ACOUSTICS AND AIR

REGIONAL RAIL LINK

PEER REVIEW OF ACOUSTIC ASSESSMENT

REPORT NO. 10150-1
VERSION A

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OCTOBER 2010

PREPARED FOR

DEPARTMENT OF TRANSPORT VICTORIA
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1 INTRODUCTION

This report provides comments on the report "Regional Rail Link: Section 2 – Noise Impact Management Report", report RRL-2000-EAC-REP-0001 Revision C, dated 4 June 2010, by KBR Arup Joint Venture ("the Arup report").

The Arup report presents a discussion of noise and vibration arising from Section 2 of the proposed Regional Rail Link – a new two-track railway between Deer Park Bypass and West Werribee Junction, west of Melbourne. As requested, this review is restricted to technical aspects of noise prediction and modelling as presented in Sections 6 - 9 of the report, and does not address questions of noise standards, impact assessment or the adequacy of the report.

2 AMBIENT NOISE MEASUREMENTS (SECTION 6)

The purpose of these measurements was to *"document the existing noise levels adjacent to the corridor and broadly describe the major contributions to the existing noise climate"*. Measurements were undertaken at 16 locations, which are considered broadly representative of the areas likely to be affected by noise from the proposal. The measurement methodology used industry-standard practices. Measurement periods vary from 3 to nearly 7 days. While a period of 7 days is generally required for formal assessment purposes, these periods are considered adequate for the stated purpose.

There is no mention in the report of meteorological conditions, which may render measurement data unreliable – typically data are excluded from consideration if the wind speed exceeds 5 m/sec or it is raining. I would suggest that any such periods be noted or marked in some way in the results.

Results are presented only in an appendix, with no summary measures and only very general comments in the main text. The general comments are in regard to audibility of sources, which was presumably determined at the time of deployment and/or removal of the loggers. Some details of how long operators were listening for would be helpful. In particular I am surprised that there was *"no existing freeway, rail or aircraft noise"* at the location at 4 Manor Road, Little River, which appears to be about 350m from an existing rail line. Some comment on the reason for some very high maximum noise levels at sites like 830 Leakes Road could also be useful.

Understanding of the existing environment, and its variability between locations, would be aided by presenting summary noise measures for each location in the main text. I suggest these could be measures of ambient levels – for example overall L_{Aeq} in day and night periods – and measures of background level – say "lowest repeatable" L_{A90} levels for the same time periods - for each location.

3 OPERATIONAL RAILWAY NOISE PREDICTIONS (SECTION 7)

The Nordic prediction method for rail noise is an established methodology and has been well validated (although not extensively in Australia), and its predictions are accepted as reliable, given appropriate input data.

Predicted numbers and types of train operations for the two scenarios studied were supplied by others and are accepted. (Note: In Table 6 why is "Maximum train length" for a Locomotive train on West Werribee to Deer Park marked "n/a"?)

The reference source noise levels are based on levels from the NSW Rail Noise Database. With respect to this I would offer the following comments.

- I am not sure exactly what items in the NSW database were used to produce the source levels in Table 8, but the locomotive levels appear reasonable.

- The value quoted for "Passenger Wagon" is not in fact an SEL – it is an L_{Aeq} value over the time of the passby (assuming it comes from the database level for "Wagons" at 100m). The SEL then depends on the time taken to pass, which depends on the number of wagons and the speed. This assumes that L_{Aeq} is calculated close to the train, where it can be assumed that SEL = L_{Aeq} + 10 log(Seconds to pass). The SEL can then be projected to the required distance using a line source calculation. Given that the train lengths involved are of the order of 100m, calculating SEL directly at 100m may lead to inaccuracies. However, for the train lengths considered here, the SEL will be dominated by the locomotive, so inaccuracies in the level from the wagons are not critical.

- A minor point – SEL stands for "Sound Exposure Level", not "Single Event Level".

Results of the validation measurements are reassuring. However it would be useful to include more details of the measurements – particularly distance from the track, site conditions and whether the measurements were free-field or at a façade. (Results from the NSW database are all for free-field conditions.)

Other items of prediction the methodology appear to be sound and consistent with generally-accepted good practice.

4 OPERATIONAL NOISE PREDICTION RESULTS (SECTION 8)

Before presenting the results in this section, I believe a number of other items relevant to the predictions should be mentioned, namely:

- train speeds assumed through stations (I believe no reduction is assumed);
- whether points or crossings have been included (I believe they have not);
- confirmation of the type of track (presumably ballasted) and rail (continuously welded?);
- whether the track contains any curves likely to give rise to squeal; and
- measures assumed in the calculations that will provide mitigation – notably details of the major cutting through Wyndham Vale.

It should also be noted that there is no allowance in the calculations for train idling or passing loops.

The predicted noise levels themselves, given all the above assumptions, appear to be reasonable on the basis of some hand calculations.

The level of detail provided in the maps in Appendix E is considered good. However they are slightly difficult to navigate because although a key map is provided at the beginning, the individual maps are not labelled with their sheet number.

5 CONSTRUCTION NOISE AND VIBRATION (SECTION 9)

The methodology used for prediction of construction noise is again standard, using the CONCAWE algorithms. Some sound power levels used for construction equipment differ from those I believe would be typical – notably I would use a lower sound power level for a tipping dump truck, and higher for dozer (at least while pushing or reversing). However the overall sound power level for a set of equipment is close to the value I would have assumed.

With respect to the comment (bottom of page 36) that *"all equipment has been assumed to be operating simultaneously",* it is not clear whether this refers to all equipment in a scenario such as "road realignment", or all equipment for all scenarios at one location – for example "road realignment" and "rail at grade" occurring simultaneously, using different equipment. In either case, depending on the parameters used for assessment this assumption may be overly conservative. For example if the relevant parameter is $L_{Aeq,15min}$ then it is unlikely that all equipment would operate for the entire 15 minutes. If equipment represents a single scenario, I presume the noise contours in Appendix E represent the worst-case scenario for each of the locations considered. This should be clarified.

The first paragraph of Section 9.1.3 refers to "driven piles", and this is also mentioned in Section 9.2, but Table 11 includes only a bored piling rig. If driven piles are to be used, noise levels could be significantly higher than predicted, so either a commitment should be made to use only bored piling or noise levels from a pile driver should be included.

The second paragraph of Section 9.1.3 indicates *"Construction equipment has been modelled as separate point sources, placed at approximately 6 m intervals"*, but the results in Appendix E appear to show only noise levels from the 18 specific sites described in Table 10. Noise due to construction of the rail line itself should be addressed in some form – if not through contours, then at least as a statement of typical noise levels likely to be experienced at various distances from the corridor, and the likely duration of the noise.

Without commenting on criteria, it is common practice to discuss maximum noise levels from construction equipment wherever they may be used at night, to assist in evaluation of potential sleep disturbance. Unless it can be assumed that work will not be undertaken at night, I believe some discussion of maximum noise levels is required.

The recommendations in Table 12 for "safe working distances" from construction equipment are considered reasonable.

With respect to blasting, and again without commenting on criteria, given the distance between the rail corridor and residences in Wyndham Vale I would be surprised if standard blast methods could achieve the criteria in Table 3 at all residences while still providing the required fragmentation. Some mention should be made of possible alternative methods such as PCF, or else treatment of residences or relocation of residents, should standard blast design not be acceptable. The use of small trial blasts to determine a local site law before proceeding with large-scale blasting should also be required.

Version	Status	Date	Prepared by	Checked by
A	Final	5 October 2010	R Bullen	N Gross