

# Community exposure to noise from transport infrastructure

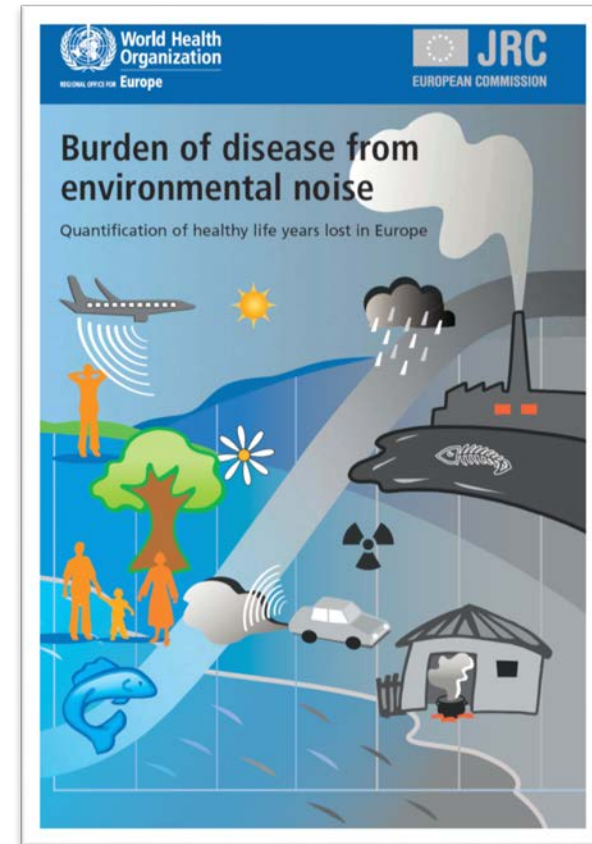
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Tonkin & Taylor Ltd*



# WHO Burden of Disease from Environmental Noise

Noise linked to the following health outcomes

- Cardiovascular disease
- Cognitive impairment
- Sleep disturbance
- Tinnitus
- Annoyance



# WHO Environmental Noise Guidelines (2018)

## Roads

>53 dB  $L_{den}$  – adverse health effects

>45 dB  $L_{night}$  – adverse effects on sleep

## Rail

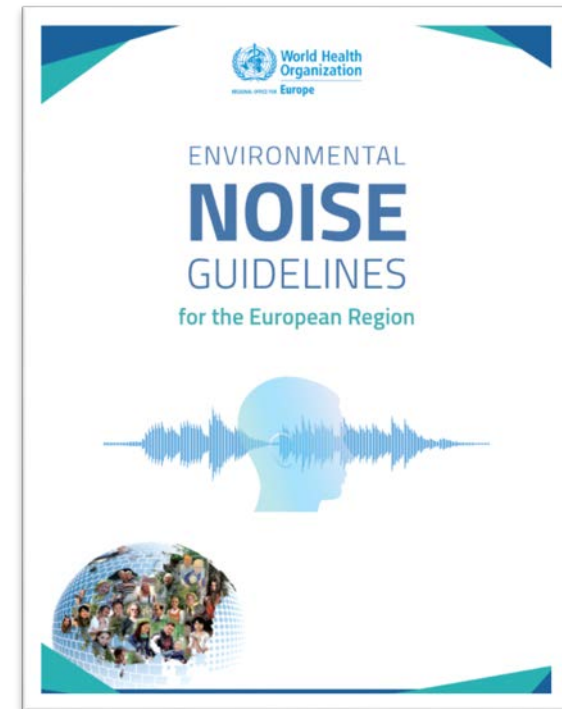
>54 dB  $L_{den}$  – adverse health effects

>44 dB  $L_{night}$  – adverse effects on sleep

## Aircraft

>45 dB  $L_{den}$  – adverse health effects

>40 dB  $L_{night}$  – adverse effects on sleep





## Guideline Development Group Recommendations – Road Traffic

- Reduce road traffic below  $L_{den}$  53 dB - equivalent  $L_{Aeq,24hr}$  50 dB(A)
- Reduce night noise below  $L_{night}$  45 dB - currently not assessed in NZ
- Reduce road noise through changes in road design and surrounding infrastructure

# NZTA National Noise Model

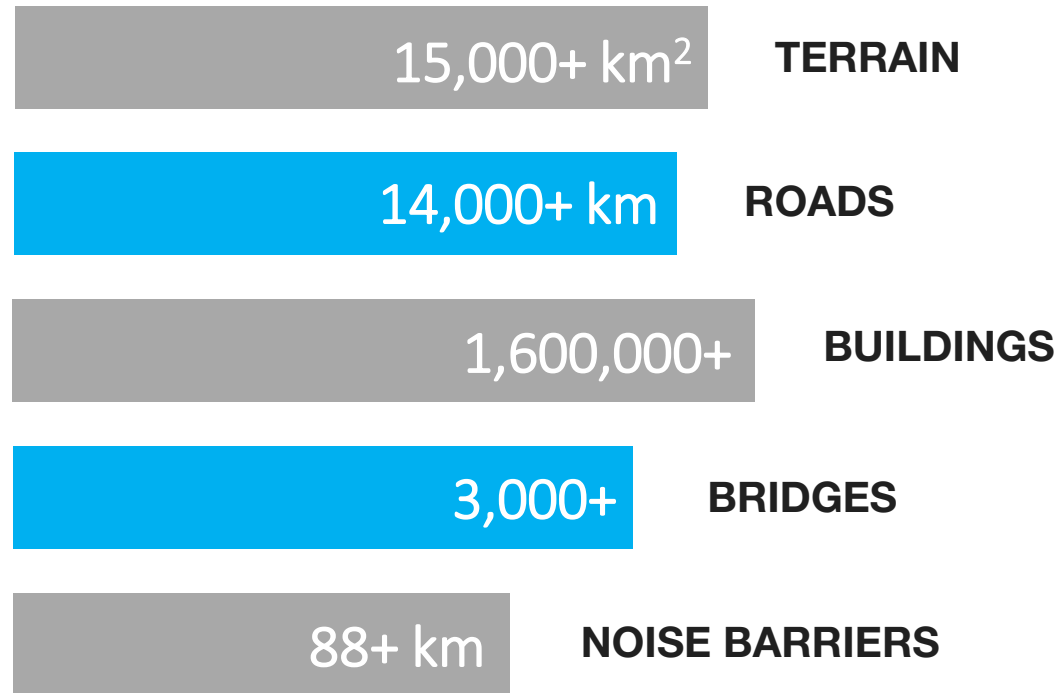


# New Zealand Noise Mapping

- Mapping all state highways, regional roads and arterial roads
- Noise contours maps illustrating extent of noise exposure
- Statistical analysis - population noise exposure distribution



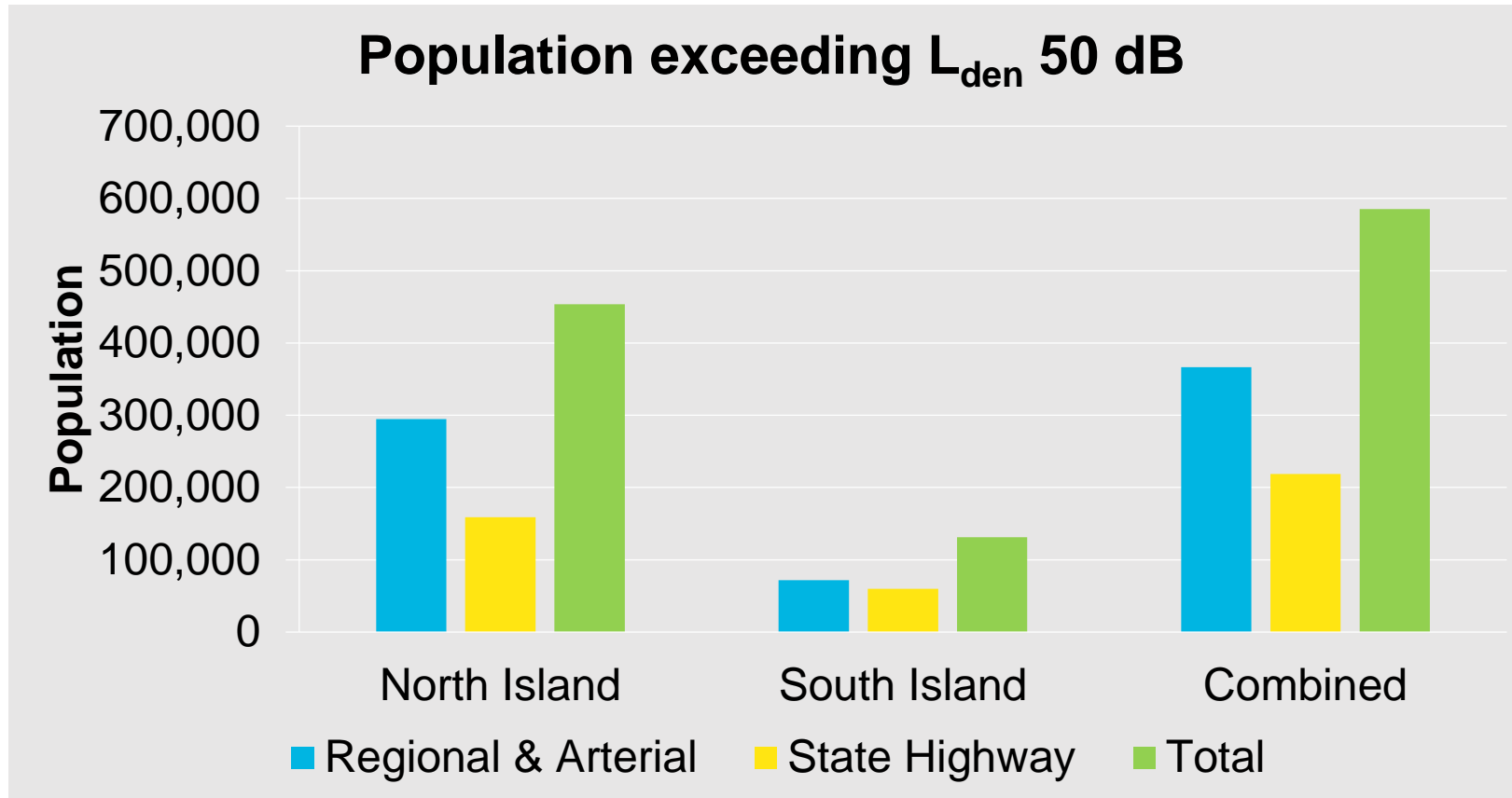
# Modelling Overview











# NZTA Research Project

## Evidential basis for community response to land transport noise



# Existing Road

## Auckland Southern Motorway

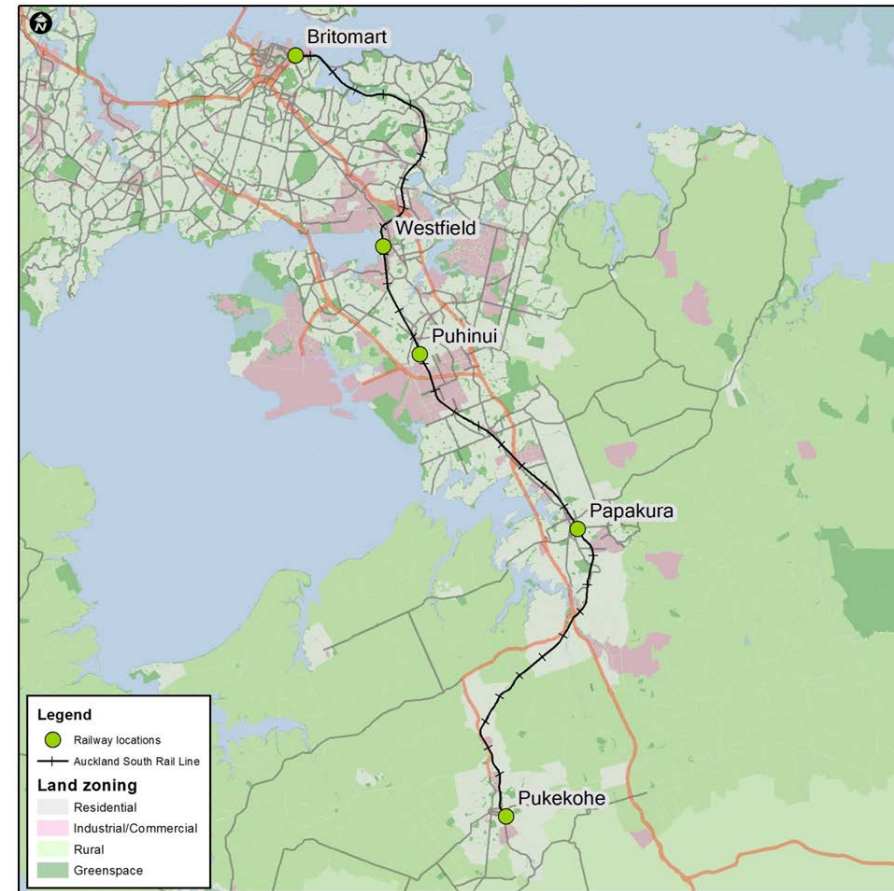
- Papakura to CBD
- 25,681 homes within 500m
- 95,000 AADT



# Rail

Section of line	Total number of trains per day	Freight percentage of rail traffic
Puhinui – Papakura	149	9%
Papakura – Pukekohe	64	28%

Section of line	Number of receivers within 150m	% of residential receivers
Puhinui – Papakura	2,160	40–50%
Papakura – Pukekohe	861	90–100%



# RoNS Study Areas

## Auckland – Waterview Connection

- 5 km of new motorway
- 2.4 km within tunnel
- 808 homes within 200m
- Completed 2017

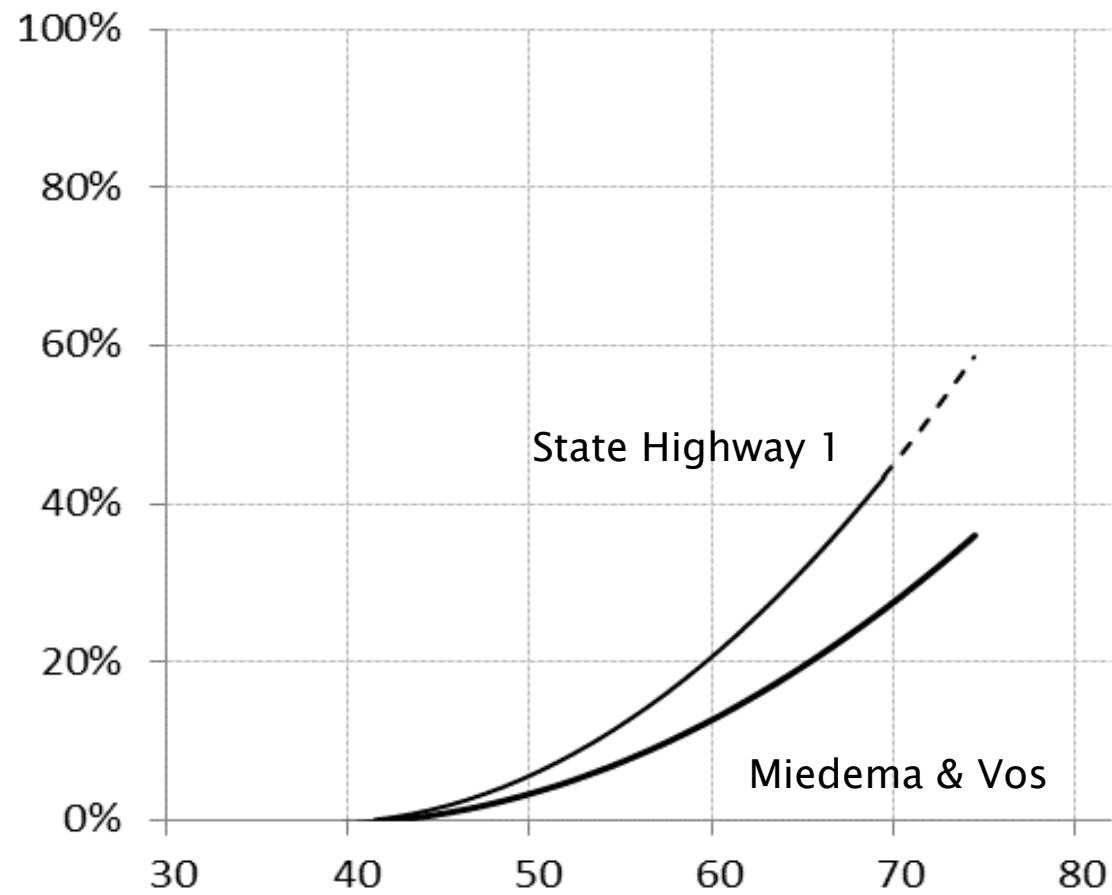


# Reported Annoyance

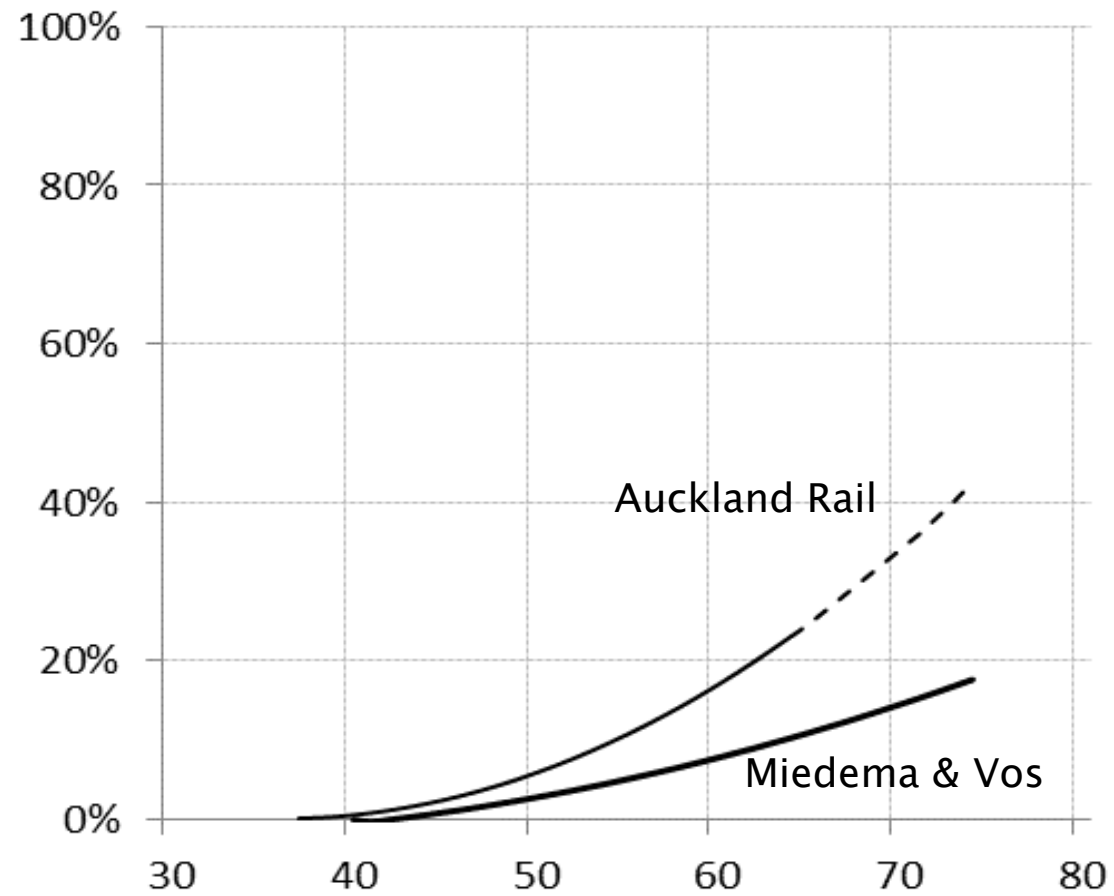
Source of noise	Proportion of respondents 'very' to 'extremely' bothered, annoyed or disturbed by noise source (%)		
	Rail	SH1	Waterview
Aircraft	21	6	9
Alarms or sirens	22	7	25
Animals	15	6	13
Buildings and construction	10	4	25
Local businesses, factories or industry	9	4	3
Pubs and nightclubs	4	1	4
Neighbours, including their children	21	8	25
Road traffic	30	24	37
Road works	14	6	25
Trains	19	1	5



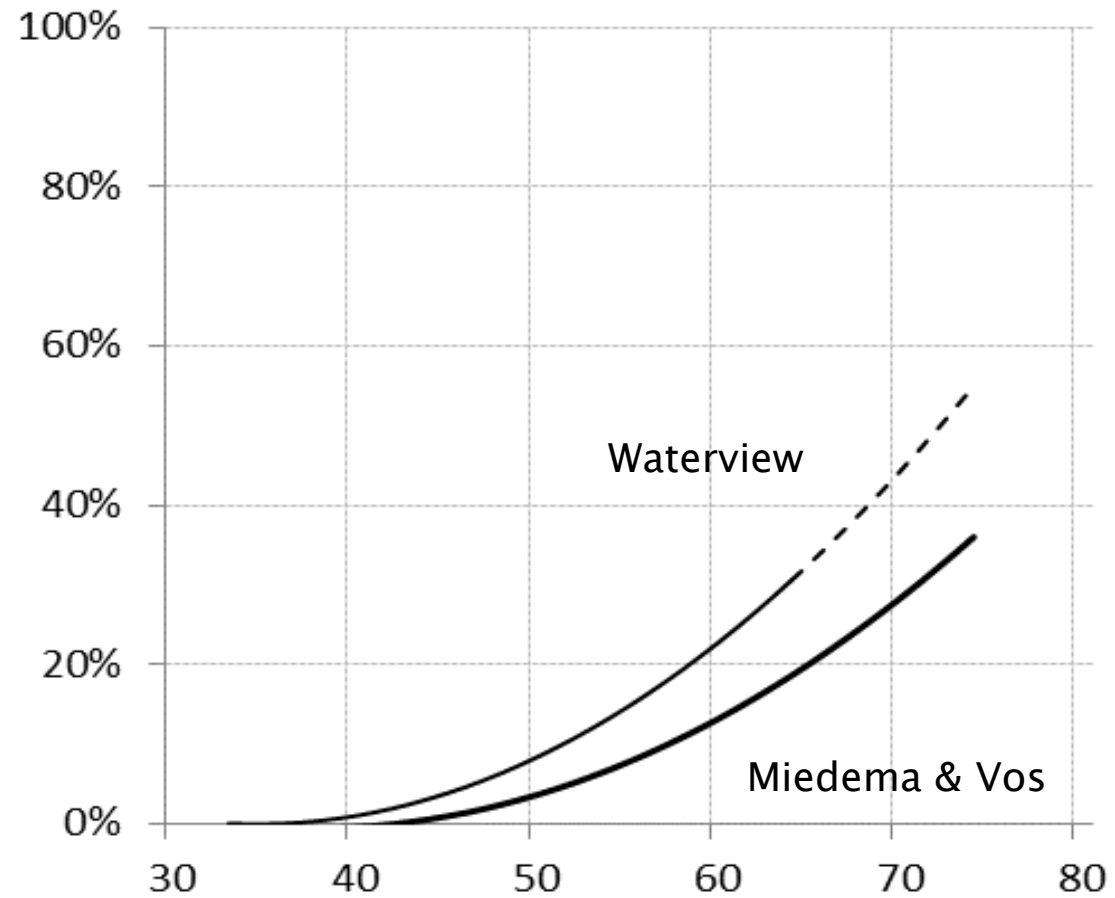
## SH 1 – percentage highly annoyed v $L_{dn}$



## Rail – percentage highly annoyed v $L_{dn}$



## Waterview – percentage highly annoyed v $L_{dn}$



# Next steps

- Enhance national noise model
  - Include rail, ports, airports
  - New data – geo-spatial and traffic information
- Further work necessary
  - Knowledge share / awareness
  - Collaboration with industry
- Transport acoustics research topics
  - Health risks and social costs
  - Noise exposure

# Questions?

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