Chapter 14

Noise and Vibration
14.0 Noise and Vibration

14.1 Introduction and Approach

A detailed Noise and Vibration Assessment was undertaken as part of the study in order to determine the existing visual and landscape values of the study area as well as the potential for impacts on these values. The results of these investigations are reported in Technical Paper 8, in Volume 2 of the Draft Assessment Report.

This section provides a summary of the noise and vibration issues related to the construction and operation of the SFRC. A description of the existing acoustic environment is provided, based on background monitoring undertaken as part of the SFRC study. Noise and vibration models were used to predict the impact of the SFRC upon the local environment, and the most appropriate operational noise criteria were applied to the project. Based on the above, the potential impacts of the SFRC with respect to noise and vibration were described, and mitigation measures to address these likely impacts were identified.

14.2 Existing Acoustic Environment

The existing acoustic environment in the Corridor of Interest was quantified by undertaking a background noise monitoring program at various locations within the Corridor of Interest. The locations selected for monitoring were scattered along the full length of the SFRC Corridor of Interest recognising the different acoustic environments along the proposed corridor. Monitoring locations were chosen in locations away from known noise sources in an attempt to gain a true snapshot of the existing acoustic environment.

Existing background noise levels within the Corridor of Interest are generally low with few existing major noise emitters within the Corridor of Interest or nearby. The average daytime background noise level (LA90) ranged between 30 dB(A) and 39 dB(A). These noise levels are generally described as “low” and are typical of rural sites without surrounding industry or transportation. A site with a night-time background level of 30 dB(A) is described as “Areas with negligible transportation” by AS1055.2 – 1997 “Acoustics – Description and measurement of environmental noise – Application to specific situations”. Night-time Rated Background Levels fell below 26 dB(A) at all but two of the noise monitoring sites.

14.3 Operational Noise Criteria

The environmental noise emission criteria for this project have been determined based on rail planning levels outlined under the Environmental Protection (Noise) Policy 1997 (Noise EPP) and the Queensland Rail (QR) Code of Practice - Railway Noise Management, November 2007. These documents outline the statutory requirements for assessing rail noise within Queensland. These documents both set noise criteria in terms of a 24-hour average equivalent continuous A-weighted sound pressure level (LAeq (24 hour)) and a single event maximum sound pressure level.

The maximum acceptable external noise levels in these documents are as follows:

- 65 dB(A) LAeq (24 hour), and
- 87 dB(A) single event maximum level3 (Max).

The noise level is to be assessed one metre in front of the most exposed façade of an affected noise sensitive place. Other relevant criteria were investigated, most notably Queensland Transports’ Interest in Planning Schemes (QTIPS) as this criterion gives guidance for planning future development adjacent to the preferred alignment.

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3 QR and the Queensland EPA define the single event maximum level as the arithmetic average of the highest 15 maximum levels generated from operational rail noise in a 24 hour period.
The construction of the preferred alignment is not proposed for between 10 and 15 years and as such determining the appropriate criteria is not possible at this time as criteria may continue to evolve over this time. In determining impacts and potential mitigation measures, both the QR criteria and the QT criteria have been assessed. By providing assessment to both criteria future planning (based on the QTIPS criterion) can also be considered at the appropriate time.

14.4 Potential Impacts and Mitigation – Operational Noise

A computer noise model was developed using various acoustic prediction methods to enable the comparison of forecast noise levels against relevant criteria. The model has been validated at locations in Queensland where rolling-stock operates at similar speeds and track conditions to that proposed for the preferred alignment.

Table 25 and Map 8.2 outline the number of dwellings forecast to experience noise levels in excess of relevant criteria.

Table 25 Forecast Number of Dwellings to Experience Noise Levels in Excess of QR External Criteria

<table>
<thead>
<tr>
<th>Contour Zone</th>
<th>Estimated Number of Dwellings Exceeding Criteria</th>
</tr>
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<tbody>
<tr>
<td>QR External Criteria</td>
<td>20</td>
</tr>
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</table>

Where residences are found to be located within the QR external criteria limit line, noise mitigation measures will be investigated. It is recommended that residences within this line be assessed on a case-by-case basis.

14.5 Potential Impacts and Mitigation – Operational Vibration

Forecast operational ground vibration levels were assessed against current Australian ‘best practice’ criteria. These criteria are the accepted vibration criteria for many governing bodies within Australia. The vibration forecasts were based on vibration levels measured for a number of train pass-bys at a location on the existing Brisbane network. These measurements were taken in order to establish the Vibration Dose Value versus distance relationship for typical rail freight movements.

The measured vibration levels for the diesel locomotive hauled trains were adjusted to account for proposed operational conditions to enable vibration impacts to be forecast for the SFRC. It was found that operational vibration impacts are forecast to be significantly lower than operational noise impacts. The forecast buffer distance within which exceedances of vibration criteria are forecast is 20 metres from the Preferred Rail Alignment which is significantly less than the buffer distance required to ameliorate noise impacts.

14.6 Potential Impacts and Mitigation – Construction Noise and Vibration

The general noise and vibration impacts from the construction of the SFRC were also investigated. The details of the construction methodology for the SFRC are yet to be fully developed. Accordingly a more detailed construction noise and vibration assessment may be required when construction methods are finalised.

It was found that there exists the potential for impacts to surrounding residences, especially those closest to the Preferred Rail Alignment. However, these impacts are short-term and can be minimised by implementing best-practice construction techniques (e.g. in-advance notification of works). Key considerations will be incorporated into the Construction Environment Management Plan for the SFRC.
14.7 Conclusion

Potential acoustic impacts from the Southern Freight Rail Corridor were investigated. The existing acoustic environmental values were quantified by a background noise monitoring program. It was found that the existing acoustic environment in the area is low.

A review of operational noise criteria was undertaken. The operational noise criteria assessed for this study are those within the Noise EPP and the QR Code of Practice – Railway Noise Management, and the Queensland Transport internal noise criterion, as identified in Queensland Transport’s Interest in Planning Schemes (QTIPS). These are listed below in Table 26.

Table 26 Summary of Relevant Noise Criteria

<table>
<thead>
<tr>
<th>Description</th>
<th>Descriptor</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>QR - External Noise Level at façade</td>
<td>( L_{Aeq} ) (24 hour) ( L_{Amax} )</td>
<td>65 dB(A) 87 dB(A)</td>
</tr>
<tr>
<td>QTIPS – Internal Noise Criterion (applicable within bedrooms)</td>
<td>( L_{Amax} )</td>
<td>50 dB(A)</td>
</tr>
</tbody>
</table>

The criteria listed in Table 26 have been adopted for the purposes of this planning study. A reappraisal of these criteria should be undertaken during detailed design.

Operational noise impacts have been assessed for the SFRC. Noise contours were produced based on statutory QR external noise criteria. Recommended mitigation measures for sensitive receivers falling within the QR External Criteria buffer were detailed. It was identified that approximately 20 residential dwellings are forecast to exceed QR external criteria. The QT internal criterion was also discussed to enable the planning of future developments in the vicinity of the SFRC.

Operational vibration was assessed based on measurements of existing diesel locomotive hauled rail movements. It was found that a buffer distance of 20 metres from a preferred alignment is required to achieve forecast compliance with operational vibration criteria.

Construction noise and vibration guidelines were then recommended for the SFRC. Buffer distances were predicted for various noisy plant and construction noise and vibration management procedures were recommended. These are to be outlined in the CEMP.