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## **Selwyn District Plan Review: DW005 Noise**

Prepared for:

Selwyn District Council  
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**3 October 2017**

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## 1.0 BACKGROUND

Acoustic Engineering Services (AES) have been engaged by the Selwyn District Council to undertake a preliminary review of a number of aspects of the current noise provisions within the Operative Selwyn District Plan (the Plan), as part of the Plan review process.

At this stage, our brief is to consider key items relating to the noise provisions in the Plan, the relevant New Zealand Standards, and District Plans in the adjoining districts – being Christchurch, Ashburton, Waimakariri, and Hurunui.

The scope of work for this report is based on the following:

- Document titled *Project Scope of Work: Noise*, as prepared by Selwyn District Council, and dated the 26<sup>th</sup> of April 2017.
- Email sent by Jeremy Trevathan of AES titled *Re: Further information required: Noise and vibration package of work*, sent on the 15<sup>th</sup> of June 2016.

The aim of this report is to cover the specific scope requested, and enable informed discussion moving forward. Consistent with discussions with the Selwyn District Council relating to the *Project Scope of Work: Noise* document, we understand that our review and advice is to be general, and the decisions regarding any possible changes to the District Plan and the specifics of rule wording and the like will be made at a later point in the process.

## 2.0 NOISE PROVISIONS IN THE OPERATIVE SELWYN DISTRICT PLAN AND THEIR APPLICATION

The Plan is split into two volumes – a Township Volume and a Rural Volume, reflective of the two general areas which make up the majority of the District. Each Volume has a set of rules and policies, with numerous cross-references to the other Volume. The primary noise rules and situations where they are applied are discussed below.

We note that the Selwyn District Plan refers to NZS 6801:1999 *Acoustics – Measurement of Environmental Sound* and NZS 6802:1991 *Assessment of Environmental Sound* and therefore the  $L_{A10}$  noise descriptor (which appears in those earlier Standards) is used throughout. The New Zealand Standards are discussed in section 3.0.

### 2.1 Township Volume

Within the Township Volume, the zones fall into two categories – Living or Business, and the following noise rules apply:

#### Living zones

The noise rules which apply within Living zoned properties are outlined in Rule 10.6.1, and are as follows:

*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.*

Sound levels are to be assessed at any point beyond the boundary of the site on which the source of any noise of interest is situated. This means that the noise limits apply at roadside boundaries, for example.

If the noise rules are not met a discretionary activity resource consent is required.

#### Business zones

The noise rules which apply in Business zones are outlined in Rules 22.4.1 and 22.4.2. Any activity conducted on any day, except any residential activity, shall be a permitted activity, provided the following noise limits are not exceeded within the time-frames, as summarised in table 2.1.

Table 2.1 – Selwyn District Plan Business zone noise limits

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 $L_{AFmax}$

Any activity that is not a residential activity that does not comply with Rule 22.4.1 is a discretionary activity, and any activity within the West Melton Business 1 zone that does not comply with the noise limits in Rule 22.4.2 is a restricted discretionary activity.

#### Specific activities

In addition, for both the Living and Business zones there is a separate specific rule (10.11.1.6) for Temporary Military Training Activities, which is as follows:

*Noise emissions occurring as a result of any Temporary Military Training Activity, when measured at the property boundary shall not exceed:*

Time (any day)	Limit (dBA) $L_{10}$	Limit (dBA) $L_{max}$
0630 – 0730	60	70
0730 – 1800	75	90
1800 – 2000	70	85
2000 – 0630	55	65

Any activity which does not comply with Rule 10.11.1 shall be a controlled activity.

## 2.2 Rural Volume

Within the Rural Volume of the Selwyn District Plan noise limits are applied 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.

### Rural zone

The general noise limits which apply within the Rural zone are outlined in Rule 9.16 *Activities and Noise* of the Selwyn District Plan, and are as follows:

*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 $L_{AFmax}$

There are notes beneath the rule noting that separate specific rules apply to take-off or landing of aircraft (9.14) and audible bird scaring devices (9.15).

Any activity which does not comply with Rule 9.16 shall be a discretionary activity.

### Exemptions

However, the District Plan also describes a number of general and other exemptions to these noise limits in 9.16.3 and 9.16.6 respectively, including:

- Activities of a limited duration required by normal primary production activities including agriculture, horticulture, aquaculture, forestry and fishing.
- Where the noise source is a warning device used by emergency services.
- Residential activities of a normal domestic nature including recreational activities, such as sporting events, that do not involve powered motor sport, powered aviation, gunfire or amplified music.
- Where the receiving residential activity exists on the same site, or a site owned by the same owner, as the noise source being assessed.
- Where the activity is a temporary military training activity and complies with specific noise limits (as addressed further below in the 'Specific activities' section).
- Noise from any motor vehicle or any mobile machinery (including farm machinery and stationary equipment not fixed to the ground).
- Audible bird scaring devices (as addressed further below in the 'Specific activities' section).

- Any temporary activity which operates between the hours of 0700 and 2100 hours excluding seasonal harvesting activities.<sup>1</sup>
- Hail cannons.
- The use of sirens associated with emergency services.

#### Specific activities

In addition, there are a number of more detailed noise limits which apply to specific activities which occur within the Rural zones of the District, as follows:

##### *Aircraft movements*

- In accordance with Rule 9.14, for aircraft movements which are not associated with emergency or law enforcement, seasonal working, military or activities in the Porters Ski and Recreation Area, a noise limit of 50 dBA  $L_{dn}$  applies at the notional boundary in the Rural zone or at the boundary of a Living zone. In addition, where the airstrip or helipad is located within 1 km of a Living zone there should be no more than 14 flights / week on any one property except that on any five days in a continuous six-month period, an unlimited number of flights is permitted. There are two notes associated with this rule which discuss averaging that can be applied and the notional boundary.

##### *Audible bird scaring devices*

- In accordance with Rule 9.15, for audible bird scaring devices there are limitations on the overall noise level and the number of events, with different rules for air horns, sirens or amplified sounds used for that purpose, and for any other bird scaring device (including fire arms), as follows:
  - Where air horns, sirens or amplified sounds are used during the daytime they should be for a maximum period of 2 seconds at any one time for not more than 10 such times in any one hour, and also no impulsive noise event shall exceed 65 dBA SEL.
  - For any other audible bird scaring device, during the daytime the impulsive noise shall not exceed 65 dBA SEL, with an allowance of up to 18 in any one hour period; during the sunset and sunrise periods (1 hour either side) the impulsive noise shall not exceed 60 dBA SEL, with an allowance of up to 3 in any one hour period; during the night-time period no device shall be operated to exceed 40 dB  $L_{Aeq}$  (10 min).

##### *Temporary Military Training Activities*

- Rule 9.16.3.5 requires that any temporary military training activities in any area of the District shall be conducted so as to ensure the noise limits in the table below are not exceeded at any point within the boundary of any Living or Business zone or at any point within the notional boundary of any dwelling, rest home hospital, or educational facility classroom in the Rural zone. Within the Burnham Military Camp defence area no noise limits in the Plan apply. Provided the limits for impulsive noise arising from the

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<sup>1</sup> The definition of temporary activity includes:

- Buildings, structures and activities ancillary to a construction project for a period of up to 12 months or the duration of the construction project, whichever is the lesser.
- A community market, provided that it does not occur on any site for more than one day per week.
- Any other activity provided that it does not occur on any site for a period of not more than 15 consecutive hours in any 24 hour period and no more than twice per month, with a total of 12 occurrences in a 12 month period; or on any site for a period which does not last longer than a total of 7 consecutive days at any one time and occurs on not more than 3 times at any one site in any 12 month period.



use of explosives, explosives simulators, ammunition, munitions or pyrotechnics at any time, shall not exceed 120 dBC (peak).

<b><i>Time (any day)</i></b>	<b><i>L<sub>eq</sub> dBA</i></b>	<b><i>L<sub>90</sub> dBA</i></b>	<b><i>L<sub>max</sub> dBA</i></b>
<i>0630 – 0730</i>	<i>60</i>	<i>45</i>	<i>70</i>
<i>0730 – 1800</i>	<i>75</i>	<i>60</i>	<i>90</i>
<i>1800 – 2000</i>	<i>70</i>	<i>55</i>	<i>85</i>
<i>2000 – 0630</i>	<i>55</i>	<i>45</i>	<i>65</i>

Provided also that the above noise limits shall not apply on up to four occasions in any period of 12 months where any exhibition or demonstration of military activities is open to the public and held between the hours of 1000 and 1700 hours.

### *Blasting*

- Rule 9.16.4 requires that airblast overpressure from blasting on any land or in water shall not exceed a peak sound pressure level of 115 dBA at the notional boundary of any dwelling, rest home, hospital or educational facility classroom.

### *Powered watercraft*

- Rule 9.16.5 requires that powered watercraft are fitted with effective mufflers during all movement under power on water and shall not exceed 85 dBA SEL between 0700 and 2100 hours, and 78 dBA SEL between 2100 and 0700 hours, assessed at any point within the notional boundary of any dwelling on any day. In addition no moving craft shall emit noise in excess of 90 dBA SEL in a single drive-by measured at any stationary point more than 25 metres from the line of travel of the craft. There is also an exception for four occasions in any 12 month period, where the noise limit may be unrestricted for any portion of a waterbody for the purposes of a special event.

### 3.0 NEW ZEALAND STANDARDS

In this section, we have discussed New Zealand Standards NZS6801, NZS6802 and NZS6803 as requested. Other New Zealand Standards not discussed in this section include NZS 6805:1992 *Airport Noise Management and Land Use Planning*, NZS6806:2010 *Acoustics – Road-traffic noise – New and altered roads*, NZS6807:1991 *Noise Management and Land Use Planning for Helicopter Landing Areas*, NZS 6808 *Acoustics – Wind farm noise*, NZS 6809:1999 *Acoustics – Port Noise Management and Land Use Planning*.

#### 3.1 NZS 6801 and NZS 6802

As outlined in section 2.0 above, the Plan refers to NZS 6801:1999 *Acoustics – Measurement of Environmental Sound* and NZS 6802:1991 *Assessment of Environmental Sound*. These standards have both been superseded by updated versions in 2008 – NZS6801:2008 *Acoustics – Measurement of Environmental Sound*, and NZS6802:2008 *Acoustics – Environmental Noise*.

The scoping document states that the reference to the outdated standards is one of the reasons the noise provisions within the Plan need to be updated. As such, the Project Scope requires a summary of how the measurement and assessment of noise has changed from the 1991 and 2008 version of the standards.

NZS6801:2008 *Acoustics – Measurement of Environmental Sound* contains procedures for undertaking measurement of environmental sound, and defines basic quantities used for the description of sound. NZS 6802:2008 *Acoustics – Environmental Noise* outlines procedures for the assessment of noise for compliance with noise limits, and provides guidance for setting noise limits and guidelines for the protection of health and amenity.

The key changes between the 1991 and the 2008 versions of NZS 6801 and NZS 6802 are as follows:

- The adoption of  $L_{Aeq}$  in NZS6802:2008 as the primary parameter for assessing noise levels in place of  $L_{A10}$ , in line with international guidelines. As  $L_{A10}$  effectively only measures the sound which occurs for 10 % of a measurement period, this can result in brief high noise level events not being captured by  $L_{A10}$  measurements, such as heavy vehicle movements. However, if the noise source is constant the values will be the same. The relationship for varying sound is typically  $L_{A10} = L_{Aeq} + 2$  to 3 dB
- The background sound level descriptor changes from  $L_{A95}$  to  $L_{A90}$ . This is the level of noise that is exceeded 90 % of a measurement period. This change is relatively minor in terms of practical implications.
- NZS 6801:2008 provides a greater level of detail on the effect of meteorological conditions and provides details of suitable conditions to undertake measurements.
- The 'background plus'<sup>2</sup> approach is removed. NZS 6802:1991 which features this methodology included a statement of warning regarding the limitations of this approach. The approach proved to be problematic in reality as there was difficulty in determining what a reasonable background noise level was, as at any location the background noise may vary with the time of day, time of year, meteorological conditions and the like. The approach also produced irregular outcomes when applied in the context of the RMA, which requires each proposal to be considered on its merits.
- Assessment in NZS6802:2008 is based on a 'rating level'. This includes adjustments for duration, residual sound, façade correction, and Special Audible Characteristics.

<sup>2</sup> Section 4.2.1 of NZS6802:1991 states 'As a guide to establishing limits of acceptability,  $L_{10}$  should not exceed the background sound level by 10 dB or more. There are, however, definite limitations to this "background plus" approach.'

Overall, in our view referencing the 2008 Standards in the Plan in place of the outdated 1991 and 1999 Standards would improve the robustness of the Plan noise rules, and is not expected to have any downsides. We are not aware of any current plans to further revise NZS6801 and NZS6802.

### **3.2 NZS 6803**

Currently NZS6803 is not referenced within the Plan. The most recent version of this Standard is NZS6803:1999 *Acoustics – Construction Noise*. This superseded the previous version NZS6803P:1984 *The measurement and assessment of noise from construction, maintenance and demolition work*.

NZS6803:1999 contains procedures for the measurements and prediction of noise from construction, maintenance, and demolition work, and provides guidance on levels of acceptability (taking into account the limited duration of the work). The Standard also provides potential methods for reduction, and includes a database of sound levels from various construction activities.

We are aware of some discussion regarding a possible further update of NZS6803:1999; however, the timing and extent of any revision is unknown. Due to the nature of the process, we would not expect a finalised revised Standard to be available within the next 5 years.

## 4.0 NOISE EFFECTS AND FEEDBACK FROM SDC OFFICERS

### 4.1 Typical activities and noise sources to which the current District Plan noise limits are applied

A large number of activities in the Selwyn District have required assessment against the acoustic provisions in the Plan. Very broadly, these activities can be categorised into those affecting people in residential areas, and those affecting people in rural areas (as reflected in the two volumes of the Plan).

Tables 4.1 and 4.2 below provide examples of the types of activities which the Plan noise limits have commonly been applied to as part of a resource consent process, along with examples of the noise sources and challenges which are associated with these activities.

*Table 4.1 – Examples of activities involving noise effects on people in residential areas*

Activity type	Examples of noise sources	Examples of challenges
<b>Commercial</b>		
Supermarkets, other big box retail	Loading bay noise Large mechanical plant	Loading bays adjoining residential. Mechanical plant in elevated locations.
Service Stations and Truck Stops	Heavy vehicles Car wash	May be in proximity to residential. Night-time activity. Effect of intermittent noises.
Café and restaurants	People outdoors Associated patrons in public areas	Reliance on management to limit noise emissions.
<b>Community facilities</b>		
Indoor recreational e.g. Aquatic centres	Large mechanical plant Car parking areas	Mechanical plant in elevated locations.
Outdoor recreational e.g. parks	People noise Public address systems	People noise is variable and cannot be directly controlled. Exemptions may apply.
Halls, Churches	Music break-out People outdoors	Bass beat may be very distinctive. People noise is variable and cannot be directly controlled. Often located in residential areas.
Schools, Preschools	Noise from children's play	Often located in residential areas.
Emergency Services	Fire siren to notify volunteers	Volunteer notification sirens cannot comply with any limits. Night-time noise emissions on site and on roads.
<b>Other</b>		
Transportation	Road, Rail, Aircraft	See sections 6.0 and 7.0

Table 4.2 – Examples of activities involving noise effects on people in rural areas

Activity type	Examples of noise sources	Examples of challenges
<b>Industrial</b>		
Large industrial – for example dairy processing plants	Rail Loading hard material into steel wagons	Appropriate reverse sensitivity controls – for example a noise control boundary
Large irrigation schemes	Construction Pumps, water in pipes, water falling	24-hour operation
Quarries	Extraction and processing Heavy vehicles on roads	Often established in proximity to rural lifestyle areas.
Contractors yards	Heavy vehicles Workshop activities	Often establish in rural lifestyle areas. Early morning activity. May generate noise with Special Audible Characteristics.
Processing activities	Heavy vehicles Mobile and fixed machinery	Early morning activity.
Freight	Rail Refrigeration containers	24-hour operation.
<b>Commercial</b>		
Airfields	Circuit training	The annoyance response is not well captured by normal $L_{Aeq}$ and $L_{AFmax}$ limits. Role of NZS6805 for minor airfields. Control of sound generated above 500 feet.
Gun Clubs	Gunshots	Not well captured by $L_{Aeq}$ and normal $L_{AFmax}$ limits. Normal limits may permit activities which have significant adverse effects.
Dog Kennels	Animal noise	Dog noise is variable and cannot be directly controlled. Sound may contain Special Audible Characteristics.
Function Venues, Entertainment	Amplified music Patron noise	Often established in residential or rural lifestyle areas. Night-time activity Bass beat may be very distinctive. People noise is variable and cannot be directly controlled.
<b>Other</b>		
Transportation	Road, Rail, Aircraft	See sections 6.0 and 7.0

Any new Plan provisions would need to ensure when assessing these common sources against the Plan, the approach is clear and provides a reasonable outcome. This is not necessarily the case with the current Plan. An example is noise associated with heavy vehicle movements – where the use of  $L_{A10}$  by the current Plan does not always provide a reliable indication of the possible effects of this type of noise source.

## **4.2 Common issues with applying and assessing compliance with the current District Plan rules**

AES met with Selwyn District Council representatives who are involved in the consenting and monitoring and compliance of the Plan to discuss their experiences with the practical application of the current noise rules. We have summarised the feedback provided by the Selwyn District Council, along with our own experience of undertaking assessments in the Selwyn District, in the sections below.

### *Townships*

- As outlined above, the Plan has a night-time noise limit of 35 dB  $L_{A10}$  for noise generated within Living zones. This is a stringent noise limit. The Council staff noted that when they have been investigating noise complaints the background noise level (not considering the noise from the source of the complaint) is often higher than the night-time noise limit anyway, and therefore it is difficult to state conclusively whether the night-time noise limits are met.
- The noise limits do not apply to residential, spiritual or educational activities. However, the Plan definitions do not in every instance make it clear what these specific activities include and therefore it is open to interpretation for each noise source. We understand that any and all activities which occur on a residential property can often be considered as a normal domestic activity (which is exempt from the noise rules). Therefore, the Council's approach to investigating noise complaints focusses on whether 'unreasonable' noise is generated in terms of section 16 of the Resource Management Act (RMA), rather than direct compliance with the Plan noise limits. This includes noise from residential heat pump units, people working in the gardens with chain saws, lawn mowers and similar sources.
- A common source of complaints in residential areas is noise from residential heat pump units. These are commonly free-standing units located close to boundaries. As above, noise from this source is generally considered exempt from the current Plan rules.
- Complaints often occur where there is a Business zone boundary next to a Living zone boundary. An example that was discussed was an existing pet crematorium which installed new furnaces which were louder, resulting in complaints from the residential neighbours.

### *Rural*

- Typical examples of activities that have resulted in complaints in the Rural zones that were discussed included alarms from cow sheds, motorbikes, wedding venues, trucks starting and idling, and gas guns used as bird scaring devices.
- As stated above there are specific rules within the District Plan for noise from audible bird scaring devices (such as gas guns), which includes an overall noise limit and a limitation of the number of events. Council noted that it is difficult to determine how the restriction on the number of events should apply. For example, on large sites does this only apply to a certain portion of the site? Alternatively, how does this apply if one property is affected by a number of different sources?

### *General*

- As noted above, in both the Rural and Township areas there are a number of activities which are exempt from the noise limits. However, these activities are often the source of complaints. Therefore, for many complaints received, Council is not able to make a direct comparison to the District Plan noise limits.
- In some cases, it is difficult to determine whether a penalty for Special Audible Characteristics should apply due to the subjectivity involved. An example that was discussed was for a Kart Club that was being established. The Kart Club were insisting

that the noise levels would be of a similar character to general traffic on roads, while the neighbours were concerned that there would be a high frequency whine associated with them.

- It was noted that complaints regarding NZDF activities have reduced significantly, since the NZDF have been engaging with the public more about when such activities are going to occur.
- There is no reference to the New Zealand Construction Noise Standard (NZS6803:1999 *Acoustics – Construction Noise*) in the current Plan and construction noise is not exempt from the Township noise limits. Currently the Council can enforce Conditions of Consent relating to construction for subdivisions and other developments which require Resource Consents, but for individual dwellings this is not captured. Council staff currently use NZS6803:1999 as a reference point and in particular find the timeframes set out within it a useful tool to discuss with the complainants the typical high noise times. A common source of noise complaints is concrete pours in Living zones – which are typically one off high noise events which happen in the early hours of the morning.
- The noise limits within the Township Volume of the Selwyn District Plan apply at any point beyond the boundary of the site where the noise is generated. Consideration should be given to whether it is appropriate to change to the approach used in other Districts where the relevant noise limits are determined by the zoning of the site receiving the noise. This would potentially allow the noise rules to be simplified. The rules could also then be altered to ensure noise limits do not apply at the common boundary between a noise sensitive site and a road or rail corridor (however this would also require a change to the way roads and other transport corridors are treated in the Plan).

Based on the above, it appears that while the current Plan noise controls are relatively extensive and provide a reasonable outcome when applied in many common sources, several features of the current rules, for example the exclusions and omissions, limit their usefulness in many practical situations.

## 5.0 CROSS BOUNDARY CONSISTENCY

In order to determine how the noise provisions in the Plan relate to approaches taken in other Districts we have compared the key noise controls to those in Christchurch, Ashburton, Hurunui and Waimakariri. Each of these Districts have slightly different approaches to the management of noise and address different noise sources.

We have considered three key zones which are present in each District – being Residential / Living, Rural, and Business / Industrial – and their comparison to each other, as well as the recommended limits in NZS 6802:2008.

Christchurch and Ashburton Districts have gone through a review process more recently (2017 and 2014 respectively) and therefore refer to the current Standards NZS 6801:2008 and NZS 6802:2008 and use  $L_{Aeq}$  as the main noise descriptor. We note that the Waimakariri and Hurunui District Plans still refer to NZS 6801:1991 and NZS 6802:1991 and therefore use  $L_{A10}$  as the main noise descriptor. Therefore, when comparing provisions greater weight has been given to the Christchurch and Ashburton plan provisions which are more up to date.

### 5.1 Residential / Living zones

NZS6802:2008 includes the following guidelines for the “reasonable protection of health and amenity associated with the use of land of residential purposes”:

- Daytime 0700 to 2200 hours – 55 dB  $L_{Aeq}$  (15 min)
- Night-time 2200 to 0700 hours – 45 dB  $L_{Aeq}$  (15 min) / 75 dB  $L_{AFmax}$
- Optional Evening 1900 to 2200 hours – 50 dB  $L_{Aeq}$  (15 min)

Table 5.1 below summarises the current noise limits outlined in the various District Plans for the Residential/Living zones.

Table 5.1 – Residential zone noise limits within District Plans

District	Daytime		Night-time	
	Time period	Noise limit	Time period	Noise limit
Selwyn	0730 – 2000 hours	50 dB $L_{A10}$ / 85 dB $L_{AFmax}$	2000 – 0730 hours	35 dB $L_{A10}$ / 70 dB $L_{AFmax}$
Christchurch	0700 – 2200 hours	50 dB $L_{Aeq}$	2200 – 0700 hours	40 dB $L_{Aeq}$ / 65 dB $L_{AFmax}$
Ashburton	0700 – 2200 hours	50 dB $L_{Aeq}$ (1 hr) / 75 dB $L_{AFmax}$	2200 – 0700 hours	40 dB $L_{Aeq}$ (1 hr) / 65 dB $L_{AFmax}$
Waimakariri	0700 – 1900 hours Monday to Saturday 0900 – 1900 hours Sunday & Public Holidays	50 dB $L_{A10}$	All other times $L_{AFmax}$ 2200 – 0700 hours	40 dB $L_{A10}$ / 70 dB $L_{AFmax}$
Hurunui	0700 – 1900 hours	55 dB $L_{A10}$	1900 – 0700 hours $L_{AFmax}$ 2200 – 0700 hours	45 dB $L_{A10}$ / 75 dB $L_{AFmax}$

We have the following general observations:

- Daytime noise limits range from 50 to 55 dB  $L_{Aeq}$  /  $L_{A10}$ . These limits are more stringent than or in line with the noise level considered reasonable for residential areas in NZS 6802:2008. In addition, the World Health Organisation recommends a guideline noise limit of 55 dB  $L_{Aeq}$  (16 hours) to ensure few people are seriously annoyed in residential situations, and a limit of 50 dB  $L_{Aeq}$  (16 hours) to ensure few people are moderately



annoyed. Therefore, for continuous activities this guidance also suggests that noise levels of 50 to 55 dB  $L_{Aeq} / L_{A10}$  are reasonable.

- Night-time noise limits range from 35 to 45 dB  $L_{Aeq} / L_{A10}$  (with three out of the five Districts nominating a 40 dB  $L_{Aeq}$  noise limit). NZS6802:2008 and the World Health Organisation recommend a guideline night-time noise limit of 45 dB  $L_{Aeq}$  to allow occupants to sleep with windows open.
- NZS6802:2008 states that for night-time noise exposure a maximum noise limit ( $L_{AFmax}$ ) should be applied to protect the majority of people from being woken during the night. It also states that  $L_{AFmax}$  noise limits should only be set for night-time hours and a 75 dB  $L_{AFmax}$  noise limit is recommended. Christchurch, Hurunui, and Waimakariri District Plans do not include  $L_{AFmax}$  noise limits during the daytime period, in line with this guidance. The  $L_{AFmax}$  night-time noise limits range from 65 dB  $L_{AFmax}$  in Christchurch and Ashburton, to 75 dB  $L_{AFmax}$  in Hurunui.
- The time periods when the day / night time noise limits apply varies between the adjoining Districts. All Districts apart from Selwyn start daytime at 0700 hours, with the onset of the night-time period varying from 1900 to 2200 hours. We note that both NZS6802:2008 and the WHO guidelines suggest there should be a total of 16 hours of daytime. This guidance has been adopted in the Christchurch and Ashburton Districts.

Based on this analysis, key issues warranting further consideration include:

- The use of a  $L_{Aeq}$  rather than the  $L_{A10}$  parameter in line with the 2008 standards
- Retention of a daytime noise limit of 50 or 55 dB  $L_{Aeq}$
- Revision of the currently restrictive 35 dB  $L_{A10}$  night-time noise limit to 40 or 45 dB  $L_{Aeq}$
- Modification of the day / night time periods

## 5.2 Rural zones

The recommended noise limits outlined in section 5.1 for the reasonable protection of amenity for residential purposes in NZS 6802:2008 also apply at the notional boundary in Rural zones. It is common for Rural zone noise limits to apply at the notional boundary of dwellings. This concept is discussed in NZS 6802:2008 where it stated that *'in rural environments it is generally dwellings or land in the vicinity of dwellings that require the greatest level of protection.'*

Table 5.2 below summaries the current noise limits outlined in the various District Plans for Rural zones.

Table 5.2 – Rural zone noise limits within District Plans

District		Daytime		Night-time	
		Time period	Noise limit	Time period	Noise limit
Selwyn	Notional	0730 – 2000 hours	60 dB $L_{A10}$ / 85 dB $L_{AFmax}$	2000 – 0730 hours	45 dB $L_{A10}$ / 70 dB $L_{AFmax}$
	Living zone boundary		55 dB $L_{A10}$ / 85 dB $L_{AFmax}$	2000 – 0730 hours	40 dB $L_{A10}$ / 70 dB $L_{AFmax}$
Christchurch	Notional	0700 – 2200 hours	50 dB $L_{Aeq}$	2200 – 0700 hours	40 dB $L_{Aeq}$ / 65 dB $L_{AFmax}$
	Boundary		55 dB $L_{Aeq}$		45 dB $L_{Aeq}$ / 70 dB $L_{AFmax}$
Ashburton	Notional	0700 – 2200 hours	50 dB $L_{Aeq}$ (1 hr) / 75 dB $L_{AFmax}$	2200 – 0700 hours	40 dB $L_{Aeq}$ (1 hr) / 65 dB $L_{AFmax}$
	Boundary		65 dB $L_{Aeq}$ (1 hr) / 85 dB $L_{AFmax}$		45 dB $L_{Aeq}$ (1 hr) / 70 dB $L_{AFmax}$
Waimakariri	Notional	0700 – 1900 hours Monday to Saturday 0900 – 1900 hours Sunday & Public Holidays	50 dB $L_{A10}$	All other times $L_{AFmax}$ 2200 – 0700 hours	40 dB $L_{A10}$ / 70 dB $L_{AFmax}$
Hurunui	Notional	0700 – 1900 hours	55 dB $L_{A10}$	1900 – 0700 hours $L_{AFmax}$ 2200 – 0700 hours	45 dB $L_{A10}$ / 75 dB $L_{AFmax}$

We have the following general observations:

- Christchurch and Ashburton also include noise limits at both the notional and site boundary for rural dwellings – with the boundary noise limit in Christchurch being of a similar order to that put in place at the notional boundary in other Districts.
- There is an additional control in the Selwyn Plan for noise generated in the Rural zone when received at a Living zone boundary. This limit is less stringent than those outlined in table 5.1 for noise generated within the Living zone properties themselves. We note that for the other Districts, the noise limits of the receiving zone apply at the boundary of receiving sites and therefore the residential noise limits described in section 5.1 would apply at Living zoned boundaries regardless. Selwyn's approach is particularly inconsistent in this respect and should be considered further.
- The notional boundary noise limits in all of the Districts (apart from Selwyn) are the same as those at the Residential / Living zone boundaries. Again, Selwyn's approach in this area should be considered further.
- The daytime noise limits in the Plan are higher than those in all other Districts and those recommended in NZS6802:2008. However, the Selwyn District Plan notes that the Rural zone is recognised principally as a business area rather than a residential area. The 60 dB  $L_{A10}$  noise limit is in line with recommendations for Business zones discussed below.
- The time periods when the day / night time noise limits apply are the same as in the Residential / Living zones.
- The noise limits for the Rural zones within the Selwyn District Plan also apply at the notional boundary of education, rest home and classroom facilities. These facilities do

not have this level of protection in the Hurunui or Waimakariri District Plans; however, the site boundary rule in Ashburton and Christchurch ensures that the levels received at these facilities is appropriate.

Based on this analysis, key issues warranting further consideration include:

- The use of a  $L_{Aeq}$  rather than the  $L_{A10}$  parameter in line with the 2008 standards
- Revision of the currently lenient 60 dB  $L_{A10}$  night-time noise limit to 50 or 55 dB  $L_{Aeq}$
- Modification of the day / night time periods
- Consideration of the notional boundary / Living zone boundary approach

### **5.3 Business / Industrial zones**

We note that the noise limits for Business / Industrial zones vary depending on the type of activities they allow (including whether any type of residential or visitor accommodation activity is permitted). Some examples of these noise limits are shown in table 5.3 below.

Table 5.3 – Business / Industrial zone noise limits within District Plans

District	Zone	Daytime		Night-time	
		Time period	Noise limit	Time period	Noise limit
Selwyn	Business 1 & 3	0730 – 2000 hours	60 dB LA10 / 85 dB LAfmax	2000 – 0730 hours	45 dB LA10 / 70 dB LAfmax
			Living zones: 55 dB LA10 / 85 dB LAfmax		Living zones: 40 dB LA10 / 70 dB LAfmax
	Business 2 (Industrial)	0730 – 2000 hours	65 dB LA10 / 85 dB LAfmax	2000 – 0730 hours	45 dB LA10 / 70 dB LAfmax
			Living zones: 55 dB LA10 / 85 dB LAfmax		Living zones: 40 dB LA10 / 70 dB LAfmax
Christchurch	Commercial	0700 – 2200 hours	55 dB LAeq	2200 – 0700 hours	45 dB LAeq / 70 dB LAfmax
	Industrial Park / Office		55 dB LAeq		45 dB LAeq / 70 dB LAfmax
	Industrial General		70 dB LAeq		70 dB LAeq
	Industrial Heavy		75 dB LAeq		75 dB LAeq
Ashburton	Business A	0700 – 2200 hours	55 dB LAeq (1 hr) / 80 dB LAfmax	2200 – 0700 hours	45 dB LAeq (1 hr) / 70 dB LAfmax
	Business B & C		60 dB LAeq (1 hr) / 85 dB LAfmax		50 dB LAeq (1 hr) / 75 dB LAfmax
	Business D, E & F (Industrial)		65 dB LAeq (1 hr) / 90 dB LAfmax		55 dB LAeq (1 hr) / 80 dB LAfmax
Waimakariri	Business 1, 2 & 5	At all times	65 dB LA10	At all times LAfmax 2200 – 0700 hours	65 dB LA10 / 75 dB LAfmax
Hurunui	Business	0700 – 1900 hours	55 dB LA10	1900 – 0700 hours LAfmax 2200 – 0700 hours	45 dB LA10 / 75 dB LAfmax
	Industrial	At all times	75 dB LA10	At all times	75 dB LA10

NZS 6802:2008 also includes various recommendations for different business / industrial use areas as follows:

- Limits of up to 75 dB LAeq (15 min) may be appropriate for heavy industrial areas.
- For town centres / mixed use zones there is tension between enabling activities which would typically be desired within the zones (such as hospitality) while also protecting the health and amenity of people who live within these zones. Generally, an external noise limit of up to 60 dB LAeq (15 min) during the day is appropriate in these areas. Where there is existing residential a night-time noise limit of 45 dB LAeq remains appropriate; however, if it is a new area where there is no existing residential development this could be increased with the requirement for any new dwelling to include a certain level of sound insulation.

The World Health Organisation recommends a 24-hour noise limit of 70 dB LAeq for “industrial, commercial, shopping and traffic areas.”

The Selwyn and surrounding Districts include daytime noise limits ranging from 55 dB  $L_{Aeq} / L_{A10}$  for the smaller scale retail/commercial areas to 75 dB  $L_{Aeq} / L_{A10}$  for heavy industrial. The night-time limits range from 45 dB  $L_{Aeq} / L_{A10}$  to 75 dB  $L_{Aeq} / L_{A10}$  for heavy industrial.

Additional controls are provided within the Plan for noise generated in Business / Industrial areas received at Living zones or notional boundaries of Rural zone properties. These limits differ from those which apply between Living or Rural zone properties. As discussed above, in other Districts typically the noise limits of the receiving zone apply at the boundary of the receiving site.

## 5.4 Specific activities

As discussed in section 2.0, the Plan includes a number of rules for specific activities which commonly occur within the District. We have therefore also considered how the surrounding Districts approach these noise sources (in addition to noise from construction), as follows:

### Aircraft

All four of the surrounding Districts include specific rules for noise from aircraft (being fixed wing and helicopters), as follows:

- *Christchurch* – Detailed rules are provided for Christchurch International Airport, which requires noise levels to be in line with the contours shown on the Planning Maps. Further discussion of the CIAL noise rules is provided below in section 6.0. In addition, there are specific requirements for helicopter movements outside of the Specific Purpose (Airport) Zone, as follows:
  - Shall only occur between 0800 and 1800 hours unless the helicopter movements take place further than 450 metres from a residential unit.
  - Within 25 metres of any residential unit no helicopter movements shall take place, unless the unit is on the site which the landing or take-off occurs.
  - Between 25 and 450 metres from a residential unit the number of helicopter movements on a site shall not exceed 24 in any calendar year, or 10 in any month, or 6 in any week, unless than unit is on the site on which the landing / take-off occurs.
- *Ashburton* – Noise from any helicopter landing pad shall comply with NZS6807:1994 *Noise Management and Land Use Planning for Helicopter Landing Pads*. Noise from aircraft shall comply with NZS6805:1992 *Airport Noise Management and Land Use Planning*.
- *Hurunui* – Noise associated with use of land for aviation purposes, including circuit, take-off and landing approach flight operations shall not exceed the limits in Table 1 below, when assessed in accordance with the provisions NZS6807: 1994 *Noise Management and Land Use Planning for Helicopter Landing Areas*. For the purposes of this rule clauses 1 to 4 of NZS 6807:1994 shall not apply.

Affected land use	$L_{dn}$ (dBA)	$L_{max}$ night-time (dBA)
Industrial	75	n/a
Commercial	65	n/a
Residential	50	70
Rural (at notional boundary)	50	70
Residential (internal)	40	55

- *Waimakariri* – Noise associated with helicopter landing sites shall be measured and assessed in accordance with the provisions of NZS 6807:1994 *Noise Management and*

*Land Use Planning for Helicopter Landing Sites*, and shall not exceed the following noise levels:

- Business 1 & 2 zones: Edn 100 Pa2s and 65 dBA  $L_{dn}$
- Business 3 Zone: Edn 1000 Pa2s and 75 dBA  $L_{dn}$
- Residential Zone: Edn 3.5 Pa2s and 50 dBA  $L_{dn}$  and between 2200 and 0700 hours 70 dBA  $L_{max}$ .
- At the notional boundary of dwelling in the rural zone: Edn 3.5Pa2s and 50 dBA  $L_{dn}$  and between 2200 and 0700 hours 70 dBA  $L_{max}$

#### Audible bird scaring devices

A summary of the rules in the Christchurch, Hurunui and Ashburton District Plans is provided in table 5.4 below. The Waimakariri District Plan does not include any specific rules for audible bird scaring devices.

*Table 5.4 – Audible bird scaring device rules within District Plans*

District Plan	Operation time	Minimum distance	Noise limit	Limitation on timing	Limitation on number
Christchurch	Sunrise and sunset	200 metres from notional boundary of dwelling	65 dB $L_{AE}$ at notional boundary	n/a	n/a
Ashburton	Hours of daylight (not before 0630 hours)	n/a	65 dB $L_{AE}$ at notional or residential zone boundary	15 in 60-minute period	One device per four hectares
			90 dB $L_{AE}$ at public space		
Hurunui	Sunrise and sunset	200 metres from an urban area	65 dB $L_{AE}$ at notional boundary	n/a	n/a

#### Temporary military training activities

Specific rules for temporary military training activities are provided in all of the assessed District Plans. The noise limits associated with temporary military events are discussed in section 8.0 below.

#### Blasting

Neither the Ashburton nor the Waimakariri District Plans include any specific noise rules for blasting. The Hurunui and the Christchurch District Plans include the following:

- *Christchurch* – The noise from blasting is only addressed specifically within the Specific Purpose (Lyttelton Port) Zone where for port quarrying activity airblast overpressure associated with quarrying shall not exceed 120 dB  $L_{Zpeak}$  within the notional boundary of any dwelling.
- *Hurunui* – Airblast overpressure from blasting on any land shall not exceed a peak non-frequency-weighted (linear or flat) level of 115 dB, provided this level may be exceeded on up to 5 % of the total number of blasts over a period of 12 months. The level should not exceed 120 dB ( $L_{in peak}$ ) at any time.

### Powered watercraft

The surrounding Districts do not include specific noise limits for powered watercraft on bodies of water.

### Construction noise

Currently noise from construction activities is excluded from the Rural Volume noise limits within the Selwyn Plan, with no exclusions in the Township Volume. All of the surrounding District Plans comment on noise from construction, as follows:

- *Christchurch* – Construction activities shall meet relevant noise limits in Tables 2 and 3 of NZS 6803:1999 *Acoustics – Construction noise*, when measured and assessed in accordance with that standard.
- *Ashburton* – Construction noise shall comply with NZS 6803:1999 *Acoustics – Construction Noise*
- *Hurunui* – Construction noise shall not exceed the recommended limits in, and shall be measured and assessed in accordance with, the provision of NZS 6803P:1984 *The measurement and assessment of noise from construction, maintenance and demolition work*.
- *Waimakariri* – Construction noise in any zone shall not exceed the recommended limits specified in, and shall be measured and assessed in accordance with, the provision of NZS 6803:P1984 *Measurement and Assessment of Noise from Construction, Maintenance, and Demolition Work*. Adjustments and exemptions provided in clause 6 of NZS 6803: P1984 shall apply.

### Temporary activities

Noise from temporary events is excluded from the Rural Volume noise limits if the events occur infrequently, with no other provisos. Christchurch and Ashburton Plans also include specific rules for temporary events, as follows:

- *Christchurch* – There are individual rules for specific areas. There is also an overarching rule for all other temporary activities outlining the following restrictions:
  - The events shall be located no closer than 30 metres from any residential unit;
  - The events shall undertake sound amplified activities for a total duration not exceeding 4 hours per day on any site, including all sound checks; and
  - Shall occur only between 0900 and 2200 hours and for sound amplified activities, either have a total amplified sound power not exceeding 500 Watts RMS, or result in a sound level not exceeding 65 dB  $L_{Aeq}$  at any residential unit.
- *Ashburton* – Noise from outdoor events in a public place is exempt from the general noise rules provided that they do not exceed a noise limit of 70 dB  $L_{Aeq}$  (1hr) when measured at the boundary of any site containing a residential unit, all activities cease by 2200 hours, and there are no more than 6 events (days) on the site in any one calendar year.

### Frost Fans

The Selwyn Plan currently does not include specific rules for frost fans. A summary of the rules in the Christchurch, Ashburton and Hurunui District Plans is provided below. The Waimakariri District Plan does not include any specific rules for frost fans.

- *Christchurch & Ashburton* – Any noise generated by a frost fan 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 applied to the total noise from all frost fans in the area

operating simultaneously and includes a correction for Special Audible Characteristics (SAC) (i.e. no further penalty is required).

- *Hurunui* – Any noise generated by a frost fan shall not exceed 55 dB  $L_{Aeq}$  (10 min) when assessed at the notional boundary of any residential unit on a separate site under different ownership. This is the cumulative noise from all frost fans within 1 km of the dwelling house and includes a correction for SAC (i.e. no further penalty is required). In addition, there is a restriction on any frost fan being within 300 metres to a dwelling on a separate lot, or within 300 metres of an urban area.

We do not see any particular reason why the current provisions for specific activities within the District should not be carried through to the Proposed Plan in some form, as they are likely to still be relevant for the type of activities which occur within the District.

We also note the following:

- *Construction* – We consider it appropriate that some reference to NZS6803: *Acoustics – Construction noise* is included within the Plan.
- *Temporary activities* – The appropriateness of the blanket exemption in the Plan should be considered. It may be appropriate to include some additional limitations on temporary activities, such as those which appear in the Christchurch and Ashburton Plans.
- *Frost fans* – We understand frost fans are not prevalent in the District and that may be the reason that there is not a specific rule in the current Plan. If during the Plan review process noise from frost fans is identified as an issue, a rule similar to those in the surrounding Districts would likely be appropriate.



## 6.0 CHRISTCHURCH INTERNATIONAL AIRPORT

Due to the proximity of Christchurch International Airport to the Selwyn District, it is important to ensure the airport can operate whilst appropriately managing effects to noise sensitive activities.

We have been requested to provide a review of the noise controls in the Plan in relation to CIAL and advise on the currency and effectiveness of those provisions, and the extent to which they are consistent with Christchurch City and Waimakariri District.

### 6.1 Operative District Plan rules

Rule 3.8.1 of the Plan permits new buildings or additions to existing buildings (which will be used as any dwelling, any building designed or intended to be used for visitor accommodation, any community facility, any educational facility, or any retail premises or office space) within the 55 dBA  $L_{dn}$  noise contour if designed to meet specific dBA SEL and dBA  $L_{dn}$  internal noise levels which are listed in a table in Appendix 20 of the Rural Volume. Any activity which does not comply with Rule 3.8.1 is a non-complying activity.

The 55 dBA  $L_{dn}$  contour is shown in the District Planning Maps and only covers approximately 20 properties within the District, located within the Rural Zone. The District Planning Maps also include the 50 dBA  $L_{dn}$  contour. There are no specific noise rules associated with the 50 dBA  $L_{dn}$  contour; however, there are policies which state residential development should be avoided, and that there should be a limitation on residential density within this contour.

Appendix 20 of the Selwyn Plan also outlines the following requirements:

1. *Consent applications must contain a report detailing the calculations showing how the required sound insulation and construction methods have been determined.*
2. *For the purpose of sound insulation calculations, the external noise levels for a site shall be determined by application of the airport noise contours. Where a site falls within the contours, the calculation shall be determined by linear interpolation between the contours.*
3. *If required as part of the final building inspection, the sound transmission of the façade shall be tested in accordance with ISO 140-5 Acoustics-Measurements of sound insulation in buildings and of building elements – Part 5 Field measurements of airborne façade elements and facades, or ASTM E336-97 Standard Test Method for Measurement of Airborne Sound Insulation in Buildings to demonstrate that the required façade sound insulation performance has been achieved. A test report is to be submitted. Should the façade fail to achieve the required standard then it shall be improved to the required standard and re-tested prior to occupation.*

### 6.2 Comparison with other Districts

Sound insulation requirements are also included within the Christchurch District Plan and the Waimakariri District Plan as the CIAL noise contours also extend into these Districts. After reviewing the sound insulation rules within these Plans, we note the following:

- The noise limits outlined in the table in Appendix 20 of the Plan are consistent with those in the Christchurch and Waimakariri Plans, noting that the Waimakariri Plan does not include internal noise level requirements for hospitals and healthcare facilities.
- All three Plans include a sound insulation rule for the single event level (SEL) and average noise ( $L_{dn}$ ) parameters. The Plans also state that where a site falls within the contours the noise level at the site shall be determined by linear interpolation. All Districts include the 50 and 55 dB  $L_{dn}$  contours on their respective Planning Maps, so an  $L_{dn}$  level can be determined by linear interpolation. However, only the Waimakariri District Plan provides 85 and 90 dB  $L_{AE}$  contours for the 747-200 aircraft to be able to calculate an SEL value by linear interpolation.

- The Christchurch Plan also includes a statement regarding testing if required by the Council. This refers to ISO 16283-3:2016 *Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 3: Façade sound insulation*. The Waimakariri District Plan does not include any comment on testing requirements.

### 6.3 Discussion

Point 3 in Appendix 20 of the Plan noted in section 5.1 above includes a requirement for the façade of the dwelling to be tested if required. In regard to the standards which are referenced, we note that ISO 140-5 *Acoustics – Measurements of sound insulation in buildings and of building elements – Part 5 Field measurements of airborne façade elements and facades* has been withdrawn and replaced by ISO 16283-3:2016 *Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 3: Façade sound insulation* (which is referred to in the Christchurch District Plan). ASTM E336-97 *Standard Test Method for Measurement of Airborne Sound Insulation in Buildings* details methods for testing noise transmission between internal spaces, and therefore would not be applicable to this situation where the testing is for external façades

While a rule for testing is also included within the Christchurch Plan, we note that in practice it may be a relatively difficult process to carry out, as the standard either requires measurements to be taken inside and outside the dwelling during a worst-case aircraft flyover, or by installing an external speaker at high level and measuring the resultant internal noise levels (which is practically difficult).

Including an additional  $L_{AE}$  contour on the Planning Maps would assist with calculating an SEL level by linear interpolation. This would assist with calculations to determine what is required to achieve the SEL levels outlined in Appendix 20 of the Plan. As the portion of the District which is affected is directly off the end of the main runway, the SEL levels may be particularly relevant.

## 7.0 NZTA GUIDELINES

The noise effects from State Highway networks throughout the District are also of relevance. We have therefore been requested to review the NZTA Guidelines / requirements with regard to the management of noise effects on land adjoining State Highways, and its potential application to the Plan. We note that the Project Scope has requested comment on the extent that the NZTA Guidelines “conform to NZS 6801 and NZS 6802”. As outlined above, NZS6801 describes methods for undertaking noise measurements, and so its scope is completely different to that of the NZTA Guidelines. NZS 6802 specifically excludes traffic noise and so has no relevance to the NZTA Guidelines.

### 7.1 Buffer and Effects areas

The NZTA document ‘*Guide to the management of effects on noise sensitive land use near to the state highway network*’, version 1.0, dated September 2015, provides recommendations to manage the reverse sensitivity effects to the State Highway. The key method which is discussed is to introduce a ‘buffer’ and an ‘effects’ area alongside the State Highways. NZTA have provided a calculation for determining the specific buffer and effects areas based on the number of vehicles, speed, road surface, and the like; however, in most situations the maps provided on the NZTA website can be used to determine the distance of each area for a specific site.

#### Buffer area

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

For rural areas NZTA recommends that all noise sensitive activities should be located outside of a buffer area, providing a setback from the State Highway. In urban areas, noise sensitive activities may be allowed in the buffer area, subject to additional vibration controls.

#### Effects area

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

For dwellings located within the effects areas an internal noise level of 40 dB L<sub>Aeq</sub> (24 hours) is recommended for both sleeping and living spaces. This noise measurement parameter is an A-weighted, time averaged noise level over 24 hours, and is based on NZS 6806:2010 and NZS 2107:2000. Internal noise level recommendations are also provided for educational, health and cultural buildings.

An effects based approach, based on achieving appropriate internal noise levels has been specified rather than a façade reduction, as this takes into account the actual road traffic noise level outside a building. This approach is consistent with NZS 6806:2010 *Acoustics – Road-traffic noise – New and altered roads*.

### 7.2 NZTA recommendations for District Plans

The NZTA document includes specific guidance regarding how their recommendations should be integrated into District Plans. Ideally, they would like to have the buffer and effects area overlaid on individual District Plan maps. These overlays would then be accompanied by rules as follows:

Either:

- *New buildings or alterations to existing buildings containing noise sensitive activities must be at least 40 metres from the edge of the state highway carriageway and there is an existing solid and continuous building, fence, wall or landform that blocks the line of sight from all parts of all windows and doors to the new or altered habitable spaces to any part of the road surface of the state highway. This excludes unaltered existing spaces.*

Or:

- *New buildings or alterations to existing buildings containing noise sensitive activities, in or partly in the state highway buffer area must be designed, constructed and maintained to achieve road-traffic vibration levels complying with class C of NS 8176E:2005.*
- *New buildings or alterations to existing buildings containing noise sensitive activities, in or partly in the state highway buffer area or effects area must be designed, constructed and maintained to achieve the indoor design noise levels from road-traffic set out in (reference table).*
- *If windows must be closed to achieve the design noise levels in [C], the building must be designed, constructed and maintained with a ventilation and cooling system.*
- *A design report prepared by a suitably qualified and experienced acoustics specialist must be submitted to the council officer demonstrating noise and vibration compliance prior to the construction or alteration of any building containing a noise sensitive activity in or partly in the state highway buffer area or effects area. The design must take into account the future permitted use of the state highway; for existing roads this is achieved by the addition of 3 dB to existing measured or predicted noise levels.*

### 7.3 Current application in District Plans

#### Selwyn District Plan

The operative Selwyn District Plan already includes a number of rules to manage reverse sensitivity noise effects from State Highways 1, 73 and 77, which pass through the Selwyn District. The primary controls contained in these rules are outlined in table 7.1 below.

*Table 7.1 – District Plan rules associated with reverse sensitivity from State Highways*

Volume	Zone	Buffer	Effects	Internal noise levels
Townships	Except for L3 at Rolleston, ODP 3 and 8 in Rolleston and L2A in Darfield	40 metres	100 metres	35 dB LAeq (24 hours) in bedrooms 40 dB LAeq (24 hours) in living rooms
	Living 2A in Darfield	20 metres	80 metres	NZS2107:2000
	ODP 3 and 8 in Rolleston	40 metres	100 metres	NZS2107:2000
	Living 3 at Rolleston	80 metres	n/a	n/a
Rural	Rural	20 metres	n/a	n/a

However, we note that there are a number of other rules within the Plan for specific areas including Outline Development Plans, subdivision rules, and the like. For example, ODP 7 & 8 and the West Melton subdivision rules all require a bund along the frontage of the State Highway in addition to a setback of 40 metres.

#### Christchurch District Plan

Christchurch District Plan rule 6.1.7.2.1 *Sensitive activities near roads and railways*, includes requirements for noise sensitive activities within 80 metres of State Highways and Railway designations, 20 metres from Collector Roads, and 40 metres from Distributor and Arterial Roads. There is also a minimum setback distance of 30 metres from State Highways and Arterial roads within Rural zones.

This results in an 'effects area' of 80 metres from the boundary of any State Highway where the building can either be designed and constructed to achieve a minimum external to internal noise

reduction of  $30 \text{ dB } D_{tr,2m,nT,w} + C_{tr}$  to any habitable space, or a minimum internal noise level of  $40 \text{ dB } L_{Aeq} (24 \text{ hours})$  within all habitable spaces. The  $40 \text{ dB } L_{Aeq} (24 \text{ hours})$  internal noise level is in line with the NZTA recommendations.

## 7.4 Discussion

The Plan rules in relation to traffic noise reverse sensitivity effects are largely based on the previous guidance from NZTA<sup>3</sup> which has been superseded by the NZTA document *Guide to the management of effects on noise sensitive land use near to the state highway network* published in September 2015. The most recent guidance includes a change to a calculation method for determining the extent of buffer / effects areas, and revising the internal noise level requirements from  $35 \text{ dB } L_{Aeq} (24 \text{ hours})$  within bedrooms and  $40 \text{ dB } L_{Aeq} (24 \text{ hours})$  within other habitable rooms to  $40 \text{ dB } L_{Aeq} (24 \text{ hours})$  in all living and sleeping spaces. As this document is the most recent guidance available, it would be good practice for any specific noise rules within the Plan to be consistent with it.

With regard to the application of the buffer and effects areas overlaid on the District Plan Planning Maps, items to consider include:

- Whether there are remaining areas of potential development in the District where such overlays will be relevant for, or if the majority of development adjacent to the State Highways has been completed.
- How to account for bunds or physical mitigation that have been implemented specifically to reduce noise levels (such as those currently required as part of ODP or subdivision rules).
- Whether requirements for setbacks continue to be appropriate without the need for such setbacks to be shown on maps.

In addition, there is currently an inconsistency between the Selwyn District Plan rules for Rural and Living zones. In Rural zones as long as the dwelling is built more than 20 metres from the State Highway there are no specific requirements. The specific buffer and effects areas for a site are not related to whether the property is located within Rural or Living zones; therefore, if the updated NZTA Guidelines are to be adopted within the Plan we would consider it reasonable to be consistent between both the Rural and Township Volumes.

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<sup>3</sup> Transit Planning Policy Manual version 1, Appendix 5D – Reverse Sensitivity, dated 1<sup>st</sup> of August 2007

## 8.0 NEW ZEALAND DEFENCE FORCE

As requested we have reviewed the document titled *Comments on Selwyn District Plan review* as prepared by the New Zealand Defence Force and dated the 14<sup>th</sup> of June 2017 with respect to noise from Temporary Military Training Activities (TMTA). We note that the document includes comment on other aspects of New Zealand Defence Force (NZDF) activities located within the Selwyn District including the West Melton Rifle Range and Burnham Camp. The noise emissions from these locations are largely dealt with through designations. This review is limited to noise from TMTA, which could take place anywhere within the District. We contacted the two nominated defence force representatives who were to provide a copy of a technical acoustic assessment upon which that document is based; however, this had still not been received at the time of writing this report.

Based on our experience, and our review of other District Plan rules and the document prepared by the NZDF we have the following comments regarding a best practice approach to the management of noise arising from TMTA:

- NZDF proposes a two-tiered approach for weapons firing and explosions – meeting conservative separation distances from sensitive receivers, and where these separation distances cannot be met, instead meeting applicable noise standards. This seems a reasonable approach, and has been adopted in the recently updated Christchurch Plan.
- We agree that using a standard separation distance has the advantage of being an easy rule to apply and monitor. However, we recommend that further investigation is undertaken regarding the basis for the specific separation distances proposed by the NZDF of 500 metres between 0700 and 1900 hours and 1,250 metres between 1900 and 0700 hours. Particularly as it appears that the Christchurch Plan has implemented significantly greater setbacks – 1,500 and 4,500 metres. As noted above we understand that there is a technical acoustic assessment completed for the NZDF and therefore we would want to review this prior to providing further comment as to the acceptability of the proposed rules.
- We note that the proposed noise standards are presented in terms of peak levels dB  $L_{Cpeak}$ . In our experience, the dB  $L_{AFmax}$  parameter has recently been more commonly used in New Zealand in relation to noise from firearms. As a general rule of thumb the 95 dB  $L_{Cpeak}$  and 85 dB  $L_{Cpeak}$  recommended would be approximately 65 dB  $L_{AFmax}$  and 55 dB  $L_{AFmax}$ .
- As stated in section 2.0 the current noise limits within the Plan include a  $L_{A10}/L_{Aeq}$  and an  $L_{AFmax}$  parameter – with the  $L_{AFmax}$  noise limits significantly greater than those stated above. We note that the Living zone limits are in line with those in the Hurunui Plan; however, the more recently updated Ashburton and Christchurch Plans include only a 65 dB  $L_{AFmax}$  daytime and 50 dB  $L_{AFmax}$  night-time noise limit. The Waimakariri Plan includes temporary military training activity as an exemption to the general noise limits, with no specific alternative restrictions.
- NZDF proposes that noise from mobile sources (vehicles, earth-moving equipment), stationary sources (generators or water pumps) and helicopters will comply with three different noise standards: *NZS6803:1999 Acoustics – Construction Noise*, *NZS6802:2008 Acoustics – Environmental Noise* and *NZS6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas* respectively. Whilst these may be appropriate standards for assessing the particular types of noise it will be complicated to assess and difficult to isolate the different sources to assess the noise – particularly with regard to fixed and mobile equipment.
- We expect that the majority of the fixed and mobile noise sources would be able to comply with the general Plan noise limits (as opposed to other specific standards), and any specific construction noise could be covered under an overarching rule within the Plan relating to construction. However, we agree that the use of *NZS6807: 1994 Noise*

*Management and Land Use Planning for Helicopter Landing Areas* to control noise from helicopter landing areas would be best practice.

- We note that the type of TMTA activities most likely to trigger these rules are typically in one locality for a period of only a few days (with the exception of the headquarters / command / communications centre). Therefore, the proposed TMTA noise limits would only apply for a small period of time. Recognising this and that TMTA are important to the security of New Zealand an approach could be to provide an exception to the Plan rules for a certain number of days each year for TMTA. This approach is included in the Christchurch Plan, with an exception of 10 days per year on any site where activities exceed the noise limits by 10 dB or less.
- Consistent with the feedback received from Selwyn District Council staff, keeping neighbours and the Council informed of TMTA activities is a key practical step in managing noise from TMTA.

Based on the above, we expect that the NZDF general approach is likely able to be integrated into any revised Plan in some form. The current Plan controls and feedback received from Selwyn District Council staff will need to be considered further, along with the underlying technical documents and the outcome of the process recently completed in the Christchurch District.



## 9.0 ELECTRICITY TRANSMISSION AND TELECOMMUNICATION FACILITIES

As requested we have reviewed the National Environmental Standards for Telecommunication Facilities and Electricity Transmission Activities documents in respect of the management of noise effects.

### 9.1 Telecommunication Facilities (NESTF) 2016 (sections 24 and 25)

The NES for telecommunication facilities considered noise in two aspects: Section 24 – *Noise limits for cabinet in road reserve*; and Section 25 – *Noise limits for cabinet not in road reserve*.

*If the cabinet is located in a residential zone or an adjoining road reserve, the noise limits for the cabinet are:*

- |                                        |                                                                          |
|----------------------------------------|--------------------------------------------------------------------------|
| (a) <i>Between 0700 and 2200 hours</i> | <i>50 dB <math>L_{Aeq}</math> (5 min)</i>                                |
| (b) <i>Between 2200 and 0700 hours</i> | <i>40 dB <math>L_{Aeq}</math> (5 min) / 65 dB <math>L_{AFmax}</math></i> |

*For any other cabinet, the noise limits for the cabinet are:*

- |                                        |                                           |
|----------------------------------------|-------------------------------------------|
| (a) <i>At any time</i>                 | <i>60 dB <math>L_{Aeq}</math> (5 min)</i> |
| (b) <i>Between 2200 and 0700 hours</i> | <i>65 dB <math>L_{AFmax}</math></i>       |

Where the cabinet is not in a road reserve or a residential zone (e.g. in a property zoned business or rural) the noise rules outlined within the Plan for the specific zone in which the cabinet is located apply.

Key comments from our review/comparison are as follows:

- For cabinets in road reserves within or adjacent to Residential zones if the noise limits are complied with, we would expect the NESTF noise limits to also be met, with the exception of the NESTF 65 dB  $L_{AFmax}$  night-time noise limit. The NESTF night-time noise limit is more stringent than the Plan Living zone night-time noise limit of 70 dB  $L_{AFmax}$ .
- For cabinets in road reserves within or adjacent to other zones if the operative noise levels are complied with we would expect the NESTF  $L_{Aeq}$  noise limits to be met in all zones except for the Business 2 or Business 1 & 3 during the night-time period. The NESTF limits are also currently more stringent than those outlined in the Plan.
- Overall, the noise limits outlined in the NESTF document are of a similar level to the general noise limits in the reviewed District Plans and NZS 6802:2008, and therefore we expect the application of the above rules in practice would not be problematic.
- The NESTF outlines specific measurement positions for the noise from cabinets. If a building with a habitable room is within 4 metres of the road reserve the noise must either be measured 1 metre from the side of the building, or on the vertical plane side of the building. In any other case, the noise must be measured at a point that is at least 3 metres from the cabinet, and within the boundaries of the adjoining land. While this is different than what would be assessed under the District Plan and NZS 6801:2008, we expect that these measurement locations have been selected due to the specific practicality issues associated with the typical placement of cabinets and have gone through a rigorous review process.
- The noise levels from a cabinet must be measured in accordance with NZS 6801:2008 and assessed in accordance with NZS 6802:2008.

### 9.2 Electricity Transmission Activities 2009 (NESET) (sections 37 and 38)

The only reference to noise levels within this document is in relation to the construction activity relating to an existing transmission line. In this situation, the activity is permitted if it complies



with NZS 6803:1999 *Acoustics – Construction Noise*. If the activity does not meet this condition then it is considered a controlled activity with control reserved to the following matters:

- (a) the timing of the works; and
- (b) the effects on sensitive land uses; and
- (c) the giving of notice of the works to parties who may be affected

We note that as discussed above, it is common for general construction activity to be assessed in accordance with NZS 6803:1999 *Acoustics – Construction Noise*, and therefore an overarching rule included within the Plan to this effect would cover this specific requirement.

## 10.0 DEFINITIONS

As requested we have reviewed the definitions within the surrounding District Plans relating to the measurement/assessment of noise. The full list of definitions pertaining to noise covered in our review can be found in table A.1 in Appendix A.

As previously discussed, recently the Christchurch and Ashburton Council's have gone through a formal review of their respective District Plans, and therefore provide a more up-to-date list of definitions in line with NZS 6801:2008 and NZS 6802:2008.

The Selwyn District Plan currently refers to superseded New Zealand Standards (such as NZS 6801:1999 and NZS 6802:1991) for noise and therefore updated terminology should be included in any Plan update.

We have the following comments regarding the current definitions within the operative Selwyn District Plan:

- In all District Plans that were reviewed, one separate chapter or section of the District Plan was provided for Definitions. The current Selwyn Plan has definitions for both the Township Volume and the Rural Volume in separate sections. While the content is very similar, there are a few definitions which only relate to the areas within the Township Volume and others that only relate to the Rural Volume (such as 'notional boundary'). Whether an overarching section or chapter for definitions would be simpler would ultimately depend on the final structure of the District Plan.
- While recently updated District Plans (Ashburton and Christchurch) still reference the  $L_{A10}$  noise descriptor, this is rarely used in the noise limits within these updated Plans. Noise descriptors have been updated in line with the most recent NZS 6801:2008 and NZS 6802:2008 and have also been described in the definitions section.
- In the Hurunui and Waimakariri District Plans, terms that are defined in Standards are referenced rather than reproduced. For example, *Noise* in the Hurunui District Plan is defined as “means that as defined in the New Zealand “Standard for the Measurement of Sound”.
- *Habitable Space* is not defined in the operative Selwyn District Plan so when assessing internal noise levels for noise intrusion (such as for aircraft and traffic) there is some ambiguity as to which spaces are required to be assessed. Possible options of definitions include the following:
  - *Christchurch District Plan* – means all the spaces of a residential unit or guest accommodation unit except any bathroom, laundry, toilet, pantry, walk-in wardrobe, corridor, hallway, lobby or clothes drying room (but including any portion of a garage used as a sleep-out).
  - *NZS6802:2008* – As defined in the New Zealand Building Code.

Overall the approach to definitions varies considerably, and the simplest approach for the Plan should be determined once the Plan content and structure is further developed. Generally, an approach where existing documents are referred to as a source for definitions where possible (for example, the RMA, NZS6802:2008 or the New Zealand Building Code) seems to us to be more logical than drafting bespoke definitions for common terms, as these existing documents have gone through rigorous review processes. However, the availability of any referenced documents to the general public should also be considered (for example, New Zealand Standards need to be purchased), along with the balance between technical definitions, and making any definitions accessible to lay readers.

## **11.0 MAHAANUI IWI MANAGEMENT PLAN**

The document titled *Mahaanui Iwi Management Plan 2013*, dated February 2013 outlines key areas which affect 'the protection and enhancement of Ngai Tahu values, and for achieving outcomes that provide for the relationship of Ngai Tahu with natural resources.'

As requested, we have reviewed this document. The document does not record any specific concerns regarding noise. We have received feedback from Ngai Tahu which confirms that the Iwi Management Plan does not include any policies on noise or vibration issues.

## 12.0 POLICIES

In line with the RMA, District Plans are required to include objectives for the District, and policies on how the objectives should be implemented. As requested we have considered in general terms the current noise-related policies in the Selwyn District, and how these may be able to be refined as part of the Plan Review process.

### 12.1 Selwyn District Plan noise policies

There are a number of policies within the Plan which are related to noise – within both the Township and the Rural Volumes. Those appearing under the ‘Noise’ sections are as follows:

#### Townships

*B3.4.10 Ensure noise in all zones does not adversely affect the health or well-being of people.*

*B3.4.11 Maintain background sound levels which are appropriate to the quality of the environment and amenity values of each zone.*

#### Rural

*B3.4.13 Recognise temporary noise associated with short-term, seasonal activities as part of the rural environment, but ensure continuous or regular noise is at a level which does not disturb people indoors on adjoining properties.*

*B3.4.14 Manage the operation of audible bird scaring devices to mitigate noise effects on surrounding properties.*

The policies for noise in the Rural Volume are more specific than those within the Township Volume and relate to specific activities.

There are a number of other policies within the Plan which relate to noise, including reverse sensitivity effects from existing roads, railways, utilities and industrial areas, and discussions of the amenity values in the differing zones.

We note that as the policies are often referred to for planning applications, the terminology which is used is important as slight variances could potentially be interpreted in different ways. In many cases it is unclear whether the differences are deliberate or not. For example, in some cases there appears to only be a requirement to “mitigate” adverse effects by some unknown amount – in which case any proposal which demonstrated some intent to reduce noise levels slightly from those which otherwise may have occurred could be considered consistent with this policy. At the other end of the spectrum some policies call for effects to be “avoided” or for amenity values to be “maintained”. It is difficult to see how a proposal which introduced any new audible noise into an area could ever be considered genuinely consistent with such policies.

In addition, we note that the policies related to aircraft noise associated with Christchurch International Airport are noticeably more specific than the other policies, and are as follows:

- Avoid new residential development and other noise sensitivity activities occurring on land which is located underneath the airport flightpath noise contours shown on Planning Map 013 for 50 dBA  $L_{dn}$  or greater
- Maintain residential density at a maximum of 1 house per 4 hectares, and avoid other noise sensitive activities in the rural area within the 50 dBA  $L_{dn}$  air-noise contour shown on the Planning Maps.

- Require any new dwelling or extension to an existing dwelling within the area under the 55 dBA  $L_{dn}$  (or greater) air-noise contour shown on the Planning Maps, to be insulated of noise to the standards required in the Table contained in Appendix 20 of this Plan.

These policies contain more technical detail than the other policies, and they appear to simply be a restatement of the equivalent rules.

## 12.2 Noise policies in adjoining Districts

Noise specific policies in surrounding Districts vary widely. This is an interesting contrast to the situation with rules, where for the general noise rules there is a reasonable degree of consistency.

Examples of the equivalent policies in other Districts are as follows (with the key terminology in italics):

### Christchurch

- *Manage adverse noise effects by:*
  - Limitations on the sound level, location and duration of noisy activities;
  - Requiring sound insulation for sensitive activities or limiting their location relative to activities with elevated noise levels.

### Ashburton

- To provide rules setting noise limits adequate for the protection of community health and welfare while enabling *reasonable noise emissions* from activities to occur.
- *To avoid or mitigate effects of noise* on residential uses, by ensuring all activities meet standards in respect of noise measured on or near the property boundary, which will *not compromise the qualities* of the residential environments, and by discouraging residential uses from locating close to land zoned or used for noisy activities.

### Hurunui

- To control noise emissions at levels *acceptable to the community* and where they exceed those levels, generally maintain a separation distance between those noise-emitting activities and sensitive activities.

### Waimakariri

- Control noise to a level that is *not unreasonable*, measured against the character and circumstances of the zone.
- Avoid noise adversely *affecting the amenity values* and health and safety of people on neighbouring sites or zones.

Each District then also includes policies relating to specific activities which are of relevance within their Districts. For example, Hurunui includes a specific policy on frost fans, and Christchurch includes specific policies for noise within the Central City.

## 12.3 Recommendations

As these policies demonstrate, there is no consistent approach to policies within the adjacent Districts. With reference to the comparisons in section 5.0 above, it is clear there is some incongruence between the policies and rules in some of these Districts, as in all cases the rules which supposedly achieve these varied outcomes are very similar.

Matters which could be considered further in relation to Selwyn's policies include:

- Whether it is an appropriate, realistic and necessary aim to ensure noise has *no* adverse effect within townships. Similarly, whether it is an appropriate aim to 'maintain background sound levels' within townships. The introduction of any new audible sound within an area would not 'maintain' current noise levels, and may have some level of adverse effect. These policies seem to be at odds with the concept of a 'minor' effect and/or only preventing noise which is 'unreasonable'.
- Whether the rural policy should continue to give non-residential uses such a high priority and only provide for indoor amenity. It is unusual for outdoor amenity in the vicinity of dwellings not to be protected in rural areas. However, this is at least consistent with the current lenient Plan daytime noise limit in these areas of 60 dB LA10.

### 13.0 RULES

Based on the above analysis and assessment, we recommend the following noise management options and areas which should be considered further when developing noise provisions for the Proposed Plan:

#### General

- We recommend that NZS 6801:1999 and NZS 6802:1991 be replaced with references to the 2008 versions of these standards in the Proposed Plan.
- We recommend that in any relevant rules the primary acoustic parameter is changed from dB LA10 to dB LAeq in line with the updated NZS 6802:2008 and international guidance. A number of definitions would also need to be updated as a result.
- Whether it may be appropriate to change the 'daytime' and 'night-time' hours to be more in line with NZS 6802:2008 and the recently updated Ashburton and Christchurch District Plans – i.e. 0700 to 2200 hours. The key issue with such a change would be with regard to noise effects during the 'evening' period (which is currently protected by more stringent noise limits).
- 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. This would potentially allow the noise rules to be simplified. This would also affect the way the interface between commercial and residential zones is managed, which is currently a cause of complaints in the District.
- Whether some changes should be made to ensure noise limits do not apply at the common boundary between a noise sensitive site and a road or rail corridor. We note that this would require a significant change to the way roads and other transport corridors are treated in the Plan (they currently have the same zoning as the surrounding sites). In other Plans, this is achieved by having no zoning for these features, or by having these areas zoned as a specific 'Transport zone' where the noise limits do not apply. We understand that the Council's Transportation Consultants (Abley Transportation Consultants Ltd) are considering whether a Transport Zone should apply as part of the Transport Project Scope.

#### Living

- Whether some change to the unusually low Living zone night-time noise limit of 35 dB LA10 is appropriate. The low Living zone night-time noise limit is more than adequate to protect sleep and is difficult to monitor. Any change would however require a discussion relating to the importance or relevance of 'night-time amenity' and the importance and relevance of striving to achieve or maintain low background sound levels in townships.
- Whether the exclusions for residential, educational and spiritual activities within the Living zones are reasonable, noting that the Selwyn District Council staff report that many of the complaints they receive relate to such activities and that none of the adjoining Districts include such wide-ranging exclusions. For example, noise from residential heat pump units.

#### Rural

- Whether some change to the unusually lenient Rural zone daytime noise limit of 60 dB LA10 is appropriate. As described above, the high rural daytime noise limit appears to be related to the general view the current Plan takes that the rural area is primarily for rural production, and any residential use is of secondary importance. A wider discussion is therefore required as to the purpose of rural areas. We note that while the

current limit would not generally be considered adequate to protect outdoor residential amenity, Selwyn District Council staff did not report any complaints directly relating to this rule.

- Whether the extensive list of exclusions within Rural zones is reasonable (such as excluding noise from any motor vehicle or any mobile machinery). We observe that such a comprehensive range of exclusions is not common, compared to adjoining Districts.

### Business

- The appropriateness of non-industrial/commercial activities located within Business zones, and methods to prevent reverse sensitivity issues. If the Plan allows residential development within areas which have a night-time noise limit above 45 dB  $L_{Aeq}$ , reverse sensitivity provisions should be included for any new dwellings.

### Reverse sensitivity from CIAL and State Highways

- The noise rules for the management of CIAL aircraft noise reverse sensitivity are generally in line with good practice. However further consideration should be given to whether the testing requirement is necessary, and if so update the standards that are referenced.
- Whether the internal noise level requirements for noise from State Highways should be updated in line with the most recent NZTA guidance. The best method for incorporating the relative buffer and effects areas within the Plan should also be considered. We understand that the Council's Transportation Consultants (Abley Transportation Consultants Ltd) consider that the most recent NZTA guidance should be incorporated.

### Specific activities

- Whether the noise rules for specific sources should be modified, and whether specific rules should be included for any additional sources which are not well controlled by the 'general' noise rules. We consider that it would be wise to consider further some additional sources, such as rifle ranges. For new ranges which are established, 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.
- Whether the setback distances, noise limits and exceptions for a small number of events a year requested for TMTA are appropriate, and what weight should be given to the modifications which appear in the current Christchurch District Plan.
- Whether construction noise should be dealt with directly, and if so what form a rule should take.
- Whether there should be specific noise rules for quarrying activity or if it should comply with the Plan noise limits. We note that the whether the current exclusion for mobile machinery is retained will affect how noise from quarrying activity is assessed.
- If there is any 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. Consideration should be given as to whether the current rule is appropriate.
- Whether the current noise limits for noise from powered motorcraft is appropriate, and should be retained.
- Currently noise from temporary activities is exempt within the Rural Volume of the Plan. Further consideration should be given to whether instead of a blanket exclusion it is appropriate to include additional controls for general temporary activities.



- We understand frost fans are not prevalent in the District and that may be the reason that there is not a specific rule in the current Plan. If during the Plan review process noise from frost fans is identified as an issue, a rule similar to those in the surrounding Districts would likely be appropriate.
- Noting the Council Compliance and Monitoring Officer's comments on the practicality of assessing compliance with the current rules, consideration should be given as to whether the current provisions for noise from audible bird scaring devices are appropriate.
- Given the more prevalent use of aircraft (primarily helicopters) compared to when the current Plan was previously reviewed, consideration should be given as to whether the current rules for aircraft within the Rural Volume remain appropriate.

We consider that with some refinement in these areas, there is considerable potential to improve the function and workability of the noise rules in the Plan.

**APPENDIX A – Definitions***Table A.1 – Examples of noise definitions within District Plans*

<b>Term</b>	<b>District / Standard</b>	<b>Definition</b>
Amenity values	Selwyn	Has the same meaning as defined in Section 2 of the Act
	Christchurch	Has the same meaning as defined in s2 of the RMA
	Ashburton	Means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes (RMA).
	Waimakariri	"Amenity values means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes (section 2, Resource Management Act 1991).
	Hurunui	Means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes
dBA	Selwyn	Means A-frequency-weighted sound pressure level in decibels relative to a reference sound pressure of 20 micropascals. See NZS 6801: 1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	Waimakariri	dBA means A-frequency-weighted sound pressure level in decibels relative to a reference sound pressure of 20 micropascals.
Decibel (dB)	Selwyn	Is the term used to identify 10 times the logarithm to base 10 of the ratio of two like quantities proportional to intensity, power, or energy. See NZS 6801: 1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	NZS6801:2008	The term used to identify 10 times the logarithm to base 10 of the ratio of two like quantities proportional to intensity, power, or energy.
	Ashburton	Decibels are a logarithmic unit used to measure sound pressure. A doubling of sound pressure results in a 3 dB increase in sound level.
	Waimakariri	Decibel (dB) means the term used to identify 10 times the logarithm to base 10 of the ratio of two like quantities proportional to intensity, power, or energy.
Habitable space	NZS6801:2008	As defined in the New Zealand Building Code
	Christchurch	means all the spaces of a residential unit or guest accommodation unit except any bathroom, laundry, toilet, pantry, walk-in wardrobe, corridor, hallway, lobby or clothes drying room (but including any portion of a garage used as a sleep-out).
L <sub>10</sub> / LA <sub>10</sub>	Selwyn	Means the L <sub>10</sub> exceedance level in A-frequency-weighted decibels, which is equalled or exceeded ten percent of the total measurement time.
	Waimakariri	L <sub>10</sub> means the L <sub>10</sub> exceedance level, in A-frequency-weighted decibels, which is equalled or exceeded ten percent of the total measurement time.
	Ashburton	Is the A-weighted sound level that is exceeded for 10% of the sample period. Previously denoted as L <sub>10</sub> , this parameter has been used for many years to describe intrusive sound. In the latest version of New Zealand Standards, it has been replaced by L <sub>Aeq(t)</sub> , which is numerically very similar.

Table A.1 – Examples of noise definitions within District Plans (ctd)

L <sub>dn</sub>	Selwyn	Means the night-weighted sound exposure level in dBA also known as the day-night average sound levels and is the 24-hour sound exposure level in A-frequency weighted decibels (dBA) for any day with the period 10pm to 7am the following day “weighted” by 10 dB to represent the increased sensitivity of people to night-time noise. See NZS 6801: 1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	NZS6801:2008	The A-frequency-weighted time-average sound level, in decibels (dBA) over a 24-hour period obtained after the addition of 10 decibels to sound levels measured during the night. [see Equation 3]
	Christchurch	means the day-night average sound level in decibels over a 24-hour period, which is calculated from the day (07:00-22:00) L <sub>Aeq(15h)</sub> and night (22:00-07:00) L <sub>Aeq(9h)</sub> values with a 10 dB penalty applied to the night-time L <sub>Aeq(9h)</sub> . L <sub>dn</sub> values can be used to describe long term noise exposure by averaging over days, weeks or months
	Ashburton	is a “day-night” noise level. This is an L <sub>eq</sub> measured over a 24hr period, where night-time noise levels are penalised by 10 dB to account for additional annoyance during sleeping hours.
L <sub>eq</sub> / L <sub>Aeq(t)</sub>	Selwyn	Means the sound level averaged over a stated time period which has the same A-weighted sound energy as the time varying sound during the same period. See NZS 6801: 1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	NZS6801:2008	10 times the logarithm, to the base 10, of the ratio of the average of the square of the A-frequency-weighted sound pressure over a specified period of time, to the square of the reference value. The time interval for every L <sub>Aeq</sub> measurement shall be stated [Equation 7]
	Christchurch	means the equivalent continuous A-weighted sound level in decibels. This is commonly referred to as the time-average sound level. L <sub>Aeq</sub> is often assessed over a reference time interval of 15 minutes, in accordance with NZS 6802:2008.
	Ashburton	is the time-averaged, A-weighted sound pressure level during the sample period and effectively represents an average value. The suffix “t” represents the time period to which the noise level relates, and should be stated in all cases. A 15-minute measurement previously denoted as “55 dBA L <sub>eq</sub> ” is now stated as “55 dB L <sub>Aeq(15min)</sub> ”.
	Waimakariri	L <sub>Aeq(t)</sub> means the time average A-weighted sound pressure level as defined in NZS 6802:2008
L <sub>max</sub> /L <sub>AFmax</sub>	Selwyn	means the maximum A-frequency-weighted sound level (dBA L <sub>max</sub> ) during a stated time period. See NZS 6801:1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	NZS6801:2008	Ten times the logarithm, to the base 10, of the ratio of the square of the maximum sound pressure, obtained with a standardised A-frequency-weighting and F-time-weighting during a stated time period, to the square of the reference pressure (20 uPa). For the purposes of this Standard L <sub>max</sub> derived from measured short-LEQ values of 100-125 milliseconds duration shall be taken as equivalent to L <sub>max</sub> derived from F-time-weighted measurements
	Christchurch	means the A-weighted maximum noise level in decibels measured with a ‘fast’ response time. It is the highest noise level that occurs during a measurement period.

Table A.1 – Examples of noise definitions within District Plans (ctd)

L <sub>max</sub> /L <sub>AFmax</sub>	Ashburton	is the maximum A-weighted sound level measured using fast response (hence F), during a chosen sample period. It is also used to describe intrusive sound. Previously denoted L <sub>max</sub> .
	Waimakariri	L <sub>AFmax</sub> means the maximum A-frequency weighted, F-time-weighted sound pressure level as defined in NZS 6802:2008.
Noise	Ashburton	Provisions for Noise are set out in Section 11: Noise. Noise levels shall be measured and assessed in accordance with NZS 6801:2008 <i>Acoustics-Measurement of Environmental Sound</i> , and NZS6802:2008 <i>Acoustics-Environmental Noise</i> .
	Hurunui	means that as defined in the New Zealand "Standard for the Measurement of Sound" - NZS 6801:1991.
Noise limit	Selwyn	means a L <sub>10</sub> , L <sub>eq</sub> or L <sub>max</sub> sound level in A-frequency-weighted decibels that is not to be exceeded during a measurement sample time in a specific time-frame. See NZS 6801:1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	NZS6801:2008	A sound level as stated in a rule, plan or consent condition which is not to be exceeded.
Noise sensitive activities	Selwyn	<ul style="list-style-type: none"> <li>- Residential activities other than those in conjunction with rural activities that comply with the rules in the plan;</li> <li>- Educational activities including pre-school places or premises;</li> <li>- Travellers' accommodation except that which is designed, constructed and operated to a standard that mitigates the effects of noise on occupants;</li> <li>- Hospitals, healthcare facilities and elderly persons housing or complex.</li> </ul>
	Christchurch	<p>in relation to Sub-chapter 13.10 Specific Purpose (Ruapuna Motorsport) Zone, means:</p> <ol style="list-style-type: none"> <li>1. residential activities, other than those existing in conjunction with rural activities that comply with the rules in the relevant District Plan as at 23 August 2008;</li> <li>2. education activities including preschools, but excluding flight training, trade training or other industry-related training facilities;</li> <li>3. guest accommodation, except that which is designed, constructed and operated to a standard that mitigates the effects of noise on occupants; and</li> <li>4. health care facilities and any elderly person's housing unit</li> </ol>
	Waimakariri	<p>Noise Sensitive Activities means:</p> <ul style="list-style-type: none"> <li>- Residential activities other than those in conjunction with rural activities that comply with the rules in the plan;</li> <li>- Education activities including pre-schools places or premises;</li> <li>- Travellers' accommodation except that which is designated, constructed and operated to a standard that mitigates the effect of noise on occupant;</li> <li>- Hospitals, healthcare facilities, and elderly persons housing or complex</li> </ul>

Table A.1 – Examples of noise definitions within District Plans (ctd)

Notional boundary	Selwyn	means a line 20m from any side of a rural dwelling or the legal boundary where this is closer to the dwelling.
	NZS6801:2008	A line 20m from any side of a dwelling or the legal boundary where this is closer to the dwelling.
	Christchurch	in relation to Chapter 6 General Rules and Procedures, means a line 20 metres from any wall of a residential unit or a building occupied by a sensitive activity, or the site boundary where this is closer to the residential unit or sensitive activity.
	Ashburton	for the purposes of measurement of noise, means a line 20 metres from any residential unit on any neighbouring site, as defined in NZS6802:2008 <i>Acoustics-Environmental Noise</i> .
	Waimakariri	Notional Boundary means a line 20 metres from any part of a dwellinghouse or the legal boundary of any site where this is closer to the dwellinghouse.
	Hurunui	means, in relation to noise, either a line 20 metres from the most exposed façade of any dwelling to a noise source, or the legal boundary where this is closer than 20 metres to the dwelling.
Reverse sensitivity	Christchurch	means the effect on existing lawful activities from the introduction of new activities, or the intensification of existing activities in the same environment, that may lead to restrictions on existing lawful activities as a consequence of complaints.
Sound exposure level (SEL) / LAE	Selwyn	means the A-frequency weighted sound pressure level in decibels which, if maintained consistent for a period of 1 second, would convey the same sound energy to the receiver as is actually received from a given noise event over the same period. See NZS 6801:1999 <i>Acoustics – Measurement of Environmental Sound</i> .
	NZS6801:2008	Ten times the logarithm to the base 10 of the ratio of the A-frequency weighted sound exposure to the square of the reference value [see Equation 5]. NOTE – SEL can be considered as the A-weighted sound pressure level which, if maintained consistent for a period of 1 second, would convey the same sound energy to the receiver as is actually received from a given noise event.
	Christchurch	means the Sound Exposure Level (SEL) in decibels. LAE is the sound level of one second duration which has the same amount of energy as the actual noise event measured. This is usually used to measure the sound energy of a particular event, such as a train pass-by or an aircraft flyover.
	Waimakariri	SEL means the Sound Exposure Level as defined in the NZS 6802:2008. SEL dBA means the sound exposure level in decibels of an individual noise event. The individual noise event used to determine the SEL dBA contour on District Plan Map 139 was a Boeing 747-200 aircraft