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# **V by Crown, 45 Macquarie Street, Parramatta**

## **Noise Impact Assessment**

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## 1 INTRODUCTION

This report presents an analysis of acoustic impacts associated with the proposed mixed-use V by Crown development, Parramatta.

This assessment has been conducted for the proposed alterations being submitted as part of the Section 75W and includes recorded noise levels previously conducted at the site and detailed within the VDM consulting report dated March 2010.

In this report we will:

- Conduct an external noise impact assessment (primarily traffic noise) and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future occupants.
- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council and NSW Environmental Protection Authority (EPA) acoustic requirements to ensure that nearby properties are not adversely impacted.

Traffic noise has been measured and assessed in accordance with Parramatta City Council acoustic requirements.

The environmental noise emission criteria will be assessed in accordance with the requirements of NSW EPA's Industrial Noise Policy.

The assessment is based on architectural drawings provided to this office by AJ+C architects.

## 2 SITE DESCRIPTION

The proposed development is a mixed use multi story building which is located on the corner of Macquarie, Hunter and Marsden Streets, Parramatta. The site is bounded by existing commercial properties in all directions.

Figure 1 shows an aerial photo of the site.

Surrounding Commercial receivers

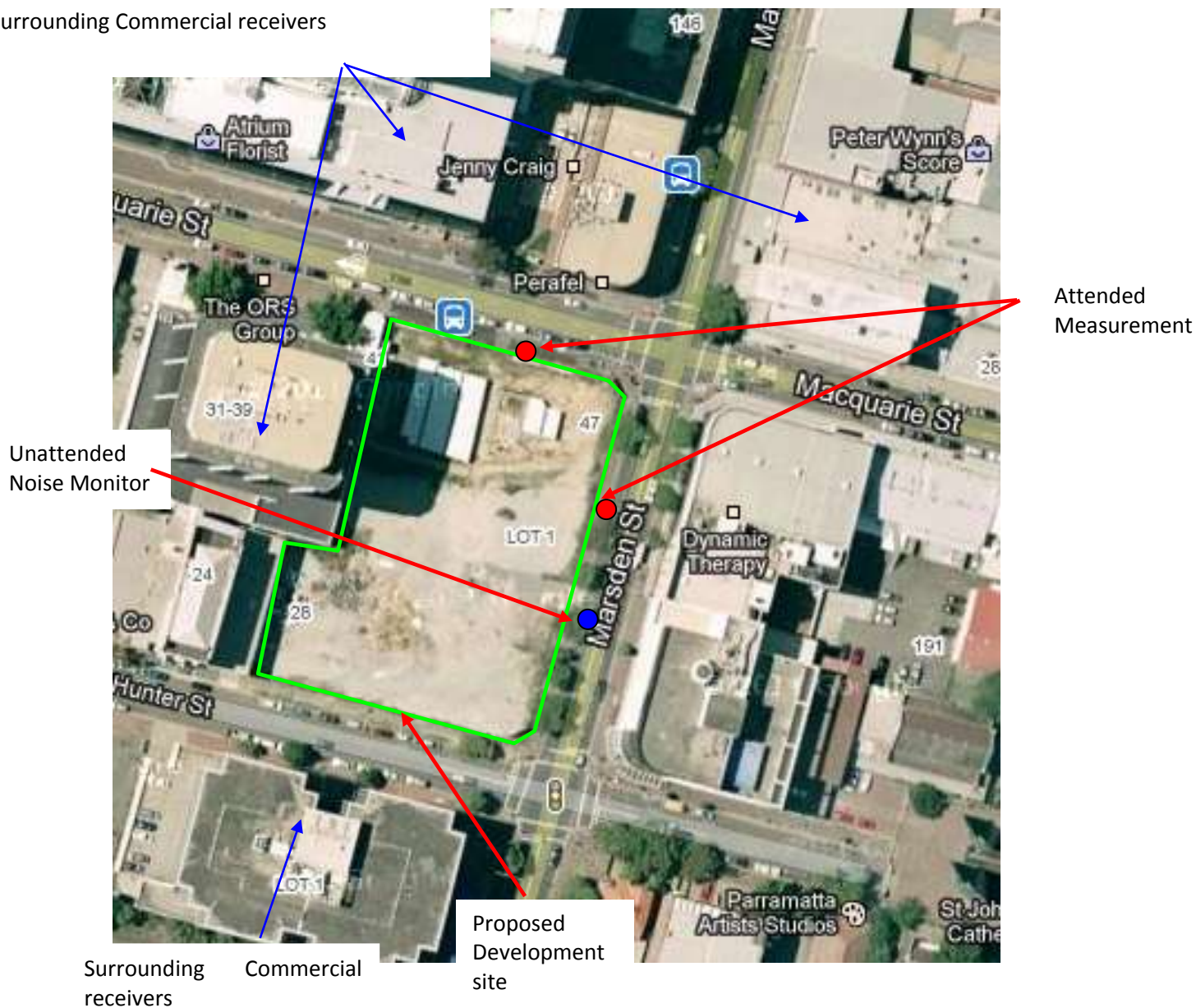


Figure 1: Site Map and Measurement Locations

### 3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic 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. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of 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 interval.

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 measurement period.  $L_{eq}$  is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the  $L_{eq}$  parameter as a means of measuring traffic noise, whereas the  $L_{10}$  parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the  $L_{90}$  parameter is not used to assess traffic noise intrusion.

## 4 ASSESSMENT CRITERIA

Traffic noise intrusion is determined according to the following documents:

- Parramatta Development Control Plan (DCP) 2011.
- AS 2107-2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.

### 4.1 PARRAMATTA CITY COUNCIL DCP 2011

Parramatta City Council DCP 2011 has the following control for acoustic amenity.

*“Design Standards*

*Residential Development*

*C.1 Internal habitable rooms of dwellings affected by high levels of external noise are to be designed to achieve internal noise levels of no greater than 50dBA.”*

### 4.2 AUSTRALIAN STANDARD 2107-2000

Australian Standard 2107 – 2000 *“Recommended Design Sound Levels and Reverberation Times for Building Interiors”* outlines recommended design internal noise levels for various spaces. The criteria applicable for this proposed development are presented in the table below.

**Table 1 – AS2107:200 Recommended Internal Noise Level Criteria**

| Type of occupancy / Activity           |                | Project Design Sound Levels           |
|--|----------------|---------------------------------------|
| Commercial/Retail                      |                | 50 dB(A) $L_{eq}$ (when in use)       |
| Houses and Apartments near major roads | Sleeping areas | 40 dB(A) $L_{eq(9hr)}$ (10pm to 7am)  |
|  | Living Areas   | 45 dB(A) $L_{eq(15hr)}$ (7am to 10pm) |

From previous experiences, we recommend design of the proposed mixed use development to comply with the satisfactory internal noise level requirements of AS 2107:2000, to achieve a suitable level of amenity for future receivers within this development. Compliance with AS210:200 requirements will result in compliance with Parramatta City Council requirements as well. The recommended project criteria are presented in table 1 above.

## 5 EXTERNAL NOISE MEASUREMENTS

A site survey was carried out. It was noticed that the main environmental noise incidents at the site are those generated by transportation noise, primarily traffic on surrounding streets.

### 5.1.1 Unattended Long Term Noise Monitoring

An unattended noise monitor was located on site as part of the VDM Consulting 'Traffic Noise Impact Assessment' report of March 2010. .

The results of the recorded noise levels have been used in this assessment.

### 5.1.2 Attended Noise Monitoring

Additional attended monitoring was also conducted on site, facing Macquarie and Marsden Streets at the boundary of the site.

Noise measurements were obtained using a Norsonic 118 Sound Level Analyser, set to A-weighted fast response. The sound level meter was calibrated before and after the measurements using a Norsonic 1251 Sound Level Calibrator. No significant drift was recorded.

Attended measurements were conducted on the 24<sup>th</sup> August, 2012 between 4:30pm and 5:30pm, during the peak traffic hour.

The traffic noise levels listed in Table 2, were determined based on the logging data presented in the VDM Consulting report and the attended measurements conducted by Acoustic Logic Consultancy. In determination of acoustic treatments, the measured level is adjusted for distance and orientation.

**Table 2 – Measured Noise Levels**

| Location                                | Measured Traffic Noise Level      |                                  |
|---|-----------------------------------|----------------------------------|
|   | Daytime (7am-10pm)                | Night Time (10pm-7am)            |
| Proposed Façade facing Macquarie Street | 68 dB(A) L <sub>eq</sub> (15hour) | 62 dB(A) L <sub>eq</sub> (9hour) |
| Proposed Façade facing Marsden Street   | 67 dB(A) L <sub>eq</sub> (15hour) | 62 dB(A) L <sub>eq</sub> (9hour) |
| Proposed Façade facing Hunter Street    | 65 dB(A) L <sub>eq</sub> (15hour) | 62 dB(A) L <sub>eq</sub> (9hour) |



## 6 EVALUATION OF NOISE INTRUSION

Noise intrusion into the proposed development will be assessed using traffic noise levels presented in Table 2 above.

Calculations were performed taking into account the orientation of windows, barrier effects, roof, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

In all cases, the selected glazing type (refer below) reduces internal noise levels to within the nominated criteria for the various space types. The external noise levels used in the calculations are those that would occur when the buildings are constructed on the site.

### 6.1 GLAZING CONSTRUCTIONS

The recommended glazing assemblies for the mixed use development are outlined in Tables 4 and 5 below. The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement.

**Table 3 – Glazing Requirements**

| Room         | Façade      | Level      | Glazing Requirements | Acoustic Seals |
|--------------|-------------|------------|----------------------|----------------|
| Living Rooms | North       | All Levels | 10.38mm Laminated    | Yes            |
|              | East        |            | 10.38mm Laminated    |                |
|              | West        |            | 6.38mm Laminated     |                |
|              | South       |            | 6.38mm Laminated     |                |
| Bedrooms     | North       |            | 10.38mm Laminated    |                |
|              | East        |            | 10.38mm Laminated    |                |
|              | West        |            | 6.38mm Laminated     |                |
|              | South       |            | 6.38mm Laminated     |                |
| Commercial   | All façades | All Levels | 6mm Float/toughened  | Yes            |

It should be noted that the above glazing types are indicative, and should be further reviewed at Construction Certificate Stage.

In addition to complying with the minimum scheduled glazing thickness, the STC rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in the Table 6 below.

Where nominated, this will require the use of acoustic seals equal to Schlegel Q-Ion series (*acoustic bulb seal*) around the full perimeter of operable frames. The frame will need to be sealed

into the building opening using a flexible 100% polyurethane sealant equal to Bostik Seal N' Flex. Note that mohair seals and/or mohair/plastic fin combination seals in windows and doors are **not** acceptable where acoustic seals are required.

It is recommended that only window systems have test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

**Table 4 – Minimum STC/R<sub>w</sub> of Glazing Requirements**

| <b>Glazing Assembly</b> | <b>Acoustic Seals</b> | <b>Minimum STC of Installed Window</b> |
|-------------------------|-----------------------|--|
| 10.38mm laminated       | Yes                   | 35                                     |
| 6.38mm laminated        | Yes                   | 31                                     |
| 10mm float              | Yes                   | 33                                     |

Noise intrusion through the masonry walls will be negligible and will not contribute to internal noise levels. Similarly, noise intrusion through the concrete slab roof construction will not be significant.

## 7 NOISE EMISSION ASSESSMENT

Detailed mechanical equipment selection and layouts are not available at this stage. The external noise emission criteria are set up in this section of the report to ensure that the amenities of nearby land users are not adversely affected.

The nearest potentially affected receivers are:

- Residential apartment further west to the proposed development.
- Residential apartment to the south across Union Street.

### 7.1 BACKGROUND NOISE MONITORING

Unattended noise monitoring was conducted by VDM Consulting at the site between the 27<sup>th</sup> August and the 6<sup>th</sup> September 2009. Additional attended measurements were conducted by Acoustic Logic Consultancy at the site on the 24<sup>th</sup> August, 2012 to verify the recorded results.

Measured background noise levels are presented below which will be used as the basis of this assessment.

**Table 5 – Measured Background Noise Levels**

| Location                    | Period/Time       | Background Noise Level<br>dB(A) L <sub>90</sub> (period) |
|-----------------------------|-------------------|--|
| V by Crown Development Site | Day (7am-6pm)     | 52   |
|                             | Evening(6pm-10pm) | 47   |
|                             | Night(10pm-7am)   | 46   |

### 7.2 ACOUSTIC OBJECTIVES

As Parramatta DCP 2011 does not specify any criteria for noise emission, noise emissions from steady noise sources (e.g.: mechanical noise) on the subject site will be managed in accordance with EPA/DECCW Industrial Noise Policy.

#### 7.2.1 EPA Industrial Noise Policy

The EPA's Industrial Noise Policy, has two criteria which need to be satisfied namely Intrusiveness and Amenity. These are described below:

- *Intrusiveness Criteria* - This guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L<sub>eq</sub> descriptor not exceed the background noise level by more than 5 dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

- *Amenity Criteria* - This guideline is intended to limit the absolute noise level from all “industrial” noise sources such as mechanical plant to a level that is consistent with the general environment.

The EPA Industrial Noise Policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. Under the policy the nearest residence would be assessed against the urban criteria.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

#### **7.2.1.1 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 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 7.1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

#### **7.2.1.2 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 EPA’s Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. This site is categorised by the residential receivers as suburban.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

**Table 6 – EPA Amenity Noise Levels**

| Type of Receiver       | Time of day                    | Recommended Noise Level<br>dB(A) <sub>Leq(period)</sub> |
|------------------------|--------------------------------|---|
| Residential - Suburban | Day                            | 55  |
|                        | Evening                        | 45  |
|                        | Night                          | 40  |
| Commercial receivers   | All times of the day and night | 65  |

### 7.2.1.3 Sleep arousal

To minimise the potential for sleep arousal the  $L_1$  (1 minute) noise level of any specific noise source does not exceed the background noise level ( $L_{90}$ ) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am.

The  $L_1$  noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Where the typical repeatable existing  $L_1$  levels exceed the above requirement then the existing  $L_1$  levels form the basis for, sleep disturbance criteria.

### 7.2.2 Protection of the Environment Operations Act Regulation

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

*Protection of the Environmental Operations (Noise Control) Regulation 2000-Sect 52*

52 *Air Conditioners*

*(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of whether any door or window to that room is open):*

*(a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or*

*(b) before 7 am or after 10 pm on any other day.*

### 7.3 NOISE EMISSION OBJECTIVES

Under the current EPA requirements the Industrial Noise Policy supersedes the requirements of the Noise Control Manual for assessment of mechanical plant noise. In addition we note that compliance with the Industrial Noise Policy will also indicate compliance with the Protection of the Environment Operations Act.

Based on the EPA's Industrial Noise Policy, Table 7 provides a summary of the assessment criteria applicable to the future residential developments at the neighbouring potentially affected residential properties, based on noise monitoring conducted for the subject site.

The projects external noise level criteria based on the INP criteria is detailed in the table below.

**Table 7 – Noise Emission Requirements for All Surrounding Residential Receivers**

| Time of day          | Measured Background Noise Level<br>dB(A) $L_{90}(\text{period})$ | Amenity Criteria<br>dB(A) $L_{eq}(\text{period})$ | Intrusiveness Criteria<br>Background + 5 dB(A)<br>$L_{eq}(15\text{mins})$ | EPA Criteria for Residential Condensers | EPA Criteria for Sleep Disturbance<br>dB (A) $L_1(1\text{minute})$ |
|----------------------|--|---|---|---|--|
| Day                  | 52   | <b>55</b>   | 57  | N/A                                     | N/A  |
| Evening              | 47   | <b>45</b>   | 52  | N/A                                     | N/A  |
| Night                | 46   | <b>40</b>   | 51  | Inaudible within neighbouring premises  | 61   |
| Commercial Receivers | N/A  | <b>65</b>   | N/A   | N/A                                     | N/A  |

The noise level criteria for noise generated on the site impacting on surrounding receivers is detailed as **BOLD** in the table above.

### 7.4 RECOMMENDATIONS

Mechanical plant items are not typically selected at DA stage.

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in table 7 of this report.

Based on previous experiences with similar developments, all plant can be satisfactorily attenuated to levels complying with the noise emission criteria through appropriate locations (where possible) and acoustic treatments such as lining of ductwork, acoustic silences, variable speed controllers, time switches, acoustic screens etc.

## 8 CONCLUSION

This report presents an assessment of potential environmental noise impact from the proposed V by Crown mixed-use development Parramatta.

Noise impacts from traffic noise on occupants of the development have been assessed in accordance with Parramatta DCP 2011 and AS2107-2000 guidelines. The acoustic treatments necessary to achieve these guidelines have been set out in section 6.

Noise emissions objectives for the site have been determined based on on-site noise logging and noise emission guidelines typically adopted by Council, and have been presented in section 7. Further detail in relation to noise emissions from the proposal will be provided at CC stage, and will ensure compliance with relevant standards. This can be conditioned in DA.

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