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## **Nulon Motor Oils, Bringelly**

## **Noise Impact Assessment**

**SSD8900**

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## 1 INTRODUCTION

The report presents our acoustic assessment of potential noise impacts from the operation of the proposed Nulon Motor Oils, Bringelly, Leppington warehouse within the Bringelly Business Hub.

This report addresses the following noise elements relating to the operation of the facility:

- Internal warehousing operations within the facility;
- Truck movements within the loading dock areas and on the internal access road;
- Trucks in transit to and from the site along New Bringelly Road;
- Car movements within carpark areas and on the internal access road;
- Cars in transit to and from the site along New Bringelly Road; and
- Loading dock operations.

In addition, noise emission objectives have been established to govern the operation of mechanical plant.

Noise emissions from the operation of the facility have been assessed against the relevant noise assessment criteria including the Environmental Protection Authority (EPA) Industrial Noise Policy (INP).

## 2 SITE DESCRIPTION

The proposed Nulon Motor Oils warehouse facility is located within the Bringelly Business Hub on to the eastern end of the site. The site is located to the north of New Bringelly Road. The site is bounded as follows:

- New Bringelly Road to the south.
- Stuart Road to the west.
- Industrial receivers to the south.
- Residential receivers within the vicinity of the site to the north, south, east and west.

See figure 1 below for the site and receiver locations.

The proposed facility is to include the Nulon Motor Oils warehouse which includes 9,210m<sup>2</sup> of floor area. For the purpose of this assessment the site has been assessed as the following which represents the acoustically worst-case scenario including the industrial warehouse. The proposed operation hours are:

1. Good handling 24 hours on all days of the week.

Access to and from the site will be via New Bringelly Road to the south.

Figure 1 below shows the site map and background noise measurement locations.

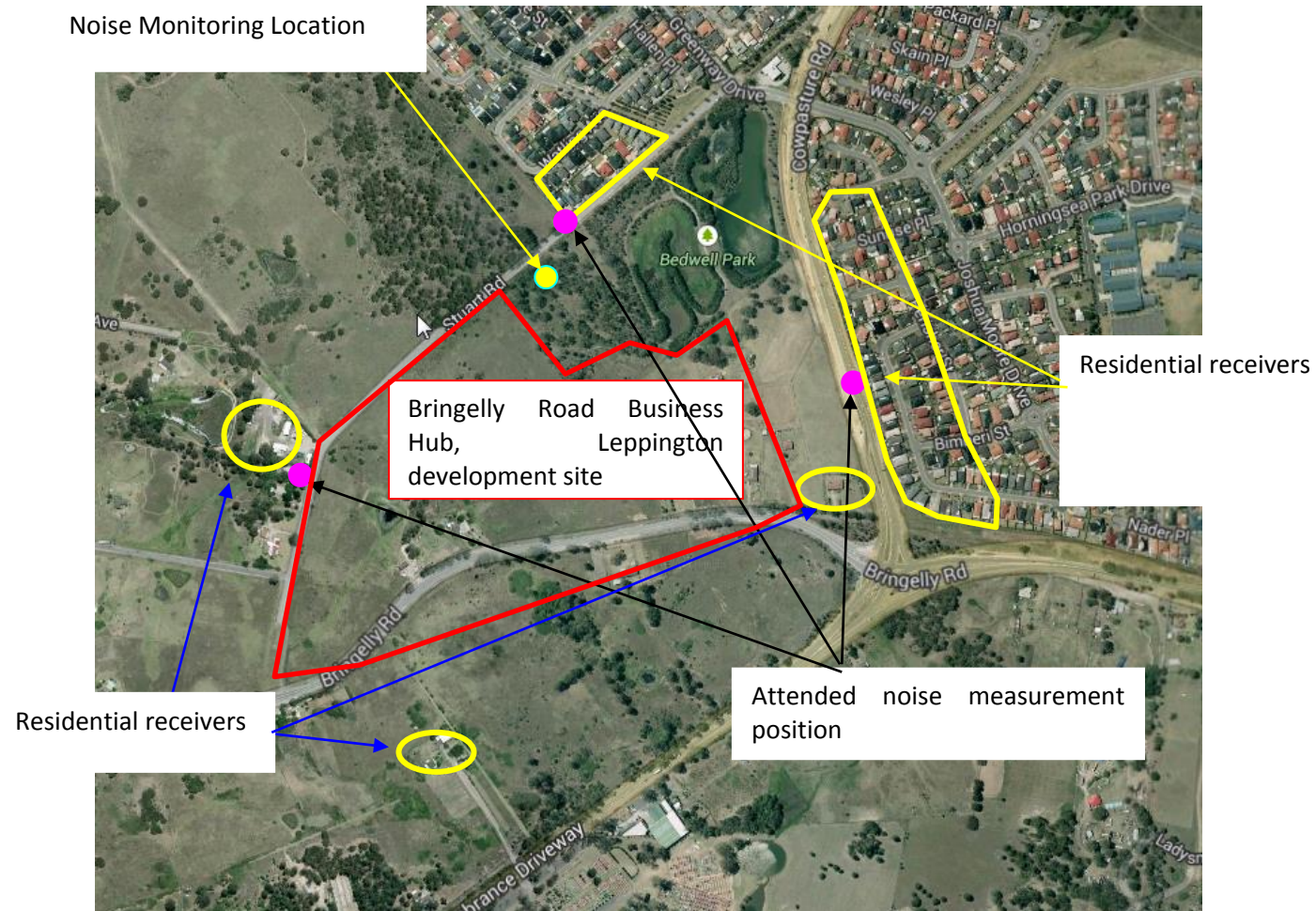


Figure 1: Site Survey and Surrounding Land Uses

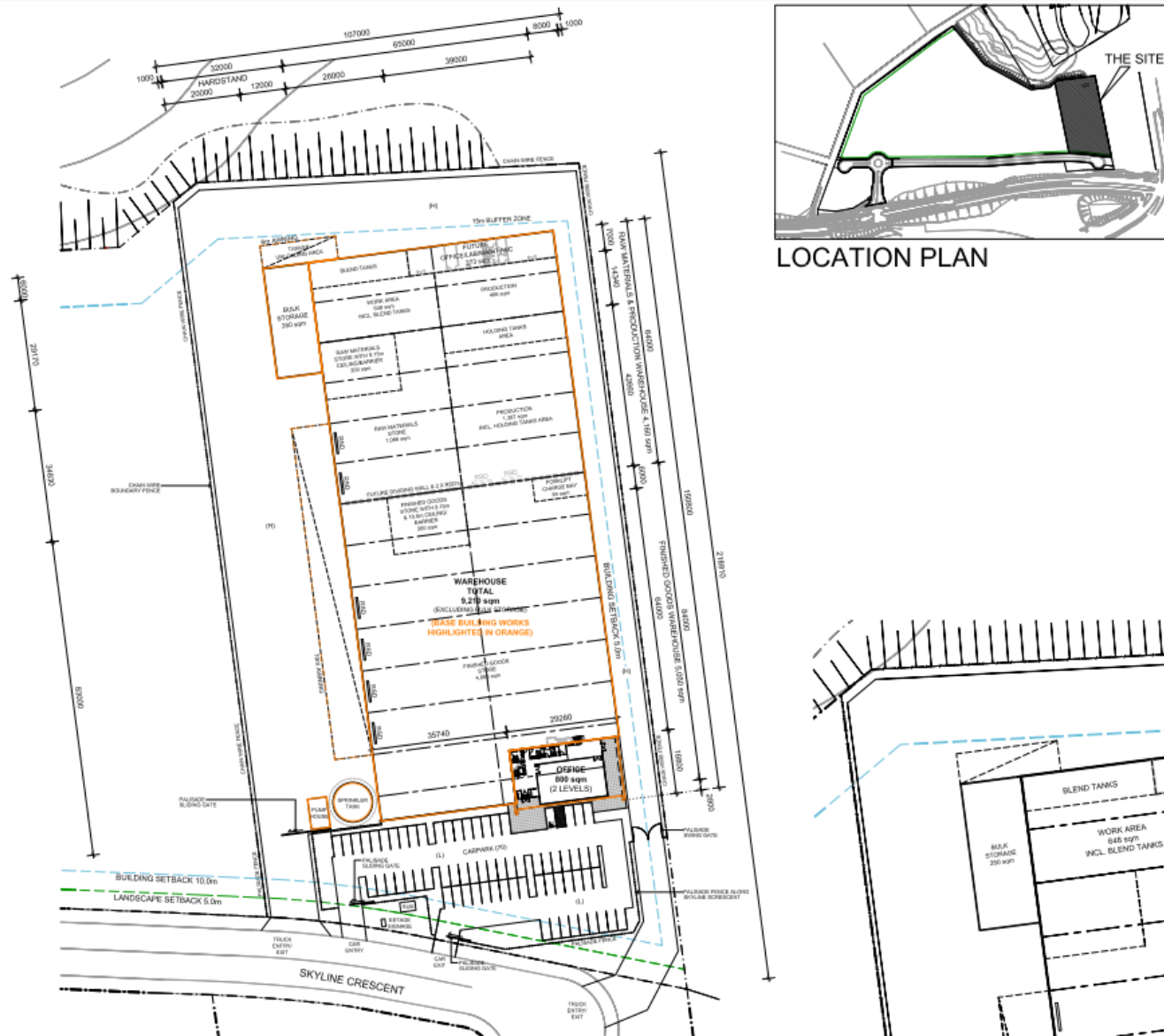


Figure 2 – Proposed Nulon Motor Oils, Bringelly warehouse

### 3 ENVIRONMENTAL 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 environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The  $L_1$  parameter (or the noise level exceeded for 1% of the time) is used during the night period to assess potential sleep arousal effects due to transient noise sources.

## 4 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment in the vicinity of the development is predominantly as result of noise from surrounding road ways within the vicinity of the site.

### 4.1 NOISE LEVEL MEASUREMENTS

As part of the previously conducted noise impact assessment for the site unattended noise logging has been obtained at the location detailed in Figure 1 above and described in this section of the report.

The background noise measurement was conducted continuously as part of the masterplan Noise Impact Assessment of the Business Hub (SSD 6324) using an unattended noise monitor. The monitor was installed at a representative location of the residential receivers to the east of the site as detailed in Figure 1 of this report. Equipment used consists of an Acoustic Research Laboratories Pty Ltd noise logger, the logger was calibrated before and after the measurement using a Rion NC-74 calibrator; no significant drift was detected. The results of noise logging are included in Appendix 1.

**Table 1 – Measured Background Noise Levels**

| Location               | Period                | Measured Background L <sub>90,15min</sub> dB(A) |
|------------------------|-----------------------|-------------------------------------------------|
| Bringelly Business Hub | Day (7am to 6pm)      | 40                                              |
|                        | Evening (6pm to 10pm) | 40                                              |
|                        | Night (10pm to 7am)   | 34                                              |

It is noted that since the time of the attended noise monitoring the south west rail link to the south of the site has commenced operations and the noise levels detailed above are a conservative background noise level.

## 5 ACOUSTIC CRITERIA

The assessment of the operational noise levels are based on the following documents:

- The NSW Environmental Protection Authority (EPA) Industrial Noise Policy (INP); and
- The NSW Road Noise Policy (RNP).

### 5.1 NSW ENVIRONMENTAL PROTECTION AGENCY (EPA) DOCUMENT – ‘NOISE POLICY FOR INDUSTRY (NPFI)’

The NPFI 2017 provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPFI has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

#### 5.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the  $L_{eq}$  descriptor not exceed the background noise level by more than 5 dB(A).

#### 5.1.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The Industrial Noise Policy sets out acceptable noise levels for various land uses. Table 2.1 on page 16 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

For the purposes of a conservative assessment, ALC will assess noise emissions in accordance with the ‘Urban’ category.

**Table 5-1 – NPFI Project Amenity Criteria**

| Type of Receiver       | Time of day | Recommended Project Acceptable Noise Level<br>dB(A) $L_{eq}(15mins)$ |
|------------------------|-------------|----------------------------------------------------------------------|
| Residential (Suburban) | Day         | 53                                                                   |
|                        | Evening     | 48                                                                   |
|                        | Night       | 43                                                                   |
| Commercial             | When in Use | 65                                                                   |

### 5.1.1 Summarised Plant Noise Emission Criteria

Summary for noise emission criteria for all plant associated with the development has been summarised below.

**Table 5-2 – Summary of Noise Emission Criteria (Plant Noise)**

| Receiver              | Time of day | Background Noise Level dB(A) $L_{90}$ | Amenity Criteria dB(A) $L_{eq}$ | Intrusiveness Criteria (Background + 5dB(A)) |
|-----------------------|-------------|---------------------------------------|---------------------------------|----------------------------------------------|
| Residential Receivers | Day         | 40                                    | 53                              | 45                                           |
|                       | Evening     | 40                                    | 48                              | 45                                           |
|                       | Night       | 34                                    | 43                              | 39                                           |
| Commercial            | When in Use | N/A                                   | 65                              | N/A                                          |

## 5.2 SLEEP AROUSAL ASSESSMENT

Potential sleep arousal impacts should be considered for noise generated between midnight and 7am. Short duration, intermittent noise events (such as cars driving into the car park and use of the loading dock) are typically assessed with reference to additional acoustic criteria specifically to assess potential sleep disturbance.

Potential impacts have been assessed using the recommended procedure in the Application Notes to the EPA NPfI. As recommended in the Application Notes, when assessing potential sleep arousal impacts includes the following:

*The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.*

*Where the subject development/premises night-time noise levels at a residential location exceed:*

- $L_{Aeq,15min}$  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, a detailed maximum noise level event assessment should be undertaken.*

*The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy.*

**Table 3 - Sleep Arousal (Emergence Criteria)**

| <b>Location</b>                                    | <b>Background Noise Level<br/>(10pm-7am)<br/>dB(A)<sub>L90</sub></b> | <b>Emergence Level<br/>dB(A) LAF max</b> |
|----------------------------------------------------|----------------------------------------------------------------------|------------------------------------------|
| All Potentially Affected<br>Residential Properties | 34                                                                   | 49                                       |

- 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 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.”*

The internal noise level guidelines have been adopted in this assessment.

### 5.3 NSW ROAD NOISE POLICY

This policy provides guidelines for the assessment of traffic noise generated by new developments on existing roads. Criteria set out by the RNP with regard to land use developments with potential to create additional traffic on local roads is detailed in the Table 3 below.

**Table 4 – Road Noise Policy Criteria (Section 2.3 – Table 3, RNP)**

| Road category<br>Type of project / land use                                      |                                                                                                               | Assessment criteria – dB(A)                |                                           |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------------------|
|                                                                                  |                                                                                                               | Day<br>(7 am – 10 pm)                      | Night<br>(10 pm – 7 am)                   |
| Land use developments with potential to create additional traffic on local roads | Existing residences affected by additional traffic on existing local roads generated by land use developments | L <sub>Aeq</sub> (15hour) 55<br>(external) | L <sub>Aeq</sub> (9hour) 50<br>(external) |

### 5.4 OPERATIONAL NOISE OBJECTIVES

Operational noise objectives have been formulated for the development to comply with the requirements of EPA criteria. Noise emission objectives are detailed below.

**Table 5 – Noise Objective for Residential Receivers**

| Receivers             | Time Period | Assessment Background Noise Level<br>dB(A)L <sub>90</sub> | Amenity Criteria<br>dB(A) L <sub>eq</sub> | Intrusiveness Criteria<br>Background + 5 dB(A)<br>L <sub>eq</sub> (15min) | Additional Traffic Noise<br>dB(A)<br>L <sub>eq</sub> (1hr) | Sleep Disturbance Criteria<br>dB(A) L <sub>AF max</sub> |
|-----------------------|-------------|-----------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------|
| Residential Receivers | Day         | 40                                                        | 53                                        | 45                                                                        | 55                                                         | N/A                                                     |
|                       | Evening     | 40                                                        | 43                                        | 45                                                                        | 55                                                         | N/A                                                     |
|                       | Night       | 34                                                        | 43                                        | 39                                                                        | 50                                                         | 49                                                      |

## 6 OPERATIONAL NOISE ASSESSMENT

Noise emissions associated with the development have been assessed in this section of the report and include vehicle movements on the site, use of the internal areas of the warehouse distribution and external loading dock activities. Predicted noise levels at residential facades have been calculated and the assumptions are detailed below.

Predicted noise levels have been presented for the worst-case noise receiver in each scenario. Operational noise impacts have been assessed individually for each activity and combined for worst case accumulative noise scenario.

For the purpose of this assessment the proposed tenancy has been assessed as all being of an industrial use as this will be the potentially greater noise source. Based on the assessment the resulting tenancies will be acoustically acceptable for either commercial/retail use or for industrial use.

### 6.1 NOISE EMISSIONS FROM VEHICLE MOVEMENTS

Noise emissions associated with vehicles movements within the development have been assessed against the requirement of the INP. The assessment is based on the following assumptions.

- The sound power levels of vehicles operating on site are as following

**Table 6 – Assumed Vehicle Operational Noise Levels**

| Noise Source                     | Sound Power Level<br>dB(A) | Speed  | Area Assessed                     |
|----------------------------------|----------------------------|--------|-----------------------------------|
| Semi-trailer                     | 105                        | 10km/h | Loading dock and<br>internal road |
| Medium rigid dual axle<br>trucks | 100                        | 10km/h | Loading dock and<br>internal road |
| Short base towing<br>vehicles    | 95                         | 10km/h | Loading dock and<br>internal road |
|                                  | 95                         | 40km/h | Loading dock and<br>internal road |
| Cars/Lt Vehicles                 | 90                         | 20km/h | Internal Road                     |

- The assumptions for the use of the facility used as the basis of this assessment are detailed in the table below.

**Table 7 - Site Vehicle Operation**

| Truck Type                          | Operation                                        | Period of Operation           |
|-------------------------------------|--------------------------------------------------|-------------------------------|
| Semi-Trailer with 40 foot container | 1 movement within a 15min assessment period      | Any time of the day and night |
| Semi Trailer                        | 1 movement within a 15min assessment period      | Any time of the day and night |
| Rigid Truck                         | 1 movement within a 15min assessment period      | Any time of the day and night |
| Small Vans                          | Upto 5 movement within a 15min assessment period | Any time of the day and night |
| Couriers                            | Upto 5 movement within a 15min assessment period | Any time of the day and night |

**Table 8 – Vehicle Movements predicted Noise Levels**

| Worst Case Noise Receiver         | Time of Day | Incoming Movements in assessment period (15 min) | Outgoing Movements (vph) | Predicted Noise Level dB(A)<br>$L_{eq}$ 15 min | Noise Emission Criteria dB(A) $L_{eq}$ 15min | Complies |
|-----------------------------------|-------------|--------------------------------------------------|--------------------------|------------------------------------------------|----------------------------------------------|----------|
| Residence to the east of the site | Day         | 2 x Trucks                                       | 2 x Trucks               | 40                                             | 45                                           | Yes      |
|                                   | Evening     | 1 x Trucks                                       | 1 x Trucks               | 37                                             | 45                                           | Yes      |
|                                   | Night       | 1 x Trucks                                       | 1 x Trucks               | 37                                             | 39                                           | Yes      |

## 6.2 LOADING DOCK OPERATION

Noise from the loading dock includes the following noise sources representing a typical worst 15 minute period have been assessed in this section of the report. Based on the proposed loading dock layouts the operation of the docks will include the arrival and departure of trucks from the dock, but will not need forklifts and the like to operate within the area to load/unload. Loading and unloading of trucks will occur from within the warehouse area with the trucks reversing up to the required docking areas. As such the potential noise sources from the loading dock areas will include the following:

- Arrival of trucks to the loading dock and docking areas, including reversing alarms.
- Departure of trucks from the loading dock.

Noise level from the operation of the loading dock is presented in Table 9 below.

**Table 9 – Loading Dock Noise Level Prediction**

| <b>Worst Case Noise Receiver</b>              | <b>Time Period</b> | <b>Predicted Noise Level dB(A)<br/>L<sub>eq</sub> 15min</b> | <b>Noise Emission Criteria dB(A)<br/>L<sub>eq</sub> 15 min</b> | <b>Complies</b> |
|-----------------------------------------------|--------------------|-------------------------------------------------------------|----------------------------------------------------------------|-----------------|
| Residential receivers to the east of the site | Day                | 35                                                          | 45                                                             | Yes             |
|                                               | Evening            | 35                                                          | 45                                                             | Yes             |
|                                               | Night              | 35                                                          | 39                                                             | Yes             |

In addition to the above an assessment of intermittent noise sources for sleep disturbance has been conducted as detailed in the table below from reversing alarms and air brakes.

**Table 10 – Sleep Arousal Assessment (Background+15dB(A) test)**

| <b>Receiver Location</b>                      | <b>Noise Source</b>             | <b>Predicted Noise Level</b> | <b>Acoustic Criteria</b>   | <b>Complies</b> |
|-----------------------------------------------|---------------------------------|------------------------------|----------------------------|-----------------|
| Residential receivers to the east of the site | Air brakes and reversing alarms | 44dB(A)LAF max               | 49dB(A)L <sub>AF</sub> max | Yes             |

### 6.3 INTERNAL WAREHOUSE OPERATIONAL NOISE

Internal activities within the all tenancies have been assessed as if they include industrial warehouse use, which is the potentially greater noise source for industrial or retail/commercial activities. In the event the assessment reveals noise levels are complaint for industrial use they will also therefore be acceptable for commercial/retail use.

The results of the assessment are presented in this section.

#### 6.3.1 Warehouse – Internal Activities

Internal activities within the warehouse have been predicted assuming forklifts operating within the warehouse area (up to 7 operational simultaneously) and general warehouse internal noise levels as measured at a similar facility to that proposed at Leppington. The predicted noise level within the warehouse is SPL 73 dB(A)  $L_{eq}$ .

The following assumptions have been made:

- A sound pressure level of 73dB(A)  $L_{eq}$  within the entire warehouse, which in our experience is the loudest typical noise level we would expect for this type of warehouse including testing of similar facilities.
- Roller shutters facing east are open.
- The walls are constructed from concrete panels.
- The roof has been modelled as 0.42mm BMT sheet metal with 50mm reflective foil insulation blanket underneath.

The predicted noise levels are presented in [Table 11](#).

**Table 11 – Warehouse Four Predicted Noise Levels**

| <b>Worst Case Noise Receiver</b>              | <b>Internal SPL</b>                 | <b>Predicted Noise Level dB(A)<br/><math>L_{eq}</math> 15 min</b> | <b>Noise Emission Criteria dB(A) <math>L_{eq}</math> 15 min</b> | <b>Complies</b> |
|-----------------------------------------------|-------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|-----------------|
| Residential receivers to the east of the site | 76dB(A) $L_{eq}$ manufacturing area | <30                                                               | Day – 45 dB(A)<br>Evening – 45 dB(A)<br>Night – 39 dB(A)        | Yes             |

## 6.4 VEHICLES ON SURROUNDING ROADS

As the proposed access to and from the site from New Bringelly Road and as such any additional traffic volumes will not be required to use residential streets and therefore an assessment of additional traffic volumes is not required to be conducted.

## 6.5 MECHANICAL NOISE EMISSION ASSESSMENT

All mechanical plant for the proposed development that are yet to be selected and treated to comply with the Industrial Noise Policy acoustic requirements as detailed in this report.

If necessary, acoustic treatments for mechanical plant should be determined at CC stage, with the provision of acoustic screens, silencers etc as necessary.

# 7 OPERATIONAL VIBRATION IMPACT ASSESSMENT

Potential vibration generated on the site during operations may be transmitted as tactile vibrations to surrounding receivers and is required to comply with the relevant standards as detailed in this sections of the report.

## 7.1 PROJECT VIBRATION OBJECTIVES

Human comfort is normally assessed with reference to the British Standard BS 7385 Part 2 1993 and the German Standard DIN 4150-3 (1999-02): *“Structural Vibration – Effects of Vibration on Structures”*, which are detailed in this section of the report.

### 7.1.1 British Standard BS 7385

The British Standard BS 6472:1992 “Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)”.

Human response to vibration has been shown to be biased at particular frequencies, which are related to the orientation of the person. This standard provides curves of equal annoyance for various orientations. These curves are applied as correction filters such that an overall weighted acceleration level is obtained. As the orientation of the resident is unknown or varying the weighting filter used is based on the combined base curve as given in ISO 2631 & Australian Standard 2670 “Evaluation of Human Exposure to Vibration and Shock in

Buildings (1 to 80Hz)” which represents the worst case of the X, Y and Z axes. Filtered measurements are made in all three co-ordinate axes and the highest value axis used.

This standard assesses the annoyance of intermittent vibration by using the Vibration Dose Value (VDV). Alternatively the VDV may be estimated by the eVDV which is derived by a simpler calculation using an empirical factor. The VDV or eVDV is calculated for the two periods of the day being the "Daytime" (6am-10pm) and "Night time" (10pm-6am). The overall value is then compared to the levels in Table 5. For this project the aim will be for a low probability of adverse comment.

**Table 12 - Vibration Dose Values ( $\text{m/s}^{1.75}$ ) above which various degrees of adverse comment may be expected in residential buildings.**

| Place                                           | Low Probability of adverse comment | Adverse comment possible | Adverse comment probable |
|-------------------------------------------------|------------------------------------|--------------------------|--------------------------|
| Residential buildings<br>16hr day (Daytime)     | 0.2 to 0.4                         | 0.4 to 0.8               | 0.8 to 1.6               |
| Residential buildings<br>8hr night (Night time) | 0.13                               | 0.26                     | 0.51                     |

#### 7.1.2 German Standard DIN 4150-3 (1999-02)

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 1.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

**Table 13 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration**

| TYPE OF STRUCTURE |                                                                                                                                                                                                       | PEAK PARTICLE VELOCITY ( $\text{mms}^{-1}$ ) |              |               |                                    |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------|---------------|------------------------------------|
|                   |                                                                                                                                                                                                       | At Foundation at a Frequency of              |              |               | Plane of Floor of Uppermost Storey |
|                   |                                                                                                                                                                                                       | < 10Hz                                       | 10Hz to 50Hz | 50Hz to 100Hz | All Frequencies                    |
| 1                 | Buildings used in commercial purposes, industrial buildings and buildings of similar design                                                                                                           | 20                                           | 20 to 40     | 40 to 50      | 40                                 |
| 2                 | Dwellings and buildings of similar design and/or use                                                                                                                                                  | 5                                            | 5 to 15      | 15 to 20      | 15                                 |
| 3                 | Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order) | 3                                            | 3 to 8       | 8 to 10       | 8                                  |

## **7.2 VIBRATION IMPACTS**

Based on the proposed location of the Nulon Motor Oils development and its proximity to surrounding receivers vibration generated on the site will comply with the relevant standards as detailed above without additional acoustic treatments or controls.

## **8 CONSTRUCTION NOISE AND VIBRATION**

This document presents a specification for the processes, which will be followed to manage noise and vibration associated with the proposed construction activities which are required as part of the Project and the potential for noise and vibration impact to receivers within close proximity.

The principal objective of this study is to undertake an evaluation of works to be performed during the operation of the various activities during construction and develop a management plan to ensure noise and vibration is:

1. Minimised to all surrounding receivers.
2. Does not exceed OH&S standards at surrounding receivers.
3. Is monitored when potentially high noise and vibration generating activities are being used.

This assessment will formulate/present the relevant noise and vibration criteria which construction activities are required to comply with. Additionally effective mitigation measures will be recommended where possible to ensure criteria is achieved and impacts are.

The principal issues, which will be addressed in this report, are:

- Identification of the noise and vibration standards which will be applicable to this project.
- Formulation of a strategy for construction activities to comply with the standards identified in the above point.

### **8.1 PROJECT OBJECTIVES**

The objective of this management plan is to set up a protocol to ensure noise and vibration emissions from the construction works associated with the project comply with applicable standards, recommend required management controls and treatments are adopted where required and detail the required monitoring to ensure standards are met.

## **8.2 PROJECT DESCRIPTION AND POTENTIALLY EFFECTED PROPERTIES**

The proposed project includes the excavation of material including infill and soft sand stone and construction of the development. The expected activities can be expected to include:

1. Building constructions.

## **8.3 CONSTRUCTION NOISE CRITERIA**

It is proposed to utilise Australian Standard AS2436:1981 *“Guide to noise control on construction, maintenance and demolition sites”*, which is the standard commonly applied by Councils for the regulation of construction noise, the New South Wales Construction Noise Guideline developed by The NSW EPA and OH&S requirements are presented in this section of the report.

### **8.3.1 Australian Standard AS2436:1981 “Guide to noise control on construction, maintenance and demolition sites**

The Australian Standard AS2436 states that where all reasonable and available measures have been taken to reduce construction noise, mitigation strategies may be put in place to reduce levels noise levels to within a reasonable and acceptable level.

For the control and regulation of noise from construction sites AS2436:1981 *“Guide to noise control on construction, maintenance and demolition sites”* nominates the following:

- a. That reasonable suitable noise criterion is established,
- b. That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes to locations of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours, and
- c. The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the demolition, excavation and construction site.

### **8.3.2 EPA Construction Noise Guideline**

The Department of Environment and Climate Change have developed a specific construction noise guideline in the aid of reducing the impact of construction associated noise.

The guideline reflects on feasible and reasonable mitigation strategies, management controls and public liaising in the effort to reach realistic compromises between construction sites and potential noise affected receivers.

### 8.3.3 EPA Construction Noise Guideline - Qualitative Assessment Method

The guideline refers to a qualitative assessment method in which construction noise is assessed on a case by case basis with regard to various activities to be conducted on site. This assessment method was developed to smaller scale projects.

Essentially this method of assessment requires that the proponent take into consideration and employ all reasonable and feasible measures to ensure that the impact on noise receivers is minimised. This is generally conducted in the following manner:

- The drafting of a noise management plan outlining all reasonable and feasible mitigation methods for the reduction of noise impact;
- The assessment of high impact equipment such as rock-hammers and piling equipment for lower noise producing methods of construction/excavation;
- The implementation of a complaints handling register and community consultation system;
- Employee (builders, contractors etc) education in effective noise reducing techniques and site etiquette; and
- The operation of plant in a quiet and efficient manner (i.e. turning off machinery when not in use).

This qualitative assessment method has been used for the basis of this report and has been used as the basis for the development of acoustic management and treatments of proposed construction activities.

In addition, the guideline specifies goals which can be used in the effort of minimising noise from construction related activities. These noise goals are presented within the table below.

**Table 14 – EPA Recommended Construction Noise Goals**

| Governing Body | Receiver Type | External sound level Goal,<br>Leq 15 min dB(A) |
|----------------|---------------|------------------------------------------------|
| EPA            | Residential   | Background + 10 dB(A) <sup>1</sup>             |
|                |               | 75 dB(A) <sup>2</sup>                          |

1: Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. (DECC CNG, 2008).

2: Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided. (DECC CNG, 2008).

These criteria for resultant noise from construction activities are aimed at maintaining comfort levels within the surrounding residential dwellings. Additionally, noise mitigation techniques as discussed in this report should be used if noise emissions exceed the above criteria. All work is to be carried out in accordance with AS 2436:1981 *“Guide to noise control on construction, maintenance and demolition sites”*.

### 8.3.4 OH&S guidelines

Regulation 49 of the Occupational Health and Safety Regulation specifies maximum levels of noise which a ‘worker’ may be exposed to. Acoustic treatment to the work environment or hearing

protection is recommended for workers exposed to higher noise levels. These maximum OH&S noise levels are presented in the table below.

**Table 15 – OH&S Maximum Noise Level Exposure**

|                                      | <b>Energy Averaged<br/>Over 8 Hour Day</b> | <b>Maximum Noise Level<br/>During Day</b> |
|--------------------------------------|--------------------------------------------|-------------------------------------------|
| OH&S maximum noise level<br>exposure | 85 dB(A) $L_{eq}$                          | 140 dB(C) $_{peak}$                       |

#### **8.4 CONSTRUCTION VIBRATION CRITERIA**

Construction vibration criteria associated with works on the project when measured at the potentially affected receivers should not exceed the following sets of vibration criteria to ensure no architectural or structural damage to surrounding buildings and human comfort is maintained. These standards have been selected as they are widely used in the assessment of vibration associated with construction activities within Australia, namely:

- German Standard DIN 4150-3 (1999-02): *“Structural Vibration – Effects of Vibration on Structures”*; and
- British Standard BS 6472:1992 *“Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)”*.

The criteria and the application of these Standards are discussed in separate sections below.

#### 8.4.1 German Standard DIN 4150-3 (1999-02)

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in the Table below.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

**Table 16 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration**

| TYPE OF STRUCTURE |                                                                                                                                                                                                     | PEAK PARTICLE VELOCITY (mms <sup>-1</sup> ) |              |               |                                    |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------|---------------|------------------------------------|
|                   |                                                                                                                                                                                                     | At Foundation at a Frequency of             |              |               | Plane of Floor of Uppermost Storey |
|                   |                                                                                                                                                                                                     | < 10Hz                                      | 10Hz to 50Hz | 50Hz to 100Hz | All Frequencies                    |
| 1                 | Buildings used in commercial purposes, industrial buildings and buildings of similar design                                                                                                         | 20                                          | 20 to 40     | 40 to 50      | 40                                 |
| 2                 | Dwellings and buildings of similar design and/or use                                                                                                                                                | 5                                           | 5 to 15      | 15 to 20      | 15                                 |
| 3                 | Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (eg buildings that are under a preservation order) | 3                                           | 3 to 8       | 8 to 10       | 8                                  |

#### 8.4.2 British Standard BS 6472:1992

British Standard BS 6472:1992 develops criteria relating to levels of building vibration that may be expected to give rise to “*adverse comment*”, in the frequency range most applicable to impacts associated with construction, which is 1 to 80Hz. These threshold values are used as criteria for assessing the loss of amenity and are presented below in Table 3.

**Table 17 – BS 6472:1992 Criteria to Avoid “Adverse Comment”**

| Type of Occupancy | Time of Day | Peak Particle Velocity ( $\text{mms}^{-1}$ ) between 1Hz to 80Hz Likely to Cause “Adverse Comment” |            |                                                                                            |            |
|-------------------|-------------|----------------------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------|------------|
|                   |             | Continuous Vibration                                                                               |            | Intermittent Vibration and Impulsive Vibration Excitation with Several Occurrences per day |            |
|                   |             | Vertical                                                                                           | Horizontal | Vertical                                                                                   | Horizontal |
| Residential       | Day         | 0.3 to 0.6                                                                                         | 0.8 to 0.6 | 8.4 to 12.6                                                                                | 24 to 36   |
|                   | Night       | 0.2                                                                                                | 0.6        | 2.8                                                                                        | 8          |
| Offices           | Day         | 0.6                                                                                                | 1.6        | 18                                                                                         | 51         |
|                   | Night       | 0.6                                                                                                | 1.6        | 18                                                                                         | 51         |
| Workshops         | Day         | 1.2                                                                                                | 3.2        | 18                                                                                         | 51         |
|                   | Night       | 1.2                                                                                                | 3.2        | 18                                                                                         | 51         |

The limits indicate that people in buildings are significantly less susceptible to horizontal vibration than to vertical vibration. Furthermore, Section 4.1 of BS 6472 notes that situations can exist where vibration magnitudes above those generally corresponding to minimal “*adverse comment*” levels can be tolerated, particularly for temporary disturbances and infrequent and intermittent events such as those associated with construction projects.

## **8.5 CONSTRUCTION HOURS**

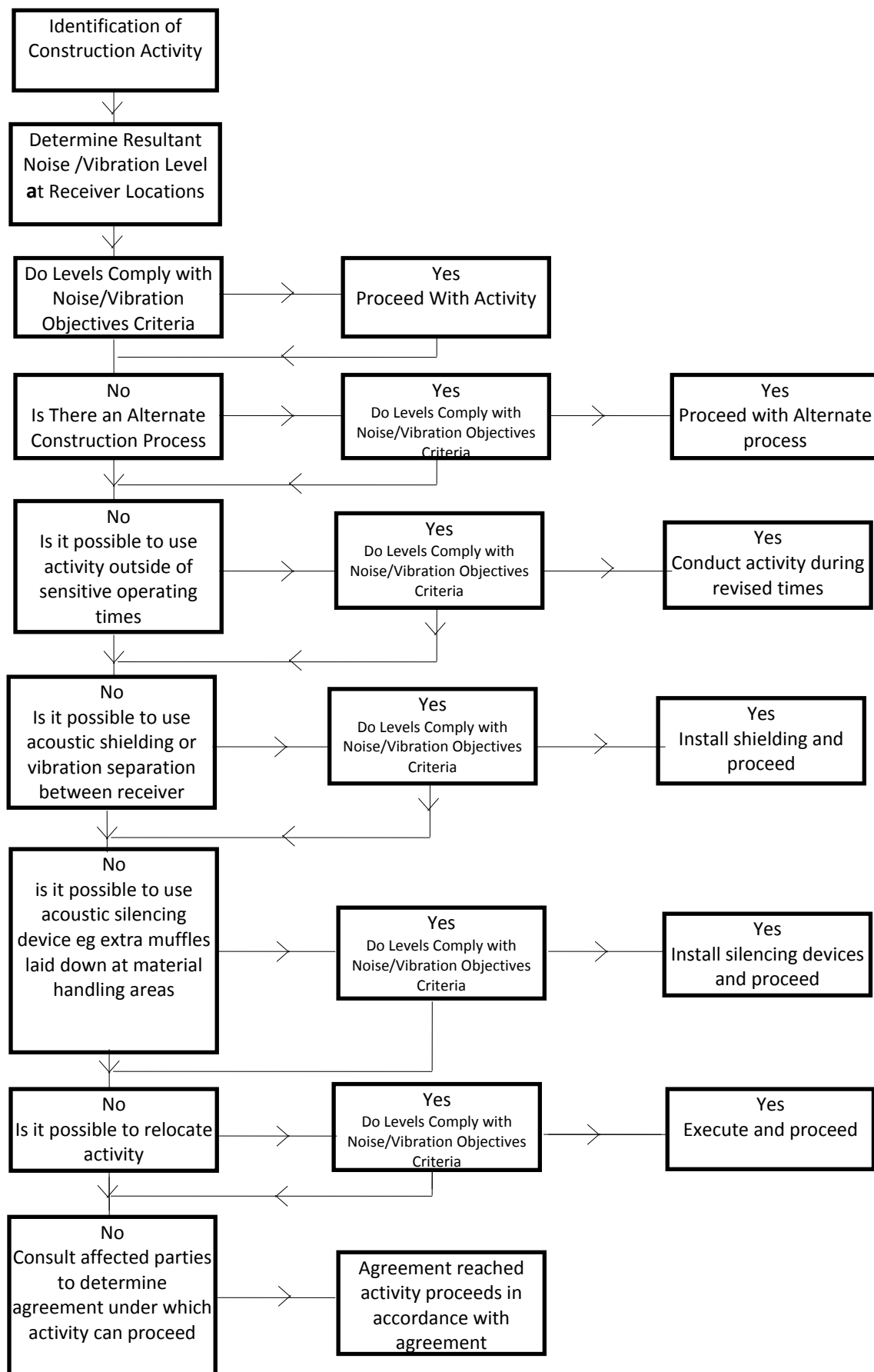
Working hours are subject to planning approval conditions. Typically the hours of work at sites will be:

- 7:00am to 5:00pm Monday to Friday
- 8:00am to 5:00pm on Saturdays
- No work on Sundays, Public Holidays or Saturdays adjacent to a Public Holiday.

Works which are proposed to be conducted outside of these hours will be subject to special approval.

## **8.6 CONTROL OF CONSTRUCTION NOISE AND VIBRATION**

As a part of the noise management of noise and vibration on each site the following process should be conducted when investigating the impact and construction activities.



**Figure 1 – Process Flowchart**

## **8.7 NOISE AND VIBRATION CONTROL METHODS**

The determination of appropriate noise control measures will be dependant on the particular activities and construction appliances. This section provides an outline of available methods.

### **8.7.1 Selection of alternate appliance or process**

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. By carrying this activity by use of pneumatic hammers, bulldozers ripping and/or milling machines lower levels of noise will result.

### **8.7.2 Acoustic Barrier**

Barriers or screens can be an effective means of reducing noise. Barriers can be located either at the source or receiver.

The placement of barriers at the source is generally only effective for static plant (tower cranes). Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependant on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

### **8.7.3 Silencing devices**

Where construction process or appliances are noisy, the use of silencing devices may be possible. These may take the form of engine shrouding, or special industrial silencers fitted to exhausts.

### **8.7.4 Material handling**

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

#### **8.7.5 Treatment of specific equipment**

In certain cases it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

#### **8.7.6 Establishment of Site Practices**

This involves the formulation of work practices to reduce noise generation. A noise plan will be developed for this project outlining work procedures and methods for minimising noise.

#### **8.7.7 Regular noise checks of equipment**

To determine the requirement for silencing devices on machinery it is proposed to undertake fortnightly noise check. Noise levels of all machines on site will be measured and if they are found to be higher than nominated for that equipment type, items such as mufflers and engine shrouds will be examined to ensure they are in good working order.

A record of these measurements will be kept on a form similar to that shown in Appendix 1. This measure is expected to maintain noise at constant levels, and prevent any increases.

#### **8.7.8 TREATMENT of EXISTING EQUIPMENT**

An effective method of mitigating vibration on existing equipment would be to vibration isolated mounts to existing equipment and installations. Vibration isolation would be required to be investigated on a case by case basis and consist of neoprene mounts as specified (such as waffle pads, supershear flex or the like).

Based on investigations conducted at the site the areas which may be suitable for treatment include tables with sensitive equipment such as microscopes and the like.

#### **8.7.9 Noise and vibration Monitoring**

Noise and vibration monitoring will be undertaken to determine the effectiveness of measures which are been implemented. The results of monitoring can be used to devise further control measures.

#### **8.7.10 Combination of methods**

In some cases it may be necessary that two or more control measures be implemented to minimise noise.

#### **8.7.11 Saw cutting**

Introduction of a saw cut to manage vibration impacting on surrounding receivers from construction activities.

## 9 CONCLUSION

This report presents the assessment of noise impacts associated with the proposed warehouse facility located within the Nulon Motor Oils, Bringelly, Leppington.

The assessment has been carried out in accordance with the following guidelines:

- New South Wales – Industrial Noise Policy;
- New South Wales – Road Noise Policy; and
- Environmental Criteria for Road Traffic Noise.

Noise impacts from the general operation of the warehouse facility will not have a significant detrimental impact on the residents within the vicinity of the project site and is acoustically acceptable.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

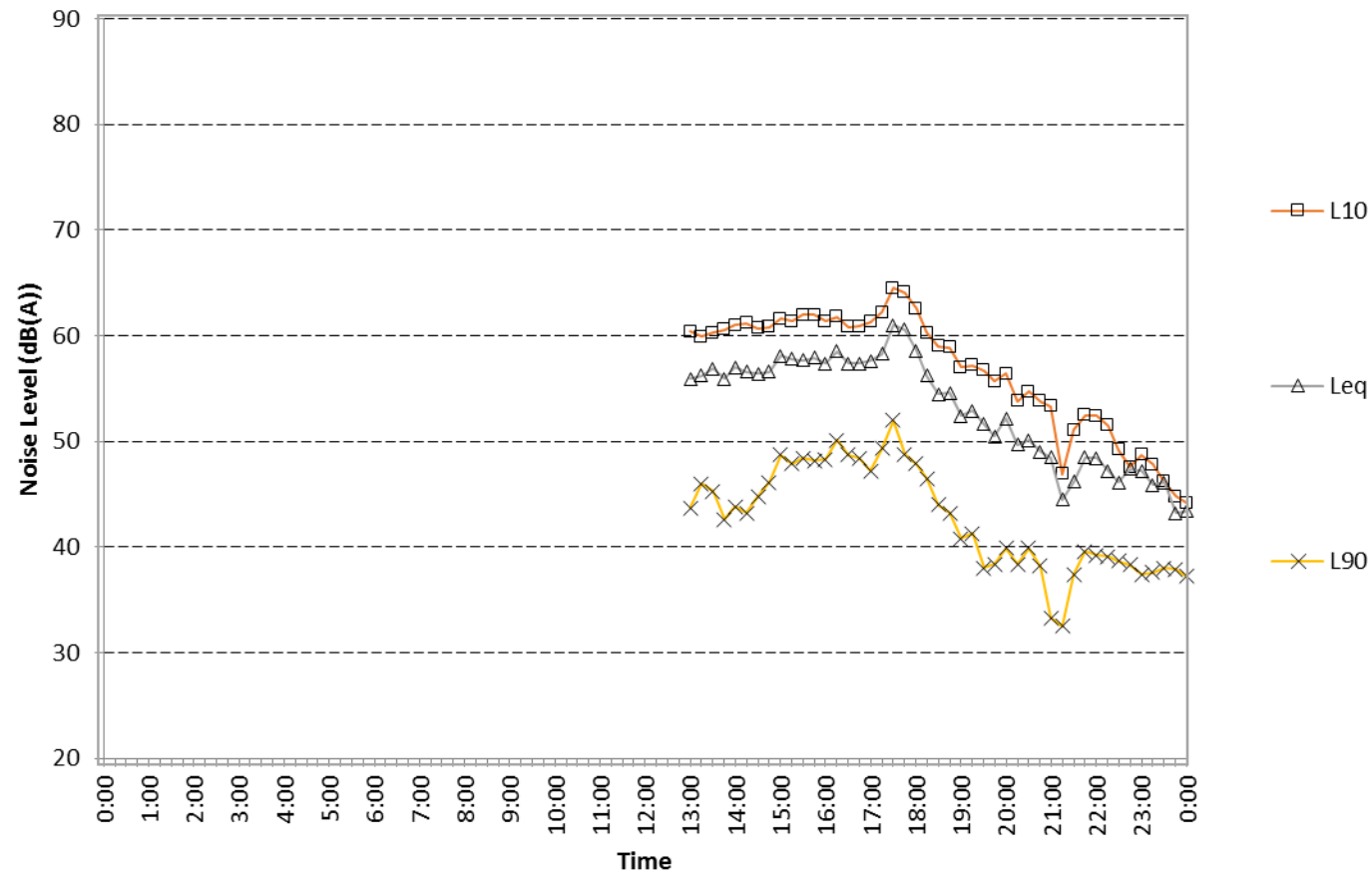
A handwritten signature in black ink that reads "B.G. White." The signature is written in a cursive, slightly slanted style.

Acoustic Logic Consultancy Pty Ltd  
Ben White

## **APPENDIX 1: NOISE LOGGING RESULTS**

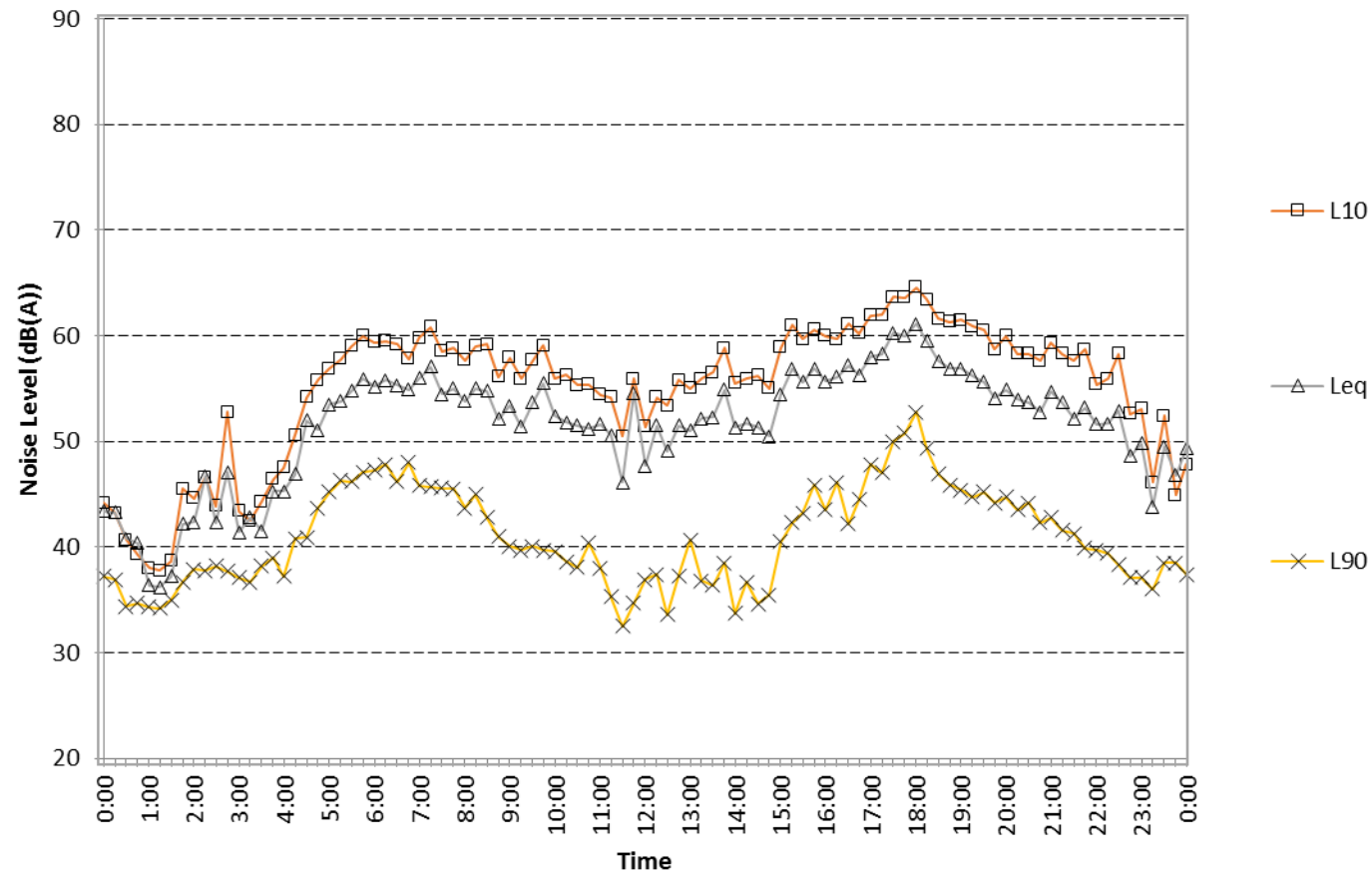
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Monday August 4, 2014



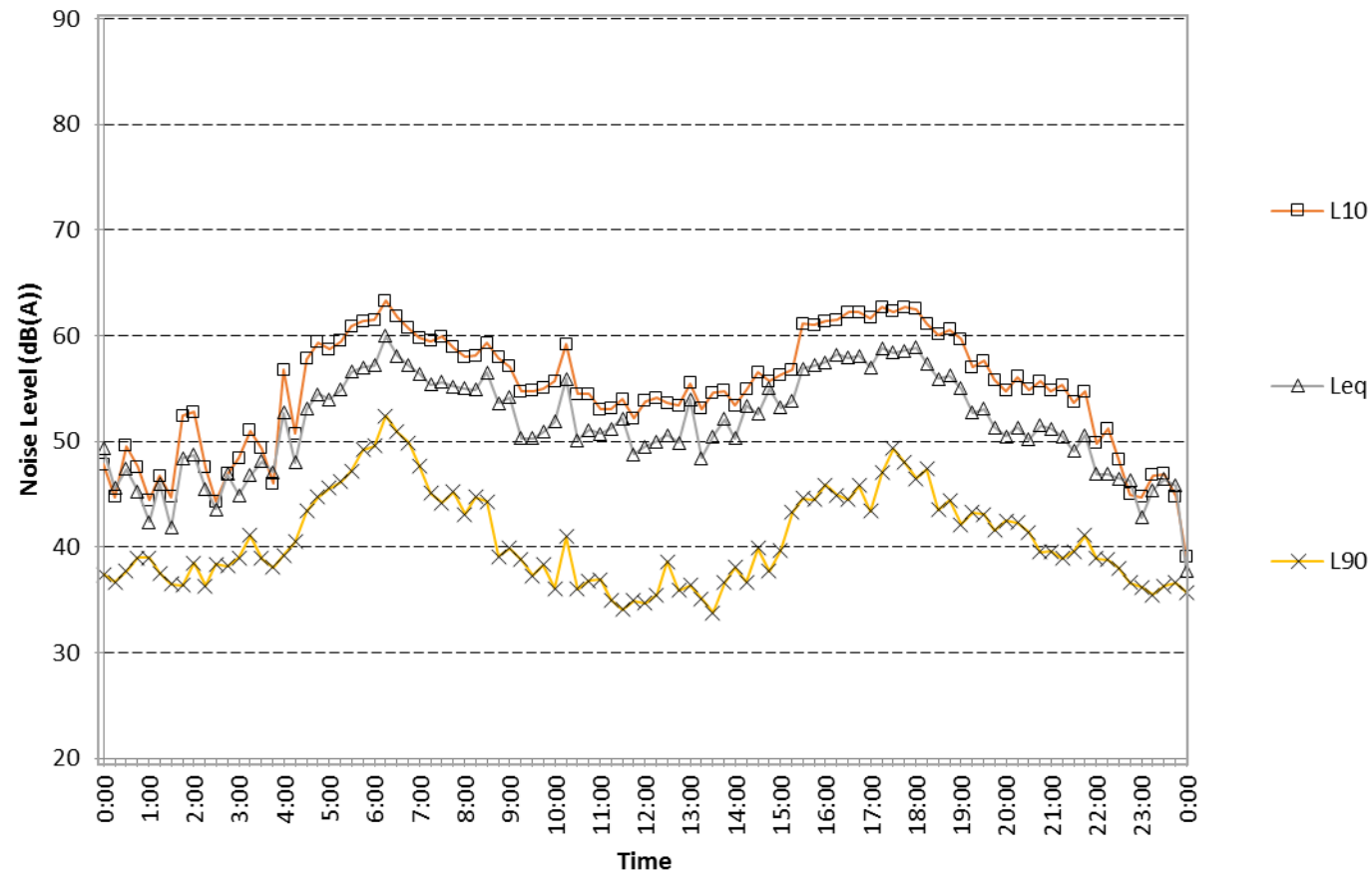
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Tuesday August 5, 2014



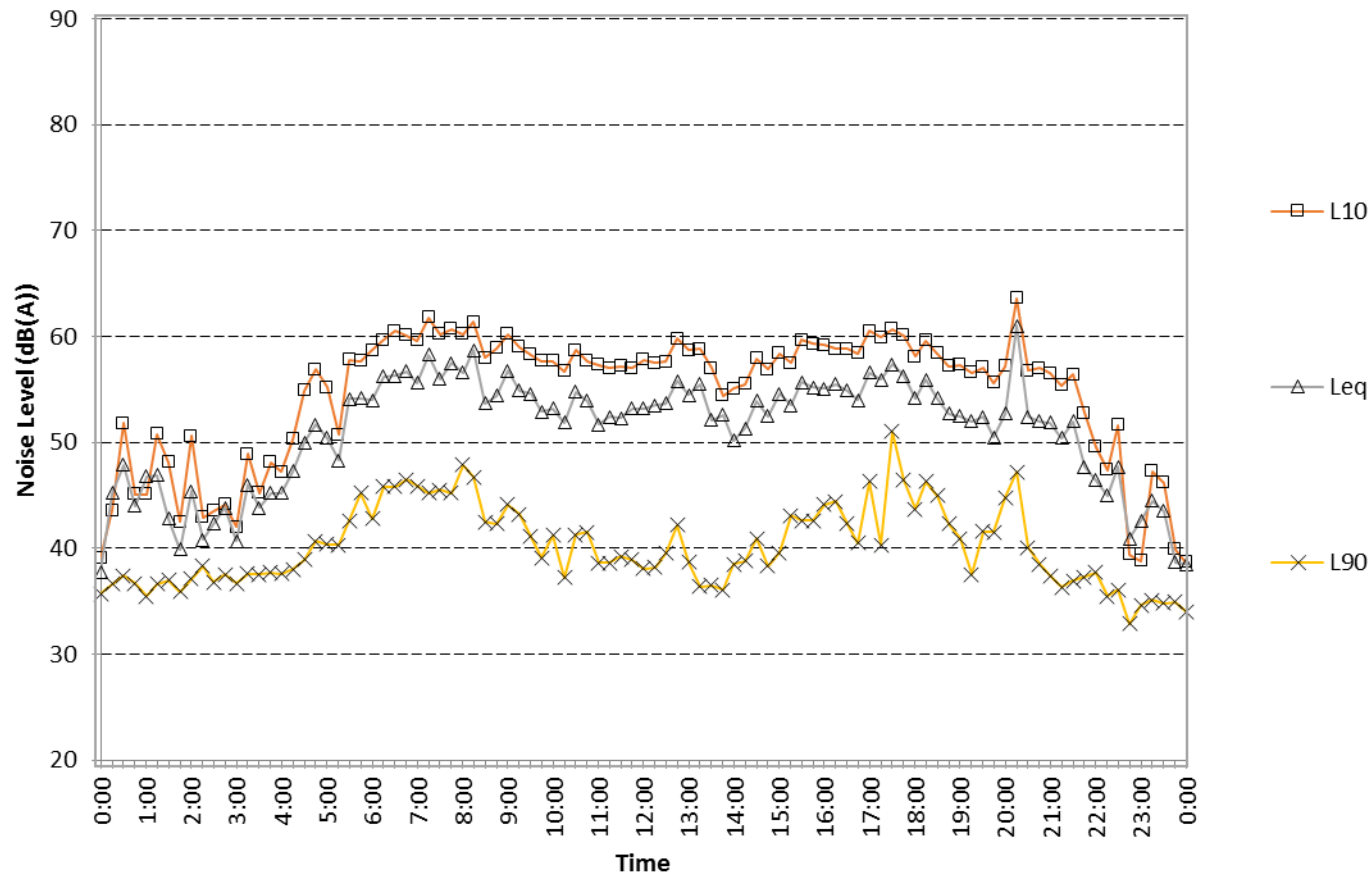
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Wednesday August 6, 2014



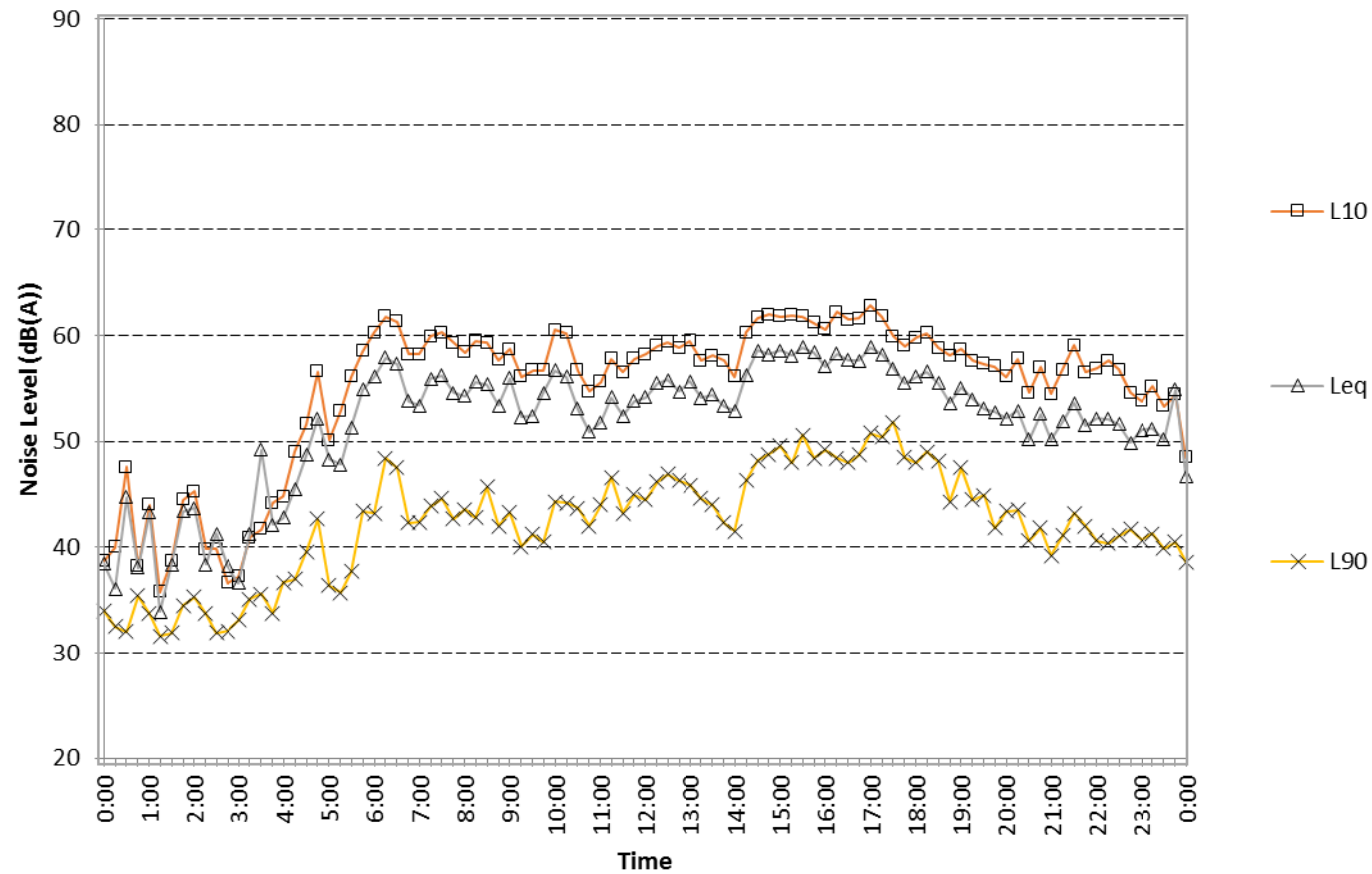
### Bringelly Road Business Hub

Thursday August 7, 2014



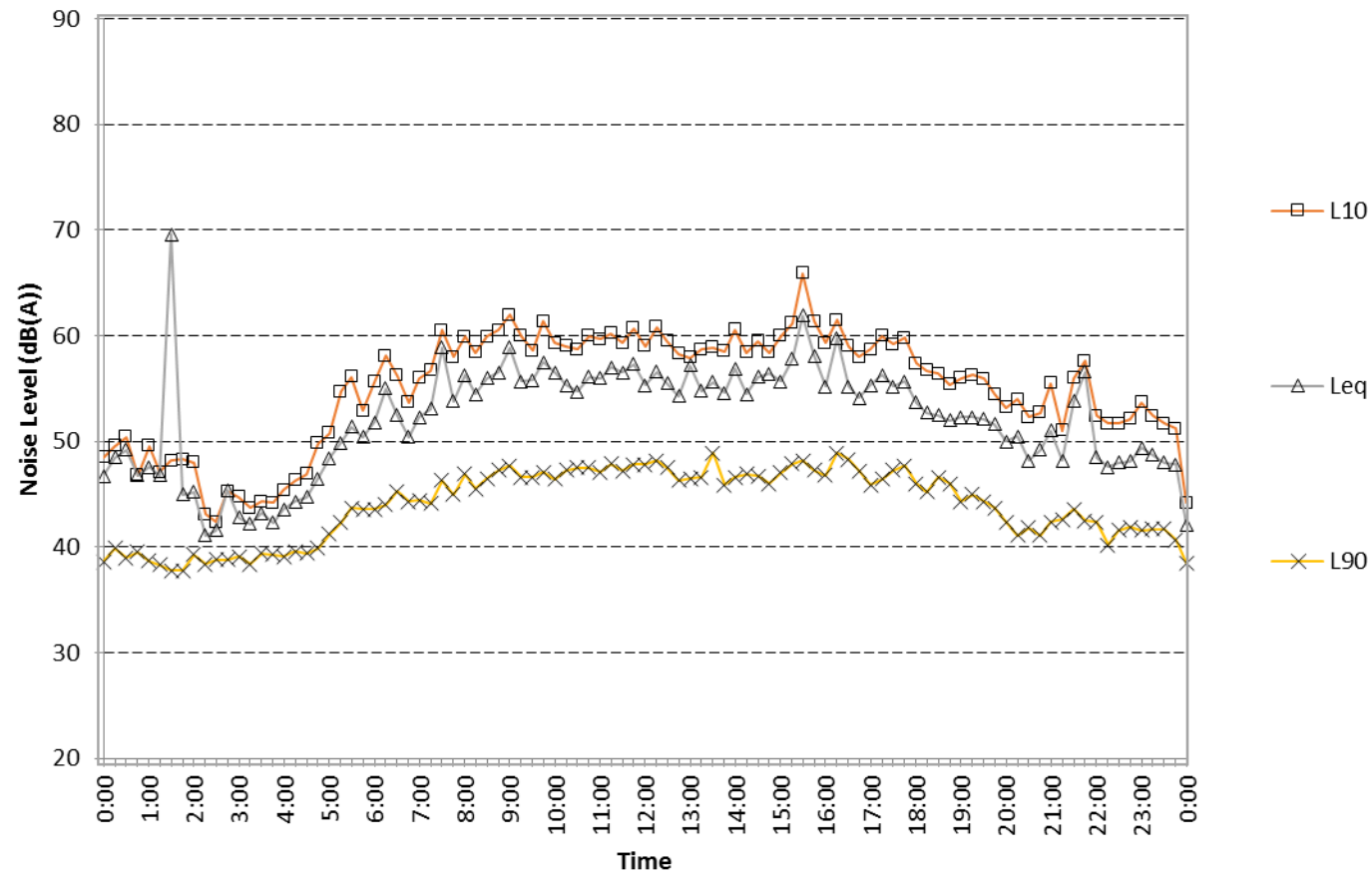
### Bringelly Road Business Hub

Friday August 8, 2014



### Bringelly Road Business Hub

Saturday August 9, 2014



### Bringelly Road Business Hub

Sunday August 10, 2014

