

# Dale Harris

## Developing a Risk Prediction Model for a Safe System Signature Project



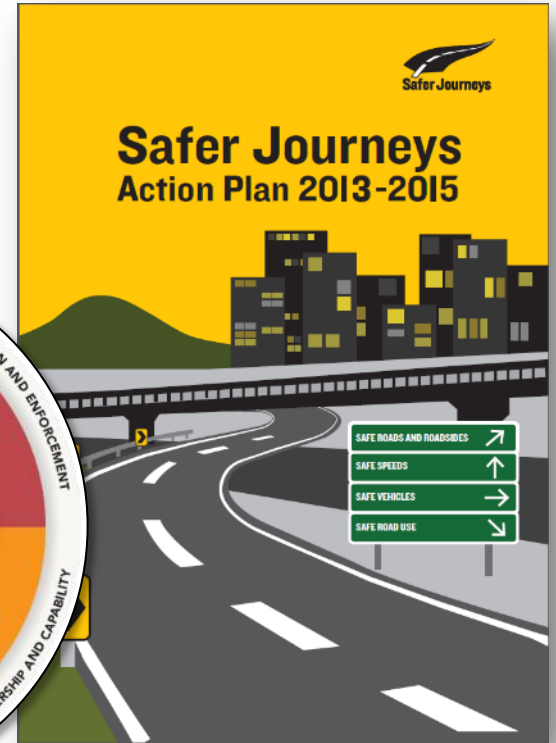
# *Developing a Risk Prediction Model for a Safe System Signature Project*

*Dale Harris  
Paul Durdin*

*IPENZ Transportation Group Conference 2015*

# Introduction

- Eastern Bay of Plenty Safe System Signature Project
- Development of a risk prediction model and mapping interface: “SignatureNET”



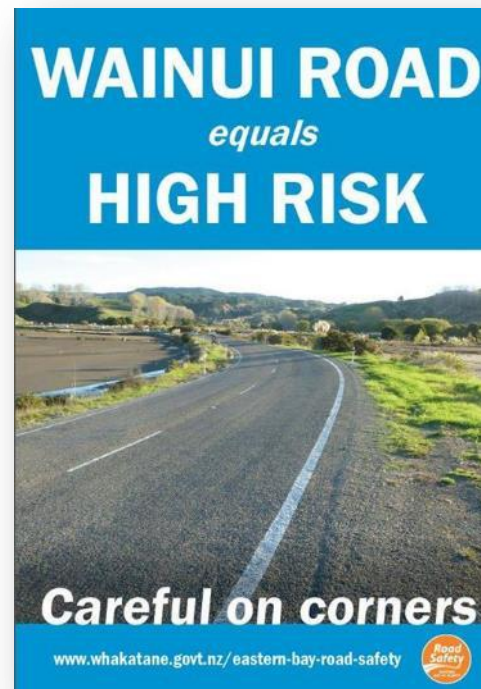
# Context – Eastern Bay of Plenty Signature Project

- Whakatane, Opotiki and Kawerau districts
- Focus on rural road safety



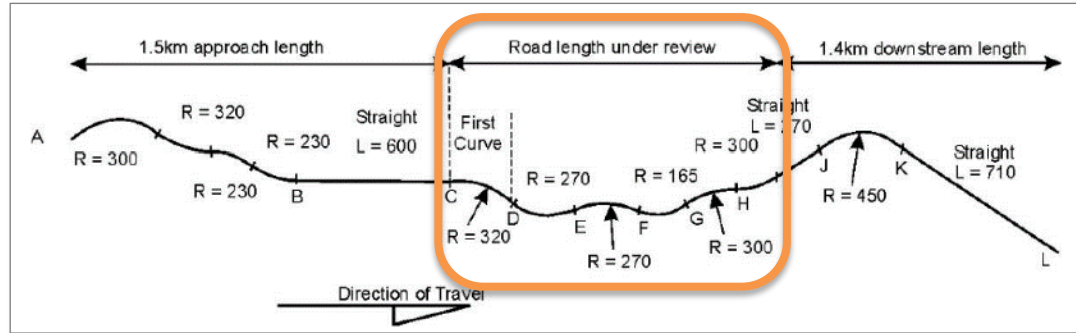
## *Risk Prediction - EBoP*

- 57.9% of rural crashes occur on curves
- Low volume road network (1500 km)
- ‘Traditional’ risk assessment using crash history unreliable
  
- A new methodology is required...



# Austroads Operating Speed Model

- Uses road geometry to estimate 85<sup>th</sup> percentile vehicle operating speeds by modelling:
  - acceleration on long straights
  - deceleration on curves
- Also identifies curve risk (desirable, undesirable, unacceptable)





## *A GIS Approach...*

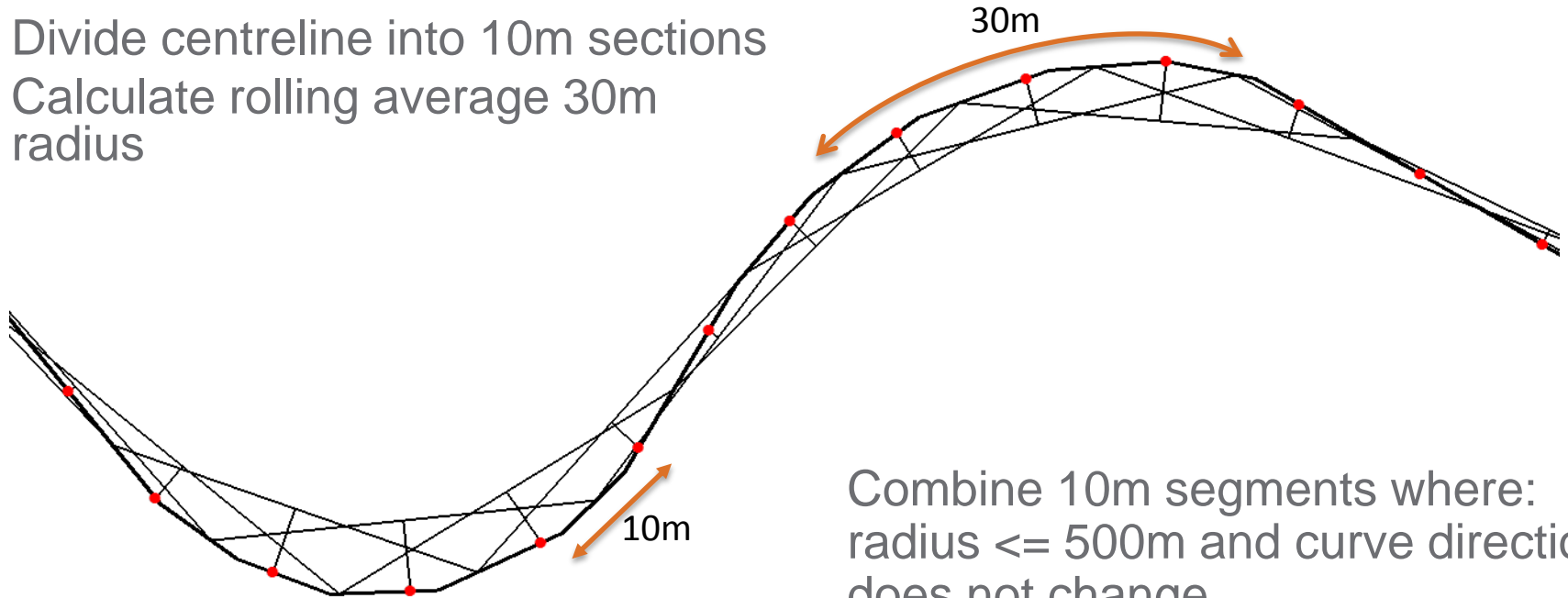


**Input:** high quality road centreline

## A GIS Approach...

- Divide centreline into 10m sections
- Calculate rolling average 30m radius

## Curve Identification



Combine 10m segments where:  
radius  $\leq$  500m and curve direction  
does not change

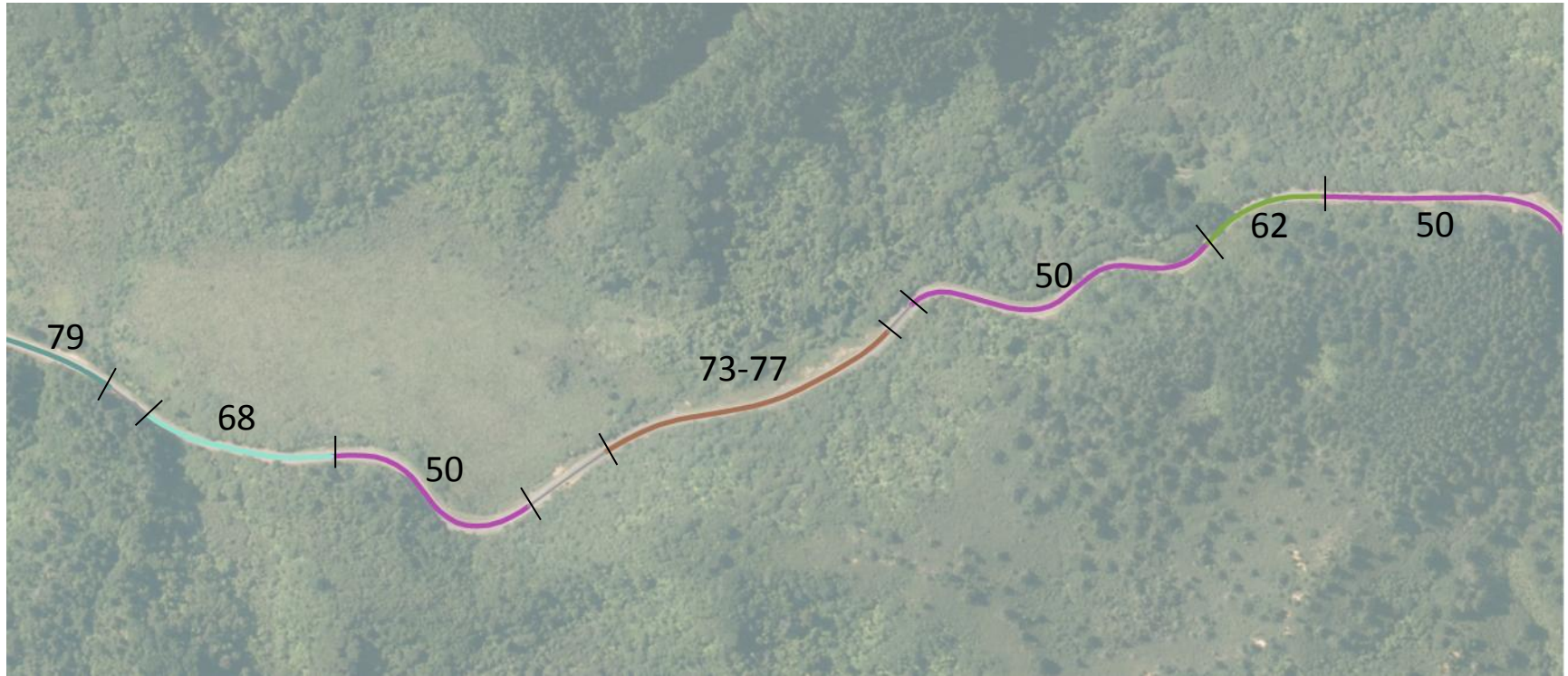


# A GIS Approach...

# Curve Identification

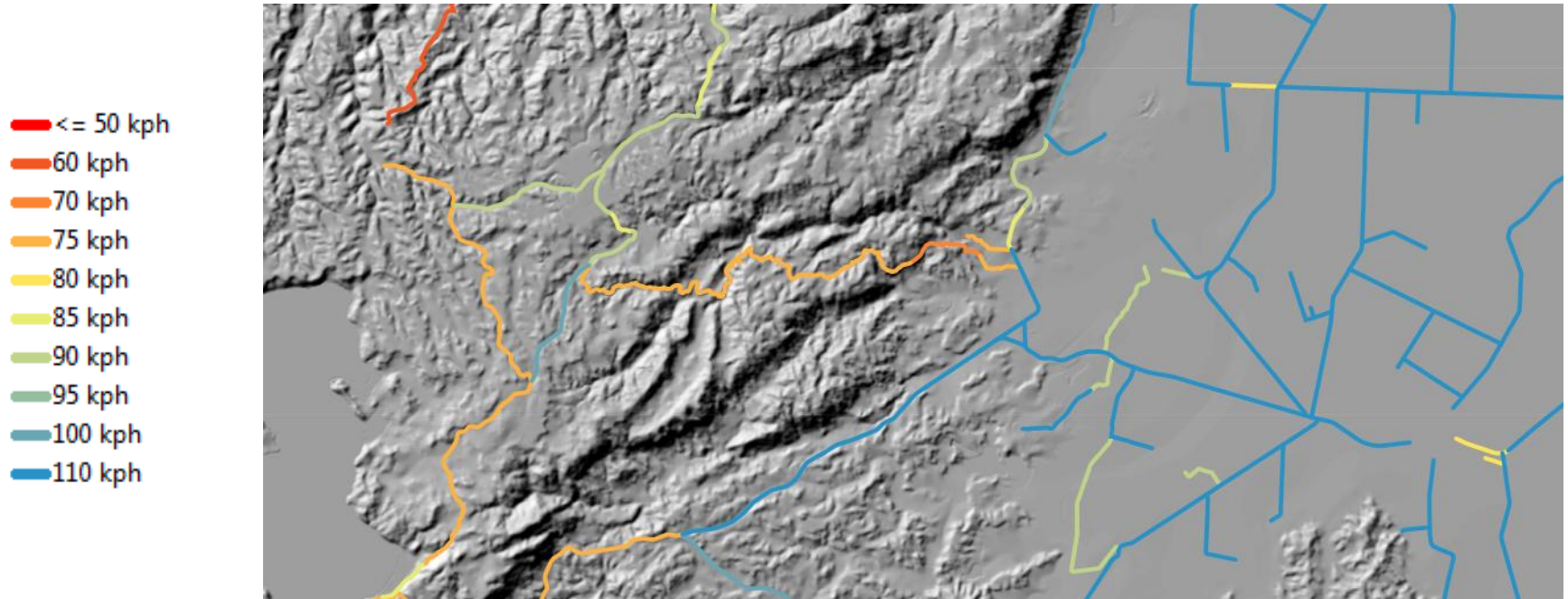


# A GIS approach - Identify Operating Speed Sections



## A GIS Approach...

## Identify Maximum Speeds



Maximum (desired) speed derived as a function of **curvature** and **terrain**



# A GIS approach...

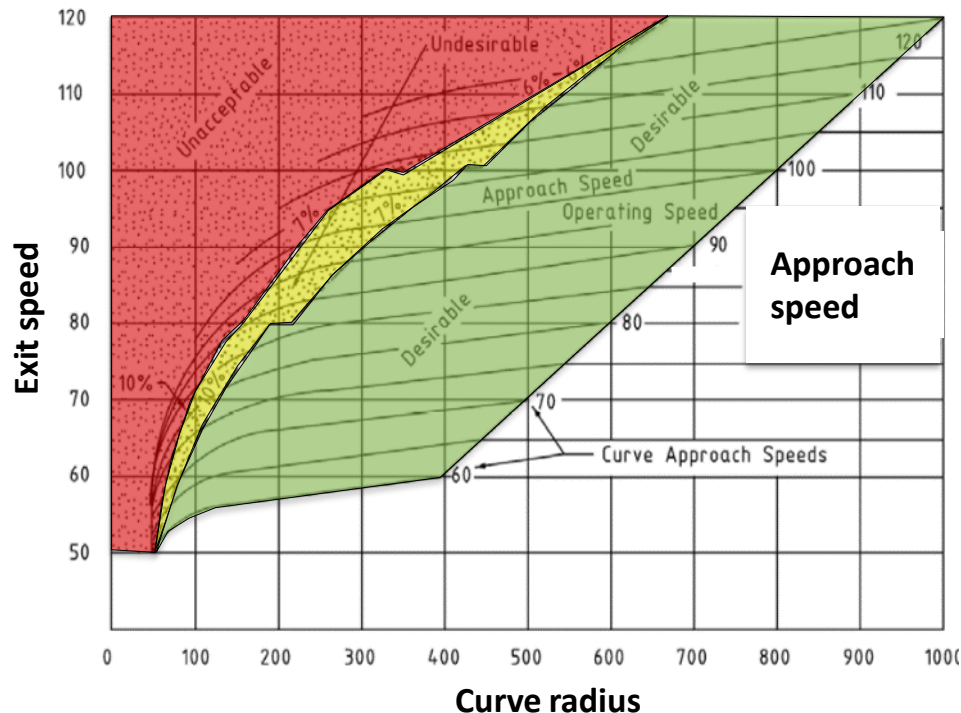
# calculate operating speeds

Speeds modelled in both directions



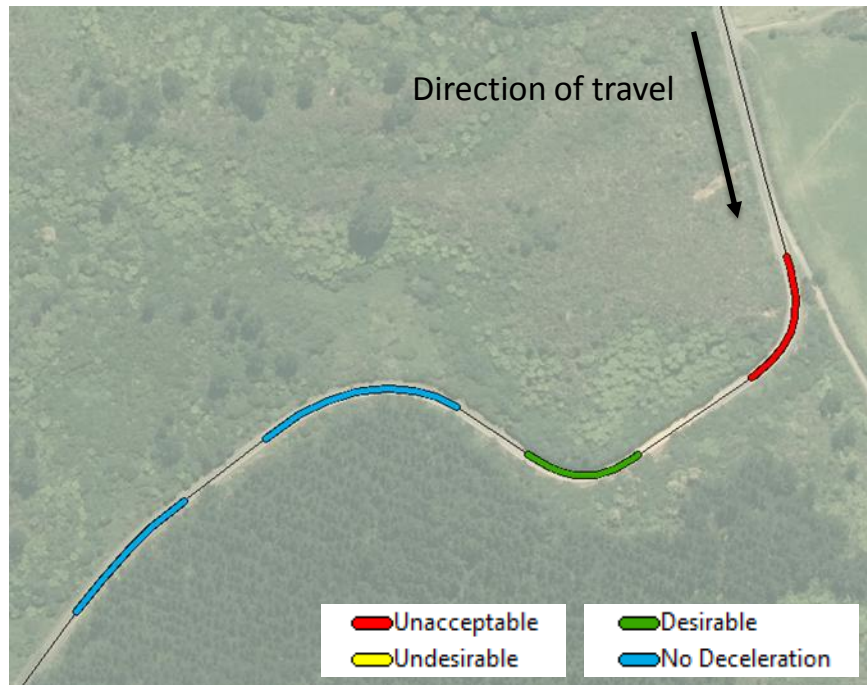
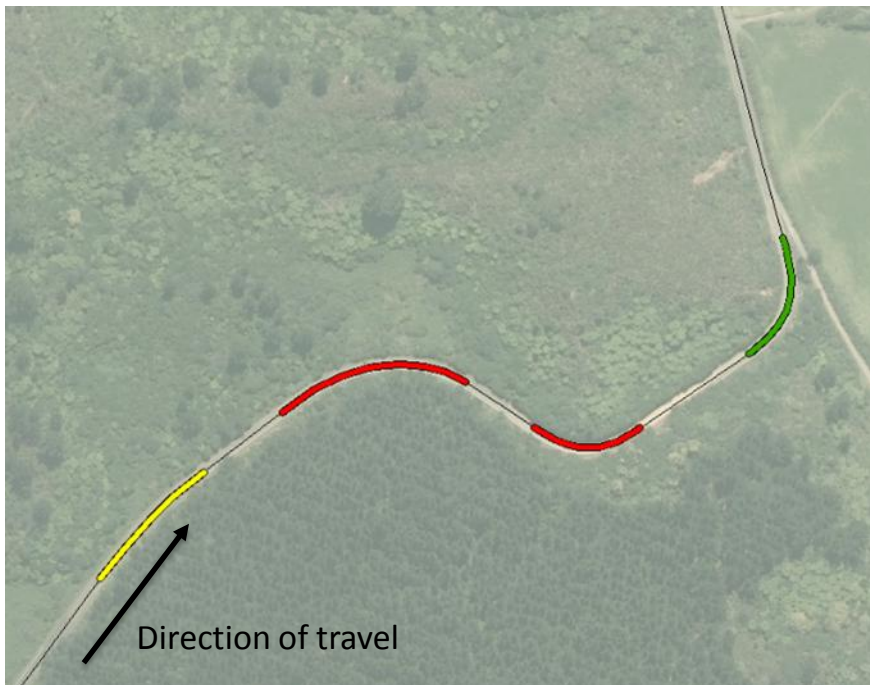
# Identifying curve limits

- **Within context:**
  - No limit (no deceleration)
  - Desirable (some deceleration)
- 
- **Out-of-context:**
  - Undesirable
  - Unacceptable





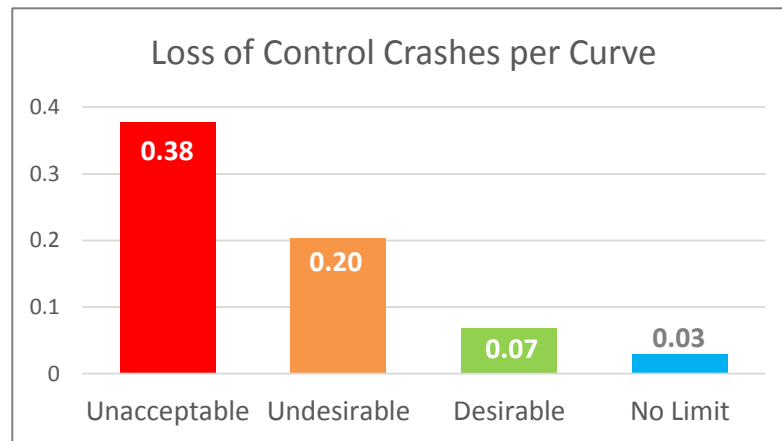
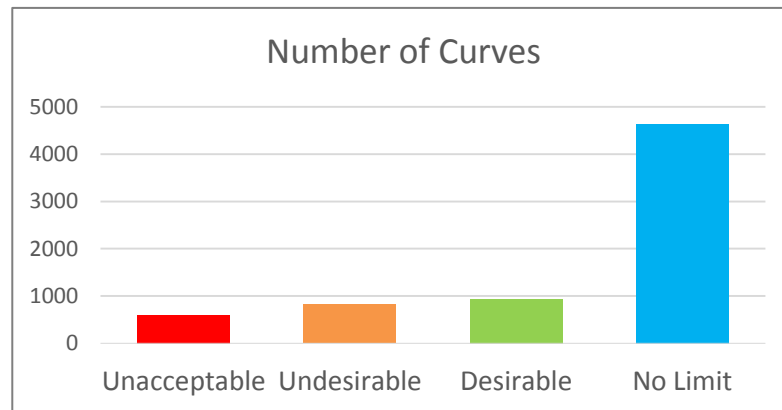
# Identifying curve limits



# Results / Validation

6,985 curves identified

**66.6% of loss of control crashes**  
occurred on the  
**20.3% of curves**  
classified as 'unacceptable' or  
'undesirable'.



# “SignatureNET” web viewer

The screenshot displays the SignatureNET web viewer interface. At the top, the title bar reads "SignatureNET Eastern BoP Signature Project". The main map area shows a network of roads with various colored overlays representing speed model results. A "Layers" panel on the left lists several data layers, with "Speed Model" selected. A "Curve Radius = 110m (DESCENDING)" popup window provides detailed data for a specific curve, including Operating Speed (68 kph), Limit (Desirable), Approach Speed (72 kph), Exit Speed (68 kph), and Speed Behaviour (Curve: Approach Speed higher than Operating Speed, Operating Speed higher than calculated Exit Speed, Decelerate to Operating Speed). A "Legend" panel on the right defines the color coding for the speed model: red for "Unacceptable", yellow for "Undesirable", green for "Desirable", and blue for "No Deceleration". A Google Street View inset window shows a street-level view of a road labeled "Waipui Rd" with a "Zoom to" button. The interface also includes a "Layers" panel with checkboxes for various data layers, a "Legend" panel, and a "Zoom to" button.

# *Applications / Conclusion*

- Supports prioritisation of targeted road safety interventions
- SignatureNET as single source of road safety information for all project partners
- Demonstrates innovation within a safe systems project
  
- Speed model as an alternative to GPS operating speed data?





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# Safety

