PREFERRED OPTIONS REPORT TO DISTRICT PLAN COMMITTEE

DATE: **DPC Meeting - 25 July 2018**

TOPIC NAME: **Noise and Vibration**

SCOPE DESCRIPTION: **Preferred Options Report for Noise (DW005) and Vibration (DW006)**

TOPIC LEAD: **Vicki Barker**

PREPARED BY: **Vicki Barker based on the Technical Baseline Reports prepared by Acoustic Engineering Services**

EXECUTIVE SUMMARY

Issue(s)	*Noise:* - *Outdated New Zealand Standards and acoustic parameters;* - *Day time and night time hours when noise limits apply;* - *Application of and inconsistency between noise limits;* - *Noise limits applying to the road and rail corridor;* - *Noise limits – too restrictive in Living Zone (night time limit); too lenient in Rural Zone (day time limit); and whether existing noise rules for specific activities are appropriate and new rules need to be considered for specific activities;* - *Management of noise at the interface between zones;* - *Exemptions;* - *Reverse Sensitivity provisions;* - *Policies and Definitions.* *Vibration:* - *Outdated provisions and gaps in the provisions.*
Preferred Options	*That noise and vibration is managed by amended provisions within the Proposed District Plan to enable improved and continued management of noise and vibration as set out in the recommendations in section 7.2 of this report.*
Recommendation to DPC	*That the Preferred Options and/or approaches for noise and vibration are endorsed for further development (targeted engagement, public consultation, Section 32 and Drafting Phase).*
DPC Decision	*That the Committee endorses the Preferred Option for 'Noise and Vibration' for further development and engagement, except that Recommendation 3.1.8(a) be amended to "further consider the CIAL related provisions and update and amend as required in consultation with CIAL."*

1.0 Introduction

Acoustic Engineering Services (AES) were engaged to deliver Baseline Reports with respect to Noise (DW005) and Vibration (DW006). As the Council's Topic Lead for Noise and Vibration, I have prepared this Preferred Options Report based on and referring to the technical Baseline Reports.

The Noise Baseline Report undertakes a review of the noise provisions within the Selwyn District Plan (the Plan), feedback from Council Officers, the relevant New Zealand Standards pertaining to noise, the noise provisions contained within plans of the adjoining districts as a comparison, and comments on particular provisions. The report arrives at a number of recommendations.

The Vibration Report identifies key vibration sources (State Highway roading construction and operation, electricity transmission construction, temporary military activities, blasting, quarrying and building construction), legislative requirements, recent case studies involving vibration management, reviews the Plan provisions in adjoining Districts, and identifies potential management approaches.

Links to the Noise and Vibration Baseline Reports are contained within **Appendix 1.**

Subsequent to the Baseline Reports, AES were requested to provide additional comment on four particular noise issues in an effort to identify a preferred option or approach, or at least to narrow the issue with respect to:

- Day time and night time hours
- Living Zone night time noise limit
- Rural Zone day time noise limit
- Management of noise at the Business/Rural interface with a particular focus on the Business 2A/Rural Zone interface.

The AES memorandum in response is attached as **Appendix 2** and the findings are discussed in Sections 3.0 and 7.0 below where relevant.

2.0 Statement of Operative District Plan Approach

2.1 Noise Provisions

Noise provisions are contained in both the Township and Rural Volumes of the Selwyn District Plan. In general, noise is controlled by specified noise limits in each zone and activities are permitted if they comply with the limits within specified timeframes (i.e. day time or night time hours). Different limits apply for day time versus night time, with the night time limits being set at a lower level. New Zealand Standards NZS 6801:1999 *Acoustics - Measurement of Environmental Sound* and NZS 6802:1991 *Assessment of Environmental Sound* are referred to in the Plan. The noise limits are expressed as both dBA L_{10} and dBA L_{max} limits across day time and night time hours which are the acoustic parameters referred to in the abovementioned NZ Standards.

There are noise related policies in both Volumes of the Plan. In the Township Volume the focus is on maintaining background sound levels to protect amenity, whereas in the Rural Volume the policies recognise temporary noise associated with short-term seasonal activities as part of the rural environment

and seek to manage the operation of audible bird scaring devices. There are also a number of noise related definitions such as dBA, Decibel (dB), and L_{10}/L_{A10} etc.

2.1.1 Zone Noise Rules

In the Living Zones noise limits apply to all activities except for residential, spiritual or educational (including pre-school) activities and warning devices associated with emergency services facilities (Rule 10.6.1). There is a note to the rule that states that sound levels shall be assessed at any point beyond the boundary of the site from which the source of any noise of interest is situated.

In the Business Zones any activity except residential is permitted if the noise limits are not exceeded within the timeframes specified (Rules 22.4.1 and 22.4.2). The limits and assessment points differ between some zones.

In the Rural Zone noise limits are specified at the boundary of any Living Zone and at the notional boundary of any dwelling, rest home, hospital, or classroom in any educational facility in the Rural Zone, except where these facilities are located within a Living Zone (Rule 9.16).

If the permitted noise limits are not met in all zones, discretionary activity resource consent is required[1].

For reference, a summary of the current limits for each zone are contained within **Appendix 3.**

2.1.2 Activities with Specific Limits

There are a number of activities that have specific noise limits rather than relying on the zone noise limits. Specific limits are provided for:

- Temporary Military Training activities - specific noise limits apply to these activities across the zones and there are exceptions for exhibitions or demonstration military activities up to 4 times a year between specified hours (Rule 9.16.3.5).
- Aircraft movements - 50dBA L_{dn} applies at the notional boundary in the Rural Zone or at the boundary of a Living Zone and there are also limits on flight movements.
- Audible bird scaring devices - limits on overall noise levels and number of events apply.
- Blasting - air blast pressure from blasting on any land or in water shall not exceed a peak sound pressure level of 115dBA at the notional boundary of any dwelling, rest home, hospital or educational facility classroom.
- Powered watercraft - powered watercraft are required to be fitted with mufflers during all movement under power on water and shall not exceed specified limits within specified hours assessed at the notional boundary of any dwelling. There are also exceptions for special events of limited frequency and duration.

2.1.3 Exemptions

As previously mentioned, exemptions are included in the Living Zone noise rule and include residential, spiritual, education activities, and warning devices associated with emergency services facilities.

The Rural Zone noise rules also contain a number of general and other exemptions to the noise limits in an attempt not to capture activities that are either required and/or anticipated as part of the Rural

[1] West Melton Business 1 is the only zone where non-compliance with the standards is a restricted discretionary activity.

environment (Rules 9.16.3 and 9.16.6). Examples include: Activities of a limited duration required by normal primary production activities including agriculture, horticulture, aquaculture, forestry and fishing; warning devices for emergency services; residential activities of a normal domestic nature including recreational activities that do not involve powered motor sport, powered aviation, gunfire or amplified music; noise from any motor vehicle or any mobile machinery (including farm machinery and stationary equipment not fixed to the ground); and any temporary activity which operates between the hours of 0700 and 2100 excluding seasonal harvesting activities.

2.1.4 Reverse sensitivity provisions

CIAL

There are noise provisions within the District Plan relating to Christchurch International Airport Limited (CIAL). In accordance with Rule 3.8.1, new buildings or additions to existing buildings (dwellings, visitor accommodation, community facility, educational facility, retail/office) within the CIAL 55 dBA L_{dn} noise contour are permitted if designed to meet specific internal noise levels (listed in Appendix 20 of the Rural Volume). If these levels are not met, non-complying activity resource consent is required. The CIAL noise contour is shown on the planning maps and covers approximately 20 rural properties within Selwyn. There are also policies (but no rules) associated with a 50dBA contour; i.e. residential development should be avoided and there should be a limitation on residential density within the contour.

NZTA

The Plan includes a number of rules to manage reverse sensitivity noise effects from State Highways 1, 73 and 77 including: buffer areas[2] (20-80 metres depending on zone); effects areas[3] (80-100m); and internal noise levels. There are also other specific rules such as for Outline Development Plan Areas adjacent to State Highways which require bunds along the State Highway and a setback.

2.2 Vibration Provisions

There are very few provisions within the Plan that manage vibration. In the Township and Rural Volumes there is a single policy: *Avoid, remedy or mitigate adverse effects caused by excessive or prolonged vibration.* The rules in the Rural Volume include:

- Vibration from any site due to blasting shall not exceed a peak particle velocity limit at the notional boundary of a sensitive activity, and noise vibration as a result of blasting is to comply with AS 2187.2-1993 Explosives - Storage, Transport and Use, Part 2 Use of Explosives, and ANZECC guidelines (Rules 9.16.4.1 and 19.17.1.1);
- Vibration from any other activity except for blasting is to comply with NZS 2631: 1985-89 Parts 1-3 (Rule 19.17.1.2).

[2] A buffer area is an area adjacent to a State Highway where new or altered sensitive activities should ideally be avoided.

[3] An effects area is an area near the State Highway where new or altered sensitive activities should be assessed and treated as necessary to mitigate effects from the State Highway.

3.0 Issues

3.1 Noise Issues

3.1.1 Reference to Outdated New Zealand Noise Standards and acoustic parameters, and the New Zealand Construction Standard is not addressed

(a) Outdated Standards

The Plan currently refers to NZS 6801:1999 *Acoustics - Measurement of Environmental Sound* and NZS 6802:1991 *Assessment of Environmental Sound*. NZS6801 contains procedures for measuring sound and defines basic quantities used for the description of sound. NZS6802 outlines procedures for assessing noise for compliance with noise limits and provides guidance for setting limits and protecting health and amenity. Both of these standards have been superseded by updated 2008 versions and therefore the Plan references to the 1991 and 1999 versions of these NZ Standards are out of date. AES consider that referencing the 2008 versions of the NZ Standards would improve the robustness of the Plan.

(b) Acoustic parameters

The noise rules currently refer to the acoustic parameter L_{A10}. L_{A10} only measures sound which occurs for 10% of a measurement period which can result in brief high-level noise not being captured. The updated NZS 6802 and International Guidelines adopt L_{Aeq} as the primary parameter for assessing noise.

(c) Construction noise

Currently there is no reference to the NZ Construction Noise Standard in the Plan (NZS6803:1999 *Acoustics - Construction Noise*) or any construction noise limits. NZS6803 contains procedures for the measurements and prediction of noise from construction, maintenance and demolition work, and provides guidance on the levels of acceptability. NZS6803 also provides potential methods for noise reduction and includes a database of sound levels from various construction activities. This standard is routinely referred to in other District Plans including Christchurch and Ashburton and provides clear guidance to measure and predict construction noise, which is a current gap in the Plan. Council staff currently use NZS6803 as a reference and find it useful.

3.1.2 Day time and night time hours

Currently the day time period when the noise limits apply in Selwyn District is 0730 to 2000 hours and the night time period is 2000 to 0730 hours. This is an early night time onset and a subsequently longer night time period than in most Districts, including Christchurch and Ashburton. The onset of the 0730 hours rather than 0700 hours is also uncommon. These hours are also inconsistent with NZS 6802 (0700-2200 hours day time and 2200-0700 hours night time).

If amended to align with NZS 6802 and Christchurch and Ashburton District Plans, less stringent noise limits would apply between 0700-0730 and 2000-2200 and there could be an associated reduction in amenity protection during these periods compared to existing. However, it is considered there is no compelling reason why any activity including residential would need amenity protection during these shoulder periods over and above what is anticipated by the NZS6802 and other District's rules.

3.1.3 Application of and inconsistency of noise limits

Noise limits in Selwyn are determined by the site generating the noise rather than the site receiving the noise. This is an unusual approach and is at odds with other Districts which apply the noise limits of the receiving zone at the boundary of receiving sites.

For example, in the Rural Zone there is control for noise when received at a Living Zone boundary of 55 dBA day time and 40 dBA night time. This limit is more permissive than the Living Zone limits of 50 dBA day time and 35 dBA night time. Another key example is the difference in the limit which applies at a dwelling in the rural zone when this noise is received from a Rural zone or a Business zone. This approach is overly complicated and the resulting inconsistency is not justified. Further consideration should be given to changing the approach to allow the noise rules to be simplified and made consistent.

This issue also affects the way the interface between zones is managed which is currently a cause of complaint in the District (and relates to the interface management issue in 3.1.6 below).

3.1.4 Noise limits applying to the road and rail corridor

Currently roads in the District Plan are zoned in accordance with the zoning of the sites they adjoin or intersect. This means that the zone noise limits technically apply at the common boundary between a noise sensitive site and a road corridor (note that State Highways are designated where noise is managed as part of the designated activity). There is little practical benefit in having a noise limit which applies at a location which is not noise sensitive as it can lead to issues with compliance, for example where traffic crossing from a driveway onto a road will not comply with any practical L_{Aeq} limit as this noise occurs right to the boundary.

Subsequent to the AES Baseline Noise Report, an additional issue that has come to Council's attention is that of noise associated with rail outside of the designated rail corridor such as rail sidings which serve industrial sites (rail corridors are designated within the District and noise is permitted as part of the designated activity). It is understood that the noise from trains moving on rail sidings is exempt from noise rules by virtue of section 326 of the RMA, however noise generated when loading and unloading would need to comply with the zone noise rules, which is not clearly anticipated by or provided for in the rules currently.

3.1.5 Noise limits

(a) Restrictive Living Zone night time noise limit

In the Living Zones, the Plan sets a night time noise limit of 35dB L_{A10}. This limit is considered restrictive when compared with the Christchurch and Ashburton District Plans and the World Health Organisation (WHO) Guidelines. NZS6802:2008 and the WHO guidelines recommend a guideline of 45 dBA L_{eq} to allow occupants to sleep with windows open. Furthermore, Council staff noted that the ambient noise level is often higher than 35dBA which makes it difficult to state whether the noise source itself exceeds the limit.

(b) Lenient Rural Zone day time noise limit

The Rural day time noise limit in the Plan of 60 dBA is higher and more lenient than the limit in all of the other neighbouring District's, the limit recommended by NZS6802, and WHO Guidelines.

The current high rural daytime noise limit appears to be related to the general view the Plan takes that the rural area is primarily for rural production[4] and any residential use is of secondary importance. AES consider that the current limit would not generally be considered adequate to protect outdoor living spaces and that if greater protection of outdoor amenity at dwellings in the Rural Zone is important a lower notional boundary limit should be adopted. In this instance AES recommend a 55 dBA limit in preference to 50 dBA as it still provides a reasonable level of protection in line with the limits outlined in NZS 6802:2008 and the WHO guidelines. However, 50dBA would provide a higher level of protection for dwellings (Option 2 in the AES memo in **Appendix 2**).

(c) Living Zone LAFmax limit

All Council's have a night-time noise exposure maximum noise limit (LAF_{max}) which NZS6802 states should be applied to protect the majority of people being woken during the night. The Selwyn night time limit of 70 dBA is not consistent with the 65 dBA limit the other councils have applied, or the 75 dBA limit recommended by NZS6802. The guidance also recommends that a day time LAFmax limit not be applied, which Selwyn currently does (Christchurch has followed the guideline and does not have a daytime LAF max limit).

(d) Limits for specific activities

The Plan contains noise rules for specific activities which are known to generate high levels of noise and therefore require specific management beyond the zone noise provisions. Issues have been identified with the effectiveness of these existing rules and gaps have been identified where there are currently no specific noise provisions for particular activities. Existing rules that need to be reviewed and amended include:

Temporary Military Training Activities (TMTA) - NZDF has two designated facilities in the District: the West Melton Rifle Range and the Burnham Camp, where noise emissions are dealt with through the existing designations. NZDF are seeking specific provisions for noise generated by TMTA outside of these designated sites. NZDF are proposing separation distances from sensitive receivers and specific noise standards. TMTA provisions were recently incorporated in the Christchurch District Plan which are a useful starting point and NZDF is willing to work with the Council to develop provisions, including providing noise assessments to support their position.

Powered motor craft - The surrounding District's do not have such a rule and therefore the appropriateness of retaining the rule in the Rural Zone needs to be considered further.

Audible bird scaring devices - There are specific rules within the Plan which limit noise from audible bird scaring devices such as gas guns, which includes an overall noise limit and a limitation on the number of events. Council officers have noted that it is difficult to determine how the restriction on the number of events should apply, i.e. on large sites does this only apply to a certain portion of the site, and how does it apply if one property is affected by a number of different sources?

Aircraft - Given the more prevalent use of helicopters within the District in particular, the current aircraft noise rules need to be reviewed and revised (the Airfields Topic has also noted the need for review).

[4] Objectives B3.4.1 and B3.4.2 in the Selwyn District Plan recognise the Rural Zone principally as a business rather than a residential area.

There are currently no specific rules in the Plan to manage noise from rifle ranges, quarrying (gravel or hard rock quarrying), and frost fans. The Community & Recreation Baseline Report also identified noise from motor sport as a potential issue. Further consideration needs to be given to whether specific noise rules should be developed for these activities (and any other activities subsequently identified).

3.1.6 Management of noise at the Interface between Zones

A particular issue for the Council is to effectively manage noise between incompatible activities/zones and the reverse sensitivity effects which can result.

The Business/Rural interface has been identified as a particular issue in Selwyn, especially where the Business 2A Zone (which includes IZone, IPort and the Inland Port) adjoins rural land. Noise from industrial or business premises can be a dominant source of noise for residential and other noise-sensitive activities, especially at night. Reverse sensitivity[5] issues can also arise when noise-sensitive land uses (such as residential activities) move close to established commercial areas or infrastructural assets such as ports.

The current limits which apply to activities within Business Zones include:

Zone	Day time limit	Night time limit	Location where limit applies
Business 1A, 2, 2B & 3	55	40	Notional boundary of rural dwelling
Business 2A	60	40	Boundary of rural zone
Business 1, West Melton	50	35	Notional boundary of rural zone

Aside from the different limits, there is a clear anomaly in the Business 2A zone in terms of the location where the noise limits apply - in the Business 2A zone there is a boundary limit only and no notional boundary noise limit.

AES were requested to provide further advice on this matter with a particular focus on the Business 2, 2A and 2B zones where they adjoin the Rural Zone and how noise should be managed (AES Memo in **Appendix 2**). Assuming rural land adjoining Business which is undeveloped is suitable for future noise sensitive development and should be afforded protection, a boundary limit in combination with a notional boundary limit is a potential approach (Option 2 in the AES memo in **Appendix 2**). If not, then a notional boundary limit would be reasonable.

A boundary limit only is the least preferred option. While a boundary limit would constrain noise to the Zone boundary and generally result in lower levels of noise being received at dwellings within Rural land it can also be unduly constraining for industry if the limit is set too low and a dwelling is distant from the common site boundary. For example, the current night time noise limit of 40dbA for the Business 2A Zone is restrictive for industrial activity and may restrict the types of activities which can occur around the fringes of the Industrial zone (i.e. effectively uses some of the business land as a 'buffer').

[5] 'Reverse sensitivity' is the effect that development of one kind may have on activities already occurring in an area.

AES also recommend that the level of noise permitted at the Business/Rural interface is consistent with the level permitted in the Rural Zone from rural activities.

Further to the AES Baseline Report, there is also a range of other measures available to manage noise and/or reverse sensitivity effects between incompatible activities. Examples include:

- Requiring specific buffer zones between noise sensitive activities such as residential and commercial (it is of note that the noise limits themselves and where they apply can also have the effect of achieving buffer areas)
- Placing restrictions on dwelling numbers and density within specified areas
- Requiring acoustic insulation of new buildings, or retrofitting insulation into buildings being converted to residential use
- The use of noise barriers between activities
- Noise Management Plans

How this issue is managed needs further consideration during the next phase of the review in consultation with key affected land owners, stakeholders and the public to ensure a consistent approach and a consistent set of provisions is achieved.

3.1.7 Exemptions

In the Living Zones the noise limits do not apply to residential, spiritual or education activities. The Plan definitions do not always make it clear what these activities include and Council officers have noted this is a matter often open to interpretation for each noise source. For example, any and all activities including heat pump units and the use of chainsaws which occur on a residential property can be considered as normal domestic activity and exempt from the noise rules. Council instead needs to rely on section 16 of the RMA and whether ''unreasonable'' noise is generated, rather than whether noise limits are met or not.

In the Rural Zone there are a number of activities that are exempt from the noise limits, which are often the source of complaints such as trucks starting and idling and mobile machinery.

Noise from temporary activities is excluded from the Rural Volume noise limits if certain events occur infrequently with no other provisos. The appropriateness of such a blanket exemption needs to be considered further and whether limitations on temporary activities should be applied like in Christchurch and Ashburton.

3.1.8 Other Reverse Sensitivity Provisions

(a) Residential Development within Business Zones

If it is proposed to allow residential development within Business Zones, then methods to prevent reverse sensitivity issues need to be considered. For example, if residential development is allowed in business areas (i.e. mixed-use development in Town Centres), reverse sensitivity provisions should be included for any new dwellings where the night time noise limit is above 45dBA $L_{Aeq.}$

(b) Christchurch International Airport Limited (CIAL)

The noise limits in Appendix 20 of the Rural Volume of the Plan that apply within the CIAL noise contour boundaries are consistent with the Christchurch and Waimakariri Plans which are also affected by the contour. The Christchurch Plan also includes a statement about testing if required by the Council in accordance with ISO 16283-3:2016. Waimakariri has no such testing requirement.

Appendix 20 currently refers to testing of the façade of the dwelling if required in accordance with ISO140-5 or ASTM E336-97. ISO 140-5 has been withdrawn and replaced with ISO 16283-3:2016 referenced in the Christchurch Plan, and ASTM E336-97 is not considered applicable. Therefore, if such a rule for testing is to be maintained it would need to be updated to reference the appropriate standards. AES also consider that such testing may be difficult to carry out in practice and an alternative approach could be considered. Overall, the testing requirement needs to be considered further in liaison with CIAL and updated and/or amended.

(c) New Zealand Transport Agency (NZTA)

The current Plan rules in relation to traffic noise reverse sensitivity effects (i.e. buffers from the state highways where new or sensitive activities should be avoided, and internal noise levels for dwellings) are based on 2007 guidance from NZTA which has been superseded by 2015 guidance[6]. The key changes as a result of the 2015 Guidelines includes how the extent of buffer and effects areas are calculated and revisions to internal noise level requirements. It would be good practice for any specific noise rules within the Plan to be consistent with this guidance where considered appropriate. Any review will also need to consider if the areas where such rules are applied are still appropriate, how to account for bunds or other physical mitigation, whether the setbacks are appropriate and should be shown on the maps, and to address current inconsistencies between Volumes.

3.1.9 Policies & Definitions

The policies will need comprehensive review to ensure they are well aligned with the rules and the terminology is effective and does not repeat rules. i.e. the CIAL related policies.

The noise related definitions will require comprehensive review in line with the updated New Zealand Standards, the National Planning Standards, and to ensure inconsistency is removed and the definitions are clear and concise.

3.2 Vibration Issue

3.2.1 Need to update outdated provisions and address gaps

Currently the Plan has a general policy and a rule relating to vibration from blasting and vibration from other activities needing to comply with outdated standards and references, i.e. AS2187.2-1993 has been superseded, the ANZECC guidelines are over 25 years old and NZS2631:1985-89 has been withdrawn. Methods to manage vibration effects need to be considered further in relation to:

- The operation of road and rail networks (outside the rail designations)
- Construction/demolition activities such as drilling, pile driving and blasting
- Common industrial activities including quarrying and mining, especially where rock breaking and blasting is involved.

Vibration can affect people and result in structural or cosmetic damage to buildings. There are no NZ Vibration Standards but there are a number of International Standards available to provide guidance on managing effects in relation to state highway construction and building standards; state highway operation; electricity transmission construction (building damage); blasting; quarrying; and temporary

[6] *Guide to the management of effects on noise sensitive land use near to the state highway network, NZTA, September 2015.*

military activities. For example, the German Standard DIN 4150.3:1999 provides vibration levels and is commonly used as a guide in other Plans to manage effects on buildings. However, standards are not always appropriate as in some instances determining compliance with standards is difficult in practical terms, and if compliance is not achieved after an activity is established remedial measures can be limited.

In the majority of cases, where the noise effects of a particular source are managed to an acceptable level, the vibration effects will also inherently be managed. Furthermore, controls such as setbacks can manage vibration effects such as from the operation of state highways (and busy arterial roads) and may be a more practical control than a specific vibration limit.

4.0 Summary of relevant statutory and/or policy context

The Ministry for the Environment Draft National Planning Standards were released on 7 June 2018. The Draft Standards propose standard definitions for 'noise' and 'notional boundary' and include a mandatory direction that any plan rule to manage an emission of noise must be consistent with the noise measurement methods contained in the New Zealand Standards listed in Table 30: Acoustic New Zealand Standards. The Standards include:

- New Zealand Standard 6801:2008 Acoustics - Measurement of Environmental Sound
- New Zealand Standard 6802:2008 Acoustics - Environmental noise
- New Zealand Standard 6803:1999 Acoustics - Construction noise
- New Zealand Standard 6805:1992 Airport noise management and land use planning - measurement only
- New Zealand Standard 6806:2010 Acoustics - Road-traffic noise - New and altered roads
- New Zealand Standard 6808:2010 Acoustics - Wind farm noise New Zealand Standard 6809:1999 Acoustics - Port noise management and land use planning

Furthermore, it is proposed to be mandatory that any plan rule to manage an emission of noise must be consistent with sections 6 and 7 of the New Zealand Standard 6802:2008 Acoustics – Environmental Noise. These sections describe a method for comparing a measured noise level to an applicable noise limit including adjustments for the type of noise and its duration.

With respect to vibration, the Draft Standard has a mandatory requirement that any plan rule to manage damage to structures from construction vibration must be consistent with peak particle velocity (ppv) limits in Tables 1, 2 and 3 in DIN 4150-3 (1999) Vibrations in buildings – Part 3: Effects on structures.

There are no National Policy Statements directly relevant to this topic.

The National Environmental Standard for Telecommunication Facilities 2016 (NESTF) covers noise limits for cabinets both within and outside road reserve and sets different limits for each location. The AES review found that the noise limits outlined in the NESTF are of a similar level to the general noise limits in the District Plan and NZS 6802 and therefore the application of the NESTF rules in practice are not expected to be problematic. Alignment with the NESTF will need to be considered further during the drafting phase.

The National Environmental Standard for Telecommunication Activities 2009 (NESET) references noise in relation to construction activity relating to an existing transmission line and therefore is very limited in

application. Such activity is permitted if it complies with NZS 6803:1999 *Acoustics - Construction Noise*. A rule within the Plan requiring general construction activity to comply with NZS 6803:1999 would cover this specific requirement.

The Canterbury Regional Policy Statement (CRPS) was not required to be considered as part of the Baseline Reports.

The Mahaanui Iwi Management Plan 2013 was reviewed and does not contain any particular policy direction or provisions concerning noise management. Feedback from Mahaanui Kurataio Ltd confirms this.

5.0 Summary of Approaches in other Districts

The Christchurch, Ashburton, Hurunui and Waimakariri District Plans were reviewed by AES to understand the approaches used to manage noise and vibration. With respect to noise, the three key zones present in each District were analysed - Residential/Living, Rural and Business/Industrial. The focus of this summary is on the Christchurch and Ashburton District Plans given these are the two recently updated District Plans (2018 and 2014 respectively).

The key comparisons are outlined below and further summary detail is contained within **Appendix 4**.

General observations include:

- The Christchurch and Ashburton Plans both reference the current 2008 New Zealand Standards (NZS 6801:2008 and NZS 6802:2008) and use L_{Aeq} as the main noise parameter.
- The day time and night time hours when noise limits apply differ between Selwyn and the two other councils. Both NZS 6802 and the WHO guidelines suggest there should be a total of 16 hours of daytime. Selwyn only has 12.5 hours of daytime compared to Christchurch and Ashburton's 15 hours.
- A key difference is that the other plans apply the noise limits of the receiving zone at the boundary of receiving sites; however, within Selwyn the noise limits that apply at any point beyond the boundary of the site are those of where the noise is generated.

Other key observations and/or differences between Selwyn, and Christchurch and Ashburton include:

- Residential/Living Zones: Night time noise limits are 40 L_{Aeq}/L_{A10} in Christchurch and Ashburton. The Selwyn night time noise limit of 35 $dBAL_{10}$ is more restrictive than the two other councils.
- Rural Zones: The day time noise limit in Selwyn of 60dBA at the notional boundary is higher than Christchurch and Ashburton which have a limit of 50.
- Business/Industrial Zones: In Selwyn additional limits are applied for noise received at Living Zones or notional boundaries in Rural Zones which differ from the limits which apply between Living or Rural zone properties. In other Districts typically, the noise limits of the receiving zone apply at the boundary of the receiving site.
- DIN 4150.3:1999 Structural Vibration has been adopted as a relevant guideline for earthworks vibration in Christchurch (and Waimakariri). The NZTA vibration limits for major roading projects are also derived from this standard and is therefore commonly used in Canterbury.

6.0 Summary of stakeholder engagement during drafting of the Baseline and Preferred Options Report

Stakeholder engagement was undertaken with representatives from NZDF during the drafting of the Baseline Report as NZDF are seeking particular provisions relating to TMTA. Mahaanui Kurataiao Ltd were provided with a copy of the draft Baseline Report but had no comments.

No other stakeholders were engaged with during the drafting of the Baseline Report in the interests of efficiency and given the opportunity for engagement at this Preferred Options Report stage and subsequent drafting stages of the District Plan Review. To initiate wider engagement and enable the feedback to be captured for the next phase of the District Plan Review, the draft Preferred Options Report was shared with the following parties:

- ECan
- NZTA
- IPort
- Lyttelton Port of Christchurch
- Fonterra
- Federated Farmers
- Porters Ski
- Orion
- NZDF
- Kiwirail
- IZone
- Metroport Christchurch
- Synlait
- Canterbury Aggregate Producers Group
- CIAL

Responses were received from the above listed parties, except for: Kiwirail; IZone; Metroport Christchurch; Canterbury Aggregates Producers Group; and Fonterra. The feedback received is summarised below.

ECan

ECan noted that policies 6.3.5 (Integration of land use and infrastructure) and 6.3.9.5(a)[7] (Rural residential development - airport noise contours) in the CRPS which address the management of reverse sensitivity effects and the avoidance of noise sensitive activities within the 50dBA Ldn airport noise contour for Christchurch International Airport are relevant, as is the definition of 'noise sensitive activities'. ECan consider that as the existing Plan provisions around reverse sensitivity within the noise contour are proposed to be carried forward into the Proposed Plan (although possibly updated/amended), this is consistent with and would give effect to these identified CRPS policies.

NZDF

NZDF noted it is a significant stakeholder in Selwyn given its facilities (Burnham Camp, West Melton Rifle Range, Weedons Depot and Communications Site, and the Glentunnel Ammunitions Depot), and in relation to TMTA. NZDF noted that all of these facilities and TMTA are essential to Defence operations.

NZDF sought expert acoustic advice on the Baseline and Preferred Option reports. In general, the matters in the reports are acceptable to NZDF, however NZDF would like to continue discussions in relation to proposed provisions for TMTA in particular, including: proposed reduced setback distances compared to those incorporated in the Christchurch District Plan, as a particular type of loud weapon has now been excluded from use; consideration of a more appropriate sound measurement method (L_{Cpeak}); and not

[7] *The location and design of any proposed rural residential development shall: (a) avoid noise sensitive activities occurring within the 50 dBA Ldn air noise contour surrounding Christchurch International Airport so as not to compromise the future efficient operation of Christchurch International Airport or the health, well-being and amenity of people;…*

having an exemption of 10 DB up to 10 days per year as the Christchurch District Plan does as this is considered inappropriate in Selwyn.

NZDF would also like further discussion regarding managing reverse sensitivity effects in relation to the Burnham Military Camp and West Melton Rifle Range (which are designated sites). In particular, NZDF consider that the West Melton Rifle Range is especially susceptible to reverse sensitivity effects with the pressure for rural-residential development increasing in the vicinity of the Range[8]. As well as seeking provisions to address reverse sensitivity, NZDF is investigating the option of providing greater statutory protection for the Range and its activities.

NZTA

NZTA are supportive of the report in general but are especially interested in ensuring vibration (and reverse sensitivity) is managed in relation to the state highway. NZTA noted that setbacks are a management method and requested they continue to be involved in the next phase of the review.

IPort

At this stage IPort do not support decreasing the lenient Rural Zone day time noise limit without first understanding Council's position and the intended policy direction in relation to balancing rural production and residential amenity in Rural areas. IPort queries whether rural areas are viewed by the Council as being primarily for rural production, with residential use being of secondary importance or not, and consider this is an important starting point for defining acceptable noise levels. If primarily for rural production, IPort query the need for protecting outdoor living spaces and the outdoor amenity of dwellings in the rural zone.

IPort agree with the commentary in the report around the management of noise at the interface between the B2A and rural zones, and generally agree that the level of noise permitted at the Business/Rural interface should be consistent with the level permitted in the Rural zone from rural activities. However, they suggest it may be appropriate to allow greater noise in rural zones at/near this interface. For example, if rural land is not suitable for residential it may be suitable to have greater noise exposure to business activity than what is otherwise permitted elsewhere in the Rural zone.

IPort agree with the recommendations concerning the updating of the NZ Standards, acoustic parameters, construction noise and day time and night time hours. Furthermore, IPort agree with the need for further consideration of whether it is appropriate to change from the current system where the relevant noise limits are determined by the zoning of the site generating the noise, to that used in other Districts where the relevant noise limits are determined by the zoning of the site receiving the noise but would like to be consulted further on this.

Overall, IPort consider that consultation with key affected landowners is critical to ensure that the proposed noise provisions, including specific noise levels, are appropriate.

LPC

LPC has a 27-hectare intermodal island port / freight hub in Rolleston which is an integral part of LPC's regional operations. The Inland Port provides essential aggregated containerised cargo land holdings in combination with the more limited port side facilities. In 2017, LPC managed 52% of all containers of the South Island's total import/exports. Volume growth is forecast to increase at greater than GDP levels throughout the next 30 years. The Inland Port is a substantial physical resource and generates 24/7 activity and noise.

[8] It is of note there is a particular CRPS Policy which seeks that rural-residential development does not compromise the operational capacity of the Burnham Military Camp or West Melton Military Training Area (6.3.9.5(e)), and the CRPS recognises both Defence facilities as 'strategic infrastructure'.

The CRPS identifies both the Port of Lyttelton (including associated facilities) and Significant Regional Transport Hubs as 'strategic infrastructure'. LPC note that the CRPS seeks to ensure that development does not adversely affect the efficient operation, use, development and future planning of strategic infrastructure; land use plans should only provide for new development that does not affect both the use and development of strategic infrastructure.

LPC support the recommendations concerning: updating the NZ Standards; acoustic parameters; amending the night time hours; more effective management of noise at the Business / Rural interface, particularly application of the noise limits at the notional boundary; and raising the Living Zone night time noise limit from 35dBA.

With respect to the management of noise at the Business/Rural Interface, LPC do not support a combined approach of a notional boundary and a boundary limit (Option 2, page 8 in the AES memo in **Appendix 2**) due to: the administration associated with this approach lacks certainty and is not as efficient or effective as application of a notional boundary; the rural interface to the Port's activities is identified in the CRPS (Map A[9]) as being within the Projected Infrastructure Boundary and establishing sensitive uses in this area would neither recognise nor provide for strategic infrastructure as associated with the Inland Port operations; and the approach would overly constrain activities undertaken within the Inland Port site.

LPC are seeking that noise contour boundaries are identified and applied based on the consented Inland Port to avoid the establishment of sensitive activities. A noise contour plot on which their resource consent was based is attached as **Appendix 5**. LPC also note that 55dBA Ldn noise contours were introduced in relation to both the Fonterra and Synlait plants through Plan Change 50 to prevent sensitive activities from establishing proximate to these businesses.

LPC are also seeking objectives and policies that seek to recognise and provide for strategic infrastructure, including avoidance of activities that may give rise to reverse sensitivity effects.

Synlait

Synlait notes that the provisions for the management of noise from the Dairy Processing Management Areas (DPMA) are being considered more specifically through a separate process and report but acknowledges that these considerations take account of both the likely changes prescribed by the draft National Planning Standards, and Council's preferred option for management of noise in the Rural Zone.

Synlait is supportive of those measures described in the report for management of noise related to reverse sensitivity effects and notes that the potential for a vibration standard for construction is a further factor for the maintenance of a strong buffer around the DPMA with limitations imposed on the construction of new dwellings.

Federated Farmers

Federated Farmers support the recommendation to amend the references to the current NZ standards and that the day time and night time periods should be aligned with the current NZ Standard and the Christchurch City and Ashburton District Plans.

Federated Farmers consider it is unusual that the plan applies noise limits from the site generated rather than the site received. If the Plan is amended so that the limit of noise *received* is at a number that aligns

[9] The feedback from LPC states Map 1 but the intention is to refer to Map A – Greenfield Priority Areas which includes projected infrastructure boundaries.

with the Christchurch City Council and Ashburton Plans, that would be agreeable in principle. In terms of the actual revised number limit, Federated Farmers would like to be involved in this work and put any proposed limit to their members in the Selwyn District to gauge how the limit could (or not) accommodate their normal farming activities.

With respect to the Business/Rural interface, Federated Farmers support measures to mitigate reverse sensitivity and would also like to be involved in this work going forward.

Porters Ski Area

The current Selwyn District Plan contains provisions specific to Porters Ski Area and permits aircraft movements for specified purposes without limitation. Therefore, the noise standards for aircraft that apply in the Rural Zone do not apply to these permitted aircraft movements (Rule E25.11.1 - Aircraft Movements). Rule E25.11.2 imposes a limit on the number of aircraft movements for all other purposes.

Porters Ski Area considers it is of critical importance to the operation of Porters Ski Area that these provisions remain within the Proposed Plan and are not replaced or amended by the district wide rules relating to noise from aircraft that would otherwise apply. Due to the mountainous terrain of the Ski Area, its highly limited accessibility and the nature of the activities undertaken, the use of helicopters is fundamental to and critical for environmental compliance, construction, health and safety, and management in emergencies or the event of a natural disaster or event.

CIAL

CIAL is in the process of recalculating the Airport Noise Contours that were last calculated in 2007/2008. It is the intention to complete this task by the end of 2018 and to provide the results to ECan for their review. CIAL understands that these revised contours will constitute a part of the CRPS review scheduled for the next 12-24 months. The outcome of this review will have ramifications for the Selwyn District Plan.

CIAL note that the Christchurch International Airport is identified in the CRPS as regionally significant infrastructure. The CRPS seeks to ensure that development does not adversely affect the efficient operation, use and development and future planning of strategic infrastructure and that new development does not affect both the use and development of strategic infrastructure.

CIAL supports: updating references to the NZ standards; amending the acoustic parameters; amending the night time hours; and raising the conservative Living Zone night time limit of 35dBA.

In terms of the noise contours, CIAL state that the approach prescribed stems from application of the land use controls contained within NZS6805: 1992. The operative 50dB Ldn air noise contour is based on predictions of future levels of airport noise using a figure of 175,000 movements per annum. The noise contours are derived using the relevant version of the United States Federal Aviation Authority's Integrated Noise Model ('INM') as referred to in NZ Standard NZS6805:1992. The focus of the 50dB Ldn air noise contour, or its equivalent, has been based on ensuring that noise sensitive activities do not encroach further towards airport operations. CIAL wish to ensure that any intensification of sensitive activities within the 50dB Ldn contour is avoided.

CIAL requests that the Council consider the recent provisions made operative for Christchurch City which:

- Restrict all activities sensitive to aircraft noise located within the 50dB Ldn Air Noise Contour.
- Define activities sensitive to aircraft noise as: residential activities, except:

- any residential activities, in conjunction with rural activities that comply with the rules in the relevant district plans as at 23 August 2008;
- care facilities;
- education activities and preschools; guest accommodation, except guest accommodation which is designed, constructed and operated to a standard to mitigate the effects of aircraft noise on occupants; health care facilities which include accommodation for overnight care; hospitals; and
- custodial and/or supervised living accommodation where the residents are detained on the site.

- Retain the equivalent to operative Rule 3.8.1 which seeks to ensure that permitted Rural buildings or additions to existing buildings (dwellings, visitor accommodation, community facility, educational facility, retail/office) within the 55 dB Ldn noise contour are permitted if designed to meet specific internal noise levels
- Insert an 'avoidance' policy for sensitive activities seeking to locate within the 50dB Ldn Air Noise Contour.
- Identify and provide objectives and policies that seek to recognise and provide for strategic infrastructure, including avoidance of activities that may give rise to reverse sensitivity effects. This should be inserted in Noise Issue 3.19, Option 2 'Update and amend the provisions to improve clarity and effectiveness'.

In addition, CIAL consider that the 50dBA notional boundary limit and the aircraft movement limits in the Operative Plan is overly simplistic in terms of the application of NZS6805:1999 (as outlined in Section 2.1.2 of the Preferred Option Report) and considers the use of a notional boundary is inappropriate in terms of the measurement and assessment of airport noise[10].

Orion

Orion has completed a review of the Noise and Vibration Preferred Options and Baseline Reports prepared by Acoustic Engineering Services (AES).

Electricity produced by generation companies at various plants is transmitted by the national grid operator (Transpower) to network operators like Orion. Orion is one of 29 electricity distribution businesses (often referred to as network lines companies) in New Zealand. Orion is a Lifeline Utility as named in the Civil Defence Emergency Management Act 2002 (CDEM Act).

Orion takes delivery of the electricity from Transpower's network at various points in Transpower's network known as Grid Exit Points. Orion then delivers that electricity through its network to over 200,000 homes and businesses in the central Canterbury region on behalf of electricity retailers who purchase the electricity from generators on the wholesale market and sell it to customers. Orion's main role is to ensure distribution of a reliable and secure supply of electricity to Central Canterbury.

In summary, Orion:

- Supports: the updating of references to the current NZ Standards; updating the outdated acoustic parameters; referring to the NZ Standard for construction noise; amending the day time and night time hours; increasing the current low Living Zone night time noise limit which will achieve consistency across Plans; that noise should be measured at the other side of the road boundary as

[10] A notional boundary limit currently applies in relation to aircraft movements within the Rural Zone and not airport noise so appears to be a misunderstanding.

per other District Plans and requests that the Council also consider identifying other circumstances where this approach may also apply, i.e. at waterbodies.

- Agrees in principle that:
    - the noise standards should relate to the receiving environment; the current high Rural Zone day time noise limit should be decreased; and that further consideration should be given to reducing the Living Zone night time LAFmax limits and not applying such limits in the day time as part of the next phase; however, this is conditional upon determining the zone noise standards that will apply. Also influencing Orion's position on these issues is the methods that Council will adopt for managing noise associated with emergency and backup generators; and
    - if allowing residential development within Business areas which have a night time noise limit above 45 dBLAeq that reverse sensitivity provisions should be included for any new dwellings; but notes that such provisions should be extended to include protection for utilities from reverse sensitivity effects.
- Requests: exemptions and specific rules are added for emergency generators etc. This was an issue assessed in detail during the recent Christchurch District Plan hearings. The general purpose of the Christchurch District Plan provisions is to enable the use (including testing and monitoring) of emergency generators during emergencies and during planned supply interruptions (copy of the provisions provided).
- Considers: the general approach of using a vibration standard is aligned with that of the Christchurch District Plan, but Orion acknowledge that there are some implementation difficulties as outlined in the AES report. Orion has an interest in this issue and requests that it is appraised of developments as further work is undertaken.

7.0 Summary of Options to Address Issues

7.1 OPTION 1 - MAINTAIN STATUS QUO

Effectiveness in Addressing Issues: A rollover of the current provisions would maintain the issues outlined in section 3.0 and is therefore considered ineffective.

Risks: The provisions are considered to need updating and revising and therefore there would be ongoing risk that noise and vibration effects are not appropriately managed. Not addressing the identified issues with the provisions would be a lost opportunity given the District Plan review is underway and the existing management approach could be retained with amendment to improve the efficiency and effectiveness of the provisions.

Budget or Time Implications: This would be the most cost and time efficient option in the short-term for the Council, but such provisions remaining in the Plan could necessitate a plan change in due course whereby costs would be incurred in any case and potential increased monitoring and compliance costs.

Stakeholder and Community Interests: All identified stakeholders and the general public.

Recommendation: Do not maintain the status quo.

7.2 OPTION 2 - UPDATE AND AMEND THE PROVISIONS TO IMPROVE CLARITY AND EFFECTIVENESS

It is proposed to update and amend the noise and vibration provisions in the Plan. The recommendations below have been informed by the Baseline Reports and the subsequent AES memo. It is of note that in some instances a clear recommendation is not able to be made at this point in time and further work will need to be undertaken in the next phase of the review alongside other Topics, and dependent on stakeholder feedback and public consultation.

Noise Issues		**Preferred Option / Recommended Approach**
3.1.1(a)	Outdated NZ Noise Standards	**That references to NZS 6801:1999 and NZS 6802:1991 be replaced with the current 2008 versions of these standards - NZS 6801:2008 and NZS 6802:1998.** Note: The Draft National Planning Standards (June 2018) propose to include a mandatory direction that any plan rule to manage an emission of noise must be consistent with the noise measurement methods in NZS 6801:2008 and NZS 6802:2008.
3.1.1(b)	Outdated acoustic parameters	**That in any relevant rules the primary acoustic parameter is changed from dB L_{A10} to dB L_{Aeq} in line with updated NZS 6802:2008 and International Guidance.** Note: A number of definitions will also need to be updated as a result.
3.1.1(c)	No construction noise provisions in the Plan	**That construction noise is managed by way of reference to NZS 6803:1999 *Acoustics - Construction Noise*.** Note: The Draft National Planning Standards (June 2018) propose to include a mandatory direction that any plan rule to manage construction noise must be consistent with NZS 6803:1999.
3.1.2	Day time and night time hours	**That the day time and night time hours associated with the zone noise limits are amended to 0700-2200 hours day time and 2200-0700 hours night time to align with NZS 6802 and the other plans (Option 3 in the AES memo in Appendix 2).**
3.1.3	Application and inconsistency of noise limits	**Further consider whether it is appropriate to change from the current system where the relevant noise limits are determined by the zoning of the site generating the noise, to that used in other Districts where the relevant noise limits are determined by the zoning of the site receiving the noise.**
3.1.4	Noise limits applying to the road and rail corridor	**Further consider whether changes should be made to ensure noise limits do not apply at the common boundary between a noise sensitive site and a road corridor and how rail noise outside of the rail corridor should be managed.**

		Note: This issue is also relevant to the Transport Topic and the management of roads, i.e. whether a Transport Zone is proposed.
3.1.5(a)	Restrictive Living Zone night time noise limit	**The proposed approach is that the current low Living Zone night time noise limit should be increased, but where exactly that limit should sit (40 or 45 dB L_{Aeq}) is recommended to be considered further as part of the next phase to ensure the provisions work together as a consistent package.**
3.1.5(b)	Lenient Rural Zone day time noise limit	**The proposed approach is that the current high Rural Zone day time noise limit should be decreased, but where exactly that limit should sit (50 or 55 dBA $L_{Aeq.}$) is recommended to be considered further as part of the next phase to ensure the provisions work together as a consistent package.**
3.1.5 (c)	Living Zone LAF_{max} limit	**Further consider reducing the Living Zone night time L_{AFmax} limits and not applying such limits in the day time as part of the next phase.**
3.1.5 (d)	Noise rules for specific activities	**Further consider whether the existing noise rules for specific activities continue to be appropriate or should be modified, and whether specific rules should be included for any additional sources which are not well controlled by the 'general' noise rules including:** **Amended rules for:** **(i) TMTA - further consider the setback distances, noise limits and exceptions for a small number of events a year requested for TMTA are appropriate, with consideration of the recently incorporated Christchurch District Plan TMTA provisions;** **(ii) Powered watercraft - whether the current noise limits for noise from powered motor craft is appropriate and should be retained;** **(iii) Audible bird scaring devices** **New rules for:** **(iv) Rifle Ranges - A noise limit of 50 dB L_{AFmax} when received at noise sensitive locations may be appropriate, in line with the current provisions provided for Darfield Gun Club.** **(v) Quarrying - whether the current exclusion for mobile machinery is retained will affect how noise from quarrying activity is assessed; and if hard rock quarrying or construction into hard rock is likely to be carried out within the District, a specific noise limit should be retained for noise from blasting.** **(vi) Frost fans similar to those in the surrounding Districts;** **(vii) Any other activities identified such as powered motorsport.**

3.1.6 (a)	Management of Noise at the Interface between Zones	**Further consider the limits and application of limits between zones as well as other methods to manage noise and reverse sensitivity effects and achieve consistency during the next phase of the review with input from affected stakeholders.**
3.1.7	Exemptions	**Further consider whether:** **(i) The exemptions for residential, educational and spiritual activities within the Living zones are reasonable;** **(ii) The extensive list of exclusions within Rural zones is reasonable (such as excluding noise from any motor vehicle or any mobile machinery);** **(iii) The blanket exemptions for noise from temporary activities applying in the Rural Volume are appropriate.**
3.1.8 (a)	Residential development in Business Zones	**If the Proposed Plan allows residential development within Business areas which have a night time noise limit above 45dBLAeq, reverse sensitivity provisions should be included for any new dwellings.**
3.1.8(a)	CIAL	**Further consider the practicality of the testing requirement and update/amend as required in consultation with CIAL.**
3.1.8(b)	NZTA	**Further consider whether the internal noise level requirements for noise from State Highways should be updated in line with the most recent NZTA guidance, and the best method for incorporating the relative buffer and effects areas within the Plan in consultation with NZTA.** Note: The Transport Baseline Report recommends that the most recent NZTA guidance should be incorporated.
3.1.9	Policies and Definitions	**Amend the policies and definitions to ensure accuracy and greater clarity and directiveness and alignment between policies and rules.**
3.2.1	Vibration	**It is unlikely that the introduction of wide-ranging vibration limits will be appropriate on balance, but specific limits may be appropriate for certain activities such as construction (building damage) and blasting. A package of provisions (noise, vibration and other controls such as setbacks) needs to be developed and considered further as part of the next phase.** Note: The Draft National Planning Standards propose that any plan rule to manage damage to structures from construction vibration must be consistent with peak particle velocity (ppv) limits in Tables 1, 2 and 3 in DIN 4150-3 (1999) Vibrations in buildings – Part 3: Effects on structures.

Effectiveness in Addressing Issues: *Updating and amending the provisions would address the issues identified in section 3.0 of this report.*

Risks: *In some instances, a tightening of the rules is recommended or recommended to be considered further which will likely not be favored by certain affected stakeholders. This can be mitigated to some degree by further targeted engagement and/or public consultation during the next phase. There is also a need for integration going forward as several other Topics relate to this work.*

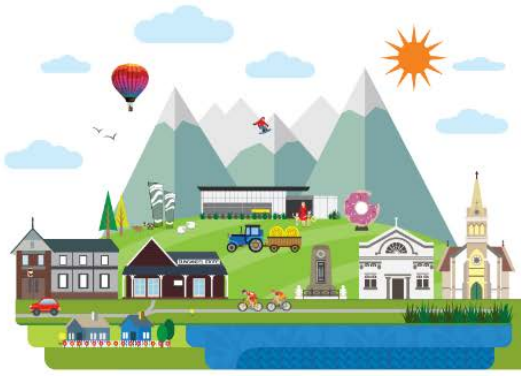
Budget or Time Implications: *This option will incur time and cost to Council to prepare an updated set of provisions but will reduce costs overall by updating and amending ineffective provisions.*

Stakeholder and Community Interests: *All identified stakeholders and general public.*

Recommendation: *Proceed with Option 2.*

9.0 Preferred Option for further engagement

The Project Team recommends that Option 2 as outlined in section 7.0 above is endorsed by the Council for further development.



Appendix 1 - Links to Baseline Reports for Noise and Vibration

Link to Basline reports below:

Noise [PDF, 531 KB] 3 October 2017

Vibration [PDF, 380 KB] 3 October 2017

Appendix 2 - AES Memorandum of 24 April 2018

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Memorandum

To:	Vicki Barker, Selwyn District Council
From:	Jeremy Trevathan, AES
File Reference:	AC16218 – 07 – R2
Date:	Tuesday 24th April 2018
Project:	**Selwyn District Plan review – Options analysis for noise rules**
Pages:	9

Meeting ☐ Telephone ☐ Memorandum ☑ File Note ☐

Dear Vicki,

Selwyn District Council (SDC) has requested comment on specific items relating to the existing District Plan noise standards. We have provided an option analysis regarding each item including discussion around the key advantages and disadvantages, and a recommended approach moving forward.

1.0 Daytime and night-time hours

Currently the daytime time period when the noise limits apply in the Selwyn District is 0730 to 2000 hours. The night time period is 2000 to 0730 hours the next day. This is a longer night time period than in most Districts, including the adjoining Ashburton and Christchurch Districts where the District Plans have been recently updated. The onset of the daytime period at 0730 hours rather than 0700 hours is also uncommon. We have identified the following options:

Option 1 – Retain the existing daytime and night time hours	
Advantages	Disadvantages
▪ A longer night time period provides additional amenity protection	▪ The current time periods don't align with the recently updated Christchurch and Ashburton District Plans and WHO / NZS 6802:2008 guidelines for night time hours. ▪ A number of businesses start at 0700 hours which makes complying during the 0700-0730 period difficult. We are not aware of any particular reason why this period would require more stringent protection. It would be unusual to suggest sleep disturbance is a widespread concern during this period.

Option 2 – Adopt the daytime, evening and night time noise periods in NZS 6802:2008 (0700 – 1900 hours daytime, 1900 – 2200 evening and 2200 – 0700 hours night time)	
Advantages	Disadvantages
▪ An intermediate step which allows for additional protection during the shoulder evening period (1900 – 2200). ▪ Would solve issue of the late onset of the daytime period (0700 – 0730).	▪ This approach is uncommon and not often adopted by other District Plans in New Zealand. ▪ The shoulder period would start at 1900 hours which may introduce issues as it is earlier than the current 2000 hour night time onset. ▪ This approach would increase the complexity of any noise limit structure and compliance assessments.

Option 3 – Adopt the daytime and night time periods outlined in NZS 6802:2008 (0700 – 2200 hours daytime and 2200 – 0700 hours night time)	
Advantages	Disadvantages
▪ The District Plan will be consistent with New Zealand Standard 6802:2008 and the Christchurch and Ashburton District Plans.	▪ If these periods are adopted, less stringent noise limits would now apply between 0700 – 0730 hours and 2000 – 2200 hours. There would be an associated reduction in amenity protection during these periods.

Recommended approach

We recommend that SDC identifies any particular activities which may currently benefit from the additional 'night time' protection between 0700 – 0730 hours and 2000 – 2200 hours. We expect that residential amenity will be the key concern.

If there is no compelling reason why these activities require protection during these shoulder periods, over and above what is recommended in NZS 6802:2008 and provided in other Districts, then we recommend that the prescribed daytime and night-time time frames outlined in this Standard are adopted (option 3 above).

2.0 Living Zone night-time noise limit

The current Living Zone night-time noise limit is 35 dB L_{A10}. This is lower than the majority of other District Plan limits, including the adjoining Ashburton and Christchurch Districts where the District Plans have been recently updated.

We have already recommended that the L_{Aeq} metric replaces the L_{A10} metric in line with the most recent versions of NZS 6802:2008 and international best practice. We have identified the following options:

Option 1 – Retain the existing night time limit of 35 dB but adopt the L_{Aeq} metric instead of L_{A10}	
Advantages	Disadvantages
▪ Provides a high level of amenity for the Living Zone – the majority of noise generating activities would not comply.	▪ Inconsistent with other District Plans. ▪ There are not many activities that actually comply with this noise limit so it is quite restrictive for noise generators. ▪ Many exclusions may need to continue to be outlined in the Plan as normal domestic activities for example may not comply with this limit. ▪ Measuring compliance can be difficult as in our experience, background noise levels in many Residential Zones of the Selwyn District are higher than 35 dB L_{Aeq}, mainly from nearby roads. ▪ Activities that exceed the District Plan limits may often still have minimal noise effects or be well below other commonly referred to guidance. Such activities will however be required to go through a Resource Consent process.

Option 2 – Adopt a 40 dB L_{Aeq} night time limit for the Living Zone	
Advantages	Disadvantages
▪ Consistent with the night time noise limit in the Christchurch and Ashburton District Plans ▪ Provides a good 'trigger' where noise levels which exceed 40 dB L_{Aeq} may not necessarily be unacceptable, but are worthy of further investigation ▪ Easier to measure non-compliances than with the current limits. The Plan may not require the exclusion of residential activities in the Living Zone, as it should be reasonable for domestic activities such as heat pumps to comply with this limit.	▪ This limit would provide less protection than the current noise limits.

Option 3 – Adopt a 45 dB L_{Aeq} night time limit for the Living Zone	
Advantages	Disadvantages
▪ Consistent with the night time noise limits outlined in the World Health Organisation and NZS 6802:2008 ▪ Easy to measure non-compliances ▪ The Plan may not require the exclusion of residential activities in the Living Zone, as it should be reasonable for domestic activities such as heat pumps to comply with this limit.	▪ In locations where there is a low background noise level at night, levels lower than 45 dB L_{Aeq} may still cause complaints. ▪ Represents a significant increase in allowable night time noise levels when compared to the status quo. ▪ Inconsistent with the District Plan limits adopted in the adjoining Ashburton and Christchurch Districts.

Recommended approach

Clause 8.6.1 in NZS 6802:2008 states that *"the guideline limits indicate generally acceptable noise limits, but communities may wish to make these more or less stringent to suit their particular circumstances."*

There is also further commentary provided in clause 8.6.3, which discusses how authorities may set more stringent limits to afford more protection to residential activities, but only after an assessment comparing

the health and amenity benefits against possible restrictions on affected activities has been made, and ambient sound levels in the District have been taken into account.

The Standard also discusses how there are practical difficulties when attempting to assess the compliance of low sound levels within high noise environments.

When considering that the existing noise limit is very low, we recommend that a night time noise limit of 40 dB L_{Aeq} is considered in preference to a 45 dB L_{Aeq} limit. We consider that this would still provide a reasonable level of protection and is lower than the limits outlined in NZS 6802:2008 and the WHO guidelines.

We note that this discussion is interrelated with the nature of any exclusions provided by the District Plan, as if a less stringent night-time limit is adopted, then it may not be reasonable to exclude as many activities from the limits.

3.0 Rural Zone daytime limit

The current Rural daytime noise limit is 60 dB L_{A10} which applies at the notional boundary of dwellings and other noise sensitive locations. This is higher than guidance provided by the WHO and in NZS 6802:2008. However, the explanation for objectives B3.4.1 and B3.4.2 of the District Plan discusses how the Rural Zone is recognised principally as a business area rather than a residential area.

For noise generated in the Rural Zone, at the boundary between the Living Zone and the Rural Zone there is a 55 dB L_{A10} limit which applies. Dwellings in Living Zones are therefore currently afforded a higher level of protection than dwellings in the Rural Zone.

We recommend that the L_{Aeq} metric replaces the L_{A10} metric in line with the most recent versions of NZS 6802:2008 and international best practice. We have identified the following options:

Option 1 – Retain the existing notional boundary limit of 60 dB but adopt the L_{Aeq} metric instead of L_{A10}	
Advantages	Disadvantages
▪ Gives non-residential uses in the rural zone a high priority and allows new activities in the rural area to generate similar levels of noise to those currently permitted.	▪ Higher than guidance for the protection of residential amenity outlined in the World Health Organisation guidelines and NZS 6802:2008 and therefore complying levels at 60 dB L_{Aeq} received at the notional boundary of a rural dwelling could be considered unreasonable. ▪ Only provides for indoor amenity at rural dwellings with windows closed. It is unusual for outdoor amenity in the vicinity of dwellings not to be protected in rural areas. Both the Ashburton and Christchurch District Plans provide this protection. ▪ Not consistent with the 55 dB boundary limit protection afforded to dwellings in the Living Zone from noise generated in Rural Zones

Option 2 – Replace the 60 dB notional boundary limit with a 55 dB L_{Aeq} notional boundary daytime limit for dwellings in the Rural Zone	
Advantages	Disadvantages
▪ Provides a level of protection for outdoor amenity at dwellings in the Rural Zone consistent with NZS 6802:2008 and the WHO guidelines to protect the majority of people from being *seriously* annoyed in outdoor living areas. ▪ Consistent with the protection afforded to dwellings in Living Zones from noise generated in Rural Zones.	▪ This limit would be more restrictive than the existing limits for noise generating activities in the rural area. ▪ No protection provided for undeveloped rural land which may introduce reverse sensitivity issues.

Option 3 – Replace the 60 dB notional boundary limit with a 55 dB L_{Aeq} boundary limit for Rural Zone sites and also provide a 50 dB L_{Aeq} notional boundary limit for rural dwellings	
Advantages	Disadvantages
▪ The 55 dB L_{Aeq} boundary limit provides protection for undeveloped rural land ▪ Provides a level of protection for outdoor amenity at dwellings in the Rural Zone consistent with the WHO guidelines to protect the majority of people from being *moderately* annoyed in outdoor living areas	▪ This limit would be significantly more restrictive for noise generating rural activities than the existing limits. ▪ Often the boundary limit is not given much weight in Resource Consent applications, as rural land which does not contain a dwelling is not particularly noise sensitive. ▪ This approach would increase the complexity of any noise limit structure and compliance assessments for noise generated on a Rural site received at another Rural site. Undeveloped rural sites which don't contain dwellings would now require a compliance assessment where they did not previously. ▪ The 50 dB notional boundary limit would provide a higher level of protection than that which is currently afforded to Living Zone dwellings (55 dB).

Recommended approach

We recommend that SDC considers whether protection of outdoor amenity at dwellings in the rural zone is important. If that is the case, then we recommend that a lower notional boundary limit is adopted. This approach would however contrast with the explanation and reasons discussion for Objectives B3.41 and B3.42 in the current District Plan which does not place priority on dwellings in the rural area.

When considering that the existing noise limit is very high, we recommend that a limit of 55 dB L_{Aeq} is considered in preference to a 50 dB L_{Aeq} limit. We consider that this would still provide a reasonable level of protection in line with the limits outlined in NZS 6802:2008 and the WHO guidelines.

If SDC consider that a higher level of protection is required at dwellings in the Living Zone, then it would be reasonable to adopt a 50 dB L_{Aeq} limit at the Rural / Living interface.

As for the Living Zone, we note that this discussion is interrelated with the nature of any exclusions provided by the District Plan. If a more stringent daytime limit is adopted, we recommend that the current exclusions provided by the Plan are also reviewed.

Typically the night time noise limit is 10 dB lower than the daytime limit. While the preceding parts of this section only discuss the daytime limit, we recommend that either the 45 dB night time limit is retained, or if option 3 with a 50 dB notional boundary limit is adopted a 40 dB limit should be selected.

4.0 Management of noise at the Business / Rural interface

SDC has requested comment on how noise should be managed for Business Zone sites adjacent to the Rural Inner Plains Zone, with a focus on the Business 2, 2A and 2B Zones.

The current limits which apply at the Business Zone / Rural Zone interface are summarised in table 4.1 below.

Table 4.1 – Noise limits at the Business / Rural Zone interface

Noise producing zone	Daytime (dBA L10)	Night time (dBA L10)	Location where limit applies
Business 1, 1A, 2, 2B & 3	55	40	Notional boundary of rural dwelling
Business 2A	60	40	Boundary of rural zone
Business 1, West Melton	50	35	Notional boundary of rural dwelling

A notional boundary limit is in place for noise produced in most Business Zones. The exception is the Business 2A zone, where there is a boundary limit.

We have provided comment on three different approaches for comparison. The first option is a notional boundary control similar to the existing controls for Business 1, 1A, 2, 2B and 3 Zones (although updated to the L_{Aeq} metric). We have also discussed the advantages and disadvantages of a combined notional boundary / boundary limit and a boundary limit only in the following tables.

Option 1 – Adopt a 55 dB L_{Aeq} daytime / 40 dB L_{Aeq} night-time notional boundary limit (no boundary limit)	
Advantages	Disadvantages
▪ Does not 'protect' areas of rural land without dwellings. This means that the limit is less restrictive for noise producers in the Business Zones. Noise producers may be able to establish right up to the boundary of the industrial zone or generate high levels at industrial / rural interface. ▪ Still provides a reasonable level of daytime and night time protection for existing rural dwellings in line with, or more restrictive than, NZS 6802:2008 and the WHO. ▪ Allows industrial activities in the Business 1, 1A, 2, 2B & 3 Zones to continue to generate similar noise levels at the notional boundary of rural dwellings. ▪ Less restrictive for noise generators within the Business 2A zone.	▪ A notional boundary rule does not consider noise effects to dwellings which may be constructed closer to the industrial boundary at some point in the future (reverse sensitivity effects). If a new dwelling is constructed, the existing industrial activities may need to constrain their activity to now comply there – which may rarely be practical. ▪ The area between the Business Zone and nearest dwelling becomes a default 'buffer zone' still zoned rural with no formal acknowledgement in the Plan and constantly varying size (depending on the proximity of any dwellings).

Option 2 – Adopt a 55 dB L_{Aeq} daytime / 45 dB L_{Aeq} night time boundary limit and a 50 dB L_{Aeq} daytime / 40 dB L_{Aeq} night time notional boundary limit	
Advantages	Disadvantages
▪ Provides protection for both the adjoining rural land and rural dwellings which reduces possible future reverse sensitivity effects or the likelihood that future noise sensitive development outside the Business Zone will force changes within the Business Zone. ▪ Cumulative noise levels from multiple activities in the Business Zone received at nearby rural dwellings will generally be lower if there is a boundary limit. ▪ Provides a level of daytime and night time protection for rural dwellings which is generally more restrictive than, NZS 6802:2008 and the WHO. ▪ Measuring compliance at the boundary of a site rather than the notional boundary is often easier. The notional boundary can be hard to locate in the field (not defined by a boundary fence for example), and requires access to the neighbouring property.	▪ More restrictive for noise producers in industrial zones which adjoin rural sites, especially if the rural dwelling is located some way from the boundary. This may influence the utilisation of the Business Zone as in effect a sacrificial informal 'buffer' moves to within the Business Zone. ▪ Business Zone areas already established without a 'buffer area' or lower noise generating activities around the perimeter cannot be accommodated. ▪ More complex to assess both a boundary and notional boundary limit.

Option 3 – Adopt a 60 dB L_{Aeq} daytime and 40 dB L_{Aeq} night-time boundary limit (similar to Business 2A with a boundary limit only)	
Advantages	Disadvantages
▪ Providing a limit at the boundary of the Business Zone, constrains high noise levels from industrial areas to the boundary of that zone and ensures that noise received at rural dwellings will be lower (including cumulative noise from multiple activities). It also provides protection for undeveloped rural land. ▪ Measuring compliance at the boundary of a site rather than the notional boundary is often easier. The notional boundary can be hard to locate in the field (not defined by a boundary fence for example), and requires access to the neighbouring property.	▪ The night time boundary limit is restrictive for industrial activities. There are a number of industrial activities which will occur during the night time. This may restrict the types of activities which can occur around the fringes of the industrial zone. ▪ There is a large difference (20 dB) between the day and night time protection afforded which is unusual. ▪ The level of noise received at a rural dwelling could be much lower if the dwelling is distant from the site boundary on a large rural site.

The above demonstrates that a setback or buffer is an appropriate planning response at the interface between business and noise sensitive uses. The choice of noise limit and place of application together determine whether this buffer is effectively provided by rural land around the perimeter, or industrial land within the Business Zone and around the perimeter.

We understand that the key location where the Business 2 / Rural Inner Plain interface occurs is at Izone in Rolleston. At this location there is a mixture of established activity, land which is to be sold, and land which has been sold but not yet developed. There are rural dwellings located various distances from the boundary in the Rural Inner Plains Zone. There is a 60 dB L_{A10} daytime limit and 40 dB L_{A10} night time limit at the boundary with the adjoining Rural Inner Plains zone.

By establishing a low night time noise limit at the boundary of the zone, the current control effectively uses some of the Izone land as a 'buffer'. If the limit is to be achieved, this restricts the types of activities which can establish around the fringes of the zone to low noise or daytime only activities.

We consider that the approach adopted by SDC will depend on whether rural land which does not contain dwellings adjoining Business Zones is considered noise sensitive or suitable for future noise sensitive development and should be afforded protection. If this is the case, then we recommend that a boundary limit in combination with a notional boundary limit (similar to option 2) should be adopted.

If not, then we consider that a limit provided at the notional boundary of rural dwellings would be a reasonable approach.

Regardless of the option selected, we recommend that the level of noise permitted at the business / rural interface is consistent with the level permitted in the rural zone from other rural activities.

5.0 Consistency in the protection afforded

When considering each of the options above, it is important to review consistency between the protection afforded, and approach (notional boundary or boundary limit) particularly for dwellings in the following locations:

- Dwellings located in the Rural Zones receiving noise from activities in the Rural Zone
- Dwellings in the Rural Zones receiving noise from activities in Business Zones
- Dwellings in Living Zones receiving noise activities in the Rural or Business Zones

The nature of the noise within these Zones and the existing noise limits which apply will influence whether the same limit at dwellings is reasonable. For example, SDC may consider that a higher noise limit can be tolerated for noise received at rural dwellings from activities in the Rural Zone than from commercial activities in the Business Zone.

I trust this will be of assistance.

Regards,

Dr Jeremy Trevathan

Ph.D. B.E.(Hons.) Assoc. NZPI®

Acoustic Engineering Services

Appendix 3 - Zone Noise Rules

Living zones

Any activity which is not a residential activity, spiritual activity or educational activity, shall be a permitted activity if the following noise limits are not exceeded within the time-frames stated.

7.30am – 8.00pm 50 dBA L_{10}
8.00pm – 7.30am 35 dBA L_{10}
7.30am – 8.00pm 85 dBA L_{max}

8.00pm – 7.30am 70 dBA L_{max}

Rule 10.6.1 does not apply to the use of sirens or warning devices associated with emergency service facilities.

Business zones

Zone	Assessment point	Time period	Noise limit
Business 1, 1A & 3 (except West Melton Business 1)	Boundary of any other side not within a living zone or within notional boundary in Rural zone	0730 – 2000 hours	60 dB L_{A10} / 85 dB L_{AFmax}
		2000 – 0730 hours	45 dB L_{A10} / 70 dB L_{AFmax}
	Within a living zone or within the notional boundary within a rural zone	0730 – 2000 hours	55 dB L_{A10} / 85 dB L_{AFmax}
		2000 – 0730 hours	40 dB L_{A10} / 70 dB L_{AFmax}
Business 2	Boundary of any other Business 1, 1A, or 3 zone	0730 – 2000 hours	65 dB L_{A10} / 85 dB L_{AFmax}
		2000 – 0730 hours	45 dB L_{A10} / 70 dB L_{AFmax}
	Within a living zone or within the notional boundary within a rural zone	0730 – 2000 hours	55 dB L_{A10} / 85 dB L_{AFmax}
		2000 – 0730 hours	40 dB L_{A10} / 70 dB L_{AFmax}
Business 2A	Boundary of any site in the rural zone, excluding road, waterway and railway reserves	0730 – 2000 hours	60 dB L_{A10} / 80 dB L_{AFmax}
		2000 – 0730 hours	40 dB L_{A10} / 65 dB L_{AFmax}
Business 2B	Within a living zone or within the notional boundary within a rural zone	0730 – 2000 hours	55 dB L_{A10} / 85 dB L_{AFmax}
		2000 – 0730 hours	40 dB L_{A10} / 70 dB L_{AFmax}
West Melton Business 1	Within a living zone or within the notional boundary within a rural zone	0730 – 2000 hours	50 dB L_{A10} / 85 dB L_{AFmax}
		2000 – 0730 hours	35 dB L_{A10} / 70 dB L_{AFmax}

Rural zones

Except as provided in link 9.16.3 below, any activity shall be conducted so as to comply with the noise limits and within the time frames stated in the following tables in order to be a permitted activity:

Maximum noise limits at any Living Zone boundary

0730 – 2000 hours 55 dB L_{A10} / 85 dB L_{AFmax}

2001 – 0729 hours 40 dB L_{A10} / 70 dB L_{AFmax}

Noise limits assessed at the notional boundary of any dwelling, rest home, hospital, or classroom in any educational facility except where that dwelling, rest home, hospital or classroom is located within a Living zone.

0730 – 2000 hours 60 dB L_{A10} / 85 dB L_{AFmax}

2001 – 0729 hours 45 dB L_{A10} / 70 dB L_{AFmax}

Appendix 4 - Comparison of Selwyn, Christchurch and Ashburton Noise Rules

Residential/Living Zones

District	Day-time		Night-time	
	Hours	**Noise Limit**	**Hours**	**Noise Limit**
Selwyn	0730-2000	50 dB LA10 85 dB LAFmax	2000-0730	35 LA10 85 dB LAFmax
Christchurch	0700-2200	50 dB LAeq	2200-0700	40 65 dB LAFmax
Ashburton	0700-2200	50 dB LAeq 75 dB LAFmax	2200-0700	40 65 dB LAFmax

Key observations and/or differences between Selwyn, and Christchurch and Ashburton include:

- The day time noise limits are 50 dB L_{Aeq}/L_{A10} in Christchurch and Ashburton and the WHO recommends a noise limit of 50-55dB L_{Aeq}. Therefore, the Selwyn day time noise limit of 50dBAL_{10} is aligned with the other Council's.
- NZS 6802 states that for night time noise exposure a maximum noise limit should be applied to protect the majority of people being woken during the night. It also states that such limits should only be set for night time hours and a 75 dB L_{AFmax} limit is recommended. Christchurch does not include a day time L_{AFmax} in accordance with the guidance, however Ashburton does. The night time limits for Christchurch and Selwyn are both set at 65 dB L_{AFmax}.

Rural Zones

District	Measured At	Day-time		Night-time	
		Hours	**Noise Limit**	**Hours**	**Noise Limit**
Selwyn	Notional	0730-2000	60 dB LA10 85 dB LAFmax	2000-0730	45 LA10 70 dB LAFmax
	Living zone boundary		55 dB LA10 85 dB LAFmax		40 LA10 70 dB LAFmax
Christchurch	Notional	0700-2200	50 dB LAeq	2200-0700	40 LA10 65 dB LAFmax
	Boundary		55 dB LAeq		45 LA10 70 dB LAFmax
Ashburton	Notional	0700-2200	50 dB LAeq 75 dB LAFmax	2200-0700	40 LA10 65 dB LAFmax
	Boundary		65 dB LAeq 85 dB LAFmax		45 LA10 70 dB LAFmax

Key observations and/or differences between Selwyn, and Christchurch and Ashburton include:

- Christchurch and Ashburton include noise limits at both the notional and site boundary. It is common for rural zone noise limits to apply at the notional boundary of a dwelling. However, in Selwyn there is a notional and a Living Zone boundary limit where the Living Zone limit is less stringent than the Living Zone noise limits. For other Districts, the noise limits of the receiving zone apply at the boundary of receiving sites (i.e. the Living Zone limits would apply at the Living Zone boundary).
- The notional boundary limits in Christchurch and Ashburton are the same as those at the Residential/Living Zone boundaries, apart from Selwyn.
- The noise limits in Selwyn also apply at the notional boundary of education, rest home and classroom facilities, whereas the site boundary rules in the Christchurch and Ashburton Plans ensures that the levels are appropriate.

Business/Industrial Zones

Key observations include:

- NZS 6802:208 includes some recommendations for business/industrial areas including: limits up to 75 dB $L_{Aeq\ (15\ min)}$ may be appropriate for heavy industrial areas; and for town centres/mixed use zones generally an external day time noise limit of up to 60 dB is appropriate, and where there is existing residential a night time noise limit of 45 dB remains appropriate but this could be increased in new areas with the requirement for dwellings to include noise insulation.
- The WHO recommends a 24-hour noise limit of 70 dB L_{Aeq} for industrial, commercial, shopping and traffic areas.
- The day time limits in Christchurch and Ashburton range from 55 dB L_{Aeq} for commercial to 75 dB L_{Aeq} maximum for heavy industrial, and the equivalent night time limits range from 45 to 75 dB L_{Aeq}.

Specific Activities

Further key observations and/or differences in relation to particular activities include:

- Aircraft - Ashburton specifically refers to noise from any helicopter landing pad needing to comply with NZS6807:1994 *Noise Management and Land Use Planning for Helicopter Landing Pads* and noise from aircraft needing to comply with NZS6805:1992 *Airport Noise Management and Land Use Planning*. With respect to helicopter movements the Christchurch rules restrict operating hours, separation distances from residential units, number of movements in proximity to residential units etc.
- Audible bird scaring devices - Christchurch and Ashburton have rules managing noise from bird scaring devices which limit operation time, minimum distance they are located from residential dwellings or areas, a specific noise limit. Ashburton also has limits on timing (15 in 1 hr) and number (one device per four hectares).
- Temporary military training activities - specific rules are provided in all of the neighbouring plans.
- Blasting - Christchurch and Hurunui have specific blasting noise provisions. The Christchurch rules only apply in relation to Lyttelton Port quarrying where an air blast overpressure limit applies (LZpeak) at the notional boundary of any dwelling.

- Powered watercraft - no specific noise limits in other plans.
- Construction noise - Both Christchurch and Ashburton apply NZS 6803:1999 *Acoustics - Construction Noise* which construction noise is required to meet.
- Temporary activities - The Christchurch Plan contains rules for specific areas and a general temporary activity rule which controls the distance of events from residential units, time period limit for sound amplified activities, hours of operation from sound amplified activities and noise limits. Ashburton exempts outdoor events in a public place from the noise rules if 70 dB $L_{Aeq\ (1hr)}$ is not exceeded at the boundary of a residential site, as well as a limitation on hours and number of events in a year.
- Frost fans - In Christchurch and Ashburton noise generated by frost fans shall not exceed 55 dB L_{Aeq} when assessed at the notional boundary of any residential unit on a separate site under different ownership. This applies to all frost fans in total operating in an area.
- The Christchurch District Plan includes provisions which require sensitive activities to be setback 80m from State Highways and railway designations. The corresponding internal noise limits for buildings within the effects area is consistent with the NZTA guidelines.

Vibration

- The Christchurch District Plan has policies in the Subdivision and earthworks chapter that earthworks could result in vibration effects which should be avoided or mitigated. Vibration associated with earthworks is required to comply with DIN 4150:1999 to be permitted. There are also a number of designations in the Plan which have vibration limits. For example, the SH76 Southern Motorway Extension Stage 2 requires construction vibration to be measured in accordance with DIN 4150.3:1999 and sets vibration limits at occupied dwellings, other occupied buildings and all other buildings. The Plan also sets a vibration limit for blasting in relation to port quarrying, but none for typical quarrying or construction activity. The Plan also notes in the Residential, Rural and Open Space Chapters that vibration caused by vehicles accessing sites may result.
- The Ashburton Plan recognises vibration as a potential effect across a number of zones and chapters in the Plan, however no specific limits or assessment criteria are included in the Plan. The Noise Chapter states that the rail corridor needs protecting against reverse sensitivity to ensure unrestricted operation, however there are no rules regarding setbacks for vibration mitigation. The designation for the Ashburton Second Bridge sets specific vibration limits and structural damage criteria based on German Standard DIN 4150.3:1999.

Appendix 5 - LPC Noise Contour Plot

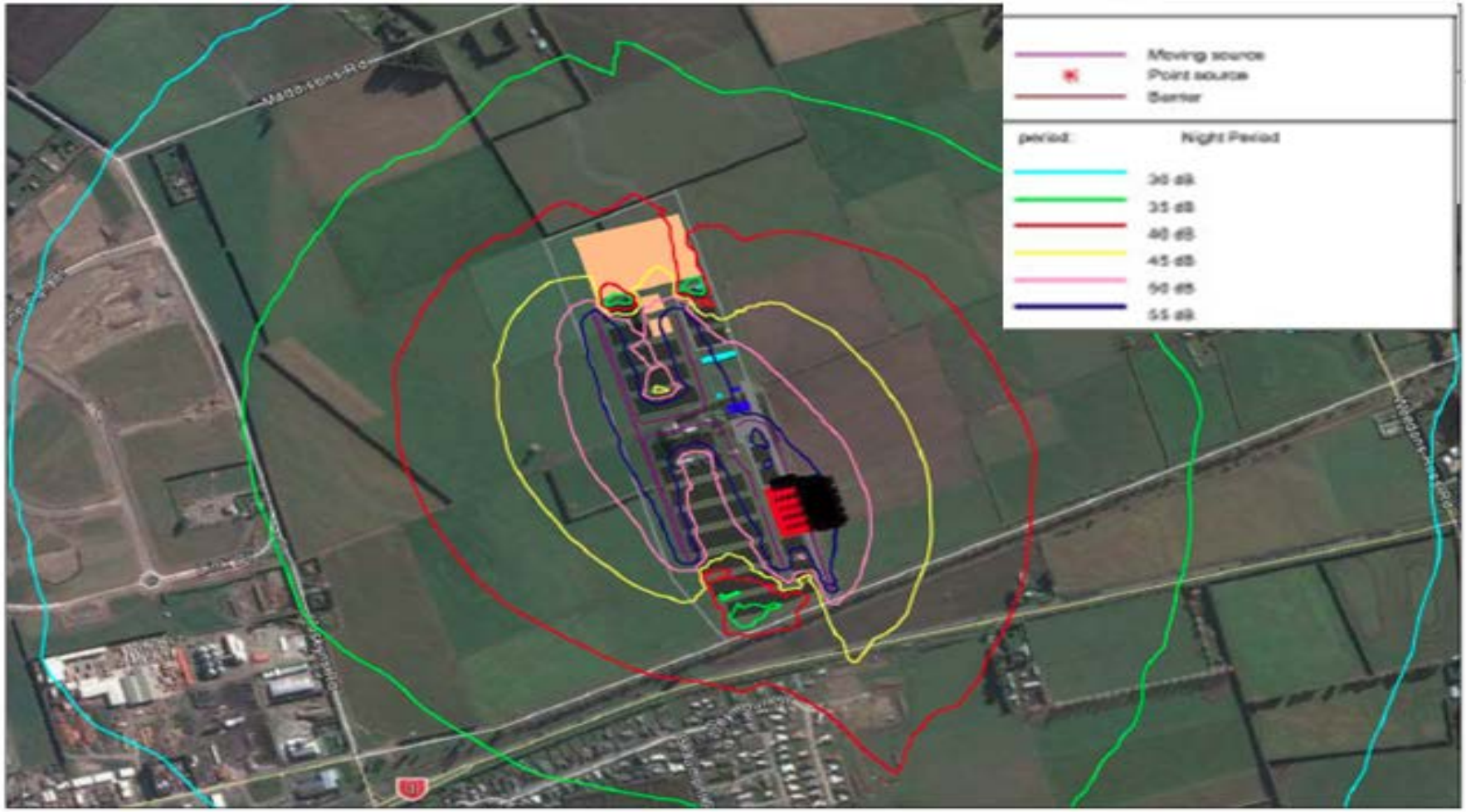

Figure 9. Loading Train, Mafis, Road Trucks and Reefers Operating, dB L_{Aeq}