



District Plan Review

General Acoustic Issues for Rotorua, Whakatane and South Waikato District Councils

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Project: **District Plan Review:
General Noise Issues for Rotorua, Whakatane and South
Waikato District Councils**

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1.0 INTRODUCTION

The Rotorua, Whakatane and South Waikato District Councils (the Councils) have begun the process of reviewing their District Plans, in order to fulfil their requirements under the Resource Management Act 1991. As part of this process, Marshall Day Acoustics (MDA) has been engaged to provide guidance on general acoustic matters and principles which is the purpose of this report. In addition MDA will work for each of the three Councils individually to develop their own District specific information that will be the subject of separate stand alone reports.

In April 2009, the Councils met to discuss the review of noise and acoustic issues in the upcoming review of their respective District Plans because the Councils are considered to have a similar urban to rural ratio and similar land use composition, albeit with some variation in relativities of scale.

The review of the Councils current District Plan's in a coordinated manner is being done with a view to harmonising the approach with similar neighbouring Local Authorities.

It was agreed that MDA would produce a report suitable for use by the Councils': "General Noise Issues for Rotorua, Whakatane and South Waikato District Councils".

Following on from this report would be a District specific report with recommended noise and vibration rules. The form of these noise and vibration rules is expected to be adopted by all three Councils in order to minimise potential cross boundary anomalies.

There is an element of commonality in the issues that all the Councils must consider when reviewing their noise and vibration rules. This report will address the common acoustic issues and a separate District specific report will be provided to each of the Councils in due course according to the Plan review timetable for each Council.

As part of the discussion there may be comments which do not apply to all three Councils equally. The reader should understand these are not necessarily errors, but there must be a degree of generalisation when discussing three separate District Plans for the purpose of recommending overarching changes.

2.0 THE PURPOSE OF NOISE AND VIBRATION RULES

Noise rules, like most other rules in society, are designed to provide a framework within which all parties have some certainty of the outcome. District Plan noise rules must recognise that virtually all activities produce some noise, and there is a need to provide a balance between the noise producer and the noise receiver.

Noise and vibration are directly linked, however on a day to day basis most Territorial Local Authorities deal predominantly with noise issues. Provision has been made for the implementation of vibration standards and these are also found in the "rules" section.

It should be noted that in order to cater for the potentially wide variety of vibration scenarios a pragmatic approach of referencing only a limited number of vibration standards have been taken while leaving the possibility of other more appropriate standards to be considered through the resource consent process.

Historically, noise rules and New Zealand's environmental noise standards have often been based upon existing noise levels in an area. This approach is now disappearing, as it is recognised that if there is to be development in an area, noise rules must provide an appropriate level of amenity for the developed area, whilst at the same time allowing noise generating activities to generate reasonable levels of noise.

The assumption that new dwellings and/or business can be introduced into an area and somehow still maintain a noise level consistent with an undeveloped area is generally impracticable. The purpose of the recommended noise limits in this report is to allow development while controlling noise to an appropriate level.

District Plan noise rules must therefore mesh closely with planning requirements. Areas zoned for residential development require rules which are consistent with the types of daily activities which occur in an urban backyard, and the need for uninterrupted sleep. Similarly, commercial and industrial zones require noise rules which allow intended activities to take place, but with appropriate control of noise to more sensitive surrounding zones.

3.0 EXISTING DISTRICT PLAN NOISE RULES

The current Councils noise rules are consistent with many others throughout New Zealand. The noise rules with respect to noise are effects based in that an activity must consider the land zoning and comply with noise limits that are designed to protect the receiver of noise.

As with many District Plans in New Zealand, the Councils Plans reference acoustic standards that have been superseded. There are also standards that now exist which would be appropriate to adopt in order to give certainty of outcome to activities that were not contemplated when the Plan was drafted, e.g. wind turbine generators, and increased use of helicopters for tourist and personal use.

4.0 NOISE DESCRIPTOR: L_{EQ} VERSUS L_{10}

4.1 Average Maximum Noise Level L_{10}

The Councils District Plan noise limits are expressed in terms of the " L_{10} " acoustic descriptor. Most existing district plans in New Zealand use this descriptor. An L_{10} noise level is that level which is equalled or exceeded for 10 per cent of the specified period. It can be generally described as the 'average maximum level'.

4.2 Average Noise Level L_{eq}

There is presently a general trend for the adoption of the L_{eq} descriptor for the assessment and measurement of environmental noise levels and for the specification of noise limits in district plans.

L_{eq} is the energy average of noise during a specified period. It is commonly known as the average noise level.

The most recent versions of all relevant environmental acoustic standards are based on the ' L_{eq} ' descriptor, including the following:

- New Zealand Standard NZS 6801:2008 Acoustics – Measurement of Environmental Sound
- New Zealand Standard NZS 6802:2008 Acoustics – Environmental Noise
- New Zealand Standard NZS 6803:1999 Acoustics – Construction Noise
- New Zealand Standard NZS 6805:1992 Airport Noise Management and Land Use Planning
- New Zealand Standard NZS 6806; Acoustics – Road traffic noise: New and altered roads
- New Zealand Standard NZS 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas
- New Zealand Standard NZS 6809:1999 Acoustics – Port Noise Management and Land Use Planning

District Plans in New Zealand which specify ' L_{eq} ' noise limits include:

- Taupo District Plan
- Rodney Proposed District Plan
- Christchurch District Plan
- Gore District Plan.

There may be other proposed plans, or plans under review which also propose to use the ' L_{eq} ' descriptor.

4.3 Discussion

The use of 'L₁₀' in District Plan limits, although widespread and remains the norm, is largely historical. The 1977 version of NZS6801 referenced L_x as a statistical representation of the sound of interest. Computing power at the time was not advanced enough to have the equivalent of modern handheld integrating sound level meters that are now commonplace.

The L₁₀ descriptor is specifically mentioned in the 1991 version of NZS6801 and was used in District Plans throughout New Zealand as a consequence. We are aware of National Development Orders from early 1980's which reference L₁₀ as the acoustic descriptor to be used when determining compliance with noise limits.

The L₁₀ descriptor was demonstrated to have a reasonably good correlation with the degree of annoyance caused by noise to receivers, and L₁₀ noise levels could be determined from analogue sound level meters by manual means.

More recent international research has shown that the L_{eq} descriptor has a greater degree of correlation to noise annoyance than L₁₀, and for this reason is widely accepted as being the preferred noise descriptor for use in environmental noise standards and noise limits.

In this regard, it is observed that a L_{eq} level contains the whole of the sound energy during the measurement period, whereas L₁₀, effectively measures only that sound which occurs for 10% of the measurement period. This can result in brief high noise level events not being captured by an L₁₀ measurement. This issue can be of significance in situations such as, for example, where there are a small number of noisy heavy vehicle pass-bys, which may be potentially disturbing, but not measured by L₁₀, as cumulatively they constitute less than 10% of the measurement time. As noted above, L_{eq} resolves this issue by containing the entire sound energy during the measurement period.

The relationship between L₁₀ and L_{eq} for varying sound levels is typically:

$$L_{10} = L_{eq} + 3 \text{ dB.}$$

A typical example of where this relationship holds true, is for noise generated by moderate to continuous traffic flows.

There are, however, a number of situations where the L₁₀ / L_{eq} relationship is different. Where there is continuous noise (e.g. fan, generator, pump, transformer), which does not vary in level, then L₁₀ = L_{eq}.

In situations where there are brief sounds of high level, then L_{eq} will be greater than L₁₀, to a varying degree depending on the loudness and duration of the brief sounds.

With advances in sound level meter technology, L_{eq} levels can be readily measured with integrating meters which are widely available and in current use.

More importantly, as noted above, the current noise standards relevant to environmental noise emission effectively use the L_{eq} noise index.

For the above reasons it is recommended the L_{eq} descriptor is used in the specification of all noise limits in the Proposed Plan. MDA's following noise control amendments and proposals implement this recommendation.

5.0 OTHER DISTRICT PLAN NOISE RULES

To provide some context for the Councils, MDA has reviewed existing noise rules in many other district plans throughout New Zealand. In the course of this review, several points are noted;

- There is no consistent format for district plans, and hence finding a particular section or subject can be very difficult and time consuming
- Many existing noise rules are very complex, often made more so by the chosen format of the plan.
- The specified hours for daytime and night-time varies considerably between districts, and in some cases these vary between different zones in a district. (see Table 1)

The simplest noise rules to find and understand are those contained in a section titled "noise", cross-referenced from all other relevant sections of the plan. Not only does this make the rules simpler to find, the wording is simplified significantly when dealing with issues such as rules at zone boundaries.

By way of example Tables 1 and 2 summarise existing noise rules in several other districts for residential and industrial zones within New Zealand. These summaries are very general, and some rewording has been necessary to achieve a consistent format for the purposes of comparison between districts. Data given in these tables should not be used as a definitive guide to any particular district plan rule.

One of the objectives of the Councils project was, where possible, harmonise noise rules and minimise potential cross boundary anomalies.

Section 7 of this report contains the proposed revised Rotorua District Plan noise rules. As MDA work with Whakatane and South Waikato District Councils we anticipate referencing the Rotorua District specific noise report and looking to maintain this approach across all three Districts.

It should be noted that the zones referred to in Section 7 are generic in their naming. Rotorua, Whakatane and South Waikato District will almost certainly have alternative names for their zones, and may even have different zone types.

5.1 Residential and Rural/Residential Zones

Table 1 summarises existing residential rules from a number of other New Zealand District Plans.

Table 1: Other NZ District Plan Noise Rules - Residential

	Unit ¹	Daytime (dB)		Night-time (dB)	
		Limit	Hours	Limit	Hours
Auckland	L _{AF10}	50 or 55 ⁴	0700-2200 Mon-Sat 0900-1800 Sun/Pub.	40 & 75 L _{AFmax} or 45 ⁴	
Christchurch	L _{Aeq}	50 & 75 L _{AFmax}	0700-2200 daily	41 & 65 L _{AFmax}	2200-0700 daily
Clutha	L _{AF10}	55	0700-2200 daily	45	
Dunedin	L _{AF10}	50 or 55 ¹⁰	0800 – 1800 daily	35 or 40 ^{5,10}	1800–0800
Franklin	L _{AF10}	45 & 75 L _{AFmax}	0700-2200 daily	35 & 65 L _{AFmax}	2200-0700 daily
Grey	L _{AF10}	55	0700-2100 Mon-Fri 0800-1700 Sat	45 & 75 L _{AFmax}	
Hamilton	L _{AF10}	50 45 Sun/Pub.	0700-2000 Mon-Sat 0700-2300 Sun/Pub	40 & 75 L _{AFmax}	2300-0600 ⁶
Hastings	L _{AF10}	45 or 55 ⁴	0700-1900 Mon-Fri 0700-1200 Sat ⁸	35 or 45 ⁴ 65, 70 or 75 L _{AFmax}	Varies
Hurunui	L _{AF10}	55	0700-1900 daily	45 & 75 L _{AFmax}	
Invercargill	L _{AF10}	55	0700-2200 daily	40 & 70 L _{AFmax}	
Manukau	L _{AF10}	45 or 50 ⁴	0700-1800 Mon-Sat	35 & 65 L _{AFmax} or 40 & 70 L _{AFmax} ⁴	2200-0700 ³
Marlborough Sounds	L _{AF10}	50 or 55 ¹⁰	0700-2200 Mon-Fri 0700-1200 Sat	45 & 70 L _{AFmax}	
Nelson	L _{AF10}	55	0700-2200 Mon-Fri 0900-2200 Sat, Sun, Pub	45 & 75 L _{AFmax}	
New Plymouth	L _{AF10}	50	0700-2200 daily	40 & 70 L _{AFmax}	2200-0700 daily
North Shore	L _{AF10}	45	0800-1800 Mon-Fri 0900-1900 Sat	No audible noise	
Queenstown Lakes	L _{AF10}	50	0800-2000 daily	40 & 70 L _{AFmax}	2000–0800
Rodney	L _{Aeq}	45 or 50 ²	0700-1900 Mon-Sat	35 or 40 ²	2200-0700 ³

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Unit ¹		Daytime (dB)		Night-time (dB)	
		Limit	Hours	Limit	Hours
Southland	L _{AF10}	50	0700-2200 Mon-Fri 0700-1800 Sat	40 & 70 L _{AFmax} ¹¹	
Thames-Coromandel	L _{AF10}	50	0700-2200 daily	40	2200-0700 daily
Timaru	L _{AF10}	50 or 55 ¹⁰	0700-2200 daily	40 or 45 ¹⁰ 70 or 75 L _{AFmax} ¹⁰	
Waikato	L _{AF10}	50	0700-1900 Mon-Sat	40 & 65 L _{AFmax}	2200-0700 & Sun/Pub. ⁵
Waimate	L _{AF10}	55	0700-2100 daily	45 & 75 L _{AFmax}	2100-0700
Waipa	L _{AF10}	50	0700-2200 Mon-Fri 0700-1800 Sat ⁸	35 or 40 ⁴ 65 L _{AFmax}	
Waitakere	L _{AF10}	50	0700-1900 daily	40 & 70 L _{AFmax}	2200-0700 daily ⁵
Waitaki	L _{AF10}	55	0700-2200 Mon-Fri 0800-1900 Sat	40 & 75 L _{AFmax}	
Westland	L _{AF10}	55	0700-2000 Mon-Fri 0700-1800 Sat	45 & 70 L _{AFmax}	
Whangarei	L _{AF10}	45 or 50 ⁴	0700-2200 daily	35, 40 or 45 ^{4,7}	

Note:

1. See Appendix A for definition of terms.
2. Lower limit applies to “low background noise” areas.
3. 40 or 45 dB evening shoulder applies Mon-Sat and 0700-2200 Sunday/Public Holidays.
4. Higher limit applies if site adjoins business zone, lower limit between residential sites.
5. 45 evening shoulder applies.
6. 45 shoulder applies 0600-0700 and 2000-2300 Mon-Sat.
7. Limit depends on zoning of site producing noise.
8. Some zones have different hours.
9. 40 or 45 shoulder applies (depending on source zone) 1800-2200 Mon-Fri & 1200 - 2200 Sat.
10. Limit varies between various residential zones.
11. L_{AFmax} control doesn't apply in all zones.

It is noted that only two of the plans reviewed (Christchurch and Rodney) use the L_{Aeq} descriptor, with all others still using L_{AF10} rules. This is arguably because most existing plans were written prior to the change to L_{Aeq} in the New Zealand standards. There are however, a number of other district plans which use the L_{eq} descriptor either entirely or partly in their plans. However, broadly speaking, L_{10} and L_{eq} values are acoustically similar, and with this in mind, most NZ District Plans effectively specify daytime noise limits of 50 – 55 dBA, and night-time limits of 40 – 45 dBA for residential zones.

In a society where businesses are increasingly open 7 days per week, it is hard to understand the rationale behind complex hours for day and night for different days of the week. In our experience, weekends are sometimes noisier than weekdays, particularly in urban areas, and we suspect that consistent hours for all days may become the norm.

Currently, Plan noise rules include an “evening” period which in our opinion should be removed and the Plan only refer to day and night-time periods.

Occasionally councils can be duty bound to strictly enforce noise limits, despite pragmatic considerations and reasonableness. In our opinion the evening period exposes Council to a requirement that is unnecessary with regard to the policies and objectives of the Plan.

This strategy would provide the following benefits:

- Align with many other Plans throughout New Zealand
- Uphold policies and objectives of the Plan in that it would more effectively allow various activities to co-exist, and with regard to residential activities, protect daytime amenity and night time recuperative sleep.
- Avoid potentially problematic enforcement issues. For instance strict compliance with the evening noise rule at 6.30pm may be unnecessarily restrictive when compliance with the night time rule is achieved.

5.2 Rural Zones

Not all district plans contain specific noise rules for rural zones. However, almost all of those that do specify the same limits as for residential zones. The key difference between the rural and residential zones is the assessment position, which should be at the notional boundary. The notional boundary concept is used throughout New Zealand, easily understood and the definition has remained unchanged in New Zealand Standards regarding noise. A further matter relating to rural zones is that most district plans exempt non- permanent or limited duration rural activities from compliance with noise rules, except for intensive farming activity.

5.3 Commercial Zones

There has been a trend for residential use to be permitted in zones not typically associated with this type of activity. Hotels/motels aside, dwellings in Commercial and even Industrial zones are becoming more popular with developers.

Unfortunately, without adequate controls put in place, complaints about Commercial/Business activities can result in long drawn out conflicts between parties that tend to inhibit otherwise legitimate activity in such zones zone.

In our opinion, potentially noise sensitive activities – dwellings in particular, that are located “out of zone” should be made to be acoustically insulated against intrusive noise from external sources.

Rules to this effect can be readily included in Plans by placing a reasonable onus on noise sensitive activities to protect them before occupancy thus averting complaints to some degree. The built up nature of a CBD for instance means several businesses may all be complying with the Plan noise limits, but the cumulative effect means noise could be problematic for a noise sensitive receiver.

This would not allow the Commercial/Industrial activities carte blanche as intra zone noise limits would remain, but it does protect them to some degree from unreasonable complaints.

5.4 Industrial Zones

The situation for industrial zones is somewhat complicated because each district has differing methods for the categorisation of commercial and industrial activities. Some districts specify limits for industrial noise only as received at residential sites, and these rules are included in Table 1. Table 2 provides a general summary of noise limits which apply between industrial or commercial sites in other local authorities, and does not reference residential sites.

It should be noted that where an industrial activity has residential neighbours for instance, the Plan requires compliance with the Residential noise limits. This ensures noise is controlled to an acceptable level for the receiver as is appropriate for an effects based Plan.

Table 2: Other NZ District Plan Noise Rules - Industrial

	Unit ¹	Daytime (dB)		Night-time (dB)	
		Limit	Hours	Limit	Hours
Auckland	L _{AF10}	60 (mixed use zone)	0700-2200	55 & 75 L _{AFmax}	
Christchurch	L _{Aeq}	57 & 85 L _{AFmax}	0700-2200 daily	49 & 75 L _{AFmax}	2200-0700 daily
Clutha	L _{AF10}	65	24 hours		
Dunedin	L _{AF10}	60	24 hours		
Franklin	L _{AF10}	55 or 60 75 L _{AFmax}	24 hours		
Grey	L _{AF10}	60 or 65	0700-2200 Comm 24 hours Ind	50 & 75 L _{AFmax}	
Hamilton	L _{AF10}	65	24 hours		
Hastings	L _{AF10}	65 or 70	24 hours		
Hurunui	L _{AF10}	75	24 hours		
Invercargill	L _{AF10}	65 75 – 85 L _{AFmax}	24 hours	40 & 70 L _{AFmax}	
Manukau	L _{AF10}	55 – 70	24 hours		
Marlborough Sounds	L _{AF10}	65	24 hours	75 L _{AFmax}	2200-0700
Nelson	L _{AF10}	65	0700-2200	45 or 55 & 75 L _{AFmax}	
New Plymouth	L _{AF10}	60 - 70	0700-2200 Bus zones 24 hours Ind	40 or 60 70 or 75 L _{AFmax}	
North Shore	L _{AF10}	65 or 70	0700-2300 B11 All others 24 hours	55 & 75 L _{AFmax} (B11)	2300-0700
Queenstown Lakes	L _{AF10}	60	0800-2000 daily	50 & 70 L _{AFmax}	2000-0800
Rodney	L _{Aeq}	60, 65, or 70	24 hours		
Southland	L _{AF10}	60	0700-2200 Mon-Fri 0700-1800 Sat	50	
Thames-Coromandel	L _{AF10}	65 or 70	24 hours		

Unit ¹		Daytime (dB)		Night-time (dB)	
		Limit	Hours	Limit	Hours
Timaru	L _{AF10}	65	24 hours	75 L _{AFmax}	2200-0700
Waikato	L _{AF10}	65 or 75	0700-2300 or 24 hours	45 75 or 85 L _{AFmax}	
Waimate	L _{AF10}	60	0700-2100 daily	55 & 80 L _{AFmax}	2100-0700
Waipa	L _{AF10}	55 or 60	0700-2200	45 & 70 L _{AFmax}	
Waitakere	L _{AF10}	65 (most zones)	24 hours		
Waitaki	L _{AF10}	55 - 65	0700-2200 Or 24 hours	45 or 60	
Westland	L _{AF10}	60	0700-2000 Mon-Fri 0700-1800 Sat	50 & 75 L _{AFmax}	
Whangarei	L _{AF10}	60 - 75	24 hours		

Note: 1. See Appendix A for definition of terms.

In summary, industrial and business zone rules are generally between 60 and 70 dB (L_{Aeq}), with some heavy industry up to 75 dB, and some light commercial as low as 55 dB. Intra zonal rules for industrial and commercial zones often apply 24 hours per day, although more stringent night-time rules in some districts may reflect a growing tendency for the issue of resource consents for residential apartments within commercial areas.

The existing District Plan noise rules applying between Industrial zoned sites (50 daytime, 45 evening and night time) are amongst the more stringent in New Zealand. We propose these are brought into line with noise limits generally used throughout New Zealand for the range and type of anticipated activities. Because of the nature of the Industrial activities, we do not anticipate any adverse noise effects arising from this change.

It should be noted that where an industrial activity has noise sensitive neighbours, for instance residential, the Plan requires compliance with the Residential noise limits. This is a fundamental requirement of an effects based Plan whereby the emitter of noise must be cognisant of the land uses surrounding it.

6.0 NOISE STANDARDS

6.1 World Health Organisation Guidance

The World Health Organisation (WHO) has issued guidelines¹ for appropriate noise levels at residential properties. These guidelines are based on extensive international research into people's reactions to noise and its effects on people's health and sleep disturbance. The guidelines consolidate scientific knowledge on the health impacts of noise on communities, and provide guidance for the protection of people from the potential effects of noise. The WHO Guidelines consider that the main sources of community noise include road, rail and air traffic noise, industries, construction, public work and general community noise.

The WHO Guidelines consider the effects of noise on dwellings to be sleep disturbance, speech interference and annoyance. Based on the WHO Guidelines, it is generally considered that the following external noise levels are acceptable for residential dwellings:

- Less than L_{Aeq} 45 dB and L_{AFmax} 70 dB during night-time, and,
- L_{Aeq} 50 dB during daytime.

6.2 New Zealand Environmental Noise Standards

The two most important New Zealand Standards dealing with environmental noise have been recently revised:

- NZS 6801: 2008 Acoustics—Measurements of Environmental Sound
- NZS 6802: 2008 Acoustics—Environmental Noise

The first of these standards (6801) deals solely with how to measure noise. It should therefore form the basis for measurement of compliance with District Plan noise limits, and should be referenced in the Plan.

The second standard (6802) should also be referenced in the Plan. It details how to assess and interpret noise measurements.

Section 8 of 6802 provides guidance for setting noise limits, and in particular offers assistance in drafting district plan noise rules. Of particular note are the following;

- Daytime is suggested as 0700 – 2200hrs, and night-time the balance. No differentiation is made between days of the week.
- An alternative approach for daytime is 0700 – 1900, and Evening 1900 – 2200 is also offered.

¹ Community Noise ed. B. Berglund, T. Lindvall, D H Schwela (prepared for World Health Organisation), 1999

- A requirement to denote the time base (t) when a noise limit is expressed. It should be noted that the (t) relates to the “rating level” and not the measurement time interval. NZS6802 states that where (t) is not provided it is assumed to be a 15 minute time base. In order to avoid confusion regarding what the noise limits mean, we recommend the (t) time base not generally be shown in order to compel use of NZS6801 and 6802 in their entirety for the measurement and assessment of environmental sound.
- The “notional boundary” assessment position (20 metres from any dwelling) is suggested as being appropriate in rural areas “...where lot sizes are large and settlement density is low...”.
- Upper limits of 55 dB ($L_{Aeq(15min)}$) daytime, 50 dB evening, and 45 dB night-time are suggested for residential areas, along with an L_{AFmax} criterion not exceeding 75 dB at night. These limits are suggested on the basis of providing an appropriate level of acoustic amenity. In other words, these limits are intended as a balance between an individual’s desire for “complete silence”, and the reality that all activity produces some level of noise.
- A limit of up to 60 dB ($L_{Aeq(15min)}$) is discussed for town centres and mixed-use zones.

In industrial zones, limits within the zone of up to 75 dB ($L_{Aeq(15min)}$) are considered appropriate provided adequate consideration is given to any residential accommodation which is permitted in that zone (such as a caretaker’s flat). MDA recommends that the Revised Councils’ District Plans should require that any “Dwellings/ occupancies/ habitable spaces in zones other than Residential and Rural” must be designed to ensure noise within such spaces is appropriately controlled.

- The standard suggests that any activity within the scope of other New Zealand Standards should be exempted from District Plan general noise rules. Similarly, exemptions are suggested for activities of limited duration such as farming, normal domestic activities, some sporting events, noise from emergency services, special entertainment events, and temporary military training activities.
- Specific noise rules are proposed for some activities, and for devices such as frost fans and bird scaring devices.

6.3 Other New Zealand Standards

Whilst 6801 and 6802 form the basis of general environmental noise assessments, they specifically exclude some noise sources, many of which are dealt with in other New Zealand standards;

- NZS 6803:1999 *Acoustics* – Construction Noise
- NZS 6805:1992 Airport Noise Management and Land Use Planning
- NZS 6806: 2010 *Acoustics* – Road traffic Noise: New and altered roads
- NZS 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas
- NZS 6808: 2010 *Acoustics* – Wind farm noise
- NZS 6809:1999 *Acoustics* – Port Noise Management and Land Use Planning

6.4 National Environmental Standards (NES) Telecommunication Facilities

Currently there is only one NES that specifies noise limits. Because an NES is binding an overrides the District Plan we will compare these requirements to those recommended as part of the Plan review on a case by case basis to ensure they are not significantly out of line.

The Telecommunication Facilities NES sets a noise limit for residential, rural and open space/reserve areas at a distance of 3m within the receiving site of 50dB $L_{Aeq(5 \text{ minutes})}$ between 7am and 10pm and 40dB $L_{Aeq(5 \text{ minutes})}$ and 65dB L_{Amax} between 10pm and 7am.

For business and industrial areas (and any other no noise sensitive zones) a noise limit of 60dB $L_{Aeq(5 \text{ minutes})}$ at all times.

In our opinion the NES noise limits are not uncommon and there is unlikely to be any significant conflict between the NES for Telecommunication Facilities and the proposed Plan noise limits.

6.5 Activities Exempt From Standard Noise Rules

A number of activities have been identified during the Plan review as requiring exemption from the standard noise limits contained in Table A1. These activities are required to comply with alternative noise limits as specified in Table A2.

We have summarised the Table A2 activities and the reasoning behind the recommendation for their separate control in Table 3.

Table 3: Summary of Noise Rules Exemptions

Activity	Issues	Recommendation
Construction Noise	Construction noise is recognised as an essential process associated with many activities. Construction noise is a limited duration activity and will generally conclude when an activity commences.	Adopt NZS6803:1999 for measurement and assessment of construction noise.
Temporary Military Training	Military activities including training are recognised as important to the security of New Zealand and a relaxation of daytime noise rules is warranted on this basis. Many District Plans throughout New Zealand provide for this type of activity.	Same provision as previous Plan rules
Vehicles and mobile machinery associated with rural production	Noise levels generated by vehicles and mobile machinery associated with rural production activities can vary widely throughout the year and are often temporary and transient. Strict compliance with standard activity district wide noise rules may not be practicable, reasonable or enforceable.	Reinforce need to satisfy S.16 and 17 of the RMA.
Prospecting and Exploration	These activities can range from short term sporadic exploration to more long term operations. The activities can also include blasting and other processes that result in short term high noise level events as well as ground borne vibration.	Compliance with standard activity district wide noise rules except for blasting which has more appropriate criteria provided. Criterion for ground borne vibration has also been included.
Community Events	Large scale community events can be difficult to organise because of potential delays through the resource consent process. The short term duration of such events is unlikely to result in any potential on	Make provision for a limited number of community events to be held within the District. Limit the number of events which can be held at any one of the designated venues per year to give nearby

Activity	Issues	Recommendation
	going noise effect if controlled through appropriate rules.	residents certainty of outcome. Criteria for low frequency sound characterised by 63 and 125Hz octane bands has been included to minimise potential annoyance, particularly with regard to events lasting 12 hours.
Helicopters	Helicopter noise can result in adverse community response. NZS6807 outlines noise limits and planning strategies to manage this.	Adopt NZS6807:1994 for managing noise and planning issues regarding helicopters.
Wind turbine generators	Noise from wind turbines with a swept area greater than 80m ² require special analyses that cannot be undertaken using NZS6801 and 6802.	Adopt NZS6808:2010. Acoustics – Wind farm noise
Dwellings/ occupancies/ habitable spaces in zones other than Residential and Rural	Reverse sensitivity issues can arise when potentially noise sensitive activities such as dwellings are developed in business and industrial zones.	Require habitable spaces in non residential areas to provide sound insulation to protect the occupants from the noise of legitimate activities within that zone.
Audible bird scaring devices and frost fans	Can result in significant impact and adverse reaction from adjacent land uses. Some recognition should be given to horticultural activities using techniques required to protect crops. The potential noise sources can be difficult to assess using standard activity district plan noise rules.	Noise rules specifically designed to provide acoustic parameters that reflect the unique noise sources.

7.0 RECOMMENDATIONS - ENVIRONMENTAL STANDARDS

This section contains recommended noise rules and the form they should take.

7.1 Noise

Noise shall be measured and assessed using the following standards:

- NZS 6801:2008 Acoustics – Measurement of Environmental Sound
- NZS 6802:2008 Acoustics – Environmental Noise
- NZS 6803:1999 Acoustics – Construction Noise
- NZS 6805:1992 Airport Noise Management and Land Use Planning
- NZS 6806: 2010 Acoustics – Road traffic Noise: New and altered roads
- NZS 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas
- NZS 6808: 2010 Acoustics – Wind farm noise
- NZS 6809:1999 Acoustics – Port Noise Management and Land Use Planning

Noise levels shall be measured and assessed at or within the site boundary of the noise receiver unless specified otherwise. The assessment position for houses, dwellings and habitable buildings in the Rural zone is within the notional boundary as defined in NZS6801.

Where standards are implemented that suggest an alternative measurement location, this shall be discussed and agreed with appropriate Council staff. Any reports submitted to Council shall describe the use of an alternative measurement position and the reasons for its use.

7.2 Vibration

Vibration from any activity shall in the first instance be measured and assessed in accordance with the following standards:

- AS 2670.1-2001 Evaluation of human exposure to whole-body vibration – General requirements
- AS 2670.2-1990 Evaluation of human exposure to whole-body vibration - Continuous and shock-induced vibration in buildings (1 to 80 Hz)
- DIN 4150-3:1999 Effects of vibration on structures

Where a scenario arises where these standards are not best suited in assessing the vibration source or receiver of interest, Council may through the resource consent process agree to the use of alternative standards.

7.3 Alternative Noise Measurement Position

Alternative measurement location(s) to those specified in Section 7 may be appropriate on a case by case basis. This shall be discussed and agreed with appropriate Council staff. Any reports submitted to Council shall describe the use of an alternative measurement position and the reasons for its use.

7.4 Noise Limits

Noise from any activity (not listed in Table A2) shall not exceed the following limits in Table A1 when measured at or within the following receiving zones.

Table A1: Noise limits

Generic Zone	Noise Limits, dB		
	Daytime	Night-time	Notes
	On any day 7am to 10pm	At all other times	
Residential	50 L _{Aeq}	40 L _{Aeq} 75 L _{Amax}	
Resort/Tourism	60 L _{Aeq}	50 L _{Aeq} 75 L _{Amax}	
Commercial	65 L _{Aeq}	60 L _{Aeq} 75 L _{Amax}	Octave band noise levels should not exceed: 75dB L _{eq(1 min)} at 63Hz 65dB L _{eq(1 min)} at 125Hz
Industrial	75 L _{Aeq}	70 L _{Aeq} 80 L _{Amax}	
Rural	50 L _{Aeq}	40 L _{Aeq} 75 L _{Amax}	To be measured and assessed within the notional boundary
Reserve/Recreation	50 L _{Aeq}	45 L _{Aeq} 75 L _{Amax}	
Water/Lake	55 L _{Aeq}	45 L _{Aeq} 75 L _{Amax}	

The activities in Table A2 are exempt from the noise limits given in Table A1. These activities are recognised as having different qualities associated with them and therefore must comply with the following noise limits when measured within the site boundary of a receiving site, notional boundary of rural houses or other specified position.

Table A2: Noise limits

Activity	Noise Controls		
Construction Noise	Comply with the provisions of NZS6803:1999 – Construction Noise		
Temporary Military Training	At any zone	L _{Aeq} , dB	L _{Amax} , dB
	0630-0730hrs	60	70
		75	90
	0730-1800hrs	70	85
	1800-2000hrs	40	60
	2000-0630hrs		
Vehicles and mobile machinery associated with rural production	Exempt providing they are of limited duration and not in a fixed location and are vehicles and mobile machinery associated with rural production activities and S16 and S17 of the RMA have been satisfied. Examples include harvesting, spraying and planting machinery.		
Prospecting and Exploration	<p>Shall comply with the relevant zone noise limits at the specified measurement and assessment position for those zone(s), except that blasting noise and all vibration shall comply with the following:</p> <ul style="list-style-type: none"> • Occur only between 7am and 7pm; and • No more than 2 events per hour, with a maximum of 8 events per day; and • All occupiers of houses, dwellings or habitable buildings within a 2 kilometre range shall be advised in writing no less than 5 working days prior to the blasting occurring; and • Overblast pressure incident on houses or habitable buildings shall not exceed 115dB L_{Zpeak}; and • Ground borne vibration shall not exceed the limits specified in DIN4150-2:1999 and Part 3:1999. 		

Activity	Noise Controls
Community Events	<p>Shall comply with the zone noise limits at the specified measurement and assessment position for those zone(s). Except as follows:</p> <p>A total of up to 6 events per year between 7am and 10.30pm may be held providing the following criteria are met:</p> <ol style="list-style-type: none"> 1. For 4 events in any 12 month period a noise limit of 80dB $L_{Aeq(1\ hour)}$ within relevant adjacent zone(s) providing the event and pre event rehearsal do not individually exceed 3 hours in duration. 2. For 2 events in any 12 month period – a noise limit of 70dB $L_{Aeq(1\ hour)}$ within relevant adjacent zone(s) providing the event does not exceed 12 hours per day over a two day period. 3. No more than 3 of the 6 events held shall be at any one of the venues listed in sub clause 5 below. 4. Octave band noise levels a incident on houses, dwellings or habitable buildings shall not exceed: <ul style="list-style-type: none"> 85 $L_{eq(1\ min)}$ at 63Hz 75 $L_{eq(1\ min)}$ at 125Hz 5. The total of 6 events per calendar year may be held only at the following locations: <ul style="list-style-type: none"> • • • • • <p>Note: The above locations and event frequencies are recommendations for Council consideration only and will be reviewed as part of the district plan review consultation process.</p>
Helicopters	Shall comply with the provisionsNZS6807:1994 – Noise management and land use planning for helicopter landing areas.
Wind turbine generators with swept area greater than 80m ²	Shall comply with NZS 6808: 2010 Acoustics – Wind farm noise
Dwellings/ occupancies/ habitable spaces in zones other than Residential and Rural	<p>A dwelling or occupancy or habitable space is permitted in zones other than Residential and Rural if the total internal noise level in any habitable room does not exceed 35 dB $L_{Aeq(24\ hours)}$ while at the same time complying with the ventilation requirements of clause G4 of the New Zealand Building Code. The total noise level shall include all intrusive noise and mechanical services.</p> <p>In determining the external noise level, an assumption that the noise incident upon the noise sensitive facade is from at least three separate activities simultaneously generating the maximum allowable noise level for that zone.</p> <p>Compliance with the above must be confirmed in writing by a suitably qualified and experienced acoustic consultant.</p>

Activity	Noise Controls
Audible bird scaring devices	<p>Noise from audible explosive bird scaring devices shall only be operated between sunrise and sunset, and shall not exceed 100dB L_{Zpeak}, when measured within the notional boundary of any rural zoned site, or within the site boundary of any residential zoned site.</p> <p>Discrete sound events of a bird scaring device including shots or audible sound shall not exceed 3 events within a 1 minute period and shall be limited to a total of 12 individual events per hour.</p> <p>Where audible sound is used over a short or variable time duration, no event may result in a noise level greater than 50dBA SEL when assessed at within the notional boundary of any rural zoned site, or within any residential zoned site.</p> <p>A legible notice is fixed to the road frontage of the property on which is the device is being used, giving the name, address and telephone number of the person responsible for the operation of any such device(s).</p>
Frost fans	<p>Noise generated by frost fans shall not exceed 55 dB $L_{Aeq, 10min}$ when assessed within the notional boundary of any other rural zoned site, or within the site boundary of any residential zoned site.</p> <p>A legible notice is fixed to the road frontage of the property on which it is being used, giving the name, address and telephone number of the person responsible for its operation.</p>

Noise Assessment Matters

In considering any application for resource consent for activities that are not predicted to comply with the relevant zone noise controls, the matters to be considered by Council shall include, but are not limited to, the following:

- The nature of the zone within which the noise generating activity is located and its compatibility with the expected environmental results for that zone.
- The nature of any adjoining zone(s), and the compatibility of the noise generating activity with the expected environmental results for those adjoining zone(s).
- Existing Ambient noise levels.
- The length of time for which specified noise levels will be exceeded, particularly at night, with regard to likely disturbance that may be caused.
- The potential for cumulative noise effects to result in an adverse outcome for receivers of noise.
- The likely adverse impacts of noise generating activities both on and beyond sites, on a site, on visitors, users of business premises, or on public places in the vicinity.
- The extent to which the noise may detract from enjoyment of any recreation or conservation area.

- The maximum level of noise likely to be generated, its nature, character and frequency, and the disturbance this may cause to people in the vicinity.
- Whether the noise generated would be of such a level as to create a threat to the health or well-being of persons living or working in the vicinity.
- The proposals made by the applicant to reduce noise generation. This may include guidance provided by a suitably qualified and experienced acoustic consultant.
- The value and nature of entertainment activities and their benefit to the wider community, having regard to the frequency of noise intrusion and the practicality of mitigating noise, or utilising alternative sites.
- The extent to which achieving the relevant limits is practicable, given any existing activities which create noise, particularly on the interface with commercial, industrial or recreational activities.
- The extent to which achieving the relevant limits is practicable where the existing noise environment is subject to significant noise intrusion from road, rail or air transport activities.
- The adequacy of information provided by the applicant.
- The level of involvement of a suitably qualified and experienced acoustic consultant in the assessment of potential noise effects and/or mitigation options to reduce noise emissions.
- Any other relevant standards, codes of practice or assessment methods based on robust acoustic principles.

APPENDIX A: DEFINITIONS

$L_{Aeq(t)}$	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. A 15 minute measurement previously denoted as “55 dBA L_{eq} ” is now stated as “55 dB $L_{Aeq(15min)}$ ”; this should however not be confused with the rating level assessment as defined in NZS6802.
L_{AFmax}	is the maximum A-weighted sound level measured using fast response (hence F), during a chosen sample period and previously denoted as L_{max} .
L_{AFmin}	is the minimum A-weighted sound level measured using fast response (hence F), during a chosen sample period.
L_{A10}	is the A-weighted sound level that is exceeded for 10% of the sample period. Previously denoted as L_{10} , 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 $L_{Aeq(t)}$.
$L_{90(t)}$	is the sound level that is exceeded for 90% of a chosen sample period, and is used to quantify background noise. Generally A-weighted (and denoted $L_{A90(t)}$), with the suffix “t” denoting the measurement time. L_{90} has replaced the previous L_{95} to bring New Zealand into line with International practice.
L_{AE}	is the A-weighted Sound Exposure Level, previously known as SEL. This is a notional parameter and is the sound level, that if maintained for a constant 1 second, contains the same energy as the varying noise level.
A-weighting	is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
NZS6801	New Zealand Standard NZS 6801:2008 <i>Acoustics—Measurement of Environmental Sound</i>
NZS6802	New Zealand Standard NZS 6802:2008 <i>Acoustics—Environmental Noise</i>
dB	decibels are a logarithmic unit used to measured sound pressure. A doubling of sound pressure results in a 3 dB increase in sound level.
L_{dn}	is a “day-night” noise level. This is an L_{eq} measured over a 24hr period, where night-time noise levels are penalised by 10 dB to account for additional annoyance during sleeping hours.