



KiwiRail - Significance and Opportunity

IPENZ TRANSPORTATION GROUP MARCH 2014



Significance

- **Multi billion dollar investment in metros underpins liveable cities**
- **Recalibration of Kiwi safety culture will demand the superior performance of rail**
- **Rail freight growth over last 5 years proportionally 4 times greater than road albeit on small base**
- **Rail freight underpins logistics of key ports today and increasingly essential to their future**
- **Rail integrated in the supply chain of NZ's dairy industry**
- **Complementary contributions of road and rail transport present opportunities for us to break paradigms**



Current Trajectory

- Sleepers - 6M of which 50% timber of which 30% beyond optimal life: *20year backlog plan*
- Turnouts - 1100 in mainline and 4000 in yards: *15 year mainline backlog plan*
- Bridges - 1300 with 30% on timber piers: *25 year plan to clear and \$14M Makatoke refurb first of 35 steel viaduct / steel trusses to go*
- Tunnels - 100 at 87km in total with 6 more than 2 km: *starting to address*



Control Systems

- Great make do history
- Expert at sweating our assets



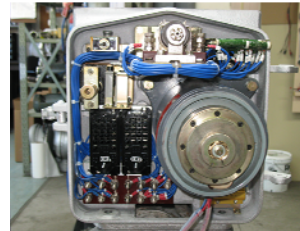
Before



Before



After



After



Auckland's 21st Century Signalling

Re-Signalling

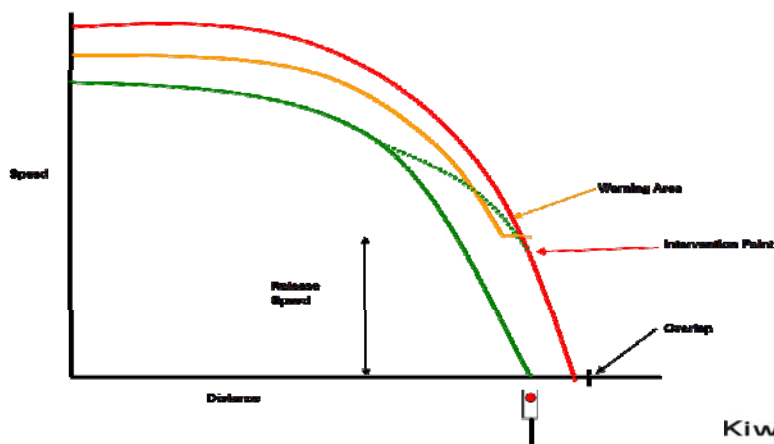
- To replace life expired equipment
- To provide 25kV AC immunised system

Additional Signalling

- To Improve Capacity
 - 6 Trains per hour on each main route (peak)
 - 20 Trains in/out per hour at Britomart
 - ARS
- To Improve flexibility
 - SIMBIDS
- To Increase Safety
 - Automatic Train Protection (ATP)



Auckland's 21st Century Signalling (continued)



Auckland's 21st Century Signalling (continued)

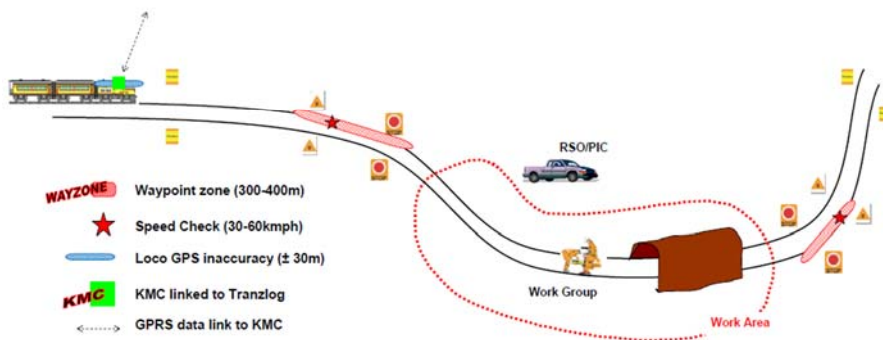
- Extensive risk assessment undertaken to determine need for Train Protection
- Concluded that an intermittent train protection system should be installed
- Auckland investment \$125m so where next for Wellington and the Freight Network



KiwiRail



Electronic Worksite Protection - Stopping Safely



- WAYZONE** Waypoint zone (300-400m)
- ★ Speed Check (30-60kmph)
- Loco GPS inaccuracy ($\pm 30m$)
- KMC** KMC linked to Tranzlog
- ←-----→ GPRS data link to KMC

Kupe Mobile Controller (KMC)
GPS location and radio hub as used for Freight Visualization and GeVIS.

Tranzlog
Locomotive event recorder linked to emergency brakes

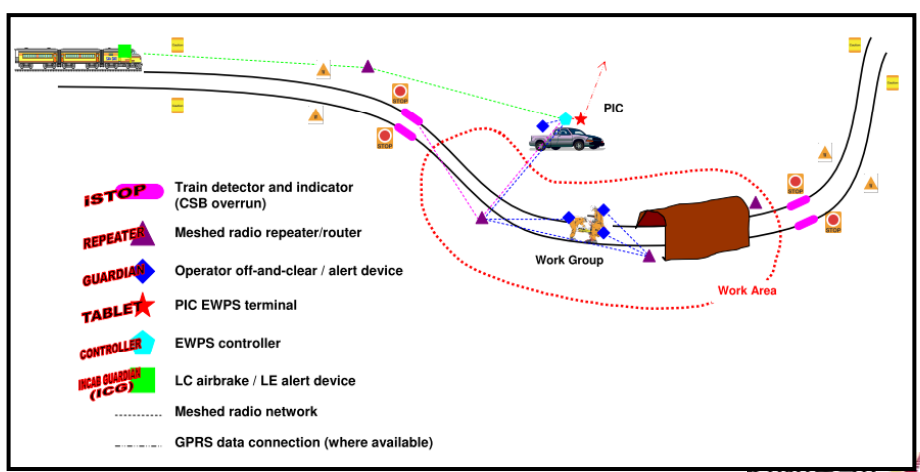
KiwiRail



How Site Protection Works



EWPS - The Ultimate Solution



Level Crossings – A Hi-rail Challenge



- Hi-rails can't trigger track circuit signals
- So level crossings pose a system risk
- Quest for safety certain solutions stalled



Level Crossings – A Hi-rail Challenge

- A non safety critical simple self cancelling radio device is now in type acceptance trials



Level Crossings – A Hi-rail Challenge



•Slow / Stop / Proceed risk still to be finalised, but this simple overlay is gaining Australasian interest

•New paradigms are possible

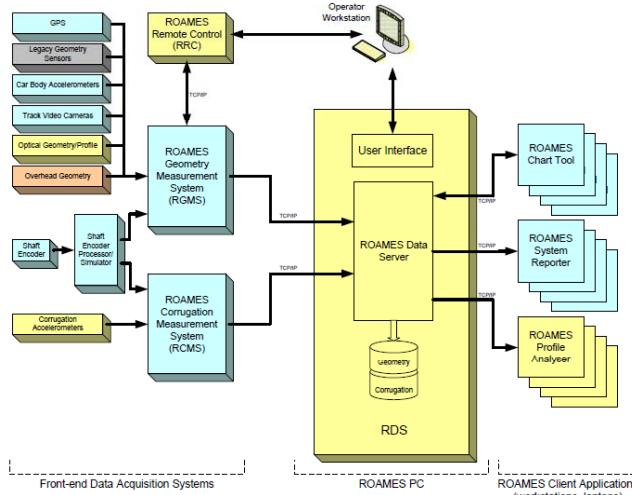


Track Asset Analysis

- Legacy data acquisition and system
- Maximo commitment 2010 and commissioned 2010
- Some 90% potential benefit still to come
- \$1.44m to provide Staged data acquisition refresh committed 2011
- Commissioning underway



Track Car Upgrade



	Timing	Cost (NZ\$)
Stage 1	11/10/13	\$659k
Stage 2	29/4/14	\$583k
Stage 3	28/5/14	\$201k



The Track Car



21st Century Inspection Opportunity

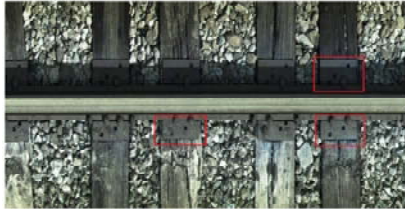


Figure 5. An example of laser based plate cutting system output. The sleepers with plate cutting have been marked.

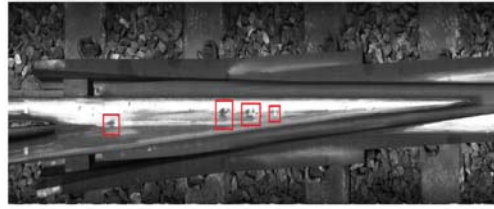


Figure 7. Rail head defect recognition on switch areas

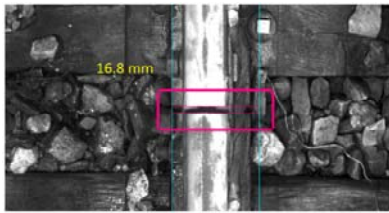


Figure 8. Rail head defect recognition on switch areas

Image ID	Image	Defect	Location	Size	Dimension	Preparation	Full Position
1		Crack	Switch area	10mm	5mm	None	
2		Crack	Switch area	15mm	8mm	None	
3		Crack	Switch area	12mm	6mm	None	
4		Crack	Switch area	18mm	10mm	None	
5		Crack	Switch area	14mm	7mm	None	
6		Crack	Switch area	16mm	9mm	None	
7		Crack	Switch area	11mm	5.5mm	None	
8		Crack	Switch area	13mm	6.5mm	None	
9		Crack	Switch area	17mm	9.5mm	None	
10		Crack	Switch area	19mm	11mm	None	

Figure 9. An example defect report sample showing defects, their location, size and dimension preparations, full position and an image highlighting defect area.



Real Time Visibility in the Rail Corridor

- GPS coverage not continuous
- Digital radio pathway introduced but some way to go
- Operating irregularities of concern
- GeVis overlay introduced using in train gps and the eRoad transponder in Infrastructure vehicles - not safety certain but a good step forward



GeVis

<http://www.kiwirail.co.nz/infrastructure/gevis.html>

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Thank you

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