

17. Noise and vibration

17.1 Introduction

The design of a transport corridor requires careful consideration of potential noise and vibration impacts at sensitive locations adjacent the corridor. Potentially sensitive locations include residences, schools, parks and health facilities.

Traffic noise from the Pacific Motorway forms a significant component of the acoustic environment along the Springwood to Rochedale corridor.

Noise and vibration needs to be considered as part of the Concept Design Study as there is the potential for significant noise and vibration impacts from the construction and operation of the busway.

17.2 Methodology

The Department of Transport and Main Roads has undertaken a significant amount of analysis of noise and vibration issues as they relate to Brisbane's busway network. This has included thorough noise and vibration analyses for the Eastern Busway, Northern Busway, Boggo Road Busway, South East Busway and Inner Northern Busway. These assessments were required to address both operational and construction noise and vibration impacts.

Detailed analysis of the potential noise and vibration impacts from the corridor will be undertaken closer to delivery of the busway extension. A desktop assessment, considering previous investigations, is deemed appropriate for the Concept Design Study. This is based on the following reasons:

- potential advancement in technologies and bus design resulting in a reduction of noise emissions from buses
- the use of up-to-date traffic volumes, available closer to the time of delivery, to ensure an accurate assessment of potential impacts
- potential changes in relevant standards and legislation.

17.2.1 Previous investigations

Pacific Motorway Transit Project

The noise and vibration assessment conducted for the Pacific Motorway Transit Project included an extension of the busway to Underwood Road, Rochedale. The conclusions regarding noise and vibration in the Pacific Motorway Transit Project are considered relevant for the assessment of the busway extension.

The Pacific Motorway Transit Project Environmental Approval Report – Section A (Connell Wagner 2006) provided an investigation of ambient noise levels within the study area of Eight Mile Plains to Springwood. Noise level monitoring was conducted at five locations along the study corridor and the resultant data was analysed and reviewed to characterise the existing environment. An existing traffic noise prediction model was created and validated. Potential traffic noise levels were predicted for the Pacific Motorway Transit Project design year. This information was reviewed to determine the ambient noise environment within the corridor and can be found within the Pacific Motorway Transit Project Environmental Approval Report – Section A, Chapter 3.

Eastern and Northern Busway Concept Design and Impact Management plans

These busway projects have completed investigations to determine potential noise and vibration impacts. Each project produced a Concept Design and Impact Management Plan which contained this information. These assessments addressed both operational and construction noise and vibration impacts. The Concept Design and Impact Management Plans provide information relating to typical noise and vibration levels that result from the construction and operation of a busway. These investigations can be found in the Eastern Busway Concept Design and Impact Management Plan, Chapter 18 (2007) and the Northern Busway Concept Design and Impact Management Plan, Chapter 17 (2007).

17.2.2 Additional investigations

For the purposes of this Concept Design Study, further ambient noise monitoring was not considered necessary. The Pacific Motorway Transit Project Environmental Approval Report conducted ambient noise monitoring in 2005. The traffic noise criteria used in the Environmental Approval Report (presented in Section 17.3.1) was derived from the measured noise results. As noise levels are expected to increase over time, along with traffic volumes, the Pacific Motorway Transit Project results should be considered as conservative. Further investigations will be required closer to construction.

17.3 Preliminary analysis

17.3.1 Existing situation

The Pacific Motorway Transit Project Environmental Approval Report presented the ambient noise levels measured at five locations along the corridor. These are reiterated in Table 17-1. The Pacific Motorway Transit Project noise report characterised the ambient noise environment in terms of the Department of Transport and Main Roads relevant criteria parameter the $L_{10(18 \text{ hour})}$. This parameter is the average $L_{10(1 \text{ hour})}$, over the 18 one-hour periods between 6 am and 12 am. The department's noise criteria for new roads and redeveloped roads are 63dB(A) $L_{10(18 \text{ hour})}$ and 68dB(A) $L_{10(18 \text{ hour})}$ respectively.

Table 17-1: Pacific Motorway Transit Project measured noise levels

Measurement location	Measurement address	$L_{10(18 \text{ hour})}$ dB(A)
1	101 Priestdale Road, 8 Mile Plains	67
2	17 Rothon Drive, Rochedale South	65
3	1024 Rochedale Road, Springwood	74
4	15 Maureen Street, Underwood	71
5	34 Wenlock Crescent, Springwood	65

Table 17-1 indicates that the Department of Transport and Main Roads new road criteria of 63 dB(A) $L_{10(18 \text{ hour})}$ is already exceeded at all measurement locations.

There are currently no specific noise standards for busways. In the absence of any specific standards the busway will be required to comply with the Department of Transport and Main Roads standard code of practice.

Potential noise impacts from the motorway and busway are typically assessed independently of each other. Mitigation options, such as noise barriers, may be required to reduce the noise impacts from the motorway. Likewise, mitigation options, such as noise barriers, may be required for the busway. Where these locations are aligned, there is potential for a mitigation solution that provides a reduction in noise impacts from both the motorway and busway. This solution may require repositioning and altering the height of the potential noise barrier. By working together to consider the corridor as a whole, it is likely that the Department of Transport and Main Roads would develop mitigation strategies that achieve better outcomes for the community. The position and height of potential noise barriers may then be designed to effectively reduce noise levels from both the motorway and busway, thereby reducing the cumulative impacts.

17.3.2 Managing issues and opportunities

Road gradient, speed and elevated structure design

The road gradient can affect the noise emissions from buses as steep grades require more engine power, thus increasing noise emissions.

There is potential to lessen noise emissions from buses by reducing the speed at which they travel along the busway.

Sections of the busway alignment which are elevated above other roads have the potential to increase noise levels at sensitive locations along the extension. Consideration may be required for incorporating noise mitigation measures into parapet designs for elevated sections of busway.

Construction noise and vibration

Noise and vibration emissions from construction activities have the potential to be significant at sensitive locations along the busway extension. Management strategies for the reduction of construction noise may include the installation of temporary or final noise screens at an early phase of construction, noise limiting devices on construction equipment, limiting of works hours, and community consultation.

Cumulative impacts from busway extension and Pacific Motorway

The Pacific Motorway Transit Project noise assessment presented noise barriers along the motorway. These proposed were generally 3 to 4 metres tall, and ranged up to 6 metres in certain locations. There is potential to incorporate into the design of the busway or Pacific Motorway a mutually effective mitigation solution for cumulative noise impacts from both the busway and Pacific Motorway. This may provide mutual benefits such as cost savings for each party involved. The combined noise and vibration levels of both sources will need to be predicted to inform future mitigation strategies.

17.4 Future investigations

Further investigation will be required closer to construction to determine the existing or 'background' noise levels within the corridor. This will aid in determination of construction noise emission goals, and be used to confirm applicable operational busway criteria. Additionally, it is anticipated that detailed bus noise emission measurements will be conducted. This data will allow for up-to-date noise predictions of the busway noise emissions.

The noise emissions from the busway will be calculated incorporating a number of factors including:

- predicted volume of buses
- bus speeds and road gradients
- actual bus pass-by noise emissions.

Technological advancements

Advancements in bus and road technologies in future years would mean that current measures for mitigation of noise emissions may become outdated. Therefore, a comprehensive review of potential mitigation strategies may be required at later design phases of the project. The review of strategies may include incorporating quieter buses, alternative screening methods and road design.

Legislation and standards

Changes in legislation and standards are likely to occur over time. These changes may present criteria other than those currently available for operational or construction noise. Any future investigation must review and incorporate relevant legislation and standards.

Identification of sensitive receptors

Sensitive locations surrounding the corridor may change or be introduced in future years. Potentially sensitive locations including schools, childcare and health facilities shall be identified and potential noise impacts addressed at a relevant phase in the project.

17.5 References

Connell Wagner 2006, 'Environmental Approval Report – Section A Pacific Motorway Transit Project', report for Queensland Department of Main Roads, Brisbane.