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DATE: 25 August 2009

PROJECT: 100 METRE SETBACK AREA AT ROLLESTON

PROPOSED PLAN CHANGE

REPORT NO.: 001 R02 2009053

PREPARED BY: Jon Farren

REVIEWED BY: Peter Ibbotson

1.0 INTRODUCTION & BACKGROUND

Marshall Day Acoustics has been engaged by Bruce and Michelle Coles to perform an assessment of potential noise effects associated with a proposed plan change to a 100 metre wide strip of land immediately to the north of the land identified as SR3 in Figure 1.

This 100 metre setback from State Highway 1 was identified in Proposed Change 1 (PC1) and Variations 1-4 of the Canterbury Regional Policy Statement. We understand that the reason for this 100 metre setback is that an appropriate noise amenity can be provided without the need for fences or barriers and PC1 proposes no residential development within this 100 metre setback.

Figure 1
Plan showing location of 100 metre setback

We understand that the proposed plan change will seek to (among other things):

- Reduce the 100 metre setback to 40 metres; and
- Provide additional residential sections within the remaining 60 metres of land.

We note that Marshall Day Acoustics was engaged by Bruce & Michelle Coles to submit technical evidence to the PC1 Hearing in support of reducing the proposed 100 metre setback to 40 metres with the provision of appropriate noise control measures. The PC1 Hearing technical evidence is directly relevant to the assessment presented in this report and many of the comments are repeated.

The following items are provided as part of our noise assessment:

- Review of published guidance and District Plan noise rules relating to traffic noise at this location;
- Discussion of setback distances and appropriate amenity;
- Proposal to adopt an effects-based assessment based on a 40 metre setback;
- Provision of one example noise control solution; and,
- Provision of appropriate noise rules.

2.0 REVIEW OF TRAFFIC NOISE REQUIREMENTS

2.1 NZ Transport Agency (NZTA)

For a proposed subdivision adjacent to a State Highway, the NZ Transport Agency (formerly Transit New Zealand) typically request an acoustical assessment of reverse sensitivity. NZTA Planning Policy Manual "Appendix 5D – Reverse Sensitivity" provides guidance for ensuring that traffic noise effects are minimised in line with International research.

The NZTA document states that whilst the provision of a building setback is an appropriate solution, an effects-based performance standard is also effective.

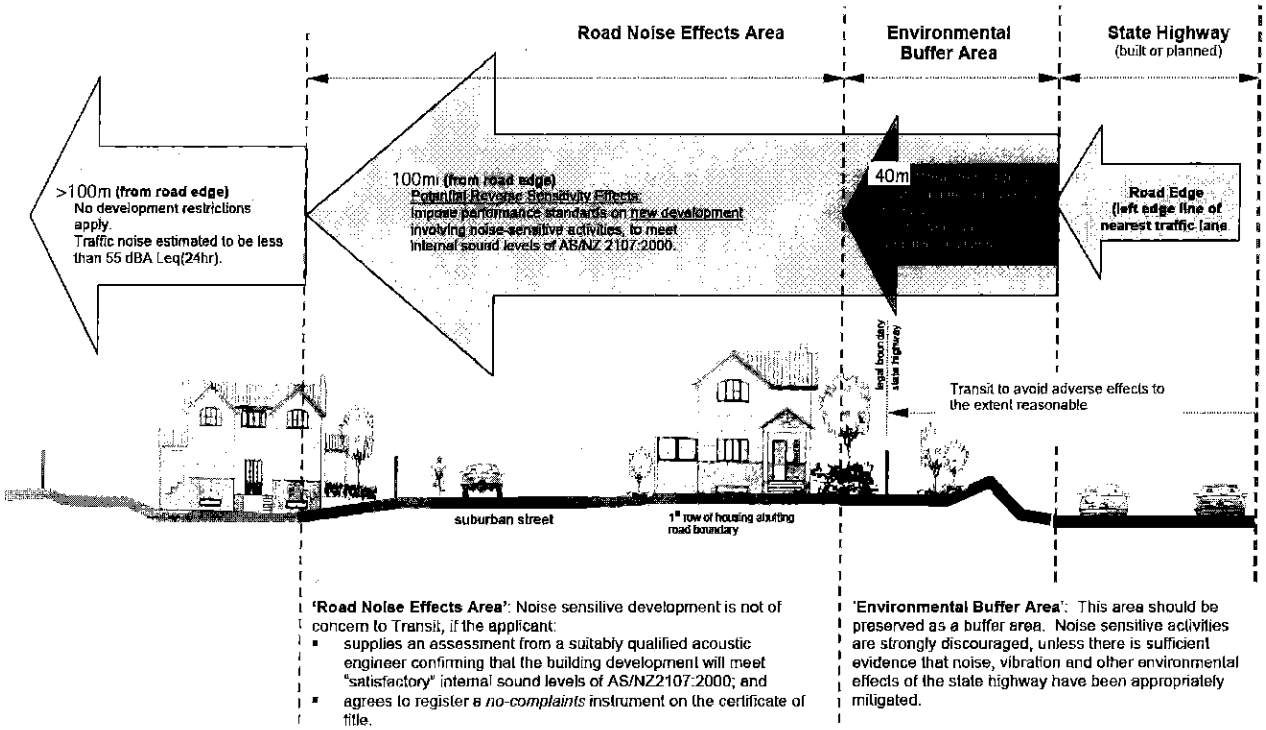
Where a road carries greater than 10,000 vehicles per day and has a speed limit of 70km/h and greater, noise sensitive development within 40m of the road is discouraged.

Between 40m and 100m, performance standards are imposed on buildings so that appropriate internal noise levels are achieved based on *AS/NZS2107-2000: Acoustics-Recommended design sound levels and reverberation times for building interiors.* For dwellings, the satisfactory design goals are 35 and 40dB L_{Aeq} (24 hours) for bedrooms and other habitable areas respectively.

At distances greater than 100m, no development restrictions apply on the basis that traffic noise levels are expected to be less than 55dB L_{Aeq} (24 hours).

Figure 2 provides a graphical representation of these requirements as they would be for the Coles' land.

Figure 2
NZTA Appendix 5D- Typical land use cross section for traffic profile Type C



Our experience in traffic noise assessment supports the general recommendations of the NZTA guidance. That is to say that whist a setback of 100 metres provides an appropriate noise level amenity, equivalent amenity can be achieved much closer to a State Highway with the provision of appropriate noise control treatment.

In our experience, when the setback is around 40 metres, an appropriate balance of noise barrier height and visual amenity can be achieved.

2.2 Selwyn District Plan

Rule 4.9.18 the Selwyn District Plan is subject to noise standards relating to reverse sensitivity from traffic noise. The rule states:

"Any dwelling, family flat, and any rooms within accessory buildings used for sleeping or living purposes shall be located no closer than 40m from the State Highway 1 carriageway. Except that this distance can be reduced where the dwelling, family flat, and any rooms within accessory buildings used for sleeping or living purposes has been acoustically insulated or subject to mounding or other physical barriers so that traffic noise from State Highway 1 is limited to levels set out below, with all external doors and windows closed:

Table 1: Internal Noise Limits

	Day time (0700–2200 Hours)	*Night-time (2200–0700 Hours)*
Within Bedrooms	*35 dBA $L_{eq\ (1hour)}$*	*30 dBA $L_{eq\ (1hour)}$*
Within Living Area Rooms	*40 dBA $L_{eq\ (1hour)}$*	*35 dBA $L_{eq\ (1hour)}$*

Living Area rooms means any room in a residential unit other than a room used principally as a bedroom, laundry, bathroom or toilet."

The provision of relatively high barriers (in the order of 5 metres) is commonly adopted to ensure that the dwellings within 40 metres of a State Highway are appropriately protected. This can result in potentially significant visual effects.

2.3 Discussion of Published Guidance

In the previous sections we have discussed both the relevant traffic noise level criteria and the means of mitigating traffic noise to achieve those criteria.

Whilst the inclusion of the 100 metre setback will provide an internal and external noise level environment in line with accepted criteria, it precludes an effects-based assessment which would permit the design of appropriate noise control options for noise sensitive development within the 100 metre strip of land.

In our experience a setback distance of 40 metres can provide appropriate internal and external noise environments with the provision of barriers and/or mitigation to the dwelling. In theory, the internal noise criteria can be achieved solely through building mitigation without a barrier. However, the provision of a barrier also allows for an appropriate outdoor noise amenity and is therefore an important noise mitigation element.

At distances closer than 40 metres, as allowed by the Selwyn District Plan, internal noise levels can be achieved through both barriers and building elements. However, appropriate outdoor noise levels can typically only achieved with barriers that are much higher. For example at a distance of 15 metres from the road edge, a 5 metres high barrier would be required. Barriers of this size will potentially have significant visual effects.

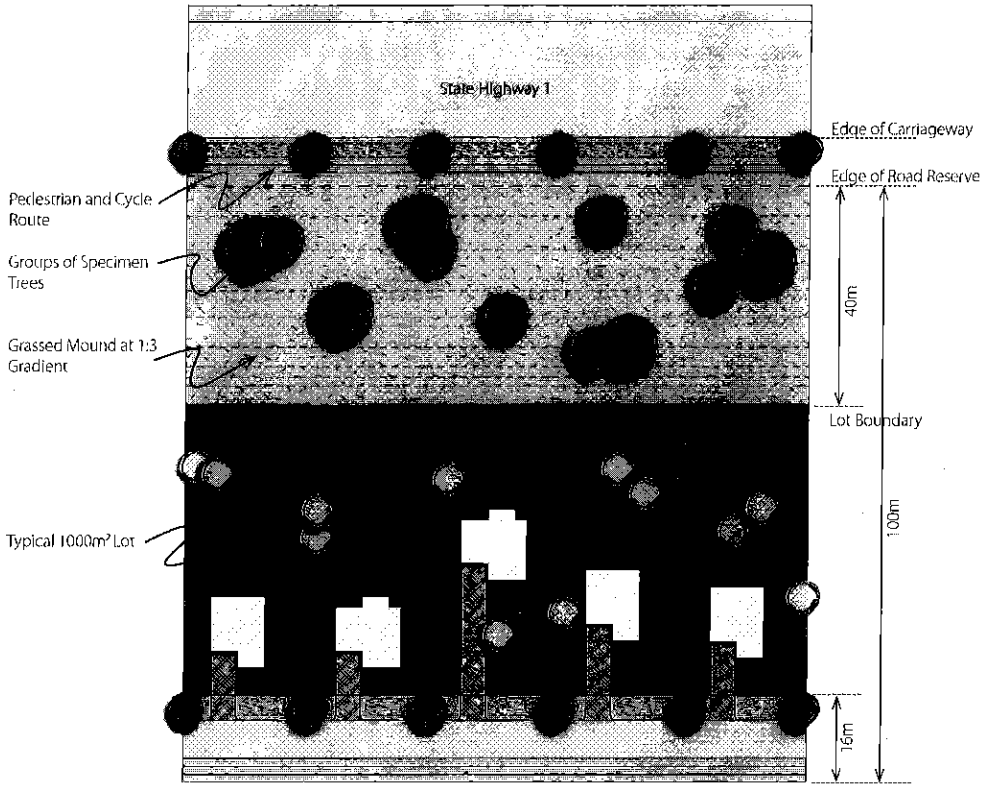
Therefore, we propose that an effects-based noise assessment should be permitted, based on a 40 metre setback and the provision of barriers and/or dwelling mitigation.

3.0 EXAMPLE NOISE CONTROL SOLUTION

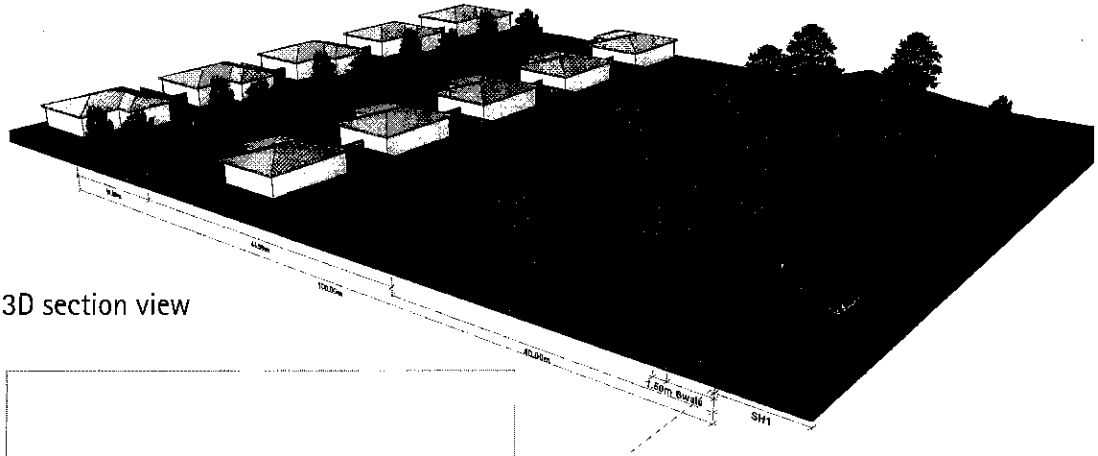
For the PC1 hearing submission, an example noise control solution was developed to illustrate that an appropriate traffic noise amenity can be provided for dwellings located within 40 to 100 metres from the State Highway. The provision of a 3 metre high earth mound provides appropriate outdoor and indoor noise amenity without the requirement for any additional dwelling noise control for a single storey dwelling (e.g. double glazing). The landscaping and indicative residential section layout shown in

Figure 3 has been developed by Harrison Grierson landscape architects and urban designers with our input.

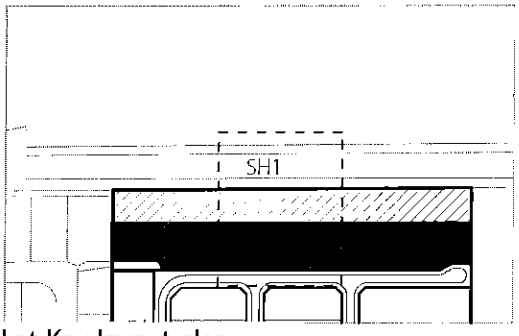
Figure 3
Indicative noise control solution for the 100 metre setback strip (Harrison Grierson)



Plan showing general layout



3D section view



Lot Key layout plan

4.0 PROPOSED NOISE RULES

In order to reflect the discussion above, we propose that a series of new noise rules are provided to permit an effects-based assessment of traffic noise at this location.

1. No dwelling, or outdoor area associated with a dwelling, shall be located closer than 40m (measured from the nearest painted edge of the carriageway) from State Highway 1.

2. For any dwelling constructed between 40 metres and 100 metres (measured from the nearest painted edge of the carriageway) of State Highway 1:

   - Appropriate noise control must be designed, constructed and maintained to ensure that noise levels within the dwelling meet the "satisfactory" internal design noise levels in AS/NZS2107:2000 "Recommended design sound levels and reverberation times for building interiors".

   - Prior to the construction of any dwellings, an acoustic design certificate from a suitably qualified and experienced acoustic consultant is to be provided to Council that the above internal sound levels from AS/NZS2107:2000 can be achieved.

3. The noise control may be applied in the form of noise control barriers/mounds between the dwelling and State Highway, or the provision of sound insulating constructions to the dwelling, or a combination of the two.

   If noise control barriers/mounds are to be used, a return may be required at each end of the barrier/mound, depending on the presence of existing development or landscaping on adjacent sites. The acoustic design certificate shall provide the location, height and construction of the barrier/mound.

4. If all windows are to remain closed to achieve the above internal sound levels in bedrooms, an alternative means of ventilation shall be sought to comply with the requirements of the New Zealand Building Code as appropriate.

In addition to the above we suggest that a series of rules be adopted to control the visual and landscape aspects of any proposed barrier/mounding noise control solution.

5.0 SUMMARY

Marshall Day Acoustics has been engaged to perform an assessment of noise effects associated with the Coles' proposed plan change to reduce the 100 metre setback from the State Highway to a 40 metre setback.

Our project experience and review of available guidance documentation supports the provision of a 40 metre setback with an appropriate effects-based noise assessment for dwellings located within 40 to 100 metres from the State Highway.

In section 3.0 we have provided one possible noise control solution through the provision of a 3 metre high landscaped mound. This design was developed for the Coles' submission to the PC1 Hearing and our colleagues at Harrison Grierson have provided an appropriately landscaped solution.

We have provided sample noise rules that would permit an effects-based assessment for dwellings. A complimentary series of rules governing landscaping and visual aspects or any proposed mounds/barriers would also be required.

On the basis of the above, we conclude that the reduction of the proposed 100 metre setback to a 40 metre setback with appropriate noise rules, will result in no more than minor noise effects.