

Vegetation Encroachment Analysis

Through digital engineering, Abley have developed advanced geospatial processes to analyse and report on Growth Limit Zone (GLZ) and tree fall risk.

Analysing Point Clouds, GIS and AMS data, our team have created processes that classify and analyse data that increase accuracy, remove reliance on ground observation and mediate risk factors for GLZ and tree fall.

Abley were commissioned by Transpower New Zealand Limited (TPNZL) to use these processes to analyse vegetation encroachment on their transmission lines. Vegetation encroachment poses a serious risk to the integrity of Transpower's network, and as such, understanding the risks and associated cost implications of a potential failure is a priority.

To better understand the relative risk of a fault caused by vegetation encroachment under various weather and conductor load scenarios, Transpower supplied DXF files containing exports from PLS-CADD; their pylon/conductor modelling and simulation package.

Encroachment Analysis

Our approach to modelling the conductor/vegetation encroachment is built on the following principles:

- **Transparency:** The outputs should be easily understood and interpreted by non-technical personnel.
- **Scalable:** The analysis should scale to very large data sets to cater for analysis over the entirety of a network.
- **Repeatable:** Results should be replicable and robust, using consistent and clear processes future application.
- **Performance:** Computational intensity should be minimised by using sequential granularity for analysis
- **Applicable:** Analysis should cater for variations in network regulations regarding voltage without manual intervention.

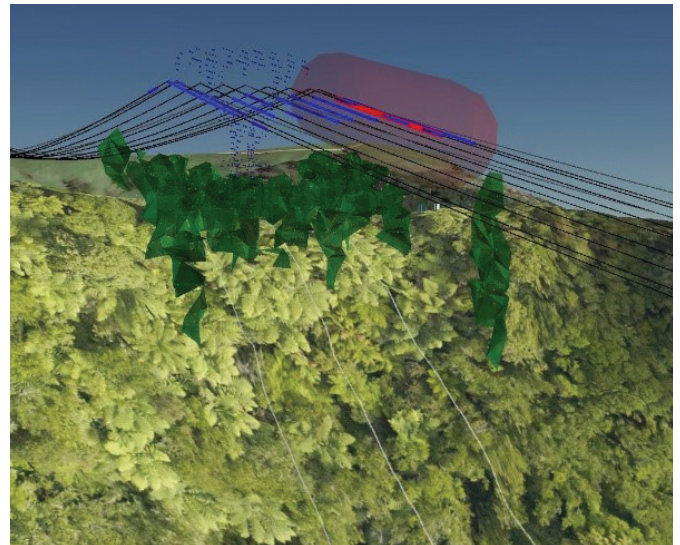


Figure 1: Buffered conductors showing encroachment

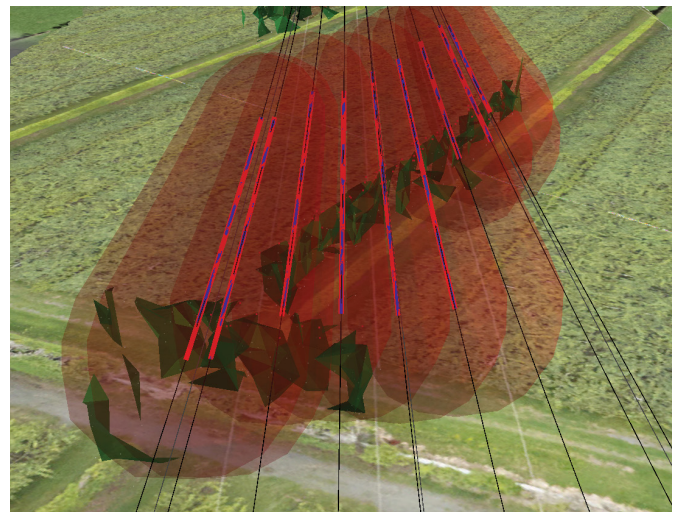


Figure 2: Accurate analysis showing encroachment

Tree Fall Analysis

Although not covered by legislation, identifying tree fall is an activity that can prevent outages during storms, but it is difficult with ground observation. Abley's tree fall analysis uses machine learning to identify individual trees, their heights, and their potential fall risk with regard to the transmission lines.



Figure 3: Identification of tree crown

Visualisation

Based in GIS, the results of the process can easily be visualised in 2D and 3D maps and made available for desktop and mobile devices. This ensures easy access for network managers and ground crews. Including property owner details and being able to provide specific locations of encroachment or treefall increases the efficiency of vegetation management.

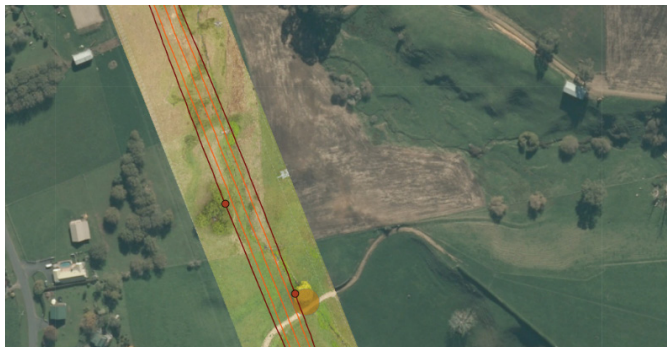


Figure 4: Visualisation of encroachment in 2D map

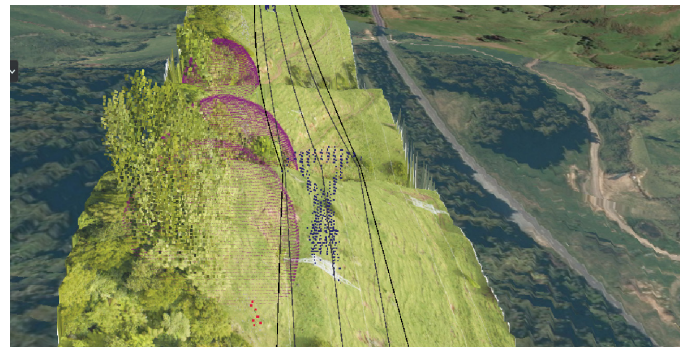


Figure 5: Analysis of tree fall arc in 3D map

Additional information in the 2D and 3D maps includes the criticality values of assets for public safety, workplace, environmental, direct cost, and total criticality. Property information has also been used to provide landowner information.

Dashboard

A data dashboard has been created to allow quick analysis of the encroachment and risk criticality.

Depending on the selected map extent, values of the associated elements dynamically update with data such as:

- Total number of conflict centre points
- Bar graph of conflict points per span number
- Count of tree fall features
- Span with highest criticality and conflict points

This dashboard is a simple way to process information and focus on key areas of risk.

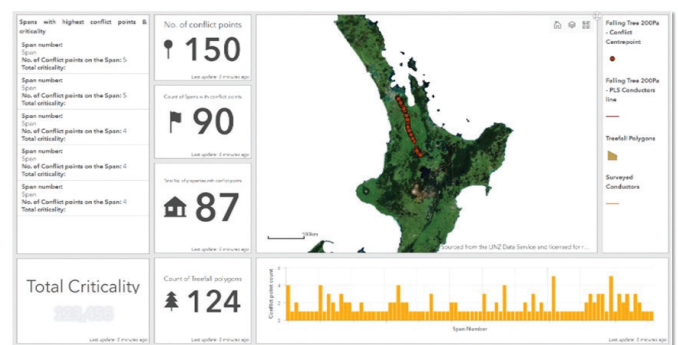


Figure 6: Rapid analysis through data dashboard



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