



Order Instituting Investigation into the November ) Investigation 19-11-011  
2019 Submission of San Diego Gas & Electric )  
Company's Risk Assessment and Mitigation Phase. )

**RISK ASSESSMENT MITGATION PHASE**

**WORKPAPERS TO**

**CHAPTER SDG&E-7**

**THIRD PARTY DIG-IN ON MEDIUM PRESSURE PIPELINE**

**November 27, 2019**

Chapter	SDG&E-7		
Risk	Third Party Dig-in on a Medium Pressure Pipeline		

PHMSA Incident Rate

Number of Incidents \_National

Type	Number of Incidents_3rd party dig-in		
	Transmission	Distribution_Main	Distribution_Service
MAOP <= 60 psig	-	127	46

SDGE

Type	Miles			
	Transmission	Distribution_Main	Distribution_Service	Total
MAOP <= 60 psig	-	7817	8512	16329

National

Type	Miles		
	Transmission	Distribution_Main	Distribution_Service
MAOP <= 60 psig	-	1212344	924770

SDGE\_3rd party digin

Type	Incident Rate		
	Transmission	Distribution_Main	Distribution_Service
MAOP <= 60 psig	-	0.16	

Chapter	SDG&E-7
Risk	Third Party Dig-in on a Medium Pressure Pipeline

Single Point

ID	Activity	Project Life In Years	Cost Forecast (O&M, \$M) 2022	Cost Forecast (Capital, \$M)			Pre-Mitigation Single Point		% risk reduction (use if % risk addressed not available) (%)	% Risk Reduction			RSE	Post-Mitigation Single Point	
				2020	2021	2022	LORE	CORE		Safety	Reliability	Financial (\$M)	Single Point	LORE	CORE
				SDG&E-7-M2	Establish a program to address the area of continual excavation	1	0.00	0.00		0.00	0.00	338	1	0.2%	0.2%
SDG&E-7-M3	Recording photographs for each locate & mark ticket visited by locator	1	0.26	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.19	337.90	0.51	
SDG&E-7-M4	Utilize electronic positive response	1	0.45	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.10	337.91	0.51	
SDG&E-7-M5	Enhance process to leverage excavation technology to help with difficult locates (vacuum excavation technology)	1	1.55	0.00	0.00	0.00	338	1	0.5%	0.5%	0.5%	0.49	336.43	0.51	
SDG&E-7-M8	Install warning mesh above buried company facilities (above open trench new facilities only)	50	0.06	0.00	0.00	0.00	338	1	0.1%	0.1%	0.1%	41.77	337.82	0.51	
SDG&E-7-C7	Prevention and Improvements - Refreshed Laptops	5	0.35	0.19	0.19	0.19	338	1	0.1%	0.1%	0.1%	0.43	338.31	0.51	
SDG&E-7-C6	Damage Prevention Analysts Program	1	0.12	0.00	0.00	0.00	338	1	9.1%	9.1%	9.1%	126.35	368.77	0.51	
SDG&E-7-M1	Automate Third Party Excavation Incident Reporting	5	0.00	3.62	3.62	3.62	338	1	0.0%	0.0%	0.0%	0.00	337.98	0.51	
SDG&E-7-M6	Promote process and system improvements in USA ticket routing and monitoring	1	0.20	0.00	0.00	0.00	338	1	0.2%	0.2%	0.2%	1.41	337.41	0.51	
SDG&E-7-C5	Locate & Mark Quality Assurance Program	1	0.03	0.00	0.00	0.00	338	1	0.2%	0.2%	0.2%	7.16	338.51	0.51	
SDG&E-7-C8-T1	Public Awareness Compliance - Tranche 1: The Affected Public	1	0.44	0.00	0.00	0.00	338	1	0.5%	0.5%	0.5%	1.81	339.64	0.51	
SDG&E-7-C8-T2	Public Awareness Compliance - Tranche 2: Emergency Officials	1	0.04	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.53	338.05	0.51	
SDG&E-7-C8-T3	Public Awareness Compliance - Tranche 3: Local Public Officials	1	0.13	0.00	0.00	0.00	338	1	0.1%	0.1%	0.1%	1.05	338.28	0.51	
SDG&E-7-C8-T4	Public Awareness Compliance - Tranche 4: Excavators	1	0.26	0.00	0.00	0.00	338	1	0.9%	0.9%	0.9%	5.43	340.95	0.51	
SDG&E-7-C9	Increase Reporting of Unsafe Excavation	1	0.06	0.00	0.00	0.00	338	1	0.1%	0.1%	0.1%	2.31	338.27	0.51	
SDG&E-7-C11	Public Awareness - Meet with Cities with Highest Damage Rates	1	0.04	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.98	338.09	0.51	
SDG&E-7-C12	Public Awareness - Remain Active Members of the California Regional Common Ground Alliance	1	0.08	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.53	338.08	0.51	
SDG&E-7-M7	Leverage data gathered by locating equipment	5	0.07	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.00	338.00	0.51	
SDG&E-7-A1	Alternative: Virtual reality training / simulation to improve locator proficiency	1	0.03	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.01	338.00	0.51	
SDG&E-7-A2	Alternative: GPS Tracking of Excavation Equipment	1	0.09	0.00	0.00	0.00	338	1	0.0%	0.0%	0.0%	0.00	338.00	0.51	

Low Alternative

ID	Activity	Project Life In Years	Cost Forecast (O&M, \$M) 2022	Cost Forecast (Capital, \$M)			Pre-Mitigation Low Alternative		% risk reduction (use if % risk addressed not available) (%)	% Risk Reduction			RSE	Post-Mitigation Low Alternative	
				2020	2021	2022	LORE	CORE		Safety	Reliability	Financial (\$M)	Low Alternative	LORE	CORE
				SDG&E-7-M2	Establish a program to address the area of continual excavation	1	0.00	0.00		0.00	0.00	338	0	0.2%	0.2%
SDG&E-7-M3	Recording photographs for each locate & mark ticket visited by locator	1	0.26	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.14	337.90	0.37	
SDG&E-7-M4	Utilize electronic positive response	1	0.45	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.07	337.91	0.37	
SDG&E-7-M5	Enhance process to leverage excavation technology to help with difficult locates (vacuum excavation technology)	1	1.55	0.00	0.00	0.00	338	0	0.5%	0.5%	0.5%	0.36	336.43	0.37	
SDG&E-7-M8	Install warning mesh above buried company facilities (above open trench new facilities only)	50	0.06	0.00	0.00	0.00	338	0	0.1%	0.1%	0.1%	30.42	337.82	0.37	
SDG&E-7-C7	Prevention and Improvements - Refreshed Laptops	5	0.35	0.19	0.19	0.19	338	0	0.1%	0.1%	0.1%	0.31	338.31	0.37	
SDG&E-7-C6	Damage Prevention Analysts Program	1	0.12	0.00	0.00	0.00	338	0	9.1%	9.1%	9.1%	92.03	368.77	0.37	
SDG&E-7-M1	Automate Third Party Excavation Incident Reporting	5	0.00	3.62	3.62	3.62	338	0	0.0%	0.0%	0.0%	0.00	337.98	0.37	
SDG&E-7-M6	Promote process and system improvements in USA ticket routing and monitoring	1	0.20	0.00	0.00	0.00	338	0	0.2%	0.2%	0.2%	1.03	337.41	0.37	
SDG&E-7-C5	Locate & Mark Quality Assurance Program	1	0.03	0.00	0.00	0.00	338	0	0.2%	0.2%	0.2%	5.22	338.51	0.37	
SDG&E-7-C8-T1	Public Awareness Compliance - Tranche 1: The Affected Public	1	0.44	0.00	0.00	0.00	338	0	0.5%	0.5%	0.5%	1.32	339.64	0.37	
SDG&E-7-C8-T2	Public Awareness Compliance - Tranche 2: Emergency Officials	1	0.04	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.39	338.05	0.37	
SDG&E-7-C8-T3	Public Awareness Compliance - Tranche 3: Local Public Officials	1	0.13	0.00	0.00	0.00	338	0	0.1%	0.1%	0.1%	0.76	338.28	0.37	
SDG&E-7-C8-T4	Public Awareness Compliance - Tranche 4: Excavators	1	0.26	0.00	0.00	0.00	338	0	0.9%	0.9%	0.9%	3.96	340.95	0.37	
SDG&E-7-C9	Increase Reporting of Unsafe Excavation	1	0.06	0.00	0.00	0.00	338	0	0.1%	0.1%	0.1%	1.68	338.27	0.37	
SDG&E-7-C11	Public Awareness - Meet with Cities with Highest Damage Rates	1	0.04	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.71	338.09	0.37	
SDG&E-7-C12	Public Awareness - Remain Active Members of the California Regional Common Ground Alliance	1	0.08	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.38	338.08	0.37	
SDG&E-7-M7	Leverage data gathered by locating equipment	5	0.07	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.00	338.00	0.37	
SDG&E-7-A1	Alternative: Virtual reality training / simulation to improve locator proficiency	1	0.03	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.01	338.00	0.37	
SDG&E-7-A2	Alternative: GPS Tracking of Excavation Equipment	1	0.09	0.00	0.00	0.00	338	0	0.0%	0.0%	0.0%	0.00	338.00	0.37	

Chapter	SDG&E-7
Risk	Third Party Dig-in on a Medium Pressure Pipeline

High Alternative

ID	Activity	Project Life	Cost Forecast (O&M, \$M)	Cost Forecast (Capital, \$M)			Pre-Mitigation		% risk reduction (use if % risk addressed not available) (%)	% Risk Reduction			RSE	Post-Mitigation	
		In Years	2022	2020	2021	2022	High Alternative			Safety	Reliability	Financial (\$M)	High Alternative	High Alternative	
							LORE	CORE						LORE	CORE
SDG&E-7-M2	Establish a program to address the area of continual excavation	1	0.00	0.00	0.00	0.00	338	1		0.182%	0.182%	0.182%	143.27	337.38	0.74
SDG&E-7-M3	Recording photographs for each locate & mark ticket visited by locator	1	0.26	0.00	0.00	0.00	338	1		0.030%	0.030%	0.030%	0.28	337.90	0.74
SDG&E-7-M4	Utilize electronic positive response	1	0.45	0.00	0.00	0.00	338	1		0.027%	0.027%	0.027%	0.14	337.91	0.74
SDG&E-7-M5	Enhance process to leverage excavation technology to help with difficult locates (vacuum excavation technology)	1	1.55	0.00	0.00	0.00	338	1		0.465%	0.465%	0.465%	0.71	336.43	0.74
SDG&E-7-M8	Install warning mesh above buried company facilities (above open trench new facilities only)	50	0.06	0.00	0.00	0.00	338	1		0.054%	0.054%	0.054%	60.67	337.82	0.74
SDG&E-7-C7	Prevention and Improvements - Refreshed Laptops	5	0.35	0.19	0.19	0.19	338	1		0.091%	0.091%	0.091%	0.63	338.31	0.74
SDG&E-7-C6	Damage Prevention Analysts Program	1	0.12	0.00	0.00	0.00	338	1		9.103%	9.103%	9.103%	183.55	368.77	0.74
SDG&E-7-M1	Automate Third Party Excavation Incident Reporting	5	0.00	3.62	3.62	3.62	338	1		0.006%	0.006%	0.006%	0.01	337.98	0.74
SDG&E-7-M6	Promote process and system improvements in USA ticket routing and monitoring	1	0.20	0.00	0.00	0.00	338	1		0.173%	0.173%	0.173%	2.05	337.41	0.74
SDG&E-7-C5	Locate & Mark Quality Assurance Program	1	0.03	0.00	0.00	0.00	338	1		0.150%	0.150%	0.150%	10.41	338.51	0.74
SDG&E-7-C8-T1	Public Awareness Compliance - Tranche 1: The Affected Public	1	0.44	0.00	0.00	0.00	338	1		0.485%	0.485%	0.485%	2.63	339.64	0.74
SDG&E-7-C8-T2	Public Awareness Compliance - Tranche 2: Emergency Officials	1	0.04	0.00	0.00	0.00	338	1		0.0%	0.0%	0.0%	0.77	338.05	0.74
SDG&E-7-C8-T3	Public Awareness Compliance - Tranche 3: Local Public Officials	1	0.13	0.00	0.00	0.00	338	1		0.1%	0.1%	0.1%	1.52	338.28	0.74
SDG&E-7-C8-T4	Public Awareness Compliance - Tranche 4: Excavators	1	0.26	0.00	0.00	0.00	338	1		0.9%	0.9%	0.9%	7.89	340.95	0.74
SDG&E-7-C9	Increase Reporting of Unsafe Excavation	1	0.06	0.00	0.00	0.00	338	1		0.1%	0.1%	0.1%	3.35	338.27	0.74
SDG&E-7-C11	Public Awareness - Meet with Cities with Highest Damage Rates	1	0.04	0.00	0.00	0.00	338	1		0.0%	0.0%	0.0%	1.42	338.09	0.74
SDG&E-7-C12	Public Awareness - Remain Active Members of the California Regional Common Ground Alliance	1	0.08	0.00	0.00	0.00	338	1		0.0%	0.0%	0.0%	0.77	338.08	0.74
SDG&E-7-M7	Leverage data gathered by locating equipment	5	0.07	0.00	0.00	0.00	338	1		0.0%	0.0%	0.0%	0.00	338.00	0.74
SDG&E-7-A1	Alternative: Virtual reality training / simulation to improve locator proficiency	1	0.03	0.00	0.00	0.00	338	1		0.0%	0.0%	0.0%	0.02	338.00	0.74
SDG&E-7-A2	Alternative: GPS Tracking of Excavation Equipment	1	0.09	0.00	0.00	0.00	338	1		0.0%	0.0%	0.0%	0.00	338.00	0.74

**SDG&E-7-C5: Locate and Mark Quality Assurance Program**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life	
		Total		Scope	Effectiveness	Risk Addressed			
Safety	% Scope	100.00%	0.15%	100% of activities will benefit	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources	1	
	% Effectiveness	5.00%							Above-marginal impact on reducing mismarks
	% Risk Addressed	3%							Mapping of the 2018 DIRT data causes
Reliability	% Scope	100.00%	0.15%	100% of activities will benefit	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources		
	% Effectiveness	5.00%							Above-marginal impact on reducing mismarks
	% Risk Addressed	3%							Mapping of the 2018 DIRT data causes
Financial	% Scope	100.00%	0.15%	100% of activities will benefit	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources		
	% Effectiveness	5.00%							Above-marginal impact on reducing mismarks
	% Risk Addressed	3%							Mapping of the 2018 DIRT data causes

**SDG&E-7-C6: Damage Prevention Analyst Program**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%	9.00%	100% of the excavation tickets	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources		1
	% Effectiveness	25.00%		Numerous impacted activities					
	% Risk Addressed	36%		Mapping of the 2018 DIRT data causes					
Reliability	% Scope	100.00%	9.00%	100% of the excavation tickets	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources		1
	% Effectiveness	25.00%		Numerous impacted activities					
	% Risk Addressed	36%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	100.00%	9.00%	100% of the excavation tickets	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources	2018 DIRT database	1
	% Effectiveness	25.00%		Numerous impacted activities					
	% Risk Addressed	36%		Mapping of the 2018 DIRT data causes					

**SDG&E-7-C7: Prevention and Improvements - Refreshed Laptops**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%	0.09%	<i>100% of laptops refreshed</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources		5
	% Effectiveness	0.25%		<i>Negligible improvement</i>					
	% Risk Addressed	36%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	100.00%	0.09%	<i>100% of laptops refreshed</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources		5
	% Effectiveness	0.25%		<i>Negligible improvement</i>					
	% Risk Addressed	36%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	100.00%	0.09%	<i>100% of laptops refreshed</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources	2018 DIRT database	5
	% Effectiveness	0.25%		<i>Negligible improvement</i>					
	% Risk Addressed	36%		<i>Mapping of the 2018 DIRT data causes</i>					

**SDG&E-7-C8 - T1: Public Awareness Compliance - The Affected Public**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	50.00%	0.49%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources		1
	% Effectiveness	1.00%		<i>Marginal effectiveness</i>					
	% Risk Addressed	97%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	50.00%	0.49%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources		1
	% Effectiveness	1.00%		<i>Marginal effectiveness</i>					
	% Risk Addressed	97%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	50.00%	0.49%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources	2018 DIRT database	1
	% Effectiveness	1.00%		<i>Marginal effectiveness</i>					
	% Risk Addressed	97%		<i>Mapping of the 2018 DIRT data causes</i>					



**SDG&E-7-C8 - T2: Public Awareness Compliance - Emergency Officials**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	5.00%	0.01%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 28% of the risk sources		1
	% Effectiveness	1.00%		<i>Same effectiveness as Affected Public Tranche</i>					
	% Risk Addressed	28%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	5.00%	0.01%	<i>Impacted population</i>					
	% Effectiveness	1.00%		<i>Same effectiveness as Affected Public Tranche</i>					
	% Risk Addressed	28%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	5.00%	0.01%	<i>Impacted population</i>			2018 DIRT database		
	% Effectiveness	1.00%		<i>Same effectiveness as Affected Public Tranche</i>					
	% Risk Addressed	28%		<i>Mapping of the 2018 DIRT data causes</i>					

**SDG&E-7-C8 - T3: Public Awareness Compliance - Local Public Officials**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	15.00%	0.08%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 56% of the risk sources		1
	% Effectiveness	1.00%		<i>Minimal impact</i>					
	% Risk Addressed	56%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	15.00%	0.08%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 56% of the risk sources		1
	% Effectiveness	1.00%		<i>Minimal impact</i>					
	% Risk Addressed	56%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	15.00%	0.08%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 56% of the risk sources	2018 DIRT database	1
	% Effectiveness	1.00%		<i>Minimal impact</i>					
	% Risk Addressed	56%		<i>Mapping of the 2018 DIRT data causes</i>					

**SDG&E-7-C8 - T4: Public Awareness Compliance - Excavators**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	30.00%	0.87%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources		1
	% Effectiveness	3.00%		<i>More effective than other diggers (expected)</i>					
	% Risk Addressed	97%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	30.00%	0.87%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources		1
	% Effectiveness	3.00%		<i>More effective than other diggers (expected)</i>					
	% Risk Addressed	97%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	30.00%	0.87%	<i>Impacted population</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources	2018 DIRT database	1
	% Effectiveness	3.00%		<i>More effective than other diggers (expected)</i>					
	% Risk Addressed	97%		<i>Mapping of the 2018 DIRT data causes</i>					

**SDG&E-7-C9: Increase Reporting of Unsafe Excavation**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life	
		Total		Scope	Effectiveness	Risk Addressed			
Safety	% Scope	1.00%	0.08%	<i>Reported problematic excavators</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 27% of the risk sources	1	
	% Effectiveness	30.00%							<i>Observed increase in excavator notifications</i>
	% Risk Addressed	27%							
Reliability	% Scope	1.00%	0.08%	<i>Reported problematic excavators</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 27% of the risk sources		
	% Effectiveness	30.00%							<i>Observed increase in excavator notifications</i>
	% Risk Addressed	27%							
Financial	% Scope	1.00%	0.08%	<i>Reported problematic excavators</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 27% of the risk sources		
	% Effectiveness	30.00%							<i>Observed increase in excavator notifications</i>
	% Risk Addressed	27%							
							2018 DIRT database		



**SDG&E-7-C12: Public Awareness - Remain Active Members of the California Regional Common Ground Alliance**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	50.00%	0.03%	<i>Affected policies</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 100% of the risk sources		1
	% Effectiveness	0.05%		<i>Marginal improvement</i>					
	% Risk Addressed	100%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	50.00%	0.03%	<i>Affected policies</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 100% of the risk sources		1
	% Effectiveness	0.05%		<i>Marginal improvement</i>					
	% Risk Addressed	100%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	50.00%	0.03%	<i>Affected policies</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 100% of the risk sources	2018 DIRT database	1
	% Effectiveness	0.05%		<i>Marginal improvement</i>					
	% Risk Addressed	100%		<i>Mapping of the 2018 DIRT data causes</i>					

**SDG&E-7-M1: Automate Third Party Excavation Incident Reporting**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%	0.005%	100% as it applies to all stakeholder groups	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources		5
	% Effectiveness	0.5%		Marginal improvement					
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes					
Reliability	% Scope	100.00%	0.005%	100% as it applies to all stakeholder groups					
	% Effectiveness	0.5%		Marginal improvement					
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	100.00%	0.005%	100% as it applies to all stakeholder groups					
	% Effectiveness	0.5%		Marginal improvement					
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes					

**SDG&E-7-M2: Establish a Program to Address the Area of Continual Excavation**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
	% Scope	% Effectiveness			Scope	Effectiveness	Risk Addressed		
Safety	% Scope	0.50%	0.180%	<i>Proportion of farmers to heavy machinery excavators</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources		1
	% Effectiveness	90.0%		<i>Percentage following procedure</i>					
	% Risk Addressed	40%		<i>Mapping of the 2018 DIRT data causes</i>					
Reliability	% Scope	0.50%	0.180%	<i>Proportion of farmers to heavy machinery excavators</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources		1
	% Effectiveness	90.0%		<i>Percentage following procedure</i>					
	% Risk Addressed	40%		<i>Mapping of the 2018 DIRT data causes</i>					
Financial	% Scope	0.50%	0.180%	<i>Proportion of farmers to heavy machinery excavators</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources	2018 DIRT database	1
	% Effectiveness	90.0%		<i>Percentage following procedure</i>					
	% Risk Addressed	40%		<i>Mapping of the 2018 DIRT data causes</i>					



**SDG&E-7-M3: Recording Photographs for Each Locate and Mark Ticket Visited by Locator**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%	0.030%	100% of tickets have associated photographs	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources		1
	% Effectiveness	1.0%		Marginal in nature					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					
Reliability	% Scope	100.00%	0.030%	100% of tickets have associated photographs	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources		1
	% Effectiveness	1.0%		Marginal in nature					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	100.00%	0.030%	100% of tickets have associated photographs	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources	2018 DIRT database	1
	% Effectiveness	1.0%		Marginal in nature					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					

**SDG&E-7-M4: Utilize Electronic Positive Response**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life
		Total		Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%	0.030%	100% of tickets will have EPR available	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources	1
	% Effectiveness	1.0%		Marginal impact on excavator behavior				
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes				
Reliability	% Scope	100.00%	0.030%	100% of tickets will have EPR available	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources	
	% Effectiveness	1.0%		Marginal impact on excavator behavior				
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes				
Financial	% Scope	100.00%	0.030%	100% of tickets will have EPR available	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources	
	% Effectiveness	1.0%		Marginal impact on excavator behavior				
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes				

**SDG&E-7-M5: Enhance Process to Leverage Excavation Technology to Help with Difficult Locates (Vacuum Excavation Technology)**

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	15.00%	0.428%	15% of targeted locations will be assisted	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources		1
	% Effectiveness	95.0%		High effectiveness					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					
Reliability	% Scope	15.00%	0.428%	15% of targeted locations will be assisted	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources		1
	% Effectiveness	95.0%		High effectiveness					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	15.00%	0.428%	15% of targeted locations will be assisted	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 3% of the risk sources	2018 DIRT database	1
	% Effectiveness	95.0%		High effectiveness					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					

**SDG&E-7-M6: Promote Process and System Improvements in 811 USA Ticket Routing and Monitoring**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life	
		Total		Scope	Effectiveness	Risk Addressed			
Safety	% Scope	100.00%	0.150%	100% of tickets, all stakeholder groups	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources	1	
	% Effectiveness	15.0%							Closely tied to the Damage Prevention Analysts program
	% Risk Addressed	1%							Mapping of the 2018 DIRT data causes
Reliability	% Scope	100.00%	0.150%	100% of tickets, all stakeholder groups	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources	1	
	% Effectiveness	15.0%							Closely tied to the Damage Prevention Analysts program
	% Risk Addressed	1%							Mapping of the 2018 DIRT data causes
Financial	% Scope	100.00%	0.150%	100% of tickets, all stakeholder groups	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources	1	
	% Effectiveness	15.0%							Closely tied to the Damage Prevention Analysts program
	% Risk Addressed	1%							Mapping of the 2018 DIRT data causes

**SDG&E-7-M7: Leverage Data Gathered by Locating Equipment**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life		
		Total		Scope	Effectiveness	Risk Addressed				
Safety	% Scope	25.00%	0.00003%	Midpoint of range	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources	5		
	% Effectiveness	0.01%		Marginal effectiveness						
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes						
Reliability	% Scope	25.00%	0.00003%	Midpoint of range	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources		5	
	% Effectiveness	0.01%		Marginal effectiveness						
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes						
Financial	% Scope	25.00%	0.00003%	Midpoint of range	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources			5
	% Effectiveness	0.01%		Marginal effectiveness						
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes						

**SDG&E-7-M8: Install Warning Mesh Above Buried Company Facilities**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life	
		Total		Scope	Effectiveness	Risk Addressed			
Safety	% Scope	0.30%	0.054%	Procurement / System size	Funding based	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 36% of the risk sources	50	
	% Effectiveness	50.00%							High effectiveness
	% Risk Addressed	36%							Mapping of the 2018 DIRT data causes
Reliability	% Scope	0.30%	0.054%	Procured from proposed funding					
	% Effectiveness	50.00%		High effectiveness					
	% Risk Addressed	36%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	0.30%	0.054%	Procured from proposed funding			2018 DIRT database		
	% Effectiveness	50.00%		High effectiveness					
	% Risk Addressed	36%		Mapping of the 2018 DIRT data causes					

**SDG&E-7-A1: Virtual Reality Training/Simulation to Improve Locator Proficiency**

Attribute	Risk Reduction		Formula	Basis			Reference	Project Life	
		Total		Scope	Effectiveness	Risk Addressed			
Safety	% Scope	100.00%	0.0002%	100% of locations would receive UTTO VR Tools	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 2% of the risk sources	1	
	% Effectiveness	0.01%							Minimal impact
	% Risk Addressed	2%							Mapping of the 2018 DIRT data causes
Reliability	% Scope	100.00%	0.0002%	100% of locations would receive UTTO VR Tools	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 2% of the risk sources		
	% Effectiveness	0.01%							Minimal impact
	% Risk Addressed	2%							Mapping of the 2018 DIRT data causes
Financial	% Scope	100.00%	0.0002%	100% of locations would receive UTTO VR Tools	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 2% of the risk sources		
	% Effectiveness	0.01%							Minimal impact
	% Risk Addressed	2%							Mapping of the 2018 DIRT data causes

SDG&E-7-A2: GPS Tracking of Excavation Equipment												
Attribute	Risk Reduction			Formula	Basis			Reference	Project Life			
	% Scope	% Effectiveness	Total		Scope	Effectiveness	Risk Addressed					
Safety	% Scope	25.00%	0.00003%	<i>Average of available opportunities</i>	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 1% of the risk sources		1			
	% Effectiveness	0.01%		<i>Minimal impact</i>								
	% Risk Addressed	1%		<i>Mapping of the 2018 DIRT data causes</i>								
Reliability	% Scope	25.00%	0.00003%	<i>Average of available opportunities</i>								
	% Effectiveness	0.01%		<i>Minimal impact</i>								
	% Risk Addressed	1%		<i>Mapping of the 2018 DIRT data causes</i>								
Financial	% Scope	25.00%	0.00003%	<i>Average of available opportunities</i>							2018 DIRT database	
	% Effectiveness	0.01%		<i>Minimal impact</i>								
	% Risk Addressed	1%		<i>Mapping of the 2018 DIRT data causes</i>								