Appendix I

Acoustic Assessment

DESIGN ADVICE MEMO

ACOUSTIC

Memo No	**A01 Issue B**
Job Name	**Rolleston West**
Job No	**201522/A**
Date	**17 November 2020**
To	**Novogroup**
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Rolleston West Plan Change (ODP Area 39 and 40)

1. Introduction

Powell Fenwick has been engaged by Rolleston West Residential Ltd to provide high level feedback regarding the reverse sensitivity noise implications of a proposed rezoning of the Holmes block and the Skellerup block in West Rolleston. Rolleston West Residential Ltd propose plan changes that rezone the land from Living 3 Zone to Living Zone Z. The Holmes block is located at 385 Burnham Rd adjacent to State Highway 1 (SH1). The Skellerup block is located on Dunns Crossing Rd over 1.5km south of SH1. The Skellerup block has no particular identifiable factors which would require noise assessment so therefore has not been considered further in this memorandum.

This memorandum does not constitute a full noise assessment of the Holmes block, which due to the likely noise exposure would be strongly recommended prior to residential subdivision consent. This memorandum is only intended to review the interests of the critical road infrastructure (NZTA SH1) and the amenity of future residential activities which occur onsite, to ensure the rezoning is acceptable from a reverse sensitivity perspective.

Specifically this memorandum draws comparisons between the proposal at 385 Burnham Rd and the nearby subdivisions ODP Area 1 (Stonebrook) and ODP Area 3/8 to gauge the suitability of the proposed rezoning.

2. Comparative Review

It is expected that the predominant source of noise which would affect the development will be from SH1. Noise from roads, particularly from busier State Highways can be readily predicted using the procedures detailed within the Calculation of Road Traffic Noise 1988. The relative noise exposure at a particular point is a function of the following variables:

- Traffic volume (annual average daily traffic (AADT))
- Road Surface Type
- Speed
- Gradient
- Angle of view and number of opposing reflecting surfaces.

Based on our review of the available SH1 road information we note the following observations:

- The traffic volume has not significantly increased since 2013 in the vicinity of Stonebrook; the application date of Stonebrook subdivision. Significant increases in traffic volume are required to measurably increase noise levels. As the Stonebrook subdivision is directly adjacent to the Holmes subdivision there will be little variance in traffic volumes.
- For ODP area 3/8 we note that traffic volumes are 20% higher which might equate to about 1 dB difference across the site.

- The road surface for the sections of road adjacent to the subdivisions are chip seal Grade 3/5.
- The marked road speed for the sections of road adjacent to the subdivisions are all 100 km/h (ODP Areas 3/8 temporarily have lower speed limits due to road works but we have assumed 100 km/h.)
- Relevant sections of SH1 have a similar gradient adjacent to the subdivision areas.
- There are no reflecting surfaces directly opposite any of the subdivisions.

Based on the above observations, we consider that the noise exposure at the Holmes Subdivision is likely to be similar to the Stonebrook subdivision and the ODP Areas 3 and 8. We have therefore compared the applicable District Plan rules to each of these Subdivisions in the following Section.

3. Rules

Holmes Block

We have been advised that Selwyn District Plan Rule 4.9.38 is applicable to the Living 3 zoned Holmes block (as currently zoned). This is presented below:

> *4.9.38 Any dwelling, family flat, and any rooms within accessory buildings used for sleeping or living purposes, and any internal areas associated with noise sensitive activities in the Living 3 Zone at Rolleston (as shown on the Outline Development in Appendix 39) shall be setback at least 80m from State Highway 1.*

Stonebrook Subdivision

We have been advised that Selwyn District Plan rules 4.9.3 and 4.9.4 are applicable to the Stonebrook Subdivision (as a generic case). These are presented below:

> *4.9.3 Except for the Living 3 Zone at Rolleston identified on the Outline Development Plan in Appendix 39 and Appendix 40, and ODP Area 3 and ODP Area 8 in Rolleston, and the Living 2A Zone in Darfield, as identified in the Outline Development Plan in Appendix 47, 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 edge of the sealed carriageway of State Highways with a posted speed limit of 70 Km/hr or greater.*
>
> *4.9.4 Except for the Living 3 Zone at Rolleston identified on the Outline Development Plan in Appendix 39 and Appendix 40, and ODP Area 3 and ODP Area 8 in Rolleston, and the Living 2A Zone in Darfield, as identified in the Outline Development Plan in Appendix 47, any dwelling, family flat, and any rooms within accessory buildings used for sleeping or living purposes within 100m from the edge of the sealed carriageway of State Highways with a posted speed limit of 70 Km/hr or greater shall have internal noise levels from road traffic that do not exceed the limits set out below with all windows and doors closed:*
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> - *Within Bedrooms: 35 dBA (Leq 24 hour)*
> - *Within Living Area Rooms: 40 dBA (Leq 24 hour)*

ODP Area 3 & 8

The below rules 4.9.35 and 4.9.36 are applicable to ODP Area 3/8 from the Operative Selwyn District Plan:

> *4.9.35 In ODP Area 3 and ODP Area 8 in Rolleston, no dwellings shall be located closer than 40m (measured from the nearest painted edge of the carriageway) from State Highway 1*
>
> *4.9.36 In ODP Area 3 and ODP Area 8 in Rolleston, for any dwelling constructed between 40m and 100m (measured from the nearest painted edge of the carriageway) from State Highway 1:*
>
> - *Appropriate noise control must be designed, constructed and maintained to ensure noise levels within the dwelling meet the internal design levels in AS/NZS2107:2000 (or its successor) – 'Recommended design and sound levels and reverberation times for building interiors'*
> - *Prior to the construction of any dwelling an acoustic design certificate from a suitable qualified and experienced consultant is to be provided to Council to ensure that the above internal sound levels can be achieved.*

Table 1 below summarises the requirements of the noise rules presented above, together with supplementary guidance from the NZTA document '*Guide to the management of effects on noise sensitive land use near to the state highway network Sep 2015 V1.0.*'

Table 1: Comparison of Subdivision Rules

Subdivision Rule/Guidance	Setback Distance (m)	Effects Buffer (m)	Noise Criteria
Living 3 Zone (Rule 4.9.38)	80m	n/a	n/a
Stonebrook (Rule 4.9.3/4)	40m	100m	Bedrooms 35 dB $L_{Aeq(24hr)}$ Living areas 40 dB $L_{Aeq(24hr)}$
ODP Area 3/8 (Rule 4.9.35/36)	40m	100m	Bedrooms 40 dB $L_{Aeq(T)}$, Living areas 45 dB $L_{Aeq(T)}$ – based on AS/NZS 2107:2016 criteria
NZTA Guidance	40m	100m	All habitable spaces 40 dB $L_{Aeq(24hr)}$

Notes: T in LAeq(T) is the duration for which the space is expected to be occupied.

We have the following commentary on the above rules:

- We have been advised by Novo Group that it is preferable to maintain consistency with rules in the District Plan.
- The original resource consent conditions for the Stonebrook site allowed properties within the 40m area provided that a specialist report was provided. Should residential activities be proposed within the 40m setback zone then we understand that this could be revisited by way of discretionary consent under Rule 4.9.56.
- AS/NZS 2107:2016 is now the most recent version of the standard, although this is accounted for within the rule. We also note that AS/NZS 2107:2016 is applicable to steady-state or quasi-steady-state noise sources and is not applicable to road traffic noise. The noise levels recommended, however, are broadly consistent with the internal noise criterion (Criteria C) presented within NZS 6806 for internal sound levels of 40 dB $L_{Aeq(24hour)}$ within dwellings near new and altered roads (which is also noted in the NZTA Guidance) but differ in the following ways:
    - The time period for assessment in AS/NZS 2107 for varying sources is the duration of the expected usage of the space. Bedrooms, for example, the expected duration might be 8 hours for night time. In this instance a space designed to the NZS 6806:2016 internal noise criterion of 40 dB $L_{Aeq(24hr)}$ would likely result in quieter levels during the night than the AS/NZS 2107:2016 40 dB $_{LAeq(8hr)}$.
    - The assessment of road traffic noise in New Zealand typically considers a 24 hour average $L_{Aeq(24hr)}$ which can readily be calculated from AADT without the need for detailed traffic information. Therefore we consider that the adoption of AS/NZS 2107 is not ideal for road traffic noise.
- The Stonebrook subdivision Rule 4.9.4 also considers a 24 hour average but has a more stringent requirement for bedrooms when compared to broader national and NZTA guidance. The 35 dB $L_{Aeq(24hr)}$ criterion is expected to broadly align with the World Health Organisation Guidelines for Community Noise 1999 guideline criterion of 30 dB $L_{Aeq(8hr)}$.
- The District Plan rules are more lenient (allow higher internal noise levels) than those written in the resource consent conditions (RC 135261). However, we have been advised that the District Plan rule is most relevant.
- The Living 3 Zone rules (whch are currently applicable) do not specify any noise criteria, and instead reverse sensitivity effects are dealt with through set back distances within the zone.
- The word '*maintained*' has been used in the Rule 4.9.36 which could imply that future increases in road noise levels (due to increasing traffic or otherwise) could trigger the occupants of dwellings to retrofit improvement measures. It is assumed that the word '*maintained*' is instead intended to ensure that any future refurbishments or modifications do not result in increased noise levels which exceed the standard. Similar wording is recommended with the NZTA Guide.
- Rules 4.9.4, 4.9.36 specify an internal level rather than a set façade reduction. The rule is therefore applicable to a wide range of developments with varying noise exposures as the target outcome is maintained.

- None of the rules provide any protection of outdoor amenity other than set back distance. The Stonebrook subdivision has a 3m acoustic barrier along the road consisting of a bund and paling fence. It is unclear without conducting a full assessment the extent that the barrier protects the outdoor amenity of the subdivision, however, it is expected to be what is *reasonably* practicable to reduce noise exposure to outdoor areas.
- We note there is no explicit requirement for mechanical ventilation where windows are required to be closed to achieve the internal design sound levels. We understand that this is consistent with the rest of the District.

Considering the above, we recommend that the existing rule wording and noise level criteria in rules 4.9.3 and 4.9.4 should be applicable to the proposed Holmes block (ODP Area 39). This rule wording is consistent with the adjacent Stonebrook subdivision, and with wider design *best practice* for road traffic noise. Any relaxing of this criteria would need to be assessed in more detail as part of a subdivision application.

In order to assist in achieving the internal design sound level criteria and to moderate outdoor noise levels we consider that a 3m high acoustic barrier should be included alongside SH1.The acoustic barrier should provisionally be 3m high and be constructed of a material with a surface mass exceeding 10 kg/m^2 such as 24mm overlapped timber palings. The barrier height may be made up in whole or in part by a landscaped bund. The detailed requirements should be determined as part of a subdivision consent.

4. Conclusion

Based on our comparative assessment and subject to the proposed rules for the Holmes block described above we consider the Holmes and Skellerup blocks are suitable for rezoning when considering road noise / reverse sensitivity effects.