HEGLEY ACOUSTIC CONSULTANTS

PROPOSED RURAL RESIDENTIAL PLAN CHANGE

SKELLERUP BLOCK, ROLLESTON

NOISE ASSESSMENT

Report No 8571

Prepared for:
Selwyn Plantation Board Ltd
ROLLESTON
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Prepared by: .....
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1 INTRODUCTION

The Selwyn Plantation Board Limited (SPBL) proposes a private Plan Change to rezone land they own at two separate sites along Dunns Crossing Road, Rolleston from Rural – Outer Plains (OP) to Living 3. The sites are known as the Skellerup Block and Holmes Block, which are located to south west of Rolleston as shown on Figure 1.

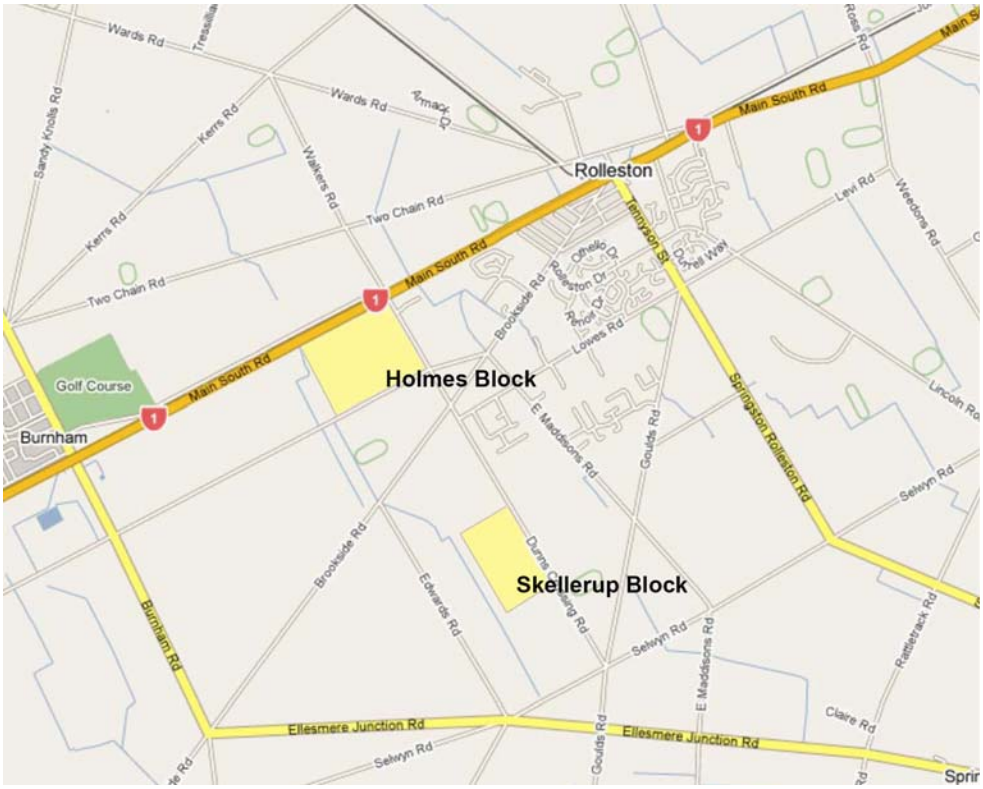

Figure 1. Site Location

This report considers the noise[1] aspects of the proposed development, the noise from existing activities in the area and how the development will be undertaken to ensure the noise for any residential activities will be controlled to within a reasonable noise limit.

[1] See Appendix A for a Glossary of Noise Terms

2 DESIGN CRITERIA

Rule 9.16 of the Selwyn District Plan sets out the permitted ACTIVITIES AND NOISE

Permitted Activities — Activities and Noise

9.16.1 Except as provided in 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:

Table C9.2 – Maximum noise limits at any Living Zone boundary.

Hours	Noise Limit
7.30am – 8.00pm	55 dBA L_{10} 85 dBA L_{max}
8.01pm – 7.29am	40 dBA L_{10} 70 dBA L_{max}

Table C9.3 – 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.

Hours	Noise Limit
7.30am – 8.00pm	60 dBA L_{10} 85 dBA L_{max}
8.01pm – 7.29am	45 dBA L_{10} 70 dBA L_{max}

Part C of the District Plan, Introduction to Rules, sets out the following requirements for noise measurement and assessment:

Except where provided elsewhere in this Plan, sound shall be measured in accordance with the provisions of NZS 6801:1999 Acoustics – Measurement of Environmental Sound and assessed in accordance with the provisions of NZS 6802:1991 Assessment of Environmental Sound.

The following additional provisions shall apply to the application of NZS 6802:1991:

4.5.1 Adjustments for special audible characteristics, if present, as provided for in Clause 4.3 and 4.4 of the Standard shall apply and will have the effect of imposing a numerical noise limit 5dBA more stringent then the L_{10} numerical limits stated in the rules.

4.5.2 Measurement time intervals provided for in Clause 5.1 of the Standard shall be limited to 10 - 15 minutes excluding pause or data exclude times. Where the sound under investigation is cyclic or occurs for durations less than 15 minutes, the measurement time interval may be less than 10 - 15 minutes excluding pause and data exclude times.

It is noted that Tegal Foods has a site at Lots 3 and 4 DP20007 in Dunns Crossing Road that was granted resource consent in July 1999. The only reference to any noise control in that consent was that the application had been assessed as a land use consent for a discretionary activity and as such the provisions of the Transitional District Plan and the Resource Management Act 1991 were taken into account.

In May 2004 Rolliston Resource Recovery Park (RRRP) was granted resource consent to operate based on the RRRP being managed and operated in a manner that would ensure the noise levels measured at or within the notional boundary of any dwelling beyond the site would not exceed the following limits:

Hours	**Noise Limit**
7.30am – 8.00pm	60dBA L_{10}
	85dBA L_{max}
8.01pm – 7.29am	45dBA L_{10}
	70dBA L_{max}

These limits are the same as set out in Table C9.3 of Rule 9.16.1.

3 EXISTING NOISE ENVIRONMENT

The potential noise sources in the area include traffic along State Highway 1, train noise, the Waste Water Treatment Plant, the Resource Recovery Park, a substation on the corner of Dunns Crossing Road and Burnham School Road and the Tegal site in Dunns Crossing Road. Noise from the Waste Water Treatment Plant is not having any effect on the existing noise environment at either the Holmes Block or the Skellerup Block so is not considered further. Similarly, the noise from trains, while clearly noticeable as they pass, is sufficiently infrequent not to be a nuisance. In addition, any acoustic design to control traffic noise will also reduce train noise.

The 2007 traffic flows on State Highway 1 just to the south of Burnham is 10,403vpd. Based on this traffic flow the noise received at the Holmes Block will be typically 67dBA 24 hour L_{eq} at 20m from the highway assuming there is clear line of sight to the highway. This is a relatively high noise level and reflects the amount of traffic passing the site.

There is less than 400vpd on Dunns Crossing Road so there is minimal traffic noise effect from this road.

The noise from the substation has been measured at 45dBA (L_{10}) at the Dunns Crossing Road and Burnham School Road corner of the Holmes Block. This noise attracts a 5dBA penalty due to the tonal effect of the transformers.

In order to understand the existing noise environment at the Tegal site a field survey was undertaken during the night time. The noise from this site is from the ventilation fans that are used to control the temperature inside the sheds.

4 POTENTIAL NOISE EFFECTS

The potential concern is for any reverse sensitivity effects from the proposed rezoning. As shown on Figure 2 there is potential noise from the Resource Recovery Park to the south west of the Holmes Block and noise from State Highway 1 traffic to the north of the Holmes Block. In addition there is a Waste Water Treatment plant on the next block of land to the west of the RRRP site although this is considered to be sufficiently clear of the proposed developments not to be of concern. The only other potential noise source of interest is from the Tegal site where the use of ventilation fans has the potential to cause elevated noise to the Skellerup Block.

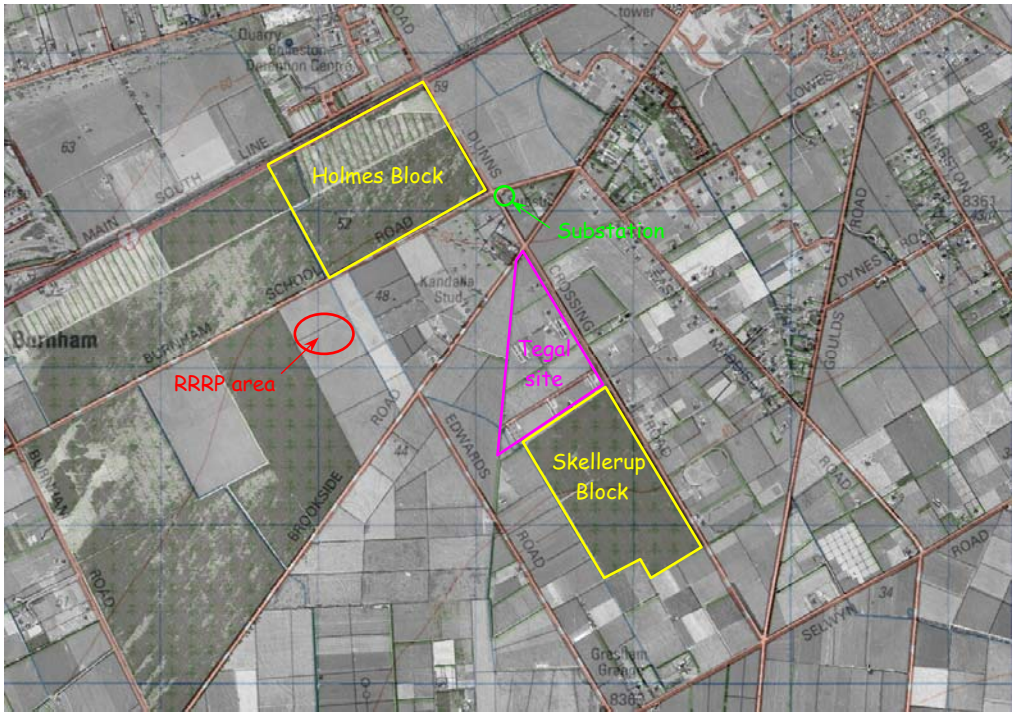

Figure 2. Location of Activities

In the Odour Assessment report it has been recommended that a minimum buffer of 150m be used from the Tegal sheds, 300m from the RRRP site and 1,000m from the Waste Water Treatment operational area. These distances have been adopted as a minimum for the noise analysis.

Based on field measurements of a typical Resource Recovery Park operating the predicted noise level at 300m is 41dBA L_{10} with the maximum level (L_{max}) being

11dBA higher at 52dBA when assuming no specific screening of the noise sources. This is well within the daytime noise level of 55dBA L_{10} and 85dBA L_{max} permitted by the District Plan at a Living Zone boundary during the daytime (7:30am – 8:00pm).

Noise from the substation is 45dBA L_{10} at the Dunns Crossing Road and Burnham School Road corner of the Holmes Block. In order to control this noise to within the Living Zone night time noise limits as set out above, it will be necessary to construct a 2m high barrier either along both the Dunns Crossing Road and Burnham School Road boundary for a minimum of 20m from the corner of the site or locate a screen fence on the Orion site. Alternatively, a 100m setback for the residential development could be used or the house designed to cater for the higher noise levels as set out for the State Highway traffic noise control.

Based on the noise as measured from the Tegal shed fans the level at 150m (the buffer distance recommended in the odour assessment report) will be 34dBA L_{10} with the L_{max} being 2dBA higher at 36dBA. When including the effects of the tonal component the ventilation fans are also within the District Plan night time (8.01pm – 7.29am) noise requirements of 40dBA L_{10} and 70dBA L_{max}. As the noise from the Tegal site is controlled by the fans the daytime levels will also be achieved. Vehicles operating on site will be sufficiently clear of the proposed development (150m minimum) to ensure they do not exceed either the daytime or night time noise limits of the District Plan for a Living Zone as set out above.

The only other noise source that is of potential concern is from traffic on State Highway 1.

Appendix 5D – Reverse Sensitivity of the NZ Transport Agency (NZTA) Planning Policy Manual August 2007 sets out the recommended design requirements to control reverse sensitivity for state highways. This policy manual aims to ensure new development achieves an acceptable level of amenity by ensuring habitable rooms meet “satisfactory” internal sound levels as recommended in *AS/NZS 2107:2000 Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors.*

Table 1 of AS/NZS2107 sets the following design criteria for houses and apartments near major roads, which would include State Highway 1:

Type of occupancy/activity	Recommended design sound level, LA_{eq}, dB(A)	
	Satisfactory	Maximum
Living areas	35	45
Sleeping areas	30	40
Work areas	35	45
Apartment common areas (e.g. foyer, lift lobby)	45	55

Figure 3 shows the NZTA guideline concept of typical distances for residential developments near highways.

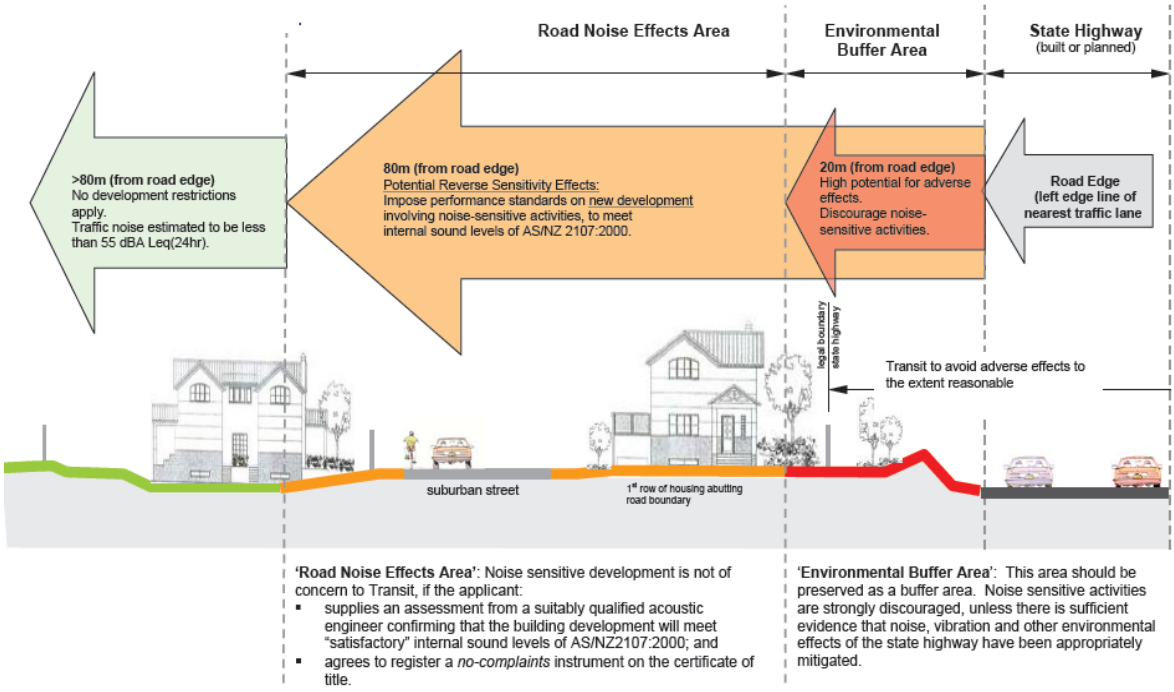

Figure 3. Typical Land Use Cross Section

From Figure 3 it is necessary to limit any residential development to 80m from the edge of State Highway 1 unless specific noise control is undertaken, such as developing a barrier to control the traffic noise to the houses.

If a barrier approximately 2m high is built along the state highway boundary this will reduce the 80m distance as set out above to 15m.

Alternatively, if the building is designed to control the noise so the internal level achieves the requirements of AS/NZS2107 as set out above, no barrier will be required. The exact house design will be dependent on the distance the house is from the road. Assuming the house is approximately 10m from the road (the edge of the carriageway) a typical house design would only require the glazing to be upgraded to a minimum of 6mm float glass, or if the windows are large, 6.38mm laminated glass. As it would be necessary to close the windows to achieve the internal level it would be necessary to provide alternative forced ventilation. This treatment is only expected to be necessary for the first row of house, as they will screen the houses behind them. However, it will depend on how the houses are located on the individual sites so it will be necessary to check there is sufficient screening for the rear house when the design layout of the proposed subdivision is known.

5 CONCLUSIONS

There are a number of existing activities generating noise on adjacent land to the proposed Holmes and Skellerup Blocks that could result in a reverse sensitivity effect. However, by implementing some basic acoustic design the noise to the proposed residential sites can be controlled to within a reasonable level based on the requirements of both the Selwyn District Plan and the NZTA.

By designing to control any potential reverse sensitivity effects to within a level that does not generate any adverse effects for either the proposed Holmes Block and Skellerup Block, the noise effects will be no more than minor. Based on noise, there is no reason why the proposed re-zoning of the Holmes Block and Skellerup Block to a Living Zone should not be permitted.

* * *

Appendix A
Guide to Noise Terms

The following sets out an explanation of the acoustic terms that will be referred to throughout this report. The aim is not to necessarily provide technical definitions, but to enable a basic understanding of what is meant.

The setting of specific noise levels to control any adverse effects does not necessarily mean that noise will not be heard. Audibility depends on the level of a sound, the loudness of the background sound and any special frequency composition or characteristics that a sound may have.

Research suggests that a small number of people (approximately 10%) will find any noise not of their own making unacceptable. Conversely, there are approximately 25% of the population that are essentially immune to any noise. Neither of these two extremes is normally designed for. In establishing the appropriate noise levels the aim is to try and represent the typical expected community reaction, this will generally be approximately 90% of the people.

In order to reflect community response to noise it is necessary to establish a measure that reflects our attitude to the sounds that we hear. Due to the variability of many sounds (level, tone, duration, intrusiveness above the existing sound, etc) no single descriptor will totally describe the potential community reaction to a sound. For this reason there are a number of terms that need to be understood.

dBA

The basic unit to quantify a sound is the decibel. The A-weighted sound level, or dBA, is a good environmental noise descriptor because of the similarity between A-weighting and the frequency response of the human ear at moderate sound levels. It can also be measured easily. However, it provides no indication of tonal frequency components or unusual frequency distributions of sound that may be the cause of annoyance. Where appropriate, this must be assessed separately.

We can hear a change in sound pressure that varies from 1 (taken as the threshold of hearing) through to 1,000,000,000,000 (taken as the threshold of pain). In order to bring these numbers to a more manageable size a logarithmic scale is normally adopted. This reduces the above values to 0 and 12 respectively. The decibel is then described as 10 times the logarithm of the ratio of the pressure level of interest, to a reference pressure level. Thus the scale becomes 0 to 120dBA.

Some typical subjective changes in noise levels are:

A change of 3dBA is just perceptible
A change of 5dBA is clearly perceptible
A change of 10dBA is twice (or half) as loud

Because we use a logarithmic scale care must be taken when adding sound levels. Two equal noise sources raises the level of one source by 3dBA. It takes 10 equal noise sources to raise the level of one source by 10dBA. ie 60dBA + 60dBA = 63dBA and 60dBA x 10 = 70dBA.

Maximum Sound Level (L_{max})

This unit equates to the highest (maximum) sound level for a defined measurement period. It is adopted in NZS6802:1991 Assessment of Environmental Sound, mainly as a method of protecting sleep.

L_{10}

The sound level which is equaled or exceeded for 10% of the measurement time. This level is adopted in NZS6802:1991 Assessment of Environmental Sound to measure intrusive sound. This level may be considered as the average maximum sound level.

Background Sound L_{95}

The sound level which is equaled or exceeded for 95% of the measurement time. This level is adopted in NZS6802:1991 Assessment of Environmental Sound to measure the background sound. This level may be considered as the average

minimum sound level and is the component of sound that subjectively is perceived as continuously present.

Equivalent Sound Level (L_{eq})

The L_{eq} may be considered as the continuous steady noise level that would have the same total A-weighted acoustic energy as a fluctuating noise over the same time period.

Day Night Level, L_{dn}

The day/night level (L_{dn}) is defined as the time-average sound level in decibels (re 20 µPa) over a 24 hour period from midnight to midnight) with the addition of 10dB to nighttime levels during the period from midnight to 07.00 hours and from 22.00 hours to midnight, to take account of the increased annoyance caused by noise at night.

Ambient Sound

The ambient sound is normally used to describe the total noise environment. The ambient sound is often measured as the 24 hour $L_{eq,}$ which is an average value over the 24 hour period. Shorter times are often used, such as the daytime period

Notional Boundary

The notional boundary is defined as a line 20 metres from the facade of any rural dwelling or the legal boundary where this is closer to the dwelling.

Figure A1 shows a noise trace with the relationship of L_{max}, L_{10}, L_{95} and L_{eq} values when including all events over the 15 minute measurement period and Figure A2 some typical noise levels.

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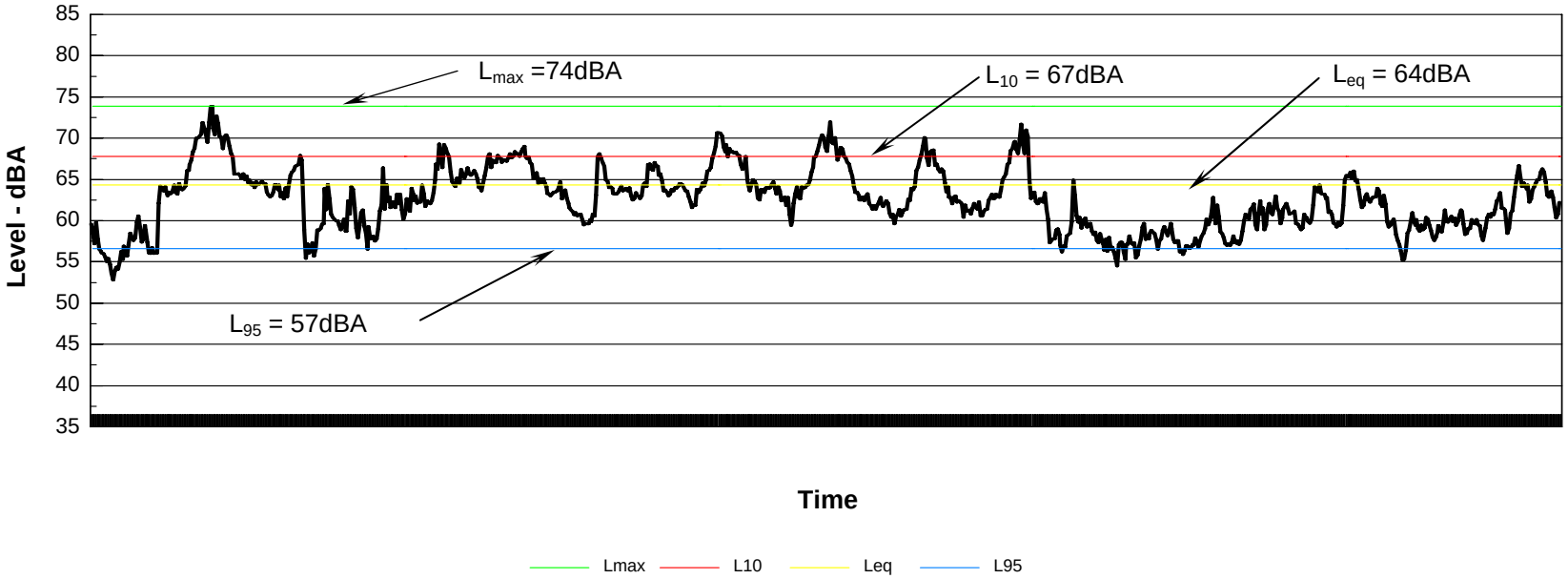

L_{max} is the maximum noise level
L_{10} is the noise level that is equaled or exceeded for 10% of the measurement period
L_{95} is the noise level that is equaled or exceeded for 95% of the measurement period
L_{eq} is the noise level that contains the same energy as the time varying noise

Figure A1

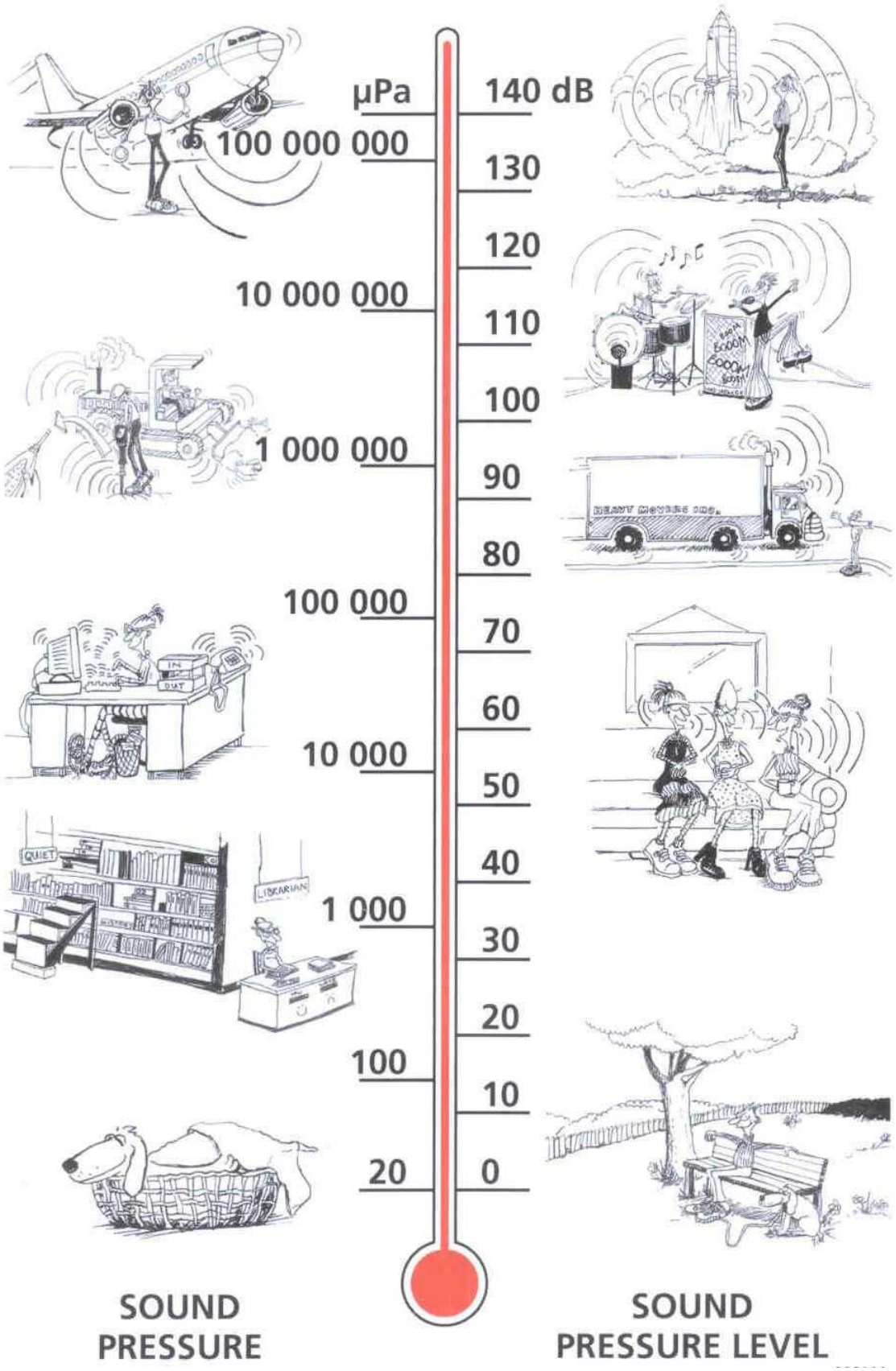
μPa
100 000 000
10 000 000
1 000 000
100 000
10 000
1 000
100
20
140 dB
130
120
110
100
90
80
70
60
50
40
30
20
10
0
QUIET
LIBRARIAN
SOUND PRESSURE
SOUND PRESSURE LEVEL

Figure A2