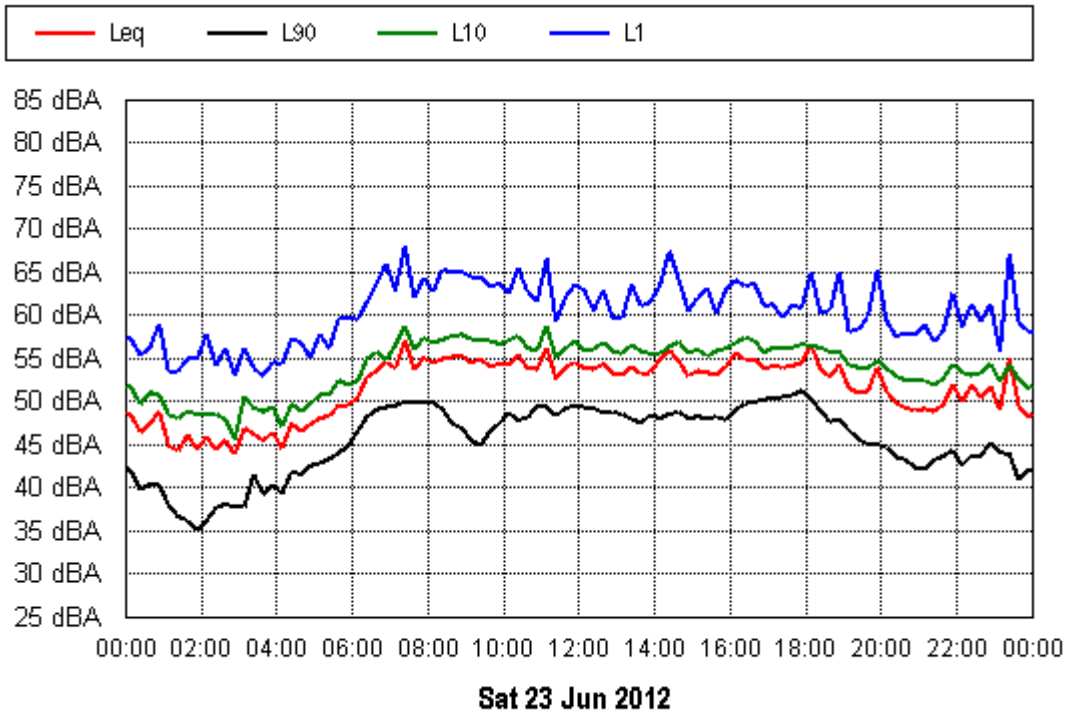
Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place



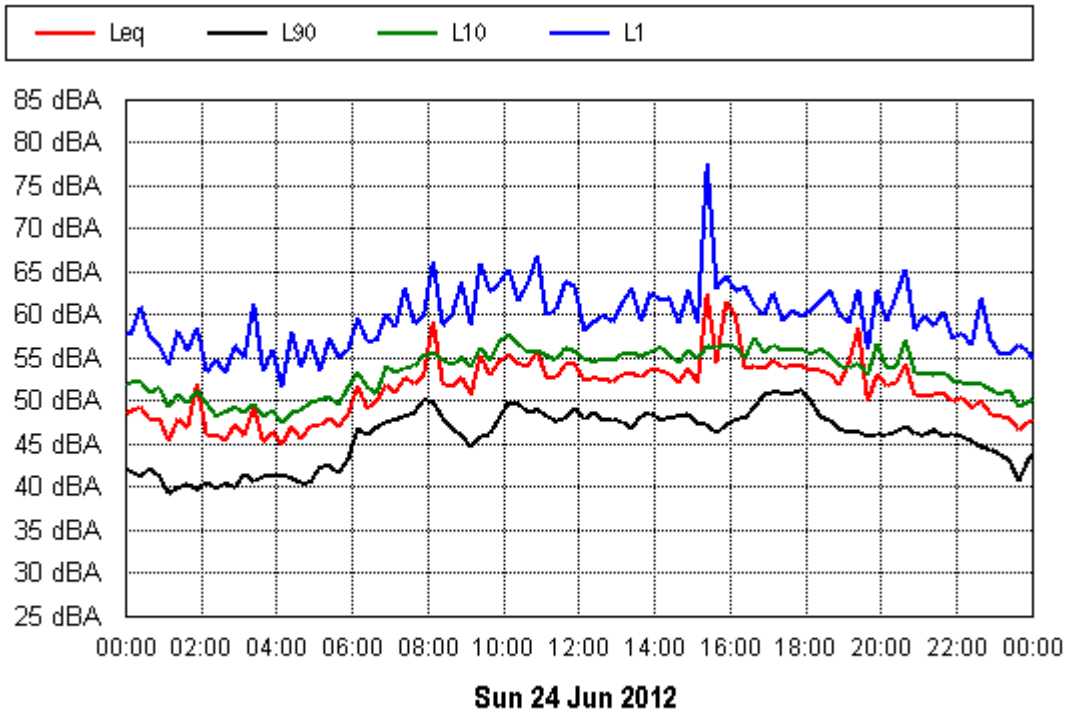


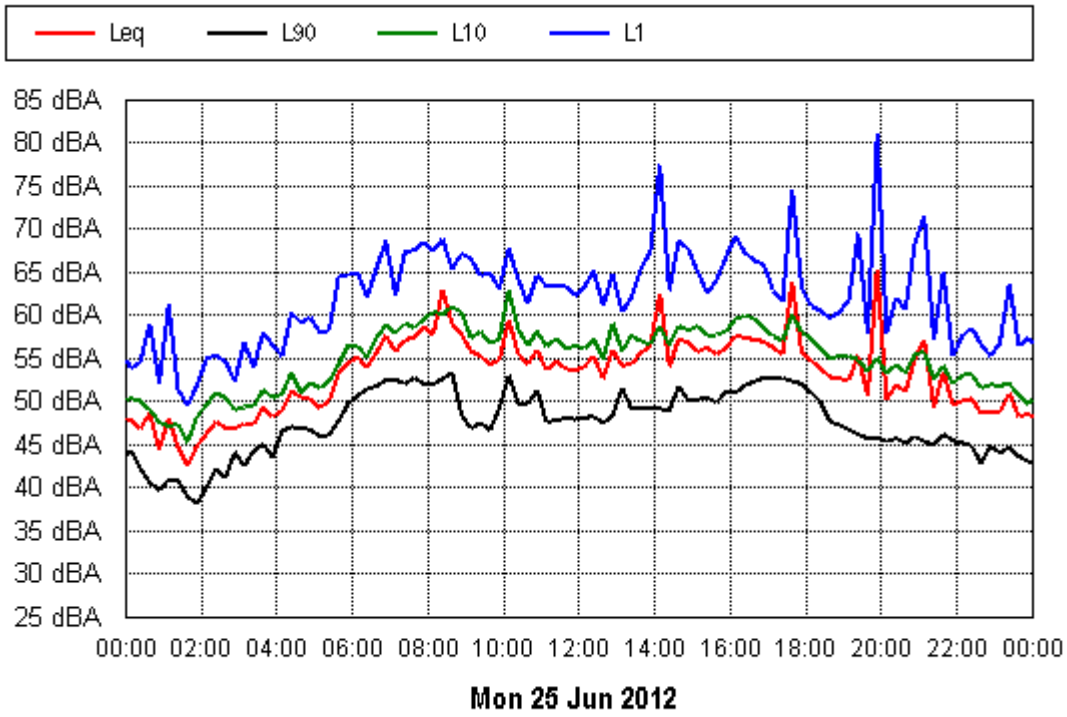
Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place





Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place





Project: Minto Concrete Recycling Facility
Location: 12 Kintyre Place