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Appendix G.
Distribution Need Analysis

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DISTRIBUTION SUBSTATION NEED ANALYSIS – PASO ROBLES DPA

I. LIMITATIONS IN THE EXISTING DISTRIBUTION SYSTEM

A. Reliability

The Paso Robles Distribution Planning Area (DPA) encompasses the communities of San Miguel, Paso Robles, Templeton, Creston, Atascadero, and Santa Margarita. Pacific Gas and Electric Company (PG&E) serves approximately 47,000 households and businesses (also referred to as customer connections[1]) within this DPA at 12 kilovolt (kV) and 21 kV primary voltage through four substations: San Miguel (70/12 kV), Paso Robles (70/12 kV), Templeton (230/21 kV), and Atascadero (70/12 kV). Bordering the Paso Robles DPA to the east is the Cholame DPA, which includes the communities of Shandon and Parkfield, and serves approximately 1,500 customer connections at 12 kV and 21 kV through one substation: Cholame Substation (70/12 and 70/21 kV). The two DPAs are connected by one long 12 kV circuit tie between a San Miguel Substation feeder and a Cholame Substation feeder.

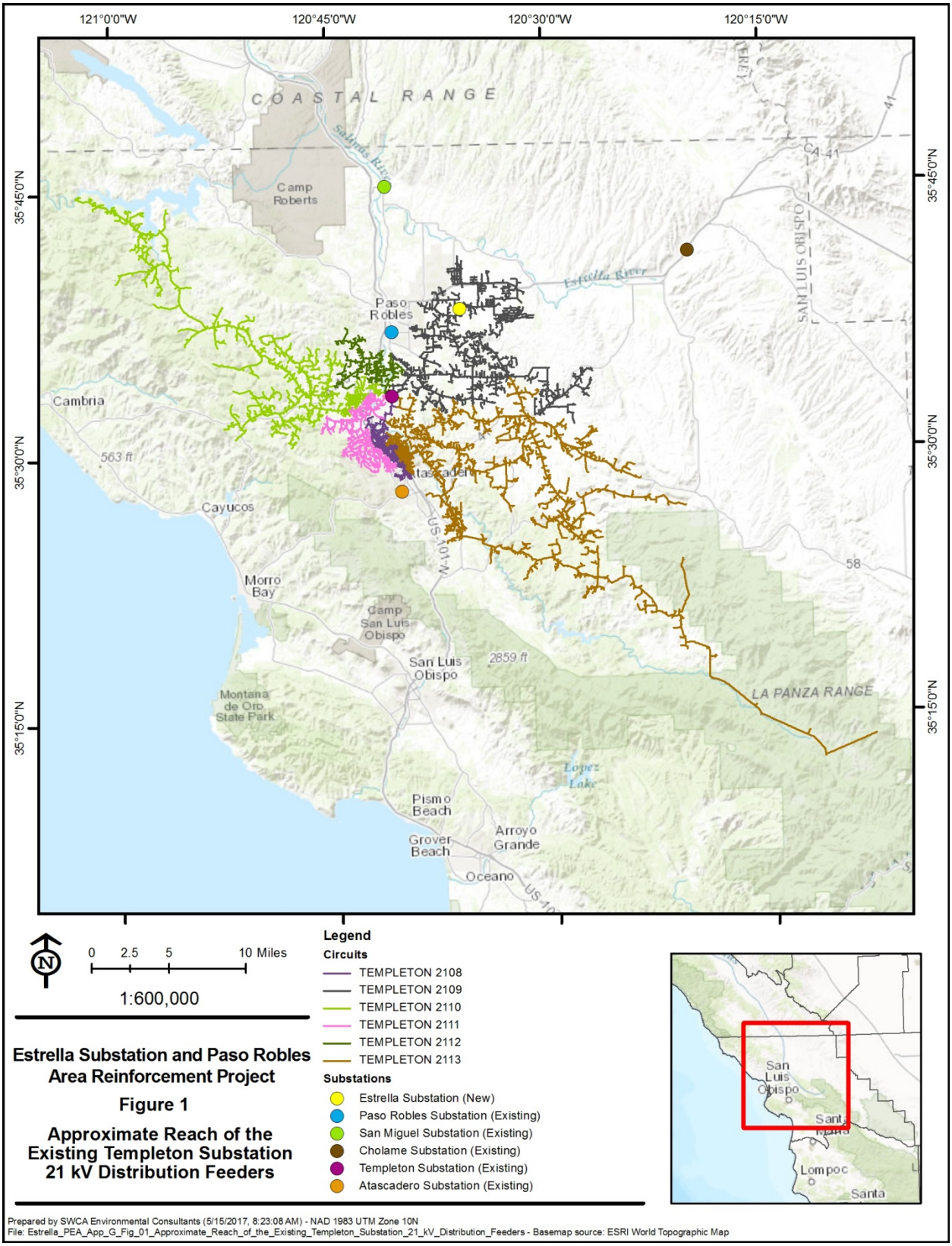
Reliable distribution systems consist of substations located at regular intervals and sized correctly in terms of capacity and number of feeders to cover the area between substations without overextending some substations and underutilizing others. The Paso Robles DPA is not currently in line with these system goals.

Templeton Substation has lengthy 21 kV distribution lines (feeders) that can carry roughly 73% more load and experience one-third less voltage drop than the 12 kV feeders from the other area substations. Even though Templeton Substation is south of the city of Paso Robles and Paso Robles Substation, its 21 kV feeders extend several miles east and north of Paso Robles Substation, serving much of east Paso Robles as well as areas south and west of Paso Robles. (*See* Figure 1, Approximate Reach of the Existing Templeton Substation 21 kV Distribution Feeders.)

Because 21 kV feeders are no more reliable than 12 kV feeders in terms of distance and area served, service reliability on a line is sacrificed by extending the reach of a 21 kV feeder to take advantage of its superior voltage performance, or adding more customers or load to take advantage of its superior capacity. Tripling the length of a feeder increases exposure to outages by 300%. Adding 73% more customers increases the number of customers experiencing an outage by 73%.

[1] Each customer connection connects to a home or business, representing many more customers than indicated by the number of connections.

Figure 1. Approximate Reach of the Existing Templeton Substation 21 kV Distribution Feeders



For these reasons, the long feeders from Templeton have resulted in poor service reliability. For example, the Templeton 2109 main line serving much of east Paso Robles, both north and south of California State Route (SR-) 46, has experienced five sustained outages and nine momentary outages over the past 5 years. These outages affected an average of just under 3,000 customer connections per event, with over 4,300 households and businesses affected in the largest event. Table 1, Five-Year Outage History (Feb. 2012 to Feb. 2017) of Templeton 21 kV Feeders, presents a 5-year outage history of main-line outages to the Templeton 21 kV feeders in Paso Robles, Atascadero, and Santa Margarita. All of the outages were a significant distance from Templeton Substation. The number of outages is relatively high for typical distribution main lines, but not unexpected in these areas due to the long express nature of the 21 kV feeders. Table 1 captures most of the sustained outages experienced by all customers in these areas; however, many customers experienced significantly more sustained outages due to more-localized outages on smaller lines extending from the main lines.

Table 1. Five-Year Outage History (Feb. 2012 to Feb. 2017) of Templeton 21 kV Feeders

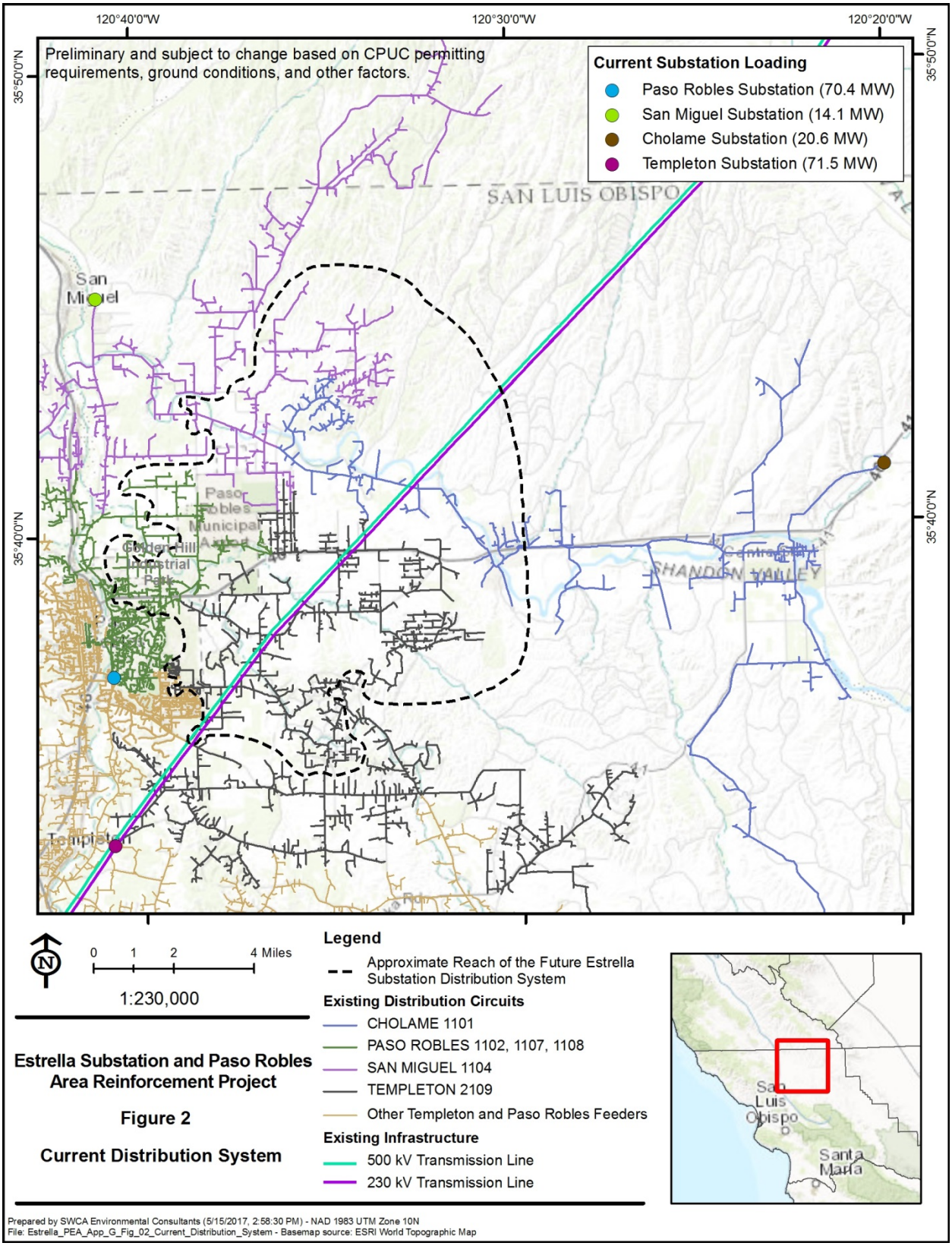
Feeder Name	Area Served Where Outages Occurred	No. of Sustained Outages	No. of Momentary Outages	Average No. of Customer Connections Affected Per Event	Highest No. of Customer Connections Affected by an Event
Templeton 2108	Northern Atascadero	7	10	2,955	3,189
Templeton 2109	Northeast Paso Robles	5	9	2,957	4,325
Templeton 2110	Rural West Paso Robles	4	20	1,802	2,926
Templeton 2111	Western Atascadero	6	10	1,847	2,433
Templeton 2112	Southern Paso Robles	3	10	475	1,068
Templeton 2113	Santa Margarita	7	25	1,911	5,446

B. Capacity

Ideally, the distribution feeder ties between distribution substations within a DPA can be used to transfer load between substations as well as restore service from one feeder to another in the event of outages on the distribution system. Because of this arrangement, forecasted overloads at one substation can be eliminated by transferring load to an adjacent substation. This process can continue until all possible load transfers are performed to allocate load to each transformer bank according to its capacity, and all substations within the DPA reach their maximum buildout (i.e., contain the maximum number and size of transformer banks and/or feeders). There is a practical limit in the ability to divide DPA load among all of the banks in exact proportion to their capabilities. Operating experience indicates that overloads become unavoidable when DPA load reaches approximately 95% of the total aggregate capacity of all of the substation banks. For this reason, PG&E normally defines available DPA capacity at 95% utilization, or 95% of its aggregate bank capacity.

In 2010, Paso Robles Substation reached its ultimate build out of three 70/12 kV, 30 megavolt-ampere (MVA) transformers. Templeton Substation currently consists of two 230/21 kV, 45 MVA transformers with lengthy distribution feeders that serve north and east beyond Paso Robles Substation. Atascadero and San Miguel substations are single-transformer facilities (30 and 16 MVA, respectively) with limited space for expansion or 70 kV transmission constraints. (*See* Figure 2, Current Distribution System.) The available capacity within the Paso Robles DPA is 212.55 megawatts (MW) based upon 95% utilization.

Figure 2. Current Distribution System



II. SITING OF NEW DISTRIBUTION SUBSTATION

A. Siting Principles

PG&E's distribution planning practices emphasize that the siting of a new substation or the addition of capacity at an existing substation should be done in a way that improves service reliability for the area, with the aim of locating substations at regular intervals and sizing them correctly to cover the area between substations without overextending some substations and underutilizing others. Thus, from an engineering perspective, the most important factors in distribution substation siting include:

(1) Proximity of existing and forecasted electric load

(2) Existing and future substation radius in miles from the substation for distribution facilities sphere of influence:

- 21 kV – Rural = 11 miles; Urban = 4 miles

12 kV – Rural = 7 miles; Urban = 3.5 miles

(3) Proximity to existing transmission and distribution systems

(4) Length and location of new transmission and distribution lines

B. Location of Expected Load Growth

City of Paso Robles planners are expecting strong industrial growth in the Paso Robles city limits north of SR-46 within the next 10 years and a resurgence of residential growth south of SR-46. City planners are estimating a 50% increase in the population of Paso Robles by 2045.

According to the City of Paso Robles (City) Public Works Director, most of the industrial growth is expected to occur within the Golden Hill Industrial Park and directly south of Paso Robles Airport along Dry Creek Road, including the Aerotech Industrial Park now occupied by Advance Adapters, a maker of specialty parts for four-wheel drive vehicles. At this time, industrial growth is anticipated to be led by wine production. For example, within Golden Hill Industrial Park, San Antonio Winery, a large 1 MW facility, is now nearing completion. Justin Vineyards, owned by Wonderful Company (Pom Wonderful), operates a large new facility and is planning to expand as soon as the industrial park itself expands eastward toward Airport Road.

To the south of SR-46, approximately 2 miles east of Paso Robles Substation and 2.7 miles west of the Estrella Substation site, development of the 827-acre Chandler Ranch property is expected to begin soon. The City has approved development of the first 154 acres of the ranch, and construction on the first 350 residences could start within 2 years.

Throughout Paso Robles, several new hotels or hotel expansions have received approval, with several now under construction. These include the new Oxford Suites Hotel, Pine Street Promenade Hotel, Hilton Garden Inn, Marriot Residence Inn, and La Entrada Discovery Gardens and Resort, and expansions of the existing Oaks Hotel and Oak Tree Inn.

C. Why Locate the New Substation within 2.2 Miles of the SR-46 230 kV Line Intersection?

The California Independent System Operator Corporation (CAISO) conducts a Transmission Planning Process each year, which builds upon the previous year's plan and studies the reliability of the electric system over a 10-year window. CAISO approved the development of a new 230/70 kV substation—Estrella

Substation—and a new 70 kV power line to interconnect to the substation to improve reliability in San Luis Obispo County in its *2013–2014 Transmission Plan, Estrella Substation Project Description and Functional Specifications for Competitive Solicitation* (CAISO 2014). The project also included a distribution component. Through a competitive solicitation process, CAISO awarded the transmission-level substation project to NextEra Energy Transmission West LLC (NEET West) in its *Estrella Substation Project, Project Sponsor Selection Report* (CAISO 2015).

During this process, CAISO identified the location for the new substation as being within a 2.2-mile radius from the intersection of SR-46 and the Morro Bay-Gates/Templeton-Gates 230 kV transmission corridor, about 5 miles east of Paso Robles Substation. (*See* Figure 3, 2.2-mile Substation Location Area.) This location was a result of a recommendation from PG&E's distribution planning engineers, based upon the siting principles described in Section II.A and the following considerations:

1. The anticipated growth areas are north and east of Paso Robles Substation, so the new distribution substation should be north and east of Paso Robles Substation in order to place the new distribution substation near the growth.

2. Since the new distribution substation would be fed from the 230 kV transmission source, the new substation should be located along the Morro-Bay Gates 230 kV Transmission Lines to minimize costs and potential project impacts.

3. The locality known as "Estrella" offered the operational advantage of being located where long distribution lines from four existing substations ended. These substations are San Miguel, Paso Robles, Cholame, and Templeton. (*See* Figure 2, Current Distribution System.) Placing the substation in Estrella would make it possible to back feed and split in half long existing distribution lines from these four sources. (*See* Figure 4, Future Estrella Substation Distribution System.) Of the potential sites in Estrella, sites north of Estrella Road would place the new substation off in a northeast corner of the DPA, too far from the growth areas near Paso Robles Airport and Golden Hill Industrial Park, just south of the airport. For this reason, the northern-most site considered was a site where the 230 kV lines cross Estrella Road, approximately 2.2 miles northeast of SR-46 along the 230 kV right-of-way.

4. The southern-most site that distribution planning engineers felt was acceptable (not too close to Templeton or Paso Robles substations and not too far from the growth areas) was a site where Union Road comes close to the Morro Bay-Gates 230 kV Transmission Lines. This southern-most site, which NEET West ultimately selected, is within 2.2 miles south of the SR-46 and 230 kV line intersection.

In summary, from a distribution perspective, the Estrella Substation site location is near the Dry Creek Road area south of Paso Robles Airport and Golden Hill Industrial Park in northern Paso Robles, where large-demand businesses are expected to be constructed. It is also at a location very well-suited for connecting to existing feeders. Adding distribution capacity at or near the Estrella Substation site will improve service reliability by allowing feeders from Templeton, Paso Robles, San Miguel, and Cholame substations to be significantly reduced in their reach and therefore significantly reduced in their exposure to outages. The new, high-growth areas can be served directly from the new distribution substation. The Estrella Substation site is far closer to the anticipated growth areas than Paso Robles Substation, and has largely-established feeder routes already in place. (*See* Figure 4, Future Estrella Substation Distribution System.) Templeton Substation is several miles farther south from Paso Robles Substation and far from the expected load growth. Neither Paso Robles nor Templeton substations would provide favorable locations for additional distribution capacity.

Figure 3. 2.2-Mile Substation Location Area

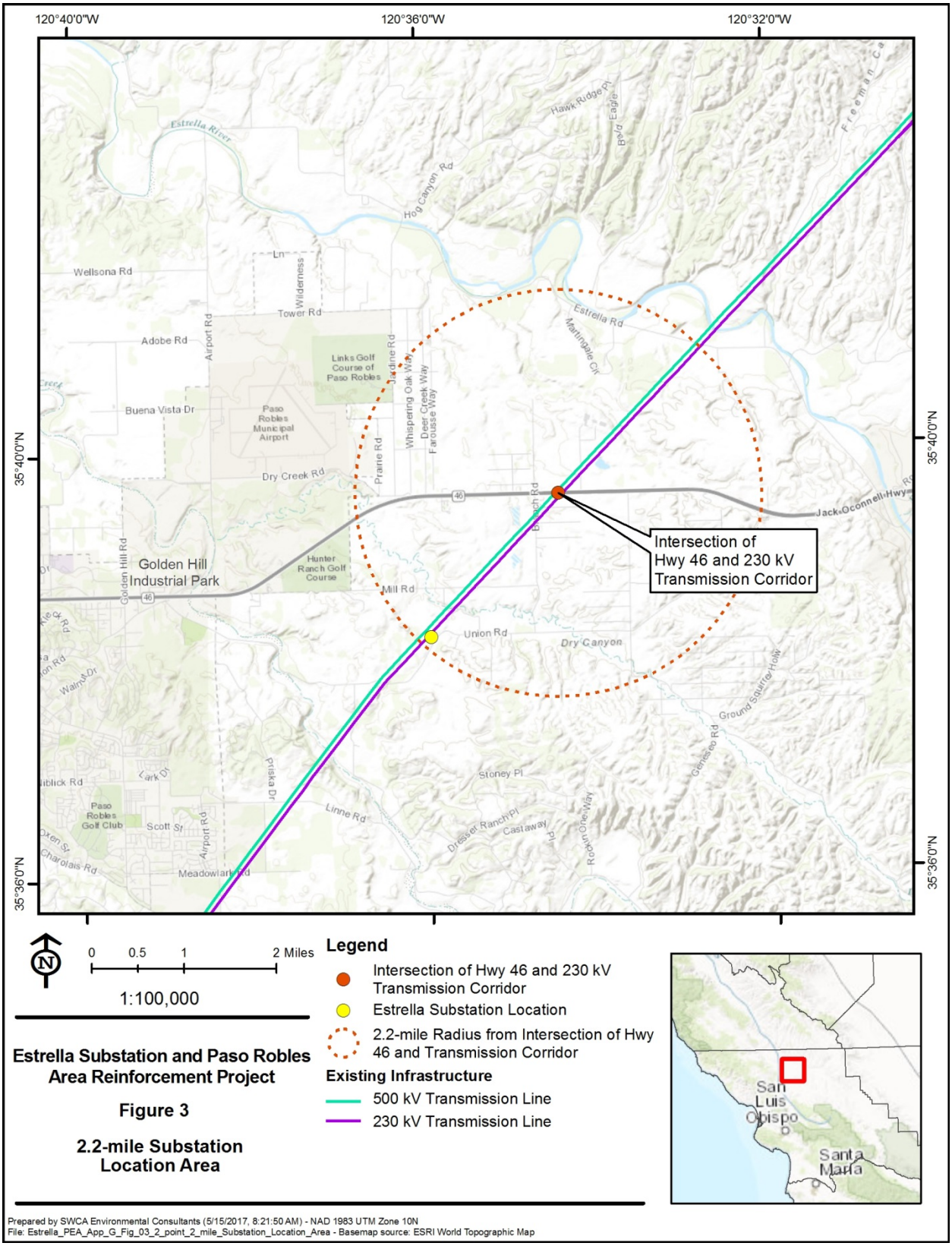
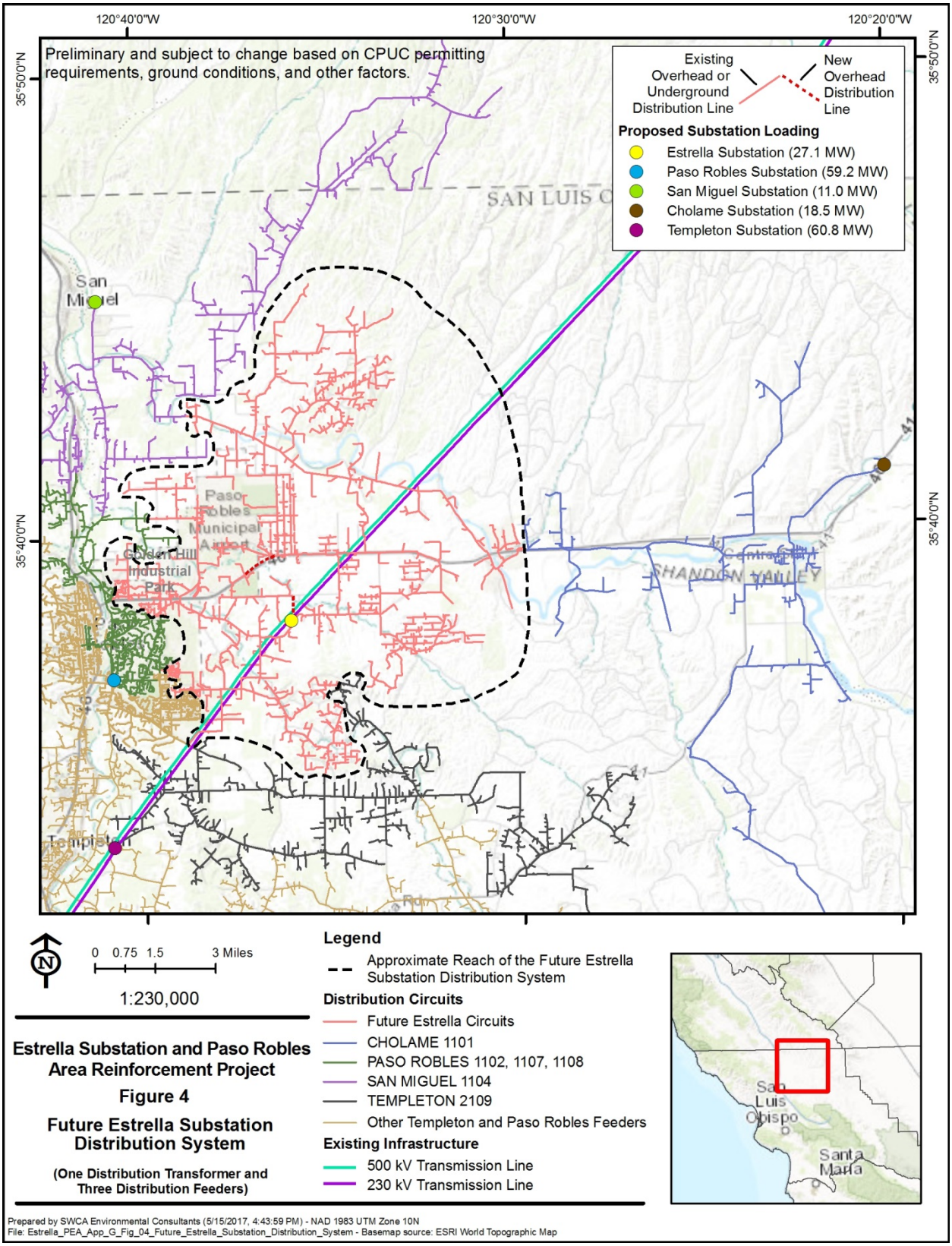


Figure 4. Future Estrella Substation Distribution System



III. TIMING OF NEW DISTRIBUTION SUBSTATION

A. Predictive Factors for Electrical Load Growth

Two primary factors will drive the timing for construction of the new distribution substation: 1) normal growth in area electrical demand and 2) large block loads. Modeling is used to predict normal electrical demand growth within a DPA, based upon many factors, including historic growth patterns, pending business service applications, and—for the first time in 2017—distributed energy resources (DER) estimates. Large block loads, which are generally associated with new business interconnections of 1 MW or more, are difficult to predict accurately due to short lead times and must also be considered because they can significantly accelerate the need for new distribution capacity.

PG&E uses the LoadSEER tool to predict growth in area electrical demand within a DPA for a 10-year period into the future. The 1-in-10 forecast assumes a 90th percentile hot summer with higher-than-average temperatures and intense heat waves. PG&E's goal is to maintain a distribution system that is capable of serving its customers during hot summers without overloads and outages. The Paso Robles DPA is an interior area, sensitive to summer heat with very significant residential and commercial air-conditioning load as well as industrial refrigeration load for the wine industry. Consequently, the 1-in-10 forecast for the DPA must be used to adequately predict DPA capacity needs.

The LoadSEER forecast does not account for all large block loads; unfortunately, large block loads associated with new business interconnections often have short lead times that cannot be anticipated in the LoadSEER modeling. Thus, distribution planners not only review electric demand modeling, but also watch and plan for the possibility of large-demand business applications that will exceed predicted electrical demand.

B. LoadSEER Forecasts

In a ruling on August 9, 2017, the California Public Utilities Commission (CPUC) provided direction to PG&E and other utilities on how to integrate DER growth scenarios into their distribution planning forecasts in order to better determine the need and timing for new distribution projects. CPUC President Michael Picker, who issued the ruling, is the Assigned Commissioner in several proceedings involving distribution resource plans that utilities are required to submit under Public Utilities Code Section 769. [2] His ruling described the current practice in which the California Energy Commission (CEC) uses utility distribution load and DER growth forecasts to prepare and adopt the California Energy Demand forecast in its biannual Integrated Energy Policy Report (IEPR). Due to what the ruling refers to as a "current misalignment of their schedules," the most recently adopted IEPR forecast is the 2016 Update, which relies on 2015 DER forecast data. Nevertheless, because "the CEC's IEPR process is structured to thoroughly vet forecasting issues of a technical, and sometimes contentious, nature," and in order to be consistent and transparent in planning assumptions, the ruling finds that "the most suitable and defensible forecast data available at this time is the 2016 adopted IEPR forecast update." The decision also allows the utilities to make certain adjustments to the IEPR forecast based on the latest public data concerning local load growth, solar energy and other factors. (*See gen'ly* Assigned Commissioner's Ruling on the Adoption of Distributed Energy Resources Growth Scenarios (A.15-07-002 though A15-07-008).)

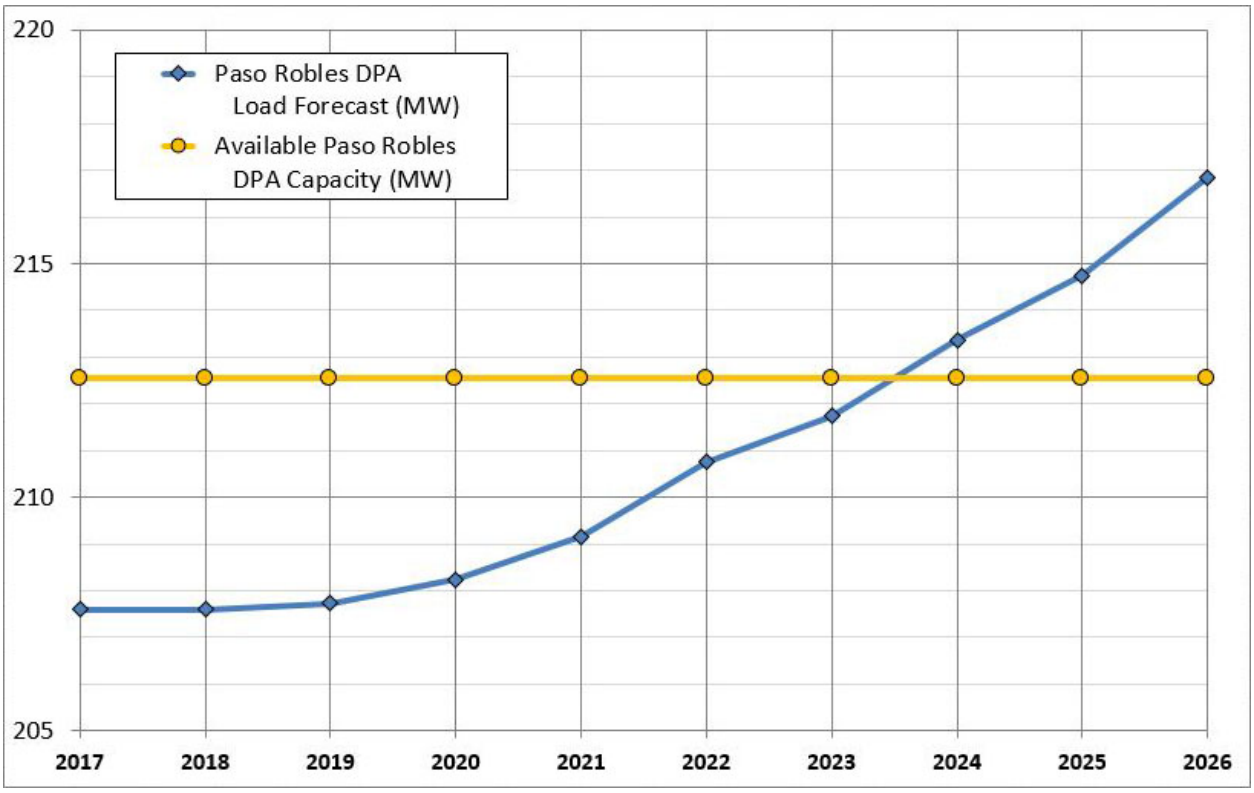
Applying the Commission's guidance, PG&E's distribution planning engineers updated their earlier forecast. Using LoadSEER, they began with the 2016 adopted IEPR Update, which incorporated the mid-case of the 2015 DER forecast and substantially lower values for photo voltaic generation in the Paso Robles

[2] Section 769 defines distributed resources as "distributed renewable generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies."

area than PG&E had previously utilized. They then added recent public data on planned new load obtained from the City of Paso Robles. The resulting LoadSEER forecast is shown in Figure 5, Updated LoadSEER Forecast, Paso Robles DPA.

Figure 5. Updated LoadSEER Forecast, Paso Robles DPA

Description of Forecast	Forecasted Load (MW)									
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Available Capacity	212.55	212.55	212.55	212.55	212.55	212.55	212.55	212.55	212.55	212.55
LoadSEER Forecast	207.60	207.59	207.73	208.24	209.15	210.75	211.74	213.37	214.74	216.85



The Paso Robles DPA has an available capacity limit of 212.55 MW. (See Section II.B, above.) The updated LoadSEER forecast indicates that distribution demand in the Paso Robles DPA will outpace this capacity between 2023 (211.74 MW) and 2024 (213.37 MW), so that new distribution capacity will be needed in 2024.

The Assigned Commission's August 9, 2017 ruling validates earlier concerns of PG&E planning engineers about relying on 100% of the DER forecast to predict when new distribution would be needed (see Appendix G at G-11). According to the ruling, "the 2016 adopted IEPR forecast mid-case is the best source for 2017 DRP Growth Scenarios trajectory case," which means using substantially lower DER forecast assumptions for the Paso Robles DPA than the CPUC had previously requested. The ruling also confirms that additional forecasting data will be needed to better predict distribution needs and timing going forward. The CPUC is continuing to study forecasting issues in the Section 769 proceedings and indicated its intent to obtain additional load data and other information from the CEC, CAISO, utilities and other parties over the next few months. Ultimately, the CPUC aims to "establish a framework for establishing a consistent and reliable forecast on an annual basis." The ruling sets out the next steps to achieve that goal.

C. Large Block Loads

As recommended by the CPUC ruling, the updated LoadSEER forecast provided here incorporates new large business loads that were not included in the 2016 IEPR Update forecast. (*See* Table 2, Large-Load Adjustments for Paso Robles DPA.) Those projected business loads, based on publicly-available data from the City of Paso Robles, include business development applications that have been filed, are in process, or were recently approved.

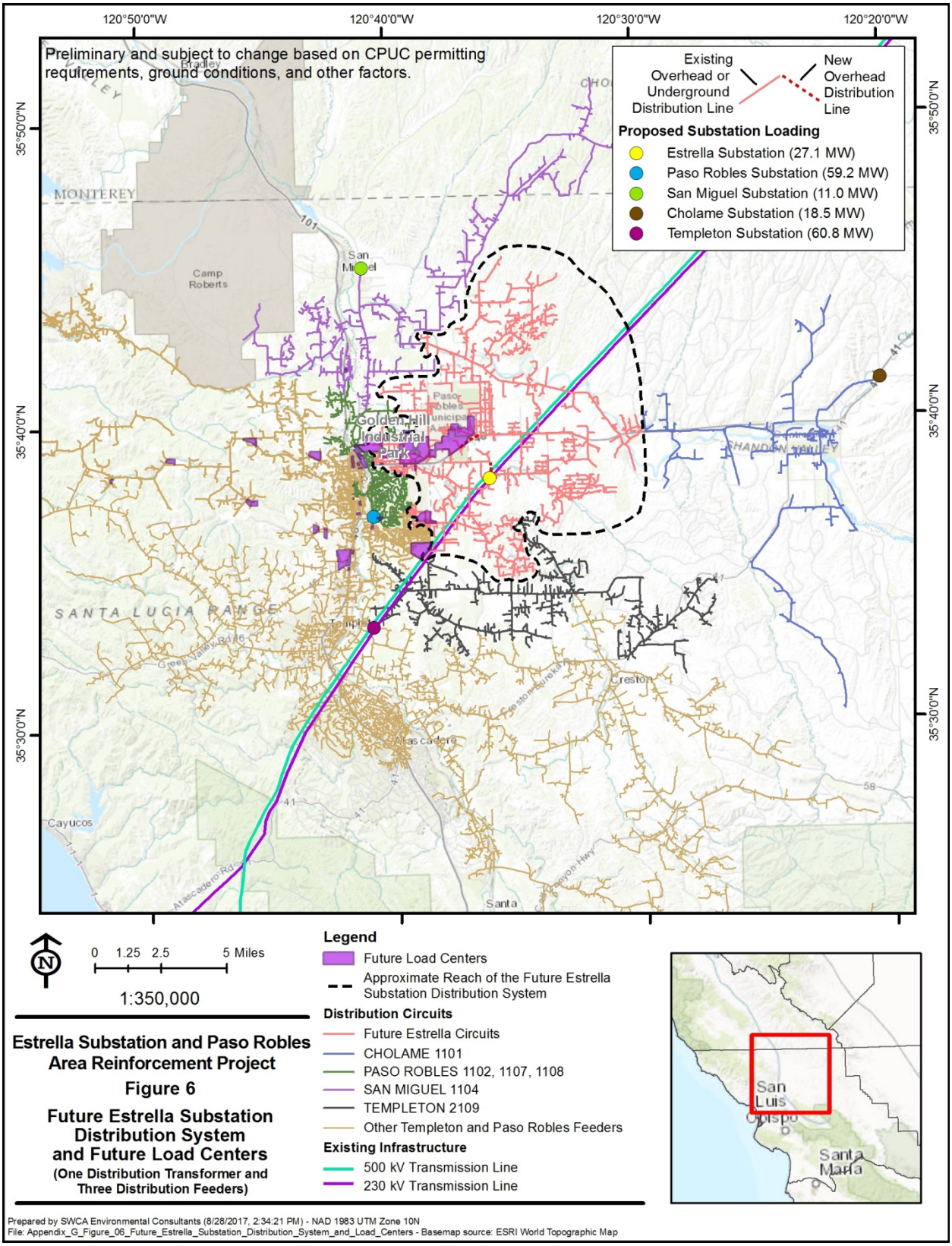
Table 2. Large-Load Adjustments for Paso Robles DPA

Paso Robles Planning Applications in Process	**Estimated Demand**	
Erskine - Paso Robles Blvd - 250,000 sq ft commercial space	0.250	MW
South Chandler Ranch - 560 domestic units (du's)	0.840	MW
Furlotti Annexation - South Vine St - 97 du's; 464,000 sq ft comm; 425 hotel rms	1.035	MW
Beechwood Specific Plan - 862 du's; 64,000 sq ft commercial space	1.357	MW
Subtotal:	**3.482**	**MW**
Approved Paso Robles Planning Entitlements		
Erskine - Golden Hill Industrial Park, Wisteria Lane - Justin Winery Expansion	0.622	MW
Southgate Center - Paris Precision Bldg - 215,000 sq ft commercial space	0.215	MW
River Oaks 2 - SFR Subdivision - 271 du's	0.407	MW
Oaks Assited Living - 101 beds - 89,000 sq ft commercial space	0.140	MW
Arjun (Blue Oaks) Apartments - 142 apartments	0.142	MW
Vina Robles Ampitheater / Hotel - 95,000 sq ft commerical space; 80 hotel rms	0.175	MW
Subtotal:	**1.700**	**MW**
PG&E New Business Applications in Process		
2017 - Vina Robles Winery - 1150 Priska Dr	0.343	MW
2017 - Rancho Fortunato Event Center - 6785 Creston Rd	0.343	MW
2017 - San Antonio Winery - Golden Hill Industrial Park, Wisteria Lane	0.987	MW
2017 - Mission Gardens, San Miguel - 85 du's	0.295	MW
2017 - Templeton Ranch - 100 du's	0.214	MW
2017 - Tract 2549 - Las Tablas Rd - 41 du's	0.522	MW
2017 - Firestone Brewery Expansion - Ramada Dr	0.500	MW
2017 - Terra Linda Farms, Templeton - 200 hp Ag Pump	0.120	MW
2019 - Meridian Winery - Red Tank Farm Expansion	0.300	MW
Subtotal:	**3.624**	**MW**
Total Large-Load Adjustments in LoadSEER:	**8.806**	**MW**

Source: City of Paso Robles Community Development Department, Project "Pipeline" Report, July 19, 2017.

Future load centers, incorporating this latest public load data, are shown on Figure 6, which also illustrates the proposed Estrella distribution system designed to serve this load. The challenge with these types of fast-paced developments is the short lead-time in planning for the increased electrical demand. In most cases, PG&E learns of these large-load interconnections only 18 to 24 months in advance of operation, from receiving an application to providing service. Of the factors that affect DPA capacity, large new business growth is the most likely to accelerate the need for new distribution capacity and the most difficult to predict.

Figure 6. Future Estrella Substation Distribution System and Future Load Centers



Underestimating the amount of available capacity to serve such loads could threaten sensitive industrial customers with major business losses. Manufacturing- or process-oriented businesses are very sensitive to interruptions in electric power that can interrupt assembly processes and cause damage to assembly equipment, costly delays for clean-up and restart, and losses of entire batches of product. Wineries, a growing industry in the area, are particularly sensitive to power outages. If PG&E receives a new business application for a large load in this area, it may exhaust all of the remaining area capacity, or initiate other commercial-industrial load growth that together could quickly outpace capacity. If this were to happen without the Estrella project in place, PG&E may be unable to permit, secure necessary land rights, and construct additional distribution capacity in time to prevent significant overloads throughout the DPA—at Paso Robles and San Miguel substations in particular.

IV. ESTRELLA PROJECT DISTRIBUTION BENEFITS

A. DPA Capacity Increase

Since the Paso Robles DPA is reaching the limits of its distribution substation capacity, the distribution system is vulnerable. Two unknowns will drive the timing of the need for additional distribution capacity: the amount of DER demand reduction and the addition of large-load interconnections. If DER demand reduction is slow to materialize or if new, large business load is added in Paso Robles, the DPA capacity limits could quickly be reached or exceeded. PG&E's new 70 kV substation at Estrella Substation provides a location for future 21 kV distribution facilities where they are most likely to be needed, and can most easily be constructed and integrated with the existing system. Without the Estrella Substation location, there may be insufficient time to put new distribution capacity in place to prevent significant overloads throughout the DPA, especially at Paso Robles and San Miguel substations.

Adding a new 70/21 kV transformer with three new distribution feeders connected to existing feeders near Estrella Substation can be accomplished in only 4 months and provide approximately 28 MW of additional capacity. The new distribution facilities at Estrella Substation will alleviate overloads within the DPA by creating additional distribution capacity, thus enabling distribution planning engineers to appropriately load substation transformer banks and transfer distribution load throughout the DPA to address needs as they arise.

While large block loads and DER estimates both inject uncertainty into the planning process, one thing is certain: distribution substation facilities will be needed sometime within 5 to 15 years, and could be needed very quickly in response to one or more large-load interconnections that could materialize at any time. The Estrella Project supports this critical future need.

B. Distribution System Reliability Improvements

The addition of a future 70/21 kV source in the Paso Robles DPA at Estrella Substation will not only increase the available capacity of the DPA, but will also allow a feeder configuration from the new substation that will reduce feeder length and provide back-ties to existing distribution feeders from San Miguel, Paso Robles, and Templeton substations. (*See* Figure 4, Future Estrella Substation Distribution System.) Estrella Substation is located near the growth areas south of Paso Robles Airport, enabling the future distribution substation to serve the expected load growth directly through much shorter distribution feeders than could be extended from existing substations. Moreover, with three feeders from the new distribution bank connected into the existing distribution system, Estrella Substation will have direct feeder ties to all substations within the Paso Robles DPA except Atascadero Substation, providing valuable system redundancy. The Paso Robles DPA benefits from the central location of Templeton Substation, with six 21 kV feeders extending north and south to provide strong ties to both Paso Robles and Atascadero substations. The future 21 kV substation at Estrella will also provide a strong tie to Templeton Substation, which will

allow cascading transfers north to south or south to north through Templeton to take advantage of available capacity wherever it exists within the DPA.

The future distribution substation at Estrella will also provide a new distribution source closer to Cholame Substation, which serves 1,500 customer connections within the Cholame DPA. The ability to establish strong circuit ties and load relief to multiple substations from a single new source will provide uniform load relief as well as optimize operating flexibility and emergency restoration throughout the Paso Robles and Cholame DPAs.

V. ADDITIONAL DISTRIBUTION Q&A

A. Why Not Expand Distribution at Paso Robles Substation?

Placing additional distribution facilities at Paso Robles Substation is not a viable option. Although the growth in demand is in Paso Robles, load in many northern areas of Paso Robles is currently being served with lengthy feeders from Templeton Substation; Paso Robles Substation has limited capacity and its existing 12 kV feeders cannot accommodate future growth in northern Paso Robles.

Adding a fourth distribution bank at Paso Robles Substation is not possible due to space constraints. For the same reason, replacing the 30 MVA banks with 45 MVA banks is not feasible because there is insufficient space to install additional feeders. PG&E has no existing mobile transformer support for 70/12 kV 45 MVA banks in any event.

Even if Paso Robles Substation had additional capacity and could install feeders within the substation, there is no easy route for new feeders to extend beyond the substation to reach the northern growth areas in Paso Robles. This is a congested urban area with existing 12 kV distribution lines. New feeders would likely be of an express nature, with most of the load being sensitive industrial customers at the ends of the feeders. Because of the congestion, new feeders would need to be combined with existing overhead feeders on double-circuit overhead routes, increasing the likelihood and extent of outages for new and existing customers served by those lines, or placed in lengthy, expensive underground routes. Either choice would be challenging.

B. Why Not Expand Distribution at Templeton Substation?

PG&E's distribution planning practices caution against adding distribution capacity at a location that will degrade service reliability. Since reliable distribution systems consist of substations located at regular intervals and sized correctly, adding more capacity and more 21 kV feeders at Templeton would be a large step backwards. While the existing 21 kV Templeton 2109 Feeder serves areas well north of Paso Robles Substation, it does not serve the growth areas near Paso Robles Airport. This feeder is forecasted to be loaded at over 80% of its capacity in 2017, limiting its ability to be extended to serve the additional load near the airport. This means that additional long or longer new feeders from Templeton Substation would be required to serve the anticipated growth areas north of SR-46. (*See* Figure 1, Approximate Reach of the Existing Templeton Substation 21 kV Distribution Feeders.).

Long feeders are problematic for several reasons. First, as explained previously, long feeders are less reliable simply because of their length and potential for outages that affect many customers. Adding new long feeders from Templeton to northern Paso Robles would further degrade system reliability. Second, in this case, the new feeders would likely be mainly express feeders with much of their load at the end of the line, which would result in most or all customers on the line experiencing an outage if there is trouble anywhere along the lengthy feeder. Third, accessible and maintainable distribution routes north out of Templeton Substation to Paso Robles are limited, and would require lengthy double- or possibly even triple-circuit overhead lines in order to reach areas in Paso Robles. While it is sometimes necessary to place

distribution lines on double-circuits, it is not ideal because distribution poles are wood and typically close to roadways. When cars hit wood poles, they generally knock out service; when cars hit poles carrying double- or triple-circuits, customers on multiple circuits may lose power. In rural areas, such as some areas north of Templeton, cars travel at high speeds and wood poles close to roadways are especially vulnerable. With poles carrying multiple lines, a single car-pole accident could take out two or three 21 kV feeders, knocking out a significant number of customers.

In theory, new electric demand south of Paso Robles Airport could be served from Paso Robles Substation, with new distribution feeders out of Templeton Substation taking over additional load in Paso Robles to free up capacity for the new growth. Cascading load within a well-connected DPA can be a useful tool in many circumstances, so long as service reliability is maintained; however, service reliability is substantially reduced whenever one substation's feeders are overextended and another substation's feeders are either underutilized or doubled-up because they are confined to only one direction of travel. In this case, although cascading load from Paso Robles Substation to Templeton Substation and then adding load at Paso Robles Substation is a possible option, it would once again require long feeders from Templeton Substation to pick up load well north of Paso Robles Substation and then require existing Paso Robles feeders to be rerouted to the new growth areas near the airport. As explained previously, rerouting feeders northeast from Paso Robles Substation to the growth areas near the airport would be especially challenging.

In either case, installing additional, lengthy distribution feeders from Templeton Substation would further compromise reliability in a distribution system that is already out of balance.

C. References

California Independent System Operator (CAISO) 2014. *2013-2014 CAISO Transmission Planning Process, Estrella Substation Project Description and Functional Specifications for Competitive Solicitation.* June 26, 2014. Online: www.pge.com/includes/docs/pdfs/safety/pasorobles/PasoRobles_CAISO_ProjectDescription.pdf. Accessed November 5, 2016.

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