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**Prestons Warehouse and Industrial Estate  
(Yarrunga Street, Prestons)**

**Noise Emission Assessment –  
Modification of Warehouses 1 and 6**

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## 1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to undertake a noise emission assessment as part of a section 96 application to the industrial subdivision at 34 Yarrunga Road, Prestons.

The proposed changes involve modification of design of Warehouse/Tenancies 1 and 6:

- Warehouse 1, proposed use not be determined by future tenant.
- Warehouse 6, proposed to be used by Volvo.

This report will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact nearby developments.
- Identify relevant Liverpool Council and EPA acoustic criteria applicable to the development (as required by Secretary Environmental Assessment Requirements).
- Predict typical operational noise emissions as a result of the proposed changes and assess them against acoustic criteria.
- If necessary, identify potential building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

## 2 SITE DESCRIPTION AND PROPOSED WORKS

The site is located at the corner of Yarrunga Street and Bernera Road, Prestons.

The change in use (to industrial) of the site has been approved and construction of warehouses on the site has commenced at the time of writing this report.

The following modification of the development approval is proposed:

- Warehouse 6:
  - This warehouse is located in the north-western corner of the site.
  - It is proposed to be used as an office and as a logistics centre for motor vehicles .
  - The site will have an on-grade car park, and is accessed via driveways off Yarrunga Road. The site will be capable of accommodating articulated trucks.
  - The site is proposed to be operational twenty four hours per day, however maintenance works on vehicles would be limited to 7am to 6pm
  - The nearest noise sensitive developments to the site are the residences:
    - To the north-west of the site (Coffs harbour Ave, approximately 350m away).

- To the southern of the site (Kurrajong Road, approximately 250m away).
- Warehouse 1:
  - This warehouse is located on the northern boundary of the site, adjacent to Warehouse 6.
  - There is no prospective tenant of the warehouse at the time of writing this report and so the use of the warehouse has is not currently known.
  - The site will have an on-grade car park, loading dock and is accessed via driveways off Yarrunga Road. The site will be capable of accommodating articulated trucks.
  - The nearest noise sensitive developments to the site are the residences:
    - To the north-west of the site (Coffs harbour Ave, approximately 400m away).
    - To the southern of the site (Kurrajong Road, approximately 250m away).
    - On Bernera Road, which is the most likely truck travel route to/from the site.

We note that other development in the vicinity of the site at 1 and 10 Yarrunga Street and 2 and 276 Kurrajong Road are currently all commercial developments.

See aerial photograph below.



### 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 SURVEY OF AMBIENT NOISE AND NOISE EMISSION GOALS

### 4.1 BACKGROUND NOISE SURVEY

Background noise logging was conducted as part of the development approval reporting for the industrial precinct as a whole (*Acoustic Environmental Impact Assessment* by Acoustic Logic dated 22/2/2016, ref 20151316.1/2202A/R5/JD).

Ambient noise levels were determined by long term noise logging. The ambient noise conditions at the site were identified in the development approval stage report and are presented below:

**Table 1 - Long Term Noise Logging Data**

| Location                    | Time of Day  |  |  |
|-----------------------------|--|--|--|
|                             | Daytime<br>(7am-6pm)                                     | Evening<br>(6pm-10pm)                                    | Night<br>(10pm-7am)                                      |
| Kurrajong Road<br>Residents | 54dB(A) <sub>Leq(Period)</sub><br>43dB(A) <sub>L90</sub> | 55dB(A) <sub>Leq(Period)</sub><br>43dB(A) <sub>L90</sub> | 49dB(A) <sub>Leq(Period)</sub><br>37dB(A) <sub>L90</sub> |

### 4.2 NOISE EMISSION CRITERIA

The following noise emission criteria were identified in the *Acoustic Environmental Impact Assessment*:

- Liverpool City Council DCP
- The EPA Industrial Noise Policy
- The EPA Road Noise Policy
- EPA guidelines for sleep arousal (Application Notes to the Industrial Noise Policy).
- The EPA document –Assessing Vibration, A Technical Guideline.
- The EPA Interim Construction Noise Guidelines.

#### 4.2.1 Liverpool City Council DCP 2014

Section 7 of the Liverpool DCP 2014 has no specific noise emission criteria set within the DCP, but has reference to the *Protection of the Environment Operations Act 2008*.

In our opinion, compliance with the Industrial Noise Policy will also meet the intended criteria of the *Protection of the Environment Operations Act*.

#### 4.2.2 EPA Industrial Noise policy

Noise sources covered by this code will include vehicle noise (generated on the site), activities noise at the leisure centre and mechanical services noise. Both the Intrusiveness and the Amenity criteria (as set out below) must be complied with.

##### 4.2.2.1 INP - Intrusiveness Assessment

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels. The criteria are as follows:

**Table 2 - EPA Intrusiveness Criteria**

| Location  | Time of Day          | Background noise Level - dB(A) <sub>L<sub>90</sub></sub> | Intrusiveness Noise Objective dB(A) <sub>L<sub>eq</sub>(15min)</sub> (Background + 5dB) |
|---|----------------------|--|---|
| All Potentially Affected Residential Properties | Day Time (7am - 6pm) | 43   | 48  |
|   | Evening (6pm - 10pm) | 43   | 48  |
|   | Night (10pm - 7am)   | 37   | 42  |

##### 4.2.2.2 INP - Amenity Assessment

The Amenity criteria set additional criteria based on the land use of the noise sensitive receivers.

Amenity criteria are as follows:

**Table 3 - EPA Amenity Criteria**

| Receiver Location                               | Land Type         | Time of Day          | Amenity Noise Objective dB(A) <sub>L<sub>eq</sub>(Period)</sub> |
|---|-------------------|----------------------|---|
| All Potentially Affected Residential Properties | Rural Residential | Day Time (7am – 6pm) | 50  |
|   |                   | Evening (6pm – 10pm) | 45  |
|   |                   | Night (10pm-7am)     | 40  |
| Commercial                                      | All               | When in use          | 65  |
| Industrial                                      | All               | When in use          | 70  |

### 4.2.3 Sleep Arousal Criteria

Potential sleep arousal impacts should be considered for noise generated before 7am or after 10pm.

Short duration, intermittent noise events (typically trucks starting and the noise from the pneumatic break release valve, which engages when a truck leaves a stationary position) are typically assessed for potential sleep disturbance.

Potential impacts are assessed using the recommended procedure in the Application Notes to the EPA Industrial Noise Policy. As recommended in the Application Notes, when assessing potential sleep arousal impacts, a two stage test is carried out:

- Step 1 - An “emergence” test is first carried out. That is, the  $L_1$  noise level of any specific noise source should not exceed the background noise level ( $L_{90}$ ) by more than 15 dB(A) outside a resident’s bedroom window between the hours of 10pm and 7am. If the noise events are within this, then sleep arousal impacts are unlikely and no further analysis is needed. This is consistent with the Noise Guide for Local Government. The guideline level is set out below.

**Table 4 - Sleep Arousal (Emergence Criteria)**

| Location              | Background Noise Level<br>(10pm-7am)<br>dB(A) $L_{90}$ | Emergence Level<br>dB(A) $L_{1(1min)}$ |
|-----------------------|--|--|
| Residential Receivers | 37   | 52                                     |

- Step 2 - If there are noise events that could exceed the emergence level, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number of occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA Industrial Noise Policy, this more detailed sleep arousal test is conducted using the guidelines in the EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

*For the research on sleep disturbance to date it can be concluded that:*

- *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.*
- *One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

#### 4.2.4 Noise from increased traffic generation on public streets

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

Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a nearby building facade.

**Table 5 – Criteria for Traffic Noise Generated By New Developments**

| Road Type                    | Time of day         | Permissible Noise Generation  |
|------------------------------|---------------------|-------------------------------|
| Sub-Arterial<br>Bernera Road | Day (7am to 10pm)   | 60 dB(A) <sub>Leq(15hr)</sub> |
|                              | Night (10pm to 7am) | 55 dB(A) <sub>Leq(9hr)</sub>  |
| Local Road<br>Kurrajong Road | Day (7am to 10pm)   | 55dB(A) <sub>Leq(1hr)</sub>   |
|                              | Night (10pm to 7am) | 50 dB(A) <sub>Leq(1hr)</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.

#### 4.2.5 Construction Noise and vibration Criteria

##### 4.2.5.1 EPA Interim Construction Noise Guidelines

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *“Noise affected” level.* Where construction noise is predicted to exceed the “noise effected” level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the “noise effected level”. For residential properties, the “noise effected” level occurs when construction noise exceeds ambient levels by more than:
  - 10dB(A)<sub>Leq(15min)</sub> for work during standard construction hours (7am-6pm Monday to Friday and 8am to 1pm on Saturdays) and
  - 5dB(A)<sub>Leq(15min)</sub> for work outside of standard construction hours.
- *“Highly noise affected level”.* Where noise emissions are such that nearby properties are “highly noise effected”, noise controls such as respite periods should be considered. For residential properties, the “highly noise effected” level occurs when construction noise exceeds 75dB(A)<sub>Leq(15min)</sub> at nearby residences.

A summary of noise emission goals for both standard hours of construction and outside standard hours are presented.

**Table 6 – Construction Noise Emission Goals**

| <b>Location</b> | <b>“Noise Affected” Level - dB(A)<sub>Leq(15min)</sub></b> | <b>“Highly Noise Affected” Level - dB(A)<sub>Leq(15min)</sub></b> |
|-----------------|--|---|
| Residences      | 53<br>(Standard Construction Hours)                        | 75  |
| Commercial      | 70   | N/A   |
| Industrial      | 75   | N/A   |

**4.2.5.2 Construction Vibration Criteria**

Vibration goals for the amenity of nearby land users are those recommended by the EPA document *Assessing Vibration: A technical guideline*. These levels are presented below:

**Table 7– Construction Vibration Goals**

| <b>Location</b>             | <b>Time</b> | <b>Peak velocity (mm/s)</b> |         |
|-----------------------------|-------------|-----------------------------|---------|
|                             |             | Preferred                   | Maximum |
| <b>Continuous Vibration</b> |             |                             |         |
| Residences                  | Daytime     | 0.28                        | 0.56    |
| Commercial/Industrial       | When in use | 0.56                        | 1.12    |
| <b>Impulsive Vibration</b>  |             |                             |         |
| Residences                  | Daytime     | 8.6                         | 17      |
| Commercial/Industrial       | When in use | 18                          | 36      |

## 5 NOISE EMISSION ASSESSMENT

This section of the report presents the expected noise emission levels associated with the use of the development for warehousing and distribution.

Therefore, an assessment of typical operational and construction noise is presented below in order to demonstrate that the industrial warehouse and distribution use of the site is capable of meeting noise emission requirements.

The following noise sources are assessed:

- Vehicular noise on site - trucks driving on site, noise from use of forklifts, and use of the car-park.
- Noise from internal areas internal operations (use of forklifts/workshop and vehicle maintenance for Warehouse 6).
- Noise created on public roads as a result of traffic generated by the site.
- Sleep disturbance from night time use of the premises.
- A preliminary assessment of noise from mechanical plant.
- A preliminary assessment of construction noise and vibration.

### 5.1 OPERATIONAL NOISE

Noise from this warehouse potentially impacts the residence to the north-west of the site (on Coffs Harbour Ave) and to the south of the site (on Kurrajong Road).

The following noise emissions are considered:

- On site vehicle and operational noise – Assessment is made of the cumulative noise impact of noise from vehicle ingress/egress, hardstand area noise (truck manoeuvring and forklifts), noise from internal activities (forklifts and pneumatic tools for vehicle maintenance in Warehouse 6). These noise events are assessed with reference to the EPA Industrial Noise Policy.
- Noise from additional on road traffic created by the site (assessed with reference to the EPA Road Noise Policy).
- An assessment of potential sleep disturbance, in the event that the site is used after 10pm.

#### 5.1.1 On site vehicle and activity noise

Assessment is made based on the following assumptions/data:

- Vehicles have an assumed sound power level (based on measurements made by this office) of:

- An articulated truck sound power of 100dB(A) typically, and 105dB(A) when reversing (taking into account a 5dB(A) penalty for the reversing beacon).
- A forklift (electric) sound power of 90dB(A).
- Up to 4 vehicle movements associated with the site in any given 15 minute period (a conservatively high assumption, effectively an inbound and out bound movement for each warehouse every 15 minutes).
- Continuous operation of a forklift in both the external hard stand areas and the internal area of each warehouse (and assuming that warehouse doors are left open).

In addition, for Warehouse 6 (vehicle maintenance), use of pneumatic hand tools (sound power 100dB(A), used in a start stop manner) has been assumed (warehouse doors left open).

Predictions take into account:

- Distance correction (hemispherical noise propagation and air attenuation).
- The noise screening provided by the building shell of the warehouse (in the case of noise from Warehouse 1 to the Coffs Harbour Ave residences).

Noise emissions are assessed with reference to the night time acoustic criteria (the most stringent). The cumulative noise emissions from the site are presented below.

**Table 8 – Warehouse 1 and 6 noise emission to Coffs Harbour Residence**

| <b>Noise Source</b>                                      | <b>Predicted Noise Level<br/>dB(A)<sub>Leq(15min)</sub></b> | <b>Permissible Noise Level</b>  | <b>Complies?</b> |
|--|---|---|------------------|
| Truck Ingress/egress/<br>manoeuvring                     | 28dB(A)   | 42dB(A) <sub>Leq(15min)</sub><br>(INP Intrusiveness Criteria).<br>40dB(A) <sub>Leq(Period)</sub><br>(INP Amenity Criteria). | Yes              |
| Hardstand Area –<br>forklifts                            | 33dB(A)   |   | Yes              |
| Internal Activities<br>(forklift and pneumatic<br>tools) | 30dB(A)   |   | Yes              |
| <b>Combined Noise Level</b>                              | <b>36dB(A)</b>  |   | <b>Yes</b>       |

**Table 8 – Warehouse 1 and 6 noise emission to 27 Bernera Road Residence**

| <b>Noise Source</b>                                      | <b>Predicted Noise Level<br/>dB(A)<sub>Leq(15min)</sub></b> | <b>Permissible Noise Level</b>  | <b>Complies?</b> |
|--|---|---|------------------|
| Truck Ingress/egress/<br>manoeuvring                     | 23dB(A)   | 42dB(A) <sub>Leq(15min)</sub><br>(INP Intrusiveness Criteria).<br>40dB(A) <sub>Leq(Period)</sub><br>(INP Amenity Criteria). | Yes              |
| Hardstand Area –<br>forklifts                            | 28dB(A)   |   | Yes              |
| Internal Activities<br>(forklift and pneumatic<br>tools) | 25dB(A)   |   | Yes              |
| <b>Combined Noise Level</b>                              | <b>31dB(A)</b>  |   | <b>Yes</b>       |

**Table 9 – Warehouse 1 and 6 noise emission to Kuurjong Road Residences**

| <b>Noise Source</b>                                      | <b>Predicted Noise Level<br/>dB(A)<sub>Leq(15min)</sub></b> | <b>Permissible Noise Level</b>  | <b>Complies?</b> |
|--|---|---|------------------|
| Truck Ingress/egress/<br>manoeuvring                     | 28dB(A)   | 42dB(A) <sub>Leq(15min)</sub><br>(INP Intrusiveness Criteria).<br>40dB(A) <sub>Leq(Period)</sub><br>(INP Amenity Criteria). | Yes              |
| Hardstand Area –<br>forklifts                            | 36dB(A)   |   | Yes              |
| Internal Activities<br>(forklift and pneumatic<br>tools) | 32dB(A)   |   | Yes              |
| <b>Combined Noise Level</b>                              | <b>39dB(A)*</b>   |   | <b>Yes</b>       |

\*In addition, this noise level will drop by more than 10dB(A) on completion of warehouses in the industrial area to the south of Warehouse 1 and 6.

**Table 10 – Warehouse 1 and 6 noise emission to 2 and 276 Kurrajong Road  
(Commercial Receivers)**

| <b>Noise Source</b>                                      | <b>Predicted Noise Level<br/>dB(A)<sub>Leq(15min)</sub></b> | <b>Permissible Noise Level</b> | <b>Complies?</b> |
|--|---|--------------------------------|------------------|
| Truck Ingress/egress/<br>manoeuvring                     | 31dB(A)   | 65dB(A)                        | Yes              |
| Hardstand Area –<br>forklifts                            | 39dB(A)   |                                | Yes              |
| Internal Activities<br>(forklift and pneumatic<br>tools) | 35dB(A)   |                                | Yes              |
| <b>Combined Noise Level</b>                              | <b>42dB(A)*</b>   |                                | <b>Yes</b>       |

\*In addition, this noise level will drop by more than 10dB(A) on completion of warehouses in the industrial area to the south of Warehouse 1 and 6.

**Table 11 – Warehouse 1 and 6 noise emission to 1 and 10 Yarrunga Road  
(Commercial Receivers)**

| <b>Noise Source</b>                                      | <b>Predicted Noise Level<br/>dB(A)<sub>Leq(15min)</sub></b> | <b>Permissible Noise Level</b> | <b>Complies?</b> |
|--|---|--------------------------------|------------------|
| Truck Ingress/egress/<br>manoeuvring                     | 54dB(A)   | 65dB(A)                        | Yes              |
| Hardstand Area –<br>forklifts                            | 52dB(A)   |                                | Yes              |
| Internal Activities<br>(forklift and pneumatic<br>tools) | 48dB(A)   |                                | Yes              |
| <b>Combined Noise Level</b>                              | <b>57dB(A)*</b>   |                                | <b>Yes</b>       |

\*In addition, this noise level will drop by more than 10dB(A) on completion of warehouses in the industrial area to the south of Warehouse 1 and 6.

On site operational noise is anticipated to be compliant with EPA noise emission requirements.

### **5.1.2 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.

As trucks enter/leave the premises, it is assumed that they will exit along Yarrunga Street towards Bernera Road. As there are no residences located on Yarrunga Road, the nearest noise effected residences are those located on Bernera Road, as the trucks drive towards the M7 motorway.

Predictions of noise generation are based on the following:

- An hourly generation of articulated/b-double trucks associated with Warehouse 1 and 6 of:
  - Up to 26 truck movements per hour during the day time (based 203 total vehicle movements with 13% being articulated trucks as per TTPA report dated 29 October 2017.
  - Although this is likely to occur, this peak rate of trip generation is assumed to potentially occur either during the day or night. (7am-10pm).
- Noise emissions are predicted at the building façade of the effected residences on Bernera Road.

Predicted noise levels are as follows:

**Table 10 – Noise Generated by Additional Road Traffic Assessment**

| Receiver Location                                   | Time of Day        | Predicted Noise Level – dB(A) <sub>Leq</sub> | Compliance   |
|---|--------------------|--|--|
| Residence Fronting Bernera Road (Sub-Arterial Road) | Daytime (7am-10pm) | 53dB(A) <sub>Leq(15hr)</sub>                 | Complies with 60dB(A) <sub>Leq(15hr)</sub> criteria. |
|   | Night (10pm-7am)   | 53dB(A) <sub>Leq(9hr)</sub>                  | Complies with 55dB(A) <sub>Leq(9hr)</sub> criteria.  |

The proposed use of the site is capable of meeting EPA Road Noise Policy guidelines, even with conservatively high numbers of vehicle movements assumed.

### 5.1.3 Transient Noise Events (Sleep Arousal) Assessment

Noise events occurring between 10pm and 7am should be assessed for potential sleep disturbance impacts on nearby residents.

The noise emissions at the window of the nearest residence (Kurrajong Road and Coffs Harbour Ave) are presented below.

The primary potential noise source is 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 110dB(A)<sub>L<sub>1(1min)</sub></sub> and is assumed to occur as the truck leaves a loading dock or when it leaves the site (moving from a stationary position at the internal driveway/Yarrunga Street intersection).

As detailed in Section 4.2.3 of this report, the sleep disturbance test is a two stage process, and presented below;

- Step 1 - The first step is to check if the emergence noise level meets the “background + 15” externally at the bedroom façade. As this step is non-compliant, as shown in the table below, we moved onto step two.

**Table 11 – Sleep Arousal Assessment – Background+15dB(A) Test Externally**

| <b>Receiver Location</b>     | <b>Noise Source</b>   | <b>Predicted Noise Level</b>           | <b>Emergence Test Level</b>            | <b>Complies?</b> |
|------------------------------|---|--|--|------------------|
| Kurrajong Road Residence     | Truck leaving Warehouse 1 loading dock                      | 45dB(A) <sub>L<sub>1(1min)</sub></sub> | 52dB(A) <sub>L<sub>1(1min)</sub></sub> | Yes              |
| Coffs Harbour Ave Residences | Truck Brake (internal driveway/ Yurrunga Road intersection) | 42dB(A) <sub>L<sub>1(1min)</sub></sub> | 52dB(A) <sub>L<sub>1(1min)</sub></sub> | Yes              |
| 27/28 Bernera Road Residence | Truck Brake (internal driveway/ Yurrunga Road intersection) | 37dB(A) <sub>L<sub>1(1min)</sub></sub> | 52dB(A) <sub>L<sub>1(1min)</sub></sub> | Yes              |

As step 1 has been satisfied, it is not necessary to further analyse potential sleep disturbance impacts.

## 5.2 MECHANICAL PLANT ASSESSMENT

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 required levels set out in section 5 of this report.

Given the distances from residences to Warehouses 1 and 6, compliance with noise emission requirements will be achievable with appropriate acoustic measures such as appropriate positioning of external mechanical plant, use of screening if required and quiet equipment selection if necessary.

## 5.3 CONSTRUCTION NOISE AND VIBRATION

With respect to construction noise, the impact on nearby development will be dependent on the activity in question and where on the site the activity is undertaken. Excavation and piling works tend to be the loudest typical construction activity. Work close to the northern and southern boundaries will have greatest potential impact on residential dwellings. However, a highly detailed acoustic assessment of individual activities cannot be undertaken prior to knowing the activities/construction methods proposed, and their duration and location.

We note that a review of construction noise from the site as a whole was included in the DA stage report (*Acoustic Environmental Impact Assessment*). Additional analysis, specific to Warehouses 3 and 4 is presented below:

- The loudest typical construction works (bulk excavation in rock, using pneumatic hammers) is not required.

- As such, the loudest typical construction activities are likely to be from the use of dozers (bucket attachment), concrete pumps, compaction works and in asphaltting. The sound power levels of these equipment types is typically approximately 105dB(A).
- Given the distance from Warehouses 1 and 6 to the nearest residences, it would be expected that construction noise levels will comply with the Noise Management Levels identified in table 6.
- In addition, given the distance between the site and the residences, all vibration will be comfortably compliant with the vibration criteria in table 7.

In light of the above, we recommend:

- On completion of a construction program for any given warehouse, acoustic review of proposed construction activities and plant/methods should be undertaken to identify the extent and duration of potential exceedances (if any) of EPA Noise Affected levels (ie – “background+10dB(A)”).
- Identify feasible acoustic controls or management techniques (for example, selection of plant, use of screens around static plant, scheduling of noisy works, notification of adjoining land users) when exceedance of Noise Affected levels may occur.

## 6 RECOMMENDATIONS

Acoustic analysis indicates that the proposed modification to Warehouse/Tenancy 1 is still capable of meeting EPA noise emission guidelines.

To ensure compliance with EPA noise emission requirements, we recommend:

Conduct a detailed mechanical plant noise emission assessment at construction certificate stage (once plant selections and locations are finalised). All plant should be acoustically reviewed (and designed) such that the noise emission goals in tables 2, 3 and 4 of this report are achieved.

- Conduct a detailed mechanical plant noise emission assessment at construction certificate stage (once plant selections and locations are finalised). All plant should be acoustically reviewed (and designed) such that the noise emission goals in tables 2, 3 and 4 of this report are achieved.
- On completion of a construction program for any given warehouse, acoustic review of proposed construction activities and plant/methods should be undertaken to identify the extent and duration of potential exceedances (if any) of EPA Noise Affected levels (ie – “background+10dB(A)”).

## 7 CONCLUSION

Operational noise emissions associated with the proposed s96 modification of Warehouse/Tenancy 1 and 6 in the industrial precinct at Yarrunga Street have been assessed with reference to relevant EPA and Liverpool Council acoustic guidelines.

An analysis of typical operational noise (vehicle, mechanical equipment noise) indicates that the site is capable of complying with relevant noise emission criteria.

Acoustic treatments for control of noise emissions have been presented in Section 6 of this report.

Provided that these recommendations are followed, compliant noise levels will be achieved at surrounding receivers, satisfying the requirements of the EPA Guidelines.

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