M80 Ring Road Ardeer - Noise Investigation

1. Noise Monitoring - Results

Noise monitoring was completed at four points around Ardeer – two at a roadside location on the M80 Ring Road, south of Ballarat Road, and two at nearby properties.

Results of Property Noise Monitoring:

Noise levels were analysed through a range of weather conditions from Wednesday 14 November – Sunday 9 December 2018. At no time did noise levels exceed 68 dB(A) L10 (18hr) which is the trigger for considering noise attenuation.

Table 1 (below) shows results of the noise monitoring in standard noise measurement conditions, with wind speeds less than 5m/s and not affected by rain.

Date	18hr Wind speed (m/s)		$L_{10(18hr)}$ (dBA)	
	Maximum	Average	Property 1	Property 2
Thursday 15th November	4.7	3.3	63	61
Friday 16th November	4.7	2.8	62	60
Monday 26th November	3.8	2.9	61	61
Tuesday 27th November	5.4[1]	3.4	61	60
Thursday 29th November	4.4	3.2	62	60
Tuesday 4th December	4.7	3.5	61	61
Wednesday 5th December	4.5	3.3	60	61

1. Only one half hour period was above 5.0m/s

Table 2 (below) is a summary of the data from the entire monitoring period and the weather conditions without any adjustment for wind, rain or minor noise. The predominant wind direction is based on the most commonly occurring specific value rather than instantaneous specific wind directions. For the purpose of comparing noise levels to VicRoads Traffic Noise Reduction Policy, the $L_{10(18hr)}$ results in the first column for each property are relevant.

The results from this broader assessment confirm noise levels were higher under westerly winds or rainfall, than standard noise measurement conditions[1] (fine with little or no wind / rain). Even in these cases, the noise levels remain below 68 dB(A) because of the substantial distance between the freeway and the affected houses.

Table 2 – Overall Summary

	Property 1 (dBA)					Property 2 (dBA)					Weather Summary Day/evening (7am to 10pm)			Weather Summary Night (10pm to 7am)		
Date	$L_{10(18hr)}$	$L_{eq(15hr)}$	$L_{eq(16hr)}$	$L_{eq(9hr)}$	$L_{eq(8hr)}$	$L_{10(18hr)}$	$L_{eq(15hr)}$	$L_{eq(16hr)}$	$L_{eq(9hr)}$	$L_{eq(8hr)}$	Predominant wind direction	Average Wind Speed (m/s)	Rain (mm)	Predominant wind direction	Average Wind Speed (m/s)	Rain (mm)
Wednesday, 14 November	-	-	-	60	58	-	-	-	58	57	-	-	-	SW	2.7	0.0
Thursday, 15 November	63	61	62	59	58	61	61	61	58	56	SSE	4.6	0.0	SE	2.6	0.0
Friday, 16 November	62	60	60	57	57	60	59	59	55	55	S	3.8	0.0	SSE	2.8	0.0
Saturday, 17 November	61	59	59	55	55	59	58	58	54	53	S	5.2	0.0	SSE	2.4	0.0
Sunday, 18 November	56	55	55	56	55	56	56	56	56	55	SE	3.0	0.0	NW	1.7	0.0
Monday, 19 November	58	57	58	55	53	58	59	59	55	53	N	4.7	0.0	NNE	3.6	0.0
Tuesday, 20 November	61	60	60	64	63	61	60	60	61	60	N	4.2	5.6	WSW	3.2	7.6
Wednesday, 21 November	62	62	62	57	56	61	60	61	57	56	W	3.9	5.0	NNE	2.4	1.8
Thursday, 22 November	64	63	63	65	64	62	61	61	62	61	N	4.6	0.0	WSW	6.6	4.6
Friday, 23 November	68[1]	67	67	63	63	65	64	64	59	59	WSW	6.2	5.4	WSW	4.5	0.0
Saturday, 24 November	64	63	63	57	57	61	60	60	55	55	WSW	4.8	0.2	SW	3.5	0.0
Sunday, 25 November	61	60	59	60	59	59	58	58	58	57	S	4.3	0.0	WSW	2.5	0.0
Monday, 26 November	61	60	60	57	56	61	63	63	55	54	SSE	3.9	0.0	SSE	2.6	0.0
Tuesday, 27 November	61	60	60	57	57	60	59	59	55	55	S	4.5	0.0	SSE	4.0	0.0
Wednesday, 28 November	63	61	61	59	58	62	63	62	57	56	S	6.1	0.0	S	4.2	0.0
Thursday, 29 November	62	60	60	58	56	60	61	61	56	55	S	4.5	0.0	SSE	2.8	0.0
Friday, 30 November	60	59	60	55	55	60	63	63	55	54	SSE	3.6	0.0	NNW	1.9	0.0
Saturday, 1 December	58	57	57	58	58	60	64	64	56	55	N	5.3	0.0	WSW	4.0	5.4
Sunday, 2 December	64	63	63	58	58	62	65	65	58	57	WSW	6.3	0.0	NW	2.5	0.0
Monday, 3 December	65	65	64	61	60	64	64	64	59	58	W	7.1	0.0	WSW	3.2	0.0
Tuesday, 4 December	61	60	60	55	55	61	62	62	60	59	SE	3.9	0.0	SSE	2.7	0.0
Wednesday, 5 December	60	60	60	57	57	61	58	59	60	60	SE	3.5	0.0	NW	1.9	0.0
Thursday, 6 December	59	58	58	57	56	61	60	60	60	59	N	4.4	0.0	N	5.6	0.0
Friday, 7 December	61	60	60	56	55	62	61	62	57	56	N	6.5	0.0	WSW	2.5	0.0
Saturday, 8 December	59	57	58	56	56	61	60	60	57	56	SSE	3.2	0.0	SSE	3.1	0.0
Sunday, 9 December	58	56	56	59	58	60	58	58	55	55	SSE	2.6	0.0	W	2.6	0.0

Note:
1. Value was rounded up to 68dBA

Results of M80 Ring Road Noise Monitoring:

Noise monitoring on the M80 was undertaken using video cameras and sound level meters at two locations. The survey was analysed over three nights, from 10pm - 5am, using noise data collected at these two M80 roadside locations, and from the two nearby properties.

Over this period, specific noise events were identified at one of the tested properties with clear peaks measured at over LAFmax 60dB, correlating with the measurement at the other tested property and the two monitors at the freeway.

The survey recordings returned the following results:

- 119 road-based events were recorded (approximately 40 per night) where the individual noise levels recorded spiked above 60dB(A).
- Of the 119 road-based events, 107 were trucks.
- 27 of the truck related noise involved engine braking, with the rest being general truck noise such as acceleration on inclines.
- Approximately 3000 trucks travel on the M80 Ring Road each night between 10pm and 5am each night, based on data collected from Weigh in Motion (WIM) data on Ring Road between Boundary Road & the Deer Park Bypass.
- The trucks observed in the survey period to be somewhat noisier than background levels represent less than 2% of overall trucks that travel along this route.
- In the same period, there were 96 non-road-based events where the individual noise levels spiked above 60dB(A). These noise events consisted mostly of aeroplanes and trains, and had peaks significantly louder than the road-based events

2. Noise Monitoring – Related Matters

Existing Noise Barrier Height

- Queries have been raised by residents of Ardeer that just prior to the M80 Ring Road upgrade works in 2013, residents were advised by the Project team that a 4-metre high noise wall would be built at this location. However, a 2-metre high wall was built (as per the pre-existing wall height).
- While early concept plans included a 4-metre-high noise wall, further analysis was undertaken as the project progressed which determined that a 2-metre noise wall would provide appropriate traffic noise attenuation until at least the year 2039.

Engine Braking

VicRoads installed 'Trucks Avoid Using Engine Brakes' signage on the M80 Ring Road, in November 2018, south of Ballarat Road. While not enforceable, this signage aims to reduce the incidence of engine braking.

Truck Noise on-road surveillance

- The most significant concerns raised by residents involve peak noises generated by loud vehicles at night time, particularly trucks.
- VicRoads has previously carried out a number of programs to reduce noise from engine brakes, particularly in residential areas. This includes the development of industry codes of practice, company policies and the installation of advisory signs at key locations requesting truck drivers to avoid using engine brakes.

- VicRoads is also undertaking on road surveillance at traffic noise 'hot spots' to manage heavy vehicle noise and further reduce its impact on the community. This surveillance targets trucks that emit abnormally high noise levels.
- The camera survey undertaken confirmed a significant number of loud truck noises. This survey could not however determine whether these trucks were excessive from a vehicle standards and emissions viewpoint.
- To further consider this vehicle standards and emissions aspect, VicRoads is treating this M80 Ring Road location as a traffic noise 'hot spot' and has been undertaking random compliance checks.

M80 Road Surfacing

- Open Graded Asphalt (OGA) was installed as part of the M80 Ring Road Upgrade Project in 2013. OGA is an asphalt material that reduces the amount of water on the road surface, leading to improved visibility and skid resistance in wet weather conditions. OGA also reduces average traffic tyre noise levels by up to 3dBA when compared with dense graded asphalt.
- Having been in place for up to five years, it appears the existing OGA surface is no longer as effective in reducing sound. It's likely this is due to the build-up of debris within the porous surface. Some level of road surface degradation also exists, which would contribute to higher tyre noise emissions.
- Resurfacing this section of the road could benefit background noise levels.
- VicRoads MNW Region will work with Major Road Projects Victoria (MRPV) to include OGA resurfacing where possible under the M80 Upgrade Princes Freeway to Western Highway project once funded.

Traffic Noise Reduction Policy

- VicRoads conducted a review of its *Traffic Noise Reduction Policy (2005)* during 2014/15, which included online community consultation.
- Any changes to the policy need to be carefully considered in the context of Victoria's rapid population growth and significant investment in new transport infrastructure.
- The findings of the review and community consultation are being considered and are informing the noise requirements of major road projects.
- In the meantime, the existing *Traffic Noise Reduction Policy (2005)* still applies.

Off-Reservation Attenuation Treatments

- The provision of acoustic treatments to individual dwellings can be a viable road traffic noise treatment option.
- VicRoads has developed *'A Guide to the Reduction of Traffic Noise'* (2003) which provides advice to residents about measures they can take to assist in reducing traffic noise in their homes.

Definitions of terms used to describe traffic noise

Due to its nature, traffic noise varies from instant to instant. Statistical terms have evolved to describe its level using a single number value.

dB: This is the abbreviation used for decibel which is the measure of sound pressure level.

dB(A): The (A) denotes that the sound pressure level has been "A" weighted so that the scale approximates the response of the human ear. The ear is less sensitive to high and low frequency sounds than it is to sounds in the mid-range. Most community noise is measured in "A" weighted decibels.

L10: This is the noise level in dB(A) exceeded for 10% of a specified time period. For a one hour period, the level would be exceeded for 6 minutes but would be less for the remaining 54 minutes.

L90: This is the noise level in dB(A) exceeded for 90% of a specified time period. Since this represents 'most' of the time, L90 generally has been adopted as a measure of the ambient baseline noise of the measurement site.

L10 (18hr): It is the arithmetic average of the hourly L10 levels over 18 hours of sampling period, i.e. between 6am and 12 midnight.

L90 (7hr): It is the arithmetic average of the hourly L90 levels over 7 hours of sampling period, i.e. between 10pm and 5am as defined in the current noise investigation study.

Leq(T): It is the equivalent continuous sound level which, if it occurred over the same time period, would give the same noise level as the actual varying sound level. The T denotes the time period over which the average is taken, for example LAeq, 8h is the equivalent continuous noise level over an 8 hour period.

LAFmax: It is the maximum sound level measured during a measurement period or a noise event. It is the root-mean-square (rms) maximum sound pressure level of a noise source or noise environment measured with sound level meter using the 'A' frequency weighting and the 'F' (Fast) time weighting. Often used for noise assessments other than aircraft.

[1] Standard noise measurement conditions such as those related to instrumentation and weather conditions are described in "Traffic Noise Measurement Requirements for Acoustic Consultants" issued by VicRoads. Reference is made to this guideline when noise measurements are undertaken in order to ensure that measurements are of high quality and are consistent over time.