Pipeline Information for the City of Lafayette

August 2017

PG&E's Vision for Gas Operations

Become the safest, most reliable gas company in the nation

Our Goal

Enhance communication and build trust with our customers and the communities we serve

Prepared by Pacific Gas and Electric Company

Executive Summary

Introduction

Pacific Gas and Electric Company (PG&E) is taking steps every day to strengthen and enhance the safety of our natural gas system, which serves more than four million customers in Northern and Central California. Over the last six years, we have implemented important changes in our gas safety operations, including enhancing the testing and inspecting of our 6,750 miles of gas transmission pipeline. The table below outlines the progress that has been made in Contra Costa County since 2011 on various pipeline safety initiatives. Please note there are more than 290 miles of transmission pipeline within Contra Costa County.

Pipeline Safety Initiatives – Contra Costa County[1]	
Progress Since 2011	
Transmission pipeline Maximum Allowable Operating Pressure (MAOP) validation complete	100%
Transmission miles surveyed using high-precision GPS	100%
Transmission pipeline strength tested	46 miles
Transmission pipeline replaced (includes pipeline upgraded for in-line inspection)	31 miles
Valves automated on transmission pipelines	43 valves
PG&E emergency exercises conducted [2]	69 exercises
Planned Initiatives	
Transmission miles to strength test[3]	4.1 miles
Transmission miles to replace[3]	2.6 miles
Valves to automate[3]	2 valves

[1] Data valid as of 05/31/2017, unless stated otherwise. Numbers in this table are approximate.

[2] Number of PG&E emergency exercises performed across all of PG&E's service area in which first responders, including those in Contra Costa County, are invited to participate.

[3] Data valid as of 06/30/2017. Numbers in this table are approximate. Please note that future work PG&E has included above is based on current plans, and those plans are subject to change due to a range of factors, e.g., permitting, material availability, availability of new technologies, and outcomes of PG&E's Gas Transmission & Storage Rate Case.

Transmission Overview

The major natural gas transmission pipelines running through Lafayette are Line 191-1, Line 191A, Line 191B, Distribution Feeder Main (DFM) 3001-01, and DFM 3002-02. DFMs connect larger transmission pipelines to local distribution systems that deliver natural gas to homes and businesses. These gas transmission pipelines are part of an integrated network providing service to 10,807 customers in Lafayette (as of June 2017).

Safety Overview

Multiple layers of protection are essential to keeping the gas transmission pipelines and the people who live near them safe. Our safety efforts include regularly assessing potential threats to pipeline integrity from weather related and outside forces (e.g., seismic activity, landslide

potential, liquefaction potential, etc.); conducting patrols and working with communities to be sure the area above the gas pipeline is safe and clear; and installing automated valves. PG&E also performs pipeline integrity assessments, such as direct assessment, in-line inspection, and strength (pressure) testing, on its sections of transmission pipeline in densely populated areas at least every seven years. The lines in Lafayette have either had a recent direct assessment or an assessment is planned by 2019. Note, PG&E has also strength tested portions of the pipelines in Lafayette, and has plans to test all sections of untested gas transmission pipeline in the city.

Planned Pipeline Projects

When planning gas transmission pipeline projects, PG&E takes a holistic view of its natural gas system. Due to the operating pressure, size and specifications of the pipelines in Lafayette, they have a different project schedule compared to larger lines that operate at greater pressures. The following table lists PG&E's planned pipeline replacement projects in Lafayette. Please note that these projects are based on current plans, and those plans are subject to change due to a range of factors (e.g. permitting, material availability, availability of new technologies, outcomes of PG&E's Gas Transmission & Storage Rate Case, etc.).

Planned Transmission Pipeline Projects in Lafayette				
Line	**Approximate Location of Pipeline Project**	**Footage of Pipeline/ Number of Valves**	**Planned Date of Execution**	**Program**
L-191-1	Near the Moraga Boulevard and 4th Street intersection	~1,600 feet	2017 – 2018	Vintage Pipeline Replacement Program[1]
L-191-1	Beechwood Drive (along the East Bay Regional Park Trail) Between Reliez Station Road and Hawthorne Drive	~50 feet	2017 – 2018	Shallow Pipeline Program[2]
L-191-1	Near Olympic Oaks Drive and Olympic Boulevard intersection	2 Valves	2021	Valve Automation Program[3]
DFM 3002-01	Mt. Diablo Boulevard Entrance to Lafayette Reservoir Recreation Area	1 Valve	2017	Inoperable and Hard-to-Operate Valve Program[4]
DFM 3001-01	St. Marys Road between South Lucile Lane and Rheem Boulevard	~1,000 feet	2018	Capacity Program[5]

Planned Transmission Pipeline Projects in Lafayette				
Line	**Approximate Location of Pipeline Project**	**Footage of Pipeline/ Number of Valves**	**Planned Date of Execution**	**Program**

[1] The Vintage Pipeline Replacement Program prioritizes replacement of all known pipe segments containing vintage fabrication and construction threats (design, manufactured, or constructed features before advent of California's 1961 pipeline safety laws) that are subject to the threat of land movement in proximity to populated areas.

[2] PG&E has implemented a Shallow and Exposed Pipe Program to identify, prioritize, and mitigate pipeline locations that have insufficient cover and are (potentially) vulnerable to exposure from third party damage and/or land movement. Routine maintenance allows PG&E to continuously monitor the pipeline condition, when external factors such as grading, vandalism, or erosion are observed, a project will be created to mitigate the integrity concern.

[3] PG&E's valve automation program and decision tree for where to install automated valves was developed with input from several industry and fire (first responder) experts, and has been approved by the CPUC.

[4] This program replaces inoperable and hard-to-operate valves. The purpose of the DFM 3002-01 project is to replace an inoperable valve that can be used in an emergency to isolate the pipeline, which feeds the communities of Lafayette and Orinda.

[5] The gas capacity program identifies and mitigates current and future gas capacity constraints. Gas systems are designed to provide safe and reliable service under predefined "design days" of abnormally high loading conditions. As systems are identified as constrained (or near constrained) under these conditions, a capacity project is created to mitigate the potential capacity shortfall to ensure the system maintains a minimum gas pressure under the design loading conditions. Note, gas load studies are continuously updated to identify these capacity needs.

Maintenance Overview

PG&E has a comprehensive inspection and monitoring program to ensure the longevity and safe operation of its natural gas transmission pipeline system. We regularly conduct patrols, leak surveys, and cathodic protection (corrosion protection) system inspections for our natural gas pipelines. If any issues are identified as a risk to public safety, we take steps right away to address them. Our work includes:

- **Patrols**: PG&E patrols its gas transmission pipelines at least quarterly (and often monthly) to look for indications of construction activity and other factors affecting pipeline safety and operation. **The lines throughout Lafayette were patrolled in August 2017, and there were no reported observations.**
- **Leak Surveys:** PG&E conducts leak surveys of its natural gas transmission pipelines semi-annually. Leak surveys are conducted by a leak surveyor walking above the pipeline with leak detection instruments or conducted aerially and followed-up with a ground leak survey if there is a leak indication identified during the aerial survey. **The lines throughout Lafayette were leak surveyed in April 2017, and no leaks were found.**
- **Cathodic Protection (corrosion protection) System Inspections:** PG&E utilizes an active cathodic protection system on its gas transmission and steel distribution pipelines to protect them against corrosion. PG&E inspects these systems annually to ensure they are operating correctly. **Inspections of the cathodic protection systems on the lines in Lafayette took place in December 2016, February 2017, and March 2017, and were found to be operating correctly.**

In addition to making sure that the pipeline is operating safely through regular inspection and maintenance, PG&E has been working with the Lafayette community to look at the area above the natural gas transmission pipelines for items that could delay emergency access or cause potential damage to the pipe.

Emergency Response, Damage Prevention and Public Awareness
PG&E works closely with first responders, including fire, police, and community emergency response teams (CERT), to share information on gas pipelines and develop gas emergency response plans to protect community safety. In 2016, PG&E public safety specialists hosted 22 emergency response trainings with Contra Costa County first responders, including firefighters with the Contra Costa County Fire Department, which provides emergency services to the City of Lafayette.

Damage Prevention is an end-to-end process that includes the field location of underground facilities as requested through the Underground Service Alert (USA) One-Call system, USA ticket management, investigations associated with dig-ins, and damage claims. Public Awareness consists of educating customers and other key audiences regarding gas safety, excavation rules, laws and best practices. PG&E's Damage Prevention and Public Awareness efforts in Contra Costa County have included, but are not limited to: hosting Call 811 Before You Dig workshops; sending letters, newsletters, bill inserts, and other mailers with information on nearby gas pipelines, 811 and other safety measures; and running newspaper and radio ads regarding safe digging practices and recommendations.

Third-party dig-ins (a pipeline damage event by a third-party) are a significant cause of damage to PG&E's buried pipelines. Pipeline patrol is a critical preventative practice to help PG&E protect pipelines and improve safety. In 2016, there were 13 third-party dig-ins on gas distribution pipelines (mains and services) in Lafayette. In 6 of these dig-ins, the excavator did not have a valid Underground Service Alert (USA) ticket to have PG&E locate and mark its facilities. It is important that anyone planning a digging or landscaping project call USA at 811 (a free service) at least two working days in advance to allow crews to mark the location of any underground utilities before work begins.

Conclusion
PG&E's top priority will always be the safety of the customers and the communities that we proudly serve. The gas transmission pipelines in the Lafayette community have been extensively tested and evaluated as operating safely. PG&E will continue to work with the City of Lafayette and local residents to plan for and share information on our efforts to ensure the ongoing delivery of safe and reliable gas service to the Lafayette community.

To learn more about PG&E's gas safety work, please visit pge.com/safety. More information on the location of PG&E's gas transmission pipelines can also be found via publicly accessible maps at pge.com/pipelinelocations.

Table of Contents

Introduction

Pacific Gas and Electric Company (PG&E) is taking steps every day to strengthen and enhance the safety of our natural gas system, which serves more than four million customers in Northern and Central California. Over the last six years, we have implemented important changes in our gas safety operations, including enhancing the testing and inspecting of our 6,750 miles of gas transmission pipeline. The following report includes detailed information on the characteristics, safety, and maintenance history of the gas transmission pipelines in Lafayette, as well as details on PG&E's damage prevention and public awareness efforts in Contra Costa County and the City of Lafayette.

Contra Costa County Initiatives and Progress

The table below outlines the progress that has been made in Contra Costa County since 2011 on various pipeline safety initiatives. Please note there are more than 290 miles of transmission pipeline within Contra Costa County.

Pipeline Safety Initiatives – Contra Costa County[1]	
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[4] See pages 12-13 and 15-16 for more information on the planned automated valve installation.

PG&E Service in Lafayette

PG&E provides gas service to 10,807 customers in Lafayette and electric service to 12,114 customers in Lafayette (as of June 2017).

Transmission Overview

The major natural gas transmission pipelines running through Lafayette are Line 191-1, Line 191A, Line 191B, Distribution Feeder Main (DFM) 3001-01, and DFM 3002-01. Please note that PG&E defines a transmission line as a pipeline, other than a gathering line, that meets ANY of the following criteria:

- Transports gas from another transmission line, gathering line, or storage facility to any of the following:
  - Distribution center[1]
  - Storage facility
  - Large-volume customer[2] that is not downstream of a Distribution Center
- Operates at or above a hoop stress[3] of 20 percent specified minimum yield strength (SMYS), or is upstream of a segment of pipe operating at or above a hoop stress of 20 percent SMYS
- Transports gas within a storage field

The table below includes information on the specific sections of these pipelines within the Lafayette city limits. *Please refer to Appendix A for a city-wide map and Appendix B for area maps of these pipelines within Lafayette.*

Transmission Pipelines in Lafayette								
Line	**Install Years**	**Nominal Diameter (inches)**	**Maximum Allowable Operating Pressure (psig[1])**	**Percent SMYS[2]**	**Material**	**Weld Types[3]**	**Miles of Pipe**	**Wall Thickness (inches)**
L-191-1	1952, 1962, 1965, 1967, 1970, 1982, 1995, 2000, 2001, 2013, 2014	10 - 16	268 283 338	21.9% 19.6% 22.9%	Steel	Seamless and Electric Resistance Weld (ERW)	3.37	0.219 – 0.375

[1] A distribution center is the location at which a transmission line changes function to a distribution line. It occurs at the downstream side of the inlet fire valve to a regulator station transporting natural gas into a distribution main primarily serving non-large volume customers who purchase gas for consumption (as opposed to purchasing for resale).

[2] A large-volume customer is a customer being served by PG&E gas facilities that have the capability of delivering 40,000 standard cubic feet per hour (scfh) or more.

[3] Hoop stress, also called circumferential stress, is induced by the operating pressure contained within the pipeline and is in the tangential direction (perpendicular both to the axis and to the radius) in both directions along every surface of the pipe wall. For example, hoop stress would be the force acting to pull apart the top half from the bottom half of a piece of pipe.

Transmission Pipelines in Lafayette								
Line	**Install Years**	**Nominal Diameter (inches)**	**Maximum Allowable Operating Pressure (psig[1])**	**Percent SMYS[2]**	**Material**	**Weld Types[3]**	**Miles of Pipe**	**Wall Thickness (inches)**
L-191A	1948, 1964, 2011, 2014	6 - 8	283	11.9%	Steel	Seamless and ERW	1.33	0.188 – 0.322
L-191B	1947, 1959, 1990, 2012	6 - 12	283	19.8%	Steel	Seamless, ERW, and Lap Weld	1.21	0.188 – 0.375
DFM 3001-01	1947, 1959, 1962, 1963, 1965, 1975, 1982, 1983	4 - 12	170	32.0%	Steel	Seamless, ERW, and Furnace Butt Weld	2.84	0.156 – 0.375
DFM 3002-01	1953, 1954, 1957, 1965, 1975, 1982, 1997, 2009, 2011, 2013, 2014	3 - 8	182 283	16.1% 22.3%	Steel	Seamless, ERW, Lap Weld, Furnace Butt Weld, and Spiral Weld	2.55	0.188 – 0.322

[1] *Pounds per square inch gage (psig).*

[2] *The Percent of Specified Minimum Yield Strength (SMYS) is used by engineers to assess the degree to which the pipeline steel is under stress while operating. 100% SMYS is the minimum point at which the steel could begin to deform; as such, a lower SMYS percentage means that the pipe is in a low stress condition. Percent SMYS is not a measure of using the pipeline to its maximum capacity; rather it is a condition where the pipeline is stressed to the point of material failure (deformation).*

[3] *The locations of these welds vary along the length of the pipeline and may be based on conservative assumptions. See pages 9-10 for additional details on pipeline welds.*

Pipeline Welds

Pipe used in the PG&E gas pipeline system may be either “seamless” or “welded” pipe; these terms indicate the process used to manufacture individual lengths (“sticks”) of pipe. “Seamless” pipe is manufactured as an extruded cylinder and does not have a longitudinal (along the length of the pipe) weld seam. “Welded” pipe is manufactured from a flat sheet of steel that is rolled

into a long cylinder and welded to create a pipe with a longitudinal seam weld. The following lists types of welds that exist in PG&E's gas transmission system:

- ***Electric Resistance Weld (ERW):*** A longitudinal weld seam created by using an electric current to heat the flat sheet of steel to its fusion temperature and then mechanically squeezing the long edges of the material together to allow them to fuse and cool.
- ***Furnace Butt Weld:*** A longitudinal weld seam produced by heating a pre-formed pipe tube with abutting edges to a very hot temperature and then passing the seam through a set of rolls which compress the edges together with enough force to produce a fusion bond between the two abutting edges.
- ***Lap Weld:*** A longitudinal weld seam produced by heating overlapping edges of a pre-formed pipe tube to a very hot temperature and passing it over a set of mandrels which compress the overlapping edges into a fusion bond.
- ***Spiral Welded Pipe Seam:*** This weld type is different from a longitudinal pipe seam (where the weld is orientated lengthwise along the pipe) in that spiral welded pipe has the weld seam orientated such that it travels in a helical fashion around the circumference of the pipe along the entire length of the pipe.

Whether seamless or welded, neighboring pieces of pipe in a pipeline are joined at their ends by circumferential (around the pipe) welds. Distances between circumferential welds in a pipeline vary depending on the lengths of pipe installed, but the maximum distance possible in a PG&E transmission line is approximately 40 feet, as that is the longest stick of steel gas pipe typically manufactured. Circumferential welds are made on the jobsite where the pipeline is being constructed by specially-qualified welders.

PG&E procedures ensure that new steel gas pipeline welds are installed, inspected, tested, and documented in compliance with the Code of Federal Regulations (CFR) (Section 49 CFR 192) and industry standards.

Safety Overview for Lafayette

The gas transmission pipelines in Lafayette have been extensively tested and evaluated to be operating safely. Safety considerations used to evaluate the gas transmission system within Lafayette are detailed below. Note, in addition to these safety considerations, PG&E performs a number of maintenance activities (see "Maintenance Overview" beginning on page 17) to ensure the longevity and safe operation of its natural gas pipelines.

Weather Related and Outside Forces (WROF)

The following factors are considered as part of PG&E's assessment of threats to pipeline integrity:

- Fault crossings
- Seismic activity
- Landslide potential
- Liquefaction potential
- Levee/erosion areas

Below is additional information regarding these factors and how they relate to the City of Lafayette. *Please refer to Appendix C for a list of publicly available resources related to WROF.*

Fault Crossings

There are no active fault crossing locations present within the city limits.

Seismic Activity (Peak Ground Acceleration)

This measures the intensity of ground shaking from an earthquake.

- PG&E's gas transmission pipelines, which are made of steel, are generally resistant to earthquake damage and are designed to be fully operational following earthquakes. Steel is considered to be a ductile material, as opposed to more brittle vintage materials such as cast iron or wrought iron, which PG&E has eliminated from its gas transmission system. In addition, any other vintage construction materials susceptible to earthquake damage are identified and prioritized for replacement through PG&E's Vintage Pipeline Replacement Program (see page 16 for more details) or monitoring through PG&E's in-line inspection (ILI) or Geo-Hazard program. In locations where there is believed to be a greater risk of pipeline failure from an earthquake, PG&E works to manage the risk of damage to the pipeline or replace the section of pipeline with a design that is expected to perform well during an earthquake.
- PG&E performs engineering assessments to determine what, if any, additional mitigations may be required to help prevent the effects of a seismic event on pipelines where potential hazards exist. For instance, at locations where a pipe is at risk to be damaged by seismic activity, design considerations could include pipe replacement to install pipe with an increased wall thickness (thicker steel), improved backfill conditions, or a more favorable fault crossing angle (at locations where pipelines cross known active fault traces, which is not the case in Lafayette).
- In the event of an earthquake of magnitude 6.0 or greater, PG&E will perform an initial damage evaluation consisting of pipeline inspection and leak survey. For earthquakes less than magnitude 6.0, a consideration of the pipeline characteristics, slope or ground failure, surface fault rupture and peak ground acceleration will be analyzed to determine if pipeline inspection and leak survey is warranted.

Landslide Potential

Per U.S. Geological Survey (USGS), California Geological Survey (CGS) and LiDAR analysis, there are sections of PG&E's gas transmission pipelines in Lafayette that are susceptible to landslides. Note, landslide potential is based on soil, rock type, slope, mapped slope failures (CGS and PG&E-LiDAR), and Peak Ground Acceleration (PGA).

- ***Las Trampas Creek:*** PG&E conducted a site assessment of several hazard tree locations along DFM 3001-01 in close proximity to Las Trampas Creek in Lafayette in May 2017 to evaluate the risk of slope failure following tree removal. PG&E concluded that for most of the trees in the Las Trampas Creek corridor, it is anticipated that removal will not pose a bank erosion hazard due to their adequate setback distance from the Las Trampas Creek slope break. PG&E will continue to monitor the Las Trampas Creek corridor post-tree removal to confirm continued bank stability and mitigate any identified issues as needed.

Liquefaction Potential

Liquefaction is a type of ground movement that can be caused by a seismic event. Based on analysis by the USGS and the CGS, there are sections of PG&E's gas transmission pipelines in Lafayette that are susceptible to liquefaction. Note, liquefaction potential is based on PGA, soil type, depth to groundwater, and documented liquefaction from past earthquakes based in part on mapping by the USGS.

- Due to Lafayette's general proximity to the Concord Fault, the area is susceptible to liquefaction. As mentioned above, PG&E's gas transmission pipelines are generally resistant to earthquake damage (and the potentially resulting liquefaction) due to the materials from which they are constructed. PG&E has proactive measures in place to monitor (and, if needed, mitigate) concerns related to liquefaction or other ground movement threats through its Geo-Hazard monitoring program.

Levee/Erosion Areas

Erosion has been observed in Lafayette per PG&E's erosion database.

- Typically erosion (by itself) does not cause pipeline integrity issues. However, over time, erosion may trigger ground movement or pipe exposure. PG&E schedules field assessments for areas identified with erosion potential to develop prioritized monitoring and mitigation schedules. Mitigation options may include applying various matting materials, installing a water diversion system such as drainage ducts, and applying proper backfill.

PG&E monitors and takes appropriate actions based on WROF as described below.

Aerial Patrol

Aerial patrol is performed, at a minimum, quarterly. Aerial patrols of pipelines in Lafayette were conducted in August 2017, and there were no reported observations.

Maintaining the Area Above the Pipeline

Since June 2012, PG&E has been working with communities to address structures and vegetation that are located above and around the gas transmission pipeline and could pose an emergency access or pipeline safety concern. When PG&E identifies an item that is too close to the pipeline, we share what we know about the safety risks and, together, develop a plan to ensure the item is located at a safe distance from the pipe. There are structures and vegetation (e.g., trees, brush) identified within Lafayette city limits that PG&E is working collaboratively with the City and local customers to address. For more information on the Community Pipeline Safety Initiative, see pages 16-17.

Pipeline Valves

There are two types of automated shut-off valves recognized within the natural gas industry: Remote Controlled Valves (RCVs), which can be operated remotely, and Automatic Shutoff Valves (ASVs), which will close automatically as a result of rapidly falling pipeline pressures and/or increased flows at the valve location, and can also be operated remotely. In the event of an emergency, PG&E can also use manual main line valves to isolate sections of pipeline.

PG&E's valve automation program and decision tree for where to install automated valves was developed with input from several industry and fire (first responder) experts, and has been

approved by the CPUC. There are currently no automated valves within the City of Lafayette; however, PG&E has an automated valve project planned for 2021 on Line 191-1 near the intersection of Olympic Oaks Drive and Olympic Boulevard. In addition, the following are the locations of the mainline valves that can be used to isolate the pipeline in Lafayette:

- There are mainline valves along Line 191-1 located near the Olympic Boulevard and Boulevard Way intersection in Walnut Creek and also near Briones Park in Lafayette; in the event of an emergency, these valves can be used to isolate sections of Line 191-1 in Lafayette. Please note, shutting in the mainline valve on Line 191-1 near the intersection of Olympic Boulevard and Boulevard Way will also isolate sections of DFM 3001-01 and DFM 3002-01 in Lafayette.
- There are mainline valves along Line 191A located near Briones Park in Lafayette; in the event of an emergency, these valves can be used to isolate sections of Line 191A in Lafayette.
- There are mainline valves along Line 191B located near Briones Park in Lafayette; in the event of an emergency, these valves can be used to isolate sections of Line 191B in Lafayette.
- There is a mainline valve on DFM 3001-01 near the Olympic Oaks Drive and Olympic Boulevard intersection in Lafayette; in the event of an emergency, this valve can be used to isolate sections of DFM 3001-01 in Lafayette.
- There is a mainline valve on DFM 3002-01 near the Mount Diablo Boulevard and Oak Hill Road intersection in Lafayette; in the event of an emergency, this valve can be used to isolate sections of DFM 3002-01 in Lafayette.

Patrolling After a Seismic Event (Earthquake)

There has been no recent seismic activity sufficient to trigger additional patrols as required under PG&E's earthquake response plans.

Patrolling After a Rain Event

Patrols were performed during the last rainy season in January 2017 through March 2017 under PG&E's rainfall response plan. Note, patrolling after a rain event is specific to high-risk locations susceptible to landslides after precipitation. There were not any immediate actions needed to be taken as PG&E will continue to monitor these locations under its routine maintenance activities and the Geo-Hazard program.

Integrity Assessments

PG&E incorporates three federally-approved methods in its Transmission Integrity Management Program:

- Direct Assessment (DA)
- Strength (Pressure) Testing
- In-Line Inspections (ILI)

PG&E performs pipeline integrity assessments on its sections of transmission pipeline in densely populated areas, also known as high consequence areas (HCAs), at least every seven years. HCA's are based on occupancy around the pipeline and are defined under 49 Code of Federal Regulations (CFR) Part 192.903. Additionally, the maximum allowable reassessment interval for integrity assessments are summarized in the 49 CFR Part 192.939.

Direct Assessments

Direct Assessment may involve any of three separate processes to assess for the presence of External Corrosion (EC), Internal Corrosion (IC) and Stress Corrosion Cracking (SCC), depending on the specific threat(s) identified. During ECDA, ICDA or SCCDA, the pipe is excavated in order to perform direct examination of the pipe in identified areas of concern. The most recent and planned direct assessments in Lafayette are shown in the table below.

Transmission Pipeline Direct Assessments in Lafayette

Line	Date of Most Recent Assessment (Type of Assessment)	Location of Most Recent Assessment	Results of Most Recent Assessment	Next Planned Assessment
L-191-1	2013 (ECDA)	Lana Lane to Deer Hill Boulevard	This assessment identified no issues requiring corrective action	2019 ICDA
L-191A	N/A*	N/A*	N/A*	2019 ICDA
L-191B	N/A*	N/A*	N/A*	2019 ICDA
DFM 3001-01	N/A*	N/A*	N/A*	2019 ICDA
DFM 3002-01	2013 (ECDA)	Intersection of Mount Diablo Boulevard and Moraga Road	This assessment identified no issues requiring corrective action	2019 ICDA

**Portions of this pipeline were assessed by another federally-approved method (e.g. ILI or pressure testing) or is not considered in a high consequence area (HCA).*

Strength Testing

Strength testing is the primary assessment practice to identify construction/fabrication-related and manufacturing-related conditions. This is done by pressurizing the pipeline with water (also referred to as a hydrostatic test) to pressures much greater than the maximum pressure at which the pipeline would normally operate. If a significant defect or third-party damage exists on the pipeline, the pipeline will leak or rupture during the strength test at the location of the defect or damage. PG&E has strength tested portions of the gas transmission pipelines in Lafayette as shown in the table below.

Transmission Pipeline Strength Testing in Lafayette	
Line	**Dates of Strength Testing***
L-191-1	1969, 1991, 2000, 2013, 2014
L-191A	2014
L-191B	1990, 2012, 2013
DFM 3001-01	1963, 1975, 1982, 1983
DFM 3002-01	1963, 1975, 1982, 1997, 2005, 2009, 2013, 2014
**Pressure testing dates may vary due to the installation of newer sections of pipeline or recertification of records.*	

PG&E has plans to strength test all sections of untested gas transmission pipeline in Lafayette.

In-line Inspection (ILI)

In-line Inspection is an assessment practice that can identify external corrosion, internal corrosion, stress corrosion cracking, manufacturing related, construction/fabrication related, excavation damage and weather & outside force conditions. This process involves a tool (commonly known as a "pig") being inserted into the pipeline to identify any areas of concern. Note that the term “piggable” means that the line is upgraded to allow for ILI tool passage by traditional means using the flow of natural gas during normal operations. PG&E may also perform non-traditional ILI in the event a line cannot be upgraded.

The mainline transmission pipelines in Lafayette are currently not piggable and there are no ILI launch sites identified within city limits. At this time, PG&E expects to perform an ILI upgrade on Line 191-1 by 2021.

Note, the order in which pipelines are upgraded is based upon risk. For pipelines operating below 300 psig, the ILI tools are unable to traverse the pipeline with consistent velocity profile and therefore cannot collect adequate inspection data. Accordingly, Line 191A, Line 191B, DFM 3001-01, and DFM 3002-01 in Lafayette are unable to accommodate traditional ILI technology because of their low MAOP. For lower-pressure pipeline where ILI is unfeasible, PG&E primarily utilizes the federally approved direct assessment or strength test methods to conduct pipeline integrity assessments.

Planned Pipeline Projects

When planning gas transmission pipeline projects, PG&E takes a holistic view of its natural gas system, which includes more than 6,750 miles of transmission pipeline spanning across the state. Due to the operating pressure, size and specifications of the pipelines in Lafayette, they have a different project schedule compared to larger lines that operate at greater pressures. The following table lists PG&E’s planned pipeline replacement projects in Lafayette. Please note that these projects are based on current plans, and those plans are subject to change due to a range of factors (e.g. permitting, material availability, availability of new technologies, outcomes of PG&E’s Gas Transmission & Storage Rate Case, etc.).

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Line	**Approximate Location of Pipeline Project**	**Footage of Pipeline/ Number of Valves**	**Planned Date of Execution**	**Program**
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L-191-1	Beechwood Drive (along the East Bay Regional Park Trail) Between Reliez Station Road and Hawthorne Drive	~50 feet	2017 – 2018	Shallow Pipeline Program[2]
L-191-1	Near Olympic Oaks Drive and Olympic Boulevard intersection	2 Valves	2021	Valve Automation Program[3]
DFM 3002-01	Mt. Diablo Boulevard Entrance to Lafayette Reservoir Recreation Area	1 Valve	2017	Inoperable and Hard-to-Operate Valve Program[4]
DFM 3001-01	St. Marys Road between South Lucile Lane and Rheem Boulevard	~1,000 feet	2018	Capacity Program[5]

[1] The Vintage Pipeline Replacement Program prioritizes replacement of all known pipe segments containing vintage fabrication and construction threats (design, manufactured, or constructed features before advent of California's 1961 pipeline safety laws) that are subject to the threat of land movement in proximity to populated areas.

[2] PG&E has implemented a Shallow and Exposed Pipe Program to identify, prioritize, and mitigate pipeline locations that have insufficient cover and are (potentially) vulnerable to exposure from third party damage and/or land movement. Routine maintenance allows PG&E to continuously monitor the pipeline condition, when external factors such as grading, vandalism, or erosion are observed, a project will be created to mitigate the integrity concern.

[3] PG&E's valve automation program and decision tree for where to install automated valves was developed with input from several industry and fire (first responder) experts, and has been approved by the CPUC.

[4] This program replaces inoperable and hard-to-operate valves. The purpose of the DFM 3002-01 project is to replace an inoperable valve that can be used in an emergency to isolate the pipeline, which feeds the communities of Lafayette and Orinda.

[5] The gas capacity program identifies and mitigates current and future gas capacity constraints. Gas systems are designed to provide safe and reliable service under predefined "design days" of abnormally high loading conditions. As systems are identified as constrained (or near constrained) under these conditions, a capacity project is created to mitigate the potential capacity shortfall to ensure the system maintains a minimum gas pressure under the design loading conditions. Note, gas load studies are continuously updated to identify these capacity needs.

Community Pipeline Safety Initiative

In addition to making sure that the pipeline is operating safely through regular inspection and maintenance, PG&E has been working with the Lafayette community to look at the area above the natural gas transmission pipelines for items that could delay access for maintenance activities or in an emergency, or cause potential damage to the pipe. In the event of an emergency or natural disaster, PG&E and other emergency response crews need to be able to get to the pipeline quickly to make the situation safe. It is also important that crews have safe access to the pipeline to conduct critical maintenance work to ensure the ongoing delivery of

safe and reliable gas. Trees, brush and structures located too close to the pipe can delay critical access and put the community at risk.

While keeping the area clear is the primary reason for our gas safety work, we are also concerned about how trees can interfere with pipes underground. PG&E and other pipeline operators across the country have seen evidence of tree roots causing damage to the pipe's external coating. When the external coating is damaged, it can lead to the possibility of corrosion and leaks. Sample photos of tree roots interacting with pipes can be found in the publicly available report from the US Department of Transportation's Pipelines and Informed Planning Alliance: http://www.ingaa.org/file.aspx?id=11683. Please also see Appendix D for photos of tree roots damaging gas pipelines in locations where trees were in the area above the pipe. While this is one of the factors that we consider, the primary reason for this gas safety program is to ensure safety crews have immediate access to the pipeline.

Tree-by-Tree Review

PG&E understands how important trees are to the local community and the environment. To be sure we are only replacing those trees that pose a safety concern, a team of gas safety experts and certified arborists conducted an in-depth review of every tree located up to 14 feet from the gas pipeline. PG&E originally identified 1,158 trees near the pipelines within the City of Lafayette. Working together with the City to review each tree, the number was reduced to approximately 941 trees, of which only around 272 are located too close to the pipeline and need to be addressed for safety reasons. The other trees can remain in place for the time being with ongoing monitoring by PG&E safety professionals. PG&E is working with the City of Lafayette, East Bay Regional Park District, East Bay Municipal Utility District, and local property owners to develop plans for this safety work.

Maintenance Overview

PG&E has a comprehensive inspection and monitoring program to ensure the safety of its natural gas transmission pipeline system. We regularly conduct patrols, leak surveys, and cathodic protection (corrosion protection) system inspections for our natural gas pipelines. If any issues are identified as a risk to public safety, we take steps right away to address them.

Patrols

Pipeline Patrol and Monitoring consists of patrolling transmission pipelines to provide continuing surveillance, including evaluating any significant activities on or near the pipeline. One of the important patrol activities is monitoring for unauthorized excavations taking place close to transmission pipelines. Patrols are performed with a mix of fixed-wing aerial, helicopter aerial and ground patrol methods on a quarterly basis at a minimum.

Federal regulations require quarterly patrols; however, PG&E often patrols its gas transmission pipelines monthly. Pipeline patrol is a critical preventative practice to address excavation damage and WROF threats. Refer to the table below for the results from the August 2017 patrols on the transmission pipelines in Lafayette.

Transmission Pipeline Patrols in Lafayette		
Line	**Date of Patrol**	**Results**
L-191-1	August 2017	No Reported Observations
L-191A	August 2017	No Reported Observations
L-191B	August 2017	No Reported Observations
DFM 3001-01	August 2017	No Reported Observations
DFM 3002-01	August 2017	No Reported Observations

Leak Survey

Pipeline safety regulations require PG&E to conduct periodic or routine leak surveys on its natural gas transmission system to find gas leaks. Transmission leak surveys are most often conducted aerially and followed-up with a ground leak survey if there is a leak indication identified during the aerial survey. PG&E leak surveyors check gas facilities line by line, from one end of a pipeline facility to the other, on regular intervals.

PG&E leak surveys its gas transmission pipelines semi-annually. The recent leak surveys performed on the gas transmission pipelines in Lafayette are shown in the table below.

Transmission Pipeline Leak Surveys in Lafayette		
Line	**Date of Leak Survey**	**Results**
L-191-1	April 2017	No Leaks
L-191A	April 2017	No Leaks
L-191B	April 2017	No Leaks
DFM 3001-01	April 2017	No Leaks
DFM 3002-01	April 2017	No Leaks

Cathodic Protection (CP) Inspections

To mitigate the potential for corrosion on buried steel gas lines, the lines are coated or wrapped before installation. Cathodic protection is then applied in order to prevent corrosion of the metal surface by applying a direct current from an anode to the pipe being protected. PG&E sends corrosion mechanics to physically monitor the levels of cathodic protection annually to identify and repair cathodic protection areas that are not working properly. Cathodic protection inspection is the primary preventative practice to address external corrosion. Refer to the table below for the recent cathodic protection inspection results for the steel gas transmission pipelines in Lafayette.

Transmission Pipeline Cathodic Protection Inspections in Lafayette		
Line	**Date of CP Inspection**	**Results**
L-191-1	December 2016	Found to be operating correctly
L-191A	March 2017	Found to be operating correctly
L-191B	March 2017	Found to be operating correctly
DFM 3001-01	December 2016	Found to be operating correctly
DFM 3002-01	February 2017	Found to be operating correctly

Vegetation and Maintenance

As long as there is a clear walking path above the pipeline, vegetation will not obstruct the ability to perform pipeline ground patrols, leak surveys, or cathodic protection inspections. It is important, however, that crews have safe and immediate access to the pipeline for any critical safety work that may be identified as part of these maintenance activities. For example, if a potential leak is detected during a leak survey, it can be much more difficult and take more time to pinpoint and fix the leak if a tree or structure is above the gas pipeline in that area. Or, if a potential issue is detected during a pipeline inspection, safety crews need immediate access to the pipe to determine the severity of the issue and if any repairs are needed. If the pipeline needs to be excavated for an integrity assessment, any trees in close proximity would need to be removed to accommodate the excavation. Strength testing also requires a clear right-of-way to identify leaks that occur during the test.

Emergency Response and Damage Prevention Overview

Emergency Response

PG&E Gas Operations is committed to emergency preparedness and continuous improvement of our emergency response and recovery capabilities. The Emergency Preparedness team develops and maintains annual emergency response plans, training, exercises, and evaluation activities in accordance with the Incident Command System (ICS), the National Incident Management System (NIMS), the Standardized Emergency Management System (SEMS), and Homeland Security Exercise and Evaluation Program (HSEEP) April 2013 principles.

PG&E works closely with first responders, including fire, police, and community emergency response teams (CERT), to share information on gas pipelines and develop gas emergency response plans to protect community safety. These plans address a variety of potential situations ranging from valve failures to natural disasters (e.g., earthquakes). In 2016, PG&E public safety specialists hosted 22 emergency response trainings with Contra Costa County first responders, including firefighters with the Contra Costa County Fire Department, which provides emergency services to the City of Lafayette.

Damage Prevention and Public Awareness

Damage Prevention is an end-to-end process that includes the field location of underground facilities as requested through the Underground Service Alert (USA) One-Call system, USA ticket management, investigations associated with dig-ins, and damage claims. The marking of

underground utilities is governed by California Government Code 4216 and the process is driven by industry best practices. Damage Prevention consists of multiple processes working together to help prevent damage from third party excavation activities. PG&E's Damage Prevention processes are reviewed annually.

Public Awareness consists of educating customers and other key audiences regarding gas safety, excavation rules, laws and best practices. Efforts include, but are not limited to, sending bill inserts in the mail, sending separate emails to customers who receive paperless billing, sending individual separate mailers, running ads in newspapers and on the radio, conducting companywide campaigns for Call 811 Before You Dig, coordinating Call 811 Before You Dig Workshops and supporting USA S.A.F.E. events that involve educating excavator companies on safe digging practices and recommendations. A few examples of Damage Prevention and Public Awareness outreach conducted recently in Contra Costa County include:

- **811 Workshops:** Beginning in October 2013, PG&E began hosting Call 811 Before You Dig workshops, covering Government Code 4216 requirements, the 811 calling process, and the use of hand digging tools. The workshops are held in areas with the highest number of dig-ins. PG&E also began conducting Call 811 Before You Dig presentations at the request of companies wishing to learn more about the 811 process and safe digging behaviors. In 2016, PG&E conducted four (4) 811 workshops in Contra Costa County.
- **Proximity Letter:** Every three years (2011, 2014, 2017, etc.) PG&E sends businesses and residents within 2,000 feet of PG&E owned gas transmission pipelines, including recipients located in Contra Costa County, a notification of their proximity to the transmission pipeline. The notification contains an envelope with a call to action message, a letter explaining why they are receiving the notification, and a gas safety brochure with information about how to locate nearby gas pipelines, damage prevention measures (811), how to identify gas leaks, and what to do in the event of a gas leak.
- **Gas Transmission Right-of-Way Letters:** During non-proximity letter years (2010, 2012, 2013, 2015, 2016) PG&E notifies non-customers within 1,000 feet of a PG&E owned gas transmission pipeline of their proximity to the pipeline. These efforts include recipients located in Contra Costa County. The safety piece contains information about how to locate nearby gas pipelines, how to avoid damaging them, how to identify gas leaks and what to do in the event of a gas leak. Please note, for this particular letter, a non-customer is any business or resident who does not receive gas service from PG&E.
- **Public Officials Newsletter:** The Public Officials Newsletter, published by the Pipeline Association for Public Awareness (PAPA), is a collaborative effort between pipeline operators across the United States to educate public officials about pipelines in their communities. Newsletter topics include information about the purpose and reliability of pipelines, the commodities they transport, how to identify and locate pipelines, damage prevention measures (811), emergency response coordination, and how to request additional information. The newsletter is mailed annually to public officials within the 40 counties containing PG&E gas distribution and/or transmission pipelines, including Contra Costa County.
- **Excavation Safety Guide-Pipeline Edition Mailer:** The Excavation Safety Guide, published by PAPA, is a collaborative effort between pipeline operators across the United States to educate excavators about excavation safety. The guide's topics include

information about the purpose and reliability of pipelines, the commodities they transport, how to identify and locate pipelines, damage prevention measures (811, pipeline markers, excavation requirements and best practices) and emergency response if a leak should occur. The guide is mailed annually to excavators within the 40 counties containing PG&E gas distribution and/or transmission pipelines, including Contra Costa County.

- **Homeowners Association Mailer:** Beginning in 2013, PG&E began sending targeted mailings to Homeowner Associations (HOAs) about gas safety and a request to integrate "Call 811 Before You Dig" requirements into their homeowner communications. The mailer also contains information about how to locate nearby gas pipelines, how to identify gas leaks and what to do in the event of a gas leak. From 2013 to 2016, PG&E submitted 119 mailers to HOAs in Lafayette. Please note, mailers may have been submitted to multiple contacts within an HOA.
- **School E-Campaign – Transmission:** Beginning in 2012, PG&E began sending an e-mail communication to school administrators and district officials located within 1,000 feet of a transmission pipeline. This e-mail was originally used to supplement the Safe Kids Program and has transitioned into the primary source for Public Awareness outreach to school administrators and district officials within PG&E service territory, and is sent every two years. The communication contains information about how to locate nearby gas pipelines, damage prevention measures (811), how to identify gas leaks and what to do in the event of a gas leak. From 2014 to 2016, PG&E submitted five (5) communications to school administrators and district officials in Lafayette.
- **Safe Kids Program:** The Safe Kids Program is a prevention-based outreach program that provides electric and natural gas hazard awareness information to teachers and students. The program includes grade- and age-appropriate content designed with the assistance of educators and utility safety experts, and includes information about electrical and natural gas indoor safety, overhead and underground safety, tree safety, natural gas pipeline public awareness, including 811 Call Before You Dig information, and hydroelectric dam safety. The program involves sending an informational direct mail piece to targeted K-8 educators as well as providing additional safety information as requested. This program is administered by a third party.

Third-Party Damage

- Third-party dig-ins (a pipeline damage event by a third-party) are a significant cause of damage to PG&E's buried pipelines. Pipeline patrols provide a leading indicator that helps PG&E protect pipelines and improve safety. Refer to the Patrol table on page 18 for more information on gas transmission pipeline patrols in Lafayette.
- In 2016, there were 13 third-party dig-ins on gas distribution pipelines (mains and services) in Lafayette. In 6 of these dig-ins, the excavator did not have a valid USA ticket to have PG&E locate and mark its facilities.

Information Resources

To learn more about PG&E's gas safety work, please visit pge.com/safety. More information on the location of PG&E's gas transmission pipelines can also be found via publicly accessible maps at pge.com/pipelinelocations.

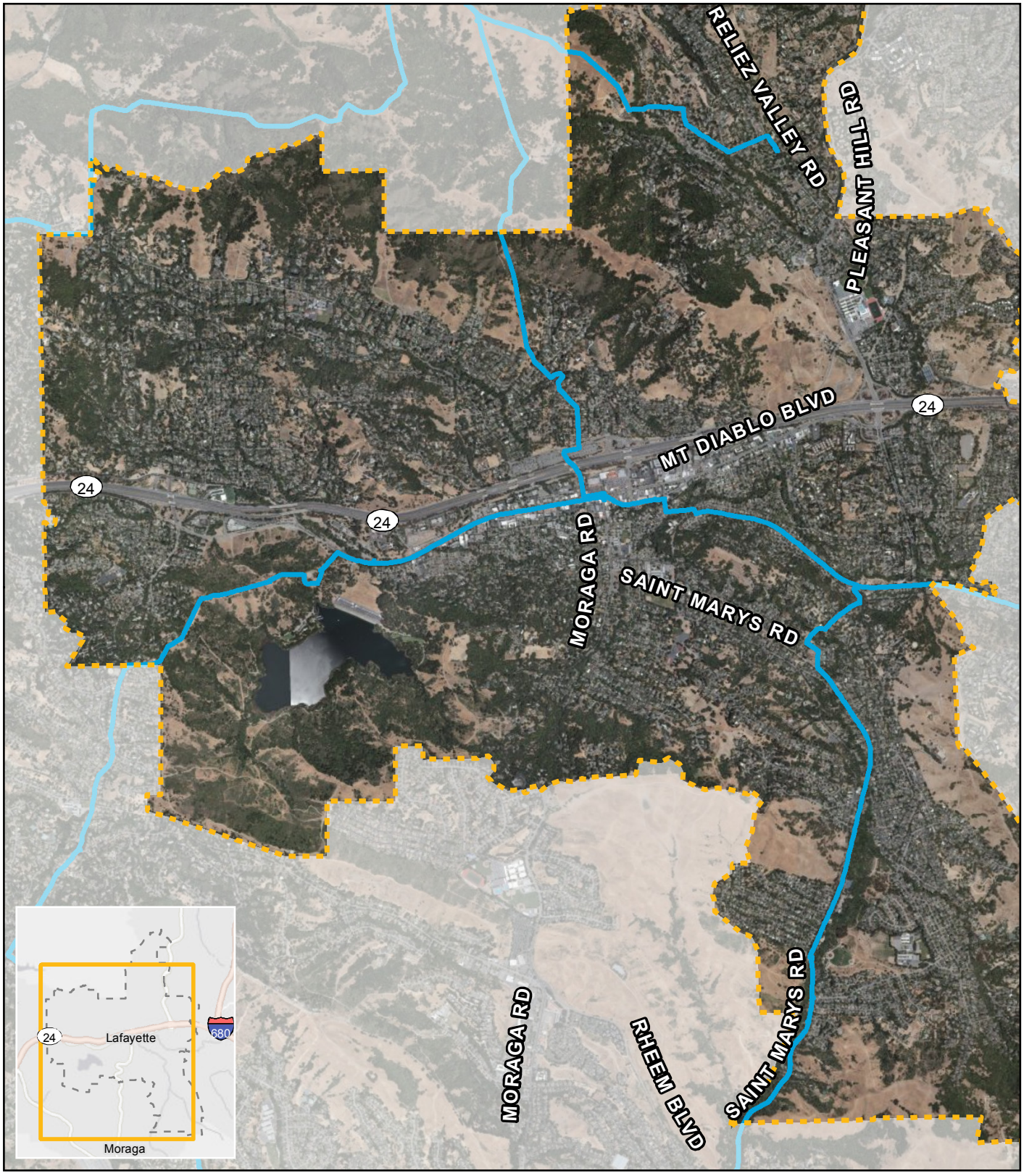
Conclusion

PG&E's top priority will always be the safety of the customers and the communities that we proudly serve. The gas transmission pipelines in the Lafayette community have been extensively tested and evaluated as operating safely, as detailed above. PG&E will continue to work with the City of Lafayette and local residents to plan for and share information on our efforts to ensure the ongoing delivery of safe and reliable gas service to the Lafayette community.

Appendices

- Appendix A: City-Wide Map
- Appendix B: Area Maps
- Appendix C: Public Sources for WROF
- Appendix D: Sample Photos of Tree Roots Interacting with Pipelines

Appendix A - City-Wide Map

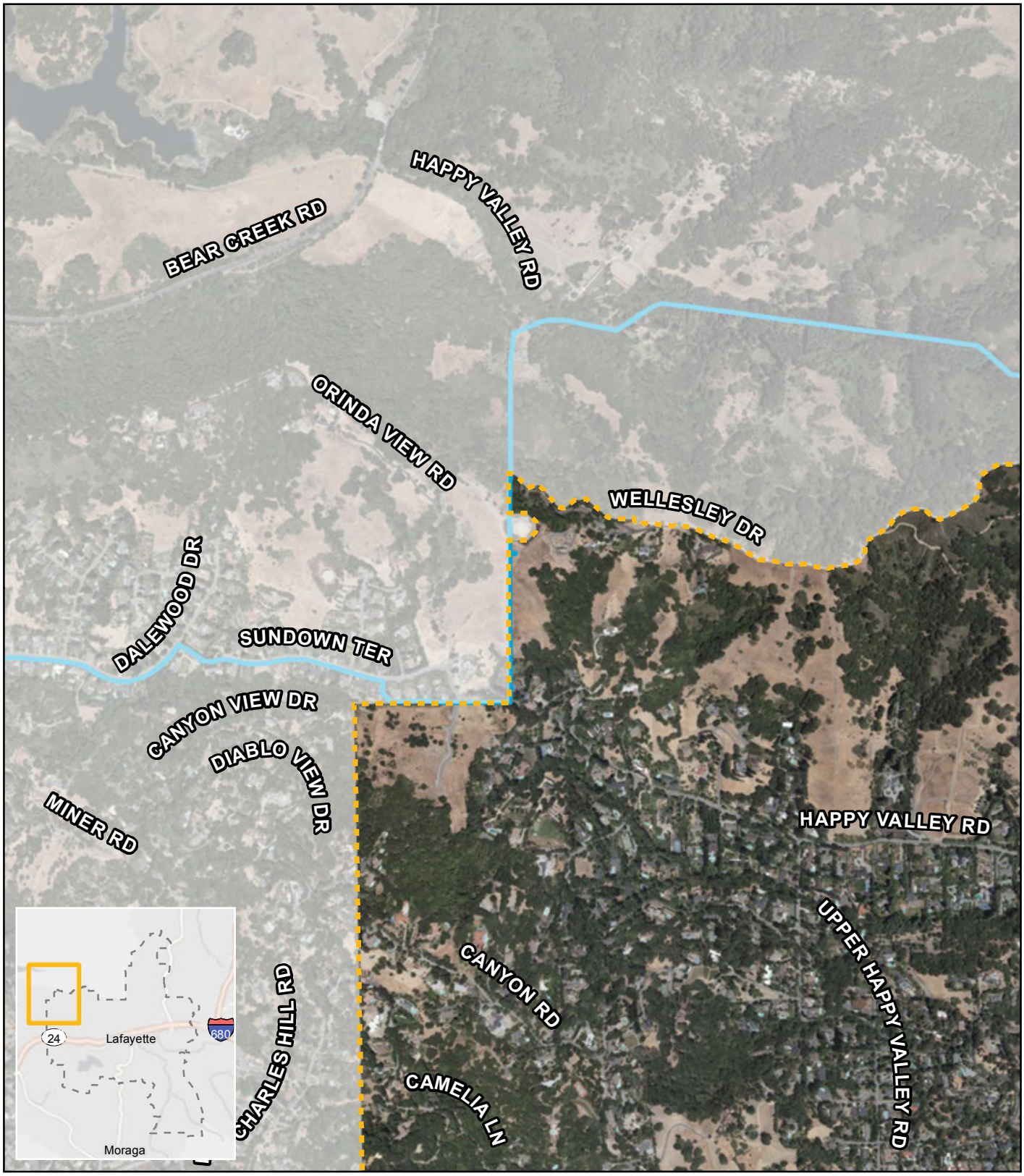


Gas Transmission Pipeline
City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Overview

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix B - Area Map

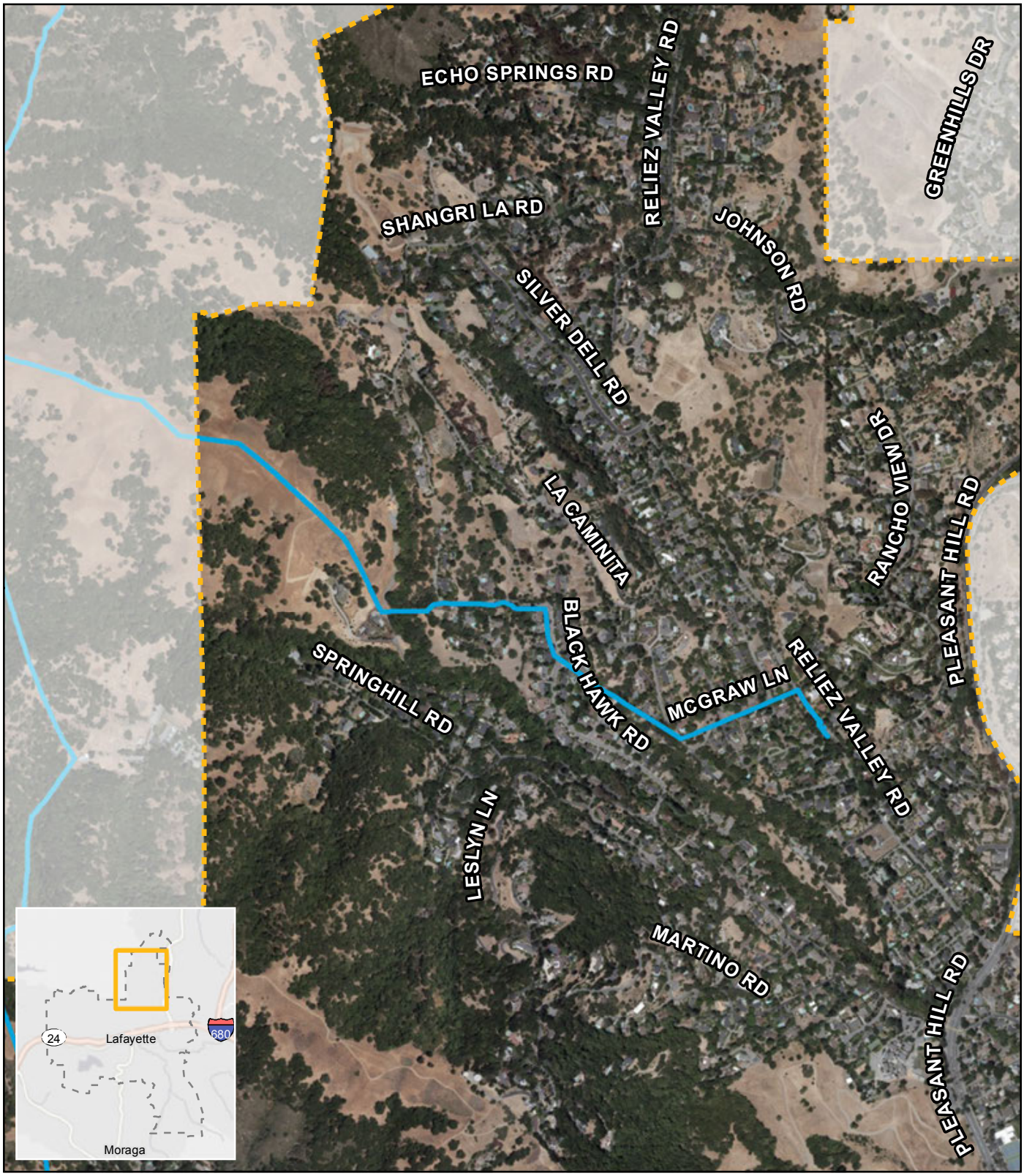


Gas Transmission Pipeline
City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Area 1

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix B - Area Map



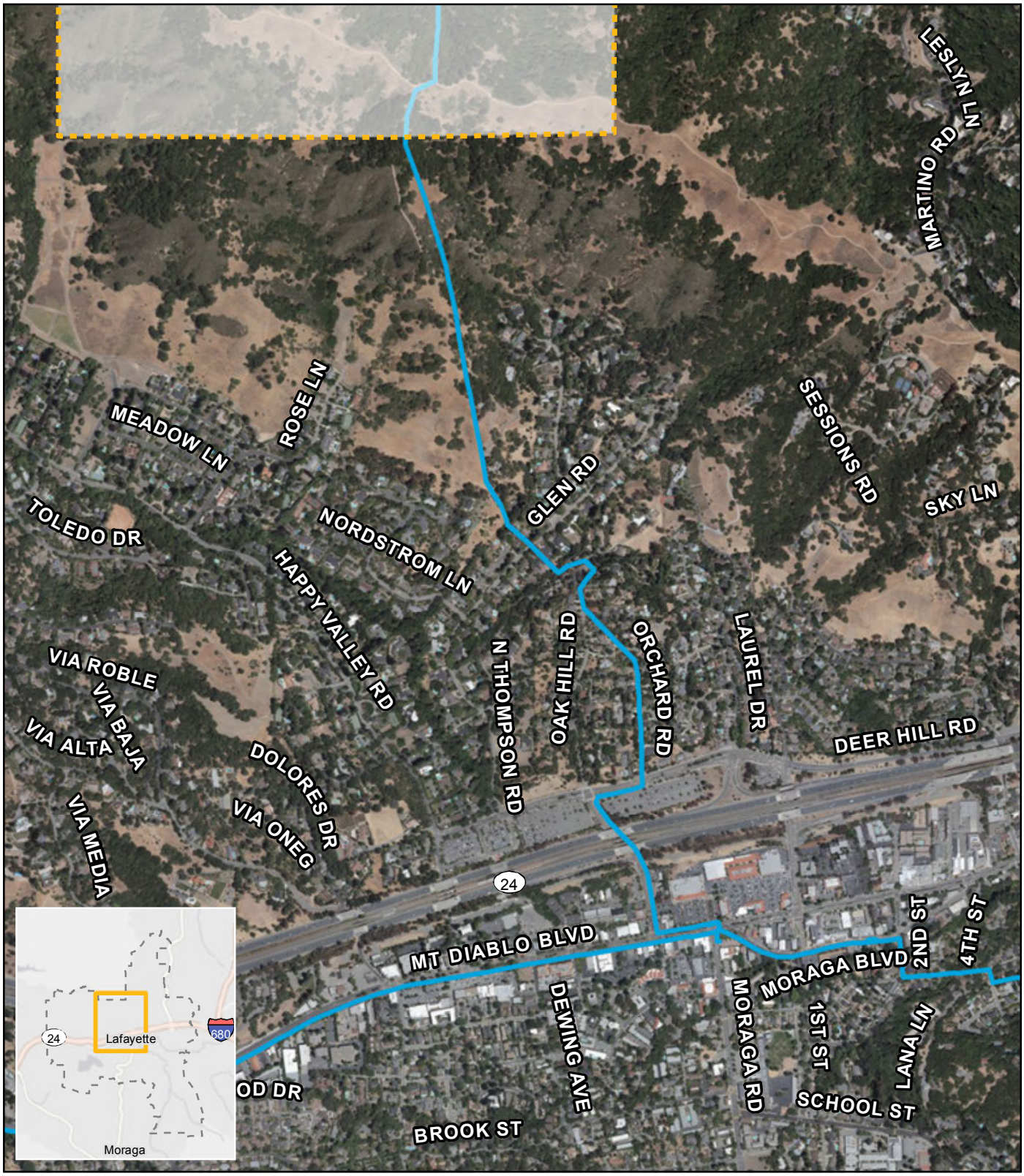
Gas Transmission Pipeline

City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Area 2

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix B - Area Map

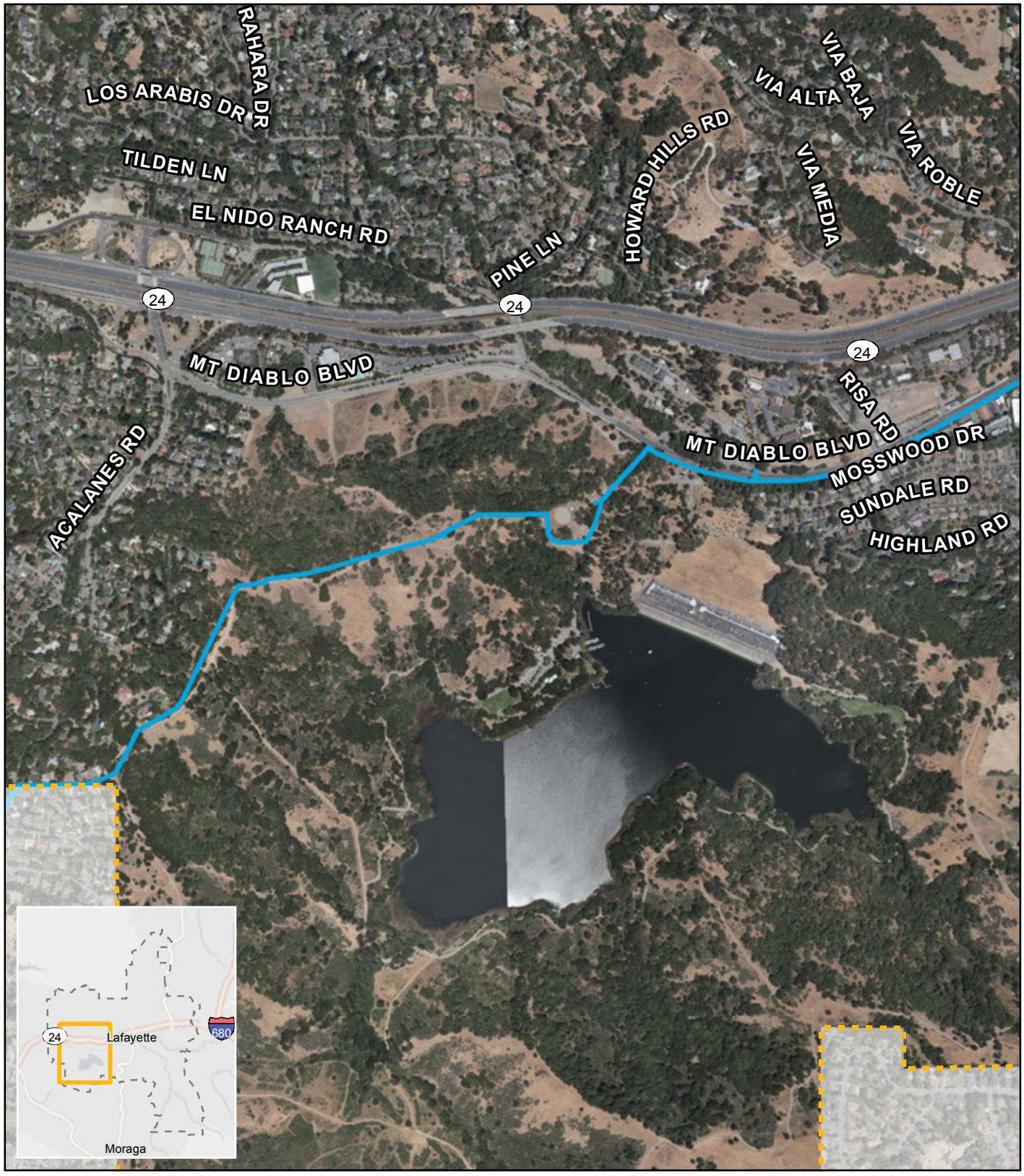


Gas Transmission Pipeline
City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Area 3

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix B - Area Map

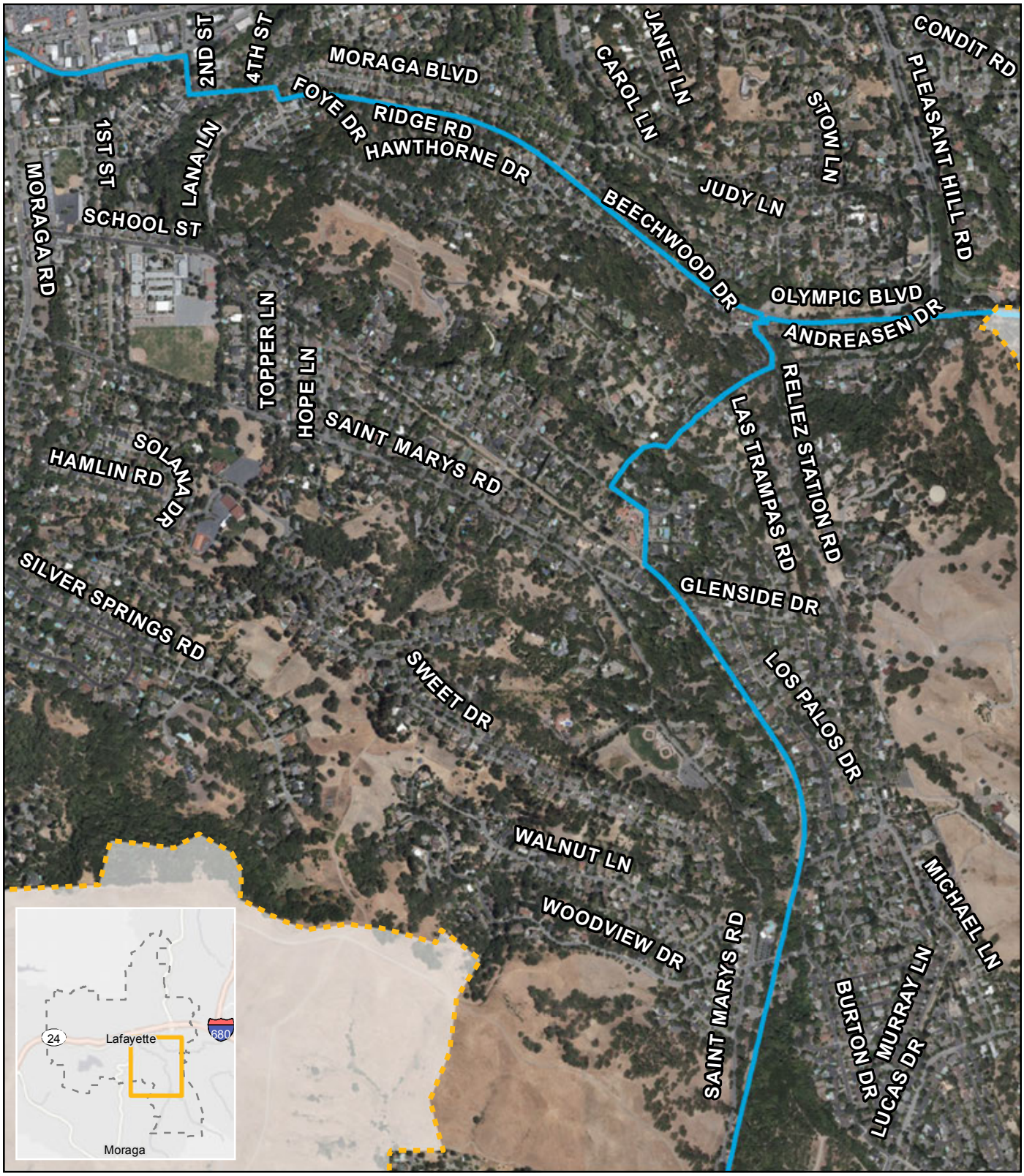


Gas Transmission Pipeline
City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Area 4

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix B - Area Map

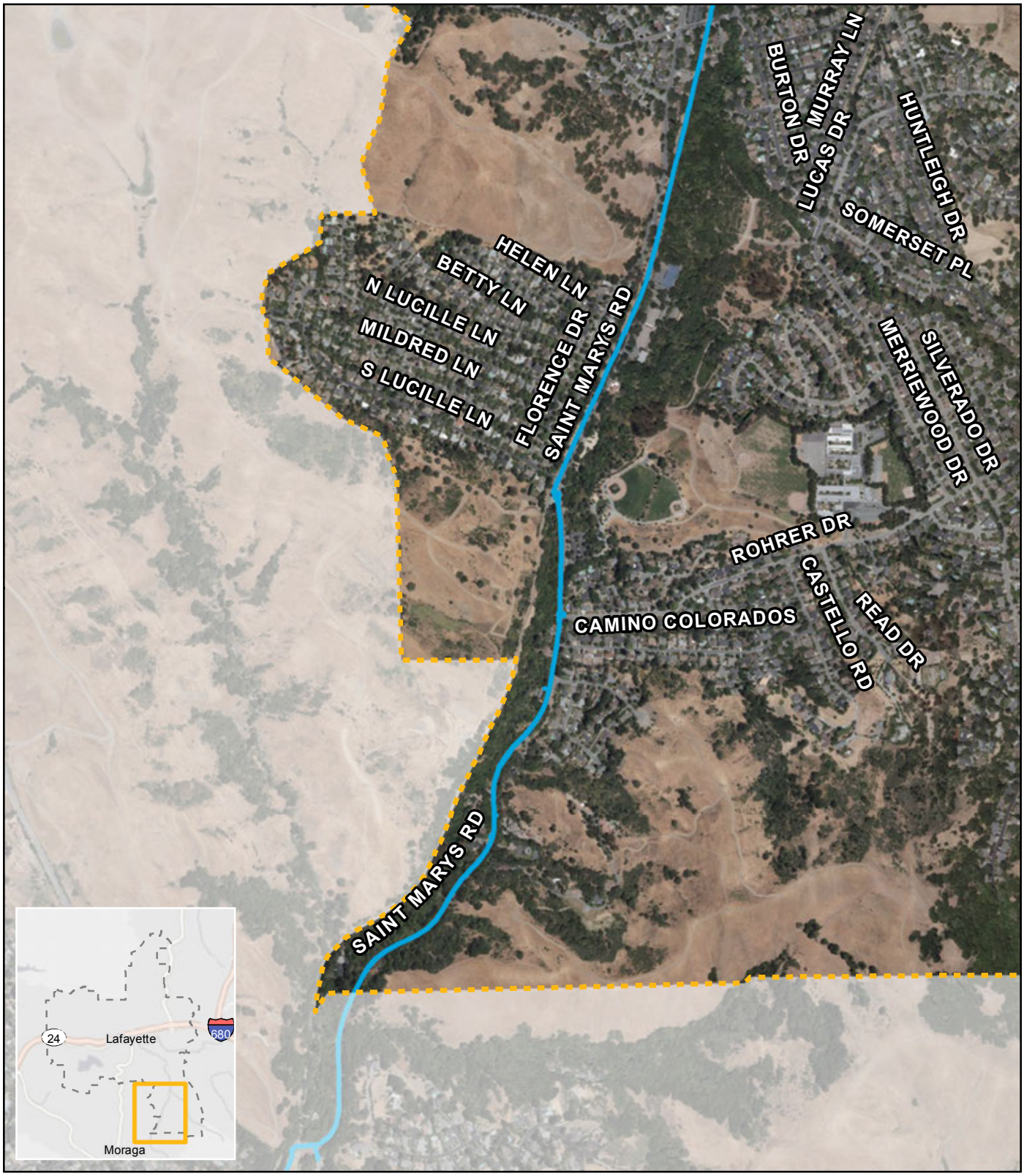


Gas Transmission Pipeline
City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Area 5

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix B - Area Map



Gas Transmission Pipeline
City Boundary

Gas Transmission Pipeline - Lafayette, Calif.
Area 6

PG&E Critical Infrastructure Information. Facilities to be operated by PG&E personnel only.
Pipeline and boundary locations are approximate and for illustrative purposes only.
Data subject to updates. Call 811 before you dig. Map Created: 7/12/2016

Appendix C - Public Sources

Publicly Available Sources

Please see below for a list of publicly available resources, some of which are considered in assessing risk based on Weather Related Outside Forces (WROF). Please note, PG&E also incorporates findings from maintenance, monitoring, and assessment activities in evaluating WROF.

- http://ngmdb.usgs.gov/Prodesc/proddesc_47.htm
- http://earthquake.usgs.gov/hazards/qfaults/map/#qfaults
- http://www.waterboards.ca.gov/rwqcb7/water_issues/programs/stormwater/docs/cgp_r_factor.pdf
- http://pubs.usgs.gov/pp/1988/1434/
- http://www.fema.gov/media-library/assets/documents/24609?id=5120
- http://pubs.usgs.gov/ds/2006/177/
- http://pubs.usgs.gov/mf/2001/2379/
- http://www.pge.com/en/safety/systemworks/dcpp/sshac/index.page
- http://pubs.usgs.gov/sim/3195/
- http://www.tucson.ars.ag.gov/unit/publications/PDFfiles/2122.pdf
- http://pubs.usgs.gov/of/2006/1037/
- https://www3.epa.gov/npdes/pubs/fact3-1.pdf
- http://earthquake.usgs.gov/monitoring/deformation/data/?region=SF
- http://www.conservation.ca.gov/cgs/information/publications/Pages/QuaternaryFaults_ver2.aspx
- http://earthquake.usgs.gov/research/external/reports/05HQGR0023.pdf
- http://www.conservation.ca.gov/cgs/fwgp/Pages/watersheds_download.aspx
- https://pubs.usgs.gov/of/2008/1009/
- http://projects.atlas.ca.gov/projects/sacvalleygeol/
- http://www.humboldtgov.org/276/GIS-Data-Download
- http://maps.conservation.ca.gov/cgs/lsi/

Pacific Gas and Electric Company

Examples of roots causing damage to natural gas transmission pipelines when trees are located too close to the pipeline

Additional sample photos of trees roots interacting with pipes can be found in the publicly available Pipelines and Informed Planning Alliance (PIPA) report on the U.S. Department of Transportation Pipeline & Hazardous Materials Safety Administration website at https://primis.phmsa.dot.gov/comm/pipa/landuseplanning.htm.

Pacific Gas and Electric Company

Examples of roots causing damage to natural gas transmission pipelines when trees are located too close to the pipeline

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