Attachments (exhibits) to Letter/report 18024-40022, 10/08/2018

PROJECT NAME:
Humboldt Bay Trail South - Limited Visual Tree Risk Assessment

PROJECT NUMBER:
715036

35570 Palomares Rd.
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✦ Locations of example trees:

✦ ✦ ✦

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✦ Inventory, data & evaluations of example trees:

No.	Common name	Genus-species	Trunk diameter(s)					Risk rating[1] (Tree Part 1)	Residual risk[1] (Tree Part 2)	Observations/Comments	Graph no.	Micro-resistance graph notes
			1	2	3	4	5					
1	Bluegum	*Eucalyptus globulus*	21					Low	N/A	Decayed pruning wounds on trunk (tension) & base (8-12" diameter) <5% canopy Trunk curvature & lean to east Major decay column at 11" depth	9	E-W (48" hgt.) decay column @ 11"… (w/anomalies)
2	Bluegum	*Eucalyptus globulus*	26	21				Low	Low	2 codominant stems @ 3' above grade 3 large wounds from stem removals (8-12" diameter) Large wounds on upper trunk (tension side) Lean to west Large dead branches at top <2% canopy	N/A	
3	Bluegum	*Eucalyptus globulus*	22	19	13			Low	Moderate	Substantially dead 3 codominant stems Large, dead limbs to west Decay at topping cut <2% canopy Excess soil over root flare	8	NE=SW (24" hgt.) sound (minor anomalies)
4	Bluegum	*Eucalyptus globulus*	42					Moderate	Low	2 codominant stems Decay column to west Lean to west ~20% canopy	N/A	
5	Bluegum	*Eucalyptus globulus*	25	20				Moderate	Moderate	Substantially dead Codominant stems w/weak attachments <2% canopy Decaying wounds Decay column north side, lower west stem Lean to west	6 & 7	6, East trunk: E-W (36" hgt.); decay @ 4.75-7" & 9-14" 7, West trunk: (N-S) (48" hgt.); decay @ 2-3.5" & 15"…

[1] The tree risk rating terms are as used in the example tree risk rating matrices included in the following pages. The definitions are taken directly from the publication Dunster, Julian A., 2017, *ISA Tree Risk Assessment Manual (Second Edition)*, International Society of Arboriculture (TRAQ program study manual). The contract mandated reference (ANSI A300 Part 9) cites use of a rating system, but does not define a specific system. The Tree Risk Assessment matrices system employed in this report is also described in the companion publication International Society of Arboriculture, 2011, *Best Management Practices, Tree Risk Assessment,* International Society of Arboriculture.

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No.	Common name	Genus-species	Trunk diameter(s)					Risk rating[1] (Tree Part 1)	Residual risk[1] (Tree Part 2)	Observations/Comments	Graph no.	Micro-resistance graph notes
			1	2	3	4	5					
6	Bluegum	*Eucalyptus globulus*	25					High	N/A	Substantially dead <2% canopy Leans to east Codominant tops Decaying wound (15" diameter to east) Decaying wound (17" diameter to north) Interior decay column @ ~9" depth	4 & 5	4: N-S (48" hgt.) decay @ 8.5"... 5: E-W (48" hgt.) decay @ 8.5"-19"
7	Bluegum	*Eucalyptus globulus*	39					Moderate	Moderate	5 large dead limbs to west 3 codominant stems w/weak attachments ~10% canopy	N/A	
8	Bluegum	*Eucalyptus globulus*	22	14				Low	High	Substantially dead <1% canopy Codominant stems Large, decaying wounds from stem removals	N/A	
9	Bluegum	*Eucalyptus globulus*	36					High	N/A	3 codominant stems with weak attachments 3 large wounds at base (stem removals) Lean to east Torsional stress and response growth <10% canopy	2 & 3	2: E-W (36" hgt.) decay @ 7.5"… 3: NE-SW (24" hgt.) decay @ 16.5"…
10	Bluegum	*Eucalyptus globulus*	27	24	20	20	11	Moderate	High	5 codominant stems w/weak attachments Large dead branches to west Excess soil over root flare Large wounds from stem removals to east Decaying stub on trunk to east <5% canopy	1	E-W (60" hgt.) decay @ 5.5"-9.5"; 11"-14"; 17.5"=19"

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✦ Tree Risk Assessment ratings definitions:

The contract-mandated reference (ANSI A300 Part 9) cites use of a rating system, but does not define a specific system. The tree risk rating terms listed and defined below are as used in the example tree risk rating matrices included in the following pages. The definitions are taken directly from the publication Dunster, Julian A., 2017, *ISA Tree Risk Assessment Manual (Second Edition)*, International Society of Arboriculture (TRAQ program study manual). Tree Risk Assessment matrices system employed in this report is also described in the companion publication International Society of Arboriculture, 2011, *Best Management Practices, Tree Risk Assessment,* International Society of Arboriculture.

5)

1) Likelihood of Failure	
Imminent	Failure has started or likely to occur in the near future even in the absence of severe weather or increased loads.
Probable	Failure may be expected under normal weather conditions.
Possible	Failure is expected during extreme weather conditions but is unlikely during normal weather conditions.
Improbable	Not likely to fail during normal weather conditions and may not fail under extreme weather conditions.

2) Likelihood of Impacting Target	
High	The failed part will likely impact the target.
Medium	The failed part could impact the target but is not expected to.
Low	There is a slight chance the failed part will impact the target.
Very Low	The chance of impacting a specified target is remote.

3) Likelihood of Failure and Impact	
Extreme	Immediate risk - failure is imminent with a high likelihood of impacting the target, and the Consequences of the impact are severe.
High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.
Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.
Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.

4) Consequences of Failure	
Severe	Target impact would likely result in serious personal injury or death, damage to high-value property, serious disruption of critical services or activities.
Significant	Target impact would result in substantial personal injury, moderate-to-high value property damage, or significant disruption of critical services or activities.
Minor	Target impact would result in minor personal injury, low-to-moderate property damage, or minor disruption of critical services or activities.
Negligible	Target impact would not result in personal injury, might involve low-value property damage, or repairable disruption of services or activities.

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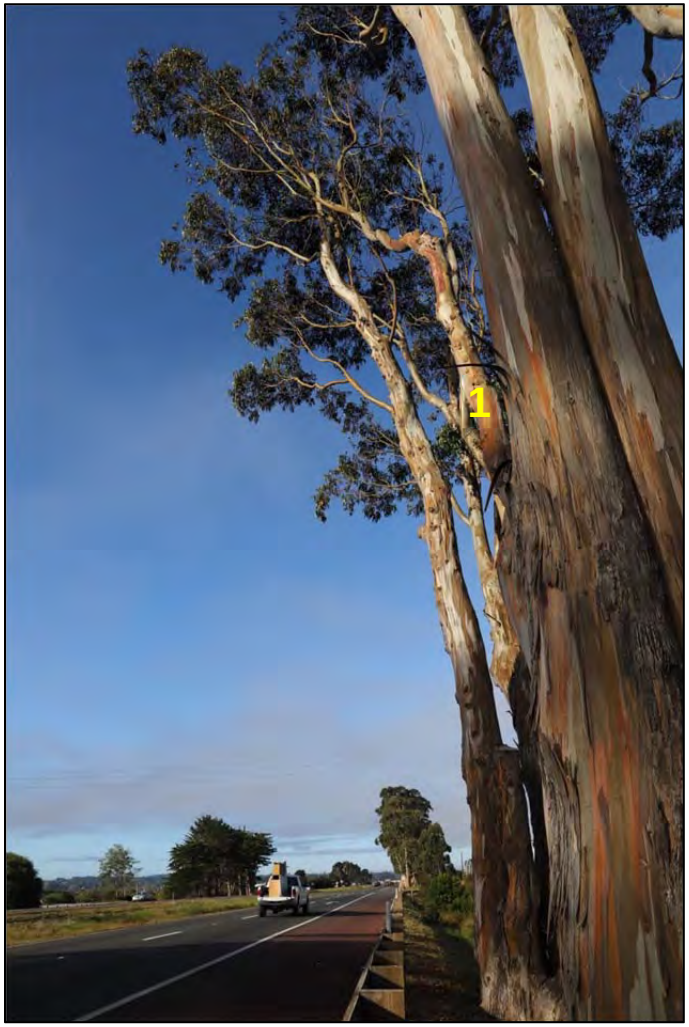
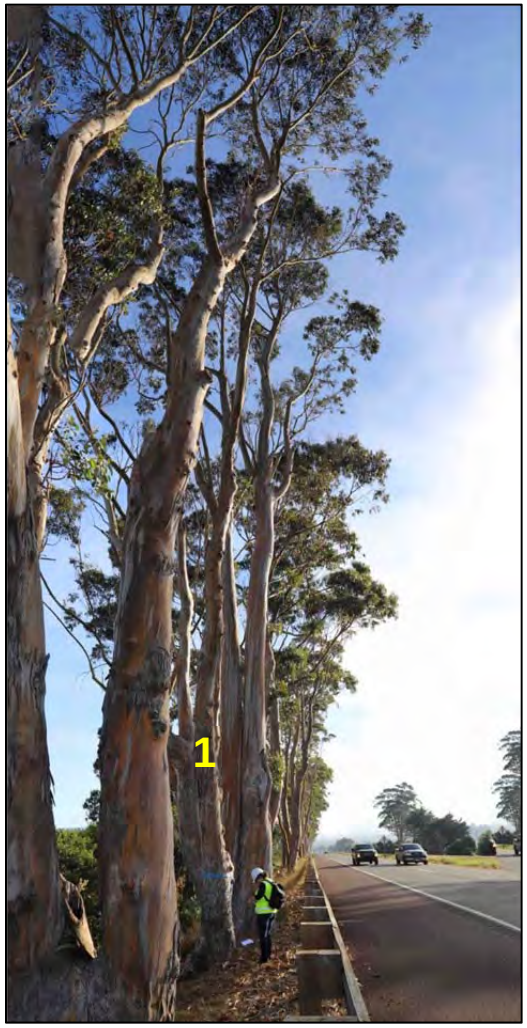
✦ Tree no. 1:





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✦ Tree no. 1 (continued):

Decaying areas at pruning cuts and trunk wounds. Below is a decayed wound on the tension side of the trunk that leans over the highway. Also illustrated are branch dieback and the very small volume of live foliage.

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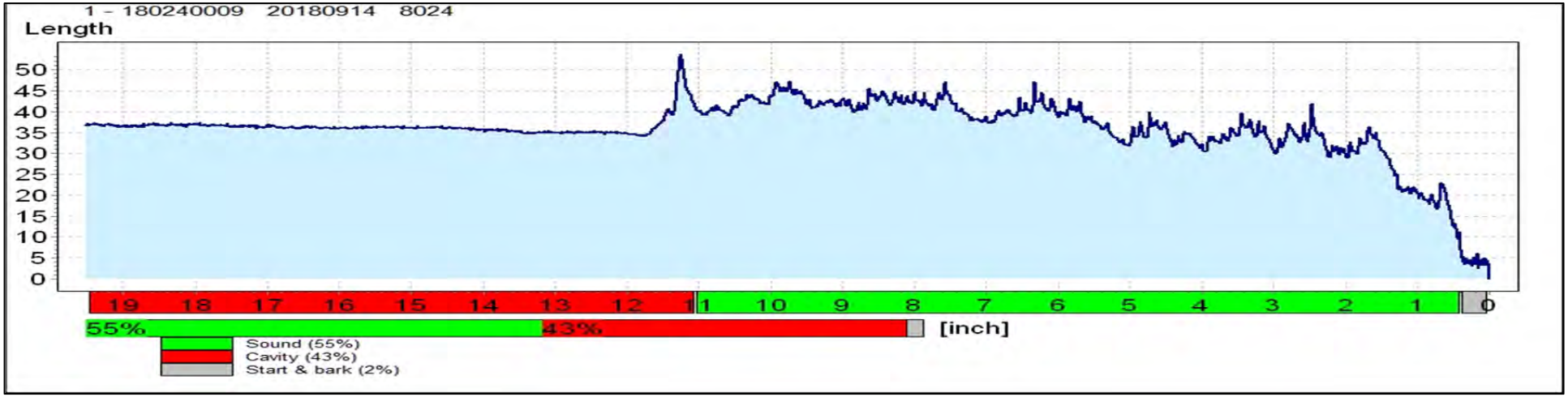
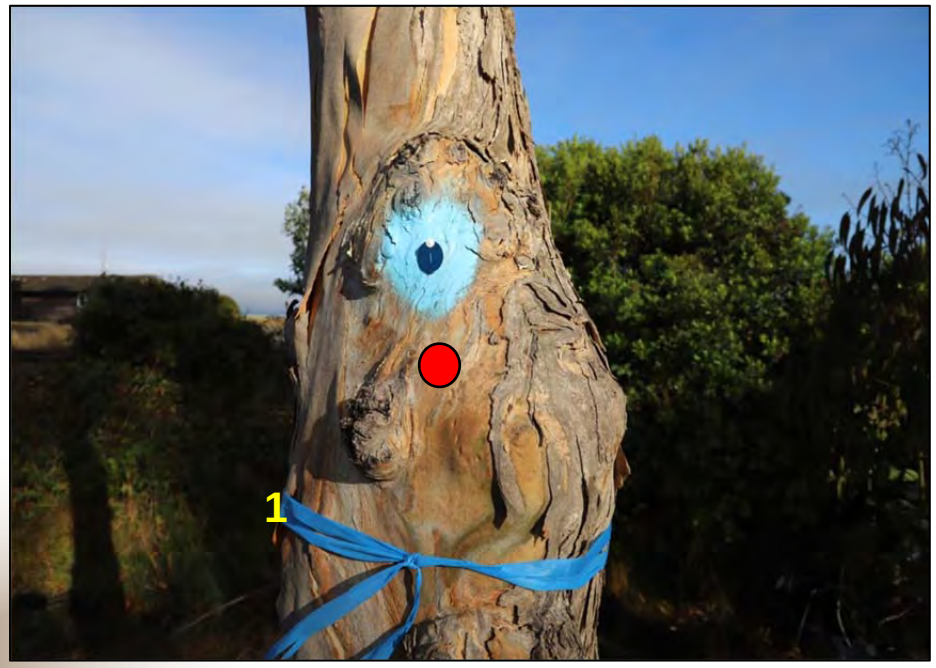
✦ Tree no. 1 (continued):



The graph of this tree's trunk indicates a major column of decay beginning at eleven inches. The preceding irregularities suggest wood degradation and pockets of decay. The red spot and arrow indicate the testing location.



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✦ Tree no. 1 (continued):

Tree Risk Assessment Matrices

Tree no.:	**1**					**Tree no.:**	**1**			
Assessment date:	9/14/2018					**Assessment date:**	9/14/2018			
Part 1:	Top (@ decayed topping cut)					**Part 2:**	N/A			
Target:	Passing vehicles/bicycles on Highway 101 (east)					**Target:**	N/A			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.				**Risk rating:**	N/A			
Mitigation recommended:	Remove tree to grade					**Mitigation recommended:**	N/A			
Residual risk:	N/A					**Residual risk:**	N/A	Negligible		
Tree Part 1						**Tree Part 2**				

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

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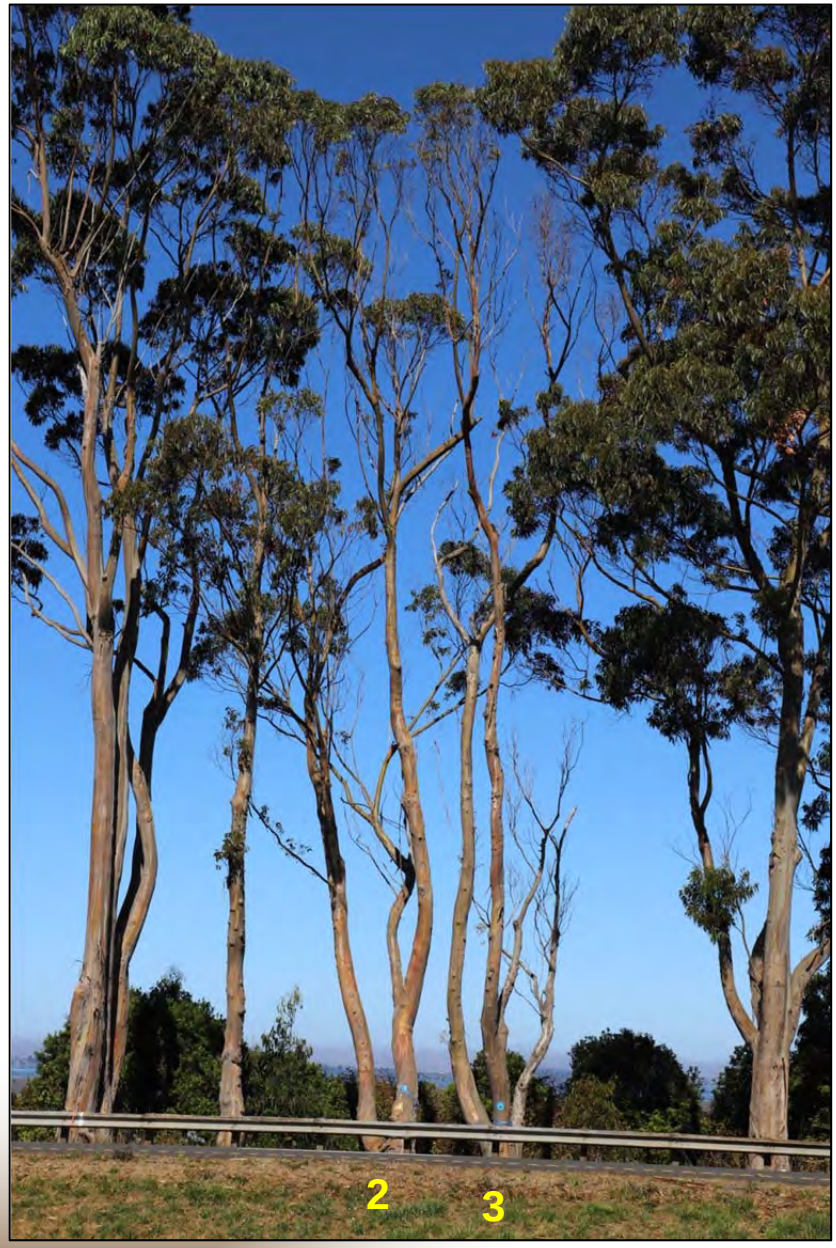
✦ Trees nos. 2 & 3:



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✦ Trees nos. 2 & 3 (continued):

Both trees exhibit substantial leans to the west. The images below exhibit the profuse dieback of the few remaining branches and the negligible amount of live foliage in both (and surrounding) canopies. The image below exhibits an entirely dead stem leaning west.

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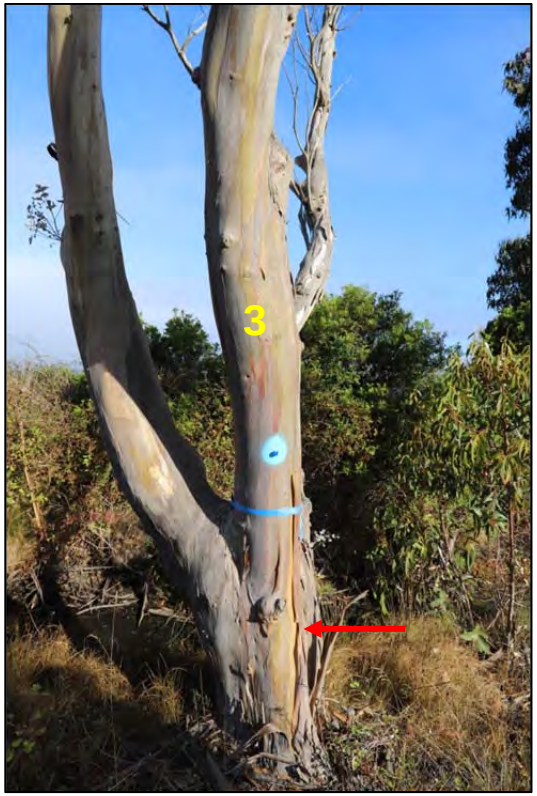
✦ Trees no. 3 (continued):

Tree no. 3: The graph of this tree's trunk does not indicate any substantial decay, in spite of the advanced state of decline and one entirely dead stem (west). The red spot and arrow indicate the testing location.



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✦ Tree no. 2 (continued):

Tree Risk Assessment Matrices

Tree no.:	**2**					**Tree no.:**	**2**			
Assessment date:	9/14/2018	Bay trail assumed constructed				**Assessment date:**	9/14/2018	Bay trail assumed constructed		
Part 1:	Large dead limbs					**Part 2:**	Whole tree failure (uprooting)			
Target:	Passing bicycles & pedestrians on trail (west)					**Target:**	Passing bicycles & pedestrians on trail (west)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.				**Risk rating:**	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.		
Mitigation recommended:	Remove dead limbs					**Mitigation recommended:**	Remove to grade			
Residual risk:	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.				**Residual risk:**	N/A			
Tree Part 1						**Tree Part 2**				

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	**Unlikely**	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	**Unlikely**	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	**Low**

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✦ Tree no. 3 (continued):

Tree Risk Assessment Matrices

Tree no.:	**3**					**Tree no.:**	**3**			
Assessment date:	9/14/2018	Bay trail assumed constructed				**Assessment date:**	9/14/2018	Bay trail assumed constructed		
Part 1:	Large dead limbs					**Part 2:**	Top @ decaying topping cut			
Target:	Passing bicycles & pedestrians on trail (west)					**Target:**	Passing vehicles/bicycles on Highway 101 (east)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.				**Risk rating:**	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.		
Mitigation recommended:	Remove dead limbs					**Mitigation recommended:**	Remove tree to grade			
Residual risk:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	**Unlikely**	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	**Low**	Low	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

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✦ Tree no. 4:

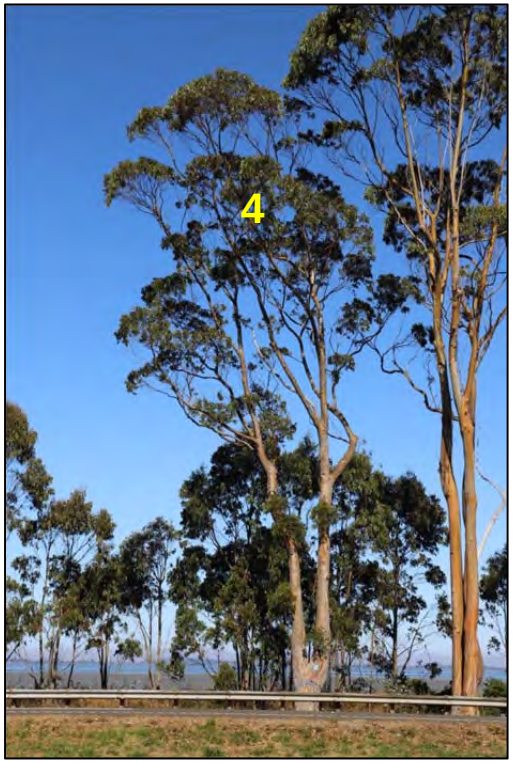

Illustration of a greater than typical foliage volume. The tree is comprised of codominant stems with a weak attachment and both lean to the west. There is a decay column to the west of the lower trunk (marked in right image).

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✦ Tree no. 4 (continued):

Tree Risk Assessment Matrices

Tree no.:	**4**					**Tree no.:**	**4**			
Assessment date:	9/14/2018					**Assessment date:**	9/14/2018	Bay trail assumed constructed		
Part 1:	Limb at top (decayed stub at attachment)					**Part 2:**	Whole tree (uprooting)			
Target:	Passing vehicles/bicycles on Highway 101 (east)					**Target:**	Passing bicycles & pedestrians on trail (west)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Risk rating:**	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.		
Mitigation recommended:	Remove dead limbs					**Mitigation recommended:**	Remove tree to grade			
Residual risk:	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.				**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	**Unlikely**	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	**Low**	Low

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✦ Tree no. 5:

Images illustrate codominant stems, negligible canopy volume, profuse branch dieback and lean over highway (east).

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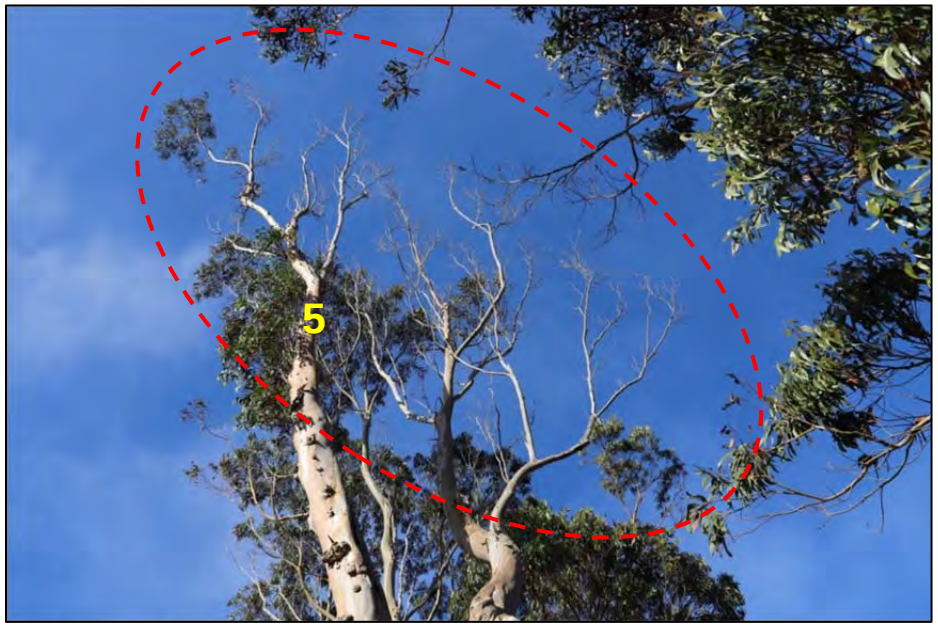
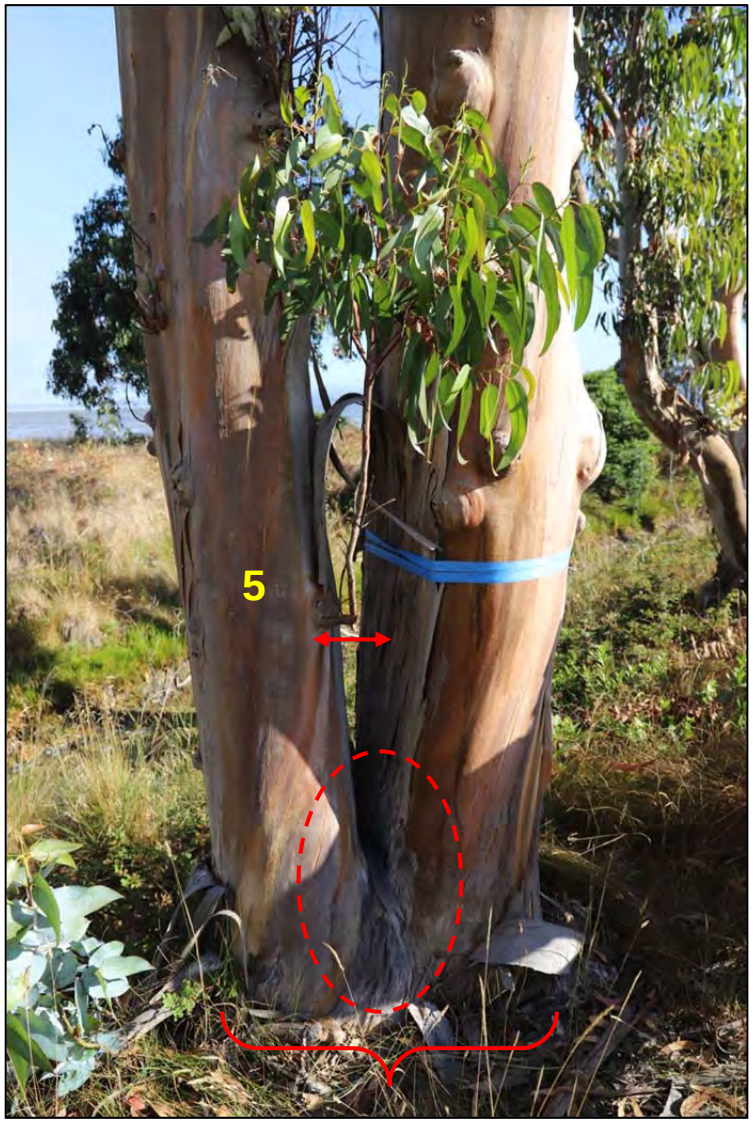
✦ Tree no. 5 (continued):



Profuse dieback of branches, decay column extending from old pruning wound, codominant, weakly attached stems and excess soil over the root flare.



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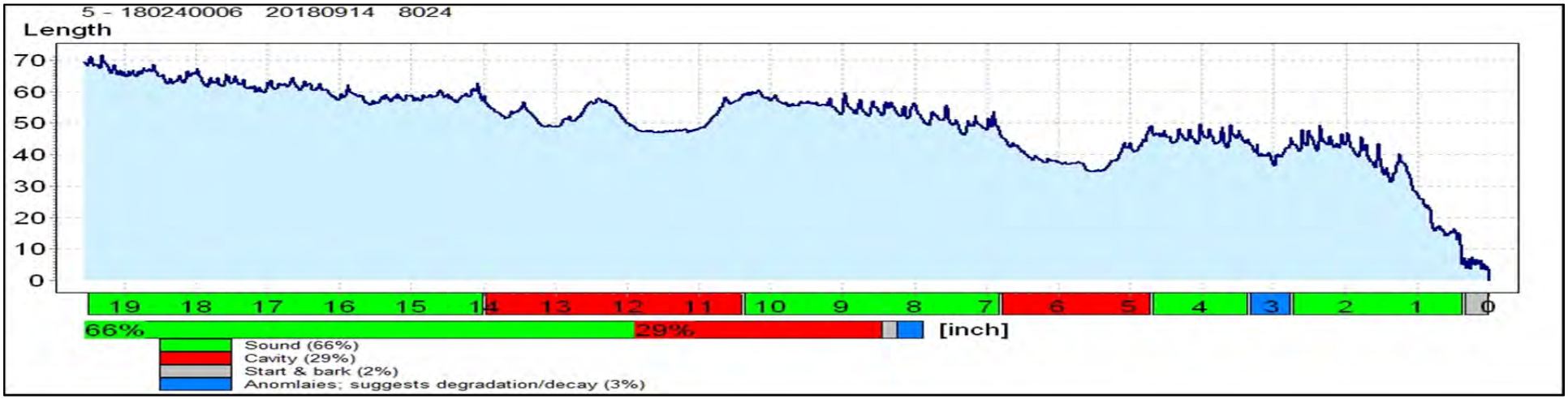
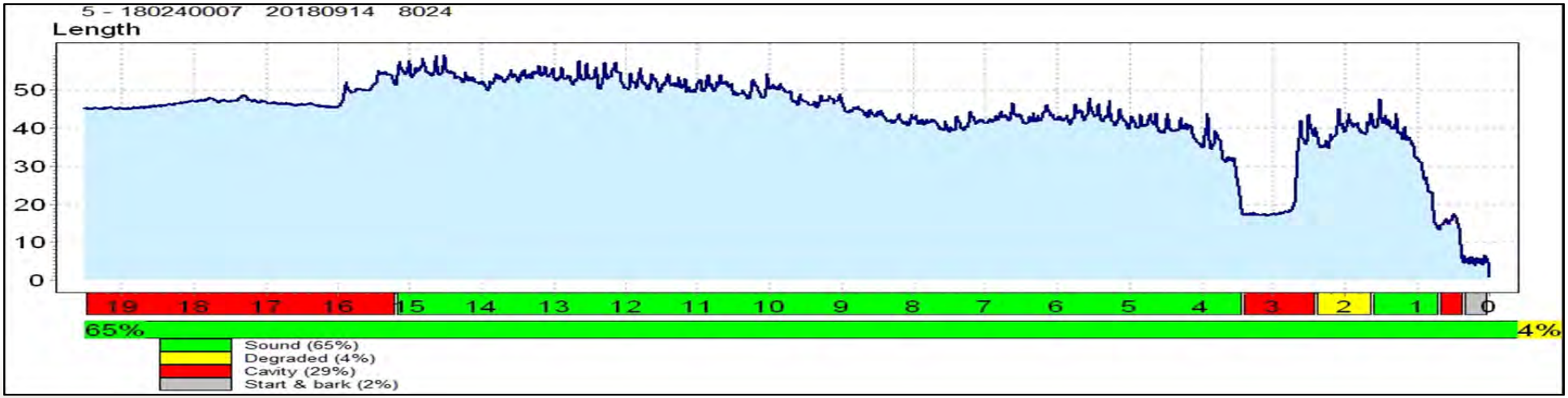
✦ Tree no. 5 (continued):



Above: Graph of east stem, E-W @ 36" height.
Below: Graph of west stem, N-S @ 48" height.



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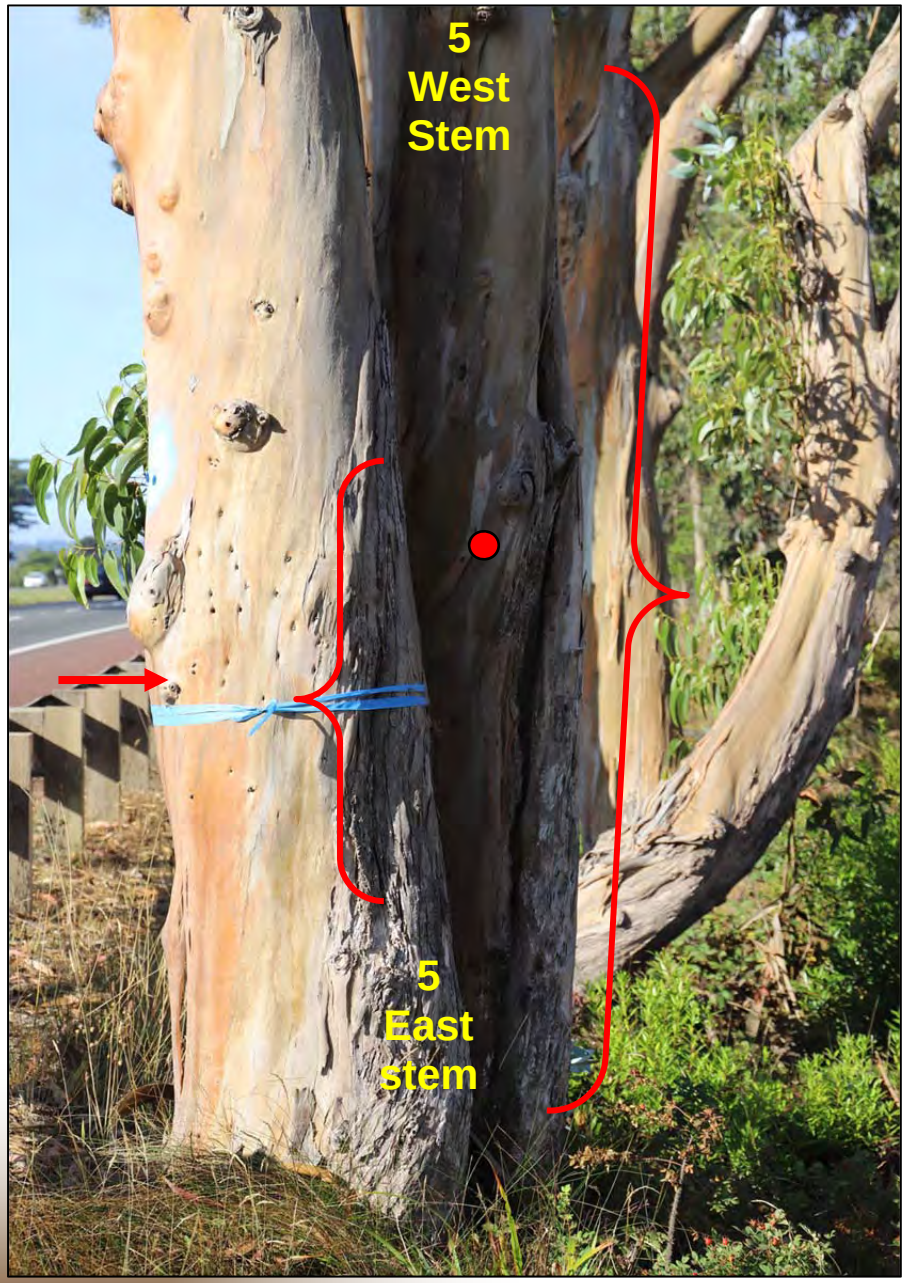
✦ Tree no. 5 (continued):



Tree no. 5: The red spot and arrow indicate testing locations. The brackets indicate externally visible columns of decay.

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✦ Tree no. 5 (continued):

Tree Risk Assessment Matrices

Tree no.:	**5**					**Tree no.:**	**5**			
Assessment date:	9/14/2018					**Assessment date:**	9/14/2018	Bay trail assumed constructed		
Part 1:	Large dead limbs					**Part 2:**	West stem (at attachment or decay)			
Target:	Passing vehicles/bicycles on Highway 101 (east)					**Target:**	Passing bicycles & pedestrians on trail (west)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Risk rating:**	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.		
Mitigation recommended:	Remove dead limbs					**Mitigation recommended:**	Remove tree to grade			
Residual risk:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Residual risk:**	N/A			
Tree Part 1						**Tree Part 2**				

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	**Somewhat likely**	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

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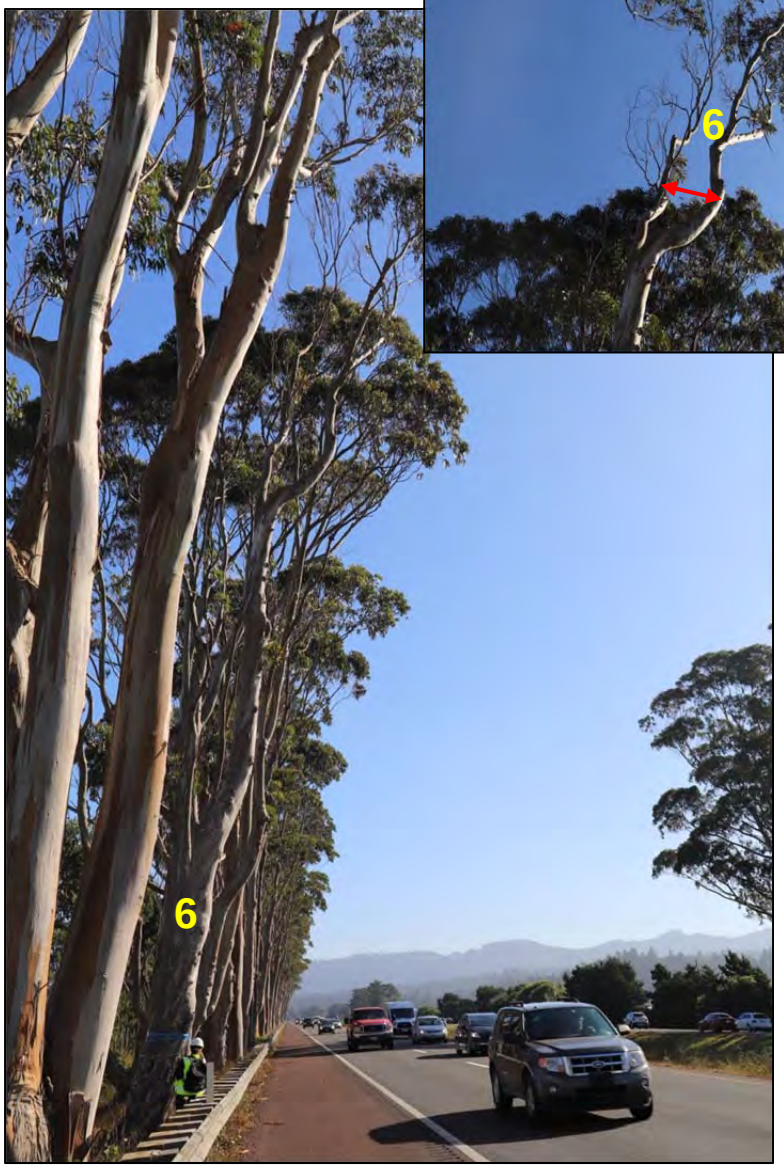
✦ Tree no. 6:

Lean over highway, no lateral branches, codominant tops, branch dieback and negligible canopy.



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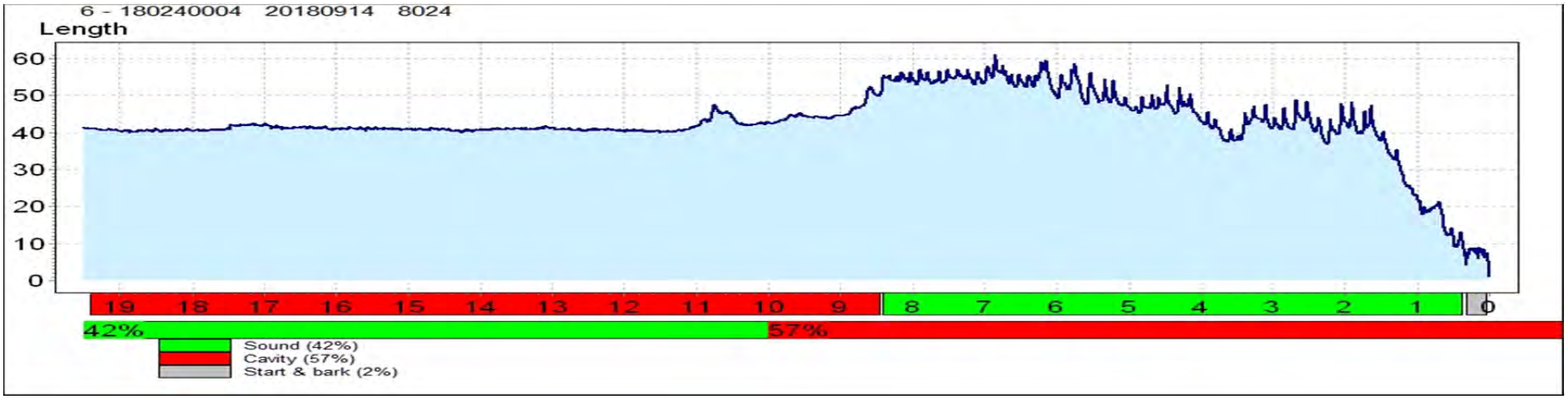
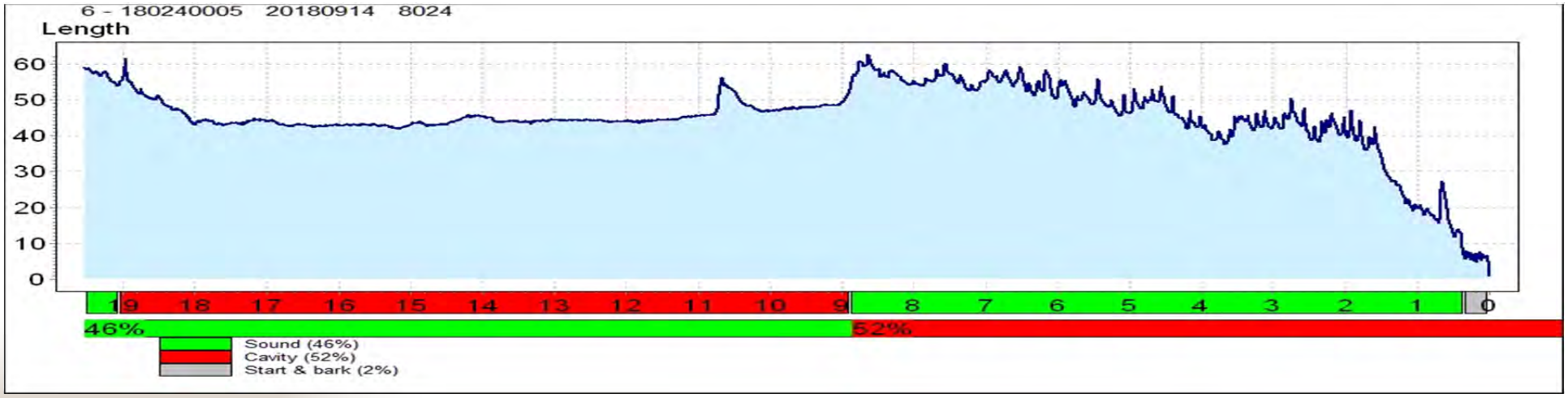
✦ Tree no. 6 (continued):



Above: N-S @ 48" height.
Below: E-W @ 48" height.



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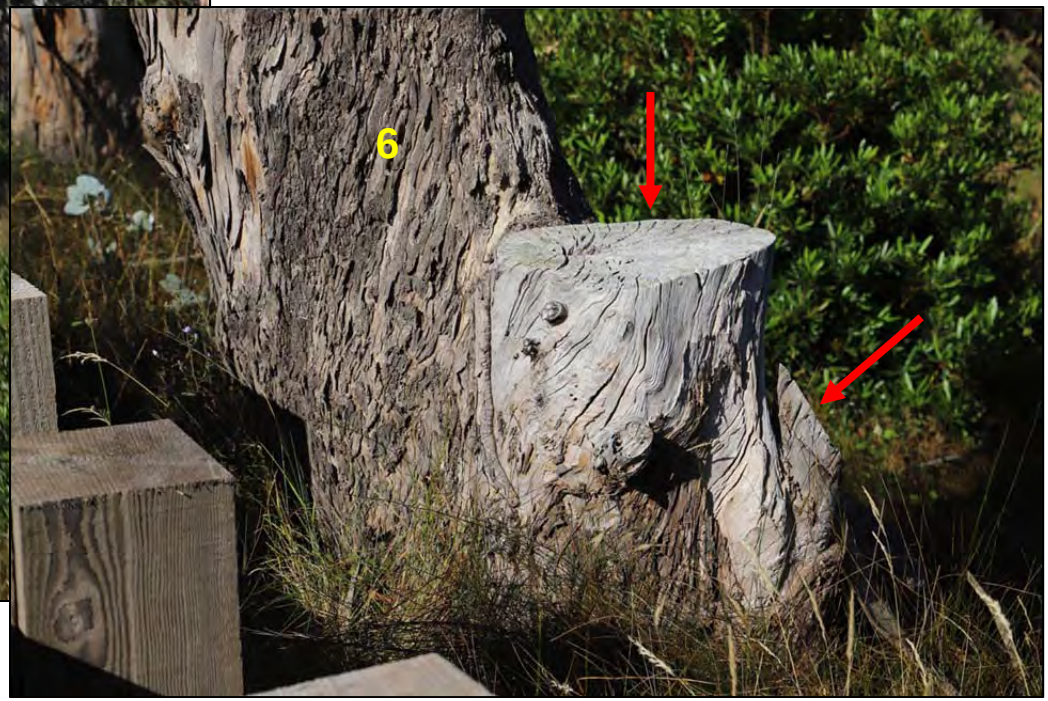
✦ Tree no. 6 (continued):

Left: The red spot and arrow indicate testing locations.
Below: Two coalesced, decaying wounds from stem removals.



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✦ Tree no. 6 (continued):

Tree Risk Assessment Matrices

Tree no.:	**6**					**Tree no.:**	**6**			
Assessment date:	9/14/2018					**Assessment date:**	9/14/2018			
Part 1:	Whole tree at base					**Part 2:**	N/A			
Target:	Passing vehicles/bicycles on Highway 101 (east)					**Target:**	N/A			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.				**Risk rating:**	N/A			
Mitigation recommended:	Remove tree to grade					**Mitigation recommended:**	N/A			
Residual risk:	N/A					**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	**Likely**
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	**High**
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

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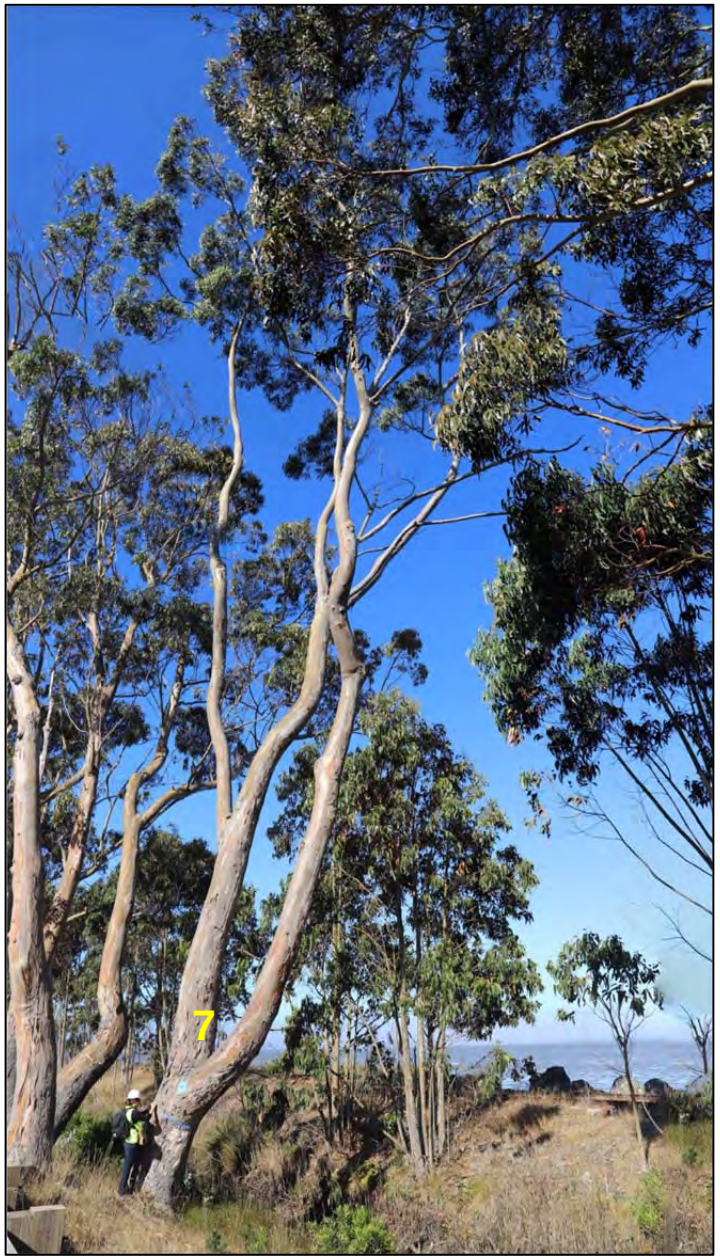
✦Tree no. 7:

Codominant stems (3), low canopy volume, lack of live lateral branches, large dead limbs to west (5), lean to west.



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✦ Tree no. 7 (continued):

Large, dead limbs; declining and negligible foliage.

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✦ Tree no. 7 (continued):

Tree Risk Assessment Matrices

Tree no.:	**7**					**Tree no.:**	**7**			
Assessment date:	9/14/2018	Bay trail assumed constructed				**Assessment date:**	9/14/2018			
Part 1:	Large dead limbs					**Part 2:**	Top(s) at topping cuts or weak attachments			
Target:	Passing bicycles & pedestrians on trail (west)					**Target:**	Passing vehicles/bicycles on Highway 101 (east)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Risk rating:**	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.		
Mitigation recommended:	Remove dead limbs					**Mitigation recommended:**	Remove tree to grade			
Residual risk:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	**Somewhat likely**	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	**Moderate**
Unlikely	Low	Low	Low	Low

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✦ Tree no. 8:

Codominant stems, negligible foliage, lacking lateral branching.

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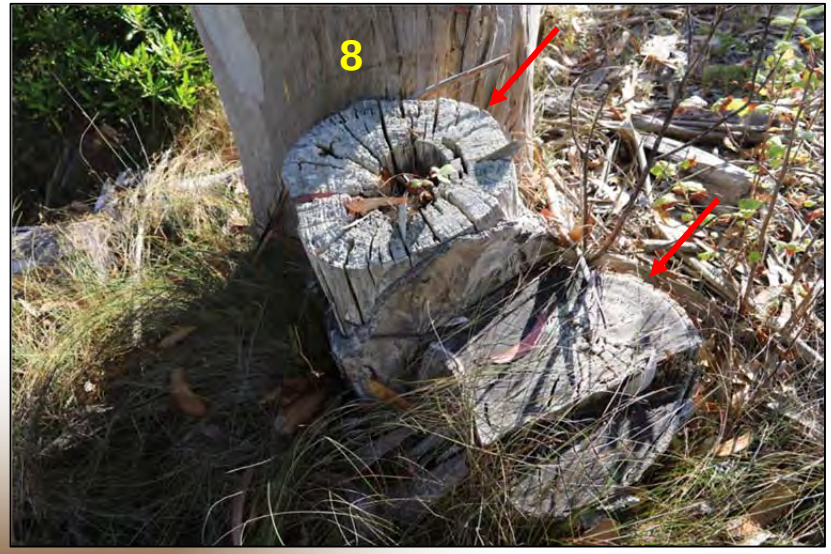
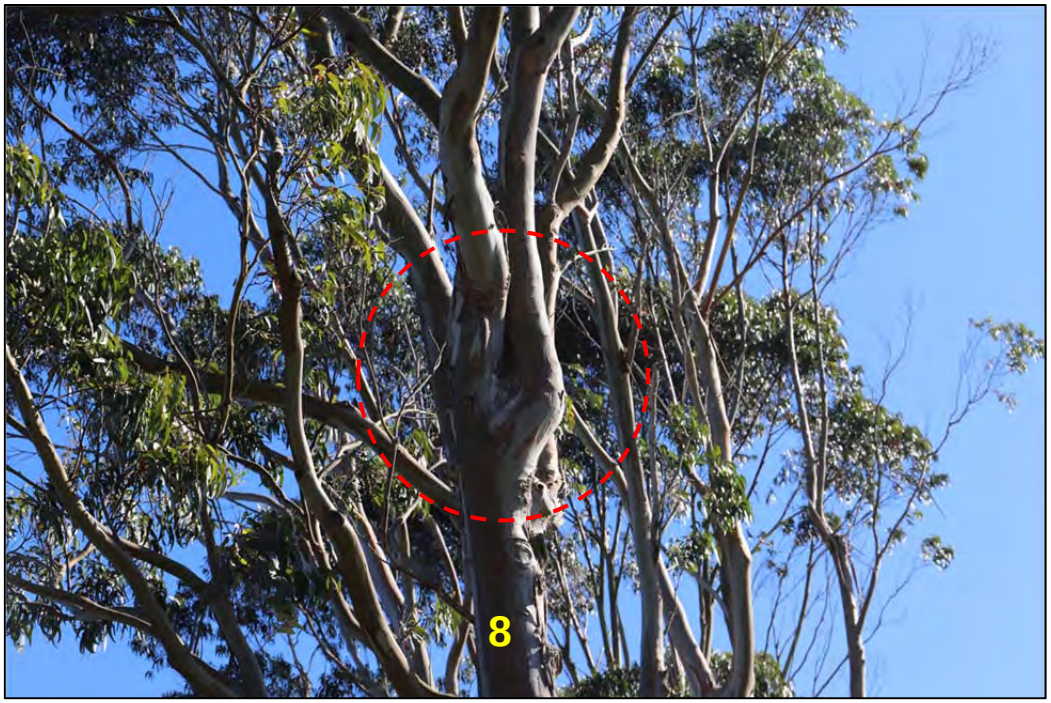
✦ Tree no. 8 (continued):

Left: Negligible foliage, profuse branch/top dieback, lack of lateral branches, codominant stems (3).
Below left: Decaying stubs from stem removals.
Below right: weakly attached, codominant sprouts from old topping site.





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✦ Tree no. 8 (continued):

Tree Risk Assessment Matrices

Tree no.:	**8**					**Tree no.:**	**8**			
Assessment date:	9/14/2018	Bay trail assumed constructed				**Assessment date:**	9/14/2018			
Part 1:	Codominat stem to west					**Part 2:**	Codominat stem to east			
Target:	Passing bicycles & pedestrians on trail (west)					**Target:**	Passing vehicles/bicycles on Highway 101 (east)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Low	Consequences are negligible, likelihood of failure and impact is unlikely, or consequences are minor and likelihood is somewhat likely. Mitigation not required.				**Risk rating:**	High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.		
Mitigation recommended:	Remove dead limbs					**Mitigation recommended:**	Remove tree to grade			
Residual risk:	High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.				**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	**Somewhat likely**	Likely
Possible	Unlikely	Unlikely	**Unlikely**	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	**Low**	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	**Likely**
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	**High**
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

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✦ Tree no. 9:

Codominant stems, low canopy volume, branch dieback, low canopy volume, lacking lateral branching, lean to east (over highway).

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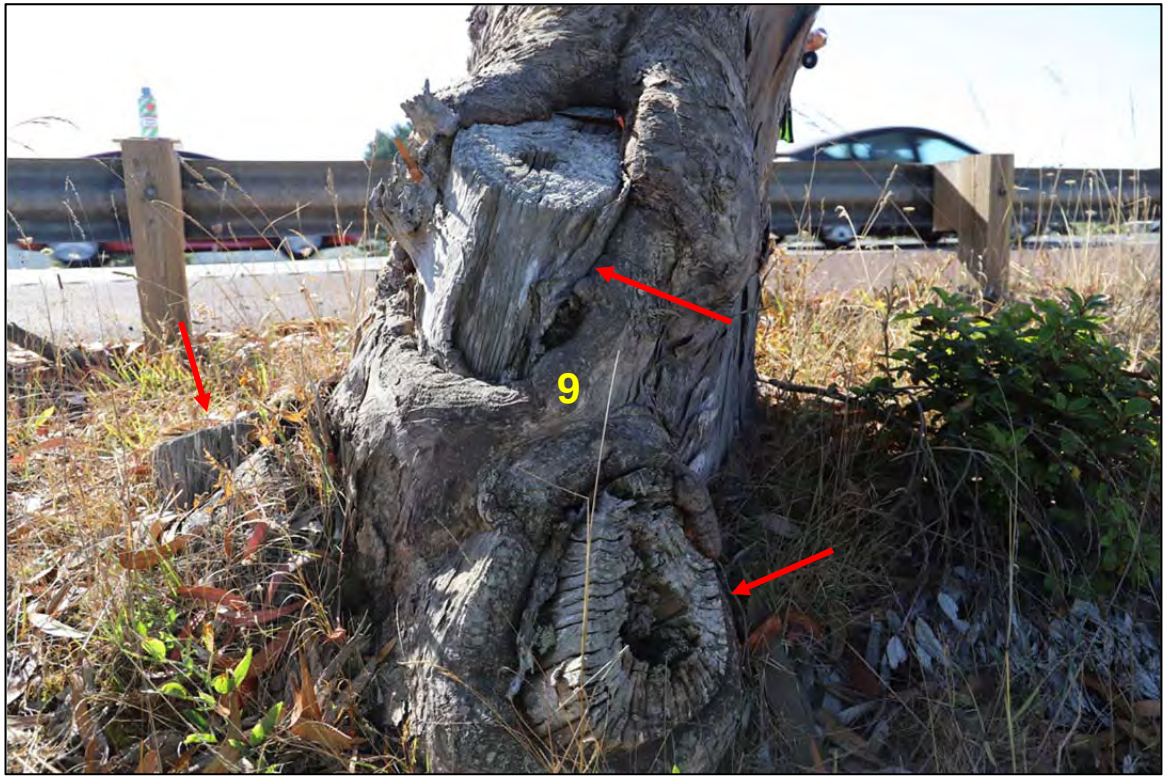
✦ Tree no. 9 (continued):

Left: Codominant, weakly attached stems and lean to east.
Below: decayed wounds from removal of stems. Coalesced into a column of decay.



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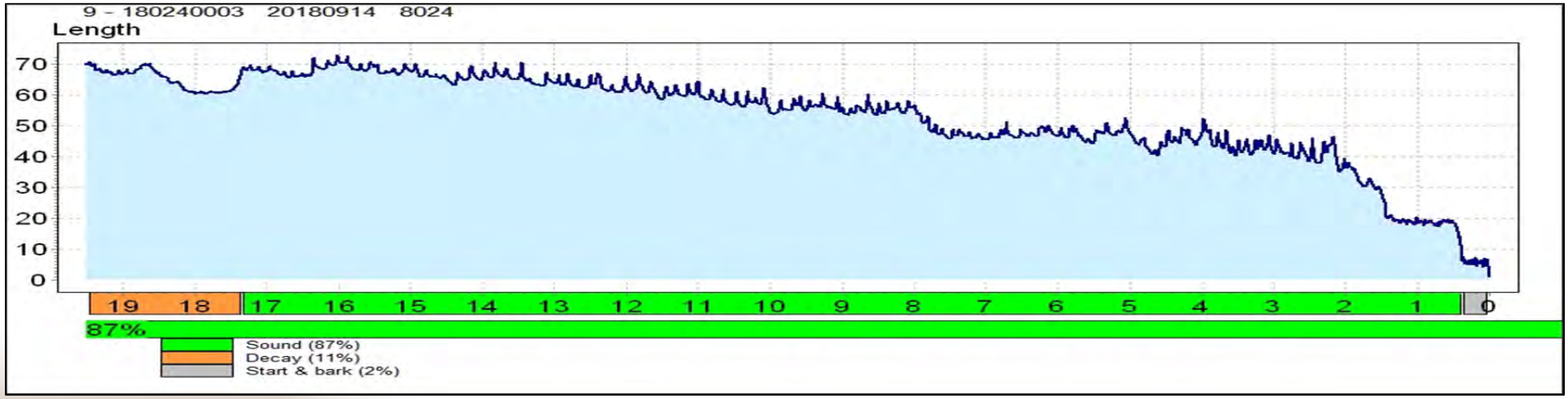
✦ Tree no. 9 (continued):

Above: E-W @ 36" height.
Below: NE-SW @ 48" height.



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✦ Tree no. 9 (continued):

The red spot and arrow indicate testing locations. Three, coalesced decaying wounds from stem removals on tension side of lean.

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✦ Tree no. 9 (continued):

Tree Risk Assessment Matrices

Tree no.:	**9**					**Tree no.:**	**9**			
Assessment date:	9/14/2018					**Assessment date:**	9/14/2018			
Part 1:	Whole tree failure (trunk collapse at base)					**Part 2:**	N/A			
Target:	Passing vehicles/bicycles on Highway 101 (east)					**Target:**	N/A			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.				**Risk rating:**	N/A			
Mitigation recommended:	Remove tree to grade					**Mitigation recommended:**	N/A			
Residual risk:	N/A					**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	**Somewhat likely**
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	**High**
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

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✦ Tree no. 10:

Codominant stems (5), negligible canopy volume, branch dieback, lacking lateral branching.

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✦ Tree no. 10 (continued):

Codominant stems (5), negligible canopy volume, branch dieback, lacking lateral branching.

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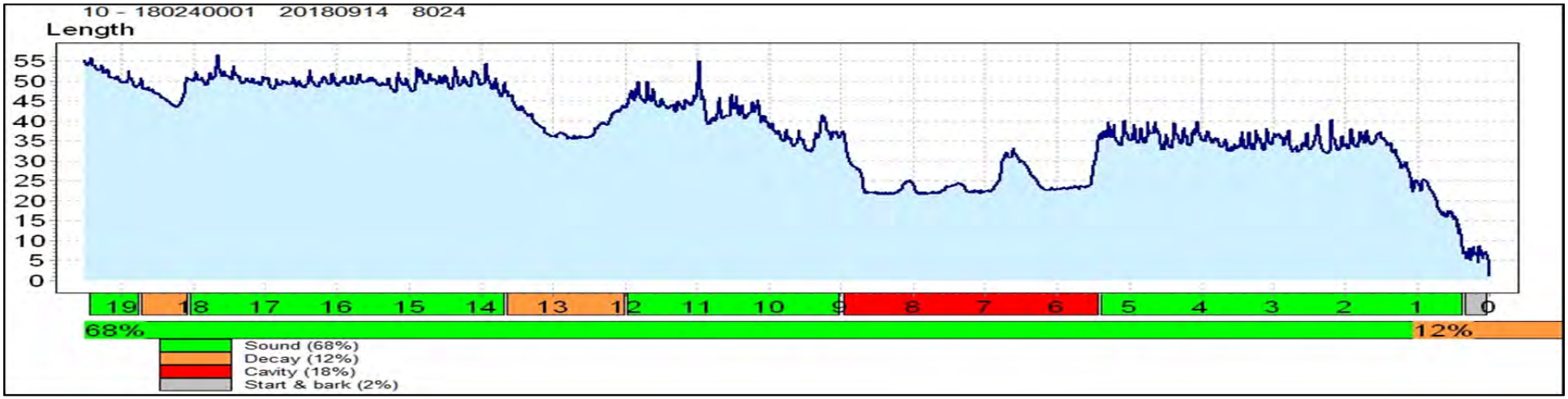
✦ Tree no. 10 (continued):



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✦ Tree no. 10 (continued):

Tree Risk Assessment Matrices

Tree no.:	**10**	Bay trail assumed constructed				**Tree no.:**	**10**			
Assessment date:	9/14/2018					**Assessment date:**	9/14/2018			
Part 1:	Declining & dead tops & limbs (west)					**Part 2:**	Tops & limbs (east)			
Target:	Passing bicycles & pedestrians on trail (west)					**Target:**	Passing vehicles/bicycles on Highway 101 (east)			
Time-frame:	1-3	years				**Time-frame:**	1-3	years		
Risk rating:	Moderate	Consequences are minor and likelihood of failure and impact is very likely or likely, or likelihood is somewhat likely and Consequences are significant or severe. Mitigation may be recommended.				**Risk rating:**	High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.		
Mitigation recommended:	Remove dead limbs and/or stems					**Mitigation recommended:**	Remove tree to grade			
Residual risk:	High	Immediate risk - Consequences are significant and likelihood of impact is very likely or likely, or consequences are severe and likelihood is likely.				**Residual risk:**	N/A			

Tree Part 1

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	**Somewhat likely**	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	**Moderate**	Moderate
Unlikely	Low	Low	Low	Low

Tree Part 2

Matrix 1: Likelihood of target impact

1) Likelihood of Failure	2) Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	**Likely**
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Likelihood of failure & target impact

3) Likelihood of Failure and Impact	4) Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	**High**
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

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✦ Examples of typical conditions (miscellaneous trees):

All images are of one tree. Illustrated is a massive column of decay, weakly attached codominant stems, basal decay from a removed stem. Below: matured, weakly attached multiple sprouts at old topping cut.

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Examples of the prevalent multiple stem trees with weak and/or decay-compromised attachments.

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Examples of the profuse topping cuts, resulting in right-angle branch aspects, decaying cuts, multiple codominant sprouts with weak attachments.
Left: stem has died-back several feet from the topping cut.

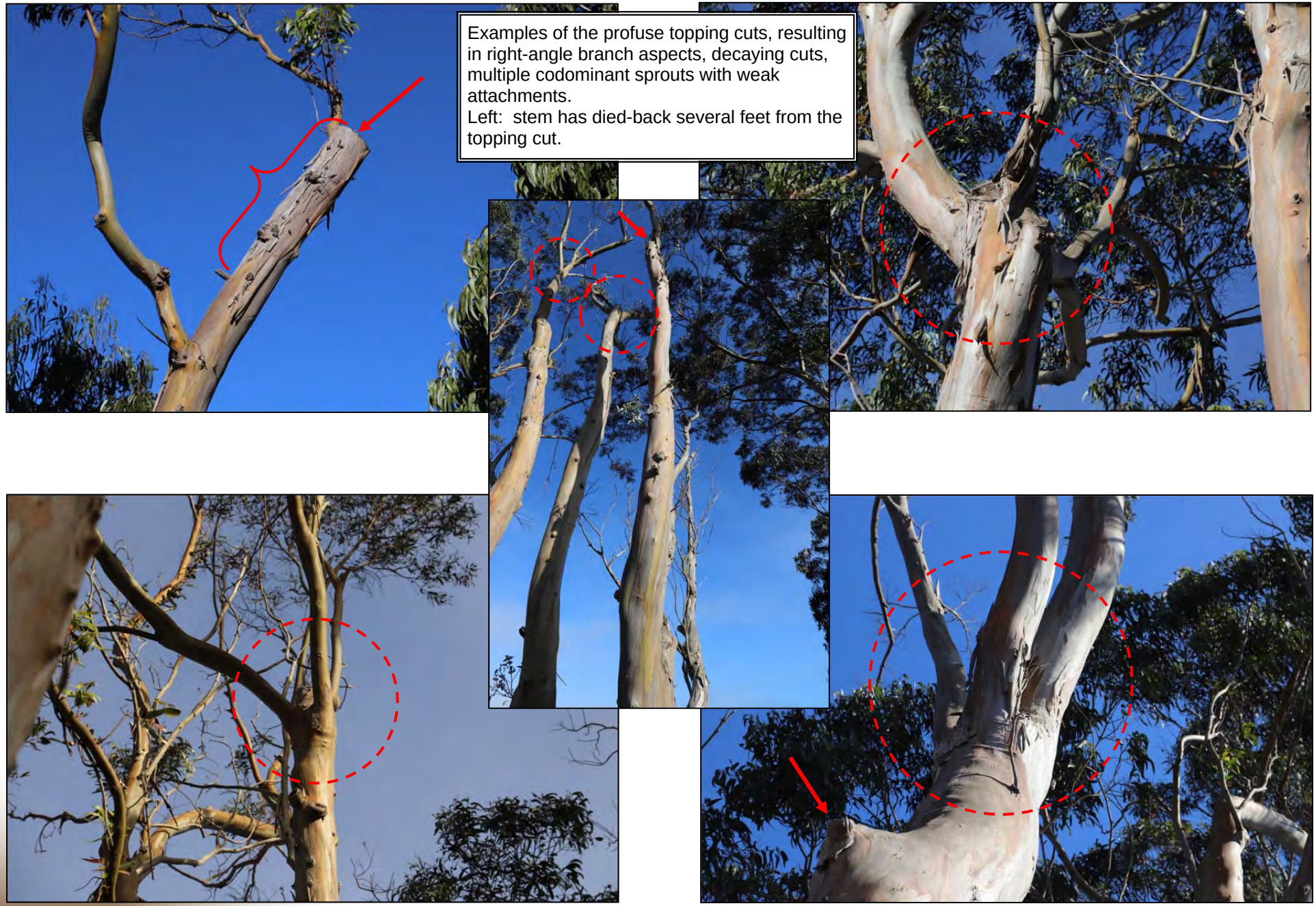

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Illustration of the virtually complete absence of primary limb structure through the pruning-off of lateral limbs, and the resulting lack of taper.




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Examples of the extent of decay from stem removals, pruning cuts and wounds. Many are associated with internal columns of decay.

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✦ Laboratory analysis of submitted soil, water and foliage samples:

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Humboldt Bay soil, leaves & water
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Soil Analyses:

The pH value of this soil strongly acid in reaction and is somewhat lower than desirable. The electrical conductivity reading indicates there are slightly high concentrations of soluble salt in this soil at this time.

The fertility analysis shows very low nitrogen, phosphorus, calcium and manganese. The potassium, magnesium, sulfate, boron, zinc and copper are in satisfactory ranges. The iron concentration is higher than necessary.

The sodium and chloride levels are higher than desirable and will cause toxicity problems. The low ESP value indicates that the sodium that is present will not create a hazard to the soil structure. The organic matter content of this soil is high. The free lime content is safely low. The mechanical analysis indicates this is a sandy loam soil in texture. A sandy loam soil generally has a satisfactory infiltration rate of 1.0 inches per hour.

Plant Tissue Analyses:

The concentrations of nitrogen, phosphorus, potassium, and calcium are lower than desirable for these trees at this time. The sodium concentration is higher than desirable.

Water Analyses:

The pH value of this water is moderately alkaline in reaction and is somewhat higher than desirable. The very high electrical conductivity shows that the levels of soluble salt are excessively high. The concentrations of calcium, magnesium, potassium, sodium, chloride, bicarbonate alkalinity, sulfate, boron, iron and manganese are higher than desirable in this water. The high SAR value indicates that the sodium present in this water will create a hazard to the soil structure it is applied to.

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Conclusions:

The poor growth of the trees in this area is due to the very poor soil and water at this site. It will be necessary to use very salt tolerant plants at this site and redwoods are not recommended as they are sensitive to chloride and this is very high in the soil and water.

It is recommended that this area have the following amendments added to the soil prior to planting per 1000 sq ft:

Calcium carbonate lime	100.0 lbs
Gypsum	50.0 lbs
Monoammonium phosphate (12-61-0)	20.0 lbs

The above materials should be incorporated into the upper 6-8" of the soil profile.

If you have any questions, please feel free to contact me.

Respectfully submitted,

Clifford B. Low M.S.

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September 21, 2018

Soil Analyses

Chemical analyses on samples received: September 18, 2018

Sample Identification	pH saturated paste	Electrical Conductivity dS/m	Nitrate Nitrogen (N)	Ammonium Nitrogen (N)	Phosphorus (P)	Potassium (K)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO4)	Boron (B)	Zinc (Zn)	Copper (Cu)	Manganese (Mn)	Iron (Fe)	SP Saturation Percentage	Calcium plus Magnesium	Sodium (Na)	Chloride (Cl)	SAR Sodium Adsorption Ratio	ESP Exchangeable Sodium Percentage
		Saturated paste extract	RESULTS REPORTED IN PARTS PER MILLION OF DRY SOIL													milliequivalents per liter in extract				
General Guidelines-Ornamental Plants	6.5-7.2	1.0-3.0	25-75	25-75	50-100	150-300	2000-4000	150-500	25-500	0.5-1.0	2.5-5.0	1.0-3.0	10-25	25-100		>6.0	<3.0	<3.0	<8.0	<9.0
Humboldt Bay	**4.2**	3.6	**0**	**6**	**1**	160	**200**	370	30	0.3	5.5	6.8	**2.4**	**369**	74	32.7	**17.8**	**32.8**	4.4	4.9

	Organic Matter (% by Weight)	Lime Content % Ca CO_3	Mechanical Analyses, % by weight, USDA Classifications			Infiltration Rate inches/hour
			Sand	Silt	Clay	Texture	
Optimum Values	>5.0	<3.0					
	14.5	1.5	68	20	12	sandy loam	1.00

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September 21, 2018

Plant Tissue Analyses

reported on dry matter basis

Chemical analyses on samples received: September 18, 2018

Sample Identification:	Survey* Range Eucalyptus globulus	Blue Gum Eucalyptus	
CONSTITUENTS			
TOTAL			
Nitrogen (N) %	1.15-1.21	**0.79**	
Phosphorus (P) %	0.14-0.21	**0.03**	
Potassium (K) %	0.54-0.72	**0.37**	
Calcium (Ca) %	1.90-2.30	**1.06**	
Magnesium (Mg) %	0.25-0.29	0.32	
Sodium (Na) %	<0.20	**0.40**	
Iron (Fe) ppm	88-120	52	
Boron (B) ppm	14-28	15	
Zinc (Zn) ppm	16-189	17	
Copper (Cu) ppm	8-11	7.2	
Manganese (Mn) ppm	855-1041	533	

Bryson & Mills. 2014. Plant Analysis Handbook IV

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September 21, 2018

CHEMICAL WATER ANALYSIS

Chemical analyses on samples received: September 18, 2018

Sample Identification:	Guideline Values For Irrigation Water	Project 18024-40022 Water
CONSTITUENTS		
pH	6.0-7.8	**7.94**
Electrical Conductivity (dS/m)	<0.75	**35.00**
Calcium, Ca (meq/l)	<5.0	**12.62**
Magnesium, Mg (meq/l)	<2.0	**90.50**
Potassium, K (meq/l)	<0.1	**4.10**
Sodium, Na (meq/l)	<3.00	**251.00**
Chloride, Cl (meq/l)	<3.00	**339.00**
Carbonate, CO_3 (meq/l)	<0.01	0.00
Bicarbonate, HCO_3 (meq/l)	<1.50	**12.80**
Sulfate, SO_4-S (meq/l)	<5.20	**12.56**
Nitrate, NO_3 (meq/l)	<0.73	0.00
Boron, B (ppm)	<0.50	**2.10**
Total Dissolved Solids, TDS (ppm)	<480	**22400**
SAR, Sodium Adsorption Ratio	<6.0	**34.96**
Iron, Fe (ppm)	<0.20	**3.70**
Manganese, Mn (ppm)	<0.10	**0.40**
Zinc, Zn (ppm)	<0.10	0.04
Copper, Cu (ppm)	<0.10	0.10
Nitrate Nitrogen, NO3-N (ppm)	<10.0	0

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Attachments (exhibits) to Letter/report 18024-40022, 10/08/2018

This document is submitted as an attachment to Dryad letter-report no. 18024-40022, dated 10/08/2018.

Respectfully submitted,

Torrey Young

Digitally signed by Torrey Young
DN: cn=Torrey Young, o=Dryad, LLC, ou, email=torrey@dryad.us, c=US
Date: 2018.10.08 12:32:45 -07'00'

Torrey Young
Registered Consulting Arborist®

ASCA Registered Consulting Arborist, no. 282
ISA Board Certified Master Arborist, no. WE-0131BM
CUFC Certified Urban Forester, no. 121
ISA Tree Risk Assessment Qualified
CA P.C. Qualified License, no. 104772
CA Contractors License no. 363372 (C-27 & D-49; inactive)

✦ ✦ ✦

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