

Appendix F

## Acoustic Review (Marshall Day Acoustics)




PREPARED FOR: **Beca Planning**  
**PO Box 448**  
**Hamilton 3240**

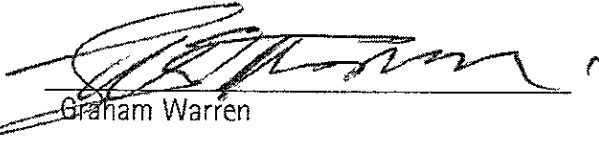
Attention: Richard Douch

DATE: 19 March 2008

PROJECT: **Te Rapa Bypass – Acoustic  
Review**

REPORT NO.: 2007469A 001 R00

PREPARED BY:   
Siiri Wilkening

REVIEWED BY:   
Graham Warren

## TABLE OF CONTENTS

1.0	INTRODUCTION.....	3
2.0	REVIEWED DOCUMENTATION.....	3
3.0	ASSESSMENT OF NOISE EFFECTS – REVIEW AND COMMENTS.....	3
3.1	Design Criteria.....	3
3.2	Existing Noise Environment.....	4
3.2.1	Traffic Volumes.....	4
3.2.2	Computer Noise Modelling of Ambient Levels.....	5
3.2.3	Summary.....	5
3.3	Future Noise Levels.....	6
3.3.1	Traffic Volumes.....	6
3.3.2	Recommended Noise Mitigation Measures.....	6
3.3.3	Assessment of Effects.....	7
4.0	COMMENTS AND SUBMISSIONS.....	7
4.1	Submissions 9, 10 and 11 – Murray.....	7
4.2	Submission 22 – WINTEC.....	7
4.3	Submission 33 – Hamilton City Council.....	8
4.4	Submission 36 – Henson.....	8
4.5	Summary of Submissions.....	9
5.0	RECOMMENDATION.....	9

## 1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged Beca Carter Hollings & Ferner (Beca) on behalf of the Consent Authorities (Hamilton City and Waikato District Councils) to undertake a review of the acoustic assessment undertaken for the proposed Te Rapa Bypass project. The acoustic assessment was undertaken by Hegley Acoustic Consultants (HAC).

The review has been undertaken by Siiri Wilkening, senior acoustical consultant with MDA. Siiri has a Masters Degree in Landscaping and Environmental Protection and has had 13 years experience in acoustics, with particular focus on environmental noise assessments, computer noise modelling and roading projects.

The review focuses on noise issues associated with the project during both construction and operational phase, current ambient and predicted future noise levels, recommended mitigation measures and the assessment of noise effects.

## 2.0 REVIEWED DOCUMENTATION

MDA received the initial Assessment of Environmental Effects, dated August 2007. Following the initial review of the AEE, and particularly the acoustic assessment report by HAC, a verbal request for further information was made to HAC, for clarification of receiver locations described in the report but not shown on the report figures. The requested information was provided by HAC.

A further, more detailed review was undertaken at a later date, addressing further issues relating to ambient noise levels and the comparison of Transit Guidelines and District Plan noise criteria. Due to timing, these issues were not covered in the official Section 92 request and were addressed in later correspondence. An informal reply was received from HAC covering the issues satisfactorily, and the information contained in the response has been incorporated into this report.

A summary of submissions was received and reviewed focussing on noise issues addressed by submitters.

## 3.0 ASSESSMENT OF NOISE EFFECTS – REVIEW AND COMMENTS

### 3.1 Design Criteria

The HAC report correctly states that the project spans two jurisdictions (Waikato District Council and Hamilton City Council) and discusses potential noise limits as set out in the respective District Plans. While the Waikato District Plan does not provide noise limits, the Hamilton City District Plan contains noise limits for new major and minor arterial roads.

HAC correctly states that the road is not an arterial road, but is a State highway and as such would not fall under those noise rules. Nevertheless, HAC assesses the road

against the noise limit of 60 dBA  $L_{10}(18 \text{ hours})$  as set out for restricted access roads in the Hamilton City District Plan.

The HAC report states that the Te Rapa Bypass should be assessed against the provisions of the Transit Guidelines noise criteria and, in the body of the report, contains an assessment based on the provisions of the Transit Guidelines. Nevertheless, compliance with the noise provisions of the Hamilton City District Plan for the extent of road within Hamilton City is discussed in the HAC report.

MDA concurs with this approach as the new road is a State highway requiring a new designation, and is not under the jurisdiction of Hamilton City Council. Its effects should therefore be considered based on the relevant noise criteria of the Transit Guidelines as has been undertaken by HAC.

In Paragraph 2.1.2 of the HAC report it is stated that *“to allow a direct comparison against the noise levels predicted in this report, the District Plan criteria must be reduced from 60 dBA to 57 dBA”*. The reason for this is because the Transit Guidelines assessment requires a facade adjustment of 2.5 decibels and the District Plan noise limit is a free field position, ie. does not require this adjustment. This issue was questioned by MDA and HAC acknowledged that an appropriate conversion would be 60 dBA  $L_{10}(18 \text{ hour free field})$  (as set out in the Hamilton City District Plan) to 60 dBA  $L_{eq}(24 \text{ hour, facade corrected})$  which is less conservative than set out in the HAC report.

### 3.2 Existing Noise Environment

The HAC report, in Section 2.2 'Existing Noise Levels', correctly identifies that ambient noise levels form the basis of assessment of traffic noise criteria in accordance with the Transit Guidelines.

#### 3.2.1 Traffic Volumes

Ambient noise levels have been determined by HAC by means of prediction based on traffic volumes on current roads. Ambient traffic noise levels have been predicted based on 2011 traffic volumes on existing roads and roads to be completed by 2011, in order to take account of the proposed construction start year of 2011. The 2011 traffic flow has been arrived at by assuming 3% non-compounding increase in traffic flow over existing levels (refer HAC report section 2.2).

Based on the traffic flow shown in figure 3.5 of the AEE (section 3.6.4) this increase is not necessarily valid. Traffic flow figures are provided for the year 2016 without the Bypass, and the numbers for small roads such as Te Kowhai and Ruffell Road show no change in traffic volume from 2006 to 2016, while other roads such as Gilchrist St would have an increase in traffic volume of 1,050%. It is considered that utilisation of adjusted 2016 traffic volumes, as provided by the traffic engineers, would have been more appropriate rather than applying an overall arbitrary traffic flow increase over existing volumes.

MDA considers that the potential considerable change in traffic volume may have a bearing on the ambient noise level predictions, either by reducing or increasing noise levels at identified receiver positions.

### 3.2.2 Computer Noise Modelling of Ambient Levels

HAC determined ambient noise levels for the area under consideration by means of computer noise modelling of the existing roading network. MDA does not agree with the methodology of undertaking modelling only, without calibration of predicted levels by means of relevant noise levels surveys.

While to a limited extent the ambient noise levels in the vicinity of the proposed alignment may be controlled by traffic on the existing roading network, the Te Rapa Bypass is a new road in a predominantly rural area, and significant lengths would traverse areas which are remote from existing roads and for which the ambient noise levels may not be controlled by traffic on those roads.

For such road alignment, the only reliable way of determining ambient noise levels is by measurement, which does not appear to have been undertaken. This also means that the computer noise model utilised to predict existing and future noise levels is not likely to have been calibrated against actual measured noise levels. Therefore, no validation of the model has been provided, which would have been expected for a project of this magnitude.

The issue of noise level surveys was discussed with HAC, and HAC agrees that such monitoring would have been useful. It is understood that the timeframe of the assessment did not permit such monitoring to be undertaken.

HAC utilised the computer noise modelling program TNM which has been shown to accurately predict traffic noise levels. The computer noise model does not appear to have been calibrated against measured levels, however, as noted above, HAC in responding to the MDA request for further information, states that previous projects have been calibrated and have been shown to accurately predict traffic noise levels.

MDA notes that, as set out above, some parts of the alignment would traverse rural land where the ambient noise environment is not likely to be controlled by traffic noise. Therefore, the model may not accurately reflect to current noise environment for some areas.

### 3.2.3 Summary

MDA considers that the discussion and determination of existing ambient noise levels is somewhat limited and would require additional information prior to construction commencing.

The lack of information at this time can be remedied by specifying a Condition which requires ambient noise level measurements, the updating of traffic volumes, calibration of the computer model prior to construction, and determination of relevant noise level criteria based on measured and validated predicted ambient noise levels.

### 3.3 Future Noise Levels

#### 3.3.1 Traffic Volumes

Future noise levels are predicted for the Design Year 2026, which is considered to be an appropriate assumption. Traffic flow information is not provided in the HAC report, but is shown on figure 8.1 of the AEE (refer Section 8.3.2) for the years 2016 and 2036.

The HAC report states that traffic volumes for the year 2026 were used for the predictions, and from discussion with HAC it is understood that traffic flow data for the year 2026 was provided to HAC.

Table 2 of the HAC report (Section 2.4) indicates that traffic flows for all roads in the vicinity were entered into the computer model. This is considered a conservative approach as generally only effects from the new road would be assessed, without contributions from existing local roads or State highways.

MDA has no issue with the assessment methodology used as it is considered conservative by taking into consideration noise from roads other than the proposed Te Rapa Bypass.

#### 3.3.2 Recommended Noise Mitigation Measures

Traffic noise was predicted for the Design Year 2026 for all roads which would be operational in that year, including Avalon Drive with noise mitigation measures implemented.

HAC assessed two mitigation options, one with noise barriers and the other utilising low-noise road surface material. Generally, the road surface mitigation option achieved lower noise levels for all positions requiring mitigation.

In section 2.8 HAC discusses the limitations of the recommended mitigation options and notes that barriers and road surface material have advantages and disadvantages which require balancing.

In particular, barriers may affect visibility and maintenance, while road surface materials may lose their noise reducing effectiveness after some years of use. MDA concurs with the assessment and discussion.

HAC recommends suitable barrier materials, should acoustic barriers be chosen for noise mitigation. It is noted that timber paling fences are mentioned as a suitable alternative. MDA disagrees with the choice of timber fencing as being suitable for long-term noise mitigation measure. It has been shown over the past 10 years that timber paling fences do not have the longevity required to reliably provide noise mitigation due to warping, gaps opening and vandalism.

Therefore, it is recommended that timber paling fences be expressly excluded from the list of acceptable noise mitigation measures for this project.

### 3.3.3 Assessment of Effects

In Section 2.8 the HAC report states that achieving compliance with the relevant Transit noise criteria means that *"the effects of noise from vehicles on the Bypass will be no more than minor"*. MDA considers that compliance with the Transit Guidelines criteria does not necessarily indicate that noise effects would be no more than minor.

For most positions assessed, noise levels would remain the same or slightly lower compared with current levels. A small number of receivers is shown to receive noise levels four to five decibels higher than predicted ambient noise levels (receivers H19, H36, H55, H71-74), which is a noticeable noise level change.

However, despite this increase in noise level, it is considered that the assessment is in accordance with the Transit Guidelines and the mitigation measures are suitable to achieve compliance with the relevant criteria.

Overall, with the implementation of the low-noise road surface mitigation option, HAC predicts that the project would result in similar or lower noise levels for the majority of assessed receiver positions.

## 4.0 COMMENTS AND SUBMISSIONS

MDA has received and reviewed the summary of submissions made, with particular focus on submissions addressing noise issues. Of the 41 submissions received, six address noise issues, five are in opposition and one in support (with amendments).

None of the submissions introduce aspects relating to noise which are not addressed to some degree in the HAC report, however, submissions are discussed in detail below.

### 4.1 Submissions 9, 10 and 11 – Murray

Submissions 9, 10 and 11 relate to neighbouring properties. The wording of these submissions in relation to noise is virtually the same, and request that the NoR include conditions/insurances that measures be specified and implemented which effectively mitigate noise levels specifically in relation to the submitters' properties.

MDA has identified the submitters' properties as being in the vicinity of H46 and H47. These receivers are not currently shown in Table 3 of the HAC report. Therefore, the current and predicted levels at these positions and any potential noise mitigation issues would need to be addressed during the Hearing.

### 4.2 Submission 22 – WINTEC

Submission 22 by WINTEC states that noise mitigation measures in the vicinity of the Avalon Drive campus should be achieved by utilisation of low-noise road surface rather than barriers. It has been shown in the HAC assessment that low-noise road surface achieves lower overall noise levels compared with barriers. If the utilisation of low-noise road surface is practicable, MDA recommends its implementation in preference to noise barriers.

Controlling noise at the source, such as with low-noise road surface, is considered to be the best option as any noise reduction achieved benefits all receivers in the vicinity.

The submission also queries the inclusion of a building on their site as a dwelling even though it is not used as a dwelling. I consider that HAC is likely to have identified all receiver positions which appeared to be used for residential or teaching purposes and may therefore have included this building. MDA considers that, if the building in question is not used for residential or teaching purposes, it can be excluded from the assessment.

WINTEC requests that should part of its site be rezoned from Major Facilities to Residential, then noise mitigation should be provided as for residential sites immediately south of the site.

The Transit Guidelines do not provide protection for vacant land, irrespective of zoning. It is, therefore, not considered reasonable to include mitigation provisions at this time for future residentially zoned land, as any new dwelling can be purpose designed incorporating acoustic insulation, thus allowing for the potential increase in noise level.

Nevertheless, Submission 33 of Hamilton City Council (refer below) requests that mitigation requirements are reassessed at the detailed design phase, and if dwellings have been built on the future residential site, those would be included in the assessment at that time.

#### 4.3 Submission 33 – Hamilton City Council

Hamilton City Council (HCC) supports the application with amendments. Those amendments include the request that the noise mitigation requirements are reassessed at the time of detailed design.

MDA notes that due to lack of ambient noise level information, discrepancies of traffic flow numbers for the assessment of ambient noise levels and the application for a 20 year designation, it is recommended that the noise mitigation assessment be updated and refined prior to construction, eg. at the detailed design phase. MDA therefore supports the HCC submission.

#### 4.4 Submission 36 – Henson

I and C Henson in their submission express concern about noise issues from traffic on the Bypass and request that the road alignment be moved towards the north-west away from their property.

It is noted that the Henson's property is approximately 750 metres from the closest alignment. The property is in the vicinity of receivers H71 to 74 as set out in the HAC report. Those receivers are not included in Table 3 of the HAC report, presumably because of the large distance between receivers and road, and the associated distance attenuation which is likely to result in noise levels well within the relevant noise criteria.

#### 4.5 Summary of Submissions

As requested, the issues noted in the submissions and discussed above have been tabulated below.

Submission No/Name	Issue	MDA Comment
9 – Murray	Effective mitigation measures to be specified in consent	Receiver not currently included in Table 3 of HAC report, information required during Hearing phase
10 – Murray	Effective mitigation measures to be specified in consent	Receiver not currently included in Table 3 of HAC report, information required during Hearing phase
11 – Murray	Effective mitigation measures to be specified in consent	Receiver not currently included in Table 3 of HAC report, information required during Hearing phase
22 – WINTEC	Low noise road surface to be preferred mitigation measure	Low noise road surface preferable to barriers
	WINTEC building identified as dwelling, should be excluded from assessment	Building can be excluded if not used for teaching purposes
	Provision of mitigation for part of WINTEC site currently proposed to be rezoned residential	Transit Guidelines do not provide for mitigation of vacant land, if dwellings are constructed prior to road, potential to include in assessment, otherwise dwelling design can incorporate noise mitigation
33 – Hamilton City Council	Reassessment of noise mitigation during detailed design phase	Reasonable request considering the lack of ambient noise level data, discrepancies regarding traffic flows used for ambient noise level prediction and the 20 year designation sought
36 – Henson	Move alignment to northwest, away from property	Henson property well separated from alignment (approx. 750 m), noise effects likely to be no more than minor; property not currently included in Table 3 of HAC report, information required during Hearing phase; compliance with criteria expected

#### 5.0 RECOMMENDATION

Following the review of the acoustic assessment undertaken by HAC, and the submissions received, MDA recommends that the following conditions be included, should consent be granted:

### Construction Noise

1. Prior to commencement of construction, a Construction Noise Management Plan (CNMP) shall be developed describing the measures adopted to meet the requirements of the NZS6803:1999 Acoustics – Construction Noise. The CNMP shall refer to noise management measures set out in Annex E of NZS6803:1999, and as a minimum shall address the following :
  - Construction sequence;
  - Machinery and equipment to be used, including the use of non-percussive machinery where practicable;
  - Hours of operation, including times and days when noisy construction work would occur;
  - The design of noise mitigation measures such as temporary barriers or enclosures;
  - Development of alternative strategies where full compliance with NZS6803:1999 cannot be achieved, including consultation with residents and other occupiers to achieve acceptable outcomes;
  - Methods for monitoring and reporting on construction noise.

### Operational Noise

2. Prior to commencement of construction, an Operational Noise Management Plan (NMP) shall be developed and include, at a minimum:
  - 2.1. Mitigation measures to be implemented to achieve compliance with the Average Noise Design Levels of the Transit New Zealand 'Guidelines for the Management of Road Traffic Noise – State Highway Improvements' (December 1999).
  - 2.2. Noise barriers shall be constructed of durable materials, and exclude timber board and batten construction.
3. As far as practicable, all noise mitigation measures identified by the NMP shall be implemented prior to the completion of construction of the Project.
4. Measurements of ambient noise levels existing prior to construction shall be undertaken at no less than six (6) positions. The results of such measurements shall be forwarded to the consenting authorities prior to the commencement of construction.
5. Compliance Monitoring: Following completion of the work, the requiring authority shall undertake monitoring of traffic noise levels at sites where ambient noise levels were previously measured. Such monitoring shall be undertaken by an appropriately qualified person within 2 and 3 years following completion of the highway and the findings shall be reported to the Council, within one month of the completion of monitoring.