Pacific Gas and Electric Company®

Tsunami Annex

to the

Company Emergency Response Plan

Document Version 4.0
Publish Date: 09/26/2024
Effective Date: 09/26/2024
EMER-3104M

[redacted]

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Table of Contents

List of Figures

List of Tables

Document Control

Geosciences maintains the Tsunami Annex. This section records the revisions made to this annex, the coworkers involved in its preparation, maintenance, review, updates, and approval.

Change Record

The following table is used to record all changes made to the plan and capture revisions made, the locations of the revisions, and coworkers responsible for the revisions:

Section(s) Affected	Person Responsible for Revision	Change
Throughout	Various	Made grammatical and format edits for readability.
Throughout	Various	Updated guidance document links and references.
1.4.2	[redacted]	Added links to external resources.
3.4	Angie Gibson/[redacted]	Removed reference to regional OECs because Cal OES no longer has REOCs. With the creation of the permanent State Operations Center team, everything goes through the SOC.
3.4	[redacted]	Amended impact of tsunamis on communications and the EOC.
4.1		Added paragraph about specific DCPP and HBPP risk assessments.
4.5.1		Changed Epage to Everbridge Alerts.
5.1.1 and 5.2		Added references to alerts for local and regional tsunamis.
4.3		Added a link to AGOL map resource and guide.
5.5.1.2		Updated language in Air Operations.
5.4.4		Updated the Leak Survey section and removed redundant information.
5.5.3	Angie Gibson and [redacted]	Removed the sub-section: Electric Rapid Assessment Strike Teams.
5.8.4		Updated the Logistics section.
5.7.8		Updated Gas Operations.
5.7.10		Updated Gas Restoration Strategy.
5.8.11		Updated and combined Finance and Administration sections.
Figure 4-2		Updated the figure to match current tsunami hazard figures.
Figure 5-2		Changed the figure to show possible Humboldt IC divisions instead of the example on San Francisco division.

Section(s) Affected	Person Responsible for Revision	Change
Table 4-1	[redacted]	Removed redundant gas asset “Distribution Service”.
Table 5-1		Added tsunami specific tasks for Gas Operations.
Table 5-2		Removed activated centers to align with the CERP table.
Appendix A		Removed references to acronyms not used in this document.
Appendix D		Added figure numbers for maps in Appendixes D2 and D3.
Appendix E		Removed Appendix E to align with other CERP annexes.

Recision Log

Number	Title
NA	NA

Reference Documents

Document Number	Title
AVI-3001M	Helicopter Operations Field Manual
EMER-01	Emergency Preparedness and Response Policy
EMER-1001S	Business Continuity Planning, Training, Exercise, and Improvement Planning Standard
EMER-2001S	Company Emergency Operations Plans Standard
EMER-2001S-F01	Change Request Form
EMER-2003S	EOC Activation After-Action Report Process Standard
EMER-3005S	PG&E’s Emergency Field Site Request and Approval Standard
EMER-3001M	Company Emergency Response Plan (CERP)
EMER-3002M	Electric Annex
EMER-3003M	Gas Emergency Response Plan (GERP)
EMER-3005M	Logistics Annex
EMER-3007M	Information Technology Annex
EMER-3008M	Emergency Communications Annex
EMER-3009M	Workforce Management and Contact Center Operations Annex

Document Number	Title
PG-3000	Shasta Area Hydro System Emergency Operating Plan
PG-3254	DeSabla Area Hydro System Emergency Operating Plan
PG-3420	Drum Area Hydro System Emergency Operating Plan
PG-3540	Motherlode Area Hydro System Emergency Operating Plan
PG-3660	Kings-Crane/Helms Area Hydro System Emergency Operating Plan
PG-5104P-28	Colusa GS EHS – Emergency Action Plan
PG-5154P-17	Gateway GS EHS – Emergency Action Plan
PG-5204P-15	Humboldt Bay GS EHS – Emergency Action Plan
TD-1910P-01	Inspecting Electric Underground Transmission Lines After a Major Earthquake
TD-3350P-17	Substation Building Earthquake Response Procedure
G.O. 166	CPUC, General Order 166
AH-1101P	HAWC Notification Procedure

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	Substation Maintenance and Construction
	Power Generation
	IT
	Materials & Distribution Operations
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Created on:	8/29/2024 3:16:18 PM	Status:	EDR request completed.
Requestor:	[redacted]	Department:	Emergency Preparedness & Response-ET
Document Type:	Guidance Document	Readable by All:	No
Document Title:	EMER-3104M Tsunami Annex		
Dollar Amount:	$0		
Job Order Num:			
ITWR Number:			
Major Work Category:			

Documents	
Title	**Version**
EMER-3104M Tsunami Anx v4.docx	Revision 1
Consolidate Files	

Reviewers/Approvers	
Add to CC List	
Approvers	
Gibson, Angelina	Approved on 9/26/2024 5:53:22 PM
Show CC List	

Change Request Form

To request changes, corrections, or additions to this Annex, the Company Emergency Response Plan (CERP) (EMER-3001M), or other associated annexes, submit a request through the online change request.

Proposed changes are significant when they affect the emergency organizational structure, critical operations, key facilities, or execution of the plan and will be published by a bulletin to the CERP or annex. Minor changes will be saved and addressed in the next document update. Refer to EMER-2001S CERP standard.

Once the bulletin is communicated, a copy will be placed under the respective annex located in the Guidance Document Library (GDL). The bulletin content will be included in the next Tsunami Annex update.

1 Introduction

1.1 Purpose

The Tsunami Annex to the Company Emergency Response Plan (CERP) assists Pacific Gas and Electric Company (PG&E) with a safe, efficient, and coordinated response to an emergency affecting power generation, gas, or electric systems following a severe or greater incident level tsunami. The annex is scalable and contains decision-making aids and tools to rapidly assess and determine the resources needed for a rapid response and recovery from any type of tsunami.

This annex covers the following key actions:

- Illustrate the risk area and assets at risk.
- Provide PG&E tsunami risk data.
- Introduce current hazard models used to guide response efforts.
- Provide guidance to coworkers responding to a tsunami.
- Address specific planning and response challenges following a tsunami not covered in other planning documents.
- Describe strategies to mitigate damage and to better prepare PG&E coworkers to respond to tsunamis safely and effectively.

This document should not be used as the sole resource for responding to a tsunami event, but as a guideline that encompasses the overall process for PG&E to respond to a tsunami.

1.2 Scope

This annex provides an overview of the company's tsunami response and is not considered a detailed or tactical response to a tsunami, but rather a guide to an overall response and a communication plan. Content documented in the CERP or annexes is not repeated in this document.

The Tsunami Annex includes, but is not limited to:

- PG&E's Tsunami Risk
- Tsunami Planning
- Concept of Operations
- Coordination and Communication
- Exercises and Training
- Appendices
  - Appendix A, Acronyms
  - Appendix B, Geosciences Command Call Agenda

- Appendix C, Tsunami Notifications
- Appendix D, Scenario Tsunami Hazard Maps
- **Error! Reference source not found.**, Emergency Communications Plans and Messaging

1.3 Regulations and Authorities

The Tsunami Annex is a supplement to the CERP, and as such retains the authorities found in CERP Regulations and Authorities section. The annex follows the policies and standards given below:

- EMER-01, Emergency Preparedness and Response Policy
- EMER-2001S, Company Emergency Operations Plans Standard
- EMER-3001M, Company Emergency Response Plan (CERP)
- G.O. 166, General Order 166

1.4 Supporting Documentation

1.4.1 Internal Plans

The Tsunami Annex supplements, but does not supersede, any existing emergency response procedures or plans, including, but not limited to:

- EMER-3001M, Company Emergency Response Plan (CERP): The CERP provides a broad outline of PG&E's organizational structure and describes the activities undertaken in response to emergency situations.
- EMER-3002M, Electric Annex: The Electric Annex details the response actions of the electric organization. It features both electric distribution and transmission.
- EMER-3003M, Gas Emergency Response Plan (GERP): The GERP provides detailed information about PG&E's planned response to emergencies affecting gas transmission and distribution systems.
- EMER-3005M, Logistics Annex and the Logistics Emergency Resource Guide (LERG): The Logistics Annex gives an overview and responsibilities of the logistics team. The Logistics Resource Guide covers major tasks and activities performed by logistics including the setup of emergency sites (base camps, staging areas, micro sites, materials laydown areas, rally safety points and community resource centers (CRCs). It also provides other resources such as position checklists, phone lists, and supplier lists.
- EMER-3007M, Information Technology Annex: The manual provides the Information Technology Coordination Center (ITCC) activation plan and how IT will respond to emergencies.
- EMER-3008M, Emergency Communications Annex: The scope of this annex covers emergency communications program roles and responsibilities, identifies types of supported events, covers communication tools currently in use, and describes the

emergency communication response team and its activation procedures. In addition to the Emergency Communications Annex is the emergency communications Plans and Messaging (a.k.a., Book of All Knowledge), which is used as a field guide for the emergency communications team (see **Error! Reference source not found.**).

- EMER-3009M, Workforce Management and Contact Center Operations Annex: The annex contains information on the Customer Care team and how Customer Care supports our first responders via the call center.
- Business Continuity Plans (BCPs): PG&E functional areas (FAs) maintain electronic copies of their BCPs in Fusion. The 2022 and 2023 BCP sites in MS-Teams will remain active until all FAs transition to Fusion.
- Power Generation Emergency Operating Plans: The hydro-system emergency operating plans (EOPs) and fossil generation station emergency action plans (Fossil EAPs) provide general guidance and serve as roadmaps to established plans, procedures, and other resources to assist Power Generation Operations and Maintenance (O&M) coworkers in responding to regional-scale emergencies, including tsunamis.

  PG&E has five hydropower EOPs, one for each hydro area (Shasta: PG-3000, DeSabla: PG-3254, Drum Spaulding: PG-3420, Motherlode: PG-3540, and Kings Crane/Helms: PG-3660) and three fossil EAPs, one for each generating station (Colusa Generating Station: PG-5104P-28, Gateway Generating Station: PG-5154P-17, and Humboldt Bay Generating Station: PG-5204P-15).

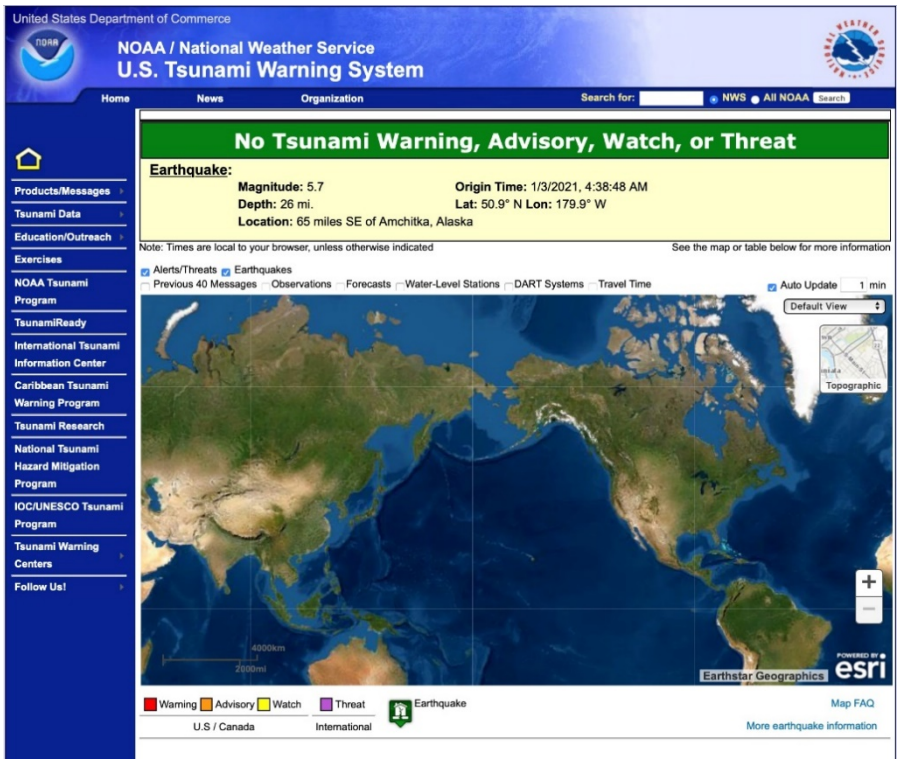
All users of this annex should be familiar with the CERP and associated annexes, other tsunami and earthquake-related emergency response resources, and the information listed in section 8, “After-Action Reports”. Refer to the EMER Guidance Document Library (GDL).

1.4.2 External Plans and Information

External plans and documents applicable to tsunami safety and response are given below:

- **California Tsunami Hazard Area Maps** (https://www.conservation.ca.gov/cgs/tsunami/maps) contain links to county-specific mapping and data for tsunami response planning. Maps are based on inundation limits corresponding to a 975-year-average return period tsunami event model.
- **California Tsunami Preparedness Guide** (https://cadoc.maps.arcgis.com/apps/MapSeries/index.html?appid=61bc8d30b53e4fb5927ae199d31f5aef) provides links to tsunami resource materials including safety, education, outreach, and preparedness.
- **National Oceanic and Atmospheric Administration** (**NOAA) National Tsunami Warning Center** (NTWC) (https://www.tsunami.gov) provides links to the real-time U.S. Tsunami Warning System (Figure 1-1) and issues four levels of tsunami alert: “Tsunami Warning, Advisory, Watch, or Information Statement”. Examples are covered in Appendix C.

Figure 1-1: Screenshot of NOAA US Tsunami Warning System Display



- United States Geological Survey (USGS) (https://earthquake.usgs.gov/)
- https://www.ready.gov/tsunamis
- https://www.tsunamizone.org/
- https://www.earthquakecountry.org/library/StayingSafeWhereTheEarthShakes_BayAreaEdition.pdf
- State of California Geological Survey Tsunami Unit information
- California Governor's Office of Emergency Services (earthquake, tsunami, and volcano program)

Use the following to learn about county specific information:

- Humboldt County Office of Emergency Services
- Redwood Coast Tsunami Work Group tsunami and earthquake information
- San Francisco DEM Tsunami Annex .pdf
- Emergency Preparedness - Alameda County (acgov.org)Emergency Preparedness - Alameda County (acgov.org)
- Monterey County Office of Emergency Services
- San Mateo County emergency preparedness

1.4.3 Additional Resources

PG&E intranet has additional resources given below:

- Emergency Operations Center (EOC) on-call resources: [redacted]
- Geosciences: [redacted]
- Geographic Information System (GIS) team: [redacted]

1.5 Annex Maintenance

PG&E's Emergency Preparedness and Response (EP&R) Strategy and Execution (SE) is responsible for developing, updating, and maintaining the CERP and its annexes in collaboration with the subject matter experts (SMEs) from the responsible FAs. Refer to the "Plan Maintenance" section of the Company Emergency Response Plan (EMER_3001M) for information regarding document approval, revision, and periodic maintenance.

This annex is reviewed and updated:

- Annually by September 30th
- When there are significant changes to tsunami science or response affecting safety

New safety procedures can be written and posted in the GDL as a bulletin to the Tsunami Annex. The changes in the posted bulletin will be reflected in the next publication of the Tsunami Annex.

The responsible document reviewers/owners may modify this annex based on the following:

- Lessons learned from exercises and actual incidents
- Post-incident recovery and "lessons learned" for any severe or greater tsunami
- Key changes to emergency response processes, structure, responsibilities, assessment process, and restoration strategies
- Feedback generated by PG&E subject matter experts (SMEs), the planning team, internal and external key stakeholders, and users of the annex
- Changes to laws or regulations pertaining to tsunami response
- Implementation of new technologies for tsunami preparedness, situational awareness, and response

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2 Emergency Organization and Responsibilities

2.1 Emergency Facilities

2.1.1 Emergency Operations Center

The Vacaville Emergency Response Center (VERC) is located at [redacted], Vacaville, California. If the facility is unaffected and access routes are open, the EOC command will be established at this location. The company may conduct back-up EOC operations out of the San Ramon Valley Conference Center (SRVCC).

2.1.2 Mobile Sites or Temporary Facilities

Because of the destructive nature of catastrophic tsunamis, some facilities may not be accessible for weeks or months, depending on the remaining structural integrity of individual structures. Following a tsunami, the company may restrict access to certain areas of the building or the entire building. In these circumstances, the company may relocate coworkers and/or offer temporary structures.

2.1.3 Role of Emergency Preparedness and Response

EP&R S&E is the overarching emergency preparedness department for the company, and leads preparedness and response initiatives across the enterprise, including the development of this Tsunami Annex.

Geosciences leads the effort to review and update the Tsunami Annex. EP&R S&E supports the review process and aids the team in meeting its annual deadline.

EP&R S&E also facilitates training exercises of this annex and will maintain and develop new training courses to build emergency response capabilities toward this and other hazards.

2.1.4 Role of Geosciences Department

Geosciences has a team of core experts who monitor geologic and seismic hazards across all FAs. The need for geosciences' services is driven by the highly active geologic and seismic settings of PG&E's service territory, the California regulatory environment, the utility's continued reinvestment in its infrastructure, and the projected growth in its customer base over the next three decades. Geosciences' technical credentials, institutional knowledge, and partnerships with SMEs in various FAs, external agencies, and academia have enabled PG&E to develop and implement state-of-the-art modeling of utility infrastructure hazard and risk. This is a leading practice within the utility discipline.

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3 PG&E's Tsunami Risk

3.1 Overview

Tsunamis from distant and local sources can affect California coastal communities and PG&E infrastructure assets.

The potential risk to PG&E infrastructure following a catastrophic tsunami includes, but is not limited to, damage to electric and gas facilities, transmission systems, distribution systems, as well as power-generation systems and facilities. A significant risk of short and long-term outages also exists for both gas and electric systems, depending on the damage. In addition to direct damage to company facilities and service impacts, large tsunamis can disrupt both emergency response and post-disaster recovery, including disrupted access, coworker availability, and resource shortages.

Tsunamis pose challenges to lifelines and utilities that provide essential infrastructure services to coastal communities. Utilities possess crucial interdependencies with other lifeline operators, including the ones managing city streets, fuel, regional roads, telecommunications, and water, serving an impacted region. Depending on the scale of the tsunami and flooding, upstream and downstream utility interactions with other operators may be impacted, and the region's overall ability to support any operator's or group's emergency response and restoration can be challenged.

3.2 Local, Regional, or Distant Tsunamis

Local tsunamis originate within 100 km (or less than 1-hour tsunami wave travel time) from the impacted coast (e.g., California coast). Local tsunami sources in Northern and Central Coastal California include:

- Offshore faulting (Cascadia subduction zone)
- Offshore landslides

In addition, inland water bodies (e.g., Lake Tahoe) can develop seiches, a tsunami which occurs within an enclosed body of water, from landslides and earthquakes.

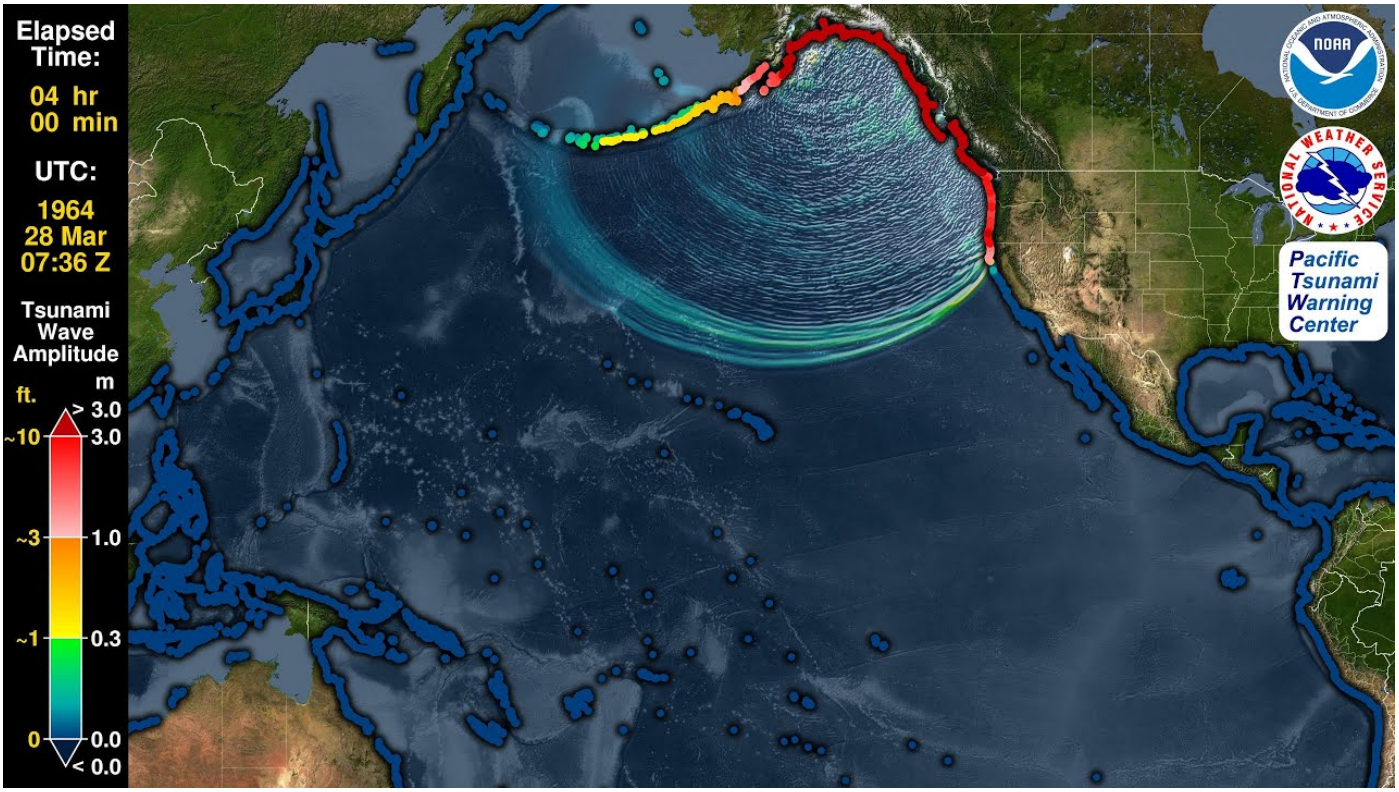
Regional tsunamis are those events located between 100 and 1,000 km (or from 1- to 3-hour travel time) from the coast.

Distant tsunamis originate more than 1,000 km (or more than 3-hour travel time) from the California coast. The tsunami generated by the great 1964 Alaska earthquake is an example of a distant tsunami that caused widespread damage in Crescent City (Figure 3-1) and Northern California.

Figure 3-1: Damage at Crescent City, CA following the 1964 Alaska Tsunami

Figure 3-2 shows the location and amplitude of the tsunami wave generated by the great 1964 Alaska earthquake along the NW Pacific and Alaska/Aleutians coastline at +4 hours.

Figure 3-2: Tsunami Wave Heights Following the 1964 Alaska Earthquake



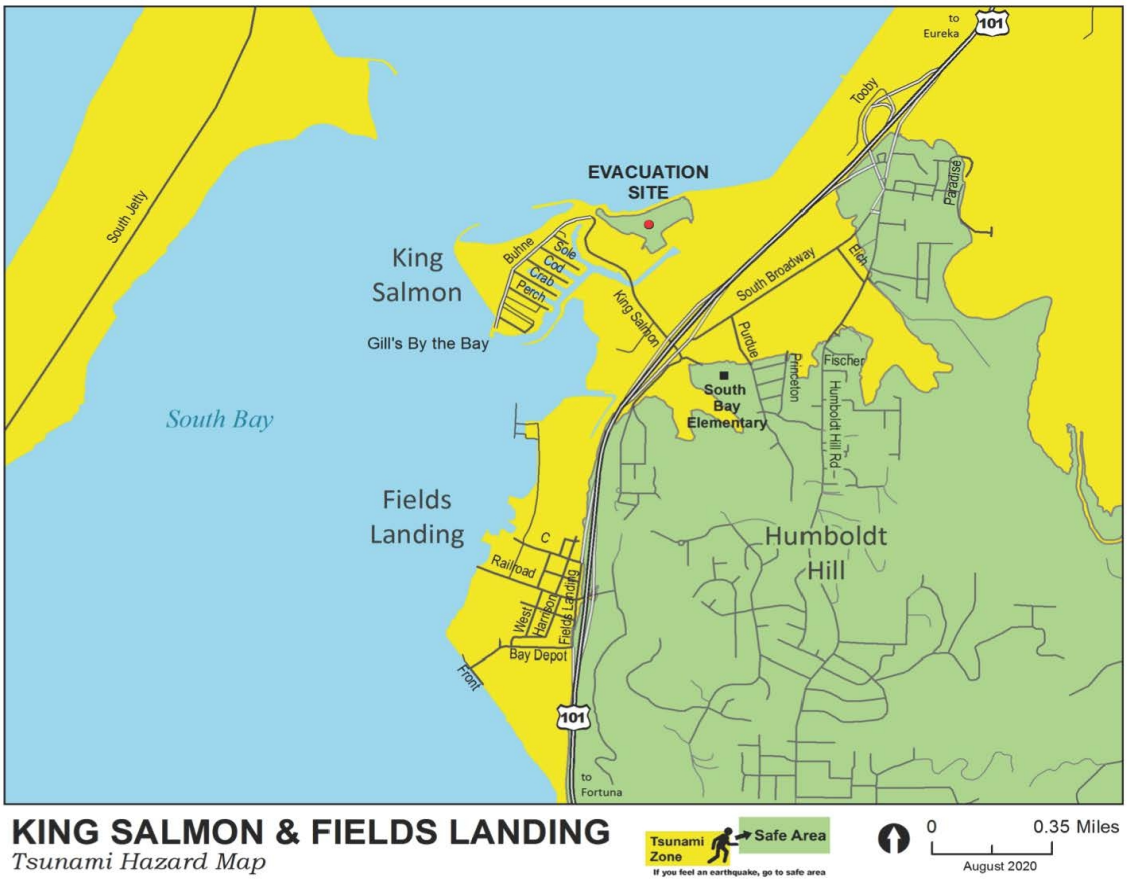
3.3 Defining Risk

PG&E's FA risk managers regularly assess areas of the company risk that fall within their business operations.

The tsunami hazard maps posted on the California Geological Survey (CGS) tsunami website are referred to as California Tsunami Hazard Area Maps (an example is shown in Figure 3-3). Tsunami Hazard Area Maps and Data are prepared to assist cities and

counties in identifying their tsunami hazards for tsunami response planning. The maps and data are compiled with the best currently available scientific information and represent areas that could be exposed to tsunami hazards during a tsunami event. They are primarily based on inundation limits corresponding to an average of 975-year return period tsunami event model. These limits have been extended to reflect potential local tsunami sources not considered in probabilistic analysis and are also modified to reflect the practical need to define limits that coincide with geographic features or city streets (CGS, 2021).

Figure 3-3: 2021 Tsunami Hazard Map for Humboldt Bay



Each FA identifies their infrastructure in the tsunami hazard area (yellow zone in Figure 3-3), identifies evacuation routes to safe areas (green zone in Figure 3-3), determines the acceptable personal and asset risk, and establishes necessary mitigation measures.

Experience from tsunamis worldwide has shown that damage due to tsunamis can be caused by:

- Wave and current activity causing drifting, erosion, and scour—largest wave is not necessarily the first; note that continued wave and current activity can last for hours following the initial arrival
- Run up causing flooding (onshore distance/elevation)
- Waterborne debris causing water and debris impact

The tsunami intensity scale in Table 3-1 lists the type and severity of tsunami effects on coastal communities and facilities. The intensity scale ranges from “Not felt” to “Completely devastating” and is integrated into the definition of PG&E incident levels in Table 5-2.

System performance following a tsunami will likely be different from scenario models. For example, system performance will vary in situations of geographic “choke points” where heavy concentrations of infrastructure exist and damages to the system pose challenges to restoration.

Coordination of disaster planning, preparedness efforts, and mitigation work can collectively improve system resilience and support.

Other major initiatives include the Natural Hazard Asset Performance program (2013–2017) that informed the company’s risk-reducing and mitigation activities and determined the susceptibility of PG&E’s assets to natural disasters.

For more information about the risk management process, refer to CERP Emergency Planning Assumptions. PG&E’s electric asset management, substation maintenance and construction, geosciences, and other FAs proactively implement risk-reducing and mitigation (e.g., updating material, building retrofitting, and anchoring equipment) projects.

Table 3-1: Tsunami Intensity Scale, Papadopoulos, and Imamura (2001)

Tsunami Intensity Level	Strength	Description
I.	Not felt	• Not felt even under the most favorable circumstances • No effect • No damage
II.	Scarcely felt	• Felt by few people on board in small vessels; not observed in the coast • No effect • No damage
III.	Weak	• Felt by most people on board in small vessels; observed by few people in the coast • No effect • No damage
IV.	Largely observed	• Felt by all on board in small vessels and by few people on board in large vessels; observed by most people in the coast • Few small vessels move slightly onshore • No damage
V	Strong	• Felt by all on board in large vessels and observed by all in the coast; few people are frightened and run to higher ground • Many small vessels move strongly onshore, few of them crash each other or overturn; traces of sand layer are left behind in grounds of favorable conditions; limited flooding of cultivated land

Tsunami Intensity Level	Strength	Description
		• Limited flooding of outdoors facilities (e.g., gardens) of near-shore structures
VI	Slightly damaging	• Many people are frightened and run to higher ground • Most small vessels move violently onshore, or crash strongly into each other, or overturn • Damage and flooding in a few wooden structures; most masonry buildings withstand
VII	Damaging	• Most people are frightened and try to run to higher ground • Many small vessels damaged; few large vessels oscillate violently; objects of variable size and stability overturn and drift; sand layer and accumulations of pebbles are left behind; few aquaculture rafts washed away • Many wooden structures damaged, few are demolished or washed away • Damage of grade 1* and flooding in a few masonry buildings
VIII	Heavily damaging	• All people escape to higher ground, a few are washed away • Most of the small vessels are damaged, many are washed away; few large vessels are moved ashore or crashed each other; big objects are drifted away; erosion and littering in the beach; extensive flooding; slight damage in tsunami control forest, stop drifts; many aquaculture rafts washed away, few partially damaged • Most wooden structures are washed away or demolished; damage of grade 2* in a few masonry buildings; most reinforced concrete (RC) buildings sustain damage, in a few damages of grade 1* and flooding is observed
IX	Destructive	• Many people are washed away • Most small vessels are destroyed or washed away; many large vessels are moved violently ashore, few are destroyed; extensive erosion and littering of the beach; local ground subsidence; partial destruction in tsunami control forest, stop drifts; most aquaculture rafts washed away, many partially damaged • Damage of grade 3* in many masonry buildings, few RC buildings suffer damage grade 2*
X	Very destructive	• General panic and most people are washed away • Most large vessels are moved violently ashore, many are destroyed or collided with buildings; small boulders from the sea bottom are moved inland; cars overturned and drifted; oil spill, fires start; extensive ground subsidence • Damage of grade 4* in many masonry buildings, few RC buildings suffer damage grade 3*; artificial embankments collapse, port water breaks damaged
XI	Devastating	• Lifelines interrupted; extensive fires; water backwash drifts cars and other objects in the sea; big boulders from the sea bottom are moved inland • Damage of grade 5* in many masonry buildings; few RC buildings suffer damage grade 4*, many suffer damage grade 3*

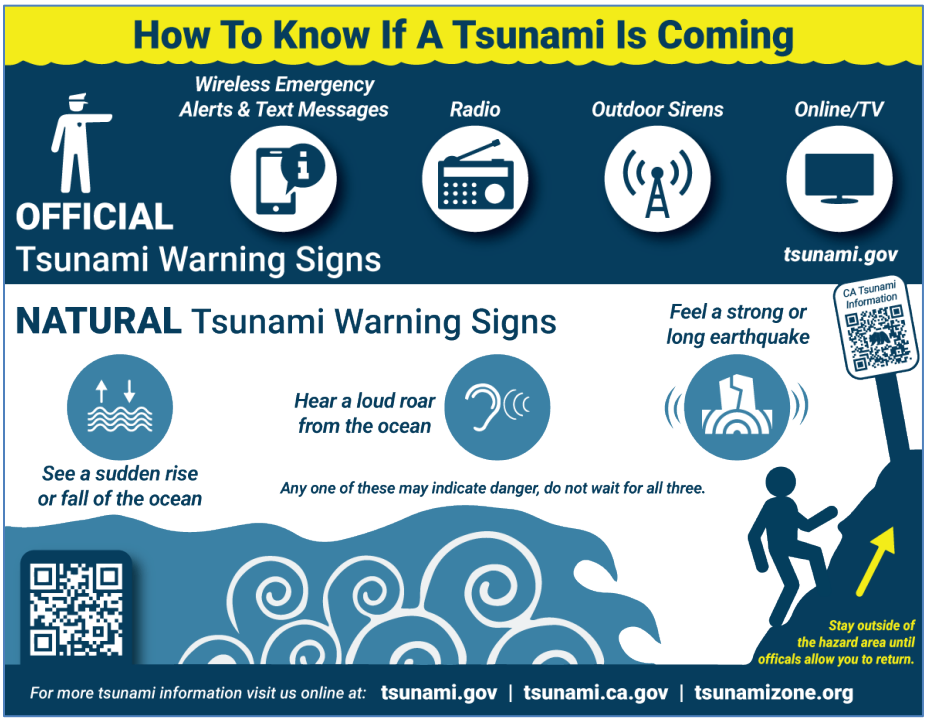
Tsunami Intensity Level	Strength	Description
XII	Completely devastating	• Practically all masonry buildings demolished; most RC buildings suffer at least damage grade 3*

* Classification of damage to buildings: Although the classification of damage to buildings due to earthquakes is well defined, such a classification is not still available for damage to buildings due to tsunamis. For this reason, only a gross classification is used in association to the tsunami intensity scale: Grade 1: slight damage; Grade 2: moderate damage; Grade 3: heavy damage; Grade 4: destruction; and Grade 5: total damage.

Personal Safety

NOAA National **Tsunami Warning Center** (https://www.tsunami.gov) provides links to real-time U.S. Tsunami Warning System (Figure 3-4). The center issues four levels of tsunami alert: “Tsunami Warning”, “Advisory”, “Watch”, or “Information Statement” (Table 4-2, on page 4-5).

Figure 3-4: Tsunami Warning Signs



Local tsunamis from nearby earthquakes or submarine landslides may have little lead time for National Oceanic and Atmospheric Administration (NOAA) warnings.

A good rule of thumb is that if you feel a strong earthquake along the coast and/or if the ocean recedes rapidly, evacuate to higher ground immediately. You should know your evacuation routes and evacuation sites in coastal areas.

3.4 Infrastructure at Risk

Like earthquakes, tsunamis present a unique planning and response challenge.

Depending on the tsunami wave height and run up, results can vary from widespread utmost damage to localized moderate damage or even barely detectable flooding. Exposures listed in PG&E's corporate risk register (CRR LINK) includes electric and gas facilities, transmission systems, distribution systems, IT/communication assets, and access assets (e.g., roads, bridges, and walkways). In that context, initial incident status information requirements will include:

- Damage to electric and gas facilities, transmission systems, and distribution systems
- Communications systems within and outside of the company
- Diminished access to facilities due to road damage
- Impacts on availability of material and coworkers resources

For more information on the identified risks to other FAs, refer to CERP Emergency Planning Assumptions, Planning Assumptions for Severe to Catastrophic Emergencies subsection. A basic overview of the assumptions is given below:

- Overwhelmed response capabilities will dictate the need for substantial mutual assistance.
- When requested, mutual assistance will be rendered through PG&E's mutual assistance agreements after PG&E exhausts or anticipates exhausting its resources, or whenever needed.
- Many coworkers will be personally affected by the incident and workforce capabilities will not be readily available on typical workdays.
- External first responders will be overwhelmed and may not respond to our facilities when called. Some coworkers may need to receive first aid or other lifesaving measures by coworkers at their work locations.
- The State of California Office of Emergency Services (OES) in the affected region will be overwhelmed or inoperable, and the state OES liaisons will need to report to the State Operations Center (SOC).
- Transportation infrastructure, such as roads and bridges, will be damaged and/or closed for inspections, making access into or out of the affected areas difficult.
- The estimated time of restoration (ETOR) will be difficult to determine without initially being able to access critical sites.
- Scarce resources will need to be prioritized through the EOC.
- Extensive public, media, government, and regulatory interest across multiple regions, and at the state, national, and international levels will exist.
- The potential for reputational risk to the company will still exist, even if the catastrophe arises from natural sources.

3.5 Assumptions and Considerations for Tsunamis

Following a severe to catastrophic tsunami along the California coastal area, basic services, including transportation, healthcare, water, power, and communications along the coast will be significantly disrupted. Refer to planning documents of local, state, tribal, and federal government entities for more information on these disruptions. While deemed useful for planning purposes, PG&E does not make any guarantees regarding the accuracy of such documents. A partial list of publicly available planning documents is included for reference purposes in section 1.4.2, External Plans and Information. In addition to the above considerations, planning assumptions specific to a catastrophic tsunami in PG&E service territory include the following:

Resources

- After a catastrophic tsunami, the response capabilities of PG&E may be exceeded and resources from unaffected areas of the service territory and from outside the company will be required.
- Depending on size, magnitude, and geographical area of the tsunami, PG&E may be in competition for externally available resources.
- PG&E may request a declaration of a “National Response Event” (NRE). A national response committee will assume the role of prioritization of placement of resources if more than one electric utility is affected and mutual assistance is being requested.

Command and Communications

- PG&E’s Vacaville Emergency Response Center (VERC) is the company’s primary EOC. The company may conduct back-up EOC operations out of the company’s San Ramon Valley Conference Center (SRVCC).
- The company’s communication channels may be locally (along the coast) non-functional, and intranet and web-based applications may be locally impacted. The EOC commander will establish a command and reporting hierarchy and communicate this information at the earliest time possible following a tsunami event. All field operations and control centers should continue with their established reporting hierarchy.

Priorities

- PG&E has met with the county emergency management offices to determine restoration priorities. However, the need to “Make Safe”, and to re-establish transmission operations of both gas and electric, may supersede any pre-determined county priorities.
- No operation described in this annex is meant to supersede any operations of PG&E workers to “Make Safe”.
- This annex does not supersede any authorities of the CERP and is meant to accompany the CERP with response activities specific to a catastrophic tsunami.

Refer to section 5.4.1 Response Priorities.

4 Tsunami Planning

4.1 Overview of Hazard Modeling at PG&E

A significant aspect of PG&E emergency planning and response involves the use of hazard information to estimate the impacts of tsunamis. Tsunami hazard and risk assessment has undergone major changes in the last few years and continues to evolve as models and gathered data improve.

A hierarchical hazard assessment (HHA) approach (e.g., NUREG/CR-6966 and NRC 2009) is used to evaluate flood and tsunami hazards at nuclear plants. FAs also use this approach to understand the potential damage that may be incurred by a tsunami or flooding event and determine whether additional site screening and modeling are warranted.

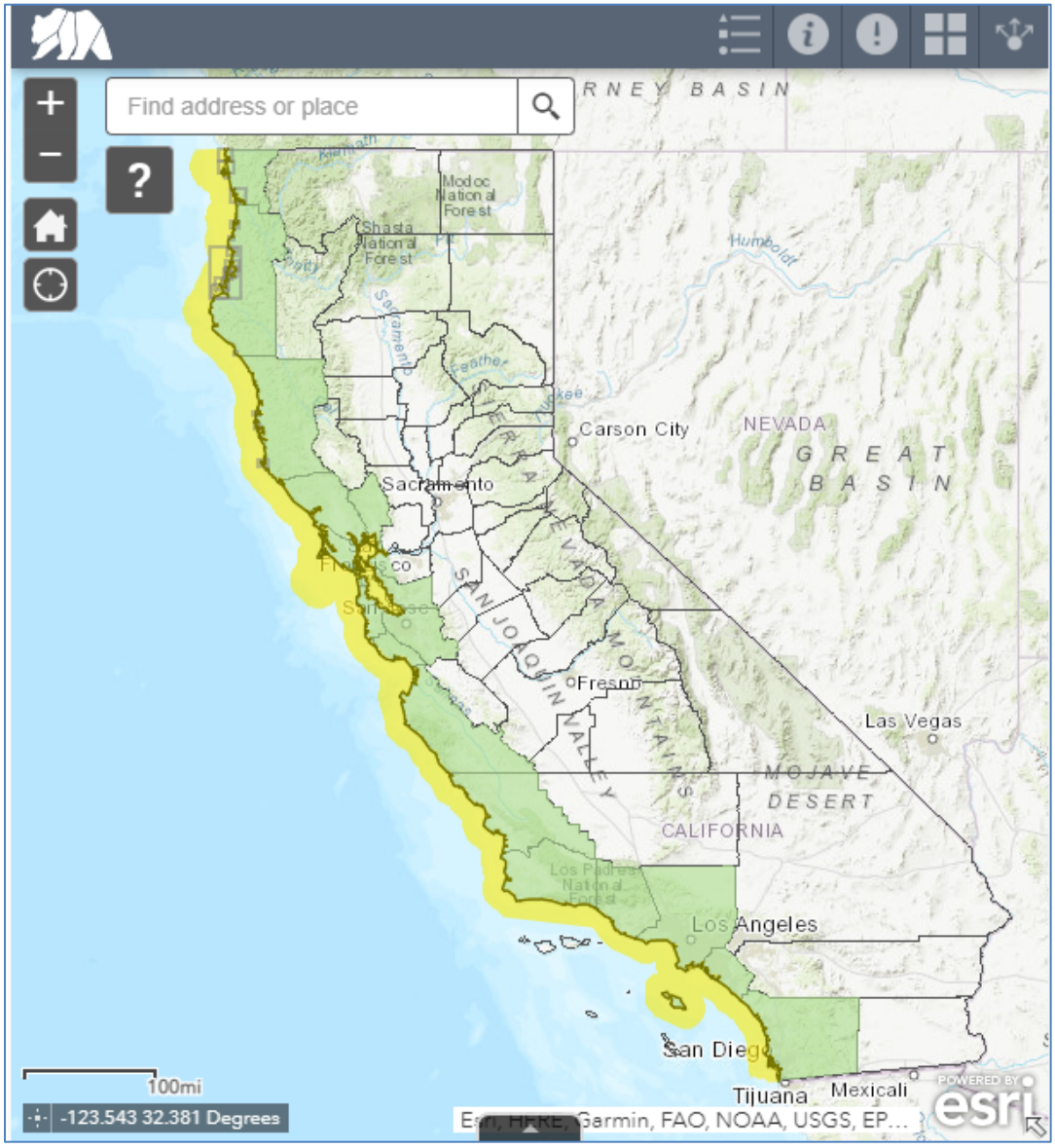
The stepwise HHA is based on a regional screening evaluation, followed by a site screening, and if necessary, a detailed evaluation. Site screening considers the local site characteristics of ground elevation (site grade to water surface elevation). Detailed tsunami hazard assessment involves modeling applicable near and far-field tsunami sources, modeling of wave propagation from the source to near shore, and numerical modeling of hydrodynamic loading, water-borne projectiles, and debris loads at the site and affected assets.

Specific tsunami risk assessments have been performed for the DCPP and Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI), which are above tsunami inundation zones. For an emergency response, note that a large tsunami could affect ingress/egress from these facilities.

4.2 Tsunami Map Context

The California Geologic Survey (CGS) has developed tsunami hazard area maps to assist cities and counties in identifying their tsunami hazard for tsunami response planning. Tsunami response planners can explore areas of interest at California Tsunami Maps and Data by zooming, panning, and clicking (or tapping) on California coastal map locations to open a pop-up window providing detailed information and links. As stated in the CGS, California Tsunami Hazard Area Maps and Data are compiled with the best currently available scientific information and represent areas that could be exposed to tsunami hazards during a tsunami event.

Figure 4-1 California Tsunami Maps



4.3 Models Developed

The CGS tsunami hazard maps do not represent the inundation from a single scenario event. The inundation line is created by combining inundation results for an ensemble of source events (local and distant earthquakes as well as undersea landslides). For this reason, all the identified inundation areas may not necessarily be inundated or flooded during a single tsunami event. While these maps were prepared to assist local jurisdictions in tsunami evacuation planning, they can also be used for regional tsunami screening.

The first step in the tsunami HHA overlays the CGS tsunami hazard maps onto PG&E critical infrastructures in a GIS database. For example, Table 4-1 and Figure 4-2 show the types and number of PG&E gas assets in Humboldt Bay – Eureka area located in the tsunami hazard map.

The tsunami hazard maps in Appendix D represent events that may have a significant impact to PG&E's service territory and assets. FAs can use the regional screening evaluations to understand their exposure to tsunamis and the incurred potential damage.

These are useful both for planning purposes and response during a "tech-down" situation.

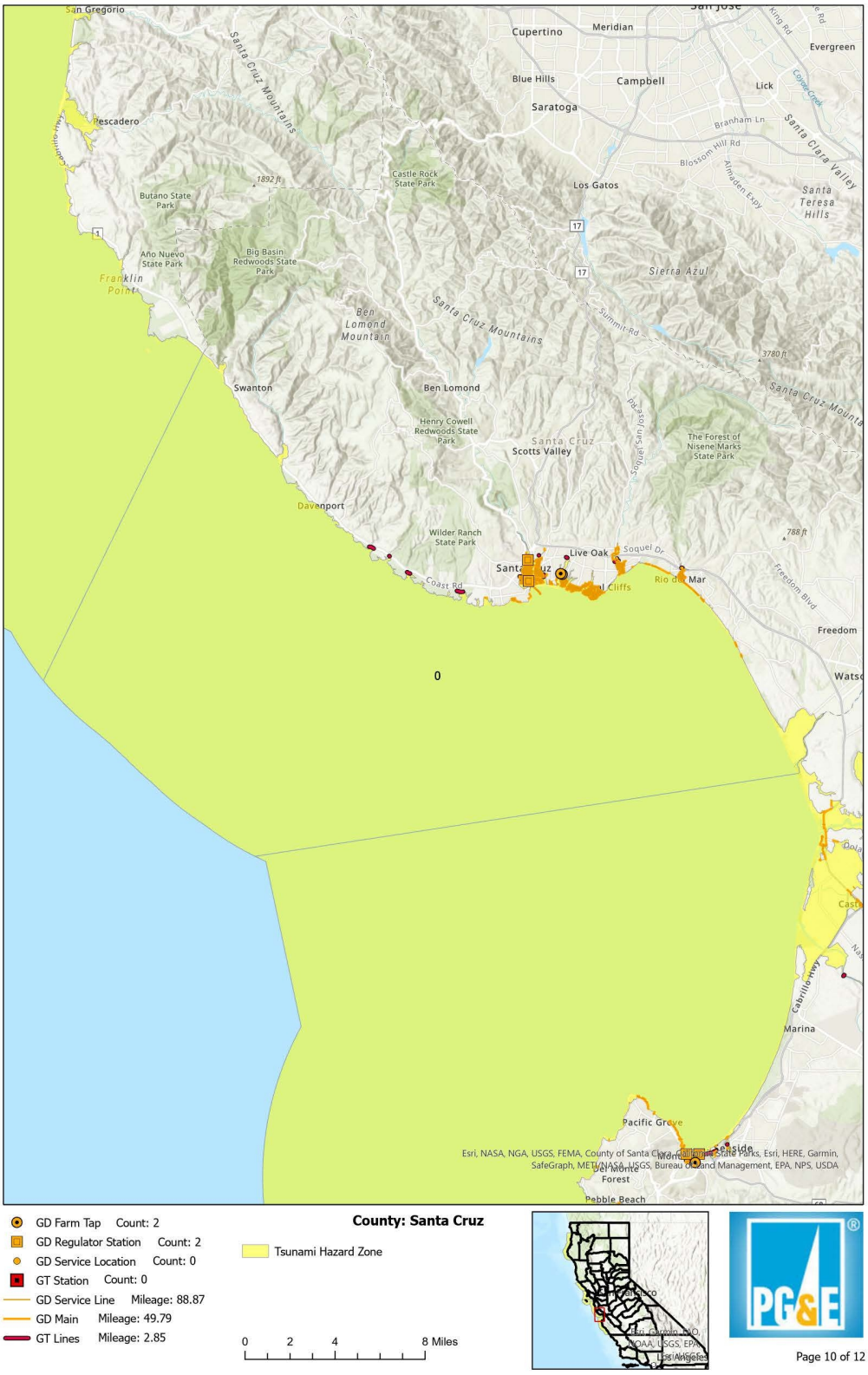
Utility infrastructure at risk from a catastrophic tsunami may include electric and gas assets identified in Table 4-1.

Table 4-1: Electric and Gas Asset Types with Potential Risk from Tsunami

Electric Assets	Gas Assets
• Generation stations • Substations • Distribution poles • Transformers • Streetlights • Underground vaults • Control buildings	• Gas transmission stations • Gas transmission lines • Gas distribution lines • Gas distribution service lines • Gas distribution regulators • Compressed natural gas (CNG) stations

Screening maps for all PG&E coastal locations are in Appendix D and available on the Geosciences SharePoint. The Tsunami Hazard GIS layers can be accessed at Tsunami Web App 1.2 (arcgis.com) Users need MEA access to GeoHub-PROD-Viewer and GeoMart-PROD-Viewer (alternatively creator and fieldworker – editor accounts can also be requested. , Refer to how to request access to GeoHub (AGOL) for users instructions.

Figure 4-2: Tsunami Hazard Map with PG&E Assets



4.5 Tsunami Alerts

Tsunami alerts are issued for U.S. and Canadian coastlines and the British Virgin Islands. They include four levels of tsunami alerts (Table 4-2): “Warning”, “Advisory”, “Watch”, and “Information Statement”. Each level has a distinct meaning relating to the local emergency response. Recommended protective actions vary within areas under warnings and advisories. Be alert to and follow instructions from local emergency officials because they may have more detailed or specific information.

Table 4-2: Tsunami Alert Levels

Alert Level	Potential Hazard(s)	Public Action
 Warning	Dangerous coastal flooding and powerful currents	Move to high ground or inland
 Advisory	Strong currents and waves dangerous to those in or very near water	Stay out of water, away from beaches and waterways
 Watch	Not yet known	Stay tuned for more information Be prepared to act
 Information Statement	No threat or very distant event for which hazard has not been determined	No action suggested at this time

Tsunami Warning: The warning is issued when a tsunami with the potential to generate widespread inundation is imminent, expected, or occurring. Warnings alert the public that dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after initial arrival. Warnings alert emergency management officials to take action for the entire tsunami hazard zone. Local officials will take appropriate actions that may include the evacuation of low-lying coastal areas and the repositioning of ships to deep waters if they can be done safely in time. Warnings may be updated, adjusted geographically, downgraded, or canceled based on updated information and analysis.

Tsunami Advisory: The advisory is issued when a tsunami with the potential to generate strong currents or waves dangerous to those in or very near the water is imminent, expected, or occurring. The threat may continue for several hours after initial arrival, but significant inundation is not expected for areas under an advisory. Local officials will take safety and timely appropriate actions (e.g., close beaches, evacuate harbors and marinas, and reposition ships to deep waters). Advisories may be updated, adjusted geographically, upgraded to a warning, or canceled based on updated information and analysis.

Tsunami Watch: The watch is issued when a tsunami may later impact the watch area. The watch may be upgraded to a warning, advisory, or canceled based on updated information and analysis. Emergency management officials and the public should prepare to take appropriate actions.

Tsunami Information Statement: A tsunami information statement is issued when an earthquake or tsunami has occurred of interest to the message recipients. In most cases, information statements are issued to indicate there is no threat of a destructive basin-wide tsunami and to prevent unnecessary evacuations. Information statements for distant events requiring evaluation may be upgraded to a warning, advisory, or watch based on updated information and analysis.

A cancelation is issued after an evaluation of water-level data confirms that a destructive tsunami will not impact an area under a warning, advisory, or watch or that a tsunami has diminished to a level that is not expected to cause additional damage.

4.5.1 HAWC 24/7 Monitoring and Notifications

Tsunamis have the potential to be a threat to the coastal areas within the PG&E service territory. The Hazard Awareness and Warning Center (HAWC) may become aware of a tsunami warning or watch through the U.S. Tsunami Warning System. When a warning is received, the HAWC will monitor and log tsunamis as described in the HAWC Monitoring and Logging standard.

When the HAWC becomes aware of an active hazard that is associated with an outage, is actively threatening PG&E assets, has reportedly caused damage to PG&E assets, or is receiving significant media coverage, the HAWC will determine whether an early alert via Everbridge is necessary per AH-1101P HAWC Notification procedure.

4.6 Other Materials and Equipment for Rapid Restoration

PG&E's tsunami planning includes the extensive update and maintenance of its infrastructure and the various materials and spare equipment procured for this work. This also includes emergency and non-emergency materials located throughout PG&E's service territory at materials distribution centers, other materials facilities, service centers, electric substations, and gas compressor stations. During emergencies, these emergency and non-emergency materials will become critical materials that will augment PG&E's emergency response and restoration capabilities. FAs will procure, manage, and replenish these materials, both emergency and non-emergency, at varying schedules. Storage of maintenance and construction material relevant to the emergency restoration work envisioned after a significant tsunami include substation, gas and electric transmission, and gas and electric distribution materials stored at the following locations:

- Fremont, Wheatland, and Fresno Materials Distribution Centers (primarily stores gas and electric distribution materials, some electric transmission and substation materials, and some tested gas transmission pipe)
- Stockton materials distribution center (primarily stores electric distribution materials, and some electric transmission materials)
- Various remote materials storage locations which are typically PG&E service centers (primarily stores distribution gas and electric materials), Emeryville materials facility and West Sacramento facility (primarily stores substation emergency materials and equipment) and other gas and electric transmission materials storage facilities

located throughout the PG&E service territory (primarily stores gas and electric transmission materials)

Gas transmission storage facilities including the S&S pipe yard (Stockton), the MHX pipe yard (Port of Stockton), the Modesto pipe-fitting materials facility, the Tracy storage facility, and the Port of Stockton storage facility (primarily stores gas transmission pipe, valves, fittings, and other related materials)

- Davis tower materials facility (primarily stores electric transmission tower parts and other transmission materials)
- Seeco facility in Reno, Nevada, and the Victor service yard in Victor, California (overhead transmission material for 60-115 kV)

For more information about the above facilities, contact the on-call logistics section chief. In addition to the above emergency materials, PG&E maintains a mobile generation fleet comprised of eight generators over 100 kw (stored in various places in the service territory including Rogers Flat, Tesla Substation, Redding, Antioch, San Francisco, and San Carlos). The Transportation Services (TS) department maintains the list of PG&E's large capacity generators, locations where they are stored. TS also transports them if they are authorized and approved for emergency use. The on-call EOC Ground Support Unit Leader will call the listed responsible contact to verify the generators availability and to obtain their approval to move the units. To request access (provided on a case-by-case basis to EOC coworkers) to the generator inventory including storage locations, the EOC coworkers can submit the Logistics Emergency Resource Guide, large-capacity generator inventory form.

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5 Concept of Operations

5.1 Preplanning for Tsunamis

A successful response to a tsunami is predicated on the following three principles because tsunamis from local or regional sources usually provide little advanced notice to PG&E and its customers:

1. The ability to communicate across technical disciplines
2. Establishment of a unified response organization
3. The ability to scale quickly

5.1.1 Preplanning for Tsunamis with Hazard Modeling

Tsunami modeling scenarios can be of great value in determining an initial hazard assessment of California tsunami inundation maps and overlay maps of PG&E assets. As the PG&E intranet may be unavailable and communications may be inoperable for some time in affected areas, the company will use the information contained in the models to estimate initial response resource needs. The teams will also need to access the information by alternate methods (e.g., having resources and hardcopies available offline and at the EOC).

5.2 Local and State Event-Triggered System Notifications

At the onset of a tsunami, the state and local authorities will notify PG&E facilities at Diablo Canyon Power Plant (DCPP), Humboldt Bay Generating Station (HBGS), and Humboldt Bay ISFSI . HAWC also monitors the NOAA tsunami alert system and in coordination with Geosciences, will issue tsunami watches, alerts, and warnings, as necessary.

5.3 Emergency Plan Activation

5.3.1 Geosciences Initial Notification of a Tsunami

Geosciences maintains an on-call rotation list of coworkers who will respond after hours to a tsunami.

Tsunamis from nearby earthquakes or submarine landslides may have little lead time ahead of National Oceanic and Atmospheric Administration (NOAA) warnings. Shaking felt from the earthquake may be the first notice of a potential tsunami for local and regional tsunami events. Waves from distant, Circum-Pacific (e.g., Japan and South America) tsunamis take hours to cross the Pacific. Estimated arrival times and wave/run up heights (via NOAA) provide emergency responders time to notify coastal communities and critical facilities. PG&E HAWC and Geosciences monitor tsunami notices from NOAA 24/7 and provide updates on potential impacts to assets.

5.3.2 EP&R and Geosciences Initial Notification of Extent of the Tsunami

Once a tsunami warning is issued for coastal California, the on-call Geosciences coworkers will review the related information to brief the director of Geosciences, the director of EP&R Response and Operations(R&O), and the VP of EP&R. See Appendix B, Geosciences Call Agenda.

Based on estimated tsunami impacts, the director of EP&R (R&O) ,will organize a conference call with the director of Geosciences, VP of EP&R, On call EOC Commander, and/or on-call Geosciences EOC coworkers to gain situational awareness about the tsunami. Once the VP of EP&R and on-call EOC Commander have been briefed, they will determine whether to activate the EOC in Vacaville or virtually, or both. Once activated, the director of EP&R R&O will initiate the notification of the on duty EOC team. The PV of EP&R will communicate to appropriate, impacted upper leadership consistent with all-hazard delegated authority.

5.3.3 Everbridge Notifications

EOC coworkers will receive an Everbridge (EVBG) message with a reporting location (e.g., the EOC or the alternate EOC) and instructions. The EVBG message may also request a confirmation of the receiver's safety and ability to report for duty. Responses will be in the form of pushing a numeric key on the phone. Messages may be sent via cell, landline, short message service (SMS) text, and/or email. EVBG recipients should respond to the received messages. EOC will initially be filled by the EOC on-call coworkers at the time of the tsunami.

5.3.4 Activation Matrix

Table 5-1 shows the immediate required response actions in relation to an incident. The actions are summarized and categorized by emergency response roles to provide an "at a glance" visual guide on initial tasks. See the CERP "Concept of Operations" section for a comprehensive overview of initial and ongoing response and recovery actions for tsunamis and other all-hazard events. PG&E coworkers with emergency roles should check in with their supervisor at the earliest opportunity and receive a briefing and/or assignment.

Table 5-1: Immediate Response Actions

Emergency Response Role	Actions
System (event-triggered)	• Geosciences and HAWC receive notice of tsunami from NOAA and issue appropriate notifications. • Concurrently, PG&E facilities at Diablo Canyon Power Plant (DCPP) and Humboldt Bay Power Plant (HBPP) are notified by the local sheriff's office.
Geosciences	• Using tsunami hazard maps, prepare interpretation of damage forecasts; forward to facility coordination center (FCC), EOC, and the director of EP&R SE.

Emergency Response Role	Actions
	• Post messages on the voice message system (VMS) for the building evaluators for Corporate Real Estate Strategy and Services (CRESS) facilities. • Geoscience field teams and contractors will report on their evaluation findings and other field information to facility coordinators. Coordinators will distribute reports to FCC, EOC, and director EP&R SE.
Emergency Preparedness and Response (EP&R R&O)	• Review NOAA wave height estimates and compare against hazard maps. Determine potential facility or resource damages. • Initiate the CERP. • Send Everbridge notifications to the on-call EOC team to assemble. • Develop an initial assessment of emergency with Geosciences. • Brief company leadership on the emergency. • Activate the EOC and assess EOC initial operational capacity staffing levels.
Public information officer (PIO) and public information coworkers	• Activate the PIO. • Post messaging on pge.com. • Utilize pre-approved and pre-scripted messaging. • Monitor social media. • Report anomalies in social media to EOC as appropriate.
Corporate Real Estate Strategy and Services (CRESS)	• Activate facilities coordination center (FCC). • Perform initial damage evaluations. • Assign building evaluators (contract) to travel to assigned facility or reporting location. • Initiate repair of any damaged buildings beginning with high-priority buildings and/or priorities established by the EOC. • Begin evaluations and tagging of high-priority buildings as appropriate (red, yellow, and green). • Report results to FCC (FCC will forward to the EOC).
Gas Operations	• Isolate any loss of containment to make safe • Activate Gas Emergency Center (GEC), if necessary • Review tsunami hazard maps to identify impacted gas assets • Perform initial damage evaluations considering inundation depths, wave heights, debris impact and pipelines and stations scouring • Prioritize remediations of impacted gas assets including gas stations, gas transmission pipelines, and gas distribution pipelines • Initiate remediation and repairs
See CERP Concept of Operations for a comprehensive overview of initial and ongoing response and recovery actions for tsunamis and other all-hazard events. PG&E coworkers with emergency role responsibility should check in with their supervisor at the earliest opportunity and receive a briefing and/or assignment.	

5.4 PG&E Incident Levels

To ensure a consistent and well-coordinated response to emergencies, the company developed an emergency classification system known as PG&E incident levels. Incident

levels range from 1 to 5, with “Level 1” representing the least damage to PG&E’s systems and “Level 5” representing a catastrophic incident.

A catastrophic tsunami would be classified as a Level 5 “catastrophic” incident. Because PG&E’s response is scalable, the processes introduced in this annex may be used for a “severe” tsunami or any event or incident as needed.

PG&E’s incident levels are useful decision support tools to help PG&E understand the complexity of an incident and the required actions at each level (e.g., emergency center activations and resources needed). This information is summarized in Table 5-2. For more information on incident levels, refer to CERP.

Table 5-2: Incident Levels

Type	Level	Description
Catastrophic	5	**Catastrophic** • Incident includes multiple emergencies, affects many customers, business operations • Significant cost and infrastructure risk/damage • Full mobilization of PG&E, contractor, and mutual aid resources • May have heavy media interest and actual reputational risk • The EOC and executive team are activated • Devastating – Tsunami Intensity XI-XII – lifeline interruptions, extensive coastal building damage and destruction
Severe	4	**Severe** • Incident includes extended multiple incidents and affects many customers • Escalating, company impact • Resources, contractors, and mutual aid may be shared between regions • May have heavy media interest and potential reputational risk • Destructive – Tsunami Intensity IX-X – extensive coastal flooding and building damage, floating debris
Serious	3	**Serious** • Incident involves large numbers of customers • Resources may need to move between regions • Potential increased, actual, or imminent negative media interest • Damaging – Tsunami Intensity VII-VIII – extensive coastal flooding
Elevated	2	**Elevated** • A pending or local incident requires more than routine operations • Resources may need to move within the region • Increased media interest • Strong – Tsunami Intensity V-VI – local flooding (e.g., king tides)
Routine	1	**Routine** • Incident involves a relatively small number of customers • Local resources are sufficient • Little to no media coverage • Large distant earthquake generated tsunami with no impact to West Coast

*Acronyms: Incident Command Post (ICP), Operations Emergency Center (OEC), Gas Emergency Center (GEC), Regional Emergency Center (REC), Alternate Emergency Operations Center (AEOC), and Emergency Operations Center (EOC).

Note the following distinctions regarding activation criteria:

- The activation of centers will be determined by situational needs at the incident commander's discretion (i.e., the EOC and/or multiple centers may be activated).
- Incident safety, damage complexity, workload and availability of workforce are the key factors in determining the need to escalate.
- Note that a dual commodity incident will default to the higher level (e.g., if an incident is rated electric Level 4 and gas Level 2, the EOC will staff to a Level 4 event).

Refer to CERP, Appendix C, Levels of Emergency and Activation Criteria for PG&E, and functional and hazard-specific annexes for more comprehensive charts and specific examples.

5.4.1 Response Priorities

During a catastrophic tsunami, the response priorities remain the same as they are for all emergency operations. At PG&E, all emergency planning and response activities are governed by the following priorities:

- Protect the health and welfare of the public, PG&E responders, and others.
- Protect the property of the public, PG&E, and others.
- Restore gas and electric service and power generation.
- Inform customers, governmental agencies and representatives, the news media, and other constituencies.
- Restore critical business functions and move towards business as usual.

These priorities are maintained through all phases of response to an emergency.

5.5 Emergency Organization

A catastrophic tsunami in the PG&E service territory will likely necessitate a dual-commodity response (gas and electric) that is supported by all FAs and will require extended operations at all levels of the response. Although a single team is on call, other teams may be required to respond to provide relief to coworkers who were activated for the initial response, fill in any gaps for coworkers who may have been affected by the tsunami and were not able to respond, supplement staffing in areas needing more support, or set up operations in new areas.

Emergency centers, including the EOC, REC, GEC, OEC, and base camps, will be staffed in a dual-commodity manner and will include both gas and electric operations.

5.5.1 Assessment and Restoration

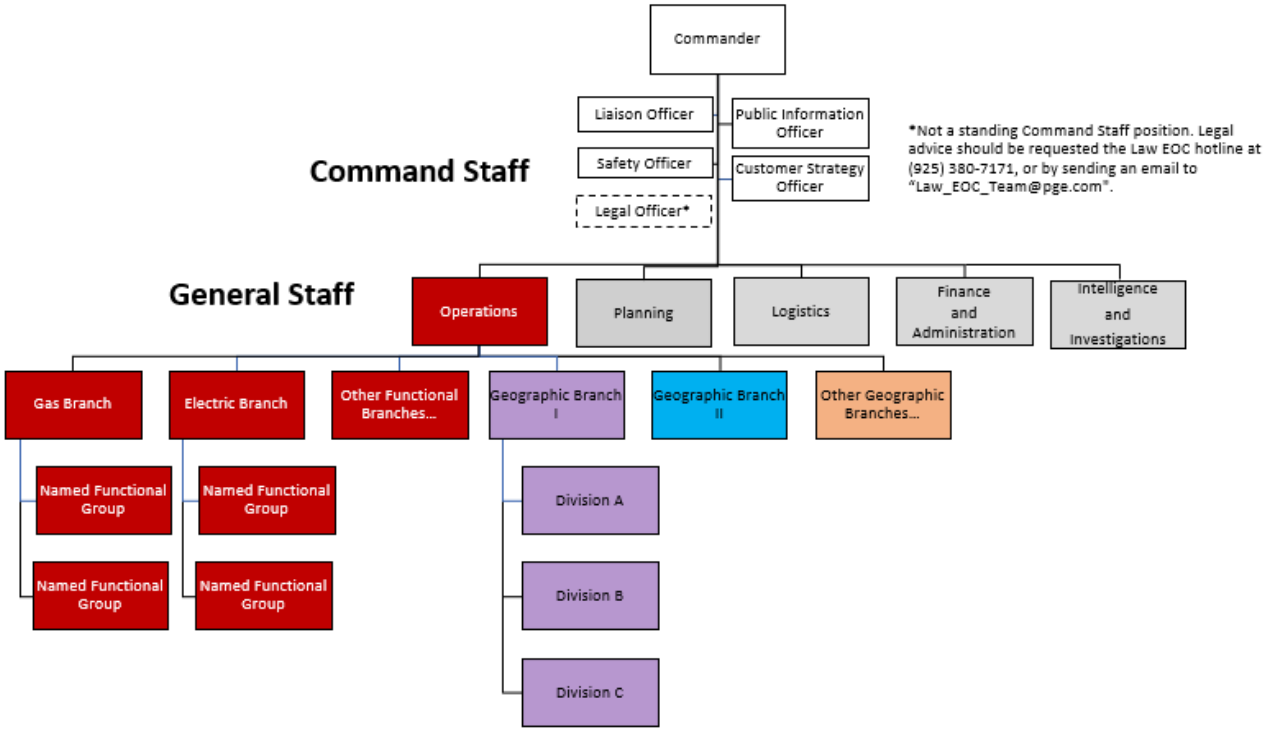
It is necessary that, at the earliest point possible in the activation, Geosciences reviews the hazard models. After the review, the EOC Commander, emergency center commanders, and leadership can be informed of the totality of the situation and make decisions as appropriate.

5.5.1.1 Damage Assessment

The initiation of damage assessment actions, in many cases, is automatically triggered by the event occurrence and existing procedures. Coworkers reporting to service centers can perform “windshield” surveys as they report to work. Damage estimates will be collected at all levels and reported to the EOC via the appropriate communication channels. Initially, damage information may be obtained through the situation unit in the EOC via review of pre-run damage models.

In addition, when a dual-commodity response is required, the field elements will likely co-locate at a single emergency field site or OEC and may perform damage assessments in tandem or under an Incident Command System (ICS) management structure. Within the Operations section, groups, divisions, and branches will be established as required when the number of damage assessment functional groups (e.g., gas assets, electric assets, facilities) or geographic incident divisions exceed the span of control of individual team members. As required, group supervisors will be assigned functional responsibilities and division supervisors will be assigned geographic area responsibilities (see Figure 5-1).

Figure 5-1: Example ICS Organization Chart



Aerial damage assessments may be key in the initial hours after a tsunami impact. Three primary assets—helicopters, airplanes, and drones—organized under an Air Operations Branch reporting to the Operations Section Chief, may conduct mission management.

In addition to air operations, PG&E may establish an initial ICS-based damage assessment field team to survey tsunami damage. Priorities may shift based on new information gained by situational awareness and damage assessments from the “boots-on-the-ground” team.

5.5.1.2 Air Operations

The Air Operations Branch Director (AOBD) in the EOC coordinates tsunami response flight activities. Specifically, when the EOC is activated, the AOBD coordinates all aviation service requests for an incident or event. To ensure requests for aviation services are coordinated in enough time to notify vendors, mission requests should be received and prioritized by close of the business day before support is required. If the number of requests requiring aviation support outnumbers the available aircraft, the Operations section will prioritize missions based on operational requirements. Refer to the Air Operations Branch section of the CERP for more information.

All contracted flights are conducted in accordance with the Helicopter Operations Field Manual (AVI-3001M) requirements and will include the coordination of priority contract helicopter missions in support of tsunami response operations.

Aerial survey needs for leak survey are supplied by LASEN™, a firm contracted to PG&E. LASEN has an aerial pipeline inspection technology called Airborne LiDAR (light detection and ranging) pipeline inspection system. This system uses a laser to detect leaks. The laser beam, transmitted down from the aircraft, is used to detect, locate, and assess the magnitude of the leak.

LASEN aerial survey is prioritized for all transmission lines and fault crossings in the affected area(s). During a catastrophic response, the LASEN taskforce lead oversees all associated work, including LASEN, follow-up investigation surveyors, and standby coworkers.

Other patrols inspect electric transmission, power generation, and hydro assets. Helicopters fly from various locations in the PG&E service area and are flight-tracked by Aviation Services' FlightCore in Vacaville. Refer to the Logistics Emergency Resource Guide for information about requesting helicopter services.

Aerial patrols fly over gas pipelines Monday through Friday on a regular schedule. On demand, special patrols can fly to the affected area after a tsunami with a two-hour call out. EOC requests for all aerial assets (both fixed wing and helicopters) are processed by FlightCore scheduling at [redacted].

Fixed-wing airplanes owned by PG&E are hangered at the Buchanan Field airport (CCR), in Concord. These planes fly the entire service territory and sometimes overnight outside the Bay Area. The airplane's crew consists of either a pilot and two patrollers who operate the camera and software for the aircraft or two pilots and one patroller who operates the LiDAR for the aircraft. After a flight, images and data from the camera are uploaded to a Geo-indexed server, which allows new images to be compared with previous images and provides a digital elevation model.

Aerial patrolling may be an important resource after a tsunami. Aerial patrollers can observe and take images of many PG&E assets. Aerial patrollers are trained to recognize geohazards such as landslides. Aerial patrol can also be used to spot fires and hotspots before a fire breaks out. "Before and after" image comparisons in our database can reveal details such as road offset by fault movement.

Limitations: Aerial patrol operates in favorable weather, that is, visual flight rules (VFR). Only Fixed Wing flights can be conducted under Instrument Meteorological Conditions (IMC). The onboard sensors cannot penetrate clouds or fog. Note that airports may close after a natural disaster while runways are inspected. The company airplanes can land at smaller airports around the state, as necessary.

Contacts: Aviation Operations Branch Director in the EOC.

5.5.1.3 Catastrophic Event Considerations

For incidents with catastrophic potential, PG&E may designate company geographic divisions as ICS branch organizations. Most incidents impacting operations will be managed at the FA OEC level with limited coworkers or resource augmentation.

For catastrophic scenarios such as a Cascadia earthquake and tsunami, the extent of damage within a discrete company division may be overwhelming. The EOC Operations Section Chief may divide the incident geographically using alphabet characters (“A”, “B”, and “C”), with division supervisors designated as needed based on operational complexity and span of control requirements. The PG&E naming convention for such “divisions within divisions” will be the home division identifier followed by the branch or group name, using a phonetic alphabet letter, such as Humboldt-Alpha or Humboldt-Bravo (see Figure 5-2).

Figure 5-2: Example of IC Divisions in the Company Humboldt Division

5.5.2 Advanced Planning

The HAWC partners with Geosciences to increase observational awareness of land movement and geologic phenomena throughout the service territory, and will include landslides, post-wildfire debris flows, earthquakes, and tsunamis. For tsunamis, the first available damage information may come from models. In anticipation of this potential, an advanced planning unit may be activated as part of a damage assessment organization to run and validate hazard models.

5.5.3 Leak Survey (Picarro)

Vehicle survey involves Picarro technology that uses a mobile-leak detection device to sweep areas. The Picarro gas-leak detection analyzer is more sensitive than traditional-gas detection instruments and precise enough to detect natural gas even when other gases are present. For catastrophic response, the Picarro task force lead oversees all work associated with Picarro, including drivers, follow-up investigation surveyors, and standby coworkers.

5.6 Emergency Field Sites

One or more emergency field sites, including base camps, micro sites, landing zones, materials laydown yards, staging areas, rally safety points, community resource centers (CRC), and mobile command vehicles may be necessary to support field operations for a tsunami incident.

Mobile and temporary emergency field sites request and approval are addressed in EMER-3005S, PG&E's Emergency Field Site Request and Approval Standard. To request an emergency field site, visit the Emergency Site Request Portal and submit a request form. Requests for landing zones, materials laydown yards, and staging areas only require field incident commander approval, while base camps and micro sites require an additional level of approval from an EOC commander or their delegate.

Refer to the Logistics Annex (EMER-3005M) for more information on emergency field sites, facilities, resources, and other capabilities.

5.7 Rally Safety Point

When responding to a tsunami incident, PG&E may establish one or more rally safety points proximate to but at a safe distance from wave impacts. Rally safety points are mobile, rapidly deployable site capabilities comprised of a tent, restrooms, and limited IT connectivity. It serves to provide crews with access to first aid, hydration, cooling or heating, and IT capability closer to work locations. When used for wildfires, rally safety points are typically co-located with Cal Fire drop zones and can be used by various first responders supporting the incident.

5.8 Emergency Responsibilities

As mentioned throughout this document, response to a catastrophic tsunami will require support from all FAs. The sections given below describe high-level actions taken by the FAs. For more information on these actions and processes, refer to the specific FA annex

to the CERP. FAs are still refining and documenting some processes in their functional annexes. Table 5-2 can be useful when ICs or EOC needs a quick “at-a-glance” reference of roles and responsibilities.

5.8.1 Geosciences

Geosciences will review tsunami data and prepare an interpretation of damage forecasts. Geosciences will forward the forecasted information to the facilities coordination center (FCC), EOC, and VP of EP&R. Throughout the response, Geosciences will be the SME technical specialist for interpreting data on the tsunami. Data provided on tsunamis may affect the emergency response. They will also facilitate integration of actual observed conditions, and the field damage reported to the EOC by geosciences field reconnaissance teams.

Depending on the size, location, and impacts from the tsunami, typical geosciences field activities include documentation of tsunami effects, system impacts, participation in FA response and recovery teams, interface with various external agencies, and participation in collaborative science data collection and assessment missions. To facilitate and manage this broad array of activities, Geosciences establishes FA support leads for communication and planning of resources, and assignment of “tactical teams” comprised of both Geosciences and contracted external support. The Geosciences FA leads, and tactical teams describe the Geosciences EOC technical specialist (on rotation) of activities to report out within the EOC, with overall orchestration by the Geosciences director.

Examples of field conditions and occurrences targeted for their post-tsunami assessments include:

- Damage to assets from flooding and water-born debris impact
- Damage related to strong currents in harbors and waterways
- Damage from sediment transport and scouring

5.8.1.1 Managing the Post–Earthquake Building Evaluation Program

Geosciences manages the post-earthquake building evaluation program that provides the information essential for the communication and coordination of post-earthquake building evaluations. While this program is designed to respond to earthquakes, Geosciences can also use it to inspect buildings damaged from tsunamis.

The Post-Earthquake Building Evaluation Manual and operational program documents to implement emergency building evaluations are electronically accessible on the Geosciences website under ”Internal Links”. Hardcopies of the documents are also located in the earthquake cabinets at the EOC. Some of the main components of this program are as follows:

- Initial damage evaluation
- City Memorandums of Understanding (MOU) for evaluations
- San Francisco Building Occupancy Resumption Program (BORP)
- San Jose BORP

- Evaluator assignments
- Earthquake kit locations

For additional information about the facility coordination center and the coordination of building evaluation reports, refer to section 5.8.15.1 Post-Earthquake Building Evaluation.

5.8.2 Emergency Preparedness and Response

The VP of EP&R will review tsunami reports, determine emergency facility potential damage, and decide which emergency centers to activate. The determination is made during the initial conference call with Geosciences mentioned in section 5.3.2 EP&R and Geosciences Initial Notification of Extent of the Tsunami. This is the first step in activation of the Company Emergency Response Plan (CERP). The director EP&R R&O will direct contact the senior manager of Emergency Field Operations (EFO) to activate the appropriate emergency center(s).

The VP EP&R will brief company leadership and direct the execution of the following early actions:

- Send notification to EOC command coworkers to assemble Everbridge.
- Develop initial assessment of emergency with Geosciences.
- Brief the company leadership on the emergency.
- Activate the EOC and assess EOC initial operational capacity staffing levels.

Pre-designated leadership who are on-call and trained EOC commanders will assume the EOC commander role.

5.8.3 EOC Commander, EOC Command Staff, and Section Chiefs

The established roles of the EOC coworkers are defined in section 7 of the CERP. During a tsunami, key differences among roles will be overcoming the challenges of communication, situational awareness, and understanding the magnitude of damage. The company will need to understand the status of impacted coworkers (employees and contractors) and proper staffing availability to accomplish incident response core capabilities. The finance & administration human resources branch supports functional area leadership coworker accountability by performing the HR Annex, Appendix F impacted coworker analysis and emergency messaging processes. As soon as possible, the EOC Commander, Command staff, and section chiefs should obtain estimates on the extent of the tsunami damage. This will be done by accessing the tsunami hazard maps for the event. Initially, the Planning section and/or Geosciences will obtain data and interpret findings to present to the EOC Commander.

Examination of the modeling data, including estimated work hours and resources needed, will assist the EOC Commander to determine key initial response strategies, including task organization within geographic divisions, number and location of emergency field sites to

set up, communication equipment may need to be deployed, and whether mutual assistance or a National Response Event (NRE)[1] should be requested.

Regular conference calls with all FA leaders will be established as early as possible in the activation. The EOC Commander will use the tactics meeting as covered in the Company Emergency Response Plan. In addition, the Corporate Incident Management Council (CIMC) may be activated during a significant event for providing executive policy support. .

5.8.4 Logistics

The Logistics Section secures resources, supplies, food, lodging, vehicles and equipment rentals, fuel, security, and medical services, as well as maintains equipment for incident coworkers. Logistics also utilizes on-call EOC and emergency site teams who will be activated when needed. The logistics chief, EOC Commander, Operations Chief, and Planning Chief should meet to discuss the scenario that should be used. Scenarios can be adjusted or modified to include more or less resources as dictated by the situation. Logistics takes critical actions to ensure adequate resources (e.g., property, equipment, materials, food, and housing) are secured and ensure their availability once requirements are determined.

The EOC Commander will need this information early in the activation to be able to request the PG&E Liaison Officer to coordinate with the local government on prioritization of clearing of access routes to be able to set up the emergency sites (base camps, micro sites, staging areas, rally safety points, CRCs, and materials lay-down areas).

5.8.5 Field Incident Management Teams

Available by request through the EOC commander, as conditions warrant, PG&E may mobilize one or more incident management teams (IMTs) to assume incident command of all or part of an impacted division. . Triggered by the event, local OECs will be activated. Field coworkers will begin contacting their supervisors to report status if possible. Though facilities in the hardest-hit area may need to be inspected prior to entering, crews will undoubtedly migrate toward their nearest service center or place of work. Superintendents should talk with crews ahead of time to discuss potential meeting sites outside the building (e.g., “south of the parking lot” or “near the main gate).”

5.8.6 Electric Operations

In addition to the deployment of field teams, initial actions for Electric Operations include activating the Electric Transmission Emergency Center (ETEC), Electric Distribution Emergency Center (EDEC), as well as Substation and T-Line Operations Emergency Center (STOEC). ETEC coworkers coordinate with system protection coworkers operating out of the EDEC and the STOEC. For more information about the ETEC and the STOEC, refer to section 2.1.2 in the Electric Annex (EMER_3002M). Electric emergency

[1] Per the DOE National Electricity Emergency Response Capabilities.pdf (energy.gov), National Response Events are natural or man-made events “forecasted to cause or that causes widespread power outages impacting a significant population or several regions across the United States and requires resources from multiple Regional Mutual Assistance Groups."

management coworkers will report to assigned locations and begin the activation of the Electric Annex and establish communications with EP&R and the EOC. The Outage Management Tool (OMT) may not be usable because of extensive damage. Electric Dispatch will initiate 911 standbys.

Electric OECs will be activated and staffed, and the process of damage assessment will begin with coworkers reporting what they see on the way to the OEC/REC. OEC coworkers will review the community restoration priorities, assess system health, and dispatch “Make Safe” crews. Field coworkers and rapid assessment strike teams perform substation site/ground assessments. For more information on electric operations response procedures, refer to section 2.2 in the Electric Annex.

5.8.6.1 Distribution Assessment Process

For emergency incidents of Level 2 or higher, electric distribution assessment activities will involve qualified electric workers (QEWs), non-qualified electrical workers (non-QEW), damage assessment teams, and strike teams, and tools to perform specific functions. Refer to Distribution Assessment Process, in the Electric Annex.

5.8.6.2 Transmission Assessment Process

In the event of a tsunami, based on the location of the tsunami and the tsunami hazard maps, the STOEC planning section chief will work with the STOEC operations section chief to create an inspection list of transmission lines in the area. For more information on the process of inspecting electric underground transmission facilities after a tsunami, refer to Transmission Assessment Process in the Electric Annex.

5.8.6.3 Substation Assessment Process

In the event of a tsunami, tsunami hazard maps and associated tables will provide a list of substations to conduct the initial assessment. Upon receipt of the maps and tables, the EOC operations section chief or transmission branch director follows the process for creating an assessment plan during a STOEC/ETEC activation.

If communications are down, substation maintenance electricians will report to their pre-assigned substations. Substation maintenance electricians assist in the assessment of substation damage and receive direction/assignments through STOEC. The substation coworkers use the Substation Rapid Assessment form to complete an initial inspection of substation facilities (equipment and buildings). They then report their findings to STOEC and the local control centers, as appropriate. Refer to Substation Assessment Process section in the Electric Annex for the forms used by substation coworkers, reporting protocol, and the information about contracted inspectors.

The Facility Coordination Center (FCC) automatically dispatches pre-assigned structural engineer contract inspectors to perform damage assessments of important indoor substation buildings. Requests for assessment of other substation buildings are directed to the FCC. Refer to section 5.8.15.1 Post-Earthquake Building Evaluation.

Substation maintenance and construction (SM&C) coworkers may perform initial damage evaluation of substation buildings (TD-3350P-17). At the direction of STOEC, Substation Engineering Services (SES) civil engineers may assist SM&C in the assessment of damage to equipment, structures, buildings, and other site facilities. Even though SES engineers are not qualified electrical workers (QEW), are trained, and certified in damage assessment of buildings.

5.8.7 Gas Operations

Gas Operations will activate the Gas Emergency Center (GEC) located immediately adjacent to the Gas Control Center, in Bishop Ranch. If the facility is untenable, the Vacaville Gas Operations Center (VGOC) is the alternate site. Having activated the Gas Emergency Response Plan (GERP), immediate actions for Gas Operations will be to establish communications with field coworkers and assess the system status via SCADA monitoring, pipeline patrol, leak survey, or review of call center activity. This procedure includes the formation of pipeline patrols, leak survey, and aerial survey assessments of damages to PG&E assets and facilities.

5.8.8 Gas Damage Assessment

Gas OECs and the GEC will be activated and staffed, and the process of damage assessment begins with coworkers reporting what they see on the way to the OEC/GEC. OEC coworkers will review the community restoration priorities, assess system health, and dispatch “Make Safe” crews. For more information on Gas Operations’ damage assessment to catastrophic incidents, refer to Damage Assessment and Damage Assessment Tools in the GERP.

5.8.9 Gas Restoration Strategy

Common Gas Operations activities such as leak survey, pipeline patrol, and system isolation are transitional from initial response and make safe to restorative activities. Repairs to the pipeline(s) are carried out while customer and resource prioritization align with re-light or longer term make safe actions. Gas Operations will set repair and restoration strategies based on the most current situational awareness when responding to the incident. Refer to Repair and Restoration/Return to Normal in the GERP.

5.8.10 Safety Officers

Safety officers will be in high demand during a catastrophic tsunami response. Safety officers will need to be located at field emergency sites and job sites in addition to the OECs, RECs, GEC, EOC, and/or other PG&E facilities. It is impossible to list all hazards that may present from a large tsunami. However, it is likely that safety officers will be dealing with hazards such as exposed vaults, downed wires, leaking gas, compromised structural integrity of buildings, and hazardous spills near areas where coworkers are working. Safety is always the number one priority at PG&E, and as such, safety office may need to be augmented to backfill staffing gaps created by safety officers assessing work locations prior to the arrival of the crew.

5.8.11 Finance and Administration

The F&A Section Chief lead the Finance and Administration (F&A) Section. This section represents the Finance Branch and Human Resources (HR) Unit and provides finance, human resources, and administrative support. F&A Section may include:

- Finance and Administration Section Chief
- Deputy Finance and Administration Section Chief
- Human Resources Unit Leader and Span of Control Emergency Roles
- Human Resources Base Camp Cell Manager and Span of Control Emergency Roles
- Finance Branch Director
- Finance Support

For more information about the F&A Section emergency response capability, see the CERP, Finance and Administration Section. For more information about the HR Unit, see the Human Resources Annex (EMER-3006M), HR Response to Natural Hazard EOC Activations section.

5.8.12 Information Technology

Assigned emergency response coworkers will notify Enterprise Network Operations Center (ENOC) that the EOC has been activated and will activate the IT coordination center. At first operational capability, IT will conduct an initial assessment of critical network/communications structure and brief the EOC on status. Strike teams will be assigned to work on specific projects, including the IT setup at field emergency sites.

5.8.13 Public Information Officer

The Public Information Officer (PIO) will develop an incident communications strategy. The PIO has “pre-developed” messages that have been pre-approved for immediate broadcasting. The PIO will also activate social media support coworkers and begin to post messages on PG&E website.

For more information, refer to EMER-3008M-Emergency Communications Annex.

5.8.14 Customer Care

Customer Care will activate its Customer Strategy Officer (CSO) team at all levels of the response (OEC, IMTs/base camps, REC, EOC) and, in conjunction with operations, begin an assessment of all impacted customers. Initial priorities will include determining an overall customer communication strategy and cadence—both for the entire event and at the local level—and completing a review of impacted critical facilities. The CSO team will also begin assessing red-tagged customer lists for immediate execution of all necessary billing and account related actions. In addition, the CSO team will assess the need, as necessary, and deploy Customer Support Units (CSUs) and additional field coworkers to support gas and electric field response and serve as mobile customer field/command units.

5.8.15 Corporate Real Estate

Corporate Real Estate Strategy and Services (CRESS), as part of the Logistics Section, will activate the Facilities Coordination Center (FCC), and in coordination with Geosciences, CRESS will coordinate the deployment of contracted building safety evaluations of high-priority buildings. The FCC is responsible for receiving and providing information on the impact of the tsunami on company facilities and coordinates the overall emergency response for our real-estate assets. Refer to the Activation Process and the Authority to Activate the EOC, Materials and Transportation Coordination Center (MTCC), FCC, and Emergency Sites section in the Logistics Annex (EMER-3005M).

5.8.15.1 Post-Earthquake Building Evaluation

While the post-earthquake building evaluation program was designed for earthquakes, the engineers on contract may also be used to evaluate damage to PG&E buildings from a tsunami. The evaluation coordinator will set up evaluation assignments. Building damage reports are received by the FCC and further disseminated to the facility unit leader in the EOC.

The evaluators will report building damage to the FCC. The evaluators are structural or civil engineers having the authority to tag buildings “red”, “yellow”, or “green” as needed. The Post-Earthquake Building Evaluation Manual and operational program documents implement emergency building evaluations. The documents are electronically accessible on the Geosciences website under Internal Links and hardcopies of the documents are located in the “Earthquake cabinet” in the EOC.

5.8.16 Environmental Services

The Environmental department manages environmental compliance at PG&E’s operating facilities, including fossil power plants, hydroelectric powerhouses, solar facilities, substations, gas compressor stations, and service centers.

After a catastrophic tsunami, Environmental will be essential in obtaining environmental permits or requesting waivers for PG&E’s distribution, transmission, and generation projects that will ensue post-tsunami. Environmental will also review projects for potential impacts on sensitive species, waterways, and cultural resources.

6 Coordination and Communication

6.1 Communication Methods and Process

During the event, communications with executives must be established and maintained. The VP of EP&R may initiate executive briefing calls to consult with or inform the corporate incident management council (CIMC) of the incident.

Depending on the incident, executives may also receive an executive summary that provides an incident status update. As an example, the update may include some or all of the following information, depending on incident complexity:

- Risk level and concerns (e.g., flooding and water-born debris impact, strong currents in harbors and waterways, sediment transport, and scouring)
- Incident status (e.g., information about weather, wildfire, and cybersecurity)
- Activated emergency centers
- Leaders to initiate emergency communications plan or business continuity plan
- Number of customers impacted, number of outages, and number of customers restored
- Public or impacted coworker safety incidents, if known
- Coworker availability status
- Coworkers impacted by the incident
- Communications and status of communication equipment and base camps
- Status of infrastructure condition
- Resources
- Mutual assistance (valid damage)
- Additional statistics, as needed, e.g., customer average interruption duration index, System Average Interruption Duration Index (SAIDI), customers experiencing a sustained outage (CESO), wires down, 911-standby requests, and outage trend

6.2 Internal Coordination and Communication

Internal communication procedures are not changed during a tsunami. However, it may be difficult to obtain phone service if all the lines are jammed. Field-level communication will leverage PG&E's radio frequencies to communicate necessary information to support safe response and restoration of service.

Certain leadership and response coworkers hold satellite phones. Each satellite phone comes with a hard cue and instructions on how to communicate from satellite-to-satellite phone, as well as from satellite to landline. For satellite phone directory, contact EP&R S&E Prevention team at [redacted].

For emergency activations, PG&E uses the Everbridge (EVBG) system to contact on-call teams and request their status and direct them to report. As required, the EOC on-call coworkers will receive a EVBG message with important reporting details such as:

- Type of emergency incident
- Where to report (EOC or AEOC or other location)
- When to report
- Safety and security instructions
- Required coworkers protective equipment

The EVBG message may also ask whether on-call rosters are safe and able to report for duty. Responses will be in the form of pushing a numeric key on the phone. Messages may be sent via landline, short message service (SMS) texts, or email. EVBG message recipients should respond to the messages they receive.

To receive Everbridge notifications timely, coworkers are required to maintain an updated emergency contact information in the “About me” tab of “PG&E@work For Me”.

6.3 External Coordination

Establishing and maintaining communications with external agencies is crucial to all aspects of restoration. The Public Safety Specialists (PSS) have pre-defined roles to work in external EOCs or meet with local government entities. PG&E’s regional vice presidents (RVPs) support engagement with local government and community leaders.

6.3.1 Coordination of Public Information

When activated, the Public Information Officer will manage media, social media, and press release requirements. When not activated, PG&E’s Marketing & Communications will manage media, social media, and press release requirements. For pre-scripted and pre-approved messages public information coworkers can use without obtaining further approvals, refer to EMER-3008M-Emergency Communications Annex.

6.3.2 Government Coordination

Staff from the liaison officer will establish contact with local OES departments and, in some instances, will send a representative to the State Operations Center (SOC). Vital information gathered from the PIO, the EOC Commander, and Customer Strategy Officer is shared among the agencies in order to ensure response priorities and information access.

7 Training and Exercises

Under the California Public Utilities Commission's (CPUC's) General Order (G.O.) 166 and as mandated by PG&E Business Continuity Planning, Training, Exercise, and Improvement Planning Standard (EMER-1001S), employees with an emergency role are trained and participate in an annual exercise. For additional information regarding training, see subsection 5.8 of EMER-3001M, Company Emergency Response Plan (CERP) and the PG&E EP&R S&E Integrated Preparedness Plan (IPP).

PG&E's EP&R S&E plans, coordinates, and conducts the following types of Emergency Preparedness Exercises:

- Seminars
- Workshops
- Tabletop exercise (TTX)
- Functional exercise (FE)
- Full-scale exercise (FSE)

All exercises are designed and executed in accordance with Homeland Security Exercise and Evaluation Program (HSEEP) methodology, the California Standardized Emergency Management System (SEMS), the National Incident Management System (NIMS), and the PG&E EP&R S&E Integrated Preparedness Plan (IPP).

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8 After-Action Reports

The after-action report (AAR) summarizes key information related to activation response and recovery activities. In accordance with the CERP, PG&E conducts an after-action review with responding incident leadership to identify strengths and opportunities for improvement. The responsible emergency management organization solicits, analyzes, and prepares a draft based on feedback from key leaders who supported the activation.

The AAR includes an improvement plan with recommended corrective actions, which may be used to enhance existing procedures and planning future emergency response exercises.

Significant or outstanding corrective actions may be submitted into the Corrective Action Program (CAP). CAPs are assigned to the owner of the responsible FA, are actively tracked, and evaluated to ensure completion.

Refer to PG&E's EOC Activation AAR Process Standard, EMER-2003S in the GDL.

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9 Appendices

Appendix A, Acronyms

Appendix B, Geosciences Command Call Agenda

Appendix C, Tsunami Notifications

Appendix D, Scenario Tsunami Hazard Maps

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Appendix A. Acronyms

Acronym	Definition
AAR	After-Action Report
ACHQ	Alternate Company Headquarters
AEOC	Alternate Emergency Operations Center
AOBD	Air Operations Branch Director
BORP	Building Occupancy Resumption Program
CAP	Corrective Action Program
CERP	Company Emergency Response Plan
CESO	Customers Experiencing a Sustained Outage
CGS	California Geological Survey
CIMC	Corporate Incident Management Council
CNG	Compressed Natural Gas
CPUC	California Public Utilities Commission
CRC	Community Resource Center
CRESS	Corporate Real Estate Strategy and Services
CSO	Customer Strategy Officer
CSU	Customer Support Unit
DCPP	Diablo Canyon Power Plant
EAP	Emergency Action Plan
ECT	Emergency Communications Trailer
EDEC	Electric Distribution Emergency Center
ENOC	Enterprise Network Operations Center
EOC	Emergency Operations Center
EOP	Emergency Operating Plan
EP&R	Emergency Preparedness and Response
EP&R SE	Emergency Preparedness and Response Strategy and Execution
ETEC	Electric Transmission Emergency Center
ETOR	Estimated Time of Restoration
EVBG	Everbridge
F&A	Finance and Administration
FA	Functional Area
FCC	Facility Coordination Center
FE	Functional Exercise
FSE	Full Scale Exercise
GDL	Guidance Document Library

Acronym	Definition
GEC	Gas Emergency Center
GERP	Gas Emergency Response Plan
GIS	Geographic Information System
G.O.	CPUC General Order
HAWC	Hazard Awareness and Warning Center
HBGS	Humboldt Bay Generating Station
HBPP	Humboldt Bay Power Plant
HHA	Hierarchical Hazard Assessment
HR	Human Resources
HRCC	Human Resources Coordination Center
HR ER TM	Human Resources Emergency Response Team
HSEEP	Homeland Security Exercise and Evaluation Program
IAP	Incident Action Plan
IC	Incident Commander; Incident Command
ICP	Incident Command Post
ICS	Incident Command System
IMC	Instrument Metrological Conditions
IMT	Incident Management Teams
IT	Information Technology
ITCC	Information Technology Coordination Center
LiDAR	Light Detection and Ranging
MTCC	Materials and Transportation Coordination Center
MYTEP	Multi-Year Training and Exercise Plan
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRE	National Response Event
O&M	Operations and Maintenance
OEC	Operations Emergency Center
OES	Office of Emergency Services
OMT	Outage Management Tool
PIO	Public Information Officer; Public Information Office
PG&E	Pacific Gas and Electric Company
PSPS	Public Safety Power Shutoff
QEW	Qualified Electric Worker
RC	Reinforced Concrete
REC	Regional Emergency Center

Acronym	Definition
REOC	Regional Emergency Operations Center
SAIDI	System Average Interruption Duration Index
SCADA	Supervisory Control and Data Acquisition
SEMS	(California) Standardized Emergency Management System
SES	Substation Engineering Services
SME	Subject Matter Expert
SMS	Short Message Service
SOC	State Operations Center
STOEC	Substation Operations Emergency Center
TTX	Tabletop Exercise
USGS	United States Geological Survey
VERC	Vacaville Emergency Response Center
VFR	Visual Flight Rules
VGOC	Vacaville Gas Operations Center
VMS	Voice Message System

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Appendix B. Geosciences Command Call Agenda

B.1 Geosciences Call Agenda

Geosciences Call Information

Conference Host: Director EP&R SE **Conference Facilitator:** Director Geosciences **Conference Attendees:** Director, EP&R SE, any ad hoc members as determined necessary
Purpose of Call: This call is held immediately following notice of a potentially impactful tsunami and takes no more than 15 minutes. The purpose of the call is to: • Discuss the incoming tsunami and potential impacts • Determine whether to activate the EOC and Alternate company Headquarters (ACHQ)

Geosciences Call Agenda

Report Item	Functional Area	Reporting
Incident Review--Tsunami Impact Tsunami details: source, expected wave arrival time and wave heights. Potential for coastal facility damage related to wave impacts, flooding, debris, ground failure (e.g., scouring, and coastal erosion/deposition, landslides, liquefaction)	Geosciences	Director, Geosciences
Activation **Need to activate EOC** **Need to activate AEOC and/or Alternate Company Headquarters (ACHQ)** **Reporting instructions for EOC and Business Continuity functions**	Command Staff	Director, EP&R SE

Questions to consider

How long will it take for the structural engineers to report, and how long does the assessment take?

Due to impacts to infrastructure and transportation for EOC reporting instructions, should we advise people to report to the VERC in Vacaville (Example: EOC responders should report to the VERC in Vacaville, if it is safe and timely to do so. If not, EOC responders should use the Virtual EOC. When communications are restored, contact your supervisor in the EOC and report your status, location, and way to contact you.)

What should the reporting instructions be to ensure business continuity of mission critical functions? (Example: Coworkers with a critical business continuity role should report to their supervisor for direction. If they are unable to contact their supervisor, they should follow the reporting instructions in their business continuity plan.)

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Appendix C. Tsunami Notifications

C.1 Example NOAA Tsunami Notifications

No Tsunami Expected:

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WEAK53 PAAQ 291253
TIBAK1

Tsunami Information Statement Number 1
NWS National Tsunami Warning Center Palmer AK
453 AM PST Mon Nov 29 2021

...THIS IS A TSUNAMI INFORMATION STATEMENT FOR ALASKA, BRITISH
   COLUMBIA, WASHINGTON, OREGON AND CALIFORNIA...

EVALUATION
----------
 * There is no tsunami danger for the U.S. West Coast, British
   Columbia, or Alaska.

 * Based on earthquake information and historic tsunami records,
   the earthquake is not expected to generate a tsunami.

 * An earthquake has occurred with parameters listed below.


PRELIMINARY EARTHQUAKE PARAMETERS
---------------------------------

 * The following parameters are based on a rapid preliminary
   assessment of the earthquake and changes may occur.

 * Magnitude      6.6
 * Origin Time    0341 AKST Nov 29 2021
                  0441  PST Nov 29 2021
                  1241  UTC Nov 29 2021
 * Coordinates    31.1 North 142.8 East
 * Depth          6 miles
 * Location       south of Honshu, Japan


ADDITIONAL INFORMATION AND NEXT UPDATE
--------------------------------------
 * Refer to the internet site tsunami.gov for more information.

 * Pacific coastal regions outside California, Oregon, Washington,
   British Columbia, and Alaska should refer to the Pacific Tsunami
   Warning Center messages at tsunami.gov.

 * This will be the only U.S. National Tsunami Warning Center
   message issued for this event unless additional information
   becomes available.

$$
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Tsunami warnings will include estimated wave heights at locations along the coast. This is an example from the Tohoku earthquake, 2011. This notice has been broken up into sections and significant information highlighted.

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WEPA41 PAAQ 110945
TSUWCA

BULLETIN
TSUNAMI MESSAGE NUMBER 5
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
145 AM PST FRI MAR 11 2011

THIS MESSAGE KEEPS THE ADVISORY AND WARNING AREAS THE SAME
AND ADDS MORE TSUNAMI OBSERVATIONS.

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR THE COASTAL
   AREAS OF CALIFORNIA AND OREGON FROM POINT CONCEPCION
   CALIFORNIA TO THE OREGON-WASHINGTON BORDER...

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR THE COASTAL
   AREAS OF ALASKA FROM AMCHITKA PASS ALASKA/125 MILES W OF
   ADAK/ TO ATTU ALASKA...

...THE TSUNAMI ADVISORY CONTINUES IN EFFECT FOR THE COASTAL
   AREAS OF CALIFORNIA FROM THE CALIFORNIA-MEXICO BORDER TO
   POINT CONCEPCION CALIFORNIA...

...THE TSUNAMI ADVISORY CONTINUES IN EFFECT FOR THE COASTAL
   AREAS OF WASHINGTON - BRITISH COLUMBIA AND ALASKA FROM THE
   OREGON-WASHINGTON BORDER TO AMCHITKA PASS ALASKA/125 MILES
   W OF ADAK/...

RECOMMENDED ACTIONS
 A TSUNAMI HAS BEEN GENERATED WHICH IS EXPECTED TO CAUSE DAMAGE
 TO THE WARNING AND/OR ADVISORY REGIONS LISTED IN THE HEADLINE.
 PERSONS IN LOW-LYING COASTAL AREAS SHOULD BE ALERT TO
 INSTRUCTIONS FROM THEIR LOCAL EMERGENCY OFFICIALS. EVACUATIONS
 ARE ONLY ORDERED BY EMERGENCY RESPONSE AGENCIES.
 - PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
   HIGHER GROUND.

 - PERSONS IN TSUNAMI ADVISORY COASTAL AREAS SHOULD MOVE OUT OF
   THE WATER... OFF THE BEACH AND OUT OF HARBORS AND MARINAS.
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MEASUREMENTS OR REPORTS OF TSUNAMI ACTIVITY

 LOCATION                    LAT    LON     TIME        AMPL
 -------------------------  -----  ------  -------    -----------
 TOSASHIMIZU  JAPAN         32.8N  132.9E  0747UTC   00.9FT/00.27M
 TOKAI  JAPAN               33.8N  137.6E  0645UTC   00.8FT/00.25M
 OFUNATO  JAPAN             39.0N  141.8E  0605UTC   10.8FT/03.29M
 HANASAKI  JAPAN            43.3N  145.6E  0643UTC   09.3FT/02.82M
 BOSO  JAPAN                34.8N  140.8E  0609UTC   02.6FT/00.78M
 MINAMITORISHIMA  JAPAN     24.3N  154.0E  0747UTC   01.5FT/00.45M
 NAHA  JAPAN                26.2N  127.7E  0902UTC   00.7FT/00.20M
```

```
TIME - TIME OF MEASUREMENT
AMPL - TSUNAMI AMPLITUDES ARE MEASURED RELATIVE TO NORMAL SEA LEVEL.
       IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
       VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

 TSUNAMI AMPLITUDES ARE EXPECTED TO PEAK TWO TO THREE HOURS AFTER
 INITIAL ARRIVAL ALONG THE NORTH AMERICAN COAST.

PRELIMINARY EARTHQUAKE PARAMETERS
 MAGNITUDE - 8.9
 TIME      - 2046 AKST MAR 10 2011
             2146  PST MAR 10 2011
             0546  UTC MAR 11 2011
 LOCATION  - 38.3 NORTH 142.4 EAST
           - NEAR EAST COAST OF HONSHU JAPAN
 DEPTH     - 12 MILES/20 KM

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  WARNINGS INDICATE THAT
WIDESPREAD DANGEROUS COASTAL FLOODING ACCOMPANIED BY POWERFUL
CURRENTS IS POSSIBLE AND MAY CONTINUE FOR SEVERAL HOURS AFTER THE
INITIAL WAVE ARRIVAL.
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TSUNAMI ADVISORIES MEAN THAT A TSUNAMI CAPABLE OF PRODUCING
STRONG CURRENTS OR WAVES DANGEROUS TO PERSONS IN OR VERY NEAR THE
WATER IS EXPECTED.  SIGNIFICANT WIDESPREAD INUNDATION
IS NOT EXPECTED FOR AREAS UNDER AN ADVISORY.  CURRENTS MAY BE
HAZARDOUS TO SWIMMERS... BOATS... AND COASTAL STRUCTURES AND MAY
CONTINUE FOR SEVERAL HOURS AFTER THE INITIAL WAVE ARRIVAL.

PACIFIC COASTAL REGIONS OUTSIDE CALIFORNIA/ OREGON/ WASHINGTON/
BRITISH COLUMBIA AND ALASKA SHOULD REFER TO THE PACIFIC TSUNAMI
WARNING CENTER MESSAGES FOR INFORMATION ON THIS EVENT AT
WWW.WEATHER.GOV/PTWC.

THIS MESSAGE WILL BE UPDATED IN 60 MINUTES OR SOONER IF
THE SITUATION WARRANTS. THE TSUNAMI MESSAGE WILL REMAIN IN EFFECT
UNTIL FURTHER NOTICE. REFER TO THE INTERNET SITE
NTWC.ARH.NOAA.GOV FOR MORE INFORMATION.

PZZ530-CAZ034-035-529-530-006-505>509-002-001-ORZ021-022-002-
001-111115-
/O.CON.PAAQ.TS.W.0006.000000T0000Z-000000T0000Z/
COASTAL AREAS BETWEEN AND INCLUDING POINT CONCEPCION
CALIFORNIA TO THE OREGON-WASHINGTON BORDER
145 AM PST FRI MAR 11 2011

...THE TSUNAMI WARNING CONTINUES IN EFFECT FOR THE COASTAL
   AREAS OF CALIFORNIA AND OREGON FROM POINT CONCEPCION
   CALIFORNIA TO THE OREGON-WASHINGTON BORDER...

PERSONS IN TSUNAMI WARNING COASTAL AREAS SHOULD MOVE INLAND TO
HIGHER GROUND.

TSUNAMI WARNINGS MEAN THAT A TSUNAMI WITH SIGNIFICANT WIDESPREAD
INUNDATION IS IMMINENT OR EXPECTED.  TSUNAMIS ARE A SERIES OF
WAVES POTENTIALLY DANGEROUS SEVERAL HOURS AFTER INITIAL ARRIVAL
TIME. ESTIMATED TIMES OF INITIAL WAVE ARRIVAL FOR SELECTED
SITES IN THE WARNING ARE PROVIDED BELOW.
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CHARLESTON-OR    0715  PST MAR 11  SEASIDE-OR       0724  PST MAR 11
CRESCENT CITY-CA 0723  PST MAR 11  SAN FRANCISCO-CA 0808  PST MAR 11

FOR ARRIVAL TIMES AT ADDITIONAL LOCATIONS SEE
NTWC.ARH.NOAA.GOV

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These are wave heights reported for the 2011 Tohuku earthquake, along the west coast.

Location	Lat.	Lon.	Time	Amplitude
North Spit CA	40.8N	124.2W	1630UTC	03.1FT/00.95M
Port San Luis CA	35.2N	120.8W	1721UTC	06.3FT/01.93M
Port Angeles WA	48.1N	123.4W	1827UTC	01.9FT/00.59M
Winter Harbour BC	50.7N	128.3W	1450UTC	01.7FT/00.53M
Santa Monica CA	34.0N	118.5W	1845UTC	02.4FT/00.74M
Santa Barbara CA	34.4N	119.7W	1801UTC	02.2FT/00.67M
Sand Point AK	55.3N	160.5W	1812UTC	01.6FT/00.49M
Nikolski AK	52.9N	168.9W	1614UTC	02.7FT/00.82M
King Cove AK	55.1N	162.3W	1713UTC	01.6FT/00.48M
Craig AK	55.5N	133.1W	1613UTC	00.8FT/00.24M
Elfin Cove AK	58.2N	136.3W	1535UTC	00.5FT/00.16M
Sitka AK	57.1N	135.3W	1711UTC	01.0FT/00.32M
Point Reyes CA	38.0N	123.0W	1803UTC	04.4FT/01.35M
Port Orford OR	42.7N	124.5W	1724UTC	06.1FT/01.85M
Adak AK	51.9N	176.6W	1747UTC	03.4FT/01.05M
Kodiak AK	57.7N	152.5W	1550UTC	00.5FT/00.15M
Los Angeles CA	33.7N	118.3W	1905UTC	01.1FT/00.32M
San Diego CA	32.7N	117.2W	1906UTC	00.7FT/00.21M
La Jolla CA	32.9N	117.3W	1834UTC	01.0FT/00.31M

Appendix D. Scenario Tsunami Hazard Maps

D.1 Electric Tsunami Hazard Maps (15 Map Plates)

Figure 9-1: Humboldt County

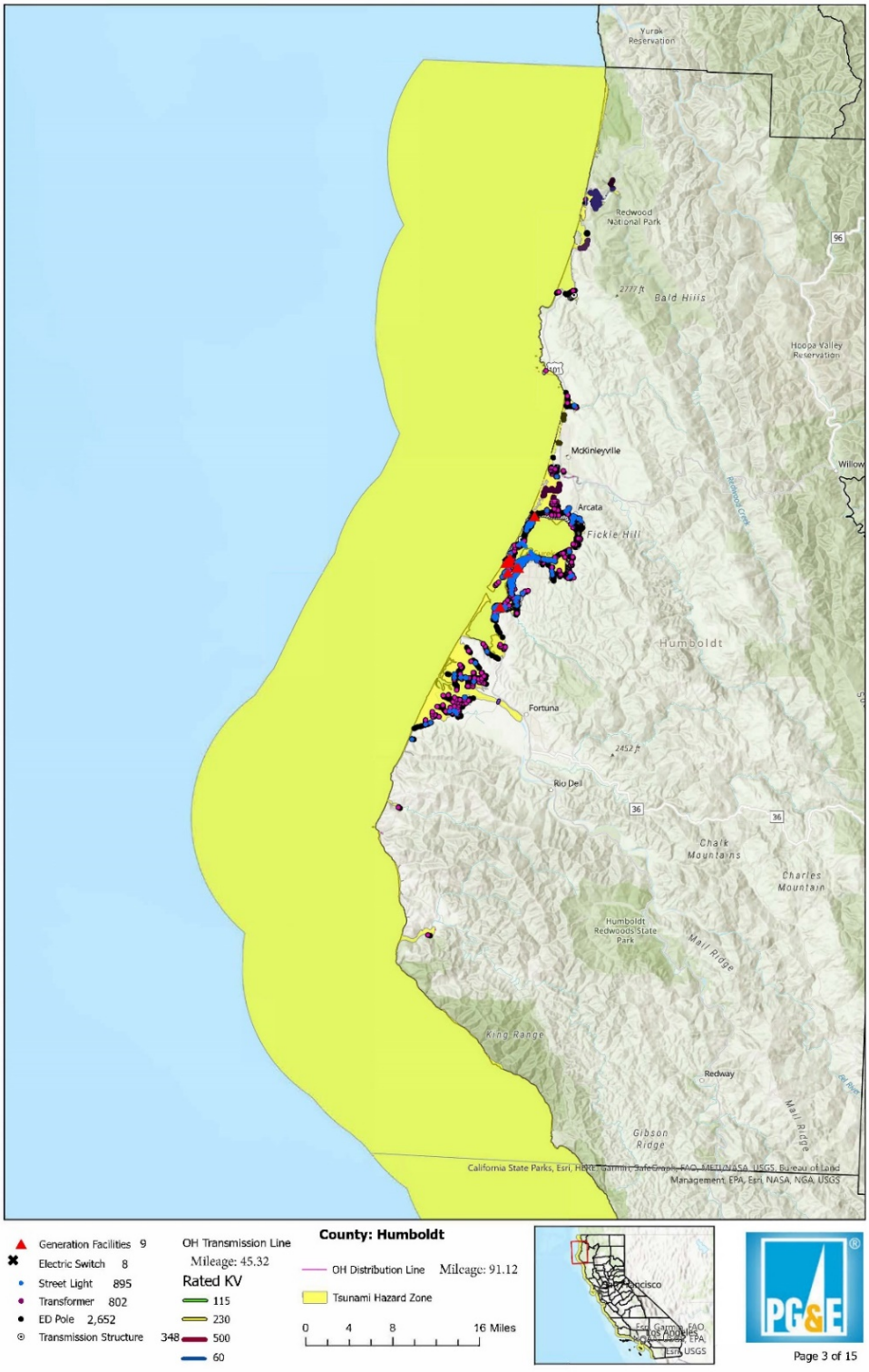


Figure 9-2: Mendocino County

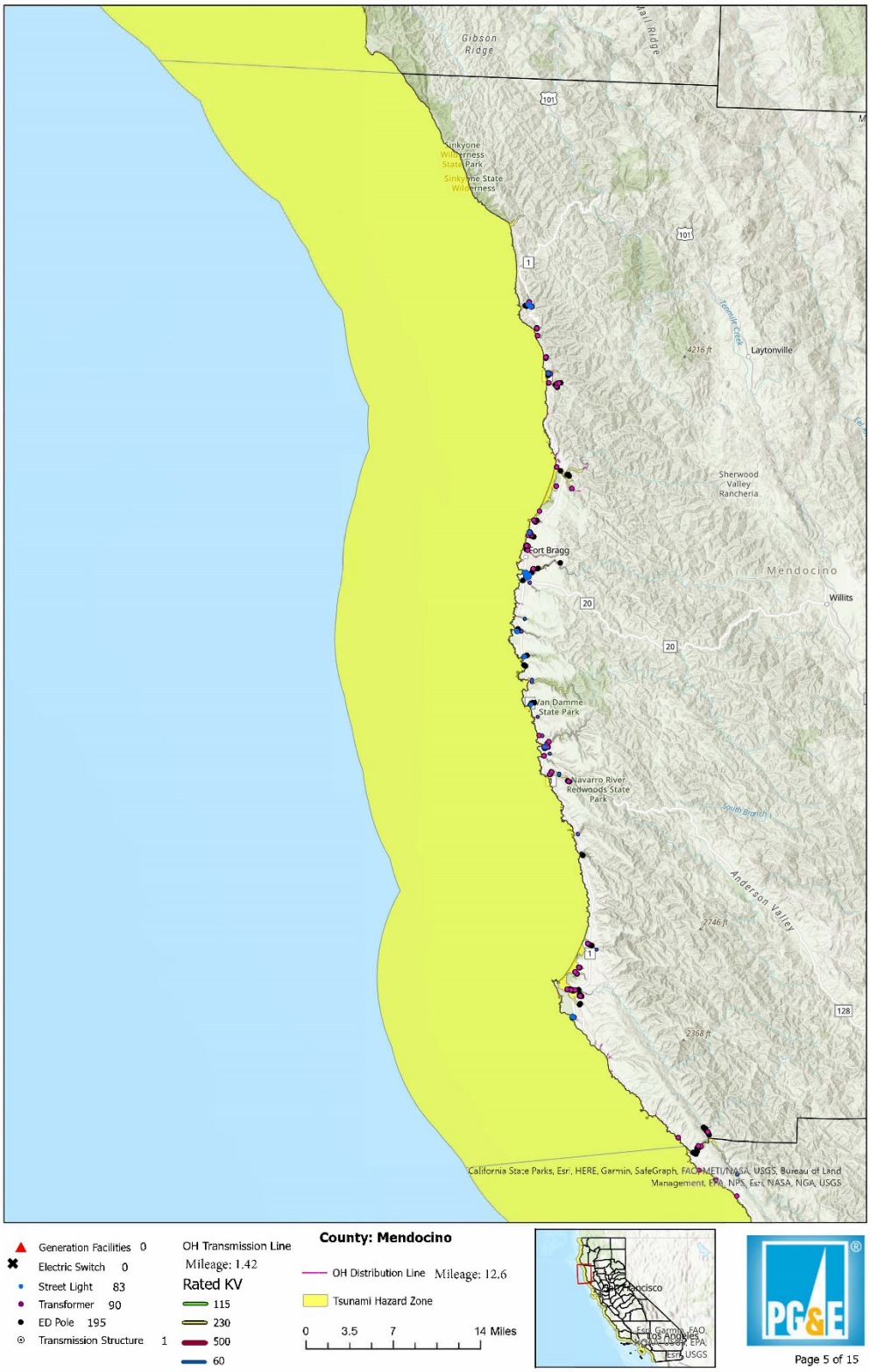


Figure 9-3: Napa County

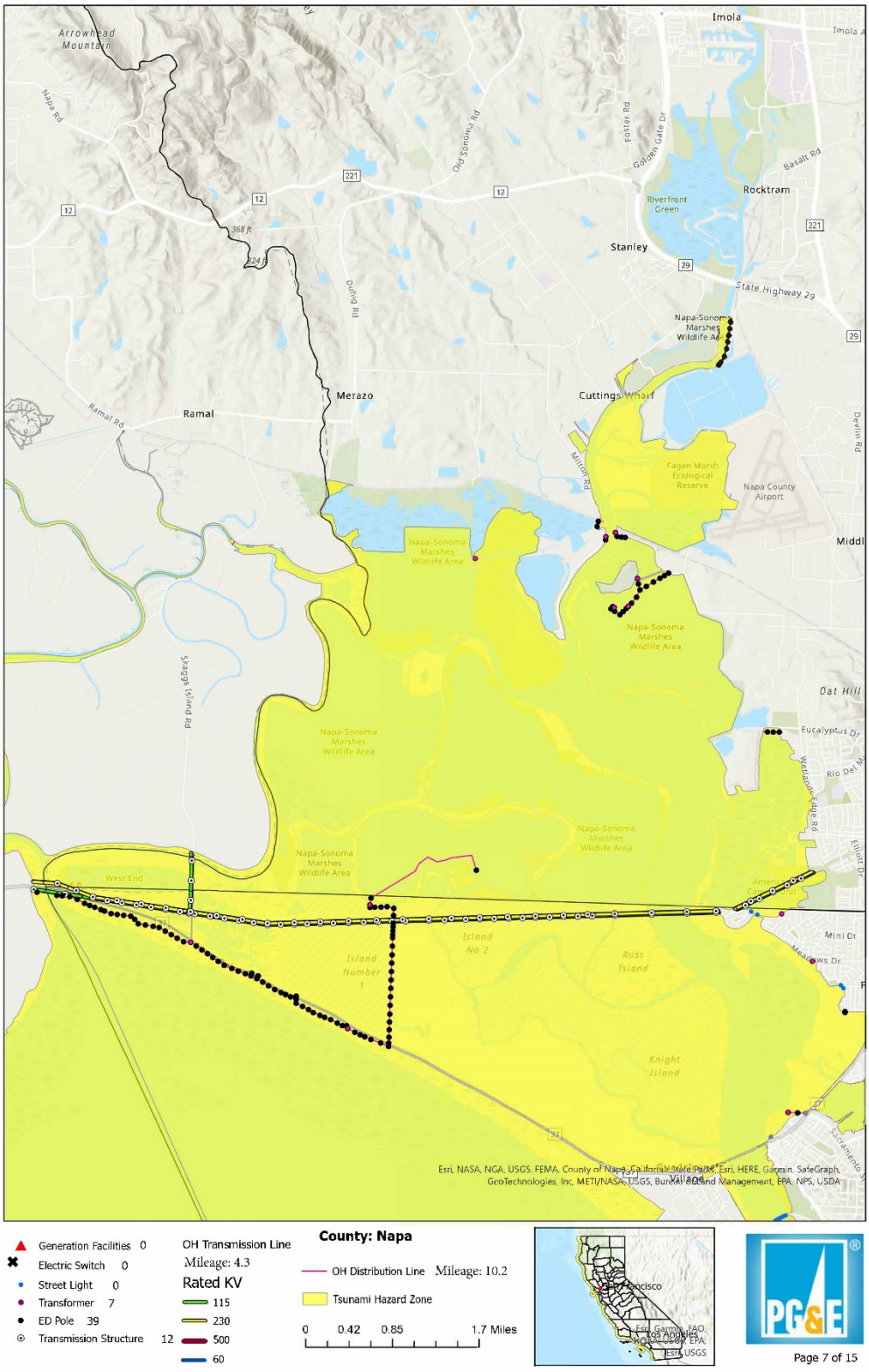


Figure 9-4: Sonoma County

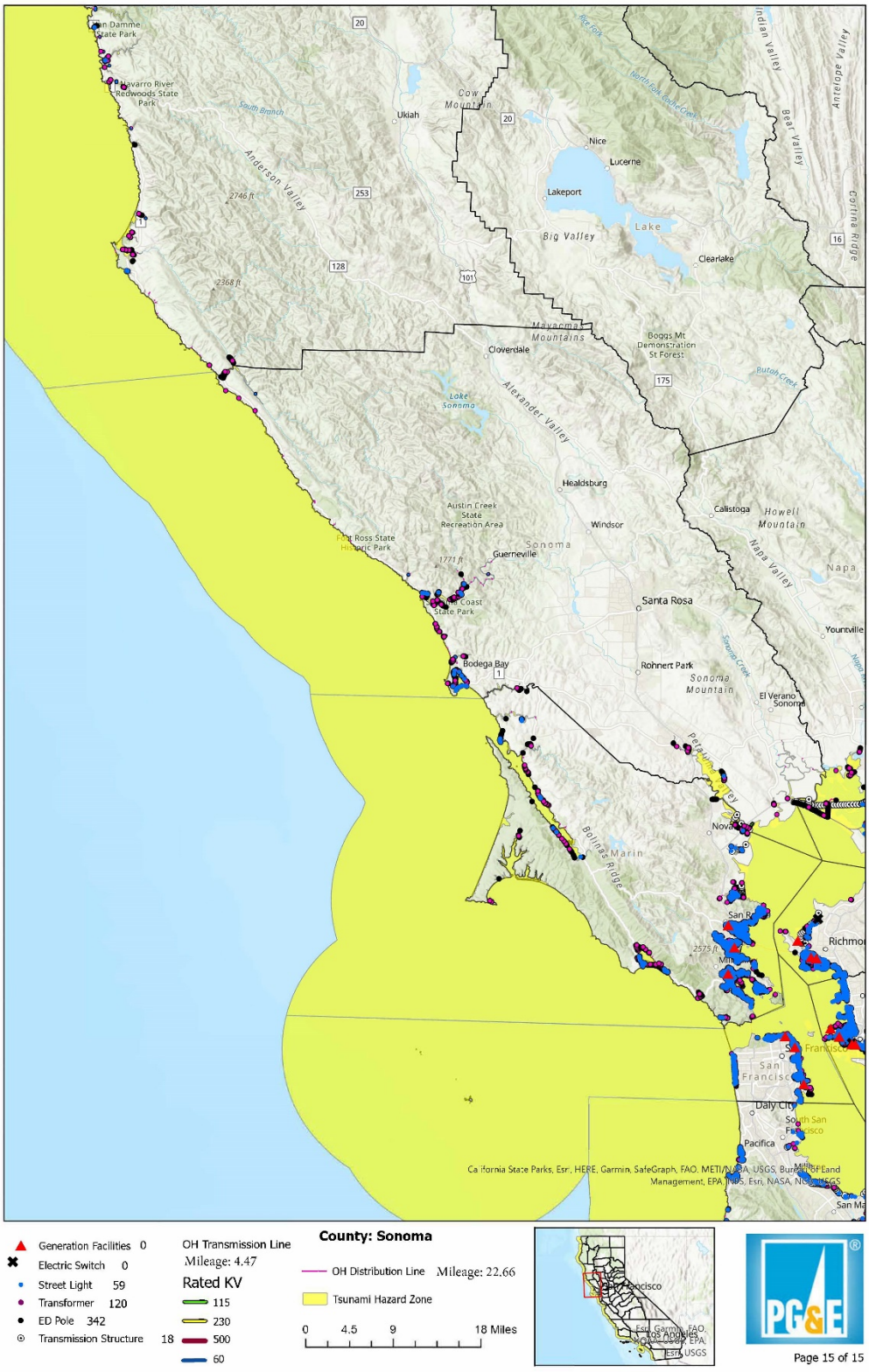


Figure 9-5: Marin County

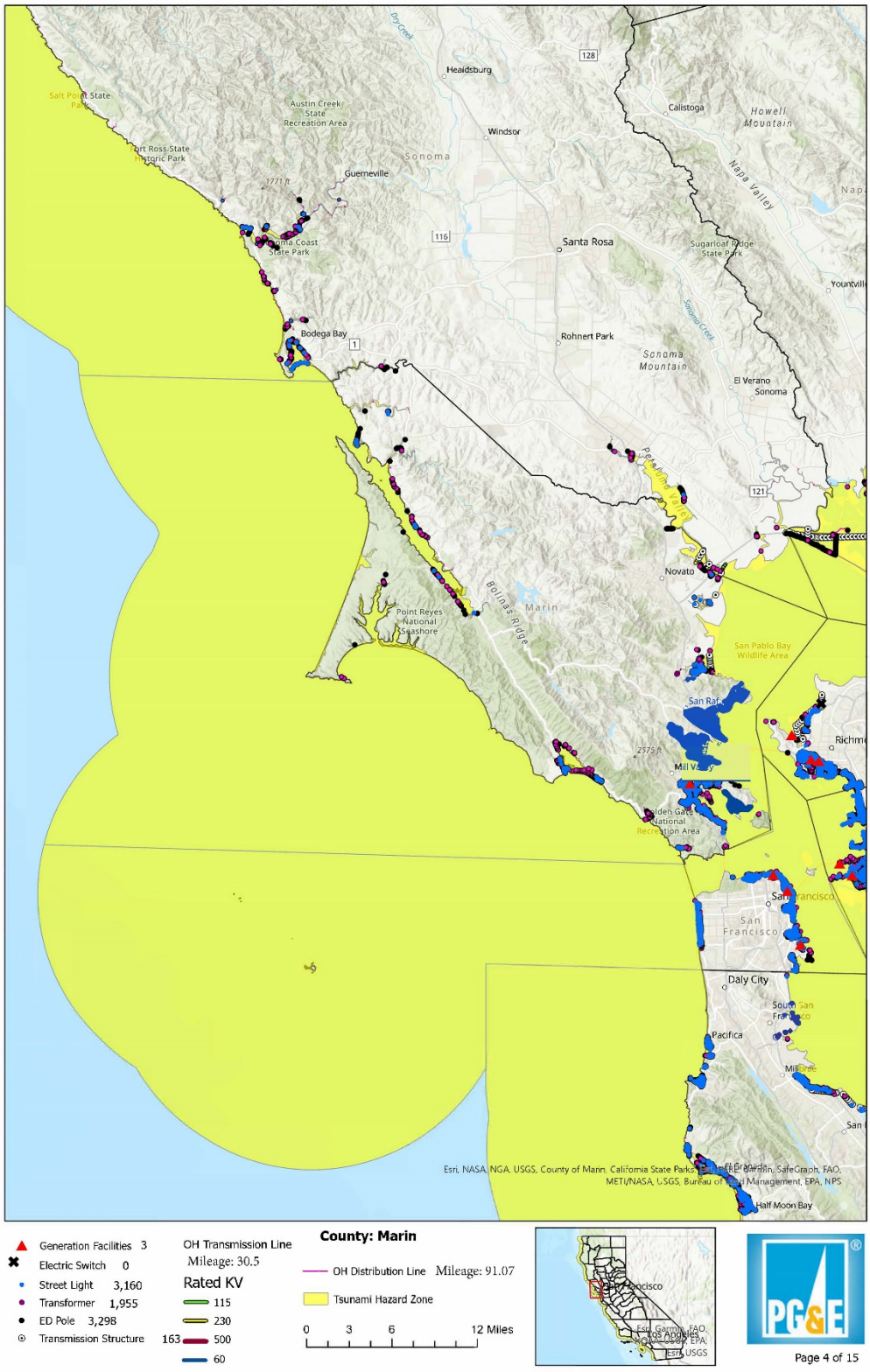


Figure 9-6: Solano County

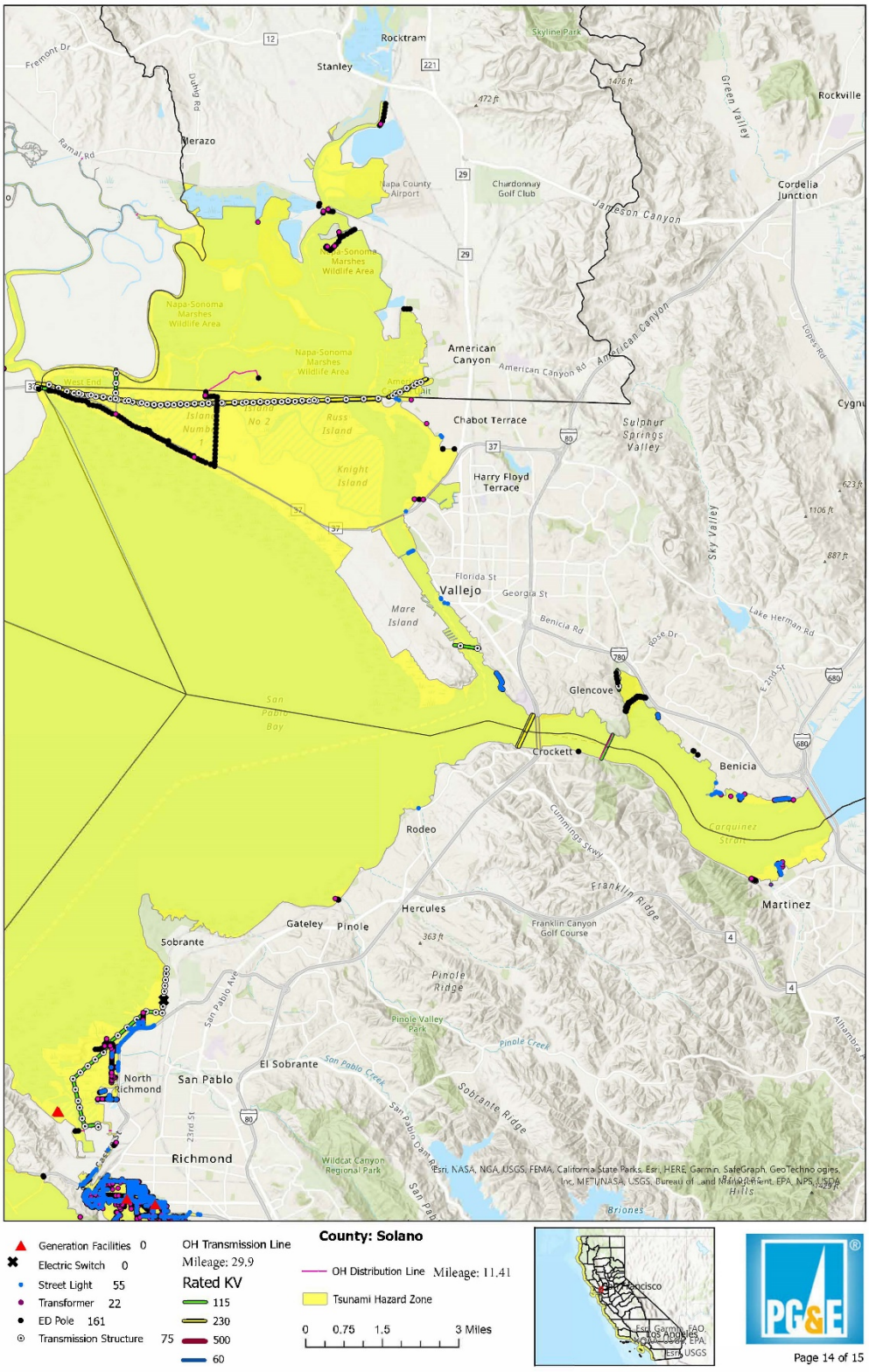


Figure 9-7: Contra Costa County

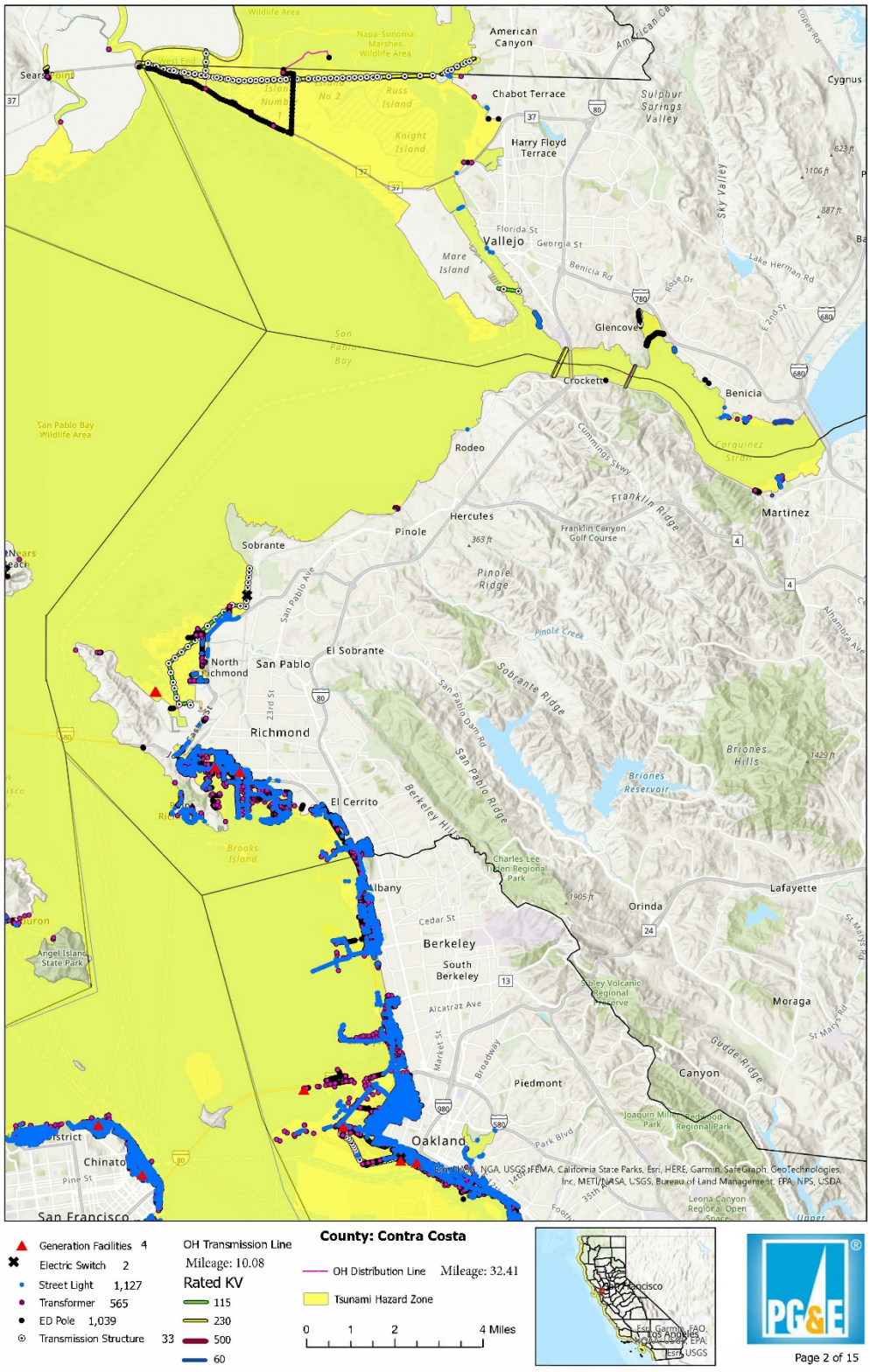
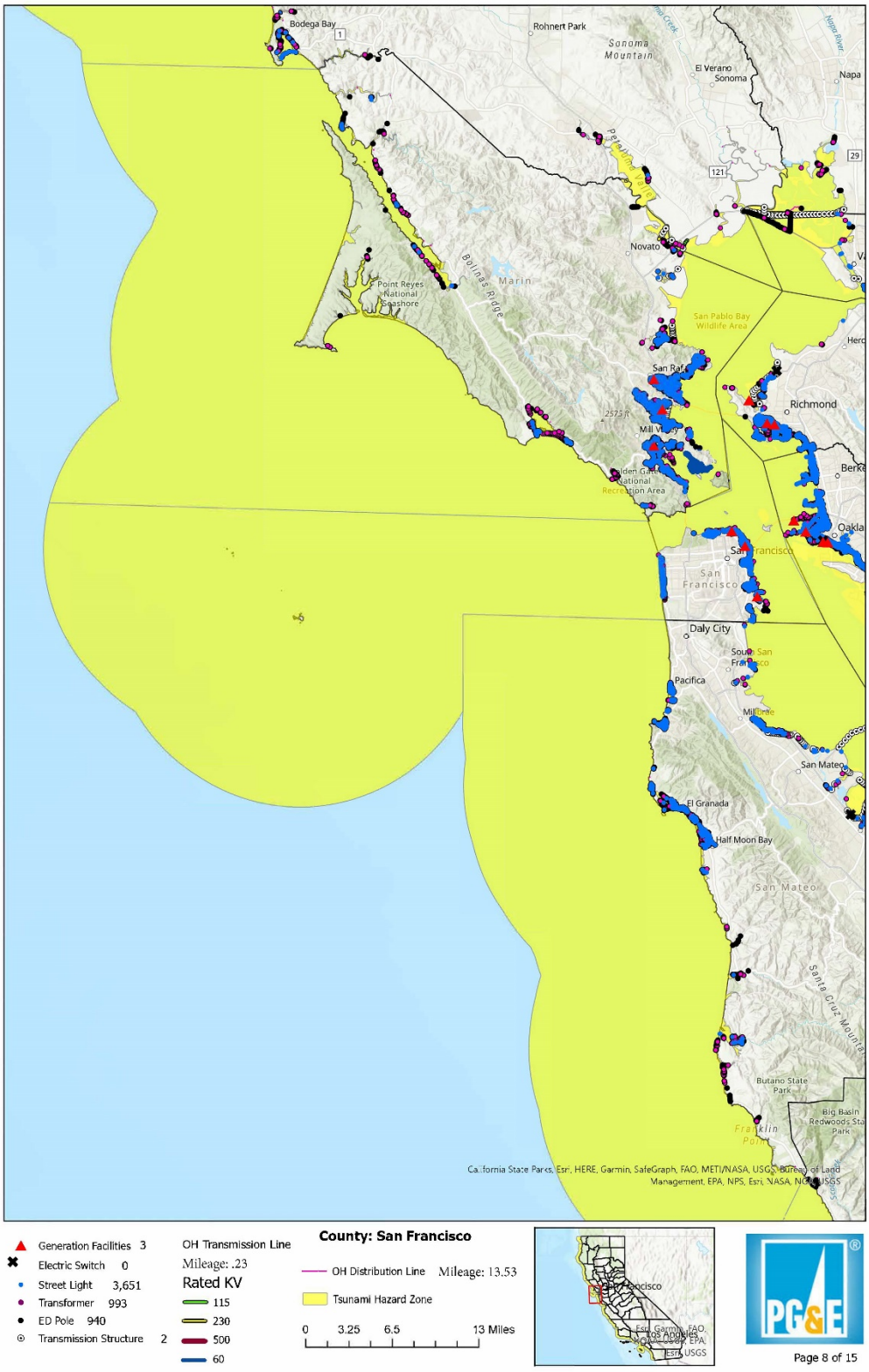


Figure 9-8: San Francisco County



Page 8 of 15

Figure 9-9: Alameda County

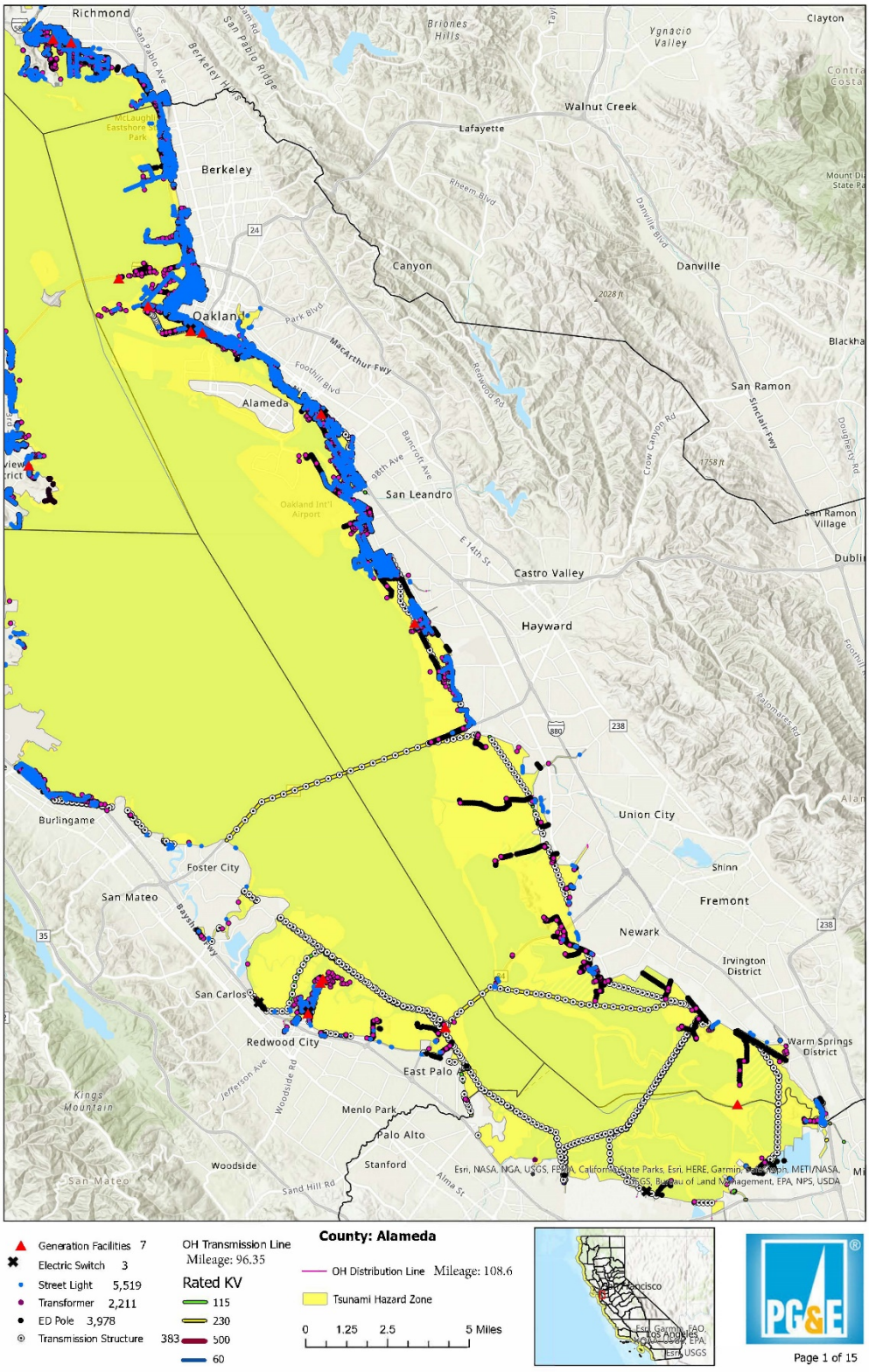


Figure 9-10: San Mateo County

Page 10 of 15

Figure 9-11: Santa Clara County

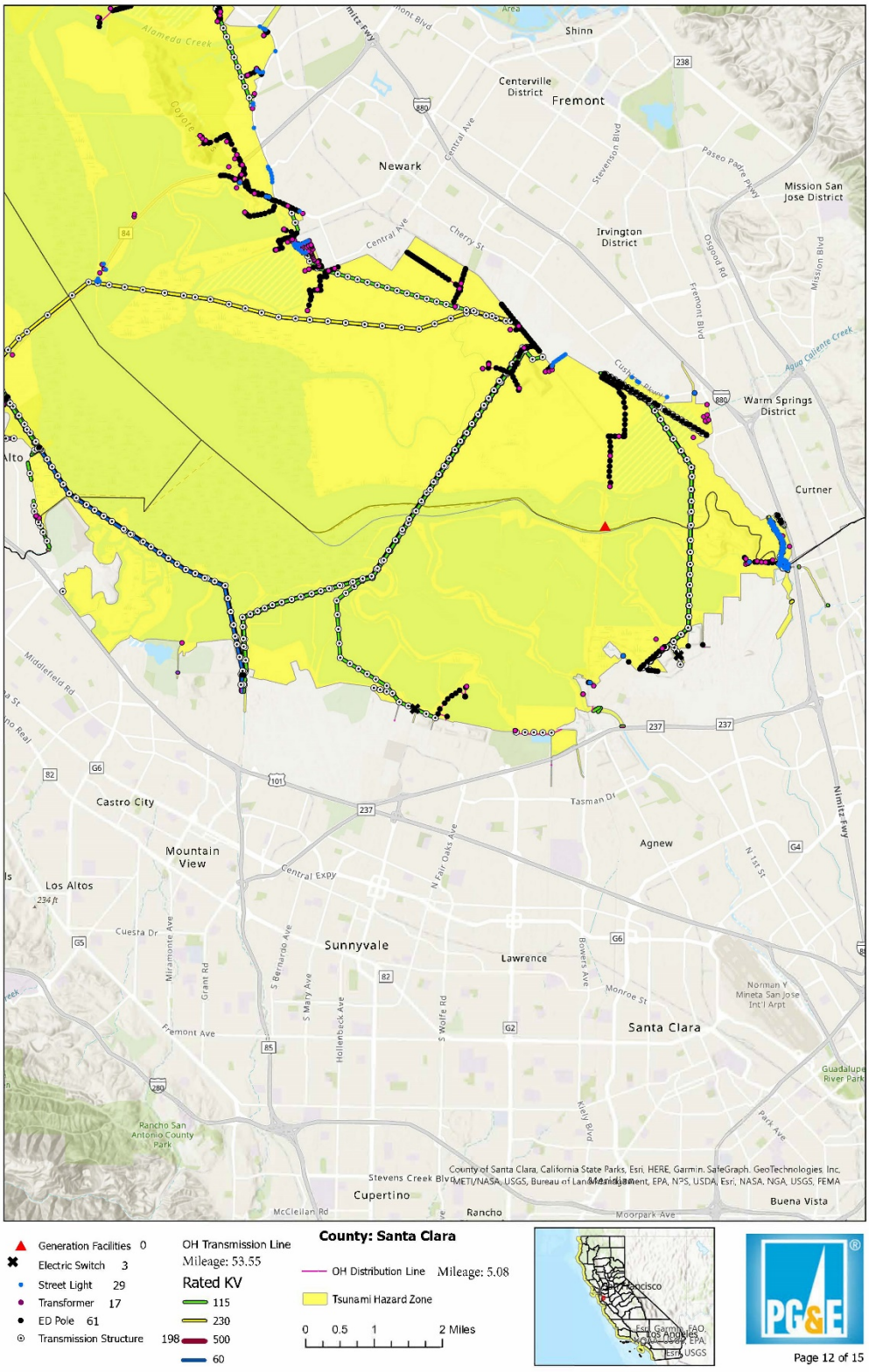


Figure 9-12: Santa Cruz County

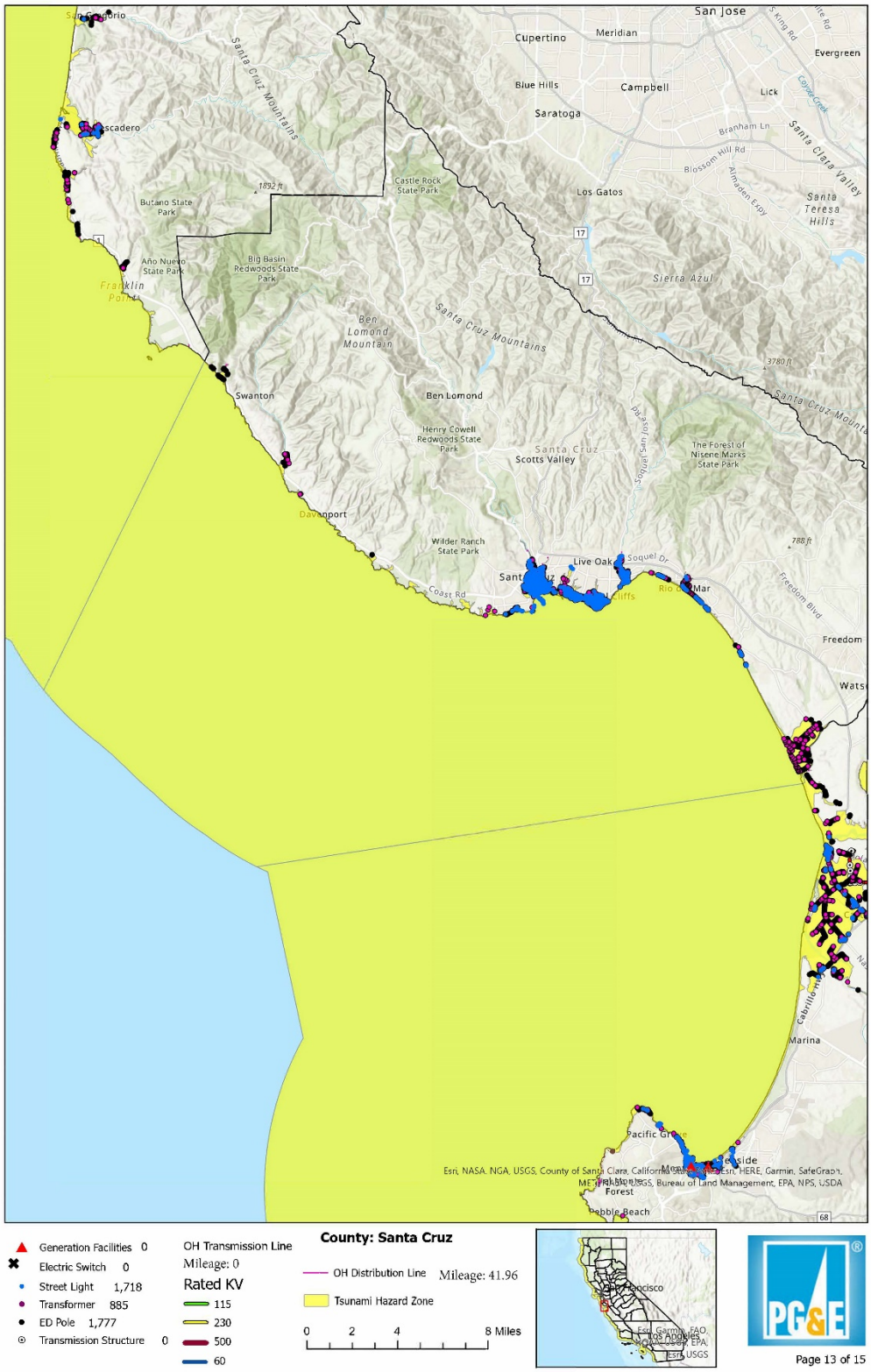


Figure 9-13: Monterey County

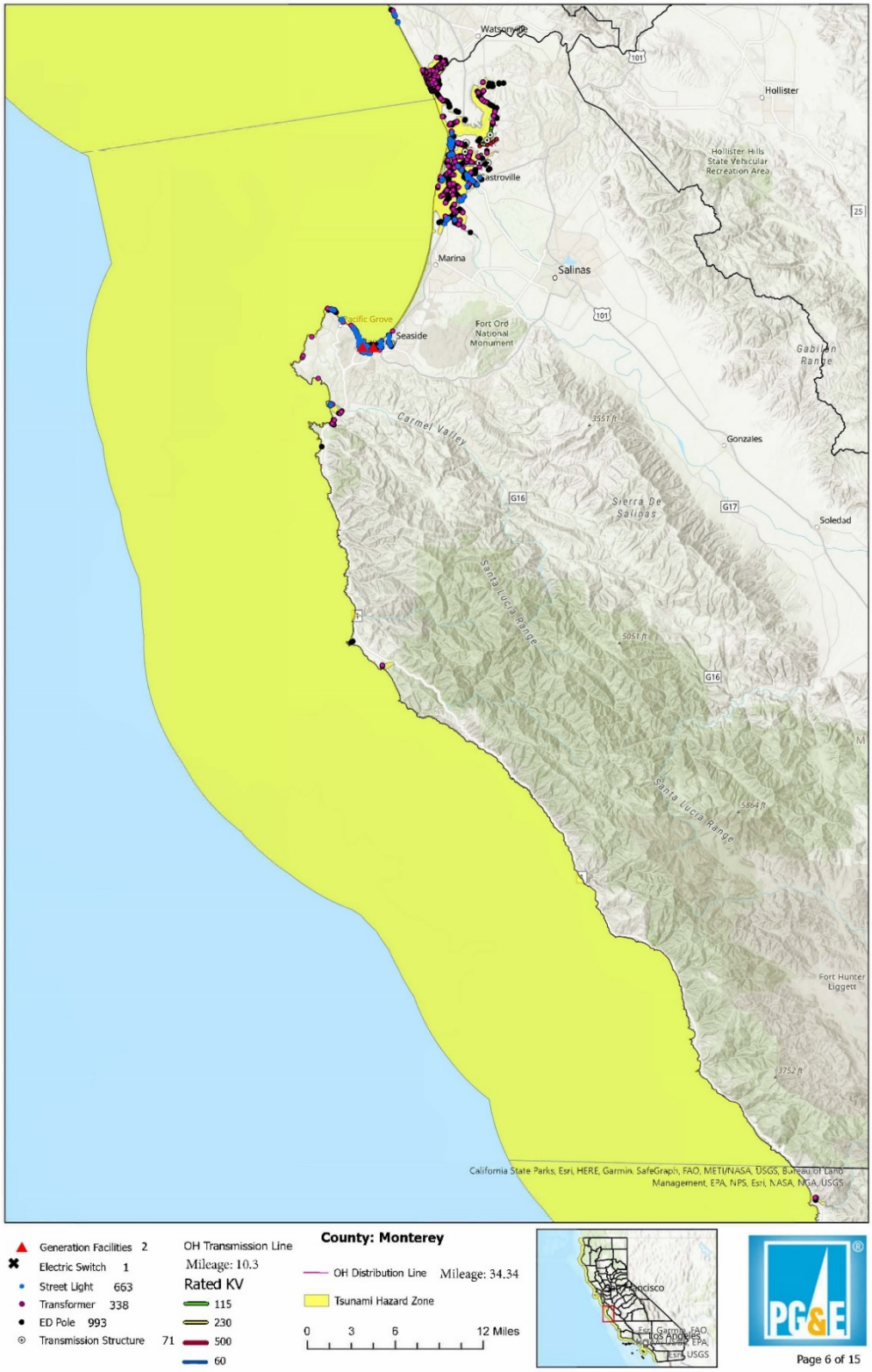
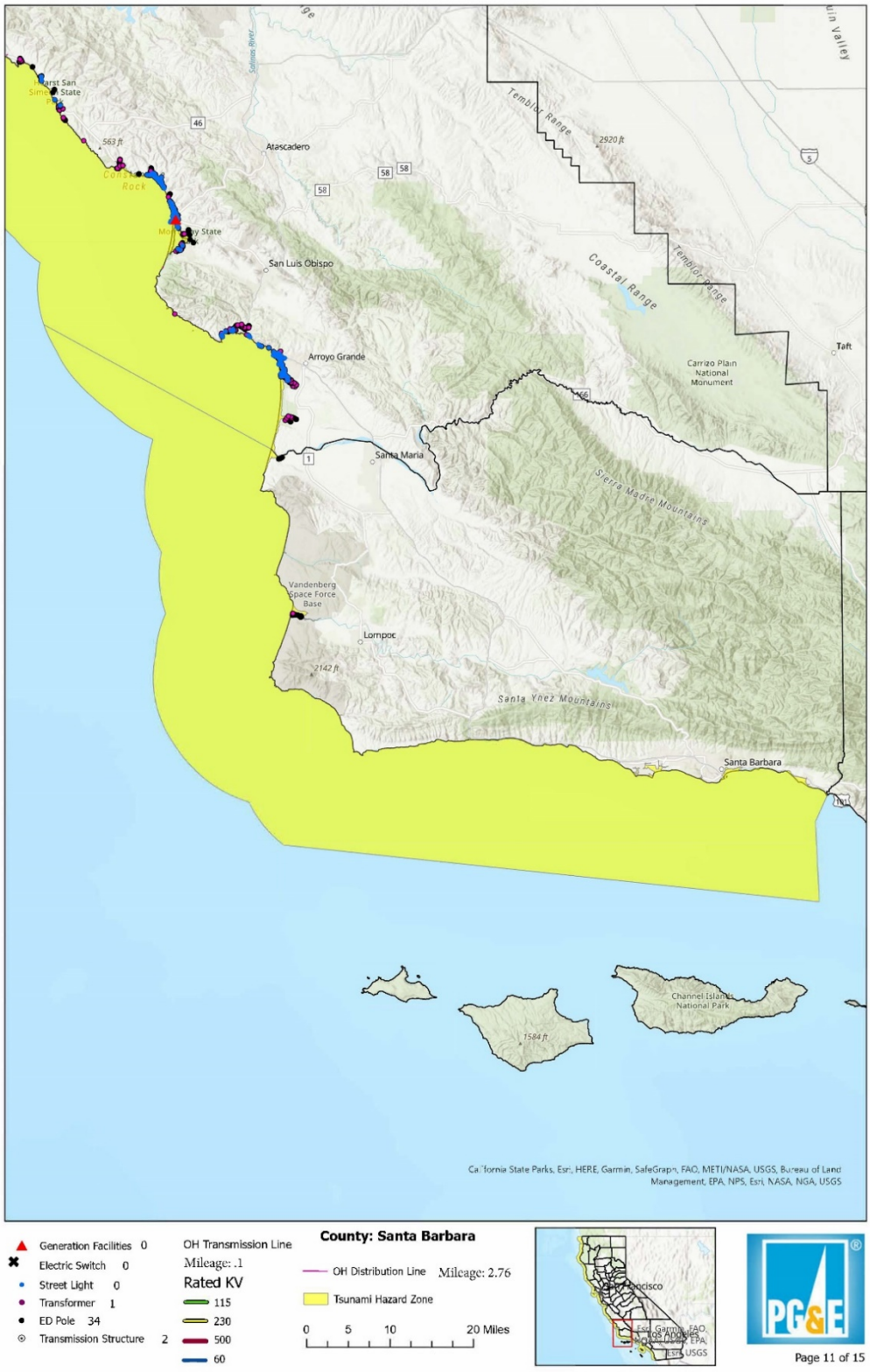


Figure 9-14: San Luis Obispo County

Page 9 of 15

Figure 9-15: Santa Barbara County



D.2 Gas Tsunami Hazard Maps (12 Map Plates)

Figure 9-16: Alameda County

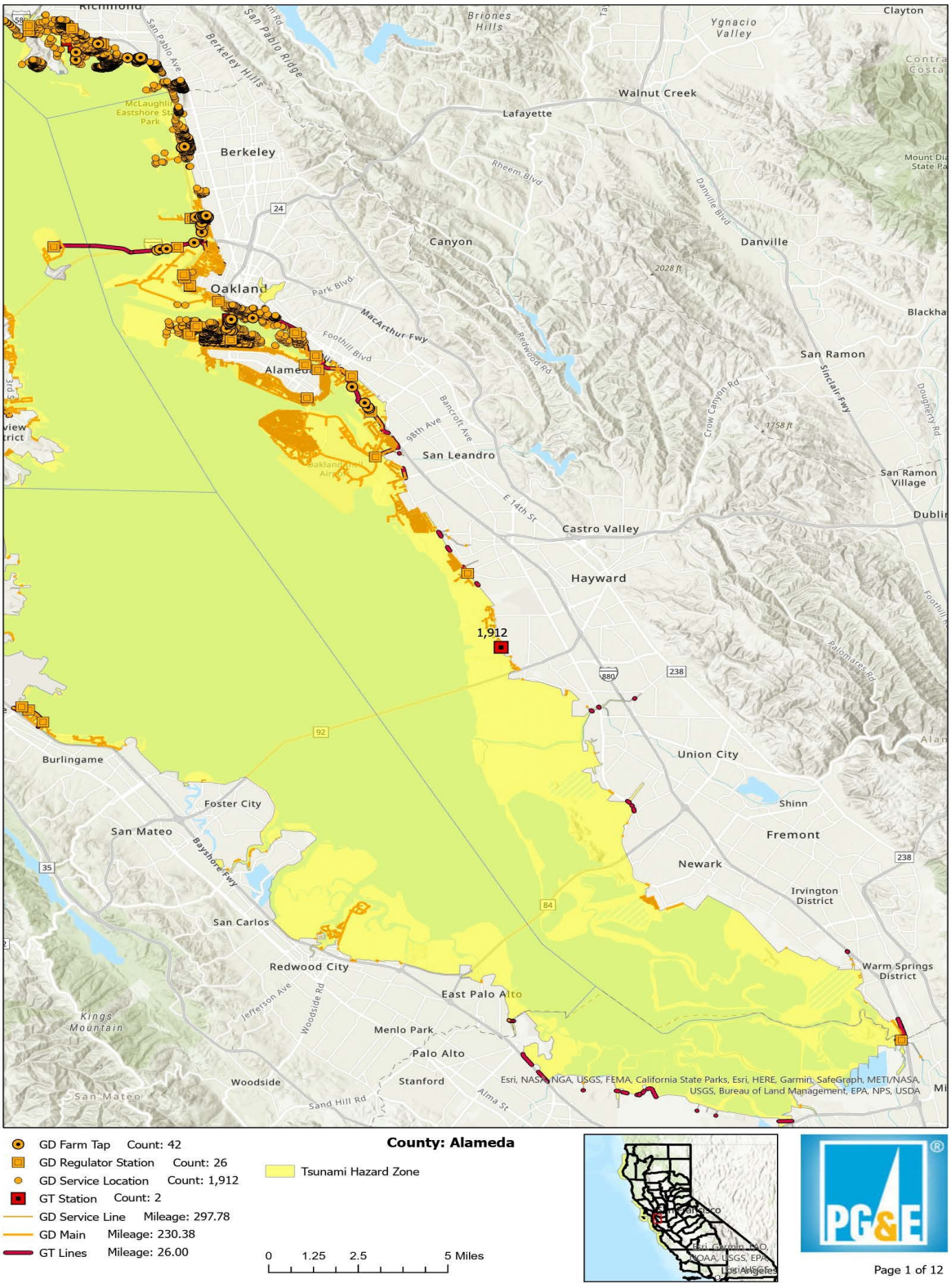
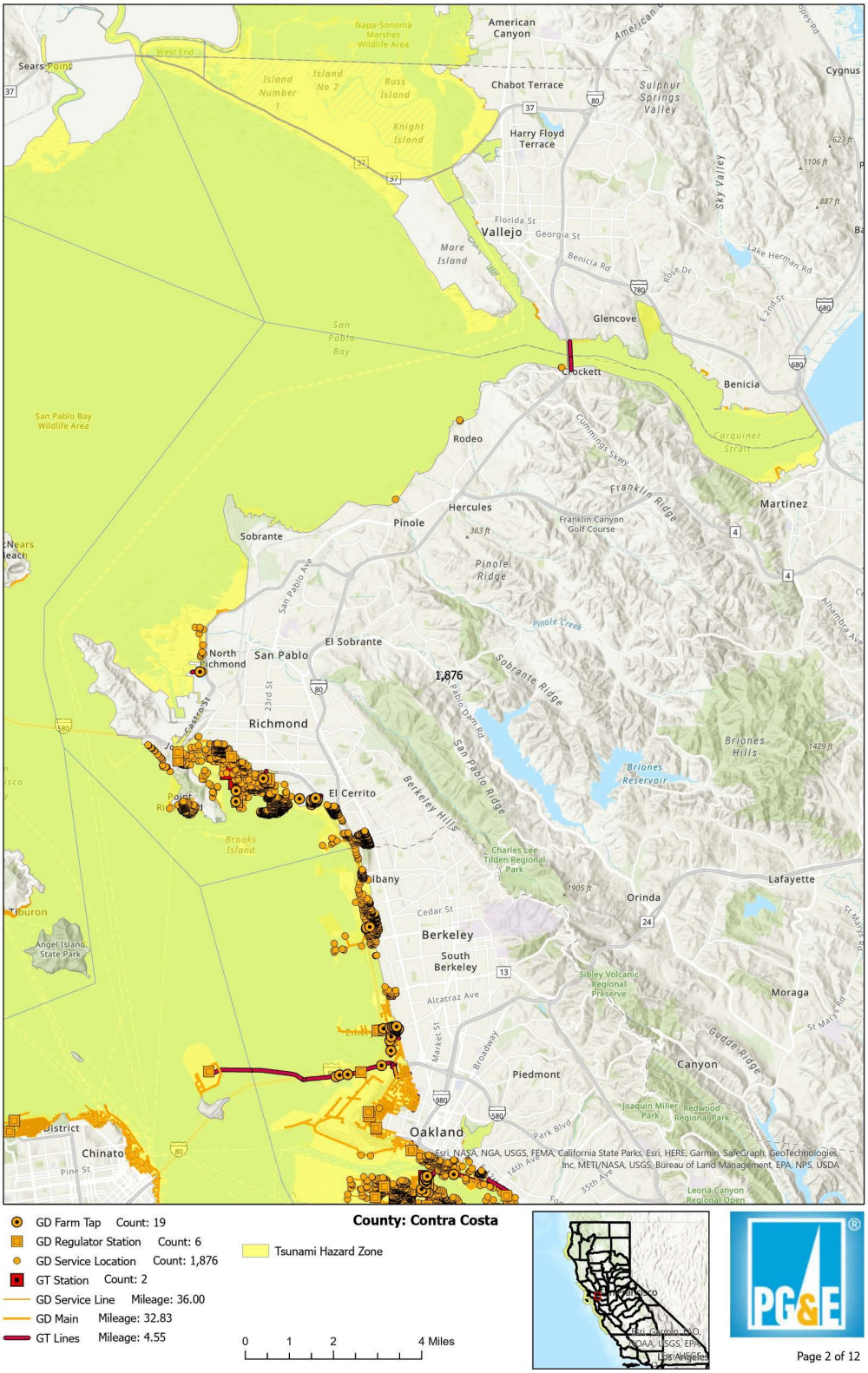
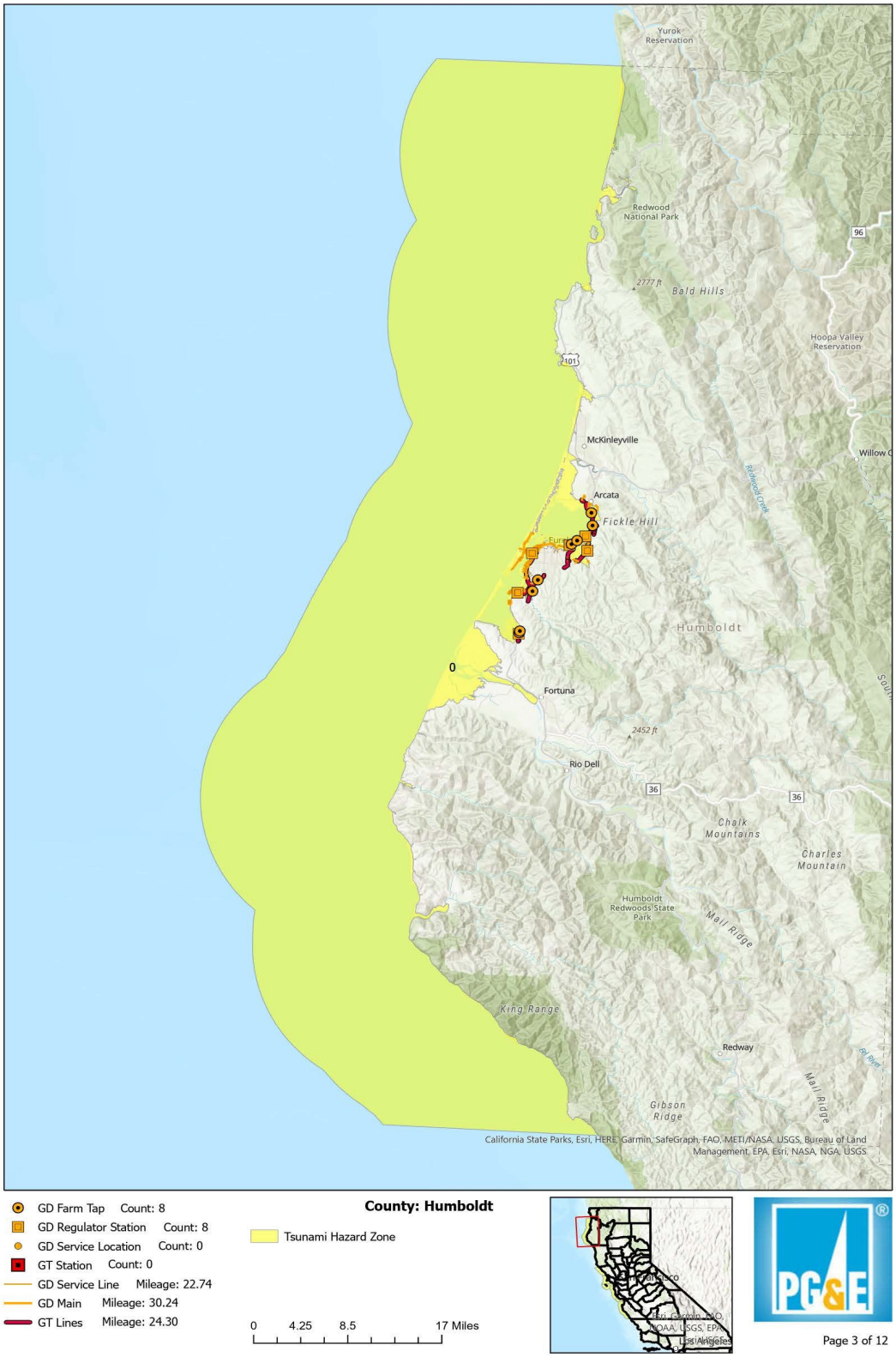


Figure 9-17: Contra Costa County



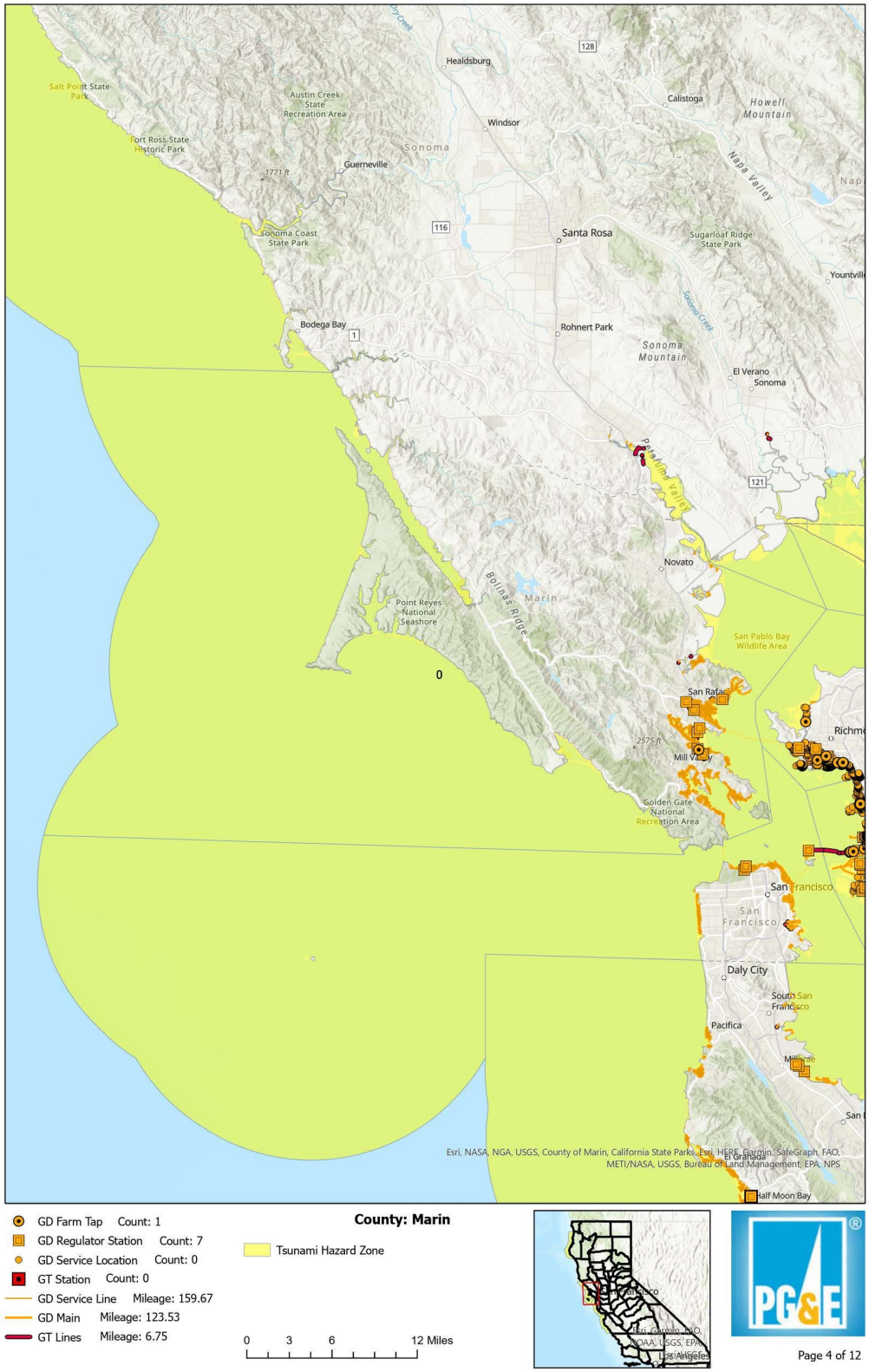
Page 2 of 12

Figure 9-18: Humboldt County



Page 3 of 12

Figure 9-19: Marin County



Page 4 of 12

Figure 9-20: Monterey County

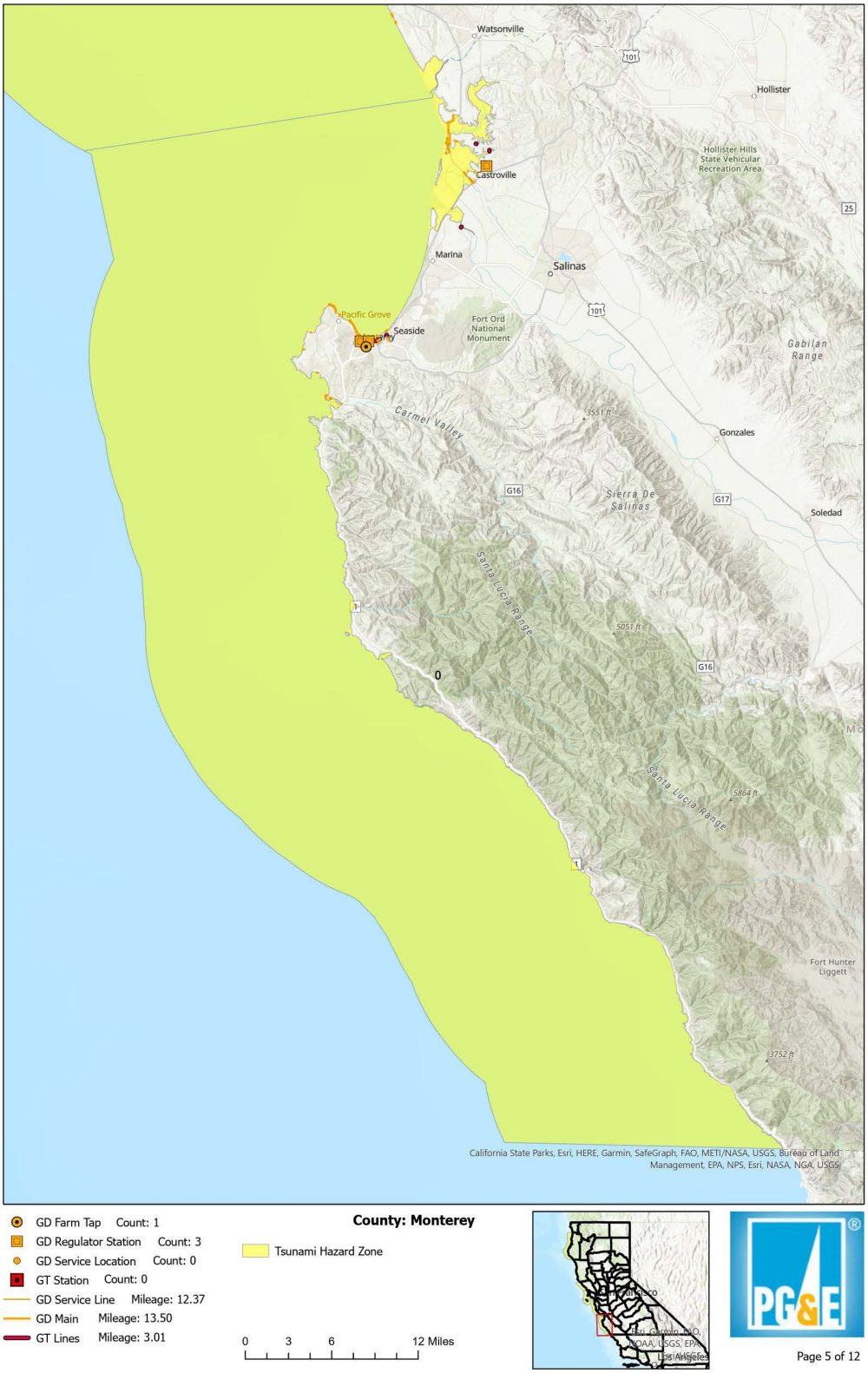
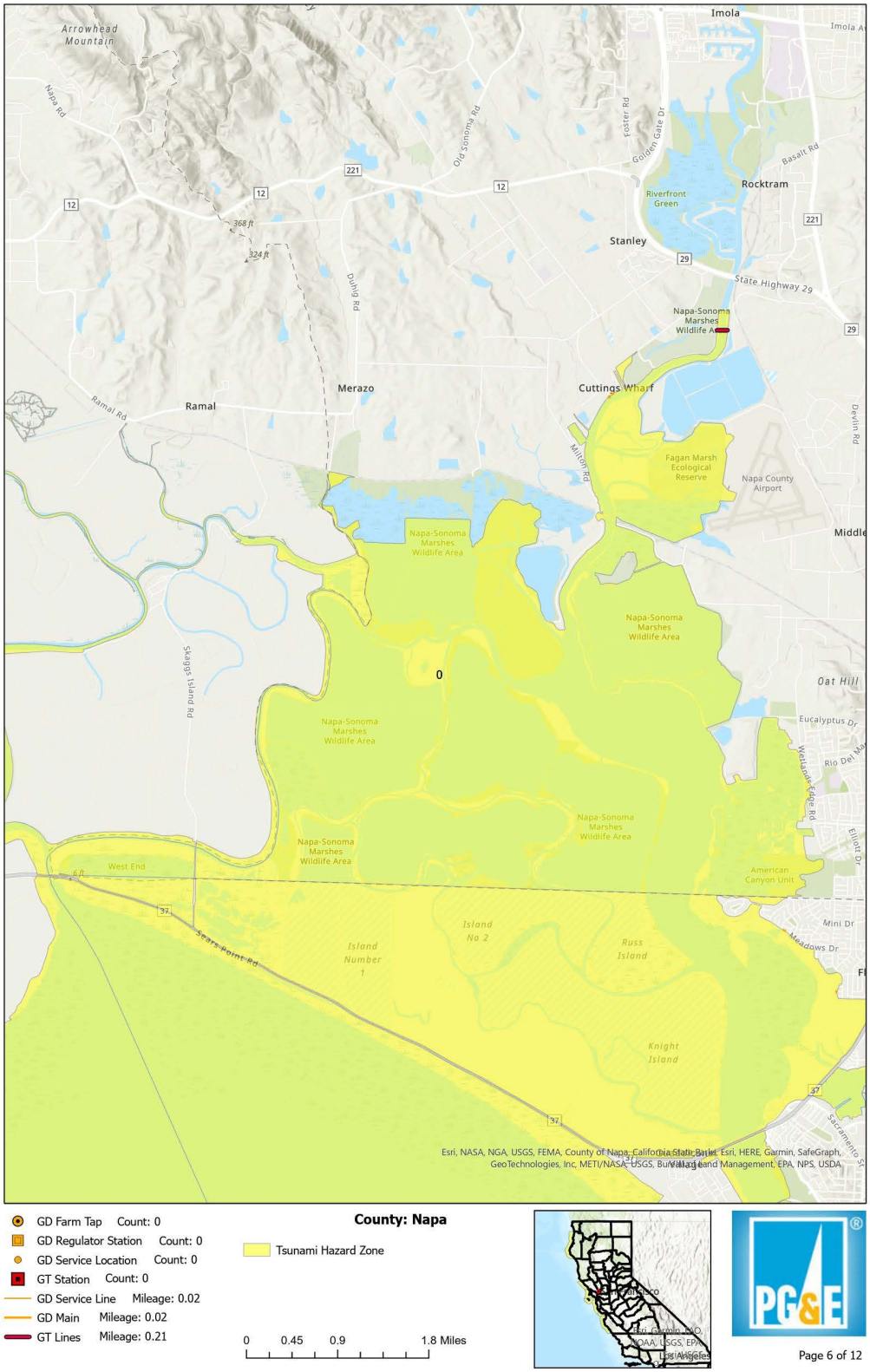


Figure 9-21: Napa County



Page 6 of 12

Figure 9-22: San Francisco County

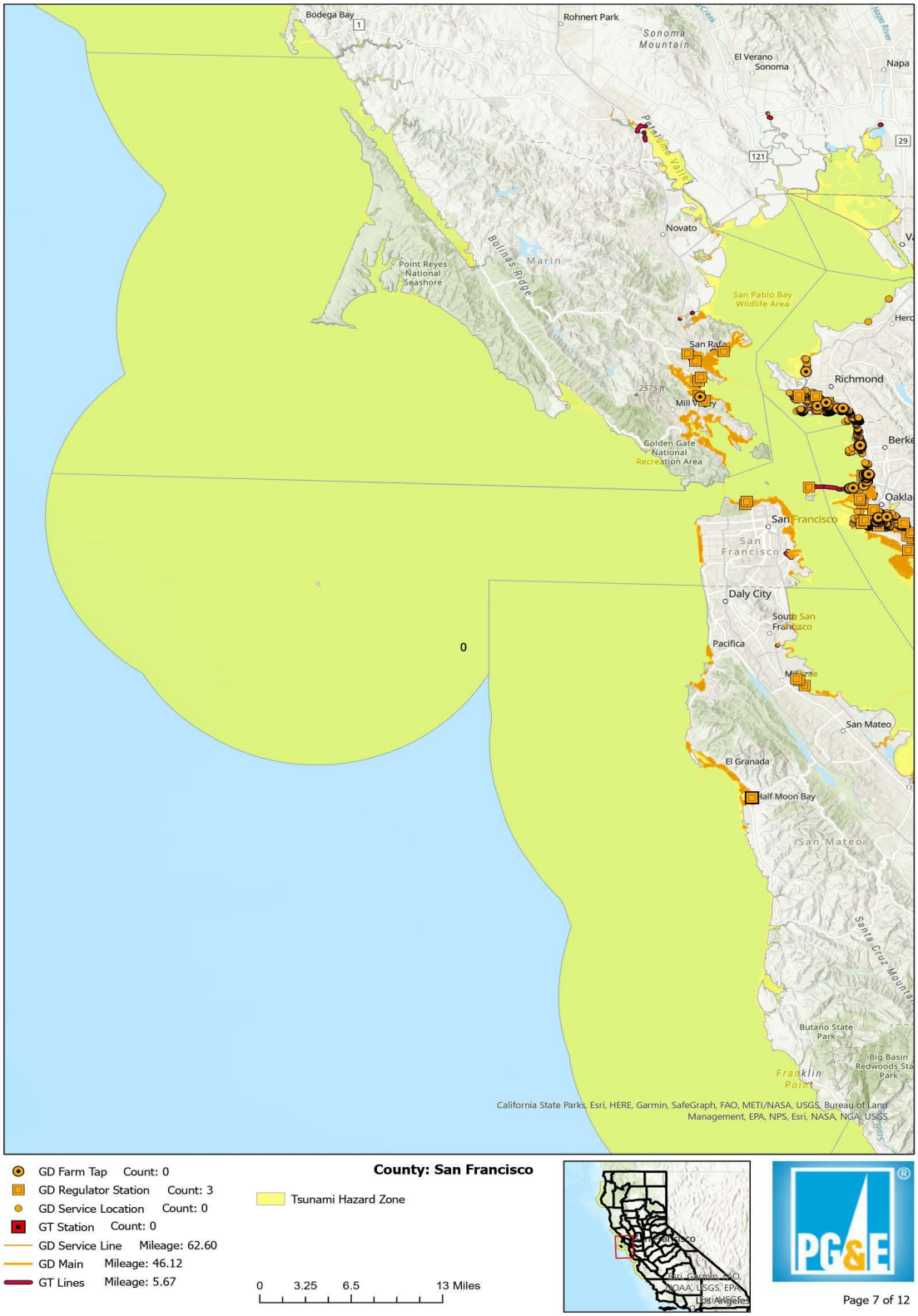


Figure 9-23: San Mateo County

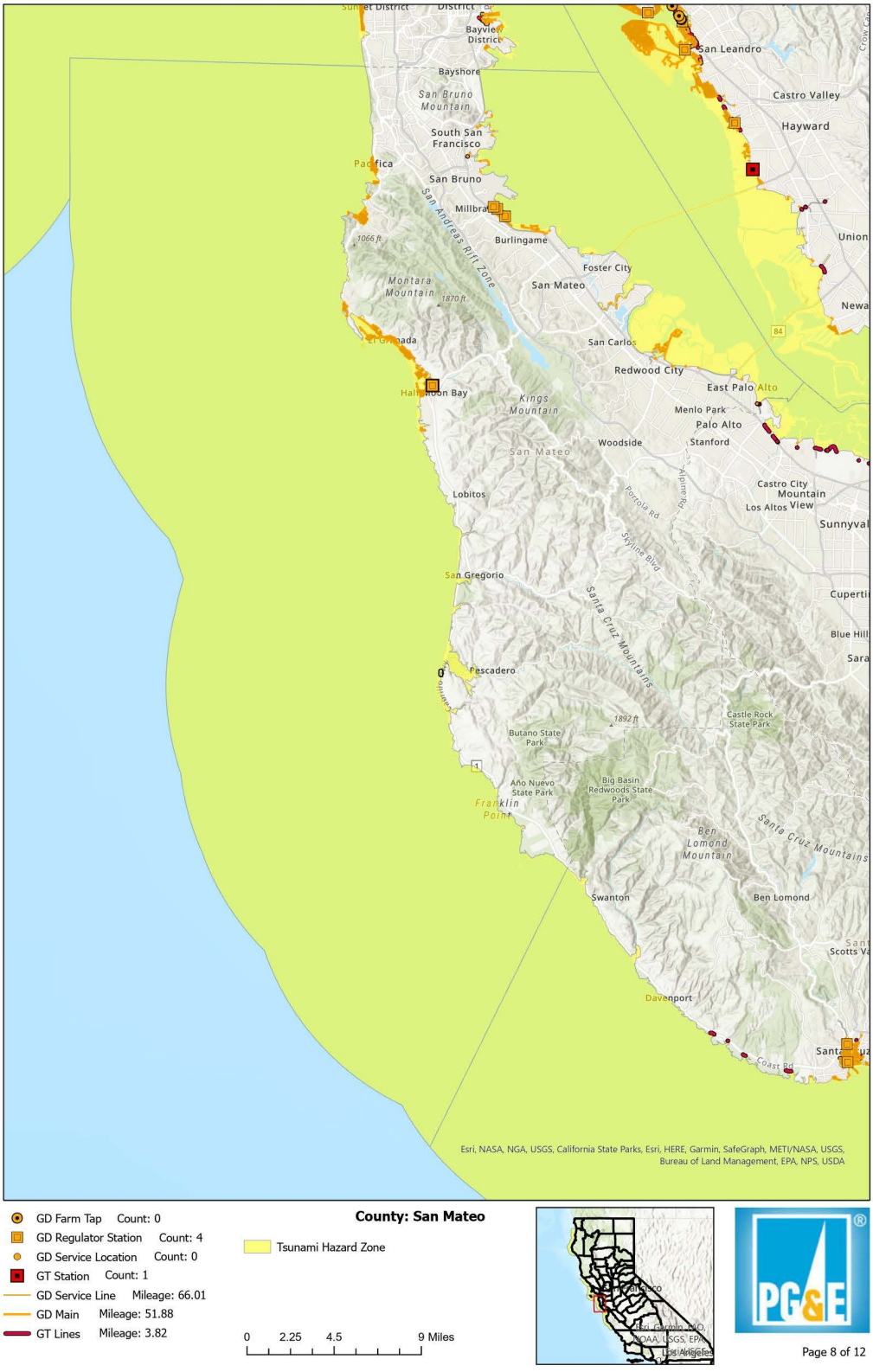


Figure 9-24: Santa Clara County

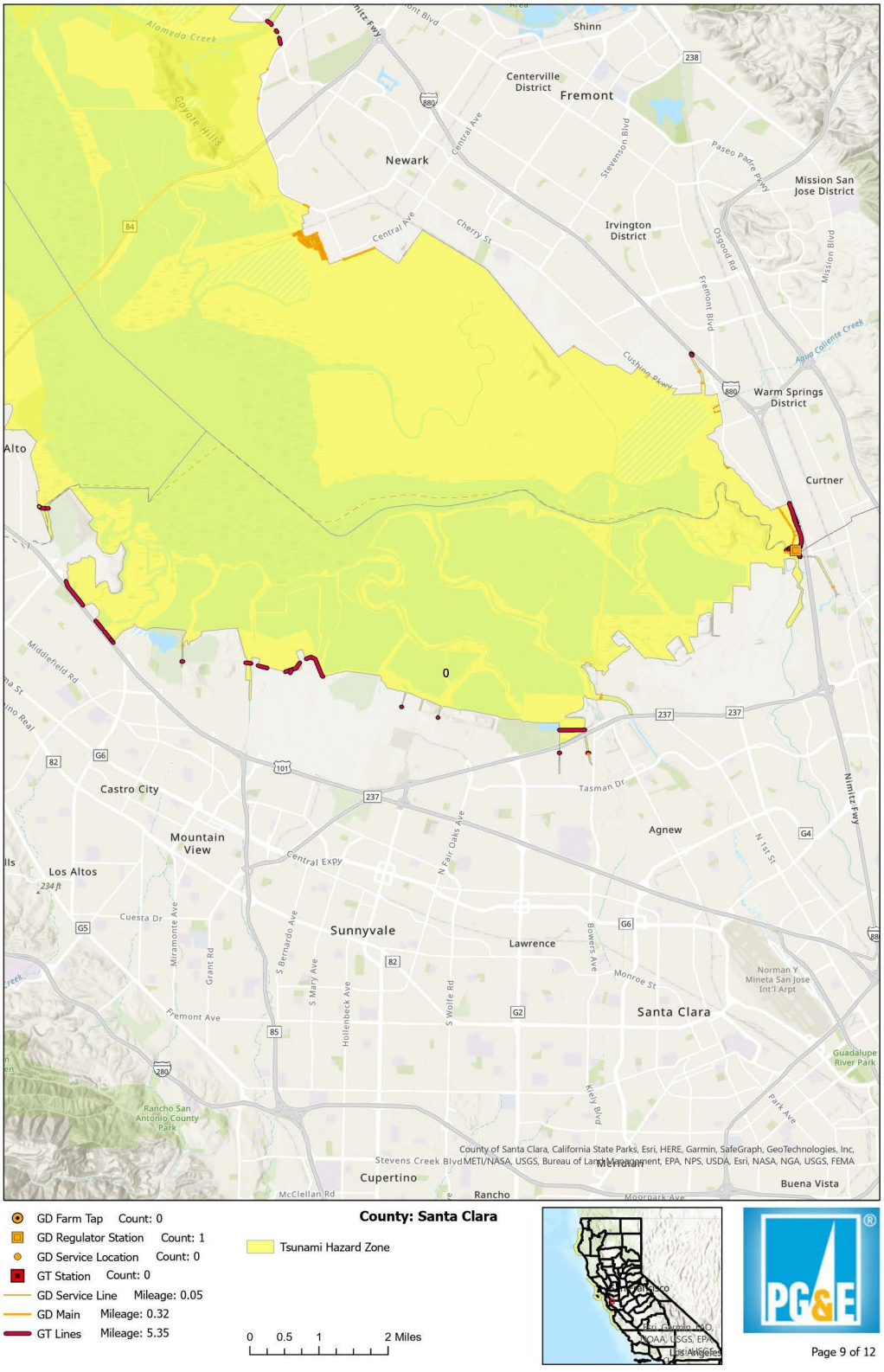
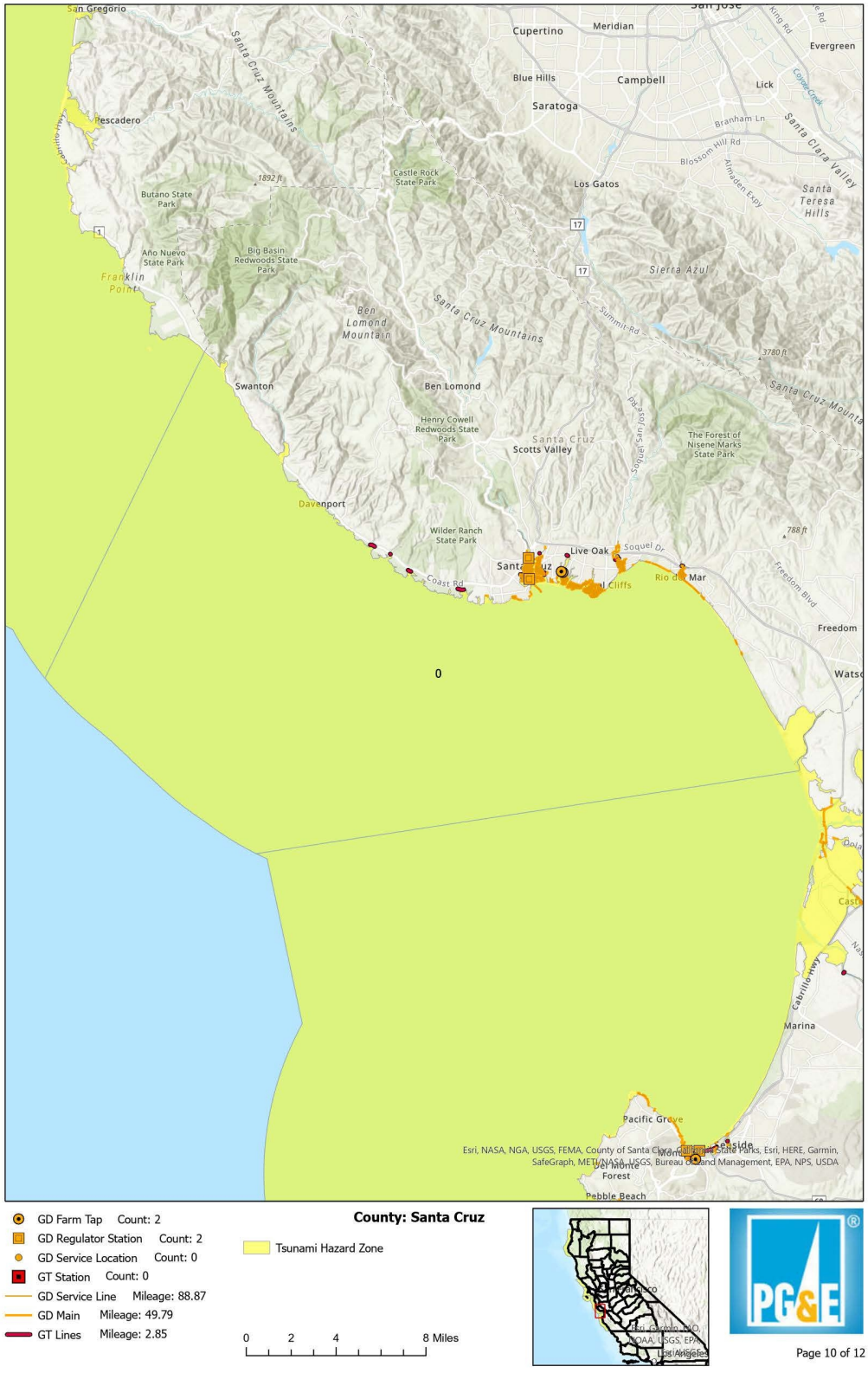


Figure 9-25: Santa Cruz County



Page 10 of 12

Figure 9-26: Solano County

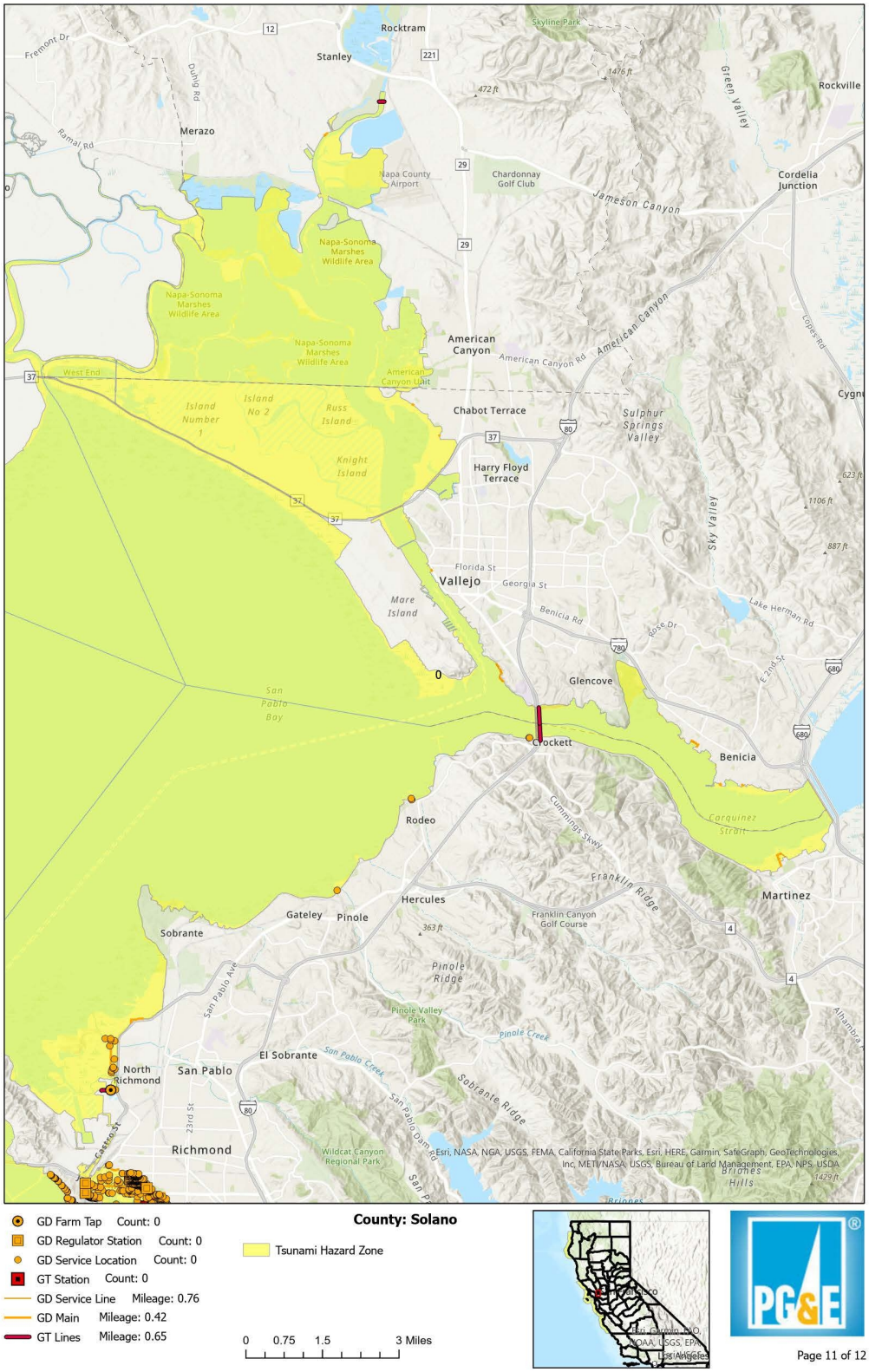
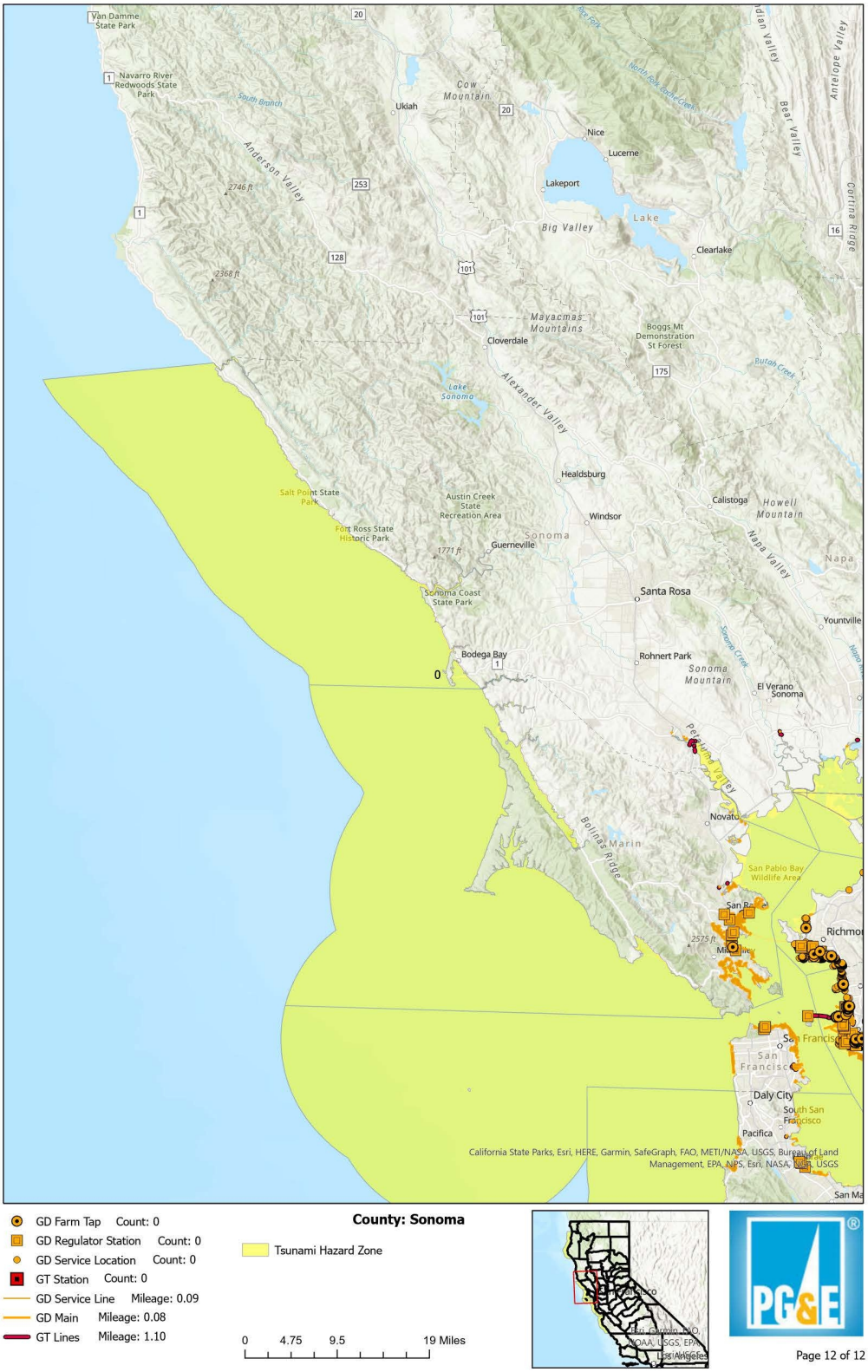


Figure 9-27: Sonoma



D.3 Facilities Tsunami Hazard Maps (3 Map Plates)

Figure 9-28: Alameda County

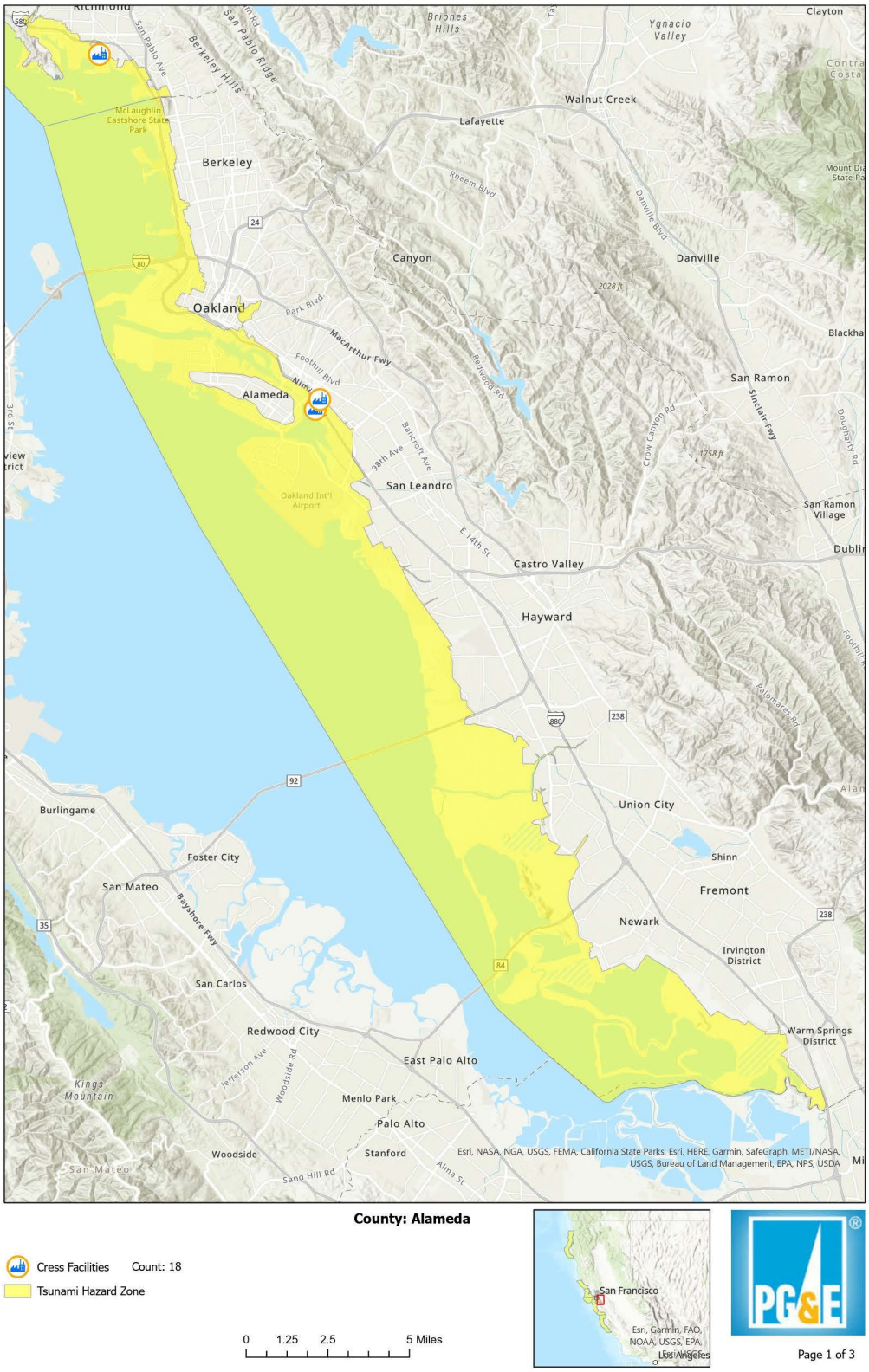
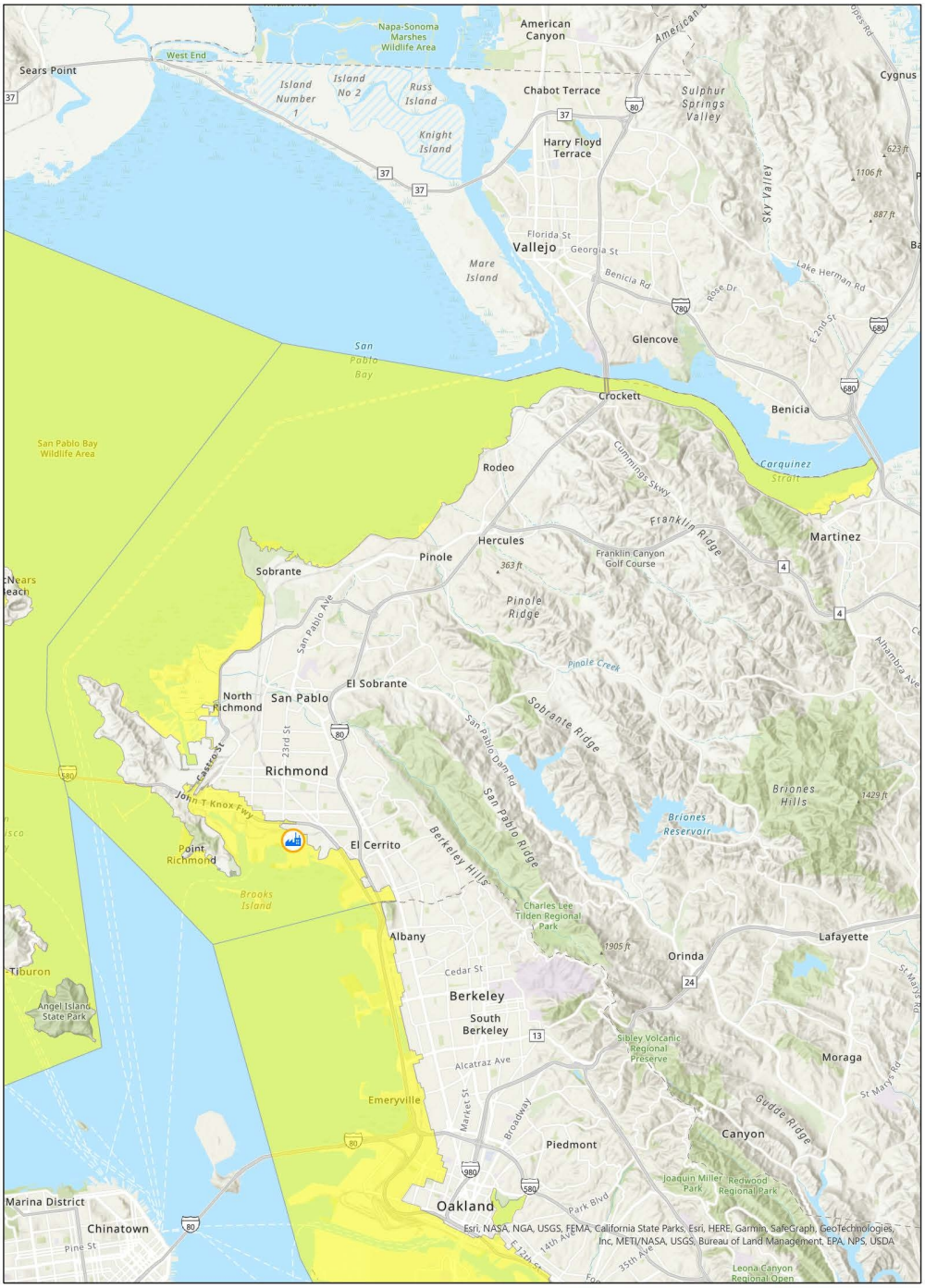


Figure 9-29: Conta Costa County



Page 2 of 3

Figure 9-30: Marin County