

CLAREMONT TOWN CENTRE

NOISE MANAGEMENT PLAN REPORT

OCTOBER 2021

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NOISE AND GROUND VIBRATION MANAGEMENT
CLAREMONT TOWN CENTRE

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FOR

TOWN OF CLAREMONT

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EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned to provide acoustical advice with regards to the Claremont Town Centre. The advice was to provide a framework for the acoustic requirements for development to be undertaken within the project area. For information, a plan of the project area is shown below.



The acoustic requirements outlined in this report are for future residential developments and not for any upgrade or improvements to the road or rail infrastructure. Any changes to the road or rail infrastructure would be undertaken in accordance with the applicable criteria as outlined State Planning Policy 5.4 “Road and Rail Noise”.

Within the Claremont Town Centre, a mixture of commercial and residential uses will be developed. Some of the commercial uses, such as food and beverage establishments could have an impact on the amenity of residential premises within and surrounding the Town Centre.

Additionally, noise received at residential premises from vehicles travelling on Stirling Highway and passenger trains on the Perth – Fremantle Train Line also need to be considered.

Note: Ground vibration at some premises located in close proximity of the Perth – Fremantle Train Line also needs to be considered.

The objectives of this document are to:

- Provide a clear and concise framework to allow the co-existence of a mixture of land uses that will be developed within the Town of Claremont.
- Establish appropriate criteria for measuring and identifying potential noise impacts at the pre-development approval phase through to the building classification stage; and
- Establish the noise attenuation measures required to preserve the amenity of existing residence and provide an acceptable level of amenity for future residences.

This document also provides the process and extent of reporting required in certifying noise attenuation measures. Thus, providing a process that assists Planning Consultants, Developers, Builders and Acoustic Consultants/Engineers to establish a project's viability based on the potentially cost prohibitive acoustic attenuation needs of a development and maximise the enjoyment and liveability of mixed land use living, by mitigating the effects of ambient/environmental noise, through appropriate forethought and design.

The acoustic requirements for the development area are summarised below.

NOISE INGRESS – STATE PLANNING POLICY 5.4

ROAD TRAFFIC NOISE

Noise received at residences and other noise sensitive premises, located adjacent or near a major road need to comply with the requirements of State Planning Policy 5.4 (SPP 5.4).

With regards to major roads, Stirling Highway runs through the project area. Other roads of significance are Gugerri Street, Stirling Road and Leura Avenue.

At this stage of the project, it is recommended that assessments in accordance with SPP 5.4 be required to be undertaken for any noise sensitive premises:

- Within the trigger distance for Stirling Highway.
- Within 50 metres of Gugerri Street, Stirling Road or Leura Avenue.

PASSENGER TRAIN NOISE

Noise received at residences and other noise sensitive premises, located adjacent or near the Perth – Fremantle passenger railway line need to comply with the requirements of State Planning Policy 5.4 (SPP 5.4).

At this stage of the project, it is recommended that assessments in accordance with SPP 5.4 be required to be undertaken for any noise sensitive premises:

- Within the trigger distance for the Perth – Fremantle Passenger line.

POSSIBLE VARIATION TO ASSESSMENT OF TRAIN NOISE

Although outside the requirements of State Planning Policy 5.4, given the intermittent nature of train noise, the Town and developers could also consider the noise impact from a single train pass.

Notes:

- 1 Under State Planning Policy, additional to residence, it includes other noise sensitive uses, including school, child care centres, hospitals, aged care facilities etc.
- 2 The above proposed criteria is for residential developments only and any modifications to the railway infrastructure would need to comply with the standard criteria, as outlined in SPP 5.4.

GROUND VIBRATION - TRAINS

The acceptable criteria for ground vibration from passing passenger trains for residential premises is 1.4x base curve 4(a) as defined in AS 2670.2-1990 "*Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)*".

Based on the measurements undertaken, it is recommended that ground vibration measurement and assessment be undertaken for all developments within 50 metres from the edge of the closest track to the development. If the results of these measurements show an exceedance of the criteria, then appropriate mitigation need to be implemented.

The criteria for ground vibration received at a residence should be :

- a. Criterion 1: vibration isolation measures will be provided where the predicted or actual vibration is Curve 2 (106 dB) or greater, as defined in AS 2670.2;
- b. Criterion 2: the proposal will be designed to meet Curve 1.4 (103 dB) as defined in AS 2670.2; and
- c. Criterion 3: vibration will be managed to be as low as reasonably practicable.

ENVIRONMENTAL NOISE

It is noted that it is likely that many of the new developments would include cafes, restaurants, and bars. Noise emissions from these premises would need to comply with the requirements of the Environmental Protection (Noise) Regulations 1997.

A Noise Management Plan is attached in Appendix D. Along with other acoustic requirements, this plan outlines the acoustic criteria and key management strategies for achieving compliance with State Planning Policy 5.4.

1. INTRODUCTION

Herring Storer Acoustics was engaged to provide acoustical advice with regards to the Claremont Town Centre redevelopment. The advice was to provide a framework for the acoustic requirements for development to be undertaken within the project area.

The acoustic requirements outlined in this report are for future residential developments and not for any upgrade or improvements to the road or rail infrastructure. Any changes to the road or rail infrastructure would be undertaken in accordance with the applicable criteria as outlined State Planning Policy 5.4.

The acoustical requirements include:

- Noise ingress, as would be required under State Planning Policy 5.4 “*Road and Rail Noise*”. This applies to noise received at residences and other noise sensitive premises located adjacent or near significant freight / traffic routes (Stirling Highway) and the Perth – Fremantle passenger railway line.
- Provide appropriate parameters and criteria relating to ground vibration from the trains.
- Provide guidance on the acoustical requirements relating to the requirements of the *Environmental Protection (Noise) Regulations 1997*.

Note : Although not required under State Planning Policy 5.4, it is recommended that assessments, as required under State Planning Policy 5.4 be undertaken for noise sensitive premises located adjacent (50 metres) of :

- Leura Avenue
- Guger Street, and
- Stirling Road

For information, the concepts plans are attached in Appendix A.

2. ACOUSTIC CRITERIA

The assessment and implementation of noise mitigation for noise received at noise sensitive premises for roads and railways, based on State Planning Policy 5.4, is well established and is standard practice. Experience has shown that the criteria stated in the Policy for both external and internal noise provides the correct balance between protecting the occupants and still allowing development.

2.1 STATE PLANNING POLICY 5.4

The Western Australian Planning Commission (WAPC) released September 2019 State Planning Policy 5.4 “*Road and Rail Noise*”. This policy provides acoustic criteria and requirements for noise received at noise sensitive premises from both road and rail infrastructure. The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

- a) noise-sensitive land-use within the policy’s trigger distance of a transport corridor as specified in **Table 1**;
- b) New or major upgrades of roads as specified in **Table 1** and maps (**Schedule 1, 2 and 3**); or
- c) New railways or major upgrades of railways as specified in maps (**Schedule 1, 2 and 3**); or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.

Policy trigger distances (Section 4.1.2)

Table 1 identifies the State’s transport corridors and the trigger distances to which the policy applies.

The designation of land within the trigger distances outlined in **Table 1** should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.

Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent.”

TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

Transport corridor classification	Trigger distance	Distance measured from
Roads		
Strategic freight and major traffic routes Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume	300 metres	Road carriageway edge
Other significant freight/traffic routes These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)	200 metres	Road carriageway edge
Passenger railways		
	100 metres	Centreline of the closest track
Freight railways		
	200 metres	Centreline of the closest track

Proponents are advised to consult with the decision-making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

Table 2 sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

In the application of the noise targets the objective is to achieve:

- indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 2: NOISE TARGETS

Proposals	New/Upgrade	Noise Targets		
		Outdoor		Indoor
		Day ($L_{Aeq}(\text{Day})$ dB) (6 am-10 pm)	Night ($L_{Aeq}(\text{Night})$ dB) (10 pm-6 am)	(L_{Aeq} dB)
Noise-sensitive land-use and/or development	New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor	55	50	L_{Aeq} (Day) 40(Living and work areas) L_{Aeq} (Night) 35 (bedrooms)
Roads	New	55	50	N/A
	Upgrade	60	55	N/A
Railways	New	55	50	N/A
	Upgrade	60	55	N/A

Notes:

- The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.
- For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.

- *The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.*
- *Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.*

Noise Exposure Forecast (Section 6.2)

*When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:*

- *no further measures is required;*
- *noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or*
- *noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/or development is subject to mitigation measures outlined in a noise management plan.”*

The Policy also requires “Notifications on Titles” as a condition of subdivision.

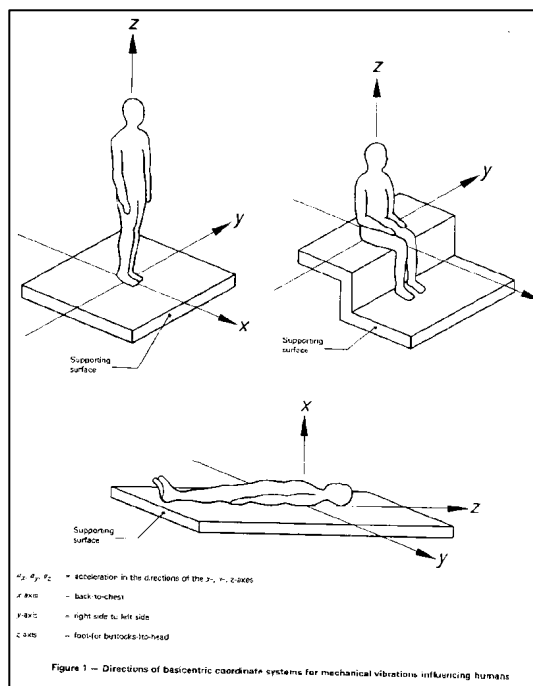
2.2 GROUND VIBRATION

For ground vibration received within a building AS 2670.2-2001 “*Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)*” has been used to assess compliance with the appropriate criteria. This Australian Standard provides various criteria with regards to human perception in various building uses. The criteria is provided as multiplies of a base curve.

AS 2670.2-2001 “*Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)*” and uses acceleration with units of m/s^2 .

As a building may be used for many different human activities, for example standing, sitting, lying or a combination of all three, vertical vibration of the building may enter the body as either z-axis, x-axis or y-axis vibration, as shown in Figure 1.

Figure 1 – Axis of Vibration

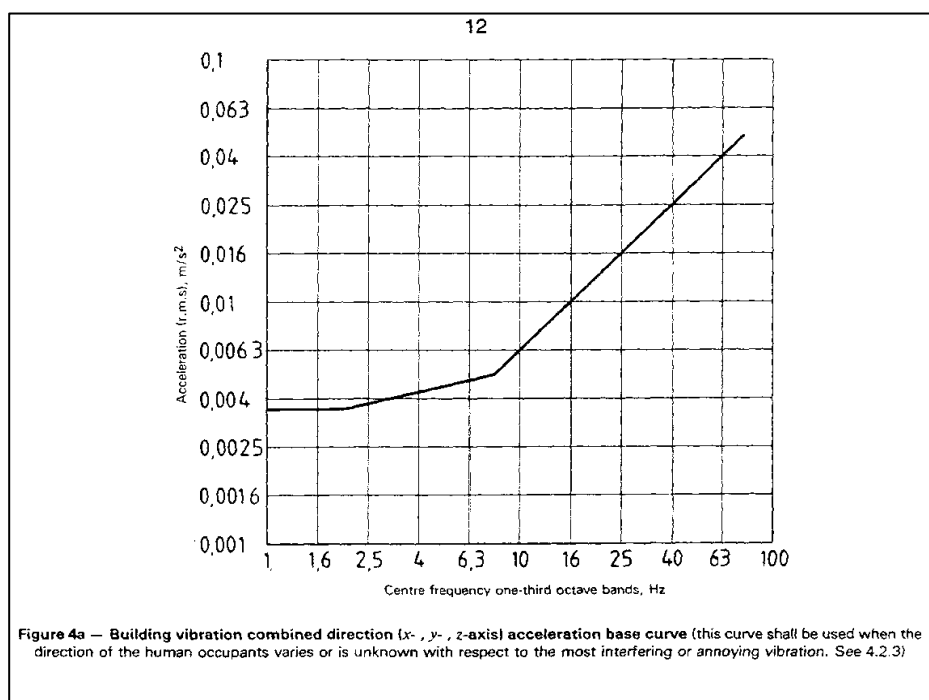


(Extract from AS2670.2-2001)

2.2.1 As it is not clear which direction vibration would enter the body, a combination curve of the base curves is used. The combination curve combines the worst-case combination of the z-axis, x-axis and y-axis curves.

In this case where the axis of the occupants varies or is not known Curve 4(a) is used as the bases of assessment. From AS2670.2 the base Curve for curve 4(a) is shown in Figure 2. This base curve represents magnitudes of approximately equal human response with respect to human annoyance and/or complaints about interference with activities. The satisfactory vibration magnitudes in rooms and building are specified as multiples of this base curve.

Figure 2 – Combined Direction Base Curve



The multiplying factors used within the AS2670.2, specify satisfactory magnitudes of building vibration within residential buildings with respect to human response and are listed in Table of Annex A of the standard. The residential section of Table 2 of Annex A is summarised in Table 2.1 below.

TABLE 2.1 – SUMMARY OF MULTIPLYING FACTORS WITHIN RESIDENTIAL BUILDINGS

Place	Time	Continuous or Intermittent Vibration	Transient Vibration Excitation With Several Occurrences
Residential	Day	2 to 4	30 to 90
	Night	1.4	1.4 to 20
Office	Day	4	60 to 128
	Night		

Table 3.1 in Appendix A of the standard lists the acceptable criteria. In this situation the passing trains would be considered as transient vibration. As such the recommended range of multiplying factors range from 1.4 to 4.0 times the base curve. However, AS2670.2 states 1.4x the base curve as the night period criteria. Hence, this has been used as the criteria for this project. We understand that the Department of Environment Regulation (DER) has expressed a preference that the 1.4 x the base curve be used as the criteria.

2.3 ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997

The *Environmental Protection (Noise) Regulations 1997* prescribe the allowable noise level emissions from one premises that can be received at another. Under the Regulations, the allowable noise levels, when received at a premise are outlined in Regulations 7 and 8.

2.3.1 Regulation 7

Regulation 7 stipulate the allowable noise levels at any noise sensitive premises from other premises. For residential premises, this noise level is determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. For commercial premises, the assigned noise levels are fixed. The base noise levels for residential premises and the assigned noise levels for commercial premises are listed in Table 2.2.

TABLE 2.2 – ASSIGNED NOISE LEVELS

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A 10}	L _{A 1}	L _{A max}
Noise sensitive premises within 15 metres of a dwelling (Highly Sensitive Areas)	0700 - 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35 + IF	45 + IF	55 + IF
Commercial Premises	All hours	60	75	80

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.

It is a requirement that noise emissions be free of annoying characteristics (tonality, modulation and impulsiveness) at other premises, defined below as per Regulation 9.

“impulsiveness” means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax Slow}$ is more than 15dB when determined for a single representative event;

“modulation” means a variation in the emission of noise that –

- (a) is more than 3dB $L_{A Fast}$ or is more than 3dB $L_{A Fast}$ in any one-third octave band;
- (b) is present for more at least 10% of the representative assessment period; and
- (c) is regular, cyclic and audible;

“tonality” means the presence in the noise emission of tonal characteristics where the difference between –

- (a) the A-weighted sound pressure level in any one-third octave band; and
- (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A Slow}$ levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 2.3 below.

TABLE 2.3 - ADJUSTMENTS TO MEASURED LEVELS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

Where the noise emission is music, then any measured level is adjusted according to Table 2.4 below.

TABLE 2.4 – ADJUSTMENTS TO MEASURED MUSIC NOISE LEVELS

Where impulsiveness is not present	Where impulsiveness is present
+10 dB(A)	+15 dB(A)

3. GROUND VIBRATION MEASUREMENTS

To assess the ground vibration emanating from passing passenger trains, ground vibration measurements were carried out of trains passing at the locations as shown on Figures 3.1 to 3.3.

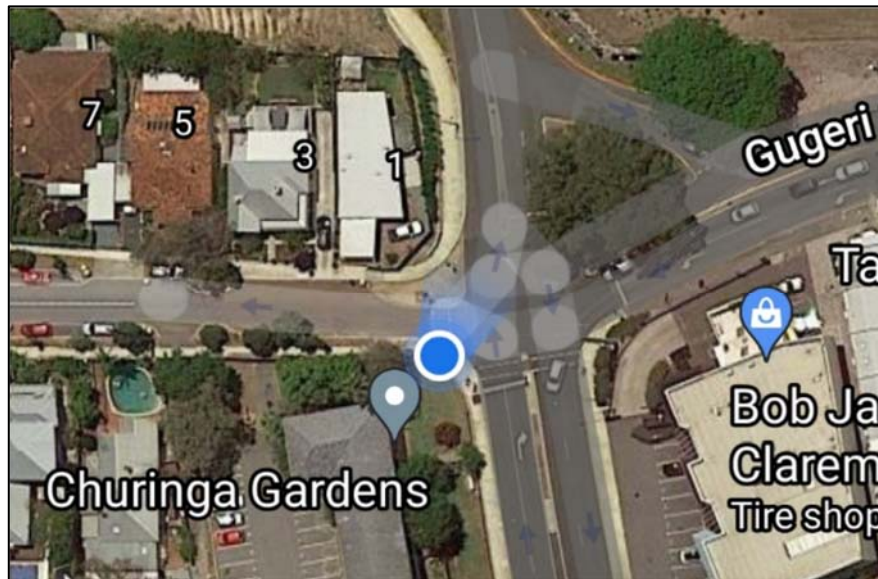


FIGURE 3.1 – NOISE AND VIBRATION MEASUREMENT LOCATION 1 (STIRLING ROAD)



FIGURE 3.2 – VIBRATION MEASUREMENT LOCATION 2 (CLAREMONT CRESCENT)



FIGURE 3.3 – VIBRATION MEASUREMENT LOCATION 3 (GUGERI STREET)

As shown in Figures 3.1 to 3.3, ground vibration measurements were recorded at the following locations:

- Location 1 - Approximately 25m from the edge of the closest railway track.
- Location 2 - Approximately 17m from the edge of the closest railway track.
- Location 3 - Approximately 60m from the edge of the closest railway track.

Vibration measurements were carried out in the 3 directional axis, parallel, perpendicular and vertically to the railway line. Ground vibration measurements were undertaken on Tuesday 1st August 2017 of six train passes in each direction. Ground vibration representative of the measurements recorded are attached in Appendix B.

The results of the ground vibration monitoring show that ground vibration all complied with the base curve criteria.

4. DISCUSSION

The proposed Noise and Vibration Management Plan / Local Planning Policy is attached in Appendix D.

4.1 STATE PLANNING POLICY 5.4

Noise received at residences and other noise sensitive premises, located adjacent or near a significant freight / traffic route and railway lines need to comply with the requirements of State Planning Policy 5.4 (SPP 5.4).

With regards to significant roads, Stirling Highway runs through the project area. However, other road with significant traffic flows within the development area are Guger Street, Stirling Road and Leura Avenue. The current traffic volumes obtained from the MRWA Traffic Map are approximately:

Stirling Highway	-	33,000 vpd;
Leura Avenue	-	10,000 vpd;
Guger Street	-	13,000 vpd; and
Stirling Road	-	15,000 vpd.

Under the Implementation Guidelines for State Planning Policy 5.4 and as shown on the PlanWA web site, compliance with State Planning Policy 5.4 is required only required for noise sensitive premises located within 200 metres of Stirling Highway and 100 metres of the Perth – Fremantle Passenger railway line, as shown below in Figure 4.1. However, it is noted that the current road traffic volumes on the other roads noted above are significant, thus it is recommended that assessments in accordance with SPP 5.4 be required to be undertaken for any noise sensitive premises:

- Within the trigger distance for Stirling Highway.
- Within the trigger distance for the Perth – Fremantle Passenger Railway line; and
- Within 50 metres of Guger Street, Stirling Road or Leura Avenue.

POSSIBLE VARIATION TO ASSESSMENT OF TRAIN NOISE

Although outside the requirements of State Planning Policy 5.4, given the intermittent nature of train noise, the Town and developers could also consider the noise impact from a single train pass.



FIGURE 4.1 - STATE PLANNING POLICY BUFFER ZONES
(<https://espatial.dph.wa.gov.au/PlanWA>)

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “*Road and Rail Noise*” the following external criteria are listed:

External “Noise Target”

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

As external noise levels exceed the “Noise Target” noise levels, then the residential premises should be designed to comply with the following internal noise levels:

Internal

Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

We also note that under the SPP5.4, noise mitigation measures should be implemented with a view to achieve, in at least one outdoor area, the L_{Aeq} of 50 dB(A) noise level for the night period.

Notes :

- 1 Under State Planning Policy, assessments are to be undertaken for other noise sensitive uses, such as school, child care centres, hospitals, aged care facilities etc.
- 2 The above proposed criteria are for the development of noise sensitive premises (ie residences) only and any modifications to the railway infrastructure would need to comply with the standard criteria, as outlined in SPP 5.4.
- 3 For information, future traffic flows are attached in Appendix C.

4.2 GROUND VIBRATION

The results of the ground vibration monitoring show that ground vibration all complied with the base curve criteria.

Even so, it is recommended that ground vibration measurement be undertaken for all developments within 50 metres from the edge of the closest track to the development. If the results of these measurements show an exceedance of the criteria, then appropriate mitigation can be implemented.

Given the above, the recommended criteria for ground vibration received at new residences are:

- a. Criterion 1: vibration isolation measures will be provided where the predicted or actual vibration is Curve 2 (106 dB) or greater, as defined in AS 2670.2;
- b. Criterion 2: the proposal will be designed to meet Curve 1.4 (103 dB) as defined in AS 2670.2; and
- c. Criterion 3: vibration will be managed to be as low as reasonably practicable.

4.3 ENVIRONMENTAL NOISE

It is noted that it is likely that many of the new developments would include cafes, restaurants, and bars. Noise emissions from these premises would need to comply with the requirements of the Environmental Protection (Noise) Regulations 1997.

APPENDIX A

DEVELOPMENT AREA



Legend

- Local Government Area
- Cadastre (View 1)



Notes:

The data that appears on the map may be out of date, not intended to be used at the scale displayed, or subject to license agreements. The map should only be used in matters related to Department of Planning, Lands and Heritage business.

DPLH BUSINESS USE ONLY



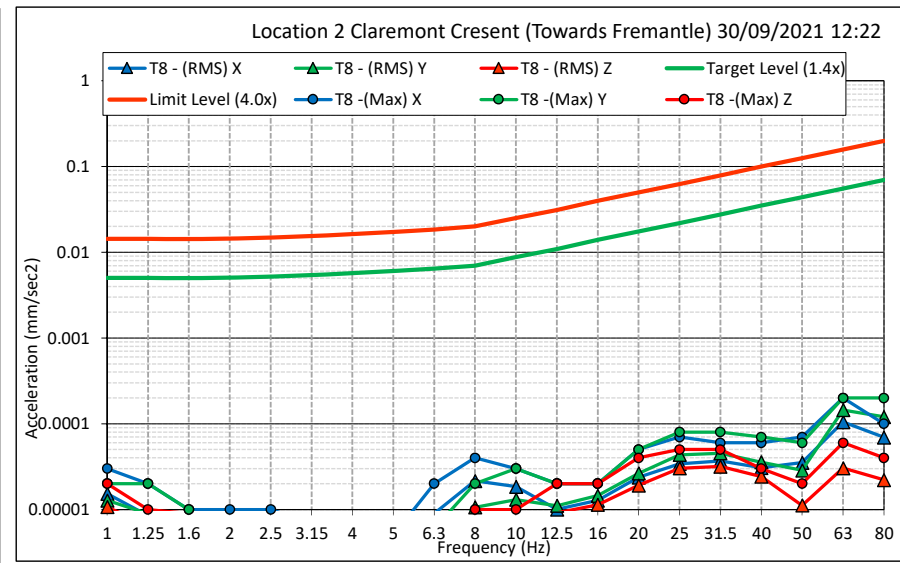
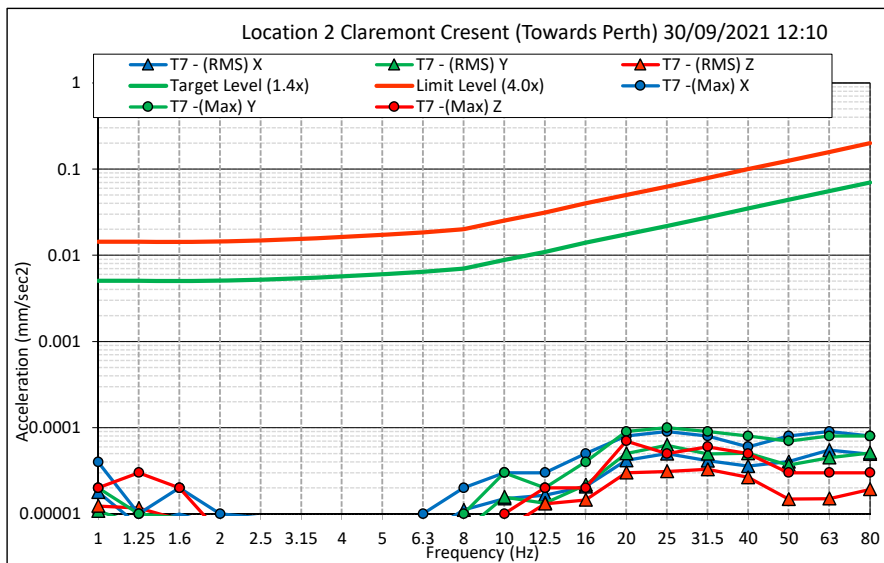
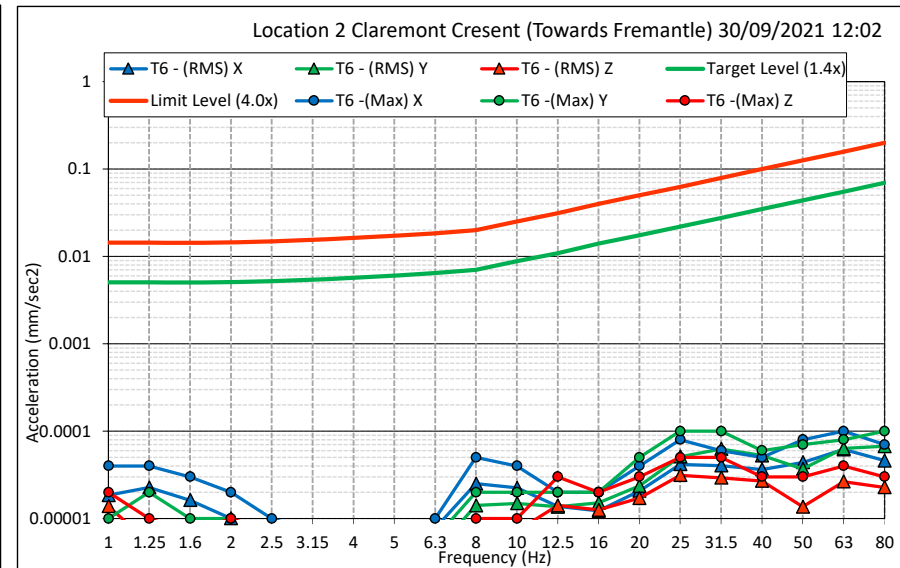
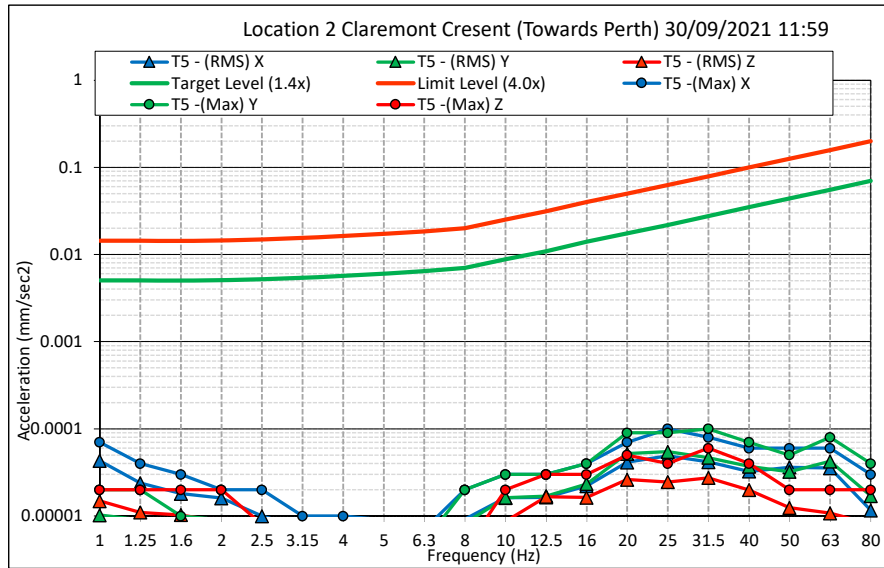
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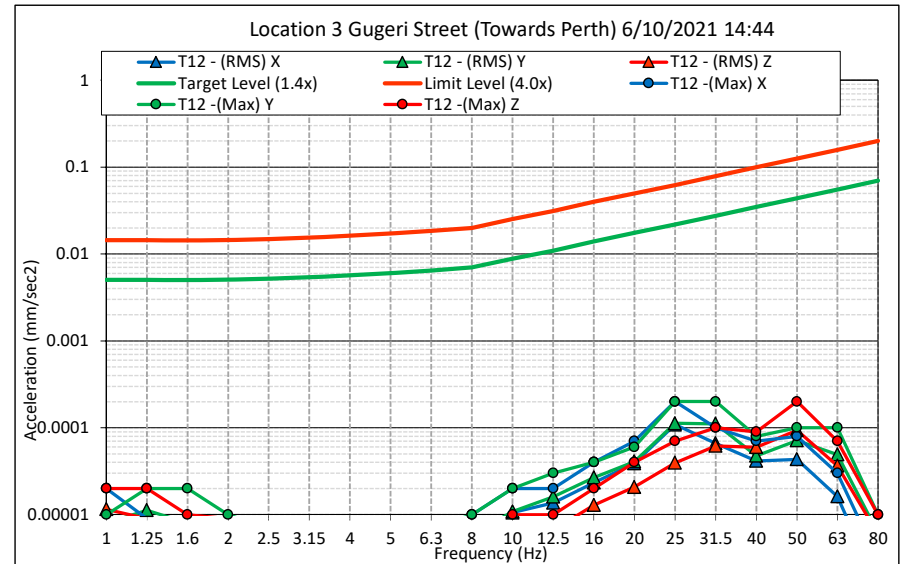
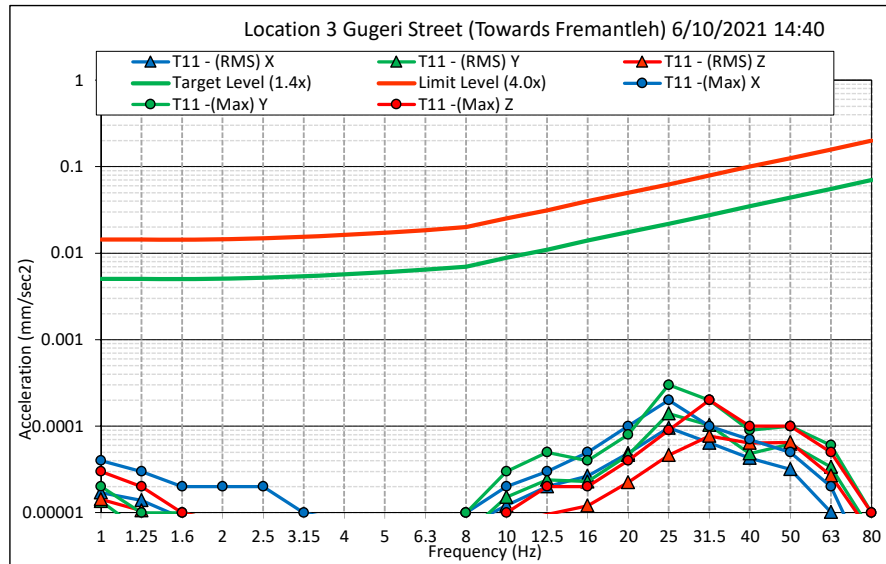
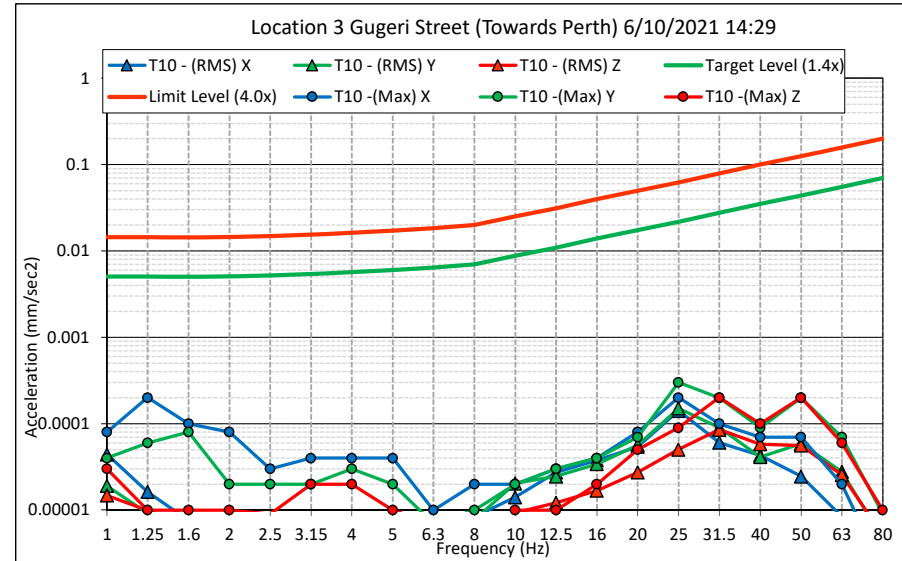
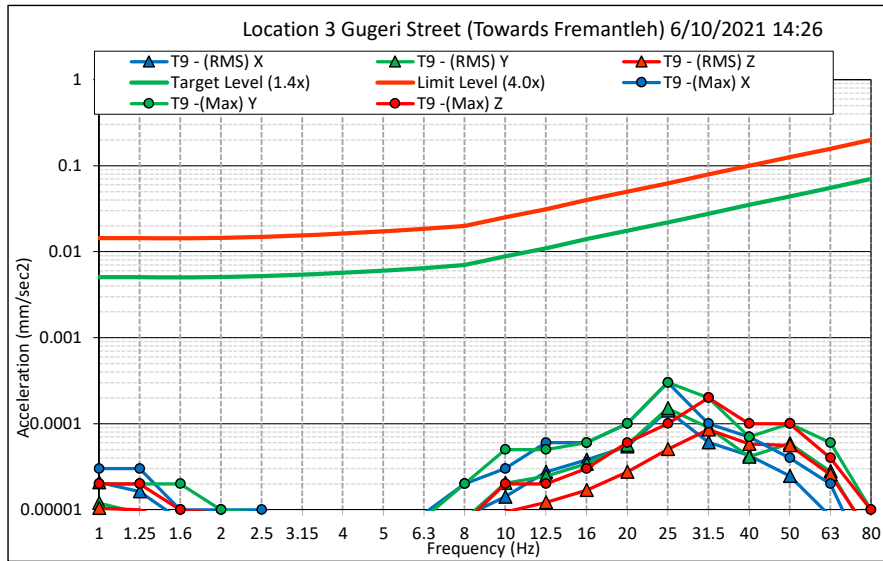
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APPENDIX B

GROUND VIBRATION MEASUREMENTS





APPENDIX C

FUTURE ROAD TRAFFIC VOLUMES

2041 ROM24 Scenario - Link Volume Plot for Stirling Hwy, Claremont Noise Assessment

All Day

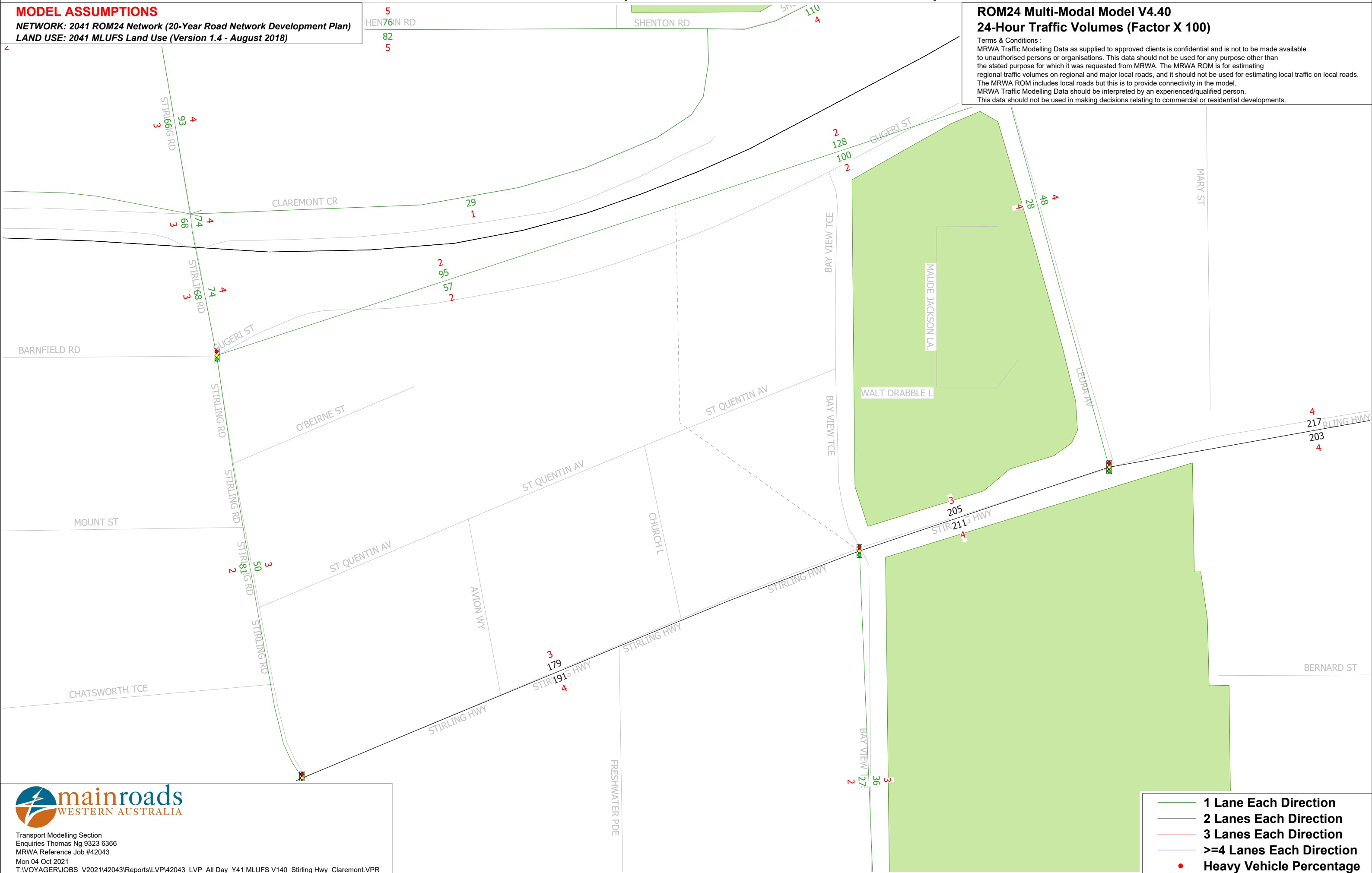
MLUFS Version 1.4 land use assumption with 20-Year Road Network Development Plan

MODEL ASSUMPTIONS

NETWORK: 2041 ROM24 Network (20-Year Road Network Development Plan)
 LAND USE: 2041 MLUFS Land Use (Version 1.4 - August 2018)

ROM24 Multi-Modal Model V4.40 24-Hour Traffic Volumes (Factor X 100)

Terms & Conditions :
 MRWA Traffic Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations. This data should not be used for any purpose other than the stated purpose for which it was requested from MRWA. The MRWA ROM is for estimating regional traffic volumes on regional and major local roads, and it should not be used for estimating local traffic on local roads. The MRWA ROM includes local roads but this is to provide connectivity in the model. MRWA Traffic Modelling Data should be interpreted by an experienced/qualified person. This data should not be used in making decisions relating to commercial or residential developments.



- 1 Lane Each Direction
- 2 Lanes Each Direction
- 3 Lanes Each Direction
- ≥ 4 Lanes Each Direction
- Heavy Vehicle Percentage



Transport Modelling Section
 Enquiries Thomas Ng 9323 6366
 MRWA Reference Job #42043
 Mon 04 Oct 2021
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APPENDIX D

NOISE AND VIBRATION MANAGEMENT PLAN

TOWN OF CLAREMONT

CLAREMONT TOWN CENTRE

NOISE MANAGEMENT PLAN

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FOR

TOWN OF CLAREMONT

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1. INTRODUCTION

This document provides a framework for the acoustic requirements for development to be undertaken within the Claremont Town Centre, as shown on the Figure 01 below.



FIGURE 01 – CLAREMONT TOWN CENTRE

Within the Claremont Town Centre, a mixture of commercial and residential uses will be developed. Some of the commercial uses, such as food and beverage establishments could have an impact on the amenity of neighbouring residential premises both within and outside the Town Centre.

The objectives of this document are to:

- Provide a clear and concise framework to allow the co-existence of a mixture of land uses that will be development within the Town of Claremont.
- Establish appropriate criteria for measuring and identifying potential noise impacts at the pre-development approval phase through to the building classification stage; and
- Establish the noise attenuation measures required to preserve the amenity of existing residence and provide an acceptable level of amenity for future residences.

This document also provides the process and extent of reporting required in certifying noise attenuation measures. Thus, providing a process that assists Planning Consultants, Developers, Builders and Acoustic Consultants/Engineers establish a project's viability based on the potentially cost prohibitive acoustic attenuation needs of a development and maximise the enjoyment and liveability of mixed land use living, by mitigating the effects of ambient/environmental noise, through appropriate forethought and design.

The acoustic requirements outlined in this Acoustic Management Plan are for future residential developments and not for any upgrade or improvements to the road or rail infrastructure. Any changes to the road or rail infrastructure would be undertaken in accordance with the applicable criteria as outlined State Planning Policy 5.4 by the appropriate infrastructure provider.

The acoustical requirements include:

- Noise ingress, as would be required under State Planning Policy 5.4 “*Road and Rail Transport Noise*”. This applies to noise received at residences and other noise sensitive premises located adjacent or near various roads as outlined in the Acoustic Management Plan and the passenger railway line.
- Ground vibration from passenger trains.
- Compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*.
- Compliance with BCA / NCC acoustic requirements.

2. JURISDICTION

- i) Environmental Protection Act 1986 and the Environmental Protection (Noise) Regulations 1997 [‘Noise Regulations’] provide powers for officers of the Department of Environment, WA Police Service and authorised Environmental Health Officers from Local Governments.
- ii) The Director Liquor Licensing Division has power to deal with noise issues and anti-social behaviour under section 117 of the Liquor Act 1988.
- iii) The Planning and Development Act 2005 provides the determining authority with the power to impose conditions on development approvals that protect the amenity of the area.
- iv) The Building Act 2011 provides the authority to set building standards and ensure that they are met through the issue of building and occupancy permits to protect the health and safety of the building inhabitants.

In addition to the above listed legislation, reference is made to the following State Planning documents prepared and adopted under the P&D Act:

- State Planning Policy 5.4 “Road and Rail Noise; and the associated guidelines.

Disclaimer: This document is a guide only. It does not replace professional specialised acoustic advice by a suitably qualified and experienced acoustic consultant. For full details of legislative requirements refer to the *Environmental Protection Act 1986, the Environmental Protection (Noise) Regulations 1997, the Liquor Act 1988, the Planning and Development Act 2005, the Building Act 2011, State Planning Policy 5.4 “Road and Rail Transport Noise” and the Implementation Guidelines for the State Planning Policy 5.4 Road and Rail Transport Noise (the Implementation Guidelines)*.

3. ACOUSTIC REPORTS

The purpose of the acoustic report(s) is to assess noise affecting the proposed development from its surroundings; and the affect the development may have on its surroundings.

An acoustic report or report(s) are to be provided for each proposed development within the Claremont Town Centre.

An acoustic report is to accompany the Development Application to indicate that the objectives of the Acoustic Management Plan can be achieved.

A further acoustic report will be required to accompany the Building Licence submission showing how the objectives / acoustic criteria are to be achieved.

3.1 WHO CAN PROVIDE AN ACOUSTIC REPORT

The report must be prepared by an Acoustic Consultant/Engineer with relevant qualifications and experience, and should be a member of one, or more, of the following professional bodies or to the satisfaction of the Town of Claremont.

- Australian Acoustical Society; or
- Engineers Australia; or
- A member firm of the Association of Australian Acoustical Consultants.

Proof of membership may be required.

3.2 ACOUSTIC REPORT TO CONTAIN

The Acoustic Report must address all matters necessary to demonstrate that the outcomes for reporting have been achieved as detailed by this document, to the Town's satisfaction. As a minimum, the acoustic report will contain:

- An assessment showing compliance with the requirements of the Environmental Protection (Noise) Regulations 1997.
- State Planning Policy 5.4 – Road and Rail Noise; and
- Compliance with acoustic BCA / NCC acoustic requirements.

Additionally, an assessment of ground vibration of developments within 50 metres of the reserve to the Perth – Fremantle Train Line is also required.

4. NOISE SOURCE IDENTIFICATION

Relevant ambient environmental noise sources include:

4.1 TRAFFIC / RAIL NOISE

Major roads and railways contribute to the ambient environmental noise of an area. In most cases, these roads and railways are characterised by a daily traffic noise pattern. In addition to those developments located within the trigger distances, as outlined in State Planning Policy 5.4, for Stirling Highway and the Perth – Fremantle passenger railway line, noise ingress assessment are also to be provided for developments within 50 metres of :

- Stirling Road;
- Guger Street; and
- Leura Avenue.

VARIATION TO ASSESSMENT OF TRAIN NOISE

Although outside the requirements of State Planning Policy 5.4, given the intermittent nature of train noise, developers should also consider the noise impact from a single train pass.

Notes:

- 1 Applicant to detail sound levels recorded at the property of contributories (motor cars, trains) on a Weekday, during the period 7.00am-9.00am; or at a period of the day that is representative of the normal peak traffic conditions for the area. Sound monitoring shall not be conducted on a public holiday or during school holidays.
- 2 The acoustic criteria and assessment shall be as outlined in State Planning Policy 5.4 “Road and Rail Noise” and associated Implementation Guideline.

4.2 BREAKOUT NOISE FROM LIFESTYLE USES AND ENTERTAINMENT VENUES

Developments that accommodate or reside in close proximity to lifestyle uses including cafes, restaurants, shops, hotels and entertainment venues such as nightclubs and bars, are integral to the vitality and enjoyment of mixed-use localities and the Town Centres. Outdoor Eating Areas associated with hotels, cafés and restaurants can also be a major source of breakout noise.

The Applicant is to:

- a) Identify all breakout noise sources that have a noticeable impact on sound levels received at the subject property, and in particular, those noise sources within a 100m radius; and

b) Specify sound levels recorded at the property during time periods that correspond to related breakout noise sources, for example:

- Nightclubs to be monitored during hours of operation after 10.00pm at night on a Friday or Saturday.
- Cafes and Outdoor Eating Areas to be monitored during peak trade periods; and
- Locations near sports grounds and stadiums to be monitored during periods of normal use; particularly when used at capacity (where practicable).

4.3 MECHANICAL PLANT AND EQUIPMENT

Air-conditioning and related service hardware such as pool pumps, traffic gates and compressors can impact on the amenity of noise sensitive premises, particularly due to the annoying characteristics contained within the noise emitted (modulation and tonality). In a residential setting, the noise emission from a single air conditioner condenser or pool pump can affect a neighbouring property. In mixed use locations, exhaust fans associated with commercial kitchens, smoke exhaust systems, refrigeration compressors and chillers associated with the air conditioning of larger premises are significant noise sources that impact on the localised environmental noise.

- a) Mechanical services, including refrigeration equipment.
- b) Goods delivery; and
- c) On-site power generators.

4.4 GROUND VIBRATION

For development located within 50 metres of the reserve for the passenger railway line, an assessment of ground vibration from the passenger line is to be undertaken.

Note: The criteria for ground vibration is shown in Appendix B.

4.5 BCA / NCC

Residential developments need to comply with the acoustic requirements of the BCA / NCC.

Class 1 buildings to comply with the requirements of Part 3.8.6.

Class 2 and 3 buildings to comply with the requirements of Part F5.

5. COMPLIANCE

The earlier in the development process that sound attenuation/treatment solutions are considered, the better the outcomes will likely be, from a cost and effectiveness perspective.

An acoustic report or report(s) are to be provided for each proposed development within the Claremont Town Centre.

5.1 DEVELOPMENT APPLICATION STAGE

An acoustic report is to accompany the Development Application to indicate that the objectives of the Acoustic Management Plan can be achieved.

5.2 BUILDING PERMIT

Prior to a Building Permit being issued, the Developer/Builder/Applicant must do the following:

- a) Provide Acoustic Report(s) detailing how the requirements of this Acoustic Management Plan and its intent are to be achieved. in the relevant design drawings and specification documents to be submitted for approval; and
- b) Provide certification confirming that full compliance with all requirements of the Acoustic Report(s) have been included in the design.

Note: The requirements of the Acoustic Reports are to be included in the relevant design drawings and specifications. Referencing the acoustic report(s) as a note on the drawings is not sufficient.

5.3 POST CONSTRUCTION / OCCUPANCY

Prior to the building being first inhabited and/or a Certification of Classification being issued, the Developer/Builder shall provide the Town with a Report confirming that full compliance with all the acoustic requirements, as outlined in the acoustic report have been implanted and included in the construction; or where drawings / specification have changed, a supporting supplementary Acoustic Report showing that compliance with the requirements of this Acoustic Management Plan has been maintained.

The Report shall be at the developer's cost, with any significant design changes resulting from the test or inspection report being the subject of a separate application for approval.

APPENDIX A

Development Area



Legend

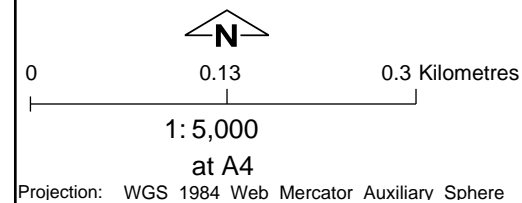
- Local Government Area
- Cadastre (View 1)



Notes:

The data that appears on the map may be out of date, not intended to be used at the scale displayed, or subject to license agreements. The map should only be used in matters related to Department of Planning, Lands and Heritage business.

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APPENDIX B

Ground Vibration Criteria

Ground Vibration Criteria

For ground vibration received within a building AS 2670.2-2001 "Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)" has been used to assess compliance with the appropriate criteria. This Australian Standard provides various criteria with regards to human perception in various building uses. The criteria is provided as multiplies of a base curve.

AS 2670.2-2001 "Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)" and uses acceleration with units of m/s^2 .

As a building may be used for many different human activities, for example standing, sitting, lying or a combination of all three, vertical vibration of the building may enter the body as either z-axis, x-axis or y-axis vibration, as shown in Figure 1.

Figure 1 – Axis of Vibration

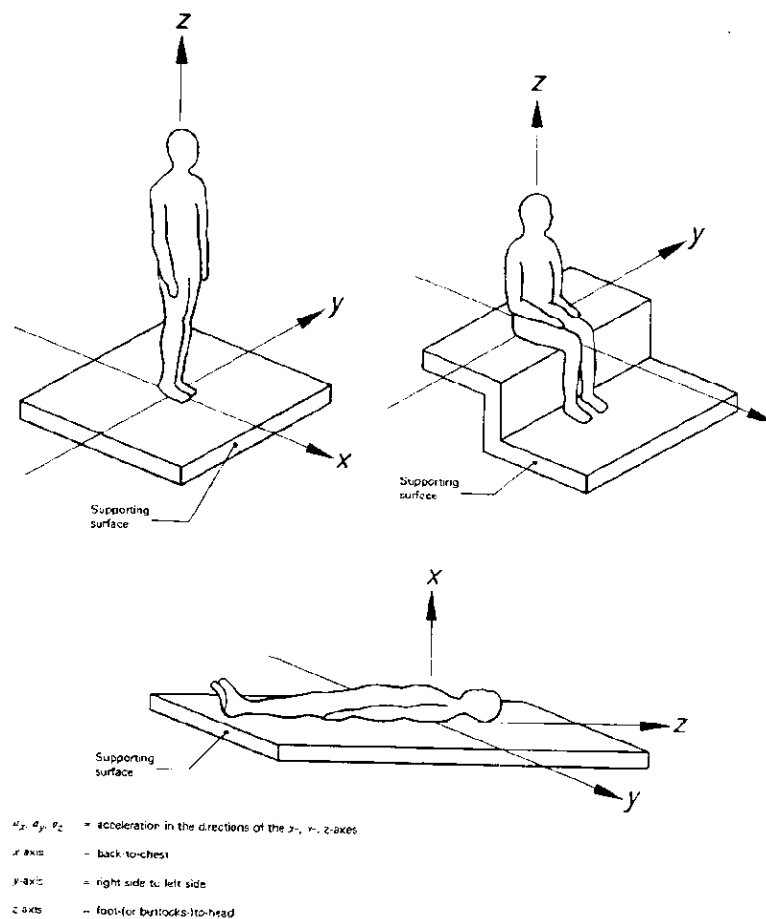


Figure 1 – Directions of basicentric coordinate systems for mechanical vibrations influencing humans

(Extract from AS2670.2-2001)

5.3.1 As it is not clear which direction vibration would enter the body, a combination curve of the base curves is used. The combination curve combines the worst-case combination of the z-axis, x-axis and y-axis curves.

In this case where the axis of the occupants varies or is not known Curve 4(a) is used as the bases of assessment. From AS2670.2 the base Curve for curve 4(a) is shown in Figure 2. This base curve represents magnitudes of approximately equal human response with respect to human annoyance and/or complaints about interference with activities. The satisfactory vibration magnitudes in rooms and building are specified as multiples of this base curve.

Figure 2 – Combined Direction Base Curve

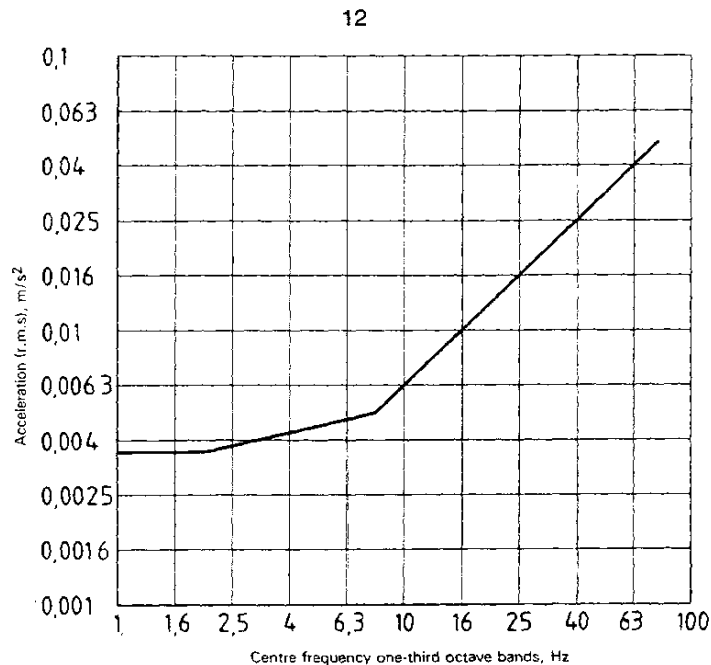


Figure 4a – Building vibration combined direction (x-, y-, z-axis) acceleration base curve (this curve shall be used when the direction of the human occupants varies or is unknown with respect to the most interfering or annoying vibration. See 4.2.3)

The multiplying factors used within the AS2670.2, specify satisfactory magnitudes of building vibration within residential buildings with respect to human response and are listed in Table of Annex A of the standard. The residential section of Table 2 of Annex A is summarised in Table 2.1 below.

TABLE 2.1 – SUMMARY OF MULTIPLYING FACTORS WITHIN RESIDENTIAL BUILDINGS

Place	Time	Continuous or Intermittent Vibration	Transient Vibration Excitation With Several Occurrences
Residential	Day	2 to 4	30 to 90
	Night	1.4	1.4 to 20
Office	Day	4	60 to 128
	Night		
Workshop	Day	8	90 to 128
	Night		

Table 3.1 in Appendix A of the standard lists the acceptable criteria. In this situation the passing trains would be considered as transient vibration. As such the recommended range of multiplying factors range from 1.4 to 4.0 times the base curve. However, AS2670.2 states 1.4x the base curve as the night period criteria. Hence, this has been used as the criteria for this project. We understand that the Department of Environment Regulation (DER) has expressed a preference that the 1.4 x the base curve be used as the criteria.

The above is only applicable to the passenger railway line.