# Building Supplies Warehouse – 57-59 Myoora Road, Terrey Hills - DA Acoustic Assessment

## Hardware General (HG)

C/o: Vaughan Milligan Development Consulting Pty Ltd

20110 – 57-59 Myoora Road, Terrey Hills – DA Acoustic Report – Revision 2

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# Building Supplies Warehouse – 57-59 Myoora Road, Terrey Hills - DA Acoustic Assessment

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# 1 INTRODUCTION

Pulse Acoustic Consultancy Pty Ltd (Pulse Acoustics) has been engaged by Hardware General (HG) to undertake an acoustic assessment of the proposed change of use & minor fit out works for the use of the site as a building supplies warehouse to be located at 57-59 Myoora Road, Terrey Hills.

We have been advised that the project site(s) have individually submitted Development Applications (DA) for the proposed change of use and minor works as per the following:

- 57 Myoora Road, Terrey Hills – DA2020-0264; and
- 59 Myoora Road, Terrey Hills – DA2020-0263.

However, the commissioning and assessment which is outlined below has been conducted as a combined assessment looking at the holistic operation of the two sites. This has been undertaken to specifically address the comments raised by Northern Beaches Council Environmental Health Unit, these include:

**DA2020/0263 – Environmental Health Unit Response:**

***Noise***

*One of the objectives of the Warringah Development Control Plan 2011 is: "To ensure that noise emission does not unreasonably diminish the amenity of the area or result in noise intrusion which would be unreasonable for occupants, users or visitors". Whilst the Statement of Environmental Effects (SEE) mentions that the development "will not have any direct or unreasonable impact on the nearby residential properties", no reliable evidence was submitted with the application to support this claim (e.g. an acoustic assessment completed by a suitably-qualified acoustic engineer/consultant).*

*Environmental Health has concerns regarding several aspects of the proposal in relation to noise:*

- *Operational hours – Previous development approvals for the property have not permitted operational activities to commence prior to 7am. The applicant is seeking to commence operations at 6am Monday - Saturday. The NSW Industrial Noise Policy (NSW EPA, 2000), classifies the period between 6am and 7am as 'night' or 'shoulder' due to the potential for less background noise. During periods of lower background noise, operational activities will have greater impact on the amenity of the area and must be appropriately assessed.*
- *The SEE states that the premises will be 'closed to the public' on Sundays and Public Holidays. This statement implies that the premises may be operational in a restricted manner on Sundays and Public Holidays. Further clarification is required as to what activities will be occurring on the premises on Sundays and Public Holidays.*
- *Adjoining Site – 57 Myoora Road - The applicant has submitted a separate proposal for the adjoining site at No. 57 Myoora Road, which will also be used as warehouse facility for building and hardware products. Whilst these proposals are presented independently, the SEE for each site lists the same business function, operational hours and primary products and acknowledges that some cross over between properties will be required for 'access etc.'.*
- *Environmental Health believes that the two sites should be considered as one development when assessing the impact of noise on nearby properties.*

- *The assessment looks at the potential noise emissions to nearby receivers from vehicle movements, loading and unloading activities. This report will discuss the acoustic criteria which have been adopted as well as the outcome of the assessment.*

- *Site Plan - The site plan indicates that racks will be erected outside the building adjacent to 3 of the 4 property boundaries. There is only 12 metres between the racks on the boundary with Council's reserve and the nearest residential building. Noise created by stocking and accessing items on outdoor racks must be considered in an acoustic assessment. Previous approvals restricted the storage of goods to the confines of the building.*

**DA2020/0264 – Environmental Health Unit Response:**

*No acoustic report has been provided with the development application to address the increase in hours of operation. The effect of noise from this site has the potential to be significant due to the presence of predominantly hard surfaces and direct residential receivers.*

*Should the applicant choose to retain the existing hours of operation from the previous consent Environmental Health would have no objections to the development. The proposed hours of operation are not in line with the Industrial noise policy section A3 "Dealing with 'shoulder' periods". The noise guide for industry further states that daytime hours are from 7am to 6pm.*

In relation to the above comments above we note the following:

- As mentioned above, the acoustic assessment outlined below address the operation of both 57 and 59, however as both sites are individually titled, recommendations for each site are provided.

- Clarification has been provided for the proposed operating hours of the facility (as instructed from the operators) are as follows:

    - Monday to Friday:

        - Staff Arrival from 6:00am.

        - Hardware General trucks to be loaded indoors between 6:00am and 7:00am (no customers between these hours). The trucks being loaded indoors will not move between 6:00am and 7:00am.

        - Customer trading between 7:00am and 5:00pm, including additional loading and unloading of Hardware General and supplier trucks.

        - Hardware General and supplier trucks to be loaded/unloaded between 5:00pm to 6:00pm (no customers between these hours).

        - Facility closed at 6:00pm.

    - Saturday:

        - Customer trading between 8:00am and 4:00pm including additional loading and unloading of Hardware General Trucks (no supplier deliveries)

    - Sunday and Public Holidays:

        - Closed.

- Several references to the NSW EPA *Industrial Noise Policy (INP) 2000* are throughout the response material, this assessment has not been undertaken in reference to this document. As in 2017 the NSW EPA superseded the INP with the NSW EPA *Noise Policy for Industry (NPI)* and therefore will be addressed in this assessment in lieu of the INP.

A list of acoustic terminology used in this report is included in Appendix A of this report.

## 1.1 Relevant Guidelines

After the Local Government (Council Amalgamations) Proclamation in 2016 Warringah Council was merged with Manly and Pittwater Councils to from the new Northern Beaches Council. Northern Beaches Council has not release a new amalgamated Local Environmental Plan (LEP) or Development Control Plan (DCP), as such the previous LEP/DCP of Warringah Council is applicable to the site.

Additionally, as mentioned above, acoustic criteria which have been adopted in this assessment will also include requirements from the NSW EPA *Noise Policy for Industry (NPI) 2017*.

## 1.2 Site Description

The project site is located at across two parcels of land 57 Myoora Road Terrey Hills (DP530175) and 59 Myoora Road Terrey Hills (DP547022). The site is located within a Light Industrial Area (IN2) as per the Northern Beaches Council (Formerly Warringah Council) Land Zoning Maps.

Located along the northern boundary of the site is a Public Recreation (RE1) area with R2 residential situated further north along both Myoora Road and Carramar Grove. Along the eastern boundary of the site is Myoora Road with more R2 residences located further east. Approximately 110m south of the 57 Myoora Road boundary is more R2 residences.

Along the immediate southern boundary of 57 Myoora Road is more Light Industrial (IN2) as well as the western boundary of both properties.

The nearest sensitive receivers to the site have been identified below.

**Receiver 1:** Residential dwellings located to the north of the site across the Public Recreation area, situated at 61-63 Myoora Road and 4-5 Carramar Grove, Terrey Hills;

**Receiver 2:** Residential dwellings located to the east of the site across Myoora Road, situated at 16 Bindook Crescent and 92 Myoora Road, Terrey Hills;

**Receiver 3:** Residential dwelling located to the southeast of the site across Myoora Road, situated at 19 Bindook Crescent, Terrey Hills; and

A map showing the site location and all measurement locations as well as nearest receivers is provided in Figure 1 below.

**Figure 1 Site Map, Measurement Locations and Surrounding Receivers – Sourced from SixMaps NSW**

# 2 ACOUSTIC SURVEY

Measured noise levels from an unattended and attended noise survey conducted at the monitoring locations indicated in the Figure 1 above, are discussed below. It is noted that traffic volumes on the local road network have been affected by the government imposed social distancing policy (i.e. COVID-19). This will result in background noise levels that are lower that otherwise would be expected, resulting in conservative noise emission criteria. Compliance with these conservatively determined criteria is positive indications that noise emission levels are unlikely to be objectionable.

An unattended noise survey was conducted between Friday 29th May 2020 and Friday 5th June 2020 at the location shown in Figure 1 above. During the monitoring period a malfunction with the unit occurred and only 24 hours of valid data was recorded. To supplement the affected results an attended operator noise measurement was conducted during the morning period on Sunday 14th June 2020.

Instrumentation for the unattended noise survey comprised of one Svan 971 noise logger (serial number 74365). Calibration of the logger was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Instrumentation for the attended noise survey comprised of a Bruel and Kjaer 2270 class 1 sound level meter (serial number 2679267). Calibration of the meter was checked prior to and following the measurements. Drift in calibration did not exceed ±0.1 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured unattended daily noise data are attached in Appendix B. The charts present each 24-hour period and show the $L_{A1}$, $L_{A10}$, $L_{Aeq}$ and $L_{A90}$ noise levels for the corresponding 15 minute periods. This data has been filtered to remove periods affected by adverse weather condition, as report by the nearest Bureau of Meteorology weather station.

## 2.1 Results in accordance with the NSW EPA *Noise Policy for Industry* (NPI, 2017) (Site Noise Emissions)

In order to assess the acoustical implications of the development at nearby noise sensitive receiver locations, the measured background noise data collected by the logger was processed in accordance with the NSW EPA's *Noise Policy for Industry* (NPI, 2017).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver location. It is the 90th percentile of the daily background noise levels during each assessment period, being day, evening and night. RBL $L_{A90\ (15minute)}$ and $L_{Aeq}$ noise levels are presented in Table 1 below.

Data affected by adverse meteorological conditions and by spurious and uncharacteristic events have been excluded from the results, and also excluded from the data used to determine the noise emission criteria. Meteorological information has been obtained from the Terrey Hills weather station (ID: 066059).

**Table 1 Measured Unattended Ambient Noise Levels corresponding to the NPI's Assessment Time Periods**

| Measurement Location | Daytime[1] 7:00 am to 6:00 pm | | Evening[1] 6:00 pm to 10:00 pm | | Night-time[1] 10:00 pm to 7:00 am | | Early Morning Shoulder Period 6:00 am to 7:00 am | |
|---|---|---|---|---|---|---|---|---|
| | $L_{A90}$[2] (dBA) | $L_{Aeq}$[3] (dBA) | $L_{A90}$[2] (dBA) | $L_{Aeq}$[3] (dBA) | $L_{A90}$[2] (dBA) | $L_{Aeq}$[3] (dBA) | $L_{A90}$ (dBA) | $L_{Aeq}$ (dBA) |
| 57-59 Myoora Road, Terrey Hills – See Figure 1. | 43 | 59 | 34 | 54 | 30 | 47 | 40 | 60 |

*Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.*

*Note 2: The $L_{A90}$ noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.*

*Note 3: The $L_{Aeq}$ is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.*

***Note 4: Based on the 24 hours' worth of valid data.***

As discussed above, a malfunction with the unattended monitoring equipment occurred. To supplement the monitoring an attended noise survey was conducted during the typical quietest time over the weekend period, Sunday morning. Results of the attended noise survey are outlined below.

**Table 2 Measured Attended Ambient Noise Levels**

| Measurement Location | Sunday 14th June 2020 – 10:30am to 10:45am | |
|---|---|---|
| | $L_{A90}$[2] (dBA) | $L_{Aeq}$[3] (dBA) |
| Southern Boundary (Bindook Crescent) – 16 Bindook Crescent, Terrey Hills - See Figure 1. | 41 | 54 |

*Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.*

*Note 2: The $L_{A90}$ noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.*

*Note 3: The $L_{Aeq}$ is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.*

The results from the measurement survey also provided ambient noise levels that are considered to be representative of the levels to be expected at the nearest and most affected residences to the proposed development.

### 2.1.1 Results in accordance with the NSW EPA *Road Noise Policy (RNP) 2011* (Noise on Surrounding Roads)

In determining the noise impacts on local road due to the increase in traffic will be assessed against the NSW EPA's *Road Noise Policy* (RNP, 2011), different time periods to those use in the EPA's NPI are used. The measurement results are therefore also presented below in accordance with the relevant time periods outlined in the RNP.

Data affected by adverse meteorological conditions and by spurious and uncharacteristic events have been excluded from the results, and also excluded from the data used to determine the noise emission criteria.

**Table 3 Measured Ambient Noise Levels corresponding to the RNP Assessment Time Periods**

| Measurement Location | Daytime [1] 7:00 am to 10:00 pm | Night-time [1] 10:00 pm to 7:00 am |
|---|---|---|
| | $L_{Aeq}$ [2] (dBA) | $L_{Aeq}$ [2] (dBA) |
| 57-59 Myoora Road, Terrey Hills – See Figure 1. | 58 | 47 |

*Note 1: For Monday to Saturday, Daytime 7:00 am – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 10:00 pm; Night-time 10:00 pm – 8:00 am.*

*Note 2: The $L_{Aeq}$ is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.*

***Note 3: Based on the 24 hours' worth of valid data.***

# 3 ACOUSTIC CRITERIA

The acoustic criteria which have been adopted for this assessment are outlined below.

## 3.1 Noise Emission Criteria (Operation)

Noise emissions from the operation of the site impacting on the adjacent land users are outlined below. Noise emissions expected from the use of the site include:

- Carpark vehicle movements and associated activities (such as forklifts, vehicle engines starting, doors slamming etc.);
- Use of the associated carpark driveway;
- Mechanical services associated with the development, including a/c condensers, exhaust systems, fresh air supply, etc.; and
- Noise impacts on surrounding roads.

### 3.1.1 Northern Beaches Council (Formerly Warringah Council) Development Control Plan (DCP) 2011

Section D3 of the Warringah Council DCP 2011 states the following:

> ***D3 Noise***
>
> *Requirements*
>
> 1. *Noise from combined operation of all mechanical plant and equipment must not generate noise levels that exceed the ambient background noise by more than 5dB(A) when measured in accordance with the NSW Industrial Noise Policy at the receiving boundary of residential and other noise sensitive land uses.*
>
> See also NSW Industrial Noise Policy Appendices
>
> 2. *Development near existing noise generating activities, such as industry and roads, is to be designed to mitigate the effect of that noise.*
> 3. *Waste collection and delivery vehicles are not to operate in the vicinity of residential uses between 10pm and 6am.*
> 4. *Where possible, locate noise sensitive rooms such as bedrooms and private open space away from noise sources. For example, locate kitchens or service areas closer to busy road frontages and bedrooms away from road frontages.*
> 5. *Where possible, locate noise sources away from the bedroom areas of adjoining dwellings/properties to minimise impact.*

**Note:** As mentioned afore, the NSW EPA's *Industrial Noise Policy (INP) 2000* was superseded by the introduction of the *Noise Policy for Industry (NPI) 2017* and will be adopted for this assessment, see below.

### 3.1.2 NSW EPA Noise Policy for Industry (NPI) 2017

In NSW, the control of noise emissions is the responsibility of Local Governments and the NSW Environment Protection Authority (NSW EPA).

The NSW EPA has recently released a document titled *Noise Policy for Industry* (NPI) which provides a framework and process for establishing external noise criteria for the assessment of noise emissions from industrial developments. The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

#### 3.1.2.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source ($L_{Aeq}$), measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

#### 3.1.2.2 Protecting Noise Amenity (All Receivers)

To limit continuing increase in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient $L_{Aeq}$ noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

Project amenity noise levels for industrial developments are specified as the recommended amenity noise level (Table 2.2 of the NPI) minus 5 dB(A). To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the $L_{Aeq,15min}$ will be taken to be equal to the $L_{Aeq,period}$ + 3 decibels (dB).

Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level, the project amenity noise level can be set at 10 dB below existing industrial noise level.

#### 3.1.2.2.1 Area Classification

The NSW NPI characterises the "Urban Residential" noise environment as an area that has through-traffic with characteristically heavy and continuous flows during peak periods, has an urban hum made up from industrial and traffic sources and is near commercial or industrial districts. Due to the location of the nearest residential receivers in the vicinity of the industrial precinct, as well as the existing acoustic environment, the urban residential noise description is most applicable.

Figure 2 is obtained from the Northern Beaches Council (Formerly Warringah Council) Land Environment Plan (LEP) and shows the land zoning map of the proposed development and the nearest sensitive receivers. For residential and non-residential receivers in a Urban Residential area, the recommended amenity criteria are shown in Table 4 below.

When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

**Figure 2 Warringah Council LEP Land Zoning Map (LZN) 6 – LZN-006**

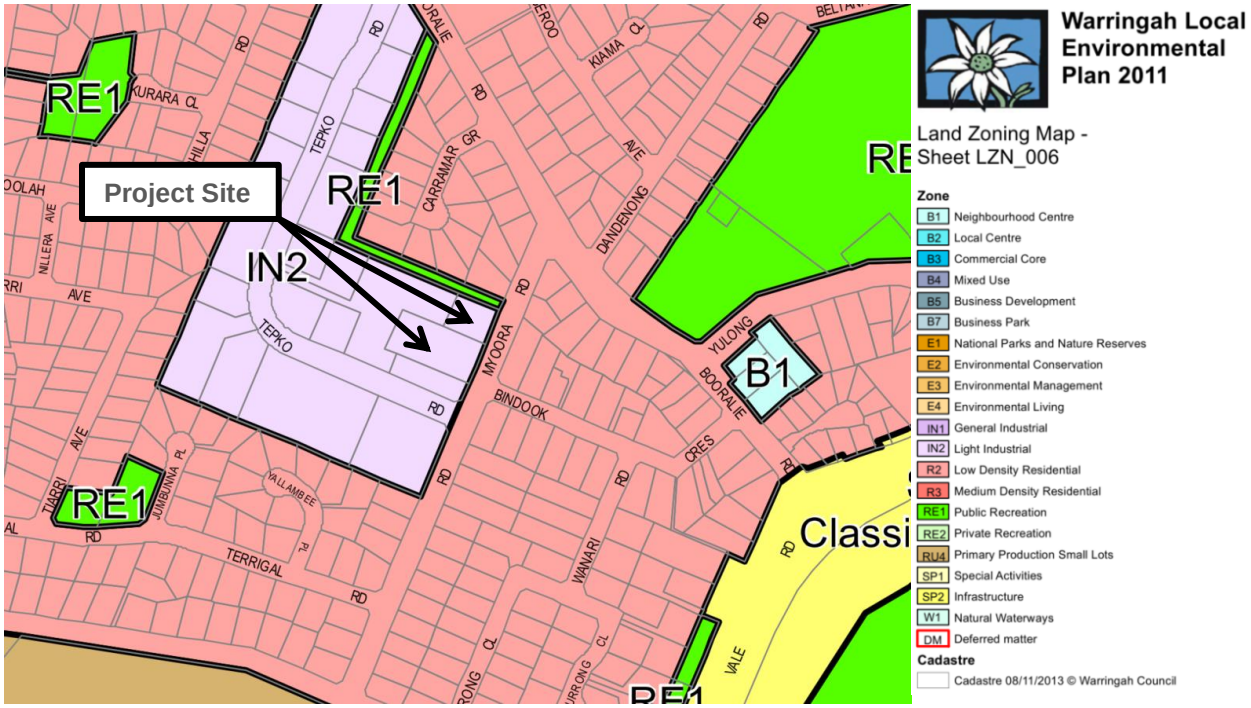


**Table 4 NSW NPI – Recommended $L_{Aeq}$ Noise Levels from Noise Sources**

| Type of Receiver | Indicative Noise Amenity Area | Time of Day[1] | Recommended Amenity Noise Level ($L_{Aeq, period}$)[2] (dBA) |
|---|---|---|---|
| Residence | Urban | Day | 60 |
| | | Evening | 50 |
| | | Night | 45 |
| Industrial | | When in use | 70 |

*Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am*

*Note 2: The $L_{Aeq}$ is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound*

#### 3.1.2.3 Maximum Noise Event (Sleeping Disturbance) – Residents Only

An accurate representation of sleep disturbance impacts on a community from a noise source is particularly difficult to quantify mainly due to differing responses of individuals to sleep disturbance – this is found even within a single subject monitored at different stages of a single night's sleep or during different periods of sleep.

In addition the differing grades of sleep state make a definitive definition difficult, and even where sleep disturbance is not noted by the subject, factors such as heart rate, mood and performance can still be negatively affected.

An assessment of sleep disturbance should consider the maximum noise level or $L_{A1(1\ minute)}$, and the extent to which the maximum noise level exceeds the background level and the number of times this may happen during the night-time period. Factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur;
- Time of day (normally between 10.00pm and 7.00am); and
- Whether there are times of day when there is a clear change in the existing noise environment (such as during early morning shoulder periods).

Section 2.5 of the EPA NPI provides the following criteria:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- $L_{AFmax}$ 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

#### 3.1.2.4 Project Trigger Noise Levels

The intrusive and amenity criteria for industrial noise emissions from the proposed development, derived using the measured noise level data, are presented in Table 5. These criteria are nominated for the purpose of determining the operational noise limits for mechanical plant and activities associated with the development which could potentially affect noise sensitive receivers.

For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive criteria are adopted. These controlling criteria are shown in bold text in Table 5.

**Table 5 External noise level criteria in accordance with the NSW NPI**

| Receiver Type | Time of Day [1] | Project Amenity Noise Level, $L_{Aeq, period}$ (dBA) | Measured $L_{A90, 15\ min}$ (RBL) [2] (dBA) | Measured $L_{Aeq, period}$ Noise Level (dBA) | Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) | Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) |
|---|---|---|---|---|---|---|
| Residential Receiver | Early Morning Shoulder Period | 45 | 40 | 60 | 45 | **43** |
| | Day | 60 | 41 | 54 | **46** | **46** |
| Industrial Receiver | When in use | 70 | N/A | N/A | N/A | **67** |

*Note 1: For Monday to Friday, Early Morning Shoulder Period is 6:00 am – 7:00 am; Monday to Saturday Daytime is 7:00 am – 6:00 pm.*

*Note 2: $L_{A90}$ Background Noise or Rating Background Level.*

*Note 3: Project Noise Trigger Levels are shown in bold.*

### 3.1.3 NSW EPA Road Noise Policy (RNP) 2011

In order to determine the noise impact on local roads, the future traffic generated by the proposed site is compared with the existing traffic. The noise impact on residences from local road traffic is considered significant if the vehicle number on surrounding roads increases by around 60% of the existing traffic volumes (this would result in an increase in traffic noise by 2 dB).

# 4 ACOUSTIC ASSESSMENT

## 4.1 Operational Noise Emissions

Noise emissions from the operation of the site need to comply with the requirements listed in section 3.1. Noise from the use of the site has been separated into four components:

- Vehicle movements in all hard stand areas and associated loading activities (i.e. forklift movements, passenger vehicle movements and truck movements);
- Early morning period noise assessment (i.e. sleeping disturbance assessment);
- Noise impacts on surrounding roads; and
- Mechanical services associated with the development, including any applicable a/c condensers, exhaust systems, fresh air supply, etc.

Each component is discussed below.

### 4.1.1 Vehicles Manoeuvring Around the Hard Stand Areas

Noise from all vehicles manoeuvring around the site has been assessed, the assessment has been based on the following assumptions:

- Passenger vehicle at low speed with a noise level of 84 dBA (Lw);
- Rigid flat tray truck at low speed with a noise level of 97 dBA (Lw);
- Electric forklift with a noise level of 80dBA (Lw); and
- Driveways, parking bays, loading bays and warehouse entry points as shown in the architectural drawings.

For the early morning arrival of staff and internal loading activities, a specific sleeping disturbance has been undertaken in section 0.

The assumptions made for this assessment and the noise control recommendations for vehicles manoeuvring around the facility are indicated below:

**Both Sites (57 & 59 Myoora)**

- All stationary vehicles should switch off their engine;
- All external racking around the site is required to have a solid backing;
- No truck or forklift movements should occur outside before 7:00am. Stationary trucks may be packed indoors between 6am and 7am. Truck movements should be coordinated prior to the closing of the previous business day in preparation of the loading the following morning; and
- All Hardware General trucks and forklifts which require some form of reversing alarm should use a Quackers alarm, as oppose to a typical tonal reversing alarm.

**57 Myoora Street**

- No more than 10 passenger vehicles entering or exiting the facility in any single 15-minute interval;
- No more than 1 Rigid Flat Tray Truck during any single 15-minute interval. (Only after 7:00am); and
- No more than 1 electric forklift in use during any single 15-minute interval. Not to be operated externally before 7:00am.

**59 Myoora Street**

- No more than 7 passenger vehicles entering or exiting the facility in any single 15-minute interval;
- No more than 1 Rigid Flat Tray Truck during any single 15-minute interval. (Only after 7:00am); and
- No more than 1 electric forklift in use during any single 15-minute interval. Not to be operated externally before 7:00am.

**Table 6 Predicted Noise Level from Vehicles Maneuvering around the site**

| Receiver Location | Predicted Noise Level dBA $L_{Aeq\ 15\ minutes}$ | Criteria dBA $L_{Aeq\ 15\ minutes}$ | Compliance? |
|---|---|---|---|
| Receiver 1 - 61-63 Myoora Road and 4-5 Carramar Grove, Terrey Hills | 37 (No trucks) | 43 (Shoulder Period) | Yes |
| | 46 | 46 (Day Period) | Yes – See Acoustic Treatments below |
| Receiver 2 - 16 Bindook Crescent and 92 Myoora Road, Terrey Hills | 41 (No trucks) | 43 (Shoulder Period) | Yes |
| | 47 | 46 (Day Period) | Partial – A Marginal Exceedance [2] |
| Receiver 3 - 19 Bindook Crescent, Terrey Hills | <35 (No trucks) | 43 (Shoulder Period) | Yes |
| | <35 | 46 (Day Period) | Yes |

*Note 1: Predicted noise levels are based on the scenario above.*

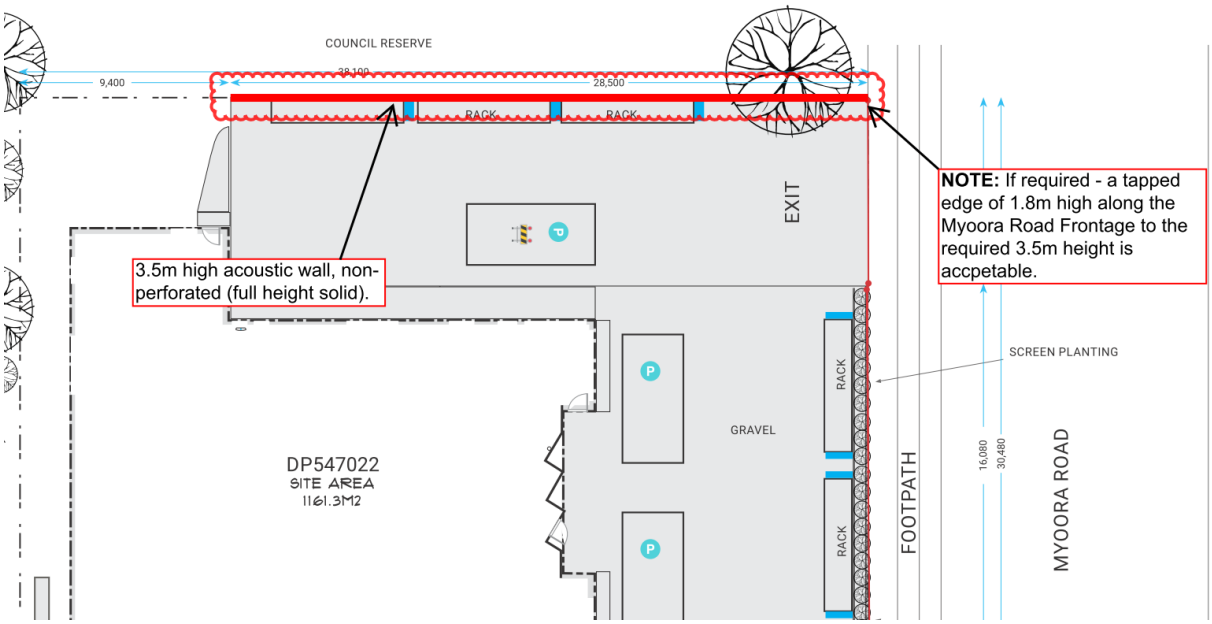
*Note 2: A marginal exceedance of 1dBA has been predicted. In accordance with section 4.2 of the NSW EPA NPI, a exceedance of less than or equal to two (2) dBA is considered negligible and no further acoustic treatments are needed.*

Assessment of vehicle movements in and around the site has been assessed above. From our analysis, a combination of building acoustic treatment and management controls are needed, a summary of these are outlined below:

- No truck movements are recommended between 6:00am and 7:00am. Trucks parked inside the warehouse may be packed between 6:00am and 7:00am. ;
- No onsite customer parking before 7:00am;
- No more than 10 passenger vehicles < 4.5T (GVM), in any 15-minute interval for 57 Myoora Road between;

- No more than 7 passenger vehicles < 4.5T (GVM), in any 15-minute interval for 59 Myoora Road;
- No more than 1 Rigid Flat Tray Truck in any 15-minute interval for 57 Myoora Road;
- No more than 1 Rigid Flat Tray Truck in any 15-minute interval for 59 Myoora Road;
- Reversing alarms for all Hardware General trucks should include a “quacker” type reversing alarm;
- The sites management plan should include all noise related conditions;
- All staff operating the forklifts should be trained and made aware of the sensitive noise conditions;
- An acoustic wall should be constructed along the northern boundary of 59 Myoora Road. As per the following:
    - A height of 3.5m is required;
    - Location of the acoustic wall is shown in Figure 3 below.
    - Acoustic wall should be a solid construction and not contain any penetrations. Either a 9mm Fibre Cement Sheeting construction or an Autoclaved Aerated Concrete (AAC) can be used for the construction of the wall.

**Figure 3 Location of Northern Boundary Acoustic Wall**



### 4.1.2 Early morning period noise assessment (i.e. sleeping disturbance assessment)

In addition to the assessment outlined above, as the two sites wish to operate (without customers) between 6:00am and 7:00am, a sleeping disturbance assessment should be undertaken. This is to be undertaken based on the maximum noise levels outlined in section 3.1.2.3.

Utilising the above building and management controls which are required, the results of a maximum noise level event of passenger vehicles arriving between 6:00am and 7:00am is outlined below.

As the cars are arriving onsite the noise event assessed below is a car door slam with a Sound Power Level of 90dBA.

**Table 7 Predicted Noise Level from Vehicles Maneuvering around the site**

| Receiver Location | Predicted Noise Level dBA $L_{Max}$ | Criteria dBA $L_{Max}$ | Compliance? |
|---|---|---|---|
| Receiver 1 - 61-63 Myoora Road and 4-5 Carramar Grove, Terrey Hills | 51 | 53 (Shoulder Period) | Yes |
| Receiver 2 - 16 Bindook Crescent and 92 Myoora Road, Terrey Hills | 52 | 53 (Shoulder Period) | Yes |
| Receiver 3 - 19 Bindook Crescent, Terrey Hills | <35 | 53 (Shoulder Period) | Yes |

*Note 1: Predicted noise levels are based on the scenario above.*
*Note 2: Compliance has been predicted*

### 4.1.3 Noise on Local Roads

Noise impacts from the increase in vehicle movements along Myoora Road are to be assessed in accordance with the NSW EPA *Road Noise Policy (RNP) 2011*.

Transport and Traffic Planning Associates (TTPA) has being engaged by the proponent to undertake a *Traffic and Parking Assessment* for the proposed development. Outlined in Section 4 of the TTPA report the following statement is provided.

> *Based on the above, the following weekday peak hour traffic generation is projected:*
>
> - *5 customer vehicles: 10 vehicle trips per hour*
> - *2 trucks: 4 vehicle trips per hour*
>
> ***Total: 14 vehicle trips per hour***

This statement is consistent with the findings our assessment. A peak hour increase of 14 vehicles will not exceed a 2dBA increase as summarised in the NSW EPA RNP *to be barely perceptible to the average person* and therefore considered acoustically acceptable.

### 4.1.4 Noise from Mechanical Services

At this stage of the project, the location and the selection of plant items have not been undertaken. A detailed assessment of noise associated from mechanical services plant cannot therefore be undertaken.

However, to ensure that future installation of plant items meet external noise levels at neighbouring properties, a proof of concept approach has been considered.

In our experience, for this type of development the following mechanical systems would be installed and their associated indicative sound power levels are outlined below.

- Maximum of 2 x Air Conditioning Condensers for the offices areas – 75dBA (Lw)

It is anticipated at this stage that air conditioning condensers will be required for the office areas inside the facilities. We would assume the proposed location for these condenser units is that they are located on the roof. In the event that the number of units and the sound power levels of these multiple units to be installed on the roof are close to the levels anticipated above, compliance of the noise emission criteria will be achieved at the nearest noise sensitive receiver locations.

# 5 CONCLUSION

Pulse Acoustic Consultancy Pty Ltd (Pulse Acoustics) has been engaged by Hardware General to undertake an acoustic assessment of the proposed change of use & minor fit out works for the use of the site as a building supplies warehouse to be located at 57-59 Myoora Road, Terrey Hills. From this assessment we note the following:

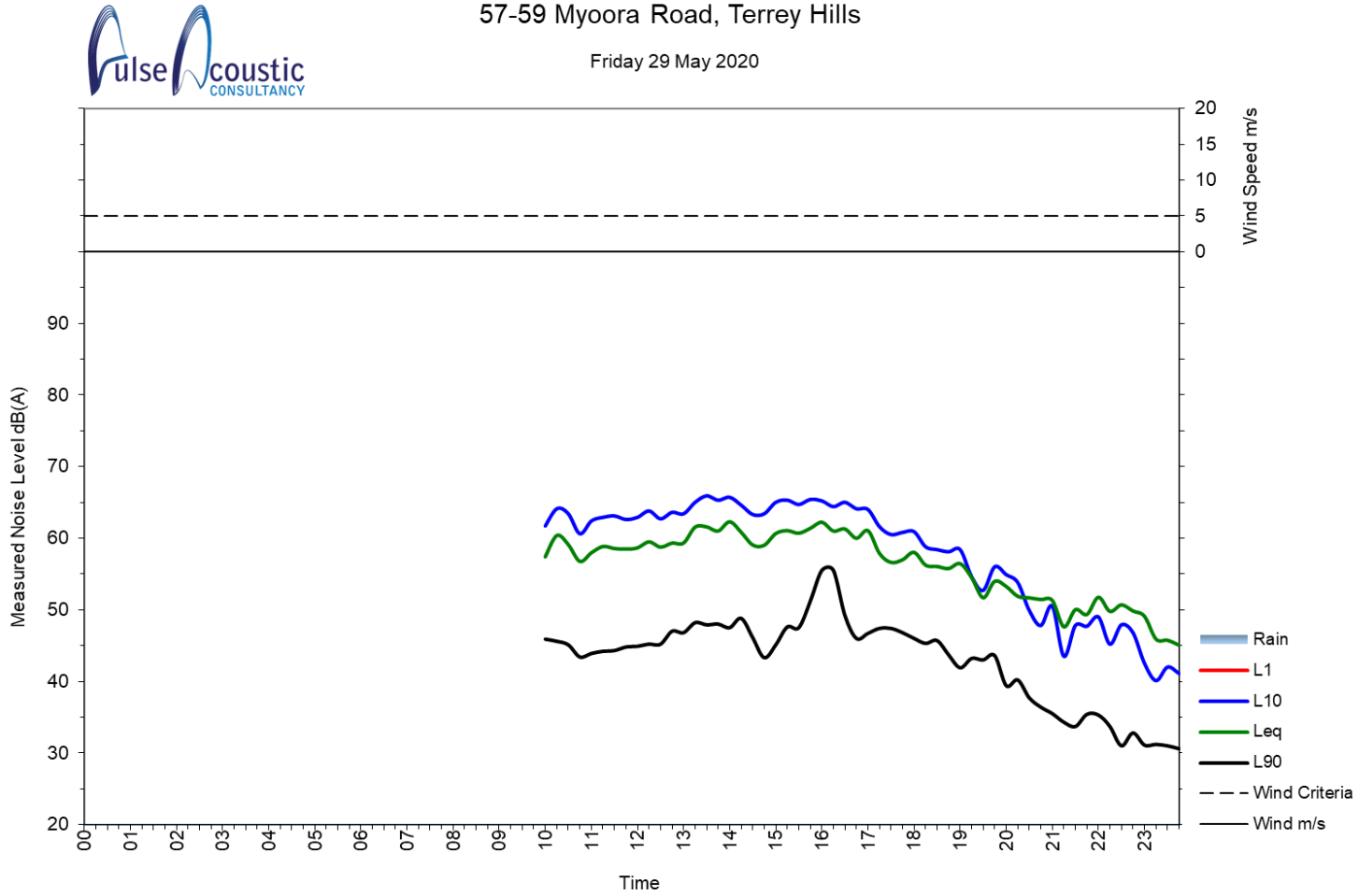
- No truck movements are recommended between 6:00am and 7:00am. Trucks parked inside the warehouse may be packed between 6:00am and 7:00am. ;
- No onsite customer parking before 7:00am;
- No more than 10 passenger vehicles < 4.5T (GVM), in any 15-minute interval for 57 Myoora Road between;
- No more than 7 passenger vehicles < 4.5T (GVM), in any 15-minute interval for 59 Myoora Road;
- No more than 1 Rigid Flat Tray Truck in any 15-minute interval for 57 Myoora Road;
- No more than 1 Rigid Flat Tray Truck in any 15-minute interval for 59 Myoora Road;
- Reversing alarms for all Hardware General trucks should include a “quacker” type reversing alarm;
- The sites management plan should include all noise related conditions;
- All staff operating the forklifts should be trained and made aware of the sensitive noise conditions;
- An acoustic wall should be constructed along the northern boundary of 59 Myoora Road. As per the following:
    - A height of 3.5m is required;
    - Location of the acoustic wall is shown in Figure 3 above.
    - Acoustic wall should be a solid construction and not contain any penetrations. Either a 9mm Fibre Cement Sheeting construction or an Autoclaved Aerated Concrete (AAC) can be used for the construction of the wall.

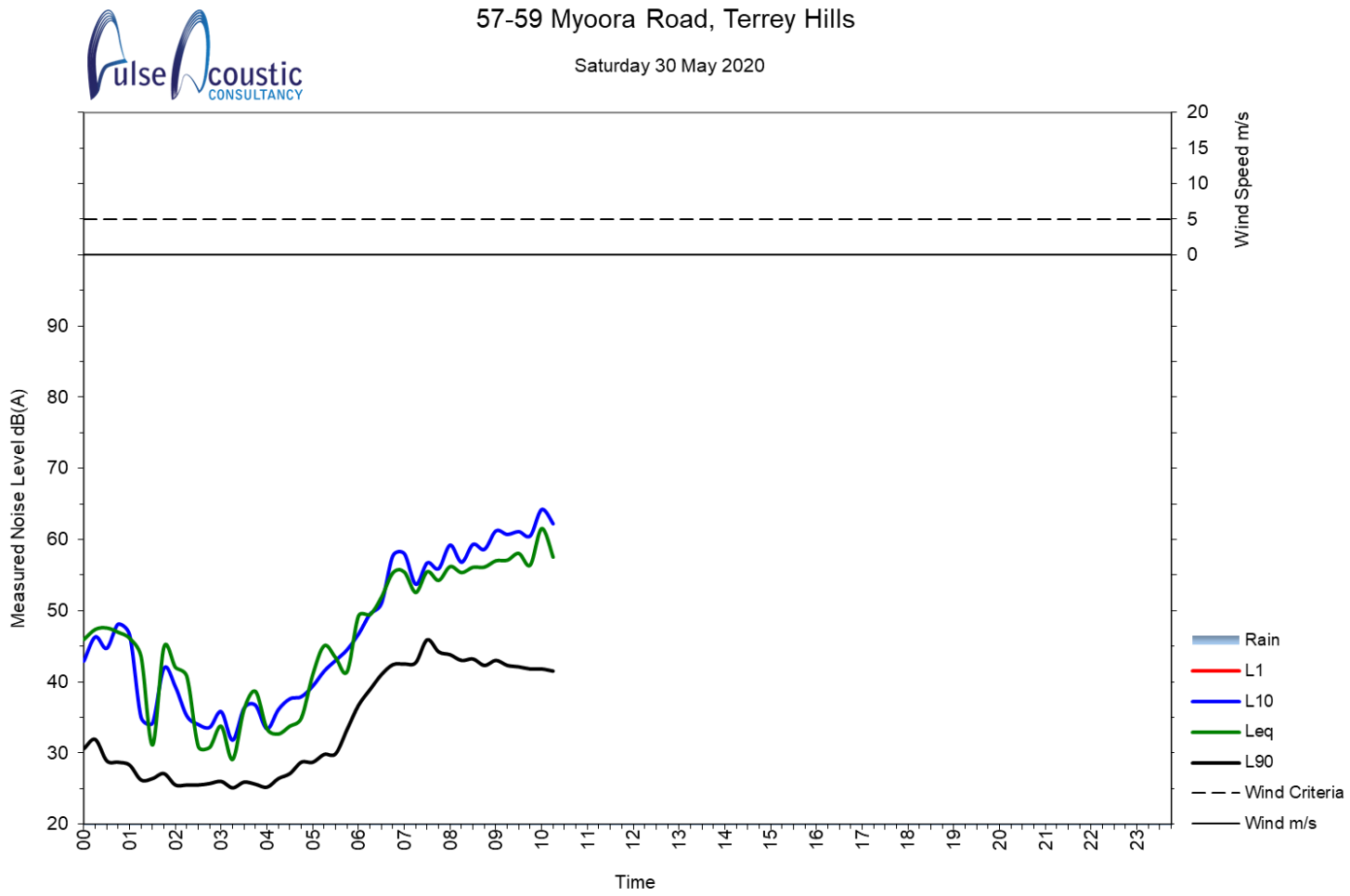
# APPENDIX A: ACOUSTIC TERMINOLOGY

| | |
|---|---|
| *Ambient Sound* | The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far. |
| *Audible Range* | The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits. |
| *Character, acoustic* | The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character. |
| *Decibel [dB]* | The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds;<br>0dB the faintest sound we can hear<br>30dB a quiet library or in a quiet location in the country<br>45dB typical office space. Ambience in the city at night<br>60dB Martin Place at lunch time<br>70dB the sound of a car passing on the street<br>80dB loud music played at home<br>90dB the sound of a truck passing on the street<br>100dB the sound of a rock band<br>115dB limit of sound permitted in industry<br>120dB deafening |
| *dB(A)* | *A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise. |
| *Frequency* | Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz. |
| *Loudness* | A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on |
| $L_{Max}$ | The maximum sound pressure level measured over a given period. |
| $L_{Min}$ | The minimum sound pressure level measured over a given period. |
| $L_1$ | The sound pressure level that is exceeded for 1% of the time for which the given sound is measured. |
| $L_{10}$ | The sound pressure level that is exceeded for 10% of the time for which the given sound is measured. |
| $L_{90}$ | The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the $L_{90}$ noise level expressed in units of dB(A). |
| $L_{eq}$ | The "equivalent noise level" is the summation of noise events and integrated over a selected period of time. |
| *Background Sound Low* | The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the $L_{A90}$ value |
| *Ctr* | A frequency adaptation term applied in accordance with the procedures described in ISO 717. |

| | |
|---|---|
| *dB (A)* | 'A' Weighted overall sound pressure level |
| *Noise Reduction* | The difference in sound pressure level between any two areas. The term "noise reduction" does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply |
| *NR Noise Rating* | Single number evaluation of the background noise level. The NR level is normally around 5 to 6 dB below the "A" weighted noise level. The NR curve describes a spectrum of noise levels and is categorised by the level at 1000 Hz ie the NR 50 curve has a value of 50 dB at 1000 Hz. The NR rating is a tangential system where a noise spectrum is classified by the NR curve that just encompasses the entire noise spectrum consideration. |
| *$R_w$* | Weighted Sound Reduction Index - Laboratory test measurement procedure that provides a single number indication of the acoustic performance of a partition or single element. Calculation procedures for Rw are defined in ISO 140-2:1991 "Measurement of Sound Insulation in Buildings and of Building Elements Part 2: Determination, verification and application of precision data". |
| *$R'_w$* | Field obtained Weighted Sound Reduction Index - this figure is generally up to 3-5 lower than the laboratory test determined level data due to flanked sound transmission and imperfect site construction. |
| *Sound Isolation* | A reference to the degree of acoustical separation between any two areas. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term "sound isolation" does not specify any grade or performance quality and requires the units to be specified for any contractual condition |
| *Sound Pressure Level, $L_P$ dB* | A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals. |
| *Sound Power Level, $L_W$ dB* | Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt |
| *Speech Privacy* | A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible. |
| *Transmission Loss* | Equivalent to Sound Transmission Loss and to Sound Reduction Index in terminology used in countries other than Australia. A formal test rating of sound transmission properties of any construction, by usually a wall, floor, roof etc. The transmission loss of all materials varies with frequency and may be determined by either laboratory or field tests. Australian Standards apply to test methods for both situations. |

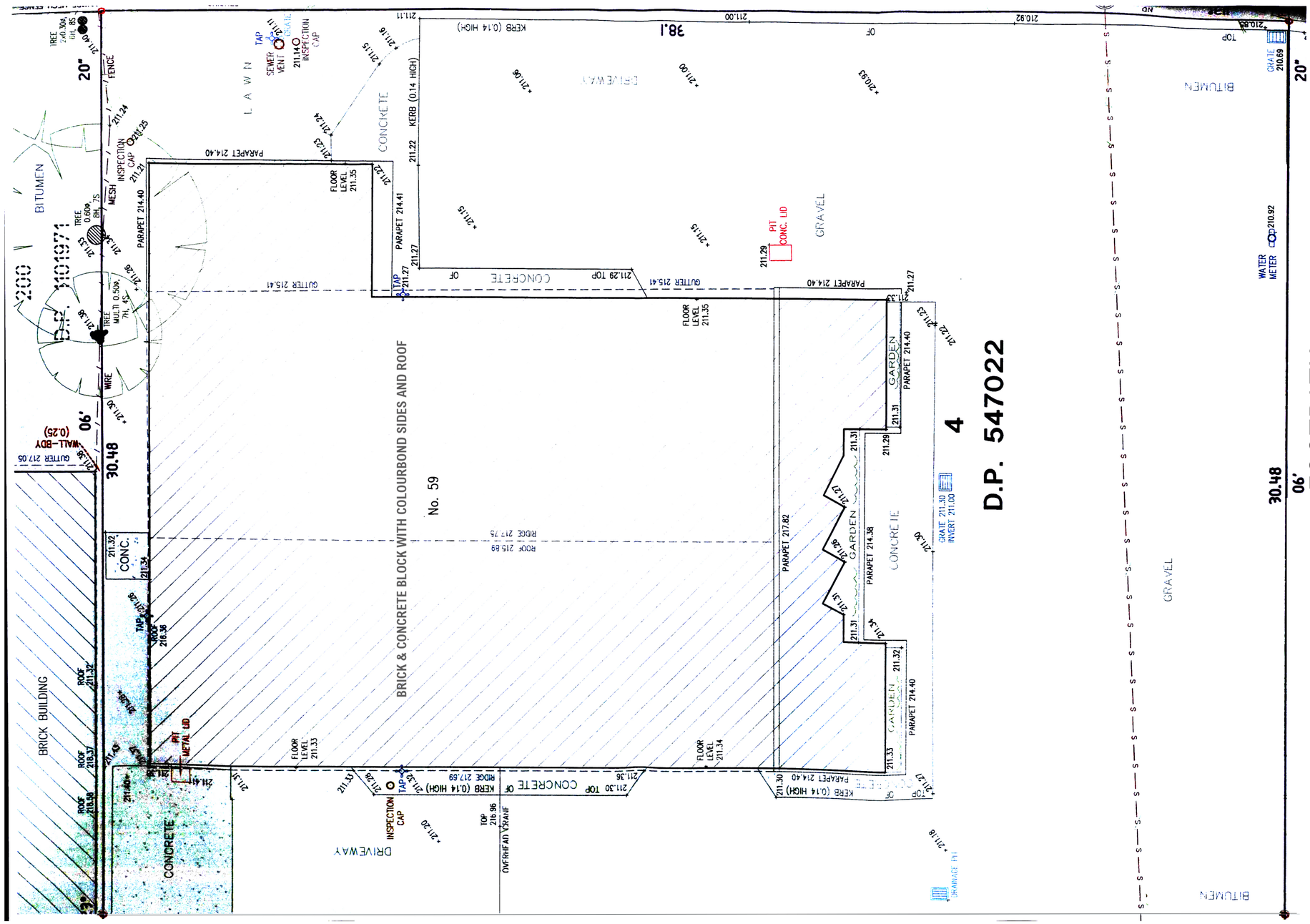
# APPENDIX B: UNATTENDED NOISE MEASUREMENTS


57-59 Myoora Road, Terrey Hills
Friday 29 May 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


57-59 Myoora Road, Terrey Hills
Saturday 30 May 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s

# APPENDIX C: ARCHITECTURAL DRAWINGS

COUNCIL RESERVE




DP530175

| | |
|---|---|
| **Hardware & General Supplies Limited**<br>Drawn By: Joanne Macgregor 02 8456-1188<br>Email: joanne.macgregor@hg.com.au | 59 MYOORA ROAD, TERREY HILLS<br>CHANGE OF USE<br>SCALE @ A2: 1:100 DATE: DECEMBER 2019<br>PAGE: 1 OF 6 TITLE: SITE PLAN |

COUNCIL RESERVE

9,400

38,100

28,500

RACK

RACK

EXIT

3.5m high acoustic wall, non-perforated (full height solid).

**NOTE:** If required - a tapped edge of 1.8m high along the Myoora Road Frontage to the required 3.5m height is accpetable.

SCREEN PLANTING

GRAVEL

RACK

RACK

FOOTPATH

16,080

30,480

MYOORA ROAD

DP1101971

DP547022
SITE AREA
1161.3M2

INSTALL OPEN FEEL, PRESSED SPEAR, BLACK METAL FENCE WITH ELECTRIC SLIDE OPENING GATE.
36.575M X 2.4M

6,000

CONCRETE SLAB

DRIVEWAY

ENTRY

RACK

RACK

DP530175

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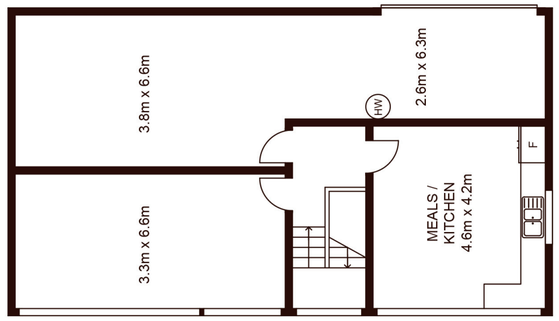
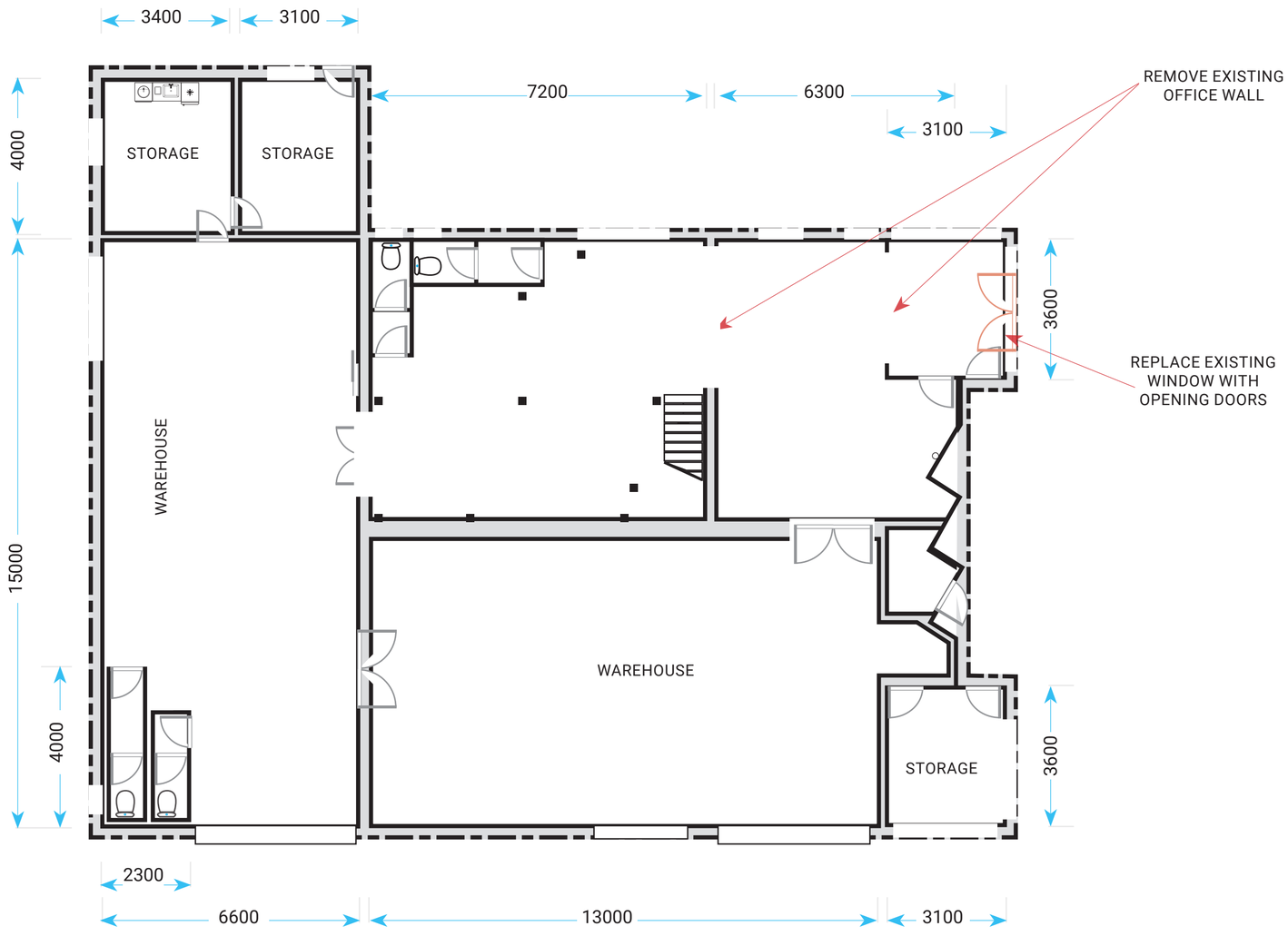
PAGE: 2 OF 6 TITLE: SITE PLAN

MEZZANINE OFFICES/LUNCHROOM





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59 MYOORA ROAD, TERREY HILLS
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PAGE: 3 OF 6 TITLE: FLOOR PLAN

COUNCIL RESERVE

EXIT

5x7.5 mtrs

3400

3100

STORAGE

STORAGE

4000

7200

6300

3100

REMOVE EXISTING
OFFICE WALL

3600

REPLACE EXISTING
WINDOW WITH
OPENING DOORS

RACK

A

A

WAREHOUSE

Cut & Bend

15000

WAREHOUSE

4000

STORAGE

3600

2300

6600

13000

3100

ENTRY

RACK


SECTION VIEW A-A

2.4M BLACK PRESSED METAL FENCE

SCREEN PLANTING BETWEEN RACK & FENCE

PRODUCT RACKING BACKED WITH COLOURBOND
DARK COLOUR PROFILE FENCE

ANGLE LOAD RACKING ON FOOTINGS TO
ENGINEERED SPECIFICATIONS

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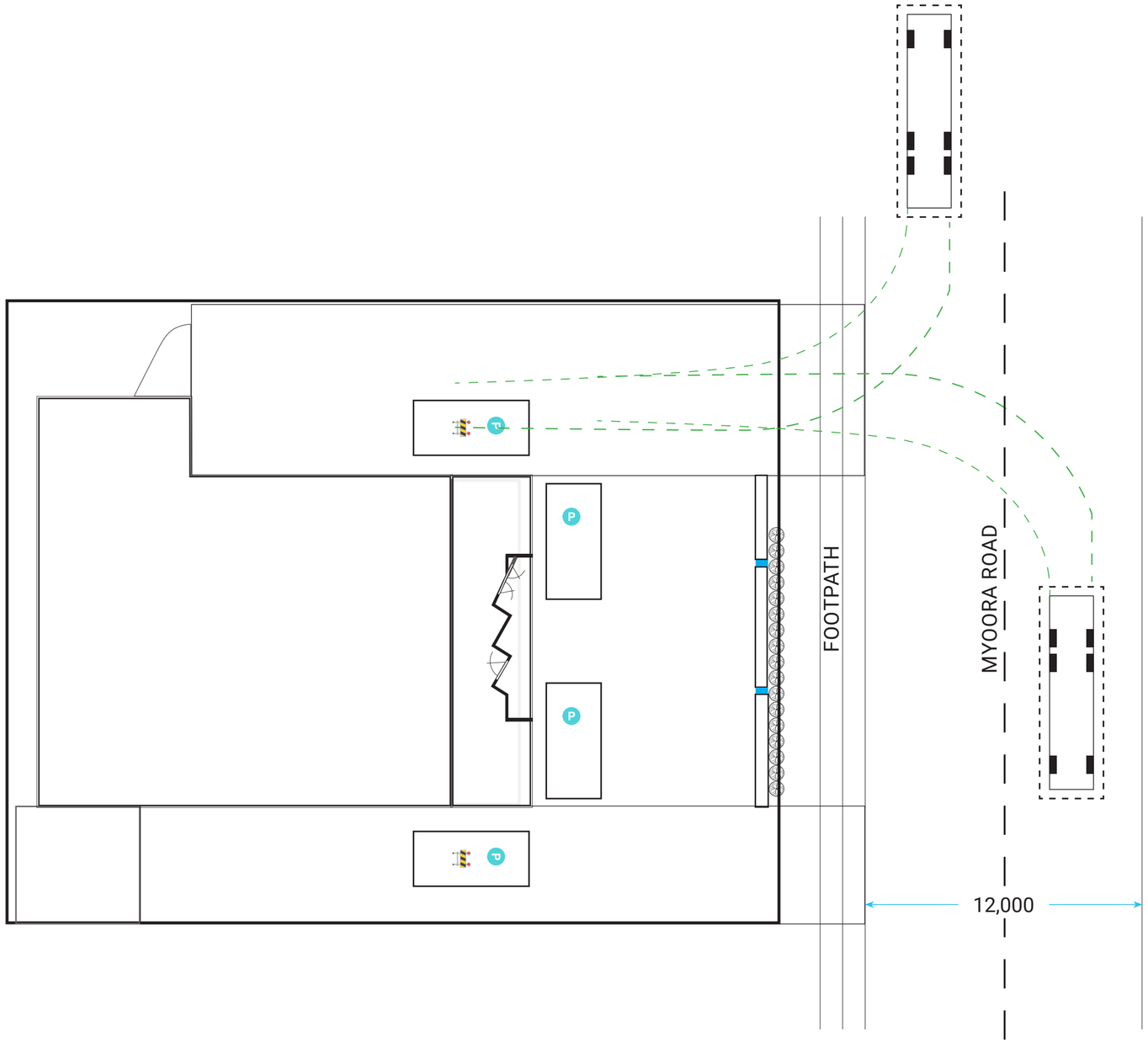
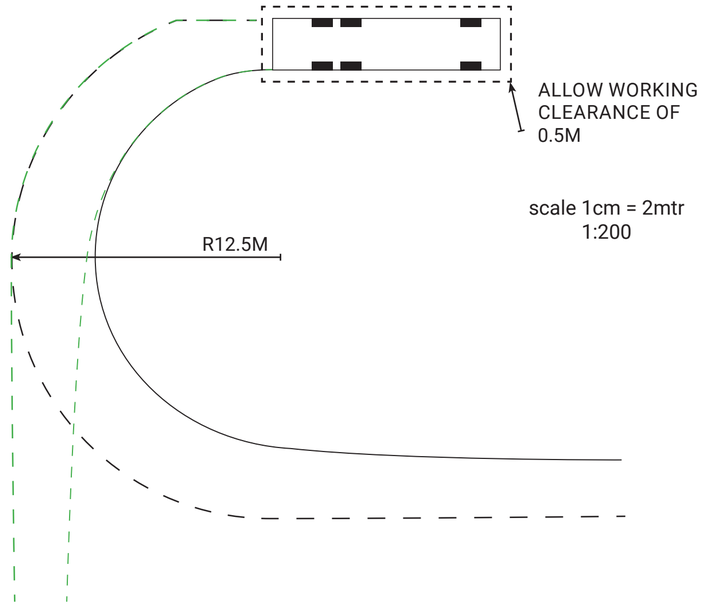
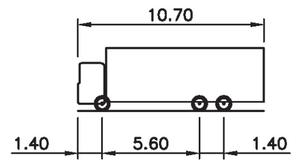
SCALE @ A2: 1:100 DATE: DECEMBER 2019
PAGE: 4 OF 6 TITLE: RACKING PLAN

# NOT TO SCALE




| | |
|---|---|
| Overall Width | 2.45m |
| Track Width | 2.45m |
| Lock to Lock Time | 6.0sec |
| Kerb to Kerb Turning Radius | 11m |
| Design Speed | 5.0km/h |

NOTES
Design based AS 2890.2 and created by Auto Track 4.

MAXIMUM SIZE OF EXPECTED DELIVERY VEHICLES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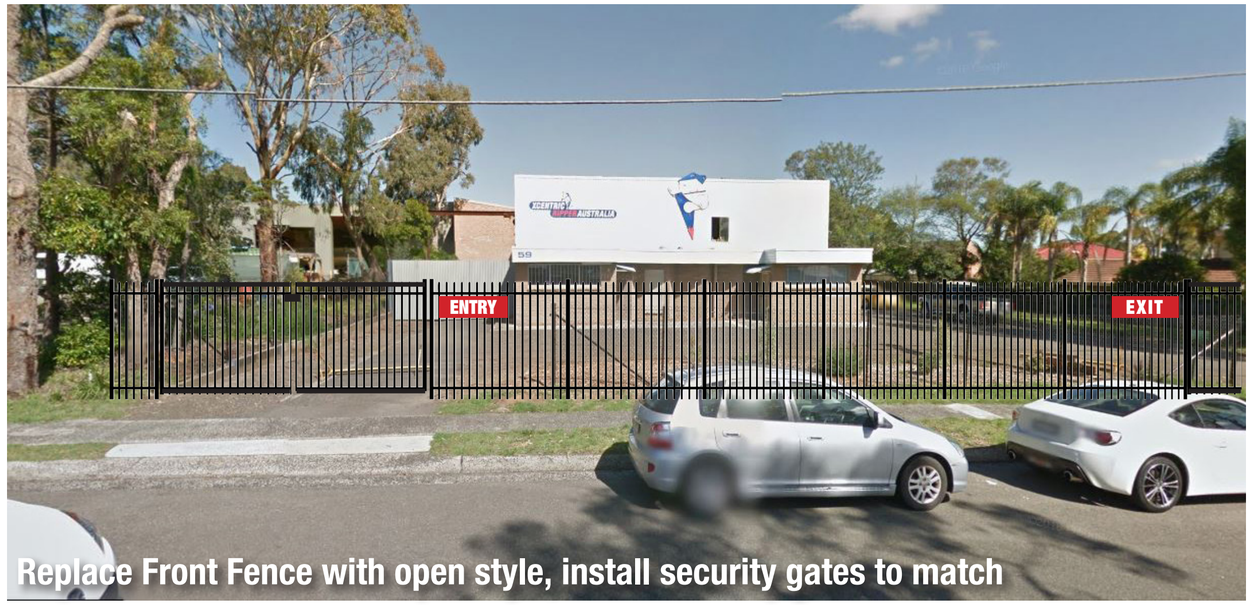
59 MYOORA ROAD, TERREY HILLS
CHANGE OF USE
SCALE NOT TO SCALE DATE: DECEMBER 2019
PAGE: 5 OF 6 TITLE: VEHICLE MOVEMENTS

Building Sign approx 15x1.2mtrs


Repaint Building, Install Signage to Awning



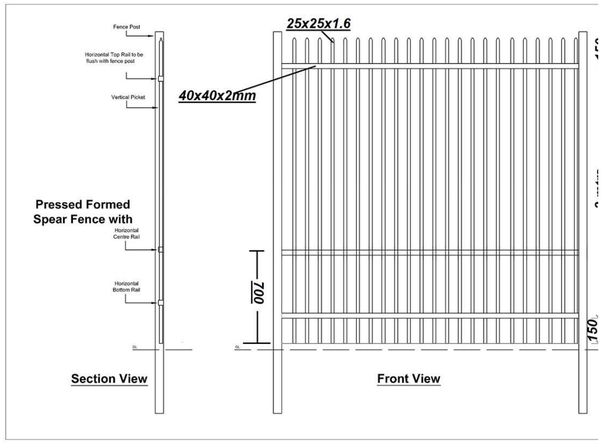

2400

Replace Front Fence with open style, install security gates to match

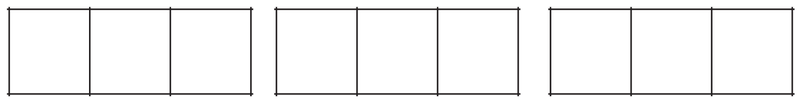
Colours

| | |
|---|---|
| Building Colour: | Dulux Teahouse Grey |
| Signs: | Hardware & General Red on Alupanel, white lettering |

| | |
|---|---|
| Fencing | 30m, including gates to 6m |
| Profile: | Black Pressed Form Spear |
| Gates: | Internal Slide -electric |




Lightweight framework between columns









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PAGE: 6 OF 6 TITLE: SIGNAGE PLAN

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CHANGE OF USE
SCALE @ A2: 1:100 DATE: DECEMBER 2019
PAGE: 7 OF 7 TITLE: SITE PLAN