



Risk Assessment and Mitigation Phase

(Chapter SDG&E-Risk-2-QWP) Electric Infrastructure Integrity Workpapers

May 17, 2021

Overall Workpaper Description	This workpaper file explains the risk scoring and Risk Spend Efficiency (RSE) quantification. It contains necessary information and sources for calculating the risk score and RSE for respective mitigations and controls filed in the 2021 RAMP.
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"Master Inputs" Tab	This sheet contains the major MAVF inputs for risk scoring
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"RSE Summary" Tab	This sheet presents a summarized view of RSE scoring
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RSE Equation	$\text{Risk Reduction} = (\text{Pre - Mitigated LoRE} * \text{Pre - Mitigated CoRE}) - (\text{Post - Mitigated LoRE} * \text{Post - Mitigated CoRE})$
Discounted Time	$1 - \left(\frac{1}{\frac{(1 + \text{Benefit Discount Rate})^{\text{Benefits Lifetime}}}{\text{Benefit Discount Rate}}} \right)$
RSE per \$M	$\frac{\text{Risk Reduction} * \text{Discounted Time}}{\text{Total Cost} (\$M)}$

Master Inputs

Discount Factors

Benefit Discount Factor 3.00%

MAVF Framework

	Range	Weight
Safety Index	20	60%
Reliability Index	1	23%
Financial Cost	500	15%
Stakeholder Satisfaction Index	100	2%

2021 RAMP
SDG&E-RISK-2-QWP
RSE Summary

Risk Name: SDG&E Electric Infrastructure Integrity

ID	Control/Mitigation Name	Lifetime Benefit	Total Cost (\$K)	% Change in LoRE	Pre-Mitigated LoRE	CoRE Safety	CoRE Reliability	CoRE Financial	CoRE Stakeholder Satisfaction	CoRE	Post-Mitigated LoRE	Risk Reduction	Discounted Time	RSE per \$Million	Source
SDG&E-Risk-2-C1	Overhead Public Safety (OPS) Program	55	21730	0.69%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.93	63.36	26.77	78.07	Internal reliability data (2010-2020), Subject Matter Expertise
SDG&E-Risk-2-C3	4W Modernization Program - Distribution	55	20578	0.09%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.73	8.25	26.77	10.74	Internal reliability data (2010-2020), Subject Matter Expertise
SDG&E-Risk-2-C4-T1	Distribution Overhead Switch Replacement Program - SCADA	55	619	0.03%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.78	2.34	26.77	101.21	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C4-T2	Distribution Overhead Switch Replacement Program - Gang	55	420	0.03%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.67	2.98	26.77	189.66	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C4-T3	Distribution Overhead Switch Replacement Program - Hook	55	1650	0.16%	1632.20	0.38	3.80	0.16	1.29	5.62	1629.56	14.87	26.77	241.19	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C6	Vegetation Management (non-HTD)	1	121651	20.85%	1632.20	0.38	3.80	0.16	1.29	5.62	1972.52	1913.50	0.97	15.27	Vegetation Database, Subject Matter Expertise
SDG&E-Risk-2-C8	Aviation Protection Program	55	1873	0.31%	1632.20	0.38	3.80	0.16	1.29	5.62	1637.29	28.63	26.77	409.35	Internal reliability data (2010-2020), Subject Matter Expertise
SDG&E-Risk-2-C10-T1	Underground Cable Replacement Program (Proactive) - UG Feeder	45	528	0.11%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.42	10.02	24.52	465.09	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C10-T2	Underground Cable Replacement Program (Proactive) - UG Branch	45	15536	1.14%	1632.20	0.38	3.80	0.16	1.29	5.62	1613.53	104.99	24.52	165.69	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C10-T3	Underground Cable Replacement Program (Proactive) - North Harbor Project	45	14911	1.33%	1632.20	0.38	3.80	0.16	1.29	5.62	1610.46	122.26	24.52	201.03	Internal data, Subject Matter Expertise
SDG&E-Risk-2-C11	Tee Modernization Program	57	11469	4.32%	1632.20	0.38	3.80	0.16	1.29	5.62	1561.76	396.04	27.15	937.55	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C13	Replacement of Live Front Equipment - Proactive	57	1752	0.00%	1632.20	0.38	3.80	0.16	1.29	5.62	1632.13	0.37	27.15	5.70	Internal data, Subject Matter Expertise
SDG&E-Risk-2-C14	DOG Switch Replacement - Underground	46	19431	0.52%	1632.20	0.38	3.80	0.16	1.29	5.62	1623.20	47.79	24.52	60.30	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C15	GO165 Corrective Maintenance Program - Underground	45	44632	1.21%	1632.20	0.38	3.80	0.16	1.29	5.62	1651.98	111.23	24.52	61.11	Internal inspection data (2018-2020), Subject Matter Expertise
SDG&E-Risk-2-C16	GO 165 Manhole Vault Restoration Program	45	9670	0.12%	1632.20	0.38	3.80	0.16	1.29	5.62	1634.10	10.69	24.52	27.12	Internal data (2016-2020), Subject Matter Expertise
SDG&E-Risk-2-C18	Distribution Circuit Reliability	45	11703	0.08%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.97	6.94	24.52	14.53	Internal reliability data (2017-2019), Subject Matter Expertise
SDG&E-Risk-2-C20-T1	Substation Reliability for Distribution Components - Batiquitos 12kV Replacements	51	7452	0.11%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.47	9.71	25.95	33.83	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T2	Substation Reliability for Distribution Components - Bernardo 12kV Breakers Replacements	51	995	0.06%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.20	5.61	25.95	146.38	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T3	Substation Reliability for Distribution Components - Chicarita 12kV Replacements	51	4221	0.11%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.48	9.69	25.95	59.56	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T4	Substation Reliability for Distribution Components - Laguna Niguel 12kV Replacements	51	8702	0.16%	1632.20	0.38	3.80	0.16	1.29	5.62	1629.52	15.06	25.95	44.90	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T5	Substation Reliability for Distribution Components - Miramar 12kV Replacements	51	1417	0.06%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.22	5.53	25.95	101.16	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T6	Substation Reliability for Distribution Components - Scripps 12kV Replacements	51	12324	0.13%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.08	11.90	25.95	25.05	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T7	Substation Reliability for Distribution Components - Pacific Beach Bus Tie Replacements	51	2294	0.08%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.93	7.17	25.95	81.06	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C20-T8	Substation Reliability for Distribution Components - Coronado 69/12kV Transformer Replacements	51	1649	0.01%	1632.20	0.38	3.80	0.16	1.29	5.62	1632.07	0.74	25.95	11.69	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C21	Distribution Substation Obsolete Equipment	51	7840	0.03%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.77	2.43	25.95	8.05	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C23	San Marcos Substation Rebuild	51	13857	0.09%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.78	8.01	25.95	14.95	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C24	Urban Substation Rebuild	51	4116	0.11%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.42	9.98	25.95	62.95	Internal reliability data (2011-2020), Subject Matter Expertise
SDG&E-Risk-2-C28	Field SCADA RTU Replacement	45	2264	0.09%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.71	8.37	24.52	90.59	Internal reliability data (2015-2020), Subject Matter Expertise
SDG&E-Risk-2-C29	SCADA Capacitors	12	2385	0.08%	1632.20	0.38	3.80	0.16	1.29	5.62	1630.88	7.41	9.95	30.92	Internal reliability data (2017-2019), Subject Matter Expertise
SDG&E-Risk-2-A1	Customer Owned E-Structure Reconfigure	34	840	0.00%	1632.20	0.38	3.80	0.16	1.29	5.62	1632.08	0.08	21.13	2.13	Internal data, Subject Matter Expertise
SDG&E-Risk-2-A2-T1	Modernize Manual Switches - OH	55	33896	0.17%	1632.20	0.38	3.80	0.16	1.29	5.62	1624.48	15.30	26.77	12.09	Internal data, Subject Matter Expertise
SDG&E-Risk-2-A2-T2	Modernize Manual Switches - UG	45	42300	0.05%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.44	4.28	24.52	2.48	Internal data, Subject Matter Expertise
SDG&E-Risk-2-A3	Avian Protection Program	55	12173	0.07%	1632.20	0.38	3.80	0.16	1.29	5.62	1631.01	6.70	26.77	14.73	Internal reliability data (2017-2019), Subject Matter Expertise