

Grid Hardening & Undergrounding

Wildfire Safety Strategy Working Group
Meeting #5 – October 15, 2025



Agenda

- Welcome and introductions
- Last meeting's input recap
- Hawaiian Electric Undergrounding Study discussion
- What's ahead



Ground Rules

- Chatham House Rule will apply – no personal or organizational attribution will be made to any comments/feedback provided during the meeting by any participant nor in written documentation. Recordings and/or artificial intelligence transcriptions of meetings are prohibited.
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2024

- Wildfire Safety Symposium – **APR. 10-11**
- Wildfire Risk Map – **JUL. 31**
- Wildfire Mitigation Strategies and Priorities – **AUG. 14**
- Future Operational Strategies and PSPS Enhancements – **AUG. 21**
- Metrics and Performance Tracking / WSS Content – **SEP. 5**
- Risk Model Deep Dive Sub-Group Mtgs 1 & 2 – **SEP. 26 & NOV. 6**
- Putting it All Together – **DEC. 12**
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- Submit WSS to the PUC – **JAN. 10**

2025

- JUL. 16 Meeting 1** – Hawaiian Electric’s Wildfire Safety Strategy
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- JUL. 30 Meeting 2** – Public Safety Power Shutoffs
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- AUG. 13 Meeting 3** – Land Management
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- SEP. 24 Meeting 4** – Ingress/Egress
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- OCT. 15 Meeting 5** – Grid Hardening & Undergrounding **Today**



Ingress/egress meeting recap

- There are two potential ways that utility infrastructure could impact ingress/egress:
 - **Fall-in risk:** Utility infrastructure falls into roadways and blocks ingress/egress
 - **Burn-in risk:** A fire that originates at utility infrastructure spreads to roadways and blocks ingress/egress
- Hawaiian Electric currently prioritizes mitigating fall-in risk, though it considers burn-in risk when planning for grid-hardening.
- Ingress/egress risk is influencing Hawaiian Electric's system hardening plans at multiple levels:
 - **Project prioritization:** influencing the order in which circuits are prioritized for mitigation
 - **Project scope and design criteria:** portions of circuits in identified high ingress/egress risk areas may be subject to alternative design criteria, such as alternative pole construction or undergrounding



Incorporating Takeaways From Ingress/Egress Meeting

- Evaluating ways to account for the higher occupancy of hotels and resort facilities in the egress risk modeling.
- Incorporating input from mapping exercise to identify important egress routes and egress-constrained areas.
- Continuing outreach to agencies to exchange data, information, and transportation infrastructure plans.
- Continuing partnerships with HWMO and other public safety partners.



Undergrounding Study

Distribution Circuits



Targeted undergrounding

2025-2027 targets for undergrounding have two parts:

1. Conduct **underground feasibility studies** to determine specific projects
2. Undergrounding of approximately **two miles of overhead powerlines in critical safety areas in Lahaina** in partnership with a community working group



Undergrounding Study Objectives

- Develop distribution hardening project solutioning decision criteria/process: In what situations should we underground (UG) vs covered conductor (CC) or other alternatives?
 - Considerations include, but are not necessarily limited to:
 - WF risk (coordinate with risk model)
 - Time value of risk
 - Egress risk (coordinate with egress risk study)
 - Reliability and PSPS impact benefit (coordinate with risk model)
 - Situation-specific mitigation effectiveness of CC
 - Unit cost
 - Schedule
 - Feasibility/Constructability
- Recommend enhancements to standards, practices, and means/methods to reduce undergrounding cost.
- Recommend criteria/policy regarding undergrounding scope. E.g., whether/when to:
 - Underground primary and parallel secondary where feasible, or
 - Underground to the customer meter.
- Develop preliminary engineering scope, cost, and schedule, for potential undergrounding cohort
- Recommend which projects from potential undergrounding cohort should be pursued.



Benefits of Undergrounding

- **Nearly eliminates WF risk:** California utilities cite 95-99% wildfire risk reduction.
- **Nearly eliminates electrical utility egress risk:**
 - Fall-in Risk: Eliminates the risk of electrical utility infrastructure fall-in (however, poles will remain if carrying telecommunication infrastructure).
 - Burn-in Risk: Nearly eliminates wildfire risk, therefore nearly eliminates risk of ignitions from the line infrastructure burning into roadways.
- **PSPS Avoidance:** Undergrounding lines may result in reduced PSPS exposure, depending on circuit configuration.
- **EFT Avoidance:** Undergrounding lines may result in reduced Enhanced Fast Trip (EFT) exposure, depending on circuit configuration.
- **Reliability Improvement:** Undergrounded lines would expect to see fewer outages.
- **Resilience Improvement:** Undergrounded lines are less vulnerable to extreme events such as storms and hurricanes.



Challenges Associated with Undergrounding

- **High and variable cost:** multiple x covered conductor; highly site-dependent (trenching, rock, restoration, access).
- **Equipment strategy and availability:** Costly to ship equipment to Hawaii. Specialized equipment to reduce costs would only be cost-effective if there is high utilization.
- **Material & labor resources:** Limited availability locally. Mainland and inter-island mobilization and shipments are costly.
- **Geology:** Hard volcanic rock, water tables, dense root systems, and variable soil depth slow trenching.
- **Topography and terrain:** Steep slopes, rough terrain, heavy vegetation, etc. make installation and restoration more complex and costly, or infeasible.
- **Permitting & environmental reviews:** Projects must navigate complex environmental, cultural, and construction permitting processes. Sensitive habitats, historic sites, shoreline areas, contamination, and soil disposal add further procedural complexity.
- **Iwi Kupuna:** Discoveries halt work and trigger consultation/monitoring protocols.
- **Land rights:** Fragmented ownership, easement negotiations, and community sensitivities can delay schedules.
- **Traffic impacts:** Extended lane closures and detours are expected, particularly in areas with narrow roadways.
- **Schedule:** Extended project timelines are common.



For Discussion Purposes Only

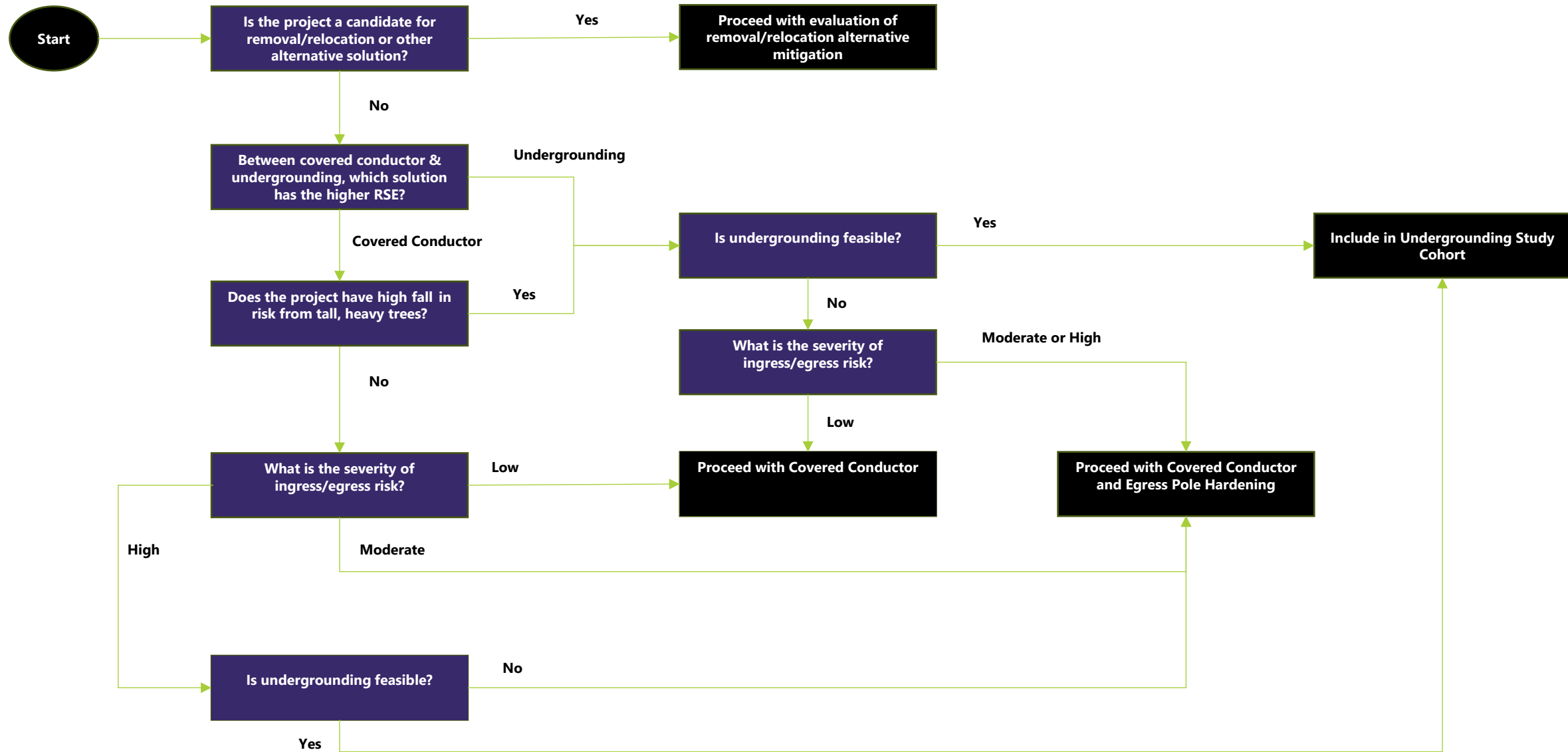
Hardening approaches are tailored to the local utility context

Utility	Portfolio Lean	2026-2028 Targets	Solution Decision Criteria
PG&E	UG-lean	UG: 1,077 miles CC: 718 miles	Decision tree considers cost-benefit ratio, net benefit, ingress/egress, PSPS impacts, and tree strike potential.
SCE	CC-lean	UG: 260 miles CC: 440 miles	UG pursued in designated "Severe Risk Areas", defined by criteria including egress, fire consequence, winds, and community concern.
SDG&E	Intent to move toward UG-heavy	UG: 50 miles CC: 130 miles	Decision to UG is based on RSE threshold. If UG RSE threshold is met, UG is pursued if feasible. CC only considered if RSE threshold for UG is not met.

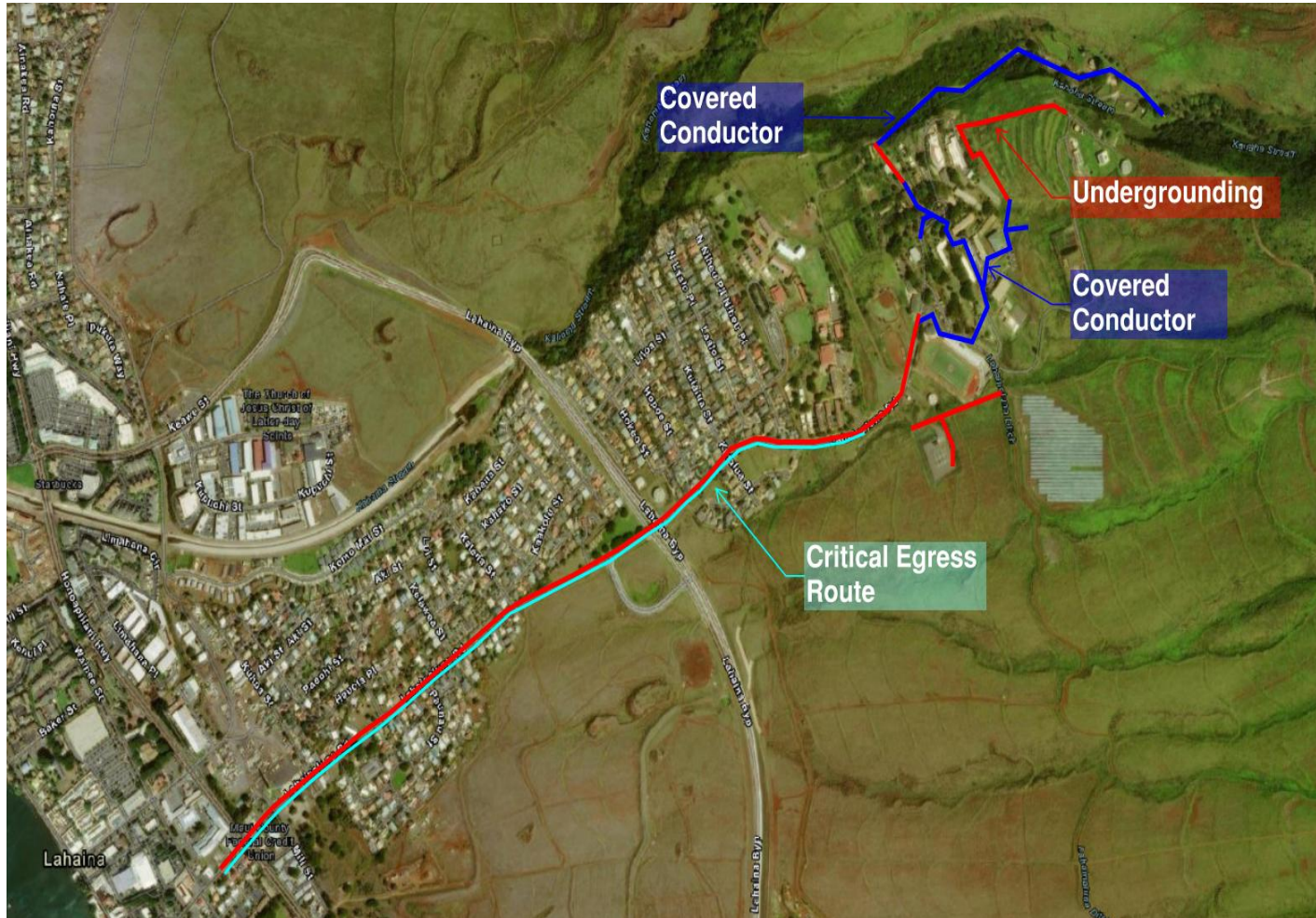
Note: SDG&E originally proposed a larger undergrounding program, but the CPUC's 2024 General Rate Case decision reduced approved funding, resulting in fewer undergrounding miles in its 2026–2028 Wildfire Mitigation Plan



Selection of Study Cohort



Maui Ckt 1223 (Lahaina Undergrounding Project)



- High wildfire risk with fire history
- Lines run along/cross critical egress roads: Lahainaluna Rd, Lahaina Bypass, Honoapiilani Hwy



Maui Ckt 1236 (Pihiholo Rd)



- High wildfire risk
- High tree strike risk from eucalyptus
- Egress constrained area
- Narrow roadways with dense vegetation and sharp switchbacks.

For Discussion Purposes Only



Mauna Lani 11 & 13



- High wildfire risk
- Undergrounding would reduce customer exposure to PSPS and EFT.
- Opportunity to underground two (2) circuits in the same trench.
- Private roadway with minimal impact to community.

Status and Schedule

Task	Status	Date Anticipated
Select undergrounding study cohort	Complete	Complete
Conduct site visits to support detailed feasibility analysis and scope of work development	Complete	Complete
Review current standards and practices and develop recommendations for potential enhancements to standards, practices, and means/methods to reduce undergrounding cost.	In progress	12/2025
Develop undergrounding scope of work, cost estimate, and schedule for each project.	In progress	12/2025
Conduct options analysis for each project (CC vs UG vs other alternatives).	Not yet started	Q1 2026
Use analysis from cohort to develop decision framework for going-forward project solution selection.	Not yet started	Q2 2026

For Discussion Purposes Only

What's ahead

- Refine and update progress of the current Wildfire Safety Strategy and file an update with the Public Utilities Commission by the end of 2025.



Mahalo for your time.

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