June 2019 | Pipeline Safety Hazard Assessment

HAMILTON HIGH SCHOOL EXPANSION

Hamilton Unified School District

Prepared for:

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Project Number HASD-01.0

PLACEWORKS

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1. Introduction

1.1 PURPOSE

This report presents the results of a Pipeline Safety Hazard Assessment (PSHA) prepared for the Hamilton Unified School District (District) which is evaluating expansion of the existing facilities at Hamilton High School. The PSHA evaluates potential exposure and fatality risk to staff and students from underground or at-grade natural gas or hazardous liquid pipeline releases and the potential for flooding from high volume water pipelines.

1.2 SCHOOL SITE LOCATION

The District intends to modernize the existing Hamilton High School, which is located at 620 Canal Street, Hamilton City, Glenn County, California. As part of the proposed project, the District would acquire an approximately 45-acre property adjacent to the existing school; construct new playing fields, a gymnasium and parking lot on the expanded site; modernize existing buildings; and plan future construction of new classroom buildings. The 45-acre project site is bounded by agricultural land to the north, commercial/agricultural properties (Westermann Farms and Dollar General) to the east, West 6th Street/State Route 32 (SR-32) to the south, and Canal Street/State Route 45 (SR-45) and the Glenn-Colusa Irrigation District Main Canal to the west. The California Northern Railroad (CFNR) right-of-way is approximately 600 feet northeast of the site. The school site is shown in Figure 1.

1.3 REGULATORY REQUIREMENTS

Under Education Code Section 17251, the California Department of Education (CDE) has authority to approve acquisition of proposed school sites. The school district must obtain CDE approval for sites to receive state funds under the state's School Facilities Program administered by the State Allocation Board. CDE standards and regulations for this process are presented in California Code of Regulations (CCR), Title 5, Sections 14010, 14011, and 14012. Information on assessing safety hazard related to pipelines is discussed in Section 14010 (h):

> *The site shall not be located near an above-ground water or fuel storage tank or within 1,500 feet of the easement of an above-ground or underground pipeline that can pose a safety hazard as determined by a risk analysis study, conducted by a competent professional, which may include certification from a local public utility commission.*

By CDE policy, "any pipeline that has a maximum operating capacity of at least 80 pounds per square inch (psi), including but not limited to those that carry natural gas, liquid petroleum, fuels or hazardous chemicals, shall be included in a pipeline survey, regardless if the pipeline is classified as a transmission or distribution line. Pipelines located within a railroad or other easement or those pipelines serving gas and oil well sites and fields shall also be included".

Additional information on pipelines is contained in CDE's School Site Selection and Approval Guide. This document states that CDE will not approve a proposed school site if the site "contains one or more pipelines, situated underground or aboveground, which carries hazardous substances, acutely hazardous materials, or hazardous wastes, unless the pipeline is a natural gas line which is used only to supply natural gas to that school or neighborhood" (CDE, 2000).

The CDE's School Site Selection and Approval Guide also contain provisions for evaluating high-pressure water pipelines:

> *To ensure the protection of students, faculty, and school property if the proposed school site is within 1,500 feet of the easement of an aboveground or underground pipeline that can pose a safety hazard, the school district should obtain the following information from the pipeline owner and operator:*
>
> - *Pipeline alignment, size, type of pipe, depth of cover*
> - *Operating water pressures in pipelines near the proposed school site*
> - *Estimated volume of water that might be released from the pipeline should a rupture occur on the site*
> - *Owner's assessment of the structural condition of the pipeline.*

1.4 REPORT OBJECTIVES

To meet the requirements of CCR Title 5 Sections 14010 (d) and (h) and CDE's policy on pipelines, this PSHA is designed to meet the following objectives:

- Identify all natural gas and hazardous liquid pipelines located within 1,500 feet of proposed or existing school sites
- Complete a Stage 1, Stage 2, or Stage 3 risk analysis for each identified pipeline to predict fatality risk
- Where appropriate, identify and develop mitigation measures to reduce predicted fatality risk to a level below an established significance threshold
- Identify all high pressure/high volume water pipelines/canals within 1,500 feet of the proposed school site and evaluate the potential for flooding
- Where appropriate, identify and develop mitigation measures to reduce flooding impacts to acceptable levels.

1.5 ASSESSMENT METHODOLOGY

The CDE has developed and published guidance procedures for evaluating safety hazards associated with natural gas and hazardous liquid releases from underground and aboveground pipelines. A detailed description of the procedures is provided in the Guidance Protocol for School Site Pipeline Risk Analysis (CDE, 2007). These procedures were used in conducting the PSHA.

The PSHA process is composed of two steps. The first step (Stage 1) is a risk screening analysis (RSA), based on the distance of the pipeline(s) from the school site and operating characteristics of the pipeline(s). If the screening criteria are met, the level of risk is acceptable and no further analysis is required.

1. Introduction

If the screening criteria are not met, then the second step of the PSHA process is completion of a Stage 2 quantitative risk analysis (QRA). The Stage 2 risk analysis considers pipeline accident rates, school dimensions, conditional probabilities for ignition, school attendance time, and fatality probabilities for different exposure scenarios (pool fire, flash fire, and explosion) to estimate individual risk (IR). Pipelines located within 50 feet of a school site also are subject to a Stage 3 (more comprehensive) analysis to verify the results of the Stage 2 evaluation.

Individual fatality risk is compared to the significance threshold level of one in one million (1.0×10^{-6}; individual risk criterion, IRC). If the estimated risk is less than one in one million, then no significant safety hazard is predicted for the school site. If the estimated risk is greater than one in one million, mitigation measures are required to reduce risk to within acceptable limits or a more detailed Stage 3 risk analysis can be conducted.

In addition to individual risk, an estimate of the potential risk for the population present at the school site is determined by calculating the total individual risk (TIR) indicator ratio and the population risk indicator. These parameters add an additional perspective by taking into account the site configuration and school population. There is no significance threshold established by the CDE for this evaluation, and this does not replace the IR estimate as the primary decision criteria for evaluating risk at the school site. However, it does provide additional information regarding the magnitude of risk at the school.

The CDE also has developed risk analysis procedures for evaluating flooding associated with releases from large diameter water pipelines, as described in CDE's Guidance Protocol for School Site Pipeline Risk Analysis (CDE, 2007). A safety issue associated with large diameter water pipelines is the potential for flooding. Also, releases from underground water pipelines can cause subterranean erosion of saturated soil, leading to subsidence or formation of a sinkhole. The most likely cause of failure is a large magnitude earthquake and associated strong ground shaking.

Although no specific criteria have been established by the CDE as a threshold of significance for flooding at a school site, a water depth of 12 inches or greater is a trigger that could warrant further evaluation (CDE, 2007).

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Source: ESRI, 2019

0 1,000
Scale (Feet)

Project Boundary

1,500-ft Radius

Figure 1
Site Location and Pipeline Map

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2. Hazard Assessment

2.1 PIPELINE INFORMATION AND OPERATIONAL DATA

There are two natural gas transmission pipelines within 1,500 feet of the school site. No natural gas distribution pipelines, crude oil pipelines, or other hazardous liquid pipelines were identified within the 1,500-foot radius (National Pipeline Mapping System, 2019). The locations of the pipelines are shown on Figure 1.

Pacific Gas & Electric (PG&E) owns and operates a 10.75-inch natural gas transmission pipeline (designated as Line 177A) approximately 550 feet to the northeast of the site at its nearest location (PG&E, 2019). Line 177A approaches the CFNR right-of-way from the east and then makes a 90-degree turn to be aligned along the east side of the railroad track. The pipeline then curves to the northwest and maintains its alignment along the CFNR right-of-way. The pipeline was originally installed in 1954, although various segments of the pipeline were replaced in 1987. The pipeline is constructed of steel and the segments near the school site have wall thicknesses that vary between 0.219 to 0.365 inch. The pipeline segment near the school site has a maximum allowable operating pressure (MAOP) of 819 pounds per square inch (psi).

There is an additional natural gas transmission pipeline (designated Line 1019-01 – distribution feeder main) approximately 600 feet east of the site. Line 1019-01 branches from Line 177A and continues toward the southeast within the CFNR right-of-way. The pipeline varies in diameter from 3.5 inches to 6.625 inches, but the segment closest to the school site is 6.625 inches in diameter. Therefore, the 6.625-inch diameter segment was analyzed in the PSHA. The pipeline was originally installed in 1968, but various segments were replaced in 1976, 1987, and 2009. The pipeline is constructed of steel and the segments near the school site have wall thicknesses that vary between 0.188 to 0.28 inch. The pipeline has a MAOP of 720 psi.

All PG&E pipelines are wrapped with tape or extru-coat plastic and equipped with an induced current cathodic protection system to minimize corrosion. The pipelines are buried a minimum of 3 feet below ground surface (bgs). Because the distance between isolation valves was not provided by PG&E, the CDE default distance of 5 miles was conservatively used in this analysis.

The PG&E pipelines are inspected in accordance with Federal (49 Code of Federal Regulations [CFR] 192) and State (California Public Utilities Commission [CPUC] General Order 112-E) regulations. The pipelines are patrolled quarterly and leak surveys are conducted annually. Also, the cathodic protection rectifiers are inspected annually and the pipe-to-soil potentials are measured six times per year. Under Federal and State regulations, the class designation of a pipeline is based on the types of buildings, population density, and level of human activity near the segment of pipeline and is used to determine the pipeline's MAOP. Pipelines are rated from Class 1 to Class 4, based on increasing levels of population. The pipelines within 1,500 feet of the school site are currently categorized as Class 1, which indicates a rural area.

Based on information provided from California Water Service (CalWater, 2019), there are no high volume (≥12 inch diameter) water pipelines within 1,500 feet of the project site. However, the Glenn-Colusa Irrigation District (GCID) owns and operates the GCID Main Canal, which is approximately 140 feet southwest from the proposed school site at its nearest location. The location of this canal is shown on Figure 1, and an evaluation of flooding potential with respect to the school site is provided in Section 2.6.

2.2 LAND USE AND TERRAIN

Surrounding land uses consist of agricultural land to the north and east, commercial properties to the east and south, residences across 6th Street to the south, and the GCID Main Canal and a parking lot to the west. There are no intervening buildings and/or structures that could partially block or buffer vapor releases or jet fires if an incident were to occur involving the natural gas pipelines in the CFNR easement north and east from the school site. Potential ignition sources may include overhead high voltage electrical lines, motor vehicles traveling along the adjacent streets, traffic and railroad crossing signals, and residential or commercial gas heating units.

2.3 RELEASE AND CONSEQUENCE SCENARIOS

In accordance with the CDE Guidance Protocol, two conservative release scenarios were evaluated for the natural gas pipeline: 1) a rupture or high volume release equal to the pipeline's diameter, and 2) a leak or small volume release from a 1-inch diameter hole. Three potential consequences were evaluated for each release scenario: 1) jet fire, 2) flash fire (flammable vapor cloud), and 3) explosion. Results from the ALOHA computer analyses indicate that unconfined vapor cloud explosions would not occur in an open environment (i.e., residential land use setting) and this scenario was not subject to further analysis.

2.4 STAGE 2 RISK ANALYSIS

The criterion for a Stage 1 screening analysis was not met because there are multiple pipelines within 1,500 feet of the school site. Therefore, a Stage 2 risk analysis was conducted to determine the cumulative individual risk (IR) to students and staff at the proposed school. The input data associated with this PSHA are provided in Appendix A and are summarized in Table 1.

Table 1 Stage 2 Analysis Inputs

Description	Diameter (inches)	Maximum Pipeline Pressure (psig)	Nearest Distance from Pipeline to Property Boundary (feet)
PG&E Natural Gas Transmission Pipeline – Line 177A	10.75	819	550
PG&E Natural Gas Transmission Pipeline – Line 1019-01	6.625	720	600

2.5 STAGE 2 RISK CALCULATION RESULTS

Risk calculation results for the natural gas pipeline are provided in Appendix A. The results indicate that the hazard footprints for the 6.625-inch natural gas transmission pipeline do not extend farther than 351 feet and would not reach the school site, which is approximately 600 feet from the pipeline. Therefore, in accordance with CDE procedures, the risk is less than significant, and no further evaluation is required for the 6.625-inch pipeline.

The calculated individual risk (IR) for the 10.75-inch natural gas transmission pipeline is 8.3×10^{-10}, which is much less than the TIR criterion of one in a million (1.0×10^{-6}) that is specified in the CDE manual. Therefore, the risk is less than significant.

As part of the Stage 2 analysis, TIR/IRC ratios and TIR indicator ratios were determined for the school site, based on the protocol presented in the CDE manual. The population risk indicator is estimated to be zero, because the jet flame hazard footprint does not reach the school site. The results are summarized in Table 2 and the calculations are provided in Appendix A.

Table 2 Stage 2 Analysis Results

Pipeline	TIR	TIR/IRC Ratio	TIR Indicator Ratio	Population Risk Indicator
10.75-inch natural gas transmission pipeline	8.3×10^{-10}	0.00	0.25	0

There are no significance thresholds established by CDE for the TIR/IRC ratio, TIR indicator ratio, or population risk indicator. These values are simply used by CDE reviewers as guidelines to determine the relative potential risk at a school site.

2.6 CANAL FLOODING POTENTIAL

In addition to natural gas and hazardous liquid pipelines, the CDE requires that the risk of releases be evaluated from high volume ($\geq$12 inches) water pipelines and aqueducts/canals. The CDE Guidance Protocol for School Pipeline Risk Analysis provides a methodology for evaluating the potential for flooding. A probability analysis is not required. CalWater responded there are no high volume water pipelines within 1,500 feet of the project site (CalWater, 2019).

The Glenn-Colusa Irrigation District (GCID) Main Canal is 140 feet west of the school site. The earthen canal is owned and operated by GCID, being the largest water district in the Sacramento Valley, with boundaries that cover approximately 175,000 acres. The GCID Main Canal is approximately 65 miles long and conveys irrigation water into a complex system of over 400 miles of canals. West of the school site, this reach of GCID Main Canal is earthen open channel. The corresponding design configuration is as follows: symmetrical trapezoid shape with a 70-foot wide bottom, approximate 130-foot wide top, water depth of approximately 13.5 feet, and a maximum flowrate of 3,000 cubic feet per second (cfs). GCID staff responded the typical flowrate for the canal at this site varies from 1,200 cfs to 3,000 cfs during the irrigation season with

an established Winter Maintenance Shutdown Period from January 7 through February 20; additionally, there is no history of failures on record within 1,500 feet of the school site (GCID, 2019).

The provided design drawings are dated September 1981, which for the canal reach west of the school site indicate: the top elevation of the west bank of the canal ranges from 8 to 13.5 feet above the designed water surface level, and the elevation of the maintenance road along the east bank is approximately 5 feet above the designed water surface level. The average freeboard of the canal varies throughout the year depending on water allotments. During maximum flow, the approximate freeboard is 5 feet based on a maximum designed flowrate of 3,000 cfs. The maximum canal water level is approximately 143.5 feet (National Geodetic Vertical Datum of 1929 or NGVD29).

The GCID Main Canal is an open channel with non-pressurized (gravity) flow in this area, and there is no credible mechanism for catastrophic failure unless there is an external event, such as an earthquake. Earthquakes or subsidence typically do not result in the canal releasing water that can cause flooding since it is primarily below ground. According to the United States Geological Survey Interactive Aggregation Website (2019), the maximum credible earthquake (i.e., 2% exceedance probability in 50 years) at the site was determined to have a peak ground acceleration (PGA) of 0.39g. This corresponds with an earthquake that has the potential to cause moderate damage to water facilities ($0.15g \leq PGA \leq 0.5g$). The site is not located in an Alquist-Priolo fault rupture hazard zone. The nearest known active earthquake faults are the Corning Fault, which is approximately 9.5 miles to the west and the Chico Monocline Fault, which is about 12 miles to the east.

The American Lifelines Alliance (ALA) estimated the repair rate of irrigation canals, based on damage from the 1979 Imperial Valley Earthquake (ALA, 2001). The repair rates are highest for canals close to the fault. For a distance of 15 to 20 kilometers to the nearest fault, the GCID Main Canal is estimated to have 0.01 repairs per kilometer. As stated previously, canals do not typically fail catastrophically during earthquakes but may undergo slumps, lateral spreading, and cracking. During the 1979 Imperial Valley Earthquake, the All-American Canal was extensively damaged due to settlement, slumping, and cracking. The flow rate in the canal was reduced from 3,700 cfs to 700 cfs while repairs were made to prevent the potential for flooding over damaged levees, but the All-American Canal was back on line at full capacity within four days. The Contra Costa Canal underwent minor levels of ground shaking during the 1989 Loma Prieta Earthquake, but no damage was reported.

In addition, the GCID Main Canal is operated at various steady flow rates that are systematically adjusted to meet irrigation demand via a sophisticated SCADA (Supervisory Control and Data Acquisition) system. The maximum water elevation is 143.5 feet (NGVD29) which is approximately 10 feet below the existing school site elevation of 153 feet above mean sea level (msl). As the water level within the canal is controlled to maintain a constant flow rate, there is minimal potential for flooding or a rise in water elevations to occur. Although the east bask on the GCID Main Canal is relatively level with Canal Street and the parking lot, the general topographic gradient in the area is to the west and southwest, which is away from the school site.

There could be underground seepage in the event of a large magnitude earthquake due to differential ground movement, but this is not likely to lead to flooding at the school site. Any potential erosion would occur at

lower elevations and would not impact the school site. In most instances, the flow rate in the canal would be reduced to a water level below the point of concern until repairs can be made. Therefore, if a large magnitude earthquake were to cause damage to the GCID Main Canal, it would not pose a significant risk of flooding to students and staff at the proposed school site.

2. Hazard Assessment

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3. Summary and Recommendations

The results of the Stage 2 screening analysis indicate that the total individual risk is 8.3×10^{-10} for the PG&E natural gas transmission pipelines, which is much less than the CDE significance threshold of one in a million (1.0×10^{-6}). Therefore, the risk to staff and students at the school site is not considered to be significant and no mitigation measures are required. Additionally, damage to the Glenn-Colusa Irrigation District Main Canal as the result of a maximum credible earthquake would not result in significant flooding at the school site or pose a risk to students and staff.

Even though the impact of pipeline releases was found to be less than significant, it is recommended that the school's emergency response and evacuation plan address the possibility of natural gas or water releases and identify potential evacuation routes. Also, contact names and numbers for the pipeline and water agencies (Pacific Gas & Electric Company, Glenn-Colusa Irrigation District, and the California Water Service) should be maintained with the emergency response plan in case the school needs to report pipeline releases or damage to the Glenn-Colusa Irrigation District Main Canal. A map of the pipeline and canal locations and emergency contact information should be kept with the school's emergency response plan.

3. Summary and Recommendations

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4. References

American Lifelines Alliance (ALA), 2001. Seismic Fragility Formulations for Water Systems, Part 2 – Appendices. April 2001.

California Department of Education (CDE), 2007. Guidance Protocol for School Site Pipeline Risk Analysis, Prepared by URS Corporation. February, 2007.

_____. 2000. Resources for School Facilities Planning, School Selection and Approval Guide. Prepared by School Facilities Planning Division, CDE, Sacramento, CA.

California Water Service (CalWater), 2019. Email Correspondence and information provided by Mr. Jason Hammond, Construction Superintendent to Ms. Robyn Chaconas, Project Engineer, PlaceWorks. Dated June 5, 2019.

Glenn-Colusa Irrigation District (GCID), 2019. Email Correspondence and information provided by Mr. Tomas Loera, Engineering Technician to Ms. Robyn Chaconas, Project Engineer, PlaceWorks. Dated May 20, 2019.

Jeffers & Associates, 2006. Modified Manning's Equation Solver. Version 3.0.

National Pipeline Mapping System, 2019. Hazardous liquids pipeline map produced by the NPMS Public Viewer at www.npms.phmsa.dot.gov. Accessed on January 16, 2019.

Pacific Gas & Electric Company (PG&E), 2019. Follow-up pipeline information provided by Ms. Sasha Helton, Gas Technical Specialist for PG&E to Ms. Robyn Chaconas, Project Engineer, PlaceWorks. Dated May 2, 2019.

US Environmental Protection Agency (USEPA), 2016. ALOHA (Areal Locations of Hazardous Atmospheres) computer model, Version 5.4.7, at USEPA website: http://www.epa.gov/emergencies/content/cameo/aloha.htm.

4. References

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Appendix A. CDE Risk Analysis Summary Forms and Calculations

Appendix

Local Educational Agency	
Date:	June 27, 2019
Local Educational Agency	Hamilton Unified School District
Contact	Diane Holliman, Chief Business Official
Telephone Number	530.826.3261
E-mail address	
Street Address	620 Canal Street
Department or Mail Drop	
City	Hamilton City
County	Glenn
Zip Code	95951

Proposed School Campus Site	
Name	Hamilton High School
Location Description	620 Canal Street
Pipelines of Interest	Two natural gas transmission pipelines
Operator/Owner	Pacific Gas & Electric Company
Product Transported	Natural Gas
Pipeline Diameter (inches)	10.75-inch; 6.625-inch
Operating Pressure (psig)	MAOP = 819 psig for 10.75-inch natural gas pipeline MAOP = 720 psig for 6.625-inch natural gas pipeline
Closest Approach to Property Line	10.75-inch natural gas pipeline = 550 feet 6.625-inch natural gas pipeline = 600 feet

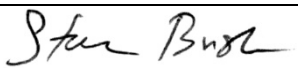
Individual Risk Estimate Result

Type of Analysis (Check One)	Stage 1		Stage 2	X	Stage 3		
Individual Risk Estimate Value	8.3×10^{-10}						
Individual Risk Criterion	1.0E-06 (0.000001)						
IR Significance (check one)	**Significant**						
	Insignificant	X					

Certification and Signatures of Risk Analyst(s)

This analysis was conducted according to the 2007 CDE Protocol except as noted. All modifications within the Stage 2 framework, and exceptions to the data and processes established in the 2007 CDE Protocol, if any, were based upon my professional opinion and in a manner consistent with the standards of care and skill ordinarily exercised by professionals working on similar projects.

I certify that the estimated risk levels were derived based upon the 2007 CDE Protocol, unless otherwise noted, and that these levels demonstrate, with reasonable expectations of uncertainties for such estimates, that the estimated Individual Risk for the school site, as the site was planned at the time of this analysis, including mitigation measures, if any, meets the Individual Risk Criterion stated in the 2007 CDE Protocol, based on the information provided to me.

Printed Name	Signature	Position or Title
Steven J. Bush, P.E.		Senior Engineer

Notice: In the event that the Individual Risk Criterion could not be met, at the option of the LEA, CDE will still accept a report for review and consultation with the LEA.

6.625-INCH NATURAL GAS TRANSMISSION PIPELINE

Input Data		
Product	natural gas	
Diameter	6.625	inches
Pressure	720	psig
R0	600	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

Base and Conditional Probability Calculations							
Base		**Leak**		**Rupture**		**Exposure**	
F0	1.2E-04	**PC(L)**	0.80	**PC(R)**	0.20	**PC(OCC)**	0.16
P0	1.2E-04	**PC(LIG)**	0.30	**PC(RIG)**	0.45	**PC(OUT)**	0.25
PAF	1.0	**PC(FIG)**	0.99	**PC(FIG)**	0.99		
PA	1.2E-04	**PC(JF)**	0.98	**PC(JF)**	0.98		
		PC(FF)	0.01	**PC(FF)**	0.01		
		PC(EIG)	0.01	**PC(EIG)**	0.01		
Calculated Values:							
PA(LJF)	0.0E+00	**PCI(LJF)**	0.233	**PCI(RJF)**	0.087		
PA(RJF)	0.0E+00	**PCI(LFF)**	0.002	**PCI(RFF)**	0.001		
PA(LFF)	0.0E+00	**PCI(LEX)**	0.002	**PCI(REX)**	0.001	**PC(EXPO)**	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

Impact Probability Calculations							
Probability Term				**Values**			
PC(LJF) =	**PA(LJF) x**	**PCI(LJF) x**	**PC(EXPO) =**	0.0E+00	0.23	0.040	**0.0E+00**
PC(RJF) =	**PA(RJF) x**	**PCI(RJF) x**	**PC(EXPO) =**	0.0E+00	0.09	0.040	**0.0E+00**
PC(LFF) =	**PA(LFF) x**	**PCI(LFF) x**	**PC(EXPO) =**	0.0E+00	0.002	0.040	**0.0E+00**
PC(RFF) =	**PA(RFF) x**	**PCI(RFF) x**	**PC(EXPO) =**	0.0E+00	0.001	0.040	**0.0E+00**
PC(LEX) =	**PA(LEX) x**	**PCI(LEX) x**	**PC(EXPO) =**	0.0E+00	0.002	0.040	**0.0E+00**
PC(REX) =	**PA(REX) x**	**PCI(REX) x**	**PC(EXPO) =**	0.0E+00	0.001	0.040	**0.0E+00**

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

IR Calculation				
	MAX PF(X)		**PC(X)**	**IR(X)**
IR(LJF) =	1.00		0.0E+00	**0.0E+00**
IR(RJF) =	1.00		0.0E+00	**0.00E+00**
IR(LFF) =	1.00		0.0E+00	**0.00E+00**
IR(RFF) =	1.00		0.0E+00	**0.00E+00**
IR(LEX) =	0.00		0.0E+00	**0.00E+00**
IR(REX) =	0.00		0.0E+00	**0.00E+00**
			TOTAL INDIVIDUAL RISK, TIR	**0.0E+00**
			CDE INDIVIDUAL RISK CRITERION, IRC	**1.0E-06**
			TIR/IRC RATIO	**0.00**
			PROTOCOL TIR INDICATOR RATIO	**0.00**

Hazard footprints do not reach school site.

XSEG Calculations

Pipe Size, Pressure, and Hazard Type			Front Property Line - Begin Zone 1			Begin Zone 2			Begin Zone 3			End Zone 3 -Back Property Line		
Pipe Size	Press.	Hazard X	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG
(in)	(psig)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
6.625	720	LJF	33	600	0	33	1063	0	33	1527	0	33	1990	0
6.625	720	RJF	93	600	0	93	1063	0	93	1527	0	93	1990	0
6.625	720	LFF	156	600	0	156	1063	0	156	1527	0	156	1990	0
6.625	720	RFF	351	600	0	351	1063	0	351	1527	0	351	1990	0
6.625	720	LEX	0	600	0	0	1063	0	0	1527	0	0	1990	0
6.625	720	REX	0	600	0	0	1063	0	0	1527	0	0	1990	0

6.625-Inch Natural Gas Transmission Pipeline
Leak - Jet Flame

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas is burning as it escapes from pipe
  Pipe Diameter: 6.625 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is closed off
  Pipe Roughness: smooth                 Hole Area: 0.785 sq in
  Pipe Press: 734.7 psia                 Pipe Temperature: 77° F
  Max Flame Length: 2 yards
  Burn Duration: ALOHA limited the duration to 1 hour
  Max Burn Rate: 563 pounds/min
  Total Amount Burned: 11,790 pounds

THREAT ZONE:
  Threat Modeled: Thermal radiation from jet fire
  Red    : 11 yards --- (15.77 kW/(sq m))
```

6.625-Inch Natural Gas Transmission Pipeline
Rupture - Jet Flame

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas is burning as it escapes from pipe
  Pipe Diameter: 6.625 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is connected to an infinite source
  Pipe Roughness: smooth                 Hole Area: 34.5 sq in
  Pipe Press: 734.7 psia                 Pipe Temperature: 77° F
  Max Flame Length: 18 yards
  Burn Duration: ALOHA limited the duration to 1 hour
  Max Burn Rate: 24,700 pounds/min
  Total Amount Burned: 79,986 pounds

THREAT ZONE:
  Threat Modeled: Thermal radiation from jet fire
  Red    : 31 yards --- (15.77 kW/(sq m))
```

6.625-Inch Natural Gas Transmission Pipeline
Leak - Flash Fire

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas escaping from pipe (not burning)
  Pipe Diameter: 6.625 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is closed off
  Pipe Roughness: smooth                 Hole Area: 0.785 sq in
  Pipe Press: 734.7 psia                 Pipe Temperature: 77° F
  Release Duration: ALOHA limited the duration to 1 hour
  Max Average Sustained Release Rate: 509 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 11,790 pounds

THREAT ZONE:
  Threat Modeled: Flammable Area of Vapor Cloud
  Model Run: Gaussian
  Red    : 52 yards --- (50000 ppm = LEL)
  Note: Threat zone was not drawn because effects of near-field patchiness
     make dispersion predictions less reliable for short distances.
```

6.625-Inch Natural Gas Transmission Pipeline
Rupture - Flash Fire

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas escaping from pipe (not burning)
  Pipe Diameter: 6.625 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is connected to an infinite source
  Pipe Roughness: smooth                 Hole Area: 34.5 sq in
  Pipe Press: 734.7 psia                 Pipe Temperature: 77° F
  Release Duration: ALOHA limited the duration to 1 hour
  Max Average Sustained Release Rate: 2,610 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 79,986 pounds

THREAT ZONE:
  Threat Modeled: Flammable Area of Vapor Cloud
  Model Run: Gaussian
  Red    : 117 yards --- (50000 ppm = LEL)
```

10.75-INCH NATURAL GAS TRANSMISSION PIPELINE

Input Data		
Product	natural gas	
Diameter	10.75	inches
Pressure	819	psig
R0	550	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	1030	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

Base and Conditional Probability Calculations							
Base		**Leak**		**Rupture**		**Exposure**	
F0	1.2E-04	**PC(L)**	0.80	**PC(R)**	0.20	**PC(OCC)**	0.16
P0	1.2E-04	**PC(LIG)**	0.30	**PC(RIG)**	0.45	**PC(OUT)**	0.25
PAF	1.0	**PC(FIG)**	0.99	**PC(FIG)**	0.99		
PA	1.2E-04	**PC(JF)**	0.98	**PC(JF)**	0.98		
		PC(FF)	0.01	**PC(FF)**	0.01		
		PC(EIG)	0.01	**PC(EIG)**	0.01		
Calculated Values:							
PA(LJF)	0.0E+00	**PCI(LJF)**	0.233	**PCI(RJF)**	0.087		
PA(RJF)	0.0E+00	**PCI(LFF)**	0.002	**PCI(RFF)**	0.001		
PA(LFF)	0.0E+00	**PCI(LEX)**	0.002	**PCI(REX)**	0.001	**PC(EXPO)**	0.04
PA(RFF)	2.3E-05						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

Impact Probability Calculations							
Probability Term				**Values**			
PC(LJF) =	**PA(LJF) x**	**PCI(LJF) x**	**PC(EXPO) =**	0.0E+00	0.23	0.040	**0.0E+00**
PC(RJF) =	**PA(RJF) x**	**PCI(RJF) x**	**PC(EXPO) =**	0.0E+00	0.09	0.040	**0.0E+00**
PC(LFF) =	**PA(LFF) x**	**PCI(LFF) x**	**PC(EXPO) =**	0.0E+00	0.002	0.040	**0.0E+00**
PC(RFF) =	**PA(RFF) x**	**PCI(RFF) x**	**PC(EXPO) =**	2.3E-05	0.001	0.040	**8.3E-10**
PC(LEX) =	**PA(LEX) x**	**PCI(LEX) x**	**PC(EXPO) =**	0.0E+00	0.002	0.040	**0.0E+00**
PC(REX) =	**PA(REX) x**	**PCI(REX) x**	**PC(EXPO) =**	0.0E+00	0.001	0.040	**0.0E+00**

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

IR Calculation				
	MAX PF(X)		**PC(X)**	**IR(X)**
IR(LJF) =	1.00		0.0E+00	**0.00E+00**
IR(RJF) =	1.00		0.0E+00	**0.00E+00**
IR(LFF) =	1.00		0.0E+00	**0.00E+00**
IR(RFF) =	1.00		8.3E-10	**8.34E-10**
IR(LEX) =	0.00		0.0E+00	**0.00E+00**
IR(REX) =	0.00		0.0E+00	**0.00E+00**
TOTAL INDIVIDUAL RISK, TIR				**8.3E-10**
CDE INDIVIDUAL RISK CRITERION, IRC				**1.0E-06**
TIR/IRC RATIO				**0.00**
PROTOCOL TIR INDICATOR RATIO				**0.25**

XSEG Calculations

Pipe Size, Pressure, and Hazard Type			Front Property Line - Begin Zone 1			Begin Zone 2			Begin Zone 3			End Zone 3 -Back Property Line		
Pipe Size	Press.	Hazard X	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG
(in)	(psig)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10.75	819	LJF	36	550	0	36	1457	0	36	2363	0	36	3270	0
10.75	819	RJF	177	550	0	177	1457	0	177	2363	0	177	3270	0
10.75	819	LFF	168	550	0	168	1457	0	168	2363	0	168	3270	0
10.75	819	RFF	699	550	1030	699	1457	0	699	2363	0	699	3270	0
10.75	819	LEX	0	550	0	0	1457	0	0	2363	0	0	3270	0
10.75	819	REX	0	550	0	0	1457	0	0	2363	0	0	3270	0

10.75-Inch Natural Gas Transmission Pipeline
Leak - Jet Flame

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas is burning as it escapes from pipe
  Pipe Diameter: 10.75 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is closed off
  Pipe Roughness: smooth                 Hole Area: 0.785 sq in
  Pipe Press: 833.7 psia                 Pipe Temperature: 77° F
  Max Flame Length: 2 yards
  Burn Duration: ALOHA limited the duration to 1 hour
  Max Burn Rate: 640 pounds/min
  Total Amount Burned: 24,156 pounds

THREAT ZONE:
  Threat Modeled: Thermal radiation from jet fire
  Red    : 12 yards --- (15.77 kW/(sq m))
```

10.75-Inch Natural Gas Transmission Pipeline
Rupture - Jet Flame

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas is burning as it escapes from pipe
  Pipe Diameter: 10.75 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is connected to an infinite source
  Pipe Roughness: smooth                 Hole Area: 90.8 sq in
  Pipe Press: 833.7 psia                 Pipe Temperature: 77° F
  Max Flame Length: 31 yards
  Burn Duration: ALOHA limited the duration to 1 hour
  Max Burn Rate: 74,000 pounds/min
  Total Amount Burned: 319,391 pounds

THREAT ZONE:
  Threat Modeled: Thermal radiation from jet fire
  Red    : 59 yards --- (15.77 kW/(sq m))
```

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas escaping from pipe (not burning)
  Pipe Diameter: 10.75 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is closed off
  Pipe Roughness: smooth                 Hole Area: 0.785 sq in
  Pipe Press: 833.7 psia                 Pipe Temperature: 77° F
  Release Duration: ALOHA limited the duration to 1 hour
  Max Average Sustained Release Rate: 598 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 24,156 pounds

THREAT ZONE:
  Threat Modeled: Flammable Area of Vapor Cloud
  Model Run: Gaussian
  Red    : 56 yards --- (50000 ppm = LEL)
```

Text Summary

ALOHA® 5.4.7

```
SITE DATA:
  Location: HAMILTON CITY, CALIFORNIA
  Building Air Exchanges Per Hour: 0.63 (unsheltered single storied)
  Time: June 4, 2019  1307 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: METHANE
  CAS Number: 74-82-8                    Molecular Weight: 16.04 g/mol
  PAC-1: 65000 ppm   PAC-2: 230000 ppm   PAC-3: 400000 ppm
  LEL: 50000 ppm     UEL: 150000 ppm
  Ambient Boiling Point: -258.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 3 meters/second from N at 3 meters
  Ground Roughness: urban or forest      Cloud Cover: 5 tenths
  Air Temperature: 77° F                 Stability Class: D
  No Inversion Height                    Relative Humidity: 50%

SOURCE STRENGTH:
  Flammable gas escaping from pipe (not burning)
  Pipe Diameter: 10.75 inches            Pipe Length: 26400 feet
  Unbroken end of the pipe is connected to an infinite source
  Pipe Roughness: smooth                 Hole Area: 90.8 sq in
  Pipe Press: 833.7 psia                 Pipe Temperature: 77° F
  Release Duration: ALOHA limited the duration to 1 hour
  Max Average Sustained Release Rate: 10,100 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 319,391 pounds

THREAT ZONE:
  Threat Modeled: Flammable Area of Vapor Cloud
  Model Run: Gaussian
  Red    : 233 yards --- (50000 ppm = LEL)
```

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 …

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

39.745709

Time Horizon

Return period in years

2475

Longitude

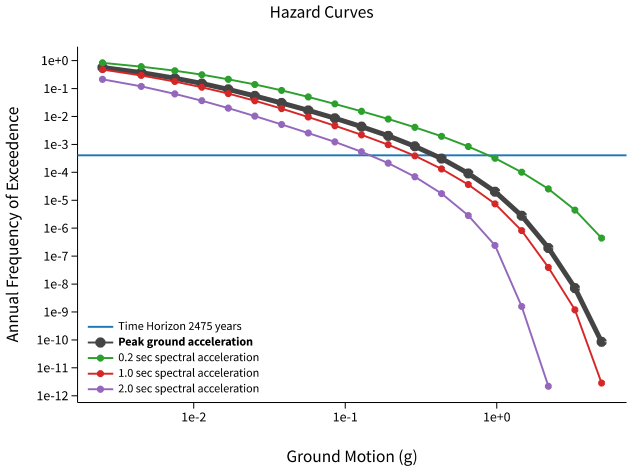
Decimal degrees, negative values for western longitudes

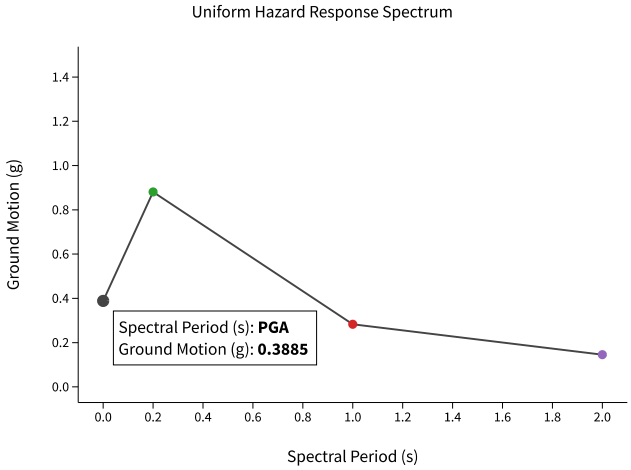
-122.018404

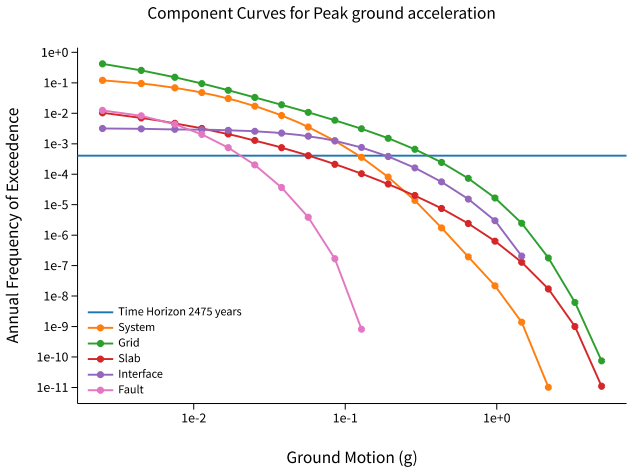
Site Class

760 m/s (B/C boundary)

Hazard Curve





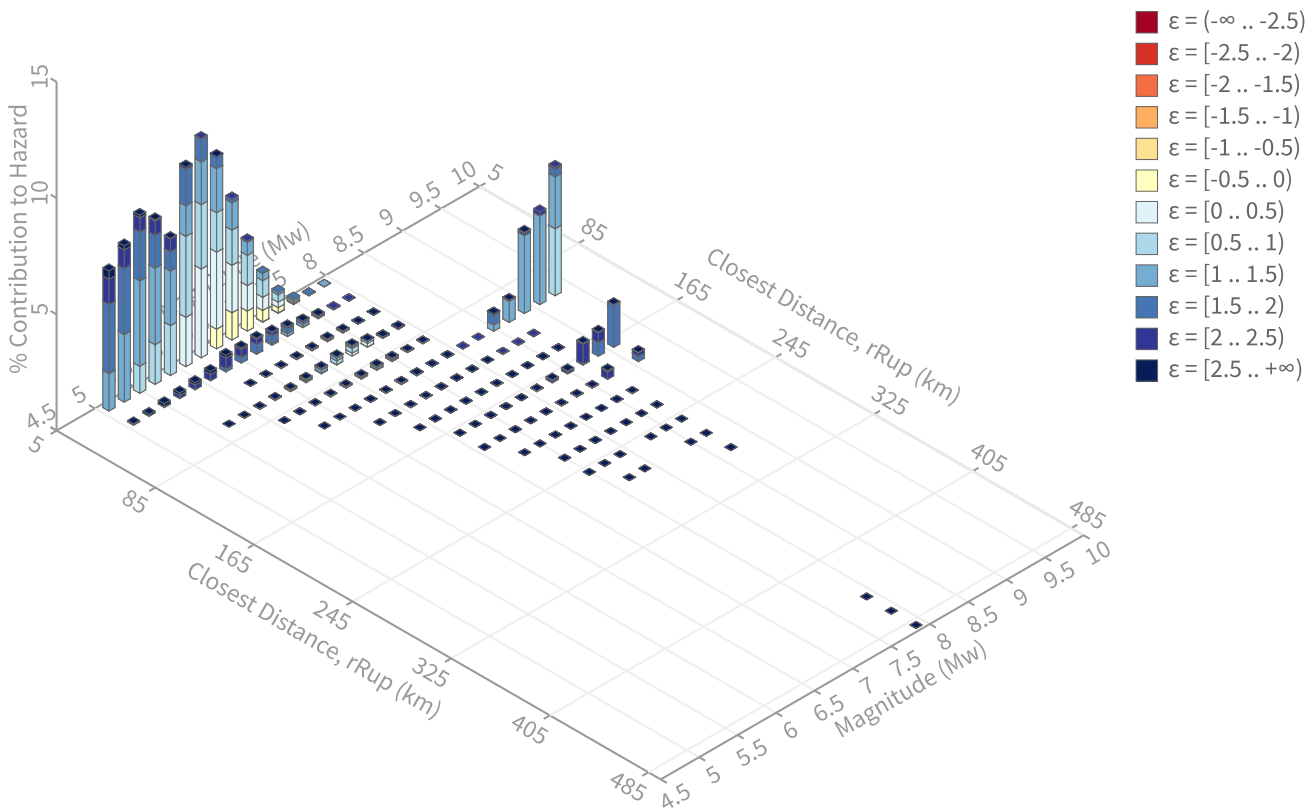


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.38853871 g

Recovered targets

Return period: 2604.5658 yrs
Exceedance rate: 0.00038394115 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.59 %

Mean (for all sources)

r: 35.69 km
m: 6.68
ε_0: 1.16 σ

Mode (largest r-m bin)

r: 10.1 km
m: 6.3
ε_0: 0.75 σ
Contribution: 9.42 %

Mode (largest ε_0 bin)

r: 7 km
m: 6.31
ε_0: 0.3 σ
Contribution: 3.82 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

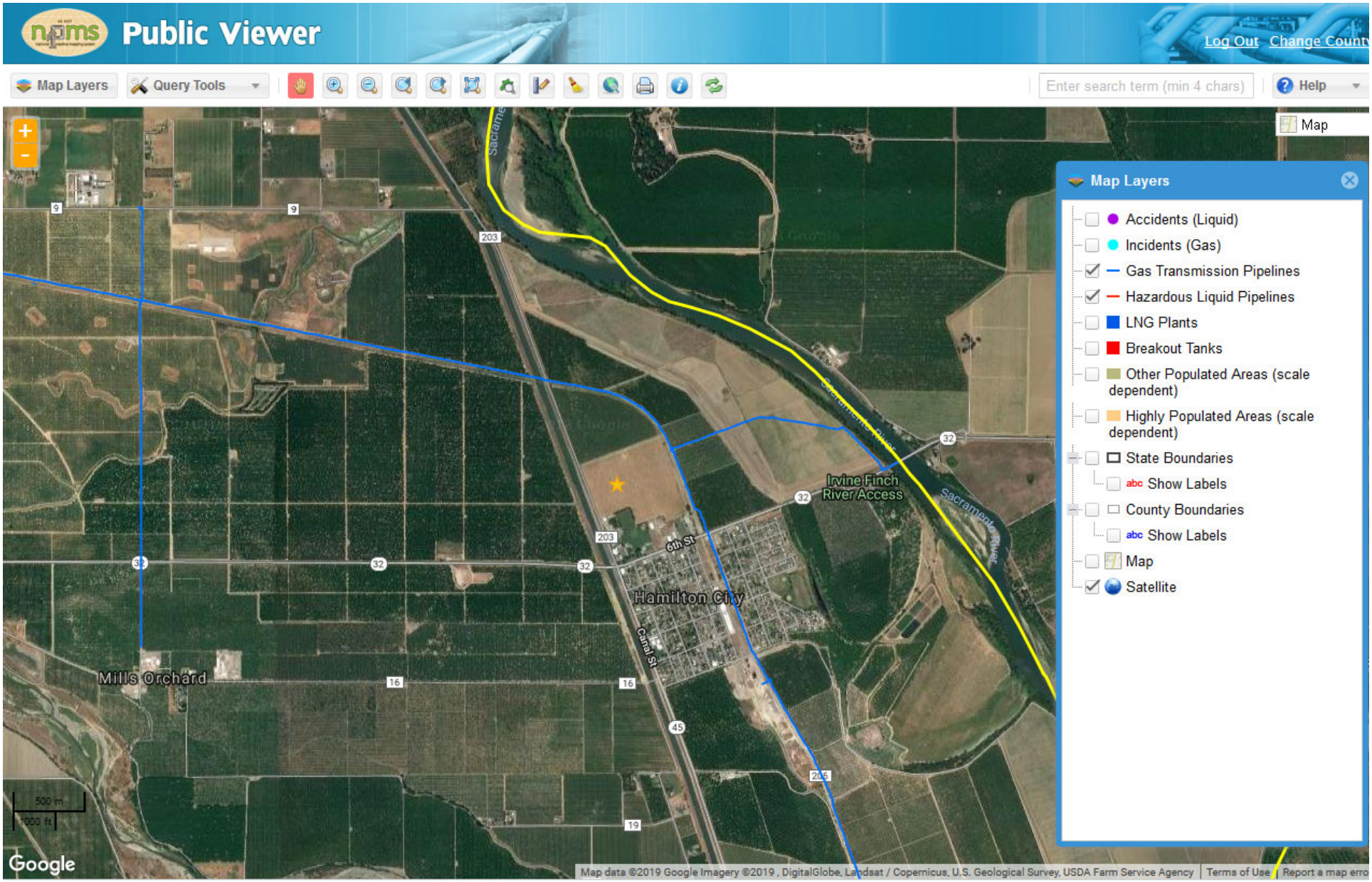
Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

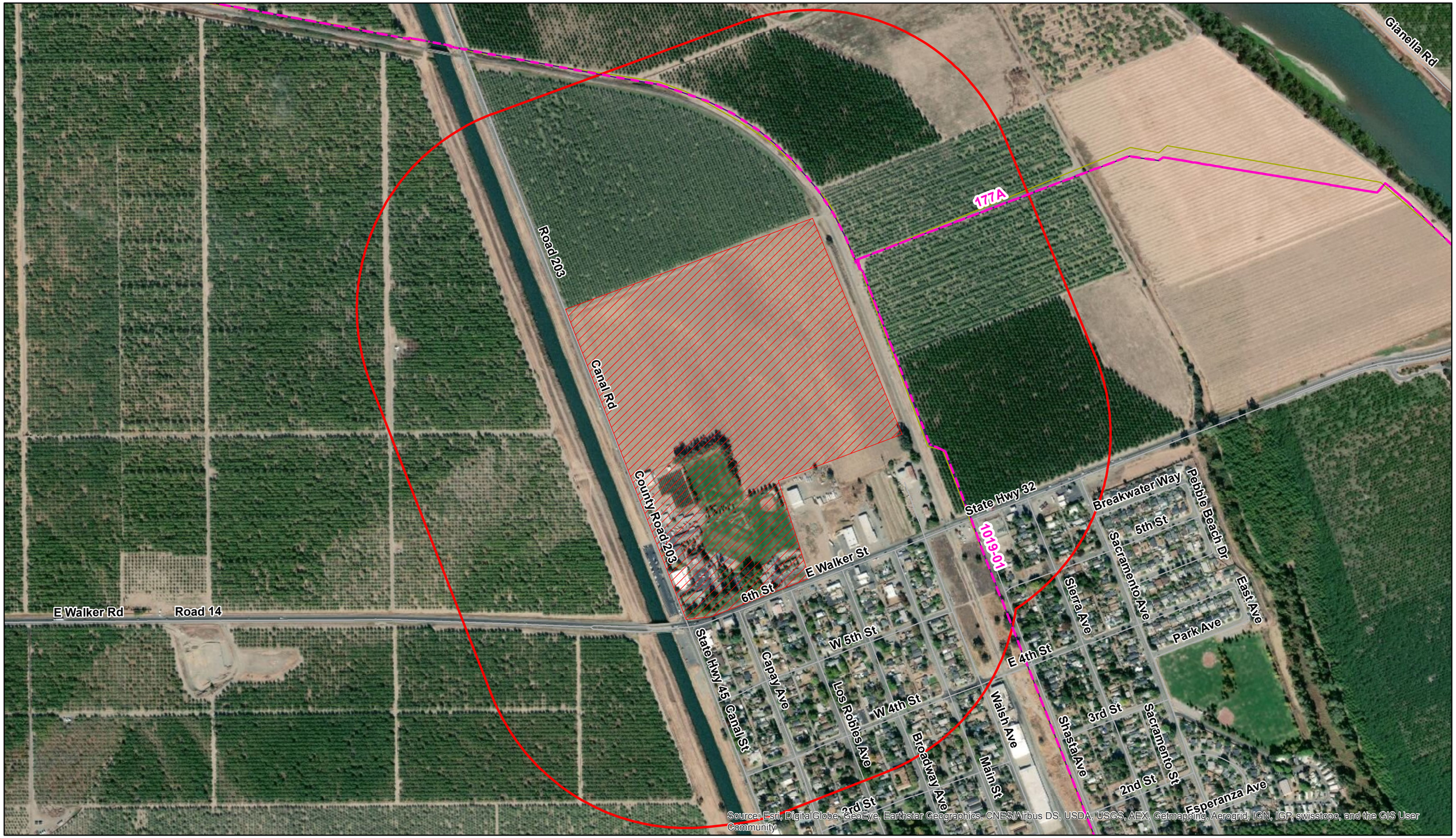
Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31 (opt)	Grid							38.66
PointSourceFinite: -122.018, 39.795		7.10	5.83	0.79	122.018°W	39.795°N	0.00	5.67
PointSourceFinite: -122.018, 39.804		7.68	5.87	0.86	122.018°W	39.804°N	0.00	3.58
PointSourceFinite: -122.018, 39.795		7.10	5.83	0.79	122.018°W	39.795°N	0.00	3.39
PointSourceFinite: -122.018, 39.822		8.88	5.96	0.99	122.018°W	39.822°N	0.00	3.39
PointSourceFinite: -122.018, 39.849		10.77	6.09	1.15	122.018°W	39.849°N	0.00	2.90
PointSourceFinite: -122.018, 39.804		7.68	5.87	0.86	122.018°W	39.804°N	0.00	2.16
PointSourceFinite: -122.018, 39.831		9.50	6.00	1.04	122.018°W	39.831°N	0.00	2.11
PointSourceFinite: -122.018, 39.894		14.08	6.30	1.39	122.018°W	39.894°N	0.00	2.00
PointSourceFinite: -122.018, 39.822		8.88	5.96	0.99	122.018°W	39.822°N	0.00	1.96
PointSourceFinite: -122.018, 39.849		10.77	6.09	1.15	122.018°W	39.849°N	0.00	1.84
PointSourceFinite: -122.018, 39.831		9.50	6.00	1.04	122.018°W	39.831°N	0.00	1.20
PointSourceFinite: -122.018, 39.894		14.08	6.30	1.39	122.018°W	39.894°N	0.00	1.16
PointSourceFinite: -122.018, 39.921		16.11	6.41	1.51	122.018°W	39.921°N	0.00	1.14
PointSourceFinite: -122.018, 39.903		14.76	6.34	1.43	122.018°W	39.903°N	0.00	1.04
UC33brAvg_FM32 (opt)	Grid							38.60
PointSourceFinite: -122.018, 39.795		7.10	5.83	0.79	122.018°W	39.795°N	0.00	5.67
PointSourceFinite: -122.018, 39.804		7.68	5.87	0.86	122.018°W	39.804°N	0.00	3.58
PointSourceFinite: -122.018, 39.795		7.10	5.83	0.79	122.018°W	39.795°N	0.00	3.39
PointSourceFinite: -122.018, 39.822		8.88	5.96	0.99	122.018°W	39.822°N	0.00	3.39
PointSourceFinite: -122.018, 39.849		10.77	6.09	1.15	122.018°W	39.849°N	0.00	2.89
PointSourceFinite: -122.018, 39.804		7.68	5.87	0.86	122.018°W	39.804°N	0.00	2.16
PointSourceFinite: -122.018, 39.831		9.50	6.00	1.04	122.018°W	39.831°N	0.00	2.10
PointSourceFinite: -122.018, 39.894		14.08	6.30	1.39	122.018°W	39.894°N	0.00	2.00
PointSourceFinite: -122.018, 39.822		8.88	5.96	0.99	122.018°W	39.822°N	0.00	1.96
PointSourceFinite: -122.018, 39.849		10.77	6.09	1.15	122.018°W	39.849°N	0.00	1.83
PointSourceFinite: -122.018, 39.831		9.50	6.00	1.04	122.018°W	39.831°N	0.00	1.20
PointSourceFinite: -122.018, 39.894		14.08	6.30	1.39	122.018°W	39.894°N	0.00	1.16
PointSourceFinite: -122.018, 39.921		16.11	6.41	1.51	122.018°W	39.921°N	0.00	1.13
PointSourceFinite: -122.018, 39.903		14.76	6.34	1.43	122.018°W	39.903°N	0.00	1.04
sub0_ch_bot.in	Interface							12.36
Cascadia Megathrust - whole CSZ Characteristic		113.46	9.12	1.15	122.945°W	40.376°N	311.92	12.36
sub0_ch_mid.in	Interface							3.65
Cascadia Megathrust - whole CSZ Characteristic		169.99	8.94	1.93	123.829°W	40.347°N	294.03	3.65

Appendix B. Agency Correspondence



Loading... | Zoom Level: 14 of 19 (1:24,000) Closest Zoom for Pipelines | 39.762563, -122.026133 | COUNTY : Glenn, CA



PG&E

05/02/2019
PG&E Critical Infrastructure Information
Must Be Held In Confidence
Facilities to be Operated by PG&E Personnel Only
Call 811 Before You Dig

- Transmission Main
- School Site Buffer
- School Site

School Site Map
620 Canal St., Hamilton City CA 95951

Gas Engineering & Operations
Geographic Information Services

By: S5HQ

1 inch = 600 feet (approx.)

0 0.3

Miles

N

Questionnaire For Natural Gas Pipeline Risk Analysis Study

Subject Property:	620 Canal St Hamilton City CA 95951	
1	Pipeline Reference (identification, line no., etc.):	1019-01
	1a. Type: (Distribution, Gathering or Transmission):	Distribution Feeder Main
2	Date of Installation (Year):	7/23/1968
3	Maximum Allowable Operating Pressure (psig):	720
	3a. Normal Operation Pressure (MOP)	720
4	Diameter (inches):	6.625
5	Construction / Wall Thickness (steel, plastic/inches):	Steel /0.188
6	Corrosion Prevention (cathodic protection, tape, etc.):	Cathodic
7	% of Specified Minimum Yield Strength (MAOP):	30.21
8	Classification (Present) (1,2,3 or 4)	Class 1
9	Inspection/Testing Results (method, date, etc.):	Per CPUC 112E
10	History of Incidents:	N/A
11	Pipeline Location Map within 1,500 feet of subject Property:	Attached

1	Pipeline Reference (identification, line no., etc.):	177A
	1a. Type: (Distribution, Gathering or Transmission):	Local Transmission
2	Date of Installation (Year):	7/22/1954
3	Maximum Allowable Operating Pressure (psig):	819
	3a. Normal Operation Pressure (MOP)	819

4	Diameter (inches):	10.75
5	Construction / Wall Thickness (steel, plastic/inches):	Steel/ 0.219
6	Corrosion Prevention (cathodic protection, tape, etc.):	Cathodic
7	% of Specified Minimum Yield Strength (MAOP):	47.86
8	Classification (Present) (1,2,3 or 4)	Class 1
9	Inspection/Testing Results (method, date, etc.):	Per CPUC 112E
10	History of Incidents:	N/A
11	Pipeline Location Map within 1,500 feet of subject Property:	Attached

QUESTIONNAIRE COMPLETED BY:

NAME:	Sasha Helton	SIGNATURE:	s5hq@pge.com
TITLE	Gas Technical Specialist	DATE:	5/2/2019
COMPANY	PG&E		

CONTACT REPORT FORM

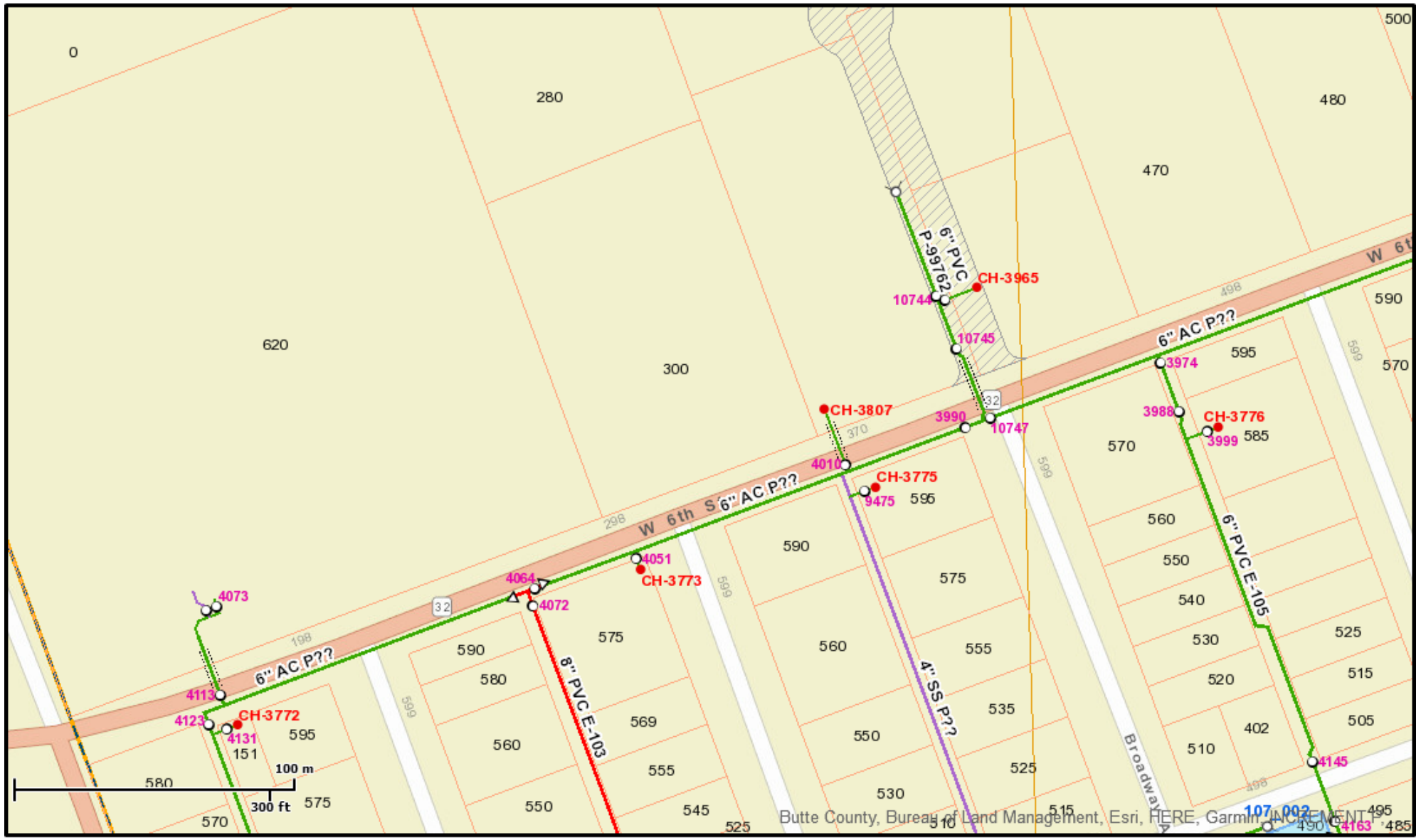
DATE:	6/26/2019	JOB No.:	HASD-01.0
CONTACT:	Jason Hammond, Superintendent	Phone No.:	530-893-6315, cell 530-624-4014
AGENCY/CO.:	California Water Service	CONTACT BY:	Steve Bush
SUBJECT:	Information Request for Hamilton High School Expansion, Hamilton Unified School District		

KEY POINTS DISCUSSED: Over the phone, Jason Hammond with CalWater verified there are no water pipelines along Canal Street/HWY 45. No other high volume water pipelines were identified within 1,500 feet of the project site.

REQUIRED ACTION: No further action required.

CC:

Hamilton City



1" = 188 ft	Hwy 32	06/05/2019	N W E S	CALIFORNIA WATER SERVICE

This map represents a visual display of related geographic information. Data provided hereon is not a guarantee of actual field conditions. To be sure of complete accuracy, please contact CalWater staff for the most up-to-date information.

From:	Tomas Loera
To:	Robyn Chaconas
Cc:	Zac Dickens; Chris Privitera
Subject:	FW: Canal Safety Hazard Assessment for Hamilton High School Expansion
Date:	Monday, May 20, 2019 12:06:46 PM
Attachments:	image001.png 1981_10MainCanal_EarthWork_Pg06.pdf Milepost 3.1 - 5.3 (to Co Rd 16).pdf

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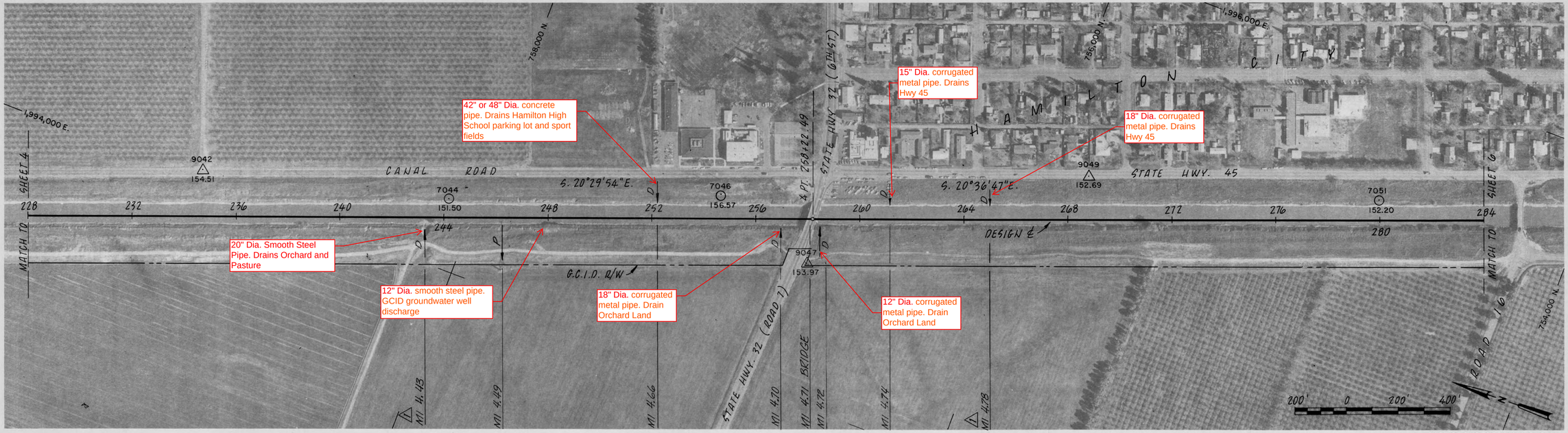
Hello Robyn,

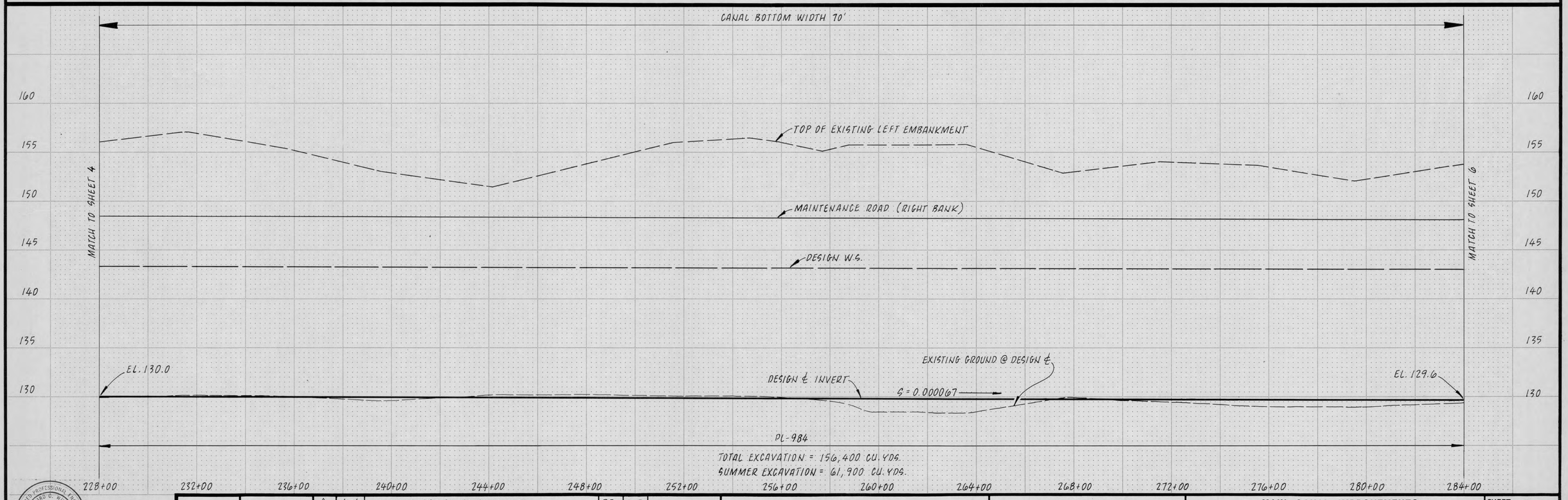
Following is the information that you requested from Glenn-Colusa Irrigation District (GCID), Zac Dickens:

Maps of the canal alignment - Please see attached pdf of main canal earth work and profile as well as the excerpts of the GCID main canal Record of Survey.
Slope - Please see attached pdf of main canal earth work and profile.
Hydraulic Gradient - Please see attached pdf of main canal earth work and profile.
Free Board - Please see attached pdf of main canal earth work and profile.
Material of construction – GCID main canal is constructed of earth.
Typical and maximum flow rates – Typical flow rate 2,500 c.f.s., maximum 3,000 c.f.s.
Inspection frequency – Inspected annually
History of leaks or failures – No failures on record at these locations.

If you have any more questions please email or call the GCID main office (530) 934-8881.
Please note that the existing topography and conditions of the Main Canal may vary from the provided design materials circa the early 1980's.
GCID requests a copy of the draft results of the hazard assessment with opportunity to comment prior to finalization.
Thank You.

Tomás Loera
Engineering Technician
Office: (530) 934-8881
Facsimile: (530) 934-3287





REGISTERED PROFESSIONAL ENGINEER — EDWARD D. WILSON — No. 21,995 — CIVIL — STATE OF CALIFORNIA

CH2M HILL

DES.	LVD
DR.	RRK
CHK.	HDW
APPD.	EDW

NO.	DATE	REVISION	BY	APPD.
1	9/25/81	ADDED LOCATION OF FACILITIES	RRK	LVD

GLENN - COLUSA IRRIGATION DISTRICT

WILLOWS CALIFORNIA

MAIN CANAL IMPROVEMENTS

PLAN & PROFILE

STA 228+00 TO STA 284+00

SHEET 5 OF

DATE JULY 8, 1981

DWG. NO. R3013.G1