NOISE & VIBRATION IMPACT ASSESSMENT

Glass Recycling Facility

2115 - 2131 Castlereagh Road, Penrith, NSW

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NOISE & VIBRATION IMPACT ASSESSMENT

Glass Recycling Facility

2115 - 2131 Castlereagh Road, Penrith, NSW

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1 Introduction

1.1 Background

5R Solutions Ltd proposes to redevelop part of the existing industrial facilities at 2115 – 2131 Castlereagh Road, Penrith, NSW. The existing industrial site is large with several buildings throughout owned by Fletcher Insulation. 5R Solutions proposes to repurpose one of the existing industrial buildings into a glass recycling facility with a proposed capacity of up to 25,000 tonnes per year.

The proposal will include a glass recycling line of mechanical equipment connected via conveyor belts. The recycling line is used to breakdown recovered glass into various grades of granulised glass. The plant / equipment will mainly be housed along the southern most facade of the proposed building, with vehicle access through the western facade of the building. All loading / unloading and glass recycling will take place inside the building with all facades fully closed during operation.

Waves Acoustic Consulting Pty Ltd (Waves Consulting) has been engaged by 5R Solutions (through Jackson Environment and Planning Pty Ltd) to prepare a Noise and Vibration Impact Assessment (NVIA) to demonstrate the noise and vibration impacts associated with the project. This report presents the results of the assessment and forms part of the Development Application (DA) for the proposal.

This report has been prepared to inform Penrith City Council and all relevant stakeholders. The aim of the report is to assess the potential noise and vibration impacts of the proposed development on any nearby sensitive receivers and has been prepared in accordance with the guidelines outlined in Section 1.2.

1.2 Relevant Guidelines

Noise from the operation of the proposal has been assessed in accordance with the NSW Industrial Noise Policy (INP), NSW EPA, 2000.

Noise from additional traffic movements on the local road network has been assessed in accordance with the NSW Road Noise Policy (RNP), NSW EPA 2011.

Vibration from the operation of the proposal has been assessed in accordance with Assessing Vibration: a technical guideline (DEC 2006).

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2 Development Description

2.1 Overview of the Development and Potential for Impacts

5R Solutions Ltd proposes to redevelop part of the existing industrial facilities at 2115 – 2131 Castlereagh Road, Penrith, NSW. The existing industrial site is large with several buildings throughout owned by Fletcher Insulation. 5R Solutions proposes to repurpose one of the existing industrial buildings into a glass recycling facility with a proposed capacity of up to 25,000 tonnes per year.

The main noise and vibration sources from the proposed glass recycling facility will include:

- Offsite vehicle movements on the local road network.
- Onsite (external and internal) vehicle movements - mainly delivery trucks / skip bins.
- Float glass crushing (internal).
- Vibratory sorting (internal).
- Various conveyor belts (internal).
- Stockpiling of glass products (internal).

Several existing industrial buildings are located at the 2115 – 2131 Castlereagh Road, Penrith, NSW site. Of these existing buildings, the proposed building for the glass recycling facility is located as shown in Figure 1 below. The proposed building is the most easterly structure of the existing buildings on the site and is connected to the adjacent buildings via a high level corrugated steel awning.

The site is predominately surrounded by industrial zoned land and buildings. The nearest industrial buildings are approximately 300, 500 and 140 m to north, west and south respectively. Residential zones with residential dwellings are located along the eastern and south eastern boundaries of the industrial site. The closest residential dwellings are located within 870 m (east) and 920 m (south east) respectively. A large recreation area called the Andrews Road Baseball Complex is located 740 m (north east). The nearest school is Kingswood Park Public School which is located 1.2 km south east (not shown in Figure 1).

2.1.1 Potential Noise Impacts

Potential noise impacts from the proposed development which will be assessed in this report include:

- Noise emission from the mechanical services and fixed noise sources associated with the development to any nearby sensitive receivers.
- Noise emission from vehicle movements on site to any nearby sensitive receivers.
- Additional noise emission from vehicle movements on the adjacent roads to any nearby sensitive receivers.

2.1.2 Potential Vibration Impacts

The offset distances (in all directions) between the proposed development and any nearby vibration sensitive receivers is very large (> 800m). The potential for vibration impacts due to the operation of the development is effectively nil. All vibration criteria with respect to cosmetic damage to buildings and human comfort impacts will be satisfied. No further consideration of vibration impacts is given in this assessment as a result.

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Figure 1 shows an aerial photo of the site with key features labelled including the noise monitoring location used for this assessment.

Figure 1. Aerial Photo and Noise Logging Location

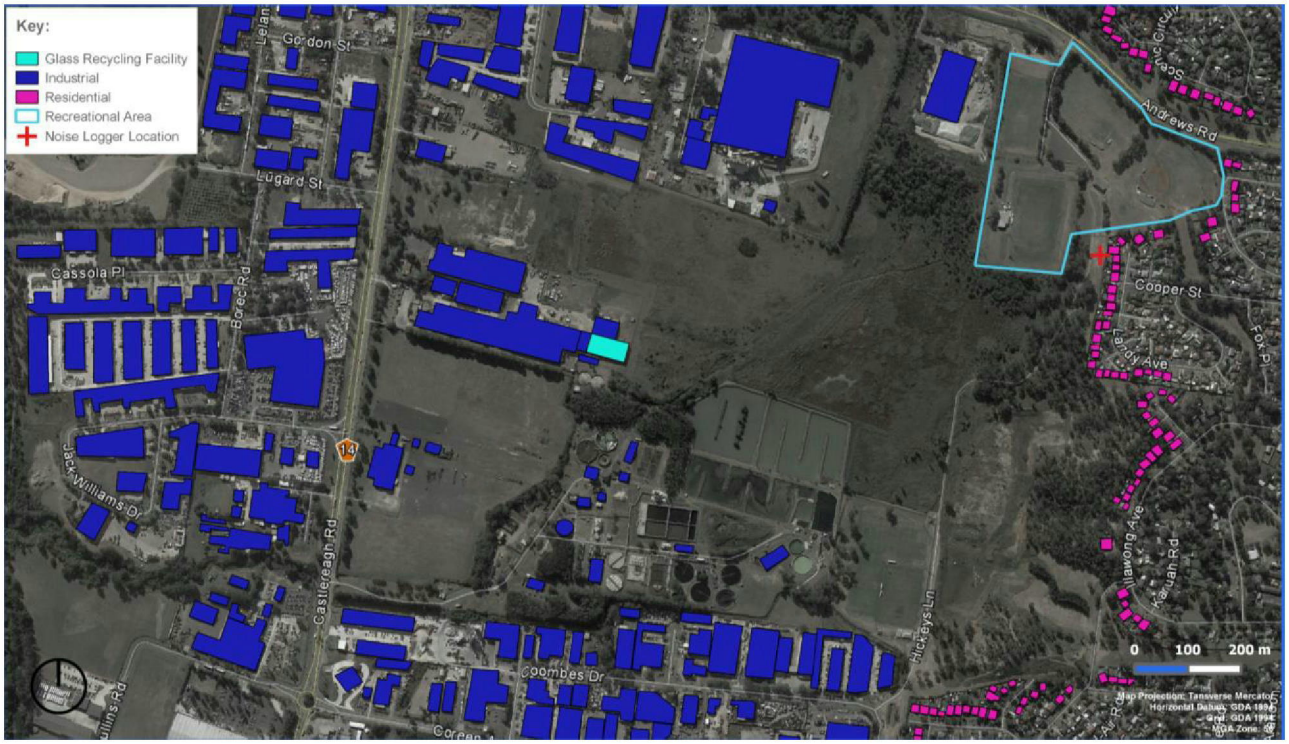

Image courtesy of Google Earth

2.2 Proposed Glass Recycling Facility

Figures 2 - 4 illustrate the proposed design of the glass recycling facility and the location of the proposed machinery inside the building.

Figure 2. General Internal Layout Plan and Truck Path (in green)

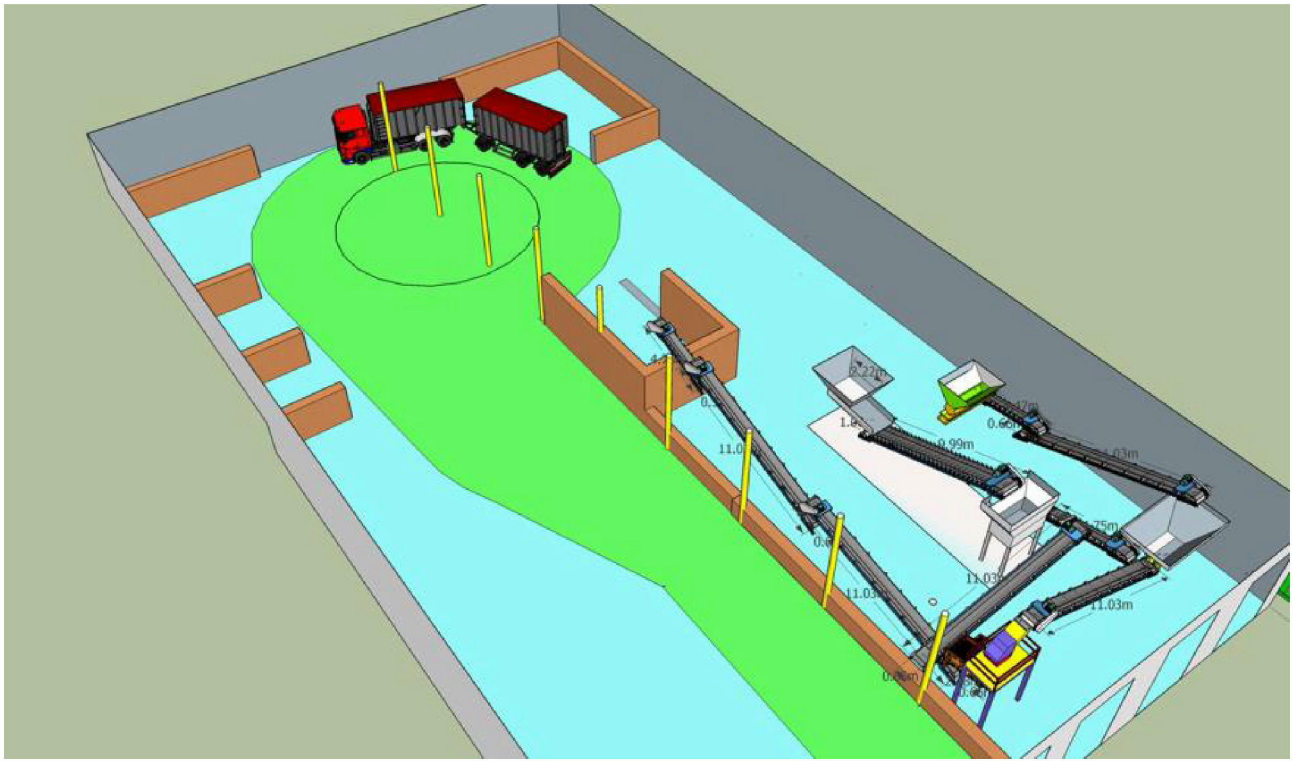

Figure 3. Proposed Glass Recycling Machinery Locations Along Southern Facade of the Building

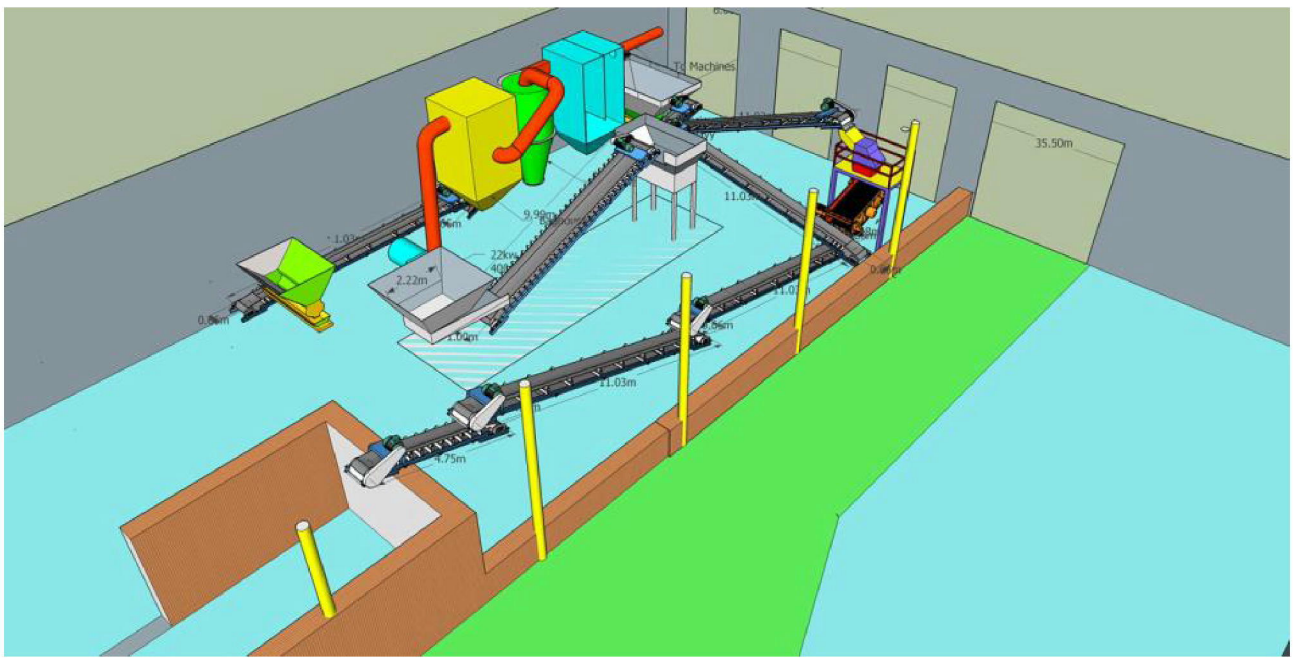

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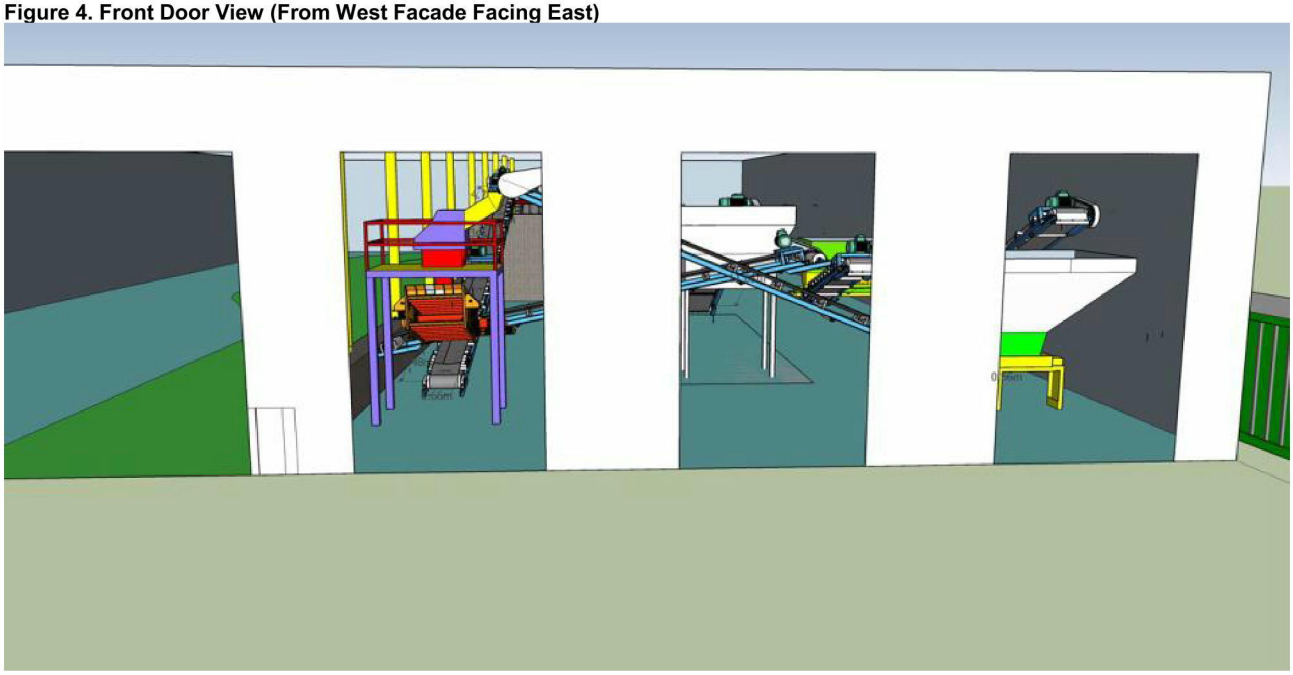
Figure 4. Front Door View (From West Facade Facing East)



2.3 Existing Operational Noise Levels

Noise levels associated with the internal operation of the glass recycling plant owned and operated by 5R Solutions at 59a Mahunga Drive, Mangree, NZ were measured and reported by Paragon Health and Safety in February 2013. The operation of the proposed site will be nearly identical, so the noise level measurements presented in report LP02-13 (by Paragon) will be used as source noise levels in this assessment.

Table 1 illustrates a summary of the worst-case internal noise levels due to operation of the glass recycling facility currently owned and operated by 5R Solutions in Mangree NZ.

Table 1. Summary of Existing Operational Noise Levels (Internal)

Noise Metric	Sound Pressure Level (dB re 20 µPa)
L_{Aeq}	94
L_{AFmax}[1]	135

Note: 1. Estimated from measured worst-case L_{Apeak} levels of 147 dB.

The noise levels measured in the Paragon report were measured throughout a typical working shift and show a combination of direct and reverberant sound pressure measured via noise dose meters fixed to workers. The levels shown in Table 1 are the worst-case noise levels observed in the measurements, so are considered conservative for this assessment.

2.4 Site Operation

The site will operate between 0500 and 2000 hours, five (5) days a week. All internal vehicle movements, loading / unloading and glass recycling operations will be undertaken with facades fully closed at all times.

2.5 Onsite Vehicle Movements

The onsite vehicle movements due to delivery of recovered glass and outgoing movements were provided by 5R Solutions and are summarised in Table 2.

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Table 2. Summary of Vehicle Movements Onsite.

Time	Movements	Movement Split		
		Incoming Tipper	Incoming Skip Bin	Outgoing Tipper
05:00	4			4
06:00	4		4	
07:00	2			2
08:00	2	2		
09:00	4		2	2
10:00	0			
11:00	6	2		4
12:00	2		2	
13:00	4			4
14:00	2		2	
15:00	4	2		2
16:00	0			
17:00	2		2	
18:00	2	2		
19:00	2		2	
20:00	0			
Total Movements	**40**			

Appendix B provides the full details of the traffic movements as supplied by 5R Solutions.

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3 Noise Measurements

3.1 Unattended Noise Monitoring

To characterise the existing acoustic environment in the area, a survey of environmental noise levels was conducted from Tuesday 29 August to Monday 04 September 2017. The noise logger was installed opposite the residential properties located on Landy Avenue, Penrith, NSW (see Figure 1).

The logger location was selected with consideration of other noise sources which may have influenced the measurements, security issues for the equipment and access permission from residents and landowners. Instrumentation for the survey comprised a Svan 977 Type 1 Sound Level Meter and Logger (Serial No. 45730) fitted with an environmental windshield.

The noise logger was programmed to continuously record the ambient noise levels. The sample time interval was set at 15 minutes with a Fast (125 ms) time weighting function. Calibration of the logger was checked prior to and subsequent to the measurements. Drift in calibration did not exceed ±0.5 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

The measured noise data has been filtered to remove erroneous data and any data measured during adverse weather conditions following review of historical weather reports from the Bureau of Meteorology (BOM) Penrith weather station (nearest weather station).

Daily graphs for the noise logger are attached in Appendix A. The graphs represent each 24-hour period of the L_{AF1}, L_{AF10} and L_{AF90} together with the L_{Aeq} levels for the corresponding 15 minute periods, as well as relevant weather data.

3.2 Unattended Noise Monitoring Results

To define the applicable environmental criteria at nearby noise sensitive receivers the measured data has been processed in accordance with the time periods stipulated by the EPA NSW Industrial Noise Policy (INP). Table 3 details the RBLs and ABLs recorded during the NSW INP daytime, evening and night-time assessment periods.

Table 3. Measured Noise Levels Corresponding to NSW INP Assessment Periods

Date	L_{AF90} Background Noise Levels			L_{Aeq} Ambient Noise Levels		
	Day	Evening	Night	Day	Evening	Night
Tuesday 29 August, 2017	41	41	41	48	45	48
Wednesday 30 August, 2017	40	40	41	49	43	47
Thursday 31 August, 2017	42	41	42	49	45	47
Friday 01 September, 2017	37	40	42	47	44	45
Saturday 02 September, 2017	37	39	41	46	45	45
Sunday 03 September, 2017	40	41	40	49	45	46
Monday 04 September, 2017	42			48		
RBL / ABL (Log Average)	**40**	**41**	**41**	**48**	**44**	**47**

Note 1: For Monday to Saturday, Daytime 0700 to 1800 hrs, Evening 1800 to 2200 hrs, Night-time 2200 to 0700 hrs.
For Sundays and Public Holidays, Daytime 0800 to 1800 hrs, Evening 1800 to 2200 hrs, Night-time 2200 to 0800 hrs.

Note 2: The RBL noise level is representative of the *median background sound level* (in the absence of the source under consideration), or simply the background level.

Note 3: The L_{Aeq} is essentially the *average sound level*. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound of the same duration.

We note that the night-time noise levels appear to be similar to the daytime noise levels which is atypical. The logger graphs indicate that early morning traffic (commuters) in between 0500 and 0700 during the weekdays are the cause. Since the early morning period is classified as night-time (under the INP) the commuter traffic is responsible for the elevated night-time noise levels.

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3.3 Attended Noise Measurements

Attended measurements of ambient noise were taken at several representative locations on 04 September 2017. These have been used to determine the various noise sources that influence the existing noise environment. During each measurement, the observer noted the various noise sources and the contributing noise level.

At each location, the attended measurements were performed for up to 15 minutes using a calibrated Svan 977 Type 1 Sound Level Meter and Logger (Serial No. 45730) fitted with an environmental windshield. Wind speeds were less than 5 m/s and all measurements were performed at a height of 1.5 metres above ground level.

Calibration of the logger was checked prior to and subsequent to the measurements. Drift in calibration did not exceed ±0.5 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. The noise environment at each of the attended monitoring locations is described Table 4.

Table 4. Attended Noise Monitoring Results

Measurement Location	Measured Noise Levels (dB re 20 µPa)			Character of the Ambient Noise
	L_{Aeq}	L_{AFMax}	L_{AF90}	
Andrews Road Baseball Complex, Penrith, NSW	55	70	51	Traffic on Andrews Road and surrounding arterial roads mainly dominated by truck exhausts. Local traffic, flora and fauna. Intermittent aircraft fly-overs (helicopters). Intermittent reserving beeper from the nearest industrial site to the west.
Adjacent to 2115 – 2131 Castlereagh Road, Penrith, NSW	72	82	63	Dominated by traffic noise along Castlereagh Road.

The environmental noise in the area is typically dominated by road traffic on the surrounding local roads. Flora and fauna noise were also found to be contributing sources of noise in the environment.

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4 Environmental Noise Criteria

4.1 NSW Industrial Noise Policy (INP)

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the NSW Environment Protection Authority (EPA).

The EPA oversees the NSW Industrial Noise Policy (INP, January 2000) which provides a framework and process for deriving noise criteria. The INP criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term.
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

4.1.1 Intrusiveness Criterion

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness criterion is defined as the equivalent continuous noise level (L_{Aeq}) of the source which is not more than 5 dB above the measured Rated Background Level (RBL), over any 15-minute period.

4.1.2 Amenity Criterion

The amenity criterion is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The criteria relate only to industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the criterion.

4.1.3 Area Classification

The INP characterises the *Suburban* noise environment as an area with an acoustical environment that:

- Has local traffic with characteristically intermittent traffic flows.
- Has some limited commerce or industry.
- Characterised by decreasing noise levels in the evening period (1800 to 2200 hrs)
- Evening ambient noise levels defined by the natural environment or infrequent human activity.
- Or any combination of the above

The Suburban amenity criterion has been applied to the nearest residential receivers for the purposes of this assessment.

An extract from the NSW INP that relates to the amenity criteria recommended for residential receiver types relevant to this assessment is given in Table 5.

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Table 5. Amenity Criteria - Recommended L_{Aeq} Noise Levels from Industrial Noise Sources (INP)

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level	
			Acceptable	Recommended Maximum
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Industrial	All	When in use	70	75
Commercial	All	When in use	65	70
Active recreation area	All	When in use	55	60

4.1.4 Sleep Disturbance

Intermittent noises due to activities such as impact noise or hydraulic brake releases from trucks are not directly addressed by the INP. A definitive noise level whereby sleep disturbance is likely to occur is not available and research in the area is ongoing.

As a screening assessment, to minimise the risk of sleep disturbance resulting from these sources, the online *INP Application Notes* recommend that the L_{AFmax} noise level outside a bedroom window should not exceed the prevailing background L_{AF90} noise level by more than 15 dB during the 2200 to 0700 night-time period.

Additionally, the summary of research included in the EPA Road Noise Policy (RNP, 2011) concludes that:

- Maximum internal noise levels below 50-55 dB L_{AFmax} are unlikely to awaken people.
- One or two noise events per night, with maximum internal noise levels of 65-70 dB L_{AFmax}, are not likely to affect health and wellbeing significantly.

Corresponding external criteria of 60-65 dB L_{AFmax} and 75-80 dB L_{AFmax} respectively result, if a 10 dB loss through open windows is adopted (as suggested in the policy).

The wide discrepancy in sleep disturbance screening criteria reflects the uncertainty regarding definitive noise levels and sleep disturbance. Nonetheless, this assessment considers the INP and RNP sleep disturbance screening criteria, as well as the frequency of exposure to the intermittent noise.

4.1.5 Project Specific Noise Criteria

Having defined the area type, the processed results of the unattended noise monitoring have been used to determine project specific noise criteria. The intrusive and amenity criteria for nearby residential receivers are presented in Table 6. These criteria are nominated for the purpose of assessing potential noise impacts from the onsite sources of noise associated with the proposed development.

For each assessment period, the lower (ie the more stringent) of the amenity or intrusive criteria are adopted, as marked in bold, as the project specific noise criteria (PSNL).

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Table 6. INP Noise Criteria

Receiver	Time of Day	ANL[1] $L_{Aeq,period}$	Measured RBL[2] $L_{AF90,15m}$	Measured $L_{Aeq,period}$	Environmental Criteria for Sources of Noise Emission		
					Intrusive[4] $L_{Aeq,15m}$	Amenity [3] $L_{Aeq,period}$	Sleep Disturbance L_{AFmax}
Suburban	Day	55	40	48	**45**	55	-
	Evening	45	41	44	45	**39**	-
	Night	40	41	47	45	**37**	**56**

Note 1: ANL = Acceptable Noise Level for residences in Suburban areas.
Note 2: RBL = Rating Background Level.
Note 3: Assuming existing noise levels are unlikely to decrease in the future.
Note 4: Because the evening and night-time RBLs are slightly higher than the daytime RBL (atypical) the Intrusiveness criteria has been derived from the lowest RBL as per the INP requirements.

For the nearby recreation area and industrial buildings, the acceptable L_{Aeq} noise levels from Table 5 will be applied as criteria in the assessment.

4.2 NSW Road Noise Policy (RNP)

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the NSW Environment Protection Authority (EPA). The EPA oversees the Road Noise Policy (RNP, January 2011) which provides a framework and process for deriving traffic noise criteria. The RNP criteria applicable to this development are given in Table 7 below.

Where the existing noise levels due to traffic already exceed the assessment criteria given in Table 7 then the RNP requires that the total traffic noise level increase should be limited to 2 dB for situations where additional traffic is generated on existing roads by changes to land use developments.

Table 7. RNP Road Traffic Noise Criteria for Residential Land Uses.

Road Category	Type of Project / Land Use	External Assessment Criteria (dB re 20 µPa)	
		$L_{Aeq,15hr}$ (Day)	$L_{Aeq,9hr}$ (Night)
Freeway / arterial / sub-arterial roads	Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	55	50

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5 Operational Noise Assessment

Noise modelling of the site was undertaken using SoundPLAN v7.4 modelling software.

The noise model was constructed from a combination of aerial photography, existing ground topography, design ground topography and design masterplans for the development. The local terrain, design of the development, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the operations of the development and surrounding environment.

The parameters in Table 8 were defined in the noise model to calculate noise levels at sensitive receivers.

Table 8. Noise Model Parameters

Variable	Parameter
Calculation Standard	CONCAWE
Meteorology Effects	A worst-case model prediction was performed with adverse weather conditions outlined in the INP to simulate temperature inversions which can occur in this area. Adverse weather conditions are specified as a 3 m/s source to receiver wind during the daytime period, and an F-class temperature inversion with a 2 m/s source to receiver drainage flow during the evening and night-time periods. This provides a conservative prediction of the potential noise impacts from the development on surrounding sensitive receivers.
Topography	Site – 1m resolution
	Surrounding Area – 5m resolution
Ground Absorption	0.75 (manly soft vegetation)
Receiver Height	4.0 m (second storey receivers)

5.1 Fixed Operational Noise Source Levels

The existing operational noise levels given in Table 1 were used as source levels in the noise model to simulate worst-case $L_{Aeq,15m}$ noise emissions period during the day, evening and night-time periods. The following assumptions were made to apply these source levels to the proposed development site:

- The sources levels from Table 1 are considered as mainly reverberant sound pressure levels as measured inside the existing facility in NZ. Similar internal reverberation times are assumed for the proposed facility so these reverberant noise levels can be applied directly.
- The corrugated steel facade of the proposed facility provides a (conservative) sound insulation of 25 dB R_w.
- All internal vehicle movements and fixed machinery operations only occur when facades are fully closed.
- Due to the potential for impulsive / intermittent noise when stockpiling and loading / unloading glass products this assessment will apply a 5 dB penalty to all predicted noise levels as per the NSW INP standard modifying factors (INP Section 4).

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5.2 Mobile Operational Noise Source Levels

Table 2 illustrates the estimated onsite vehicle movements provided by 5R Solutions. For a worst case 15-minute INP assessment, vehicle volumes during the night-time period have been modelled. This equates to two (2) vehicle movements (ie trucks) in a worst case 15-minute period. The vehicle movements were modelled leaving the western facade underneath the awning connecting buildings onsite. The vehicles were modelled moving across the site to the entry / exit point of the site with Castlereagh Road. Sound power levels for the modelled vehicle movements and speed assumptions are outlined in Table 9.

Table 9. Sound Power Levels for Onsite Vehicle Movements

Noise Source	Sound Power Level LWA (dB re 1 pW)	Average Speed (km/h)
Heavy Vehicles	106	25
Light Vehicles	96	40

5.3 Predicted Operational Noise Impacts - INP

Noise modelling of the onsite fixed and mobile noise sources has been used to predict the noise emissions from the typical operation of the facility to the surrounding sensitive receivers.

A selection of the predicted worst case operational noise levels due to onsite noise sources are summarised and compared against the INP criteria in Table 10.

In addition, a noise contour map is provided in Appendix B. The noise contours presented are taken at 4.0 m elevation to simulate second storey receivers (ie worst case for typical residential receivers). The noise contours show how the noise emission from the proposed development propagates into the surrounding environment. Since the proposed operations do not change significantly throughout the working day, the noise predictions are applicable to the day, evening and night-time periods.

Table 10. Predicted Operational Noise Levels and Compliance with the INP Criteria.

Location	Predicted Worst-Case Operational $L_{Aeq,15m}$ (dB re 20 µPa)	INP Criteria Exceedance $L_{Aeq,15m}$ (dB re 20 µPa)			Predicted Worst-Case Operational L_{AFmax} (dB re 20 µPa)	L_{Amax} Sleep Disturbance Exceedance
		Day	Evening	Night		
Residential		**45**	**39**	**37**		**56**
Ariel Crescent	31	0	0	0	46	0
Cooper Street	35	0	0	0	52	0
Garnet Drive	32	0	0	0	46	0
Hickeys Lane	34	0	0	0	47	0
Illawong Avenue	33	0	0	0	48	0
Lakeview Drive	33	0	0	0	47	0
Landy Avenue	34	0	0	0	50	0
Scenic Circuit	31	0	0	0	48	0
Recreational		**55**	**55**	**55**		
Andrews Road Baseball Complex	35	0	0	0	-	-
Industrial		**70**	**70**	**70**		
North, East and South	<60	0	0	0	-	-

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The results from Table 10 and from Appendix B demonstrate that the noise emissions from the site to the surrounding environment are low. The proposed development satisfies the noise emission criteria for the NSW INP at all nearby residential receivers.

Table 10 and from Appendix B also demonstrate that the potential for noise impacts during the night-time which have large L_{Amax} noise events are low. The sleep disturbance criteria are satisfied as result.

The NSW INP noise criteria at all nearby recreational and industrial receivers are also satisfied.

5.4 Predicted Operational Noise Impacts – RNP

Comparing the applicable RNP criteria from Table 7 to the measured traffic noise along Castlereagh Road from Table 4 we find that the RNP criteria are already likely to be exceeded. Based on this, the allowable increase in noise due to traffic from the proposed site must not exceed 2 dB as per the RNP requirements.

To calculate the traffic noise impacts generated by the operation of the development the existing road traffic volumes for Castlereagh Road (nearest impacted road) are required. Existing traffic data for Castlereagh road was obtained from the Roads and Maritimes Services (RMS) Mulgoa Road / Castlereagh Road Corridor Upgrade - Preferred Options Report (April 2017).

Table 11 summarises the increase in noise levels on Castlereagh Road due to the traffic generated by the proposed development site.

Table 11. Summary of Traffic Noise Increases on Surrounding Road (from available traffic data)

Road	Existing Traffic Volume per Day	Increase in Traffic Volume (due to site)	Increase in noise levels dB
Castlereagh Road	~34,000	40	<0.01

Since the existing traffic noise levels on Castlereagh Road already likely exceed the RNP criteria, all new traffic noise increases must satisfy the 2 dB increase criteria. Table 11 shows that the proposed development generates negligible additional traffic noise. The RNP criteria are satisfied as a result.

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6 Conclusion

Waves Consulting has conducted a noise and vibration impact assessment of the proposed development at 2115 – 2131 Castlereagh Road, Penrith, NSW. The proposal seeks to repurpose an existing industrial building on the site to house a Glass Recycling Facility. This assessment has investigated the worst-case noise emissions associated with the operation of the facility.

This assessment has demonstrated that the predicted noise emissions from the site to the surrounding environment are low. The proposed development satisfies the noise criteria of the NSW Industrial Noise Policy (INP) during the day, evening and night-time periods.

The L_{Amax} sleep disturbance impacts from the operational noise events generated by the site where investigated in this assessment. The proposed development satisfies the L_{Amax} sleep disturbance criteria at all nearby sensitive receivers.

Since the existing traffic noise levels on Castlereagh Road already likely exceed the RNP criteria, all new traffic noise increases must satisfy the RNP 2 dB increase criteria. Table 11 of this assessment shows that the proposed development generates negligible additional traffic noise. The NSW Road Noise Policy (RNP) criteria are satisfied as a result.

The offset distances (in all directions) between the proposed development and any nearby vibration sensitive receivers is very large (> 800m). The potential for vibration impacts due to the operation of the development is effectively nil. All vibration criteria with respect to cosmetic damage to buildings and human comfort impacts will be satisfied as a result.

It is concluded that the proposed Glass Recycling Facility is a complying development with respect to noise and vibration impacts and is therefore suitable for operation.

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APPENDIX A:
GRAPHICAL NOISE LOGGER DATA

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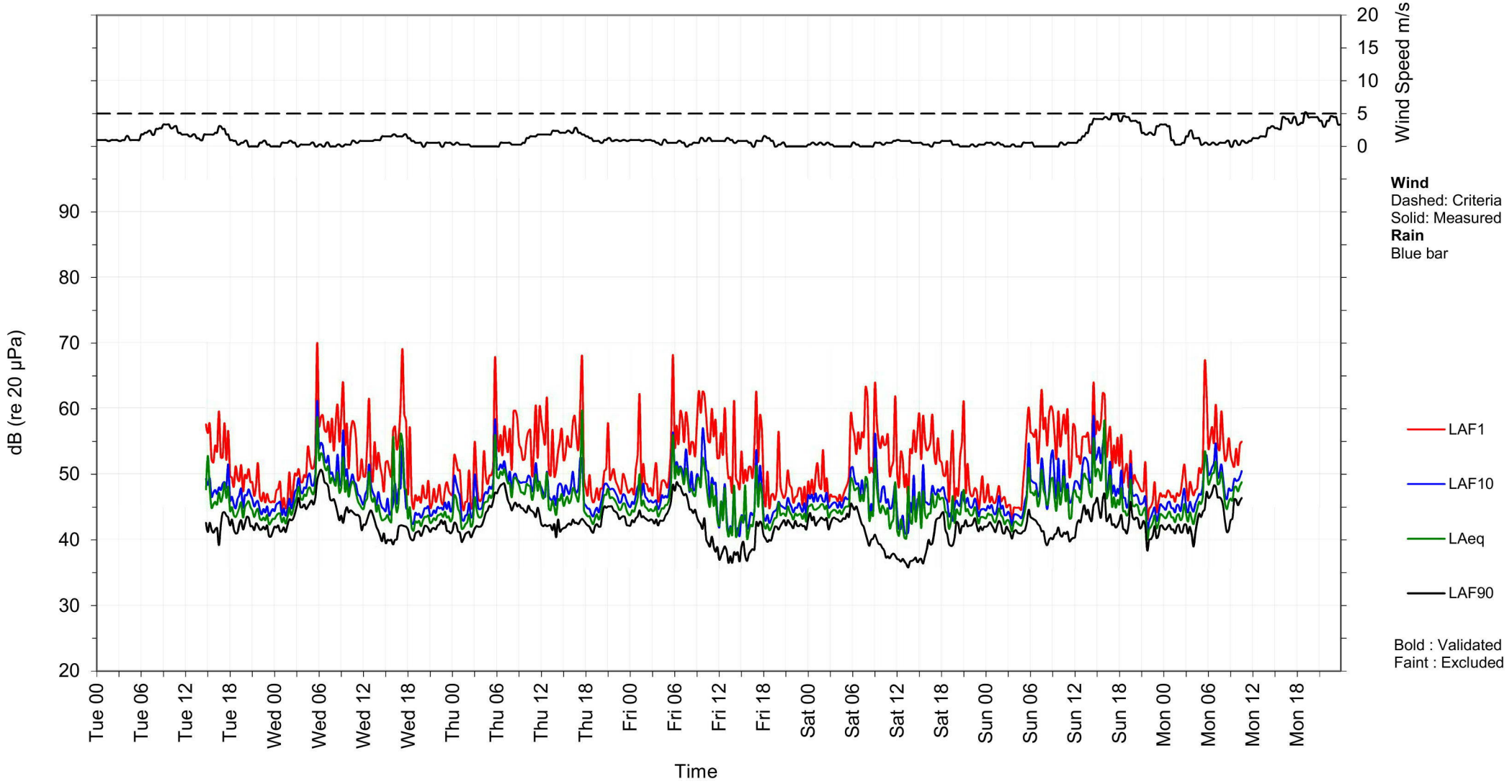
5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

Tuesday 29 August 2017
to
Monday 04 September 2017



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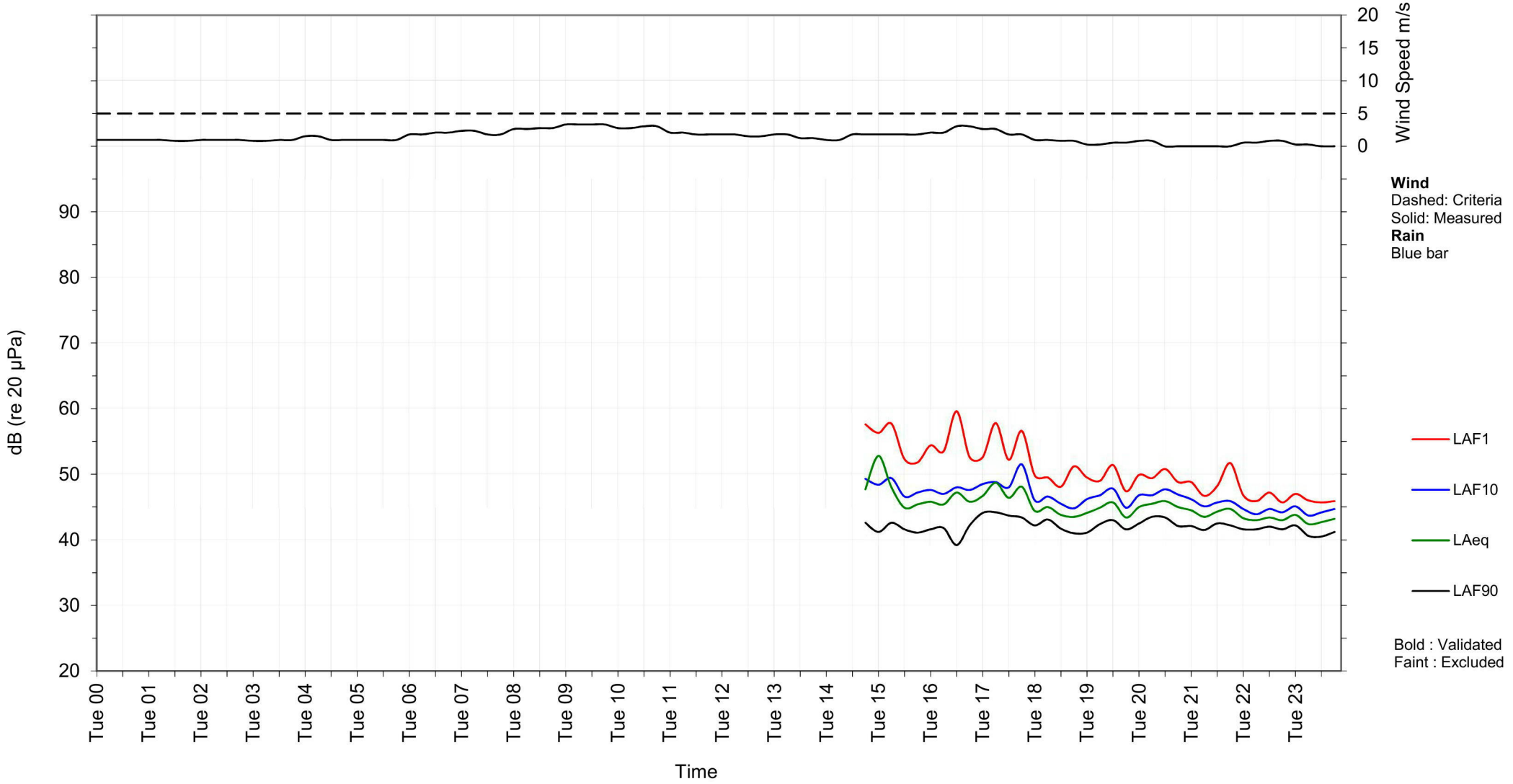
5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

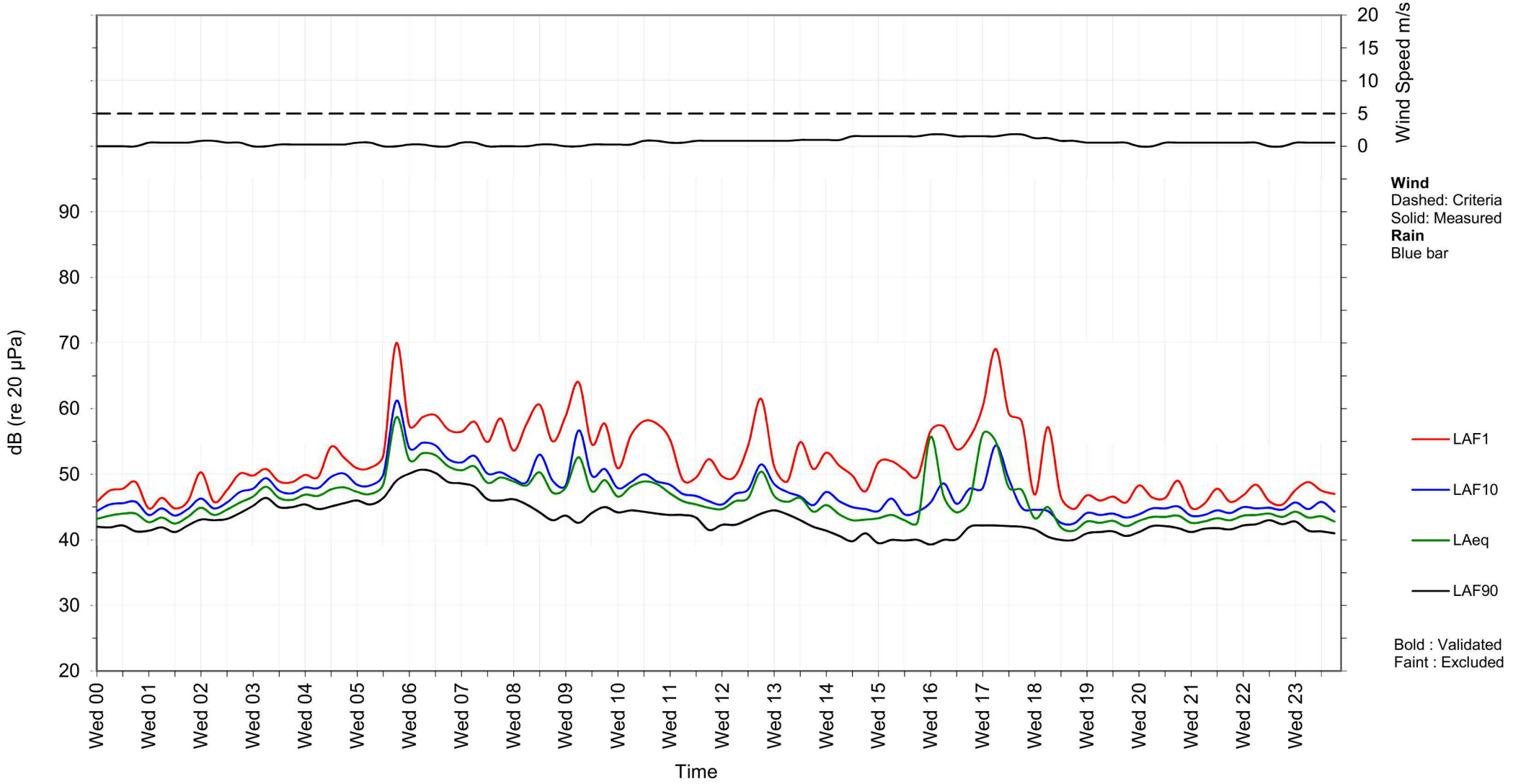
Tuesday 29 August 2017



Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017

5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

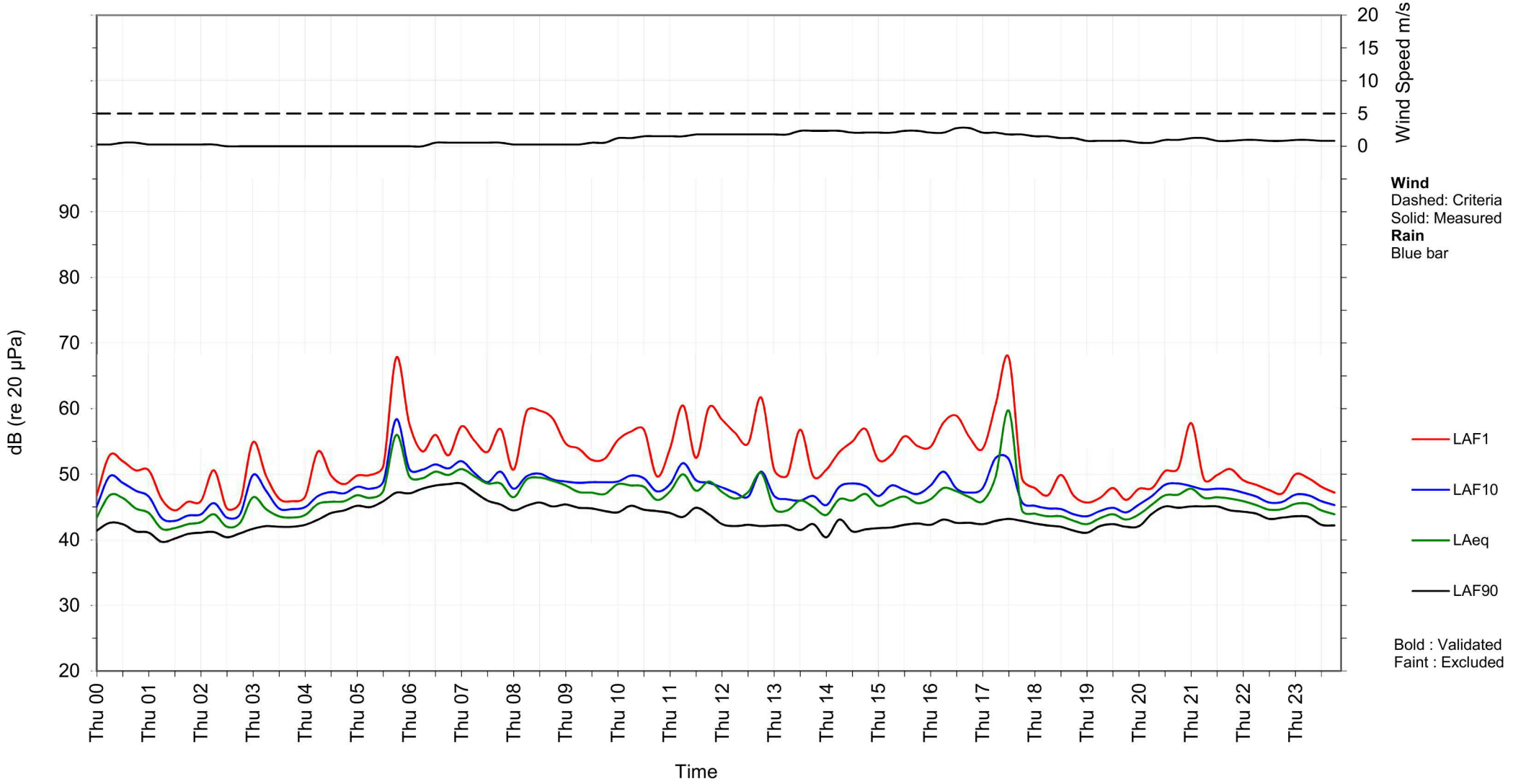
Wednesday 30 August 2017



Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017

5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

Thursday 31 August 2017



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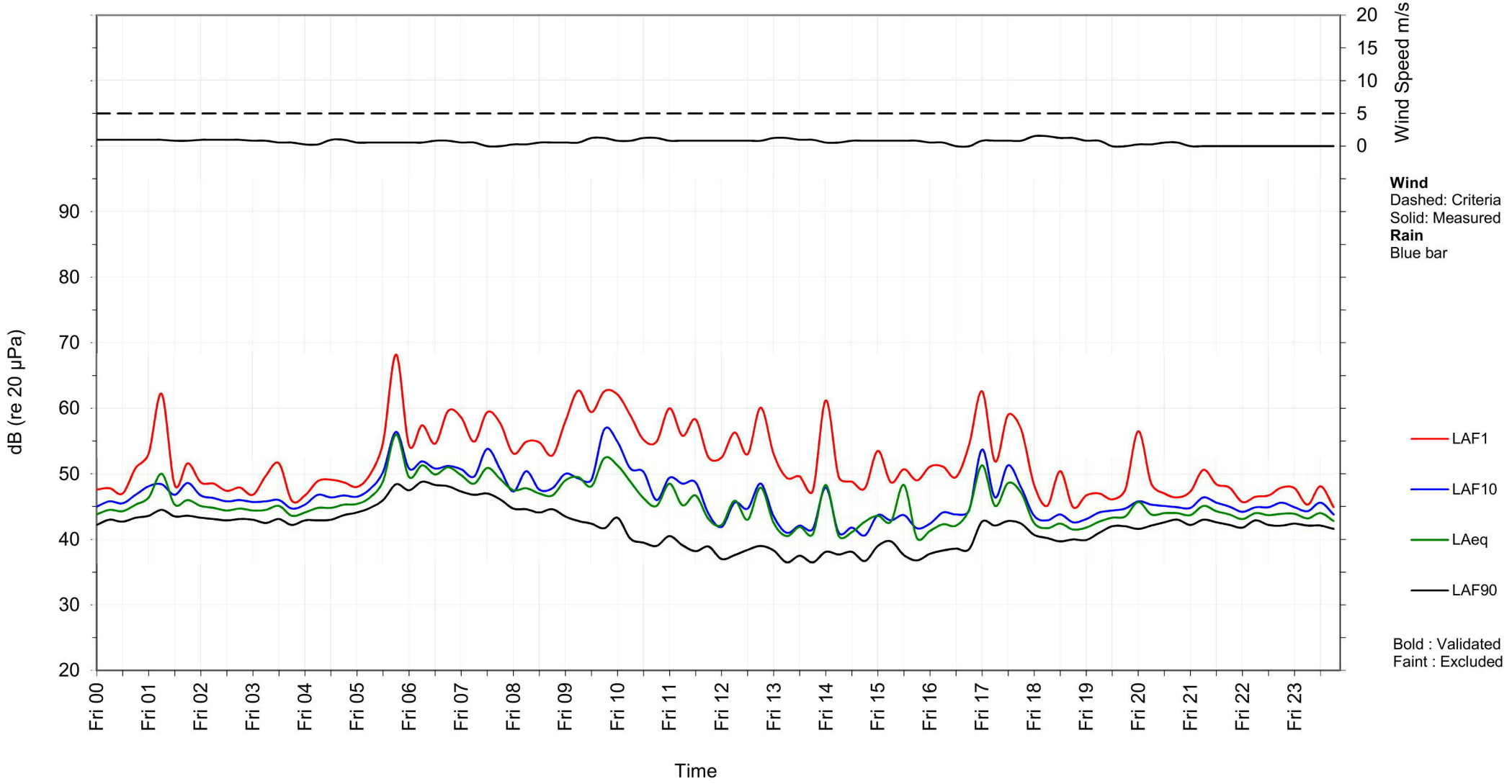
Version: 1, Version Date: 28/09/2017

5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

Friday 01 September 2017



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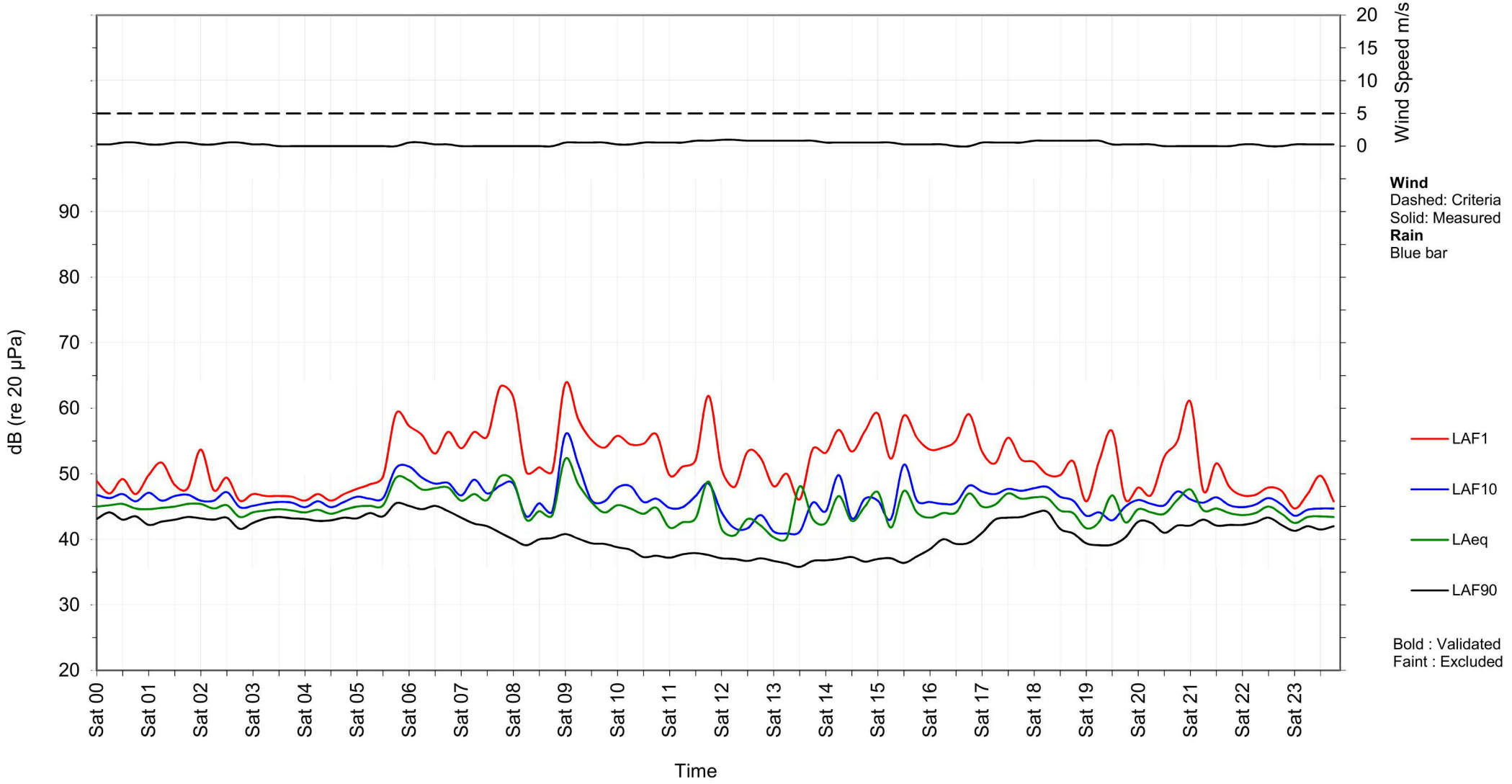
Version: 1, Version Date: 28/09/2017

5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

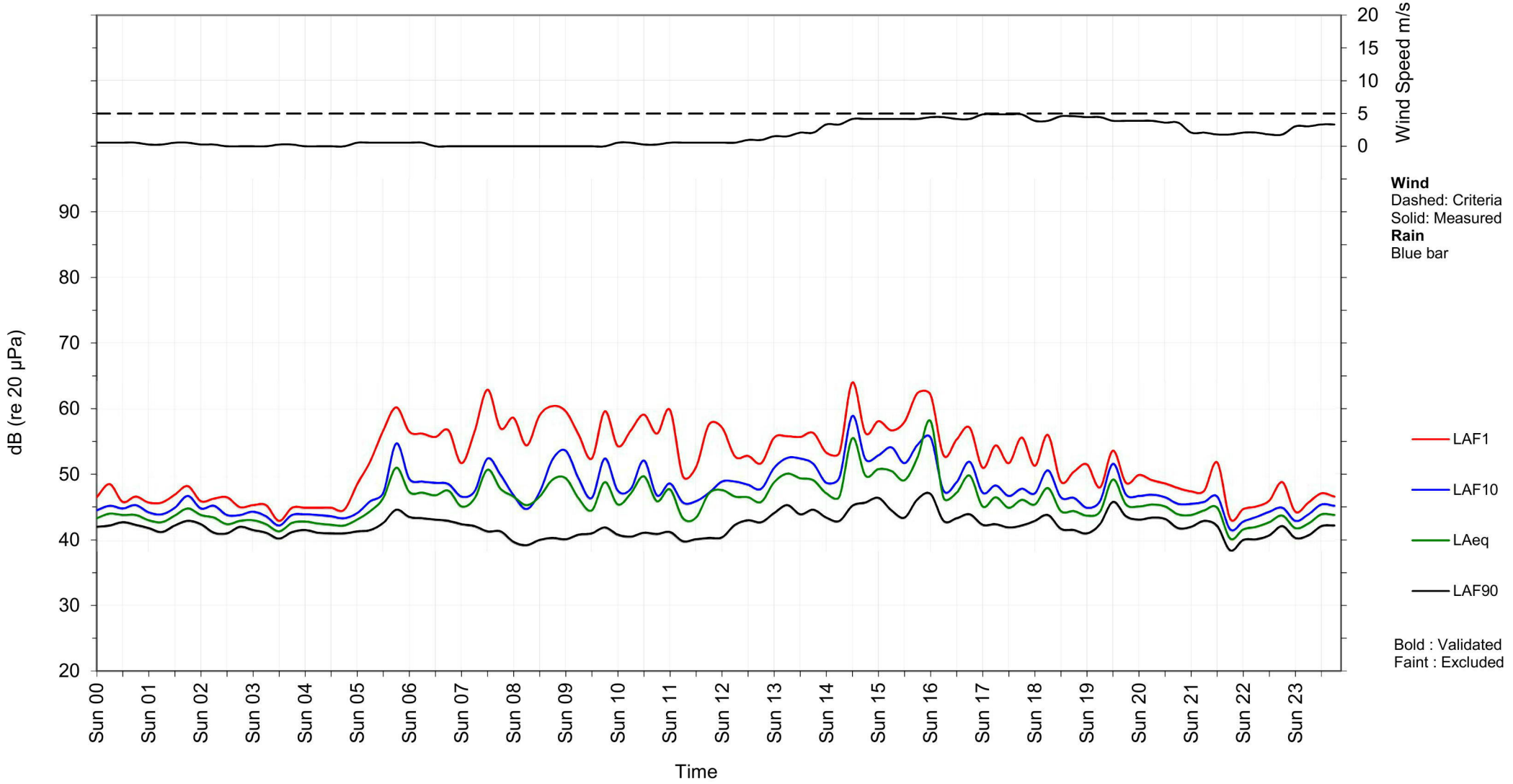
Saturday 02 September 2017



Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017

5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

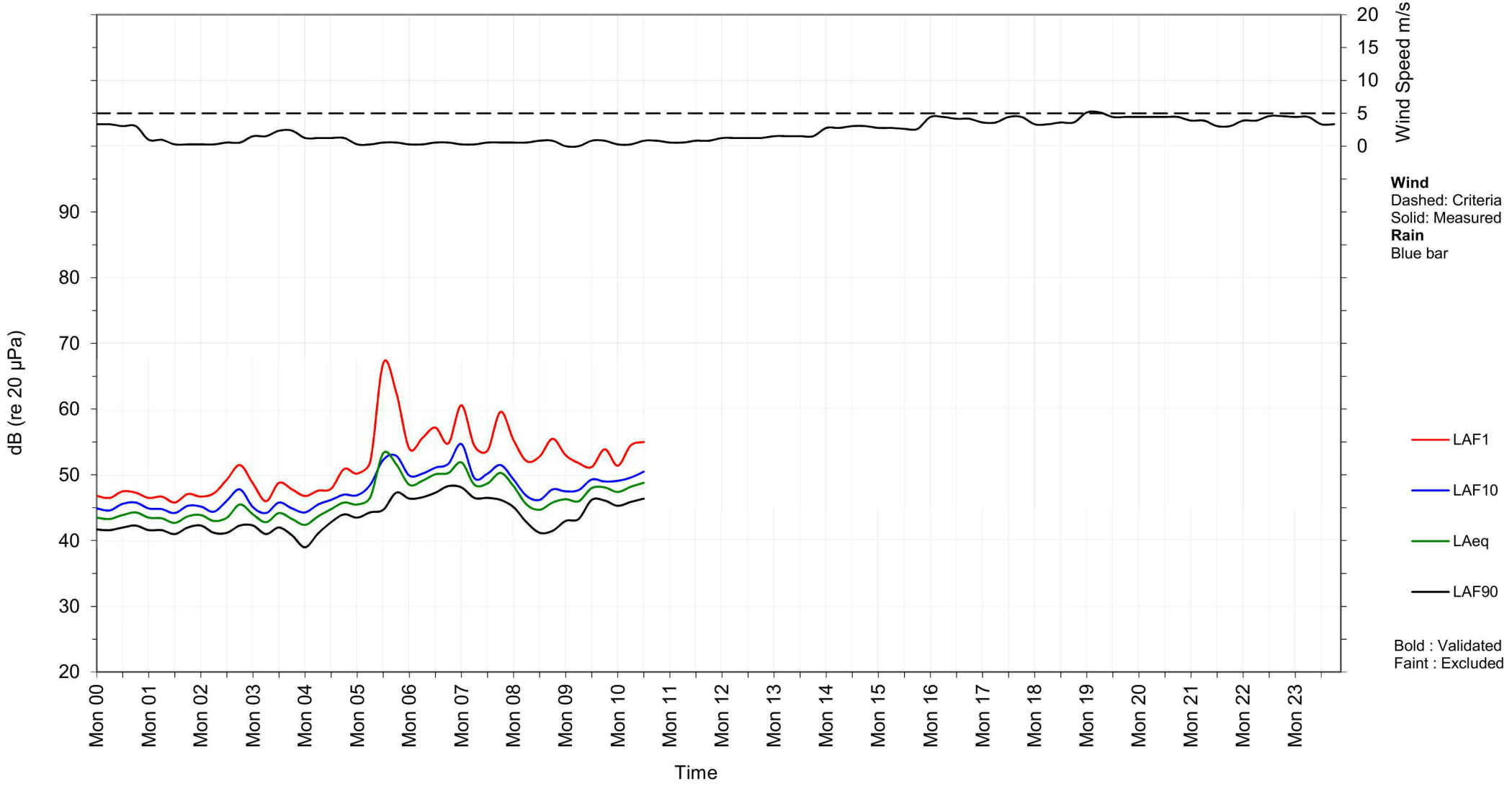
Sunday 03 September 2017



Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017

5R Solutions Ltd - Glass Recycling Facility
Adjacent to Landy Avenue, Penrith, NSW
60.00739.01

Monday 04 September 2017



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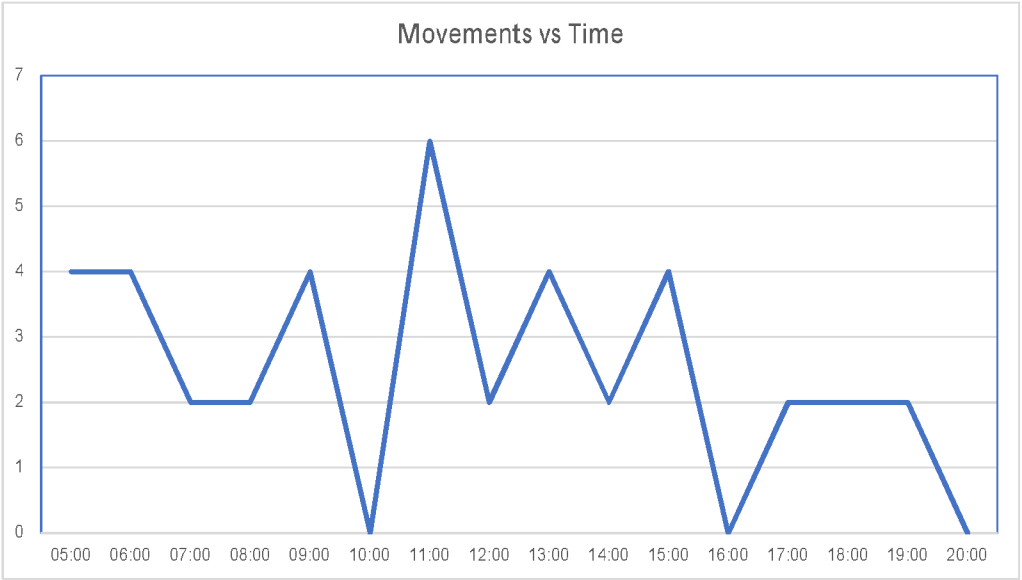
APPENDIX B:
TRAFFIC MOVEMENT SUMMARY
(supplied by 5R Solutions)

Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017

Truck Movement Timetable
@26,000 TPA

Time	Movements	Movement Split		
		Incoming Movement		Outgoing Movement
		Tipper	Skip Bin	Tipper
05:00	**4**			4
06:00	**4**		4	
07:00	**2**			2
08:00	**2**	2		
09:00	**4**		2	2
10:00	**0**			
11:00	**6**	2		4
12:00	**2**		2	
13:00	**4**			4
14:00	**2**		2	
15:00	**4**	2		2
16:00	**0**			
17:00	**2**		2	
18:00	**2**	2		
19:00	**2**		2	
20:00	**0**			
Total Movements	**40**			



Assumptions

5 Day working week 50 Weeks per year

@26,000 is 104tn per Day

**** Movements include the outward and inward action for each load thus are double the load count**

Incoming Product Split	Loads per Day	**Movements** per Day**
45% via 12tn Tipper	4	**8**
55% 8tn Skip Bin	7	**14**
Outgoing		
100% 12tn Tipper	9	**18**

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APPENDIX C:
NOISE CONTOUR MAPS

Document Set ID: 7857604
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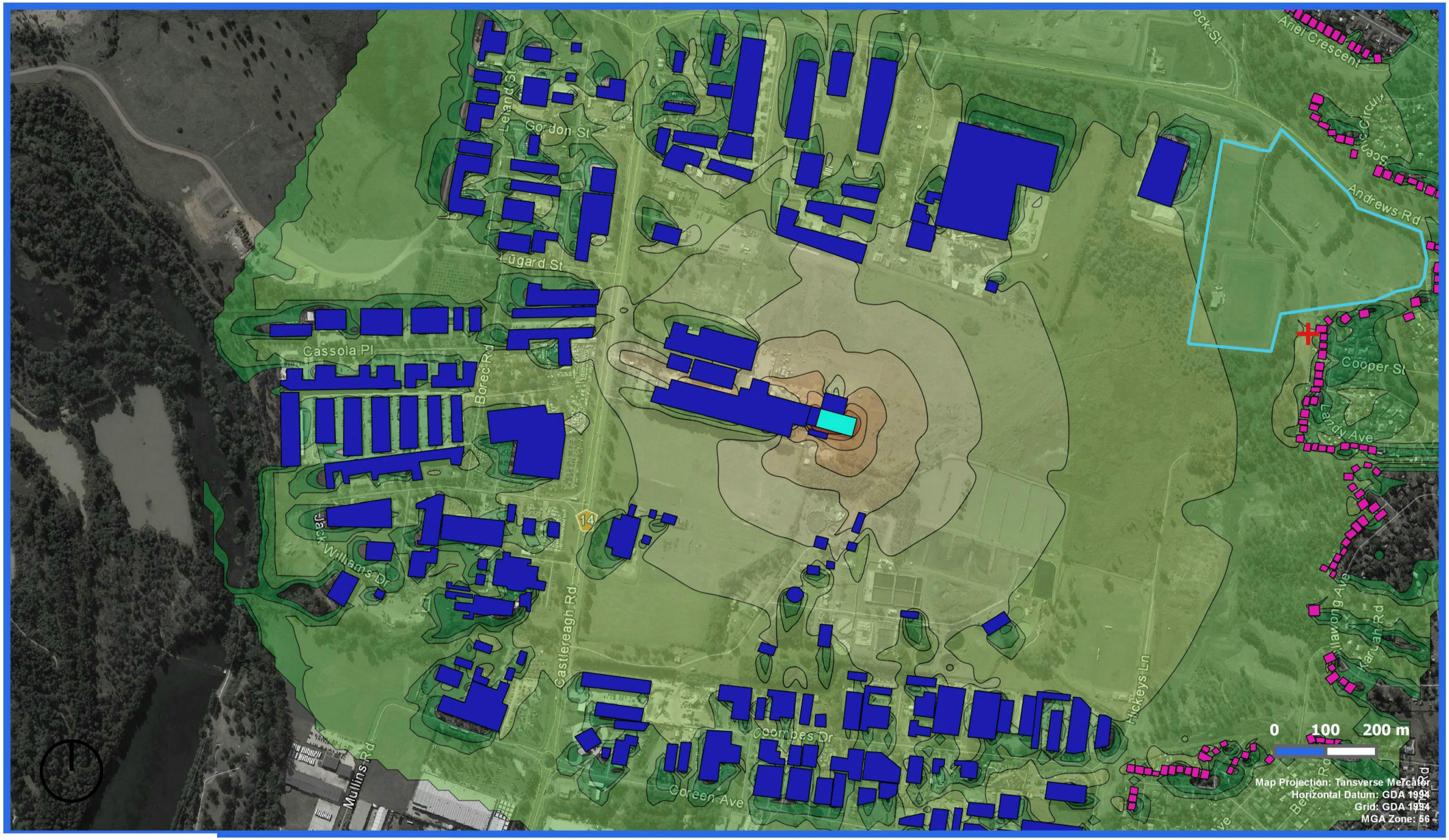


Key:

- Glass Recycling Facility
- Industrial
- Residential
- Recreational Area
- Noise Logger Location

LAeq Worst-Case (dB)

20	40	60
25	45	65
30	50	70
35	55	75

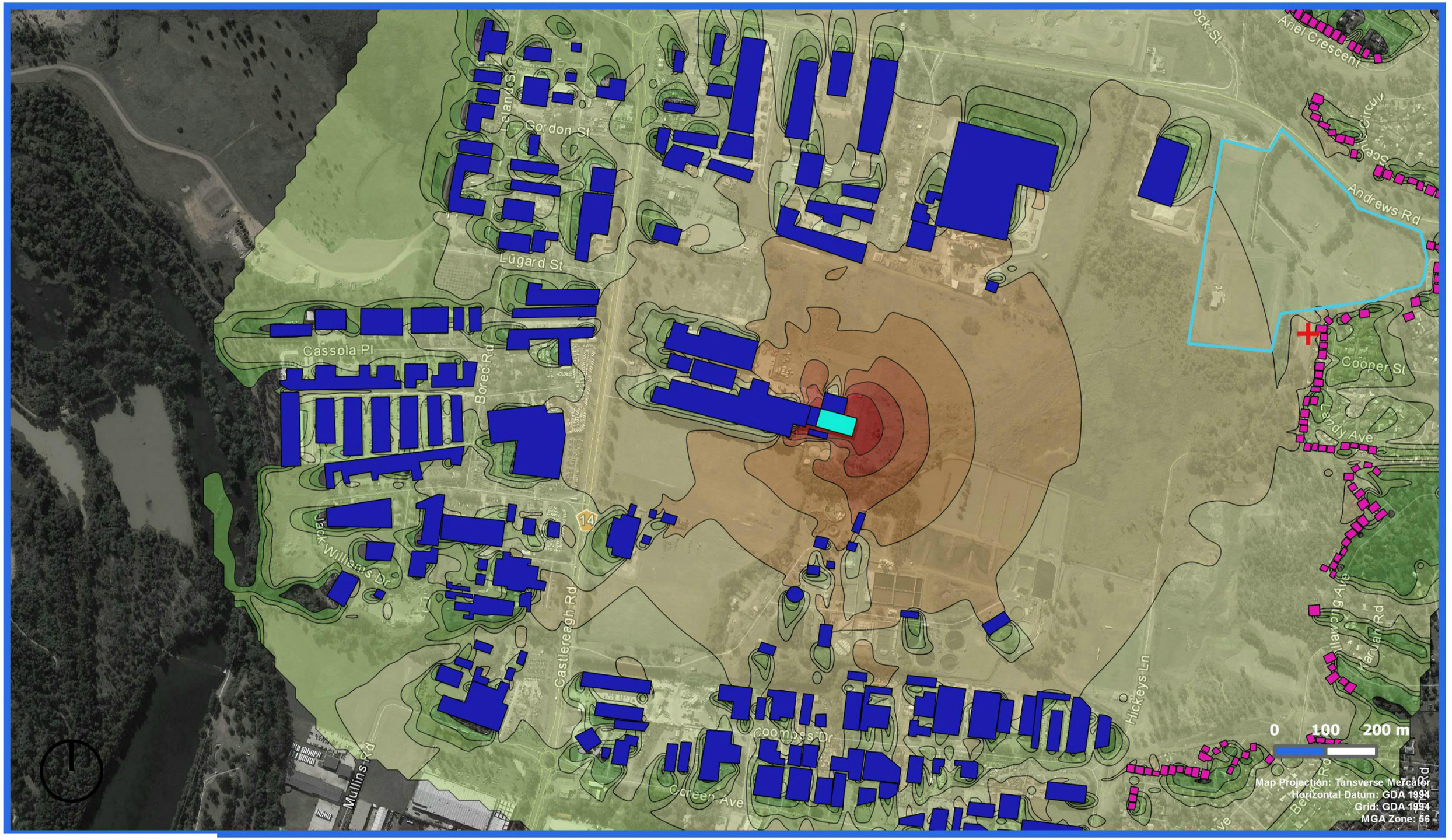
NOISE IMPACT ASSESSMENT

5R Solutions Ltd
Glass Recycling Facility
2115 - 2131 Castlereagh Road, Penrith, NSW

Waves CONSULTING

Project Number: 60.006739.01
Date: 04 September 2017
Revision: 01
Prepared by: TC

Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017



Key:

- Glass Recycling Facility
- Industrial
- Residential
- Recreational Area
- Noise Logger Location

LAFmax Worst-Case (Night) (dB)

20 25 30 35 40 45 50 55 60 65 70 75

NOISE IMPACT ASSESSMENT

5R Solutions Ltd
Glass Recycling Facility
2115 - 2131 Castlereagh Road, Penrith, NSW

Waves CONSULTING

Project Number: 60.006739.01
Date: 04 September 2017
Revision: 01
Prepared by: TC

Document Set ID: 7857604
Version: 1, Version Date: 28/09/2017