Effect of resealing on wet crashes

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Would like to acknowledge Peter Cenek, OPUS Research who undertook the work on our behalf.

Background (1)

T10 Specification

- One of several critical elements of the Transport Agency's safety management of sealed sections of the state highway network is the T10 *Specification for state highway skid resistance management*: 2013. This specification is concerned with the cost-effective provision of road surfaces that have an appropriate level of wet friction for all road vehicles.
- Appropriate wet friction is determined by reference to investigatory and threshold levels of skid resistance, as measured by the sideway-force coefficient routine investigation machine (SCRIM).
- The investigatory level for skid resistance (IL) is a maintenance priority indicator for programming treatment. IL's have been set with the objective of equalising the personal risk of a wet road skidding crash across the state highway network while maintaining an economic balance between the cost of their provision and the resulting savings in crashes.

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Balance is important point from this slide

Background (2)

T10 Specification Investigatory Levels

Site category	Skid site description	Investigatory level (IL), units ESC					
		0.35	0.40	0.45	0.50	0.55	0.60
1	Approaches to: a) Railway level crossings b) Traffic signals c) Pedestrian crossings d) Stop and Give Way controlled intersections (where state highway traffic is required to stop or give way) e) Roundabouts. One lane bridges: a) Approaches and bridge deck.						
2	a) Urban curves <250m radius						
	b) Rural curves <250m radius			L	M	H	
	c) Rural curves 250-400m radius		L	L	M	H	
	a) Down gradients >10%. b) On ramps with ramp metering.						
3	a) State highway approach to a local road junction. b) Down gradients 5-10% c) Motorway junction area including on/off Ramps d) Roundabouts, circular section only.						
4	Undivided carriageways (event-free).						
5	Divided carriageways (event-free).						

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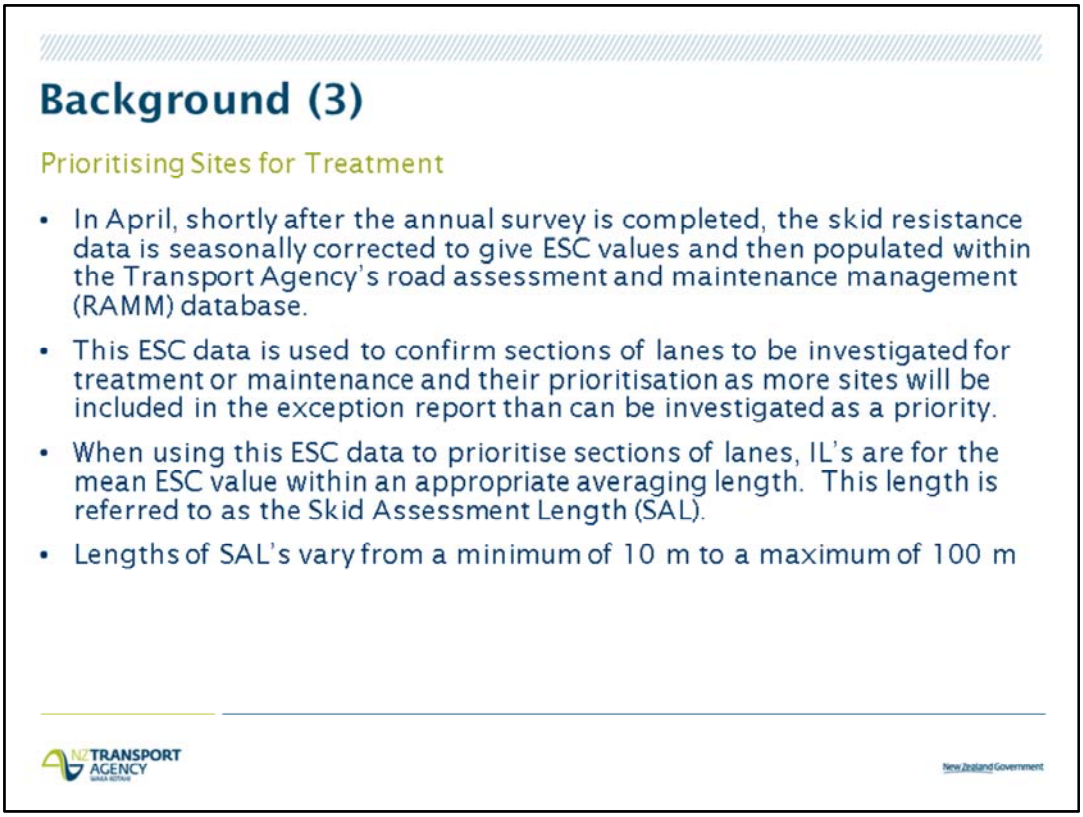
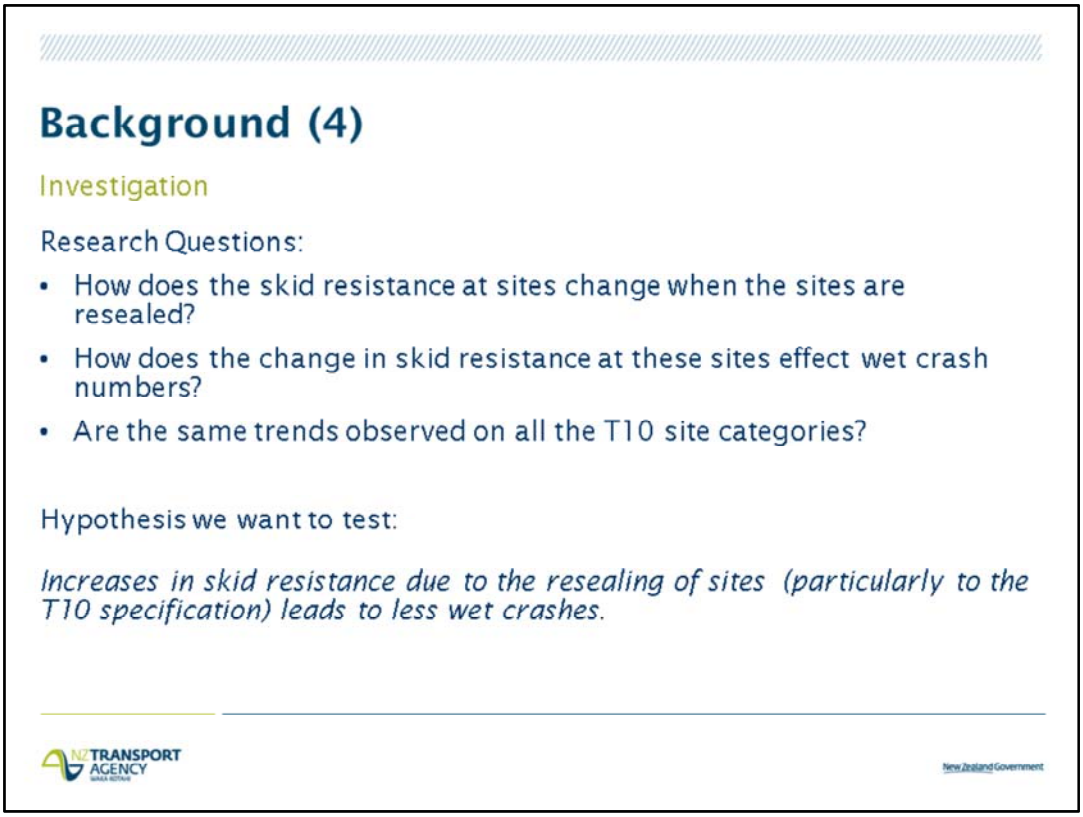
Very simplified version of Table 1 from the T10 specification.
Default in Black and bands either side for local management within national guidelines.
Curves based on risk rating from Crash Risk Analysis model.



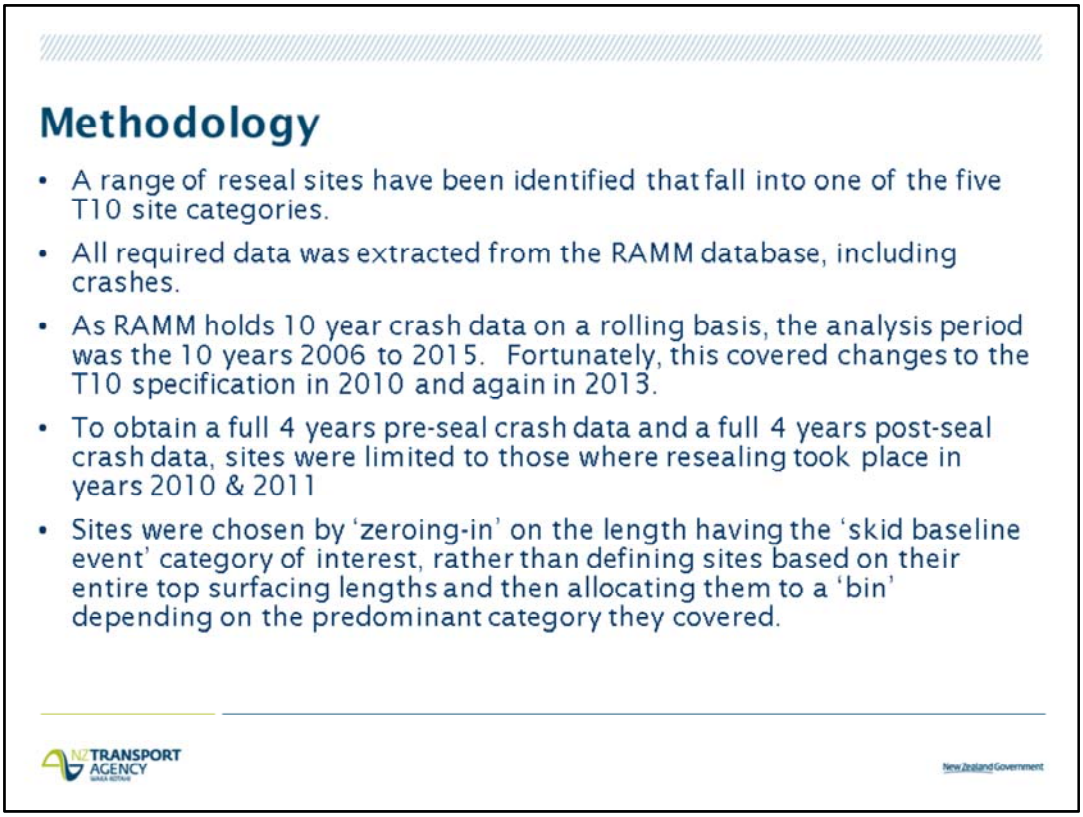
Prioritised for treatment based on ESC and average over each SAL length.

Would treat a number of SAL's together e.g. curves

Refer to my presentation yesterday on skid policy.



Research tried to address a number of questions



Looked at 10 years of crash data.

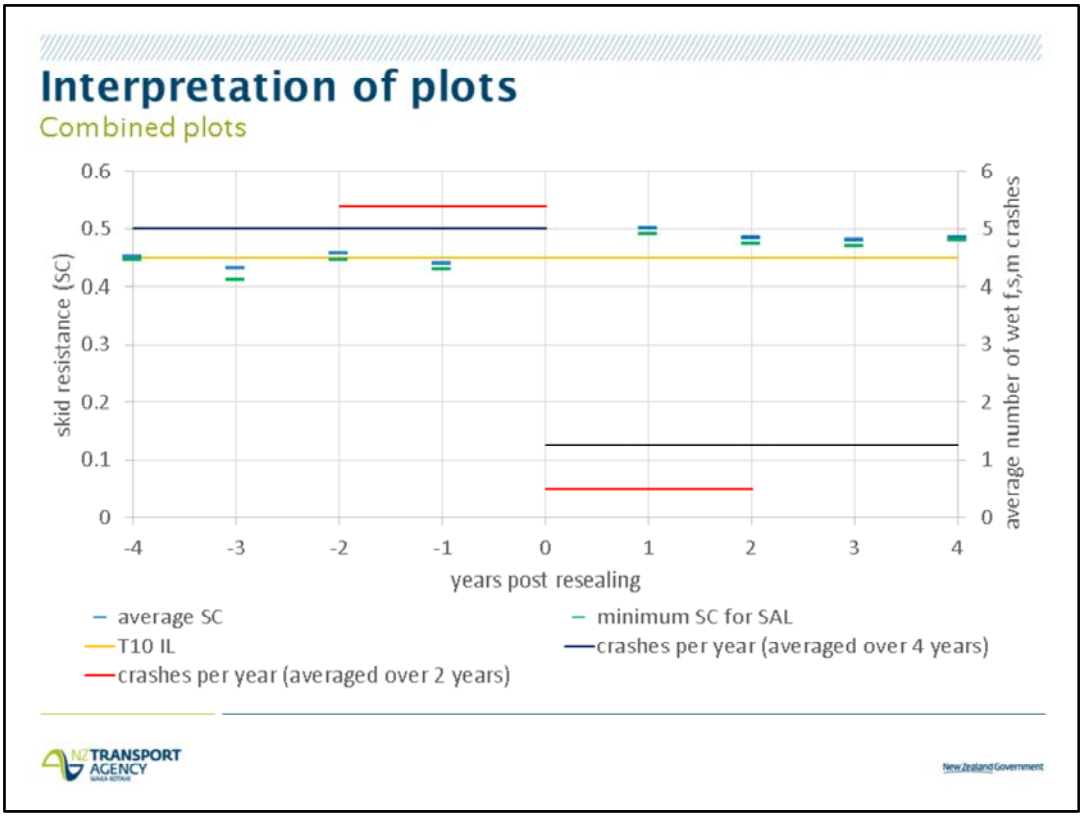
2010/2011 chosen to enable 4 years pre and post sealing.

Methodology (2)

Sites selected for analysis

A total of 20 sites were selected for investigation so that there were multiple sites for each T10 site category. However, a subset of five have been used to illustrate the graphical analysis procedure adopted.

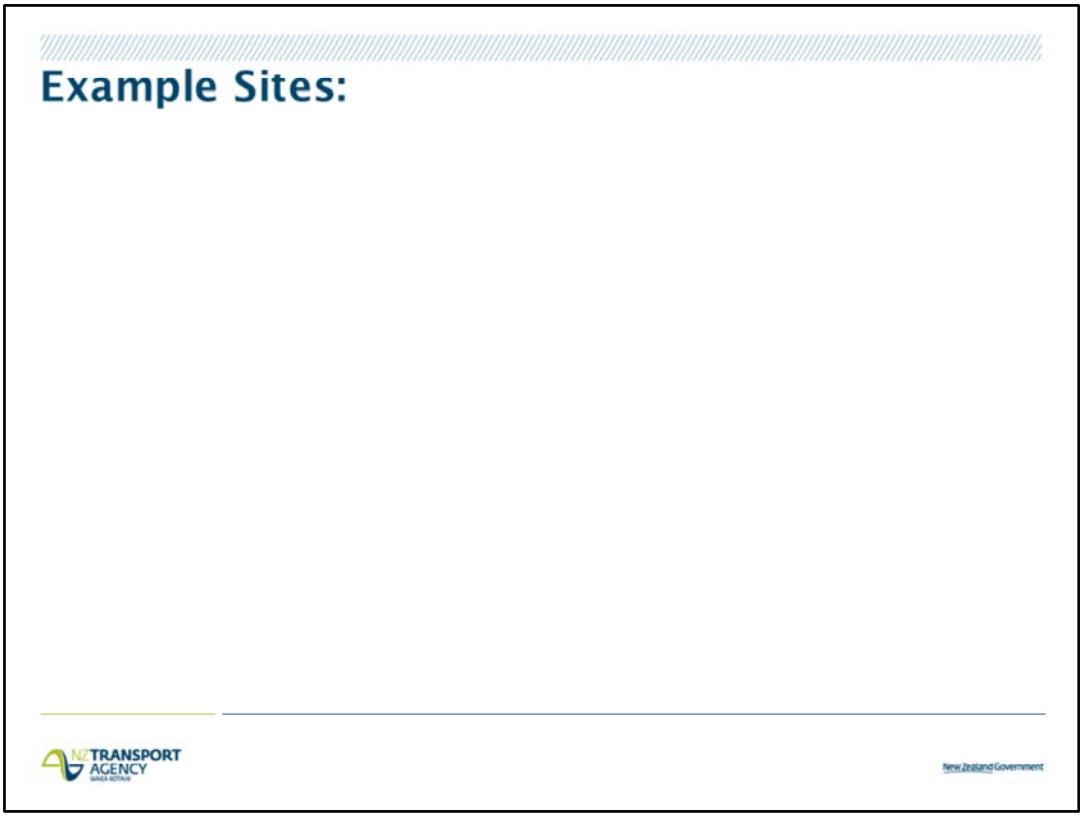
Site Cat	Type	SH	RS	RP	Lane
1	Intersection	003	471	1,850-1,904	R1
2	Curve	002	962/12.85-I	13,370-13,600	L1
3	Gradient	045	000	670-760	L1
3	Gradient	01N	1060	6,990-7,080	L1



Plot of crash rates before and after the re-sealing. The black line is the 4 year average before and after the resealing while the red line is the 2 year average before and after the re-sealing.

Plot of measured skid resistance (average and minimum) over the years before and after re-sealing. In this example you can see an increase when the site has been resealed. The yellow line is the required investigatory level (IL) for the site.

Sample plot not based on an actual site.



In this presentation, the plots for crash rate and skid resistance have been combined so that you can see how the skid resistance has changed with the resealing and what effect this has had on the number of wet crashes.

Intersection 003-471/1,850-1,904 R1

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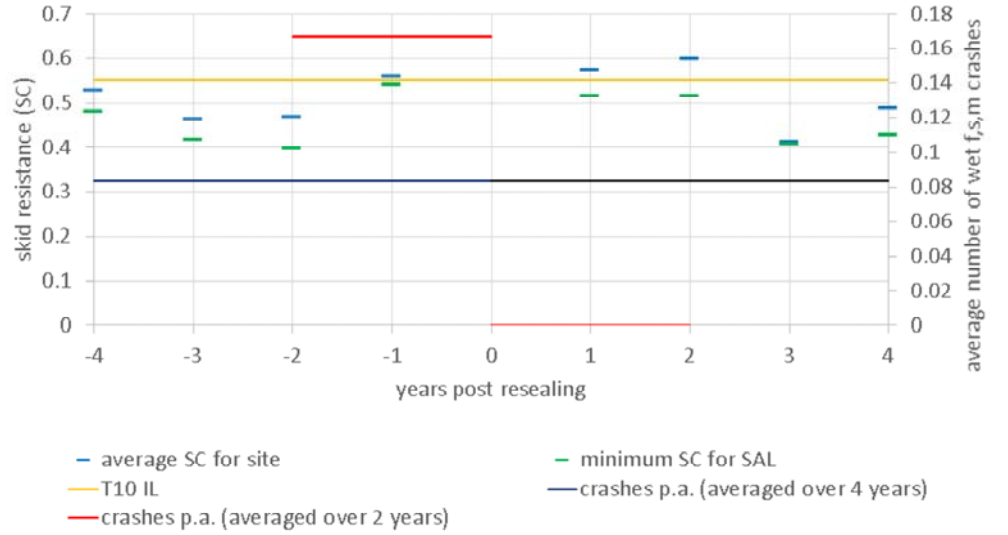
Intersection 003-471/1,850-1,904 R1

Wet "injury" crashes (F,S,M)



Curve 002-962/12.85-I 13,370-13,600 L1

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Curve 002-962/12.85-I 13,370-13,600 L1

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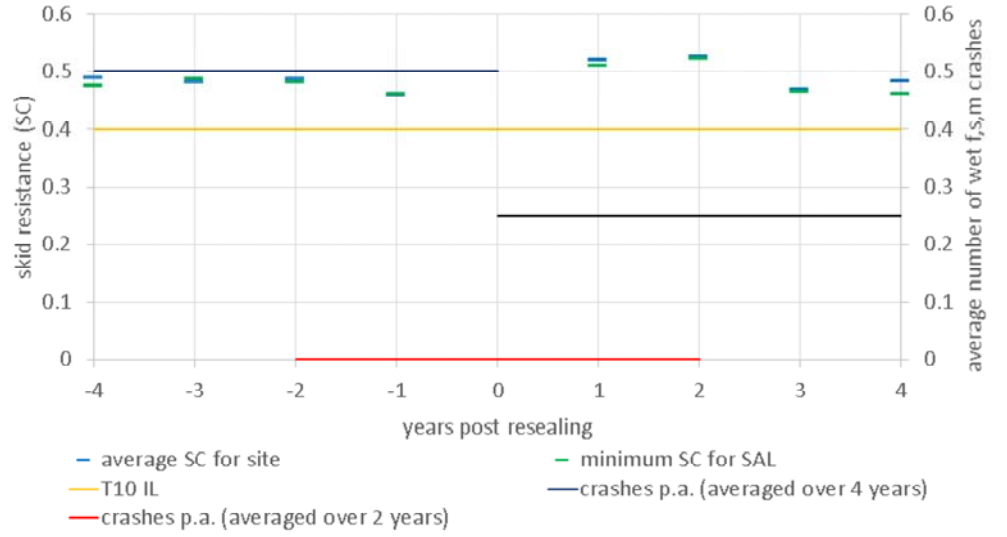

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Gradient 045-000/670-760 L1

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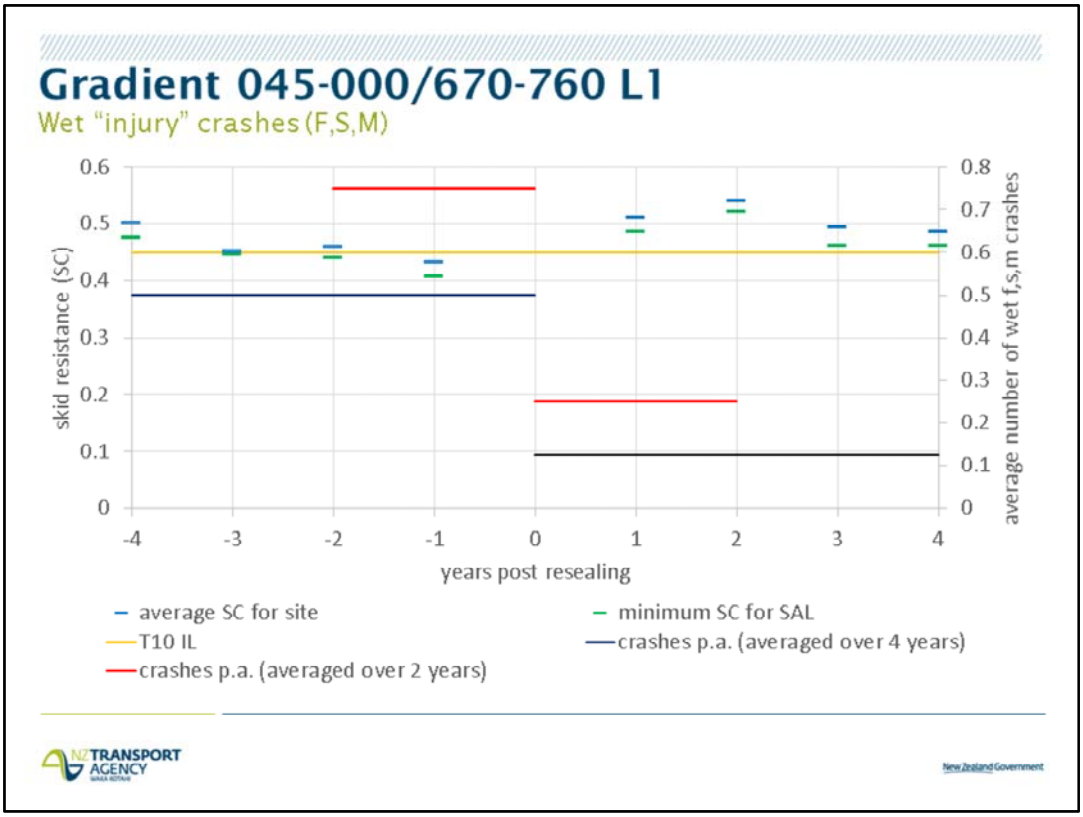

- Reseal has increased the skid resistance above the IL and the site has maintained a high skid resistance since resealing. Both the 2 year and 4 year "all injury" crashes have decreased since resealing.

Gradient 01N-1060/6,990-7,080 L1

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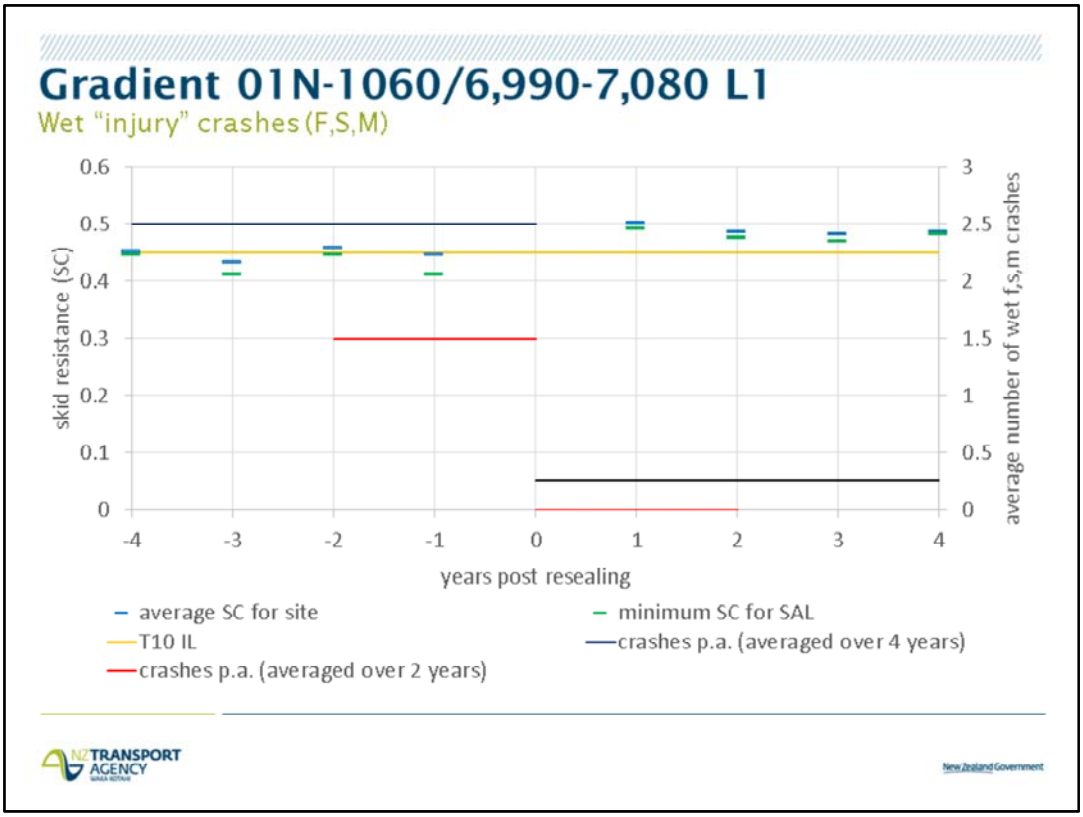

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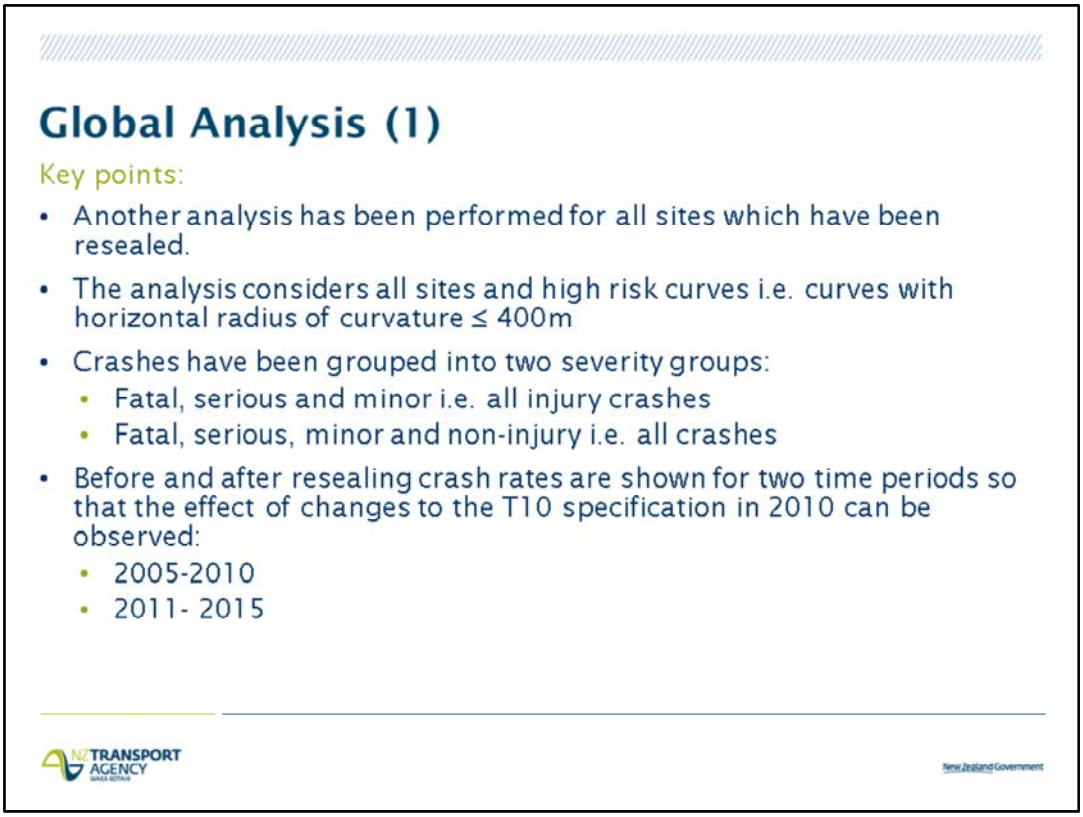
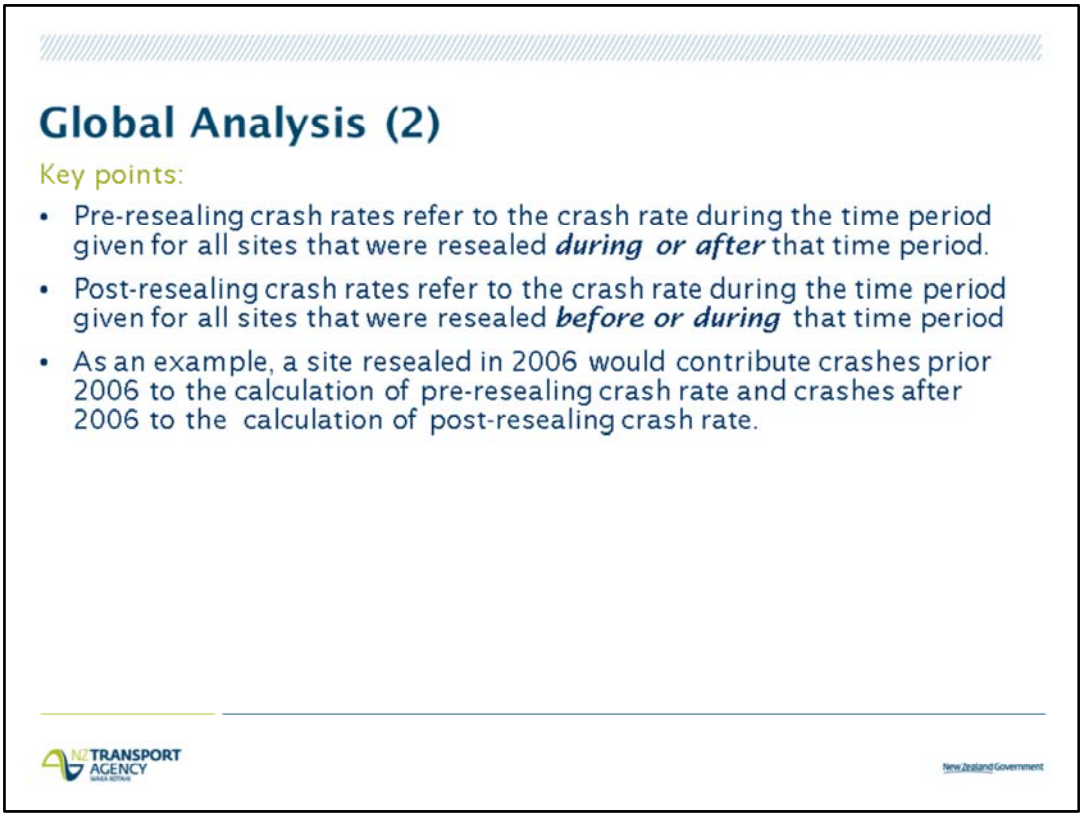


- Analysis has been combined to give an over all view of the crash rates at sites both before and after resealing has occurred.



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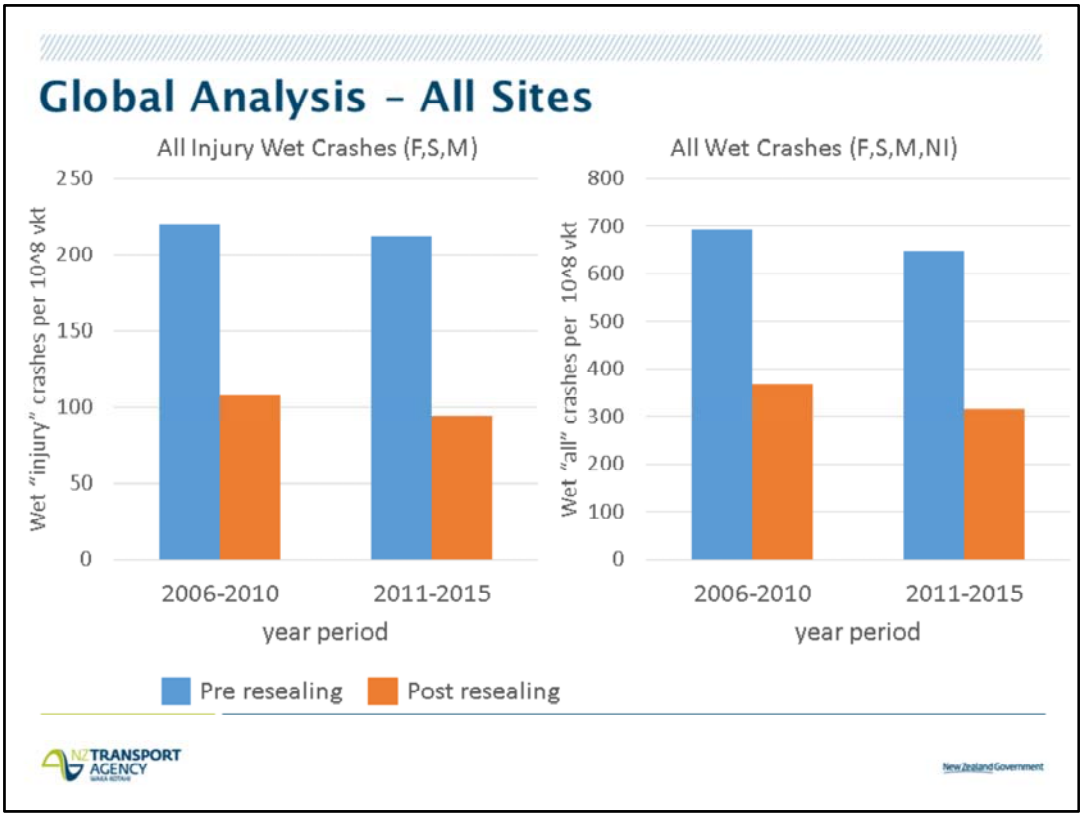
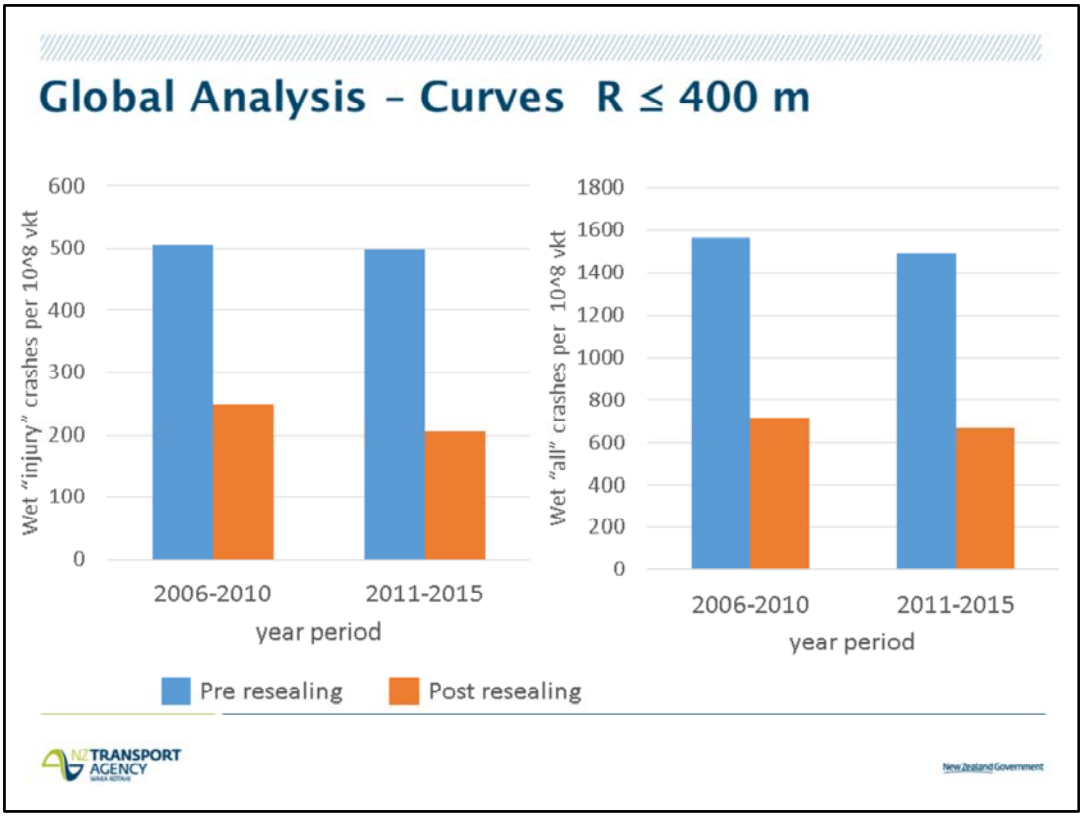


- Can see a marked decrease in the crash rates when the sites are sealed.
- There is a small improvement between the prior 2010 and post 2010 data. This may be related to the introduction of the T10 specification.



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Conclusions

Individual Site Analysis:

- Where a site has been resealed, there is a corresponding drop in the wet crash numbers generally coinciding with an increase in skid resistance levels.

Global Analysis:

- Sites that have been resealed have lower crash rates post sealing for both "injury" and "all" wet crashes.
- The reduction in crash rate brought about by resealing is about 50% for the period 2005-2010 and 45% for the period 2011-2015. However, there is no significant difference in the level of reduction between all sites and curve sites.