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Warehouse 1A and 1B

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1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to undertake a noise emission assessment as part of a modification application to the industrial subdivision at 34 Yarrunga Road, Prestons (the Prestons Industrial Estate).

The proposed change involves a modification of design of Warehouse 1.

This report will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact nearby developments.
- Identify relevant noise emission criteria from the conditions of consent applicable to the site (condition C29).
- Predict typical operational noise emissions as a result of the proposed changes and assess them against acoustic criteria. Where appropriate, consider the cumulative impact of existing operational noise from the site.
- If necessary, identify potential building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

2 SITE DESCRIPTION

The Prestons Industrial Estate consists of 5 industrial lots, and is bounded by Kookaburra Road North, Yarrunga Street, Bernera Road and Kurrajong Road.

The proposed modification relates to Warehouse 1 and involves toe construction of two warehouses:

- Warehouse 1A, on the eastern part of the site, which will be used by Intetrading as a logistics hub.
- Warehouse 1B, on the western part of the site, which will consist of a speculative warehouse (tenant unknown at this stage).

The site will contain a loading dock along its southern side. The loading dock to warehouse 1A will be accessed via an internal roadway to the east of the site, and the loading dock to warehouse 1B will be accessed via an internal roadway to the south of the site (“Estate Road”).

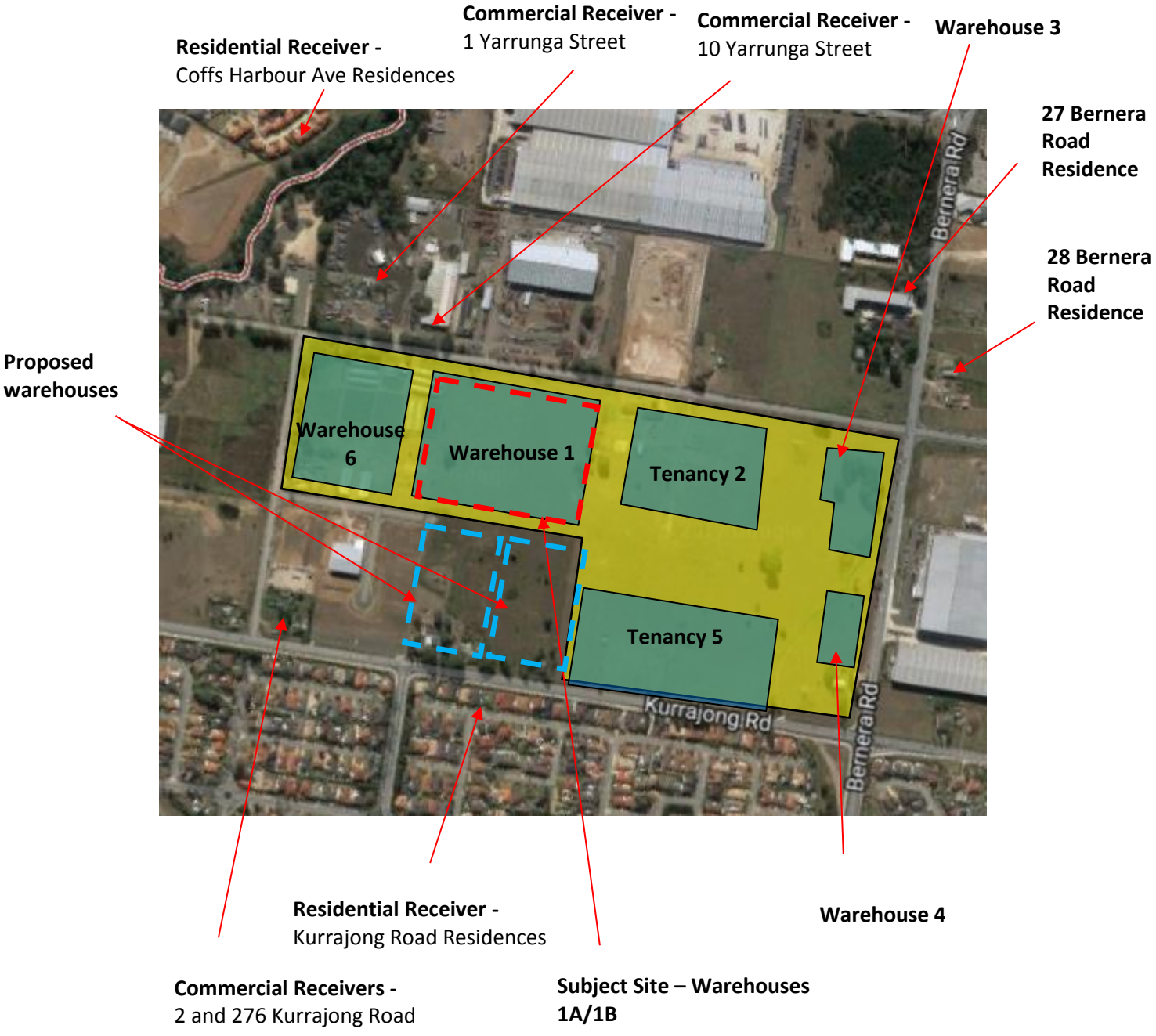
Warehouse 1A has an on grade car park for 88 passenger vehicles and Warehouse 1B has an on grade car park for 62 passenger vehicles.

The nearest noise sensitive developments to the site are the residences to the south, on Kurrajong Road. While there are also residences a similar distance away to the north-west and north-east (Coffs Harbour Ave and Bernera Road residences respectively), it is the Kurrajong Road residences which are the most potentially impacted as they directly face the loading dock.

We note that there is lapped and capped boundary fencing along the northern boundary of these properties (facing Kurrajong Road). This fencing provides noise screening to the ground floor and outdoor open space areas of the developments, however we note that one of these dwellings (15 Huskisson Street) is double storey and the first floor windows overlook the boundary fencing.

We also note that there are two new warehouses proposed to be constructed to the immediate south of the site.

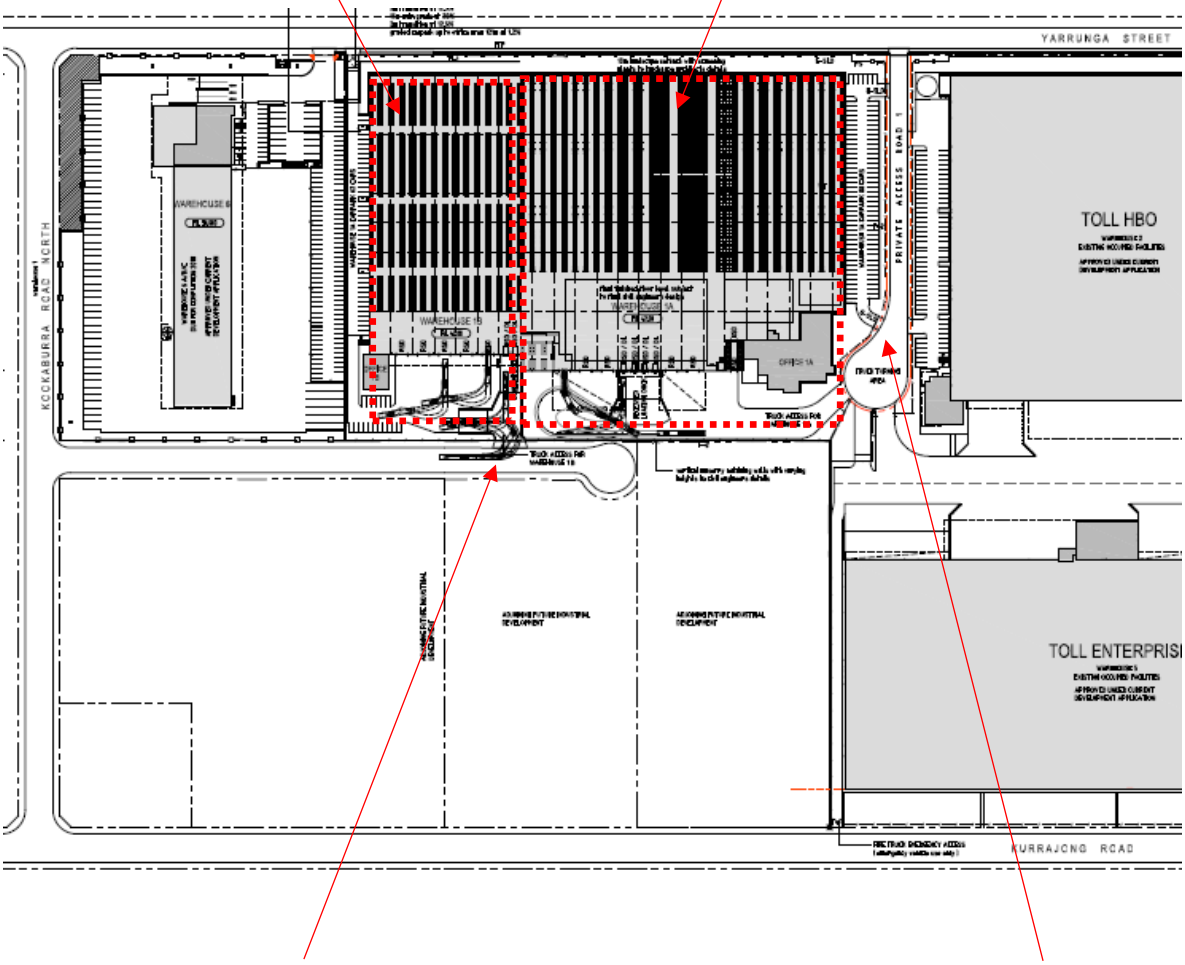
See aerial photograph below.



The site layout is as follows:

Warehouse 1B (Speculative)

Warehouse 1A (Intertrading)



Dock Accessed via Estate Road

Dock Accessed via Internal Road to Yarrunga Street

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 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_1, L_{90} and L_{eq}.

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 GOALS

4.1 OPERATIONAL NOISE

Noise emission limits for the site are set in condition of consent C29 to SSD 7155 and are as follows:

Table 1 – Condition of Consent C29

Location	Time of Day		
	Daytime (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am)**
All Residential Receivers	48dB(A)$L_{eq(15min)}$	48dB(A)$L_{eq(15min)}$	42dB(A)$L_{eq(15min)}$ 52dB(A)$L_{1(1min)}$

4.2 CONSTRUCTION NOISE AND VIBRATION CRITERIA

4.2.1 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)$L_{eq(15min)}$for work during standard construction hours (7am-6pm Monday to Friday and 8am to 1pm on Saturdays) and
    - 5dB(A)$L_{eq(15min)}$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)$L_{eq(15min)}$ at nearby residences.

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

Table 2 – Construction Noise Emission Goals

Location	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
Residences	53 (Standard Construction Hours)	75
Commercial	70	N/A
Industrial	75	N/A

4.2.2 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 3 – Construction Vibration Goals

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

5 NOISE EMISSION ASSESSMENT

An assessment of typical operational and construction noise is presented below in order to demonstrate that 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).
- An assessment of noise from mechanical plant.
- A preliminary assessment of construction noise and vibration.

In addition, to ensure that the proposed use of the site does not results in cumulative noise impact, a survey of existing operational noise was conducted.

5.1 SURVEY OF EXISTING OPERATIONAL NOISE

The proposed development relates to Lot 1. As discussed in section 2, it is the residences to the south of the industrial subdivision (on Kurrajong Road) that are the most potentially impacted, as they have line of sight to the south facing loading dock (the primary noise source from the site). It is existing Warehouse 5 that is closest to these residences on Kurrajong Road.

With respect to warehouse 5:

- Warehouse 5 has its loading docks inbound from Kurrajong Road. As such, the loading docks are completely shielded from the residences on Kurrajong road by Warehouse 5 itself. Further, a proposed expansion to the western end of Warehouse 5 will actually provide acoustic benefit with respect to the existing Warehouse 5 loading dock, as it will partially close of the dock along its western edge.
- The only noise source associated with current operation of Warehouse 5 that has the potential to cause a cumulative noise impact to the Kurrajong Road residences would be noise emission from the warehouse itself. In this regard we note:
    - A survey of warehouse noise was conducted on 10 August 2018. Measurements were made using a Norsonic 140 Type 1 sound analyser set on A-weighted fast response mode.
    - The survey was conducted during the daytime (between 10am and 12pm) as Warehouse 5 does not currently operate 24 hours per day.
    - Noise measurements were made on the warehouse shop floor during a typical peak period of operation (with conveyer belts, forklifts and ancillary machinery being the primary noise sources. The sound pressure level measured as a spatial average on the shop floor was approximately 65dB(A)$L_{eq(15min)}$.
    - Additional measurements were then made on at the Kurrajong Road residences (5-11 Huskisson Road). Noise emanating from the Warehouse 5 was inaudible at the Huskisson Road boundary in a 45dB(A)L_{90} noise environment. This indicates that noise emanating

from Warehouse 5 must be below 35dB(A)L_{eq} at Kurrajong Road, and easily compliant with the noise emission goals identified in table 1.

- Being comfortably below the current noise emission limit, provided that the use of Warehouse 1 is compliant with the noise limits in Table 1, then there is no risk that cumulative noise impacts will result in an exceedance of the guidelines.

- Further, we note that there are two new warehouse proposed to be constructed to the immediate south of the loading dock (refer to aerial photo in section 2). These warehouses, once constructed, will provide significant additional noise screening (at least 10dB(A)) to the residences to the south.

5.2 NEW 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.

5.2.1 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) and an airbrake noise level of 114dB(A)$L_{1(1min)}$.

  - A forklift (electric) sound power of 90dB(A).

  - Passenger vehicle noise level of 84dB(A)L_{eq} from the car engine when manoeuvring in the car park and 90dB(A)$L_{1(1min)}$ from a car start/door close.

- Four articulated truck 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).

The critical residences to consider from an acoustic viewpoint are those on Kurrajong Road, just to the west site (25-35 Huskisson Street). This is because those directly south of the site will be screened from the loading docks by the proposed warehouse itself, however those at 25-35 Huskisson Street will potentially have a line of site to the loading docks on the western boundary of the site.

Predictions take into account:

- Distance correction (hemispherical noise propagation and air attenuation).
- The noise screening provided by boundary fencing to the site (see recommendations in section 7).

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.

Both the 15 minute average and the peak ($L_{1(1min)}$) noise levels are assessed.

Table 4 – Operational Noise Assessment t Residences to the South (25-35 Huskisson Street)

Noise Source	**Predicted Noise Level dB(A)$L_{eq(15min)}$**	**Permissible Noise Level**	**Complies?**
Truck Ingress/egress/ manoeuvring	37dB(A)	42dB(A)$L_{eq(15min)}$	Yes
Hardstand Area – forklifts	32dB(A)		Yes
Internal Activities (forklift and pneumatic tools)	30dB(A)		Yes
Combined Noise Level	**38dB(A)**		**Yes**

Table 5 – Operational Noise Assessment t Residences to the South (25-35 Huskisson Street)

Noise Source/ Location	Predicted Noise Level	Permissible Noise Level	Complies?
Truck Ingress/egress/ manoeuvring	46dB(A)$L_{1(1min)}$	52dB(A)$L_{1(1min)}$	Yes
Car start/Door Close (Passenger Vehicle Car Park)	50dB(A)$L_{1(1min)}$	<30dB(A)$L_{1(1min)}$	Yes

The site is capable of complying with noise emission requirements.

In the event that 24 hour use of the loading docks is proposed, the noise mitigation measures in section 6 are recommended.

5.3 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 levels required by Consent Condition of C29.

Compliance with noise emission requirements will be achievable with appropriate acoustic treatment. It is unlikely that any large externally located equipment (even if used at night) will require acoustic treatment.

We note:

- Primary external mechanical plant is likely to consist of air-conditioner condensers serving office areas and smoke exhaust fans.

- Condensers serving office areas will typically have a sound pressure level of no more than 65dB(A) at 1m distance, and will not require any form of acoustic treatment to ensure compliant noise emissions.

- Smoke exhaust fans used for the purpose of ventilation (relief air mode) will not require any form of acoustic treatment provided that they have a sound pressure level of no more than 75 dB(A) at 3m distance. In the event that fans exceed this noise level, acoustic treatment to the fan discharge (internally lined ducting or acoustic attenuator) will be required.

- Any externally located back up diesel generator is to have a noise level of no more than 75dB(A) at 7m distance.

- If an occupant of the warehouse expansion were to install large external equipment which is operated at night time (such as refrigeration plant), in the event that the sound power of the plant exceeds 90dB(A), it is likely that a noise screen around the equipment item will be required (such that the line of sight between the equipment item and any residence is broken).

5.4 CONSTRUCTION NOISE AND VIBRATION

We note that a review of construction noise from the industrial subdivision as a whole was included in the DA stage reporting (*Acoustic Environmental Impact Assessment* by Acoustic Logic dated 22/2/2016 Revision 5). Additional analysis, specific to the proposed expansion 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 asphalting. The sound power levels of these equipment types is typically approximately 105dB(A).

- Given the distance from site the nearest residences, it would be expected that construction noise levels will generally comply with the Noise Management Levels identified in table 2.

- In addition, given the distance between the site and the residences, all vibration will be comfortably compliant with the vibration criteria in table 3.

In light of the above, we recommend:

- On completion of a construction program, 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, notification of adjoining land users) when exceedance of Noise Management Levels may occur.

6 RECOMMENDATIONS

Acoustic analysis indicates that the proposed modification works is capable of meeting noise emission requirements in condition of consent C29.

However to ensure compliance, we recommend:

- Forklifts used in external areas should consist of electric and gas. In the event that a prospective tenant proposes to use diesel forklifts, a detailed noise emission assessment to justify this use should be included in any development application for use of the site.

In addition:

- 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 Warehouses 1A and 1B at the Prestons Industrial Estate have been assessed with reference to condition of consent C29.

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 condition C29.

Please contact us if you have any queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Thomas Taylor