

9 August 2013

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By email: Craig.Friedel@selwyn.govt.nz

Cc. Patricia.Harte@dls.co.nz

Dear Craig

RE: PLAN CHANGE 41 – PROPOSED NOISE MITIGATION

This letter presents my assessment of the provisions in draft Plan Change 41 that are proposed to mitigate traffic noise effects on the Plan Change area, for the purpose of avoiding reverse sensitivity effects on the road network.

In my email of 1 July 2013, I advised you that I considered that the draft application did not provide sufficient information relating to building setback, physical barriers and acoustic insulation to support proposed permitted activity rule 4.9. My reasons were as follows:

1. Referring to section 5.5 on page 12, it is stated incorrectly that the proposed internal levels are the same as those that apply to the Rolleston Living 3 zone where it adjoins State Highway 1. The proposed new rule applies separate limits for daytime and night-time periods, expressed as Leq 1 hr, whereas Townships Volume rule 4.9.4 applies a single figure limit expressed as Leq 24 hr. The equivalence of these limits, and the relationship of the proposed limits to guidelines of acceptability (e.g. AS/NZS 2107:2000) is not discussed.
2. Referring to point 4(a) of the table on page 11, which mentions a proposed “noise absorbent fence”, and section 5.5 second bullet point on page 12, there is insufficient detail to provide the Council or future developers certainty that the proposed acoustic fence would be effective in fulfilling the noise barrier requirements of the proposed new rule.
3. There is also insufficient information to demonstrate that the acoustic fence would achieve sufficient noise attenuation to support the proposed 25 m minimum setback, instead of the 40 m and 100 m setbacks that apply to the Rolleston Living 3 zone.
4. The requirement for acoustic insulation should include a further requirement, that any building consent application for a new residential development or an

extension to an existing residential development shall include a report from an experienced acoustic engineer which verifies the proposed construction will satisfy the internal noise limits in the proposed rule.

5. There is no assessment of the effectiveness of the proposed rule to address effects of traffic noise on outdoor living areas that would result from the projected increase in traffic.

Following your instructions on 5 July, I met with the applicant's Planning consultant Patricia Harte, Planning Manager for Davie Lovell-Smith Ltd on 8 July, and I have prepared the following assessment which I consider addresses the above matters raised in my email.

PC 41 NOISE ASSESSMENT

Introduction

I have examined the proposed methods for mitigation of road traffic noise described in section 5.5 of the draft Plan Change document.

The new rule in clause 3.3.6 of the Plan Change document propose that, to achieve prescribed internal noise standards for daytime and night-time within Bedrooms and Living Rooms of buildings used for residential purposes, such buildings shall be set back at least 25 m from Shands Road and either insulated or protected by an acoustic barrier.

Section 5.5 of the Plan Change states that the proposed internal limits are the same as those that apply to the Rolleston Living 3 zone where it adjoins State Highway 1. However the proposed new rule applies separate limits for daytime and night-time periods, expressed as Leq (1 hour assessment period), whereas Townships Volume Part C rule 4.9.4 (as applied by PC12) applies single-figure limits of 35 dBA Leq for bedrooms and 40 dBA Leq for Living Area Rooms (24 hour assessment period) with doors and windows closed, in the Rolleston Living 3 zone. I understand that the proposed limits in draft PC 41 came from a pre-PC12 version of Part C, rule 4.9.2.6, and as such they are no longer relevant. Therefore in this assessment, the appropriateness of the current 24-hour Leq limits for the Rolleston Living 3 zone are considered for the PC 41 land area in respect of outdoor noise levels generated by traffic on Shands Road and limits of acceptability in relevant standards and guidelines.

The Table in section 5.3 of the Plan Change states that a "noise absorbent fence" shall be installed in the location shown in the Outline Development Plan (ODP) within the road boundary of the site, behind an existing line of trees which will be retained. However as the acoustic performance of a traffic noise barrier relies principally on its physical mass and height to intercept and diffract noise, and not on noise-absorption, it is more appropriate to refer to the proposed fence as an "acoustic barrier fence". The location, height and specifications of an acoustic barrier fence in conjunction with the proposed 25 m setback are examined in this assessment, with regard to achieving appropriate indoor and outdoor noise levels.

Assessment

Examination of traffic count data supplied by Selwyn District Council taken on Shands Rd between Blakes Rd and Trents Rd from 25 June – 2 July 2011 indicates that traffic counts on weekdays range between approximately 6700 and 7100 vpd (vehicles per day, Average Daily Totals or ADT), with approximately 5000 on Saturdays and 4100 on Sundays. Because 95% occurs between 6 am and 10 pm, most of the noise would be generated in that period, and perceived as relatively constant except during peak hours at 7 am and 5 pm when noise would be about 3 dBA higher than the rest of the day. Between 10 pm and 6 am, night-time noise would be at least 10 dBA lower than during daytime, and perceived as intermittent vehicle movements rather than constant traffic noise. It should be noted that the traffic noise characteristics of this site are significantly different to those of the Living 3 zone at Rolleston, where noise from State Highway is at much higher levels and continues through into the night.

As noted in the discussion of the Wider Traffic Environment in section 5.7 of the Plan Change document, NZTA's assessment of traffic impacts for the CSM2 project indicates that traffic flows on this section of Shands Road are predicted to increase from current levels by no more than 9% by the year 2041. 9% change would slightly increase the level of existing daytime traffic noise by 1 dBA which would not be noticeable. However for completeness I have adopted a year 2041 figure of 7704 vpd for noise calculations in this assessment, adjusted from a 2011 highest weekday count of 7068.

Traffic volumes on Trents Road can be disregarded, as they are much lower than Shands Road, and would not contribute significantly to traffic noise received in the Plan Change area.

Calculations on NZTA's calculator for road traffic noise, using the adjusted year 2041 value of 7704 vpd for Shands Road, have produced predicted free-field noise levels (dBA Leq 24 hr) that would be received at the proposed dwelling setback of 25 m. The predicted levels are set out in Table 1 below for the following scenarios:

No acoustic barrier fence, and 3 m and 4 m high acoustic barrier fence heights, for each of the following receiver heights:

- 1.8 m (i.e. ground floor level and outdoors)
- 3 m (i.e. first floor level)

For these calculations I have assumed the acoustic barrier fence would be located approximately 10 m from the road edge behind the existing boundary trees (i.e. at the position indicated in the ODP). To provide satisfactory noise reduction, the surface mass of the fence must be 8-10 kg/m² with no gaps in the barrier construction or at ground level.

Table 1

Predicted noise level (dBA Leq 24hr) at 25 m from Shands Rd, for stated receiver heights and acoustic barrier fence heights

Receiver height	No barrier fence	Barrier fence 3m height	Barrier fence 4m height
1.8 m (ground floor/outdoors)	65	54	52
3 m (first floor level)	65	55	53

In terms of outdoor noise levels, Table 2 indicates that,:

1. A level of 65 dBA Leq (24 hr) would be received at 25 m from the road, if no acoustic barrier fence is installed. At locations closer to the road, levels would be higher. These levels significantly exceed 55 dBA Leq (24 hours) which NZTA's Planning Policy Manual Appendix 5 suggests is an upper limit of acceptability. They also exceed 55 dBA Leq (16 hours), which is recommended by WHO and NZS 6802:2008 for the avoidance of serious annoyance and protection of amenity in outdoor residential situations. This indicates that a physical barrier is needed to provide a satisfactory level of noise in outdoor areas.
2. An acoustic barrier fence height of at least 3 m would be sufficient to reduce daytime traffic noise to 55 dBA Leq (24 hr) outdoors at the 25 m setback. Levels at locations closer to the fence would be lower, due to greater screening.

With regard to internal levels at ground and first floor levels of new dwellings, an external level of 55 dBA Leq (24 hr) would ensure that internal sound levels in the dwellings with doors and windows closed would be at least 5 dBA lower than required by the current District Plan limits in the Rolleston Living 3 zone, i.e. 35 dBA Leq for bedrooms and 40 dBA Leq (24 hr). Taking into account that typical building construction achieves 15 dBA noise attenuation with windows open, then internal levels with windows open might exceed the 35 dBA limit for bedrooms by 5 dBA; however this would occur only during daytime and the levels would still be consistent with the maximum internal design sound level of 40 dBA Leq (24 hr) recommended in AS/NZS 2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors*.

On this basis, I consider that the proposed setback and a 3 metre high acoustic barrier fence can achieve acceptable outdoor and indoor noise levels for the reasonable protection of residential amenity and avoidance of serious annoyance. However to ensure that all parts of the proposed residential properties are protected, I consider that the acoustic barrier fence should extend 25 m along each of the side boundaries from the road boundary corners (as indicated in Attachment 1 of this report).

The mass of the acoustic barrier fence should be 8 -10 kg/m² with no gaps in the barrier construction or at ground level. This is achievable with 20 - 25mm thick timber, or other materials such as concrete, Hardiflex or Titan Board. A common solution is H3 treated timber, nailed through overlaps or "board and batten", with a H4 fillet along the base at ground level to stop gaps.

An earth mound or mound and acoustic barrier fence combination at least 3 m high would be equally effective.

Conclusions and Recommendations

This assessment shows that a 3 metre high acoustic barrier fence at the road and side boundaries, as described above, in combination with the proposed 25 m setback and typical building construction, can achieve acceptable outdoor and indoor noise levels for the reasonable protection of residential amenity and avoidance of serious annoyance. I do not consider that it is necessary to require acoustic insulation or to specify noise standards that otherwise apply to State Highway noise in this instance.

I therefore recommend that the proposed rule in clause 3.3.6 of the Plan Change document should be amended as follows:

Living 3 Rural Residential – Shands Road Traffic Noise Mitigation

4.9.XX For the purpose of protection against traffic noise intrusion from Shands Road, any dwelling, family flat and any rooms within accessory buildings used for sleeping or living shall be located no closer than 25 metres from Shands Road and shall be acoustically insulated and/or subject to physical acoustic barriers in the locations indicated in the ODP. so that noise from traffic from on Shands Road does not exceed the levels set out below, with all external doors and windows closed.

... (delete proposed internal noise limits)

The finished height of any acoustic barrier shall be no less than 3 metres above the adjacent ground level of any proposed residential lot. The mass of any acoustic barrier shall be 8 -10 kg/m² and it shall be constructed and maintained with no gaps in the barrier construction or at ground level.

Yours sincerely,

Novo Group Limited



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ATTACHMENT 1

Indicative extension of the acoustic barrier by 25 m at side boundaries

