



HEGLEY ACOUSTIC
CONSULTANTS

Transportation Noise

Yours or Mine

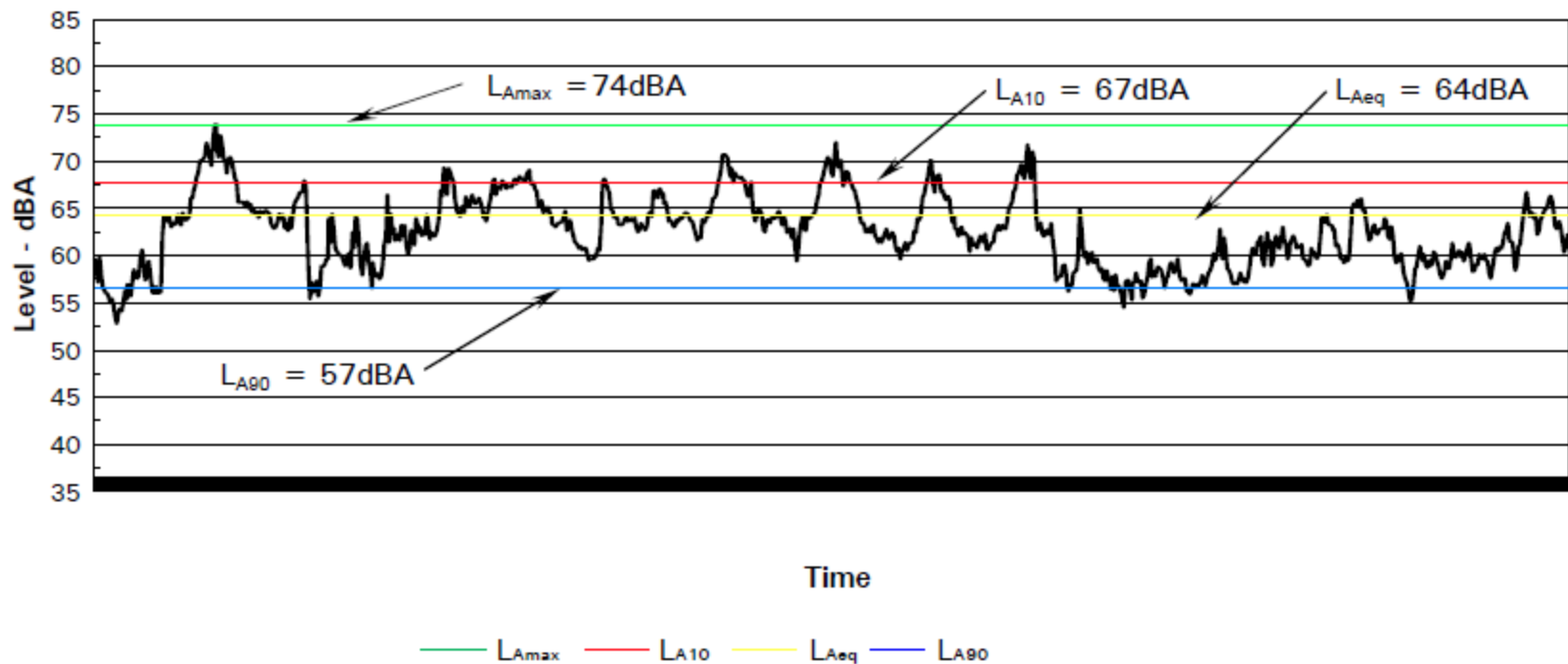
How is noise measured?

Traffic

Port

Airports

Sound source	Sensation	Level (dBA)
Jet aircraft (100m)	Extremely loud	120
Pneumatic drill (1m)	Very loud	110
Siren (5m)	Very loud	100
Heavy truck (5m)	Loud	90
Workshop	Loud	80
Radio	Loud	70
Normal conversation (1m)	Moderate	60
Quiet office	Quiet	50
Public library	Quiet	40
Rustle of paper	Very quiet	30
Quiet church	Faint	20
Threshold of hearing (silence)	Inaudible	0

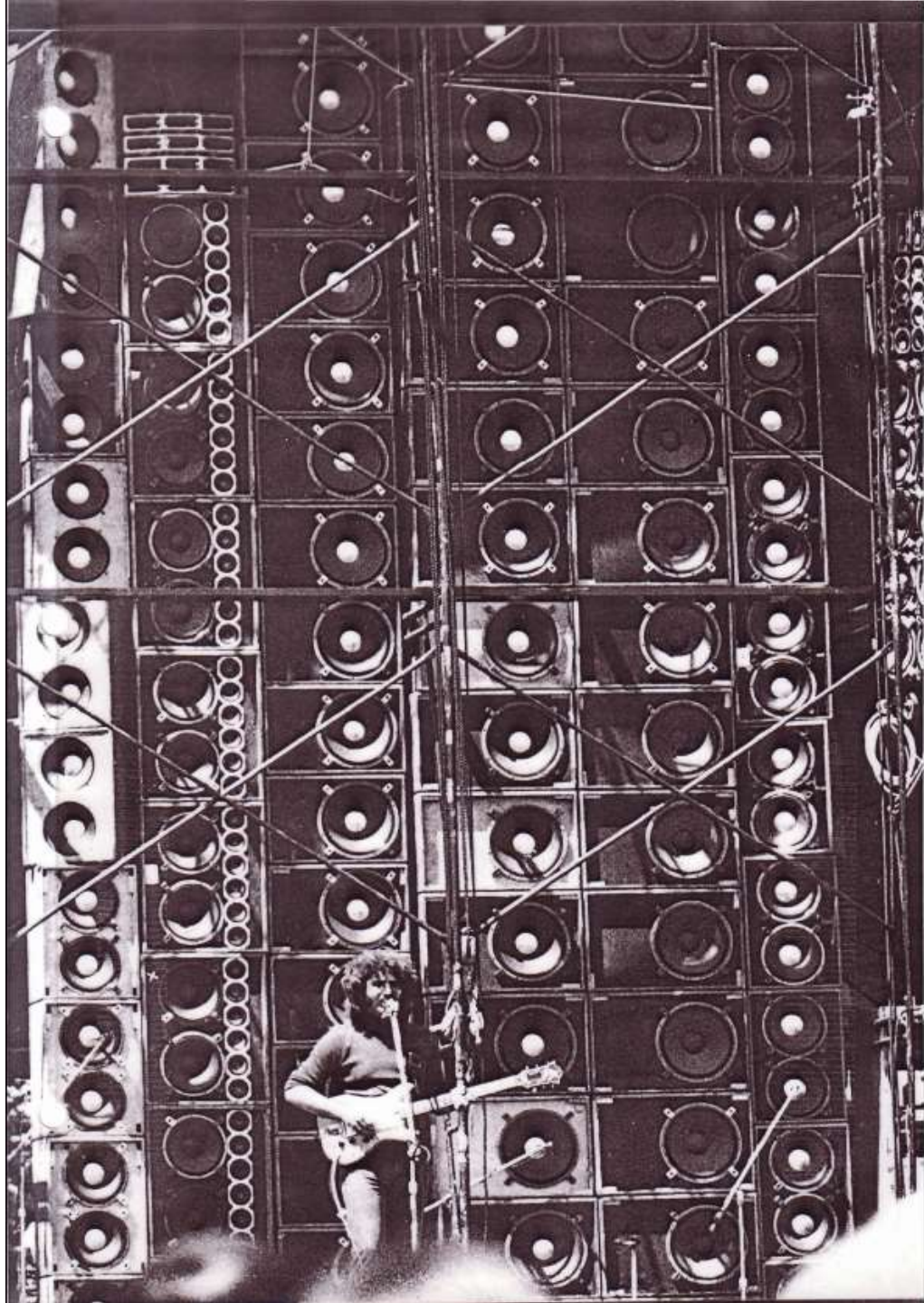


L_{Amax} is the maximum noise level

L_{A10} is the noise level that is equalled or exceeded for 10% of the measurement period

L_{A90} is the noise level that is equalled or exceeded for 90% of the measurement period

L_{Aeq} is the noise level that contains the same energy as the time varying noise



Increase of 3dBA just noticeable

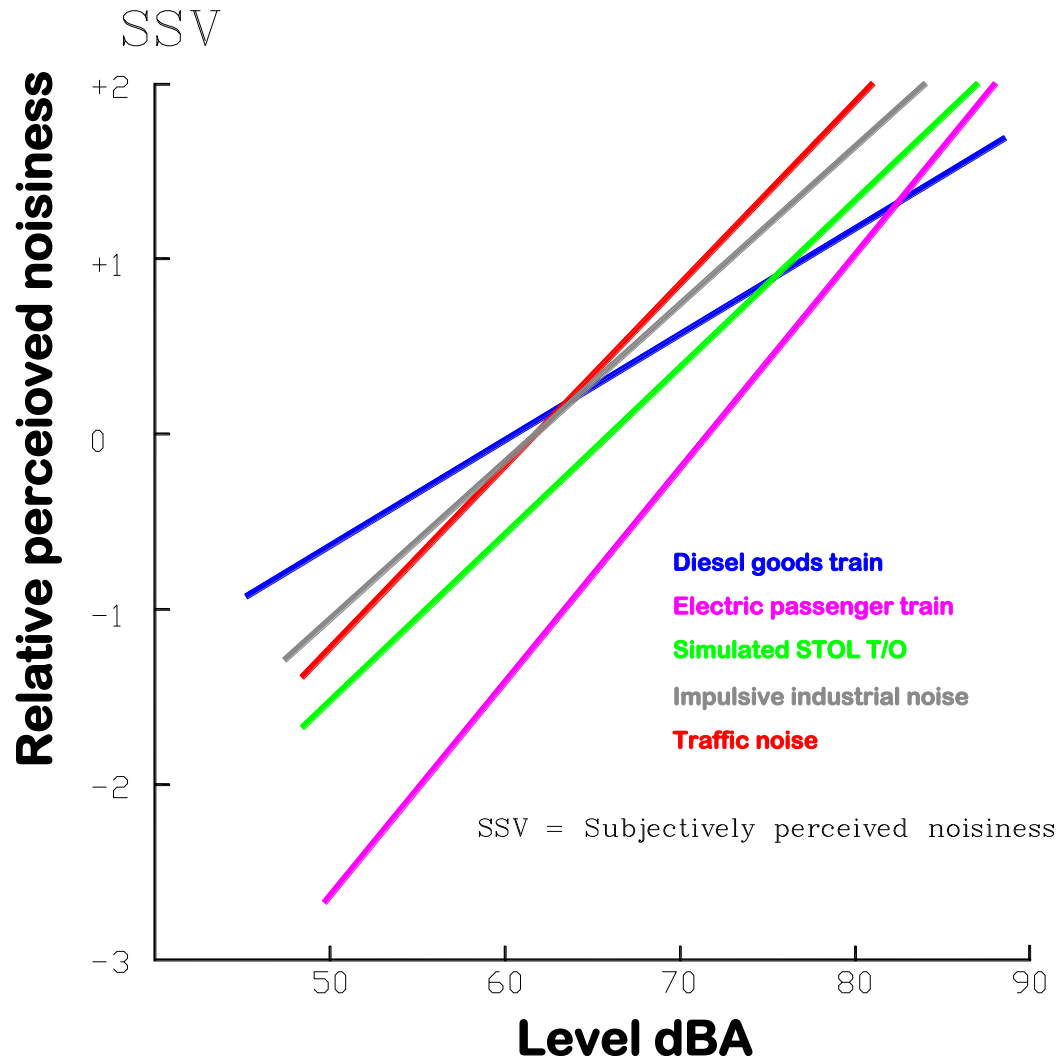
Increase of 5dBA clearly noticeable

Increase of 10dBA sounds twice as loud

2 equal sources +3dBA, $2 \times 50 = 53\text{dBA}$

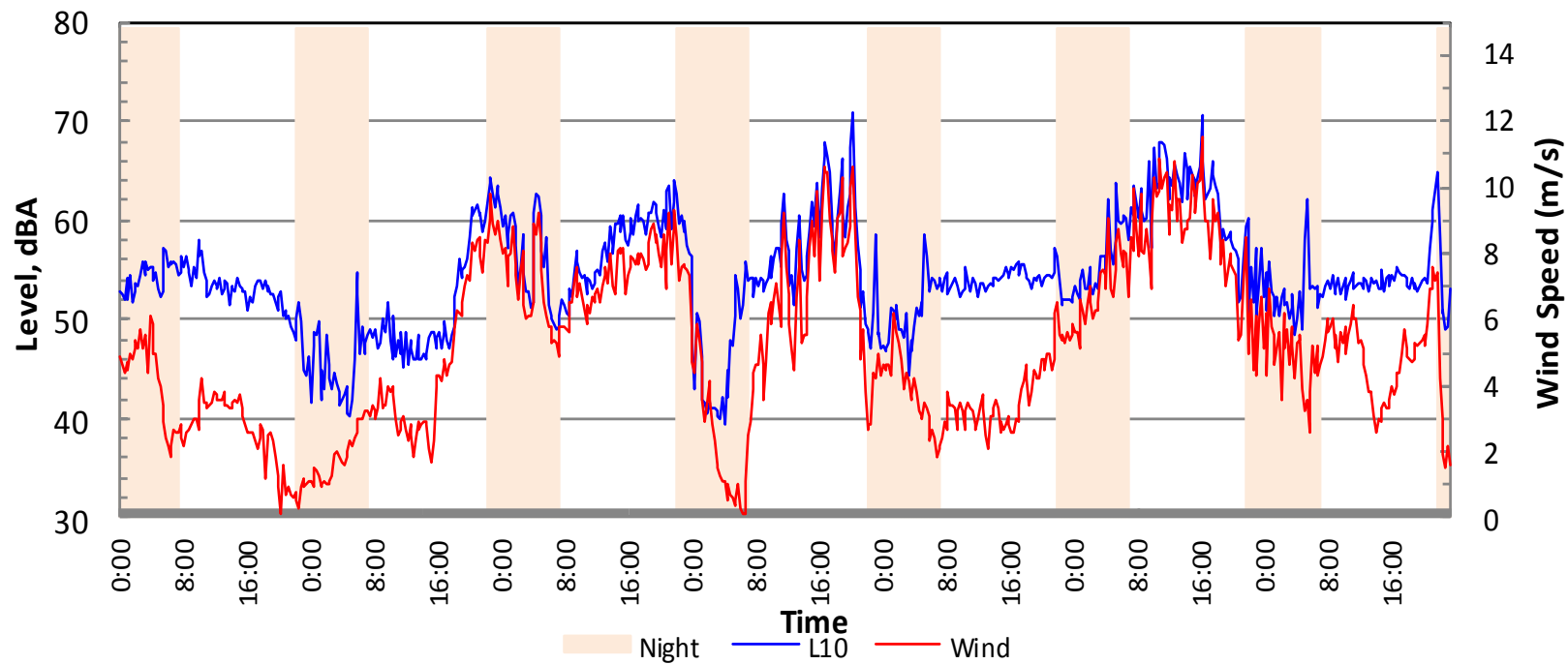
3 equal sources +5dBA, $3 \times 50 = 55\text{dBA}$

10 equal sources +10dBA, $10 \times 50 = 60\text{dBA}$



Subjective Reaction To Different Community Noises

Effects of Wind



NOISE CONTROLS

NZS 6801:2008 Acoustics – Measurement of Environmental Sound

NZS6802:2008 Acoustics – Environmental Noise

NZS 6805:1992 Airport Noise Management and Land Use Planning

NZS 6806:2010 Acoustics – Road-Traffic Noise – New and Altered Roads

**NZS6807:1994 Noise Management and Landing Use Planning for
Helicopter Landing Areas**

**NZS 6809: 1999 Acoustics - Port Noise Management and Land Use
Planning**

**What are the main sources of
transportation noise**

USS Iowa (BB-61) fires a full broadside of nine 16"/50 and six 5"/38 guns during a target exercise near Vieques Island, Puerto Rico, 1 July 1984. Official U.S. Navy photo by Photographer's Mate Airman J. Alan Elliott. Note concussion effects on the water surface, and 16-inch gun barrels in varying degrees of recoil. [DN-ST-85-05379]





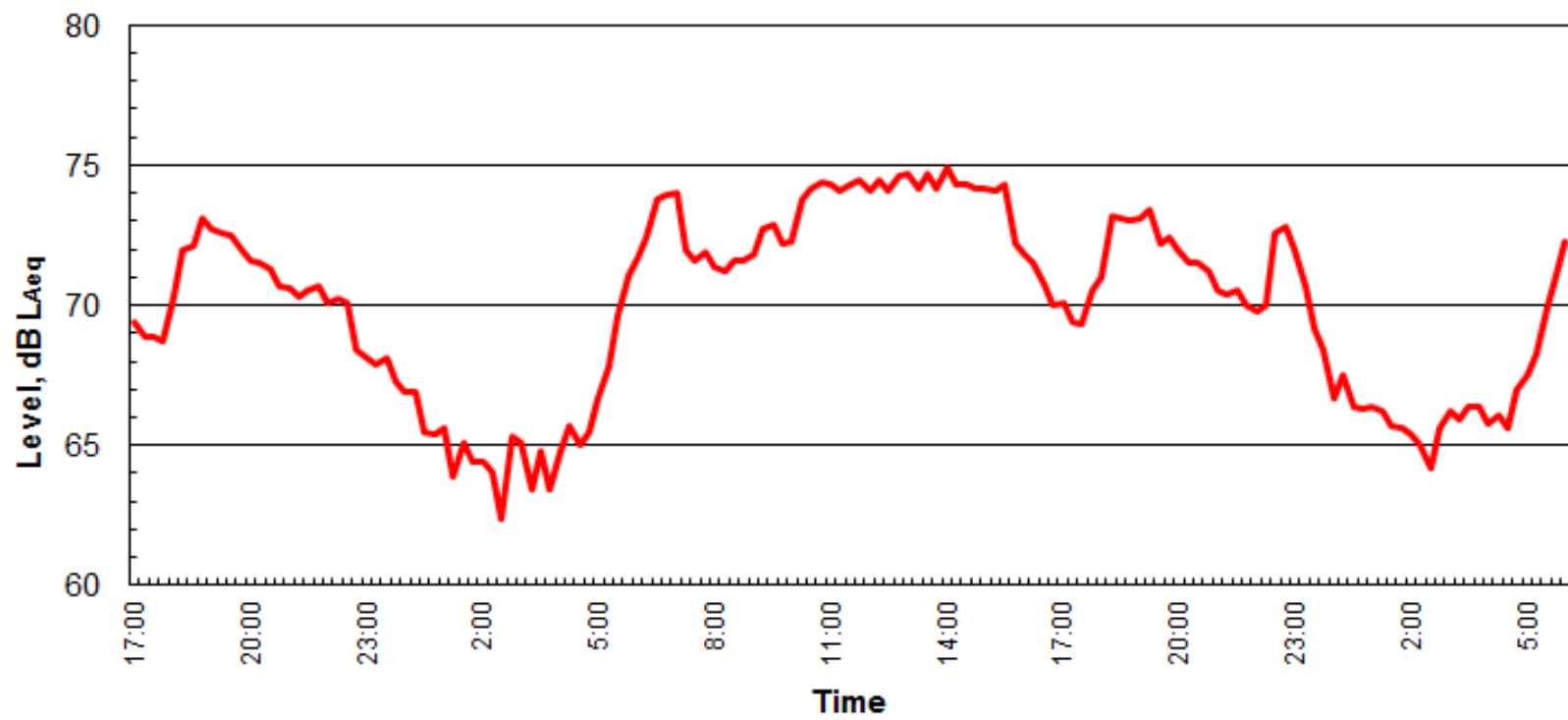
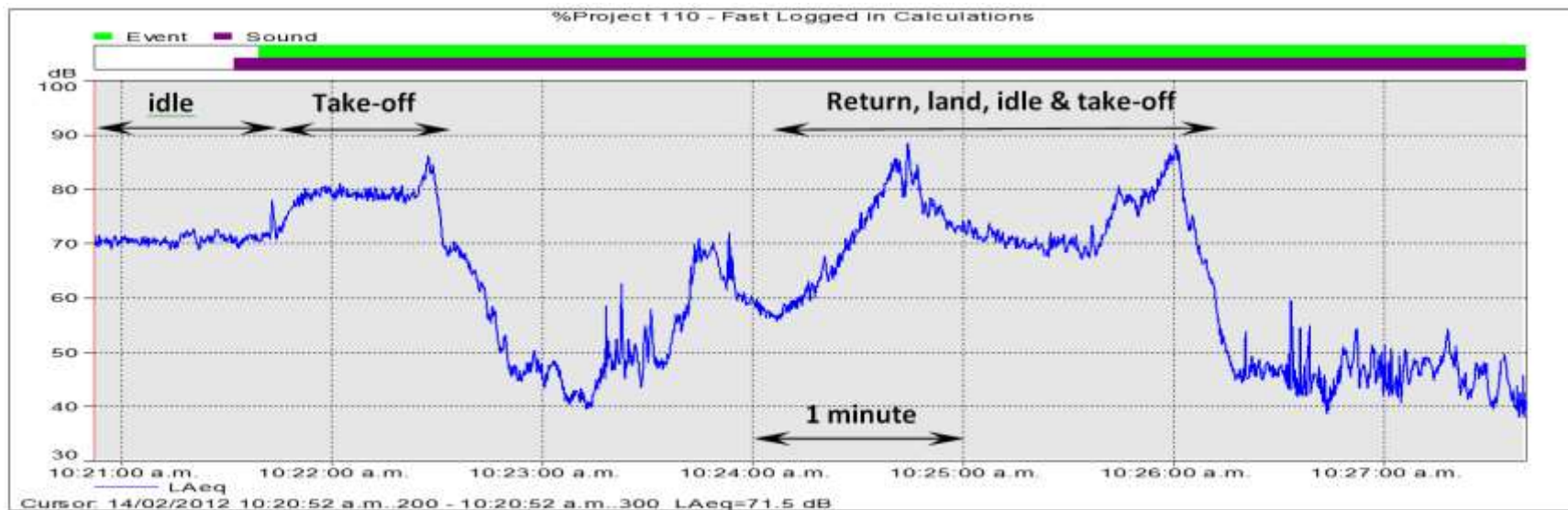


Table 2 – Noise criteria

Category	Altered roads dB L _{Aeq(24h)}	New roads with a predicted traffic volume >75 000 AADT at the design year dB L _{Aeq(24h)}	New roads with a predicted traffic volume of 2000 to 75 000 AADT at the design year dB L _{Aeq(24h)}
A (primary free-field external noise criterion)	64	64	57
B (secondary free-field external noise criterion)	67	67	64
C (internal noise criterion)	40	40	40



AS350 Helicopter



AS350 Helicopter at 50m

Table 1 – Limits of acceptability

Affected land use	L_{dn} day-night average sound level dBA	L_{max} night-time maximum sound level dBA
(i) Industrial	75	n/a
(ii) Commercial	65	n/a
(iii) Residential	50	70
(iv) Rural (at notional boundary)	50	70
(v) Residential (internal)	40	55

PORT NOISE

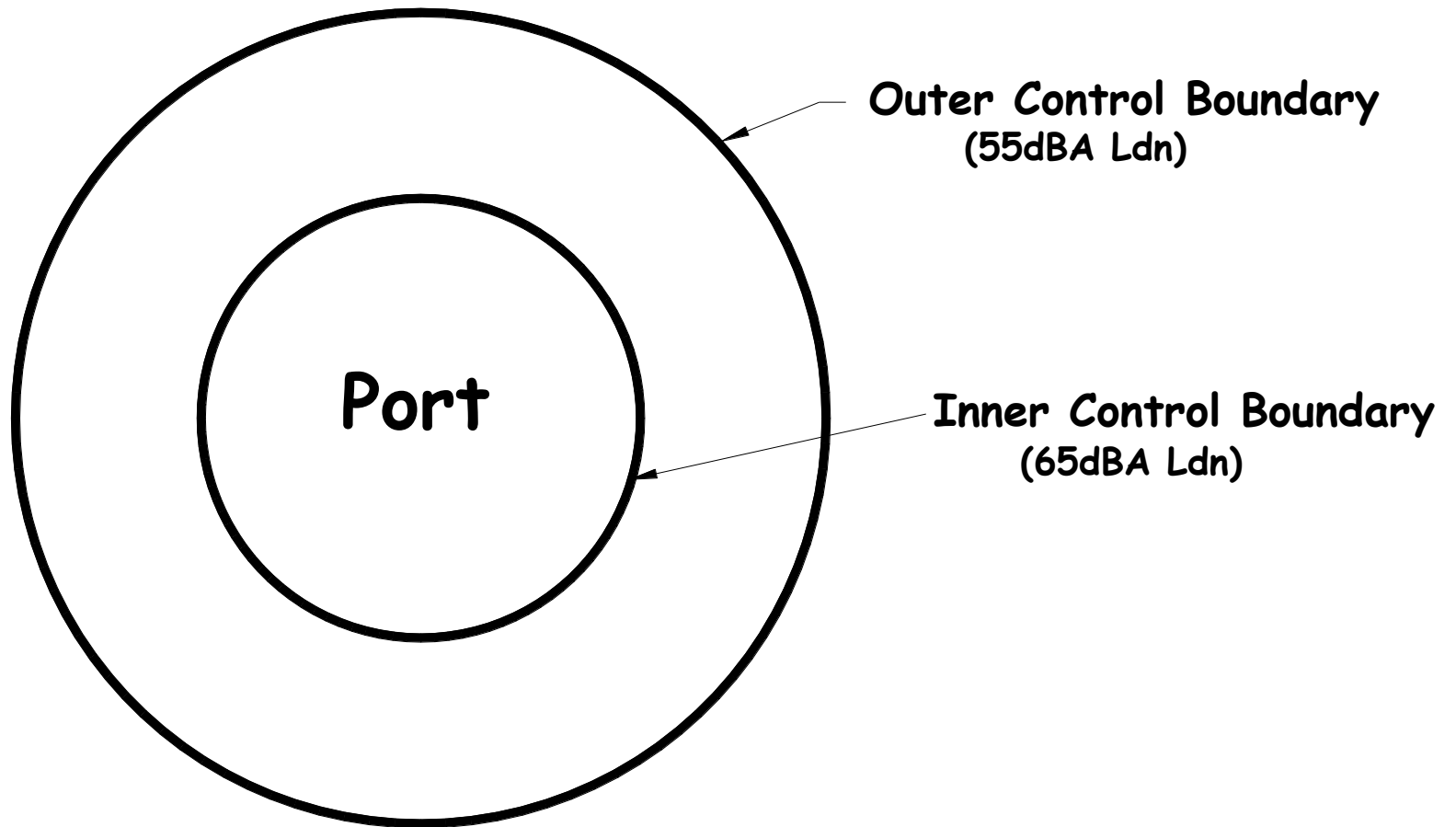
What does it mean?

How do we control noise effects?

What are the appropriate noise controls?

Port Standard Criteria

- Adopts an average daily noise exposure L_{dn}
- 55dBA L_{dn} will cause relatively little annoyance
(Community Noise - World Health Organization 1995)
- 65dBA L_{dn} is an undesirable noise exposure



Between the Outer Control Boundary and the Inner Control Boundary

New noise-sensitive activities and alterations or additions to existing buildings used for noise-sensitive activities, should be permitted activities subject to conditions requiring that new buildings, or alterations or additions to existing buildings used for noise-sensitive activities, be adequately insulated from port noise.

Inside the Inner Control Boundary

- New noise-sensitive activities should be prohibited activities.
- In exceptional circumstances new noise-sensitive activities could be discretionary activities subject to conditions requiring that buildings used for such activities be adequately insulated from port noise.
- Alterations or additions to existing buildings associated with noise-sensitive activities should be discretionary activities, subject to conditions requiring that alterations or additions to existing buildings used for noise-sensitive activities, be adequately insulated from port noise.

Noise Modelling

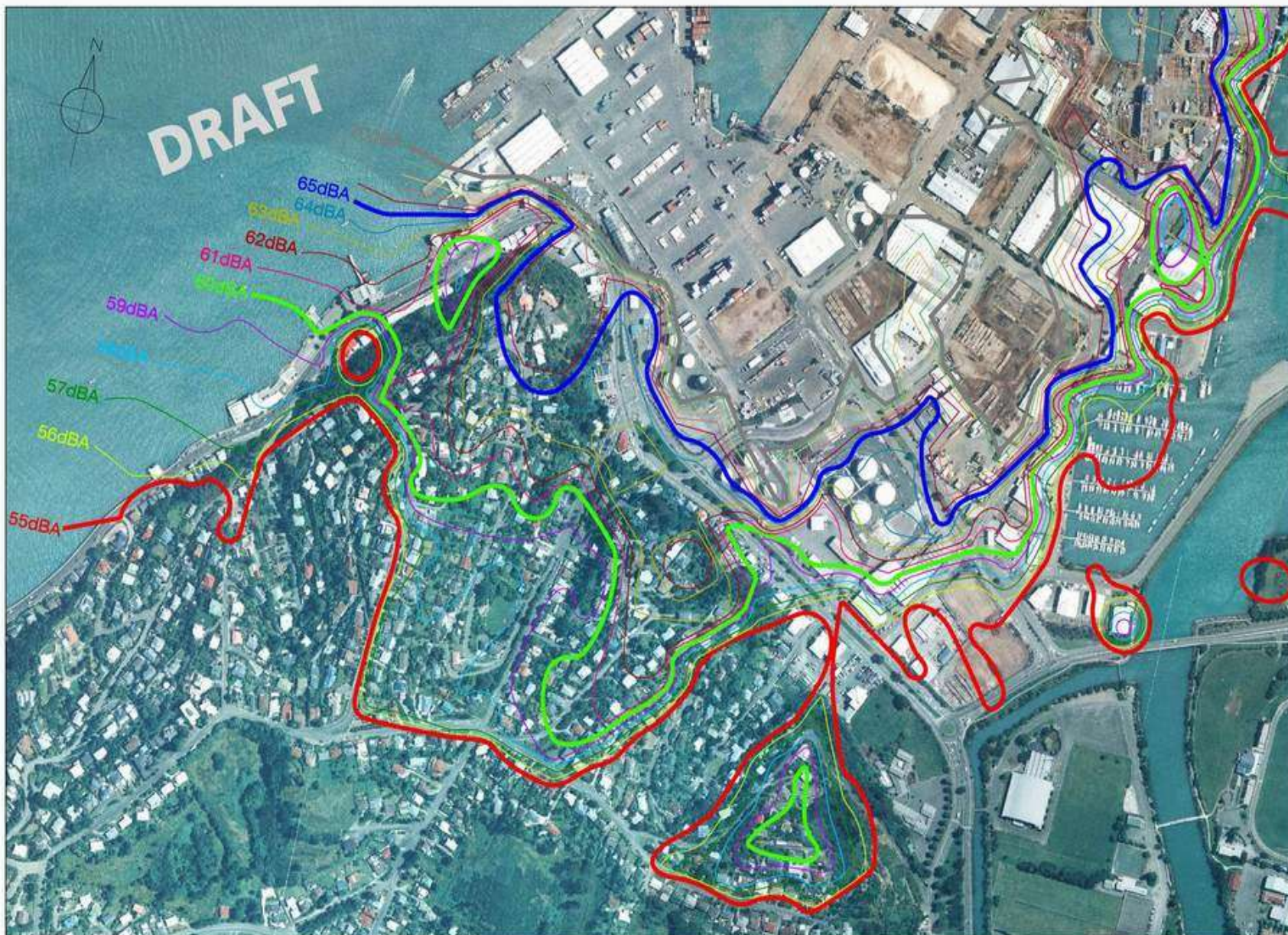
- Record the noise of ships, plant and machinery.
- Develop a computer model for Port.



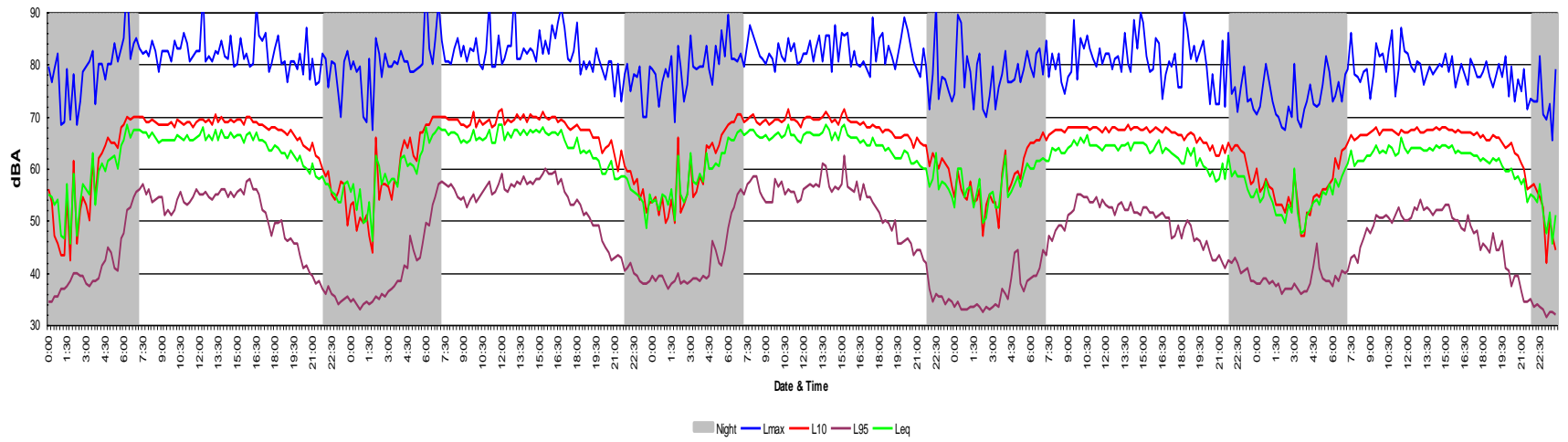
Noise Monitoring

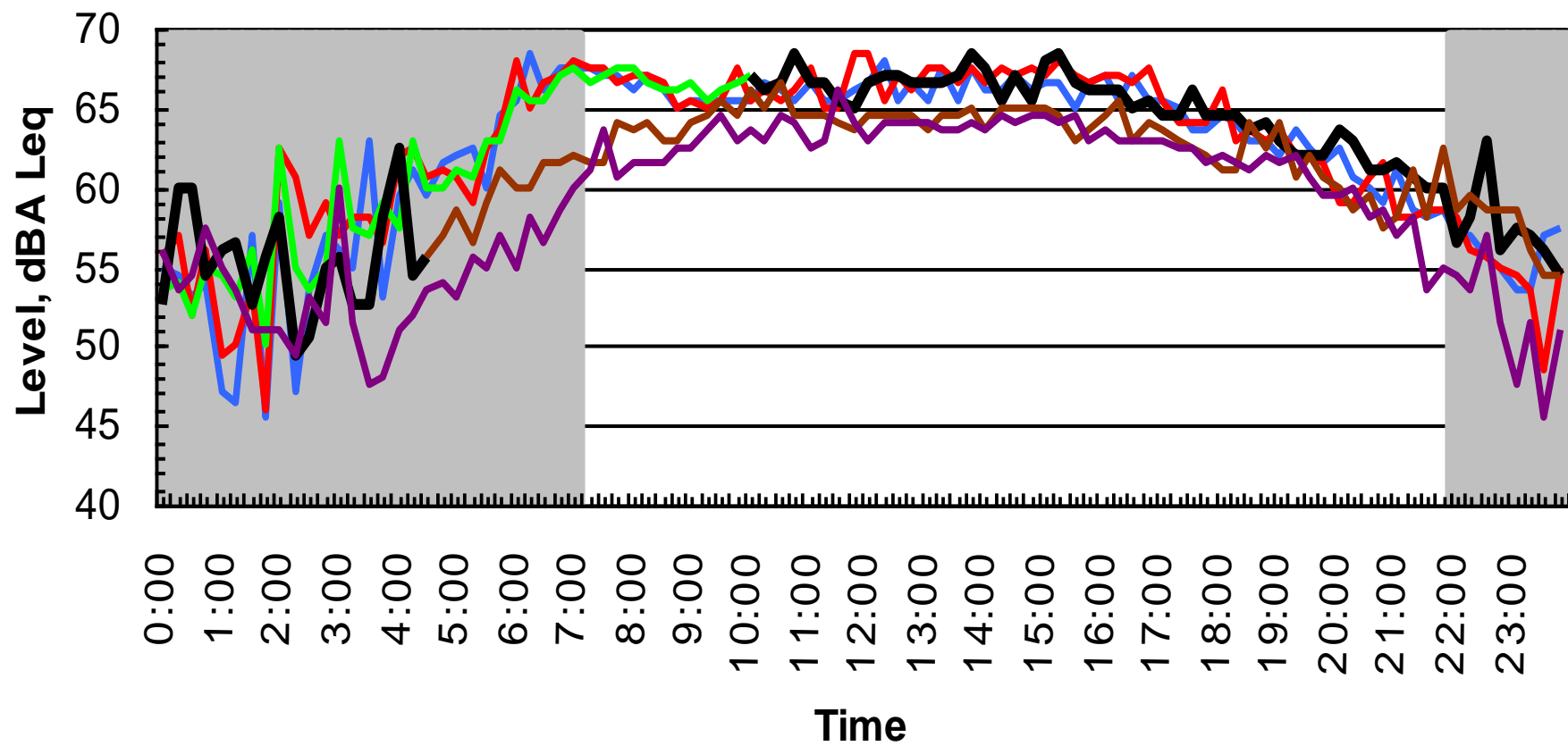
- Monitor actual port noise.
- Verify model
- Determine a busy 5 day period.
- Predict resulting noise contours.





↔ No ships in port ↔





Treatment to houses

Beyond the Outer Control Boundary

No noise control required

House Design

NZS 6809 states:

It should be noted that an indoor design sound level of 45dBA L_{dn} is the upper limit of acceptability, and a more stringent indoor design sound level may be appropriate in some situations.

Who Pays

Some cases the Port provide or contribute towards acoustic insulation (and in some cases offer house purchase) depending on the level of noise received as determined by the port noise contours.

Approach applies to “noise affected properties” which are defined as:

a property used for residential purposes that is situated in the Residential Zone adjacent to the Port and identified on the port noise contour map as likely to receive levels of port noise at or above 55dBA L_{dn}

Properties 65dBA L_{dn} and above

Offer to purchase or provide acoustic treatment.

The owner to have right to elect whether to accept either the offer of purchase or the offer of acoustic treatment with no time limit.

Properties 60dBA to 65dBA L_{dn}

Offer to contribute 50% towards the costs of acoustic treatment.

Properties 55dBA to 60dBA L_{dn}

The Port Noise Liaison Committee will provide technical advice to noise affected properties.

On request by the property owner the Port may offer, on the recommendation of the Port Noise Liaison Committee, to contribute up to a maximum of 50% of the costs of acoustic treatment.

AIRPORT NOISE

Same basic approach as Port Noise

**Table 1. RECOMMENDED NOISE CONTROL CRITERIA FOR LAND USE PLANNING
INSIDE THE AIRNOISE BOUNDARY**

Recommended control measures	Day/night level L_{dn}
New residential, schools, hospitals or other noise sensitive uses are prohibited. Steps shall be taken to provide existing residential properties with appropriate acoustic insulation to ensure a satisfactory internal noise environment. Alterations or additions to existing residences or other noise sensitive uses shall be permitted only if fitted with appropriate acoustic insulation.	>65
Consideration should be given to purchasing existing homes, or relocating residents, and rezoning the area to non-residential use only.	>70
There is a high possibility of adverse health effects. Land shall not be used for residential or other noise sensitive uses.	>75

Table 2. RECOMMENDED NOISE CONTROL CRITERIA FOR LAND USE PLANNING INSIDE THE OUTER CONTROL BOUNDARY BUT OUTSIDE THE AIR NOISE BOUNDARY

Recommended control measures	Day/night level L_{dn}
<p>New residential, schools, hospitals or other noise sensitive uses should be prohibited unless a district plan permits such uses, subject to a requirement to incorporate appropriate acoustic insulation to ensure a satisfactory internal noise environment.</p> <p>Alterations or additions to existing residences or other noise sensitive uses should be fitted with appropriate acoustic insulation and encouragement should be given to ensure a satisfactory internal environment throughout the rest of the building.</p>	<p>>55</p>

Effects of changed flight paths

- A year-long trial began last October to reduce the distance flown over urban Auckland as planes come in to land.
- Community response has been vocal from Mt Eden, Epsom, Royal Oak, One Tree Hill, Onehunga, Mangere Bridge and Remuera.