

Wildfire Risk Governance Committee

Governance Committee

December 17, 2020

Executive Sponsor(s): [REDACTED] (SVP and Chief Risk Officer)

Author(s) & Affiliation: [REDACTED] (Sr Director, Risk – Special Projects)

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PGE-DIXIE-NDCAL-000011506

Safety

Earthquake

Duck, Cover & Hold

Emergency Plan & Exit Strategy

Have a plan for yourself and your household

24/7 Nurse Care Line

If you experience a work-related discomfort or injury, call 1-888-449-7787 and notify your supervisor.



Wash your hands!



Wear a Mask



Practice social Distancing

Meeting Agenda

Date:	12/18/2020		
Desire Outcomes:	<ul style="list-style-type: none"> • Decision: Inspection targeting approach and method • Decision: PSPS Distribution Targeting Approach • Decision: EVM Plan • Decision: System Hardening Plan 		
Meeting Agenda			
	What - Content	Who - Facilitator(s)	Slide Number
	Action Item Update		3-11
	Inspections Update		12-17
	PSPS Distribution Update		18-23
	Vegetation Management Update		24-27
	System Hardening Update		28-46

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ACTION ITEM REVIEW

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Enhanced Vegetation Management – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Enhanced Vegetation Management	EVM Tree Weighted Model white paper	Internal Audit to review the risk buydown curve and methodology to convert from the native VM Wildfire Risk Model to the Tree Weighted Model		In progress - New target date is 12/11/2020	1/8/2021	12/11/2020
Enhanced Vegetation Management	EVM and System Hardening Plan Alignment WGR – 11/20/2020	EVM 2021 Plan needs to sync up with System Hardening 2021 Plan to ensure that EVM does not perform work that will not be required if a 2021 SH project will address the risk		Pending System hardening Plan	Dependent on approval of SH work plan	
Enhanced Vegetation Management	Internal Audit	Internal Audit to review EVM risk model and process to develop ~1000miles of no regret plan		In Progress - Meetings are being scheduled	1/8/2021	
Enhanced Vegetation Management	Project Plan and Scheduling VM Team Add – 11/13/2020	Develop project plan and schedule around associating the VM Wildfire Risk 100M x 100M pixels with individual segments within the Vegetation Management ARC Collector system		In Progress	1/8/2021	

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System Hardening – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
System Hardening	ECOP Deep dive	Provide deep dive on three Engineering Corrective Tag Optimization (ECOP) projects outside of top 20%		In Progress	12/18/2020	12/18/2020

The screenshots display the following data for various ECOP projects:

- Project 1 (Diamond Springs 1107):** Risk Score 0.073, Ignition Probability 9.9E-05, Conseq. Rank 1072 (28%), Avg. Score Rank 951 (26%).
- Project 2 (Pueblo 2152):** Risk Score 0.073, Ignition Probability 9.9E-05, Conseq. Rank 1072 (28%), Avg. Score Rank 951 (26%).
- Project 3 (Pueblo 2102792):** Risk Score 0.073, Ignition Probability 9.9E-05, Conseq. Rank 1072 (28%), Avg. Score Rank 951 (26%).

The 'High Risk Flags' section for Project 3 includes:

- Count of PSPS Events: 0
- Count of EC Tags: 19
- CPZ in Top 20% of Risk?: No
- Fire Rebuild?: No

The 'Mitigation Plan' section includes questions such as:

- Is this circuit being removed? Why not? (Customer connections prohibit the removal of the line)
- Is this circuit being Undergrounded? Why not? (Mitigations are under consideration)
- What Overhead Mitigations are being deployed? (Mitigations are under consideration)

ECOP projects have had profiles developed and are ready for review and potential inclusion in the 2021 workplan. Approval slides are in the system hardening section.

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System Hardening – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
System Hardening	Total Cost of Ownership For Mitigations WGR – 11/20/2020	Do a deep dive into the Total Cost of Ownership Calculations for the SH Mitigations – Hold a separate review with SH team and Operational Observer	[REDACTED]	Pending	1/8/2021	12/18/2020
System Hardening	Open Tags	Follow up with open tag issue		In progress - Procedures for ECOP bundling under review	1/8/2021	12/18/2020

DTS FAST– Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
DTS FAST	2021 additional scope	Propose additional line mileage for 2021		In progress	12/18/2020	

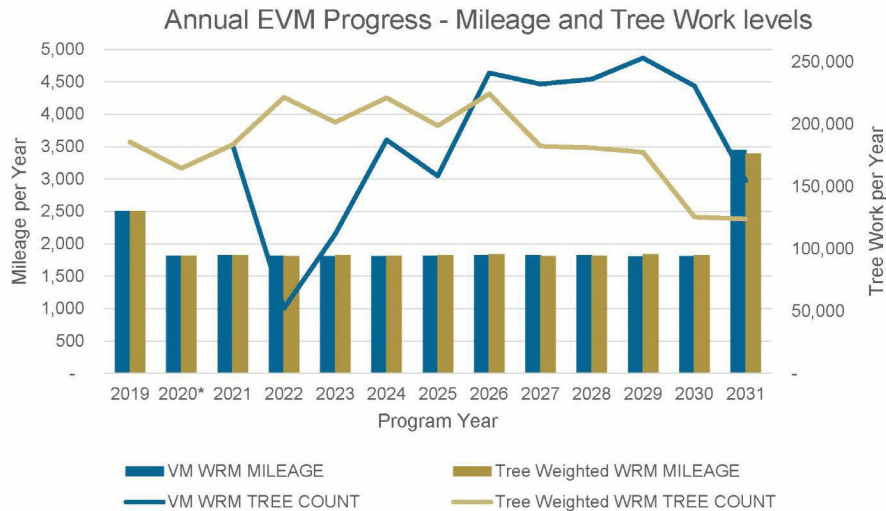
DTS-FAST is currently being reviewed for project level approvals for the transmission and distribution deployment

Overhead Inspections – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Overhead Inspections	Rate of Degradation Trends WGR – 11/20/2020	Utilize the data-mining platforms available at PG&E (Palantir) to understand the rate of degradation of the assets in the different climatic or other appropriate zones. Need location-specific degradation		In Progress	1/8/2021	
Overhead Inspections	Lessons Learned WGR – 11/13/2020	Review and understand lessons learned from the 2019 and 2020 Tier 3 and Tier 2 Inspections that have been completed. Areas to focus on -What improvements can be made to the plans? -What improvements can be made to the methods that were used? -What tags were discovered in 2020 that somehow missed in 2019, and do we understand why		In Progress	1/8/2021	

Enhanced Vegetation Management – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Enhanced Vegetation Management	EVM programs timeframes WGR – 11/3/2020	Determine the EVM program's overall time frame and pace when Strike Potential Trees are factored into the 25500 miles of HFTD Circuits. Understand which of the 25500 miles need EVM work		Pending - To be presented by Matt Sanders on 12/11/2020	12/18/2020	12/18/2020



Year	VM Wildfire Risk Model				
	VM WRM Tree Count	VM WRM Mileage	Cumulative Tree Count	Cumulative Mileage	Trees Worked Per Mile
2019	185,732	2,499	185,732	2,499	74
2020	164,627	1,810	350,359	4,309	91
2021	183,465	1,819	533,824	6,128	101
2022	52,140	1,811	595,949	7,931	29
2023	111,756	1,804	707,705	9,735	62
2024	187,363	1,805	895,068	11,540	104
2025	158,376	1,814	1,053,444	13,354	87
2026	241,146	1,818	1,294,589	15,172	133
2027	232,181	1,816	1,526,771	16,988	128
2028	235,977	1,819	1,762,748	18,807	130
2029	253,106	1,800	2,015,854	20,607	141
2030	230,656	1,804	2,246,509	22,411	128
2031	154,766	3,444	2,401,276	25,856	45

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Enhanced Vegetation Management – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Enhanced Vegetation Management	EVM programs and resources WGR – 11/3/2020	Provide a full picture of all vegetation management work, outside of just the enhanced vegetation management.		In Progress	12/18/2020	12/18/2020

Work In Progress

Program	Units	Unit Cost	Budget (\$M)
Routine Distribution (VMBA)	1,400,000		
Enhanced Vegetation Management (EVM)	1,913*		
Catastrophic Event Memorandum Account (CEMA)	65,000		
Routine Transmission (unit=mile)	17,880*		

INSPECTIONS UPDATE

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HFTD Inspection Plan Approach and Scope Options

Plan Options	Distribution	Transmission	Substation
1 Keep 2021 Plan As-Is	<ul style="list-style-type: none"> All Tier 3 Inspected; 33% of Tier 2 Inspected <input type="checkbox"/> Plan based upon Circuit Ranking Methodology <input type="checkbox"/> <p>Tier 3: 265,314* structures Tier 2: 212,833* structures</p>	<ul style="list-style-type: none"> All Tier 3 Inspected; 33% of Tier 2 Inspected <input type="checkbox"/> Plan based upon Circuit Ranking Methodology <input type="checkbox"/> <p>Tier 3: 11,399 structures Tier 2: 12,395 structures</p>	<ul style="list-style-type: none"> All Tier 3 Inspected; 33% of Tier 2 Inspected <input checked="" type="checkbox"/> Plan based upon SAP ABC Indicator + other Tier 1 substation HFTD proximity considerations <input checked="" type="checkbox"/> <p>Tier 3: 42 substations Tier 2: 59* substations</p>
2 Augment 2021 Plan with Additional High-Risk Assets Identified by New Risk Model Outputs	<ul style="list-style-type: none"> This allows Distribution to target high risk structures, while balancing resource constraints <input checked="" type="checkbox"/> Add structures from 2022 plan that have highest Wildfire Risk Model consequence scores. Allow full inspection of Tier 3 structures to provide 3 full years of 100% Tier 3 inspection <p>Tier 2: + 1,000 - 4,000* structures</p>	<ul style="list-style-type: none"> Include structures from 2022 plan with high Technosylva building consequence scores (250+ buildings) into 2021 plan <input checked="" type="checkbox"/> 250+ building value used by Meteorology to define high consequence Additional structures can be balanced within current resource estimates <p>Tier 2: + 736 structures</p>	<p>No Wildfire Risk Model fully functional to augmentation of current plan</p>
3 Redesign 2021 Plan to New Risk Model Outputs	<ul style="list-style-type: none"> 'Reshuffle' inspection plan to align with consequence outputs from Wildfire Risk Model <input type="checkbox"/> Add 107k structures, drop 40k structures out of the Tier 2 plan to ensure top 66% of structures inspected by end of 2021 Evaluate aligning Tier 3 plan to consequence based inspection – only inspect high consequence structures <p>High resource effort to redesign plan; likely delay in inspection & patrol execution</p>	<p>No Wildfire Risk Model fully functional to support full redesign of plan</p>	<p>No Wildfire Risk Model fully functional to support full redesign of plan</p>

*Structure/substation counts also include lower Tier structures included in inspection cycle

= Recommended Option = Potential Option **CONFIDENTIAL – FOR INTERNAL DISCUSSION**

Key Decision – Approval for 2021 Inspection Plan Approach and Scope

Approval Status	Pending
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Decision Detail
<p>This approval is for 2021 Inspection Plan Approach and Scope for Overhead Distribution, Overhead Transmission, and Substation. This decision approves of the risk-based approach used to establish the 2021 plans and approximate count of structures/substations to be inspected.</p>




Concerns and Mitigations
<ul style="list-style-type: none"> Exact structure counts will be identified as final platmap and structure analysis is refined within the approved upon approach. HQ loading needs continued evaluation for additional structures identified in Augmented approached

Approvals			
	Distribution	Transmission	Substation

Action Items and Validations	

Inspections Methods Overview

Inspection methods are driven by maintenance and inspection manual/standards that associate equipment failure modes and preferred inspection type

	Distribution	Transmission	Substation
 <p>GROUND</p> <ul style="list-style-type: none"> Advantages <ol style="list-style-type: none"> Inspections done on site Minor work can be performed simultaneously (vegetation removal and mastic application) 	✓	✓	✓
 <p>CLIMBING</p> <ul style="list-style-type: none"> Advantages <ol style="list-style-type: none"> Internal guy tensioning Examination for loose / missing bolts 		✓ *Only 500kV	
 <p>AERIAL - DRONE / HELICOPTER</p> <ul style="list-style-type: none"> Advantages <ol style="list-style-type: none"> Close up evaluation of top half of structure Thorough images taken that can later be reviewed 		✓	✓

✓ = Inspection method within 2021 plan

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Distribution and Substation Inspections Methods Overview

Asset Class	Inspection Type	Structure / Asset Type	Inspection Cycle	
			Tier 2, Zone 1, HFRA	Tier 3
Distribution	Ground	Wood & Steel	3 years	Annual
Substations	Ground and Aerial	All Assets within Substation	3 years*	Annual

Inspection Method Rationale

- Aerial is not currently used for Distribution assets; **there are pilots being conducted for drone inspections** and there may be potential to do drone inspections in rural locations in the future.
- All substations will receive a ground inspection, **and all substations with outdoor equipment will receive an aerial inspection.**
- There are substations that are constructed with all equipment indoors that are not able to receive aerial inspections; there is also at least one substation that is constructed underground.

* Tier 2 & 3 Adjacent substations (i.e. substations within Tier 1 that meet certain proximity conditions for inspection) follow this cycle

Transmission Inspections Methods Overview

Voltage	Inspection Type	Structure Type	Inspection Cycle	
			Tier 2, Zone 1, HFRA	Tier 3
500 kV	Ground and Aerial	Steel	3 years	Annual
	Climbing	Steel	3 years	Annual
	Infrared	Steel	3 years	Annual
60-230 kV	Ground and Aerial	Steel	3 years	Annual
	Climbing	Steel	<i>As triggered</i>	<i>As triggered</i>
	Ground and Aerial	Wood	3 years	Annual
	Infrared	Steel and Wood	3 years	Annual

Inspection Method Rationale

- Ground and aerial inspections are visual, but find different issues at different rates. As a result, both inspections are performed.
- Climbing is performed for 500 kV because these inspections include internal guy tensions, which is required for these assets
- Non-500kV structures do not have prescribed climbing plans as the **higher find rate issues found from climbing have long deterioration cycles**
- Climbing in non-500kV is **triggered when certain deterioration/corrosion conditions are present** as defined by inspection job aids
- Infrared can identify issues that can't be assessed visually per the FMEA.

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Key Decision – Approval for Inspection Methods for 2021 Plan

Approval Status	Pending
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Decision Detail
This approval is for the inspection methods (ground, aerial, and climbing) to be used for the 2021 inspections for the Distribution Overhead, Transmission Overhead, and Substation plans. These methods are consistent with ETPM/EDPM/TD-3328S.

Concerns and Mitigations
<ul style="list-style-type: none"> Additional pilot programs may be proposed that introduce new methods within 2021 inspection year

Approvals			
	Distribution	Transmission	Substation

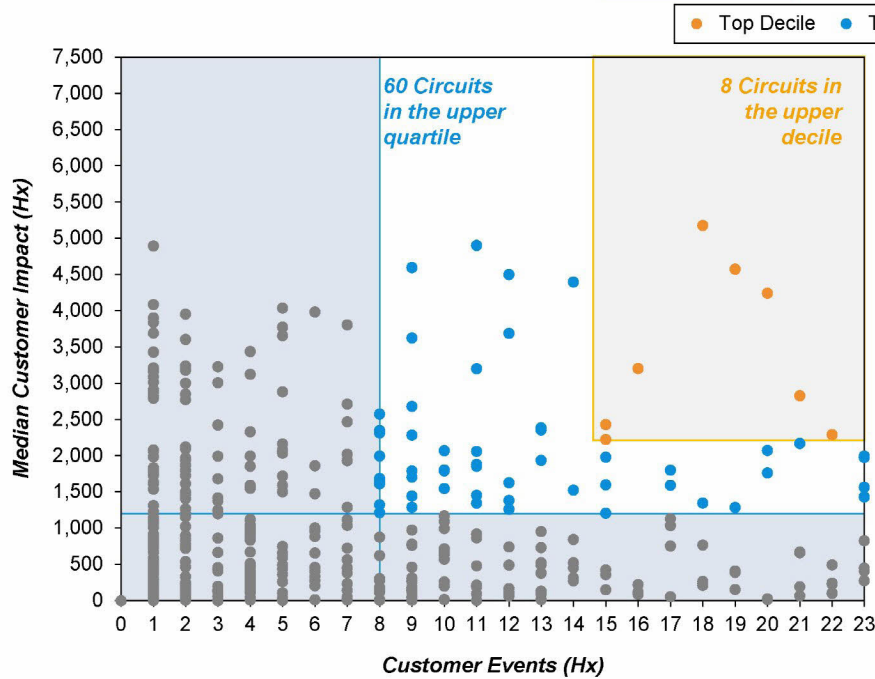
Action Items and Validations	

PSPS DISTRIBUTION UPDATE

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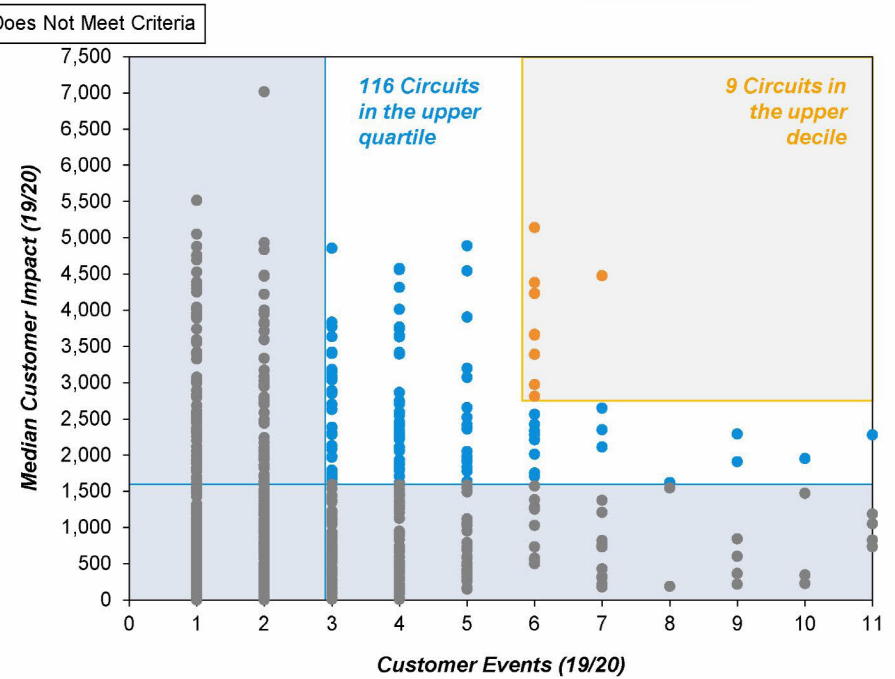
Circuits targeted for PSPS Mitigation can be triangulated by setting thresholds based on Median Customer Impacts and Event Frequency

PSPS Event Frequency and Impacted Customers (10 Year Lookback)¹



Quadrant Thresholds	Top Quartile	Top Decile
Customer Events	>8	>15
Median Customer Impact	>1,200	>2,200

PSPS Event Frequency and Impacted Customers (Actuals '19/'20)²



Quadrant Thresholds	Top Quartile	Top Decile
Customer Events	>3	>6
Median Customer Impact	>1,600	>2,800

Each dot on both scatter plots represents a circuit

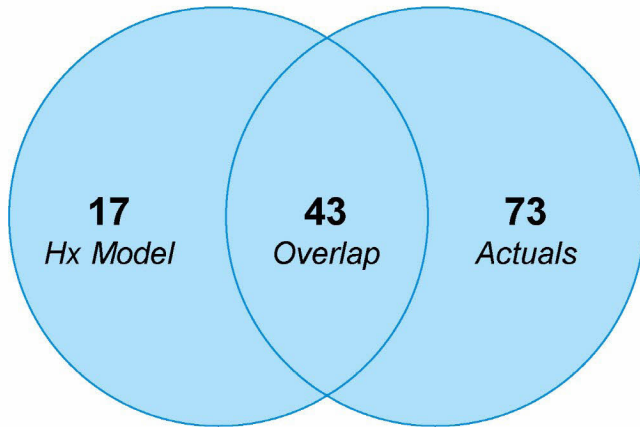
Note: (1) Excludes actual events from 2020; (2) Does not include 12/3 PSPS event in Kern; (2)

Thresholds for Event Frequency and Customer Impacts

For Discussion

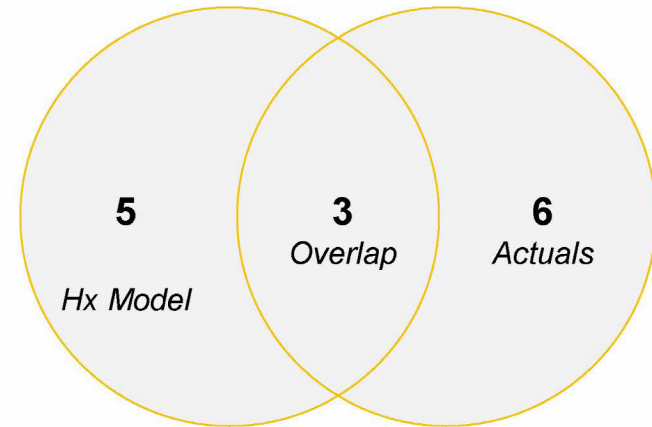
Given the agreed upon targeting method of the 2x2 matrix (Event Frequency and Median Customer Impacts); **Should we target circuits within the top quartile or top decile?**

Top Quartile: 133 target circuits



Quadrant Thresholds	10 yr Lookback	Actuals
Customer Events	>8	>3
Median Customer Impact	>1,200	>1,600

Top Decile: 14 target circuits



Quadrant Thresholds	10 yr Lookback	Actuals
Customer Events	>15	>6
Median Customer Impact	>2,200	>2,800

Prioritizing mitigation scoping for target circuits

Recommendation

Given the agreed upon thresholds and target circuits; we will prioritize circuits based on the total estimated customer impacts from on the 10-year lookback and 2020 actuals.

Top 15 (Top Quartile)	Total Estimated Customer Impacts
EL DORADO PH 2101	87,390
PLACERVILLE 2106*	78,265
APPLE HILL 2102	68,860
PINE GROVE 1102	67,736
STANISLAUS 1702*	58,658
WEST POINT 1102	58,145
ORO FINO 1101	57,925
PARADISE 1104	55,559
SILVERADO 2104	54,829
BRUNSWICK 1106	53,736
ORO FINO 1102	45,249
BRUNSWICK 1105	44,511
CALISTOGA 1102*	43,973
WEST POINT 1101	40,457
DUNBAR 1101*	40,258

List Continues...

Top 14 (Top Decile)	Total Estimated Customer Impacts
EL DORADO PH 2101	87,390
PLACERVILLE 2106*	78,265
APPLE HILL 2102	68,860
PINE GROVE 1102	67,736
WEST POINT 1102	58,145
ORO FINO 1101	57,925
BRUNSWICK 1106	53,736
BRUNSWICK 1105	44,511
DUNBAR 1101*	40,258
APPLE HILL 1104	38,715
FORESTHILL 1101*	35,743
RINCON 1101*	34,289
MOUNTAIN QUARRIES 2101	31,906
NARROWS 2102	14,998

Top Decile circuits should be targeted with a strong preference for System Hardening

Note: Circuits with a Asterix (*) have a planned / proposed PSPS mitigation

Approval to Scope Community Impact PSPS Projects (Ext. 10-15 Miles of Hardening)

Circuit	Recommendation	Key Notes	PSPS Targeting (Quartile / Decile)	PSPS Events (Hx)	PSPS Median Customer Impacts (Hx)	Total Customers Impacted (Hx)
PLACERVILLE 2106	System Hardening – TBD	3,000 ft UG	Target / Target	18	5,175	78,265
DUNBAR 1101	System Hardening – multi year	Extensive UG work and lots of Dx devices [about 2 mi UG]	Target / Target	16	3,203	40,258
CALISTOGA 1102	System Hardening 2021	Wastewater Treatment Plant	Target / Non-Target	20	2,071	43,973
CALISTOGA 1102	System Hardening 2021	UG or OH Possible	Target / Non-Target	20	2,071	43,973
MOUNTAIN QUARRIES 2101	System Hardening – TBD	To support Mid-Feeder Microgrid project	Target / Target	9	3,622	31,906
MARTELL 1101/OLETA 1101	System Hardening 2021	Sutter Creek	Target / Non-Target	13 / 7	1,934 / 1,037	16,486 / 8,380
PLACERVILLE 1112	System Hardening 2021	1100 ft along Reservoir St.; downtown commercial	Target / Non-Target	10	2,068	29,271
PLACERVILLE 1112	System Hardening 2021	800 ft along Blair St.	Target / Non-Target	10	2,068	29,271
WYANDOTTE 1109	System Hardening – TBD	1,600 ft UG; Tribal community currently supported by diesel generation	Target / Non-Target	8	2,313	18,504
BRUNSWICK 1110	System Hardening – TBD	1000 ft UG to benefit 400 customers, including key community resources	Target / Non-Target	10	1,801	20,582
ALLEGHANY 1101	System Hardening – multi year	Expensive and extensive UG work; options possible	Non-Target / Non-Target	17	1,034	22,200
OAKHURST 1101	System Hardening – TBD	High customer impact; low frequency; add'l circuits 1102/1103 could be mitigated	Non-Target / Non-Target	4	1,996	9,979
BANGOR 1101	System Hardening 2021	Complement to Microgrid Program	Target / Non-Target	19	411	14,759

11 of the 13 of the Community Impact circuits fall within the 133 circuits identified as part of the Top Quartile Threshold

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Key Decision – Approval of PSPS Mitigation Targeting and Prioritization (Distribution)

Approval Status	Pending
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Decision Detail

Distribution PSPS mitigations will be targeted based on a 2x2 comparison of Median Customer Impact and Customer Events (for both the Hx and '19/'20 actuals. Team requests approval on:

1. Approval for total customers impacted as the prioritization ranking to be used for the targeted circuits in the top quartile
2. Approval for the top quartile triangulation for the circuits that will be scoped for PSPS mitigations (133 circuits)
3. Approval for the top decile circuits to be aggressively scoped for system hardening work as soon as feasibly possible (14 circuits)
4. Approval for the 15-18 Miles of Customer Requested work to be done as system hardening work in support of PSPS Mitigations

Concerns and Mitigations

- The 10-year lookback is based on the 3x3km climatology (not the current 2x2klm climatology); Model to be updated later in 2021. Not expected to have a material impact in the projected customer impact or circuit prioritization. See appendix for additional detail.

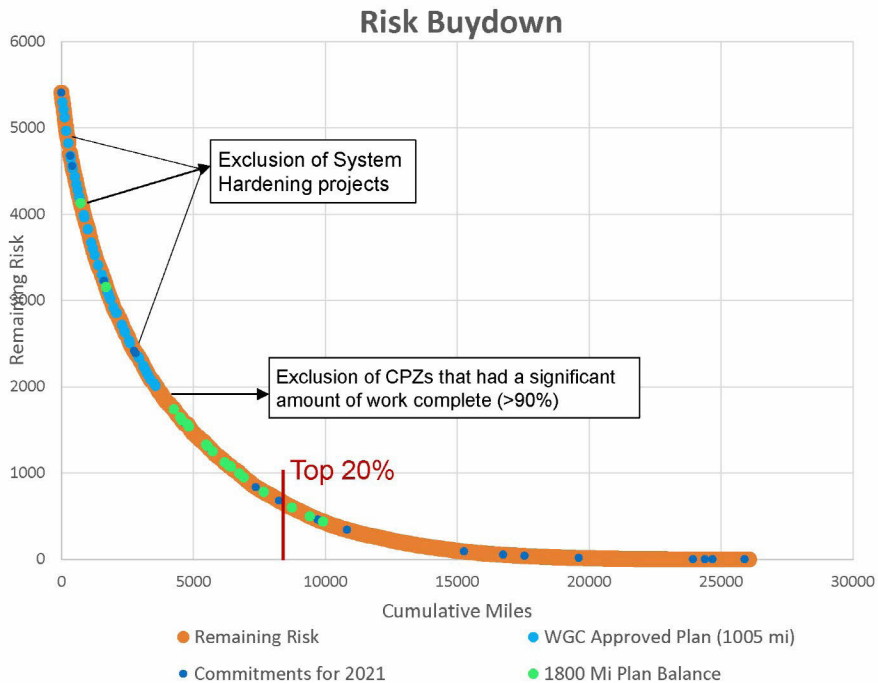
Approvals	

Action Items and Validations

VEGETATION MANAGEMENT UPDATE

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Risk Buydown Curve for the 2021 EVM Plan



VM Wildfire Risk Model

	Plan	WGC Approved (Original Plan)	WGC Approved - removed 3 SH Projects	Commitments	Remaining Optimization	Total
Risk Tranche	< 10%	1,056	1,005	10	28	1,044
	>10-20%	-	-	105	333	438
	>20-30%	-	-	60	82	142
	>30-40%	-	-	117	-	117
	>40-50%	-	-	36	-	36
	>50%	-	-	42	-	42
Total Miles	1,056	1,005	370	443	1,819	

Notes:

- **Update to Total Miles in WGC Approved Plan:** 3 of 4 identified System Hardening projects/CPZs existed on WGC Approved 'No Regrets' Plan. This removes 50 miles from original plan and re-allocates those miles to be re-optimized.
- **Commitment Miles:** Increased to include 105 miles of Girvan 1101 (Zogg Fire) over 4 CPZs.
- **Re-Optimization/Remaining Miles:** All of 12/15 re-optimization miles exist in the top 10% of Tree-Weighted Adjusted Risk.
- **New Total:** New total due to optimization is **1,819** (previously 1824)
- **Condition 1:** 1482 miles of system hardening are in the top 20% of risk according to the vegetation DX model, representing **81.5% of the total 2021 portfolio**
- **PSS Review:** Public safety specialist are still reviewing the 2021 plan, and additional changes may be routed through the change management process.

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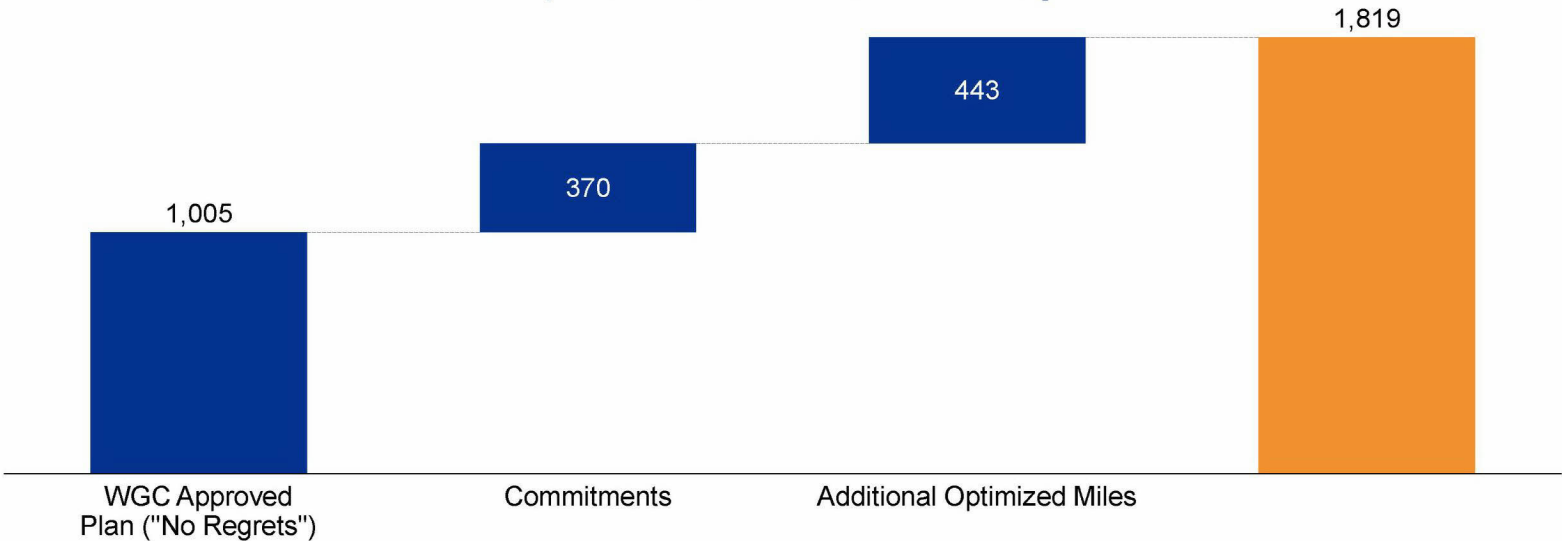
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2021 EVM Plan Details

2021 EVM DET

Miles	1,800
Budget	

1,819 Mile EVM Plan Build Up



	WGC Approved Plan ("No Regrets")	Commitments	Additional Optimized Miles	Total
Number of Trees Worked*	81,481	51,431	67,645	200,557
Cost (\$M)				
Risk Bought Down	1,122	64**	165	1,351**
Risk (Unit Uncertainty) (\$M)				

* This tree count has an efficiency coefficient incorporated, which VM is looking to improve upon in order to realize cost savings
 ** This is an approximation due to partial CPZs from the commitments, in which the EVM team has 95% confidence

Key Decision – Full 2021 EVM Plan

Approval Status	Pending
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Decision Detail
<p>EVM 2021 plan consists of 1,819 miles. This contains 1,005 miles of WGC approved plan, 370 miles of community commitments, and 443 additional optimized miles. Team requests approval on:</p> <ul style="list-style-type: none"> • Full 2021 EVM Plan

Concerns and Mitigations
<ul style="list-style-type: none"> • Subject to adjustments by PSS feedback which will be routed through the change control process

Approvals	

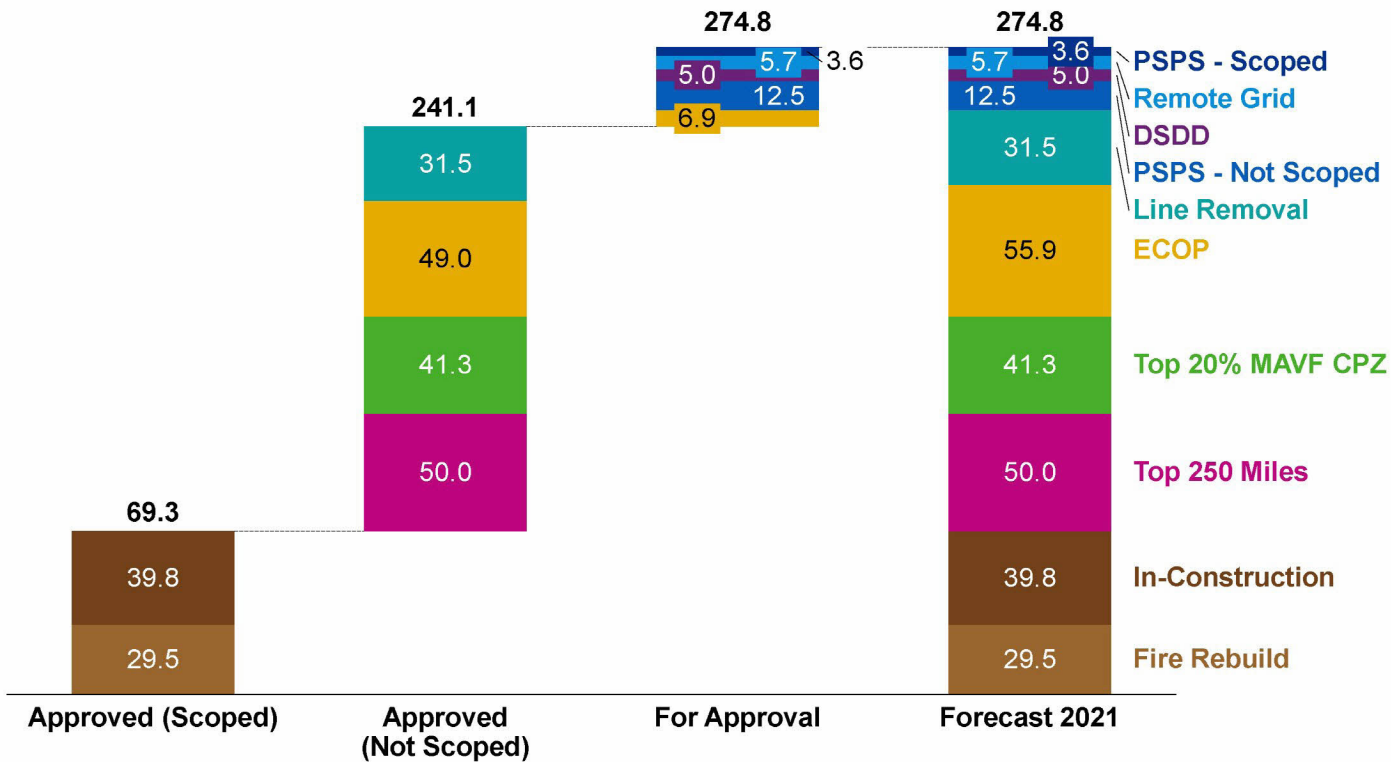
Action Items and Validations	

SYSTEM HARDENING UPDATE

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System Hardening – Project Approval Tracking

System Hardening Project Portfolio and Approvals (Total Miles)



Key Takeaways

Approvals for This Week

- DSDDD Pilot Projects (5 miles)
- PSPS-Scoped Mitigations (3.6 miles)
- PSPS-Community Impact Projects (10-15 Miles)
- Remote Grid Projects (5.7 Miles)
- ECOP Projects (6.9 miles)
- Total Miles for Approval: ~33.7**

Forecast 2021

Total Miles: 274.8
Plan Miles: 179.4

Planned miles reflect a discount applied to total miles based on the executability challenges for 2021 (see following slide)

2021 LTIP Target

	Total Miles	Discount Rate ¹	2021 Plan Miles	Condition 1 (80% of system hardening miles have to be highest-risk miles over the three-year period)	Condition 2 (Minimum percentage of miles mitigated with either Line Removal or Undergrounding over the three-year period)
				Meets Condition 1	Meets Condition 2
Scoped - Approved					
Fire Rebuild	29.5		29.5	29.5	24.6
In-Construction	39.8		39.8	5.11	-
Subtotal	69.3		69.3	34.6	24.6
Not Scoped - Approved					
Line Removal	31.5	10%	28.3	28.3	28.3
Highest Risk 250 Miles - Top 50	50	50%	25	25	-
Top 20% MAVF	41.3	50%	20.7	20.7	-
ECOP Projects In Estimating - In Top 20%	49.0	50%	24.5	24.5	10
Subtotal	171.8		98.5	98.5	38.3
Scoped - Not Yet Approved					
PSPS Mitigation	3.6	98%	0.1	0.1	0.1
ECOP Projects In Estimating - Not Top 20%	6.9	50%	3.5	-	-
Remote Grid	5.7	50%	2.8	1.4	2.8
DSDD	5.0		5	-	-
Subtotal	21.2		11.3	2.9	2.9
Not Scoped - Not Yet Approved					
PSPS Mitigation	12.5	98%	0.25	0.25	0.25
Subtotal	12.5		0.25	0.25	0.25
Total					
Total - By Category	274.8		179.4	133.36	63.15
			Percent of Plan	74%	35%

Note: (1) Discount rates applied based on the likelihood of completing work in 2021 due to executability issues

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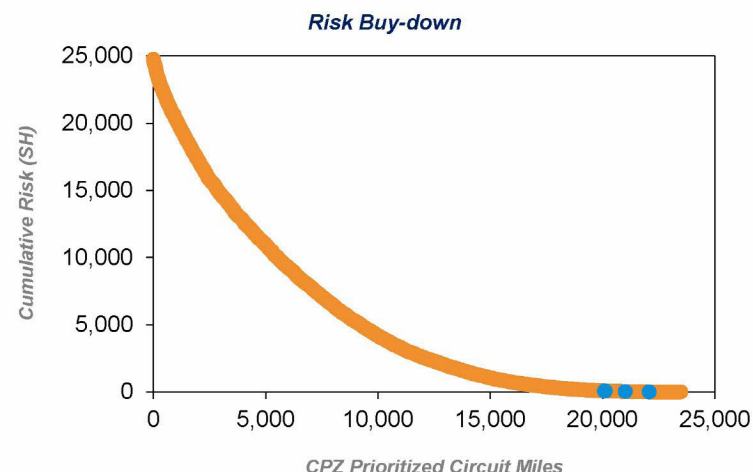
Approval to continue DSDD Pilot Projects

Background

- CalTrans now requires a civil PE stamp on electric projects for the Design Standard Decision Document (DSDD); PG&E organization is not designed to accommodate this new process requirement
- CalTrans has agreed to a pilot, whereby they would take on the Civil Stamp and charge PG&E through the permit process
- 12 projects are underway to pilot this new process, in order to establish a repeatable process for submitting these projects for permitting with CalTrans
- Seeking approval for 3 (listed below) which have not been approved via other means (~5.0 miles of hardening); these have already been submitted and are in-process with CalTrans

Impacts

- This pilot has broad-reaching impacts to all T&D electric work with CalTrans; impacts several hundred projects in the 2021 plan and may impede our ability to execute portions of the high risk projects this year
- 17 jobs were delayed by these new requirements in 2020; projects being scoped now in the top 20% are potentially impact (e.g., Middletown 1101, Middletown 1102)



Order	CPZ	Residual Miles	2021 Risk Rank	Notes
35052731	BIG BASIN 110110296	1.47	2456 (68%)	FOR APPROVAL
35052737	MIWUK 1701953336	1.587	2336 (64%)	FOR APPROVAL
35094513	STANISLAUS 17021804	1.92	2706 (74%)	FOR APPROVAL
35114040	PINE GROVE 11021222	1.4	2271 (62%)	<i>Approved as a part of in-construction projects approved on 12/5</i>
Total Miles		6.37		

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Key Decision – Approval to Continue DSDD Pilot Projects

Approval Status	Pending
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Decision Detail
<p>Request for all currently submitted Design Standards Decision Document (DSDD) pilot projects to continue in order to streamline our permitting process with CalTrans moving forward. Pilot projects are in review by CalTrans, and if removed the pilot would have to restart or face other delays.</p> <p>This includes three (3) orders accounting for 5.0 miles of hardening.</p>

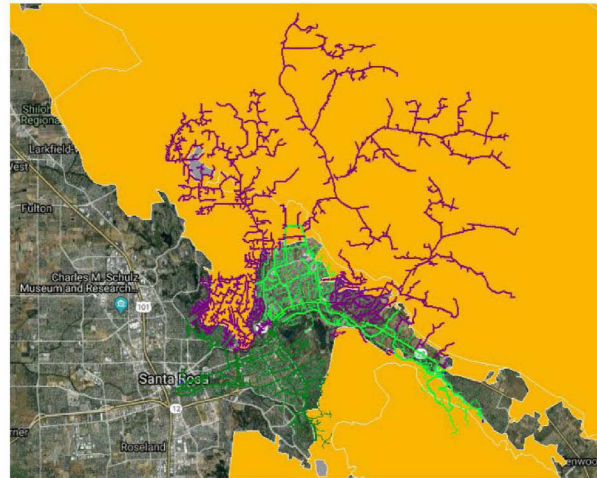
Concerns and Mitigations
<ul style="list-style-type: none"> • Removing these projects would require the pilot to restart • CalTrans permitting is a major hurdle for project set-up and deliver

Approvals	

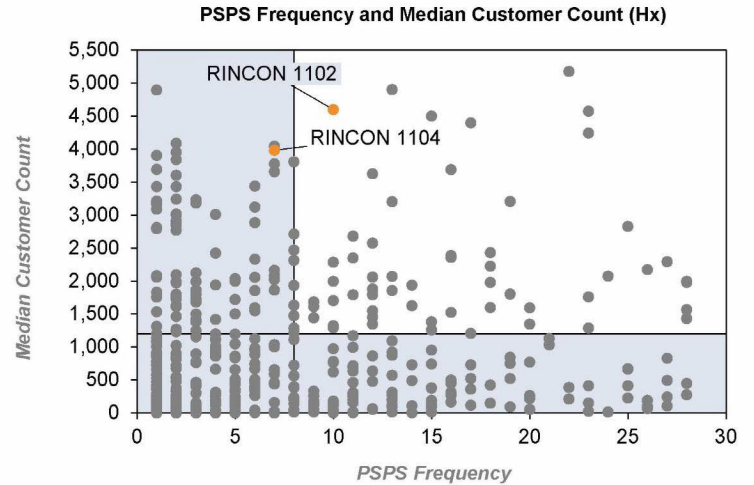
Action Items and Validations	

Proposed PSPS Project for Inclusion: Order 35145525 – Rincon 1102/1104

Project Location and Overview	
Work Bucket	PSPS
Circuit	Rincon 1102/1104
CPZ	Rincon 1104CB
County	Sonoma
Project Miles	1.78
Risk Statistics	
Mean Risk Score	0.069
Ignition Probability	5.1 E -05
Conseq. Rank	2944 (81%)
2021 Risk Rank	3302 (91%)
2018 Risk Rank	1257 (35%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	
Project Status	Field Scoping
In Service Date	9/1/2021
HFTD	Tier 3
Customer Count	8,697



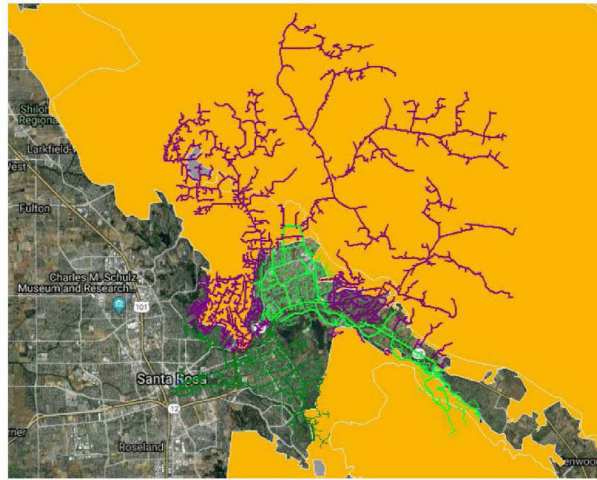
High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	8,564 / 1150 (-86%) <i>Upper Quartile of Hx PSPS 2x2</i>
Count of EC Tags	2 <i>(11 additional tags may be addressed with 1104 OH removal)</i>
Strike Potential Trees	297
Top Quartile of PSPS Prioritization	Yes
Fire Rebuild?	No



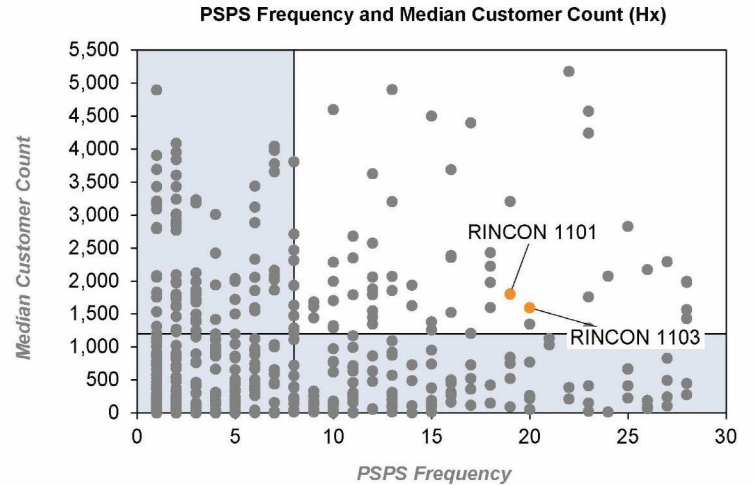
Mitigation Plan	
PSS Concerns	
<ul style="list-style-type: none"> Egress: Main travel routes are small, two lane roads, with minimal shoulder. Minimal impact to civilian egress, but significant for fire resources Fire History: Significant fire history directly impacting project area (Tubbs and Nuns, Kincade, Glass) 	
Mitigation Plan and Rationale	
<ul style="list-style-type: none"> 1.4 miles underground; 0.06 miles OH (due to creek crossing) UG mitigation chosen to keep customers energized during PSPS events. This substation is in Tier 2 serving ~7,500 customers in Tier 1. 	
Issues / Factors Influencing Timeline	
<ul style="list-style-type: none"> UG easement rights, project calls for long lead items - PMI-9TT. All UG option will likely extend timeline for creek crossing. 3 capacity jobs on Santa Rosa circuits that will impact the number of customers we can prevent from experiencing a PSPS event that are planned for 2021; without, can keep ~3,400 customers energized 	

Proposed PSPS Project for Inclusion: Order 35145524 – Rincon 1101/1103

Project Location and Overview	
Work Bucket	PSPS
Circuit	Rincon 1101/1103
CPZ	Rincon 1103CB
County	Sonoma
Project Miles	1.48
Risk Statistics	
Mean Risk Score	0.016
Ignition Probability	0.00016
Conseq. Rank	2033 (56%)
2021 Risk Rank	1755 (48%)
2018 Risk Rank	532 (15%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	
Project Status	Field Scoping
In Service Date	9/1/2021
HFTD	Tier 3
Customer Count	5,757



High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	6,280 / 2,730 (-56%) <i>Upper Quartile of Hx PSPS 2x2</i>
Count of EC Tags	0
Strike Potential Trees	347
Top Quartile of PSPS Prioritization	Yes
Fire Rebuild?	No

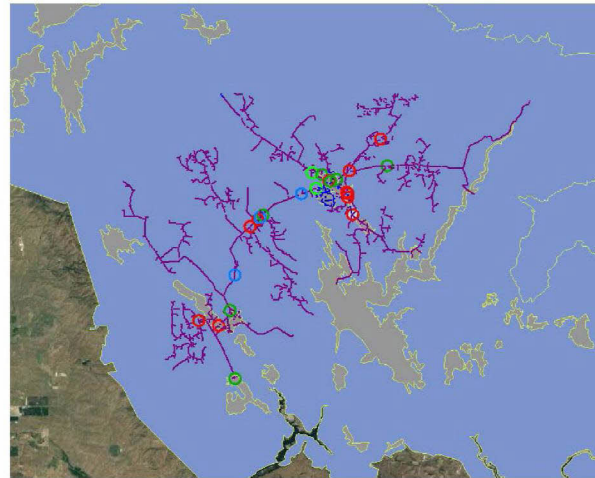


Mitigation Plan
<p>PSS Concerns</p> <ul style="list-style-type: none"> Egress: Main travel routes are small, two lane roads, with minimal shoulder. Minimal impact to civilian egress, but significant for fire resources Fire History: Significant fire history directly impacting project area (Tubbs and Nuns, Kincade, Glass) <p>Mitigation Plan and Rationale</p> <ul style="list-style-type: none"> 1.48 miles underground UG mitigation chosen to keep customers energized during PSPS events. This substation is in Tier 2 serving ~3,600 customers in Tier 1. <p>Issues / Factors Influencing Timeline</p> <ul style="list-style-type: none"> UG easement rights, project calls for long lead items - PMI-9TT. 3 capacity jobs on Santa Rosa circuits that will impact the number of customers we can prevent from experiencing a PSPS event that are planned for 2021; without, can keep ~3,400 customers energized

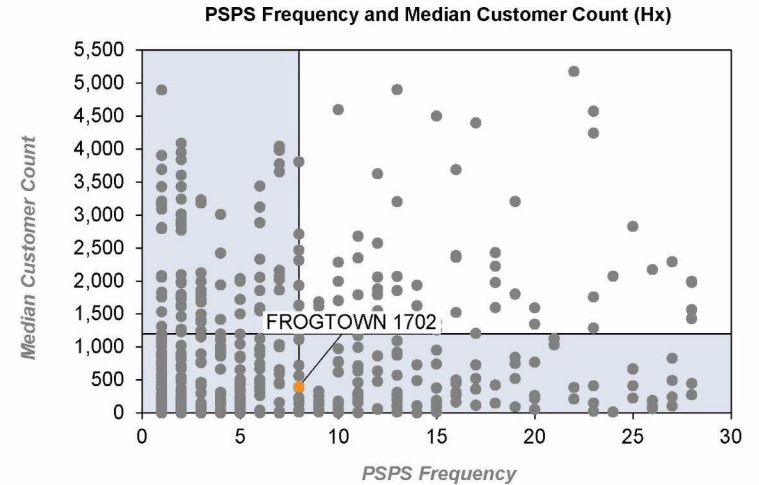
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Proposed PSPS Project for Inclusion: Order 35145540 – Frogtown 1702

Project Location and Overview	
Work Bucket	PSPS
Circuit	Frogtown 1702
CPZ	Frogtown 1702CB
County	Calaveras
Project Miles	1.09
Risk Statistics	
Mean Risk Score	0.039
Ignition Probability	0.00016
Conseq. Rank	1692 (47%)
2021 Risk Rank	1316 (36%)
2018 Risk Rank	2556 (70%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	
Project Status	Field Scoping
In Service Date	9/1/2021
HFTD	Tier 3
Customer Count	4,177



High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	4,050 / 2,116 (-48%) <i>Upper Quartile of Actual PSPS 2x2</i>
Count of EC Tags	15 <i>(13 additional may be addressed during removal of 715A Conductor)</i>
Strike Potential Trees	155
Top Quartile of PSPS Prioritization	No
Fire Rebuild?	No



Mitigation Plan	
PSS Concerns	
<ul style="list-style-type: none"> Egress: This project would alleviate the hazard of infrastructure falling into highway 49 (primary ingress / egress route for civilians and first responders) Fire History: Minimal fire history in town; significant fire history to the North, South, and East (e.g., Butte 2015, Rim 2013, Darby 2001) 	
Mitigation Plan and Rationale	
<ul style="list-style-type: none"> 0.59 miles underground; 0.7 miles OH; 1.1 miles OH removal UG mitigation chosen to keep customers energized during PSPS events. This substation is in Tier 2 serving ~2,000 customers in Tier 1. 	
Issues / Factors Influencing Timeline	
<ul style="list-style-type: none"> UG CalTrans easement rights down CA HWY 49. 450' of new easements to serve existing UG customers. 	

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Approval to Scope Community Impact PSPS Projects (Ext. 10-15 Miles of Hardening)

Circuit	Recommendation	Key Notes	PSPS Targeting (Quartile / Decile)	PSPS Events (Hx)	PSPS Median Customer Impacts (Hx)	Total Customers Impacted (Hx)
PLACERVILLE 2106	System Hardening – TBD	3,000 ft UG	Target / Target	18	5,175	78,265
DUNBAR 1101	System Hardening – multi year	Extensive UG work and lots of Dx devices [about 2 mi UG]	Target / Target	16	3,203	40,258
CALISTOGA 1102	System Hardening 2021	Wastewater Treatment Plant	Target / Non-Target	20	2,071	43,973
CALISTOGA 1102	System Hardening 2021	UG or OH Possible	Target / Non-Target	20	2,071	43,973
MOUNTAIN QUARRIES 2101	System Hardening – TBD	To support Mid-Feeder Microgrid project	Target / Target	9	3,622	31,906
MARTELL 1101/OLETA 1101	System Hardening 2021	Sutter Creek	Target / Non-Target	13 / 7	1,934 / 1,037	16,486 / 8,380
PLACERVILLE 1112	System Hardening 2021	1100 ft along Reservoir St.; downtown commercial	Target / Non-Target	10	2,068	29,271
PLACERVILLE 1112	System Hardening 2021	800 ft along Blair St.	Target / Non-Target	10	2,068	29,271
WYANDOTTE 1109	System Hardening – TBD	1,600 ft UG; Tribal community currently supported by diesel generation	Target / Non-Target	8	2,313	18,504
BRUNSWICK 1110	System Hardening – TBD	1000 ft UG to benefit 400 customers, including key community resources	Target / Non-Target	10	1,801	20,582
ALLEGHANY 1101	System Hardening – multi year	Expensive and extensive UG work; options possible	Non-Target / Non-Target	17	1,034	22,200
OAKHURST 1101	System Hardening – TBD	High customer impact; low frequency; add'l circuits 1102/1103 could be mitigated	Non-Target / Non-Target	4	1,996	9,979
BANGOR 1101	System Hardening 2021	Complement to Microgrid Program	Target / Non-Target	19	411	14,759

11 of the 13 of the Community Impact circuits fall within the 133 circuits identified as part of the Top Quartile Threshold

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Key Decision – Approval of the PSPS Projects

Approval Status	Pending
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Decision Detail
<ol style="list-style-type: none"> Twelve (12) PSPS projects currently in the O&W pipeline; of which three (3) are being recommended for approval based on an the 10 year look-back for PSPS event frequency, customer impact and community project considerations. Primary hardening method is UG, unless prevented by topography or ROW concerns. Community Impact Projects which have been evaluated via the PSPS evaluation criteria outlined previously

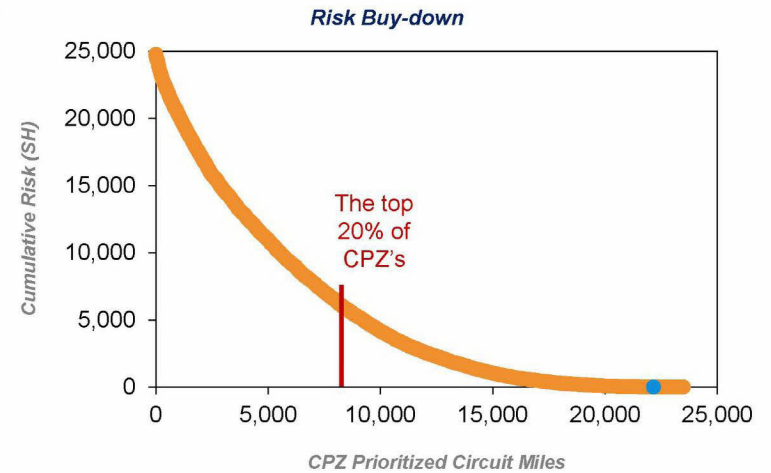
Concerns and Mitigations
<ul style="list-style-type: none"> Capacity jobs on Santa Rosa will impact the PSPS mitigation effects for the Rincon jobs (until completed in June 2021).

Approvals	

Action Items and Validations	

Proposed RG Project for Inclusion: #631 UC Berkeley Whitaker

Project Location and Overview	
Work Bucket	Hardening
Circuit	Dunlap 1102
CPZ	DUNLAP 1102778286
County	Tulare
Project Miles	2.6
Risk Statistics	
Mean Risk Score	0.000491
Ignition Probability	3.64E-05
Conseq. Rank	2461 (68%)
2021 Risk Rank	2738 (75%)
2018 Risk Rank	2637 (73%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	-
Project Status	Field Scoping
In Service Date	12/1/2021
HFTD	Tier 2
Customer Count	3



High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	3
Count of EC Tags	0
Strike Potential Trees	21
CPZ in Top 20% of Risk?	No
Fire Rebuild?	No

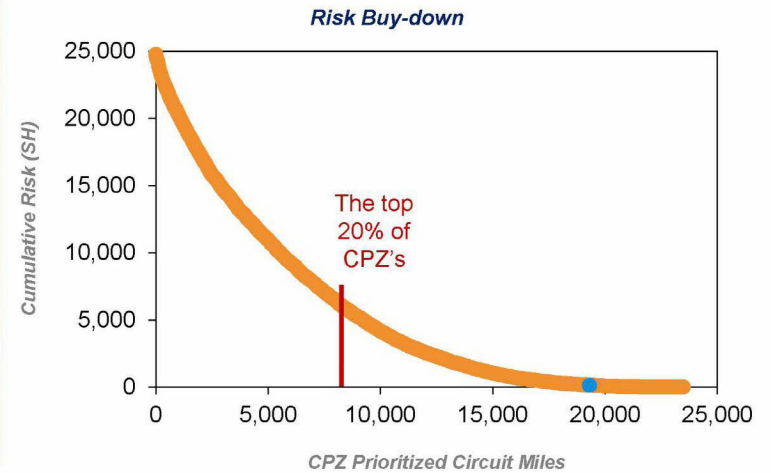
Mitigation Plan
<p>PSS Concerns</p> <ul style="list-style-type: none"> Egress: Main travel route ~2 mile dirt road off main highway not maintained by county. Bad weather will make it difficult to traverse without 4x4. Minimal impact to civilian egress, but significant for fire resources Fire History: Proximity to fires, but not on actual footprint <p>Mitigation Plan and Rationale</p> <ul style="list-style-type: none"> 2.6 miles of line removed Eliminate line hardening requirement, reduce PSPS customer impacts, and savings of ~89% compared to Hardening Customer potentially will have ability to stay on during PSPS events Strong customer interest in project due to current frequent outages <p>Issues / Factors Influencing Timeline</p> <ul style="list-style-type: none"> Cultural Survey issues - Work area is within an area currently mapped by the California Historic Resources Information System as being two overlapping archaeological sites - high chance that avoidance of the resource will not be feasible. Survey is just the beginning of the process, and that testing either for historic eligibility or for boundary/feature testing will end up being necessary – extending time for completion. Possibility of CEQA requirement (MND or EA) Proximity of sites to federal lands

Proposed RG Project for Inclusion: #650 Ringtail

Project Location and Overview	
Work Bucket	Hardening
Circuit	Placerville 2106
CPZ	PLACERVILLE 21061104
County	El Dorado
Project Miles	0.7
Risk Statistics	
Mean Risk Score	0.006447
Ignition Probability	0.000119
Conseq. Rank	2171 (60%)
2021 Risk Rank	2131 (59%)
2018 Risk Rank	14 (0%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	-
Project Status	Field Scoping
In Service Date	12/1/2021
HFTD	Tier 3
Customer Count	1



High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	1
Count of EC Tags	0
Strike Potential Trees	8,666
CPZ in Top 20% of Risk?	No
Fire Rebuild?	No

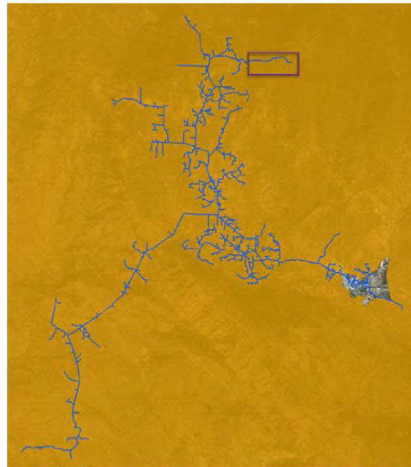


Mitigation Plan
<p>PSS Concerns</p> <ul style="list-style-type: none"> ▪ Egress: Main route includes partial steep dirt road with potential winter access issues without 4x4. Minimal impact to civilian egress, but significant for fire resources ▪ Fire History: Proximity to fires, but not on actual footprint <p>Mitigation Plan and Rationale</p> <ul style="list-style-type: none"> ▪ 0.7 miles of line removed ▪ Eliminate line hardening requirement, reduce PSPS customer impacts, and savings of ~47% compared to Hardening ▪ Customer potentially will have ability to stay on during PSPS events <p>Issues / Factors Influencing Timeline</p> <ul style="list-style-type: none"> ▪ Customer desire for input on fence aesthetics

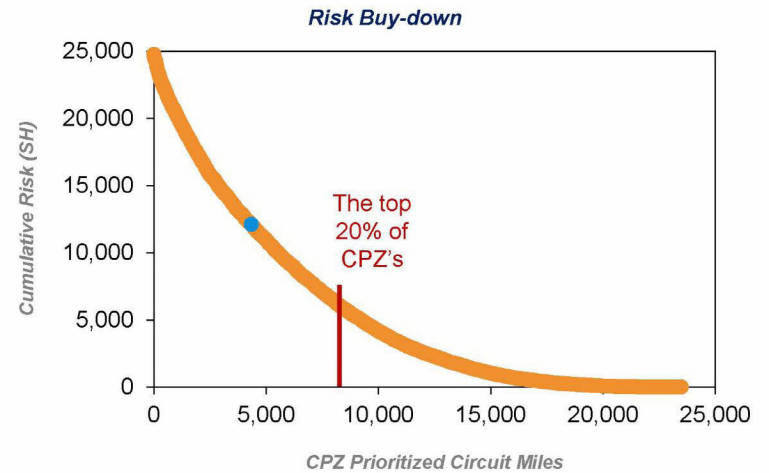
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Proposed RG Project for Inclusion: #581 Miami Mountain

Project Location and Overview	
Work Bucket	Hardening
Circuit	Oakhurst 1101
CPZ	OAKHURST 110110090
County	Mariposa
Project Miles	1.5
Risk Statistics	
Mean Risk Score	0.174369
Ignition Probability	5.7E-05
Conseq. Rank	167 (5%)
2021 Risk Rank	421 (12%)
2018 Risk Rank	1021 (28%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	-
Project Status	Field Scoping
In Service Date	12/1/2021
HFTD	Tier 3
Customer Count	2



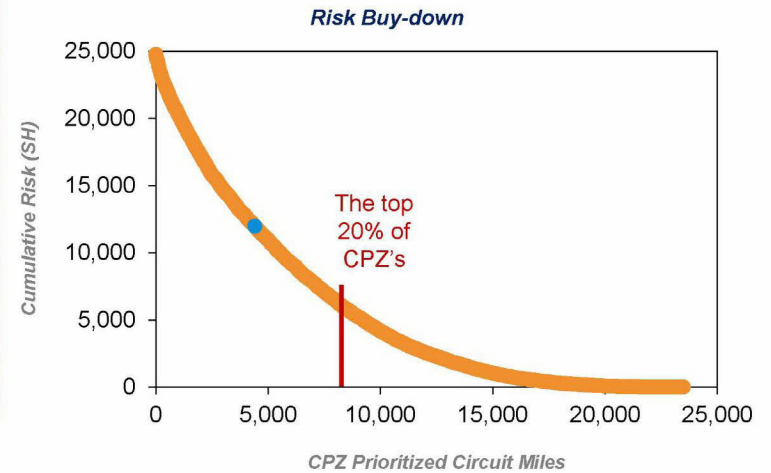
High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	2
Count of EC Tags	14
Strike Potential Trees	3,724
CPZ in Top 20% of Risk?	Yes
Fire Rebuild?	No



Mitigation Plan
<p>PSS Concerns</p> <ul style="list-style-type: none"> Egress: Main travel route is long, one lane dirt road off main highway. Bad weather will make it difficult to traverse without 4x4. Minimal impact to civilian egress, but significant for fire resources Fire History: Prior PG&E ignition on property. General proximity to fires Vegetation: Significant annual veg management, huge number of dead pines/regrowth fuel load under non-insulated primary <p>Mitigation Plan and Rationale</p> <ul style="list-style-type: none"> 1.5 miles of line removed Eliminate line hardening requirement, reduce PSPS customer impacts, and savings of ~65% compared to Hardening Eliminate significant re-occurring veg mgmt. work Customer potentially will have ability to stay on during PSPS events <p>Issues / Factors Influencing Timeline</p> <ul style="list-style-type: none"> Wetlands proximity to one footprint (Biologist survey complete, have 2 alternative footprints) Cultural survey – potential historic building proximity

Proposed RG Project for Inclusion: #531 Slaughter House

Project Location and Overview	
Work Bucket	Hardening
Circuit	Mariposa 2101
CPZ	MARIPOSA 210135244
County	Mariposa
Project Miles	0.99
Risk Statistics	
Mean Risk Score	0.172856
Ignition Probability	7.61E-05
Conseq. Rank	468 (13%)
2021 Risk Rank	428 (12%)
2018 Risk Rank	1464 (40%)
Operational Characteristics	
Estimated Full Project Cost (Expected Case)	
Actual and Committed Costs	-
Project Status	Field Scoping
In Service Date	12/1/2021
HFTD	Tier 3
Customer Count	2



High Risk Flags	
PSPS Customer Impacts (Pre / Post) mitigation	2
Count of EC Tags	3
Strike Potential Trees	1,144
CPZ in Top 20% of Risk?	Yes
Fire Rebuild?	No

Mitigation Plan
<p>PSS Concerns</p> <ul style="list-style-type: none"> ▪ Egress: Main travel route is long, one lane dirt road (~3 miles) off main highway. Bad weather will make it difficult to traverse without 4x4. Minimal impact to civilian egress, but significant for fire resources ▪ Fire History: General proximity to fires, but not on actual footprint <p>Mitigation Plan and Rationale</p> <ul style="list-style-type: none"> ▪ 1 mile of line removed ▪ Eliminate line hardening requirement, reduce PSPS customer impacts, and savings of ~62% compared to Hardening ▪ Customer potentially will have ability to stay on during PSPS events <p>Issues / Factors Influencing Timeline</p> <ul style="list-style-type: none"> ▪ Multiple private parties involved <ul style="list-style-type: none"> - Tenant-Owner – need multiple approvals for customer service agreement and easement agreement - Multiple parties on property deed ▪ Very dilapidated buildings and services panels ▪ Customer desire for input on fence aesthetics

Key Decision – Approval to Execute Remote Grid Projects

Approval Status	Pending
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Decision Detail
4 remote grid projects for approval in the 2021 plan. Projects include 5.7 miles of line removal and significant reduction in customer impacts versus system hardening.

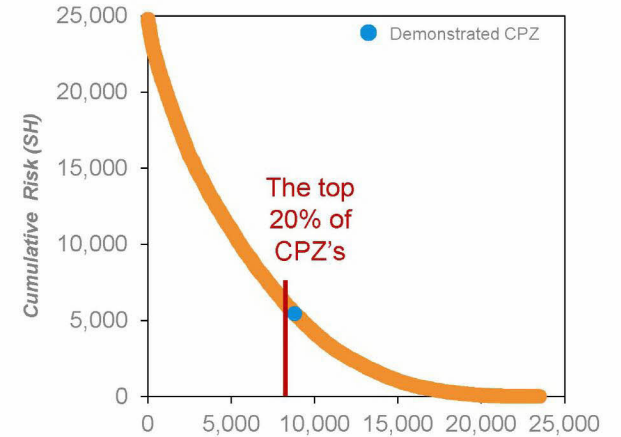
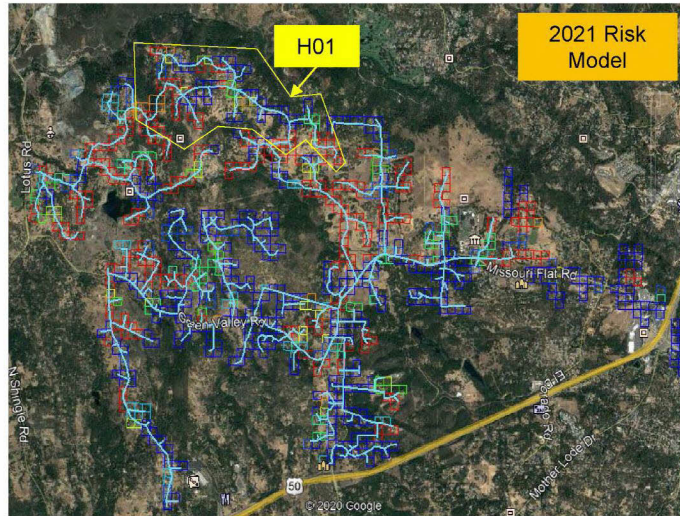
Concerns and Mitigations
<ul style="list-style-type: none"> Cultural survey issues: Some sites near California historic sites; surveys on-going

Approvals	

Action Items and Validations	

Proposed ECOP Project for Inclusion

Project Location and Overview	
Work Bucket	ECOP
Circuit	DIAMOND SPRINGS 1107
CPZ	DIAMOND SPRINGS 11071402
Project Miles	2.59
CPZ Risk Statistics	
Risk Score	0.092
Ignition Probability	9.14 E -05
Conseq. Rank	726 (20%)
Avg. Score Rank	811 (22%)



Operational Characteristics	
Project Cost (Forecast)	
Project Status	AA Approved
In Service Date	12/2023
HFTD	Tier 2/Tier 3
Customer Count	126

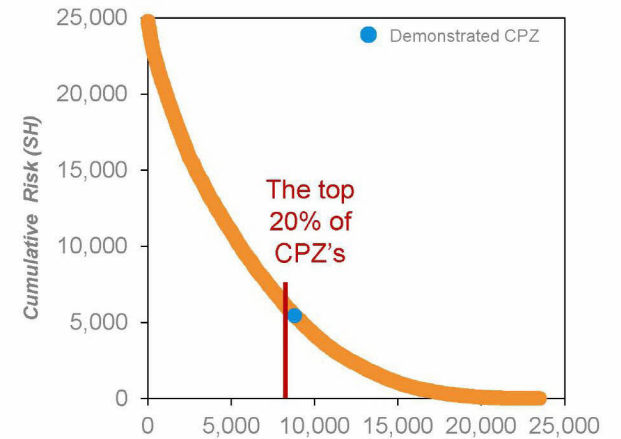
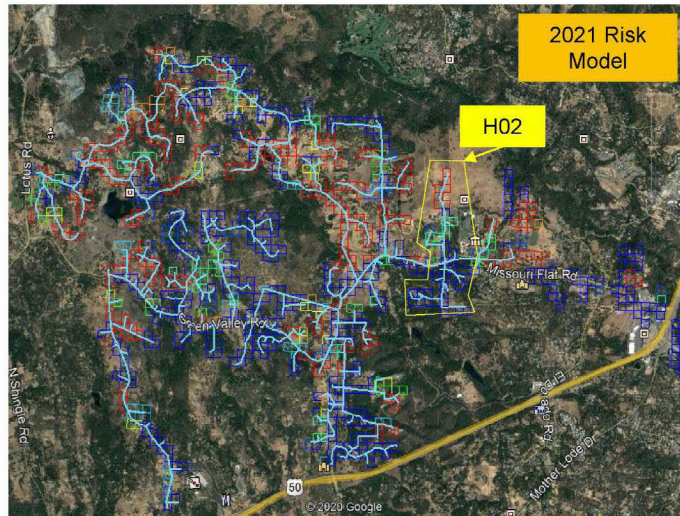
High Risk Flags	
Count of PSPS Events	0
Count of EC Tags	44
CPZ in Top 20% of Risk?	No
Fire Rebuild?	No

Mitigation Plan
<p>Is this circuit being removed? Why not?</p> <ul style="list-style-type: none"> Customer connections prohibit the removal of the line
<p>Is this circuit being Undergrounded? Why not?</p> <ul style="list-style-type: none"> Mitigations are under consideration
<p>What Overhead Mitigations are being deployed?</p> <ul style="list-style-type: none"> Mitigations are under consideration

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Proposed ECOP Project for Inclusion

Project Location and Overview	
Work Bucket	ECOP
Circuit	DIAMOND SPRINGS 1107
CPZ	DIAMOND SPRINGS 11071402
Project Miles	2.18
CPZ Risk Statistics	
Risk Score	0.092
Ignition Probability	9.14 E -05
Conseq. Rank	726 (20%)
Avg. Score Rank	811 (22%)



Operational Characteristics	
Project Cost (Forecast)	
Project Status	AA Submitted
In Service Date	12/2023
HFTD	Tier 2/Tier 3
Customer Count	32

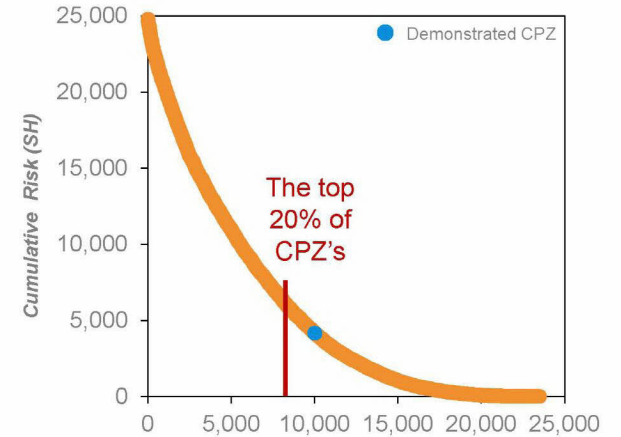
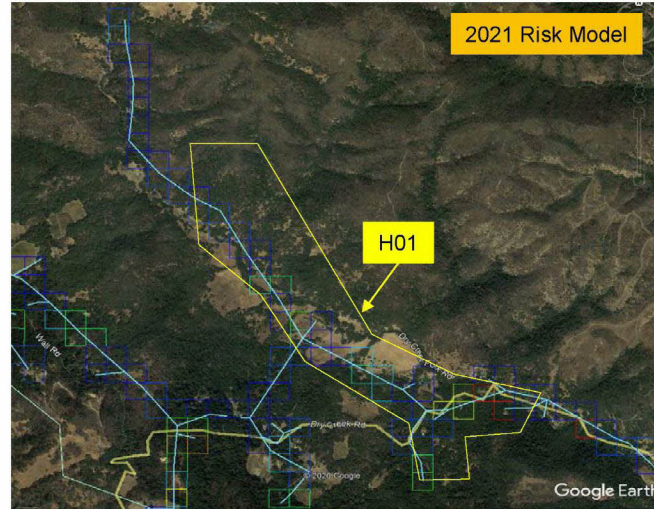
High Risk Flags	
Count of PSPS Events	0
Count of EC Tags	41
CPZ in Top 20% of Risk?	No
Fire Rebuild?	No

Mitigation Plan
<p>Is this circuit being removed? Why not?</p> <ul style="list-style-type: none"> Customer connections prohibit the removal of the line
<p>Is this circuit being Undergrounded? Why not?</p> <ul style="list-style-type: none"> Mitigations are under consideration
<p>What Overhead Mitigations are being deployed?</p> <ul style="list-style-type: none"> Mitigations are under consideration

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Proposed ECOP Project for Inclusion

Project Location and Overview	
Work Bucket	ECOP
Circuit	PUEBLO 2102
CPZ	PUEBLO 2102792
Project Miles	2.13
Risk Statistics	
Risk Score	0.073
Ignition Probability	9.9 E -05
Conseq. Rank	1012 (28%)
Avg. Score Rank	951 (26%)



Operational Characteristics	
Project Cost (Actual)	
Project Status	AA Approved
In Service Date	12/2022
HFTD	Tier 3
Customer Count	15

High Risk Flags	
Count of PSPS Events	0
Count of EC Tags	19
CPZ in Top 20% of Risk?	No
Fire Rebuild?	No

Mitigation Plan
<p>Is this circuit being removed? Why not?</p> <ul style="list-style-type: none"> Customer connections prohibit the removal of the line
<p>Is this circuit being Undergrounded? Why not?</p> <ul style="list-style-type: none"> Mitigations are under consideration
<p>What Overhead Mitigations are being deployed?</p> <ul style="list-style-type: none"> Mitigations are under consideration

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Key Decision – ECOP Project Approval

Approval Status	Pending
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Decision Detail
This approval is for the inspection methods (ground, aerial, and climbing) to be used for the 2021 inspections for the Distribution Overhead, Transmission Overhead, and Substation plans. These methods are consistent with ETPM/EDPM/TD-3328S.

Concerns and Mitigations
<ul style="list-style-type: none"> Additional pilot programs may be proposed that introduce new methods within 2021 inspection year

Approvals	

Action Items and Validations	

APPENDIX

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90% Percentile Consequence Score (P90) Alignment with Current Inspection Plans



Overview of

P90 is a descriptive statistic for the wildfire consequence on PG&E electrical systems. It is determined by looking at the 90th percentile of consequence scores. This measure only examines consequence, and does not include a likelihood component.

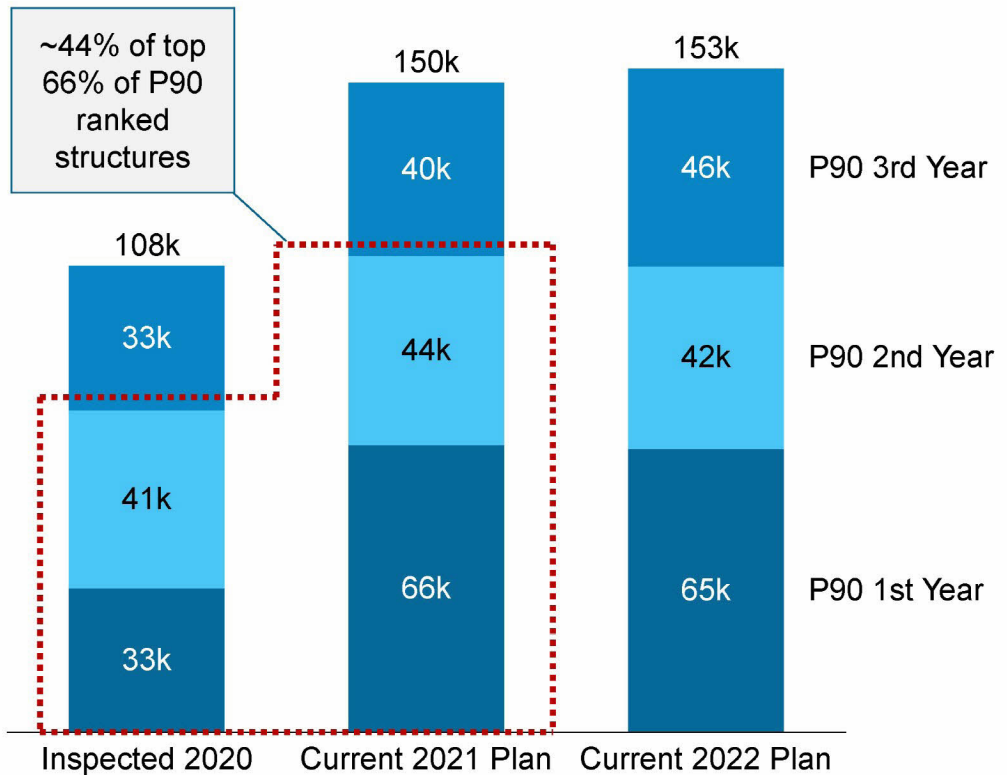
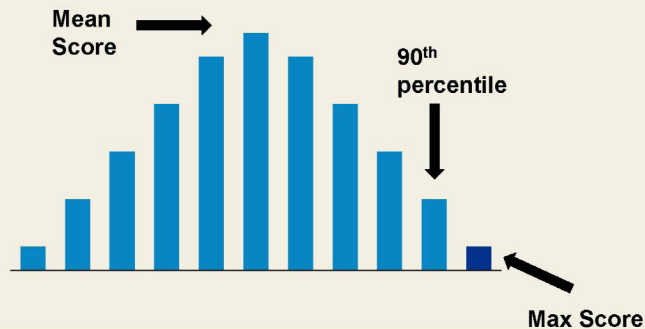
LoRe

X

CoRe (Ignition Spread X Consequence)

P90 helps to tell a more wholistic story than other descriptive statistics

- The mean value provides a measure of central tendency, but does not fully highlight tail risk.
- Max scores are noisy, and can see significant variance in results




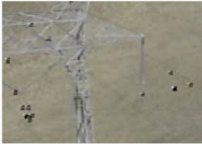
- Does not include T2 structures in T3 inspection cycles
- Does not include structures in platmaps without P90 scores (~586 structures)

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90% Percentile Consequence FAQ

- **Why was the 90th percentile of consequence used instead of a mean value like in the 2021 Conductor Risk Model, or some other aggregation like max, median, sum?**
 - The maximum within each plat cell is the metric most sensitive to noise
 - Median/mean/sum would all effectively "erase" information about how dangerous some spots within a plat cell could be
- **Why was the 90th percentile approach not selected for other models like the 2021 Conductor Risk Model or the 2021 EVM Risk Model?**
 - These two models are calibrated to produce risk scores across HFTD 2 and 3
 - These risk scores must be able to be aggregated, and compared to other similar scores which mandates the aggregation by averaging or summing
- **Is the 90th percentile based on all the wildfire simulations run?**
 - Yes; The per-pixel consequence scores are based on all the wildfire simulations run at the simulation site in that pixel
- **Were any corrections proposed or implemented due to the highly variable and skewed nature of the consequences outcomes?**
 - Yes; Choosing p90 which avoids the potentially noisy nature of max values.
 - Consequence values are currently "skewed" to express worst case scenarios

Overhead Inspections – Other Transmission Programs

Program	Description	Scope
Osmose below-grade foundation pilot	Below-grade inspections to identify correlations between above ground observations and below ground condition. Results to inform operability assessment and detailed inspection methods.	Representative sample size to allow statistical evaluation of many characteristics (foundation, soil type, structure age, other geographic factors, etc.).
LineVue 	Assess steel core conductor condition (remaining cross sectional area, identify local flaws)	Pilot testing performed at Livermore Training Center using conductor pulled from field. Field testing on one circuit scheduled this month, another possible test under discussion for 2021.
ATS sampling program	Collect and test at ATS components whose condition cannot be evaluated visually per the FMEA.	Representative sample size to allow statistical evaluation of many characteristics (component type, age, geographic factors, etc.). Most samples obtained to date have been opportunistically collected from pole replacements and predominantly represent HFTD areas.
Drone Span	Drone photos and inspector review across entire line spans, for enhanced visibility to mid-span conditions.	Pilot testing on the Oleum-North Tower-Christie 115 kV Line as part of interim conductor risk assessment before the capital conductor replacement project is installed.
Corona inspection 	Combined IR/UV inspection. Vendor provides full video.	Performed on all lines receiving IR inspections in 2020. Two findings. Review of findings and determination of additional scope is ongoing.

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Climbing Inspections for non-500 kV provided better insights than drone inspections in some instances; expanding climbing inspections beyond current scope would require additional funding

Climbing inspections of non-500 kV towers

- Data from 2019 WSIP (most towers received combined climbing/ground inspection).
- Climbing gives *higher (worse) condition scores for steel members* than drone inspections.
- Climbing *identified more non-conformances related to damaged/loose members and bolts* than drone inspections.

Distribution of non-500 kV tower steel member inspection scores

Non-500 kV Score	Steel Member Score	
	Climbing	Drone
1 (best)	54.0%	72.5%
2	39.2%	24.2%
3	6.2%	3.1%
4	0.5%	0.2%
5 (worst)	0.1%	0.0%

Find rates for selected inspection questions

Non-500 kV Lattice Structures 2019 Inspections	Responses for Both Climbing and Drone	Both inspections found issue	Climbing find / Drone miss	Climbing miss / Drone find	Issue not found
Damaged members (e.g., broken, bent, corrosion)	12,027	1.7%	10.0%	5.0%	83.3%
Damaged crossarm/framing	11,319	0.2%	2.4%	2.6%	94.9%
Loose or missing members	12,034	0.1%	1.2%	0.4%	98.3%
Damaged bolts	12,009	0.0%	0.8%	0.4%	98.7%
Loose bolts	12,007	0.0%	2.1%	0.5%	97.4%
Galvanized or paint finish in poor condition	11,972	2.0%	7.9%	6.3%	83.8%

Option	Description
Status quo	<ul style="list-style-type: none"> No additional prescribed climbing inspections. Climbing inspections remain as-triggered by field/engineering. Further explore changes for 2021 ETPM rollout in June.
Alternative 1	<ul style="list-style-type: none"> Change the as-triggered language to specify certain scenarios. Scenario 1: High Technosylva consequence > 250 buildings: ~724 lattice structures at [REDACTED] (approx. +27% to current climbing budget, +1% to overall transmission inspection budget). Scenario 2: Structures with specific findings from 2019 climbing inspection. Estimated 1000-1500 structures depending on selection of findings. Approx. [REDACTED]
Alternative 2	<ul style="list-style-type: none"> Change to annual climbing for lattice structures in Tier 3, 3-year cycle for Tier 2/Zone 1/HFRA, 5-year cycle for non-HFTD. Approx. 2400 Tier 3, 2600 Tier 2/Zone 1/HFRA, 3900 non-HFTD per year. Cost at [REDACTED] (approx. +350% to current climbing budget, +14% to overall transmission inspection budget). Could modify this alternative to require climbing inspections on alternate cycles.
Alternative 3	<ul style="list-style-type: none"> Change to annual climbing for lattice structures in Tier 3, 3-year cycle for Tier 2/Zone 1/HFRA. Non-HFTD structures remain as-triggered. Approx. 2400 Tier 3, 2600 Tier 2/Zone 1/HFRA. Cost at [REDACTED] (approx. +180% to current climbing budget, +7% to overall transmission inspection budget).

Alternatives 1-3 will require additional funding not in current investment plan.

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10 Year Lookback (HX) Analysis

PSPS mitigations are being targeted using the 10-Year lookback (Hx) analysis completed by meteorology

What it is:

- This analysis simulates the number of PSPS events and customer impacts per event given the 2020 scoping criteria
- Leverage the 10 year lookback model evaluates the number of events and customer impacts using the 2020 scoping criteria
- Impacts are broken down by Dx, Tx, and Substations, which allows for specific targeting for different mitigation options

Potential Challenges:

- The 10-year lookback is based on the 3x3km climatology (not the current 2x2klm climatology)
- Does not include the transmission vegetation guidance that was amended in September
- Does no include OA scores improve on structures where targeted repairs were made over the year

Mitigation targets are also evaluated against the actual results from 2019/2020 to triangulate target circuits

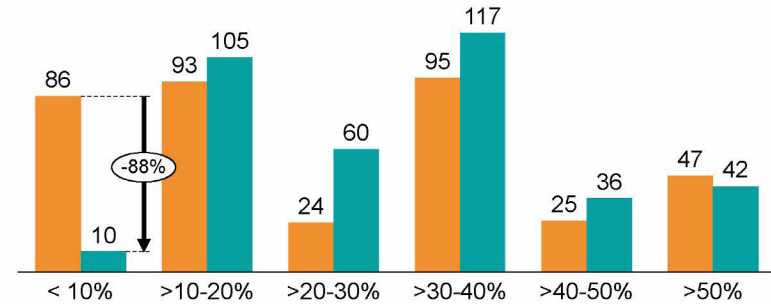
VM Wildfire Tree Weighting vs. VM Wildfire Risk Model

- The differences in distribution of risk tranches between the two models are for Community Commitment and Remaining Optimization miles

VM Wildfire Tree Weighting Risk Model

	Plan	WGC Approved (Original Plan)	WGC Approved - removed 3 SH Projects	Commitments	Remaining Optimization	Total
Risk Tranche	< 10%	1,056	1,005	86	443	1,534
	>10-20%	-	-	93	-	93
	>20-30%	-	-	24	-	24
	>30-40%	-	-	95	-	95
	>40-50%	-	-	25	-	25
	>50%	-	-	47	-	47
	Total Miles	1,056	1,005	370	443	1,819

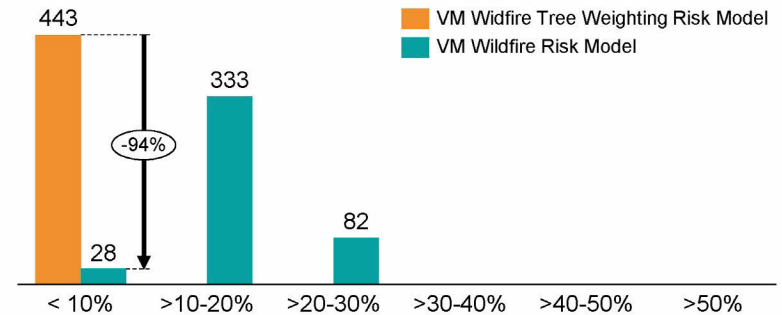
Community Commitments



VM Wildfire Risk Model

	Plan	WGC Approved (Original Plan)	WGC Approved - removed 3 SH Projects	Commitments	Remaining Optimization	Total
Risk Tranche	< 10%	1,056	1,005	10	28	1,044
	>10-20%	-	-	105	333	438
	>20-30%	-	-	60	82	142
	>30-40%	-	-	117	-	117
	>40-50%	-	-	36	-	36
	>50%	-	-	42	-	42
	Total Miles	1,056	1,005	370	443	1,819

Remaining Optimization



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INFORM: Public Safety specialists are an integral part of the project review process comprising two phases

Phase 1



Phase 2



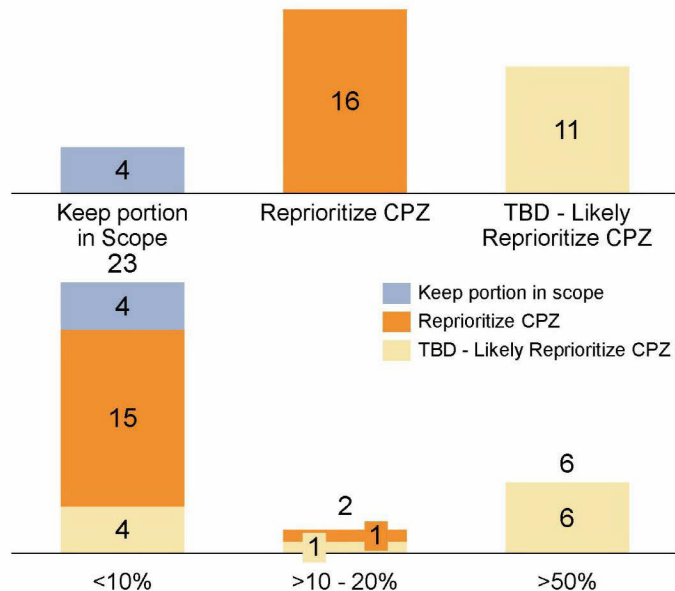
Both the System Hardening and EVM workstreams have leveraged this process to obtain inputs from local public safety specialist teams thereby ensuring a synergistic approach to reviewing projects

Enhanced Vegetation Management – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Enhanced Vegetation Management	EVM plan review by PSS	PSS review all the plan identified and approved on 12/11		In Progress	1/8/2020	

Summary Statistics

- Public Safety specialists have analyzed 31 CPZs:



CPZ's to be reprioritized

CPZ Name	Total Miles
WILLITS 1102circuit_breaker	5.1
WILLITS 1103circuit_breaker	2.9
ANDERSON 11031600	4.7
HORSESHOE 11011682	0.6
ANDERSON 1103circuit_breaker	6.4
COTTONWOOD 1101circuit_breaker	6.0
COTTONWOOD 1102circuit_breaker	14.5
GIRVAN 1102circuit_breaker	6.3
JESSUP 1102circuit_breaker	2.2
JESSUP 11031540	2.6
JAMESON 1103circuit_breaker	2.6
JAMESON 11057652	16.4
VACA DIXON 110118292	0.6
VACA DIXON 11059792	1.2
VACAVILLE 11046542	13.5
TYLER 11051704	12.3

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