New Model for Seismic Loads on Pole Mounted Assets

Or Straight as a pole… until the soil gets involved.

Dale Donovan | 20 May 2026

Using Soil-Structure Interaction Model for Pole Mounted Assets

Background

- Bess Pole Mounted Batteries
- Busck Poles
- Low Seismic Area (Tauranga) earthquake loads still governed design
- Designs unable to evalaute pole foundations

Getting Better at Pole Mounted Designs

Focused on Double Busck 11m with a 1000kg weight
Including foundation aids, i.e. Breast Blocks and Donuts on standard design

Structural

Using Soil Structure Interaction SSI Model for Pole Mounted Assets

- Soil flexibility increases periods dramatically, lower pole demands
- Accurate representation of performance, soil failure (rotation)

Geotechnical

SSI using p-y springs model

- Foundations controlled by soil behaviour and displacement limits
- Cohesive soils are suitable, Non-cohesive soils require restrictions or refinement

Conclusions

Structural - Crossline

Poles behave elastically under all assessed seismic loads - all North Island Z values

- In Cohesive Soils existing poles are able to resist the maximum expected seismic demands, Z=0.42
- In non-cohesive soils the poles are able to resist seismic loads up to Z of 0.19, may be able to increase to 0.26 (Wanganui and Christchurch)

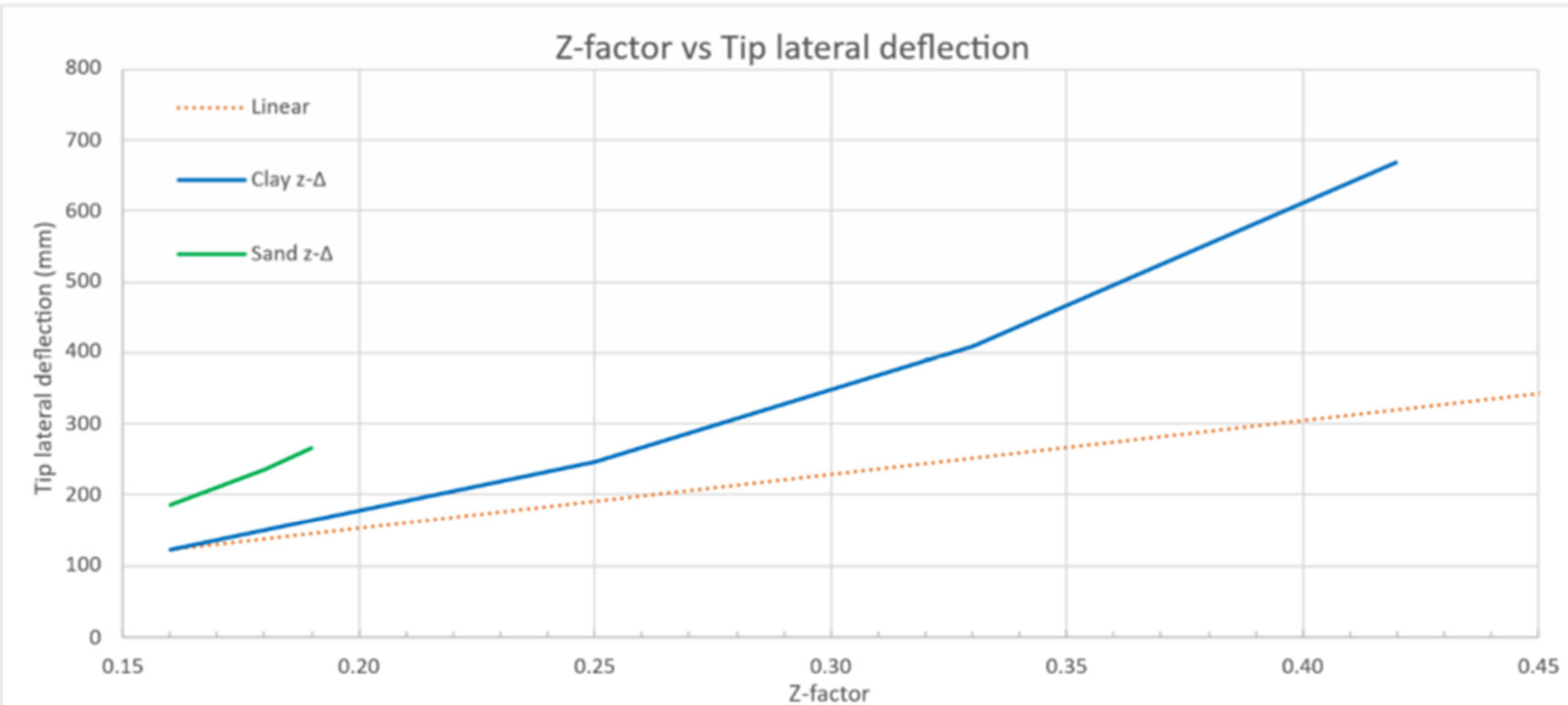


Figure 8 Z-Factor vs Tip Lateral Deflection

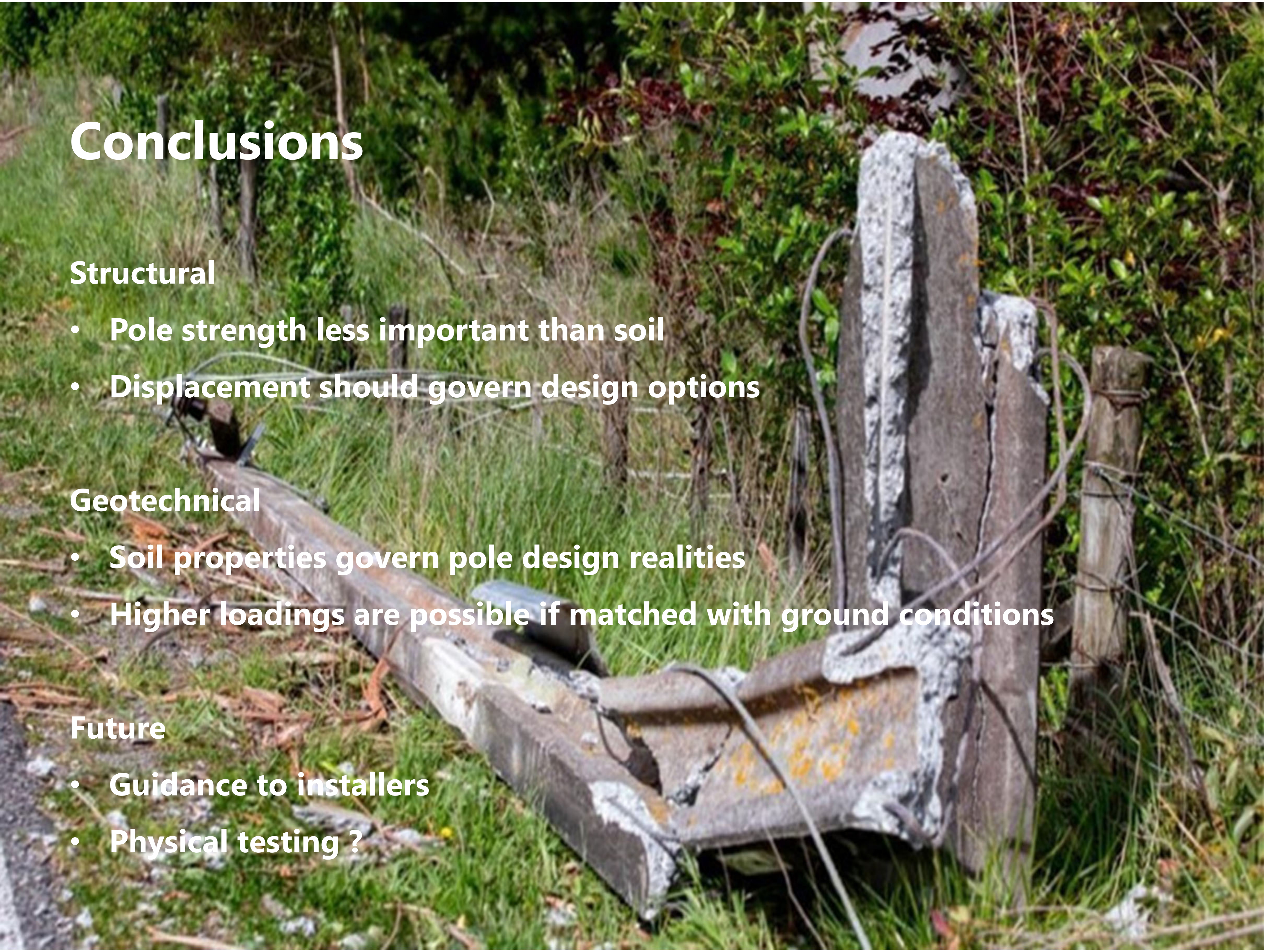
Geotechnical

Modelling using p-y springs

- Cohesive soils more ductile – larger displacements
- Non-cohesive soils more brittle – lower capacities

Addition to drawings for installer observations

Soil Type	Minimum Density/Consistency	Comments	Groundwater
Clay or SILT (fine grained soils)	Stiff Undrained Shear Strength=50kPa Cannot be indented by thumb pressure	Hole is self-supporting.	Below toe of pole
Sand or Gravel (coarse grained soils)	Medium Dense DCP>3blows/100mm Pile hole staying open – i.e. self-supporting once excavated.	If hole is collapsing or running sands present location is unlikely to be suitable.	Below toe of pole
Note – Where the pole installer is uncertain as to the suitability of the ground conditions, we recommend they notify Powerco, who in turn may seek advice from a geotechnical engineer (familiar with Powerco's designs, materials and equipment).			



Conclusions

Structural

- Pole strength less important than soil
- Displacement should govern design options

Geotechnical

- Soil properties govern pole design realities
- Higher loadings are possible if matched with ground conditions

Future

- Guidance to installers
- Physical testing ?

POWERco