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Acoustic Assessment

For

Proposed Commercial Development Honeysuckle Central

Prepared For:

Buildev Pty Ltd
&
Eureka Funds Management

By

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REPORT REF NUMBER:-HONEYSUCKEL CENTRAL DA REVA.DOC

REPORT TITLE:- ACOUSTIC ASSESSMENT FOR PROPOSED COMMERCIAL AND RETAIL DEVELOPMENT HONEYSUCKLE CENTRAL

PREPARED FOR:- BUILDEV PTY LTD & EUREKA FUNDS MANAGEMENT

1. INTRODUCTION

Hunter Acoustics has been engaged to conduct an assessment of the impact of a proposed commercial and retail development on nearby residential receptors and the impact of road and rail and general noise on the proposed development at Honeysuckle Drive, Newcastle. The proposed development is described in the drawings prepared by Suters Project number 10299 and Issue F dated 26th of November 2008 and named Honeysuckle Central. This report addresses the requirements of the Director General of the Department of Planning, sets appropriate noise emission criteria for the proposed development and describes the acoustic treatments necessary to ensure that the occupied spaces within the proposed will meet the requirements for acoustic amenity set out in AS NZS 2107.

2. TERMS AND DEFINITIONS

dB(A) ..... Unit of sound pressure level, modified by the A-weighting network to represent the sensitivity of the human ear.

SPL..... The incremental variation of sound pressure from the reference pressure level expressed in decibels.

SWL (L_W)..... Sound Power Level of a noise source per unit time expressed in decibels from reference level $W_{O.}$

L_X ..... Statistical noise descriptor. Where (x) represents the percentage of the time for which the specified noise level is exceeded.

L_{eq}..... Equivalent continuous noise level averaged over time on an equivalent energy basis.

L_1..... Average Peak Noise Level in a measurement period.

L_{10}..... Average Maximum Noise Level in a measurement period.

L_{90}..... Average Minimum Noise Level in a measurement period.

L_{max}..... Maximum Noise Level in a measurement period.

Background Noise Level..... Noise level determined for planning purposes as the one tenth percentile of the ambient L_{A90} noise levels.

P_O ..... Reference Sound Pressure for the calculation of SPL in decibels.

W_O..... Reference Sound Power for the calculation of SWL in decibels.

LT..... Rail Traffic Noise Criteria as defined in RIC Guideline

3. ACOUSTIC ISSUES

3.1 DESCRIPTION OF THE DEVELOPMENT

The proposed development is set adjacent to the Newcastle Rail corridor and Honeysuckle Drive which is a collector traffic route. Newcastle City Council DCP 2005 is the relevant planning instrument for the area and requires that the impact of noise generators such as road, rail and other noise sources, on the proposed development be considered as part of the development application.

The proposed development consists of three independent buildings and is intended to be constructed in three stages and each has the potential to be impacted by rail noise and vibration from the nearby Newcastle Rail corridor and by traffic noise from Honeysuckle Drive. The proposed development is shielded from noise generated by the operation of Newcastle Harbor and, therefore, harbor noise sources impacting the development do not need to be considered.

It is proposed that the three independent buildings each be serviced by variety of mechanical plant which is dedicated to the building it serves. The mechanical plant for each building will be located on the roof of the building it serves. Mechanical plant has the potential to impact nearby residences and in particular the residential apartments at building B7 of the Lee Wharf project and the new residential apartments opposite on Honeysuckle Drive. Suitable protective measures need to be put in place to protect the acoustic amenity of the residents adjacent to the proposed residential development and consideration needs to be given to the internal acoustic amenity of the proposed development.

3.2 DIRECTOR GENERALS REQUIREMENTS

The Director General requires that the acoustic impact of the proposed development on nearby residential receivers be considered in accordance with DECC guidelines and has set out the requirements regarding noise and vibration as follows:-

3.2.1 Noise Impacts

The EA should include a comprehensive noise assessment of the existing environment, potential impacts and proposed noise amelioration measures for the proposed development. The NSW Industrial Noise Policy (DEC, 2000) provides a guide to the methodology and assessment criteria preferred by DECC to determine noise planning levels.

3.2.2 Utilities

In consultation with the relevant agencies, the EA shall address the existing capacity and requirements of the development for the provision of utilities including staging of infrastructure works in particular:

- Include details of how the easement for noise, vibration and electrolysis is to be addressed in the design of the proposal.
- Address the impacts of the development on the adjacent rail infrastructure.

3.3 CONSTRUCTION NOISE AND VIBRATION

3.3.1 Construction Noise

The NSW DECC has recently released its Draft Construction Noise Guideline which makes provision for normal commercial construction that is conducted in normal hours to be assessed under a qualitative assessment methodology under Section 5 of the guide. The qualitative assessment method involves identifying noisy construction activities that have the potential to cause disturbance to nearby residences and putting in place a level of community consultation and noise management consistent

with the nature and duration of the particular construction noise source. Attachment 1 is an extract of Figure 3.1 from the guide which indicates the method of selecting the appropriate assessment and management methods. The guide also recommends general criteria and limits to construction times for the control of construction noise as set out below:-

1. Construction period of 4 weeks or under.
   The L_{10} level * measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20dB(A).

2. Construction period greater than 4 weeks and not exceeding 26 weeks.
   The L_{10} level* measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10dB(A).

*L10: Noise level exceeded for 10% of a specified time period

Time restrictions

Monday to Friday: 7am to 6pm.

Saturday: 8am to 1pm if audible on residential premises, otherwise 7am to 1pm.

No construction work to take place on Sundays or Public Holidays.

Silencing

All possible steps should be taken to silence construction equipment. It is particularly important that silenced equipment should be used on road and rail works where 24 hour operation is necessary.'

3.3.2 Construction Vibration

Because the detailed building design has not been competed, the geology has not been fully investigated and, construction methods have not been finalised, it is not possible to precisely predict the levels of construction vibration that may occur. However, based on experience on other sites in the area (The Boardwalk, Lee Wharf and the Hunter Water Building in particular) it is my professional opinion that certain construction methods that when used in the area have the potential to cause cosmetic damage to Heritage buildings or create complaint as a result of high vibration levels. To protect adequately sensitive receptors from construction vibration, a buffer zone of 20 metres is required between the source and the receiver. In the case of Honeysuckle Central there are no sensitive receivers closer than 20 meters to a potential construction vibration source and so in my opinion there is no significant risk of structural damage to any building. There is a possibility that there will be some adverse comment from nearby residents in respect of construction vibration but the vibration levels will be low and are generally likely to be within the criteria set with the NSW DECC guide for vibration impact assessment.

3.4 TRAFFIC NOISE

The EPA has set out noise level criteria in its document Environmental Criteria for Road Traffic Noise where it refers to AS NZS 2107 2000 as the appropriate standard for determining internal traffic noise levels for commercial and other non residential development.

Australian Standard AS 3671 requires the use of the recommended noise levels in Australian Standard AS 2107 for the assessment of internal noise levels. The noise levels are to be assessed as an L_{Aeq} for the same sampling period as the traffic noise descriptor. For commercial uses in inner suburbs Table 1 of AS2107 – 2000 recommends internal design sound levels for offices as reproduced in Table 1 below.

Table 1 Acceptable Internal Noise Levels

Use	Acceptable Level dB(A)	Maximum Level dB(A)
General Office Areas	40	45
Private Offices and Boardrooms	35	40
Public Areas	40	50

3.5 RAIL TRAFFIC NOISE

Rail Infrastructure Corporation has published guidelines for residential receptors affected by Rail Traffic Noise, however, it does not address requirements for commercial buildings. Commercial buildings are less sensitive to noise intrusion and are generally provided with air-conditioning ensuring that windows are normally closed. The key requirement for rail noise intrusion is that the noise from Rail Traffic does not interrupt the efficient running of an office environment. To achieve this I recommend that the appropriate criteria is a maximum internal noise level of 55 dB(A) $L_{Amax.}$

3.6 RAIL TRAFFIC VIBRATION

The NSW EPA requires that human exposure to vibration be assessed under it guide Assessign Vibration a Technical Guide which is based on BS 6472 1992. Under the DECC Vibration Guide rail traffic vibration is regarded as continuous, intermittent vibration and is assessed under Section 2.4 of the guide.

3.7 HARBOUR AND GENERAL NOISE

Not applicable to this development

4. METHODOLOGY

4.1 ROAD TRAFFIC NOISE ASSESSMENT

Honeysuckle Drive is a traffic noise source that requires assessment under DCP2005. Traffic noise levels on Honeysuckle Drive have been measured by Hunter Acoustics on a number of occasions in recent years at locations that represent position of the proposed façade at peak traffic times. The measurement was conducted under free field conditions and, therefore, a 2.5 dB(A) façade correction was added to the measured values to give the values in Table 2. Given the nature of the area and the current use there is no reason to expect a significant increase in traffic noise over time from the measured values because the traffic mix is expected to change. It is expected that there will be a reduction in the percentage heavy vehicles as inner city construction tapers off in the area. Traffic calming measures are already in place and, as residential and commercial development completes the traffic speed and volume are expected to reduce slightly. Even if this does not occur a substantial increase in traffic volume of the order of 50 % increase would be required to significantly effect current traffic noise levels and this is considered to be unlikley.

Table 2 Current Traffic Noise Levels

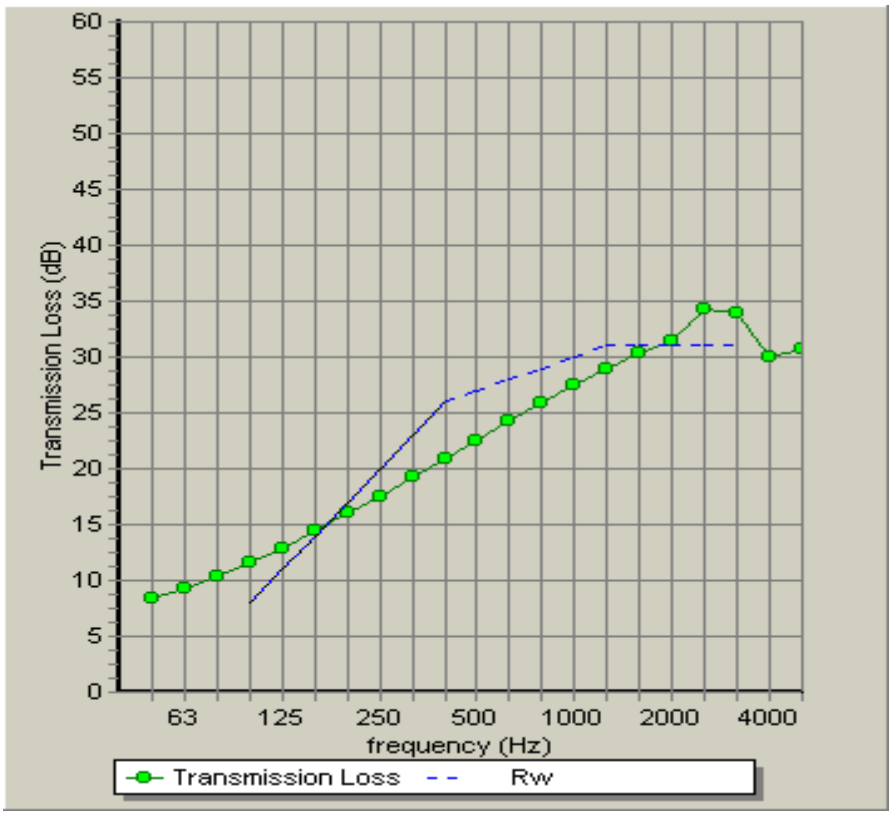
Development	Existing Road Traffic Noise Levels	
	Daytime 7 am – 10 pm	$L_{Aeq\ 1\ hr}$ 66.0 dB(A)

4.2 ROAD TRAFFIC NOISE TREATMENT AND ATTENUATION

AS 3671 Acoustics -Road Traffic Noise Intrusion, - Building Siting and Construction specifies the calculation of a Traffic Noise Attenuation (TNA_C) value for building components so as to achieve the internal noise levels specified in AS/NZS 2107- 2000. Traffic noise attenuation was calculated in accordance with Appendix C of AS3671.

- External walls will need to be designed to provide a minimum Rw + Ctr > =50.
- Windows and glass doors in facades exposed to road traffic noise need to achieve a Rw + Ctr > = 27. The use of minimum 6.38 mm laminated glass in these elements will ensure that traffic noise remains within acceptable levels and does not become intrusive for workers in the building. Figure 1 below provides the minimum transmission loss for window systems that will meet the requirements.

Figure 1 Transmission Loss Dntw for Window Systems



4.3 RAIL TRAFFIC NOISE ASSESSMENT

Measurements of rail traffic noise were conducted on site on the 27th of November 2008. Received noise levels from the railway at the proposed façade are shown in Table 3. It has been found in previous surveys that rail traffic on the Newcastle line is generally not sufficiently frequent to require assessment as an L_{A10} value, therefore, this assessment is conducted on maximum internal noise levels to prevent intrusive noise disruption of works.

Table 3 Rail Noise Levels

Train By Pass	Type	L_{Amax}	LAeq
1	**2 Car Electric**	**68.5**	
2	**4 Car Electric**	**76.3**	
3	**4 Car Diesel**	**79**	**66.5 dB(A)**
4	**2 Car Electric**	**69.8**	
5	**4 Car Electric**	**72.4**	
6	**4 Car Electric**	**76.3**	
7	**2 Car Diesel**	**69.6**	
8	**2 Car Electric**	**66.5**	
Arithmetic Average		**72.3**	
Transmission Loss Required across Façade (Worst Case) To Achieve 55 dB(A) L_{Amax}		**79-55=24 dB(A)**	**46.9**

Rail noise levels and the required attenuation have been calculated in octave bands in accordance with the requirements of the Rail Infrastructure Corporation Noise guidelines. The design levels used to determine attenuation requirements are the least offensive RC 50 noise curves to give a maximum Internal noise level of 55 dB(A) for a typical train pass by. This will give an L_{Aeq} train pass of 46.9dB(A) which is not considered to be intrusive in a commercial office environment.

4.4 RAIL NOISE TREATMENT AND ATTENUATION

4.4.1 Windows and Doors

Specific treatment is required for selection of glass and framing for doors and windows in areas that have a direct exposure rail traffic noise and external walls must meet a minimum level to ensure that the glass treatments are effective. Façade performance required to ensure that rail traffic noise levels will meet the internal noise level requirements of AS / NZS 2107 – 2000 are as follows:-

- External walls will need to be designed to provide a minimum Rw + Ctr = 50 or Dntw + Ctr = 45.
- Windows and associated frames need to achieve a Dntw +Ctr= 27. Minimum 6.38 mm laminated glass in facades will ensure that rail traffic noise levels remain within acceptable levels and do not become intrusive for workers in the building. Figure 1 above provides the minimum transmission loss for window systems that will meet the requirements.

4.5 RAIL VIBRATION

Measurements of Rail Induced Vibration were taken on the site as part of another study on 7 April 2003 recent surveys have shown that the vibration levels and overall train volume have not changed since 2003. Vibration levels measured and the resultant vibration dose value calculated in accordance with Section 2.4 of the DECC Vibration Guide are shown in Table 4.

Table 4 Calculated VDV Values for Newcastle Rail Corridor at 145 trains per 16 hour day.

						VDV Limits		
PPV Values	**mm/s**	**m/s**	**RMS Acceleration**	**eVDV train**	**VDV 16hrs**	**Low Probability of Comment**	**Adverse Comment Possible**	**Adverse Comment Probable**
vs	0.305286	0.000305	0.00646518	0.016	0.055	**0.2 to 0.4**	**0.4 to 0.8**	**0.8 to 1.6**
x	0.042286	4.23E-05	0.0008955	0.002	0.007			
y	0.013571	1.36E-05	0.00028741	0.0007	0.002			
z	0.156571	0.000157	0.00331579	0.0082	0.028			

Table 4 shows that vibration from rail is unlikely to cause adverse comment by people in the proposed development.

4.6 NOISE FROM PEOPLE IN THE STREET

No assessment required

4.7 GENERAL BUILDING CONSTRUCTION

Normal masonry construction is proposed for the exterior shell of the building and this will be adequate to provide the required level of attenuation.

4.8 EASEMENT TO PROTECT RAILWAY INFRASTRUCTURE FROM NOISE AND VIBRATION

4.8.1 Impacts from Sound on the Rail Line

There are no identified impacts from sound generated by the proposed development that have the potential to impact on Railway Infrastructure.

4.8.2 Impacts from Vibration on Railway Infrastructure

The boundary of the development site and, therefore, the closest point of approach for any vibration generating equipment such as piling equipment, or similar, is 25 metres from the boundary of the rail corridor and 35 metres from the nearest rail line.

Testing conducted by Hunter Acoustics for piling and excavation in the Honeysuckle precinct on developments including, the Boardwalk and the Hunter Water Headquarters building has shown that vibrations from construction sources does not exceed 10 mm/s Peak Particle Velocity at a distance of 20 metres from the source.

BS 7385 recommends vibration damage limits of 50 mm/s Peak Particle Velocity for industrial buildings and infrastructure, such as that in the rail corridor.

It has been shown in studies by the Department of Mines that vibration levels in excess of 100mm/s

are required to induce liquefaction in saturated soils and, thereby, cause subsidence.

Therefore, there is no risk that vibration from construction and operation of the proposed development would impact adversely on Railway Infrastructure.

5. MECHANICAL SERVICES

Background noise levels were measured at the site by data logging between the 27th of November and 4th of December 2008. Rating Background Noise Levels (RBL) for Day, Evening, and Night were determine in accordance with Appendix 3 of the DECC Industrial Noise policy. The Rating Background Noise levels are set out in Table 5.

Table 5 Rating Background Noise levels and INP Criteria

Time	**Background Level**			**Amenity Level**		
	Day 7 am to 6pm	**Evening 6 pm to 10 pm**	**Night 10 pm to 7 am**	**Day 7 am to 6pm**	**Evening 6 pm to 10 pm**	**Night 10pm to 7 am**
27 Nov	50	46.5	43.6	59.8	54.9	52.7
28 Nov	48.2	49	42.8	61.3	57.4	54.8
29 Nov	49.2	48.9	42.7	59.4	57.3	56.5
30 Nov	49.5	46.0	43.5	58.8	56.8	53.7
1 Dec	54.0	47.2	43.0	62.1	58.4	54.7
2 Dec	53.6	48.0	43.9	59.7	57.3	56.8
3 Dec	54.2	50.7	40.8			
4 Dec	52.3					
RBL	50.0	48.0	43.0			
Intrusiveness Criteria	**55**	**53**	**48**			
L_{Aq}				60.1	57.0	54.8
Urban Amenity Criteria				**50** (60 -10)	**47** (57-10)	**45** (54.8 -10)

The dominant noise emission source for the proposed development is the continuous noise from mechanical plant that has the ability to elevate the noise level at the nearby residential buildings.

The mechanical plant from each building will be additive at the residential receivers and the proponent has indicated that they expect that the buildings in the proposed development will be in use in the evening and night times. In order to allow for variations in fan speed and equipment load conditions from daytime to night time a Maximum Sound Power Level is set for each building plant enclosure for day evening and night time periods. The Maximum Sound Power Level set out in Table 6 below is the sum of all equipment within the plant room including Car Park Exhaust, Air Conditioning Plant, Mechanical Ventilation and any other equipment.

Table 6 Maximum Sound Power Level for Plant and Equipment in Roof Top Plant Rooms

	West Building	Middle Building	East Building
Day Time			
Maximum SWL	**82.0**	**82.0**	**82.0**
Distance to Northern Receiver	30.0	30.0	30.0
Distance loss	37.5	37.5	37.5
Received	44.5	44.5	44.5
Sum	**49.2**		
Criteria	**50.0**		
Evening	West Building	Middle Building	East Building
Maximum SWL	**79.0**	**79.0**	**79.0**
Distance to Northern Receiver	30.0	30.0	30.0
Distance loss	37.5	37.5	37.5
Received	41.5	41.5	41.5
Sum	**46.2**		
Criteria	**47.0**		
Night Time	West Building	Middle Building	East Building
Maximum SWL	**75.0**	**75.0**	**75.0**
Maximum SWL	30.0	30.0	30.0
Distance to Northern Receiver	37.5	37.5	37.5
Distance loss	37.5	37.5	37.5
Sum	**42.2**		
Criteria	**45.0**		

To avoid impacting on the amenity of the neighboring residents once the project is competed the total effective Sound Power Level for all mechanical plant in each building should not exceed the following levels:-

- Daytime Sound Power Level of mechanical plant not to exceed 82 dB(A) overall and not to exceed 80 dB in any Octave Band 125 to 4000 Hz
- Evening Sound Power Level of mechanical plant not to exceed 79 dB(A) overall and not to exceed 75 dB in any Octave Band 125 to 4000 Hz
- Night time Sound Power Level of mechanical plant not to exceed 75 dB(A) overall and not to exceed 70 dB in any Octave Band 125 to 4000 Hz.

6. RECOMMENDATIONS TO ENSURE A SATISFACTORY ACOUSTIC OUTCOME

To ensure that the final development adequately addresses the requirements for acoustic amenity set out by the Director General and Newcastle DCP 2005 the following recommendations are made and should be included in a statement of commitments as part of the development application.

- Construction noise and vibration will be managed and controlled in accordance with the NSW DECC Draft Construction Noise Guideline August 2008.
- The façade of the building shall be appropriately designed and constructed so as to achieve the minimum façade sound attenuation of:-
  - External walls Rw + Ctr = 50
  - Windows Rw + Ctr =27
- The maximum effective Sound Power Level of the total mechanical plant for each building, after the application of any necessary acoustic treatment, is not to be more than:-
  - Daytime Sound Power Level of mechanical plant not to exceed 82 dB(A) overall and not to exceed 80 dB in any Octave Band 125 to 4000 Hz
  - Evening Sound Power Level of mechanical plant not to exceed 79 dB(A) overall and not to exceed 75 dB in any Octave Band 125 to 4000 Hz
  - Daytime Sound Power Level of mechanical plant not to exceed 75 dB(A) overall and not to exceed 70 dB in any Octave Band 125 to 4000 Hz.
- No high level construction vibration activities such as, piling, heavy excavation, high compression compaction, or the like will be carried out within 20 metres of a sensitive receiver as defined in section 3.1.2 of the Industrial Noise Policy unless monitoring and control of the vibration levels is undertaken by an appropriately qualified consultant.

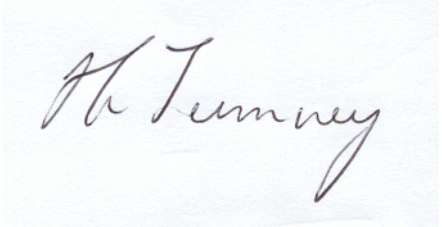
7. CONCLUSION

This assessment has shown that the requirements set out by the Director General can be met by the proposed development provided the recommendations set out in Section 6 above are adhered to.

Therefore, it is my professional opinion that there are no grounds to refuse the development based on the level of noise impact.

Please do not hesitate to contact me if you have any questions regarding this report.

Yours Sincerely
Hunter Acoustics



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Attachment 1 Figure 3.1 Construction Noise Guide.

Figure 3.1 Selecting the assessment method