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### **RE: ACOUSTIC ASSESSMENT 380 MOTORWAY LINK, WALLARAH**

This letter report presents the results of a noise impact assessment conducted for an industrial rezoning at 380 Motorway Link, Wallarah NSW. The assessment has been conducted to respond to a gateway approval.

The NSW Department of Planning and Environment granted Gateway Approval on 9 December 2016 for the amendment of the (then) Wyong Local Environment Plan (2013) to rezone the subject land for industrial development and environmental protection purposes. This report has been prepared to satisfy a requirement under point 1 of the Determination that a noise impact assessment must be included with any planning proposal pertaining to the subject land.

#### **AMBIENT NOISE LOGGING**

Ambient noise levels were monitored by Spectrum Acoustics at a sensitive residential location near the site from 9-15 October 2017. Data was recorded at 15 minute statistical intervals using a Rion NL-42 environmental noise logger. The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". The noise logger used complies with the requirements of AS 1259.2-1990 "Acoustics – Sound Level Meters", and has current NATA calibration certification.

The logger was programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the logger was performed during the instrument's initialisation procedures, with calibration results being within the allowable  $\pm 0.5$  dB(A) range.

Figure 1 shows the project site and the noise logger location as well as other information relevant to the assessment of potential noise impacts. Logger N1 was placed by the creek in the rear yard of a Birdwood Drive residence which is receiver R1 in this assessment. Receiver R2 indicated in Figure 1 is at the western end of Waterhen Close, where the acoustic environment is dominated by traffic on the Motorway Link Road. Noise data from a nearby location at a similar distance from the Pacific Highway at Lake Munmorah were adopted for this receiver.

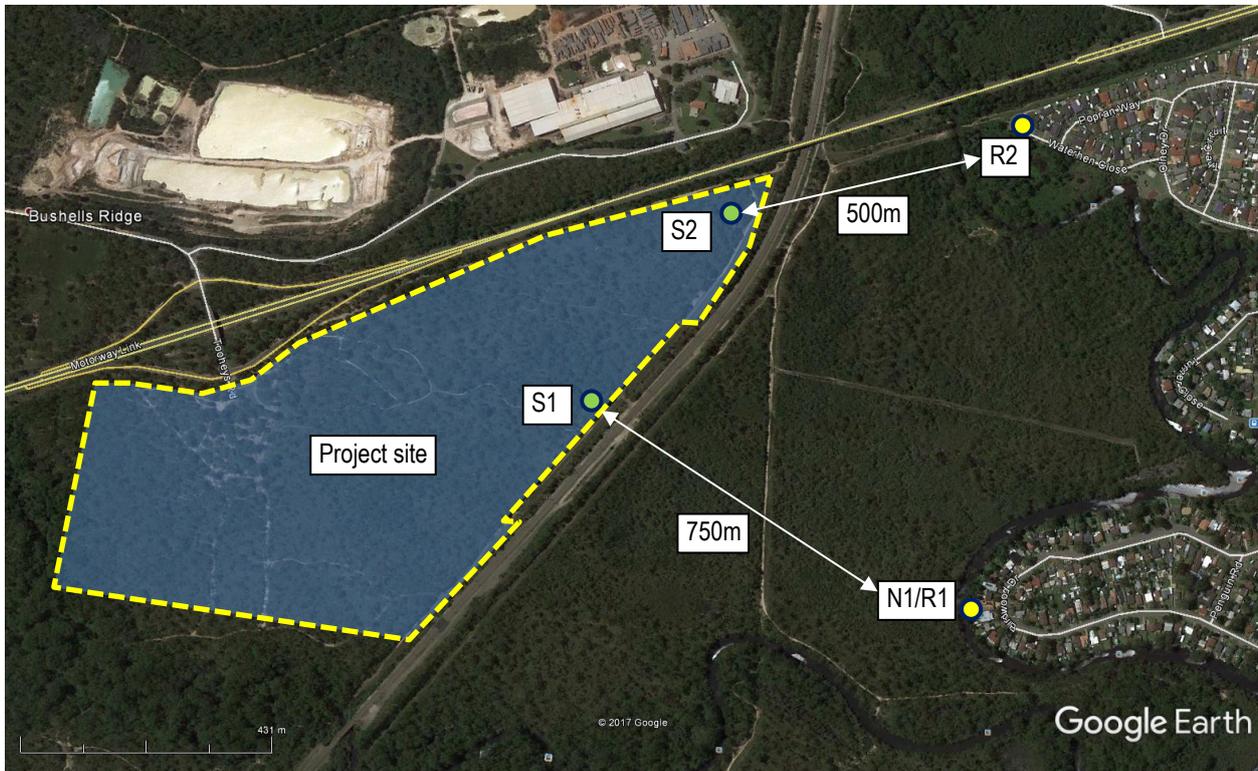


Figure 1. Project site and logger locations (Source: Google Earth).

Ambient  $L_{Aeq}$  and background ( $L_{A90}$ ) noise levels obtained from the loggers are summarised below in Table 1 and shown graphically in Appendix A. Table 1 includes the background ( $L_{90}$ ) levels, the  $L_{eq}$  over the full day (11 hour, 7am-6pm), evening (4 hour, 6pm-10pm) and night (9 hour, 10pm-7am) periods.

TABLE 1 MEASURED AMBIENT NOISE LEVELS			
Location	Day	Evening	Night
N1 9-15 Oct 2017	38 dB(A) $L_{90}$	34 dB(A) $L_{90}$	31 dB(A) $L_{90}$
	51 dB(A) $L_{eq}$ (period)	44 dB(A) $L_{eq}$ (period)	45 dB(A) $L_{eq}$ (period)
N2 16-20 Oct 2017	53 dB(A) $L_{90}$	50 dB(A) $L_{90}$	38 dB(A) $L_{90}$
	67 dB(A) $L_{eq}$ (period)	66 dB(A) $L_{eq}$ (period)	63 dB(A) $L_{eq}$ (period)

## NOISE CRITERIA

### Operations

In setting noise goals for a particular project the INP considers both Amenity and Intrusiveness criteria. The former is set to limit continuing increase in noise from industry, whilst the latter is set to minimise the intrusive impact of a particular noise source.

Amenity criteria are dependent upon the nature of the receiver area and the existing level of industrial noise. Observations and measurements made during the retrieval of the logger indicated that the acoustic environment was characterised by noise from traffic at N2 and environmental sources at N1. Receiver N2 is considered to be “urban” and receiver N1 is considered to be “suburban” as per definitions in the INP.

The intrusiveness criteria are based on the Rating Background Level (RBL) for the time period, plus 5 dB(A). The RBL (L90) is defined as the overall single figure background level representing each assessment period.

**Table 2** below specifies the noise criteria determined for the two receiver locations.

TABLE 2 NOISE CRITERIA				
Location	Criterion	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
N1 Birdwood Drive	Intrusiveness dB(A),Leq(15-min.)*	43	39	36
	Amenity dB(A),Leq(period)**	55	45	40
	Maximum dB(A),Leq(period)	60	50	45
N2 Waterhen Close	Intrusiveness dB(A),Leq(15-min.)*	58	55	43
	Amenity dB(A),Leq(period)***	60	50	45
	Maximum dB(A),Leq(period)	65	55	50

\* Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the “L<sub>90</sub> of the L<sub>90</sub>s” for each separate day of the monitoring period.

\*\* Suburban zone amenity criterion per Tables 2.1 and 2.2 of INP.

\*\*\* Urban zone amenity criterion per Tables 2.1 and 2.2 of INP.

In order to consider the potential noise impacts of the proposal, any individual industry within the site must not exceed the intrusiveness criteria in Table 2 and noise emissions from the entire site operating at capacity must not exceed the amenity criteria. As the facility may operate on a 24-hour basis, the night time criteria are considered in this assessment.

### Sleep Disturbance

Businesses within the site may operate on a 24-hour basis and as such there is a requirement to consider potential sleep disturbance impacts. The EPA prefers maximum noise levels from impacts to be no more than 15 dB above the background level at a bedroom window. The sleep disturbance criteria are therefore 46 dB(A),L<sub>max</sub> at N1 and 53 dB(A),L<sub>max</sub> at N2.

### Traffic

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the INP if the vehicles are not on a public road. If the vehicles are on a public road, the NSW *Road Noise Policy* (RNP) applies. Noise from the proposal must, therefore, be assessed against the project specific noise goals of the INP and also the criteria in the RNP.

The RNP recommends various criteria based on the functional categories of roads applied by the Roads and Traffic Authority (RTA). The RTA differentiates roads based on a number of factors including traffic volume, heavy vehicle use, through or local traffic, vehicle speeds and applicable traffic management options. Vehicles accessing the site will do so via the Motorway Link Road which is considered an arterial road as per definitions in the RNP.

**Table 3** below shows the noise criteria relevant to traffic on various road types extracted from Table 1 of the RNP. For the assessment of traffic noise, the day time period is from 7am to 10pm, whilst night is from 10pm to 7am.

TABLE 3 ROAD TRAFFIC NOISE CRITERIA		
Situation	Recommended Criteria	
	Day (7am to 10pm)	Night (10pm to 7am)
3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	Leq (1hr) 60 (external)	Leq (1hr) 55 (external)

Application notes accompanying the RNP also state that "...for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion."

## NOISE ASSESSMENT

### Site Operations and Noise Levels

Figure 1 shows two indicative source locations S1 at 500m from receiver N1 and S2 at 750m from receiver N2. The propagation paths from source to receiver are heavily wooded.

The loudest business ever measured by Spectrum Acoustics in an industrial area was an automotive tuner with a dynamometer. Measured noise levels at various distances from the open roller door are summarised as follows:

Distance	Leq	Duration(s)
0 m	108.5	22
3 m	94.0	25
10 m	82.2	25

A measured LAeq(*T*) for a single event of duration *T* (sec) is corrected to a 15-minute Leq for *N* events by

$$LAeq(15min) = LAeq(T) + 10 \times \log_{10}(NT/900)$$

Substituting the measurement time of *T*=25 seconds and a maximum *N*=2 events in a 15 minute period gives LAeq(15min) = 69.7 dB(A) at 10m from the source.

The change in sound pressure level for a point at distance D1 from a source to a more distant point at d2 from the source is given by

$$\Delta D = 20 \cdot \log_{10}(D2/D1)$$

The additional attenuation through medium density forest is generally accepted as 6 dB/100m. Applying these two loss factors to the above stated level at 10m gives received levels well below 20 dB(A) at both N1 and N2. These levels are significantly below the intrusiveness criteria.

### **Sleep Disturbance**

Allowing for instantaneous maximum impact levels to be 10 dB greater than LAeq levels, the predicted maximum levels at both N1 and N2 are below 30 dB(A) which is well below the sleep disturbance criteria.

### **Traffic Noise**

Vehicles accessing the site would do so predominantly from the west, towards the M1 Motorway, where there are no residences. A small proportion of heavy vehicles associated with the site may arrive from and depart to the east past residences 35m from the Motorway Link Road, as indicated in Figure 1.

Approximately 20 years ago, Spectrum Acoustic personnel conducted the acoustic assessments for most of the Blue Haven residential development. The assessments found that traffic noise criteria would be exceeded in the absence of noise barriers. The barrier heights were determined through modelling to be sufficient to achieve the noise criteria. It can therefore be assumed that current traffic noise levels at the Blue Haven residences along the Motorway Link Road are within 2 dB of the criteria.

Consequently, the RNP application note discussed in Section 3.5 applies and traffic noise from the proposal under assessment must not increase existing traffic noise levels by more than 2 dB.

The RMS traffic count station ID 05302 on the Motorway Link reported an average daily traffic count (two ways) of approximately 20,000 vehicles per day in 2016. Other RMS traffic counters in the region suggest a heavy vehicle content of approximately 7%. This equates to 1,400 heavy vehicles per day currently passing by Blue Haven residences along the Motorway link road.

Solving the following equation for N

$$10 \log_{10}((N+1400)/1400) = 2 \text{ dB}$$

gives a maximum of 800 heavy vehicles per day travelling east of the project site in order to remain compliant with the road traffic noise criterion. It is not likely that the small proportion of site related vehicles travelling east of the site would approach this number

In summary, there are no conceivable industries that would be loud enough to exceed the night time operation noise criteria and no number of industries likely to exceed the maximum amenity criterion for the site. Site related heavy vehicle movements east of the site past Blue Haven residences are likely to be well below the maximum number for compliance with the traffic noise criterion.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 49542276.

**SPECTRUM ACOUSTICS PTY LIMITED**



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# APPENDIX A

## NOISE LOGGER DATA CHARTS

