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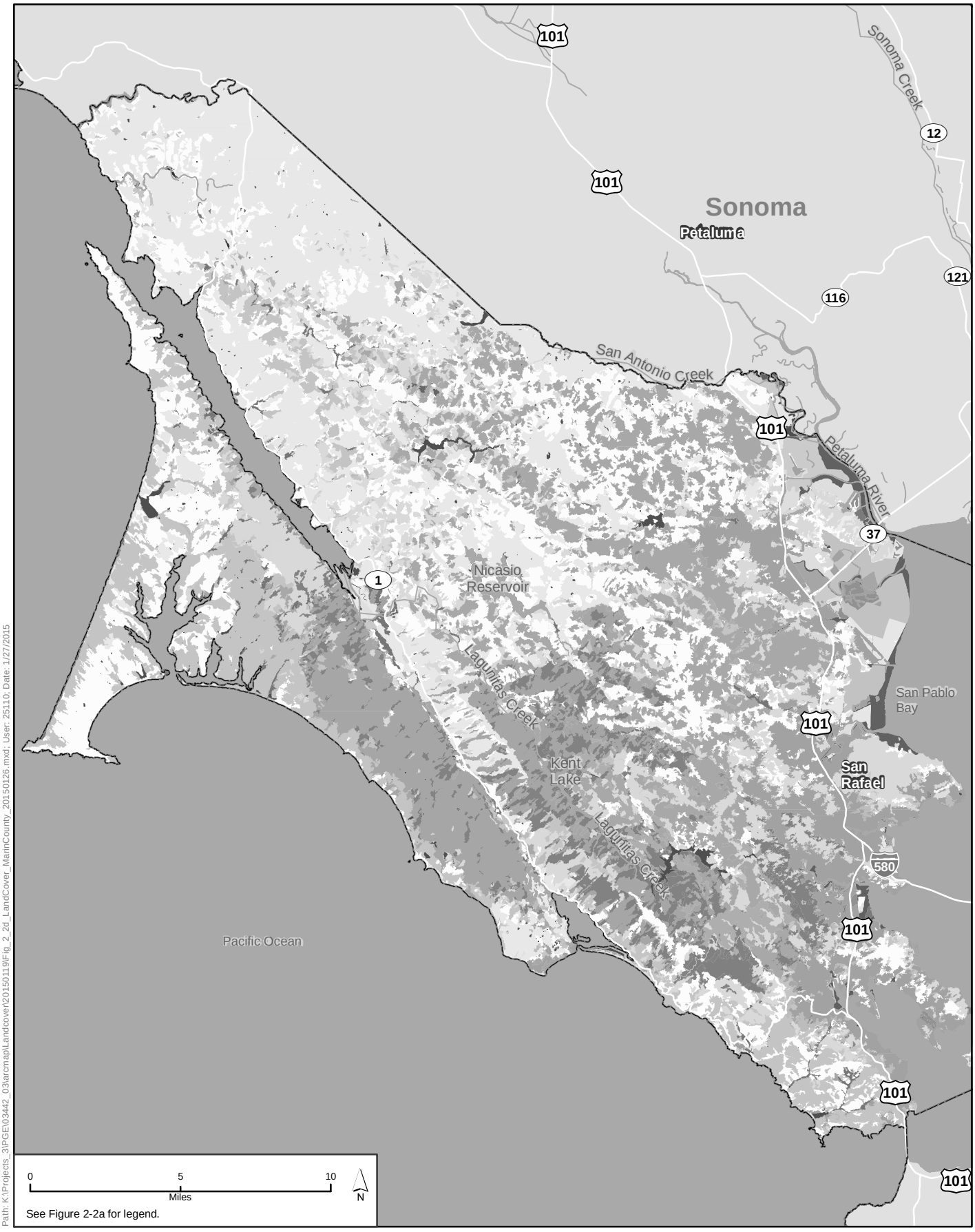

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Figure 2-2d
Land-cover Types in Marin County

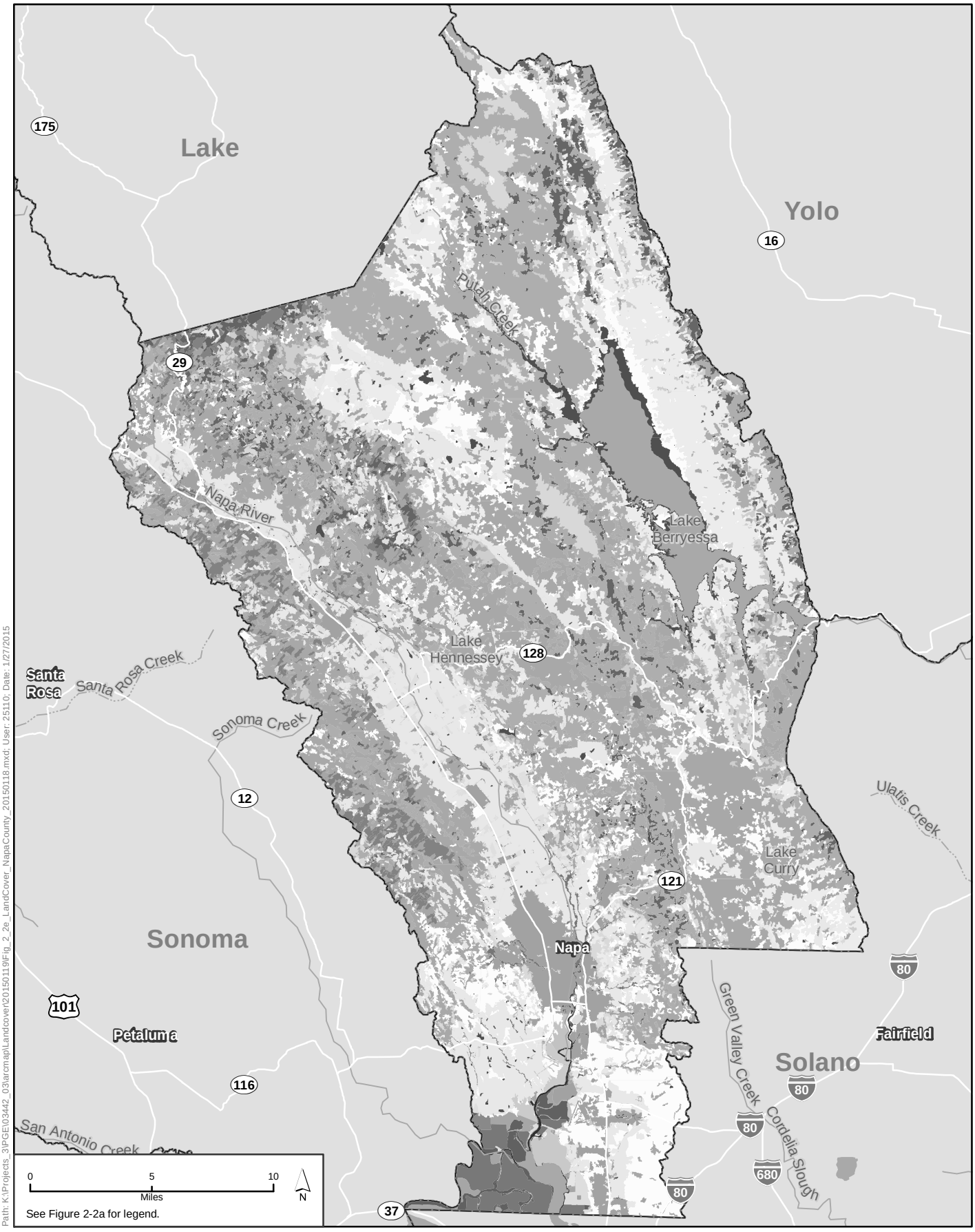

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Figure 2-2e
Land-cover Types in Napa County

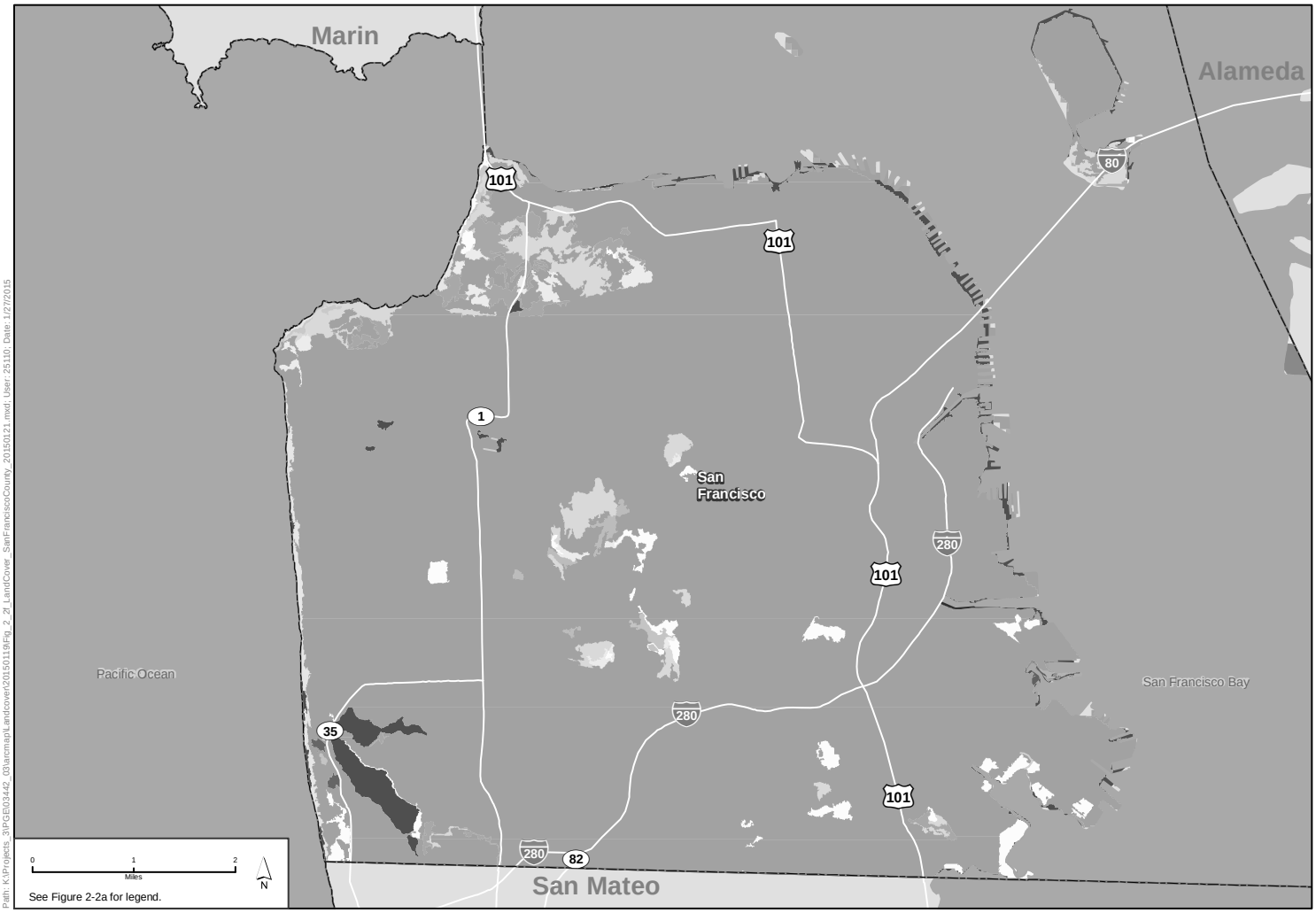

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Figure 2-2f
Land-cover Types in San Francisco County

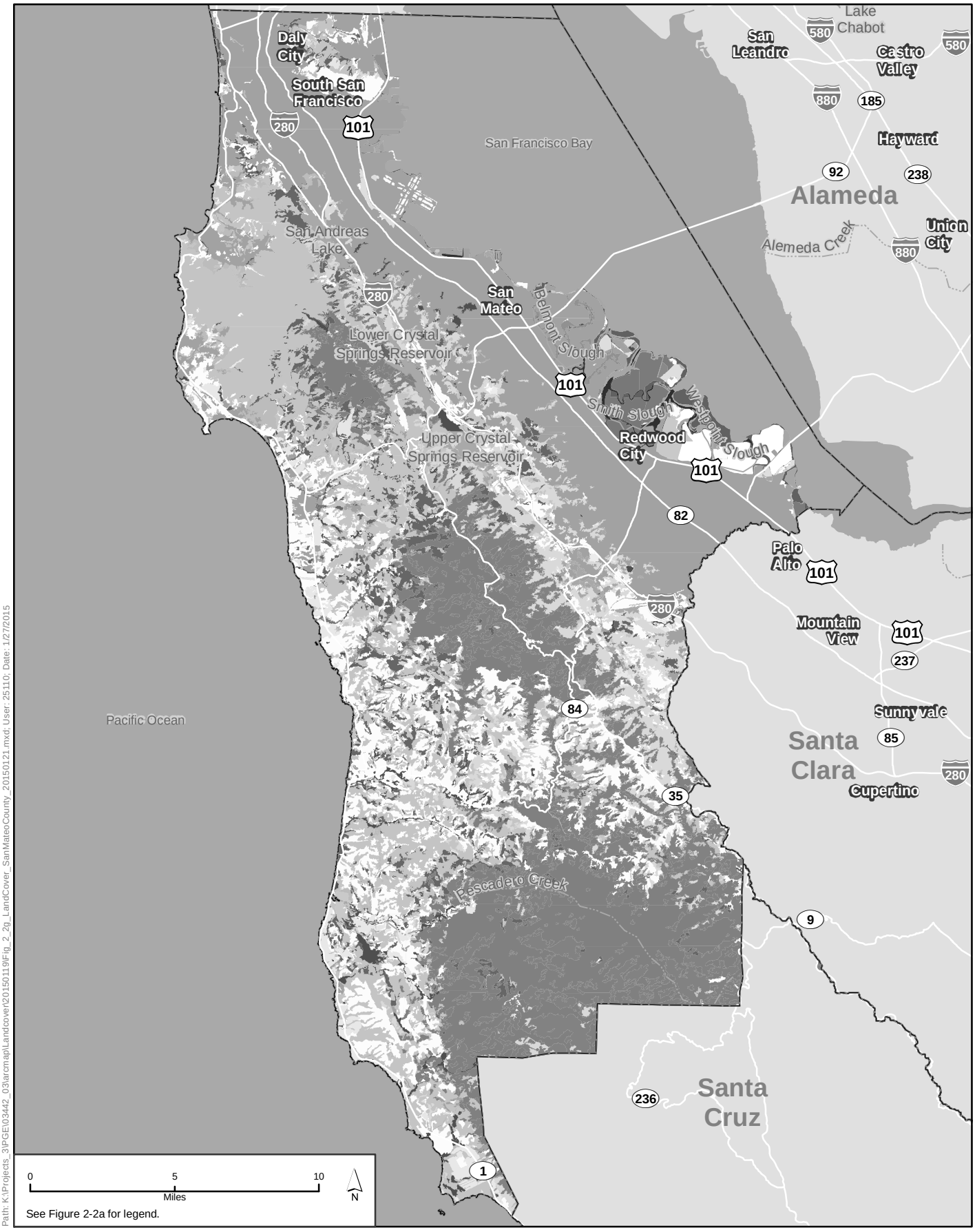

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Figure 2-2g
Land-cover Types in San Mateo County

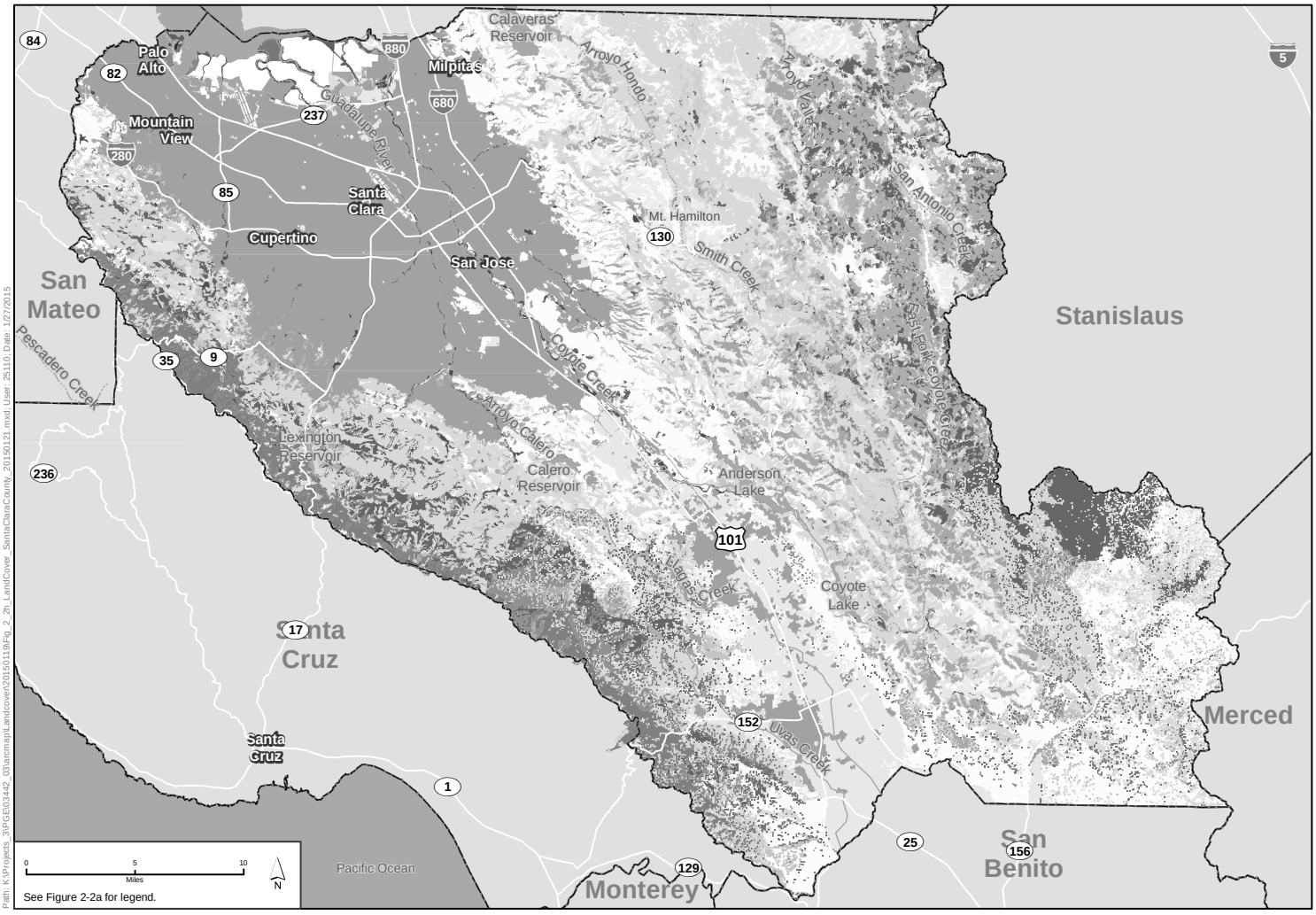

Figure 2-2h
Land-cover Types in Santa Clara County

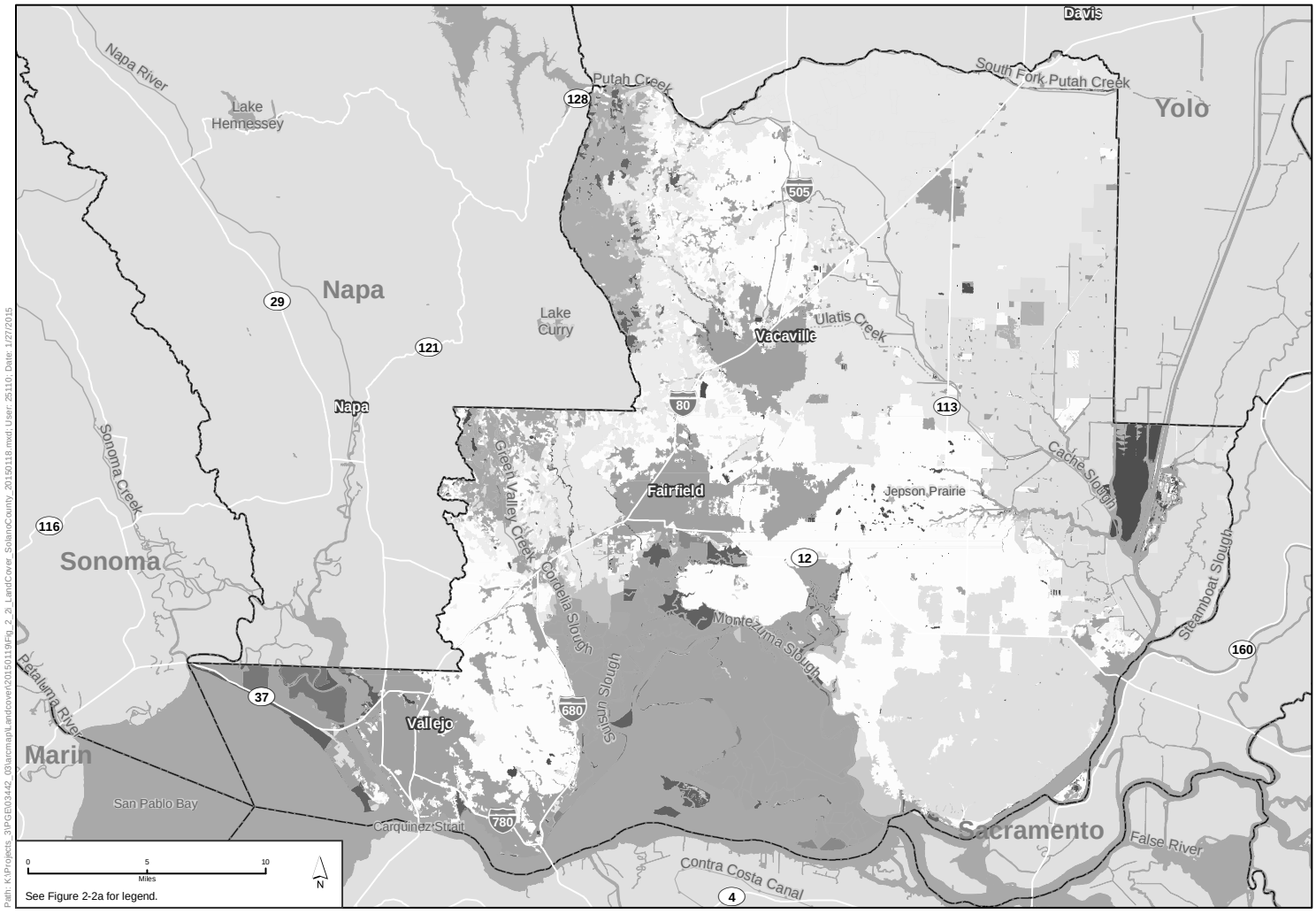

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Figure 2-2i
Land-cover Types in Solano County

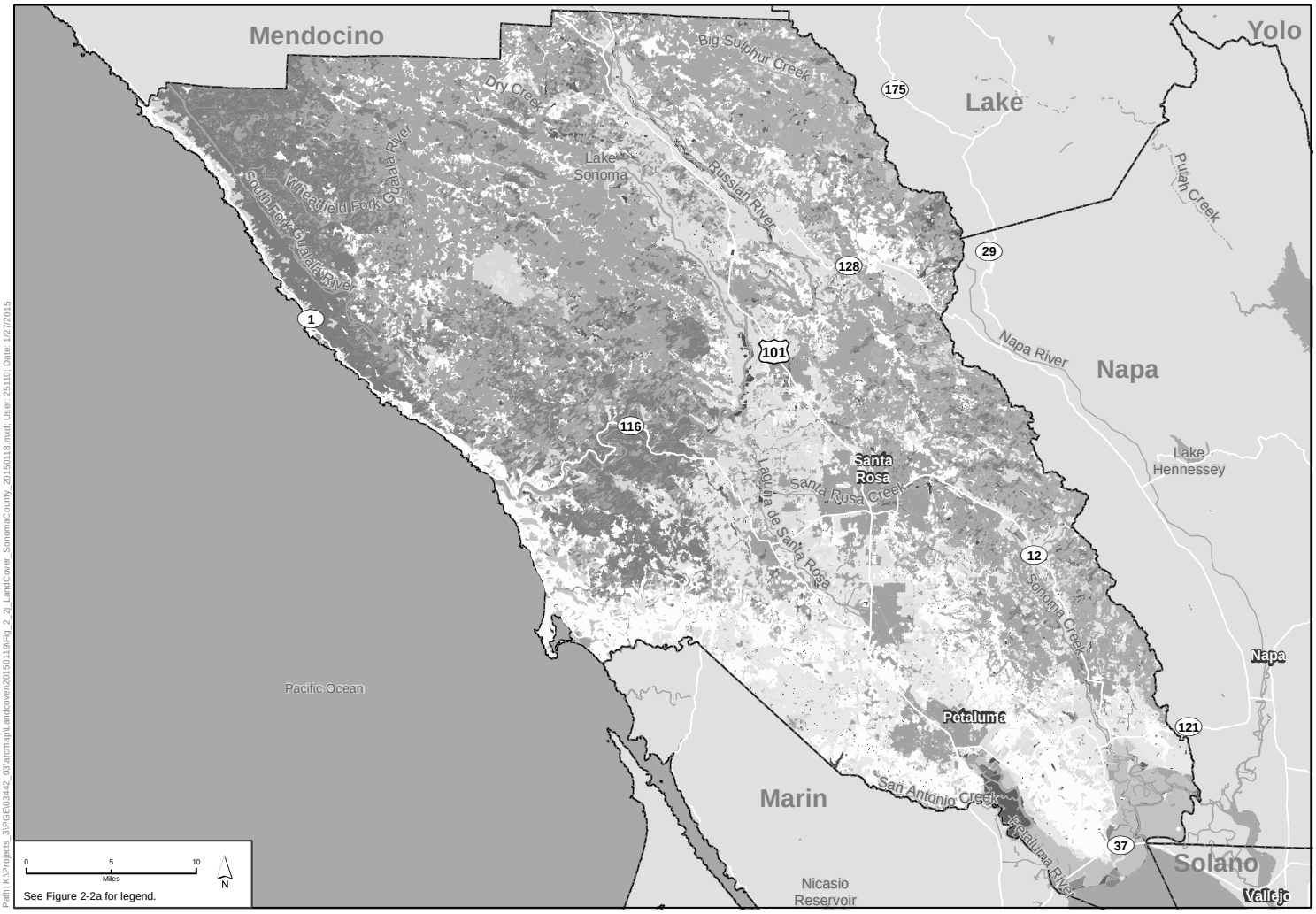

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Figure 2-2j
Land-cover Types in Sonoma County

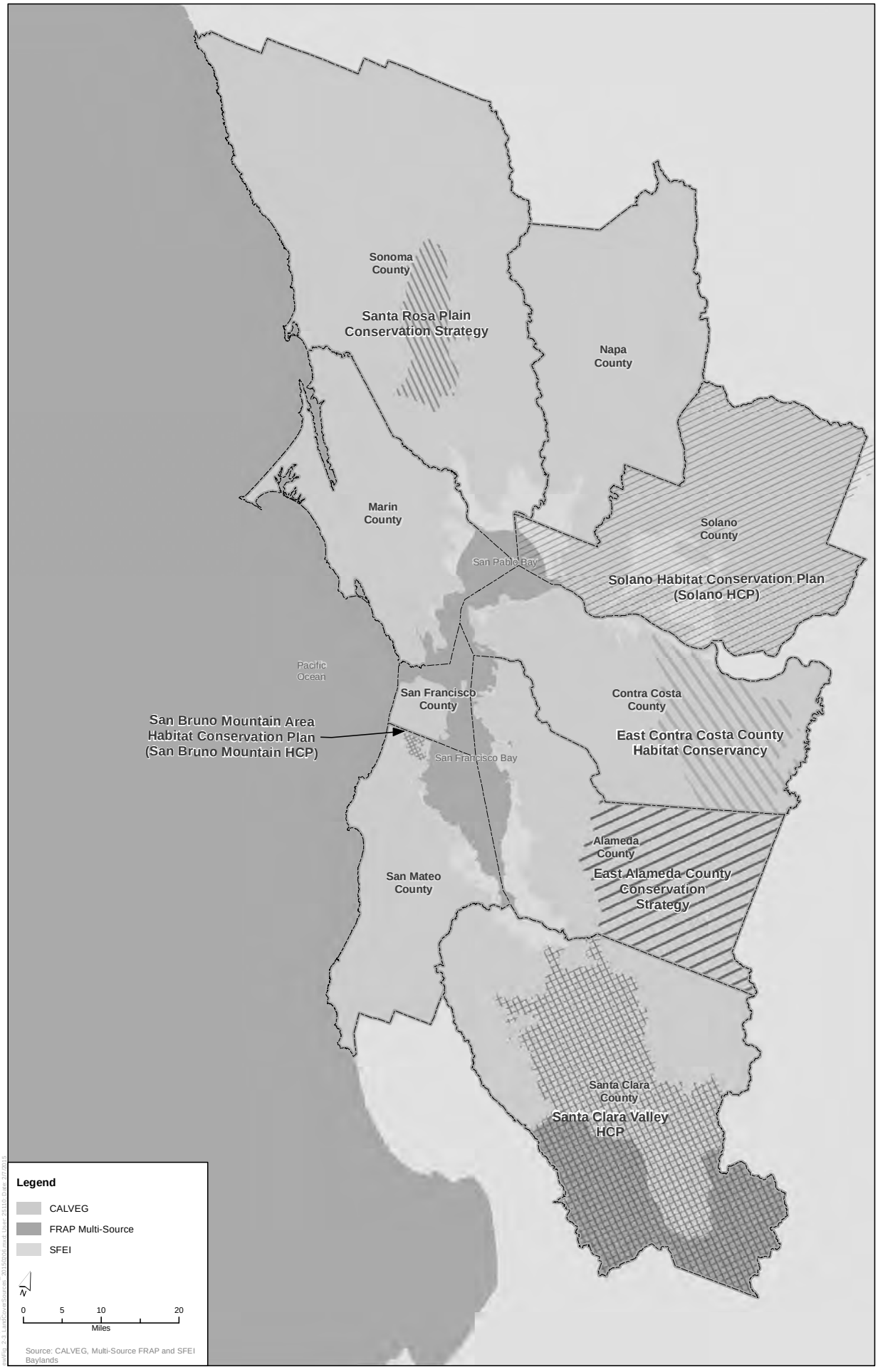

Figure 2-3
Plan Area and Data Sources

that include information on the species status, critical habitat (if applicable), range, habitat requirements, population trends and threats, species management, and references (Appendix B, *Species Accounts*) to assist with the permitting and regulatory processes.

2.3.4 Species Habitat Models

PG&E created species-specific habitat models with input from USFWS and CDFW to be aligned with other regional conservation plans and strategies within the Bay Area to estimate the amount of habitat within the Plan Area and the potential impacts on covered species. The data sources, procedures, habitat classifications, and updates used for the models are described below.

2.3.4.1 Data Sources

The species models use the following data sources.

- California Wildlife Habitat Relationship (CWHR)
- CNDDB
- CALVEG, FRAP Multi-Source, and SFEI's Modern Baylands (as described above)
- East Contra Costa HCP/NCCP habitat models
- Santa Clara Valley Habitat Plan habitat models
- Solano HCP habitat models
- East Alameda County Conservation Strategy habitat models
- Santa Rosa Plain Conservation Strategy conservation areas
- San Bruno Mountain Area HCP habitat maps
- USFWS Recovery Plan species' range and designated core area
- Peer-reviewed literature identifying other species' ranges
- Expert field surveys identifying other species' ranges
- National Hydraulic Dataset (NHD)

2.3.4.2 Procedures

PG&E built its wildlife habitat models through an iterative process. Generally, the process included the following steps.

1. Use the CWHR to determine species range.
2. Verify range with CNDDB occurrences and other available species expert data.
3. Develop conceptual models based on CWHR, CNDDB, land-cover data, literature review, and field knowledge and begin building models in GIS Model Builder.
5. Compare modeled habitat with existing established regional conservation plan models.
6. Use existing regional conservation plan models where they exist.
7. Extrapolate habitat suitability criteria from regional conservation plans to create habitat models in other portions of the Plan Area.

8. Integrate other data (i.e., NHD and recovery plan information) to refine and improve models.
9. Submit the models to USFWS and CDFW for review.
10. Integrate agency revisions.

PG&E did not use plant habitat models because of the unique microhabitat requirement for these species.

The CWHR is an information system pertaining to California's wildlife and is maintained by CDFW in cooperation with the California Interagency Wildlife Task Group (California Department of Fish and Game 2010a).

The CWHR system contains life history, geographic range, habitat relationships, and management information on 694 species of amphibians, reptiles, birds, and mammals known to occur in the state. The system includes the CWHR System Software, a community-level matrix model associating California's wildlife to a standardized habitat classification scheme. To support this model, geographic ranges for each species were developed using current published and unpublished biological information and professional judgment by recognized experts on California's wildlife.

Species-level experts and CWHR staff have made every effort, where justified by the distribution of known species observations or known habitat associations, to represent a species' range with standard polygons of major geographic features in California such as mountain ranges, valleys, buffered river corridors, and ecological subsections of California. The CWHR species range maps are continually reviewed and updated as new animal occurrence data become available. The range maps have been digitized as GIS layers to support predictions of the CWHR System Software and species richness assessments for statewide conservation (California Department of Fish and Game 2010a).

If a CWHR range was not available for a species, some combination of other data sources was used to derive a range. Those sources could include one or more of the following.

- CNDDB occurrence data, sometimes with an added buffer.
- USFWS Recovery Plan species' range or designated core area.
- Peer reviewed literature identifying other species' ranges.
- Expert field surveys identifying other species' ranges (e.g., butterfly survey data from entomologist Dr. Richard Arnold).

PG&E went through an iterative process of developing conceptual models for the species based on habitat requirements, species location information, and land-cover data. PG&E also used habitat models from regional conservation plans to validate the range and habitat for covered species. Where possible, PG&E used habitat suitability criteria from regional conservation plans to create habitat models in other portions of the Plan Area (Figure 2-3).

2.3.4.3 Habitat Classification

Table 2-3 presents the estimated extent of each wildlife species' habitat present in the study area and Plan Area and the data sources used to determine the modeled habitat and estimate the acreages of habitat for covered species in the Plan Area. Table 2-4 identifies the amount of habitat within each buffered ROW. Table 2-5 shows the regional location of wildlife species' modeled habitat within the Plan Area.

Table 2-3. Estimated Extent of Covered Wildlife Species Habitat

Covered Species	Data Source	Range in Study Area (acres)	Range in Plan Area (acres)
Invertebrates			
California freshwater shrimp	CNDDB occurrence data within suitable land cover. Digitized data from the recovery plan, added sites recommended by CDFW, buffered waterways by 100 feet, and selected areas within suitable land cover.	1,636	72
Conservancy fairy shrimp	CNDDB occurrences within Vernal Pool Recovery Areas and within Solano HCP Plan Area buffered by 0.25 mile excluding urban land-cover.	5,260	292
Longhorn fairy shrimp	Critical habitat.	791	11
Vernal pool fairy shrimp	Alkali wetland and seasonal wetland in East Contra Costa HCP/NCCP and in East Alameda County Conservation Strategy. All vernal pool core areas (outside of the three other plans referenced for this species) that have annual grassland vegetation, and Solano HCP's "Grassland - Vernal Pool Systems" layer. Includes extant occurrences.	66,917	4,963
Vernal pool tadpole shrimp	Alkali wetland and seasonal wetland in East Contra Costa HCP/NCCP and in East Alameda County Conservation Strategy. All vernal pool core areas (outside of the three other plans referenced for this species) that have annual grassland vegetation, and Solano HCP's "Grassland - Vernal Pool Systems" layer. Includes extant occurrences.	61,664	4,382
Delta green ground beetle	CNDDB polygon data, Dr. Richard Arnold's data (Arnold, pers. comm.) buffered by 500 feet, and Jepson Prairie Preserve with Urban areas removed	3,380	122
Bay checkerspot butterfly	Annual Grassland within Santa Clara Valley Habitat Plan's habitat model that is based on serpentine seep and grassland land-cover types. Data for that plan was reviewed by species experts (Dr. Alan Launer and Dr. Stewart Weiss). The model includes Edgewood Park based on recent surveys and evidence of adults and larvae, but does not include Jasper Ridge because there are no extant occurrences there.	8,913	912
Callippe silverspot butterfly	Model focuses on East Bay, but east of Interstate 580 and State Route 13, within "Annual Grassland" land-cover. It also includes CNDDB occurrences and Dr. Richard Arnold's point and polygon data. Polygon data buffered by typical flight distances of 2,625 feet. Includes the entire "Callippe Silverspot Butterfly Conservation Area" from the Solano HCP, as suitable.	112,051	6,807

Table 2-3. Continued

Covered Species	Data Source	Range in Study Area (acres)	Range in Plan Area (acres)

Covered Species	Data Source	Range in Study Area (acres)	Range in Plan Area (acres)
Invertebrates (continued)			
Lange's metalmark butterfly	Based on Dr. Richard Arnold's occurrences.	77	13
Mission blue butterfly	Based on Dr. Richard Arnold's occurrences, buffered by a typical flight distance of 3,937 feet and within "Chamise-Redshank Chaparral", "Coastal Scrub", or "Annual Grassland" land-cover. (CNDDB was referenced but Dr. Arnold's data is more comprehensive.)	10,693	653
San Bruno elfin butterfly	CNDDB occurrence data, buffered by a typical flight distance of 2,625 feet, with unsuitable habitat (urban/suburban/rural development) removed.	15,036	373
Amphibians and Reptiles			
California tiger salamander (Sonoma County DPS)	Santa Rosa Plain Conservation Strategy selected parcels attributed as "Potential For Presence of CTS and Listed Plants" and "Areas Within 1.3 Miles of Known Breeding." Also California tiger salamander corridors and conservation area boundaries.	31,355	2,404
California tiger salamander (Central California DPS)	Santa Clara Valley Habitat Plan, East Contra Costa HCP/NCCP, and East Alameda County Conservation Strategy habitats. Uses Solano HCP's land-cover "Grassland – Valley Floor" and "Grassland – Vernal Pool System." CWHR outside of others' plans, includes select land-cover types of "Blue Oak Woodland," "Annual Grassland," and "Coastal Oak Woodland." Also uses CDFW's habitat layers in Solano County.	1,149,805	41,151
California red-legged frog	East Alameda County Conservation Strategy models, East Contra Costa HCP/NCCP models, Santa Clara Valley Habitat Plan models, and Solano HCP conservation areas. Other areas included CWHR, buffered streams/rivers, reservoirs, and swamps/marsh by 300 feet, and selected preferred land-cover types. Also includes selected habitat within critical habitat. Mori Point and Sharp Park Beach were also included.	1,190,384	33,242

Table 2-3. Continued

Covered Species	Data Source	Range in Study Area (acres)	Range in Plan Area (acres)
Amphibians and Reptiles (continued)			
Alameda whipsnake	CWHR (R053) modified to remove north of Sacramento River and the Peninsula because no CNDDB records are present in these areas. Includes East Contra Costa HCP/NCCP data (three types: core, perimeter core, and movement). Includes East Alameda County Conservation Strategy data. Also includes some specific watershed indicated by species expert Karen Swaim. Includes critical habitat without urban areas. In the rest of the CWHR study area, selected land-cover types of "Chamise-Redshank Chaparral," "Desert Scrub," "Mixed Chaparral," and "Coastal Scrub" and attributed as "Core Area." This area was further buffered by 500 feet and attributed as "Perimeter Core." Perimeter Core was buffered by 1 mile and attributed as "Movement." These methods are consistent with the East Contra Costa HCP/NCCP. From these three types, PG&E subtracted urban and removed areas west of Highway 680 near Fremont based on current knowledge of the species' distribution.	335,452	10,804
San Francisco garter snake	Used USFWS guidance on core habitat, then buffered core habitat by 590 feet to create dispersal habitat. Removed Urban land-cover types.	6,020	573
Birds			
Ridgway's rail	Suitable land-cover types within CHWR. Petaluma Marsh Wildlife Area. Coastal Marsh land-cover type from Solano HCP. CNDDB occurrences.	137,662	2,622
Mammals			
Salt marsh harvest mouse	Suitable habitat within CHWR and CNDDB occurrences within Solano HCP Plan Area.	60,064	2,138
San Joaquin kit fox	Habitat models for East Contra Costa HCP/NCCP and Santa Clara Valley Habitat Plan. For East Alameda County Conservation Strategy, used both Low Use and Core Habitat (i.e., modeled habitat inside of Conservation Zones CZ5, CZ6, CZ7, CZ9, and CZ10).	182,959	8,282

Table 2-4. Estimated Extent of Covered Wildlife Species Habitat by Facility Type

Species/Habitat Classification[1]	Electric Distribution	Electric Transmission	Gas Distribution	Gas Transmission	Total[2]
Invertebrates					
California freshwater shrimp	59	8	2	3	72
Conservancy fairy shrimp	39	99		153	291
Longhorn fairy shrimp	2	9			11
Vernal pool fairy shrimp	1,381	1,332	615	1,635	4,963
Vernal pool tadpole shrimp	1,230	1,123	572	1,457	4,382
Delta green ground beetle	23	46		54	123
Bay checkerspot butterfly	56	475	12	369	912
Callippe silverspot butterfly	1,481	3,233	650	1,443	6,807
Lange's metalmark butterfly		8		5	13
Mission blue butterfly	115	335	56	146	653
San Bruno elfin butterfly	133	170	7	62	372
Amphibians and Reptiles					
California tiger salamander - Sonoma County DPS	1,010	501	363	530	2,404
California tiger salamander - Central California DPS					
Potential Breeding Habitat	29	31	7	47	114
Potential Upland Habitat	9,783	18,809	2,637	9,809	41,038
California red-legged frog					
Potential Riparian Habitat	4,180	2,979	942	1,162	9,263
Potential Dispersal Habitat	5,610	12,516	561	5,292	23,979
Alameda whipsnake					
Core Habitat	52	237	17	34	340
Perimeter Core Habitat	196	738	59	134	1,127
Movement Habitat	2,346	4,864	1,007	1,119	9.336
San Francisco garter snake					
Core Habitat	37	117	8	82	244
Dispersal Habitat	55	147	10	117	329
Birds					
Ridgway's rail	678	1,472	64	408	2,622
Mammals					
Salt marsh harvest mouse	364	1,430	58	286	2,138
San Joaquin kit fox					
Core Habitat	538	2,023	53	1,335	3,948
Low-Use/Quality Habitat	798	2734	63	736	4,331

[1] Habitat classifications were derived from other regional conservation plan data and reflect important life history elements for the species or other important habitat characteristics.

[2] Unmapped facilities are not included but are primarily expected to be located in urban areas; minor new construction activities are not included but would be reviewed on a case-by-case basis for species issues.

Table 2-5. Regional Location of Wildlife Species' Modeled Habitat

	North Bay Region			East Bay Region			South Bay/ Peninsula Region		
	Marin	Sonoma	Napa	Alameda	Contra Costa	Solano	SF	San Mateo	Santa Clara
Invertebrates									
California freshwater shrimp	18%	67%	15%	0%	0%	0%	0%	0%	0%
Conservancy fairy shrimp	0%	0%	0%	0%	0%	100%	0%	0%	0%
Longhorn fairy shrimp	0%	0%	0%	100%	0%	0%	0%	0%	0%
Vernal pool fairy shrimp	0%	29%	3%	3%	4%	54%	0%	3%	4%
Vernal pool tadpole shrimp	0%	33%	3%	3%	2%	51%	0%	4%	4%
Delta green ground beetle	0%	0%	0%	0%	0%	100%	0%	0%	0%
Bay checkerspot butterfly	0%	0%	0%	0%	0%	0%	0%	7%	93%
Callippe silverspot butterfly	0%	0%	1%	21%	45%	30%	0%	3%	0%
Lange's metalmark butterfly	0%	0%	0%	0%	100%	0%	0%	0%	0%
Mission blue butterfly	8%	0%	0%	0%	0%	0%	1%	91%	0%
San Bruno elfin butterfly	22%	0%	0%	0%	7%	0%	0%	71%	0%
Amphibians and Reptiles									
California tiger salamander - Sonoma County DPS	0%	100%	0%	0%	0%	0%	0%	0%	0%
California tiger salamander - Central California DPS (Potential Breeding Habitat)	0%	0%	0%	28%	33%	16%	0%	0%	23%
California tiger salamander -Central California DPS (Potential Dispersal Habitat)	0%	0%	0%	28%	33%	16%	0%	0%	23%
California red-legged frog (Potential Riparian Habitat)	3%	4%	2%	27%	27%	6%	0%	9%	23%
California red-legged frog (Potential Dispersal Habitat)	3%	4%	2%	27%	27%	6%	0%	9%	23%
Alameda whipsnake (Core)	0%	0%	0%	35%	64%	0%	0%	0%	1%
Alameda whipsnake (Perimeter Core)	0%	0%	0%	35%	64%	0%	0%	0%	1%
Alameda whipsnake (Dispersal)	0%	0%	0%	35%	64%	0%	0%	0%	1%
San Francisco garter snake (Core)	0%	0%	0%	0%	0%	0%	0%	100%	0%

Table 2-5. Continued

	North Bay Region			East Bay Region			South Bay/ Peninsula Region		
	Marin	Sonoma	Napa	Alameda	Contra Costa	Solano	SF	San Mateo	Santa Clara
Amphibians and Reptiles (continued)									
San Francisco garter snake (Dispersal)	0%	0%	0%	0%	0%	0%	0%	100%	0%
Birds									
Ridgway's rail	14%	1%	2%	9%	2%	45%	0%	20%	7%
Mammals									
Salt marsh harvest mouse	12%	2%	4%	18%	16%	19%	0%	21%	6%
San Joaquin kit fox (Core)	0%	0%	0%	38%	58%	0%	0%	0%	5%
San Joaquin kit fox (Low-Use/Quality)	0%	0%	0%	38%	58%	0%	0%	0%	5%

Extent of Existing Covered Plant Habitats

PG&E explored multiple methods of estimating covered plant habitat in the course of developing the Bay Area O&M HCP. Such methods included evaluating corridors that extended beyond the ROW, creating habitat models (similar to the approach used for wildlife species), and evaluating the frequency and rate of discovery of new locations to create a predictive model of future distribution. However, the techniques tended to overestimate habitat because they included areas that did not have records of species, predicted habitat in areas that do not contain records of species, or resulted in population estimates that overstated actual observed populations. Therefore, PG&E predicted that use of the methods described above would result in expensive and ineffective survey requirements, without significant benefit to the covered species. The agencies felt that an office-based method, such as that used to estimate habitat for wildlife species, would not have an adequate spatial resolution to characterize baseline conditions or to estimate impacts on known plant populations, which tend to be limited in distribution and population size. Therefore, PG&E and the agencies worked together to develop a straightforward approach to habitat estimation based on known populations. This approach uses CNDDB records. CNDDB includes 10 accuracy classes, the first two are specific occurrences (a specific point and a specific polygon[s]), the third is non-specific but bounded, and the fourth is a non-specific circular feature with a 1/10th mile radius. Accuracy classes 5–10 are non-specific circular features with broader radii ranging from (1/5th mile to 5 miles); the larger the circle the more vague the location.

PG&E queried CNDDB records in the Plan Area to estimate the land area of habitat for each covered plant occurrence in the database with an accuracy class of 1 or 2. These accuracy classes were selected because they represent precise data that are accurately mapped. For covered plant occurrences with an accuracy class of 1, the occurrence was assumed to occupy a maximum of five acres of habitat, although in many cases this is likely to be an overestimate as the occurrences tend to be clusters of plants. For covered plant occurrences with an accuracy class of 2, the actual land area reported for the occurrence was used. Non-specific occurrences consisting of bounded areas or points with accuracy class rankings of 3 through 10 (least accurate) were not included in the determination of estimated habitat because of the lack of specificity for these locations; many of the

non-specific occurrences are historic, and the location and current status of these populations has not been recently verified. Table 2-6 identifies the extent of known and estimated habitat present for each covered plant species in the Plan Area and within the maximum corridor width (200 feet) of PG&E facilities.

Table 2-6. Summary of Covered Plant Species Habitat within Plan Area

Category/ Plant Species	Documented CNDDB Habitat[b] (acres)	CNDDB Habitat within Plan Area[a] (acres)				
		Electric Transmission	Electric Distribution	Gas Transmission	Gas Distribution	All Mapped Facilities[c]
Pallid manzanita	158.61	0.09	0.26	0.00	1.92	2.27
Sonoma sunshine	500.82	0.00	0.00	2.50	0.00	2.50
Coyote ceanothus	436.10	0.02	0.00	7.04	0.00	7.06
Fountain thistle	39.28	0.00	0.13	0.67	0.00	0.80
Santa Clara Valley dudleya	1,559.80	0.65	0.09	2.60	0.00	3.34
Contra Costa wallflower	53.97	0.17	0.00	0.00	0.00	0.17
Marin dwarf flax	435.86	0.05	0.21	1.69	0.00	1.95
Burke's goldfields	667.19	0.03	0.15	0.81	0.00	0.99
Contra Costa goldfields	507.09	0.16	0.05	2.32	2.75	5.28
Sebastopol meadowfoam	698.59	0.00	0.04	0.00	0.00	0.04
Antioch Dunes evening primrose	69.65	0.17	0.00	0.00	0.00	0.17
White-rayed pentachaeta	41.06	0.00	0.04	0.00	0.00	0.04
Metcalf Canyon jewelflower	816.92	0.33	0.30	7.40	0.00	8.03

[a] Estimate based on 200-foot corridor and buffer of all mapped facilities and CNDDB records with specific and known locations and population sizes (i.e., accuracy classes 1 and 2).

[b] Estimate based on CNDDB records with specific and known locations and population sizes (i.e., accuracy classes 1 and 2).

[c] *All mapped facilities* may not be a sum of electric transmission, electric distribution, and gas transmission areas because some facilities overlap or are close to one another. Unmapped facilities are not included but are primarily expected to be located in urban areas; minor new construction activities are not included but would be reviewed on a case-by-case basis to ensure impacts do not exceed take authorization.

2.3.4.4 Updates

PG&E may periodically update the modeled habitat for wildlife species in this HCP to ensure it accurately represents the habitat available for the covered species. For example, if FRAP is updated, PG&E may update its habitat models based on a more current land-cover data set. Similarly, if PG&E receives better wetland data for Santa Rosa Plain or Solano County, this data could be integrated to better assist PG&E in avoiding wetland habitats. Further, if it becomes apparent that certain areas of the modeled habitat are inaccurate (e.g., urban areas with no natural vegetation), then PG&E may revise the model in that specific area.

PG&E would also continue to integrate CNDDB updates into its MapGuide system on a semi-annual basis to augment the modeled habitat and assist its planners and biologists in understanding where species have been detected.

2.3.5 Critical Habitat

Section 7 of the ESA requires that USFWS evaluate the effects of implementing the Bay Area O&M HCP in designated critical habitat. Critical habitat has been designated for 12 covered species, all of which have designated critical habitat in the Plan Area. Table 2-7 presents the extent of critical habitat in both the study area and the Plan Area.

This information is presented to assist USFWS with the internal Section 7 consultation and BO that will be required for issuance of the incidental take permit. PG&E requests that, for covered species with proposed critical habitat, USFWS provide a conference opinion regarding the effects of PG&E's covered activities on proposed critical habitat.

Table 2-7. Designated Critical Habitat

Covered Species	Designation List Date	Total Critical Habitat in California (acres)	Critical Habitat in Study Area (acres)	Critical Habitat in Plan Area (acres)
Invertebrates				
Conservancy fairy shrimp	February 10, 2006	161,787	4,414	324
Longhorn fairy shrimp	February 10, 2006	13,557	791	12
Vernal pool fairy shrimp	February 10, 2006	590,247	21,124	1,133
Vernal pool tadpole shrimp	February 10, 2006	228,784	12,663	607
Delta green ground beetle	August 8, 1980	969	969	32
Bay checkerspot butterfly	August 26, 2008	18,292	18,292	1,731
Amphibians				
California tiger salamander (Central California DPS)	August 10, 2004	199,107	46,326	869
California tiger salamander (Sonoma County DPS)	September 30, 2011	47,381	47,381	5,438
California red-legged frog	March 17, 2010	1,640,649	640,097	10,348
Reptiles				
Alameda whipsnake	October 2, 2006	154,835	152,169	4,255
Plants				
Contra Costa wallflower	April 26, 1978	305	281	41
Contra Costa goldfields	June 18, 1997	14,730	12,093	1,138
Antioch Dunes evening primrose	April 26, 1978	305	281	41

Chapter 3
Covered Activities

*[**Summary**: This chapter presents detailed information on activities proposed for coverage in the Bay Area O&M HCP. The 33 O&M and minor new construction activities discussed in this chapter are associated with PG&E's gas and electric transmission and distribution system, as mandated for public safety and reliable energy. The vast majority of O&M activities would affect less than 0.1 acre (approximately 66 × 66 feet), be regularly re-occurring, and take a couple of hours to complete. This chapter also discusses the CPSI, a multi-year safety enhancement initiative to upgrade gas transmission lines and ensure pipeline integrity.]*

3.1 Introduction

The Bay Area O&M HCP addresses those covered activities necessary for the safe and efficient operation of PG&E's gas and electric systems. To meet the needs of customers and satisfy CPUC's requirements to offer "adequate, efficient, just, and reasonable" service, PG&E must construct, operate, and maintain facilities and, in some cases, perform minor new construction for safe and efficient gas and electric service. The Bay Area O&M HCP covers three categories of activities that would be conducted in accordance with CPUC requirements and for which PG&E is requesting incidental take authorization: O&M, minor new construction, and CPSI activities.

- **O&M**.
    - *Operation activities* include inspecting, monitoring, testing, and operating valves, enclosures, switches, and other components. These covered activities involve utility personnel working at facilities; personnel typically use existing access roads.
    - *Maintenance activities* include repairing and replacing facilities, structures, and access roads. This work includes reconductoring electric transmission and distribution projects and gas pipeline replacement. They also include emergency repair and replacement and vegetation management, including tree pruning and removal.
- **Minor new construction**. These activities include installing new or replacement structures to upgrade existing facilities or extend service to new residential or commercial customers. When conducted in natural vegetation or agricultural lands that contain suitable habitat for covered species, upgrades to existing facilities and new electric or gas line extensions are limited to 2 miles or less from an existing line. End-to-end extensions exceeding 2 miles would not be covered under the Bay Area O&M HCP. Multiple 2-mile extensions in different geographic areas would be covered, but each would be treated as a separate activity. The size of a minor new construction project would be estimated as the total footprint, expressed in acres. Consistent with the requirements of NEPA and CEQA, the Bay Area O&M HCP would not allow segmentation of proposed construction to obtain coverage under the Bay Area O&M HCP. New or replacement structures to upgrade existing facilities are limited to 1.0 acre or less of new gas pressure limiting stations (PLS) and 3.0 acres or less per electric substation expansion.
- **CPSI**. These activities are required by CPUC to enhance the operation and safety of PG&E's natural gas transmission system in heavily populated areas and are scheduled to be performed

throughout PG&E's service area. The gas pipeline system will be inspected and field tested, and at-risk damaged pipeline segments will be replaced. Covered activities associated with the CPSI work are described in Section 3.2.5, *Community Pipeline Safety Initiative*, and are anticipated to be implemented primarily from 2015 to 2020 in the Plan Area, although some work to ensure gas line integrity may continue beyond 2020. Although PG&E would perform the majority of work in urban areas, some work would be in natural vegetation and in agricultural areas that provide habitat for covered species. Pipeline replacement segments are estimated to be typically 4 to 8 miles long; however, some segments may be much shorter.

Emergency work is defined in PG&E's Utility Procedure ENV-8003P-01 as "A project or activity which includes but is not limited to emergency repairs to facilities necessary to maintain service essential to the public health, safety or welfare. Emergency repairs include those that require a reasonable amount of planning where delay of project or activity would result in significant safety or environmental impacts. Furthermore, emergency projects include specific actions necessary to prevent or mitigate an emergency." The covered activities described below are the same as those conducted for emergency work (i.e., the amount and extent must be the same), with the difference being the timing and urgency of completing the work. Emergency work typically requires immediate repairs and thus an abbreviated environmental review process or no environmental review process. If not pre-screened, emergency work would require post-project assessments to determine impacts and associated mitigation.

The covered activities do not generally include any work on facilities outside the Plan Area or new construction actions unrelated to maintenance, repair, and operation of existing pipeline and transmission/distribution lines, except for minor new construction as described above. However, the USFWS may allow projects outside the Plan Area or study area on a case-by-case basis provided the impacts associated with these activities are of a similar size and duration to those analyzed here.

PG&E frequently uses third parties to perform O&M work and is responsible for the performance of third parties. PG&E's contractors who conduct O&M work in natural vegetation throughout the Bay Area are considered third parties and would be covered by the incidental take permit. These contractors could carry out any of the covered activities. Prior to initiating ground-disturbing activities in habitat of covered species, PG&E would require these parties to perform the following actions.

- Train employees and contractors performing O&M covered activities on the Bay Area O&M HCP requirements that are applicable to their job duties and work.
- Enter into a new or revised contract with PG&E that contains enforceable provisions committing the third party to comply with provisions of the Bay Area O&M HCP and USFWS incidental take permit.

The Bay Area O&M HCP administrator would maintain a record of contractors working in the Plan Area, the status of how they are covered by the Bay Area O&M HCP, and copies of any independent environmental documentation submitted by PG&E contractors.

The following description of the covered activities associated with the Plan Area's natural gas and electric systems is based on standard PG&E procedures. The procedures employed during actual activities in the present or future may vary slightly from standard procedures. However, such activities are expected to have a level of impact similar to or less than the covered activities that are presented below and further evaluated in Chapter 4, *Covered Species Impact Analysis*.

3.2 Natural Gas System

3.2.1 Transmission and Distribution System

PG&E's natural gas system consists of a transmission system and a distribution system. The transmission system in the Plan Area comprises 16 primary gas transmission lines totaling approximately 1,820 miles of pipeline. The largest two facilities are Line 2 and Lines 300A and B.

- **Line 2**. This 115-mile-long (of which 13.3 miles are within the Bay Area), 12- to 20-inch-diameter pipeline runs from the Brentwood Terminal in Contra Costa County to the Panoche Metering Station in Fresno County.
- **Lines 300A and B**. These 502-mile-long (of which 42 miles are within the Bay Area), 34-inch-diameter pipelines run from the California/Arizona border near Needles, California, to PG&E's Milpitas Terminal in the Bay Area.

The transmission system transports natural gas in steel pipelines buried 3 to 4 feet deep (measured to the top of the pipe). The pipe diameter is 8 to 42 inches. Gas pressure in transmission pipelines generally exceeds 60 pounds per square inch (psi). The Bethany Compressor Station located in the Plan Area maintains the gas pressure in the pipelines.

The gas distribution system consists of approximately 19,350 miles of both steel and plastic lines within the Plan Area. Typically, the 0.25- to 24-inch-diameter lines are buried 2 to 4 feet deep. Gas pressure in distribution pipelines is generally less than 60 psi. Approximately 90% of the gas distribution lines are in urban areas. The transmission and distribution pipelines are buried in native soil; however, in areas of rocky soil, imported backfill is used to offset potential damage to the pipes.

The ROW width of the natural gas system varies from 5 to 150 feet. PG&E owns less than 1% of the linear ROW in fee title; the remainder is in private easements and/or public utility easements (i.e., franchise).

Generally, PG&E has nonexclusive easements without the right to fence the pipeline corridors. PG&E may obtain exclusive easements with the right to construct fences when security fencing is required for valve lots, compressor station(s) and other aboveground facilities, or subsurface vaults.

3.2.2 Work Methods and Techniques

PG&E performs all work practices in accordance with federal, state, and local environmental, safety, and construction regulations and standards. Where applicable, PG&E conducts the work in accordance with landowner agreements.

PG&E lines of business (LOB) provided the below general descriptions of the methods PG&E uses for access, staging, clearing, grading, erosion control, trenching and excavating, and crossings during O&M activities typically performed in the PG&E service area. The impact estimates in Chapter 4 include any permanent or temporary loss of natural land-cover types from the methods and techniques described below and calculated in Table 4-1 in Chapter 4, *Covered Species Impact Analysis*.

3.2.2.1 Access

Generally, facilities are located in areas where PG&E crews can use existing public and private roads to access the facilities' ROWs. In general, pickup trucks or small sport utility vehicles are used to access the facilities. PG&E is seeking coverage for its access on roads and for construction of temporary access roads. Rural private roads may be dirt or gravel and periodically may require repair or maintenance. The gas and electric facility road maintenance practices and potential impacts are discussed under the G13b covered activity description. In the event that no road exists or an emergency arises, offroad travel or construction of a new temporary access road may be necessary. PG&E restricts speed limits to those deemed safe for site-specific driving conditions—not faster than 15 miles per hour (mph)—and may further restrict speeds if covered species are present. PG&E periodically creates temporary access roads when access to a covered activity site is not readily available. Temporary access roads are typically required for larger-scale activities, such as installing new gas pipelines or accessing pull sites for electric reconductoring projects. Currently, PG&E does not know where all temporary roads would be located. However, PG&E's environmental staff sites all roads to minimize impacts on covered species and their habitats through PG&E's environmental screening process, as described in Chapter 5, *Conservation Strategy*. PG&E creates these roads within a minimum impact area and ultimately decommissions them, restoring the area to preconstruction conditions at the completion of the covered activity. In some instances, however, roads may be left in place to provide site access for annual patrols or inspections. The covered activity descriptions below include discussion of construction of temporary access roads, as appropriate.

3.2.2.2 Staging

A staging area is typically required for large-scale covered activities, such as pipeline replacement. PG&E determines the location of the proposed staging areas during the screening process and locates the staging areas to avoid and minimize impacts on sensitive resources. If sensitive resources such as water bodies, wetlands, or modeled habitat are present, a biologist demarcates the sensitive resources with flagging or temporary orange construction fencing before construction. PG&E typically uses larger trucks to transport pipes and equipment such as tracked vehicles (i.e., vehicles that run on continuous tracks instead of wheels). Crews park, store, and stage construction equipment in these designated areas. PG&E restores staging areas to preconstruction conditions at the completion of the activity. The covered activity descriptions discuss the sizes of the staging areas.

3.2.2.3 Clearing

Activities involving clearing, such as transmission line construction, conform to agreements with the landowner when the activity is on private property and/or to permits issued by regulatory and land management agencies. After staking the work area, maintenance personnel remove trees and brush (clear and grub such obstacles as rocks or tree stumps by mechanical means) within the construction ROW to the extent necessary to allow safe and efficient use of construction equipment.

3.2.2.4 Grading

PG&E limits grading to the area necessary to ensure the safe movement of construction equipment in the ROW and designs its covered activities that involve grading to minimize impacts on natural drainage and slope stability. Construction footprint calculations include acres of potential impacts

from grading. Where steep terrain requires the ROW to be graded at two elevations (*two-toning*), PG&E recontours such areas after construction to approximate preconstruction topographic conditions and implements erosion control measures to prevent runoff. If the disturbed area is greater than 0.1 acre, PG&E crews also mulch, reseed, and fertilize the area.

Sometimes PG&E must temporarily install prefabricated bridges or culverts in the ROW or in access roads to ensure safe access and reduce environmental impacts in accordance with state and federal regulations. If the bridge is needed for only a short duration, then a portable bridge is assembled onsite and secured with a crane to span the crossing. If a longer term crossing is required, a culvert is installed after PG&E obtains all appropriate permits from the regulatory agencies.

During the grading phase, PG&E segregates topsoil from subsoil and windrows the topsoil within the designated work site. During periods of rain, soil piles are covered, consistent with applicable stormwater permits. The soil is typically covered with plastic sheeting and secured with gravel bags or other weights no more than 10 feet apart to minimize the potential for erosion. Surface rocks, where present and useful for reclamation, are set aside with the topsoil windrow. If not reclaimed, the rocks are taken to a landfill. PG&E makes every attempt to cover the pipeline by placing the subsoil over the pipe first and then spreading the preserved topsoil evenly over the graded area.

3.2.2.5 Erosion Control

PG&E reviews various types of erosion control and implements applicable BMPs identified in the *California Stormwater Best Management Practices Handbook* published by the California Stormwater Quality Association (2014). For example, PG&E employs erosion control techniques to preclude pipeline washout, gully development, and sedimentation of local drainages. Standard erosion control measures may include installation of water bars along temporary or dirt roads, diversion channels and terraces to reduce erosion and runoff, ditch plugs installed in ditches to prevent washout, and other soil stabilization practices such as jute mats, wood mulching, straw mulch, and other methods described in the handbook. The type(s) chosen depends on the situation and the condition of the site. PG&E uses permanent articulating cement ground mat systems (i.e., erosion control or "Ercon" mats) and riprap infrequently—on less than 100 linear feet of stream each year in the Bay Area—and only when other biomechanical methods cannot be used or when repairs are made to existing riprap structures. If biomechanical methods cannot be used or repairs to existing riprap are needed, PG&E uses the minimum riprap necessary to accomplish the activity and so that it will not exceed a total of 100 linear feet per location. PG&E does not undertake vegetation removal, grading, or substantial alteration of drainage conditions when performing erosion control work.

3.2.2.6 Trenching and Excavating

The process of excavating the pipeline trench varies according to location, soil type, and terrain. PG&E conducts trenching and excavating in accordance with California Occupational Safety and Health Administration (Cal/OSHA) requirements for employee and public safety. Self-propelled trenching machines or backhoes are used for trench excavation on moderate terrain. Trenches crossing waterways are excavated using a backhoe, dragline, or clamshell. PG&E schedules trenching for the summer, when the creeks are dry; otherwise, a tunneling method such as jacking and boring or horizontal directional drilling (described below) is used. If workers encounter rock or rocky formations, tractor-mounted mechanical rippers are used to expedite excavation. In areas where mechanical rippers are not practical or sufficient, rock trenching equipment may be

employed. The width and depth of the trench depends on the diameter of the pipe, soil type, terrain, and minimum depth requirements. Typically, the trench is 12 inches wider than the diameter of the pipe. The trench must be deep enough to achieve adequate soil cover over the pipe. The following minimum soil covers apply to the described areas.

- **Uncultivated areas**: 2.5–3 feet.
- **Cultivated areas**: 3–6 feet.
- **Rocky areas**: 1.5–2 feet.

In areas where it is necessary to trench through topsoil and subsoil, a two-pass trenching process is used. The first pass removes topsoil, and the second pass removes subsoil. Removed soils (*spoil*) from each excavation are stored in separate rows. This technique allows proper soil-profile restoration after backfilling. Windrows contain gaps at appropriate locations to prevent stormwater runoff from ponding. Bank stabilization methods depend on site-specific conditions, but, under the Bay Area O&M HCP, work materials and methods would be consistent with species conservation needs and in accordance with any acquired USACE CWA Section 404 and CDFW permits or agreements.[1]

PG&E field crews implement other BMPs as needed to provide erosion control and to prevent construction runoff from entering the streams. In cultivated and improved areas and areas with thin layers of topsoil, it is sometimes necessary to remove and stockpile topsoil within the construction ROW until the trench is backfilled. This effort could last up to 3 weeks. The stockpiled topsoil then is distributed evenly across the disturbed portion of the ROW during cleanup.

PG&E crews clear the trench of loose rocks and, when necessary, provide imported material or other suitable bedding material as a cushion for the pipe. Backhoes are used to clean the trench after ripping, or, in extremely rare circumstances, blasting is implemented after other alternatives, such as rerouting, are exhausted. PG&E minimizes the length of exposed trench to the extent possible and provides access across the trench at convenient intervals for public safety.

3.2.2.7 Crossings

Boring and open trenching are typical construction methods for crossings (crossing types are described below). PG&E typically uses boring when crossing active waterways, railroads, and major roadways. The three most common boring methods are jack-and-bore, horizontal directional drilling, and microtunneling. The method is based on the crossing type, soil type, terrain, and type of facility being installed. PG&E generally avoids open trenching unless a waterway is very small or seasonal.

- **Jack and bore**. PG&E often uses this boring method (also referred to as *dry bore*) to cross major highway systems (all federal and state highways) and railroads, as well as places where open cuts are prohibited. Crews excavate each side of the crossing to accommodate the equipment (a boring auger). The displaced fill is either stockpiled or removed, depending on whether the area will be permanently affected or if PG&E will revegetate it following a temporary disturbance. Stockpiling is done within the ROW. The bore could be for a pipe ranging from 2 to 24 inches in diameter. Sacrificial pipe, the same size as the pipe being installed, typically is used as a sleeve for the boring auger. This sleeve is pushed under the crossing as the auger drills through the

[1] Subject to the limitations discussed in Section 3.2.2.5, *Erosion Control*, use of riprap would be minimized.

soil. The permanent gas pipe is then pushed through and attached to the sacrificial pipe. The pipe is cut in short lengths to accommodate the limited excavation area then welded to the inserted piece ahead of it and jacked into place. The average size of the excavation or trenching is 10 feet wide by 40 feet long. PG&E uses the same method if casing pipe is necessary. The casing pipe, sized larger than the carrier pipe, is installed as a sleeve for the boring auger. The gas pipe then is installed through the casing. Cased crossings have vent pipes that extend above ground, have cathodic protection, and are appropriately marked.

- **Horizontal directional drilling**. Longer distances, typically more than 120 feet, can be drilled using this method rather than the jack-and-bore method. Directional drilling, which PG&E most often uses to cross large waterways, is the preferred method for conduit installation to minimize surface disturbance. The only excavation required is a "mud pit," approximately 6 feet wide by 6 feet long by 3 feet deep. The tunnel is drilled from surface to surface, and a registered engineer determines the pipe's maximum angle of deflection. Workers set up a drilling machine on one side of the crossing at the appropriate location. The auger drills at a predetermined angle from the surface elevation toward the crossing; the angle is prescribed to attain the correct depth below the feature being crossed. During drilling, a mud solution, typically bentonite, is pumped into the tunnel along with other additives to maintain the tunnel's shape and integrity. Crews use nontoxic additives when drilling under streams and typically USACE or CDFW requires a "frac-out" plan as a standard permit condition (see below). This solution reduces friction during installation of the pipeline. The drilling machine pulls the pipeline through the tunnel. The mud solution is pumped into a truck as the pipeline displaces it. Once the pipeline is installed, both ends are excavated and cut off at the appropriate depth to match the rest of the pipeline. PG&E contains the soil removed during drilling within the mud solution and tests it for contaminants prior to hauling the solution offsite and disposing of it at landfills that accept such material.
- **Microtunneling**. This is PG&E's preferred method for stream crossings. PG&E also often uses microtunneling in extremely wet conditions where it is necessary to control the amount of soil being removed as the boring head progresses. Each side of the crossing is excavated to accommodate the boring equipment (i.e., a jetting head and suction equipment). Microtunnel excavation can be a trench as small as 10 feet by 40 feet or as large as 50 feet by 50 feet, depending on the required depth. A jetting head containing multiple high-pressure water jets is attached to the pipe being installed. Crews use plumbed or tanked water—not water from adjacent streams or rivers. Water forced through the jets dislodges the soil as the head is pushed, and the pipe is installed behind it. Suction equipment controls the amount of soil being removed to accommodate the forward progress of the jetting head and pipeline. Only the soil displaced by the pipeline is removed. PG&E crews capture water used during this process in baker tanks and dispose of it according to state and federal water quality regulations.
- **Open-trench waterway crossings**. PG&E rarely uses an open-trench waterway crossing and does so only when a waterway is very small or seasonal. If PG&E uses the open-trench technique for river crossings, a trench is opened in the streambed using backhoes, backhoes on barges, clamshells, or draglines, depending on the streamflow characteristics. Flow is maintained at water crossings during construction using bypass piping and temporary cofferdams. At large rivers, spoil removed from the trench is stockpiled out of the water within designated work sites but not where it can re-enter surface waters. The pipeline is placed at least 6 feet below scour depth. A plug of unexcavated soil is left at each bank of the stream or river crossing to preserve the integrity of the streambank. PG&E crews do not remove these plugs until necessary for installation of the pipe. The entire length of pipe for the crossing is assembled as a unit, tested

and then placed in the trench. After installation, crews backfill the trench and the streambank, stabilize the soil through compaction, and restore the area to approximate preconstruction conditions. PG&E's bank stabilization methods depend on site-specific conditions, but work materials and methods are consistent and in accordance with state and federal water quality regulations.

For safe construction, PG&E conducts hydrologic evaluations for any major planned crossings during the appropriate time of year, as required.

Contingency Planning for Frac-Outs

Drilling fluid fractures, commonly called *frac-outs*, occur when the pressure of the drilling lubricant escalates, fractures the soil, and allows the drilling fluids to escape the bore. PG&E crews design and direct the drilling operation to minimize the risk of spills of all types. PG&E prepares a site-specific frac-out plan that outlines standard precautionary measures to control and clean up the drilling lubricant. The frac-out plan includes the following: a point-of-contact list in the event a frac-out or spill occurs, guidance for when drilling should occur (such as performing drilling during daylight hours so that the loss of bentonite or machine pressure can be visually identified), and a list of tools and equipment required onsite to clean up and remove the drilling fluid. The point-of-contact list also outlines the notification procedure to inform all agencies with jurisdiction of the waterway of the nature of the incident. In addition to permit conditions and frac-out plan guidance, projects that require contingency planning for frac-outs typically require the preparation and implementation of a stormwater pollution prevention plan (SWPPP) that contains detailed methods and measures to avoid spills.

Crossing Types

- **River, stream, and backwater crossings**. River crossing methods vary according to specific river characteristics, such as width, depth, flow, and riverbed geology. PG&E conducts construction in accordance with permits and agreements issued by USACE, CDFW, USFWS, and other appropriate regulatory agencies. Construction may require separate review and approval in accordance with the terms of the specific permits or agreements. Pipelines crossing major streams and rivers are coated with concrete prior to installation to provide negative buoyancy and protection from erosion. PG&E installs temporary vehicle crossings for construction traffic only if an existing crossing, such as a bridge, is not available in the vicinity. Temporary vehicle crossings consist of culvert bridges, Flexifloats, or portable bridges.
- **Fault crossings**. Where geologic studies suggest a high potential for ground rupture, PG&E designs the fault crossing to avoid overstressing the pipe in the event of differential movement. Designs of fault crossings vary, depending on the type of fault and the likelihood, amount, and potential consequences of expected fault displacement. To address the potential for fault displacement, the pipeline trench is widened and deepened to accommodate the anticipated fault displacements. The pipeline in the fault zone is completely suspended in granular bedding material to minimize the resistance of the trench backfill to displacement of the pipe. This method allows the pipe to remain fixed relative to movement of the trench as fault displacement takes place.
- **Road, railroad, and utility crossings**. PG&E uses the open-trench method when crossing roads with light traffic and where local authorities or owners of private roads permit this crossing method. PG&E provides a temporary road detour to the shoulder of the road or a construction

bridge consisting of plating for trenched thoroughfares. Boring or manually exposing the pipe or cable are generally the methods used to cross under underground utilities. Jack-and-bore is the typical boring method used at railroad crossings.

- **Aqueduct and canal crossings**. Site-specific circumstances determine the construction method PG&E uses for crossing aqueducts and canals. In most cases, boring is appropriate. Where required or necessary, crews construct an aerial suspension system for the pipeline.

3.2.2.8 Pipe Placement

Large trucks transport lengths of pipe, valves, and fittings to the ROW or work area, and PG&E crews unload the materials. Crews typically assemble sections of pipe requiring angle joints in the field using prefabricated elbow sections so that the pipe conforms to the contours of the terrain. The pipe joints are welded, X-rayed, inspected, and field-coated to prevent corrosion. The material used for field coating depends on the location of the pipe.

Large trucks or track-mounted equipment lower the pipeline into the trench. (Work crews bring this equipment to the covered activity site on a truck.) Typically, the old pipe is filled with slurry and abandoned in place or cut and capped. The trench is backfilled with the excavated material. If the excavated material has too much rock for placing around the pipe, a rock-free material is imported and placed around and over the pipe to a depth of 1 foot. Surplus material is used to form an earthen crown over the trench and allow for settling of the backfill. All excavations and trenches are compacted to be in adherence with the specific requirements at each location. The industry standard minimum compaction requirement for ROWs is 85%.

3.2.2.9 Pipeline Marking

PG&E crews install identifying markers over the centerline of the pipeline. These markers show the general location and direction of the pipeline, identify the owner of the pipeline, and convey emergency information in accordance with applicable regulations. Additional markers (fence post-like structures with attached signs) are placed on streambanks, not in waterways, and on roads, fences, public access crossings, and edges of agricultural fields. The markers are installed in alignment with the active pipeline. Special markers providing information and guidance to aerial patrol pilots also may be installed.

3.2.2.10 Cleanup and Restoration

The final phase of pipeline installation involves cleanup and restoration of the ROW to achieve compatibility with pre-existing vegetative conditions, in accordance with standard procedures approved by federal and state regulatory authorities. PG&E removes construction material and re-contours disturbed areas to their pre-project grade. Depending on the nature of the site and the type of installation that took place, several tasks may be involved in the cleanup and restoration. For example, placement of a pipeline or other infrastructure in a trench results in surplus soil that cannot be returned to the trench. The surplus soil normally is distributed evenly over the disturbed section of the ROW. If a property owner objects to this approach, the surplus soil is deposited at an approved local dumping site. Restoration of the ROW surface involves smoothing it with motor graders or disc harrows. Restoration may also require stabilizing slopes by recontouring, creating slope breaks or diversion ditches, or using dirt, sandbags, or other materials to stabilize the soil and direct runoff away from disturbed areas. On cultivated or improved lands, measures are taken to remove rocks and leave the ground surface in a condition satisfactory to landowners. If the

disturbed area is greater than 0.1 acre, crews also mulch, reseed, and fertilize, as needed and pursuant to landowner agreement. For some projects (e.g., gas pipeline projects), restoration may not occur in certain areas, such as riparian areas, serpentine habitats, or blue oak woodlands where the ROW has become overgrown and operational requirements dictate that access to and through the ROW be maintained for annual patrols and inspections, especially at creek and river crossings. In those situations, PG&E mitigates the impacts as permanent impacts.

3.2.3 Operation and Maintenance Covered Activities for the Natural Gas System

3.2.3.1 G1. Patrols

Aerial Patrol

PG&E conducts aerial patrols of gas pipelines and associated facilities quarterly using fixed-wing aircraft that fly at an elevation of 500 feet. Helicopters are used periodically as needed.

Ground Patrol

Compliance with CPUC measures requires periodic ground patrols of the gas transmission lines. On a quarterly to annual basis, PG&E conducts ground patrols of the pipelines and associated facilities on foot, with ATVs, or by using small trucks or SUVs on existing access and pipeline patrol roads. The purpose of the patrols is to observe surface conditions on and adjacent to the transmission line ROW and look for indications of leaks, ensure that pipeline markers are clearly visible, and record conditions that might affect safety and operation. Ground patrols also read gas meters.

Leak Detection Patrol

PG&E conducts leak detection patrol of the gas facility system at either 6-month or 12-month intervals. Leaking gas from pressurized pipelines can present hazardous conditions that must be corrected. The patrol is conducted on foot or by small trucks, depending on the terrain and accessibility. PG&E uses either a portable hydrogen-flame ionization gas detector or a laser-methane detector to sample air above the gas line to test for leaks. Where vegetation has overgrown in the ROW, vegetation pruning or removal of a 2- to 4-foot-wide path is required to allow safe access for the crew conducting the patrol. The ROW clearing width varies depending on the site location and vegetation type; the focus is on minimizing impacts on natural vegetation. Section 3.2.3.13, *G13. Pipeline Right-of-Way Vegetation Management*, which discusses the G13a covered activity, describes and calculates estimated disturbance from vegetation clearing.

PG&E estimates that the entire gas transmission and distribution system is patrolled once per year.

3.2.3.2 G2. Inspections

Valves

Valves are located along all pipelines at different intervals depending on the size of the line and number of taps off the line. PG&E inspects valve sites along the pipelines and tests the valves three to four times per year. Light trucks are used on existing access and pipeline patrol roads. Valves are not marked, but they are located inside vaults or fenced areas and can be accessed by a two- or

three-member maintenance crew. Crews lubricate valves as necessary, using a gun pump to apply either motor oil or grease (e.g., 1,033 grease).

Telecommunication Sites

PG&E conducts routine inspections of telecommunication sites, which are used to monitor gas pipeline functions remotely, on a monthly basis unless problems are identified at specific sites. Light trucks use existing access and pipeline patrol roads, or PG&E uses fixed-wing aircraft.

Anode Beds

Anode beds (discussed in detail under Section 3.2.3.8, *G8. Pipeline Cathodic Protection*) are part of the cathodic protection system (CPS) and usually placed approximately every 10 to 20 miles along the pipeline. PG&E inspects cathodic protection every 2 months, or as indicated by the integrity management team, by checking the electric current at various Electric Test System (ETS) stations along the line and at anode bed sites. Simple testing instruments are used. Typical surveys may take 10 days to complete at each pipeline. Light trucks use existing access and pipeline patrol roads.

Pressure Limiting Stations

PG&E conducts routine inspections of existing PLS every 2 months along transmission lines and annually along distribution lines. A single light truck uses existing access and pipeline patrol roads.

Land Surveys

PG&E periodically conducts land surveys of facilities and facility ROWs along the alignment. It is estimated that the entire gas transmission and distribution system is inspected once per year.

3.2.3.3 G3. Pipeline Remedial Maintenance and Internal Pipeline Inspections

G3a. Pipeline Remedial Maintenance

Remedial maintenance corrects erosion and vandalism problems and involves the evaluation of internal pipeline issues. PG&E performs remedial maintenance at approximately 100 locations per year. The majority of these locations are in upland land-cover types, but some are in streams. Maintenance materials used for site-specific solutions to erosion problems may include biodegradable jute netting and, to a lesser extent, the periodic use of concrete, Ercon mats, or concrete pillow systems. The extent of concrete, Ercon mat, or concrete pillow system installation would not be longer than 100 feet or wider than 50 feet on any stream in the Plan Area and would comply with permits for work in waterways. PG&E installs concrete, Ercon mats, or concrete pillow systems at approximately one location per year.

Vandalism can affect any structures located above ground; it usually entails visual (e.g., graffiti) rather than structural impacts. Of the 100 sites maintained each year, PG&E estimates that only 10 will require fencing for protection from vandalism. Fencing these areas requires excavation for fence post installation; this action would result in a 50- by 50-foot disturbance area for each fenced location and a 50- by 50-foot work area.

G3b. Internal Pipeline Inspections

PG&E inspects the internal coatings of its pipelines annually. Every 7 years, on average, each segment is inspected above ground by electronically measuring the integrity of the pipeline coating. Using technology such as magnetic flux leakage (MFL), PG&E inspects the pipeline with sensors to measure pipe corrosion, cracks, and indentations. During these procedures, the pipeline remains in operation. If problems are indicated, the pipeline is inspected internally using a pipeline inspection device ("pig") that is inserted into the pipe at an external launch and receiver point. No excavation is required. The pig travels throughout the length of the pipeline employing robotically operated cameras to look directly inside pipes. Once the "pigging" data are analyzed, the inspection crew conducts a calibration test (i.e., excavates a bell hole) at two or three locations along the pipeline to confirm that the pigging results are accurate. The area exposed depends on the length of pipeline where the pig has indicated possible problems. If corrosion cannot be repaired, pipeline replacement is necessary (see Section 3.2.3.11, *G11. Pipeline Replacement*).

PG&E internally inspects approximately 100 miles of pipeline each year, resulting in 50 inspection locations per year. On average, two or three calibration tests are conducted at each site along a 10-foot length of pipe, requiring a bell hole work area of approximately 10 feet by 10 feet along the exposed pipeline. Soil excavation, soil stockpiling, and construction vehicle travel are within the work area during the inspection.

For the purposes of estimating impacts, PG&E assumed that all internal inspections result in a section of pipeline that needs to be replaced, and that excavation, soil stockpiling, staging, and the use of construction vehicles would disturb a 50- by 50-foot work area. PG&E hydrostatically tests the new section of pipe (see Section 3.2.5.3, *G18. CPSI—Hydrostatic Testing*) and disposes of the water using either a baker tank or sewer.

3.2.3.4 G4. Compressor Station Upgrades and Maintenance

The Bethany Compressor Station is a 100-acre facility in eastern Alameda County and within the Plan Area. The compressor station occupies a developed and fenced site. Some routinely maintained natural land is present within the grounds, and approximately 17 acres of landscaped and natural lands surround the station. PG&E conducts inspections daily and performs maintenance and upgrades two times every couple of years. Typical maintenance tasks include overhauling compressors and engines, repairing and replacing piping, painting the station, and drilling or cleaning water wells. In addition, operations and air quality standards may require modifications or upgrades to station equipment. To make such improvements, PG&E acquires approved permits to meet these standards. Inspections, maintenance, and upgrades to the Bethany Compressor Station are within the fenced facility footprint. Access to the site is from existing roads. Crews mow a strip approximately 600 feet long by 20 feet wide outside the perimeter of the facility's fence line once each year to comply with local fire standards.

3.2.3.5 G5. Pipeline Electric Test System Installation

The ETS is a component of the cathodic protection system. Units are installed 1 to 5 miles apart on pipelines to (1) determine protection system effectiveness by measuring conductivity, and (2) help crews locate the pipe prior to excavation. This technology precludes the need to systematically expose the pipe and physically examine it for signs of corrosion. The ETS consists of two wires (leads) that are welded to the pipe; the leads are exposed at the surface inside a 4-foot-tall, 4-inch-

diameter plastic tube or valve box. Installation entails exposing a 3- to 5-foot-long section of pipe, attaching the leads with a small weld, and recovering the pipe. During ETS installation, the pipeline remains in operation. Most sites are accessible from existing access roads. Where an ETS is not accessible from an existing road, workers access it on foot or by use of small trucks.

PG&E performs approximately seven ETS installations per year. At each installation site, soil excavation, soil stockpiling, and the use of construction vehicles disturb an approximate 50- by 50-foot work area.

3.2.3.6 G6. Pipeline Valve Maintenance – Recoating

As part of activities G10. Pipeline Coating Replacement and G11. Pipeline Replacement, PG&E may need to recoat a gas pipeline valve. Mainline valves, which are generally 7 to 20 miles apart, regulate the flow of gas through the pipeline and enable crews to isolate portions of pipeline. Occasionally, these valves malfunction or wear out, causing leaks. Depending on the condition of the valve, PG&E will either recoat or replace approximately five valves annually. Recoating is done by sandblasting the valve over tarps, collecting the debris, and recoating the valve with a specialized epoxy that protects against corrosion.

3.2.3.7 G7. Pipeline Valve Maintenance – Replacement or Automation

As part of activities G10. Pipeline Coating Replacement and G11. Pipeline Replacement, PG&E may replace a gas pipeline valve. PG&E is upgrading and automating its existing valves—or installing new automated valves when automation of existing valves is not possible—to ensure overall pipeline system safety. Once the pipeline valves are automated, PG&E will check them annually to ensure that they work properly. Approximately eight locations require maintenance each year and crews conduct maintenance within the existing facility footprint.

3.2.3.8 G8. Pipeline Cathodic Protection

Corrosion of underground steel pipes is a continual maintenance issue for gas system pipelines. Pipe generates or carries corrosion-cell current that, as it moves to the soil, can form pits in the pipe. These pits can weaken sections of the pressurized pipe and cause it to fail. PG&E uses cathodic protection to prevent corrosion.

PG&E undertakes approximately 100 cathodic protection activities per year using the methods described below. Of those activities, approximately 25 would require excavation, and an estimated 20% (five total activities) would be in natural vegetation. A work area approximately 100 by 10 feet wide is needed to install the cable, excavate the soil, stockpile soil, and house construction equipment. Most installations require 5 to 7 days to complete.

Anode Beds

As a pipeline's coating degrades over time, it requires increased cathodic protection to prevent corrosion. *Cathodic protection* is a technique to control pipeline corrosion by making the pipeline the cathode of an electrochemical cell. A cable rated for the expected current output connects the negative terminal of a *rectifier*, which is a small piece of equipment that is mounted on an existing utility pole, to the pipeline. A cathode protection expert adjusts the operating output of the rectifier to the optimum level after conducting various tests, including measurements of electrochemical potential. Pipe coatings commonly degrade faster in areas of high moisture content (e.g., locales with

regular precipitation or irrigation) than in drier areas. Increased cathodic protection current accelerates the consumption of anode beds and decreases their effectiveness. Consequently, anode beds must be replaced periodically, and additional anodes may be needed. The pipeline continues to operate during installation or replacement of the anodes.

Galvanic anode cathodic protection is PG&E's preferred method for distribution facilities and for use in urban areas. Galvanic anodes do not require an external power source, and installation requires minimal excavation for installation. There is some flexibility as to where the anode beds can be located, with beds usually placed approximately every 10 to 20 miles along the pipeline. The installation of anodes typically can be accomplished in a single day.

Deep-Well Anode Beds

Deep-well anode beds typically have a 20-year life span and are abandoned in place when no longer in use, pursuant to local environmental health department regulations. Installation of deep-well anode beds involves drilling deep ground wells (200 to 300 feet) and installing zinc or magnesium bars, platinum anode rods, or ground mats. PG&E uses this installation method where pipelines are exposed to large amounts of induced alternating current (AC) (typically from adjacent high-voltage electric transmission lines) or where soil conditions dictate. For many applications, the anodes are installed in a 200- to 300-foot-deep (or more), 10-inch-diameter vertical hole and backfilled with conductive coke (a non-toxic carbon material that improves the performance and life of the anodes). Once an anode bed is installed, it is connected to the pipeline and the electric line by an underground cable. The deep-well anode bed typically is located approximately 10 to 15 feet from the gas pipeline and every 10 to 20 miles along the pipeline corridor. In the Plan Area, a rectifier is the standard method PG&E uses to provide electricity. Installation of deep-well anodes typically requires 4 days to complete. Work crews evenly distribute leftover fill evenly over the buried work site and grade it to blend in with the existing site, reserving topsoil to spread on top.

Other Types of Anode Beds

Other protection measures include the installation of cathodic protection units (CPUs), anode flex and magnesium anodes, and horizontal anode beds. Although deep anodes are preferable, these other measures can be used for certain soils or in isolated corrosion areas where installing a deep well is not practical.

Installation of CPUs involves trenching a few feet parallel to the pipeline and installing the flex or magnesium anode at the same depth as the pipeline. Trenching for CPU installation varies in width, from approximately 4 inches to 2 feet.

Horizontal anode beds are installed parallel to the pipeline, 400 to 1,000 feet from the ROW centerline, at approximately the same depth as the pipeline. The need to install or replace a horizontal anode bed is relatively infrequent, and PG&E anticipates it will occur less than once per year in the Plan Area. A small underground cable delivers an electric current from the horizontal anode bed to the pipeline.

3.2.3.9 G9. Pipeline Lowering

PG&E may need to lower gas pipelines to increase the depth below surface and thereby improve public safety. The need for pipeline lowering arises mostly in agricultural areas and areas of intense

land use, but it also may occur in other land-cover types or in waterways where pipe structures are exposed.

Pipeline lowering typically involves trenching and installing a new pipeline parallel to, and to a greater depth than, the existing pipeline. Typically, the old pipe is abandoned in place and either capped or filled with slurry and then capped. Pipeline lowering may be needed at any time of year, depending on operational restrictions related to the need to temporarily shut down the pipeline.

PG&E lowers approximately 1 mile of pipeline every 3 years. A 20-foot-wide work corridor is needed for trenching and soil excavation, soil stockpiling, and the use of construction vehicles. The pipeline requires hydrostatic testing prior to pressurizing the gas pipeline (see Section 3.2.5.3, *G18. CPSI—Hydrostatic Testing*).

3.2.3.10 G10. Pipeline Coating Replacement

PG&E coats natural gas pipelines to protect them from degradation and external corrosion. When a pipeline's coating has deteriorated to the point of requiring replacement, PG&E recoats the pipe with epoxy. To determine whether the coating has maintained its integrity, PG&E induces an electric current on the pipeline at the ETS station and then measures for a loss of voltage, which would indicate degradation in coating integrity.

To avoid bending or affecting the integrity of the pipe, the pipeline must be excavated in sections and supported at intervals typically of 40 feet. Workers remove the old coating by jetting, scraping, or sandblasting and typically place plastic sheeting or tarps below the pipe to collect the residue. PG&E performs testing to determine if the material is hazardous and then disposes of it in accordance with regulations. The surface is then prepared for the new wrap by running a self-contained grit- or shot-blasting machine over the pipe. The pipeline continues to operate while a coating machine applies the coating.

PG&E recoats approximately 1 mile of pipeline every 5 years. This requires construction vehicles and includes vegetation removal, trenching, soil excavation, and soil stockpiling. Section 3.2.2, *Work Methods and Techniques*, describes the work methods and techniques to remove and replace the pipe. On average, a 20-foot-wide work area is needed for this activity. The majority of recoating is in upland land-cover types but may periodically be within streams. In intermittent and ephemeral streams, PG&E schedules instream maintenance when the stream is dry. One mile of pipeline coating replacement typically involves three different access locations.

3.2.3.11 G11. Pipeline Replacement

Public safety sometimes necessitates replacing sections of pipe for various reasons, including those listed below.

- Development alongside the pipeline has resulted in a change of class location (see *maintenance classes* in the glossary for class definitions).
- Aging or corrosion has affected the integrity of the pipeline.
- Pipelines have been damaged by the contractor(s) working on behalf of PG&E, resulting in a construction dig-in.
- Acts of nature have damaged the pipeline.

In the case of class location changes, PG&E must move or replace the line with stronger pipe to comply with DOT- and CPUC-mandated safety regulations. PG&E uses standard pipeline construction techniques, as described in Section 3.2.4.2, *G15. New Customer/Business Pipeline Installation*. As the old pipeline is removed from service for the tie-in to the new line, it is *blown down* (i.e., gas is evacuated to the atmosphere from the affected section of pipe through a blowdown stack). Any gas condensation is captured and removed from the old pipeline and disposed of in compliance with current regulatory standards. Existing pipeline is abandoned in place by filling it with slurry before the pipeline is capped. Typically, the crew will cut and cap the pipeline every 1,000 feet, depending on the location. Slurry is used if the pipeline crosses a water body or needs to be stabilized. In the event a pipeline is abandoned in place, PG&E will typically place the new section of pipe as close to the abandoned pipeline as possible and modify any existing easements by expanding the easement width to accommodate the new section of pipeline. In some cases, PG&E may need to acquire new easement rights to accommodate the new pipeline alignment.

PG&E performs pipeline replacement approximately five times per year. The length of pipe affected varies, depending on the reason for replacement. The minimum length of pipe replaced is typically 40 feet (one joint of pipe), although up to 1 mile could be replaced during each replacement effort. A 50- by 50-foot area for new valve equipment is required along each pipeline replacement. Trenching and soil excavation, soil stockpiling, staging, and construction vehicles disturb a 20-foot-wide work area, which includes the 10-foot excavation area. Once the new pipeline is installed, PG&E hydrostatically tests and backfills the pipeline (see Section 3.2.5.3, *G18. CPSI—Hydrostatic Testing*) and disposes of the water using either a baker tank or sewer. Pipeline replacement can occur at any time of year, depending on operational restrictions related to the need to temporarily shut down the pipeline.

3.2.3.12 G12. Pipeline Telecommunication Site Maintenance

A supervisory control and data acquisition (SCADA) system monitors pipeline functions remotely and transmits pipeline operational information to PG&E's operations offices at the Brentwood Gas Terminal via PG&E's utility telecommunications system. Periodic vehicle or helicopter access is required to check the telecommunication facilities, replace batteries, conduct minor maintenance, or make adjustments to the facilities or components. In the event of major storm damage, reconstruction of the facility or replacement of a component is required as soon as weather permits. A staging area may be required for major maintenance or storm damage repairs. The staging area may be located either next to the site within the temporary work area or at a distant location (for helicopter transport of workers and materials). The pipelines continue to operate during site maintenance.

PG&E performs this activity approximately once per year. A 20- by 20-foot work area is needed for soil excavation, soil stockpiling, and the use of construction vehicles. Also, approximately once per year, PG&E must install new fiber optic cable, which requires an estimated 10- by 1,500-foot work area.

3.2.3.13 G13. Pipeline Right-of-Way Vegetation Management and Access Road Maintenance

G13a. Pipeline Right-of-Way Vegetation Management

PG&E manages vegetation along the pipeline ROWs to prevent damage to the natural gas system, facilitate inspections related to routine O&M tasks, and comply with state and federal regulations that require PG&E to patrol periodically for gas leaks. The gas system vegetation management program is designed to remove weeds, brush, and trees around equipment and facilities for ROW visibility, fire hazard reduction, security, safety, and maintenance access. Trees and brush that interfere with patrols or tree and brush roots that may pose a threat to buried pipelines may require periodic removal. PG&E also clears any tree canopy and brush that obscures the ROW to facilitate aerial inspections and maintain the line of sight between gas line markers. PG&E's ROW management associated with vegetation management focuses on the need to be able to patrol, inspect, and protect facilities. In the past, PG&E has limited the extent of vegetation management clearing in the ROW to the smallest extent practicable, but future ROW clearing is expected to increase, thereby facilitating long-term future facility patrols and maintenance. To keep incompatible vegetation from growing over the facilities, PG&E does not replant trees within the ROW after vegetation management, although reseeding—with the landowner's notification—is routinely performed.

PG&E identifies areas within the ROW that require vegetation removal during routine patrols. A ROW width averages 20 feet over the gas pipeline. The ROW width is dependent on legal easement documentation and the type of vegetation. For example, some easements are 10 feet wide, and others can be up to 65 feet wide. Vegetation management usually is accomplished by manually removing (with a chainsaw) large-diameter woody vegetation, then mechanically removing other vegetation with a brush hog, hydro-axe, or brush rake, usually to establish a maximum clearance height of 1 foot from the ground (depending on vegetation and the return growth rate), and to allow surveys by foot. If access is poor, vegetation is manually lopped into 6- to 24-inch lengths and scattered within the ROW. PG&E also relies on chemical control (herbicides) for vegetation management. Although herbicides[2] cannot be included as a covered activity because of the uncertain impacts of herbicides on endangered species, the following information provides an overview of PG&E's practices.

PG&E uses herbicides in accordance with label requirements and EPA regulations, and are applied by a qualified applicator licensed by the California Department of Food and Agriculture. In general, herbicides are used in the gas transmission ROWs and for cut-stump applications (where PG&E has notified landowner). Only federal and California EPA-registered herbicides are used. These include selective and nonselective, inorganic and organic, contact and translocated, and pre-emergent and post-emergent types. The use of herbicides is subject to landowner notification. PG&E contracts with licensed and registered pest control advisors to prepare herbicide prescriptions for vegetation control and eradication within ROWs.

The covered activity described in this section is for those instances in which vegetation management is necessary as a distinct and separate action that PG&E crews perform, and not a part of ROW clearing that may occur for other covered activities, such as pipeline replacement. On average, the

[2] Herbicide use is included in this chapter to provide an overview of PG&E's vegetation control practices. It is acknowledged that the use of herbicides cannot be permitted under the federal ESA.

ROW is reclaimed 10 times per year by removing 10 feet of vegetation on each side of the pipeline over a 0.5-mile length. Ongoing vegetation management of the ROW disturbs a 20-foot-wide corridor averaging 1 mile in length. Frequency is based on an assumed return interval of 5 years within tree- and shrub-dominated land-cover types.

G13b. Pipeline Access Road Maintenance

Access road maintenance work takes place in the ROW. PG&E maintains the road without altering the road profile. Every 2 to 3 years, PG&E performs surface maintenance on an as-needed basis to keep the access road in operational condition. At approximately five locations a year a temporary turnout that is approximately 45 feet in length and 10 feet wide is needed. If a culvert is replaced during maintenance activities, PG&E would obtain additional required permits (e.g., USACE CWA Section 404 permit).

3.2.4 Minor New Construction Covered Activities

3.2.4.1 G14. Gas Pressure Limiting Station Construction

Human population densities determine the class location designations of pipelines. A change of class location designation may require PG&E to move or replace a pipeline with thicker pipe to increase safety, as mandated by CPUC (see Section 3.2.3.11, *G11. Pipeline Replacement*).

An alternative to replacing the pipeline is installing a PLS that lowers the pressure of the gas in the line. A typical PLS encompasses a footprint area of approximately 250 by 100 feet, including aboveground pipe and valve structures and a small control/monitoring building (usually 100 square feet) surrounded by security fencing. The control building houses pressure flow monitoring and SCADA equipment. The local distribution system or solar panel-charged batteries provide the electricity for the SCADA equipment.

Installation of a PLS occurs approximately once every 5 years and involves excavating a pipeline joint. A construction corridor approximately 100 feet long by 100 feet wide and a laydown area approximately 100 by 100 feet may be required. In addition, the footprint of the PLS is 250 by 100 feet, including fencing. As part of the PLS installation, a portion of the pipeline is blown down. Once the PLS is in place, the pipeline must be hydrostatically tested (see Section 3.2.5.3, *G18. CPSI—Hydrostatic Testing*).

3.2.4.2 G15. New Customer/Business Pipeline Extension

To serve new residential or commercial customers, PG&E installs new pipelines. Installing new sections of pipeline, up to 2 miles in length, to existing segments involves clearing and grading the ROW, trenching and excavating, pipe placement (including welding, inspection of welds, field-coating or fiber-wrapping, and backfilling), hydrostatic testing, corrosion protection, marking the pipeline, erosion control, and cleanup and restoration. In most terrains, trenching is used to install the pipeline, unless specific circumstances, such as an open crossing of a ravine or a similar small open area, dictate construction of aboveground sections. Specialized trenching and boring methods are used at crossings of rivers, streams, backwaters, washes, faults, roads, railroads, utilities, aqueducts, and canals. Section 3.2.2, *Work Methods and Techniques*, described in detail these methods and the other actions involved in new pipeline installation.

PG&E installs new pipeline extensions approximately once per year. A new 10-foot-wide ROW over the pipeline alignment is required and could be in natural vegetation, city streets, or agricultural settings. Trenching and soil excavation, soil stockpiling, and the use of construction equipment require an approximate 125- by 20-foot work area, which includes the 10-foot excavation area on one side of the alignment. In the event that no access road exists or an emergency arises, it may be necessary to construct a new temporary access road to implement this covered activity.

3.2.5 Community Pipeline Safety Initiative

The CPSI is a multi-year program that will result in the implementation of new gas transmission safety regulations and system improvements designed to meet or exceed new regulatory standards in PG&E's natural gas transmission system. The four main aspects of the CPSI are focused on testing, inspecting, replacing, and automating the gas transmission system. When CPSI is finished, PG&E will have completed a comprehensive assessment of all 5,786 miles of its natural gas transmission pipelines, identified areas of concern, and mitigated risks by replacing pipelines or strength testing them.

3.2.5.1 G16. CPSI – Existing Pipeline Replacement

In general, CPSI involves replacing a targeted pipeline estimated to be 4 to 8 miles long. Replacing an existing pipeline with a new pipeline involves first clearing and grading the ROW, trenching and excavating the existing pipeline alignment, placing the pipe (including welding, inspecting the welds, field-coating or fiber-wrapping, and backfilling), performing hydrostatic testing, protecting pipes against corrosion, marking the pipeline, implementing erosion control measures, stockpiling spoil in the ROW, removing or abandoning existing line, and cleaning up and restoring the ROW. In general, the existing pipeline will be abandoned in place and filled with slurry and capped, although some of the pipelines will be removed and restored. PG&E may need to acquire additional ROW to accommodate an increase in the pipeline corridor for about 75% of the new pipeline.

PG&E will replace approximately 248 miles of pipeline. Of the 248 miles, approximately 75% (186 miles) are in urban areas and will cause no disturbance to natural or agricultural land-cover types. The remaining 62 miles are in non-urban areas. A new 10-foot-wide ROW above the pipeline alignment is required and could be in natural vegetation. Trenching and soil excavation, soil stockpiling, staging, and the use of construction vehicles require a work area, which includes the 10-foot-wide excavation area along the length of the pipeline.

PG&E may perform CPSI pipeline replacement at any time of year, depending on operational restrictions related to the need to temporarily shut down the pipeline. In the event that no access road exists or an emergency arises, construction of a temporary road that is estimated at 0.5-mile in length by 12 feet wide may be necessary to implement this covered activity.

3.2.5.2 G17. CPSI – Valve Replacement or Automation

Mainline valves, which regulate the flow of gas through the pipeline and enable crews to isolate portions of pipeline, occasionally malfunction or wear out, causing leaks. PG&E also replaces valves to allow for the passage of inspecting devices (i.e., pigging for in-line inspections). PG&E replaces faulty valves for operational and public safety reasons. To ensure overall pipeline system safety PG&E will be automating approximately 120 existing valves and, when automation is not possible, replacing approximately 64 valves. Enhancing or replacing approximately eight of the valves per

year may include an aboveground valve, several small cabinets for a SCADA system, and electric service extension. Mainline valves are generally 7 to 20 miles apart.

Prior to replacing or installing valves, a portion of the gas line must be blown down. Valve replacement occurs within the existing station facility corridor. If PG&E replaces a small section of the pipeline during valve placement or automation, the pipeline must be hydrostatically tested (see Section 3.2.5.3, *G18. CPSI—Hydrostatic Testing*). PG&E may replace or automate valves at any time, depending on weather and on operational restrictions related to the need to temporarily shut down the pipeline.

Disturbance areas account for the anticipated need for facility upgrades and fencing of 10% of the valves, which expands the footprint to a 50- by 50-foot facility. Soil excavation, soil stockpiling, and the use of construction vehicles require an approximate 150- by 150-foot work area. A 50- by 50-foot laydown area to store equipment may also be required.

3.2.5.3 G18. CPSI – Hydrostatic Testing

To ensure pipeline integrity, PG&E is hydrostatically testing all pipeline segments without a hydrostatic test on file as part of CPSI. Since 1970, all new pipeline segments are required to be hydrostatically tested and recorded. Testing complies with requirements of CPUC, California Department of Transportation (Caltrans), Regional Water Quality Control Boards, and Cal/OSHA. PG&E typically conducts testing before backfilling the underground pipeline and estimates that it will hydrostatically test 100 segments of pipeline by 2020. PG&E most commonly uses water as the test medium, but compressed air or compressed nitrogen gas occasionally are used for testing small-diameter pipes. Testing pressure and duration are determined by pipe size, pipe specifications, pipe-wall thickness, and elevation. Prefabricated test heads are installed on the section of line to be tested. The section is then filled with water from an available source, such as a fire hydrant. Water can also be transported to the site by water trucks or sent through temporary aboveground water lines. Once the pipeline is filled, a hydrostatic pump is used to increase the internal pressure to the designed test pressure, typically 1.5 times the system's maximum operating pressure. The amount of water used in a hydrostatic test depends on the diameter and length of pipe tested.

Upon successful completion of the hydrostatic test, pressure is reduced, and the water is expelled from the pipeline using air compressors and a cylindrical foam pig. PG&E discharges only clean water, and the water is not released under pressure. PG&E obtains any necessary water quality permits, expels and disposes of test water in a manner consistent with local water quality considerations, and implements its water quality BMPs when disposing of test water. Because most of the testing will be conducted in urban areas, PG&E is anticipating it will be able to discharge water to baker tanks or sewers. If baker tanks or sewer systems are not feasible when working in natural vegetation areas, crews would lay temporary plastic or rubber pipe to discharge the test water to non-habitat areas or agricultural land. Each segment of pipeline is approximately 2 to 4 miles in length; approximately 60 of those segments are in urban areas where no impacts on natural vegetation would result. The remaining 40 tests would be in non-urban areas. Soil excavation, soil stockpiling, and the use of construction equipment at each end of the pipeline requires an approximate 20- by 50-foot work area. An additional 100- by 100-foot laydown area and a staging area are also required at each end of the pipeline. Hydrostatically tested pipelines may require a 100- by 100-foot staging area to store the baker tank(s).

3.3 Electric System

3.3.1 Transmission and Distribution System

PG&E's electric system consists of a transmission system and a distribution system. The electric transmission system in the Plan Area consists of approximately 4,430 miles of transmission lines. Bulk transmission lines (230 kV and 500 kV) are supported on steel-lattice towers or steel poles. Power lines with a 60 kV, 70 kV, or 115 kV capacity are most often supported by wood poles, but steel poles, tubular steel poles, and lattice towers are also used in certain areas throughout the HCP Plan Area.

PG&E operates 207 transmission substations in the Plan Area. Power from high-voltage transmission lines is transformed to lower voltage at these substations. The in-line spacing of these structures varies. The height of conductors above the ground also varies according to topography and the design of the transmission system. Generally, conductors on 230 kV and 500 kV systems are designed to maintain a minimum clearance of 30 feet above the ground. CPUC General Order (G.O.)95 dictates the design of electric facilities. Conductor sag varies and is configured on the basis of the towers/poles, the electric load, ambient air temperature, conductor type, and span length. Transmission ROWs are of varying widths and generally are within easements that are negotiated with private landowners or the holders of public lands. PG&E owns less than 1% of these ROWs in fee title; the rest are in easements. The widths depend on system voltage, the number of lines per ROW, terrain, and other factors. The electric transmission system includes a network of fiber optic communications cable associated with the SCADA system. In addition, there may be cables owned by other entities located inside the PG&E ROW that the Bay Area O&M HCP does not cover. For example, fiber optic communications cable is typically installed on transmission structures with clamping apparatus, either above or below the transmission circuits.

PG&E's electric distribution system provides links between most customers and the transmission system. Approximately 14,885 miles of overhead distribution lines extend through the Plan Area, and another 8,130 miles are underground. Wood or steel poles support the distribution conductors. The electric distribution ROW widths vary according to the system voltage, terrain, and other factors. The distribution system includes primary and secondary distribution lines that deliver electricity and distribution transformers that reduce voltage from distribution to utilization levels.

Insulators are positioned between support structures and conductors to support the wires and isolate energized conductors from potential grounding. Most insulators for transmission voltages are ceramic; however, non-ceramic insulators made of fiberglass rods and rubber shrouds also are used.

3.3.2 Work Methods and Techniques

PG&E performs all work practices in accordance with federal, state, and local environmental, safety, and construction regulations and standards. Where applicable, PG&E conducts work in accordance with landowner agreements.

3.3.2.1 Access

Access to electric and gas facilities is similar in that PG&E uses existing public and private roads to access the ROW to the maximum extent possible. However, because the length of electric facilities is

greater than that of gas facilities, and because electric facilities are more frequent in remote areas, PG&E must construct new temporary access roads periodically when access to the site is not readily available. Currently, PG&E does not know where all temporary roads would be located, but it would site roads to minimize impacts on covered species and their habitats using the AMMs described in Chapter 5, *Conservation Strategy*. PG&E constructs these roads within a minimum footprint area and ultimately decommissions and restores them to preconstruction conditions at the completion of the activity. In some instances, however, roads may be left in place to provide site access for annual patrols or inspections. The covered activity descriptions below include discussion of construction of permanent and temporary access roads, as appropriate.

3.3.2.2 Staging

A staging area is typically required for large-scale covered activities, such as transmission line reconductoring. The covered activity descriptions discuss the sizes of the staging areas.

3.3.2.3 Clearing

Activities involving clearing, when necessary, conform to landowner agreements or permits issued by regulatory and land management agencies. Clearing for electric facilities begins by staking the construction ROW. Maintenance personnel then clear vegetation, remove obstacles, and grade to the extent necessary to allow safe work practices and access. In the event that minor clearing of privately owned commercial tree species (i.e., orchards) is necessary, construction personnel move and stack the trees in accordance with the landowner's preference. Stump profiles are left as low as required for safe work practices and access. Stumps may be removed where appropriate. Debris generated during clearing of the ROW is either chipped and left onsite or disposed of appropriately. In some instances, PG&E's easement documents dictate the methods for disposal.

3.3.2.4 Grading

PG&E performs grading to allow for safe work practices and access and to ensure the proper installation of electric facilities. PG&E also conducts grading to maintain the structural integrity of an electric facility that is being affected by soil movement. On steep terrain where the ROW must be two-toned, PG&E restores the areas after construction to approximate preconstruction topographic contours.

PG&E segregates topsoil from subsoil and windrows the topsoil near the site to preserve topsoil. Surface rocks, if present and useful for reclamation, are set aside. PG&E collects unused rocks and hauls them offsite to a landfill. PG&E restores graded areas after construction to approximate preconstruction topographic contours where possible and, if the impact area is greater than 0.1 acre, PG&E revegetates the impact area. The construction footprint calculations include areas potentially affected by grading.

Sometimes PG&E temporarily installs prefabricated bridges or culverts in the ROW or in access roads to ensure safe access and reduce environmental impacts in accordance with state and federal regulations. If the bridge is only needed for a few hours, then a portable bridge is pieced together onsite and secured with a crane to span the crossing. If a longer term crossing is required, then PG&E installs a culvert after obtaining the requisite permits from the regulatory agencies.

3.3.2.5 Erosion Control

As it does for gas facilities, PG&E considers various types of erosion control and implements applicable methods and/or measures identified in the *California Stormwater Best Management Practices Handbook* (California Stormwater Quality Association 2014) for electric transmission and distribution facilities. Erosion control techniques are employed to preclude impacts on towers and poles resulting from soil movement, gully development, and sedimentation of local drainages. PG&E uses standard erosion control measures that may include grading; installation of water bars along temporary or dirt roads, diversion channels, and terraces to reduce erosion and runoff; ditch plugs installed in ditches to prevent washout; riprap to repair or maintain bank stability; and other soil stabilization practices such as jute mats, wood mulching, straw mulch, and other methods described in the handbook. The methods PG&E chooses depend on the situation and the condition of the site. Most erosion control work is small and contained within work sites. Larger erosion control efforts to repair or maintain bank stability, for example, are conducted on an infrequent, as-needed, basis. This work typically involves more extensive planning and permitting to gain the necessary approvals from relevant agencies. PG&E infrequently uses riprap in the Bay Area—on less than 100 linear feet of streams each year—and only if other biomechanical methods cannot be used or when making repairs to existing riprap structures. PG&E does not undertake vegetation removal, grading, or substantial alteration of drainage conditions when performing erosion control work.

3.3.2.6 Trenching and Excavating

The process of excavating the underground electric line trench varies according to location, soil type, and terrain. PG&E conducts trenching and excavating in accordance with Cal/OSHA requirements for employee and public safety.

3.3.2.7 Crossings

Boring and open trenching are typical construction methods for crossings of underground electric line construction. PG&E typically uses boring when crossing active waterways, railroads, and major roadways. The three most common boring methods are jack-and-bore, horizontal directional drilling, and microtunneling.

3.3.2.8 Cleanup and Restoration

The final phase of large covered activities such as underground line construction involves cleanup and restoration of the ROW. The goal of restoration is to achieve compatibility with pre-existing vegetative conditions, in accordance with standard procedures approved by federal and state regulatory authorities. PG&E removes construction material and re-contours disturbed areas to their pre-project grade. Depending on the nature of the site and the type of installation that took place, several tasks may be involved in the cleanup and restoration.

3.3.2.9 Vegetation Management

Vegetation interference with electric lines is one of the most common causes of electric outages throughout the United States. Electric outages may occur when trees or tree limbs grow, fall, or in other ways make contact with electric lines. Outages may also occur when electric lines sag into vegetation below the lines because of increased load or ambient air conditions (i.e., high air temperature or wind). Vegetation that comes into contact with electric lines can also start fires.

PG&E has more than 3,000 vegetation-related outages throughout its service area per year, and each of these outages has the potential to be a fire ignition point. Specifically, *vegetation management* refers to maintaining the electric system in working order, which requires a specific clearance distance from the line. Vegetation management activities are required for maintenance of the electric system, which includes lines and utility structures such as poles and boxes.

When pruning vegetation, there must be enough clearance to ensure that the pruned vegetation does not grow back into the electric lines before the vegetation maintenance crews inspect the line on the next cycle. Pruning prescriptions depend on the location of the vegetation in relation to the line. If the vegetation is located adjacent to the line, limbs can be pruned along one side of a tree (i.e., side pruning). Vegetation growing under the lines is often topped (i.e., its height is reduced) at the required height below the conductors. Vegetation management is only implemented for those trees and shrubs that will interfere with the electric line when at a mature height or when North American Electric Reliability Corporation (NERC) requirements specify different prescriptions. With few exceptions, such as in the case of pole clearing, any low-growing species are left untouched because they will never pose a risk to the safety or reliability of the electric line. NERC requires clearing at subject poles to remove any vegetation that could propagate a fire.

The vegetation management program operates under the following regulatory requirements.

- **NERC Standard Facilities Design, Connections, and Maintenance (FAC)-003-2**. Addresses the requirements to improve the reliability of the electric transmission system by preventing vegetation-related outages that could lead to cascading on critical electric lines operated at 200 kV or higher.
- **Public Resource Code 4292**. Addresses poles and towers with specific types of equipment (subject poles) on distribution and transmission overhead electric facilities in State Responsibility Areas (SRAs) and some select Local Responsibility Areas (LRAs) during fire season.
- **Public Resource Code 4293**. Addresses primary distribution and transmission overhead electric conductors in SRAs during fire season.
- **CPUC General Order 95, Rule 35**. Addresses requirements for all primary and secondary distribution and transmission overhead electric conductors.
- **CPUC General Order 95, Rules 37 and 43:** Address the construction design (minimum ground-to-conductor clearances) of overhead electric facilities, and temperature and maximum electric loads, both of which effect maximum sag of the electric lines.
- **NERC Standard FAC-003-01**. Addresses all NERC-regulated overhead transmission electric lines.
- **California Independent System Operator (CAISO) Transmission Maintenance Agreement**. Addresses all transmission overhead electric facilities.

These regulations require line clearances, as shown in Table 3-1.

Table 3-1. Line Clearance Requirements by Regulation and Facility Voltage

	Voltage					
Regulation	Less than 4 kV	4 kV–21 kV	60 kV/70 kV	115 kV	230 kV	500 kV
CPUC General Order 95, Rule 35	No strain or abrasion	18 inches and hazard trees	1.5 feet and hazard trees	1.6 feet and hazard trees	2.6 feet and hazard trees	10 feet and hazard trees
Public Resource Code 4292	10 feet	10 feet	10 feet	10 feet	10 feet	10 feet
Public Resource Code 4293	NS	4 feet and hazard trees	4 feet and hazard trees	10 feet and hazard trees	10 feet and hazard trees	10 feet and hazard trees
PG&E Minimum Clearance Distance	No strain or abrasion	18 inches LRA, 4 feet SRA and hazard trees	4 feet and hazard trees	10 feet and hazard trees	10 feet and hazard trees	20 feet and hazard trees
CAISO Transmission Maintenance Agreement	NS	NS	NS	NS	NS	NS
NERC FAC-003-01	NS	NS	NS	NS	NS	NS
NERC FAC-003-02	NS	NS	0.82 feet	1.41 feet at sea level	3.49 feet at 3,000 feet elev.	5.66 feet at 3,000 feet elev.

Note: NS – No Standard

Rules 37 and 43 are not included in the table because Rule 37 allows modifications to values set in Rule 35, and Rule 43 provides safety loading guidance.

The regulatory clearance distances shown above are minimums. While CAISO Transmission Maintenance Agreement and NERC FAC-003-01 guidelines have no standard, PG&E implements a minimum clearance of 20 feet based on best management practices to minimize the potential for fires. Actual prescribed clearance distances are greater to account for tree growth and movement, as well as sag and blow-out distances. *Sag* is the additional distance a line can sag toward the ground when it is carrying an electric load during a hot weather. *Blow-out* is the additional distance a line can swing side to side under windy conditions. These distances are provided in Table 3-2.

Table 3-2. Estimated Sag and Blow-Out Distances Used to Support Transmission Line Clearance Prescriptions

	Span Length (feet)						
Span Segment	200	400	600	800	1,000	1,500	2,000
Sag distance (feet)							
Quarter span	3	5	8	9	11	12	13
Mid-span	4	7	10	12	14	16	17
Blow-out distance (feet)							
Quarter span	0	1	3	5	9	20	36
Mid-span	0	2	4	7	12	27	48

3.3.3 Operation and Maintenance Covered Activities for the Electric System

3.3.3.1 E1. Patrols

Aerial Patrol

PG&E conducts aerial patrols of electric transmission lines, distribution lines, and associated facilities annually (in terms of calendar years) using helicopters only.

Ground Patrol

If electric transmission lines and associated facilities are located in no-fly zones, PG&E personnel conduct ground patrols on foot or with ATVs, or use small trucks or SUVs on existing access roads. These patrols occur on a 2- to 5-year cycle, depending on whether the facility is wood or steel. Vegetation management personnel conduct annual ground patrols of transmission and distribution lines by vehicle and on foot. It is estimated that 33.3% (7,664 miles) of the electric distribution system and 87.5% (3,876 miles) of the transmission system is patrolled each year. Approximately 95% of the patrolled system length is accessible from existing roads. The rest is patrolled on foot or by use of a helicopter. Approximately 5% (577 miles) of the electric system requires access by offroad travel using light trucks or ATVs.

3.3.3.2 E2. Inspections

Tower, Pole, and Equipment Inspection

PG&E routinely inspects tower footings and poles to verify stability, structural integrity, and equipment condition (e.g., fuses, breakers, relays, cutouts, switches, transformers, paint). Footings and poles are accessed from existing roads or may require off-road travel, either in vehicles or on foot.

Outage Inspection

When outages and CPUC Reportable Incidents occur because of weather, accidents, equipment failure, or other reasons, PG&E inspects lines to determine the location and probable cause of the outage. Lines are accessed from existing roads or may require offroad travel, either in vehicles or on foot.

Substation Inspection

PG&E inspects all transmission and distribution substations every 1–2 months to verify equipment operation and conduct safety inspections. Substations are accessed from existing roads in vehicles.

Telecommunication Sites

PG&E conducts routine inspections of telecommunication sites annually unless problems are identified at specific sites. Access is by light truck on existing access and power line ROW roads or by helicopter. Helicopter patrols are infrequent, and hovering typically lasts only a few minutes, allowing personnel to collect a GPS point for the site or note the facility location.

Sections of Line

The regular inspection of underground facilities, instrumentation and control, and support systems is critical for safe, efficient, and economical operation. PG&E inspects aboveground components at least annually for corrosion, equipment misalignment, loose fittings, and other common mechanical problems. The underground portion of the line is inspected at vault locations annually. Inspections are performed from existing roads or may require offroad travel, either in vehicles or on foot.

Land Surveys

When new construction is proposed by a property or land developer, PG&E conducts land surveys of facilities and facility ROWs for construction layouts and other purposes. Data collected include precision measurements regarding length and slope and other geology-related information. Access is by vehicles on existing roads but may include offroad travel or surveys on foot.

3.3.3.3 E3. Insulator Washing or Replacement

Conductive airborne particles or bird droppings that settle on ceramic insulators can provide a path across the insulators, causing contamination-induced electric faults. PG&E personnel periodically wash ceramic insulators to reduce the risk of such faults. Nonceramic insulators tend to perform better in contamination-prone areas. Insulators are washed periodically to prevent faults using a truck- or trailer-mounted spray system or a helicopter. Washing typically is done during energized conditions (i.e., while the power lines are operating). Distilled water is used to wash the insulators; dry washing using ground corn hulls also is used.

PG&E replaces insulators when they have been damaged by gunshot, lightning, or heavy corrosion or when they no longer can be washed. They can be replaced while energized or de-energized, depending on access, loading, and safety. Replacement typically takes a four- to six-person crew with a small truck for hauling crewmembers, tools, and materials. If access is limited, a helicopter may be used to land crewmembers and tools on a tower. Insulators are washed or replaced approximately once annually.

3.3.3.4 E4. Substation Maintenance

Most of PG&E's substations are located near load centers, such as residential, commercial, and industrial areas. Typical minor maintenance tasks at these substations include repair and replacement of transformers, switches, fuses, cutouts, meters, and insulators. Maintenance of substation systems requires this type of work approximately once per year. Load demands may require modifications of station equipment or installation of new facilities. These covered activities could require use of station property or adjacent property for construction staging, materials storage, permanent facilities, and land management.

PG&E conducts vegetation management inside and outside of substation facilities as required to meet CPUC and local regulations and ordinances, reduce and eliminate fire hazards, enhance security for fenced facilities, enhance aesthetics, and reduce potential for illegal dumping and homeless encampments. Covered activities on PG&E lands to control vegetation external to substations may include the mowing of grass and weeds. Treatments include pruning or removal of vegetation where needed on the immediate perimeter of a fenced facility (usually within 3 to 5 feet of the fence).

Occasionally, public agencies, municipalities, or neighboring landowners ask PG&E to conduct additional special projects on PG&E parcels outside of the fenced facility, usually for the purpose of fuel reduction to maintain compliance with local and state fire codes. These projects, aimed at managing fire risk or public nuisances, may include brush and weed mowing and discing, herbicide treatments, tree thinning or pruning, and trash removal. Workers may use tractors, flail mowers, or string trimmers for mowing and discing operations. Tree service crews use chainsaws to manually prune or remove hazard trees and to cut brush. Herbicides may be applied, when appropriate, by use of vehicle-mounted spray equipment on tractors, ATVs, and pickups, or manually applied by backpack sprayer. Herbicide applications on special projects are prescribed by a California Licensed Pest Control Adviser and may include pre-emergent, directed post-emergent, and cut stump treatments. Substations are located primarily in residential, commercial, and industrial areas. No impacts on natural vegetation would result within the fenced perimeters during maintenance because the grounds are blacktopped or graveled. An estimated 150 acres of PG&E property external to fenced substation perimeters is disced, mowed, or cleared of vegetation annually and is part of the baseline condition for sites that have been maintained annually. It is estimated that one of these substations has adjacent sensitive habitat, resulting in a 20-foot by 1,000-foot disturbance area.

3.3.3.5 E5. System Outage Repair

Covered activities involving outage repair are necessary to maintain the level of public safety the CPUC requires. Weather, equipment failure, accidents, fire, or bird electrocution are typical causes of outages. When an outage is reported, PG&E patrols the line until personnel determine the cause of the outage. Access is primarily on existing roads, although some overland access with small trucks or SUVs is expected. Depending on the cause of the outage, repair may entail anything from reclosing a switch to replacing a transformer or pole. Crews repair and restore circuits as quickly as possible.

PG&E performs outage repair approximately 500 times per year in rural locations throughout the Plan Area. Soil excavation, soil stockpiling, and the use of construction equipment disturb an approximate 22-foot by 22-foot work area during each repair.

3.3.3.6 E6. Tower and Boardwalk Replacement or Repair

E6a. Tower Replacement or Repair

PG&E tower replacement or repair typically involves tower extensions or strengthening the foundations or superstructures of towers. Superstructures typically are strengthened by replacement, modification, or the addition of pieces of steel lattice, as determined by engineering analysis specific to each tower.

Tower Extensions

The most common method to raise a tower involves installing a prefabricated extension at the bottom, waist, or top of the tower. The extension is typically installed using a helicopter or crane depending on the tower location. If a crane is used, an approximately 25-foot by 40-foot area is graded adjacent to the tower to serve as a level crane pad. This occurs approximately 360 times annually. Temporary wood pole supports (shoo-flies) are constructed adjacent to the tower to support the conductors while the crane lifts the tower. The tower extension is installed, the conductors replaced, and the shoo-flies removed.

The second method requires lifting the tower. A tower lifter is driven beneath the tower, and its four arms are clamped to the tower legs. The tower legs are unbolted from the base, the tower is lifted, and leg extensions are installed.

Strengthening Tower Foundations

To strengthen tower foundations, concrete from the existing footings is broken away to expose the steel reinforcements. A new replacement concrete footing, called a grade beam, is poured between reinforcements. When the towers are accessible from existing roads, the old concrete footings are removed and hauled offsite on large trucks. For some project locations the old concrete footings are bagged in a giant tarp with ropes and bundled and taken by helicopter from the tower site and disposed of according to regulations, typically at a local landfill. To repair foundations submerged in water, such as in the San Francisco Bay, a cofferdam is installed at low tide to allow access to the foundation footing. The wood cofferdam is built around the footing to be repaired and is used to isolate the footing from the water. The mud is removed by hand, and the dam is pushed down to the required depth to expose the solid piling, usually 3 feet below the mud line. Typically the mud is placed in bags and taken to a landfill. If there is little mud collected, then it is returned to the base of the footing after the cement is poured. The material is staged by helicopter or barge, or a combination of both. The old concrete pier is chipped away to expose the pile. New pins are inserted, a new rebar cage is installed around the pile, and the concrete is replaced. The cofferdam then is removed by excavating around the outside and hoisting it from the tower.

Where PG&E cannot complete the work from an existing boardwalk, construction crews place a rubber mat at the base of each footing as a work area. If a lot of material is needed at the job site, PG&E builds a temporary section of boardwalk laterally from the existing boardwalk. A helicopter is then used to place the material on the temporary boardwalk, and workers move the material to the work site by hand or wheelbarrow.

If piles are not required for the tower foundation, footing repairs can be done within a work area extending approximately 2 feet from the footing. If piles are required, the work area may need to be extended to 20 feet outside the tower footprint. For a couple of hours, PG&E crews may use rubber mats to temporarily access the area requiring maintenance work. Workers place the mats in such a way to help protect the vegetation around the temporary boardwalk during its construction.

Strengthening Tower Superstructures

Superstructures typically are strengthened by replacement, modification, or addition of pieces of steel lattice, as determined by engineering analysis specific to each tower. Other minor repairs that require accessing facilities are replacing fuses, breakers, relays, cutouts, switches, transformers, and paint.

E6b. Access Boardwalk Repair and Replacement

PG&E has many miles of boardwalks that service transmission facilities in the vegetated margins of the San Francisco Bay. The boardwalks typically extend from levees and provide access across marsh and salt ponds to transmission tower footings. These boardwalks have a 15- to 20-year life and require repair and replacement. Approximately 15 times per year, 1,500 feet of boardwalk are repaired or replaced, which consists of installing replacement piles (spaced approximately 100 feet apart) and replacement planks. PG&E crews perform boardwalk maintenance and construction activities using hand tools and gas-powered tools such as drills and saws. Replacement piles are

pushed into the ground using a steel bar for leverage and the weight of four people. The planking is transported along the boardwalk on special hand-dollies. Planking is slid into place, drilled, and bolted. If the boardwalk is not too degraded (i.e., still walkable), crews do much of the work from the boardwalk and some from adjacent to the boardwalk where piles are being replaced. If PG&E is raising the height of an existing boardwalk, crews do the work from the boardwalk. If the boardwalk is substantially degraded, crews do the work within a 10-foot corridor around the boardwalk being replaced. When a 10-foot by 10-foot work area is required, soil excavation and soil stockpiling disturb vegetation.

3.3.3.7 E7. Facility Installations (Shoo-Flies)

PG&E needs to replace or repair poles/towers and equipment (e.g., anchors, cross arms, insulators, wires, cables, guys, switches) when they fail or become unsafe. New additions to existing transmission line facilities or tap lines from the old facilities may require installation of a shoo-fly.

Shoo-fly installations involve adding temporary poles or structures around existing permanent facilities to limit service interruptions until work crews can make permanent repairs. Shoo-flies consist of a number of poles and anchors supporting conductors to bypass facilities needing repairs or upgrades. In some cases, existing conductors are removed from the old poles or structures and reattached to the shoo-fly structures. In most cases, this is accomplished with one or two poles for every circuit attached to the structure being shoo-flied. For example, one double-circuit 115 kV tower (six wires attached) requires a minimum installation of four poles. Shoo-fly supports are removed when the repair or construction work is complete. Section 3.3.3.6, *E6. Tower and Boardwalk Replacement or Repair*, discusses covered activities requiring shoo-flies. Shoo-fly installations occur approximately 100 times per year. A work area of approximately 25 by 100 feet is frequently required.

3.3.3.8 E8a. Pole Equipment Repair and Replacement

PG&E repairs or replaces pole equipment (e.g., cross arms, insulators, pins, transformers, wires, cables, guys, anchors, switches, fuses, and paint) when it fails, becomes unsafe, outlasts its usefulness, or is identified for replacement. Replacement and repair of pole equipment typically are performed with the pole in place, using a line truck. Such repairs and replacements take place approximately 500 times per year.

3.3.3.9 E8b. Utility/Wood Pole Replacement

When replacing a PG&E distribution or transmission pole, the new pole is framed (i.e., cross arms, pins, insulators, grounds, bonding, markers, and any equipment are installed) on the ground adjacent to the existing pole prior to setting the pole in the ground. To replace a pole, the line is typically de-energized. A line truck augers a hole, the new pole is moved into the new hole, the conductors are moved from the old pole to the new pole, the old pole is typically removed, and the old pole site is backfilled with the augured soil. Existing wood poles may be replaced with new wood poles or light-duty steel poles. PG&E pole replacements take place approximately 500 times per year, requiring a 10-foot-long by 7-foot-wide work area.

3.3.3.10 E9. Line Reconductoring

PG&E replaces conductors (wires) once the wires have outlasted their usefulness. Work crews install replacement conductors by temporarily splicing them to the ends of the existing conductors and pulling them through travelers (pulleys) attached to the arms of the towers or pole cross arms. Travelers are installed at each tower or pole using a boom truck. Where a boom truck cannot be used, a winch is used to install the travelers. In some cases, a helicopter is necessary to install the travelers and conductors.

Reconductoring typically is done in 2- to 3-mile sections with the use of pull and tension sites ("pull sites"). *Pull sites* are temporary construction areas that are used during the removal of existing conductors and the placement of new conductors along the transmission line. Pull sites may be used to stage materials and provide work areas for tower or pole work. Pull sites are typically located within relatively flat areas that are in line with the conductor. Several pieces of equipment are used at the pull sites, including tensioners (rope trucks) to feed out the new conductor and adjust tension, conductor reels to receive the existing conductor as it is removed, and reels of new conductors. Trailers pulled by semi-trucks, which also are parked onsite, typically deliver and remove the reels. Onsite cranes move the conductor reels on and off of the semi-trucks.

Pull sites are generally rectangular and vary in size, from approximately 50 to 350 feet wide for small pull sites and approximately 100 to 1,250 feet long for large pull sites. Distances between pull sites vary, but on average, approximately 2.7 miles of conductor separates single pull sites or groups of pull sites. Vegetation mowing and minor grading may be required to prepare pull sites for use.

Before pulling the conductor, PG&E crews installs clearance structures at road crossings and other locations (where necessary) to prevent conductors from contacting existing electric or communication facilities or passing vehicles. These temporary structures consist of wood poles.

After the conductors are pulled into place, they are tensioned by pulling them to a predetermined sag and tension. The conductors are then permanently attached to the insulators and existing conductors.

Electric distribution reconductoring takes place approximately 250 times a year, and electric transmission reconductoring takes place approximately 10 times a year. One-third of all reconductoring work requires a pull site; the remaining reconductoring work requires installation and removal of travelers on a two-circuit line, resulting in disturbance. Electric transmission reconductoring also requires in a 25-foot by 25-foot work area.

3.3.3.11 E10. Vegetation Management

PG&E performs routine vegetation management on all of its overhead electric distribution and transmission facilities to maintain compliance with Public Resource Code Section 4293, CPUC G.O. 95 and Rule 35, the CAISO Transmission Maintenance Agreement, and NERC's FAC-003-01 and 02. PG&E's electric vegetation management team makes informed decisions regarding tree removal versus tree pruning based on a variety of considerations, including those listed below.

- Regulatory requirements—what is needed to comply with current standards and guidelines?
- Facility protection objectives—what is needed to best protect the facilities?
- Tree health—will required clearance distances affect tree health?

- Economics—what are the costs and benefits of pruning versus removing?
- Property owner notification—does the property owner object to removal?
- Land rights—does PG&E have the land rights to support removal?
- Environmental considerations—are there species, habitat, erosion, or other environmental issues to consider?

In addition, PG&E performs work focused specifically on outage prevention to provide reliable electric service and reduce the risk of fires. The clearance regulations identify, by voltage, specific clearance distances that PG&E must maintain between vegetation and energized conductors (see Tables 3-1 and 3-2). Minimum clearance distances range from 18 inches to 20 feet.[3] Vegetation removals for routine maintenance and reliability work generally involve individual trees or small groups of trees encompassing less than 0.1 acre (66 by 66 square feet) per event on an annual basis.

Additional information on vegetation management's environmental screening process and best management practices is provided in Chapter 5, *Conservation Strategy*.

E10a. Routine Maintenance

Routine Maintenance

Routine vegetation management includes an annual patrol of vegetation growing near overhead distribution and transmission facilities. It also includes pruning or removal of trees that will not remain outside of required clearance distances or that may pose a hazard to electric facilities before the next year's patrol. Approximately 80% of the routine maintenance is pruning the trees to a clearance level dependent on voltage and regulations, and approximately 20% is removal of small in-growth or hazard trees. It is estimated that 20 hazard trees are removed annually.

Public Safety and Reliability Maintenance

This activity focuses on tree work outside of the minimum clearance distances on distribution line sections that have a history of high numbers of tree-related outages. This activity affects larger portions of the tree than other routine vegetation maintenance work. The goal is to increase public safety and reliability by reducing the number of outages by preventing power line contacts from tree or branch failures. PG&E prioritizes the distribution line sections that have the worst performance, as measured by either a high number of customers who have been without power or a high number of repeat outages. Once a line section is prioritized, personnel analyze the outage data to determine the pattern of tree failure that has historically caused vegetation-related outages and a vegetation-specific management prescription is written for trees along those line sections. For example, if the outage history shows that redwood limbs typically cause outages during storms, the prescription would be to identify and remove redwood limbs that overhang the electric line. If the outage history shows that bay trees have a history of blowing over during storms and causing outages, then the prescription would identify bay trees that may blow over and remove them.

[3] Clearance distances take into account the growth rate of the vegetation in a year's time. So that PG&E has to perform maintenance only annually, pruning clearances include the average growth rate in the clearance calculations. For example, vegetation with a growth rate of 8 feet in one year, PG&E will clear 12 feet so that a 4-foot clearance is maintained all year.

E10b. Pole Clearing

PG&E performs pole clearing around subject poles on its overhead distribution and transmission facilities to maintain compliance with Public Resource Code Section 4292 (see Table 3-1 for clearance requirements).

There are two subcategories of pole clearing: maintenance of previously cleared poles and maintenance of poles that have never been cleared of vegetation. Both subcategories occur annually. Vegetation clearing for existing poles applies to vegetation that has grown over the course of the year (i.e., grasses, forbs, saplings, and branches). Vegetation clearing for new poles requires the removal of all vegetation within 10 feet of a pole that could propagate a fire. Vegetation management includes annual patrol of overhead facilities, removal of material capable of propagating a fire, and—with property owner notification—chemical treatment with herbicides to prevent regrowth. In some cases, because of vegetation regrowth, it is necessary to clear a pole more than once during a given season.

Approximately 100 poles are cleared of vegetation in a 10-foot radius around the pole annually in natural vegetation.

E10c. Tree Removal — Small Groups

When appropriate—considering tree species, growth rates, site conditions, landowner notification, and appropriate permits—PG&E removes small groups of trees growing below overhead transmission and distribution facilities while conducting routine maintenance activities (E10a). Trees are removed in groups affecting 0.1 acre (4,350 square feet) at approximately 25 locations each year, two to three of which could be in riparian areas. Trees are cut off at ground level, leaving the roots and stump in place.

E10d. Tree Removal—ROW Clearing

PG&E uses an integrated vegetation management program to manage incompatible vegetation (tall-growing plant communities) and maintain low-growing diverse plant communities that are compatible with transmission ROWs. Properly maintained ROWs are essential for ensuring the safety of the public and workers, minimizing vegetation-related outages, providing access for the inspection and maintenance of facilities, and ensuring the timely restoration of service during emergency conditions. PG&E vegetation management staff prioritizes lines and line sections to be worked in the current budget year. Prioritization is based on a NERC-regulated line, line criticality, level of risk of an outage, vegetation density, and property ownership. Goals of transmission ROW vegetation management also include protecting the transmission system in the event of a fire, as well as preventing vegetation-caused fires.

NERC requires transmission owners to have a documented Transmission Vegetation Management Plan (TVMP). The TVMP needs to describe how owners conduct work on their applicable active transmission line ROWs to prevent sustained outages due to vegetation coming into contact with conductors and causing vegetation-related outages leading to blackouts or cascading outages (Standard FAC-003-2). Compliance with the standard is mandatory, and if a transmission owner allows vegetation to encroach into the Minimum Vegetation Clearance Distance (“imminent threat”), steep fines can be levied. PG&E’s TVMP is associated with its critical transmission line ROWs, which operate at 200 kV or more, and some transmission line ROWs, which operate at less than 200 kV.

The first step of the integrated vegetation management program is to clear the ROW of incompatible vegetation (e.g., any vegetation growing within the ROW that has the potential, at maturity or at any other time in its lifecycle, to grow or fall into PG&E minimum clearance distances). Vegetation management typically is accomplished either mechanically or manually. However, because cutting or mowing can stimulate resprouting of incompatible vegetation, PG&E vegetation management staff monitors the ROW for resprouting and reinvasion by incompatible vegetation. When resprouting and reinvasion does occur, staff manages the ROW to achieve the desired outcome. A number of factors are considered in selecting and implementing the appropriate management method or methods; management frequently includes the use of herbicide applications to selectively control the incompatible vegetation.

This covered activity is defined by those instances in which vegetation management is necessary as a distinct and separate action. The long-term goal of a vegetation management program in the transmission ROW is to convert tall-growing plant communities to low-growing communities. Low-growing shrubs, grasslands, or plants are preferred at the belly of the span, which is the middle 50% of the line between towers. Vegetation may be taller near towers. Management toward low-growing communities can be accomplished over a period of many years by selectively controlling incompatible plants while preserving low-growing shrubs, grasses, and plants. With proper management, the low-growing vegetation eventually can dominate the ROW and suppress the growth of the tall-growing vegetation, thereby reducing the need for future treatments.

ROW management is based on the concept of creating wire zones and border zones. The *wire zone*, which comprises the ROW area beneath the transmission wire plus 10 feet on either side, is managed for low-growing shrub-forb-grass plant communities (early successional). The *border zone*, which extends from the wire zone to the edge of the ROW, is managed for taller shrubs and brush communities (transition zone). This management concept is depicted in Figure 3-1.

At approximately 10 locations per year, PG&E removes 1 mile of vegetation in a 25-foot-wide area under the belly of the span and prunes the remaining vegetation in a 75-foot-wide area along the 252 miles of 130 kV and 500 kV transmission lines. This estimated area is based on an assumption that PG&E removes most trees from under the belly of the span, and, depending on clearance requirements, leaves the trees near towers. In riparian areas, vegetation management is anticipated to be more targeted. Riparian vegetation clearing is not expected to extend beyond 1,000 feet in one continuous area, and 1,000 feet of clearing is anticipated only once every 3 to 5 years. Riparian removals for this activity are illustrated in Figure 3-2 and Figure 3-3. Low growing trees that stay below the clearance distance height are compatible and are retained. If the trees are incompatible than they will be removed, however the compatible understory vegetation will be retained.

E10e. Tower Cage Clearing

PG&E performs vegetation management around poles and towers on its overhead transmission facilities to maintain the visibility necessary to inspect the footings for structural integrity as required by the CAISO Transmission Maintenance Agreement. Managing vegetation around poles and towers also keeps the interior of the tower clear of woody vegetation. Vegetation management includes patrol of poles and towers and removal of all trees, tree seedlings, and any material that obstructs the ability to visually inspect the tower and pole footings. The work is scheduled throughout the year and the work type depends on the plant material to be removed. Vegetation management involves cutting vegetation with string trimmers or chainsaws, and treatment with herbicides to prevent regrowth, where appropriate.

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Figure 3-1
Wire Zone/Border Zone ROW Management Concept

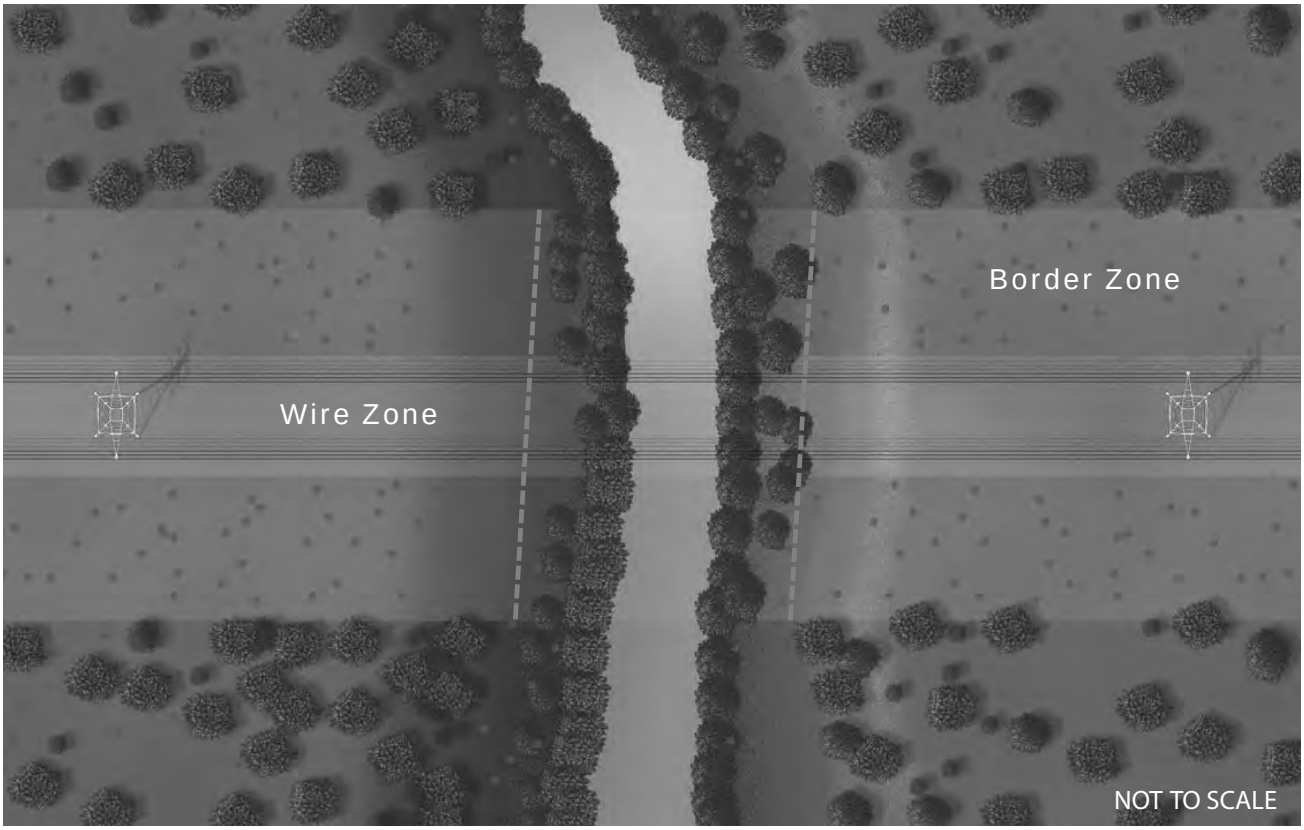

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Figure 3-2
Vegetation Management for Transmission Lines Perpendicular to Riparian Areas

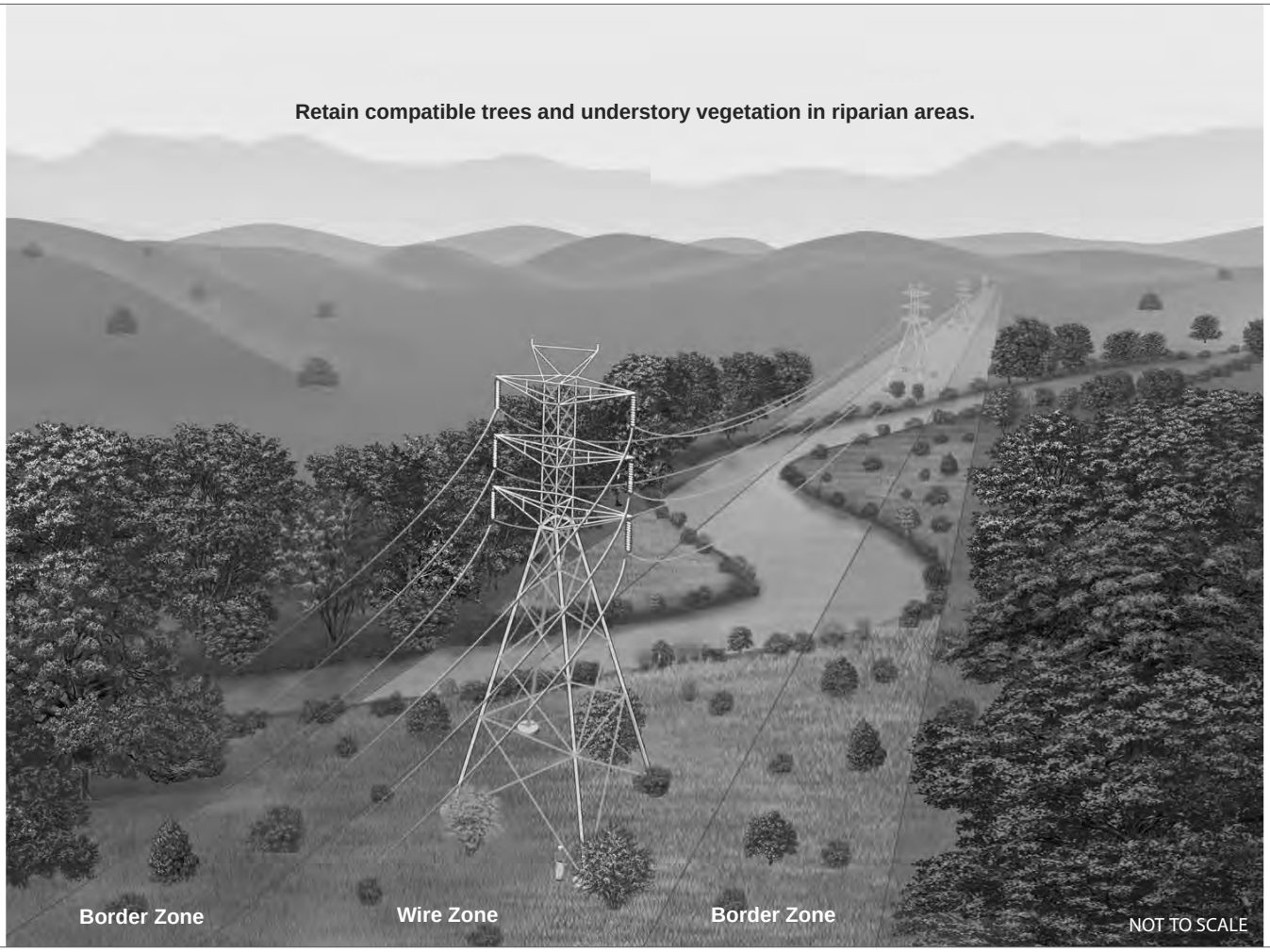

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Figure 3-3
Vegetation Management for Transmission Lines
Parallel to Riparian Areas

PG&E performs this activity approximately 80 times a year. Approximately 10% of the time (eight times annually), vegetation is pruned or removed within a 1,600-square-foot area.

E10f. Fee Strip Maintenance

To comply with city and county ordinances for fuels reduction and beautification, PG&E performs weed abatement work on PG&E-owned land under electric transmission facilities approximately once a year along a 1-mile ROW corridor. Work type and timing varies depending on requirements defined in each local ordinance. Ongoing vegetation management includes removing material by chemical, mechanical, or physical methods, depending on the site conditions, environmental considerations, types of vegetation, and size of the area. Methods may include mowing, discing, the use of string trimmers, and treatment with herbicides.

3.3.3.12 E11. Wood Pole Test and Treat

E11a. Inspection and Maintenance

PG&E identifies the line segments for inspection and testing based on age and condition. Staff evaluates all transmission and distribution wood poles that are at least 10 years old to determine whether they are suitable candidates for replacement, trussing, stubbing, or fiber-wrapping. Within a 3-foot radius around the pole, construction crews excavate 20 inches of soil and bore a minimum of three $^{9}/_{16}$-inch holes at 45° angles to the axis of the pole. Each successive boring is 120° to the right and 12 inches above the previous bore. The shell thickness and circumference of the pole are used to determine whether the pole is a candidate for replacement or reinforcement.

Inspection and maintenance occurs frequently, roughly 60,000 times per year. Approximately 10% (6,000) of these poles are in non-urban areas. The excavation of soil within the 3-foot radius of the existing pole results in disturbance.

E11b. Reinforcement

Approximately 180 poles (or 3% of the 6,000 wood poles in non-urban areas) that PG&E inspects will need reinforcement. Staff determines the type of reinforcement method—stubbing or trussing—after reviewing the testing results of an inspected line segment. Stubbing and trussing entail driving or setting a short steel truss or wood pole into the ground and attaching it to the existing pole to provide the support originally afforded by the pole butt. Fiber-wrapping is performed on poles that are not candidates for trussing or replacement. This entails fiber-wrapping the pole at or below ground level with a material that has been impregnated with preservatives to retard external deterioration of the pole. Excavation of soil within the 6-foot radius of the existing pole results in disturbance.

3.3.4 Minor New Construction Covered Activities

3.3.4.1 E12. New Distribution and Transmission Line Construction or Relocation

To provide additional service to customers or replace facilities, 2-mile extensions of distribution and transmission lines on new wood poles or light-duty steel poles are installed approximately twice a year. Each line extension requires the following.

- Approximately 15 wood or direct-embedded light-duty steel or self-supporting steel poles per mile. Each work site is approximately 10 feet by 10 feet.
- A pull site of approximately 50 by 50 feet, or similar to the site necessary for electric line reconductoring.
- A staging area of approximately 75 feet by 75 feet.

Access to the new or replacement transmission or distribution section may require construction of a new 10-foot by 1,000-foot unsurfaced access road. Similarly, degraded or eroding access roads may need to be repaired or replaced.

Once construction crews survey and stake the centerline for the new line, pole sites, pull sites, access roads, and laydown areas are cleared, if necessary. PG&E uses a machine auger to excavate the site of the new pole and any necessary anchor holes. The width and depth of the setting hole depend on the size of the pole, soil type, span, and wind loading. Typically, minimum pole-setting depths range from 4 to 14 feet.

Poles are framed (cross arms, pins, insulators, grounds, bonding, markers), and any equipment is installed. Any anchors and guys are installed before the pole is set. After the pole is set, conductors are strung (see Section 3.3.3.8, *E8a. Pole and Equipment Repair and Replacement*, and Section 3.3.3.9, *E8b. Utility/Wood Pole Replacement*).

3.3.4.2 E13. Tower Line Construction

To provide additional service to customers or to replace or upgrade facilities, approximately twice a year during the permit term PG&E may construct up to 2 miles of new transmission lines as an extension from existing transmission lines. These extensions may be constructed in natural vegetation and on agricultural lands that contain suitable habitat for covered species. These new lines would be supported by steel-lattice towers, light-duty steel poles, or tubular steel poles (TSPs) with concrete foundations. Each line requires the following.

- A new ROW (maximum of 200 feet wide) no longer than 2 miles.
- Approximately 10 tower lines, each requiring an approximately 25-foot by 100-foot work site.
- Three pull sites with an average size of 50 feet by 150 feet.
- A laydown area of approximately 100 feet by 100 feet.

Once construction crews survey and stake the centerline for the new line, tower sites, pull sites, access roads, and laydown areas are cleared, if necessary. Crews excavate an area of 25 by 100 feet for the foundation and concrete footings are poured. A crane or helicopter is used to erect the tower, depending on the tower type. After the tower is erected, conductors are strung (see Section 3.3.3.10, *E9. Electric Line Reconductoring*).

3.3.4.3 E14. Minor Substation Expansion

Substations typically are constructed close to residential, commercial, or industrial development but may be located in natural vegetation. PG&E would limit minor substation expansions under the Bay Area O&M HCP to 3 acres of permanent vegetation loss per substation attributable to the substation footprint. This construction footprint may be required for additional transformers, fencing, and new distribution line outlets. The expansion area also may be used for setbacks, landscaping, and access.

PG&E grades, paves, or surfaces the substation sites and fence the area for safety and security reasons.

The Bay Area O&M HCP assumes five electric substation expansions over the permit term in undisturbed areas.

3.3.4.4 E15. Underground Line Construction

Underground line construction is conducted almost exclusively in urban settings. For both transmission and distribution lines, underground cable installation is accomplished using a cut-and-cover construction method (open trenching) for the underground power line, duct banks, and splice vaults. For this activity, the construction specifications for a 115 kV transmission line were considered as the average size; however, construction area dimensions vary with the voltage capacity of the line and are frequently smaller than those necessary for constructing a 115 kV line. Although this width varies, typically, a minimum access width of 65 feet is required to allow for the trench excavation and construction of the duct bank. The covered activity construction area length varies based on the length of the line. During construction, trench excavation spoil is removed and stored. If hazardous material is present, construction crews haul the material offsite and dispose of it appropriately. Underground line construction occurs about once every 10 years.

Duct Bank Installation

As the trench for the underground cable is completed, crew installs the cable conduit, reinforcement bar, ground wire, and concrete conduit encasement duct bank. The duct bank typically consists of polyvinyl chloride (PVC) conduits that contain the underground cables.

The typical trench dimensions for installation of a single circuit are approximately 3 feet wide by 5 feet deep; however, trench depths vary, depending on soil stability and the presence of existing substructures. Dewatering, if necessary because of a high groundwater table, is conducted using a pump or well-pointing to remove water from the trench. Construction crews then pump the water into baker tanks and haul it away for proper disposal.

Once the PVC conduits are installed, thermal-select or controlled backfill is imported, placed, and compacted. A road base backfill or slurry concrete cap then is installed.

Vault Installation

Vaults are installed in urban areas within public utility easements at intervals that vary with the voltage capacity of the conductor. The vaults are used initially to pull the cables through the conduits and splice cables together. During operation, vaults provide access to the underground cables for maintenance inspections and repairs. Vaults are constructed of prefabricated steel-reinforced concrete and are typically about 20 feet long, 10 feet wide, and 8 feet deep. The total excavation footprint for a vault is typically about 22 feet long, 12 feet wide, and 10 feet deep.

Cable Pulling, Splicing, and Termination

After installation of the conduit, cables are installed in the duct banks. Each cable segment is pulled into the duct bank, spliced at each of the vaults along the route, and terminated at the bus structures (switchboard) inside the switchyards. To pull the cable through the duct bank, a cable reel is placed at one end and a pulling rig is placed at the other. With a fish line, a larger wire rope is pulled into

the duct. The wire rope is attached to cable-pulling eyes for pulling. To ease pulling tensions, a lubricant is applied to the cable as it enters the duct. Cables are spliced at vaults after they are completely pulled through the ducts. A splice trailer is positioned directly above the vault manhole openings for each access. At each end, cables will rise out of the ground on a transition pole and terminate at a bus structure in the switchyards.

Special Construction Methods

To minimize surface disturbance, horizontal directional drilling is the preferred method for conduit installation (see Section 3.2.2.7, *Crossings*).

3.4 Other Covered Activities

3.4.1 Biological Surveys and Handling

PG&E's personnel or its contractors would perform biological surveys for covered species in hot zones or for large activities. The individuals conducting the surveys would have the qualifications specified in USFWS survey guidelines (U.S. Fish and Wildlife Service 2005b; U.S. Fish and Wildlife Service and California Department of Fish and Game 2003) or as otherwise approved by USFWS. If surveys require physical capture and immediate release of covered species, such as California tiger salamander, California red-legged frog and Alameda whipsnake, for projects involving covered activities, a qualified and approved biologist will be used. A qualified biologist is a person who has the educational background, training, and work experience (handling experience, permits, or training) required to perform a specific biological task; the biologist will be approved by the USFWS prior to the work being done. Such activities are considered take under the ESA and require permit coverage. Biologists will also conduct surveys for covered species on private land within the study area being considered for purchase to provide mitigation of impacts on covered species. Although these surveys are not expected to require handling of individuals in most instances, incidental take of covered species may result if handling is needed or if individuals are killed by vehicle strikes. Such surveys and take would be covered by the Section 10(a)(1)(B) permit.

3.4.2 Management of Lands Purchased or Conserved for Mitigation

PG&E may have an ongoing obligation to manage mitigation lands where it holds title in fee. In the course of conducting standard maintenance and monitoring under a USFWS-approved management plan, take could occur. The Bay Area O&M HCP would cover management activities (e.g., fencing, surveying, conducting pre-activity biological surveys, conducting habitat enhancements, driving on these lands) and the potential for take, including management activities carried out by any independent land manager with whom PG&E has contracted to perform such activities on PG&E's behalf.

Chapter 4
Covered Species Impact Analysis

*[**Summary**: This chapter estimates the impacts of covered activities on covered species and their habitats within the Plan Area, which is a subset of the study area. The Plan Area consists of the portions of the nine Bay Area counties where PG&E would implement covered activities. The study area consists of the entirety of the nine counties—Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco Counties. The study area is also discussed for the purpose of addressing the overall impact covered activities could have on covered species. This chapter details the approach used to calculate the proportional level of impacts in acres for each covered activity across the Plan Area, and evaluates the potential for covered activities to result in temporary and permanent loss of covered species' modeled habitat. PG&E's O&M activities are conducted on the basis of maintenance schedules and inspection findings. Small activities typically have short lead times and large activities typically have long lead times, but the HCP assumes that any activity could be implemented in a given year.]*

4.1 Methods for Analysis

PG&E developed a systematic approach to quantify habitat impacts from covered activities. The approach to quantifying habitat impacts has two main goals: 1) to analyze the impacts of covered activities on all modeled habitat, and 2) to assesses the potential for covered activities to result in take of individuals. For the Bay Area O&M HCP, the approach to quantifying habitat impacts for wildlife species involves the following.

1. Developing annual estimates of temporary and permanent disturbances resulting from each covered activity using the estimated size of the covered activity and the estimated frequency with which it occurs in a given year.
2. Quantifying the amount of modeled habitat by covered wildlife species and facility type.
3. Estimating potential habitat disturbances based on the proportion of the facility corridor that falls within the modeled habitat of each covered wildlife species.
4. Adjusting species impact estimates based on tracked and validated O&M activity impacts, input from subject matter experts, and guidance from USFWS on allowable take limits, to adjust the impact estimates and take limits.
5. Estimating potential habitat impacts on critical habitat for covered species that have critical habitat.
6. Analyzing impact estimates to covered plant species, based on CNDDB record review, aerial photo review of known populations, and site-specific surveys.

4.1.1 Definitions of Permanent and Temporary Impacts

Potential disturbances illustrated in Table 4-1 could result in temporary or permanent impacts to covered species in the Plan Area. These disturbances are assumed to occur anywhere within the Plan Area, including in urban areas, on roads or paved areas, or in habitat. These disturbances, when located in habitat, would result in impacts to covered species.