

A location technology approach

POWERCO CAR VS POLE



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- Car v pole factors
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- Summary

Car v pole risk vs general crash risk

Are they different?

YES

Which Powerco poles are at a greater risk of a **car v pole** collision?

Data sources

WAKA KOTAHI

Crash: Waka Kotahi Crash Analysis System

- ❑ Approximate crash location
- ❑ Info relating to crash scenes
- ❑ Access permission required

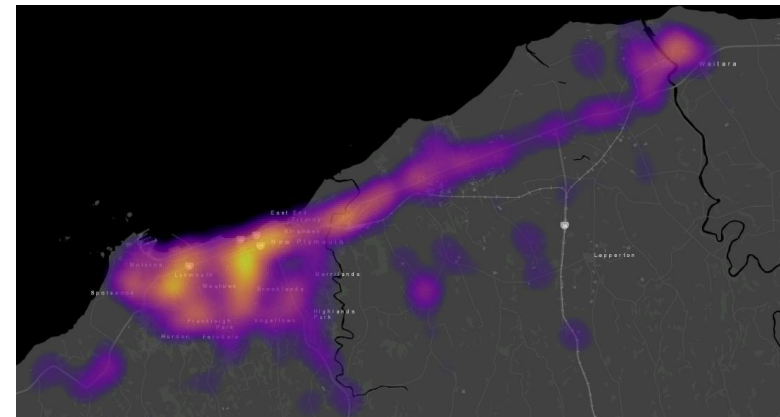
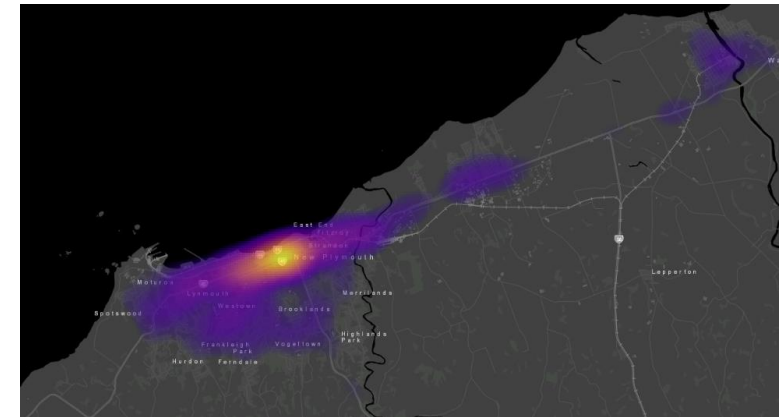
Road: Waka Kotahi Road Centerline

- ❑ Road classification
- ❑ Average daily traffic count
- ❑ Open dataset

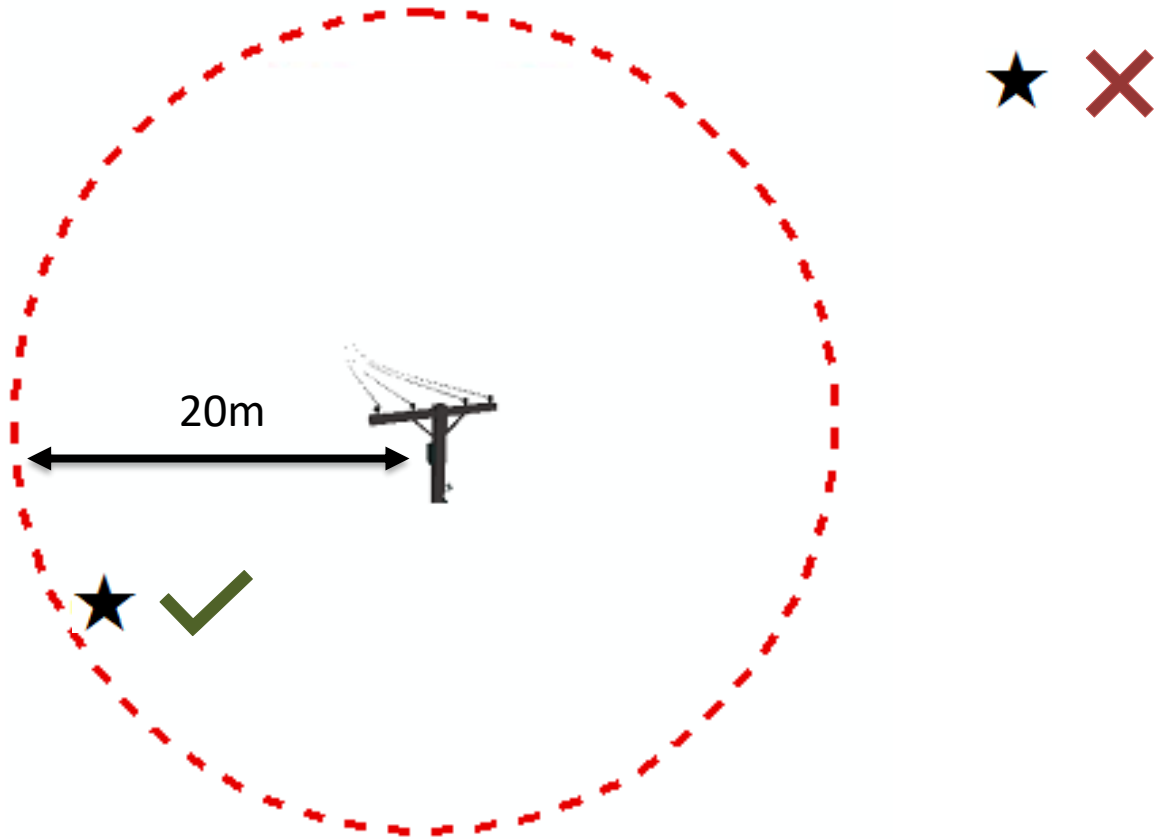
Crashes

CRASH TYPES

- ❑ All crashes (top)
- ❑ Crashes involving Poles (bottom)
- ❑ Vehicle lost control crashes



Poles and crashes



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

Poles and crash severity

MINOR CRASH



Poles and crash severity

FATAL CRASH



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

CAR V POLE CRASH FACTORS

FIXED FACTORS: CRASHES INVOLVING CAR (CAS)

Intersection	Count	Percent
No	6261	71%
Yes	2541	29%

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

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

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

CAR V POLE CRASH FACTORS

LITERATURE REVIEW

Table 7. Summary of relationships between utility pole crash frequency and severity versus roadway factors (Zegeer and Parker 1983).

f - frequency related
s - severity related

	Variable	Strong Evidence of a Relationship	Some Evidence of Logical Relationship	No Known Relationship
Utility Pole Variables	Utility Pole Frequency (Spacing)	f		s
	Lateral Pole Distance from Road	f	s	
	Type of Pole Material (Steel, Wood, Concrete)	s		f
	Size of Utility Pole	s	f	
	Breakaway Pole Concept	s		f
	Protective devices in front of Pole (i.e. guardrail or crash cushion)	s,f		
Traffic Variables	Traffic Volume (ADT)	f		s
	Traffic Mix (% Trucks, Etc.)		s	f
	Impacting Vehicle Size and Weight	s		f
	Volume/Capacity Ratio			f,s
	Speed Limit (as an indication of vehicle speeds on a roadway)	s,f		
Highway Geometric Variables	Curvature	f	s	
	Superelevation		f,s	
	Grade	f	s	
	Roadway Width		f	s
	Shoulder Width and Condition		f,s	
	Number of Lanes	f		s
	Presence of Median	f		s
	Median Width		f	s
	Number of Intersections/Mile		f	s
	Availability of Curb Parking	f		s
	Side Slope	f	s	
	Presence of Curb		f	s

Frequency related:

- ❑ Road Pole Density
- ❑ Traffic volume
- ❑ Road curve
- ❑ Road Grade
- ❑ Intersection density
- ❑ Surface type
- ❑ Urban or rural

FACTOR ASUMPTIONS

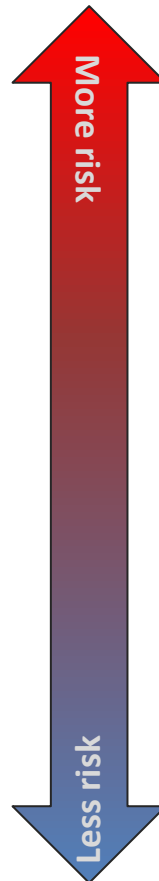
ANALYSIS FACTORS



FACTOR ASUMPTIONS

ANALYSIS FACTORS

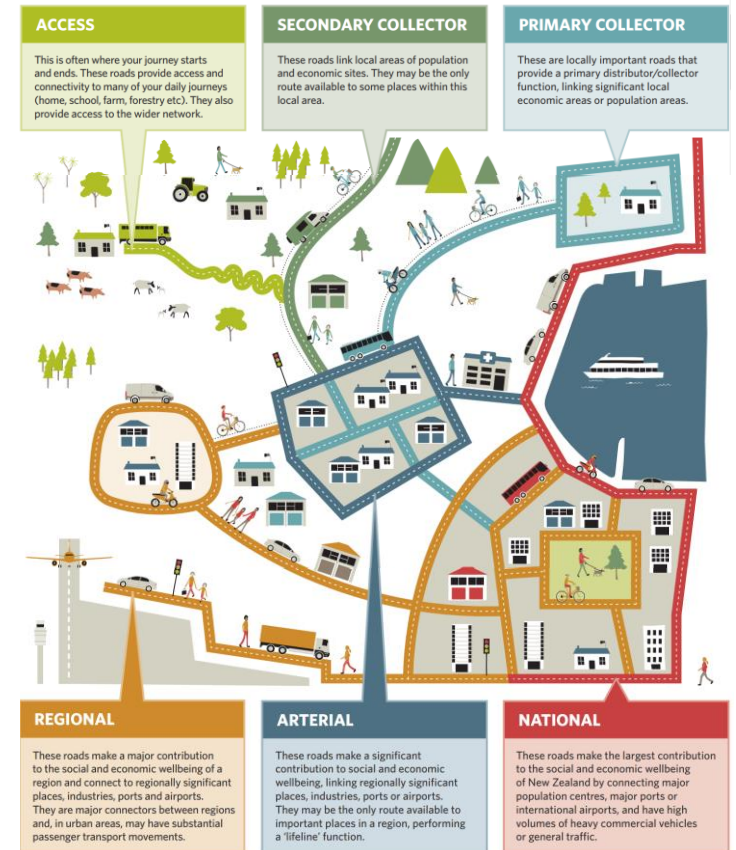
Road Class	
	Percentage
Arterial	24%
Primary Collector	23%
Secondary Collector	16%
Regional	13%
Access	10%
High Volume	5%
Low Volume	3%
National	1%
National Strategic	0%



**Arterial
Primary Collector**

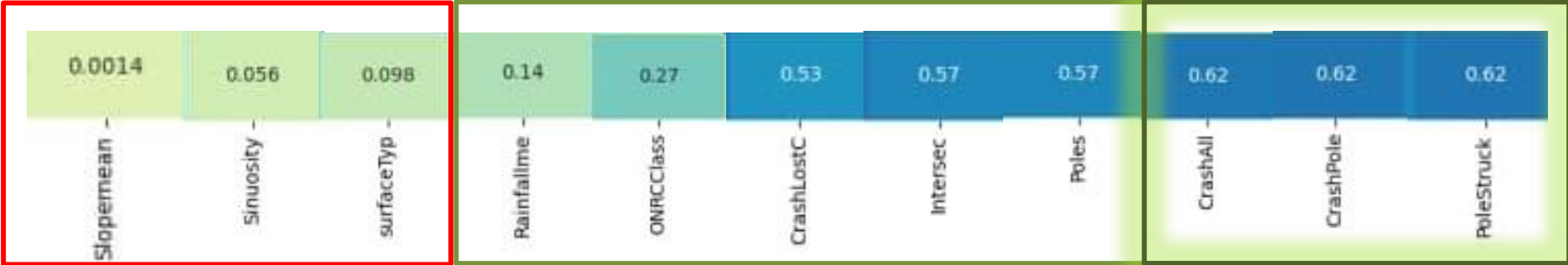
**Secondary Collector
Regional
Access**

**High Volume
Low volume
National
National strategic**



FACTORS – OUTCOMES

STATISTICAL ANALYSIS



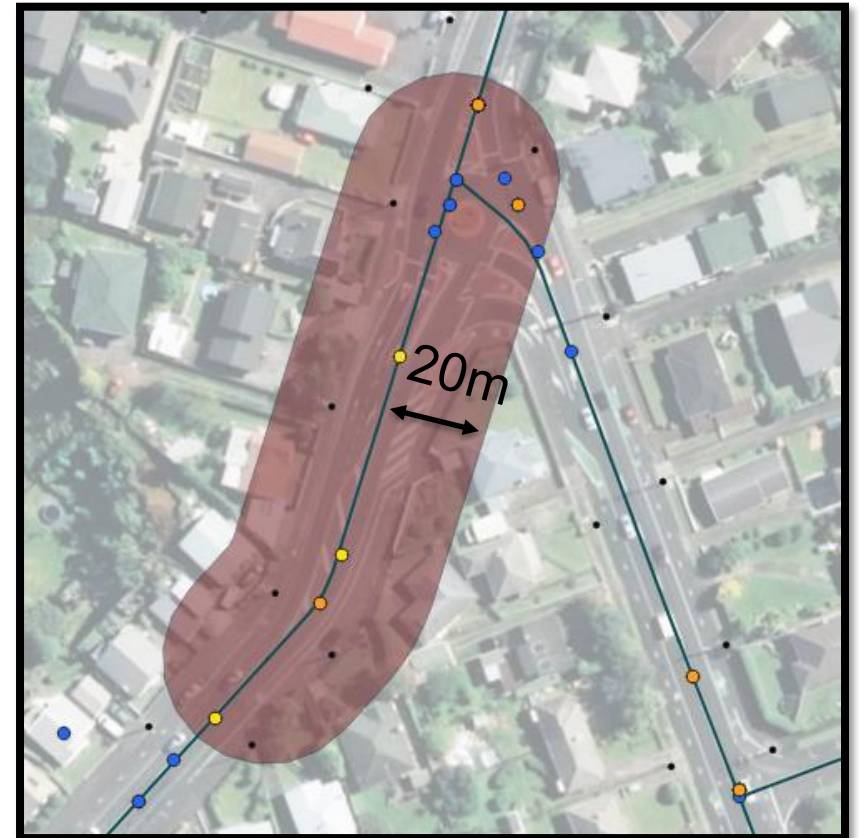
Note: Vales are specific to Powerco region

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

WAIT, WHAT? ROAD ANALYSIS???

ROAD RISK

- ❑ Waka Kotahi Road centreline dataset
 - ❑ Split into 100m sections
 - ❑ Extend 20m from road centreline
 - ❑ = Road section
- ❑ Road sections are used to count features:
 - ❑ Crashes
 - ❑ Poles
 - ❑ Intersections



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

WAIT, WHAT? ROADSIDE ANALYSIS???

ROADSIDE RISK

We know:

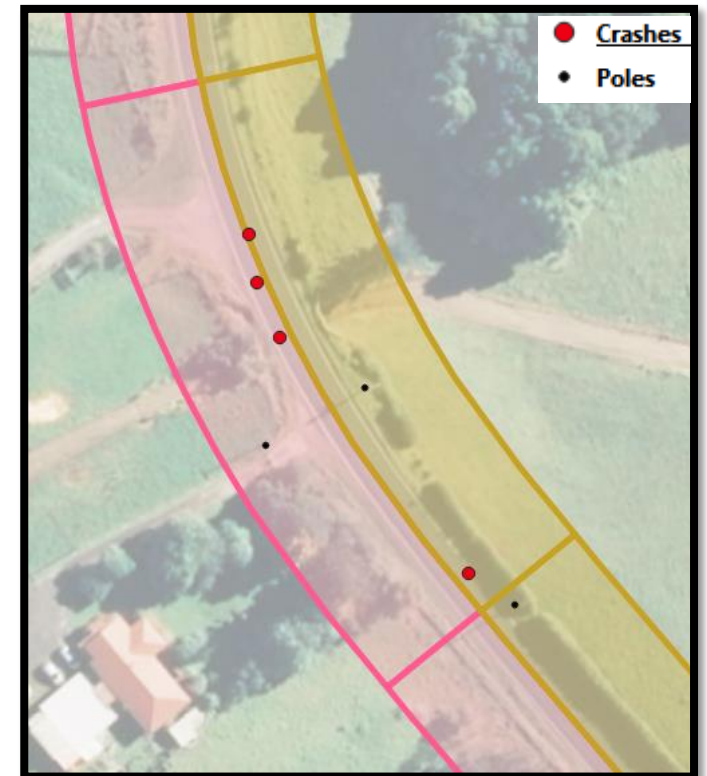
- ❑ Poles are not equally distributed along each side of the road
- ❑ Car crashes may occur at any point on the road, even cross the centreline

Why:

- ❑ Gives a better understanding of what happened, based on direction of travel

How:

- ❑ Split road sections along the centreline – represents the 2-way flow of traffic



ROADSIDE RISK

DEFINITION

The risk of one side of the road

ROADSIDE RISK

FIRST, WE MUST UNDERSTAND

- The general orientation of the road section:
 - North-East/ South-West or
 - South-East/ North-West?

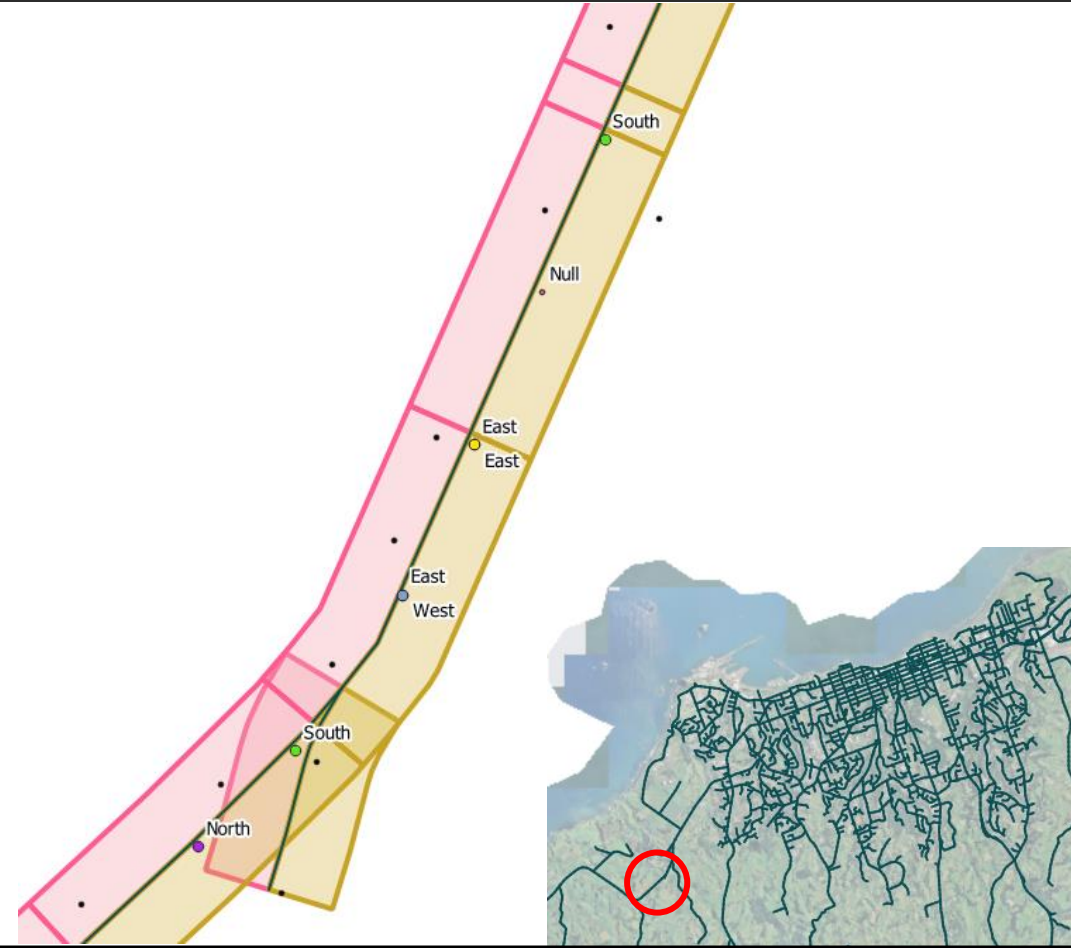
- Is the left or right side of the road north-east bound?

- Is the crash point located on the correct side of the road centreline, based on the crashed vehicles travel direction?

ROADSIDE RISK

DATA CHALLENGE – EXAMPLE

- ❑ Poles mostly on one side of road
- ❑ Crashes (car v pole):
 - ❑ Recorded on one side of the road centerline
 - ❑ One point, several crashes
 - ❑ Same point, different directions
- ❑ Road direction???

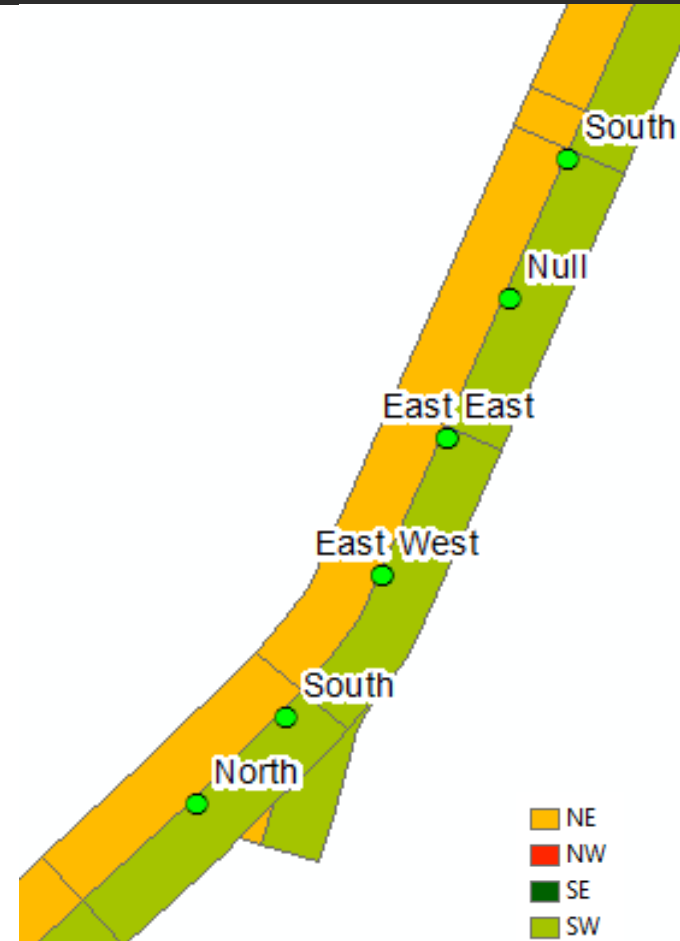


ROADSIDE RISK

DATA CHALLENGE – RESULT

- Left side of road = north-east
 - North = 1
 - East = 3

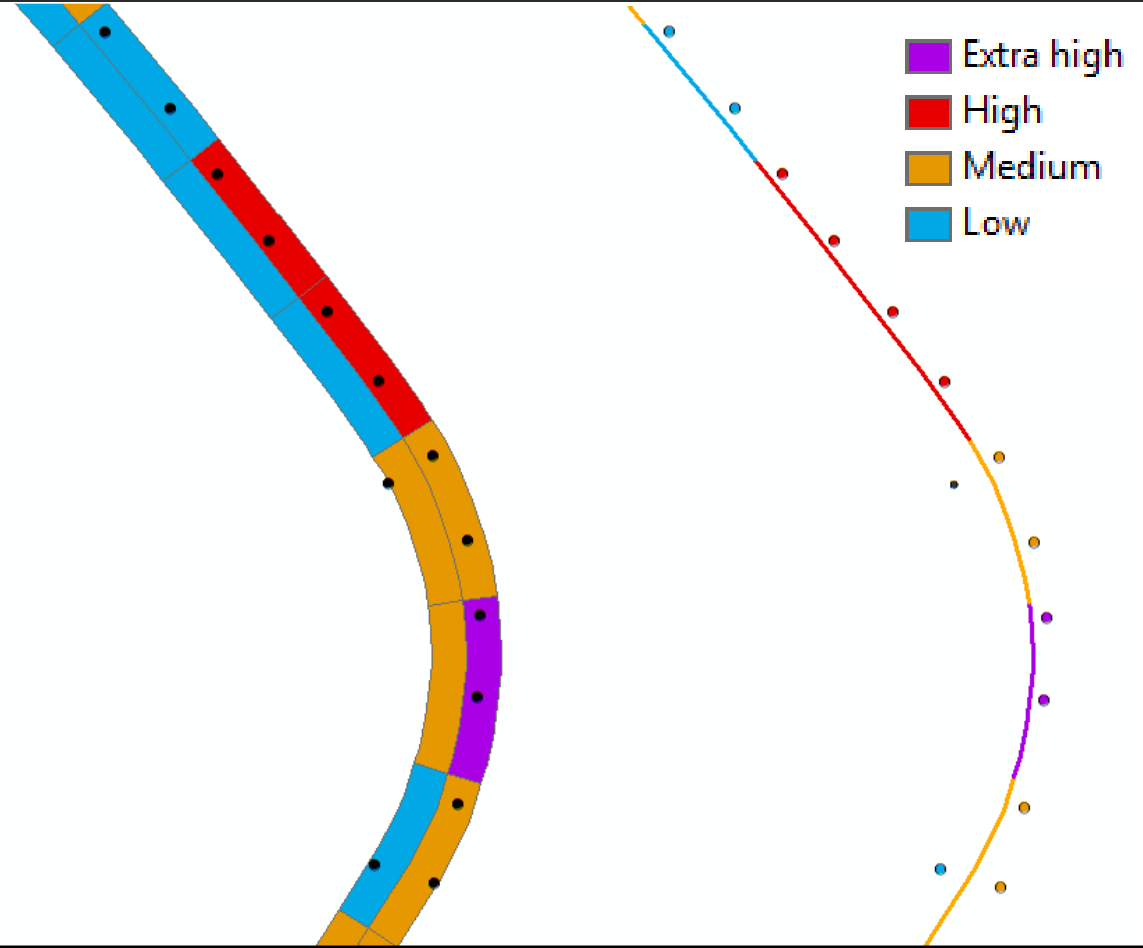
- Right side of road = south-west
 - South = 2
 - West = 1



What side of the road, section of road and pole has the greatest risk of car v pole crashes?

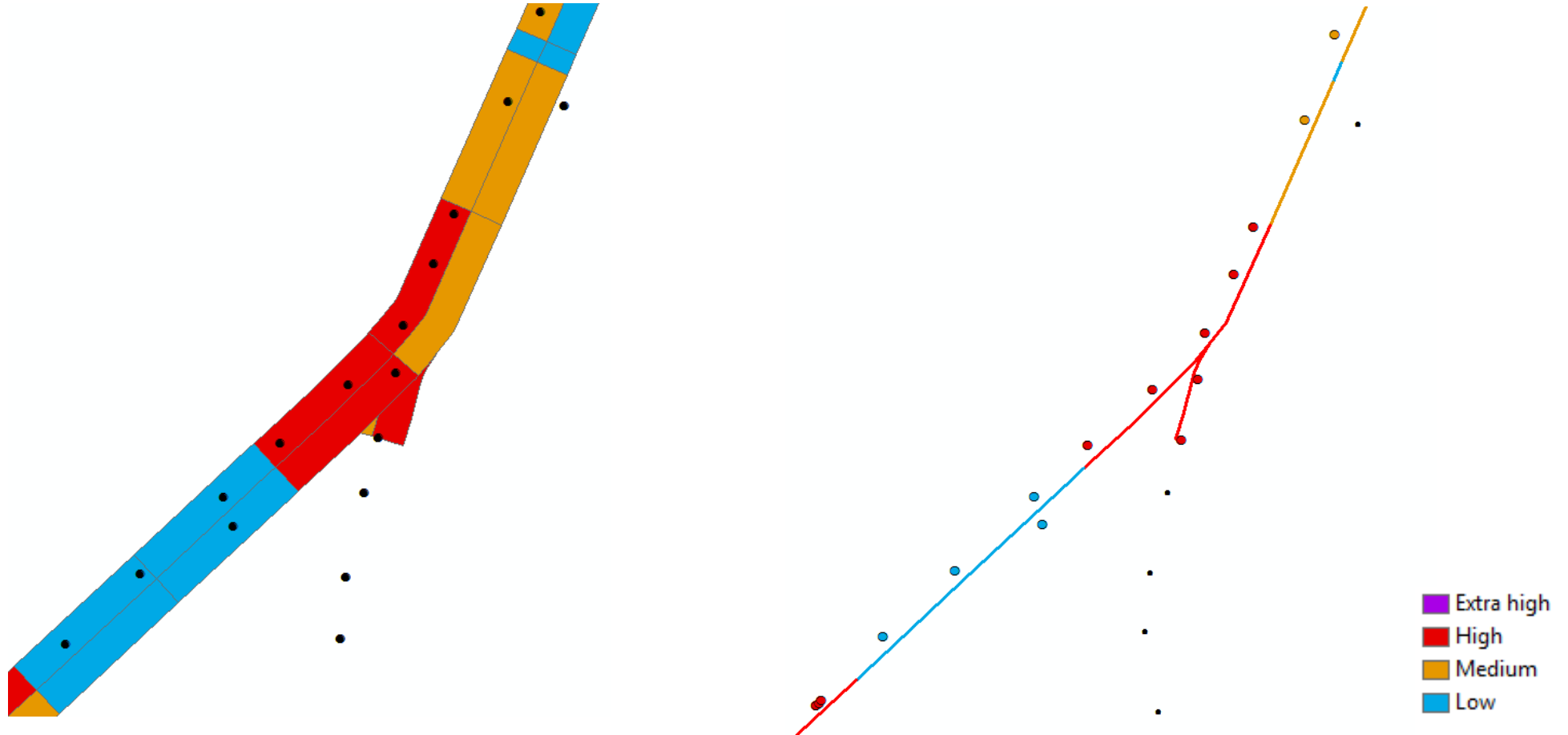
RISK RESULT

- Risk level:
 - Classified statistical risk
- Features:
 - Blocks = roadside risk
 - Points = poles with roadside risk
 - Line = Road with highest roadside risk



RISK RESULT

[Redacted text box]



Are car v pole events random?

Why are they repeatedly happening in the same location?

Why are they not happening to some poles?

Summary

- ❑ Powerco have a repeatable process to analyse car v pole
- ❑ Powerco have a prioritised group of poles for mitigation
- ❑ Success comes down to combining your data with external data
- ❑ The power of visualisation

If this is what was accomplished with Kens efforts, where could this go next?



LOCATION. DATA. CONNECTIVITY.

Questions?

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