Cardno ITC

Shaping the Future

# ACOUSTIC ASSESSMENT
## Mixed Retail, Commercial and Residential Development
## Part 3A Application

**Lot 11 DP 774322 and Lots 6-8 DP 977044**
**78 to 90 Old Canterbury Road,**
**Lewisham**

**Prepared For:**

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**DOCUMENT HISTORY**

| Issue No. | Revision No. | Date | No of Pages | Comment |
|---|---|---|---|---|
| 0 | A | 20/5/10 | 15 | Draft |
| 0 | B | 27/5/10 | 15 | Draft |
| 0 | C | 13/10/10 | 15 | Final |
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**REPORT APPROVAL**

Approved by: **Dr Simon Kean** Date: **27/5/10**
(Cardno ITC)

Approved by: Date: **13/10/10**
(Cardno ITC)

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# 1 INTRODUCTION

Cardno ITC was engaged to conduct a desktop study to address the Director General Requirements (DGR's) in relation to development at 78 to 90 Old Canterbury Road, Lewisham proposed by Lewisham Estate Pty Ltd. The site currently forms part of a Master Plan Study by Tony Owen Partners.

## 1.1 Proposal Description

The Concept Plan is for a Major Project comprising a mixed use development for residential, commercial and retail land uses with associated car parking facilities and public domain improvements. The Concept Plan is for buildings ranging in height from 4 to 9 storeys with a maximum overall FSR of 3.5:1. Public domain improvements include the creation of new streets, open space areas and pedestrian access points

Figure 1-1 identifies the entire site forming part of the Tony Owen Partners Masterplan, as well as nearby infrastructure and receivers.

This report addresses the Director General's requirements outlined in 16 March 2009 (MP 08_0195) that are relevant to noise and vibration:

- 1.6 Marrickville LEP 2001 and any relevant Development Control Plans (DCP's)
- 16.1 Aircraft and Rail Noise
- 16.2 Vibration impact from the Rail Corridor

Cardno ITC considers that the DGR's will be identical for the entire site and have based this acoustic assessment on the above requirements.

In addition to the specified noise sources above, the DCP's also require road traffic noise intrusion and noise emission from the site to be assessed.

We also note that there are plans by the State Government to undertake a feasibility study regarding the extension of the existing Light Rail from Lilyfield to Dulwich Hill. Should such a plan be approved and constructed, then it could pass the site and hence impact the site (western portion mostly) with noise and vibration associated with pass-bys.

# 2 LOCATION

## 2.1 Site Description

The subject site is located at 78-90 Old Canterbury Rd, Lewisham, which is legally described as Lot 11 in DP 774322 and Lots 6-8 in DP 977044. The site is an irregular shaped allotment that is currently occupied by an assortment of industrial buildings. As described in Figure 1, the site is bounded by Longport Street and the Inner West rail corridor, to the north, Old Canterbury Road to the east, Hudson Street to the south and a green corridor (redundant freight railway corridor) to the west. A few outbuildings are located within the green corridor to the west and attached to the western boundary alignment of the subject site. The north eastern corner of the site is bounded by William Street and Brown Street. The site has a total area of 13,115sqm

## 2.2 Surrounding Topography and Conditions

The site is at a low point on the surrounding topography with higher level surroundings on both the east and west elevations. Surrounding buildings are primarily low rise (2 storey's or less) which provide minimal to no external shading onto the site.


**Proposed Development**
Source: Tony Owen Partners, October 2010

# 3 RELEVANT CRITERIA

## 3.1 Department of Planning

The Director Generals previous requirements for the site were:

> **1.** ***Relevant EPI's policies and Guidelines to be addressed:***
>
> **Marrickville LEP 2001 and any relevant Development Control Plans**
>
> **16.** ***Noise and Vibration Assessment***
>
> **The EA shall address the issue of noise from the airport and the rail corridor, and, provide detail of how this will be managed and ameliorated through the design of the buildings, in compliance with the Department of Planning's interim *Guidelines for Development near Rail Corridors and Busy Roads* relevant Australian Standards.**
>
> **The EA shall include a report assessing the potential impact of vibration from the rail corridor and measure required to mitigate any adverse impacts on buildings and land uses.**

In light of the above, the following documents have been referenced:

- *NSW Government Department of Planning's Development near Rail Corridors and Busy Roads - Interim Guidelines,(DoP Interim Guideline) issued December, 2008*
- *District Control Plan 35*
- *District Control Plan 36*

The impact from the disused freight line will not be considered as it has been confirmed with RailCorp (Goods Control) that the line has not been used this year. Furthermore, there is currently a brief being finalized to undertake a feasibility study to use the freight corridor for light rail. If successful, a light rail system would be constructed as an extension to the existing Lilyfield Station.

## 3.2 Criteria to Address Aircraft Noise Intrusion

Aircraft noise intrusion shall be assessed using AS2021. Reference will also be made to the recent Sydney Airport Masterplan.

In accordance with the Standard and the Masterplan, the site is wholly located within Australian Noise Exposure Forecast 2029 (ANEF) 20 to 25 Contours and therefore development is permissible as follows:

- Residential will be "conditional"
- Retail/Commercial will be "acceptable"

This assessment will primarily focus on the more sensitive residential aspect of the development, particularly given that such development is "conditional" which essentially requires an acoustic assessment. In proving that it is feasible for residential development to be constructed and meet the internal noise levels as per the Standard, the retail and commercial developments will be capable of being met, possibly with less stringent constructions.

The most appropriate development type as per the Standard is "*houses, home units, flats, caravan park"* where the recommended indoor maximum noise level measured using the A-weighted Scale with a Slow Weighting ($L_{Asmax)}$ design sound levels during an aircraft flyover are as follows:

- 50dBA sleeping areas and dedicated lounges
- 55dBA other habitable spaces
- 60dBA bathrooms, toilets and laundries

Given that the layout of internal spaces is not yet known, a level of $L_{Asmax}$ 50 will be used in designing the preliminary façade design.

## *3.3 Industrial Noise Emission from Plant*

Site specific noise criteria were not determined during this desktop study as site investigation work is required.

Criteria for the new development should be established through measurement of the ambient background noise level at the nearest sensitive receivers. The ambient background noise level should be determined from long term logging of the $L_{90}$ statistical noise parameter and termed the Rating Background Level (RBL).

For larger developments of this size a Council resolution set noise criteria at 3dBA above the ambient background noise level. Note that this differs from the criteria in DCP 36 which is background plus 5dBA which is intended for smaller scale domestic plant. The purpose of the 3dB criteria is prevent the progressive increase in noise levels and preserve amenity within the region.

Noise emission from the site that has the potential to affect sensitive receivers shall be assessed as an $L_{Aeq,15min}$ level. Any characteristics of noise emission shall be adjusted in accordance with the methodology in the Department of Climate Change and Water's (DECCW's) Industrial Noise Policy (INP). Note that Marrickville City council has not adopted the criteria that are set within the INP.

In order to satisfy the above requirements at noise-sensitive receptors such as residences noise criteria are recommended for daytime (7am to 6pm), evening (6pm to 10pm) and night-time assessment periods (10pm to 7am).

Where background levels have not been measured Appendix A of AS1055 provides a guide to typical background $L_{A90}$ noise levels for various neighbourhood description types. The proposed project is in a region with medium density transportation and may be described as category R3. Based on the typical background noise levels the estimated criteria for this proposal are in Table 1. These should be revised during detail design from logged noise levels.

**Table 1 Estimated Noise Criteria**

| **Estimated Noise Criteria, dBA $L_{eq}$** | | |
|---|---|---|
| Day (7am to 6pm), | Day (7am to 6pm), | Day (7am to 6pm), |
| 50 | 45 | 40 |

## *3.4 Criteria to Address Rail and Road Noise Intrusion*

For road traffic noise District Control Plan (DCP) 35 Part C8 states that:

- Development along a major road or railway corridor shall incorporate noise attenuation measures complying with the design requirements of the Model Road and Rail Noise Intrusion Policy prepared by the Southern Sydney Regional Organisation of Councils.

Discussion with Marrickeville Council confirms that the Department of Planning *Interim Guideline for Development near Rail Corridors and Busy Roads* supersedes the requirements in DCP 35.

The Department of Planning's approach categorises the project façade according to distance from the road or rail corridor and transportation speeds to identify indicative building construction materials.

These indicative construction materials, subject to review during detail design, provide for the following internal noise criteria to be met.

- 35dBA in any bedroom (between 10pm and 7am)
- 40dBA other habitable spaces bathrooms, toilets and laundries

The descriptor to be used is $L_{Aeq}$, the time period has been assumed by Cardno ITC to be 1hr, the use of this time period is inline with other similar policies and general procedures.

## *3.5 Criteria to Address Rail Vibration*

In terms of developing criteria for vibration, British Standard *BS6472:1992 (BS6472) – Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80 Hz)* and the Department of Environment and Climate Change – *Assessing Vibration – A Technical Guideline (AVTG)*, dated February 2006 are considered by Cardno ITC as the most relevant documents. Furthermore these documents are referenced as part of the Interim Guideline which provides a screening procedure based on typical site conditions.

BS6472 includes a method to calculate an Estimated Vibration Dose Value (eVDV) and in reviewing these documents, the following criteria are considered appropriate for residential receivers:

- VDV of 0.2 to 0.4 $m/s^{1.75}$ during the daytime period (7am to 10pm)
- VDV of 0.13 to 0.26 $m/s^{1.75}$ during the night (10pm to 7am)

# 4 ASSESSMENT OF NOISE INGRESS VIA BUILDING ENVELOPE

Based on the current preliminary information, the following section outlines the indicative building construction envelope that may be required to address noise intrusion from each noise source type. At the end of this section the most stringent construction type will be used as the indicative construction type recommended by this study.

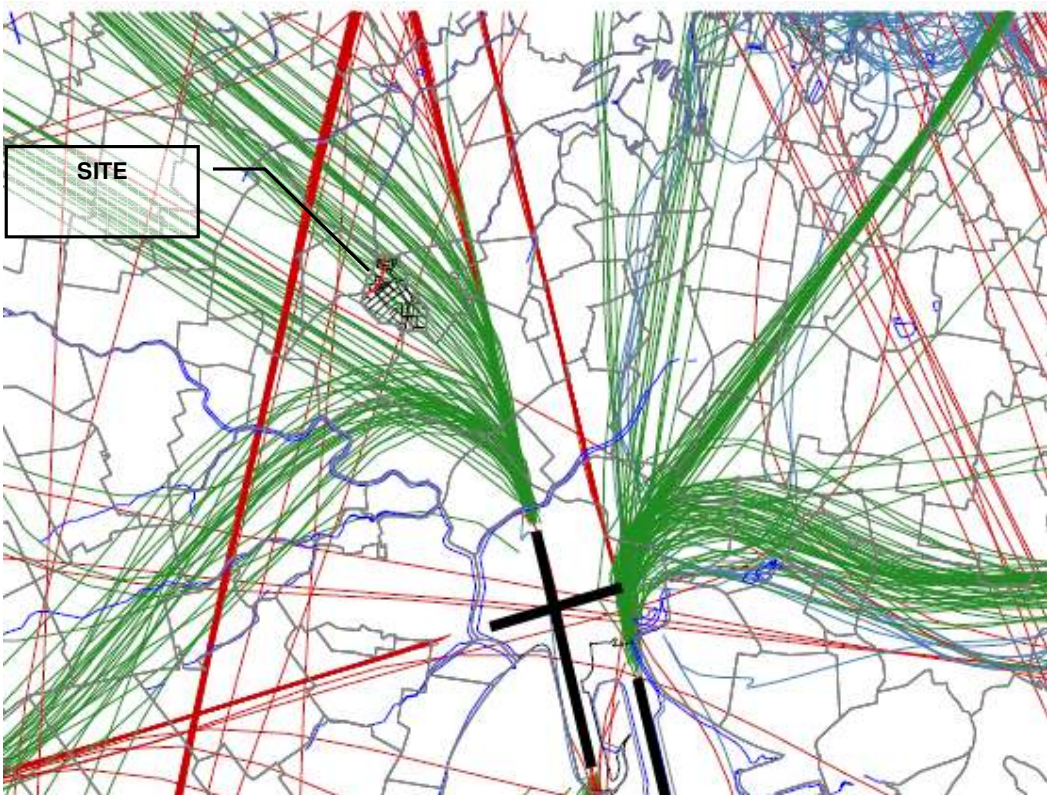
The purpose is not to provide detailed design but to undertake an assessment to ascertain the level of impact due to noise impinging on the building envelope and demonstrate that criteria can be met by reasonable construction methods.

## *4.1 Impact Due to Aircraft Noise*

### *4.1.1 Typical Noise Levels Associated with Aircraft Movements*

AS2021 provides a methodology to access the impact from aircraft flyovers. In accordance with this Standard, the noisiest aircraft movement will be associated with the departure of a Boeing 747 along the main north-south runway that would fly directly over the site. Such movements have been confirmed with Air Services Australia (see Figure 3) and on average result in a level of 88dBA. This approach has considered the worst case scenario, the change in noise level when the distance from the site is varied by 500m is nominally 3dB (ie, noise from overhead flights range from 85 to 88dBA).

***Figure 3 Typical Track Density Plot – Single November Day 2009***



It should be noted that the newer Airbus A380, although larger in size and capacity results in quieter movements. Table 2 is a comparison of noise levels (as measured by Airservices Australia) between an A380 and 747-400.

**Table 2 Comparison of Noise Levels between A380 and B747-400**

| Location of NMT | Aircraft type | Arriving or Departing | Average LA max dB(A) | Reduction in noise |
|---|---|---|---|---|
| Sydenham | A380 | Departing | 87.7 | - 4.4 |
| | B747-400 | Departing | 92.1 | |
| | A380 | Arriving | 93.9 | - 2.6 |
| | B747-400 | Arriving | 96.5 | |
| Leichhardt | A380 | Departing | 81.7 | - 3.9 |
| | B747-400 | Departing | 85.6 | |
| | A380 | Arriving | 84.4 | - 2.1 |
| | B747-400 | Arriving | 86.5 | |
| Annandale | A380 | Departing | 71.5 | - 5.5 |
| | B747-400 | Departing | 77.0 | |
| St Peters | A380 | Departing | 73.6 | - 6.7 |
| | B747-400 | Departing | 80.3 | |
| Croydon | A380 | Departing | 76.7 | - 2.3 |
| | B747-400 | Departing | 79.0 | |

Source: The above Table is reproduced from the Masterplan, Table 14.3.

### *4.1.2 Typical Reductions Required*

Based on the maximum typical noise level of 88dBA and the most stringent of the criteria (50dBA for bedrooms and dedicated lounges), the required aircraft noise reduction (ANR) is 38dB (ie 88dB – 50dB).

In order to calculate the weighted sound reduction index ($R_w$) of each of the major façade components, the ANR, typical constructions and building element dimensions is required. The project is not at a stage where the dimensions are known in detail. Instead typical upper level bedroom dimensions and window areas have been assumed in order to provide indicative constructions.

Given the high noise level of the aircraft flyover, the roof and walls are likely to require an $R_w$ approaching 50, such a rating will be not be difficult given that the buildings in the development are likely to be a concrete roof and brick facades. The weakest link acoustically will be the windows which are likely to require an $R_w$ in the region of 44. Ratings in the region of $R_w$ 35 and above require specific double glazed units that will incorporate 2 different glass thicknesses, such as 6mm and 10mm (possibly laminated) and a gap of at least 50mm.

To provide a higher level of certainty, and given the high level of transmission loss of the glazing that is required, it is recommended that more thorough calculations are undertaken once the typical dimensions are known. As recommended by AS2021, these calculations should be conducted using octave band data. Furthermore, Cardno ITC recommends that detailed site measurements be undertaken to not only determine the noise level of the flyover, but the number of flyovers that would occur during the night-time period. Such a study may well significantly reduce the glazing requirements.

### *4.2 Impact Due to Rail Noise*

The existing rail noise is associated with trains travelling along the Inner West Line. In discussion with RailCorp, the following has been confirmed:

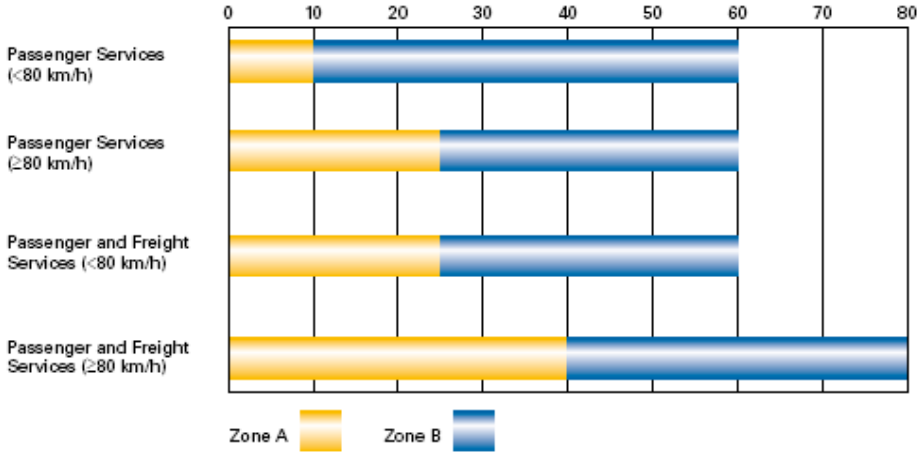
- 6 rail lines
  - 2 local lines between the platforms (southern end)
  - 2 suburban lines (next 2 lines after local)
  - 2 main lines (the northern most lines)
- Trains travelling along the local lines usually travel no more than 60km/hr
- Trains travelling along the suburban lines usually travel no more than 80km/hr
- Trains travelling along the main lines can travel to 90km/hr
- No freight trains have travelled along this line past the site, since the closure of the Summer Hill Flour Mill in December, 2008.

Based on the above information and an estimated distance between the closest track and the façade of at least 30m (estimated by considering the location of the existing northern facades and the location of the closest track), a "screening" assessment was undertaken as per the methodology in the Interim Guideline. Reproduced below from the guideline in Table 2 is a chart that can be used to trigger the level of acoustic reporting required. Generally a site located in Zone B will not require detailed acoustic assessment unless there are unusual features associated with the rail line or the site. From the information available to Cardno ITC during this desktop study it is assumed that:

- the rail line only serves passenger trains; and,
- the distance between the closest track and façade will be at least 30m;
- the speed of the closest passenger line will be <80km/hr;

Given that Zone B for passenger services begins at 10m (<80km/hr) and 25m (80km/hr or more) it is reasonable to assume that the noise impinging on the northern façade of the development would be negligible and that standard construction may suffice. This is provided that acoustic detailing and installation is well documented.

**Table 3 Chart Showing Distance from Rail Line, Service, Speed and Zone**



Given that the site is considered to be in Zone B, the typical constructions, with reference to Appendix C of the Interim Guideline would be from Category 2. A summary of the constructions relevant to this project includes:

- Roof $R_w$ 43
- Façade walls $R_w$ 45
- Glazed windows and doors $R_w$ 27

### *4.3 Impact Due to Road Noise*

The Interim Guideline requires mandatory assessment if the proposed residential development that fronts or is in close proximity to a road has an annual average daily traffic (AADT) of >40,000 vehicles.

In accordance with the RTA Traffic Volume Maps, Old Canterbury Road has been designated as a road that carries volumes between 20,000 and 40,000 vehicles per day. The road operates as a sub-arterial road in the network.

The most appropriate screening test in the interim guidelines is Screen Test 1(a) for speeds in the range of 60km/h to 70km/h. Under this screen test the building will be in a Category 5 area.

Indicative construction elements that meet internal noise goals for Category 5 are:

- Roof $R_w$ 55
- Façade walls $R_w$ 55
- Glazed windows and doors $R_w$ 43

### *4.4 Building Envelope Construction*

Based on the assessed external noise sources the indicative building construction elements require an acoustic rating of:

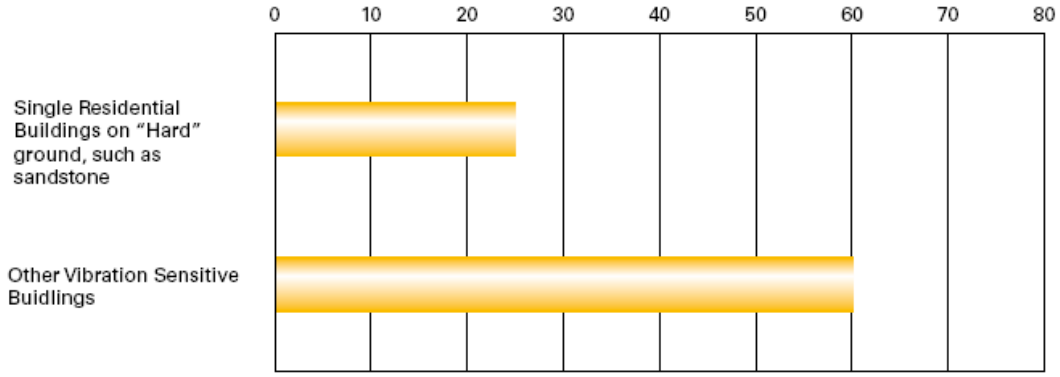
- Roof $R_w$ 55
- Façade walls $R_w$ 55
- Glazed windows and doors $R_w$ 44

## *5* ASSESSMENT OF GROUNDBORNE RAIL VIBRATION

For this desktop study the methodology in the interim guidelines has been used to determine the likely impact of rail vibration on the proposed development. In the absence of site data it has been assumed that there are no additional site specific issues associated with this site.

For typical development sites the guideline indicates that a detailed acoustic assessment is required when the distance between the residential building and the rail line is less than 25m, or other vibration sensitive buildings are within 60m of the rail line. This is illustrated in Table 4 in the guideline which has been reproduced below.

**Table 4 Chart Showing Distance from Rail Line before Detail Vibration Study Required**




The distances between the residential buildings and the rail line are greater than 25m indicating that under the assumptions in this desktop assessment that a detailed vibration assessment is not required at this preliminary stage for residential receivers on the site. However, commercial buildings are located approximately 30m from the rail line and therefore may be subject to the requirement for a detailed vibration review. A comprehensive list of premises that may be considered vibration sensitive is not included in the guideline. However, these type of premises would generally include the following:

- Theatre, cinemas and performance spaces
- Hospitals, clinics or medical equipment suppliers
- Churches
- Heritage Buildings
- Specialist measurement equipment manufacturers or suppliers

There is not enough information known with respect to the type of commercial premises proposed for this development at this stage of the project. Therefore we recommend the following for the detailed design phase of the development:

1. Identify the proposed tenancies to be included in the development
2. Identify whether these tenancies include any vibration sensitive spaces such as those above
3. If vibration sensitive tenancies are identified, prepare a detailed vibration impact assessment for these premises.

Generally shops, restaurants and showrooms, would not be considered vibration sensitive spaces.

## *6* IMPACT ASSESSMENT OF ADJACENT LIGHT RAIL

The light rail has the potential to impact on the development. Potentially the rail line may be located within the trigger level distances in the interim guideline. Within these trigger distances a detailed acoustic assessment is required, including site investigation.

We also note that on the proposed plan, it is shown that there is to be a light rail station located near the development. Operations at stations have the potential to cause additional disturbance due to intermittent noise events as the train approaches or leaves the station.

# 7 ASSESSMENT OF PLANT NOISE EMISSION

During the conceptual design stage the environmental noise criteria must be established if there is to be significant noise emission from items such as from plant, exhaust fans and entertainment noise to neighbouring receivers.

Following the establishment of criteria an assessment should be conducted to determine compliance with the criteria.

Compliance can typically be achieved for these noise source types through suitable location of plant and entertainment areas, plant specification and the use of attenuators and noise barriers.

# 8 CONCLUSION

A preliminary noise and vibration assessment has been completed for the proposed development to be located at 78 to 90 Old Canterbury Road, Lewisham.

In the absence of the light rail line this assessment has identified that the indicative noise reduction requirements of the building construction are:

- Roof $R_w$ 55
- Façade walls $R_w$ 55
- Glazed windows and doors $R_w$ 44

These noise reduction requirements can reasonably be met through the specification of materials and systems with the appropriate acoustic rating.

The indicative noise reduction requirements are for the potentially worst case affected façade that is directly impacted by the assumed road traffic noise component from Old Canterbury Road and aircraft noise. Further refinement during the detailed design stage and following site investigation may indicate that the noise reduction requirements may be reduced at this and other facades.

Vibration levels from train passbys are unlikely to require additional assessment provided that site conditions and the development are typical, as assumed in the interim guidelines, and that no commercial vibration sensitive buildings are proposed for the development. If vibration sensitive commercial premises are proposed for the development, then a details vibration assessment is recommended for these premises as part of the detailed design phase of the project.

During detailed design items that have the potential to emit noise to neighbouring receivers should be assessed against the DECCWs INP or local council criteria. Appropriate mitigation should be installed where potential exceedences are identified.

The light rail currently under investigation by the State government has the potential to impact on this development. This may result in the requirement for additional investigation and subsequent mitigation measures to be implemented.