ACOUSTICS AND AIR

BORG ST MARYS

NOISE ASSESSMENT

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PREPARED FOR

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DOCUMENT CONTROL

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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.

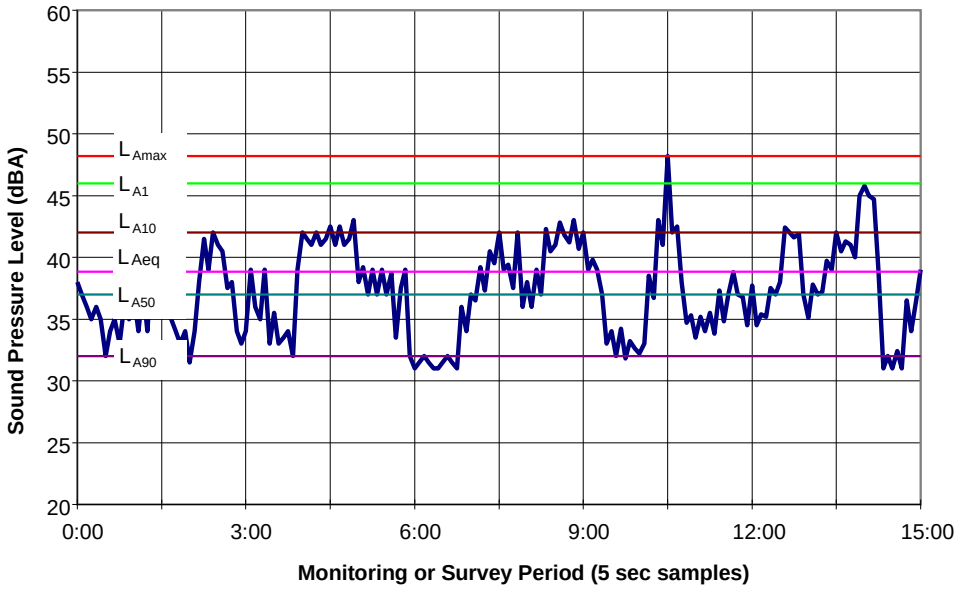
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

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

Borg Manufacturing Pty Ltd is proposing to increase the throughput/volume of the existing resource recovery and recycling facility at 25 Dunheved Circuit, St Marys, Lot 143 in DP 1013185.

The Proposal was declared to be a State Significant Development (SSD-10474). The Secretary's Environmental Assessment Requirements (SEARs) for the Proposal have been issued and set out the environmental assessment requirements for the project.

Wilkinson Murray Pty Limited has been engaged by Borg Manufacturing to prepare a Noise and Vibration Impact Assessment (NVIA) for inclusion in the Environmental Impact Statement (EIS) relative to the project.

The proposal is for the increase of throughput/volume of waste to the existing Resource Recovery Facility at 25 Dunheved Circuit. The site currently has approval for the sorting and processing of 18,000 tonnes of waste per annum (DA01/1034 Penrith Council). It is proposed to increase this throughput to 150,000 tonnes per annum, consisting of 110,000 tonnes wood/timber waste and 30,000 tonnes of plasterboard. As a result of processing the timber materials, a minor amount of waste metals (approx.10,000 tonnes) will also be collected on site and transferred elsewhere for processing.

The NVIA presents the findings of the assessment of potential operational and transportation noise and vibration impacts associated with the proposed development. The assessment has been carried out in accordance with the following guidelines:

- NSW Noise Policy for Industry (EPA, 2017);
- NSW *Road Noise Policy* (DECCW, 2011); and
- *Assessing Vibration: a technical guideline* (DEC, 2006).

1.1 Secretary's Environmental Assessment Requirements

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSD 10474) for the Proposal, issued by NSW Department of Planning and Environment.

Noise and Vibration, including:

- a quantitative noise and vibration impact assessment undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and including an assessment of nearby sensitive receivers;
- cumulative impacts of other developments; and
- details and justification of the proposed noise mitigation, management and monitoring measures.

It is noted that due to the location of the site and proposed activities vibration generated by the proposal will be negligible and as such has not been discussed any further in this report.

2 SITE DESCRIPTION

2.1 Site Location

The site is identified as 25 Dunheved Circuit, St Marys, being Lot 143 in DP 7013185. The site is an irregular shaped battle-axe lot with an area of 6,140m^2 and is zoned IN1 General Industrial. The land is predominantly flat, with vegetation on the site, all areas of the site are hardstand.

The lot contains:

- a 3,455m^2 waste process cladding with a ridge;
- a site office and amenities;
- two inground 20m weighbridges;
- external areas sealed with concrete hardstand; and
- water tanks.

The site location is shown in Figure 2-1.

Figure 2-1 Site location

2.2 Project Description

2.2.1 Proposal Overview

The proposal is for the increase of throughput/volume of waste to the existing Resource Recovery Facility at 25 Dunheved Circuit. The site currently has approval for the sorting and processing of 18,000 tonnes of waste per annum (DA01/1034 Penrith Council). It is proposed to increase this throughput to 150,000 tonnes per annum, consisting of 110,000 tonnes wood/timber waste and 30,000 tonnes of plasterboard. As a result of processing the timber materials, a minor amount of waste metals (10,000 tonnes) will be collected on site and transferred elsewhere for processing. No physical works are proposed to the existing site or buildings.

Processing of timber and wood and plasterboard waste will happen inside the existing building by way of compaction and shredding/grinding. The majority of the processed wood waste will be transferred to the Borg Manufacturing site in Oberon, NSW to be used in the manufacture of particle board and MDF products, or to be used as fuel for dryers. The typical types of wood waste include clean pallets, unlaminated particle board, MDF, LOSP pine and laminated MDF with coatings, along with other urban and raw wood materials deemed suitable. These waste materials will come from a number of sources including Borg Panels customers, framing and truss builders, freight companies and other timber companies.

Plasterboard will be minimised and grinded, with paper removed during the grinding process. The gypsum generated by processing will be used for agricultural soil conditioning or reused in plasterboard production.

Waste metals recovered during the timber processing will be manually sorted and separated, and then taken off-site to other waste facilities to be processed or disposed of.

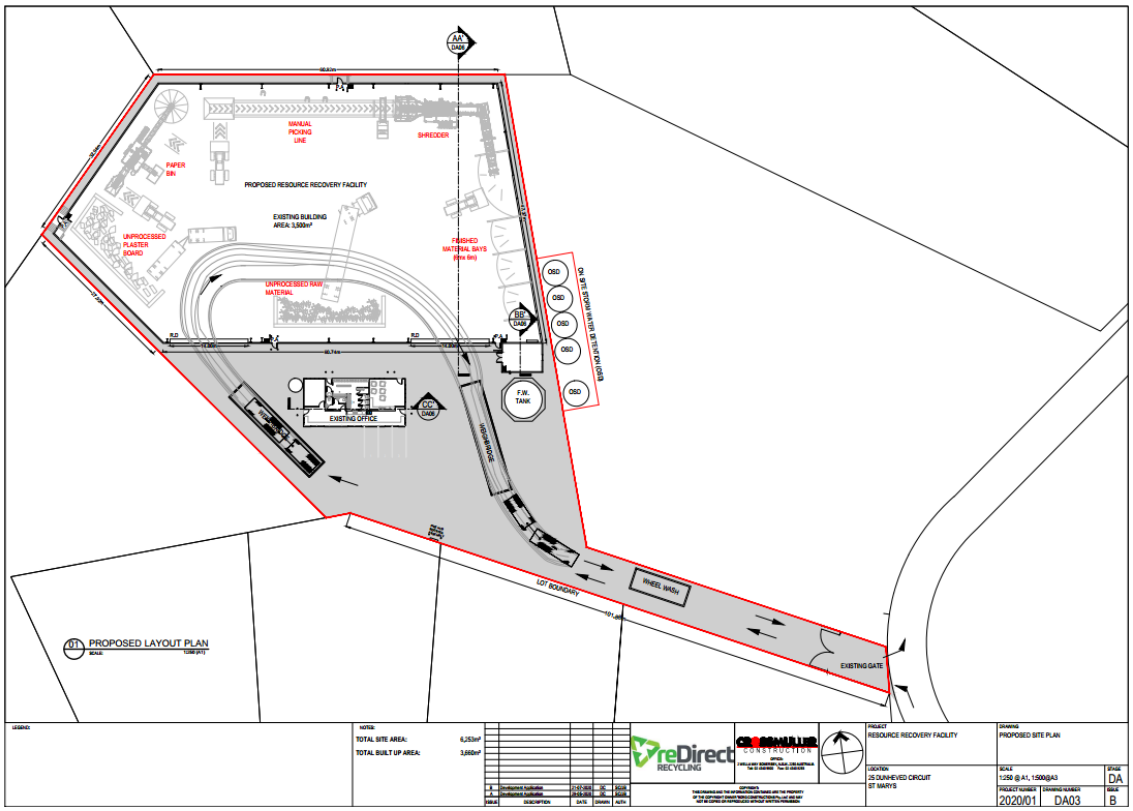
All RRF activities (storage and processing) will be undertaken inside the existing building on 25 Dunheved Circuit.

The proposed RRF will receive the following waste stream:

- 110,000 tonnes of Urban and Natural Wood wastes (MDF off-cuts, raw wood offcuts, clean pallets, LOSP pine, engineered wood products, particleboard, some laminated MDF with paint and plastic coatings);
- 30,000 tonnes of plasterboard waste, primarily offcuts and de-construction materials from construction sites; and
- Minor amounts <10,000 tonnes of ferrous and non-ferrous metals. This will be made up of steel, and steel components removed from the processing of pallets i.e. nails, strapping etc. waste metals will be sorted and dispatched off-site.

The key components of the Proposal are shown in Figure 2-2.

Figure 2-2 Site plan showing proposed site layout



It is noted that there are no new facilities proposed for this development.

2.2.2 Hours of Operation

It is proposed to operate the facility 24 hours a day, 7 days a week including processing, waste delivery and collection. This is consistent with the previous approval on-site under SSD-8200.

A modern waste recycling facility needs to be able to receive, process and despatch 24 hours per day, although for the majority of times, it can be expected that most operations would be carried out in daytime hours.

There will be up to 10 staff employed onsite in processing, stockpiling, receiving, dispatch and office related work.

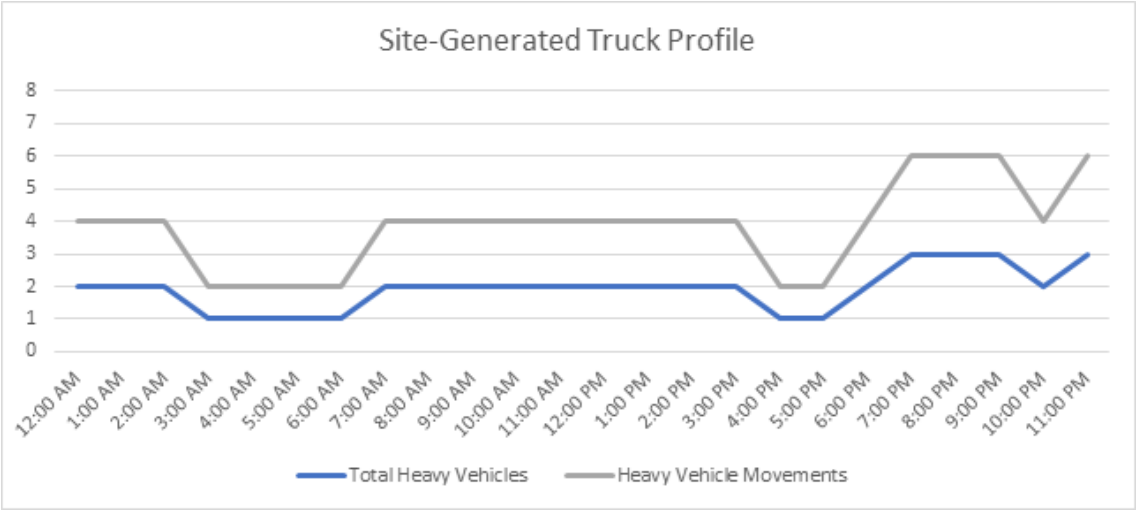
2.2.3 Off-site Road Traffic Overview

The expected truck route is shown in Figure 2-3. Trucks enter and leave the site on Dunheved Circuit and Links Road before entering and leaving on Forrester Road. Trucks turning south on Forrester Road are expected to head towards Great Western Highway.

Figure 2-3 Truck route

Figure 2-4 shows a project profile of trucks and movements to the facility.

Figure 2-4 Truck profile



3 NOISE SENSITIVE RECEIVERS

The site is located within a well-established industrial area and it is surrounded by industrial buildings. Existing residential receivers are situated more than 825m from the site.

Seven (7) discrete receiver locations were used in this study to assess the potential noise impacts of the site operations at sensitive receptor locations identified in the area surrounding the Project Site and were selected based on their close proximity to the Project Site.

A golf course (AR1) is present to the west at approximately 300m from the subject site and this has been considered in the assessment as an active recreational area.

These locations of the nearest receivers identified are presented in Table 3-1 and Figure 3-1.

A receiver (TR1) along Forrester Road has been selected for the assessment of off-site road traffic noise due to its proximity to the main road.

Table 3-1 Noise sensitive receivers

Receiver ID	Land use	Address	Approx. Distance to site
R1	Residential	21 Hartog Drive Werrington County	1,290 m
R2	Residential	12 Poole Street Werrington County	1,390 m
R3	Residential	66 Reid Street Werrington	1,500 m
R4	Residential	199 Forrester Road, North St Marys	1,375 m
R5	Residential	12 Townsend Crescent, Ropes Crossing	1,245 m
R6	Residential	50 Rafter Parade, Ropes Crossing	1,430 m
R7	Residential	St Marys ADI Site Central Precinct	825 m
AR1	Active Recreation (Golf Course)	118-176 Links Road, St Marys	300 m
TR1	Residential	185 Forrester Road, North St Marys	1,440 m

Figure 3-1 Nearest sensitive receivers

4 EXISTING NOISE ENVIRONMENT

4.1 Ambient Noise Levels

In order to characterise the existing acoustical environment at the nearest sensitive receivers, ambient noise levels have been established from previous noise assessments in the area and measurements conducted by Wilkinson Murray.

The previous noise assessments in the area, used by Wilkinson Murray are:

- Waste Transfer Facility – St Marys - 25 Dunheved Circuit, St Marys Noise Impact Assessment prepared EPA Application by SLR for the site in July 2015 (ref. report number 610.14692-R5 EPL) (Referred to L1); and
- Operational and Construction Noise Impact Assessment for Links Road Upgrade, prepared by RCA Acoustics (Reference 13810-401/2, dated 20 November 2018) (Referred to L2).

Wilkinson Murray Pty Limited has reviewed the above measurements and is satisfied with the approach and methodology utilised for the assessment of the existing ambient noise levels.

The monitoring locations are presented in Figure 4-1.

Figure 4-1 Noise Monitoring Locations

The data obtained from the previous noise assessments was processed in accordance with the procedures contained in the NSW *"Noise Policy for Industry"* (NPfI, 2017). A summary of the measured ambient (L_{Aeq}) and rating background levels (RBL) is presented in Table 4-1.

Table 4-1 Measured noise levels

Location	$L_{Aeq,period}$ (dBA)			RBL (dBA)		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
L1 – 12 Poole Street, Werrington County	58	57	47	44	42	36
L2 – Near Colonel Way, Werrington County	45	38	41	34*(35)	32	28**(30)

1 **Day** is defined as 7.00am to 6.00pm;
2 **Evening** is defined as 6.00pm to 10.00pm;
3 **Night** is defined as 10.00pm to 7.00am;
* NPfI recommends a minimum criterion of 35dBA.
** NPfI recommends a minimum criterion of 30dBA.

These locations are typical suburban areas close to the St Marys industrial area, therefore the background noise levels measured at these locations are considered representative of the background noise levels at all other residential receivers. In addition, the measured background noise levels are consistent with the estimated average background A-weighted sound pressure levels ($L_{A90,\ T}$) presented in the Australian Standard 1055.3-1997 Acoustics – Description and measurement of environmental noise, Part 3: Acquisition of data pertinent to land use. In fact, for areas with low density transportation these are equal to 45dBA, 40dBA and 35dBA for day, evening and night time, respectively.

4.2 Existing Road Traffic Noise Levels

Primarily to support the traffic noise assessment long-term unattended noise monitoring was undertaken by Wilkinson Murray on Forrester Road, North St Marys, which is the major transport route for the project.

The monitoring was conducted on the front façade of 173 Forrester Road, North St Marys (Referred to as L3). The existing traffic noise levels consistent with the noise descriptors used for traffic noise impact assessment ($L_{Aeq,15hours}$ and $L_{Aeq,9hours}$) is presented in Table 4-2. In analysing the background noise levels, any data affected by inclement weather conditions has been discarded according to the requirements of the NPfI.

Table 4-2 Existing Road Traffic Noise Levels

Location	Daytime (7am to 10pm)	Night Time (10pm to 7am)
	$L_{Aeq,15hour}$ (dBA)	$L_{Aeq,9hour}$ (dBA)
173 Forrester Road	67	62

Charts presenting summaries of the measured daily noise data are attached in Appendix A.

5 OPERATIONAL NOISE CRITERIA

5.1 Onsite Operational Noise - NSW Noise Policy for Industry

The NSW *NPfI* provides a framework and process for deriving noise criteria for consents and licences that enable the EPA and others to regulate premises for noise.

The *NPfI* documents a procedure for assessment and management of industrial noise which involves the following steps:

- Determining the project noise trigger levels for a development. The project noise trigger level is the lowest benchmark level above which noise management measures are required to be considered. They are derived by considering short-term intrusiveness due to changes in the existing noise environment (applicable to residential receivers only) (referred to as the **intrusive noise criterion**) and maintaining noise level amenity for particular land uses for residents and other sensitive receivers (referred to as **amenity noise criterion**).
- Predicting or measuring noise produced by the development (having regard to any associated annoying characteristics and prevailing meteorological effects).
- Comparing the predicted or measured noise level with the project noise trigger level and assessing impacts and the need for noise mitigation and management measures.
- Considering any residual noise impacts following the application of feasible and reasonable noise mitigation measures.
- Setting statutory compliance levels that reflect the best achievable and agreed noise limits for development; and
- Monitoring and reporting environmental noise levels from the development.

The project noise trigger level represents the level that, if exceeded, may indicate a potential noise impact upon a community. It is a benchmark or objective and is not intended for use as a mandatory requirement.

5.1.1 Intrusiveness Noise Level

For assessing intrusiveness, the background noise level (L_{A90}) is measured and the Rating Background Level (RBL) determined. The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous noise level (L_{Aeq}) of the source (measured over a 15-minute period) does not exceed the background noise level (RBL) by more than 5dBA.

5.1.2 Amenity Noise Level

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include transportation noise (when on public transport corridors), noise from motor sport, construction noise, community noise, blasting, shooting ranges, occupational workplace noise, wind farms, amplified music/patron noise.

The amenity noise level aims to limit continuing increases in noise levels which may occur if the intrusiveness level alone is applied to successive development within an area.

To prevent increases in industrial noise due to the cumulative effect of several developments, the project amenity noise level for each new source of industrial noise is set at 5dBA below the recommended amenity nose level.

The recommended amenity noise level represents the objective for total industrial noise at a receiver location. The project amenity noise level represents the objective for noise from a single industrial development at a receiver location, as follows:

To prevent increases in industrial noise due to the cumulative effect of several developments in an area, the project amenity noise level for each new source of industrial noise is set at 5 dBA below the recommended amenity nose level. For comparison with the intrusiveness level, the project amenity noise trigger level is converted from a period level (day, evening or night time periods) to a 15-minute level by adding 3 dBA in accordance with the *NPfI*.

The residential area near the project site would be considered suburban. An extract from the NSW *NPfI* that relates to the amenity noise levels for suburban areas an industrial receivers is given in Table 5-1.

Table 5-1 Amenity noise levels

Receiver	Noise Amenity Area	Time of Day[1]	Recommended Amenity Noise Level L_{Aeq} (dBA)
Residence	Suburban	Day	55
		Evening	45
		Night	40
Industrial	All	When in use	70
Active Recreation	All	When in use	55

Note 1: Daytime 7.00am–6.00pm; Evening 6.00pm–10.00pm; Night 10.00pm–7.00am.

5.2 Sleep Disturbance from Maximum Noise Level Events

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.

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."

5.3 Project Noise Trigger Levels

The amenity and intrusiveness noise levels and resulting project trigger levels (shown in **bold**) are shown in Table 5-2.

Table 5-2 Project noise trigger levels

Receiver	Based on monitoring	Period	Intrusiveness Noise Level[1] $L_{Aeq,15min}$ (dBA)	Project Amenity Noise Level[2] $L_{Aeq,15min}$ (dBA)
R1	L1 – 12 Poole Street, Werrington County	Day	**49**	53
		Evening	47	**43**
		Night	41	**38**
R2		Day	**49**	53
		Evening	47	**43**
		Night	41	**38**
R3		Day	**49**	53
		Evening	47	**43**
		Night	41	**38**
R4		Day	**49**	53
		Evening	47	**43**
		Night	41	**38**
R5		Day	**49**	53
		Evening	47	**43**
		Night	41	**38**
R6	L2 – Near Colonel Way, Werrington County	Day	**39**	53
		Evening	**37**	43
		Night	**35**	38
R7		Day	**39**	53
		Evening	**37**	43
		Night	**35**	38
Industrial neighbours	-	When in use	**-**	**70**
AR1	-	When in use	**-**	**55**

Note 1: Intrusiveness noise level is $L_{Aeq,15min} \leq$ RBL +5.
Note 2: Project amenity noise level (ANL) is suburban ANL minus 5dBA plus 3dBA to convert from a period level to a 15-minute level.

5.4 Project Maximum Event Noise Trigger Levels

For maximum noise level events (night time period only), the following screening maximum event noise trigger levels in **Table 5-3** apply.

Table 5-3 Sleep disturbance trigger levels

Receiver	Based on the following RBLs	Period	Intrusiveness Noise Level[1] $L_{Aeq,15min}$ (dBA)	Maximum Noise Levels[2] L_{AFmax} (dBA)
R1	L1 – 12 Poole Street, Werrington County	Night	41	52
R2		Night	41	52
R3		Night	41	52
R4		Night	41	52
R5		Night	41	52
R6	L2 – Near Colonel Way, Werrington County	Night	40	52
R7		Night	40	52

5.5 Road Traffic Noise Criteria

Applicable noise criteria for proposals which have the potential to increase traffic on roads are presented in the NSW *Road Noise Policy (RNP)*.

A residential area is present along the eastern side of Forrester Road. According to the *RNP*, Forrester Road is classified as an arterial road.

The *RNP* assessment criteria for residential land uses are presented in Table 5-4.

Table 5-4 RNP – Road traffic noise criteria for residential receivers

Road Category	Type of Proposal Land Use	Noise Criteria	
		Day (7am-10pm) $L_{Aeq,15hour}$ (dBA)	Night Time (10pm-7am) $L_{Aeq,9hour}$ (dBA)
Freeway / Arterial / Sub-Arterial Roads	Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use development	60	55

With regard to the permissible increase in road traffic noise from a land use development the *RNP* states:

> *"For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'."*

As the existing road traffic noise levels already exceed the road traffic noise criteria shown in Table 5-4 the applicable noise criteria would be equal to the existing road traffic noise plus 2dB as presented in Table 5-5.

Table 5-5 Road Traffic Noise Criteria

Receiver	Noise Criteria	
	Day (7am-10pm) $L_{Aeq,15hour}$ (dBA)	**Night Time (10pm-7am) $L_{Aeq,9hour}$ (dBA)**
TR1	69	64

6 NOISE IMPACT ASSESSMENT

6.1 Noise Modelling Methodology

Site related noise emissions were modelled using the CadnaA Ver2020 noise prediction software. To complete this, a representative 3-D model within the software was constructed of the site and surrounding receivers.

Factors that are addressed in the modelling are:

- equipment sound level emissions (in octave bands) and locations;
- screening effects from buildings and barriers;
- receiver locations;
- ground topography;
- noise attenuation due to geometric spreading; and
- ground absorption and atmospheric absorption.

Certain meteorological/weather conditions may increase noise levels by focusing soundwave propagation paths at a single point. The meteorological effects on noise propagation such as temperature inversion and wind are considered in the noise prediction model. Predictive noise modelling was carried out in using the ISO 9613 algorithm. The ISO 9613 prediction applies to meteorological conditions favourable to propagation, that is downwind propagation and/ or night time temperature inversions. Using this modelling approach is consistent with Fact Sheet D of the NPfI that requires noise levels to be modelled using noise enhancing meteorological conditions.

All receivers were modelled at 1.5 m above ground level.

6.2 Operational Noise Assessment

The dominant noise would be generated internally within the processing shed by the processing line as well as mobile plant including operations of frontend loaders, telehandler and tipping operations from trucks. Externally, noise will be dominated by trucks entering and leaving the site.

The operational scenario considered all equipment to be simultaneously and continuously operating throughout the 15-minute assessment period. This is considered to be a conservative assumption as it is unlikely to occur.

Assumptions made for operational activities:

- The site operates 24 hours per day;
- Operations do not vary between day, evening and night time;
- One (1) telehandler has been modelled indoor and will be operational for 100% of the assessment period;
- One (1) front-end loader has been modelled indoor and will be operational for 100% of the assessment period;

- The processing line has been modelled indoor and includes a shredder. These have been considered to operate for 100% of the time;
- All noise sources have been considered to operate simultaneously for 100% of the time over any 15-minute period; and
- Two (2) trucks in a 15 minute period have been considered to enter, tip material, and leave the site.

The equipment considered in the modelling scenario and the assumed Sound Power Levels are presented in Table 6-1.

Table 6-1 Operational equipment sound power levels

Plant and Equipment	No units	Sound Power Levels	Source
Waste Timber Processing			
Front End Loader	1	105	Wilkinson Murray Database
Telehandler	1	105	Wilkinson Murray Database
Over Belt Magnet	1	<70	Borg
Primary shredder	1	110	Wilkinson Murray Database
Secondary Shredder	1	110	Wilkinson Murray Database
Manual Picking line	1	<70	Borg
Air Compressor	1	<60	Borg
Gypsum Board Processing			
Forklift	2	86	Borg
Turbo Seperator	1	81	Borg
Conveyors, pumps etc	1	<50	Borg
Kockums Blower+ rotary valve	1	93	Borg
Workshop and amenities			
Streetsweeper	1	88	Borg
Tools	1	<80	Borg
Office, weighbridge			
Truck wheel washer	1	91	Wilkinson Murray Database
Weighbridge	1	<80	Wilkinson Murray Database
Truck manoeuvring and tipping	1	107	Wilkinson Murray Database

The predicted noise levels associated with the operational activities are presented in Table 6-2. Seven locations surrounding the site have been selected as representative of surrounding residences, whereby night noise criteria has been applied based on ambient noise measurements.

Table 6-2 Predicted operational noise levels

Receiver	Predicted Noise Levels $L_{Aeq,15min}$ (dBA)	Project Noise Trigger Levels Day/Evening/Night	Complies (Yes/No)
R1	28	49/43/38	Yes
R2	27	49/43/38	Yes
R3	27	49/43/38	Yes
R4	26	49/43/38	Yes
R5	20	49/43/38	Yes
R6	18	39/37/35	Yes
R7	21	39/37/35	Yes
AR1	41	58	Yes

A review of results indicates compliance for 24 hour operations will be easily achieved.

Figure 6-1 presents noise contours for the assessed operational scenario.

Figure 6-1 Operational noise level Contours

Figure 6-2 presents noise contours for the assessed operational scenario around the boundary of the site.

Figure 6-2 Operational noise level contours around the boundary of the site.

A review of the contours indicates general compliance with the industrial amenity noise criteria of 70dBA $L_{Aeq,1hr}$.

6.2.1 Sleep Disturbance Assessment

The instantaneous noise sources and their typical L_{AFmax} SWL that may have the potential to generate sleep disturbance can be summarised as follows:

- Truck dumping 110-115 dBA L_{AFmax}
- Reversing alarms 100-115 dBA L_{AFmax}

To be conservative, the upper level has been used for the noise predictions. The predicted night time L_{AFmax} noise levels at receivers surrounding the site are summarised in Table 6-3.

Table 6-3 Predicted maximum noise levels at residences – L_{AFmax}

Receiver	Noise Level L_{AFmax}	Night Criteria	Complies (Yes/No)
R1	33	52	Yes
R2	32	52	Yes
R3	31	52	Yes
R4	31	52	Yes
R5	31	52	Yes
R6	29	52	Yes
R7	28	52	Yes

A review of results indicates that compliance with sleep disturbance will be easily achieved.

6.3 Cumulative Noise Levels

A review of predicted noise levels indicates that the highest predicted noise levels from the facility will be $L_{Aeq(15minute)}$ of between 27 and 28 dBA at Werrington County residences to the west of the site. These levels compare to existing noise levels of 41-48 dBA that have been measured at these residences.

As the predicted noise levels are more than 10dBA below existing L_{Aeq} noise levels at residences, the contribution to cumulative noise levels will not be perceptible.

6.4 Road Traffic Noise Assessment

Road traffic noise impacts on Forrester Road during daytime is considered negligible due to the existing high traffic volume. The main impact would occur during night time on residential receivers located along Forrester Road. For the purpose of assessing the road traffic noise impact, receiver TR1 has been considered in the assessment.

Road traffic noise associated with staff cars would be negligible.

For the assessment of road traffic noise impacts, the peak two-way truck movements presented in Figure 2-4 have been considered. These are equal to 62 truck movements during daytime and 18 truck movements during night time.

Prediction of future road traffic noise levels was undertaken based on the assumption that all trucks associated with the proposal have similar noise emission characteristics. Noise levels from trucks were measured along Forrester Road and the highest sound pressure levels were considered for the assessment. This provides a conservative approach to the assessment.

The predicted future road traffic noise levels are shown in Table 6-4.

Table 6-4 Predicted noise levels associated with road traffic at TR1

Period	Existing Road Traffic Noise $L_{Aeq,period}$	Predicted Additional Road Traffic Noise	Cumulative Road Traffic Noise	Criteria
Night Time 10pm-7am $L_{Aeq,9hour}$ (dBA)	62	54	62.6	64

The cumulative road traffic noise levels were predicted to comply with the noise criteria. The increase in traffic noise levels from the recycling facility was predicted to be less than 1dB. An increase of traffic noise levels of less than 2dB is not considered noticeable to the human ear.

7 CONCLUSION

Borg Manufacturing Pty Ltd is proposing to increase the throughput/volume of the existing resource recovery and recycling facility at 25 Dunheved Circuit, St Marys.

Wilkinson Murray Pty Limited has been engaged by Borg Manufacturing to prepare a Noise and Vibration Impact Assessment (NVIA) for inclusion in the Environmental Impact Statement (EIS) relative to the project.

Noise and vibration from the proposed development has been assessed against NSW Government policies in relation to operational noise and road traffic noise.

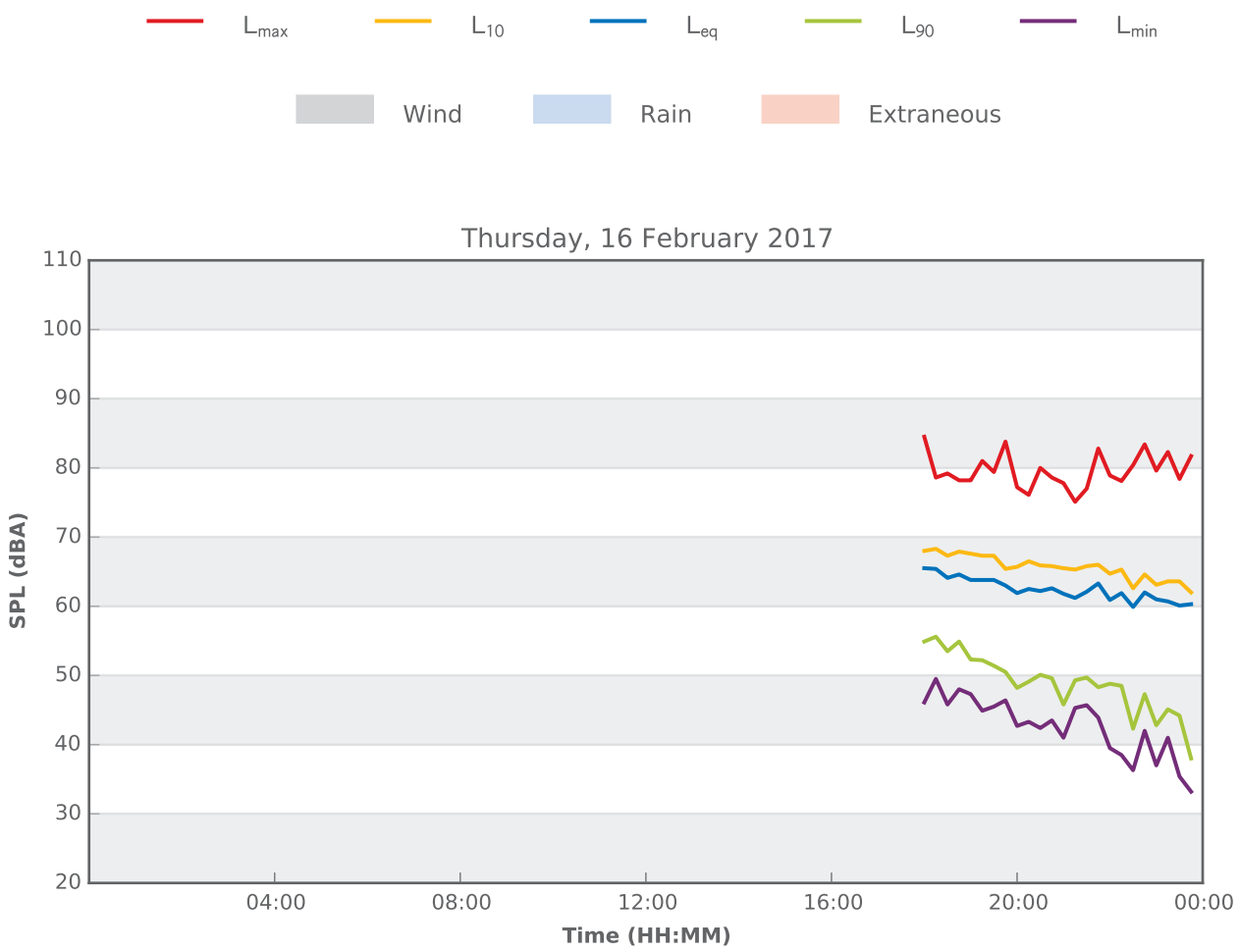
The noise impact associated with operational activities is predicted to comply with the noise criteria at all the considered residential receivers.

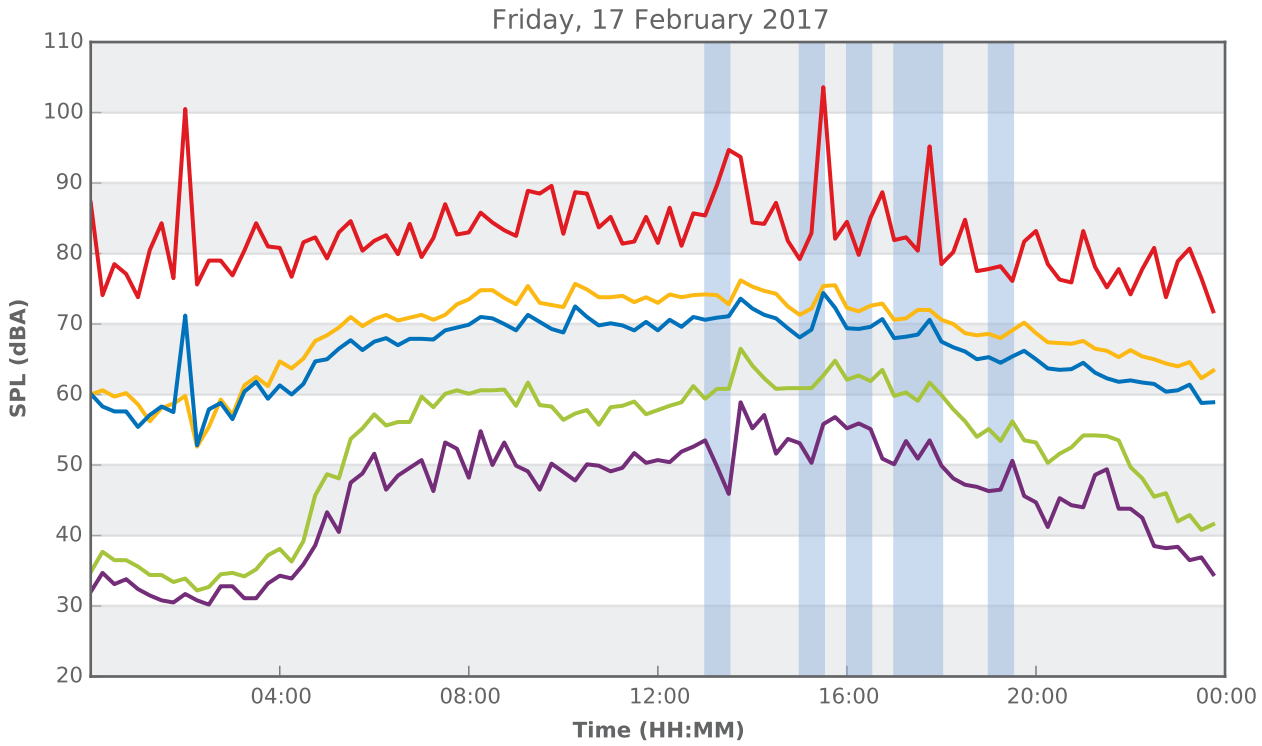
Potential noise impacts from traffic on the surrounding road network, arising from additional truck movements associated with the operation of the recycling facility are predicted to not be noticeable as increases in noise level of 1dB was predicted.

APPENDIX A

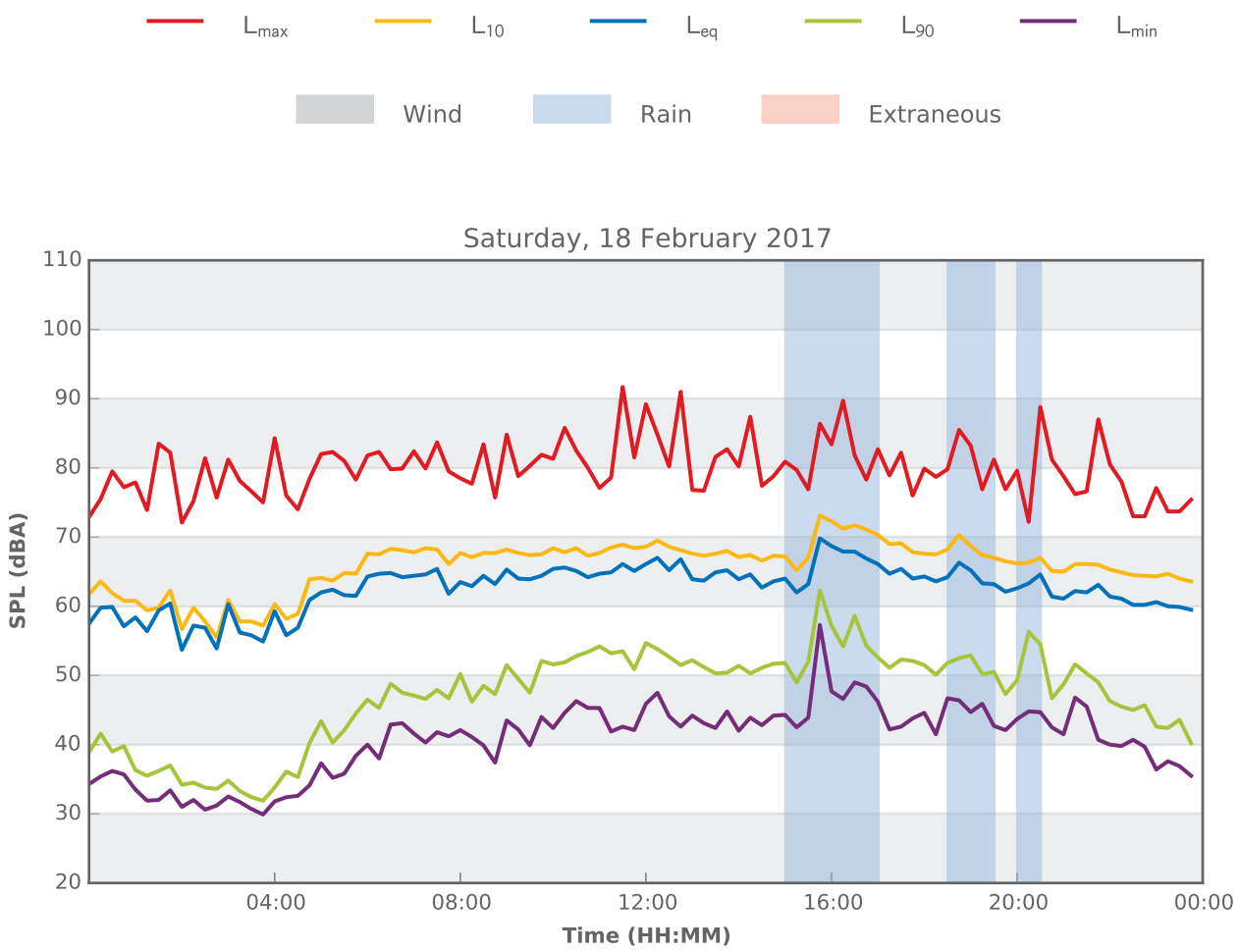
NOISE MEASUREMENT RESULTS

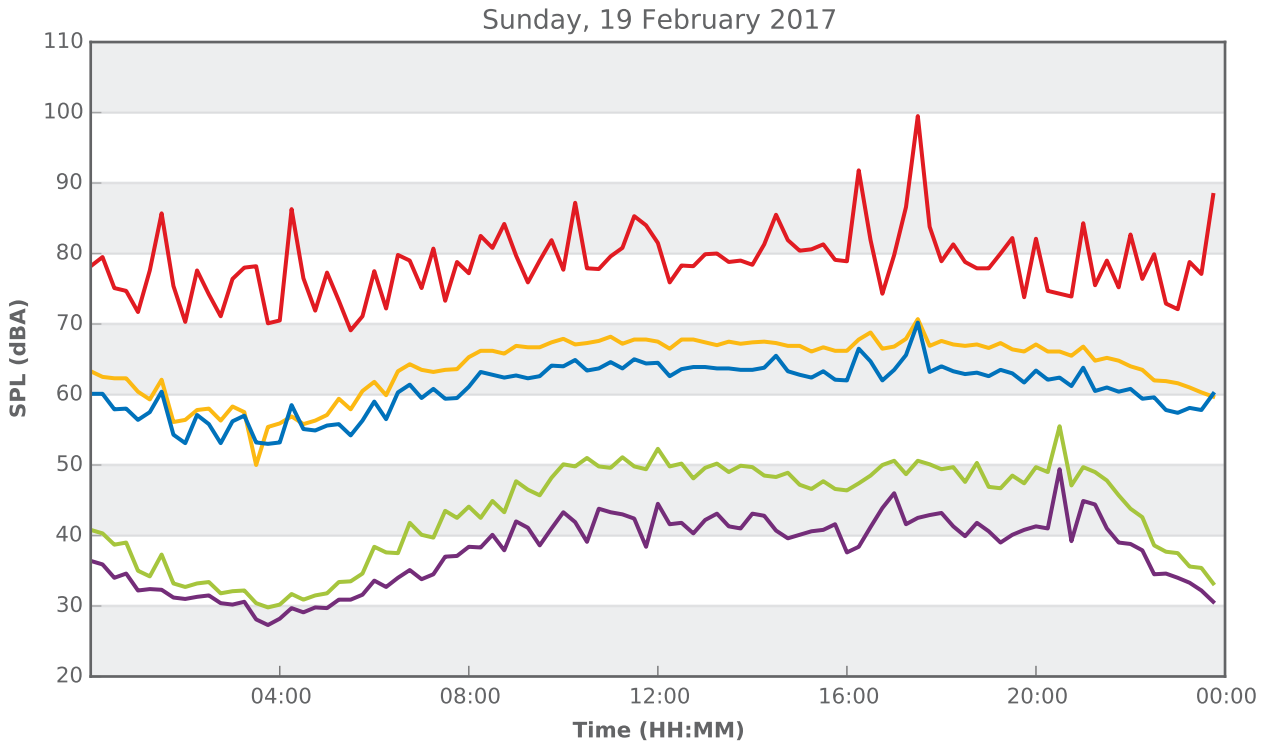
173 Forrester Road, North Saint Marys





173 Forrester Road, North Saint Marys





173 Forrester Road, North Saint Marys