Noise Management in Urban Environments

Creating a Proactive Decision Support Environment in Managing Road Traffic Noise

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Outline

- Background and significance
- Creating a decision support environment for proactive noise management
- Decision Support Tool
- Benefit Index (proposed)
- Conclusions

Path way

Stage 1 - 1 ½ Years ⇨ Stage 2 & 3 5 – 7 Year

Stage 1

- **Full range noise amelioration strategy for road traffic noise**
- **DST to facilitate the above strategy**
- **Benefit/Cost of alternative treatment within and outside road reserve**

Stage 2 & 3

- Upgrade to include other road authorities
- Upgrade to include other noise pollutants
- Life Cycle costing and Monitoring

Investment decision framework for Urban Noise Management (including all noise pollutants, life cycle costing)

Partner organisations

Research Partners

RMIT UNIVERSITY

QUT

Industry Partners

Queensland Government Department of Main Roads

Queensland Government Department of Public Works

ARUP

WHO Study – Traffic induced costs to community

Switzerland Experience (Source: Dietrich Schwela, Jan 2001)

Adverse health effect literature (evident but non-conclusive)

Areas affected

- Mental ill health, stress related aspects of mental health, sleep disturbance, annoyance.

Health Impacts

- Anxiety, depression, psychological morbidity and cardiovascular effects (evident but non conclusive).
- Cognitive impairments in young school children (fairly conclusive).
- Awakenings, changes in sleep state or after effects (evident but non conclusive).
- Annoyance appears to be the most responsive impact of traffic noise, the main driver related to complaints (fairly conclusive).

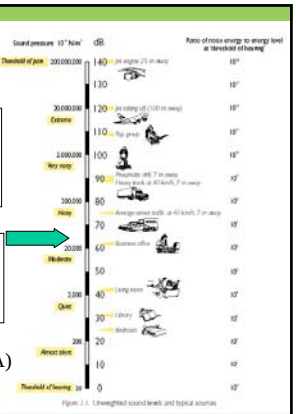
Noise criteria

WHO descriptors and guidelines
Leq(16hr) = 50dB(A) for outdoor living
Leq(16hr) = 35dB(A) for indoor areas,
Leq(8hr) = 30dB(A) for bedrooms,
Leq(8hr) = 35dB(A) for schools (class time).

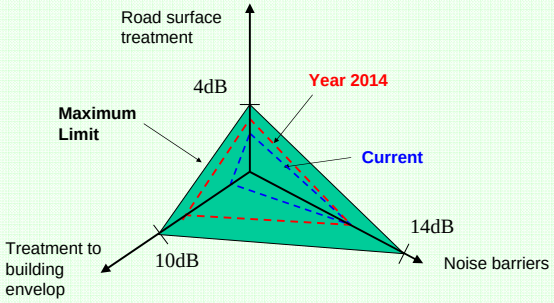
Australian Road Authorities

Current Planning Levels
L10(18hr) = 63-68dB(A) external criteria-day
Leq(1hr) = 60dB(A) – external criteria – night

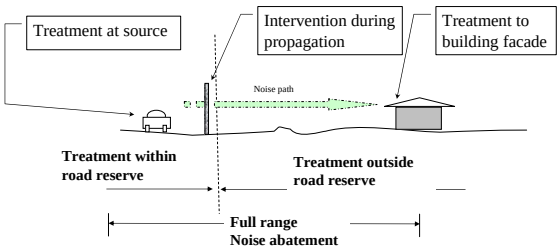
long term goal - Leq(24hr) = 55dB(A)



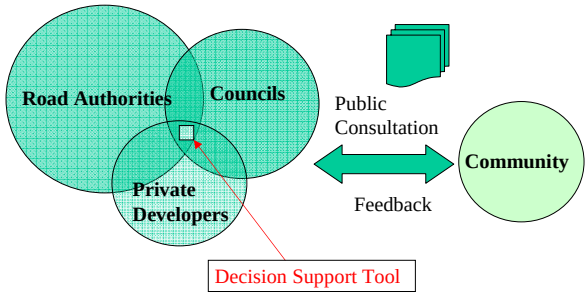
Proactive Decision Support



Full range noise abatement strategy

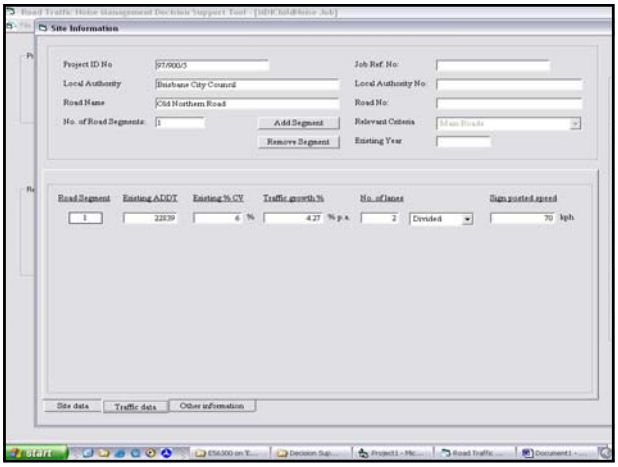


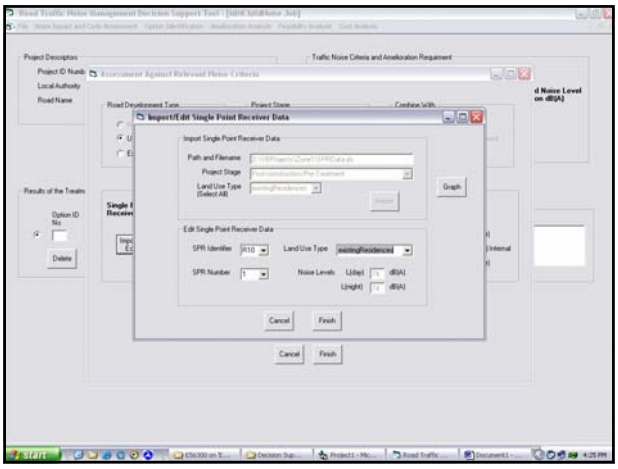
Decision Support Integration

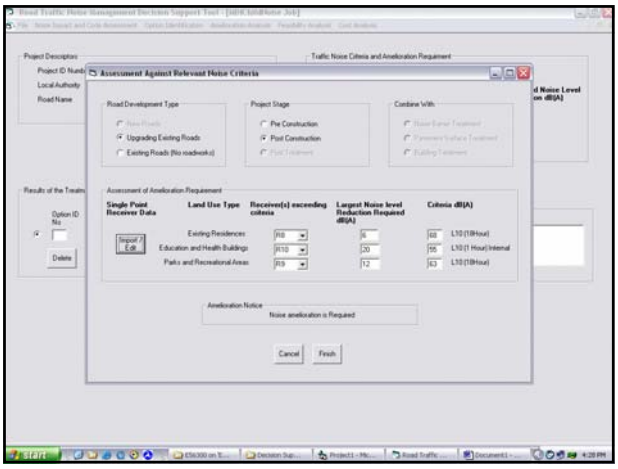


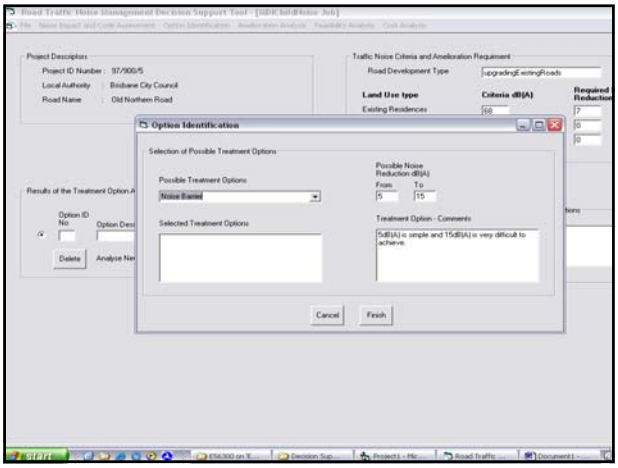
Decision Support Tool

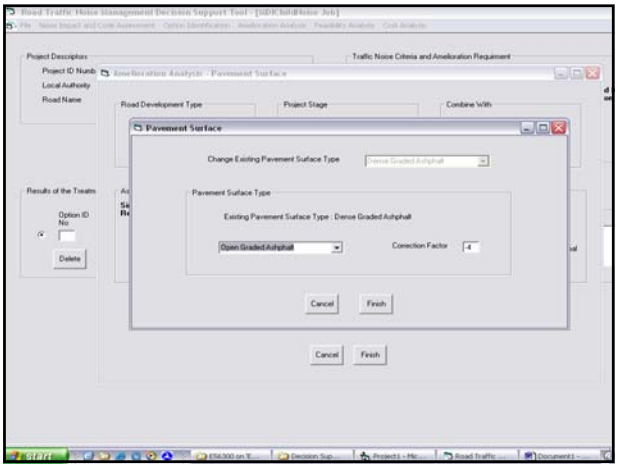
- Noise impact and code assessment
- Option identification (within and outside road reserve)
- Amelioration analysis
- Option feasibility (technical validity & constructability)
- Concept costing
- Benefit Assessment (cost, social and environmental factors)

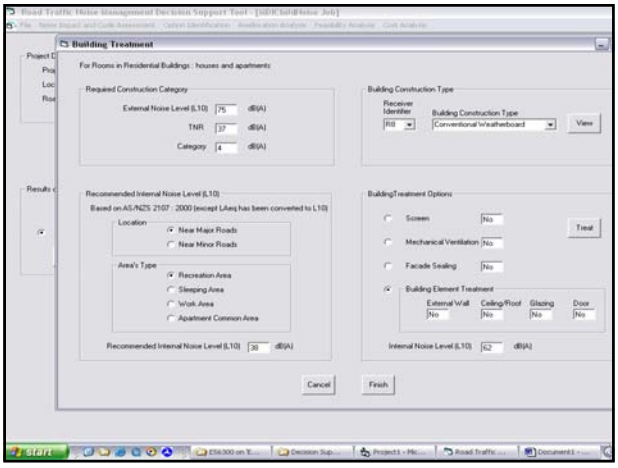


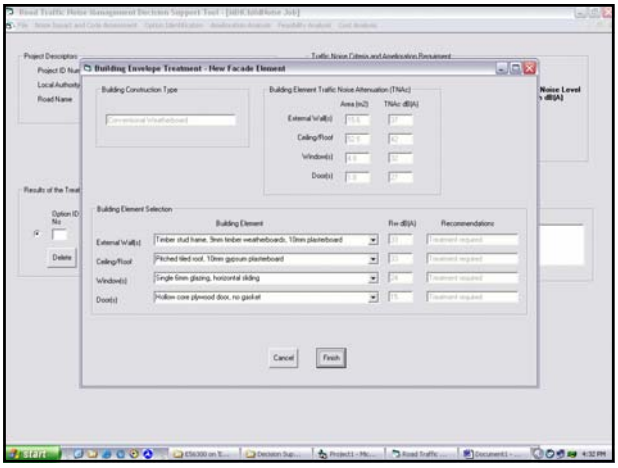


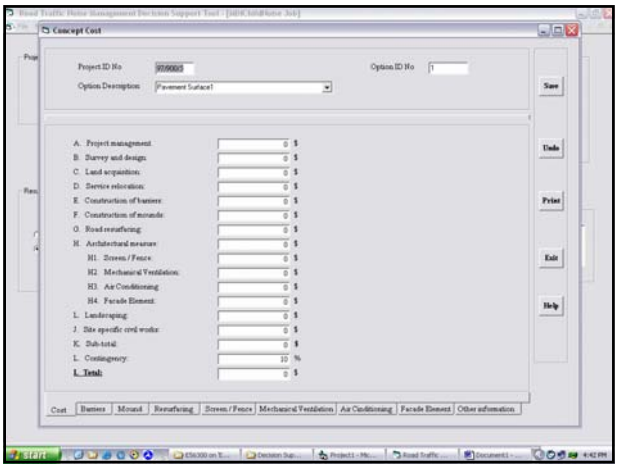


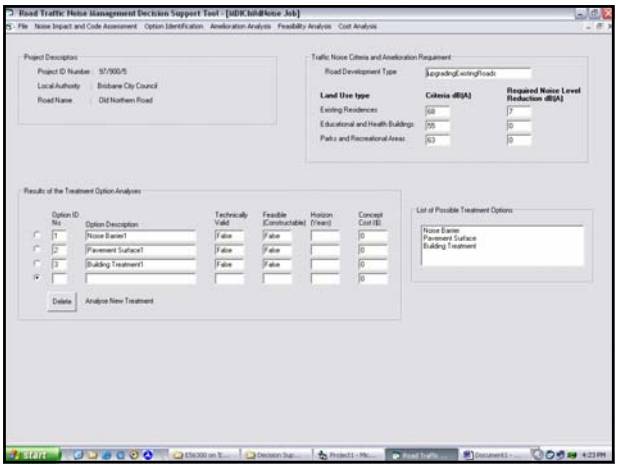












Benefit Index

$$BI = \left[\left(\frac{N_d * R * N_r}{C}\right) + \left(\frac{N_d * R * N_r}{2C}\right)\right] * S_f * E_f$$

N_d – *Difference between existing and target noise levels*
R – *Number of receivers*
N_r – *Noise level reduction*
C – *Cost of treatment*
S_f – *Factor for Social acceptance (1.0 – 0.2)*
E_f – *Factor for Environmental acceptance (1.0 – 0.2)*

Conclusions

- A decision support framework for integrated noise abatement within and outside road reserve has been developed.
- Creating an integrated decision support environment for stakeholders is both desirable and feasible.
- Tools for such decision support with cost/benefit assessment capabilities can encourage proactivness.
- DST has the flexibility to customise for noise criteria adopted by deferent authorities and to also integrate TNM models in order to transfer data.
- Proposed Benefit Index covers social, economical and environmental considerations.