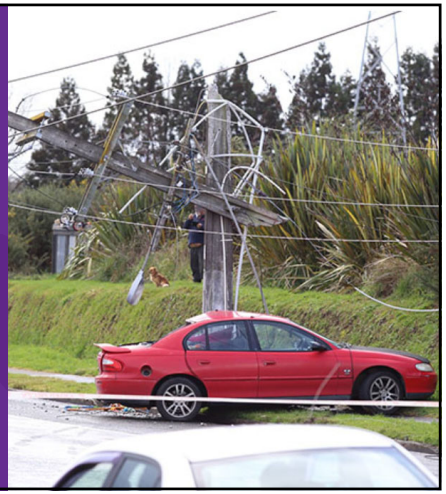
POWERCO

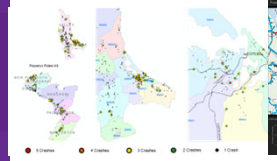
Vehicle versus Pole

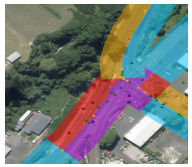


Overhead Pole Renewals

POLE REPLACEMENTS

- Replacing 5,000+ poles
- 70% of replacements roadside
- Pole replacements designed for 50 years +
- Opportunity to identify high risk poles and crash sites to design rebuilds for safer roads





2017/2018
- Concept Model
- Review Results

2020/2021
- Full Modelling Requirements
- Build Model

2021
- Identify High Risk Poles in Projects
- Work with Roading Engineers to Minimise Crash Risk

Concept Project

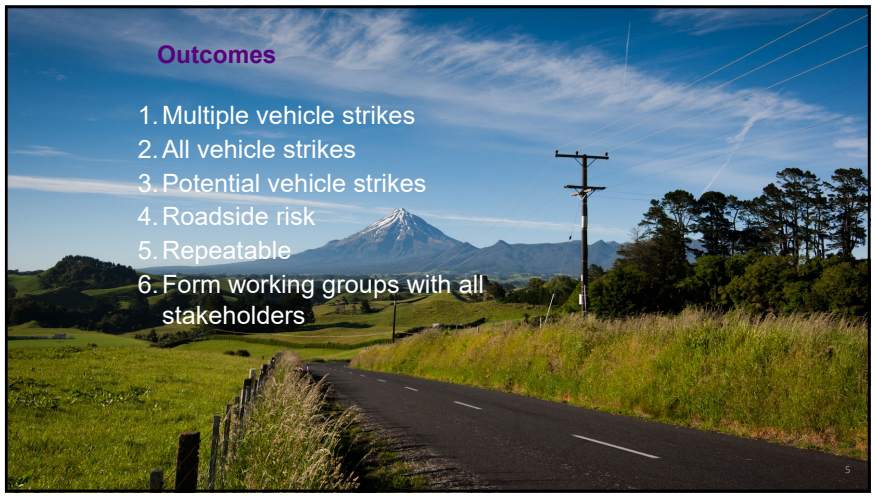
AIM: IDENTIFY POLES THAT HAVE A POTENTIAL FOR VEHICLE V POLE

Identified High Risk Poles

Using Powerco and Waka Kotahi Data (loss of control crashes only)

Positive Results

1. Identified poles hit multiple times
2. Identified over double the amount of pole strikes
3. Identified poles of interest



Powerco solution: a location technology approach

What Powerco poles are at risk of a **vehicle v pole** collision?

What is the frequency of different crash **severities** at each pole?

What **factors** are related to vehicle v pole crashes?

What is the **risk of the road** in relation to vehicle v pole crashes?

What **side of the road** has the greatest risk of vehicle v pole crashes?

6

Data sources

Waka Kotahi crash data. Data dates back from 1988 till today. Important attributes:

- Crash Severity (Fatal, Serious, Minor and Non-injury).
- Date and time.
- GPS Location (finial position of the car).
- Weather conditions.
- Vehicle Direction (North, South, East or West).
- Speed limit of the road.
- Object Struck.

Waka Kotahi road maps were used instead of Powerco road maps for the following attributes:

- Traffic flow
- Slope
- Curve

Pole data and locations could be accessed in the Powerco data base.

- Pole Type
- Location
- Asset Owner

Ministry for the Environment

- Average annual rainfall

Vehicle v pole at a glance

Injury	Count
Fatalities (Powerco)	189
Serious Injury	905
Minor Injury	2,050

Crash type	Count
All Crashes	159,884
Lost control crashes	24,694
Crashes involving poles	8,640

Poles	Count
Total poles	334,856
Powerco pole fleet	267,000
Poles hit once	7,168
Poles hit more than once	1,472
Powerco poles hit once	4,803
Powerco poles High Risk	825

Number of crashes within 20m	Pole count
1	7,168
2	1,051
3	254
4	76
5	53
6	21
> 7	17

Car v pole crash factors

Weather	Count	Percent
Fine	6478	74%
Heavy rain	453	5%
Light rain	1680	19%
Mist or Fog	140	2%
Null	43	0%
Snow	8	0%

Posted speed	Count	Percent
10	1	0%
20	2	0%
30	34	0%
40	1	0%
50	4497	51%
60	70	1%
70	554	6%
80	433	5%
90	8	0%
100	3202	36%

Road seal	Count	Percent
End of seal	1	0%
Null	1	0%
Sealed	8709	99%
Unsealed	91	1%

Intersection	Count	Percent
No	6261	71%
Yes	2541	29%

Road curvature	Count	Percent
Curved	3890	44%
Null	3	0%
Straight	4909	56%

Road gradient	Count	Percent
Flat	7311	83%
Hill Road	1388	16%
Null	103	1%

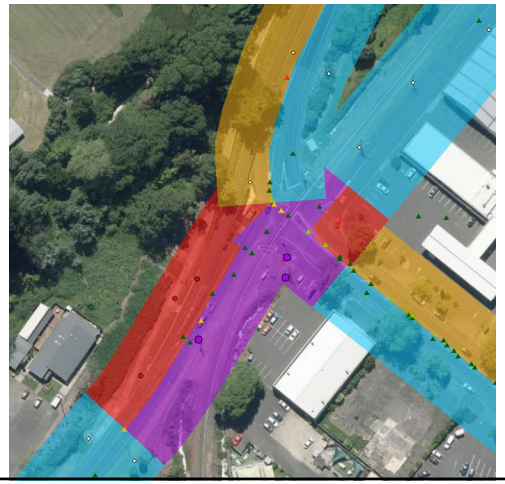
Natural light	Count	Percent
Bright sun	1906	22%
Dark	4397	50%
Overcast	2093	24%
Twilight	401	5%
Unknown	5	0%

Powerco Network

2017 VEHICLE V POLE – OMS
FAULT DATA
2017 VEHICLE v POLE _
Update AFTER MODELLING

Number of Reported Incidents - 96
Number of Poles replaced – 57
SAIDI - 10.68 minutes
SAIFI - 0.099
Estimated Cost - $500k +
Total number of vehicle v pole - Unknown
Social Cost - $23,669,400 (Ministry of Transport 2021)
Total number vehicle v pole - 162
Fatalities – 4 (3 on Powerco poles)
Serious harm – 26 (22 on Powerco poles)

Number of crashes	Number of vehicle v Pole
71	4



Case Study 1 Kimbolton

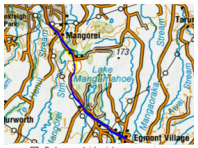
- Pole ID P36852
- Type Mass Reinforced with a concrete foundation
- Two fatal crashes 1987 1991
- Minor damage on pole base
- No feeder outages recorded – no records of vehicle v pole in Po bases
- Extra high risk road segment and pole

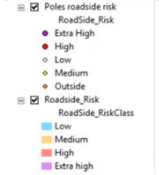
Case Study 2 Waihi

- Pole ID: 301635.
- One car vs pole crash noninjury.
- 34 Crashes near the pole since 1993.
- No fatal or serious crashes.
- Extra high road risk segment and pole risk.
- 794 Customers on this feeder.
- 284 Customers down stream from isolation point.

Current Waka Kotahi Project

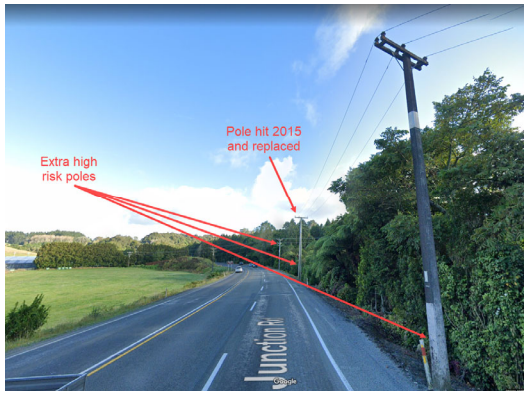
Safety Upgrade State Highway 3 New Plymouth to Egmont Village





Current Waka Kotahi Project

Safety Upgrade State Highway 3 New Plymouth to Egmont Village



HK1

Complete Importing layers into overhead planning tool (ArcGIS).

- Site checking (Roading engineers, Line designers and overhead asset engineers.)
- Redesign extra high-risk poles.
- Design standards to account for roadside risk.
- Create risk and consequence for project creation.
- Smart investment tool.
- Associating cost to life and injury.
- Associating cost to asset damage.
- Using road risk for ground mounted assets.

Pole hit June 2012 Fatal. Pole was replaced in the same location the next day.

Slide 16

HK1 Hugo King, 16/06/2021