

Enhancing Road Resilience by Mitigating the Disruption from Earthquake-impaired Underground Pipelines?

Presenter:

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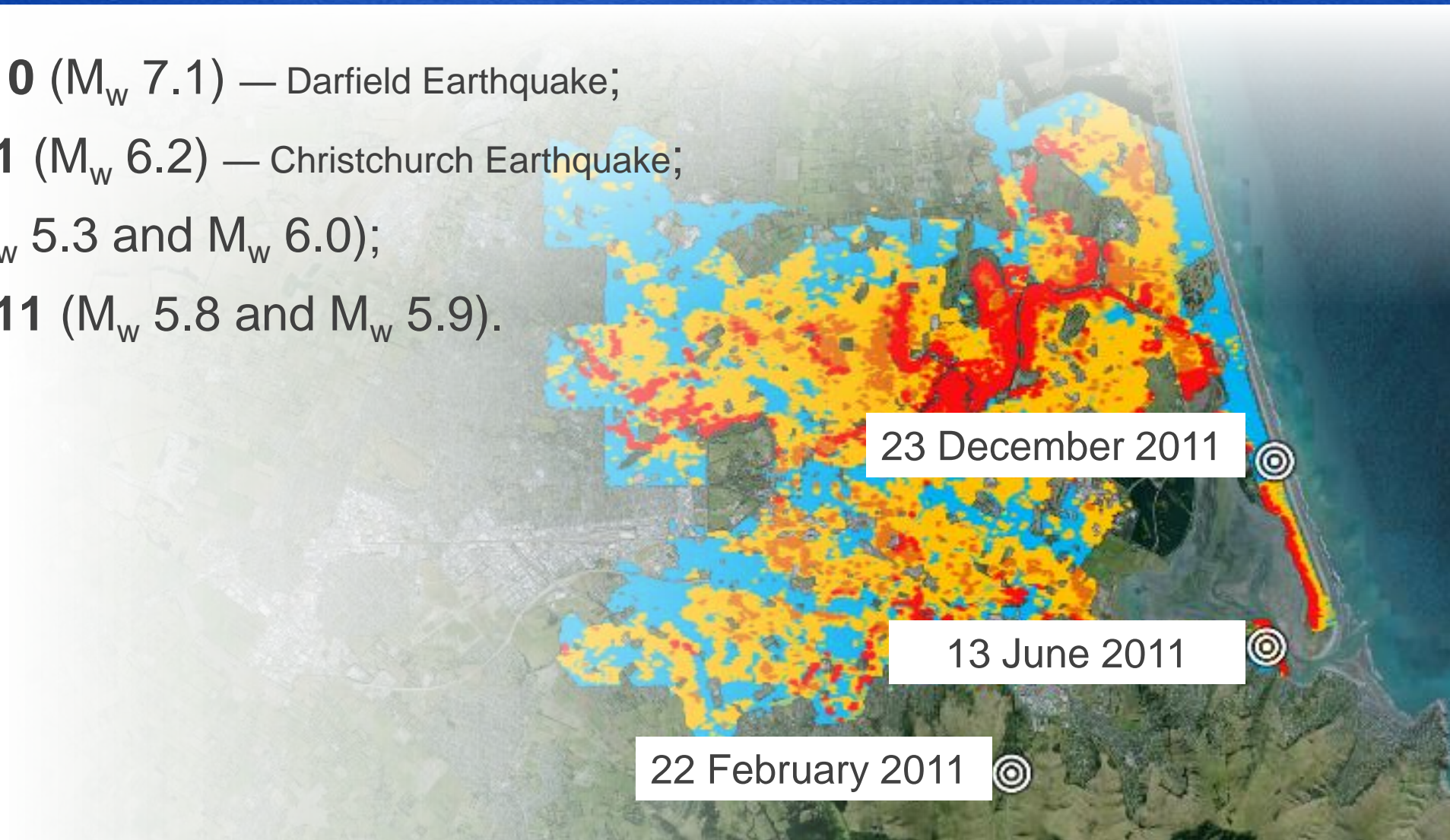
Outline of Presentation

- Issues incurred from the Canterbury earthquakes in 2010-2011
- Roading system resilience
- Proposed solutions
- Conclusion

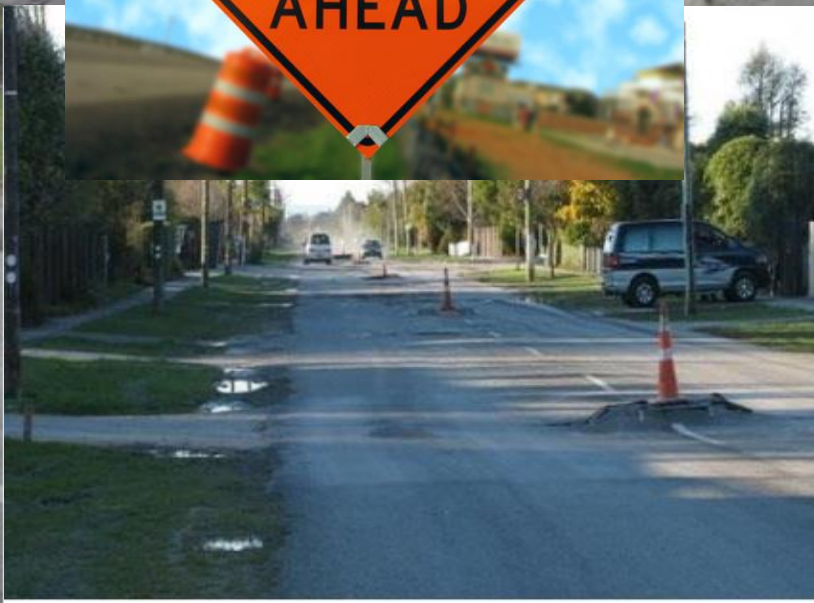


Canterbury Earthquake Sequence 2010-2011

- **4 September 2010** (M_w 7.1) — Darfield Earthquake;
- **22 February 2011** (M_w 6.2) — Christchurch Earthquake;
- **13 June 2011** (M_w 5.3 and M_w 6.0);
- **23 December 2011** (M_w 5.8 and M_w 5.9).



Issues



What is Infrastructure Resilience?

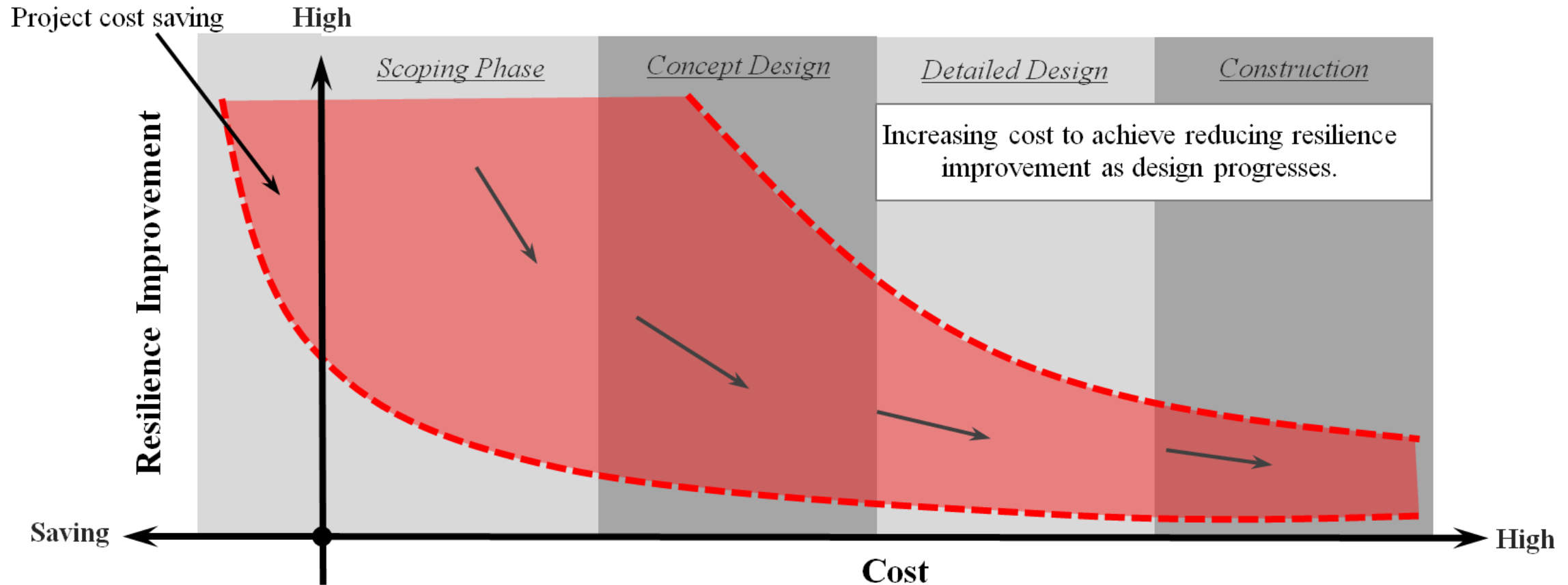
“Infrastructure resilience is the ability to reduce the magnitude and/or duration of disruptive events.”

US National Infrastructure Advisory

Holistic Assessment Considering

- Performance
- Frangibility
- Functionality
- Adaptability
- Consequence
- Cost

Cost for Improving Infrastructure Resilience



- Biggest steps in resilience for small cost early in project cycle – design philosophy.
- Early consideration of resilience can facilitate cost saving through optimisation.
- Detailed design and construction phases – small potential steps in resilience improvement for high cost.

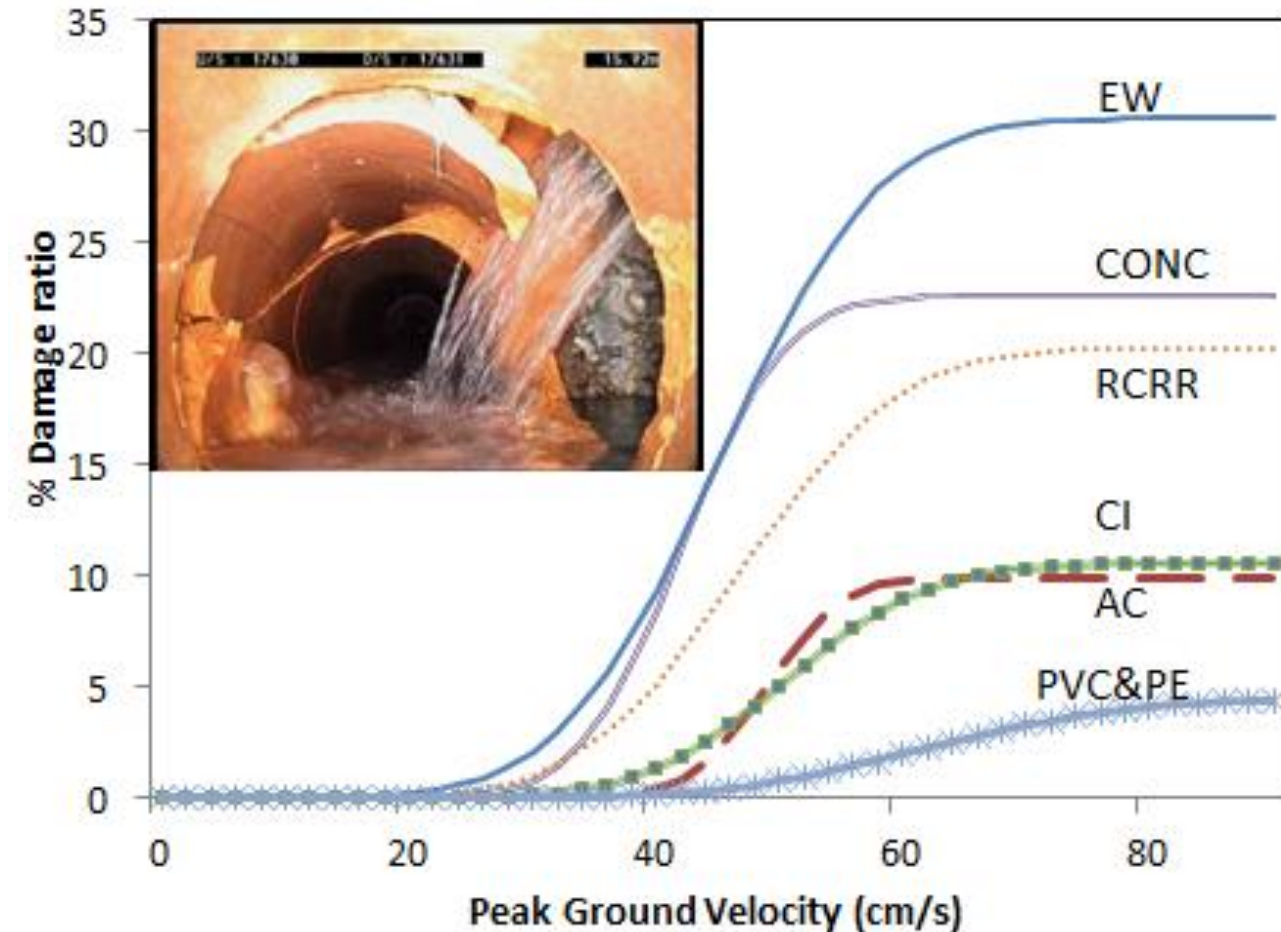
Proposed solutions (1)

Fragility curves of sewer pipelines in different liquefaction zones

Estimate the damage to pipes

Predict the potential effects on roads

Mitigate disruption for roads



Proposed solutions (2)

- **Roading engineers, Geotechnical engineers, and Civil engineers**



Proposed solutions (3)

Strategically and systematically manage three waters and roads restoration



Questions?

