

Wellington Electricity Pole Reinforcement



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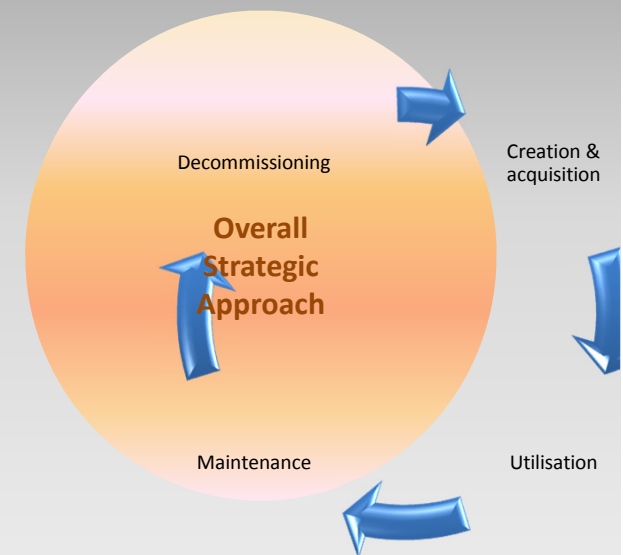
Organisation: Wellington Electricity Lines Limited

Population Description

Item	Description
Population:	37,801
Asset value:	\$ 96 million
Current Standard:	Concrete
Median pole age:	30 years
Population:	Concrete – 28,681 Hardwood – 4,386 Softwood – 4,576 Fibreglass – 11 Steel - 147

Pole Management Strategy

- Standardised poles
 - Definitive difference with regards to the existing pole types on the WE* network, depending on the geographic location.
 - WE* currently makes use of standardised poles for concrete, wood and composite applications.
- Deflection tests for wooden poles
 - 5 year cycle
- Visual inspections for concrete and composite poles
 - 5 year cycle
- Pole tagging
 - Red, Yellow, Non Regulatory Yellow and Blue
- Pole replacements
 - 3,500 per 5 year cycle
 - 1,000 (Red tags)
 - 2,500 (Yellow tags)
- Average expenditure of \$6 million p.a. on pole replacements.
- Replacement of cross arms and associated hardware done during pole replacements.



Improvements to Strategy

- Pole reinforcement is seen as a potential for cost savings whilst increasing the service life of poles.
 - Pole Reinforcement costs are advertised to be less than 20% of the cost of a pole replacement depending on site/ pole condition.
 - Reinforced poles are advertised to achieve a residual service life extension in excess of 20 years.
- WE* spends \$6 million a year on pole replacement.
 - Over \$4 million is spent on replacing yellow tag poles.
 - Potential to save if yellow tag poles could be reinforced instead of replaced.

Past Successes quoted



50 years in-service



49 years in-service



Entire section reinforced



**Capacity upgrades
ET truss**

Planning - 2016

- Extensive research done to identify potential suppliers.
- Evaluation of various products and methodologies.
- Identification of two possible suppliers:
 - Logsys from Western Australia
 - Proven concept
 - Longevity of Osmose product (1960's)
 - Large international footprint (AUS & USA)
 - IAMSLS from New Zealand
 - Proven concept
 - Local supplier (Wellington office)
 - Existing relationship to WE* (Design work)
 - Competitive PoleEnforcer product



First Trial – June 2017

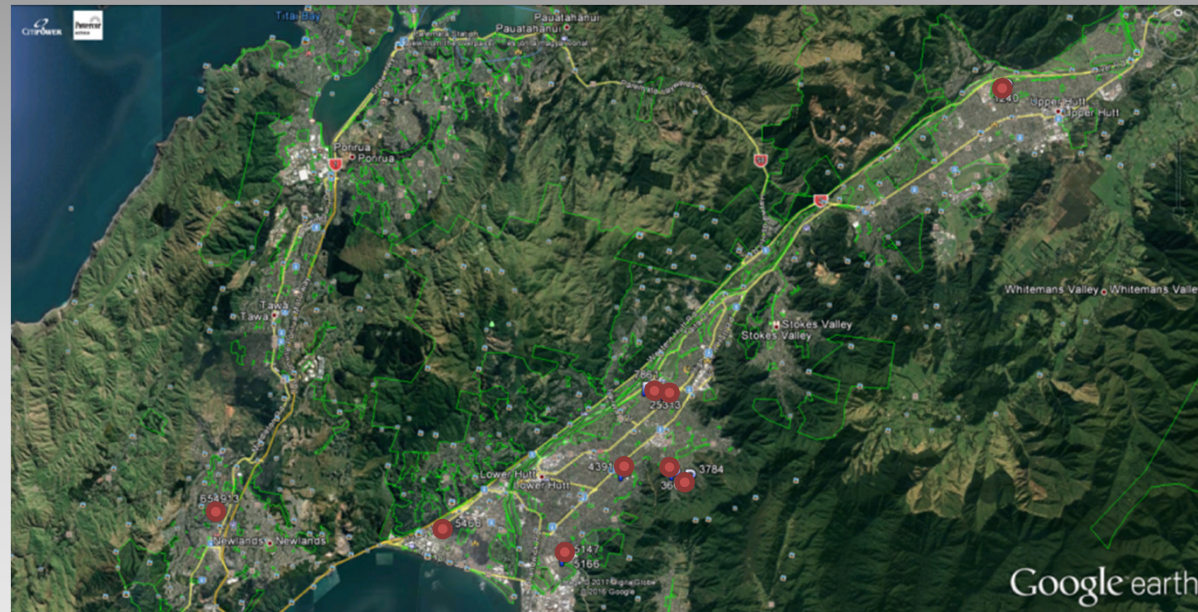
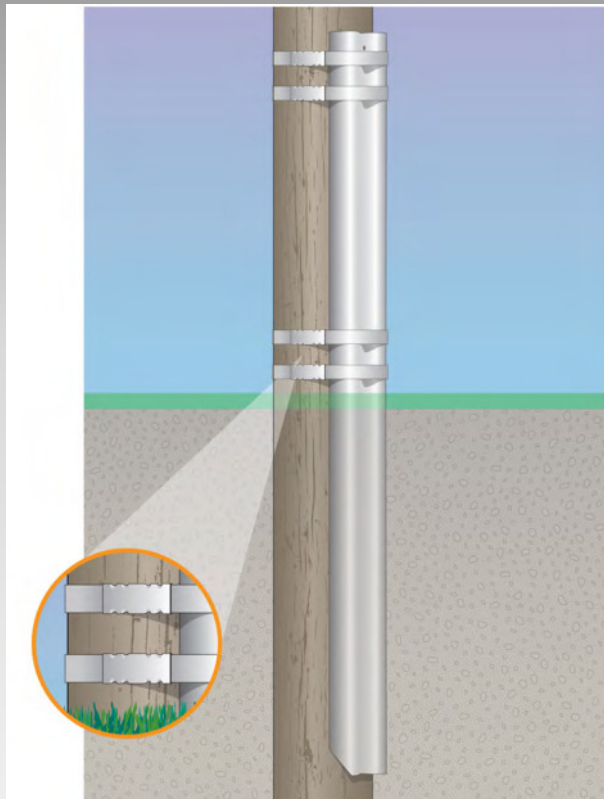
- Conducted training with Logsys and the 3 contracting companies that work for WE*
 - Connetics, Downer & North Power
- Engaged with Logsys to do WE*'s first trial.
 - Identified 9 poles to be reinforced (poles that had failed Deuar testing and had been yellow tagged).
 - Shipped Logsys tooling, crew and materials to Wellington.
 - Truck & trailer with all tooling required
 - Trusses & Banding
 - 2 x line crew members
 - 1 x Principle Structural Engineer
- Training successful
 - 20 contractor team members attended 3 day trial
 - Half a day classroom session done to cover concepts such as:
 - Risk & Hazard identification
 - Basics of pole structural design
 - Application & Installation of the product
 - Two and a half days spent with Logsys and contractor teams reinforcing poles on the WE* network.
 - Initial poles done by an experienced Logsys crew.
 - Thereafter contracting teams were allowed to apply the reinforcing under Logsys supervision.

Process flow followed

- Step 1 - Planning
 - Geospatially map poles
- Step 2 - Design
 - Create prelim designs
- Step 3 - Specify
 - Issue preliminary reinforcement designs
- Step 4 - Construct
 - Validate design data
 - Reinforcement installation
 - Capture records
- Step 5 - Re-test
 - Test poles using Deuar methods
- Step 6 - Evaluate
 - Identify if pole requires further strengthening, or if tags can be removed
 - Update database



Pole reinforcement trial 1



- HV & LV Angle with service
- HV & LV inline pole
- HV & LV inline pole with heavy service
- LV inline take of pole
- LV Termination
- 3 x LV angle poles
- LV inline pole
- 6 x Hardwood poles
- 3 x Softwood poles

Pictures of trial 1



[Demo](#)

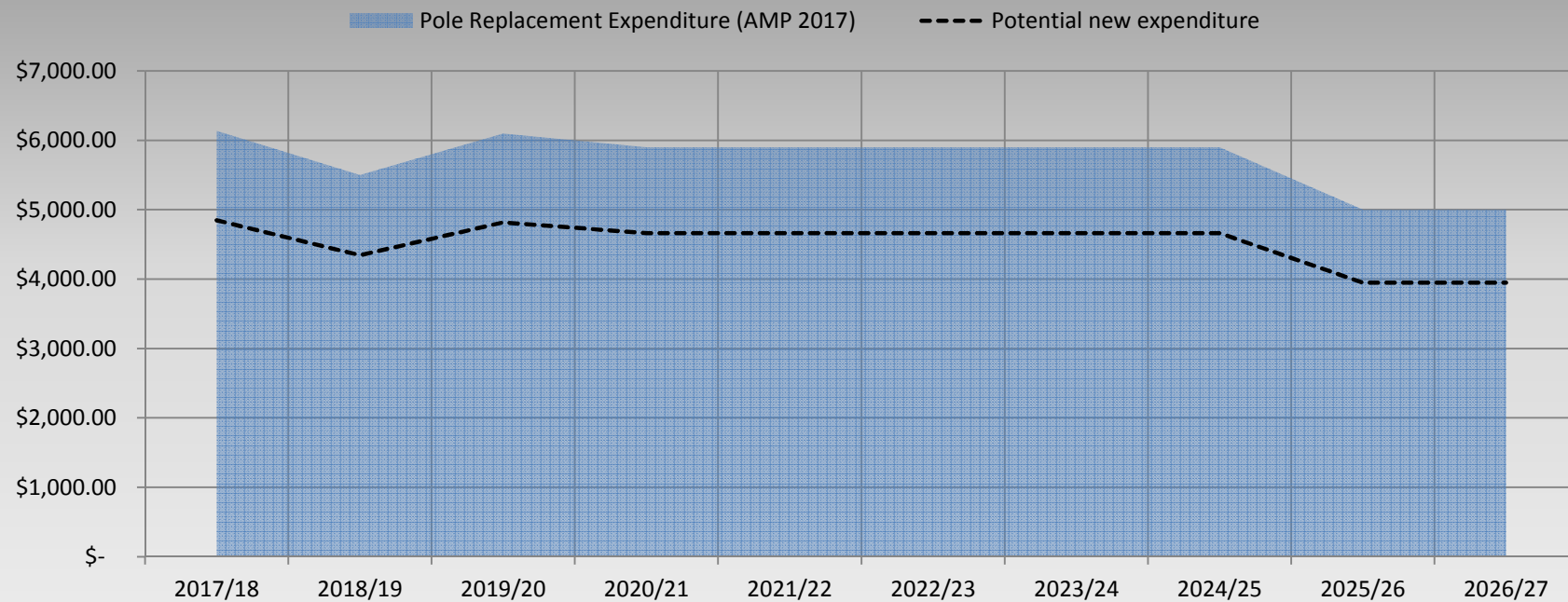
Results of reinforcement trial 1

- 9 poles reinforced by WE* in June 2017.
- All poles were Deuar tested after reinforcing was applied
 - 6 x hardwoods passed standard Deuar test
 - 3 x softwoods could not be Deuar deflection tested due to truss installations
- Yellow tags removed from hardwoods and poles labelled as “reinforced” on GIS and scheduled for Engineering Assessments at 6 monthly intervals.
- 6 x Yellow hardwood tag poles (Usually replace within 12 months)
 - Approximate costs of replacement for 6 x hardwoods = \$51,000
 - Cost of reinforcement (training, hiring of tools, labour, traffic management & materials) = \$21,500 (Cost reduction = 60%)
- 3 x Yellow softwood tag poles
 - Could not be accurately tested using Deuar deflection test
 - Logys models show 2 poles are “fit for purpose” while one pole is overloaded and requires upgrade or ET truss.

Important learnings from trial:

- **Not all yellow tags are likely candidates for pole reinforcement.**
 - Poles with defects on cross arms & hardware
 - Poles close to services
- **Require a new method to deflection test softwood poles post reinforcing.**
- **Poles should be modelled using accurate data before reinforcing.**

Potential for Savings



Estimate based on being able to reinforce half of the yellow tag pole population at a cost of \$3,500 per pole

Summary of WE* pole reinforcement

- How WE* has managed risks:
 - Extensive training and trials done with experienced engineers & line crews.
 - All installations for pole reinforcement applications are designed by experienced engineers.
 - Designs done using the principles of AS/NZS 7000, 2016 and consider wind pressures of 1,000 Pa to 1,200 Pa.
 - Site specifics taken into account at design stage and further evaluated during and after construction.
- Future work:
 - Correlate feedback from contracting teams on trial 1.
 - Conduct trial 2 with IAMSL.
 - Poles identified and planning has begun to undertake trial.
 - Identify a method to conduct Deuar deflection testing with reinforcement trusses in place.
 - Do further analysis to accurately determine number of poles that could be reinforced on WE* network.
 - Conduct Engineering Assessments of reinforced poles over 2018.
 - Conduct a detailed cost benefit analysis of pole reinforcement and its implications for WE*.
 - Evaluate results of above and make amendments to WE* Fleet Strategy for poles.

Questions?

Photo credit – Simon Woolf