Managing unsealed road dust in NZ

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NZ TRANSPORT AGENCY
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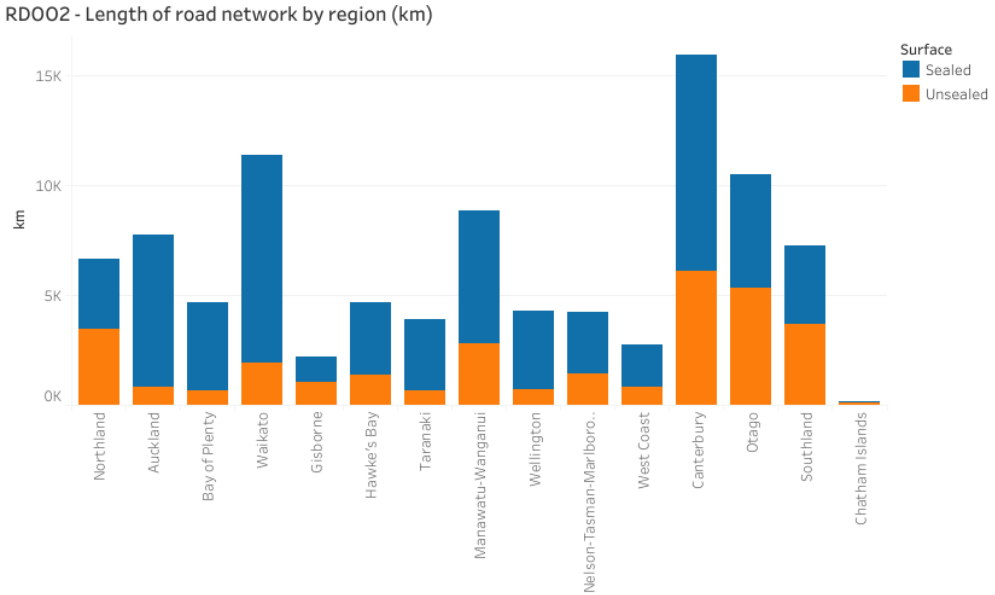
New Zealand Government

What do we know?

Road dust can have significant local effects

- Approximately 64,400km sealed and 30,900 km unsealed roads in NZ
- Nearly all NZTA roads are sealed
- Greatest length of unsealed roads in Canterbury (followed by Otago, Southland and Northland)
- Most recent 9 yrs 1,400km reduction in unsealed road length
- Greatest distance travelled by unsealed road in Northland followed by Canterbury, Otago and Southland
- Largest number of “buildings” next to unsealed roads also in Northland followed by Canterbury, Otago and Southland
- Large proportion of TSP in road dust
- Exceedances of NES near unsealed roads
- Potential impacts on health, amenity, and land productivity



Source: NZ Transport Agency

Responsibilities

Unsealed roads are in local road networks

- Management of unsealed roads – local council responsibility
- Funded through rates
- NZTA provides co-funding
- Councils must prioritise against a range of other factors

Funding/implementation

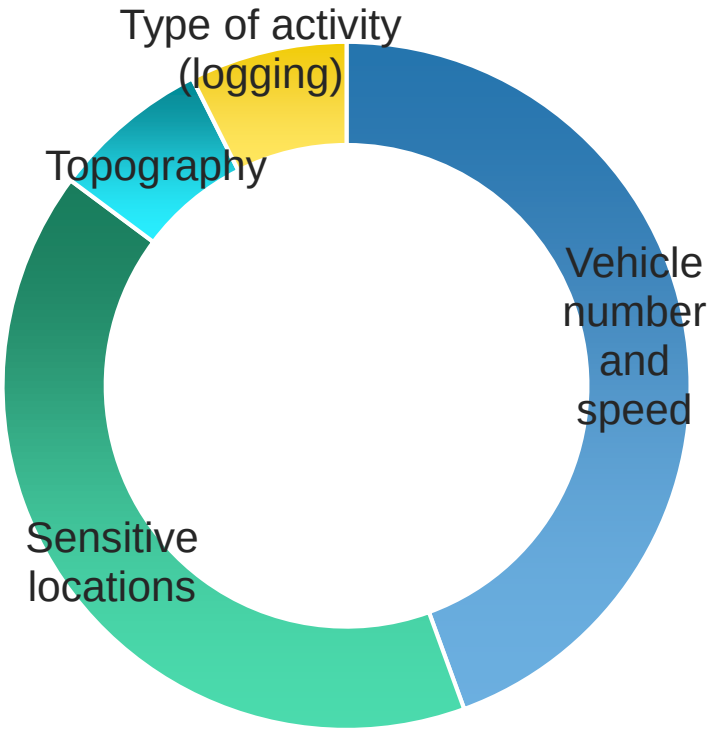
Local councils manage local network with funding assistance from NZTA

- Local councils can receive funding for road dust mitigation
- Eligible under ‘maintenance activity’ classes
- Options could include dust suppression or sealing
- Assess using least cost whole of life net present value
- Funded either:
  - Within existing allocated budget; or
  - Through cost scope adjustment
- Funding assistance is at rate relevant to the Council concerned

Criteria for funding

Based on effects and exposure

- Number of vehicles – HDV and LDV (total up to 8 points)
- Speed of vehicles – HDV and LDV (total up to 4 points)
- Number of dwellings per km (total up to 5 points)
- Other sensitive locations e.g. schools/maraes, ecologically sensitive areas, horticultural areas (total up to 6 points)
- Type of topography (up to 2 points)
- Rainfall (up to 2 points)
- Logging activity and duration (up to 2 points)



Decision making

Based on effects and exposure

Total dust risk score	Dust risk category	Potential benefit from dust mitigation	Action to be taken
0 to 9	Low	Little or no benefit from mitigation.	End of decision-making process.
10 to 19	Medium	There may some benefit from mitigation.	Return to and repeat the ‘Site dust risk factors and scores’ with refined site-specific information.
20 to 29	High	There is likely to be a benefit from mitigation.	Complete assessment of suitable mitigation options.

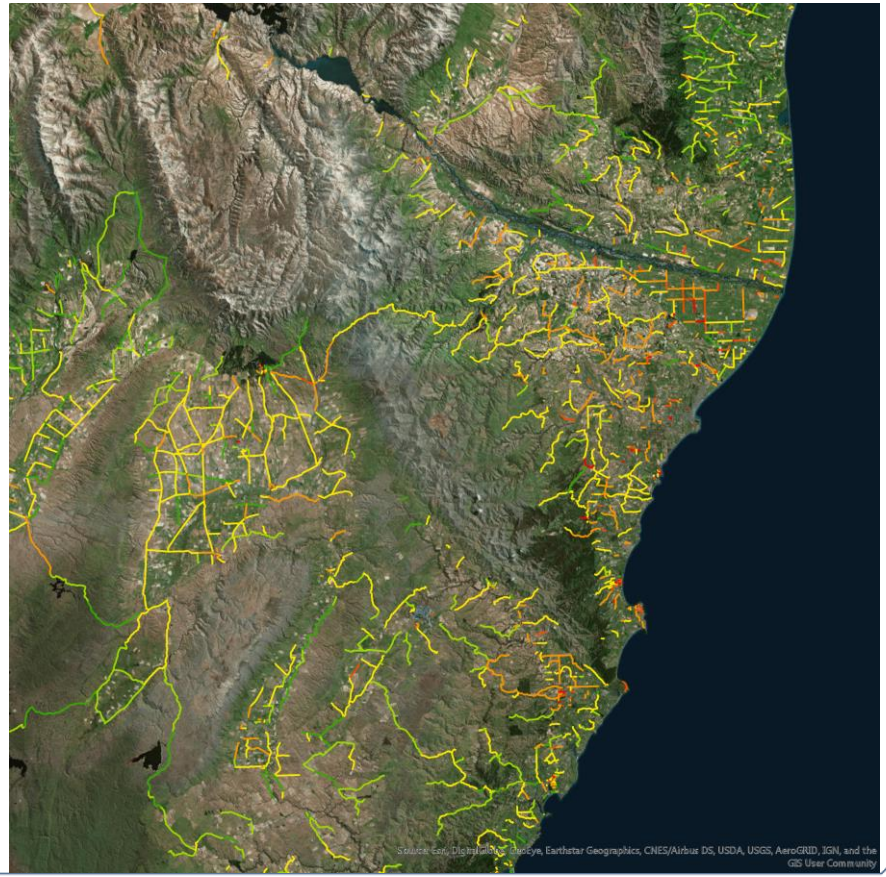
NZTA mapping of road dust risk

Trial completed

- National risk assessment / cost
- Preliminary identification/prioritisation of risk areas regionally
- Refinement of risk scores

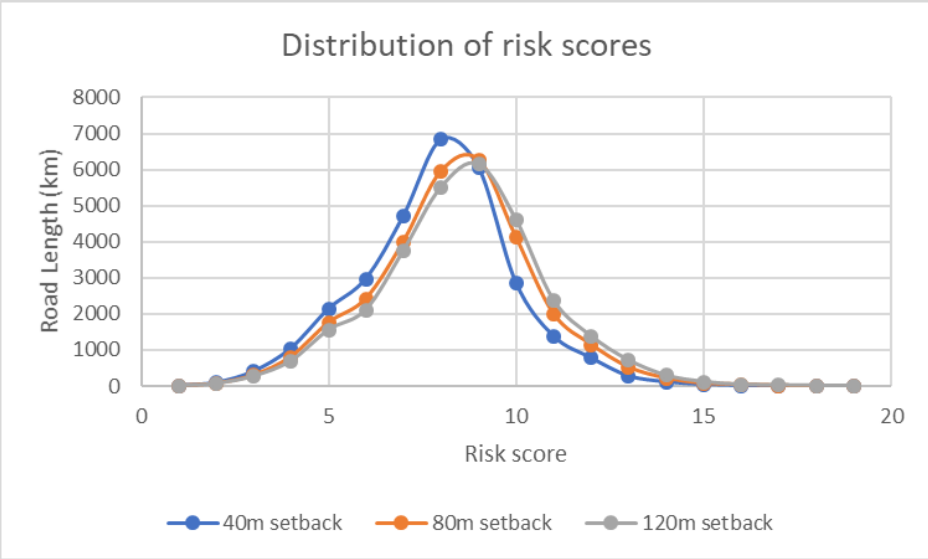
Next steps

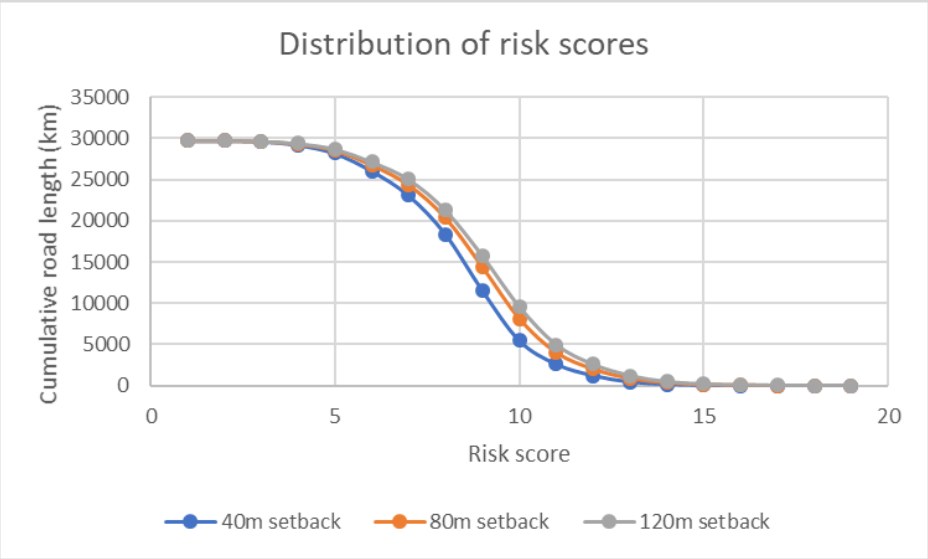
- Refinement of building type (dwelling vs farm building) and speed parameters
- Add dust emissions model?
- Add dust exposure model?
- Include social (health) cost?



NZTA mapping of road dust

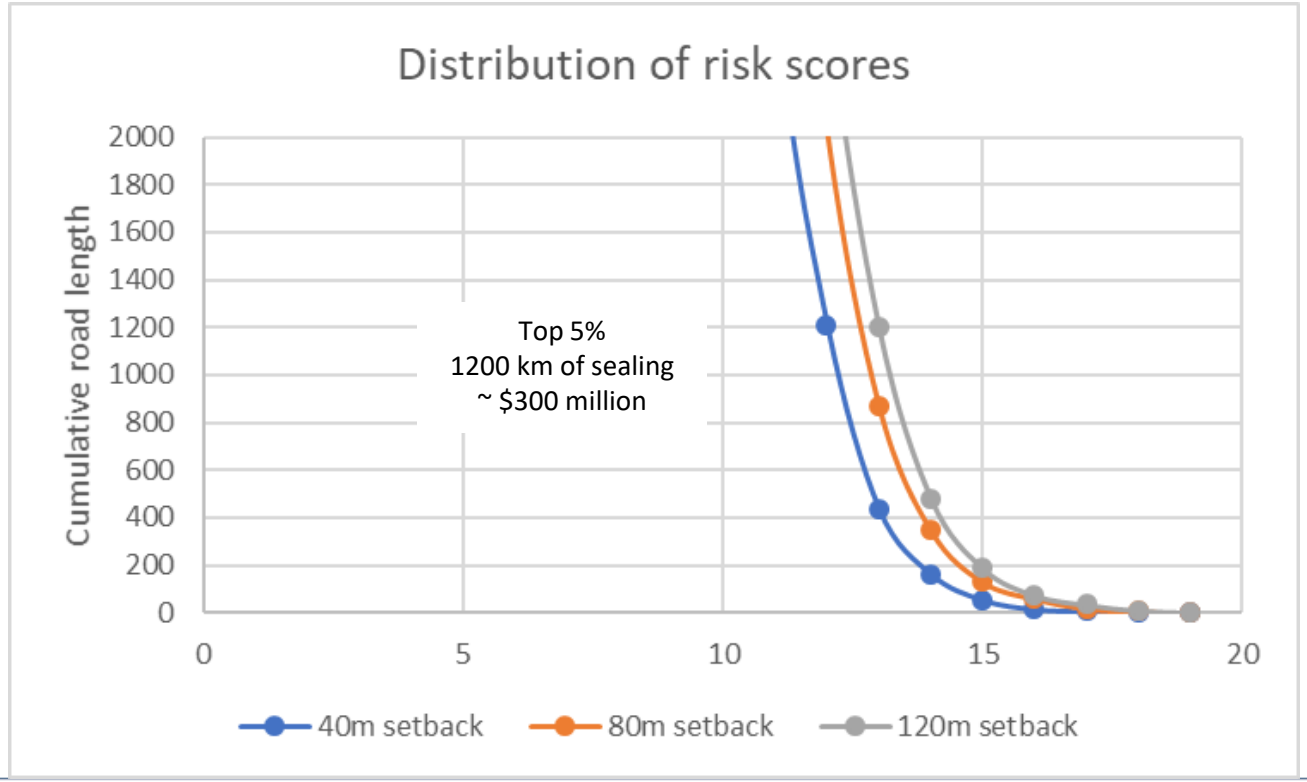
Risk score distribution





NZTA mapping of road dust

Funding implications



Mitigation options

Based on traffic volume, weather, road construction, and how long mitigation is required

Mitigation option	Suitable traffic volume	Longevity of the dust mitigation option	Rainfall frequency and intensity
Sealing the road	High – unlimited	10+ years	
Magnesium chloride	Medium ~250 AADT	Medium – three to four months	Duration of effectiveness is reduced in high rainfall areas. Roadway can become slippery.
Lignin sulphate	Light <100 AADT	Short – requires frequent refreshing	Duration of effectiveness is reduced in high rainfall areas.
Synthetic polymer emulsions	Light <100 AADT	Short – requires frequent refreshing	Duration of effectiveness is reduced in high rainfall areas.

Mitigation options

Based on traffic volume, weather, road construction, and how long mitigation is required

UNPAVED ROAD CHEMICAL TREATMENT SELECTION TOOL

UCPRC City and County Pavement Improvement Center

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There are millions of kilometers/miles of unpaved roads around the world managed by numerous authorities, land owners, and public and private organizations. Common to all of these roads are unacceptable levels of dust, poor riding quality and/or impassability in wet weather, and expensive maintenance and gravel replacement activities. Over the last 100+ years, a range of different chemical treatments have been developed to overcome these issues. Most of these are proprietary, which can complicate selection of an appropriate treatment for a specific set of conditions. There is also no single product that will solve all problems under all conditions.

A procedure has therefore been developed to guide practitioners in the selection of an appropriate treatment. This procedure, based on the 1999 US Forest Service Guide (*Dust Palliative Selection and Application Guide*), and updated with new research and experience, factors traffic, climate, material properties, and road geometry into the most appropriate treatment selections for a given set of input values. The procedure is based on the philosophy of using chemical treatments to keep good roads in good condition, rather than attempting to use chemical treatments to "fix" bad roads. This unpaved road chemical treatment selection tool and information related to it is fully described in the UCPRC guideline entitled "Guidelines for the Selection, Specification, and Application of Chemical Dust Control and Stabilization Treatments on Unpaved Roads." This web-based chemical treatment selection tool can be considered as a companion to the guideline

Mitigation benefits – health and maintenance

Fines (dust) retention can reduce unsealed road maintenance

Loss of fines (as dust) on an untreated road

Stable fines preservation on a treated road

Issues with funding

Not much take up of funding….

- Possible issues with criteria
- Local funding has competing interests
- Potential issues with communication/understanding of impacts