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ConnectBetter

Quantifying the likelihood of barrier strike maintenance

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Introduction

- Roadside or median barriers are becoming more common on New Zealand's roading network
- Associated maintenance costs are increasing
- Can we quantify these costs?

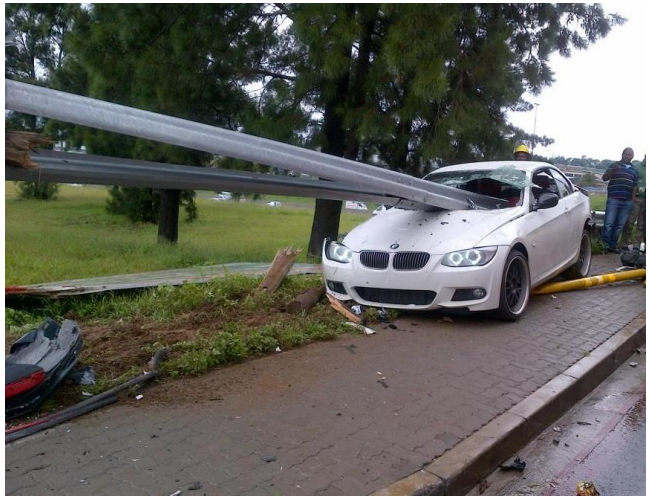
Yes we can!

What we looked at





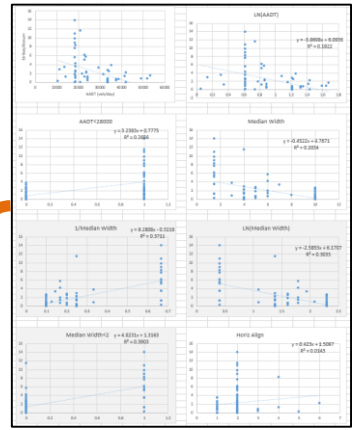
What we looked at

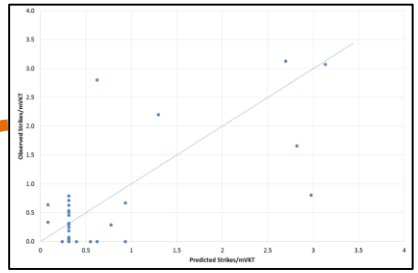


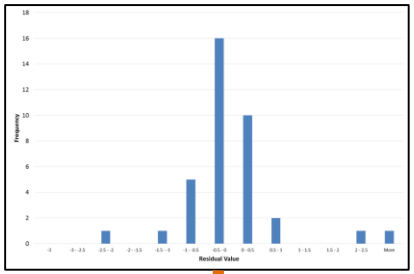
Data Collection

Model Development

- Analysis Toolpak used in Excel to investigate data
- Trends identified and tested
- Sensibility checks
- Iterate and try again
- Equations developed







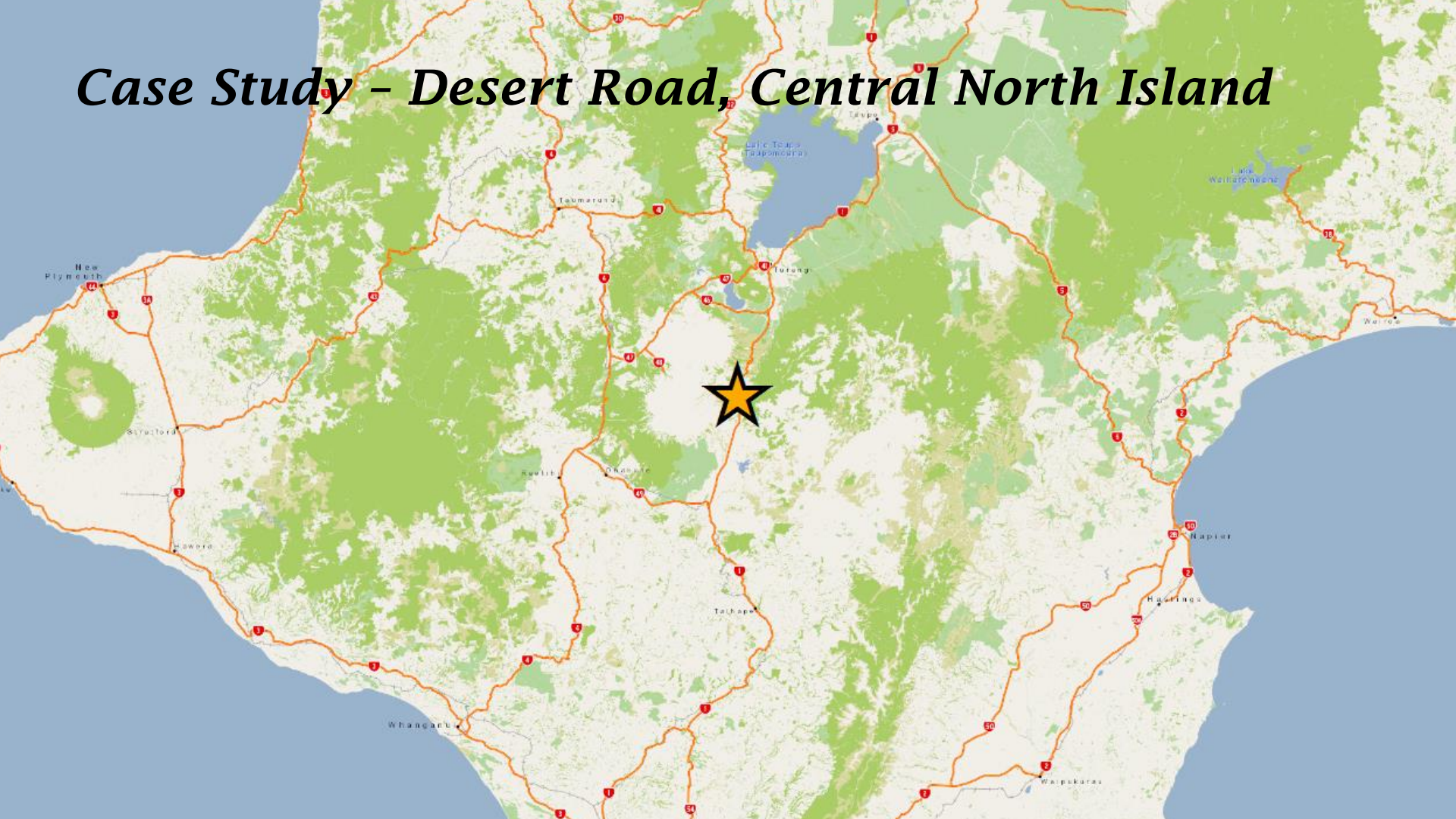
Results – Nuisance Strikes

Significant variables	Median wire rope	LHS wire rope
Horizontal alignment	✓	✓
Median width	✓	
ATP	✓	✓
Posted speed	✓	
Offset from centreline		✓
Length of section	✓	✓
AADT	✓	✓

Results – All-Strikes

Significant variables	Median wire rope	LHS wire rope	Median W-beam (>40m)	LHS W-beam (>40m)
Horizontal alignment	✓	✓		✓
Median width	✓			
ATP	✓	✓		
Posted speed	✓			
Offset from centreline		✓		
Terrain			✓	✓
AADT	✓	✓	✓	✓
Length of section	✓	✓	✓	✓

Case Study – Desert Road, Central North Island



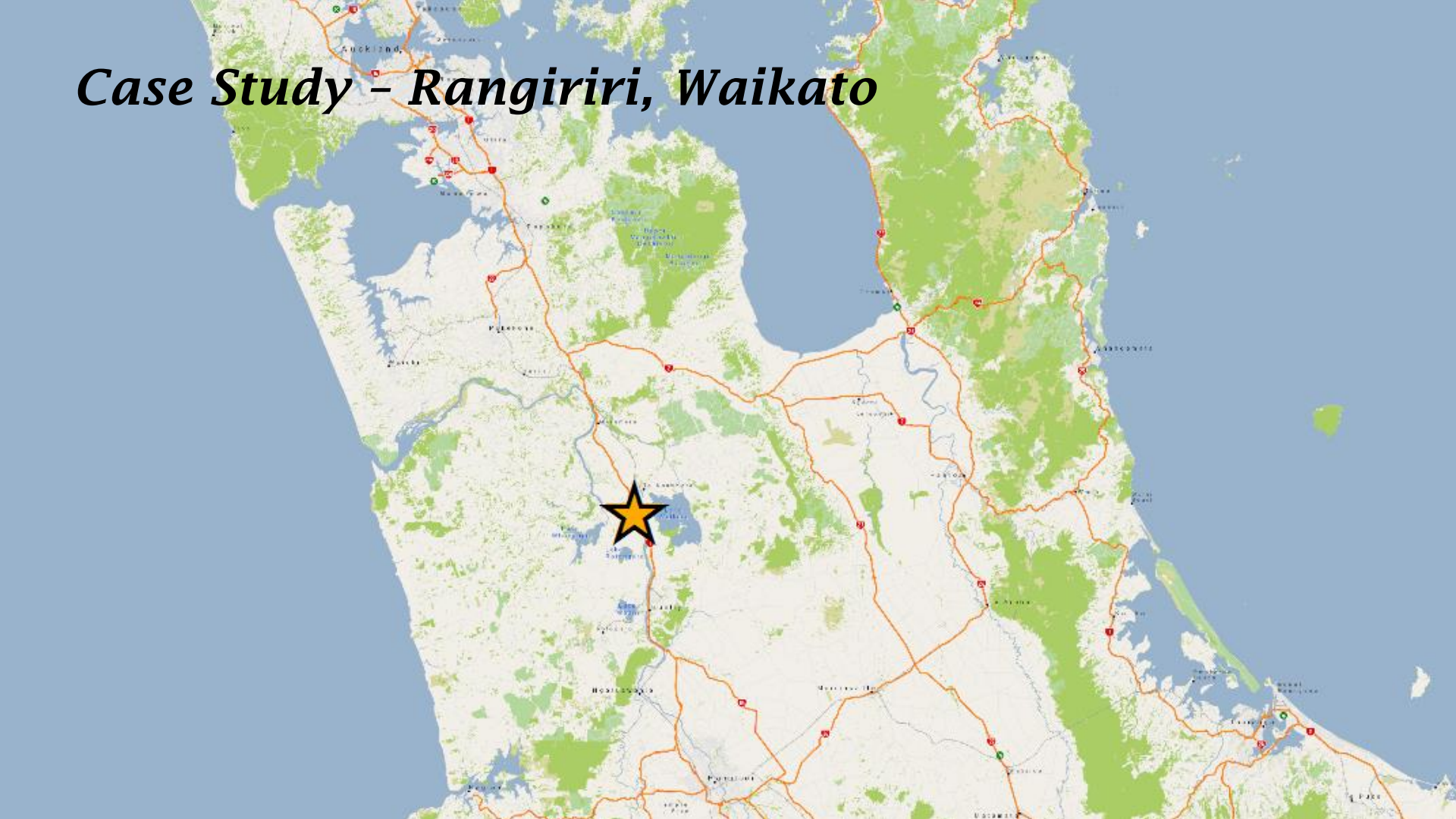
Case Study – Desert Road, Central North Island

SH01N/777/14.11 – 14.32

SH01N/777/5.90 – 5.91

SH01N/763/10.00 – 11.20

Case Study – Rangiriri, Waikato



Case Study – Rangiriri, Waikato

SH01N/502/0.43 – 0.90

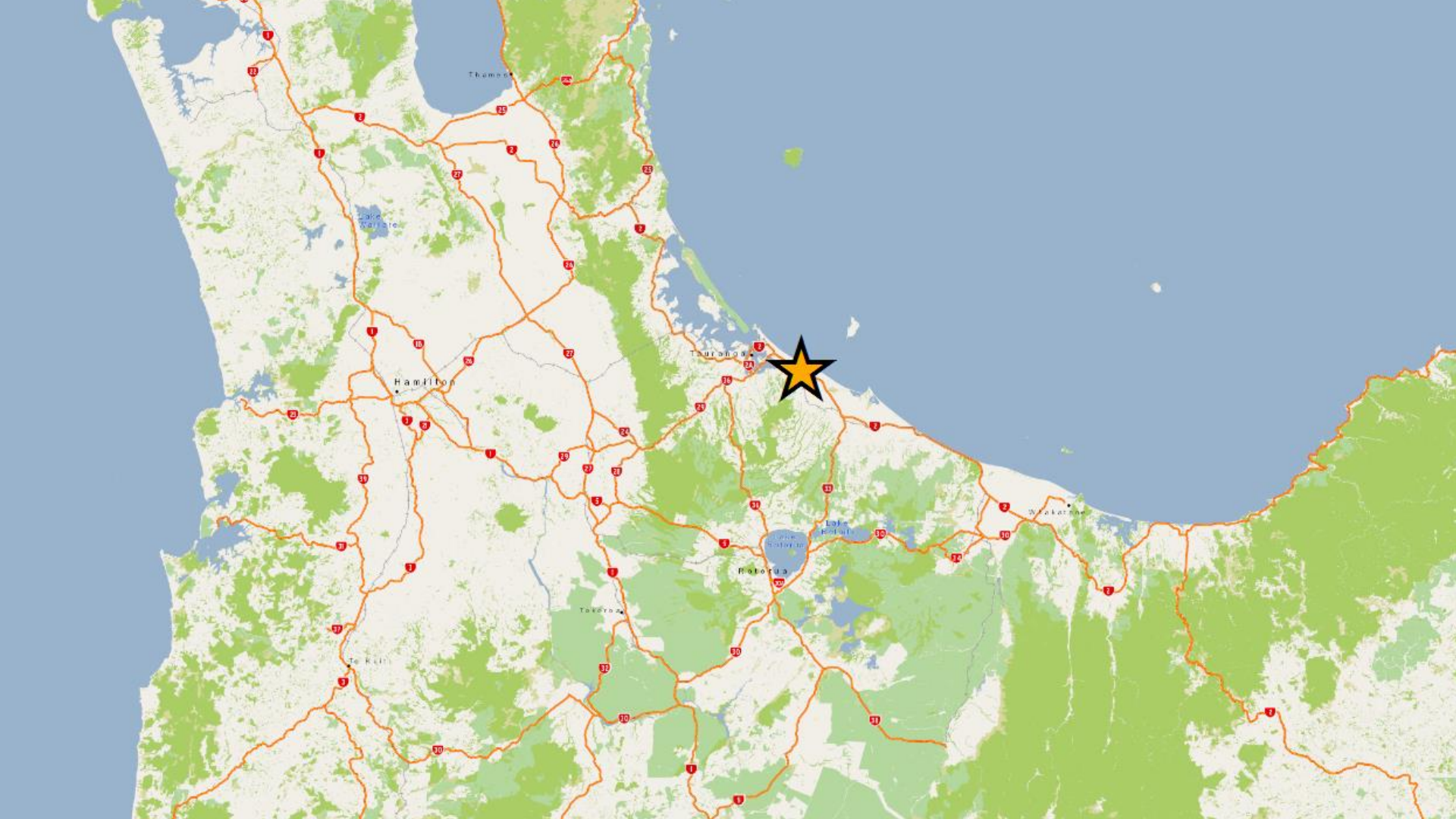
SH01N/486/12.53 – 13.10

SH01N/502/0.06 – 0.40

Using the tool

- The tool can be accessed at: *http://www.nzta.govt.nz/resources/?category=60&subcategory=103&audience=&term=&sort=date&start=0* → *Look for RR580*
- Excel 2007 or later needs to be used
- Macros/editing need to be enabled
- The tool is intended for use by asset managers and practitioners

Now an example…..


Hamilton
Rotorua
Tauranga

Roadside Barrier Strike Prediction Model

Site/Location Information:	Tauranga Eastern Motorway WRB
Barrier Type:	Median Wire Rope

Inputs

2-way AADT (vehicles/day):	23000	Horizontal alignment variable:	1 - Straight	Posted speed < 100kph?	No
Barrier length (m):	6300	Audio tactile road markings:	Yes	Terrain Code:	[redacted]
Average strike cost (Wire Rope)*:	$ 2,700	Centreline-LHS barrier offset (m):	[redacted]	% Heavy Vehicles traversing section	[redacted]
Average strike cost (W-Beam)**:	[redacted]	Median width (m):	2		

Outputs

Vehicle Kilometres Travelled		Estimated Total Strikes		Estimated Nuisance Strikes***	
		Strike rate: 0.585 per million VKT		Strike rate: 0**** per million VKT	
Annual VKT: 52,888,500 per annum		Strike rate: 30.947 per annum		Strike rate: 0**** per annum	
		Maintenance cost: $ 83,557 per annum		Maintenance cost: 0**** per annum	

** Default value: $2,700 /Strike*
*** Default value: $2,000 /Strike*
**** Nuisance strikes occur during drive-away events (where the driver is unlikely to be found liable for the cost of repair)*
**** Nusiance strikes can only be calculated for barriers of type: LHS Wire Rope, Median Wire Rope*
***** Value rounded to zero*

Barrier details

Site/Location Information: Tauranga Eastern Motorway WRB

Barrier Type: Median Wire Rope

- LHS Wire Rope
- Median Wire Rope
- LHS W-Beam > 40m
- Median W-Beam > 40m
- LHS W-Beam ≤ 40m

Inputs

2-way AADT (vehicles/day):	23000
Barrier length (m):	6300
Average strike cost (Wire Rope)*:	$ 2,700
Average strike cost (W-Beam)**:	[redacted]

Posted speed < 100kph?	No
Terrain Code:	[redacted]
% Heavy Vehicles traversing section	[redacted]

Horizontal alignment variable:	1 - Straight
Audio tactile road markings:	Yes
Centreline-LHS barrier offset (m):	[redacted]
Median width (m):	2

1 - Straight
2 - Easy curves
3 - Easy-moderate curves
4 - Moderate curves
5 - Tight curves
6 - Very tight curves

Outputs

Annual VKT:	52,888,500	per annum

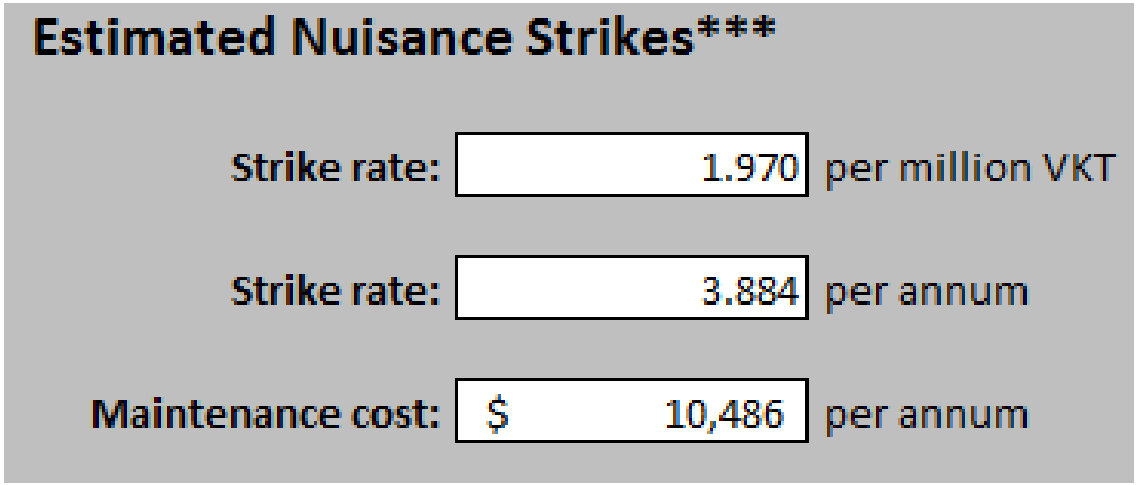
Estimated Total Strikes

Strike rate:	0.585	per million VKT
Strike rate:	30.947	per annum
Maintenance cost:	$ 83,557	per annum

Estimated Nuisance Strikes***

Strike rate:	0****	per million VKT
Strike rate:	0****	per annum
Maintenance cost:	0****	per annum

Outputs


Estimated Nuisance Strikes***
Strike rate:
1.970
per million VKT
Strike rate:
3.884
per annum
Maintenance cost:
$
10,486
per annum

Outputs

No ATP, No widening

Maintenance cost:	$	10,486	per annum

With ATP

Maintenance cost:	$	7,343	per annum

6% discount rate, 40 year analysis period

$48,000 in savings

Widening by 1m

Maintenance cost:	0****	per annum

6% discount rate, 40 year analysis period

$160,000 in savings

Conclusions

- No common template for recording barrier strikes
- The tool developed is a valuable output of the research for practitioners
- Benefits for economic evaluations and design considerations
- To see the full research report go to: *http://www.nzta.govt.nz/resources/?category=60&subcategory=103&audience=&term=&sort=date&start=0* → *Look for RR580*

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