

Tree Strike Risk Calculation for

Bucks Creek 1101

- *Count Trees within 6 ft of Conductor*
- *Calculate Tree Strike Residual Risk for*
 - Non-Hardened Circuits*
 - Circuits generically hardened with 1/0 ACSR XLPE*
 - Circuits generically hardened with 397.5 AAC XLPE*



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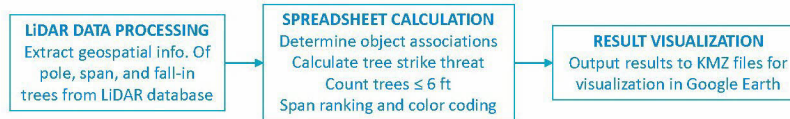
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CALCULATION WORKFLOW

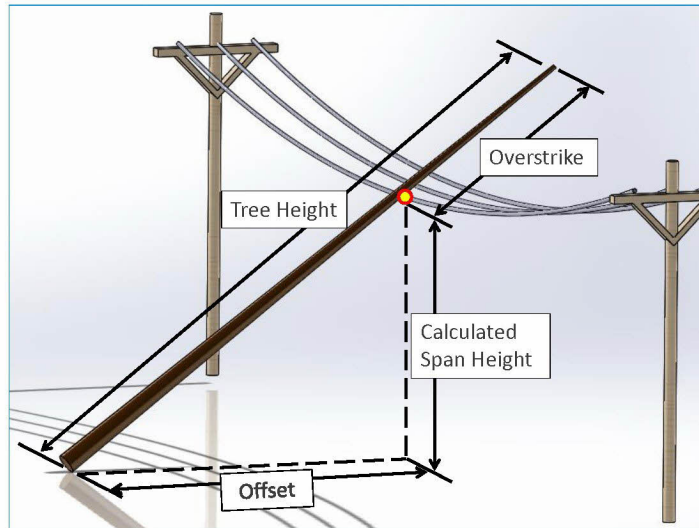
- LiDAR data processing
 - Extract pole, span, and fall-in tree geospatial information from LiDAR database
- Import processed data into Excel spreadsheet
 - Determine Tree–Span–Pole associations based on the LiDAR geospatial info
 - **Tree strike threat:** Calculate number of fall-in trees in each span that can touch the line
 - **Trees within 6 ft:** Calculate number of fall-in trees in each span that are within 6 ft from the line
 - Rank and color code the spans in each category based on the number of trees in each span
- Output results to Google Earth for visualization
 - For each circuit, span, pole, and tree results are output to separate KMZ files such that they are shown as different layers in Google Earth





Assumptions for Non-Hardened System

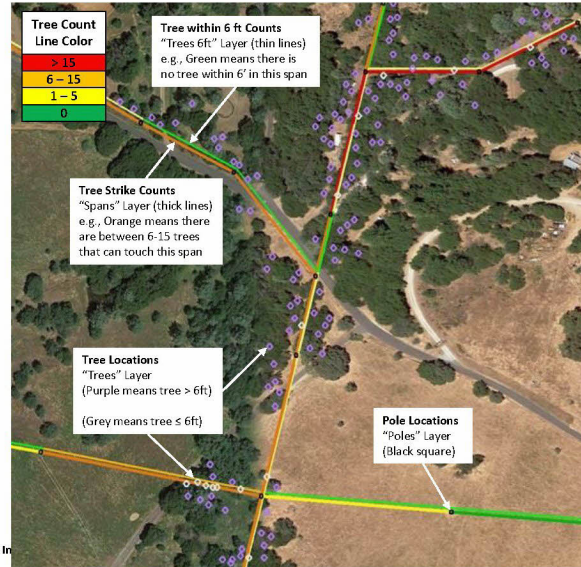
- Tree-Span relationship is tagged in LiDAR (see figure)
- All fall-in trees have potential to strike the span regardless of wind speed and wind direction
- Tree strike failure is counted as true when a tree is tagged as fall-in with non-zero Overstrike
- Spans are ranked based on the number of fall-in trees in each span





Definition of KMZ Layer Symbols and Line Colors

- Tree strike threat color coding
 - Thick red lines: Spans that have more than 15 fall-in trees that can touch the line
 - Thick orange lines: Spans that have 6 to 15 fall-in trees that can touch the line
 - Thick yellow lines: Spans that have 1 to 5 fall-in trees that can touch the line
 - Thick green lines: Spans that have zero fall-in tree that can touch the line
- Tree distance color coding
 - Thin red lines: Spans that have more than 15 fall-in trees within 6 ft of the line
 - Thin orange lines: Spans that have 6 to 15 fall-in trees within 6 ft of the line
 - Thin yellow lines: Spans that have 1 to 5 fall-in trees within 6 ft of the line
 - Thin green lines: Spans that have zero 15 fall-in tree within 6 ft of the line





RESULTS – Bucks Creek 1101

- Tree strike threat calculation
 - Tree counts that can touch the non-hardened line
 - Tree counts that can break a hardened line
- Residual risk calculation

$$= \frac{\text{No. of Spans in Threat Level}}{\text{Total Spans}} \times \text{Weight Factor}$$

Bucks Creek 1101 (Non-hardened)

Threat Level	Trees Touching Non-Hardened (No. of spans)	Linear Span Length (miles)	Tree Strike Residual Risk	
			Weight Factor	Non-Hardened
High (15+ trees)	13	0.74	1	0.078
Medium (5-15 trees)	51	2.35	0.75	0.229
Low (1-5 trees)	60	2.36	0.50	0.180
None	43	1.78	0	0.000
Total:	167	7.23		0.487

Bucks Creek 1101 (Hardened w/ 1/0 ACSR XLPE)

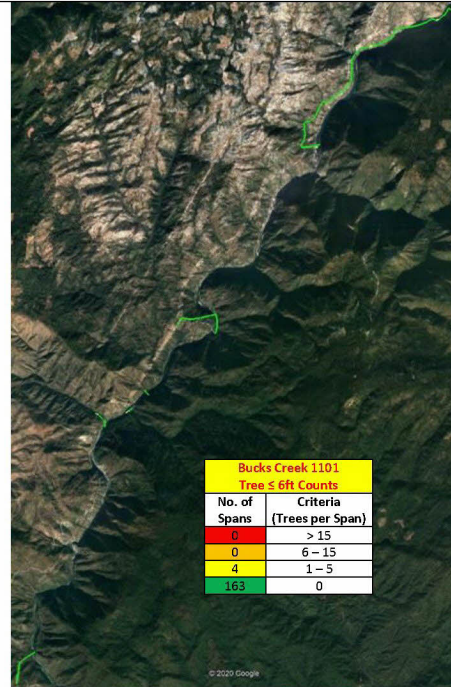
Threat Level	Trees Breaking Hardened (No. of spans)	Linear Span Length (miles)	Tree Strike Residual Risk	
			Weight Factor	Non-Hardened
High (15+ trees)	1	0.04	1	0.006
Medium (5-15 trees)	27	1.22	0.75	0.121
Low (1-5 trees)	65	2.84	0.5	0.195
None	74	3.13	0	0.000
Total:	167	7.23		0.322

Bucks Creek 1101 (Hardened w/ 397.5 AAC XLPE)

Threat Level	Trees Breaking Hardened (No. of spans)	Linear Span Length (miles)	Tree Strike Residual Risk	
			Weight Factor	Non-Hardened
High (15+ trees)	0	0.00	1	0.000
Medium (5-15 trees)	18	0.84	0.75	0.081
Low (1-5 trees)	69	3.00	0.5	0.207
None	80	3.38	0	0.000
Total:	167	7.23		0.287

Bucks Creek 1101

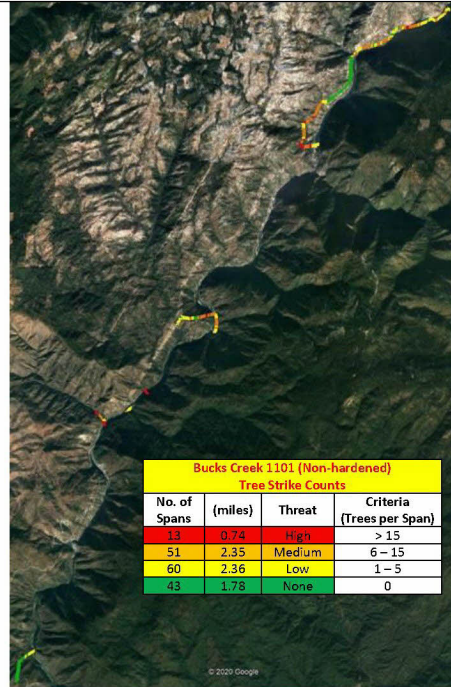
- * - Trees 6ft.kmz
- Trees that are within 6 ft of line
 - 0 span have more than 15 trees in each span that are within 6 ft
 - 0 span have 6 to 15 trees in each span that are within 6 ft
 - 4 spans have 1 to 5 trees in each span that are within 6 ft
 - 163 spans have zero tree in each span that are within 6 ft





Bucks Creek 1101

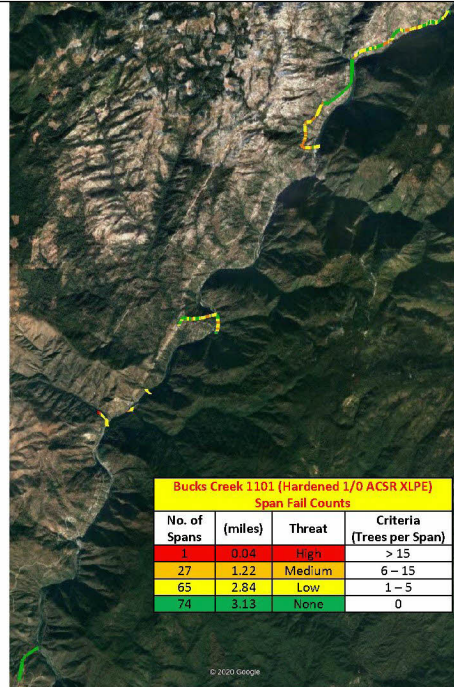
- * - Spans.kmz
- Based on 2019 LiDAR
- Trees that can touch the line
 - 13 spans have more than 15 trees in each span that can strike
 - 51 spans have 6 to 15 trees in each span that can strike
 - 60 spans have 1 to 5 trees in each span that can strike
 - 43 spans have zero tree in each span that can strike





Bucks Creek 1101

- * - Spans.kmz
- Based on 2019 LiDAR
- Trees that can break 1/0 ACSR XLPE
 - 1 span have more than 15 trees in each span that can break the span
 - 27 spans have 6 to 15 trees in each span that can break the span
 - 65 spans have 1 to 5 trees in each span that can break the span
 - 74 spans have zero tree in each span that can break the span





Bucks Creek 1101

- * - Spans.kmz
- Based on 2019 LiDAR
- Trees that can break 397.5 AAC XLPE
 - 0 spans have more than 15 trees in each span that can break the span
 - 18 spans have 6 to 15 trees in each span that can break the span
 - 69 spans have 1 to 5 trees in each span that can break the span
 - 80 spans have zero tree in each span that can break the span

