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-9

THIRD PARTY DIG-IN ON HIGH PRESSURE PIPELINE

November 27, 2019

PHMSA Incident Rate

National

Type	Number of Incidents_3rd party dig-in		
	Transmission	Distribution_Main	Distribution_Service
MAOP > 60 psig	91	40	6

SDG&E

Type	Miles			
	Transmission	Distribution_Main	Distribution_Service	Total
MAOP > 60 psig	234	281	3	518

National   Miles

Type	Miles		
	Transmission	Distribution_Main	Distribution_Service
MAOP > 60 psig	297553	83618	2288

SDG&E_3rd party digin

Type	Incident Rate		
	Transmission	Distribution_Main	Distribution_Service
MAOP > 60 psig	0.01	0.02	

Pre-mitigation

Chapter	SDG&E-9
Risk	Third Party Dig-in on a High Pressure Pipeline

Single Point

ID	Activity	Project Life	Cost Forecast (O&M, $M)	Cost Forecast (Capital, $M)			Pre-Mitigation Single Point		% risk reduction (use if % risk addressed not available) (%)	% Risk Reduction			RSE Single Point	Post-Mitigation Single Point	
		In Years	2022	2020	2021	2022	LORE	CORE		Safety	Reliability	Financial ($M)		LORE	CORE
SDG&E-9-M2	Establish a program to address the area of continual excavation	1	0.01	0.00	0.00	0.00	0	18		0.4%	0.4%	0.4%	1.09	0.25	18.13
SDG&E-9-M3	Recording photographs for each locate & mark ticket visited by locator	1	0.03	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.04	0.25	18.13
SDG&E-9-M4	Utilize electronic positive response	1	0.06	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.02	0.25	18.13
SDG&E-9-M5	Enhance process to leverage excavation technology to help with difficult locates (vacuum excavation technology)	1	0.06	0.00	0.00	0.00	0	18		0.5%	0.5%	0.5%	0.36	0.24	18.13
SDG&E-9-C16	Install warning mesh above buried company facilities	50	0.06	0.00	0.00	0.00	0	18		1.6%	1.6%	1.6%	31.85	0.25	18.13
SDG&E-9-C7	Prevention and Improvements - Refreshed Laptops	5	0.04	0.03	0.03	0.03	0	18		0.1%	0.1%	0.1%	0.09	0.25	18.13
SDG&E-9-C6	Damage Prevention Analysts Program	1	0.02	0.00	0.00	0.00	0	18		9.1%	9.1%	9.1%	21.27	0.27	18.13
SDG&E-9-M1	Automate Third Party Excavation Incident Reporting	5	0.00	0.43	0.43	0.43	0	18		0.0%	0.0%	0.0%	0.00	0.25	18.13
SDG&E-9-M6	Promote process and system improvements in USA ticket routing and monitoring	1	0.02	0.00	0.00	0.00	0	18		0.2%	0.2%	0.2%	0.30	0.25	18.13
SDG&E-9-C5	Locate & Mark Quality Assurance Program	1	0.00	0.00	0.00	0.00	0	18		0.2%	0.2%	0.2%	1.58	0.25	18.13
SDG&E-9-C8-T1	Public Awareness Compliance - Tranche 1: The Affected Public	1	0.05	0.00	0.00	0.00	0	18		0.5%	0.5%	0.5%	0.39	0.25	18.13
SDG&E-9-C8-T2	Public Awareness Compliance - Tranche 2: Emergency Officials	1	0.01	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.12	0.25	18.13
SDG&E-9-C8-T3	Public Awareness Compliance - Tranche 3: Local Public Officials	1	0.02	0.00	0.00	0.00	0	18		0.1%	0.1%	0.1%	0.22	0.25	18.13
SDG&E-9-C8-T4	Public Awareness Compliance - Tranche 4: Excavators	1	0.03	0.00	0.00	0.00	0	18		0.9%	0.9%	0.9%	1.18	0.25	18.13
SDG&E-9-C9	Increase Reporting of Unsafe Excavation	1	0.01	0.00	0.00	0.00	0	18		0.1%	0.1%	0.1%	0.49	0.25	18.13
SDG&E-9-C11	Public Awareness - Meet with Cities with Highest Damage Rates	1	0.01	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.22	0.25	18.13
SDG&E-9-C12	Public Awareness - Remain Active Members of the California Regional Common Ground Alliance	1	0.01	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.11	0.25	18.13
SDG&E-9-M7	Leverage data gathered by locating equipment	5	0.01	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.00	0.25	18.13
SDG&E-9-A1	Alternative: Virtual reality training / simulation to improve locator proficiency	1	0.03	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.00	0.25	18.13
SDG&E-9-A2	Alternative: GPS Tracking of Excavation Equipment	1	0.09	0.00	0.00	0.00	0	18		0.0%	0.0%	0.0%	0.00	0.25	18.13

Low Alternative

ID	Activity	Project Life	Cost Forecast (O&M, $M)	Cost Forecast (Capital, $M)			Pre-Mitigation Low Alternative		% risk reduction (use if % risk addressed not available) (%)	% Risk Reduction			RSE Low Alternative	Post-Mitigation Low Alternative	
		In Years	2022	2020	2021	2022	LORE	CORE		Safety	Reliability	Financial ($M)		LORE	CORE
SDG&E-9-M2	Establish a program to address the area of continual excavation	1	0.01	0.00	0.00	0.00	0	2		0.4%	0.4%	0.4%	0.14	0.25	2.28
SDG&E-9-M3	Recording photographs for each locate & mark ticket visited by locator	1	0.03	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.01	0.25	2.28
SDG&E-9-M4	Utilize electronic positive response	1	0.06	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.00	0.25	2.28
SDG&E-9-M5	Enhance process to leverage excavation technology to help with difficult locates (vacuum excavation technology)	1	0.06	0.00	0.00	0.00	0	2		0.5%	0.5%	0.5%	0.04	0.24	2.28
SDG&E-9-C16	Install warning mesh above buried company facilities	50	0.06	0.00	0.00	0.00	0	2		1.6%	1.6%	1.6%	4.01	0.25	2.28
SDG&E-9-C7	Prevention and Improvements - Refreshed Laptops	5	0.04	0.03	0.03	0.03	0	2		0.1%	0.1%	0.1%	0.01	0.25	2.28
SDG&E-9-C6	Damage Prevention Analysts Program	1	0.02	0.00	0.00	0.00	0	2		9.1%	9.1%	9.1%	2.68	0.27	2.28
SDG&E-9-M1	Automate Third Party Excavation Incident Reporting	5	0.00	0.43	0.43	0.43	0	2		0.0%	0.0%	0.0%	0.00	0.25	2.28
SDG&E-9-M6	Promote process and system improvements in USA ticket routing and monitoring	1	0.02	0.00	0.00	0.00	0	2		0.2%	0.2%	0.2%	0.04	0.25	2.28
SDG&E-9-C5	Locate & Mark Quality Assurance Program	1	0.00	0.00	0.00	0.00	0	2		0.2%	0.2%	0.2%	0.20	0.25	2.28
SDG&E-9-C8-T1	Public Awareness Compliance - Tranche 1: The Affected Public	1	0.05	0.00	0.00	0.00	0	2		0.5%	0.5%	0.5%	0.05	0.25	2.28
SDG&E-9-C8-T2	Public Awareness Compliance - Tranche 2: Emergency Officials	1	0.01	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.01	0.25	2.28
SDG&E-9-C8-T3	Public Awareness Compliance - Tranche 3: Local Public Officials	1	0.02	0.00	0.00	0.00	0	2		0.1%	0.1%	0.1%	0.03	0.25	2.28
SDG&E-9-C8-T4	Public Awareness Compliance - Tranche 4: Excavators	1	0.03	0.00	0.00	0.00	0	2		0.9%	0.9%	0.9%	0.15	0.25	2.28
SDG&E-9-C9	Increase Reporting of Unsafe Excavation	1	0.01	0.00	0.00	0.00	0	2		0.1%	0.1%	0.1%	0.06	0.25	2.28
SDG&E-9-C11	Public Awareness - Meet with Cities with Highest Damage Rates	1	0.01	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.03	0.25	2.28
SDG&E-9-C12	Public Awareness - Remain Active Members of the California Regional Common Ground Alliance	1	0.01	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.01	0.25	2.28
SDG&E-9-M7	Leverage data gathered by locating equipment	5	0.01	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.00	0.25	2.28
SDG&E-9-A1	Alternative: Virtual reality training / simulation to improve locator proficiency	1	0.03	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.00	0.25	2.28
SDG&E-9-A2	Alternative: GPS Tracking of Excavation Equipment	1	0.09	0.00	0.00	0.00	0	2		0.0%	0.0%	0.0%	0.00	0.25	2.28

Chapter	SDG&E-9
Risk	Third Party Dig-in on a High Pressure Pipeline

High Alternative

ID	Activity	Project Life	Cost Forecast (O&M, $M)	Cost Forecast (Capital, $M)			Pre-Mitigation		% risk reduction (use if % risk addressed not available) (%)	% Risk Reduction			RSE	Post-Mitigation	
							High Alternative							High Alternative	
		In Years	2022	2020	2021	2022	LORE	CORE		Safety	Reliability	Financial ($M)	High Alternative	LORE	CORE
SDG&E-9-M2	Establish a program to address the area of continual excavation	1	0.01	0.00	0.00	0.00	0	45		0.4%	0.4%	0.4%	2.69	0.25	44.55
SDG&E-9-M3	Recording photographs for each locate & mark ticket visited by locator	1	0.03	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.10	0.25	44.55
SDG&E-9-M4	Utilize electronic positive response	1	0.06	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.05	0.25	44.55
SDG&E-9-M5	Enhance process to leverage excavation technology to help with difficult locates (vacuum excavation technology)	1	0.06	0.00	0.00	0.00	0	45		0.5%	0.5%	0.5%	0.87	0.24	44.55
SDG&E-9-C16	Install warning mesh above buried company facilities	50	0.06	0.00	0.00	0.00	0	45		1.6%	1.6%	1.6%	78.24	0.25	44.55
SDG&E-9-C7	Prevention and Improvements - Refreshed Laptops	5	0.04	0.03	0.03	0.03	0	45		0.1%	0.1%	0.1%	0.22	0.25	44.55
SDG&E-9-C6	Damage Prevention Analysts Program	1	0.02	0.00	0.00	0.00	0	45		9.1%	9.1%	9.1%	52.26	0.27	44.55
SDG&E-9-M1	Automate Third Party Excavation Incident Reporting	5	0.00	0.43	0.43	0.43	0	45		0.0%	0.0%	0.0%	0.00	0.25	44.55
SDG&E-9-M6	Promote process and system improvements in USA ticket routing and monitoring	1	0.02	0.00	0.00	0.00	0	45		0.2%	0.2%	0.2%	0.75	0.25	44.55
SDG&E-9-C5	Locate & Mark Quality Assurance Program	1	0.00	0.00	0.00	0.00	0	45		0.2%	0.2%	0.2%	3.87	0.25	44.55
SDG&E-9-C8-T1	Public Awareness Compliance - Tranche 1: The Affected Public	1	0.05	0.00	0.00	0.00	0	45		0.5%	0.5%	0.5%	0.96	0.25	44.55
SDG&E-9-C8-T2	Public Awareness Compliance - Tranche 2: Emergency Officials	1	0.01	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.29	0.25	44.55
SDG&E-9-C8-T3	Public Awareness Compliance - Tranche 3: Local Public Officials	1	0.02	0.00	0.00	0.00	0	45		0.1%	0.1%	0.1%	0.54	0.25	44.55
SDG&E-9-C8-T4	Public Awareness Compliance - Tranche 4: Excavators	1	0.03	0.00	0.00	0.00	0	45		0.9%	0.9%	0.9%	2.91	0.25	44.55
SDG&E-9-C9	Increase Reporting of Unsafe Excavation	1	0.01	0.00	0.00	0.00	0	45		0.1%	0.1%	0.1%	1.20	0.25	44.55
SDG&E-9-C11	Public Awareness - Meet with Cities with Highest Damage Rates	1	0.01	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.54	0.25	44.55
SDG&E-9-C12	Public Awareness - Remain Active Members of the California Regional Common Ground Alliance	1	0.01	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.26	0.25	44.55
SDG&E-9-M7	Leverage data gathered by locating equipment	5	0.01	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.00	0.25	44.55
SDG&E-9-A1	Alternative: Virtual reality training / simulation to improve locator proficiency	1	0.03	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.00	0.25	44.55
SDG&E-9-A2	Alternative: GPS Tracking of Excavation Equipment	1	0.09	0.00	0.00	0.00	0	45		0.0%	0.0%	0.0%	0.00	0.25	44.55

SDG&E-9-C5: Locate and Mark Quality Assurance Program

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					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		
	% 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*					1
	% 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*				2018 DIRT database	
	% Effectiveness	5.00%		*Above-marginal impact on reducing mismarks*					
	% Risk Addressed	3%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-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*					
	% 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*				2018 DIRT database	
	% Effectiveness	25.00%		*Numerous impacted activities*					
	% Risk Addressed	36%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-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%	*100% of laptops refreshed*	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%		*Negligible improvement*					
	% Risk Addressed	36%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	100.00%	0.09%	*100% of laptops refreshed*					
	% Effectiveness	0.25%		*Negligible improvement*					
	% Risk Addressed	36%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	100.00%	0.09%	*100% of laptops refreshed*				2018 DIRT database	
	% Effectiveness	0.25%		*Negligible improvement*					
	% Risk Addressed	36%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-C8 - T1: Public Awareness Compliance - The Affected Public

Attribute	Risk Reduction			Formula	Basis			Reference	Project Life
			Total		Scope	Effectiveness	Risk Addressed		
Safety	% Scope	50.00%	0.49%	*Impacted population*	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%		*Marginal effectiveness*					
	% Risk Addressed	97%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	50.00%	0.49%	*Impacted population*					
	% Effectiveness	1.00%		*Marginal effectiveness*					
	% Risk Addressed	97%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	50.00%	0.49%	*Impacted population*				2018 DIRT database	
	% Effectiveness	1.00%		*Marginal effectiveness*					
	% Risk Addressed	97%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-C8 - T2: Public Awareness Compliance - Emergency Officials

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

SDG&E-9-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%	*Impacted population*	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%		*Minimal impact*					
	% Risk Addressed	56%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	15.00%	0.08%	*Impacted population*					
	% Effectiveness	1.00%		*Minimal impact*					
	% Risk Addressed	56%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	15.00%	0.08%	*Impacted population*				2018 DIRT database	
	% Effectiveness	1.00%		*Minimal impact*					
	% Risk Addressed	56%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-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%	*Impacted population*	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 97% of the risk sources		
	% Effectiveness	3.00%		*More effective than other diggers (expected)*					
	% Risk Addressed	97%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	30.00%	0.87%	*Impacted population*					1
	% Effectiveness	3.00%		*More effective than other diggers (expected)*					
	% Risk Addressed	97%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	30.00%	0.87%	*Impacted population*				2018 DIRT database	
	% Effectiveness	3.00%		*More effective than other diggers (expected)*					
	% Risk Addressed	97%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-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%	*Reported problematic excavators*	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%		*Observed increase in excavator notifications*					
	% Risk Addressed	27%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	1.00%	0.08%	*Reported problematic excavators*					1
	% Effectiveness	30.00%		*Observed increase in excavator notifications*					
	% Risk Addressed	27%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	1.00%	0.08%	*Reported problematic excavators*				2018 DIRT database	
	% Effectiveness	30.00%		*Observed increase in excavator notifications*					
	% Risk Addressed	27%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-C11: Public Awareness - Meet with Cities with Highest Damage Rates

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	3.00%	0.03%	*Top 3% of cities (7 cities out of 240 total)*	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 89% of the risk sources		
	% Effectiveness	1.00%		*Same effectiveness as Affected Public Tranche*					
	% Risk Addressed	89%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	3.00%	0.03%	*Top 3% of cities (7 cities out of 240 total)*					1
	% Effectiveness	1.00%		*Same effectiveness as Affected Public Tranche*					
	% Risk Addressed	89%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	3.00%	0.03%	*Top 3% of cities (7 cities out of 240 total)*				2018 DIRT database	
	% Effectiveness	1.00%		*Same effectiveness as Affected Public Tranche*					
	% Risk Addressed	89%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-C12: Public Awareness - Remain Active Members of the California Regional Common Ground Alliance									
Attribute	**Risk Reduction**			**Formula**	**Basis**			**Reference**	**Project Life**
			Total		**Scope**	**Effectiveness**	**Risk Addressed**		
Safety	% Scope	50.00%	0.03%	*Affected policies*	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%		*Marginal improvement*					
	% Risk Addressed	100%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	50.00%	0.03%	*Affected policies*					
	% Effectiveness	0.05%		*Marginal improvement*					
	% Risk Addressed	100%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	50.00%	0.03%	*Affected policies*				2018 DIRT database	
	% Effectiveness	0.05%		*Marginal improvement*					
	% Risk Addressed	100%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-C16: Install Warning Mesh Above Buried Company Facilities

Attribute	Risk Reduction			Formula	Basis			Reference	Project Life
	% Scope		Total		Scope	Effectiveness	Risk Addressed		
Safety	% Scope	9.00%	1.6%	Procurement / System size	Funding based	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 35% of the risk sources		50
	% Effectiveness	50.00%		High effectiveness					
	% Risk Addressed	35%		Mapping of the 2018 DIRT data causes					
Reliability	% Scope	9.00%	1.6%	Procurement / System size					
	% Effectiveness	50.00%		High effectiveness					
	% Risk Addressed	35%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	9.00%	1.6%	Procurement / System size				2018 DIRT database	
	% Effectiveness	50.00%		High effectiveness					
	% Risk Addressed	35%		Mapping of the 2018 DIRT data causes					

SDG&E-9-M1: Automate Third Party Excavation Incident Reporting

Attribute	Risk Reduction			Formula		Basis			Reference	Project Life
			Total			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*					2018 DIRT database	
	% Effectiveness	0.5%		*Marginal improvement*						
	% Risk Addressed	1%		*Mapping of the 2018 DIRT data causes*						

SDG&E-9-M2: Establish a Program to Address the Area of Continual Excavation

Attribute	Risk Reduction			Formula	Basis			Reference	Project Life
			Total		Scope	Effectiveness	Risk Addressed		
Safety	% Scope	1.00%	0.360%	*Proportion of farmers to heavy machinery excavators*	SME Estimate	SME Estimate	Based on a mapping of the 2018 DIRT database causes, this mitigation addresses 40% of the risk sources		
	% Effectiveness	90.0%		*Percentage following procedure*					
	% Risk Addressed	40%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	1.00%	0.360%	*Proportion of farmers to heavy machinery excavators*					1
	% Effectiveness	90.0%		*Percentage following procedure*					
	% Risk Addressed	40%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	1.00%	0.360%	*Proportion of farmers to heavy machinery excavators*				2018 DIRT database	
	% Effectiveness	90.0%		*Percentage following procedure*					
	% Risk Addressed	40%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-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*					
	% 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*				2018 DIRT database	
	% Effectiveness	1.0%		*Marginal in nature*					
	% Risk Addressed	3%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-M4: Utilize Electronic Positive Response

Attribute	Risk Reduction			Formula	Basis			Reference	Project Life
			Total		Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%		*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%	0.030%	*Marginal impact on excavator behavior*					
	% Risk Addressed	3%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	100.00%		*100% of tickets will have EPR available*					1
	% Effectiveness	1.0%	0.030%	*Marginal impact on excavator behavior*					
	% Risk Addressed	3%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	100.00%		*100% of tickets will have EPR available*				2018 DIRT database	
	% Effectiveness	1.0%	0.030%	*Marginal impact on excavator behavior*					
	% Risk Addressed	3%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-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%		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		
	% Effectiveness	95.0%	0.428%	High effectiveness					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					
Reliability	% Scope	15.00%		15% of targeted locations will be assisted					1
	% Effectiveness	95.0%	0.428%	High effectiveness					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					
Financial	% Scope	15.00%		15% of targeted locations will be assisted				2018 DIRT database	
	% Effectiveness	95.0%	0.428%	High effectiveness					
	% Risk Addressed	3%		Mapping of the 2018 DIRT data causes					

SDG&E-9-M6: Promote Process and System Improvements in 811 USA Ticket Routing and Monitoring

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					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		
	% 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					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				2018 DIRT database	
	% Effectiveness	15.0%		Closely tied to the Damage Prevention Analysts program					
	% Risk Addressed	1%		Mapping of the 2018 DIRT data causes					

SDG&E-9-M7: Leverage Data Gathered by Locating Equipment

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	25.00%	0.000%	*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%	0.000%	*Midpoint of range*					
	% Effectiveness	0.01%		*Marginal effectiveness*					
	% Risk Addressed	1%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	25.00%	0.000%	*Midpoint of range*				2018 DIRT database	
	% Effectiveness	0.01%		*Marginal effectiveness*					
	% Risk Addressed	1%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-A1: Virtual Reality Training/Simulation to Improve Locator Proficiency

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	100.00%	0.000%	*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%	0.000%	*100% of locations would receive UTTO VR Tools*					
	% Effectiveness	0.01%		*Minimal impact*					
	% Risk Addressed	2%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	100.00%	0.000%	*100% of locations would receive UTTO VR Tools*				2018 DIRT database	
	% Effectiveness	0.01%		*Minimal impact*					
	% Risk Addressed	2%		*Mapping of the 2018 DIRT data causes*					

SDG&E-9-A2: GPS Tracking of Excavation Equipment

Attribute	Risk Reduction		Total	Formula	Basis			Reference	Project Life
					Scope	Effectiveness	Risk Addressed		
Safety	% Scope	25.00%	0.000%	*Average of available opportunities*	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%		*Minimal impact*					
	% Risk Addressed	1%		*Mapping of the 2018 DIRT data causes*					
Reliability	% Scope	25.00%	0.000%	*Average of available opportunities*					
	% Effectiveness	0.01%		*Minimal impact*					
	% Risk Addressed	1%		*Mapping of the 2018 DIRT data causes*					
Financial	% Scope	25.00%	0.000%	*Average of available opportunities*				2018 DIRT database	
	% Effectiveness	0.01%		*Minimal impact*					
	% Risk Addressed	1%		*Mapping of the 2018 DIRT data causes*					