2013 Southern Apex Summit

BPE-HAY A&B Reconductoring – Data Gathering, Analysis and Management

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Presentation Overview

- Reconductoring of BPE-HAY A&B Lines
- Data Processing of Reconductoring Analysis
  - Conductor Selection
  - Potential Low Clearance Issue Evaluation
  - Automated Rectification Generation Spreadsheet
  - Loading Analysis Data Process
  - Summarising for Design Solution Selection

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BPE-HAY Line Background

Bunnythorpe to Haywards (BPE-HAY) A&B Transmission Lines

- Two Single Circuit 220kV Transmission Lines
- Both Lines Run Side By Side Entire Length
- A Line – 330 Structures
- B Line – 310 Structures
- First Commissioned in 1950
- Large Terrain Variability
- Existing Conductor Goat ACSR/GZ

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Conductor Selection

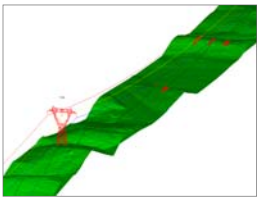
Conductor Options Considered

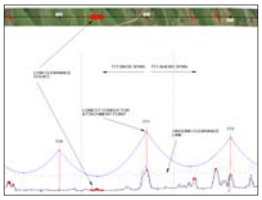
- Goat ACSR/AC – 80°C
- Zebra ACSR/AC – 65°C / 75°C / 80°C / 85°C / 90°C
- Sulfur AAAC/1120 – 55°C / 60°C / 65°C / 90°C

Increasing the maximum operating temperature of a conductor increases its capacity. However higher temperature also means more thermal expansion of the conductor which leads to a greater conductor sag and lower ground clearance.

Low Clearance Issue Evaluation

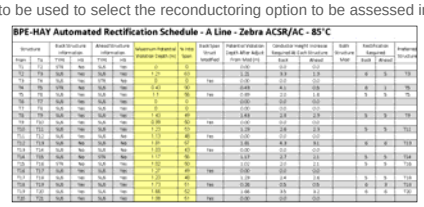
- All lines modelled through 3D modelling software PLS-CADD
- Uses Arial Laser Survey (ALS) to produce ground profiles and obstacle modelling
- Used to check for potential low clearance issues for each reconductoring option
- Large proportion of spans identified as having potential low clearance issues.



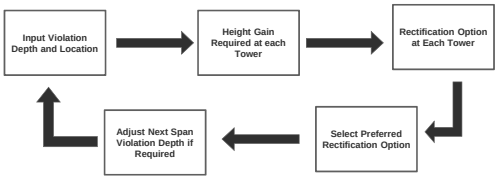


Development of Automated S/S

- Zebra 75°C – Medium Sag Option ~ 300 of 640 Spans have low clearance issues.
- 10 Reconductoring options = **~ 3000** low clearance issues to rectify?!
- Spreadsheet developed to automate rectification process
- Not as accurate as manual process but allows for a quicker and direct comparison of the magnitude of work required between the reconductoring options.
- Able to be used to select the reconductoring option to be assessed in more detail.


BPE-HAY Automated Rectification Schedule - A Line - Zebra ACSR/AC - 85°C

Processes of Automated S/Sheet



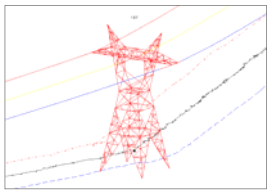
Output Processing / Verification

- Spreadsheet tested and optimised through comparison of automated and manual analysis.
- Spreadsheet developed through iterative upgrade process.
- Tested for various scenario's to remove flaws.
- Optimised to get as close to manual analysis as possible.
- Outputs summarised into volume of work required.


BPE-HAY A Line - SSR Rectification Schedule

Loading Analysis

- PLS TOWER models developed and used to produce tower and foundation loadings.
- Outputs used to assess structural and foundation strengthening requirements
- Loading assessment is conductor specific. Maximum operating temperature does not affect loads.
- Rectifications applied affect tower loading



Structure Loading - Analysis

- Towers built in 1950. Towers designed to different standards than used today. Assessed to todays standards.
- Reconductoring options using larger than existing conductor – higher loads.
- Developed techniques to process TOWER outputs to approximate strengthening requirements.
- Strengthening summarised in terms of kg of new steel required.

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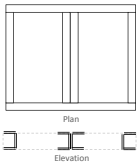
Geotechnical Analysis

- Both line almost completely grillage foundations.
- Geotechnical assessment carried out and foundation capacity determined.
- Developed spreadsheet to assess foundation load against capacity using inputs directly from PLS-CADD.
- Identifies quantity of foundations requiring strengthening. Does not assess strengthening requirements.



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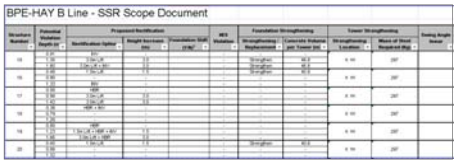
Summarising for Final Solution

- Outputs all collated and summarised at high levels to allow for quick comparisons of quantum of works required.
- 'Scope Document' produced to summarise all information in the one location
- Enabled for direct comparisons and evaluation of the different options to best allow the selection of the preferred reconductoring option.


BPE-HAY B Line - SSR Scope Document

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Questions

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