

Noise Monitoring Report

Bowral Waste Centre - EPL 13366

April 2021



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Acknowledgement of Country

4Pillars acknowledges the Traditional Owners of the land on which this study was conducted, the people of the Gundungurra and Tharawal nations. We pay our respects to their Elders past and present.

Introduction and background

Objective and scope of work

Bowral Landfill engaged 4Pillars Environmental Consulting (4Pillars) to conduct noise monitoring for the Bowral Waste Centre (8 Kiama Street, Bowral, NSW – the Site), to assess compliance with Environment Protection Licence (EPL) 13366.

4Pillars' scope of work was as follows:

- Conduct attended noise monitoring during the daytime period (07:00 to 18:00) at four monitoring points located at nearby residential receivers surrounding the Site;
- Analyse data against EPL 13366 noise criteria; and
- Prepare a noise monitoring report and draw conclusions regarding compliance.

Site details and monitoring requirements

The subject Site is 8 Kiama Street, Bowral, NSW, 2576 – part lots 13 and 14 in DP1022146. The landfill site is located within the Wingecarribee Shire local government area (LGA). The landfill site falls within the IN1 (general industrial) development zone under the *Wingecarribee Local Environment Plan 2010*. Surrounding land zoning includes IN1 and IN2 (light industrial), R3 and R2 (medium and low density residential), RU4 (primary production small lots) and RE1 (public recreation). The majority of surrounding land uses are agricultural or industrial, such as horticulture, landscaping supply, self-contained storage, sewerage treatment, car repairs, etc. The nearest residential area is medium density and occurs immediately to the east of the Site, along Railway Parade. Residential and business receivers are located to the east and west of the Site (refer Figure 2).

The landfill licence was transferred to Bowral Waste Pty Ltd (the Licensee) in July 2019. The site was not operational until November 2019. Since the commencement, the site progressively reached full scale of operations in February 2020.

As noted above, the Site is subject to EPL 13366. Regarding the assessment of noise and noise emission, the licence states:

“E4 Noise Assessment

E4.1 – A noise compliance assessment report must be submitted to the EPA within 90 days of commencement of full operations. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include an assessment of compliance with noise limits of this licence.”

and,

“L5 Noise Limits

L5.1 – Noise from the land filling operations must not exceed an LA10 (15 minute) noise emission criterion of 50 dB(A), except as expressly provided by this licence.

L5.2 – Noise from the premises is to be measured or computed at any point within 6 meters of any residence or other noise sensitive area in the vicinity of the premises to determine compliance with condition L5.1. 5dB(A) must be added if the noise is tonal or impulsive in character.”

Noise monitoring methodology

Sampling locations

The Site EPL does not identify the locations where sampling must be carried out, instead stating that samples must be obtained within 6 m of any residence or noise sensitive area in the vicinity of the premises. 4Pillars has previously identified four locations in the 2019-20 noise report. The locations considered appropriate to assess noise levels are (refer Figure 3):

- R1. 23 Kiama Street (immediately south west of the Site access gate);
- R2. 1 Funston Street (north east of the Site recycling area);
- R3. 24 Railway Parade (east of the Site recycling area); and
- R4. 23 Loftus Street (further east of Railway Parade).

Noise assessment equipment was placed between 5 m and 10 m from the edge of the relevant property boundaries and sufficient distance away from any reflecting structures at the locations listed above. The sample locations were considered representative of noise conditions experienced at the receiver locations and modelling for computed results has not been deemed necessary.

Description of Noise Logger

Attended noise monitoring was carried out on 13 April by two qualified and experienced environmental scientists (Ms T Nguyen and Ms S Burke), using an Ngara Real Time Sound Acquisition System developed by Acoustic Research Labs Pty Ltd. This is a Class 1 (IEC 61672-1:2013), Type 1 (AS1259.1:1990 and AS1259.2:1990) instrument. A Type 1 instrument is intended for field use, with typical applications in technical studies of sound, general consulting work in acoustics and noise, and measurements. The meter was calibrated at a NATA-accredited laboratory within two years of the measurement period. The calibration certificate is provided in Appendix 2. The Ngara unit uses a UC-53A RION microphone attached to a NH-17 with 5 metre cable and preamplifier. The microphone is mounted to the end of a supplied 1.2 m microphone post, to comply with the relevant standards. It is highly sensitive and, for this reason, exposure to rain and other extremes in weather is not acceptable during sampling. It is noted that windy conditions prevailed during measuring periods (refer to Table 1).

Sampling procedure

Measurements were taken during the day period only, as the Site is not operational during evening or night periods. The meter was operated in accordance with the manufacturer's specifications and other relevant reference documents (i.e. AS 2659.1988). During recording, the meter was set to 'fast' time weighting and 'A' frequency weighting. The microphone was fitted with a foam windscreen and positioned 1.2 m above ground level during recording. Once the microphone was set up, checked and ready to log data, recording was started by the operator.

Samples were obtained over a period of at least 15 minutes at each location, with sound pressure level and equivalent LAeq readings taken every 100 ms. Prior to and during recording, detailed notes were taken on parameters including weather, time interval, location, meter settings, operating equipment and plant and noise sources not related to the activity. The equipment was handled with care, packaged and transported in accordance with the manufacturer's specifications.

Site operations

The Site was operational on the day of sampling. The operation of the landfill at the time of monitoring included the acceptance of waste, deposition of waste in designated recycling bays, sorting waste for resource recovery, deposition of waste in the active cell and waste compaction. The heavy machinery present on site at the time of monitoring included a 14 tonne excavator, 20 tonne excavator, dump truck, one front end loader and compactor. The site was observed to be at peak operations around mid-afternoon, coinciding with when monitoring took place, during which several customer trucks entered and exited the site. The trucks that entered the site included walking floor vehicles, truck and dog vehicles, semi trailer vehicles and light vehicles (cars, trailers, four wheel drives and vans).

Extraneous noise sources

During sampling, there were several extraneous noise sources in the area. The Bowral Brickworks shares the northern boundary of the Site and uses the Site's haul road to access its active quarry, which is located immediately adjacent (south-east) to the landfill pit. On the day of sampling, activities at Bowral Brickworks were audible, particularly at the monitoring locations on Kiama Street and Railway Parade.

Vehicle movements on public roads (not associated with the Site) were a significant contributor to noise levels on the day of sampling. The impact was most significant at sampling locations on Railway Parade, Funston Street and Loftus Street. The impact was less significant at 29 Kiama Street, which is a no-through-road.

Passenger and freight trains travelling along the Southern Railway line were identified as another very significant noise source not related to the Site. Four trains passed during monitoring events. Their impact on sound pressure levels was a function of their length and whether the horn was used as it approached stations and the nearby level crossing. Generally speaking, trains are considered an ongoing source of background noise during the day time period within the vicinity of receivers and at the Site and removal of noise emissions from the Southern Railway was not practical due to the frequency and level of disturbance.

At 24 Railway Parade and 23 Loftus Street, noise from other industrial activities was generally audible, but not dominant or impulsive. At 29 Kiama Street, noise from activities at the landfill and nearby industrial sites were dominant.

The time that extraneous noise sources occurred were noted in the field for the purposes of excising the noise from monitoring data, ensuring that there is no impact of extraneous noise on the results.

Results

Weather conditions

Sampling took place between 12:07 and 15:51 on 13 April 2021. During this time, the average temperature was approximately 18°C and cloud cover was low with no rainfall. A wind rose for the month in which the monitoring period occurred is presented in Figure 1. The wind rose indicates that for the period of monitoring, winds from the west, north-east and south-east were dominant. The average wind speed for the period is 4.9 m/s and the percentage occurrence of calm wind conditions was 5.6% (speed less than or equal to 0.5 m/s).

The meteorological conditions during sampling sessions met the criteria for ‘noise-enhancing conditions’ under Table D1 of the EPA’s *Noise Policy for Industry 2017*. The policy states that light to moderate daytime winds, temperature inversions and source to receiver winds have the potential to increase noise levels. As average wind speeds greater than 3 m/s were present at the time of sampling, there is a possibility that noise levels were enhanced, however, noise assessment during this period was necessary to comply with Condition E4.1 of Environment Protection Licence 13366. The impact of weather and extraneous noise sources downwind during readings has been taken into account when estimating the operational noise levels.

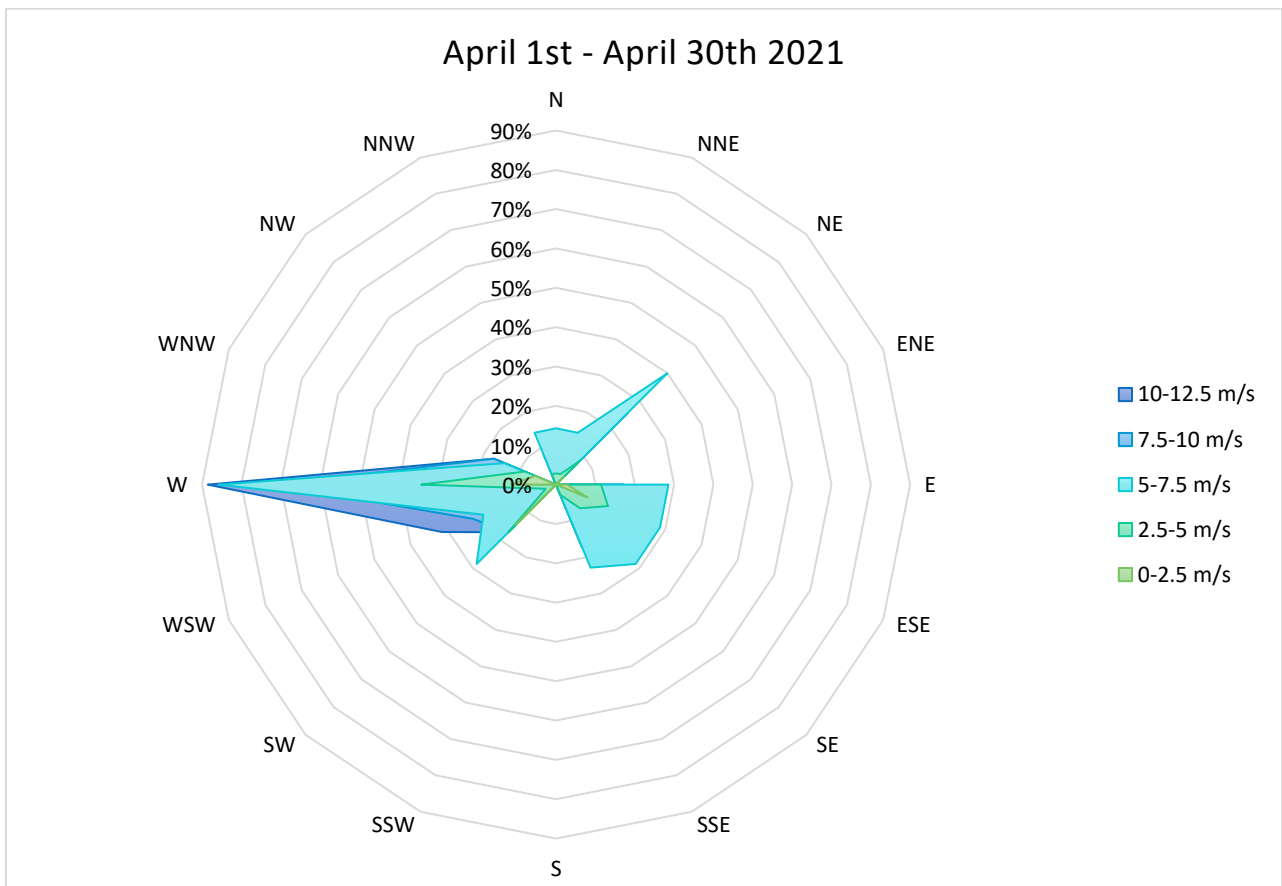


Figure 1: Windrose from Moss Vale AWS (Station ID 068239) for 1 April to 30 April (from 09:00 to 15:00).

Date	Monitoring location	Session start time	Rainfall (mm)	Average Wind speed (m/sec)	Wind direction	Stability class	Meteorological Conditions
13/04/21	29 Kiama Street	12:04	0	13km/h	E	A	NEC
	1 Funston Street	12:42	0	13km/h	W	A	NEC
	24 Railway Parade	13:04	0	13km/h	W	A	NEC
	23 Loftus Street	13:36	0	13km/h	W	A	NEC
KEY		STD: Standard conditions NEC: Noise-enhancing conditions VNE: Very noise-enhancing conditions					

Table 1: Meteorological conditions during sampling. Wind speed and direction figures represent 1-minute interval readings, averaged over the sampling period. Meteorological condition categories are consistent with those specified in the Noise Policy for Industry 2017 (Table D1).

Noise results

The results of noise sampling events are provided below in Table 2. Due to unexpected technical errors, the noise logger failed to record noise data for the fourth monitoring position, so LAeq, LA10 and LA90 were not calculated for 23 Loftus Street. As previously stated, the Site EPL does not specifically identify the locations where sampling must be carried out, instead stating that samples must be obtained within 6 m of any residence or noise sensitive area in the vicinity of the premises. Although unfortunate, the absence of data for 23 Loftus Street has been deemed to not compromise the integrity of this noise assessment.

It should also be noted the measured noise levels include noise from all sources, including sources external to the Site. Measurements of LA10 noise levels at the three monitoring points varied between 52.2 and 63.0 dBA.

The attended noise monitoring results indicate noise levels at the monitoring points are strongly influenced by an array of surrounding noise sources, in particular non-site related traffic, industrial activities and passing freight trains and therefore isolating operational noise from the Site with a high degree of accuracy is not feasible.

Discussion

Site contribution to measured noise levels

The noise levels measured at 23 Kiama Street would ordinarily be considered the most representative of site operations. At this monitoring location, there is less extraneous noise contribution than at other locations. Audible extraneous noise sources included industrial noise, truck and mobile plant movements at the southern end of the brickworks site, the level of noise emanating from Austral and Bowral Waste were considered equal. Calculations for site noise contributions were not adjusted at this monitoring point based on the background noise data that was available.

The key challenges that introduce uncertainty to the results at this location are noise emissions from the Brickworks, as demonstrated in monitoring data from 2019 while the Landfill was not operational, and climatic conditions, specifically the moderate westerly winds blowing towards the receiver during measurement which enhances sound pressure levels (SPLs). Therefore, the measured SPL is likely to be a conservative calculation. In the past, at locations on Railway Parade, noise from the Site was considered approximately equivalent (or less than) to regular extraneous noise sources noise due to regular passing vehicles. It is a general rule of thumb in acoustics that the addition of another identical noise source will increase overall noise by approximately 3 dBA. Therefore, the site contribution at 23 Kiama has been conservatively estimated to be 55 dBA. This does not take into account the effect of downwind measurement and noise enhancing conditions, which we have not quantified in this instance).

Monitoring at 24 Railway Parade is representative of recycling operations at Bowral Waste Centre with recycling operations being audible from Railway Parade. Sounds from passing trains, train horns and passing vehicles are not considered an anomaly at this location as they are common elements of the surrounding environment, thus were not removed from the monitoring data in the determination of site contributions. The background level of noise measured in 2019 when the site was non-operational was approximately 58 dBA. The measured noise level during this monitoring event was 52 dBA. Given that the measured level is lower than background levels recorded in 2019, the actual site contribution is determined to be

<47dB(A). Therefore, even without considering the downwind measurement and noise enhancing weather conditions, site contribution at the measurement point is estimated to be <47 dBA.

The monitoring points at Kiama Street and Railway Parade, being the closest to the site, have been determined to be less than the relevant assessment criteria. Monitoring at 1 Funston Street and 23 Loftus Street are significantly further away from noise generating activities and sources of noise on site. The contribution from site operations would be considerably lower at these receivers due to distance attenuation, among other factors. Due to the level of complexity of extraneous noise sources at these locations, we do not consider it to be necessary or feasible to calculate the site noise contribution. However, we are able to conclude with a reasonable degree of certainty that noise contributions at these receivers is less than the relevant assessment criteria/limit.

Compliance Assessment

The NSW Industrial Noise Policy (2000) stated *"A development will be deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition"*. The updated *Noise Policy for Industry* (2017) no longer includes this statement and however, the principle remains relevant for assessing the impact of an exceedance. The effect of noise-enhancing weather conditions must also be taken into account. The raw LA10 results at each monitoring location exceed 50 dB(A), however the estimated noise from the landfill operations at each monitoring location, once extraneous noise contributions are taken into account are deemed to be within the noise limits set in EPL 13366.

Recommendations to improve future investigations

Due to the proximity of the Site to other noise sources, 4Pillars recommends future noise monitoring sessions include either:

- Paired noise tests – where noise loggers are set up at different distances between the Site and extraneous noise sources, to improve confidence in the correction factors applied and relative contributions; or
- Conduct readings within the Site, very close to noise sources, and calculate the noise experienced at nearby receivers. This will require competence in modelling and access to appropriate software (i.e. SoundPlan); and
- Conducting noise monitoring during periods when the site is not operational to further establish baseline data of background noise levels, where practical.

Conclusion

The results of attended noise monitoring indicate that under the meteorological and surrounding noise conditions present at the time, Bowral Waste was compliant at all monitoring locations during the monitoring session with the relevant day time LA10 (15 minute) noise assessment criteria. In addition to the above recommendations, 4Pillars recommends noise monitoring continue annually, at the monitoring locations established in this assessment to monitor trends.

Appendices

The following appendices are attached to this report.

- Appendix 1. Site figures and photographs.
- Appendix 2. Sound Level meter calibration certificate.
- Appendix 3. Definitions for key terms.

Limitations of this assessment

To the best of our knowledge and based on information provided to us by the client or their representatives, the information contained in this report is accurate at the date of issue. 4Pillars has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental sector in Australia. No other warranty, expressed or implied, is made or intended. The opinions and judgements expressed in this report should not be construed as legal opinions or advice. 4Pillars is also not responsible or liable for any third-Party use or reliance on this report.

Date & time at start	Location	LAeq (15min)	LA10 (15min)	LA90 (15min)	Estimated Site contribution to measured LA10(15 min)*	Estimated effect of Meteorological conditions	Confidence in estimate	Notes on noise sources
13/04/21 12:07	23 Kiama Street	79	58	48	55	Moderate	Moderate	Austral audible Landfill vehicles audible Trains passing Pedestrians
13/04/21 12:42	1 Funston Street	73	63	35	Not calculated	Moderate	Moderate	Austral machinery audible Cars passing Birds Pedestrians
13/04/21 13:04	24 Railway Parade	74	52	36	<47 dBA	Moderate	Moderate	Landfill machinery audible Austral machinery audible Cars passing Train passing Pedestrians Birds Overhead aircraft

Table 2: Results of attended noise monitoring. All sound measurements are in decibels (dB), A-weighted and averaged over a 15-minute period.

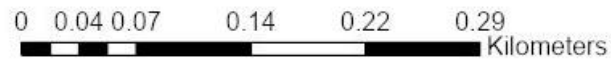
* LA Eq 15 minutes

Appendix 1 – Figures and Photographs



Date Produced: 22/04/2020
Basemap Imagery: MapBrowser, © Nearmap [30/01/2020]

Figure 2: Surrounding land use and noise monitoring points.



Date Produced: 22/04/2020
Basemap Imagery: MapBrowser, © Nearmap [30/01/2020]

Figure 3: Noise sources ordinarily associated with the development

Appendix 2 – Calibration certificate



Unit 36/14 Loyalty Rd
 North Rocks NSW AUSTRALIA 2151
 Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
 www.acousticresearch.com.au

Sound Level Meter
 IEC 61672-3:2013
Calibration Certificate
 Calibration Number C19773

Client Details	Acoustic Research Labs Pty Ltd Unit 36/ 14 Loyalty Road North Rocks NSW 2151		
Equipment Tested/ Model Number :	ARL Ngara		
Instrument Serial Number :	87812B		
Microphone Serial Number :	41754		
Pre-amplifier Serial Number :	28325		
Pre-Test Atmospheric Conditions	Post-Test Atmospheric Conditions		
Ambient Temperature : 25.5°C	Ambient Temperature : 24.6°C		
Relative Humidity : 53.6%	Relative Humidity : 43.7%		
Barometric Pressure : 100.36kPa	Barometric Pressure : 100.32kPa		
Calibration Technician : Lucky Jaiswal	Secondary Check: James Jepsen		
Calibration Date : 24 Dec 2019	Report Issue Date : 24 Dec 2019		
Approved Signatory :			Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.18dB	Temperature	±0.2°C
12.5kHz	±0.19dB	Relative Humidity	±2.4%
16kHz	±0.31dB	Barometric Pressure	±0.015kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.11dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.



Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172. Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Appendix 3 – Definitions for key terms

DESCRIPTOR	DEFINITION
LA	The A-weighted root mean squared (RMS) noise level at any instant
LA MAX	The maximum A-weighted noise level over a time period or for an event
LA 10	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
LA 90	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The LA90 level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes
LA EQ	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise