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**Proposed Modification of Warehouse and Office  
Facility  
Lot 2/133-145 Lenore Lane, Erskine Park  
Acoustic Assessment**

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## 1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to undertake an assessment of operational noise associated with a proposed modified industrial development at Lot 2, 133-145 Lenore Lane, Erskine Park.

In this report, we will:

- Identify nearby noise sensitive receivers to the site.
- Identify relevant noise emission controls applicable to the site.
- Identify anticipated operational noise sources from the site, predict noise emissions at nearby sensitive development and assess them against acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

## 2 SITE DESCRIPTION AND PROPOSED WORKS

The site is located on Lenore Lane, Erskine Park, within the Erskine Park Industrial Precinct.

The site is presently approved for a Warehouse and Distribution Facility as per Project Approval (Section 75J) dated 12 July 2010 and Notice of Modification (Section 75W) dated 24 February 2013.

The site is anticipated to generate up to 20 large truck movements per day. Vehicular access to the site is via a driveway on Lenore Lane, on the southern boundary of the site. Vehicles using the site would drive on Lenore Drive/Lane and Erskine Park Road, all of which are located within the industrial precinct, prior to reaching an arterial road (Mamre Road). The roadways do not pass through any residential area prior to reaching Mamre Road.

The site is bounded on all sides by either by existing industrial development or vacant land approved for industrial use.

The nearest noise sensitive development to the site is:

- Residential dwellings located at Regulus Street, Erskine Park (550m to the north of the site).
- Rural residential development to the south of the site (approximately 1,500m away).

See aerial photograph below.

Nearest residential development



### 3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely  $L_{10}$ ,  $L_{90}$  and  $L_{eq}$ .

The  $L_{10}$  and  $L_{90}$  measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The  $L_{10}$  parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the  $L_{90}$  level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The  $L_{90}$  parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the  $L_{90}$  level.

The  $L_{eq}$  parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period.  $L_{eq}$  is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

$L_1$  levels represent is the loudest 1% noise event during a measurement period.

## 4 NOISE EMISSION CRITERIA

### 4.1 CONDITIONS OF CONSENT

Noise emission controls for the site are set out in schedule 3, conditions 12, 13 and 14 of the Project Approval document, with the noise emission controls of condition 12 then being modified as per condition 8 of the S75W modification for the site.

Relevant noise emission goals for the site, as per the original approval (and as modified) are as follows:

**Table 1 – Noise Emission Criteria**

Location	Time of Day	Noise Emission Objective
Any residence or other noise sensitive receiver	Day Time (7am - 6pm)	42dB(A) $L_{eq}(15min)$
	Evening (6pm - 10pm)	42dB(A) $L_{eq}(15min)$
	Night (10pm - 7am)	40dB(A) $L_{eq}(15min)$ and 50dB(A) $L_{1(1min)}$

In addition we note:

- Condition 13 requires that the Proponent undertake an acoustic review prior to construction to demonstrate the project's compliance with the project noise levels and detailing specific noise mitigation treatments and measures to be implemented to control noise emissions. This report has been prepared to address the requirements of condition 13.
- Conditions 14 requires a Noise Management Plan detailing:
  - All activities that will be carried out during construction and operation and the associated noise sources.
  - Identify noise affected receivers and project specific noise limits.
  - Describe the methods and procedures and noise mitigation treatments to be implemented.
  - Detail a noise monitoring program to be implemented to monitor the effects of the project on the acoustic environment during operation.
  - Detail procedures in the event of complaints.
  - Include a Transport Code of Conduct on local and regional road network, including traffic noise.

This report has been prepared to address the requirements of condition 14.

#### 4.2 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

For the purpose of assessment when determining the Transport Code of Conduct, the noise emission controls set out below will be adopted.

For land use developments with the potential to create additional traffic on public streets the development should comply with the EPA Road Noise Policy.

We note that Mamre Road is the first road from the site where trucks would be expected to pass through residential areas. Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a residential building facade.

**Table 2 - Criteria for Traffic Noise Generated by New Developments**

Road Type	Time of day	Permissible Noise Generation
Arterial (Mamre Road)	Day (7am to 10pm)	60 dB(A) <sub>Leq(15hr)</sub>
	Night (10pm to 7am)	55 dB(A) <sub>Leq(9hr)</sub>

However, if existing noise levels exceed those in the table above, section 3.4 of the Road Noise Policy is applicable, which requires noise impacts are reduced through feasible and reasonable measures. However, in determining what is feasible/reasonable, the Policy notes that an increase of less than 2dB(A) is a minor impact and would be barely perceptible.

## 5 NOISE EMISSION ASSESSMENT

An assessment of operational and construction noise is presented below.

Being a distribution centre, the primary noise source associated with the site will be vehicle noise. The following noise sources are assessed:

- Vehicular noise on site (trucks driving to loading docks, loading/unloading).
- Noise from use of indoor areas (forklifts).
- A preliminary assessment of noise from mechanical plant.
- Noise created on public roads as a result of traffic generated by the site.

In each case:

- Noise emissions will be assessment with reference to the night time noise emission criteria (the most stringent).
- Noise emission predictions will take into account acoustic attenuation with distance, including air absorption and adverse weather conditions (temperature inversion/wind calculated as per table 5.10 of Engineering Noise Control by Beis and Hansen 1988).
- Noise emissions will also take into account the line of sight acoustic screening provided by the industrial warehouse in between the site and any residences to the north/south of site.

### 5.1 VEHICLE NOISE (TRUCKS ENTERING/LEAVING THE SITE AND CIRCULATING ON THE SITE)

Noise generated by vehicles manoeuvring on the site will be assessed with reference to the noise emission controls site out in section 4.

In addition to the assessment parameters outlined above (regarding air absorption/adverse weather etc), the predictions take into account:

- An assumed worst case scenario of 2 inbound and 2 outbound semi-trailer truck movements in any 15 minute period (a conservative assuming, given a total of 20 per day are expected).
- One forklift (sound power 94dB(A) $L_{eq}$ ) is assumed to be operating continuously during this period.
- A truck sound power level of 105dB(A) $L_{eq}$ .

Predicted noise levels are set out below.

**Table 3 – Truck movements/Use of Loading Dock**

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A) $L_{eq}(15min)$	Permissible Level (Night) dB(A) $L_{eq}(15min)$	Complies?
Vehicles manoeuvring, and driving to/from site	Residences north of site (Regulus Street)	<30dB(A) $L_{eq}(15min)$	40dB(A) $L_{eq}(15min)$	Yes
	Residences South of Site	<25dB(A) $L_{eq}(15min)$	40dB(A) $L_{eq}(15min)$	Yes

Noise emissions from the vehicles using the site are compliant with noise emission goals.

## 5.2 USE OF INDOOR AREAS (FORKLIFTS)

The primary noise source associated with the use of internal areas will be from the use of forklifts manoeuvring material within the warehouses.

Predictions of operational noise are presented below. Predictions are made on the following assumptions:

- That there are up to five forklifts (sound power 94dB(A) $L_{eq}$ ) in operation at any one time.
- That the building shell is made of sheet metal (0.5mm thick) and that roller doors are left open (and therefore a conservative assessment).

Predicted noise levels are set out below.

**Table 4 – Noise From Activity in Internal Areas**

Noise Source	Noise Receiver Location	Predicted Noise Level – dB(A) $L_{eq}(15min)$	Permissible Level (Night) dB(A) $L_{eq}(15min)$	Complies?
Internal Activities Within Warehouse	Residences north of site (Regulus Street)	<25dB(A) $L_{eq}(15min)$	40dB(A) $L_{eq}(15min)$	Yes
	Residences South of Site	<20dB(A) $L_{eq}(15min)$	40dB(A) $L_{eq}(15min)$	Yes

Noise emissions from operational activities in internal areas are compliant with noise emission goals.

### 5.3 NOISE GENERATED BY ADDITIONAL TRAFFIC ON PUBLIC ROADS

Noise created as a result an increase in traffic on public roads is assessed with reference to the EPA Road Noise Policy.

Primary access/egress to the site is via the driveway on Lenore Lane and James Erskine Drive before reaching the nearest arterial road to the site (Mamre Road). It is a vehicle movement on Mamre Road which brings vehicles closest to residential development. It is this noise source which is assessed below.

Predictions of noise generation are based on the following:

- A daily traffic generation of up to 20 articulated trucks per day.
- For the purpose of this assessment, all truck movements are assumed to occur during a night time period (most conservative assessment).
- Vehicle sound power levels when driving on the public road (40-50km/h) of 110dB(A)<sub>Leq</sub> for articulated trucks.

Predicted noise levels at the building façade of the residences adjacent to Mamre Road are assessed below.

**Table 5 – Noise Generated by Additional Road Traffic Assessment**

Time of Day	Receiver Location	Predicted Noise Level – dB(A) <sub>Leq</sub>	Compliance
Daytime (10pm-7am)	Residences fronting Mamre Road	<52dB(A) <sub>Leq(Day)</sub>	Complies with 55dB(A) <sub>Leq(9hr)</sub> night time criteria.

Noise as a result of additional traffic generation is compliant with the EPA Road Noise Policy.

There are no vehicle management controls (such time restrictions or preferred routes) which are necessary to be incorporated by management to ensure the acoustic amenity of nearby development is maintained.

### 5.4 TRANSIENT NOISE EVENTS (SLEEP AROUSAL)

In the event that the site is used after 10pm or before 7am, noise events occurring in this period should be assessed for potential sleep disturbance impacts on nearby residents.

Short duration, high intensity noise events should be assessed with reference to sleep arousal criteria. The primary potential noise source of this nature will be the use of the pneumatic valve which engages when a truck moves from a stationary position. Based on measurements conducted by this office, the sound power of this noise event is 113dB(A)<sub>L1(1min)</sub>.

The noise emissions at the window of the nearest residences are presented below.

Noise emissions are assessed with reference to the short duration late night noise event criteria (the  $L_1(1min)$  criteria) as identified in section 4.

**Table 6 – Sleep Arousal Assessment**

Receiver Location	Noise Source	Predicted Noise Level	Permissible Noise Level	Complies?
Residences north of site (Regulus Street)	Truck Brake (on site)	34dB(A) $L_1(1min)$	50dB(A) $L_1(1min)$	Yes
Residences South of Site	Truck Brake (on site)	<30dB(A) $L_1(1min)$	50dB(A) $L_1(1min)$	Yes

Peak noise events are compliant with the sleep disturbance ( $L_1(1min)$ ) acoustic criteria set out in section 4.

## 5.5 MECHANICAL PLANT

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in section 4 of this report.

Compliance with noise emission requirements will be achievable with appropriate acoustic treatment.

Given the distance from the site to nearby residential development, it is unlikely that significant acoustic treatment will be required. Indicative analysis indicates that even noisy equipment (sound power of up to 95dB(A)) is unlikely to require acoustic treatment to meet 40dB(A) noise emission requirements as detailed in section 4.

None the less, detailed review of all primary external equipment (cooling towers, air cooled chillers, major exhaust fans) should be conducted at construction certificate stage once equipment items are selected.

## 6 RECOMMENDATIONS

Acoustic analysis indicates that the site is capable of complying with the acoustic requirements of the conditions of consent.

However, we recommend the following to ensure ongoing compliance with EPA requirements:

- Detailed acoustic review of all external plant items (roof top equipment etc) should be undertaken following equipment selection and duct layout design (at CC stage).
- Noise monitoring and complaints handling:
  - Once the site is operational, one attended noise measurement is warranted to ensure that vehicle and equipment noise does not exceed noise emission requirements. This should be conducted at the residences on Regulus Street, and should include a night time/evening time measurement if the site is operation at this time.
  - Ongoing noise monitoring of the site once operational is not warranted given the site is anticipated to be compliant with noise emission goals by more than 10dB(A).
  - In the event of complaint, it is imperative that management ascertain:
    - Whether the complaint relates to equipment noise or vehicle noise.
    - The time of the noise event (given the distance between the site and the nearest residences, there is a risk that the precise location of the noise will be difficult to determine, given the number of other industrial lots in the area).
- Vehicle noise management:
  - Drivers should be instructed not to use engine brakes when driving in residential area on Mamre Road.
  - In the event of significant increase in night time truck movements associated with the site (to more than 40 per night), additional acoustic analysis should be conducted in which the night time traffic noise levels on Mamre Road (where it passes through residential areas) is determined in order to calculate the impact of the any additional truck traffic associated from the site in the context of the total number of truck movement on Mamre Road.

## 7 CONCLUSION

Operational noise emissions associated with the proposed industrial development at Lot 2, 133-145 Lenore Lane, Erskine Park have been assessed with reference to the noise emission controls currently imposed on the site.

An analysis of typical operational noise (vehicle, mechanical equipment equipment) indicates that the site is capable of complying with relevant noise emission criteria. Ongoing compliance with these criteria will be achieved provided that the recommendations in section 6 of this report are adopted.

Please contact us if you have any queries.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'T. Taylor', is positioned above the printed name.

Acoustic Logic Consultancy Pty Ltd  
Thomas Taylor