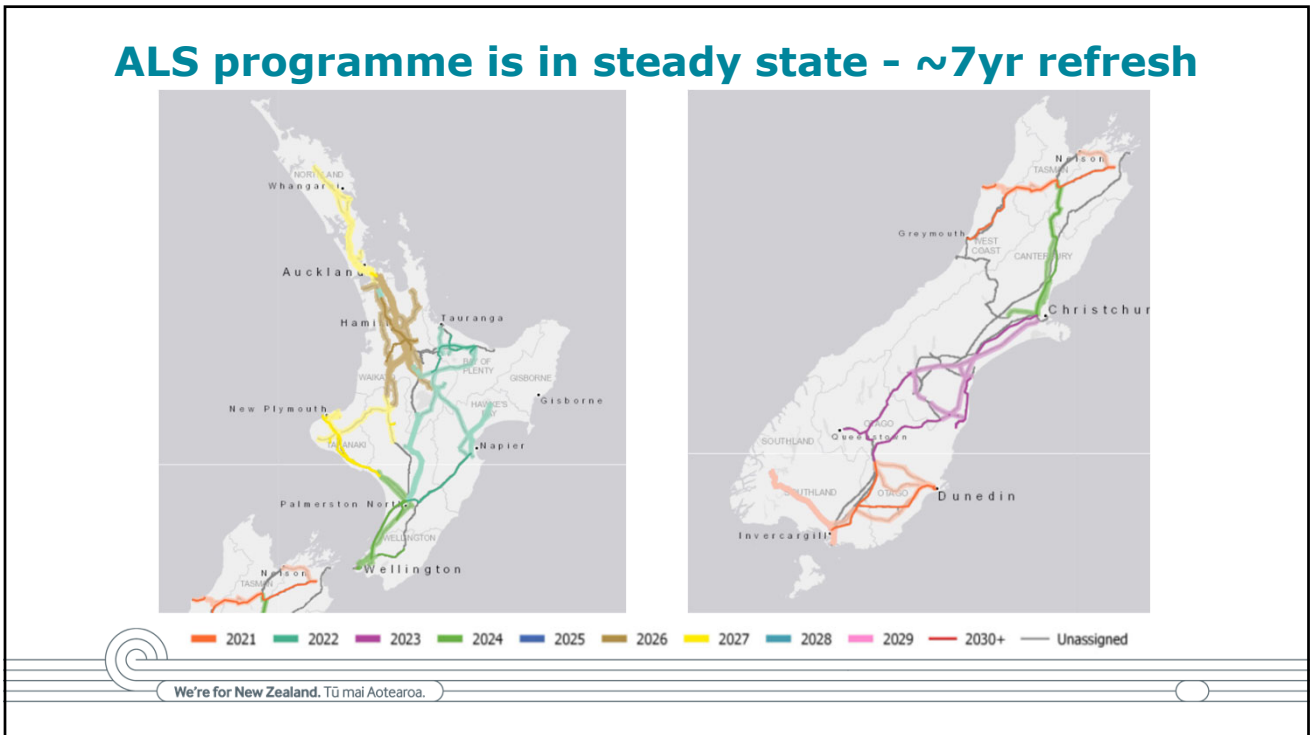


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## Aerial Laser Survey (ALS)

### 1. Survey



### 2. Data processing



### 3. Engineering modelling

Engineering tool

## Aerial Laser Survey (ALS)

### 1. Survey

- Airborne laser scan,
- Meteorological support for conductor temperature calculation

### 2. Data processing

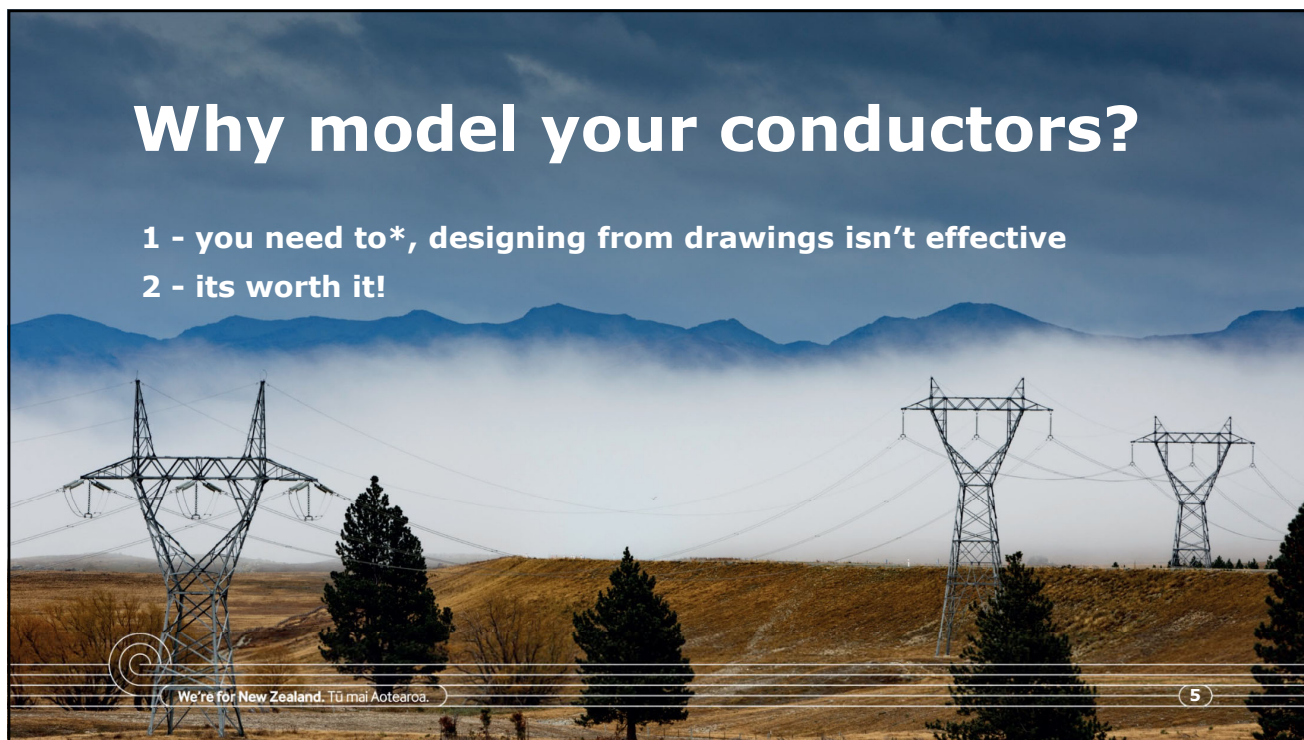
- Turning dots into data sets that are meaningful for you
- Imagery processing, ground truthed photos
- Wire temperature calculation for sagging

### 3. Engineering modelling

- TL engineering software such as PLS-CADD
- Conductor sagged accurately at the calculated survey temperature

# Why model your conductors?

- 1 - you need to\*, designing from drawings isn't effective
- 2 - its worth it!



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## Why? - Where is the value

**Knowledge of our asset behaviour is the basis of our decision making**

### 1. Risk – to understand it

- **Under Clearances** – we acknowledge and actively pursue them
- **Assurance** – our means of assuring electrical clearance

### 2. Unlock your potential

- **Uprating** - existing assets, unlock latent capacity
- **Connecting** - new Customers
- **Reconfiguring** – for enhancements or maintenance

### 3. Asset information

- **Information** - as important as specification and condition data
- **Decision making** - essential
- **Loading** - structures and foundations



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## Why? - Technical need

Higher Tension + Longer Spans = Much greater sag change with temperature

Cannot\* assess conductor at its surveyed position

Distribution networks will have assets that aren't as sensitive

### Sags matter, blowout matters

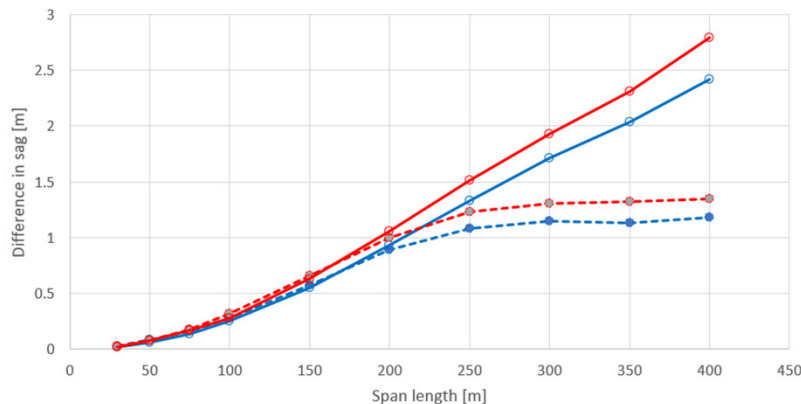
- Sag changes 6x – 10x more than the length change
  - Operational heating introduces slack
  - Thermal uprating introduces slack
  - Strain insulator set replacement introduces slack
- Conductor blow-out will result in potential clearance violations
  - If you don't measure it you won't know
  - Advice to 3<sup>rd</sup> party construction, urban development

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## Difference in sag, observed at 10°C vs rated 50°C Judge for yourself when modelling is needed

Sag change from 10°C to 50°C



—•— Dog @ 10% CBL    —○— Dog @ 20% CBL    - - -•- - Nobelium @ 10% CBL    - - -○- - Nobelium @ 20% CBL

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## How to succeed – getting the basics right

### How hot was that wire?

- **Wire temperature at survey** – you MUST\* establish it
  - Calculated (energy balance) –  $I^2R$  & solar **vs** convective cooling → solve for wire temperature
  - We require NIWA field support, and no we can't directly detect wire temperature, Planks Law
- **Perfect weather isn't perfect** – temperature calcs are less sensitive when convection is effective, try and have at least some breeze when you survey, you'll be less wrong.

### 'Who' matters

- **Engineering competence** – engineering models needs engineering competence
- International market isn't good due to compliance driven clients not valuing the engineering opportunity.
- We use Opten/PSC who have lines engineering and survey roots, collaborate to understand what you value as a business and are very cost effective

### Accuracy and quantity,

- **Absolute (less tight)** – "where is that dot in NZ exactly, I want to compare it to a third party design"?
- **Relative (tightest)** – within a span all my data needs to be consistent and accurate, conductor to building etc.

### Data for data's sake

- **Feature coding / data processing** – fit for **your** purpose,
  - how do you treat different obstacles?
  - your use of information will drive what information you needs



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## Pitfalls to be aware of

**Drones** are fine, they have their place, they are just one piece of the process:

- limited payload and in turn quality of equipment
- limited to line of sight and range, they'll have their place for some utilities

**Accuracy** – prove it.

- **Primary** data needs to be reliable.
- **Supplementary** data can be validated against primary

**Know what you need** so you or your management aren't woo'd.

- Test and validate propositions, we are an attractive target for vendors

**TP are here for NZ**, if you're interested get in touch we'll share ;our experience and knowledge

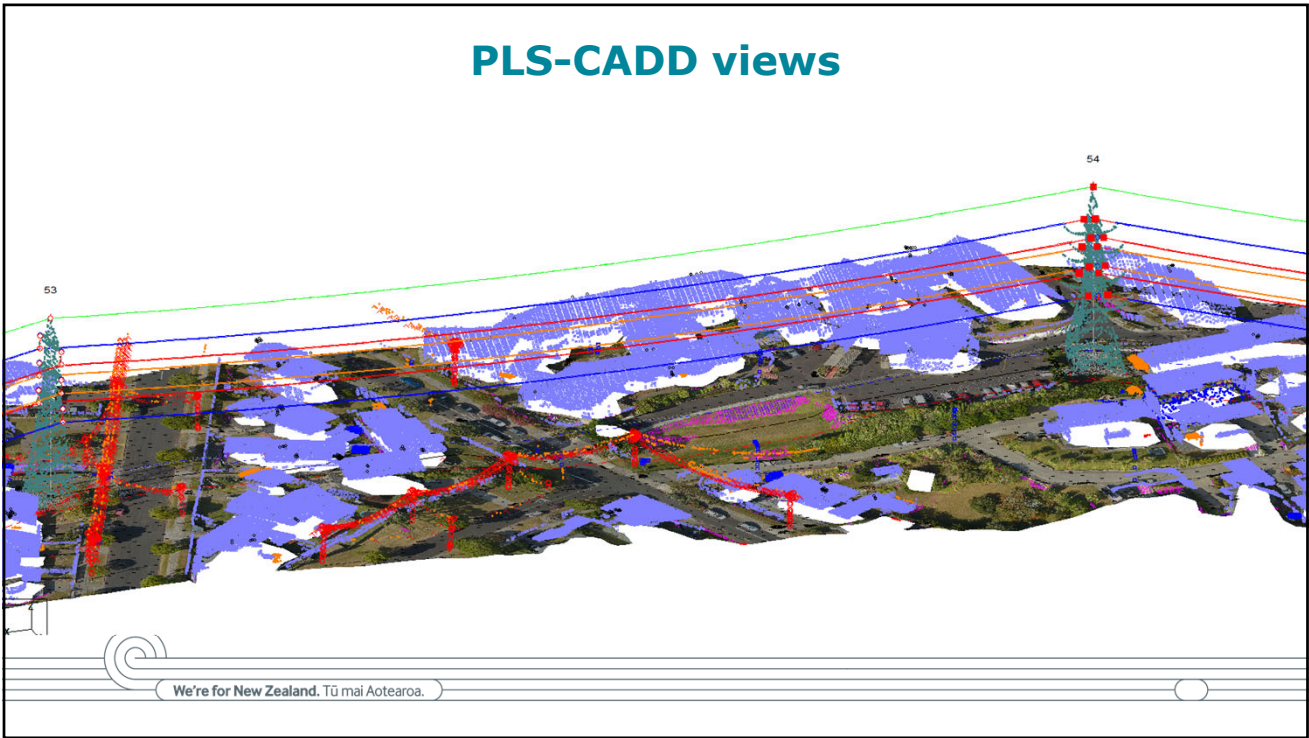
**Excess data**, survey density was satisfactory years ago, cull what you don't need (but don't throw it away)



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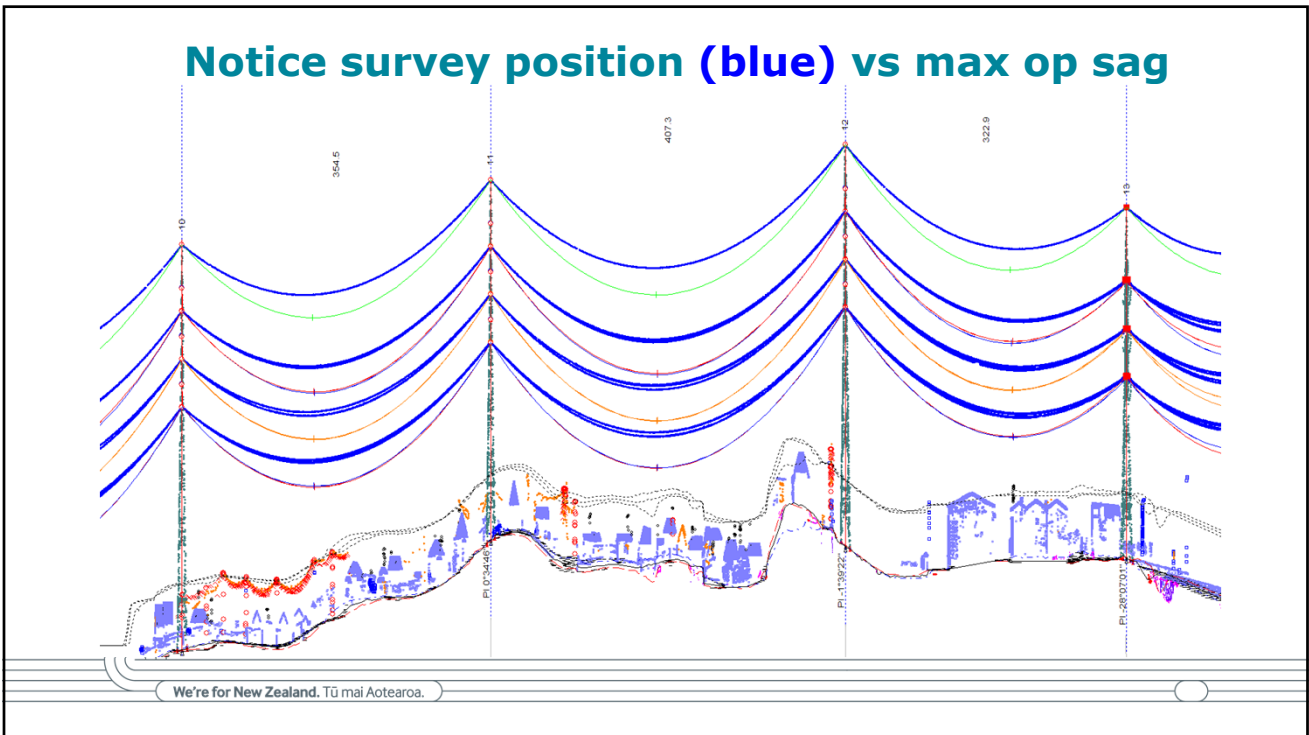
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### PLS-CADD views



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### Notice survey position (blue) vs max op sag



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