GLASS BENEFICIATION PLANT

126 ANDREWS ROAD, PENRITH

NOISE VALIDATION REPORT

Prepared For Environment Protection Authority

Prepared by Nicolas Israel, Director

National Integrated Creative Solutions

On Behalf of GLASS RECOVERY SERVICES

March 2014 (Rev01)

May 2014 (Rev02)

1 Background

1.1 GENERAL

The NSW Environment Protection Authority (EPA) recently requested, amongst other matters, that noise validation testing be conducted to demonstrate whether the activities currently conducted at the Glass Beneficiation Plant (GBP) operated by Glass Recovery Services (GRS) at 126 Andrews Road, Penrith (site) complies with the Project Specific Noise Levels (PSNL) recommended in the Environmental Impact Statement prepared by Benbow Environmental Pty Ltd for the above activities and released to the authorities in May 2013.

During the preparation of the EIS and following extensive consultation with relevant authorities additional noise modelling and attended noise monitoring were conducted to ensure that the issues raised by the authorities were addressed. In addition, many scenarios were modelled to ensure that the Authorities requests were met.

This report presents the results of the first round of attended noise testing conducted on Friday 21 and Saturday 22 February 2014, and the second round of attended noise testing conducted on 2 May 2014 at close proximity to the plant as requested by the EPA. This report presents also the results of the computer modelling requested by the EPA after the re-calibration of the model on the basis of the results of second round of noise testing and taken into consideration the noise mitigation measures already implemented on site (i.e. Dust collectors acoustic enclosure and non-tonal low volume reverse beeper for the Front End Loader) and other noise mitigation measures agreed to by the EPA (i.e. 5 metres bunkers at the Southern and South Eastern sides of the plant).

The primary objectives of this report are to provide the EPA with the results of the noise testing and computer modelling conducted in accordance with its request and to determine whether the activities conducted on site comply with the PSNL. Other objectives are:

- To identify dominant noise sources in the vicinity of GRS's site;
- to identify noise sources within the GRS's site that may have a contribution to the overall noise emenating from the site; and
- to provide recommendations on additional reasonable, practical and achievable noise mitigation measures and amelioration strategies, if required and where appropriate.

1.2 SITE LOCATION AND SENSITIVE RECEPTORS

The site is identified as 126 Andrews Road, Penrith. Its property description is Lot 1 DP 747153. Figure 1 is an extract from Penrith Local Environment Plan 2010 which shows the site in the local context.

The local regional area of the subject site location is predominantly populated by industrial premises such as the glass works, building materials manufacturing facilities, warehousing and commercial premises. The site was previously used as an industrial warehouse for the production of fertilisers. An existing warehouse building, workshop, office, vehicle parking area and hardstand areas are found onsite.

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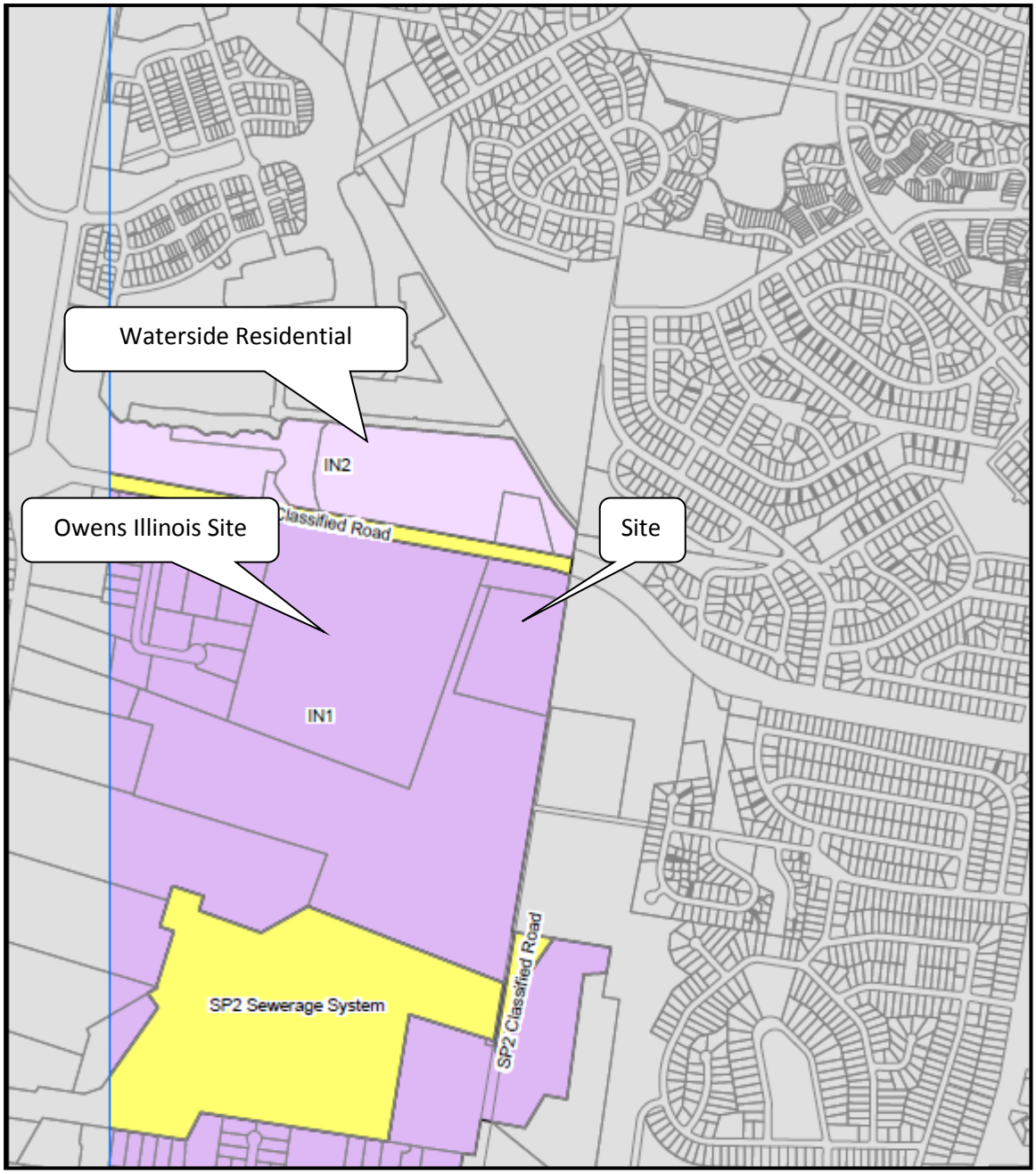
Figure 1-1: Penrith Local Environment Plan 2010



Note: - Sourced from Land Zoning Map – Sheet LZN_012

- IN1 indicates the area is classified as General Industrial

- IN2 indicates the area is classified as Light Industrial

- SP2 indicates the area is classified as Infrastructure

- Grey shaded areas are un-classified

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Figure 1-2 provides the locations of sensitive receptors in the vicinity of GRS's site keeping in mind that R8, R9, R10 and R11 are not established yet but rather proposed as part of the Waterside Residential Precinct.

Figure 1-2: Site Location & Considered Receiver Locations

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2 Site Operations

The site currently operates on 24/7 hours basis but only limited activities are conducted between the hours of 6.00 pm and 6.00 am as outlined below.

2.1 OPERATIONS BETWEEN 6.00 AM AND 6.00 PM

Between the hours of 6.00 am and 6.00 pm the plant operating conditions are normal and include the following activities:

- Internal activities such as loading and unloading of materials, screening, crushing, removal of unwanted materials, etc…
- Roller shutter doors are open on most sides including both the Southern and Eastern sides of the building
- Trucks entering and leaving the site
- Trucks loading and unloading materials
- Front end loaders transferring materials from inside to the outside of the building
- Other materials are being moved within the boundary of the site

2.1 OPERATIONS BETWEEN 6.00 PM AND 6.00 AM

Between the hours of 6.00 pm and 6.00 am only limited activities are conducted and special operating conditions apply as outlined below:

- No activities are conducted on the Eastern side of the building;
- Only one (1) Front End Loader operates at the Southern side of the building;
- Some lights are kept on for safety and security reasons;
- All doors including roller shutter doors at the Eastern side of the building are locked; and
- The roller shutter doors at the Southern Side of the building operate manually while the transfer of cullet from inside the building to the external bunkers occurs.

Following approval of the all equipment and structures associated with the plant, the 5 metres high bunkers to be constructed at the Southern and South Eastern sides of the building will provide complete shielding (high noise barrier) of the activities conducted externally during normal operations and more so during the period of 6.00 pm to 6.00 am. This should provide additional noise reductions at several sensitive receptors.

The above operating conditions will be adhered to except in the case of an emergency or if GRS personnel are directed otherwise by an authorised officer. The above operating conditions may require some slight changes following recent communications with the EPA.

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3 Measurement Locations and Results

Two rounds of noise measurements were conducted as requested by the Environment Protection Authority. The first round of noise measurements included sensitive receptors and the second round included GRS activities at close proximity and within the boundary of the site.

3.1 First Round of Noise Measurements – 21/02/2014 & 22/02/2014

The attended noise testing commenced at approximately 3.00 pm on Friday 21 February 2014 and finished at approximately 12.40 am on Saturday 22 February 2014.

The attended noise measurements were conducted at residential receptors R1, R2, R3, R4, R5, R6 and R7 for the three periods; day, evening and night. The attended noise measurements included also the recreation areas identified in figure 1-2 as R12 and R13 for the three periods; day, evening and night. The last session of noise measurement at R13 was stopped and may be considered as void due to the arrival of an extremely noisy motorbike with two dangerous riders to the nearby reserve.

The distances included in the following three tables are derived from using the Department of Land and Information's software Six Map. They were measured from the centre of the source to the centre of the receptors (Flag to Flag). Distances from receptors to the boundary of GRS site are included in the EIS.

Table 3-1 below provides the raw results of noise measurements conducted at sensitive receptors during the day time period. The table also includes the most dominant sources that contributed to the total noise levels during the measurements period for each location.

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Table 3-1: Measured Noise Levels, Attended Noise Monitoring – Day Time Period, dB(A)

Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level – dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
R1 @ 400 metres 31 Ariel Crescent Cranebrook 21/02/2014 1734-1746	L_{A1}	60.9	Sunny Warm No wind	File No = GRS12 • **GRS inaudible** • Birds • Traffic on local streets • Lawn mowing activity nearby • Light aircraft • Continuous noise from a nearby site not associated with GRS
	L_{A10}	54.8		
	L_{Aeq}	53.1		
	L_{A90}	48.5		
R2 @ 420 metres 19 Ariel Crescent Cranebrook 21/02/2014 1748-1758	L_{A1}	58.2	Sunny Warm No wind	File No = GRS13 • **GRS inaudible** • Birds • Dog barking • Traffic on Andrews Road and local streets • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	49.9		
	L_{Aeq}	49.6		
	L_{A90}	45.1		
R3 @ 300 metres 6 Koala Glen Cranebrook 21/02/2014 1658-1713	L_{A1}	66.2	Sunny Warm No wind	File No = GRS10 • **GRS inaudible** • Birds • Motor bike in nearby reserve • Noisy trucks on Andrews Road • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	59.6		
	L_{Aeq}	56.6		
	L_{A90}	50.5		
R4 @ 395 metres 42 Scenic Circuit Cranebrook	L_{A1}	71.2	Sunny Warm No wind	File No = GRS11 • **GRS inaudible** • Birds • Traffic on Andrews Road • Motor bike in nearby reserve • Noisy trucks on Andrews
	L_{A10}	65.3		

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Table 3-1: Measured Noise Levels, Attended Noise Monitoring – Day Time Period, dB(A)

Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level – dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
21/02/2014 1714-1729	L_{Aeq}	62.1		Road
	L_{A90}	51.9		
R5 @ 540 metres 93 Allard Street Penrith 21/02/2014 1636-1651	L_{A1}	70.4	Sunny Warm No wind	File No = GRS09 • **GRS inaudible** • Birds • Lawn mower nearby • Light aircraft • Traffic on Andrews Road • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	60.2		
	L_{Aeq}	59.5		
	L_{A90}	50.0		
R6 @ 560 metres 58 Ceres St Penrith 21/02/2014 1618-1633	L_{A1}	64.5	Sunny Warm No wind	File No = GRS08 • **GRS inaudible** • Birds • Dogs barking • Traffic on Andrews Road • People not associated with GRS chatting nearby
	L_{A10}	56.1		
	L_{Aeq}	55.3		
	L_{A90}	47.2		
R7 @ 425 metres 5 Echo Place Penrith 21/02/2014 1601-1616	L_{A1}	63.9	Sunny Warm No wind	File No = GRS07 • **GRS inaudible** • Birds • Dogs • Traffic on Andrews Road • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	55.0		
	L_{Aeq}	54.3		
	L_{A90}	47.0		
R12 @ 160 metres Nepean Rugby League Field Penrith 21/02/2014	L_{A1}	65.4	Slight breeze Sunny Warm	File No = GRS05 • **Plant Audible** • Very loud birds nearby • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	57.4		
	L_{Aeq}	55.2		

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Table 3-1: Measured Noise Levels, Attended Noise Monitoring – Day Time Period, dB(A)				
Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level – dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
1529-1544	L_{A90}	47.3		• Nearby workers started up an electricity generator - not associated with GRS
R13 @ 255 metres Nepean Rugby League Field Penrith 21/02/2014 1550-1556	L_{A1}	66.4	Sunny Warm No wind	File No = GRS06 • **Plant Audible** • Very loud birds nearby • Traffic on Andrews Road • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	63.2		
	L_{Aeq}	61.4		
	L_{A90}	59.2		

Table 3-2 below provides the raw results of noise measurements conducted at sensitive receptors during the evening time period. The table also includes the most dominant sources that contributed to the total noise levels during the measurements period for each location.

Table 3-2: Measured Noise Levels, Attended Noise Monitoring – Evening Time Period, dB(A)				
Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
R1 @ 400 metres 31 Ariel Crescent Cranebrook 21/02/2014 1826-1841	L_{A1}	55.3	Sunny Warm No wind	File No = GRS17 • **GRS inaudible** • Dogs barking • Traffic on local streets and Andrews Road • Lawn mowing in nearby property • Noises from the little Athletics in nearby reserve • Other noises not associated with the plant
	L_{A10}	52.3		
	L_{Aeq}	50.8		
	L_{A90}	47.2		
	L_{A1}	58.5	Sunny	File No = GRS18+GRS19

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Table 3-2: Measured Noise Levels, Attended Noise Monitoring – Evening Time Period, dB(A)

Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
R2 @ 420 metres 19 Ariel Crescent Cranebrook 21/02/2014 1842-1857	L_{A10}	50.6	Warm No wind	• **GRS inaudible** • Birds • Dogs barking • Traffic on Andrews Road • Reverse alarm/beeper just audible (sporadically)
	L_{Aeq}	49.2		
	L_{A90}	45		
R3 @ 300 metres 6 Koala Glen Cranebrook 21/02/2014 1921-1936	L_{A1}	60.4	Sunny Warm Slight breeze	File No = GRS21 • **GRS inaudible** • Birds • Traffic on Andrews Road • Tree leaves noises
	L_{A10}	55.0		
	L_{Aeq}	52.7		
	L_{A90}	47.9		
R4 @ 395 metres 42 Scenic Circuit Cranebrook 21/02/2014 1904-1919	L_{A1}	69.3	Sunny Warm No wind	File No = GRS20 • **GRS inaudible** • Noises from people in reserve • Traffic on Andrews Road • Birds • Noisy Trucks on Andrews Road
	L_{A10}	64.6		
	L_{Aeq}	60.9		
	L_{A90}	49.5		
R5 @ 540 metres 93 Allard Street Penrith 21/02/2014 1944-1959	L_{A1}	63.8	Sunny Warm No wind	File No = GRS22 • **GRS inaudible** • Birds • Traffic on Andrews Road • Cicadas • Frogs • Dogs barking
	L_{A10}	57.5		
	L_{Aeq}	54.6		
	L_{A90}	47.2		
R6 @ 560 metres	L_{A1}	61.0	Slightly cooler	File No = GRS23

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Table 3-2: Measured Noise Levels, Attended Noise Monitoring – Evening Time Period, dB(A)

Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
58 Ceres St Penrith 21/02/2014 2001-2016	L_{A10}	52.7	Light breeze Slightly cooler	• **GRS inaudible** • Traffic on Andrews Road • Dogs barking • People talking in reserve
	L_{Aeq}	51.6		
	L_{A90}	46.0		
R7 @ 425 metres 5 Echo Place Penrith 21/02/2014 2019-2034	L_{A1}	61.0	Slightly cooler	File No = GRS24 • **GRS inaudible** • Traffic on Andrews Road • Dogs barking • Cicadas • Clear line of sight
	L_{A10}	55.5		
	L_{Aeq}	52.0		
	L_{A90}	44.5		
R12 @ 160 metres Nepean Rugby League Field Penrith 21/02/2014 2104-2119	L_{A1}	57.6	Slightly cooler	File No = GRS27 • **Plant Inaudible** • FEL just audible • Traffic on Andrews Road • Continuous noise from a nearby site not associated with GRS • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	50.7		
	L_{Aeq}	48.7		
	L_{A90}	28.5		
R13 @ 255 metres Nepean Rugby League Field Penrith 21/02/2014 2041-2056	L_{A1}	66.0	Slightly cooler	File No = GRS26 • **Plant just audible** • Traffic on Andrews Road • FEL just audible • Continuous noise from a nearby site not associated with GRS • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	57.4		
	L_{Aeq}	55.2		
	L_{A90}	36.0		

Table 3-3 below provides the raw results of noise measurements conducted at sensitive receptors during the night time period. The table also includes the most dominant sources that contributed to the total noise levels during the measurements period for each location.

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Table 3-3: Measured Noise Levels, Attended Noise Monitoring – Night Time Period, dB(A)				
Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
R1 @ 400 metres 31 Ariel Crescent Cranebrook 21/02/2014 2200-2215	L_{A1}	53.5	Fine weather No clouds No wind	File No = GRS28 • **GRS inaudible** • Traffic on Andrews Road • Traffic on local streets including Laycock Street • Continuous noise from a nearby site not associated with GRS • Cicadas
	L_{A10}	48.3		
	L_{Aeq}	46.0		
	L_{A90}	42.0		
R2 @ 420 metres 19 Ariel Crescent Cranebrook 21/02/2014 2217-2232	L_{A1}	48.0	Fine weather No clouds No wind	File No = GRS29 • **GRS inaudible** • Traffic on Andrews Road • Traffic on local streets including Laycock Street • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	44.9		
	L_{Aeq}	44.7		
	L_{A90}	41.3		
R3 @ 300 metres 6 Koala Glen Cranebrook 21/02/2014 2307-2322	L_{A1}	68.5	Fine weather No clouds No wind	File No = GRS31 • **GRS inaudible** • Continuous noise from a nearby site not associated with GRS • Traffic on Andrews Road • Reverse alarm/beeper just audible (sporadically) • Noisy motor bike • Many dogs barking
	L_{A10}	57.9		
	L_{Aeq}	57		
	L_{A90}	46.1		
R4 @ 395 metres 42 Scenic Circuit	L_{A1}	67.3	Fine weather No clouds No wind	File No = GRS30 • **GRS inaudible** • Continuous noise from a nearby site not associated with GRS
	L_{A10}	60.9		
	L_{Aeq}	57.4		

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Table 3-3: Measured Noise Levels, Attended Noise Monitoring – Night Time Period, dB(A)				
Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
Cranebrook 21/02/2014 2249-2304	L_{A90}	44.2		• Traffic on Andrews Road • Emergency vehicles
R5 @ 540 metres 93 Allard Street Penrith 21/02/2014 2327-2342	L_{A1}	66.2	Fine weather No clouds No wind	File No = GRS32 • **GRS inaudible** • Traffic on Andrews Road • Cicadas • Frogs
	L_{A10}	56.3		
	L_{Aeq}	54.8		
	L_{A90}	41.6		
R6 @ 560 metres 58 Ceres St Penrith 21&22/02/2014 2349-0004	L_{A1}	62.8	Fine weather No clouds No wind	File No = GRS34 • **GRS just audible** • Continuous noise from a nearby site not associated with GRS • Traffic on Andrews Road • Barking dogs for several minutes • Very noisy birds passing by
	L_{A10}	50.8		
	L_{Aeq}	50.0		
	L_{A90}	39.4		
R7 @ 425 metres 5 Echo Place Penrith 22/02/2014 0006-0021	L_{A1}	53.8	Fine weather No clouds No wind	File No = GRS35 • **GRS just audible** • Traffic on Andrews Road • Continuous noise from a nearby site not associated with GRS • Reverse alarm/beeper just audible (sporadically)
	L_{A10}	46.9		
	L_{Aeq}	45.1		
	L_{A90}	38.9		
R12 @ 160 metres Nepean Rugby	L_{A1}	61.9	Fine weather No clouds	File No = GRS36 • **GRS just audible** • Traffic on Andrews Road
	L_{A10}	54.7		

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Table 3-3: Measured Noise Levels, Attended Noise Monitoring – Night Time Period, dB(A)

Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
League Field Penrith 22/02/2014 0023-0029	L_{Aeq}	53.8	No wind	• Continuous noise from a nearby site not associated with GRS Reverse alarm/beeper just audible (sporadically) It was cut short due to the unforseen events in the adjacent reserve
	L_{A90}	45.1		
R13 @ 255 metres Nepean Rugby League Field Penrith 22/02/2014	L_{A1}		Fine weather No clouds No wind	Stopped and becomes void due to circumstances beyond my control. Refer to comments included in this document LAeq was observed during the short period and it was between 50.9 and 51.1
	L_{A10}			
	L_{Aeq}	51.0		
	L_{A90}			

Note: Due to the large number of measurements only a summary of the results, as raw data, has been included in the above table. The entire raw data results could be supplied upon request as it requires some time to be compiled in a legitimate format.

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3.2 SECOND ROUND OF NOISE MEASUREMENTS – 2/05/2014

Tables 3-4, 3-5 and 3-6 include the results of the noise measurements undertaken during the second round (2 May 2014). These measurements were conducted at close proximity of GRS activities and within the boundary of the site.

Table 3-4: Measured Noise Levels, Attended Noise Monitoring – Day Time Period, dB(A)

Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level – dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
South Eastern side of the site L1 @ 38 metres 2/05/2014 1657-1712	L_{Aeq}	51.1	Fine weather No wind	File No = 2GRS02 • GRS plant • Dust collector • Front End Loaders • Trucks • Reverse alarm/beeper (sporadically)
Southern side of the site L2 @ 36 metres 2/05/2014 1717-1732	L_{Aeq}	46.7	Fine weather No wind	File No = 2GRS03 • GRS plant • Front End Loaders • Reverse beeper (sporadically)

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Table 3-5: Measured Noise Levels, Attended Noise Monitoring – Evening Time Period, dB(A)				
Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
Eastern side of the site L3 @ 43 metres 2/05/2014 1812-1827	L_{Aeq}	53.6	Fine weather Cooler No wind	File No = 2GRS05 • GRS plant • Reverse beeper (sporadically
Southern side of the site L4 @ 36 metres 2/05/2014 1854-1909	L_{Aeq}	50.7	Fine weather Cooler No wind	File No = 2GRS09 • GRS plant • Front End Loader • Reverse beeper (sporadically)

Table 3-6: Measured Noise Levels, Attended Noise Monitoring – Night Time Period, dB(A)				
Measurement Location & distance to source Date & Time	**Noise Descriptor/ Level - dB(A)**		**Observed Meteorological Conditions**	**Observations/Most Dominant Sources**
Eastern side of the site L5 @ 43 metres 2/05/2014 2309-2224	L_{Aeq}	52.5	Fine but cool weather No wind	File No = 2GRS18 • GRS plant • Reverse beeper (sporadically
Southern side of the site L6 @ 36 metres 2/05/2014 2327-2342	L_{Aeq}	46.5	Fine but cool weather No wind	File No = 2GRS19 • GRS plant • Front End Loader • Reverse beeper (sporadically) • Continuous noise from a nearby site not associated with GRS

Note 1 – L1 was selected at this topographic location due to the fact that during the day time period the location used for other measurements on the Eastern side was impacted on by very audible traffic noise on Andrews Road as well as loud noises from people at the neighbouring reserve and would not have been representative of the noise from GRS activities only

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Note 2 - L2, L4 and L6 are at the same topographic location but were used as such to identify them during the different time periods.

Note 3 – L3 and L5 are at the same topographical location but were used to identify them during the different time periods

For the day time period and during the two measurements at L1 and L2, all activities were conducted as normal with all doors left open, trucks entering and leaving, front end loaders moving around the site, forklift operating, tradesmen working in the workshop and the occasional reverse beepers were also heard.

For the both the evening and night time periods and during the four measurements at L3, L4, L5 and L6, all activities were conducted as normal inside the building, however externally different conditions to the day time period were implemented. These include one front end loader (and reverse beeper) operating at the southern side of the building and only the doors in the southern side of the building were kept open to ensure that worst case scenario is taken into consideration in the measurements since they will be required to be opened at different times during the evening and night periods.

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4 Equipment and Calibrations

The sound level meter/analyser (SLM) used for all attended measurements was Svantek Svan 957 which is Type 1 SLM.

The SLM was calibrated before and after the measurements and after every battery change as outlined below. No unacceptable deviations were observed. The SLM was not switched off between calibrations unless to change the batteries after which calibration was conducted. In addition, during the testing the SLM was set to 'Fast' time weighting and 'A' frequency weighting.

For the first round of noise measurements conducted on 21 & 22 February 2014, the following calibrations were performed:

1) File No = GRS01 – Calibration before measurements 21/04/2014 1506 hours – 17s SPL = 93.8 dB (A)
2) File No = GRS16 – Calibration signal 21/02/2014 -1823 hours -26s SPL = 93.5 dB(A)
3) Calibration signal 22/02/2014 – 0040 – 21s SPL = 93.9

For the second round of noise measurements conducted on 2 May 2014, the following calibrations were performed:

1. File No = 2GRS01 – Calibration before measurements 2/05/2014 1655 hours – 15s SPL = 93.9 dB (A)
2. File No = 2GRS12 – Calibration signal 2/05/2014 - 2158 hours - 15s SPL = 94.0 dB(A)
3. File No = 2GRS17 – Calibration signal 2/05/2014 – 2258 hours – 22s SPL = 94.0 dB(A)
4. File No = 2GRS20 - Calibration signal 2/05/2014 – 2350 – 18s SPL = 94.1 dB(A)

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5 Additional Noise Measurements

In addition to the above measurements the level of noise emenating from the dust collector, the front end loader and the newly installed low volume non-tonal reverse beeper were also measured and the results are outlined below.

5.1 DUST COLLECTOR

The results of the dust collector's noise measurements conducted during the first round and dated 21 February 2014 are:

- File No = GRS02 – Measurement of Dust Collector's noise at 7 metres North of the Dust Collector 21/04/2014 1509 hours – 2.5min LAeq = 71.7 dB(A)
- File No = GRS03 – Measurement of Dust Collector's noise at 7 metres East of the Dust Collector 21/04/2014 1513 hours – 2.5min LAeq = 70.0 dB(A)
- File No = GRS04 – Measurement of Dust Collector's noise at 7 metres South of the Dust Collector 21/04/2014 1517 hours – 4.5min LAeq = 72.9 dB(A)

Due to the fact that the recommended acoustic enclosure for the dust collector is being designed, a temporary noise barrier was installed for a few weeks now to assist in mitigating noise from the dust collector at the sensitive receptors.

The results of the dust collector's noise measurements conducted during the second round and dated 2 May 2014 are:

- File No = 2GRS06 – Measurement of Dust Collector's noise at 7 metres East of the Dust Collector 2/05/2014 1830 hours – 5min LAeq = 61.7 dB(A)
- File No = 2GRS07 – Measurement of Dust Collector's noise at 7 metres North of the Dust Collector 2/05/2014 1837 hours – 6.1min LAeq = 64.1 dB(A)
- File No = 2GRS08 – Measurement of Dust Collector's noise at 7 metres South of the Dust Collector 2/05/2014 1845 hours – 5.2min LAeq = 64.0 dB(A)

It should be noted that the measurements of the dust collector's noise were conducted with the acoustic enclosure installed but not fully sealed due to the fact that the Company is now based in Queensland and GRS is waiting on the additional materials to arrive so the full installation can be completed. Hence, the level of noise emanating from the dust collector will be even lower by an additional 1-3 dB. This could be confirmed as part of noise monitoring required by either or both the Development Consent and the Environment Protection Licence.

In addition to this mitigation measure and as part of the whole site's Vegetation and Landscaping management plan, it is proposed that additional trees, shrubs and bushes be planted at the Northern and North Eastern sides of the car park. These additional mitigation measures should provide additional reductions to the noise levels at the receptors located to the North and North East of the plant (i.e. R3).

The above results (the highest readings) and the 1/3 Octave frequency analysis performed during the measurements were used to calculate the sound power level of the dust collector.

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5.2 FRONT END LOADER

The noise level of the front end loader was measured while it was travelling at about 15 Km/h and at a distance of 8 metres. The result is included below.

File No= 2GRS10 – Measurement of front end loader at 8 metres while travelling at about 15 Km/h 2/05/2014 1913 hours – 1.02 min LAeq = 62.2 dB(A)

The above result and the 1/3 Octave frequency analysis performed during the measurement were used to calculate the sound power level of the front end loader.

5.3 LOW VOLUME NON-TONAL REVERSE ALARM/BEEPER

The noise level of the reverse beeper was measured at 8 metres while the front end loader was stationary and in reverse gear. The result is included below.

File No= 2GRS11 – Measurement of reverse alarm/beeper at 8 metres while the front end loader was stationary and in reverse gear 2/05/2014 1915 hours – 42 seconds LAeq = 76.2 dB(A)

The above result and the 1/3 Octave frequency analysis performed during the measurement were used to calculate the sound power level of the reverse alarm/beeper.

5.4 MEASUREMENTS AT R3 & R4 WITHOUT ANY GRS-ASSOCIATED ACTIVITIES

Between 2200 – 2225 hours, all activities at GRS site were stopped including the plant, transfer of cullet from inside the building to the external bunkers. Noise measurements were undertaken at the two (2) most sensitive receptors R3 and R4. The results of these measurements are included below.

File No = 2GRS13 – Measurement at R3 – 6 Koala Glen, Cranebrook 2/05/2014 2202 hours – 10 min LAeq = 51.0 dB(A)

File No = 2GRS14 – Measurement at R4 – 42 scenic Circuit, Cranebrook 2/05/2014 2215 hours – 10 min LAeq = 49.3 dB(A)

5.5 MEASUREMENTS AT R3 & R4 WITH GRS-ASSOCIATED ACTIVITIES

Between 2200 – 2225 hours, all activities at GRS site were stopped including the plant, transfer of cullet from inside the building to the external bunkers. The plant was restarted at 2225 and noise measurements were undertaken again at the same two (2) most sensitive receptors R3 and R4. The results of these measurements are included below.

File No = 2GRS15 – Measurement at R4 – 42 scenic Circuit, Cranebrook 2/05/2014 2243 hours – 12 min LAeq = 51.0 dB(A)

File No = 2GRS16 – Measurement at R3 – 6 Koala Glen, Cranebrook 2/05/2014 2232 hours – 10 min LAeq = 50.1 dB(A)

Based on the results of the above two sets of attended noise measurements included in Sections 5.4 and 5.5, it can be concluded that GRS activities have zero contribution to existing noise environment and that the small variation for R3 is mainly due to the different types of vehicles travelling on Andrews Road during the measurements.

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6 Project Specific Noise Levels

Extensive noise assessments which included long-term unattended noise measurements and short-term attended noise measurements were undertaken at the sensitive receptors during the preparation of the EIS in 2012 as part of the Noise Impact Assessment. In addition, extensive consultation was conducted with the authorities resulting in more measurements and more computer modelling. At the end of all the above, it was agreed that the Project Specific Noise Levels (PSNL) are those included in table 6-1 below.

Table 6-1: Project Specific Noise Limits (PSNL) for On-Site Operational Noise

Location	Period	PSNL
Surrounding residential receptors (R1-R11)	Day	46
	Evening	42
	Night	35
	Shoulder period	46
Sporting fields to the east of the site (R12 – R13)	When in Use	55

The EPA INP specifies the following periods as being:

- **Day:** the period from 7:00 am to 6:00 pm Monday to Saturday; or 8:00 am to 6:00 pm on Sundays and public holidays
- **Evening:** the period from 6:00 pm to 10:00 pm
- **Night:** the remaining periods.
- **Shoulder period –** morning 5:00 am to 7:00 am

(These periods may be varied where appropriate)

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7 Computer Modelling

This section presents the methodology used to re-calibrate the noise model, the reference points where attended measurements were undertaken, all sources associated with the activities conducted on site and results of the computer modelling.

7.1 NOISE VALIDATION METHODOLOGY

Following extensive consultation with the EPA, the following noise validation methodology was adopted:

1) Undertake attended noise measurements at two (or more) locations at close proximity to the plant and within the boundary of the site to ensure that the noise levels are representative of the activities conducted on site without any contribution from other external sources, if possible. The results are presented in Section 3.2 of this report;
2) Undertake noise measurements of the dust collector at a distance of at least 7 metres and at three locations; North, East and South. The results are presented in Section 5.1 of this report;
3) Undertake noise measurements of the front end loader at 8 metres while it was travelling at 15 km/h. The results are presented in Section 5.2 of this report;
4) Undertake noise measurements of the reverse beeper at 8 metres while the front end loader was stationary and the gear was selected in reverse. The results are presented in Section 5.3 of this report;
5) Undertake 1/3 octave frequency analysis for the dust collector, the front end loader and the reverse beeper to determine the sound power level so it can be entered into the SoundPlan noise model;
6) The locations of the attended noise measurements were used as reference points to recalibrate the noise model based on the specific operating conditions during each measurement and any other condition observed during that particular measurement to ensure that the model is calibrated as accurately as possible. The operating conditions are presented in Section 3.2 of this report;
7) The roller shutter doors on the southern side of the building were left open during all measurements and also during the post calibration computer modelling to ensure that the worst case scenario is considered during the measurements and modelling.

7.2 CALIBRATION OF SOUNDPLAN PREDICTIVE NOISE MODEL

Noise emissions from the plant were modelled using the Concawe algorithm within SoundPlan V7.1. This model is recognised by the NSW EPA for modelling environmental noise emissions and has been used by many environmental consultants across Australia on many projects. This noise model has been achieving highly accurate and very reliable results.

For the noise model re-calibration, the following data was used:

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- Existing data for the buildings including walls, roof, openings, doors and other associated structures;
- The existing bunkers and other associated structures/items;
- Existing data for the trucks and other machinery except for the front end loader;
- Sound power levels of the front end loader as mentioned in Sections 5.2 & 7.1 of this report;
- Sound power level of the dust collector as mentioned in Sections 5.1 & 7.1 of this report;
- All reference points where attended measurements were undertaken as outlined in Section 3.2; and
- 1/3 Octave band frequency analysis for all specific noise sources such as the dust collector, the front end loader and the reverse beeper found to comply with the EPA's INP for being non-tonal. Hence modifying factors were not required to be incorporated in neither the re-calibration of the noise model nor the predictive noise modelling.

7.3 NOISE MODELLING RESULTS

Following calibration of the noise model to achieve the noise levels obtained during the attended noise measurements at all reference points for all time periods to an accuracy of 0-0.6 dB, the noise model was then run for the three time periods to determine the noise levels at all sensitive receptors. The modelling was performed under both neutral and adverse weather conditions relying on the weather data used in the Noise Impact Assessment and Air Quality Assessment included in the Environmental Impact Statement (EIS). The weather data were obtained from the closest weather monitoring station at Penrith Lakes.

The SoundPlan Noise Model was run with the following data:

- Existing data for the buildings including walls, roof, openings, doors and other associated structures;
- The proposed bunkers with a height of 5 metres and other associated structures/items;
- Existing data for the trucks and other machinery except for the front end loader;
- Sound power levels of the front end loader as mentioned in Sections 5.2 & 7.1 of this report;
- Sound power level of the dust collector as mentioned in Sections 5.1 & 7.1 of this report;
- All reference points where attended measurements were undertaken as outlined in Section 3.2;
- For the day time, all doors were left open;
- For both the evening and night time periods, all doors on the Eastern were closed;
- For the day time period, we considered that all activities are conducted as normal with all doors left open, trucks entering and leaving at the same rates with the previous modelling, front end loaders moving around the site, forklift operating, tradesmen working in the workshop;

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- For the both the evening and night time periods, we considered that all activities are conducted as normal inside the building, however externally different conditions to the day time period were used as committed by GRS. These include one front end loader (and reverse beeper) operating only at the southern side of the building with the doors on that side of the building kept open to ensure that worst case scenario is taken into consideration since they will be required to be opened at different times during the evening and night periods.
- To ensure that all reflective surfaces near the noise source were included in the model, all existing (i.e. Andrews Road, driveway, car park) and proposed hard stand areas (i.e. bunkers and around the bunkers), were also included in the noise modelling.

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The results of the modelling are included in tables 7.1 and 7.2 below.

Table 7-1: Predicted $L_{eq,\ 15\ minutes}$ Operational Noise Levels for Neutral Weather Conditions, dB(A)

Location		Predicted Noise Levels			Project Specific Noise Levels		
Receptor	**Floor Level**	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
Residence							
R1	1	31	23	23	46	42	35
	2	32	23	23	46	42	35
R2	1	32	23	23	46	42	35
	2	32	24	24	46	42	35
R3	1	36	31	31	46	42	35
	2	37	31	31	46	42	35
R4	1	32	26	26	46	42	35
	2	32	26	26	46	42	35
R5	1	27	21	21	46	42	35
	2	27	21	21	46	42	35
R6	1	27	22	22	46	42	35
	2	28	22	22	46	42	35
R7	1	31	26	26	46	42	35
	2	32	26	26	46	42	35
R8	1	21	12	12	46	42	35
	2	22	12	12	46	42	35
R9	1	24	14	14	46	42	35
	2	25	14	14	46	42	35
R10	1	27	16	16	46	42	35
	2	28	16	16	46	42	35
R11	1	30	21	21	46	42	35
	2	31	22	22	46	42	35
Active Recreation Area							
R12	1	39	34	34	55	55	55
R13	1	40	35	35	55	55	55

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Table 7-2: Predicted $L_{eq,\ 15\ minutes}$ Operational Noise Levels for Adverse Weather Conditions, dB(A)

Location		Predicted Noise Levels			Project Specific Noise Levels		
Receptor	Floor Level	Day	Evening	Night	Day	Evening	Night
Residence							
R1	1	35	27	27	46	42	35
	2	36	27	27	46	42	35
R2	1	35	27	27	46	42	35
	2	36	27	27	46	42	35
R3	1	40	34	34	46	42	35
	2	40	34	34	46	42	35
R4	1	35	30	30	46	42	35
	2	36	30	30	46	42	35
R5	1	31	26	26	46	42	35
	2	31	26	26	46	42	35
R6	1	31	26	26	46	42	35
	2	32	26	26	46	42	35
R7	1	35	30	30	46	42	35
	2	35	30	30	46	42	35
R8	1	25	15	15	46	42	35
	2	26	15	15	46	42	35
R9	1	28	17	17	46	42	35
	2	29	17	17	46	42	35
R10	1	31	18	18	46	42	35
	2	32	19	19	46	42	35
R11	1	34	25	25	46	42	35
	2	34	25	25	46	42	35
Active Recreation Area							
R12	1	42	37	37	55	55	55
R13	1	43	37	37	55	55	55

Note: Adverse weather conditions are for Class F stability and wind of 2m/s directly from the source to the receptor

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7.4 DISCUSSION ON NOISE MODELLING RESULTS

Based on the results included in table 7-1 of Section 7.3 above, it can be concluded that under neutral weather conditions, the activities conducted by GRS at this site comply easily with all noise criteria (Project Specific Noise Levels) at all sensitive receptors and during all time periods provided that all conditions outlined in this report and included in the computer modelling are fully implemented and complied with.

Based on the results included in table 7-2 of Section 7.3 above, it can be concluded that under adverse weather conditions, the activities conducted by GRS at this site comply with all noise criteria (Project Specific Noise Levels) at all sensitive receptors and during all time periods provided that all conditions outlined in this report and included in the computer modelling are fully implemented and complied with.

It is noted that whether the doors on the southern side of the building are open or closed during all time periods it did not affect significantly the noise levels at most receivers and certainly it did not cause any change to the compliance with the PSNL at any location for all time periods. This is mainly associated with the 5 metres high bunkers proposed to be installed in that section of the site.

It is also noted that the predicted noise levels were obtained by using the most conservative approach in many components of the model to ensure that GRS activities on that site will have zero contribution to the noise environment for many years to come. In addition to this, more management plans will be implemented on site and it is highly likely that the works associated with these plans will reduce the noise levels even further at the receptors.

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8 Comments

The comments included in this Section include comments on both the first round of attended noise measurements and the results of the noise modelling.

8.1 COMMENTS ON FIRST ROUND OF ATTENDED NOISE MEASUREMENTS (21&22/02/2014)

Based on the results of the first round raw data and without calculating the contribution of GRS's activities to the overall noise experienced in the area and specifically at the testing locations, the following preliminary conclusions are made:

1. GRS's activities were inaudible at all sensitive residential receivers during the day-time period;
2. GRS's activities were inaudible at all sensitive residential receivers during the evening-time period;
3. GRS's activities were inaudible at all sensitive residential receivers during the night-time period except for locations R6 and R7 where GRS's activities were just audible;
4. GRS's activities were just audible at Recreational receivers during the day-time period;
5. GRS's activities were inaudible at Recreational receiver R12 and just audible at R13 during the evening-time period; and
6. GRS's activities were just audible at Recreational receivers during the night-time period.

It is of significant importance to note that the results of attended noise measurements conducted in March 2012 as part of the preparation of the EIS and the results presented in this report (for both first round of 21&22/02/2014 and second round of 2/05/2014) are very comparable and in most cases the results are very similar, in particular the LA90 background noise levels, despite the fact that the measurements were conducted by different employees and using different Sound Level Meters. This means that the noise environment in that area has not changed in two (2) years with or without GRS operating. Hence, GRS activities have zero contribution to the overall noise environment of the area with the exception of reverse alarm/beepers which are very sporadic and may not have any impact on the L_{Aeq} values for these periods. This aspect has already been addressed as outlined in this report.

Another important observation is the fact that the most dominant sources noticed during the previous rounds (March 2012 and February 2014) of noise measurements revealed that the most dominant sources are still the same (traffic on Andrews Road, birds, dogs, the adjacent industry, etc…).

Table 8-1 below provides a summary of simplified logarithmic addition. The table could also be used for subtraction to determine the Sound Pressure Level of one noise source only.

Table 8-1 : Addition of Equal Sources (Sound Pressure Level)

Number of Equal Sources	Addition to Level of One Source (dB)
1	0
2	3
3	5
4	6
5	7
6	8
7	8.5
8	9

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9	9.5
10	10

Hence, when using the logarithmic addition and subtraction formulas for the noise measured and the additional dominant sources in the area, the following additional conclusions are also made:

1. The level of noise emenating from GRS complies with the criteria specified for the Recreational receptors during all three time periods. The result of the noise measurements taken at R13 during the day time is not associated with GRS's activities but rather noisy birds and traffic on Andrews Road during peak hours;
2. GRS's plant and associated equipment were inaudible during most of the measurements (except on a few where it was just audible but would still comply with the relevant PSNL) at all locations of residential receptors and during the three time periods; and
3. The only just audible source associated with GRS's activities is the reverse alarm/beeper installed on the Front End Loader. This aspect has already been addressed as outlined in this report.

Due to the fact that during the first round of attended noise measurements (February 2014) most dominant sources were not associated with GRS's activities, it is acceptable practice to calculate the level of noise attributed to GRS's activities by using simple logarithmic calculations based on the above table.

8.2 COMMENTS ON NOISE MODELLING RESULTS

As previously stated and following the submission of the first Revision of this report, EPA's and GRS' representatives conducted extensive consultation in relation to confirmation and validation of the predicted noise levels at the receptors to ensure that GRS comply with the PSNL.

Subsequently, a comprehensive validation of the predicted noise levels at all sensitive receptors was performed which included attended noise measurements in the vicinity of the plant and within the boundary of the site, re-calibration of the SoundPlan Noise model and undertaken noise modelling to obtain the predicted noise levels at the receptors.

The results of the noise modelling for all receptors during the three time periods and for both neutral and adverse weather conditions are included in tables 7-1 and 7-2 of section 7.3.

These results confirm that GRS activities do not have any contribution to the noise levels previously measured at these receptors

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9 Recommended Mitigation Measures

Despite the fact that the level of noise emanating from GRS's site as a result of its activities comply with the PSNL at all locations and time periods, we recommend that additional mitigation measures be implemented to ensure that GRS's activities comply under any adverse weather conditions and to provide a safety margin for potential wear and tear in the equipment/machinery used on site between scheduled maintenance and service rounds.

The following additional mitigation measures are recommended for consideration by GRS's management:

1. Complete the installation of the acoustic enclosure around the noisy sections of the dust collector to ensure that the noise level of this source is reduced even further to below those measured during the second round of noise measurements;
2. Replace and/or update the reverse alarm/beepers of the heavy machineries used by GRS on the external side of the building by installing non-tonal low volume reverse alarm/beepers during both the evening and night time periods. These alarms/beepers must be consistent and comply with the alarms/beepers specified in the document titled: *"Review of alternative to 'beeper' alarms for construction equipment – For Department of Environment and Climate Change NSW Government",* dated 8 May 2009 and prepared by Marion Burgess and Mathew McCarty;
3. Ensure that additional shrubs, bushes and trees are planted on both the Northern and North Eastern sides of the car park located at the Northern side of the site;
4. All Roller Shutter Doors located on the Eastern side of the building should be kept closed between the hours of 6.00 pm and 6.00 am except in an emergency or if directed by an authorised officer;
5. Highly visible signs to this effect should be placed on both sides of the doors and on both the inside and outside walls of the building (4 signs per door);
6. This mitigation measures should be included in GRS's Environmental Management Plan and Operational Procedures Manual to ensure full compliance with this requirement;
7. This mitigation measure and other mitigation measures previously recommended should be included in the induction and regular training for all employees to ensure full compliance with these requirements;
8. No activities should be conducted on the eastern side of the building between 6.00 pm and 6.00 am except for an emergency or as directed by an authorised officer; and
9. Only one Front End loader with low-volume non-tonal reverse alarm/beeper installed, will operate between the hours of 6.00 pm and 6.00 am at the southern side of the building.

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10 Further Considerations

Despite the fact that GRS will comply with the PSNL following the implementation of the above mitigation measures, we believe that the NSW EPA should take into account the considerations outlined below before making its decision on the noise-related aspects of this project.

10.1 NSW INDUSTRIAL NOISE POLICY

The NSW Industrial Noise Policy (INP) 2000 includes several aspects for consideration when assessing the impact of noise from industrial activities. Some of these aspects are outlined below and they are extracted directly from the INP without any alterations.

Section "*1.4 Applying the policy*" states

"The assessment of noise impact is complex and subjective, and is rarely (if ever) able to be considered in isolation from other social and economic aspects of a development or activity. The policy outlines processes to help strike a feasible and reasonable balance between the establishment and operation of industrial activities and the protection of the community from noise levels that are intrusive or unpleasant."

Section "*1.4.1 Principles underpinning the noise criteria*" states

"The industrial noise source criteria set down in Section 2 are best regarded as planning tools. They are not mandatory, and an application for a noise producing development is not determined purely on the basis of compliance or otherwise with the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development.

The criteria help to determine consent/licence conditions because they provide information on the likely effect of any environmental noise associated with the development."

Section "*1.4.4 Noise criteria and assessment*" states

"Project-specific noise levels

For a particular project, the more stringent of the intrusive or the amenity criteria sets the project specific noise levels for that project. Generally, the intrusive criterion applies for all new industries until an area begins to become more developed, causing increased noise levels. At this stage the amenity criterion starts to take over as the applicable criterion. Where several new industries are proposed for a new area, care must be taken to ensure that equitable levels are set for each proposed industry (Section 2.2.4)."

Section "*1.4.6 Negotiating noise impacts*" states

"If, after all feasible and reasonable mitigation measures are applied, the resultant noise emissions exceed the project-specific noise levels, then the residual level of impact needs to be balanced against any social and economic benefits derived from the source of the noise.

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Negotiation between the regulatory/consent authority, the community and the proponent to establish achievable noise limits is described in Section 8. This negotiation process is in addition to the direct consultation that normally occurs throughout the impact assessment process between the proponent and the community."

Section "*1.4.7 Setting noise limits in consent and licence conditions"* states

"In setting noise limits, the regulatory/consent authorities need to consider the technical practicalities of mitigation, the amount of noise reduction provided, community views, benefits arising from the development and cost of achieving the project specific noise levels recommended here, along with the environmental consequences of exceeding the project-specific noise levels. It is important that the project-specific noise levels are not automatically interpreted as conditions for consent, without consideration of the other factors. In many instances, it may be appropriate to set noise limits for a development above the project-specific noise levels recommended in this document (Section 9)"

Section "*2.2.1 Notes to support the noise level tables"* States

"1. The recommended acceptable noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

2. In assessing noise levels at residences, the noise level is to be assessed at the most affected point on or within the residential property boundary or, if this is more than 30 m from the residence, at the most-affected point within 30 m of the residence.

3. In assessing noise levels at commercial or industrial premises, the noise level is to be assessed at the most-affected point on or within the property boundary.

4. Where internal noise levels are specified in Table 2.1, they refer to the noise level at the centre of the habitable room that is most exposed to the noise and are to apply with windows opened sufficiently to provide adequate ventilation. In cases where the gaining of internal access for monitoring is difficult, then external noise levels 10 dB above the internal levels apply.

5. In assessing noise levels at passive and active recreational areas, the noise level is to be assessed at the most-affected point within 50 m of the area boundary."

Section "*7.2 Controlling noise at the source"* states

"Best management practice

Best management practice (BMP) is the adoption of particular operational procedures that minimise noise while retaining productive efficiency. When an appropriate mitigation strategy that incorporates expensive engineering solutions is being considered, the extent to which cheaper, non-engineering-oriented BMP can contribute to the required reduction of noise should be taken into account.

Application of BMP includes the following types of practice:

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- *in open-cut mines: restricting movement of trucks on ridgelines and exposed haul routes where their noise can propagate over a wide area, especially at night. This means restricting night-time movement of spoil to areas shielded by barriers or mounds, and reserving large-scale spoil movement for daytime*
- *scheduling the use of noisy equipment at the least-sensitive time of day*
- *siting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area; or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise*
- *where there are several noisy pieces of equipment, scheduling operations so they are used separately rather than concurrently*
- *keeping equipment well maintained*
- *employing 'quiet' practices when operating equipment—for example, positioning idling trucks in appropriate areas*
- *running staff-education programs on the effects of noise and the use of quiet work practices*."

10.2 EXISTING INDUSTRY IN THE AREA

During both attended noise monitoring conducted as part of this noise validation assessment, a continuous noise was noticed at most locations and at different times of the three time periods. This was also observed during all previous attended noise measurements in the area and was included in previous assessment reports. It is believed to be emanating from an industrial site nearby.

10.3 OTHER CONSIDERATIONS

10.3.1 Community Benefits

There are several benefits to the wide community in the local and regional context of the development. Local employment will receive a boost and there will be an economic flow on to businesses extending beyond the Penrith City Council area.

The wider community would have greater and more long-term benefits from the plant. The plant meets the precautionary principle of Ecologically Sustainable Development and will reuse valuable materials that replace virgin raw materials in the production of glass containers and bottles.

The recycling process uses much less energy to make new glass products than manufacturing glass from virgin raw materials. Every tonne of glass recycled saves 315kg of carbon dioxide from being released into the atmosphere during the creation of new glass (Waste Online, 2004). Further benefits include:

- Conserving natural resources by making products from used glass instead of virgin raw materials;

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- Prevention of pollution since the glass recycling process creates less air and water pollution than making new glass from virgin materials;
- Saving energy - making products from recycled glass takes much less energy than making new glass; and
- Saving landfill space by recycling glass rather than being sent to landfills.

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11 Proposed Additional Options

Based on our extensive experience in noise assessments for existing and new developments, we believe that GRS would easily comply with the PSNL during all time periods and at all sensitive receptor locations provided that the mitigation measures are fully implemented and complied with (most of them are already implemented on site). However, just in case for any unknown reasons or unforseen events this does not occur and to provide all stakeholders, including Government authorities and community, with confidence that GRS's activities will be conducted in the best environmentally friendly manner having regard to all social and economic considerations and community net benefits, GRS will consider implementing any (or a combination) of the following three initiatives:

- Environmental Improvement Plan;
- Continuous Environmental Improvement Program; or
- Pollution Reduction Program.

The above three initiatives could be either noise orientated only or they may include noise, air and waste.

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12 Conclusion

Based on the information included in EIS, additional information previously submitted to the authorities at different times and in this report, it can be concluded that provided that the noise mitigation measures recommended in this report are fully implemented on site and the operating conditions outlined in this report are adhered to, the level of noise emanating from GRS's glass beneficiation plant complies with the Project Specific Noise Levels.

It is also concluded that following the implementation of the above mitigation measures, GRS's activities would have zero contribution to the existing noise environment. This is demonstrated by the results of the attended noise measurements conducted at different times and confirmed by the noise modelling results included in this report.

When taking into account the results of attended noise measurements and computer modelling presented in this report, the provisions included in the INP, the social and economic benefits to the community and the Ecologically Sustainable Development considerations, we believe that the plant could be operated on a 24 hour per day and 7 days per week basis with nil impact on human health and the environment. This would be achieved based on the provision that the recommended mitigation measures and operating conditions are implemented. It is noted that most of the recommended mitigation measures and operating conditions have already been implemented on site.

However, to provide all stakeholders, including Government authorities and community, with confidence of its compliance with the PSNL, GRS is willing to consider additional environmental improvement options including any of the three options listed in the Section 11 of this report, provided that these options are reasonable, achievable and practical..

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