EnergyAustralia

Delta electricity

Appendix C
Traffic Noise Assessment

MARULAN GAS TURBINE FACILITIES

SUBMISSIONS RESPONSE & PREFERRED PROJECT REPORT

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URS

WILKINSON MURRAY

26 February 2009

WM Project Number: 05255
Our Ref: 05255 traffic 18-12-2008 Ltr.doc
Fax/Email: nicol.brewer@urscorp.co

Nicole Brewer
URS
Level 3, 116 Miller Street
NORTH SYDNEY NSW 2060

Dear Nicole

Re: Marulan Gas Turbine Facility, Traffic Noise Impact Assessment

Delta Electricity and EnergyAustralia are proposing to develop two separate gas turbine power generating Facilities collocated at the Marulan Site. A gas pipeline and other shared infrastructure servicing both Facilities would also be constructed along with high voltage transmission lines connecting each facility to the nearby TransGrid 330kV Marulan Switchyard.

URS Australia was commissioned to undertake an environmental assessment (EA) as required under the Environmental Planning and Assessment Act 1979. The EA addresses the environmental aspects of the two facilities individually, as well as cumulative aspects. The EA was on public display from Wednesday 10th September to Friday 10th October 2008.

URS has undertaken further traffic impact studies of the proposed Marulan Gas Turbine Facilities and presented these in a Traffic Impact Assessment (TIA). With regard to traffic noise the EA included a noise assessment that concluded that there would be minor increases in road noise during the operational stage and the peak construction activities and as such traffic noise impacts would be negligible not requiring a detailed traffic noise assessment.

Since further traffic studies have been undertaken, a commensurate traffic noise assessment was appropriate and is presented in this report.

Project Description

The Marulan Site would be accessed via Brayton Road and Canyonleigh Road. Brayton Road heads in a north-west direction from the Marulan township. Approximately 9 kilometres along Brayton Road from the Marulan township, Canyonleigh Road branches to the east off Brayton Road. The Site is located approx 9 kilometres along Canyonleigh Road from the Brayton Road intersection. The entry point to the Marulan Site is located to the east of the TransGrid Switchyard. The entry road to the site initially utilises an easement over the entry road to the Arthursleigh property.

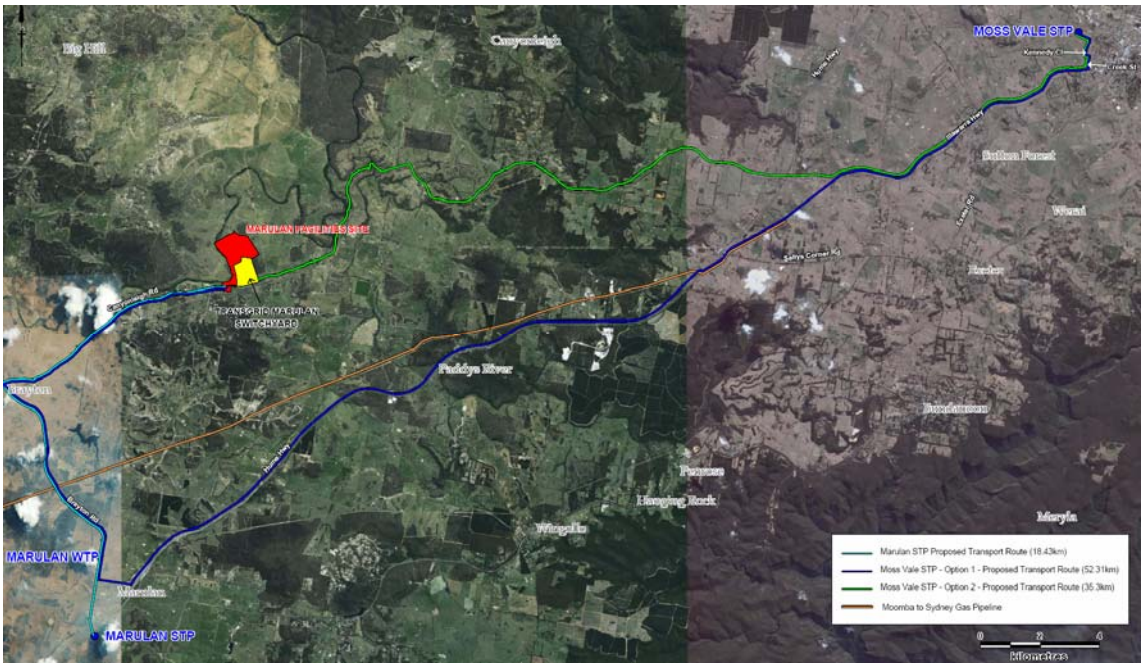
The preferred route for transporting equipment and construction materials would be via the Hume Highway, Brayton Road and Canyonleigh Road. During the initial operation of the Facilities this is also likely to be the access route to the Site. Traffic generation during operation would be as a result of shift changes, general maintenance and water delivery to the site.

A number of current and potential water sources, including potable and recycled water have been identified to provide water quantities which could meet and exceed the requirements of the proposed Facilities. These include:

- Marulan water supply network;
- Marulan sewage treatment plant; and
- Moss Vale sewage treatment plant.

Any of the above water servicing options for each of the Facilities' water demands could be adopted in conjunction or in combination with the other options and Site storm water run-off. These water sources would require transport to the Marulan Site (refer to **Figure 1**).

Figure 1 Potential Transport Routes



Transporting water from Moss Vale Sewage Treatment Plant (STP) could be achieved via two potential routes:

- Route Option 1: via Kennedy Close, Creek Street, Illawarra Highway then onto Hume Highway, Brayton Road and Canyonleigh Road to the Site;
- Route Option 2: via Kennedy Close, Creek Street, Illawarra Highway then onto Canyonleigh Road to the Site.

Transport from the Marulan water treatment plant or Marulan sewage treatment plant would be via Brayton Road and Canyonleigh Road.

Traffic Noise Criteria

Criteria for assessment of noise from traffic on public roads are set out in the Environmental criteria for Road traffic Noise (*ECRTN) and are a function of the road functional category*. In the EA the functional category for Canyonleigh Road and Brayton Road were considered to be "sub-arterial". Due to the additional information in the TIA the functional road category for Canyonleigh Road and Brayton Road are revised to a Collector Road. In terms of the *ECRTN* road classifications, the Hume Highway would be considered a "freeway/arterial" road and Kennedy Close, Creek Street and Portland Avenue are considered "local" roads.

The relevant criteria are set out in Table 1.

Table 1 Criteria for Traffic Noise – Residences

Type of Development	Noise Level Criterion		Where Criteria are already Exceeded – Allowance Criterion
	Daytime (0700-2200hrs)	Nighttime (220-0700hrs)	
Land use developments with potential to create additional traffic on existing freeways/arterials	$L_{Aeq,15hr}$ 60dBA	$L_{Aeq,9hr}$ 55dBA	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2dB. Where feasible & reasonable, noise levels from existing roads should be reduced to meet the noise criteria. In many instances this may be achievable only through long-term strategies.
Land use developments with potential to create additional traffic on collector roads	$L_{Aeq,1hr}$ 60dBA	$L_{Aeq,1hr}$ 55dBA	
Land use developments with potential to create additional traffic on local roads	$L_{Aeq,1hr}$ 55dBA	$L_{Aeq,1hr}$ 50dBA	

There are no construction traffic noise criteria. It is general practise to use the operational criteria as a guide for the construction traffic impacts. However it should be noted that construction noise criteria are generally higher than operational noise criteria since:

- construction noise only occurs for a relatively short duration;
- construction activities usually involve equipment and heavy machinery that is inherently noisy; and
- options for reducing noise from construction traffic activities are more limited than for noise from ongoing operations;

The differences in people's response to noise from stationary sources and transportation sources.

People are typically more annoyed by noise from stationary sources because they perceive that practical alternatives are available to reduce or eliminate the noise at the site of the stationary source. Road traffic noise is usually tolerated more than stationary sources due to the general usefulness to the community of roads and traffic.

In principle, noise produced by stationary sources is annoying when it is heard over and above the level of the "background" or surrounding environmental noise climate. The noise impact of stationary sources is therefore expressed as the difference between noise from the source and the background noise.

The sound level criteria for transportation sources are based on sociological surveys of large numbers of people and represent what is considered to be the onset of significant degradation of the noise environment relative to the expectations of the general population.

Existing Traffic Flows

Construction activities would be limited to 0700hrs to 1800hrs from Monday to Friday and 0700hrs to 1300hrs on Saturdays. Table 2 outline the measured traffic flows on various roads under assessment for the periods outlined above.

Table 2 Existing daytime Traffic Volumes

Road	ALL	%HV[1]
Canyonleigh Road[2]	47	23%
Brayton Road – south of Johnniefelds Quarry[2]	40	23%
Brayton Road – east of Wollondilly Street[2]	90	16%
Hume Hwy[3]	28,026	10%[4]
Illawarra Hwy[3]	11,341	10%[4]
Kennedy Close	60	3%
Creek Street	130	3%
Portland Avenue	33 (36)	31%

Note 1 HV = Heavy Vehicles
2 Peak 1 hour daytime traffic
3 AADT
4 Estimated

Cumulative Traffic Noise Impact Assessment

The traffic noise assessment addresses the traffic noise impacts along each of the following portions of road:

- Canyonleigh Road – between Brayton Road intersection and the Marulan Site;
- Brayton Road – from Canyonleigh Road intersection and south of Johnniefelds Quarry
- Brayton Road – from Hume Highway, east of Wollondilly Street
- Moss Vale STP Locality - Hume Highway, Illawarra Highway, Kennedy Close and Creek Street
- Marulan STP and Marulan Water Supply Network Locality - Portland Avenue Marulan

Canyonleigh Road

The impact on Canyonleigh Road with respect to increased traffic volumes is summarised in Table 3. All traffic volumes account for total vehicle movements. Table 3 also estimates the number of houses potentially impacted by traffic noise. Table 4 presents predicted traffic noise levels along Canyonleigh Road using the US Federal Highway Administration Traffic Noise Model.

Table 3 Traffic volumes and number of houses impacted – Canyonleigh Road

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow (Peak 1 hour)	47	47	47
% Heavy Vehicles	23	23	23
With Development (Scenario 1)			
Construction Traffic Flow during peak construction month (Peak 1 hour)	48	0	0
Major Facility Maintenance after 6 years	0	0	12
Water Delivery (Peak 1 hour)	0	3	3
Operational Traffic (Peak 1 hour)	0	5	5
Total Traffic Flow during peak construction month (Peak 1 hour)	95	55	67
% Heavy Vehicles	25	26	27
Number of houses impacted			
Number of houses less than 20m		0	
Number houses between 20-30m		2	
Number houses between 30-50m		1	
Number houses greater than 50-100m		0	
With Development (Scenario 2)			
Construction Traffic Flow during peak construction month (Peak 1 hour)	24	0	0
Major Facility Maintenance after 6 years	0	0	12
Water Delivery (Peak 1 hour)	0	3	3
Operational Traffic (Peak 1 hour)	0	4	5
Total Traffic Flow during peak construction month (Peak 1 hour)	71	55	67
% Heavy Vehicles	27	26	27
Number of houses impacted			
Number of houses less than 20m		0	
Number houses between 20-30m		2	
Number houses between 30-50m		1	
Number houses greater than 50-100m		0	

Table 4 Predicted Traffic Noise Impacts on Canyonleigh Road[1]

	Predicted Noise levels, $L_{Aeq, 1hour}$		
	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development existing traffic noise levels			
Houses between 20-30m	59	59	59
Houses between 30-50m	57	57	57
With Development (Scenario 1)			
Houses between 20-30m	62	60	61
Houses between 30-50m	60	58	59
With Development (Scenario 2)			
Houses between 20-30m	61	60	61
Houses between 30-50m	59	58	59

Note 1 Traffic speed assumed to be 100km/hr.

Analysis of Table 4 for the Project indicates the following key elements:

- For construction scenario 1 traffic noise levels are likely to increase existing traffic noise levels by 3 dB. For construction scenario 2, traffic noise levels are likely to increase existing traffic noise levels by only 2 dB. As stated above, there are no construction traffic criteria; however the exceedance of the 2 dB allowance criteria for scenario 1 would indicate a noticeable change in traffic noise. However, this needs to be considered relative to the worst case calculation scenario which would only occur for a worst case day hour, for the worst case three months in a 12 month construction duration.
- For operational scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by 1 dB. For the residences along Canyonleigh Road noise levels would remain below the recommended criterion of 60 $L_{Aeq,1hour}$.
- For the major maintenance scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by 2 dB. Not exceeding the allowance criterion would indicate a marginal change in traffic noise that most people would not necessarily notice and this would only occur every 6 years for a worst case hour a day for a maintenance duration of 3 to 6 weeks.

Brayton Road - South of Johnniefelds Quarry

The impact on Brayton Road, South of Johnniefelds Quarry with respect to increased traffic volumes is summarised in Table 5. All traffic volumes account for total vehicle movements. Table 5 also

estimates the number of houses potentially impacted by traffic noise. Table 6 presents predicted traffic noise levels along Brayton Road using the US Federal Highway Administration Traffic Noise Model.

Table 5 Traffic volumes and number of houses impacted – Brayton Road, South of Johnniefelds Quarry

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow (Peak 1 hour)	40	40	40
% Heavy Vehicles	23	23	23
With Development (Scenario 1)			
Construction Traffic Flow during peak construction month (Peak 1 hour)	48	0	0
Major Facility Maintenance after 6 years	0	0	12
Water Delivery(Peak 1 hour)	0	3	3
Operational Traffic (Peak 1 hour)	0	5	5
Total Traffic Flow during peak construction month (Peak 1 hour)	88	48	60
% Heavy Vehicles	25	26	27
Number of houses impacted			
Number of houses less than 20m		4	
Number houses between 20-30m		0	
Number houses between 30-50m		1	
Number houses greater than 50-100m		3	
With Development (Scenario 2)			
Construction Traffic Flow during peak construction month (Peak 1 hour)	24	0	0
Major Facility Maintenance after 6 years	0	0	12
Water Delivery (Peak 1 hour)	0	3	3
Operational Traffic (Peak 1 hour)	0	4	5
Total Traffic Flow during peak construction month (Peak 1 hour)	64	47	60
% Heavy Vehicles	27	26	27
Number of houses impacted			
Number of houses less than 20m		4	
Number houses between 20-30m		0	
Number houses between 30-50m		1	
Number houses greater than 50-100m		3	

Table 6 Predicted Traffic Noise Impacts on Brayton Road, South of Johnniefelds Quarry[1]

	Predicted Noise levels, $L_{Aeq, 1hour}$		
	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development existing traffic noise levels			
Houses less than 20m	59	59	59
Houses between 30-50m	56	56	56
Houses greater than 50-100m	53	53	53
With Development (Scenario 1)			
Houses less than 20m	63	60	61
Houses between 30-50m	60	57	58
Houses greater than 50-100m	57	54	55
With Development (Scenario 2)			
Houses less than 20m	62	60	61
Houses between 30-50m	59	57	58
Houses greater than 50-100m	56	54	55

Note 1 Traffic speed assumed to be 100km/hr.

Analysis of Table 6 for the Project indicates the following key elements:

- During construction scenario 1, traffic noise levels are likely to increase existing traffic noise levels by 4 dB. For construction scenario 2, traffic noise levels are likely to increase existing traffic noise levels by only 3 dB. As stated above, there are no construction traffic criteria; however the exceedance of the 2 dB allowance criteria for scenario 1 would indicate a noticeable change in traffic noise. However, this needs to be considered relative to the worst case calculation scenario which would only occur for a worst case day hour, for the worst case three months in a 12 month construction duration.
- For operational scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by 1 dB. For the residences along Brayton Road noise levels would remain below the recommended criterion of 60 $L_{Aeq,1hour}$.

- For the major maintenance scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by 2 dB. Not exceeding the allowance criterion would indicate a marginal change in traffic noise that most people would not necessarily notice and this would only occur every 6 years for a worst case hour a day for a maintenance duration of 3 to 6 weeks.

Brayton Road – east of Wollondilly Street

The impact on Brayton Road, east of Wollondilly with respect to increased traffic volumes is summarised in Table 7. All traffic volumes account for total vehicle movements. Table 7 also estimates the number of houses potentially impacted by traffic noise. Table 8 presents predicted traffic noise levels along Brayton Road using the US Federal Highway Administration Traffic Noise Model.

Table 7 Traffic volumes and number of houses impacted – Brayton Road, east of Wollondilly Street

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow (Peak 1 hour)	90	90	90
% Heavy Vehicles	16	16	16
With Development (Scenario 1)			
Construction Traffic Flow during peak construction month (Peak 1 hour)	48	0	0
Major Facility Maintenance after 6 years	0	0	12
Water Delivery (Peak 1 hour)	0	3	3
Operational Traffic (Peak 1 hour)	0	5	5
Total Traffic Flow during peak construction month (Peak 1 hour)	138	98	110
% Heavy Vehicles	20	17	15
Number of houses impacted			
Number of houses less than 20m		6	
Number houses between 20-30m		19	
Number houses between 30-50m		0	
Number houses greater than 50-100m		0	
With Development (Scenario 2)			
Construction Traffic Flow during peak construction month (Peak 1 hour)	24	0	0
Major Facility Maintenance after 6 years	0	0	12
Water Delivery (Peak 1 hour)	0	3	3
Operational Traffic (Peak 1 hour)	0	4	5
Total Traffic Flow during peak construction month (Peak 1 hour)	114	97	110
% Heavy Vehicles	20	17	15
Number of houses impacted			
Number of houses less than 20m		6	
Number houses between 20-30m		19	
Number houses between 30-50m		0	
Number houses greater than 50-100m		0	

Table 8 Predicted Traffic Noise Impacts on Brayton Road, east of Wollondilly Street[1]

	Predicted Noise levels $L_{Aeq, 1hour}$		
	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development existing traffic noise levels			
Houses less than 20m	58	58	58
Houses between 20-30m	57	57	57
Houses between 30-50m	55	55	55
Houses greater than 50-100m	52	52	52
With Development (Scenario 1)			
Houses less than 20m	61	59	59
Houses between 20-30m	60	58	58
Houses between 30-50m	58	56	56
Houses greater than 50-100m	55	53	53
With Development (Scenario 2)			
Houses less than 20m	60	59	59
Houses between 20-30m	59	58	58
Houses between 30-50m	57	56	56
Houses greater than 50-100m	54	53	53

Note 1 Traffic speed assumed to be 60km/hr.

Analysis of Table 8 for the Project indicates the following key elements:

- During construction scenario 1 traffic noise levels are likely to increase existing traffic noise levels by 3 dB. For construction scenario 2, traffic noise levels are likely to increase existing traffic noise levels by only 2 dB. As stated above, there are no construction traffic criteria; however the exceedance of the 2 dB allowance criteria for scenario 1 would indicate a noticeable change in traffic noise. However, this needs to be considered relative to the worst case calculation scenario which would only occur for a worst case day hour, for the worst case three months in a 12 month construction duration.
- For operational scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by 1 dB. For the residences along Brayton Road noise levels would remain below the recommended criterion of 60 $L_{Aeq,1hour}$.

- For the major maintenance scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by 1 dB. Not exceeding the allowance criterion would indicate a marginal change in traffic noise that most people would not necessarily notice and this would only occur every 6 years for a worst case hour a day for a maintenance duration of 3 to 6 weeks.

Moss Vale STP Locality

The Moss Vale STP site is accessed via the Hume Highway, Illawarra Highway, Kennedy Close and Creek Street.

Hume Highway and the Illawarra Highway are not considered any further since their traffic volumes are quite high and the additional operational truck movements for the water supply would not have a perceivable noise impact.

On Creek Street there are approximately 13 houses within 20 metres and along Kennedy Street there are approximately 35 houses within 20 metres.

The impact on Kennedy Close and Creek Street with respect to increased traffic volumes is summarised in Table 9. All traffic volumes account for total vehicle movements. Table 10 presents predicted traffic noise levels along Kennedy Close and Creek Street using the US Federal Highway Administration Traffic Noise Model.

Table 9 Traffic volumes at Moss Vale

Activity	Average Daily Traffic (Operation)	
	Kennedy Close	Creek Street
No Development		
Traffic Flow (Peak 1 hour)	60	130
% Heavy Vehicles	3	3
With Development		
Water Delivery (Peak 1 hour)	3	3
Total Traffic Flow (Peak 1 hour)	63	133
% Heavy Vehicles	8	5

Table 10 Predicted Traffic Noise at Moss Vale[1]

	Predicted Operational Noise levels $L_{Aeq, 1hour}$	
	Kennedy Close	Creek Street
No Development		
Houses less than 20m	52	54
With Development		
Houses less than 20m	53	55

Note 1 Traffic speed assumed to be 60km/hr.

Analysis of Table 10 for the Project indicates the following key elements:

- Operational traffic noise levels are likely to increase existing traffic noise levels by 1 dB.
- Traffic noise levels along Kennedy Close and Creek Street are likely to remain within the local daytime criterion of 55 $L_{Aeq, 1hour}$.

Marulan STP and Marulan Water Supply Network Locality

Transporting water from either the Marulan water supply network or the Marulan sewage treatment plant would require water transport truck to use Portland Avenue Marulan. On Portland Avenue there are approximately 9 houses within 20 metres of the road.

There is no traffic count data available for Portland Avenue however it has been assumed to be similar to Brayton Road, south of Johnniefelds Quarry.

The impact on Portland Avenue with respect to increased traffic volumes is summarised in Table 11. All traffic volumes account for total vehicle movements. Table 12 presents predicted traffic noise levels along Brayton Road using the US Federal Highway Administration Traffic Noise Model.

Table 11 Traffic volumes – Portland Avenue

Activity	Average Daily Traffic (Operation)[1]
No Development	
Traffic Flow (Peak 1 hour)	40
% Heavy Vehicles	23
With Development	
Water Delivery (Peak 1 hour)	3
Total Traffic Flow (Peak 1 hour)	43
% Heavy Vehicles	28

Table 12 Predicted Traffic Noise Impacts along Portland Avenue, Marulan[1]

	Predicted Operational Noise levels $L_{Aeq, 1hour}$
No Development	
Houses less than 20m	54
With Development	
Houses less than 20m	55

Note 1 Traffic speed assumed to be 60km/hr.

Analysis of Table 12 for the Project indicates the following key elements:

- Operation traffic noise levels are likely to increase existing traffic noise levels by 1 dB.
- Traffic noise levels along Portland Avenue are likely to remain within the local daytime criterion of 55 $L_{Aeq, 1hour}$.

Summary of results

Table 13 summarises the outcomes of the traffic noise assessment.

Table 13 Summary of Outcomes from Traffic Noise Assessment

Route	Predicted increase in existing traffic noise levels					
	Construction		Operation		Major Maintenance	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Canyonleigh Road	Increase by 3 dbA *No criteria*	Increase by 2 dbA *No criteria*	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*	Increase by 2 dbA *Below criteria*	Increase by 2 dbA *Below criteria*
Brayton Road, north south portion	Increase by 4 dbA. *No criteria*	Increase by 3 dbA *No criteria*	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*	Increase by 2 dbA *Below criteria*	Increase by 2 dbA *Below criteria*
Brayton Road east west portion	Increase by 3 dbA *No criteria*	Increase by 2 dbA *No criteria*	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*
Kennedy Close and Creek Street	NA	NA	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*	NA	NA
Portland Ave	NA	NA	Increase by 1 dbA *Below criteria*	Increase by 1 dbA *Below criteria*	NA	NA

Conclusion

There are no construction traffic noise criteria. For construction scenario 1 traffic noise levels are likely to increase existing traffic noise levels by greater than 2 dB. For construction scenario 2 traffic noise levels are less than scenario 1. The construction traffic noise predictions need to be considered relative to the worst case calculation scenarios considered which would only occur for a worst case day hour, for the worst case three months, for a 12 month construction duration.

It should be noted that construction noise criteria are generally higher than operational noise criteria since:

- construction noise only occurs for a relatively short duration;
- construction activities usually involve equipment and heavy machinery that is inherently noisy; and

- options for reducing noise from construction traffic activities are more limited than for noise from ongoing operations;

Due to the limited opportunity for effective noise control for construction traffic noise, it is recommended that construction traffic only operates during daytime periods and that letter box drops to noise sensitive receivers be implemented.

During the operational stage, there would be minor, light vehicle activity and small number of water trucks, as such negligible impact has been predicted.

For the major maintenance scenarios 1 and 2, traffic noise levels are likely to increase existing traffic noise levels by up to 2 dB. Not exceeding the allowance criterion would indicate a marginal change in traffic noise that most people would not necessarily notice and this would only occur every 6 years for a worst case hour a day for a maintenance duration of 3 to 6 weeks. It is recommended that maintenance traffic only operates during daytime periods and that letter box drops to noise sensitive receivers be implemented.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
WILKINSON MURRAY PTY LIMITED

John Wassermann
Director