



**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE  
STATE OF CALIFORNIA**

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Order Instituting Rulemaking Regarding Policies, Procedures and Rules for Development of Distribution Resources Plans Pursuant to Public Utilities Code Section 769.	Rulemaking 14-08-013 (Filed August 14, 2014)
And Related Matters.	Application 15-07-002 Application 15-07-003 Application 15-07-006
<b>(NOT CONSOLIDATED)</b>	
In the Matter of the Application of PacifiCorp (U 901-E) Setting Forth its Distribution Resource Plan Pursuant to Public Utilities Code Section 769.	Application 15-07-005 (Filed July 1, 2015)
And Related Matters.	Application 15-07-007 Application 15-07-008

**SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E)**  
**2018 DISTRIBUTION DEFERRAL OPPORTUNITY REPORT**

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Dated: September 4, 2018

Pursuant to Ordering Paragraph No. 2.d of Decision (D.)18-02-004, Southern California Edison Company (“SCE”) respectfully submits its 2018 Distribution Deferral Opportunity Report (“2018 DDOR”). The 2018 DDOR is attached.

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**Appendix A**  
**2018 DDOR**



# Distribution Deferral Opportunity Report

## Southern California Edison's 2018 Distribution Deferral Opportunity Report

Executive Summary of the 2018 Distribution Deferral Opportunity Report (DDOR) in compliance  
with Ordering Paragraphs (OPs) 2d and 2j of Decision (D.) 18-02-004

Southern California Edison  
September 4th, 2018

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## 1. Purpose

Consistent with Ordering Paragraphs No. 2d and 2j of Decision (D.) 18-02-004, Southern California Edison Company (SCE) hereby submits its 2018 Distribution Deferral Opportunity Report (DDOR). This cover letter summarizes the components of SCE's 2018 Distribution Deferral Opportunity Report.

## 2. Background

On February 15, 2018, the California Public Utilities Commission (Commission or CPUC) issued Decision (D.) 18-02-004 on Track 3 Policy Issues, Sub-Track 1 (Growth Scenarios) and Sub-Track 3 (Distribution Investment and Deferral Process). The Decision directs the Investor-Owned Utilities (IOUs) to file a Grid Needs Assessment (GNA) Report and Distribution Deferral Opportunity Report (DDOR) on an annual basis.

On April 16, 2018, SCE submitted Advice 3787-E to seek approval of its Distribution Resources Plan (DRP) Proposed Work Plans and reporting Formats for the GNA Report and DDOR, in compliance with Ordering Paragraph (OP) 2k of Decision (D.) 18-02-004.

On July 17, 2018, the Commission's Energy Division issued E-4944 (Draft Resolution), which addresses the formatting and implementation of SCE's annual Grid Needs Assessment and Distribution Deferral Opportunity Report filings.

On August 13, 2018, SCE submitted comments to the Draft Resolution addressing the Draft Resolution's OP 6 and 7, which contain modifications to SCE's proposed GNA and DDOR formats.

On August 24, 2018, the Commission's Energy Division issued Final Resolution E-4944 approving formats with modifications to SCE's annual Grid Needs Assessment and Distribution Deferral Opportunity Report filings.

## 3. Executive Summary

The DDOR is an Excel-based workbook containing three sheets: "Planned Investments," "Candidate Deferral Projects," and "Candidate Deferral Add Info." The data reflected in the workbook represents a portion of SCE's traditional infrastructure projects that contribute to the safe and reliable operation of the distribution system and serves as the baseline for evaluating opportunities for DERs to potentially defer or avoid traditional distribution system investments.

- The projects listed within the "Planned Investments" sheet provide one or more of the following services identified in the Competitive Solicitation Framework Working Group: Capacity, Reactive Power, Voltage, and/or Reliability (Back-Tie). SCE does not currently have Resiliency (Microgrid) projects within its Planned Investments. For all Planned Investment projects listed in the DDOR, SCE provides data on the ten attributes required by D.18-02-004,<sup>1</sup> including the substation, circuit, project description and type of equipment to be installed. In total, SCE has included 557 Planned Investments in its DDOR.

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<sup>1</sup> D.18-02-004, at pp. 36-37.

- The “Candidate Deferral Projects” sheet are a subset of SCE’s Planned Investments and can be recognized by the Planned Investment “DER Eligible Service” column populated as ‘Yes.’ In total, SCE has reported on 20 Candidate Deferral Projects.
- SCE’s Candidate Deferral Projects also have additional attribute information displayed within the “Candidate Deferral Add Info” sheet and whose details are further explained in 3.4.

### 3.1. DPAG Agenda

SCE’s DPAG agenda will contain the elements outlined in Decision (D.) 18-02-004, Section 3.7.3 encompassing review of the following:

- 1) Safety
- 2) Introduction and Overview
- 3) Planning Assumptions and Grid Needs reported in GNA
- 4) Planned Investments and Candidate Deferral opportunities reported in the DDOR
- 5) Candidate Deferral Prioritization
- 6) Underlying technical and operational requirements
- 7) Proposed contingency plans for Candidate Deferral projects

Solicitation information will be shared with all bidders during a market webinar prior to launching the Request for Offers, so those topics are not included in the proposed DPAG agenda.

### 3.2. Filtering Methodology

Pursuant to Ordering Paragraph 2.O of D.18-02-004, SCE applied Timing and Technical screens for use in the initial deferral screening process.

#### 3.2.1. Timing Screens

SCE’s Planned Investments list contains projects from SCE’s distribution planning forecast which have Operating Dates from 7/1/2018 through 12/31/2022. SCE’s Candidate Deferral projects are a subset of its Planned Investments list containing projects with Operating Dates from 1/1/2021 through 12/31/2022 (within the last two years of the aforementioned forecast). This reflects minimum project lead-times, which are primarily driven by the time and process requirements of the Integrated Distributed Energy Resources (IDER) Competitive Solicitation Framework (CSF) Request for Offer (RFO) process, for interconnection processes and required lead time for developers to install the DER solution(s). SCE anticipates a minimum lead time of at least three years for the entire process, which includes solicitation, CPUC approval, permitting, procurement, installation, and operation. For example, if a project is selected for potential deferral from the 2018 planning process, SCE will provide a minimum lead time of three years to become operational, thus the first year of potential candidate deferral projects will have an operating date in 2021. Furthermore, Candidate Deferrals must also pass an additional technical screen discussed in the subsequent section.

#### 3.2.2. Technical Screens

The technical screen determines whether DERs can provide the required service(s) to meet the grid need that an SCE project was proposed for. The four services DERs can provide are based on

the services adopted in the IDER CSF:<sup>2</sup> Capacity, Reactive Power, Voltage, and/or Reliability (Back-Tie).<sup>3</sup>

### 3.2.3. Project Categories

SCE's 2018 DDOR includes projects that meet one or more of the services identified in the CSFWG: Capacity, Reactive Power, Voltage, and/or Reliability (Back-Tie). Examples of projects that fall into one or more of the following categories include: circuit outage contingency mitigation; substation outage contingency mitigation; subtransmission line contingency mitigation; an increase in circuit capacity; an increase in substation capacity; voltage concern; underground cable temperature mitigation; new circuit(s); a new substation; and/or facilitation of load transfer.

### 3.2.4. Project Status

The projects included in SCE's 2018 DDOR have a wide range of scope and needs. The projects are those that have statuses of either approved, submitted internally to technical planning or emergent.

## 3.3. Deficiency

### 3.3.1. Capacity

Capacity deficiencies arise from increases in generation or load growth driven by new customers connecting to the electric system or additions from existing customers. Increases in generation and load can cause the capacity limits of distribution equipment to be exceeded based on current carrying capacity or equipment/cable operating temperature limits. For capacity deficiencies, the Mega-Volt Ampere<sup>4</sup> (MVA) deficiency is the difference between the forecasted demand and the capacity limit of the equipment. MVA deficiencies occur when the load is greater than the established capacity limits. The Deficiency % is calculated by dividing the MVA deficiency by the capacity limit in MVA and multiplying by 100%. This same calculation was also employed for temperature limit overages by converting the amount of MVA adjustment required to bring temperature to within capacity limits.

### 3.3.2. Voltage

SCE Rule 2 requires that customer service voltage be maintained to within 5% of nominal voltage<sup>5</sup>. For example, with nominal customer service voltage at 120V, the range of required voltage is 114V to 126V. Voltage regulators and capacitors are installed to maintain nominal voltage within this range.

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<sup>2</sup> D.16-12-036, at p. 8.

<sup>3</sup> Ibid. SCE does not currently develop projects that provide Microgrid utilizing local generation serving customers over utility distribution lines as there are still major challenges in the safe and reliable operations of these configurations. Therefore, Resiliency (Microgrid) services as defined in the CSFWG final report are not included in SCE's 2018 DDOR.

<sup>4</sup> The Apparent Power (MVA) is a combination of Real Power (MW) and Reactive Power (MVAR).

SCE plans to serve the forecasted MVA on the electric system as it can be larger than MW due to the existing power factor. If the power factor is unity, the amount of MVA required to be delivered to customers should be the same or very close to MW. The further power factor gets from unity, the more MVA is required to serve customers compared to MW. This is because Reactive Power or MVAR is another unit of power consumed by customers.

<sup>5</sup> Refer to Rule 2 Description of Service at <https://www.sce.com/NR/sc3/tm2/pdf/Rule2.pdf>



#### 3.3.2.1. Voltage Regulators

Typically the voltage deficiency is calculated based on a power flow study. Voltage regulation impacts are studied in power flow models to determine the impact on the voltage at the customer's meter which is reported in Voltage per Unit (Vpu). The Deficiency % is the percent voltage rise that occurs from the addition of the voltage regulation device.

#### 3.3.2.2. Capacitors

Voltage needs are also solved by capacitor projects which can be used for power factor and/or voltage correction. The capacitors used to correct voltage deficiency are programmed to be turned on and off at predetermined voltage levels.

#### 3.3.3. Reactive Power

If the Mega Volt-Ampere Reactive (MVAR) needs are based on correcting for unity power factor, the needs are determined using SCE's existing planning tools and an Excel-based spreadsheet. The VAR Analysis in SCE's existing planning tools uses a ratio of reactive power (VAR) to Volt-Amps (VA) to determine the amount of reactive power needed on the circuit. The deficiency needs in the DDOR represent the output of these calculations. The deficiency percent is the amount of MVAR to be added divided by the existing MVAR multiplied by 100%.

#### 3.3.4. Capacitor Projects

All (Distribution Service Required) voltage projects containing a "Project Description (Additional Information)" of either 'Capacitor on Pole Line (Overhead)' or 'Capacitor on Ground (Padmounted)' designation do not have deficiency values populated. SCE does not currently have the ability to consistently obtain this information to capture the voltage need retroactively from the time the project was created.

All (Distribution Service Required) reactive power or combined reactive power and voltage projects containing a "Project Description (Additional Information)" of either 'Capacitor on Pole Line (Overhead)' or 'Capacitor on Ground (Padmounted)' will only have deficiency values populated for one year. As part of SCE's existing planning process, needs for distribution reactive power and voltage are currently planned for one year in the future (i.e. projects with an operating date in 2018 will have deficiency values reported for only 2018; projects with an operating date in 2019 will have deficiency values reported for only 2019).

In some cases, subsets of these projects with 2018 operating dates indicate a deficiency of 100%. In 2017, SCE undertook a data clean-up process regarding the modeling of all capacitors in their planning system. Capacitors that were not modeled show a deficiency of 100%, even though physically a capacitor is installed. SCE has addressed this issue and projects with operating dates beginning in 2019 have the appropriate deficiencies shown.

### 3.4. Candidate Deferral Additional Information

The "Candidate Deferral Add Info" sheet includes each Candidate Deferral project's Capacity (MW), Energy Need (MWh), Time of Year, and Monthly/Yearly frequency.

SCE estimated the minimum amount of DER needed in order to defer the project. In order to evaluate the deficiency (MW, V, MVAR), assessments were completed on the system/area of interest without the proposed project to determine how much DERs are needed to bring system conditions below violation thresholds. Load was removed iteratively to the system/area of interest to provide the most effective mitigation.

The services required for potential project deferral from years 2021 through 2027 were utilized as an input for LNBA analysis. For this year's DDOR, all Candidate Deferral projects are addressing system needs within the June to October time frame.

### 3.5. Estimated LNBA Range

The LNBA calculation which populates the "Estimated LNBA Range" utilizes the same methodology approved by the Commission in Ordering Paragraph 12 of Decision (D.) 17-09-026. Consistent with SCE's response to OP 6 of E-4944, SCE expressed its "Estimated LNBA Range" attribute as a quantitative \$/kilowatt-year-range. However, not all identified needs on SCE's distribution system are in kilowatts. Some of SCE's voltage projects are expressed as a \$/volt-year-range, and its reactive power projects are expressed as a \$/kilovar-year-range.

### 3.6. Prioritization Metrics

To identify projects with a high likelihood of being successfully deferred with DER, SCE will apply the following three metrics to prioritize the Candidate Deferral Projects:

- Cost Effectiveness
- Forecast Certainty
- Market Assessment

SCE will present the methodology used to apply these metrics during the Distribution Planning Advisory Group (DPAG).

### 3.7. Cost Methodology

Estimated project costs are needed to calculate the "Estimated LNBA Range" for both Planned Investments and Candidate Deferral Projects. Project Unit Costs are presented for the Candidate Deferral Projects. The estimated cost information developed for the DDOR report utilizes the most up-to-date information within SCE's tools as available at the time of data extraction and are subject to change. SCE recognizes that different projects are at different points in their respective lifecycles. This leads to natural variance in the cost estimates as some projects are at initial stages and some are at more developed stages of design.

### 3.8. GNA and DDOR Comparison

#### 3.8.1. Attribute Consistency in GNA and DDOR

SCE has consistently applied substation, circuit, and facility IDs across their Grid Needs Assessment and Distribution Deferral Opportunity Report filings.

#### 3.8.2. Time Frame Differences

The system needs in the GNA range from 6/1/2018 through 12/31/2022. The projects in DDOR range from 7/1/2018 through 12/31/2022.

### 3.8.3. Need Differences

The GNA needs were extracted by reverting all projected load transfers within the five year (2018-2022) timing screen. The DDOR needs were extracted by reverting project-based transfers related to a distribution project in year 4 (2021) and year 5 (2022).

### 3.8.4. Linking GNA to DDOR

SCE has provided an additional column in its DDOR “Candidate Deferral Projects” sheet entitled “Link to GNA.” SCE notes that there is typically not a one-to-one relationship between GNA and DDOR projects, but such relationship can be one-to-one, one-to-many, many-to-one, or many-to-many.

## 3.9. Operating Dates and Needs [year(s) containing deficiency]

Some projects within SCE’s Planned Investments have an Operating Date (OD) that does not align with the project need date [year(s) containing deficiency]. If a single location has multiple planned projects in consecutive years, SCE will attempt to plan construction work at the same time instead of visiting the same location in consecutive years. An example of this is replacement of old equipment and a capacity increase being required at the same location. If the needs for these projects are close, construction is attempted to be planned at the same time in an effort to realize cost savings.

## 3.10. Conclusion

SCE thanks the Commission for the opportunity to provide this summary for their 2018 Distribution Deferral Opportunity Report.

# PLANNED INVESTMENTS















CANDIDATE DEFERRAL  
PROJECTS

Substation	Circuit	Distribution Service Required	Project Description	Project Description (Additional Information)	Type of Equipment To Be Installed	Operating Date	Deficiency (MVA or VPU)					Deficiency %					DCR	Comments	Link to GNA
							2018*	2019*	2020*	2021*	2022*	Units	2018*	2019*	2020*	2021*			
Mira Loma 220/66 (S)	n/a	Reliability	Substation Outage Contingency Mitigation	Install automated equipment	Substation	6/1/2021	0.00	0.00	0.00	12.00	32.00MVA	0.00%	0.00%	0.00%	1.41%	3.76%	Yes	0-100 S/KW-yr	None
Moorpark 'A' 220/66 (S)	n/a	Capacity	Increase Substation Capacity	Transfer Substation Load from One Bus to Another	Substation	6/1/2021	0.00	0.00	0.00	4.90	11.10MVA	0.00%	0.00%	0.00%	0.89%	2.01%	Yes	0-100 S/KW-yr	Substation: Moorpark 220/66 kv
Saugus 'C' 220/66 (S)	n/a	Capacity, Reliability	Subtransmission Line Contingency Mitigation	Increase Wire Size	Primary Feeder - Subtransmission	6/1/2022	0.00	0.00	0.00	0.00	1.55MVA	0.00%	0.00%	0.00%	1.78%	Yes	0-100 S/KW-yr	Line: Elizabeth Lake - Pitcher 66 kv	
Elizabeth Lake 66/16 (D)	n/a	Capacity, Reliability	Subtransmission Line Contingency Mitigation	Increase Wire Size	Primary Feeder - Subtransmission; Protection Equipment; IT	6/1/2022	0.00	0.00	0.00	0.00	1.20MVA	0.00%	0.00%	0.00%	1.37%	Yes	0-100 S/KW-yr	Line: Saugus-Elizabeth Lake-MWD Foothill 66 kv	
Rector 220/66 (S)	n/a	Capacity, Reliability	Subtransmission Line Contingency Mitigation	Install 68kV New Wire	Primary Feeder - Subtransmission; Substation	6/1/2021	9.90	7.80	9.30	10.70	11.90MVA	6.60%	5.44%	6.48%	7.46%	9.09%	Yes	100-500 S/KW-yr	Line: Rector - Riverway No.2 66 kv
Vera 66/12 (D)	n/a	Capacity	New Circuit	Add (1) 12kV Circuit	Substation; Primary Feeder - New Distribution Line, Protection Equipment, Capacitor	6/1/2021	0.00	0.00	0.00	3.90	7.00MVA	0.00%	0.00%	0.00%	5.36%	9.61%	Yes	0-100 S/KW-yr	Substation: Lampson; Circuit: Bison, Jaguar
Springville 220/66 (S)	n/a	Capacity, Reliability	Subtransmission Line Contingency Mitigation	Increase Wire Size	Primary Feeder - Subtransmission; Substation	6/1/2022	0.00	0.00	0.00	0.00	1.67MVA	0.00%	0.00%	0.00%	2.64%	Yes	0-100 S/KW-yr	Line: Springville-Strathmore 66 kv	
Live Oak 66/12 (D)	n/a	Capacity	Increase Subtransmission Line Capacity	Increase Wire Size	Primary Feeder - Subtransmission; Protection Equipment	6/1/2021	3.71	2.15	2.87	4.78	4.90MVA	3.37%	1.96%	2.61%	4.35%	4.46%	Yes	0-100 S/KW-yr	Line: Padua-Live Oak 66 kv
Mira Loma 66/12 (D)	n/a	Capacity	New Circuit	Add (1) 12kV Circuit	Substation; Primary Feeder - New Distribution Line, Protection Equipment, Capacitor	6/1/2021	0.00	0.00	0.87	1.80	2.76MVA	0.00%	0.12%	1.20%	2.48%	3.79%	Yes	0-100 S/KW-yr	Substation: Mira Loma, Circuit: Brewer
MacArthur 66/12 (D)	n/a	Capacity	New Circuit	Add (1) 12kV Circuit	Substation; Primary Feeder - New Distribution Line, Protection Equipment, Capacitor	6/1/2021	0.00	0.00	0.00	0.22	1.45MVA	0.00%	0.00%	0.00%	0.17%	1.14%	Yes	0-100 S/KW-yr	Substation: Cabrillo; Circuit: Xerox
Crater 66/16 (D)	n/a	Capacity, Reliability	Increase Substation Capacity	Install 68kV New Wire	Primary Feeder - Subtransmission; Substation; Protection Equipment; IT	6/1/2022	0.00	0.00	0.00	0.00	0.20MVA	0.00%	0.00%	0.00%	0.69%	Yes	0-500 S/KW-yr	Line: Crater-Latigo-Tapia 66 kv	
Elizabeth Lake 66/16 (D)	n/a	Capacity	New Circuit	Add (1) 16kV Circuit	Substation; Primary Feeder - New Distribution Line, Protection Equipment, Capacitor	6/1/2022	0.00	0.00	0.00	0.00	0.80MVA	0.00%	0.00%	0.00%	0.73%	Yes	0-100 S/KW-yr	Substation: Elizabeth Lake, Circuit: Tuba	
Lockheed 66/16 (D)	n/a	Capacity	New Circuit	Add (1) 16kV Circuit	Substation; Primary Feeder - New Distribution Line, Protection Equipment, Capacitor	6/1/2022	0.00	0.00	0.00	0.00	0.56MVA	0.00%	0.00%	0.00%	0.77%	Yes	0-100 S/KW-yr	Substation: Lockheed, Circuit: Orion, Starfighter	
Newhall 66/16 (D)	n/a	Reliability, Voltage	Subtransmission Line Contingency Mitigation	Add (2) 14.4 MVAR Capacitors	Capacitor	6/1/2021	0.00	0.00	0.00	0.00	0.01Vpu	0.00%	0.00%	0.00%	8.00%	12.00%	Yes	0-100 S/KW-yr	Substation: Newhall 66/16 kv
Mariposa 66/12 (D)	n/a	Reliability, Voltage	Subtransmission Line Contingency Mitigation	Add (1) 14.4 MVAR Capacitor	Capacitor	6/1/2022	0.02	0.00	0.00	0.01	0.00Vpu	34.80%	0.20%	1.20%	17.80%	2.20%	Yes	0-100 S/KW-yr	Substation: Mariposa 66/12 kv
Sun City 115/12	n/a	Capacity	Increase Substation Capacity, New Circuit	Increase transformer capacity from 56 to 84 MVA, Add (1)	Substation; Substation Bank; Primary Feeder - New Distribution Line, Protection Equipment, Ca	6/1/2022	0.00	0.00	0.00	0.00	3.76MVA	0.00%	0.00%	0.00%	5.17%	Yes	0-100 S/KW-yr	Substation: Sun City; Circuit: Equinox, Sundance	
Hathaway 66/12	n/a	Capacity	Increase Substation Capacity	Upgrade transformer component	Substation	6/1/2022	0.00	0.00	0.00	0.00	0.40MVA	0.00%	0.00%	0.00%	0.77%	Yes	0-100 S/KW-yr	Substation: Hathaway	
Nugates 66/12 (D)	n/a	Capacity	New Circuit	Add (1) 12kV Circuit	Substation; Primary Feeder - New Distribution Line, Protection Equipment, Capacitor	12/31/2021	1.05	1.05	0.93	0.95	1.10MVA	0.91%	0.91%	0.81%	0.83%	0.96%	Yes	100-500 S/KW-yr	Substation: Railroad; Circuit: Caboose, Diner, Trestle
Garnet 115/13 (D)	n/a	Capacity	Increase Substation Capacity, New Circuits	Rebuild 115kV & 33kV Switchcracks, Add (2) 56 MVA Transf	Substation; Substation Bank; Primary Feeder - New Distribution Line, Protection Equipment, Ca	6/1/2021	3.77	18.00	110.70	176.10	176.60MVA	1.80%	8.59%	52.82%	84.01%	84.24%	Yes	0-100 S/KW-yr	Substation: Garnet; Circuit: Coachella, Pierson
Lindsay 66/12 (D)	n/a	Reliability, Voltage	Subtransmission Line Contingency Mitigation	Increase Wire Size	Primary Feeder - Subtransmission; Protection Equipment	6/1/2022	0.00	0.00	0.00	0.00	0.00Vpu	0.00%	0.00%	0.00%	2.80%	Yes	0-100 S/KW-yr	Line: Lindsay-Strathmore 66 kv	
End	End	End	End	End	End	End	End	End	End	End	End	End	End	End	End	End	End	End	End

CANDIDATE DEFERRAL

ADD INFO

Link to GNA	Substation/Subtransmission line	Circuit	Distribution Service Required	Operating Date	Estimated LNBA Range (\$/kW-yr)	Unit Cost of Traditional Mitigation	Capacity (MW)*	Energy Need (MWh)*	Time of Year	Monthly Frequency*	Yearly Frequency*	Year
Line: Elizabeth Lake - Pitchgen 66 kV	Saugus 'C' 220/66 (S)	n/a	Capacity, Reliability	6/1/2022	0-100	\$ 5,898,370	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							0	0	Summer	0	0	2021
							2	3.91	Summer	5	15	2022
Line: Saugus-Elizabeth Lake-MWD Foothill 66 kV	Elizabeth Lake 66/16 (D)	n/a	Capacity, Reliability	6/1/2022	0-100	\$ 3,089,237	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							0	0	Summer	0	0	2021
							2	3.91	Summer	5	15	2022
Line: Rector - Riverway No.2 66 kV	Rector 220/66 (S)	n/a	Capacity, Reliability	6/1/2021	100-500	\$ 27,410,000	10	28.18	Summer	10	25	2018
							7	17.87	Summer	10	25	2019
							9.5	25.98	Summer	10	25	2020
							11	32.25	Summer	10	25	2021
							18	77.38	Summer	15	40	2022
Substation: Moorpark 220/66 kV	Moorpark 'A' 220/66 (S)	n/a	Capacity	6/1/2021	0-100	\$ 3,279,000	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							4.9	10.83	Summer	5	15	2021
							11.1	36.45	Summer	10	25	2022
None	Mira Loma 220/66 (S)	n/a	Reliability	6/1/2021	0-100	\$ 234,000	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							12	52.61	Summer	15	40	2021
							32	275.14	Summer	25	65	2022
Line: Springville-Strathmore 66 kV	Springville 220/66 (S)	n/a	Capacity, Reliability	6/1/2022	0-100	\$ 1,829,017	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							0	0	Summer	0	0	2021
							12.5	46.94	Summer	15	40	2022
Line: Lindsay-Strathmore 66 kV	Lindsay 66/12 (D)	n/a	Reliability, Voltage	6/1/2022	0-100	\$ 2,210,000	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							0	0	Summer	0	0	2021
							11	158.63	Summer	40	100	2022
Substation: Newhall 66/16 kV	Newhall 66/16 (D)	n/a	Reliability, Voltage	6/1/2021	0-100	\$ 1,512,446	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							4	6.89	Summer	5	15	2021
							0	0	Summer	0	0	2022
Substation: Mariposa 66/12 kV	Mariposa 66/12 (D)	n/a	Reliability, Voltage	6/1/2022	0-100	\$ 1,530,682	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							0	0	Summer	0	0	2021
							17.5	79.91	Summer	15	40	2022
Line: Crater-Latigo-Tapia 66 kV	Crater 66/16 (D)	n/a	Capacity, Reliability	6/1/2022	>500	\$ 10,844,000	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							0	0	Summer	0	0	2021
							0.2	0.2	Summer	5	15	2022
Line: Padua-Live Oak 66 kV	Live Oak 66/12 (D)	n/a	Capacity	6/1/2021	0-100	\$ 1,708,000	0	0	Summer	0	0	2018
							0	0	Summer	0	0	2019
							0	0	Summer	0	0	2020
							11	30.09	Summer	10	25	2021
							16	42.76	Summer	10	25	2022

Link to GNA	Substation/Subtransmission line	Circuit	Distribution Service Required	Operating Date	Estimated LNBA Range (\$/kW-yr)	Unit Cost of Traditional Mitigation	Capacity (MW)*	Energy Need (MWh)*	Time of Year	Monthly Frequency*	Yearly Frequency*	Year
Substation: Lampson; Circuit: Bison, Jaguar	Vera 66/12 (D)	n/a	Capacity	6/1/2021	0-100	\$ 3,503,000	0.0	0.00	Summer	0	0	2018
							0.0	0.00	Summer	0	0	2019
							0.0	0.00	Summer	0	0	2020
							3.9	20.77	Summer	15	40	2021
							7.0	48.46	Summer	20	50	2022
Substation: Lockheed; Circuit: Orion, Starfighter	Lockheed 66/16 (D)	n/a	Capacity	6/1/2022	0-100	\$ 3,924,994	0.0	0.00	Summer	0	0	2018
							0.0	0.00	Summer	0	0	2019
							0.0	0.00	Summer	0	0	2020
							0.0	0.00	Summer	0	0	2021
							0.6	0.60	Summer	5	15	2022
Substation: Mira Loma; Circuit: Brewer	Mira Loma 66/12 (D)	n/a	Capacity	6/1/2021	0-100	\$ 3,776,985	0.0	0.00	Summer	0	0	2018
							0.1	0.09	Summer	5	15	2019
							0.9	2.15	Summer	10	25	2020
							1.8	8.04	Summer	15	40	2021
							2.8	18.92	Summer	25	65	2022
Substation: Elizabeth Lake; Circuit: Tuba	Elizabeth Lake 66/16 (D)	n/a	Capacity	6/1/2022	0-100	\$ 3,926,077	0.0	0.00	Summer	0	0	2018
							0.0	0.00	Summer	0	0	2019
							0.0	0.00	Summer	0	0	2020
							0.0	0.00	Summer	0	0	2021
							0.8	2.08	Summer	10	25	2022
Substation: Hathaway	Hathaway 66/12	n/a	Capacity	6/1/2022	0-100	\$ 120,000	0.0	0.00	Summer	0	0	2018
							0.0	0.00	Summer	0	0	2019
							0.0	0.00	Summer	0	0	2020
							0.0	0.00	Summer	0	0	2021
							0.4	0.39	Summer	5	15	2022
Substation: Sun City; Circuit: Equinox, Sundance	Sun City 115/12	n/a	Capacity	6/1/2022	0-100	\$ 5,407,000	0.0	0.00	Summer	0	0	2018
							0.0	0.00	Summer	0	0	2019
							0.0	0.00	Summer	0	0	2020
							0.0	0.00	Summer	0	0	2021
							1.6	1.82	Summer	5	15	2022
Substation: Railroad; Circuit: Caboose, Diner, Trestle	Nogales 66/12 (D)	n/a	Capacity	12/31/2021	100-500	\$ 3,850,000	1.1	2.58	Summer	10	25	2018
							1.1	2.59	Summer	10	25	2019
							0.9	2.39	Summer	10	25	2020
							1.0	2.44	Summer	10	25	2021
							1.1	3.01	Summer	10	25	2022
Substation: Garnet; Circuit: Coachella, Pierson	Garnet 115/33 (D)	n/a	Capacity	6/1/2021	0-100	\$ 83,559,000	3.8	6.13	Summer	10	25	2018
							18.0	75.75	Summer	15	40	2019
							110.7	1397.64	Summer	35	90	2020
							176.1	2155.86	Summer	35	90	2021
							176.6	2159.60	Summer	35	90	2022
Substation: Cabrillo; Circuit: Xerox	MacArthur 66/12 (D)	n/a	Capacity	6/1/2021	0-100	\$ 935,716	0.0	0.00	Summer	0	0	2018
							0.0	0.00	Summer	0	0	2019
							0.0	0.00	Summer	0	0	2020
							0.2	0.54	Summer	5	15	2021
							1.4	6.89	Summer	15	40	2022
End	End	End	End	End	End	End	End	End	End	End	End	

\* All Capacity and Energy Needs are the sum of the individual substation needs

\*\* The Monthly and Yearly Frequency is the maximum of all individual needs