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# Appendix A – WDT1644

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## Queue Cluster 12 Phase II Report

November 20, 2020

This study has been completed in coordination with the California Independent System Operator Corporation (ISO) per Southern California Edison Company's Wholesale Distribution Access Tariff (WDAT), Attachment I Generator Interconnection Procedures (GIP)

### Interconnection Study Document History

No.	Date	Document Title	Description of Document
1	11/20/2020	Queue Cluster 12 Phase II Appendix A Report	Final Phase II interconnection study report

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## A. INTRODUCTION

██████████ Interconnection Customer (“IC”), submitted a completed Interconnection Request (“IR”) to Southern California Edison (“SCE”), the Distribution Provider, for their proposed ██████████ Generating Facility”). The IC’s IR and/or Attachment B stipulated Full Capacity Deliverability Status (“FCDS”) and an Option A selection for the Generating Facility. In addition, the IC requested an In-Service Date (“ISD”) and Commercial Operating Date (“COD”) of 9/30/2023 and 12/31/2023, respectively. However, the actual in-service dates for the Generating Facility will depend on the duration required for: licensing, engineering, detailed design, and construction associated with the facilities required to interconnect the Generating Facility. The duration for these activities would commence after the Generation Interconnection Agreement (“GIA”) for the Generating Facility has been executed or filed at the Federal Energy Regulatory Commission (“FERC”) for acceptance and funded.

In accordance with FERC’s approved SCE’s Wholesale Distribution Access Tariff (“WDAT”) Attachment I Generator Interconnection Procedures (“GIP”), the Generating Facility was grouped with QC12 Phase II projects to determine the impacts of the group as well as impacts of the Generating Facility on SCE’s Distribution System and the ISO Grid. An Area Report, Subtransmission Assessment Report, and Distribution Assessment Report have been prepared separately to discuss the combined impacts of all projects on the ISO Grid and impacts to non-ISO controlled distribution facilities served out of the ██████████ ██████████<sup>1</sup>, respectively. This Appendix A report focuses only on the impacts or impact contributions of the Generating Facility to SCE’s Electric System and is not intended to supersede any contractual terms or conditions specified in the forthcoming GIA.

## B. REPORT OBJECTIVE

SCE performed a QC12 Phase II Study that included the Generating Facility, and this report addresses the results of the analysis.

The report provides the following:

1. Transmission and Distribution system impacts attributed to the Generating Facility.
2. System reinforcements or mitigation necessary to address the adverse impacts attributed to the Generating Facility under various system conditions.
3. A list of required facilities and a good faith estimate of the Generating Facility’s cost responsibility and SCE’s construction schedule<sup>2</sup>, assuming SCE is constructing the required facilities. Such information is provided in Attachment 1 and Attachment 2 as separate documents in the Appendix A report package for the Generating Facility.
4. Identification of potential short circuit duty impacts to Affected Systems served from the Transmission, Subtransmission or Distribution System.

Furthermore, since the Generating Facility encompasses a battery energy storage system (“BESS”), an “As-Available Charging” analysis to determine the charging impacts on SCE’s Electric System was

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<sup>1</sup> This includes non-ISO controlled Distribution System facilities at the subtransmission level (66 kV or 115 kV) and low voltage facilities that are 50 kV and below.

<sup>2</sup> It should be noted that construction is only part of the duration of months specified in the study, which includes final engineering, licensing, and other activities required to bring such facilities into service. These durations are from the execution of the GIA, receipt of: all required information, funding, and written authorization to proceed with design and engineering, procurement, and construction from the IC as will be specified in the GIA to commence the work.

conducted as well. The analyses focused on the Charging Capacity<sup>3</sup> aspects of the Generating Facility and considered varying levels of system demand with minimal generation dispatch within the local distribution system.

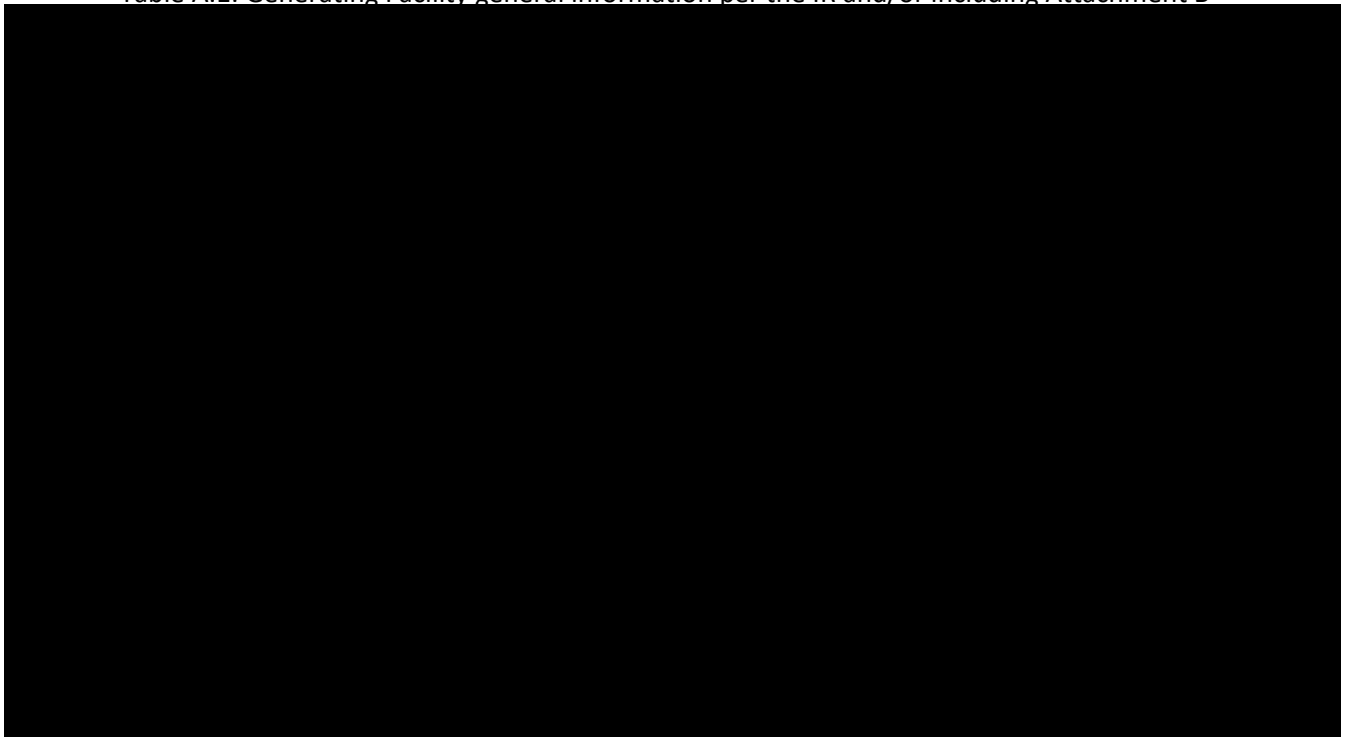
Accordingly, this report also discloses the following:

- a. The adequacy of SCE’s Electric System to support the Generating Facility under As-Available Charging Distribution Service (“ACDS”).
- b. Provides a high-level explanation of potential exposure to the Generating Facility of charging restrictions on the electric system.]
- c. The As-Available Monthly Contract Demand Charge per kW (monthly rate) used to calculate the IC’s Generating Facility demand charge rate. Please refer to Attachment 2 of this report for the monthly rate assigned to the IC’s Generating Facility.

### C. DESCRIPTION OF GENERATING FACILITY

Generating Facility: all equipment and facilities comprising the IC’s [REDACTED] Generating Facility located in the [REDACTED], as disclosed by the IC in its IR and/or Attachment B, as may have been amended during the Interconnection Study process, as summarized below:

Table A.1: Generating Facility general information per the IR and/or including Attachment B



<sup>3</sup> Charging Capacity: The load associated with the storage component of the Eligible Customer’s Resource charged from the Distribution System that is used for later redelivery of the associated energy, net of Resource losses, to the Distribution System. Charging Capacity does not include load that is subject to the Distribution Provider’s retail tariff.

### **Generation Export Limit for the Generating Facility**

The IC requested a total net output capacity of [REDACTED] as measured at the POI. The Parties acknowledge that should the Generating Facility exceed this value or if the Generating Facility is capable of exceeding this value, the IC shall be required to install, own and maintain a control limiting device or, alternatively, by means of configuring the Generating Facility's control system, as approved by SCE, that will ensure the Generating Facility complies with these restrictions.

### **As-Available Charging Capacity Limit for the Generating Facility**

The IC specified in its IR that the BESS component of the Generating Facility will charge solely from the Generating Facility's Solar photovoltaic arrays for the sole purpose of allowing the timing of delivery of energy produced by the Generating Facility to be shifted for delivery to the ISO/SCE controlled Grid at a time other than when produced. As such, the IC understands and acknowledges that no evaluation has been performed for charging the BESS component of the Generating Facility from the SCE's Distribution System, and that the BESS component shall be charged utilizing only the output of the Generating Facility's Solar photovoltaic arrays and that it shall not charge from SCE's Distribution System. Accordingly, the IC agrees to install, own, operate and maintain a control limiting device or, alternatively, by means of configuring the Generating Facility's control system to ensure the BESS component of the Generating Facility does not charge from SCE's Distribution System. Such control limiting device and/or the Generating Facility's control system must be reviewed and approved by SCE.

If the IC does not install a control limiting device or implement control system functions, SCE will require one of the following additional Interconnection Facility scope which is not included as part of this study:

- a. An SCE protection device that will isolate the Generating Facility if values are exceeded.
- b. A function as part of a future Generation Control Monitoring System which will open the SCE-owned device if values are exceeded

The scope of facilities that will be installed by SCE and the IC for physical interconnection of the Generating Facility, to provide for the requested 10.0 net MW output at the POI taking into account the requested Deliverability, and in support of ACDS resulting from this study are detailed in Attachment 1 to this Appendix A report. Figure A.1 illustrates the Generating Facility and Figure A.2 illustrates the location of the Generating Facility. Additional Generating Facility information is provided in Table A.2.

Figure A.1: Generating Facility One-Line Diagram

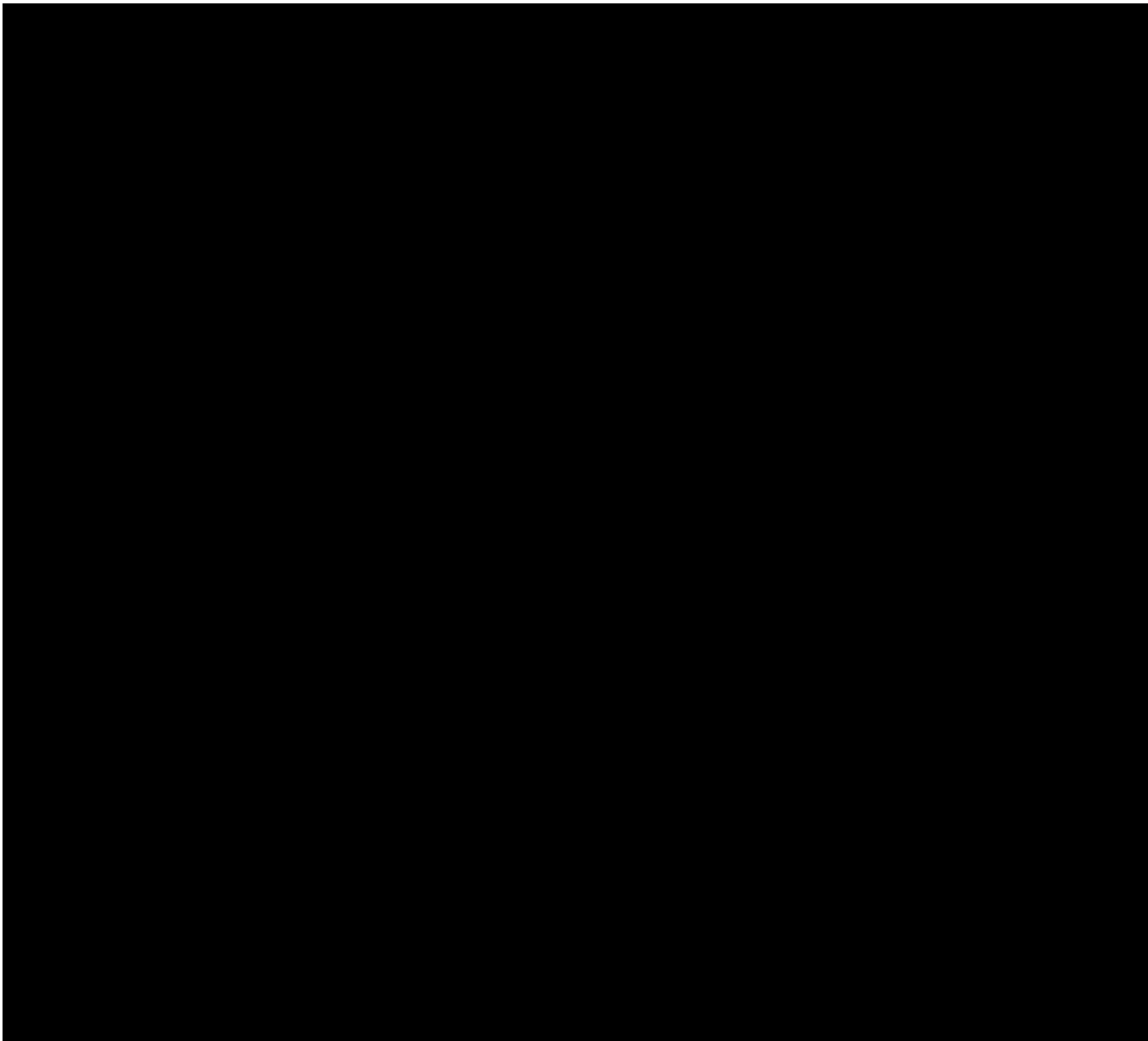


Figure A.2: Generating Facility Location Map

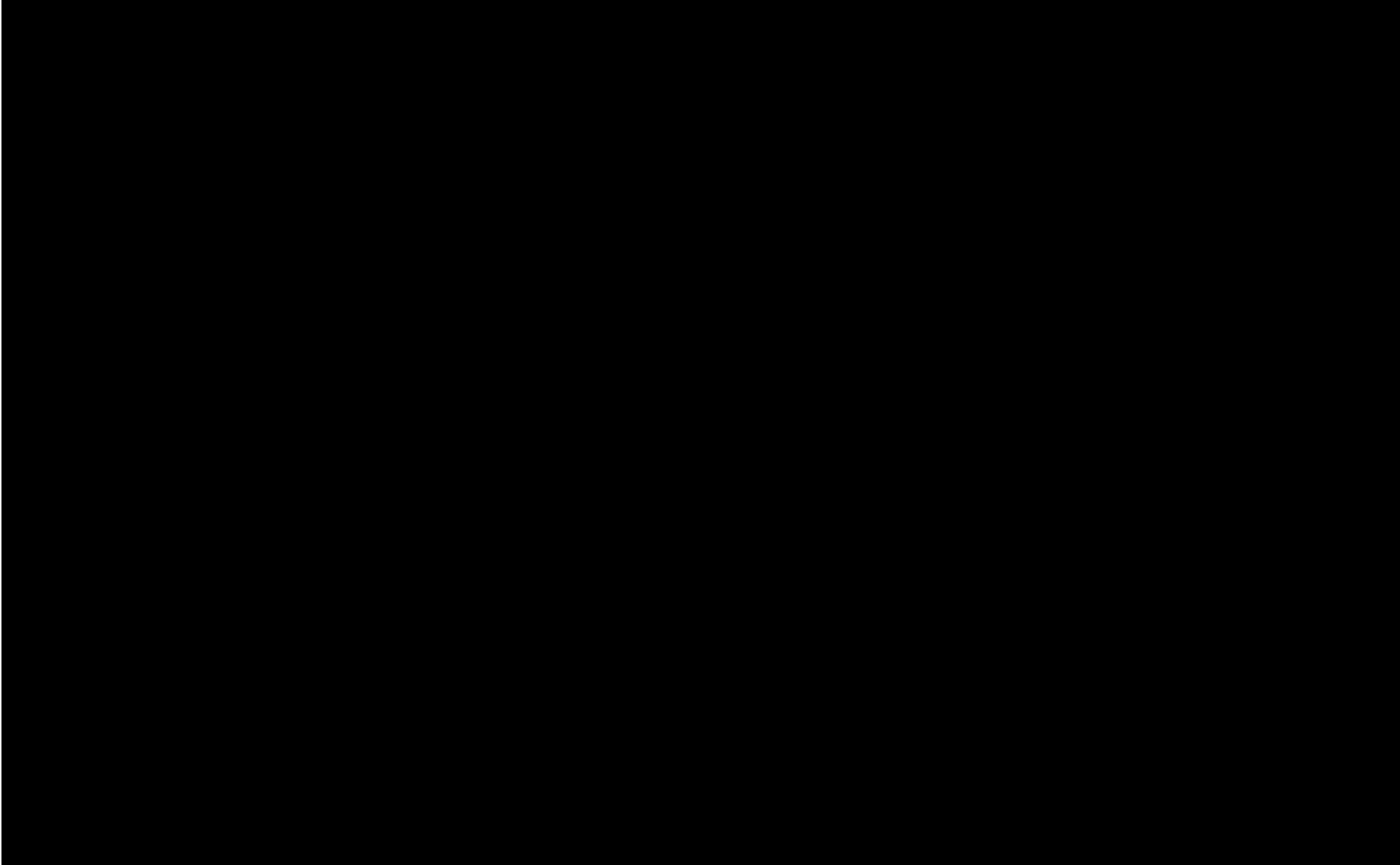




Table A.2: Additional Generating Facility General Information per IR and/or Attachment B

Generating Facility Location	
SCE's Planning Area	
SCE's Subtransmission System	
Interconnection Voltage	
POI	
Maximum Generating Facility Delivery at POI Requested	
Pad-Mount Transformer(s)	
Generator/Inverter/Converter Data	
Auxiliary Load and/or Station Light and Power	

#### D. STUDY ASSUMPTIONS

For detailed assumptions regarding the transmission, subtransmission and distribution system, please refer to the Area Report, Subtransmission Assessment Report, and Distribution Assessment Report, respectively. Below are the assumptions specific to the Generating Facility:

1. The Generating Facility was modeled as described in Table A.1 and Table A.2 above.
2. Wildfire mitigation measures have been incorporated into all of SCE's construction standards and operational practices. SCE has notified ICs with a proposed project(s) and associated Interconnection Facilities to be located in, or interconnecting to, an identified high fire risk area ("HFRA") or high fire risk area circuit ("HFRA circuit"). SCE is implementing these measures to address the heightened wildfire risk in HFRA and HFRA circuits. As a result of implementing these mitigation measures, please be advised that the facilities and their associated costs identified in this Appendix A report (Attachment 1 and Attachment 2) are above and beyond the mitigation identified in previous studies. In the future, SCE may develop and implement additional mitigation measures in these HFRA that are not identified in this study as a means of continuously ensuring the safety and reliability of SCEs Electric System and the public it serves. If this occurs prior to interconnecting the Generating Facility, additional scope will be included via an addendum to this study report or via Technical Study report outlining the facilities.
3. The facilities that will be installed by SCE and the IC are detailed in Attachment 1.
4. Environmental Activities, Permits, and Licensing.

The assumptions for the Environmental Activities, Permits, and Licensing are as follows:

- a. SCE's Interconnection Facilities ("IF") and Distribution Upgrades ("DU"s) needed to interconnect the Generating Facility and provide for the level of service requested for

## Charging Capacity:

SCE's scope of work will not require a California Public Utilities Commission ("CPUC") license.

### i. SCE's IFs and DUs:

- SCE will act as the lead for regulatory agency communication for permits issued to SCE covering SCE facilities.
- SCE environmental activities may include, but are not limited to, the following:
  - Perform all environmental studies and construction monitoring of SCE internal substation construction activities and provide study results to the IC for inclusion in its environmental documents, if applicable.
  - Collaborate with the IC during the environmental study phase on the IC's proposed study methodologies and findings, as studies are being planned and performed for SCE's scope of work.
  - Review IC's California Environmental Quality Act ("CEQA") /or National Environmental Policy Act ("NEPA") documents, technical studies, surveys, and other environmental documentation to ensure SCE's scope of work is adequately described in such documents (IC will include SCE's scope of work in its environmental documents. If the Generating Facility's CEQA and/or NEPA documents do not sufficiently incorporate SCE's scope of work, SCE's assumed environmental work and permitting level of effort may increase, resulting in the need to update cost and duration estimates, and potentially amend the GIA).
  - Review SCE's internal existing technical reports/documents when available.
  - Prepare SCE's IF and DU description of the Generating Facility, including scope changes during permitting/pre-construction or construction.
  - Communicate scope changes to the IC's environmental team and discuss/approve subsequent actions including new surveys as necessary.
  - Complete General Order 131-D Consistency Determination and Environmental Evaluation.
  - Regulatory agency communication, consultation, reporting, and acquisition of SCE permits addressing SCE's facilities and scope of work.
  - Prepare environmental requirements for construction clearance.
  - Develop communication plan.
  - Perform pre-construction coordination field visit.
  - Provide Environmental Awareness/Worker Environmental Awareness Program ("WEAP") training.
  - Perform construction monitoring oversight for IFs and DUs.
  - Complete construction and post-construction site assessments.
- IC performs all environmental studies and prepares draft environmental permit applications related to the installation of SCE's IFs and DUs, except for the SCE internal substation activities as described above. The IC's responsibilities include as applicable, but are not limited to: notifications to the Native American Heritage Commission ("NAHC") and follow-up notifications to the tribes and individuals in the NAHC contact list; performing cultural and paleontological resources records

searches, cultural resources inventories (survey and recording), testing and evaluation and/or data recovery of archaeological sites, and appropriate documents in the form of inventory reports, research design, and/or data recovery reports; cultural and paleontological monitoring when/if required, and arranging curation agreements for artifacts and fossil specimens collected; performing a California Natural Diversity Database search, habitat assessment, and protocol or focused surveys for species with the potential of occurring in identified suitable habitat; conducting jurisdictional delineations for wetlands or other regulated waters; preparing draft environmental permit applications, pre-construction biological resource surveys for IFs and DUs, biological resource monitoring during construction for IFs and DUs, and cultural and paleontological monitoring during construction for IFs and DUs; mitigation costs including, but not limited to, offsite/compensatory mitigation and onsite restoration, and developing mitigation plans or other environmental reports or submittals to support installation of SCE's IFs and DUs.

- Prior to commencing work and during execution of work, the IC should collaborate and obtain SCE concurrence on all work outlined above. The IC is advised that should the environmental studies and resulting reports not meet the industry standards utilized in the State of California and/or by SCE in accordance with Applicable Laws and Regulations, as determined by SCE, the IC shall be required to remedy all deficiencies under SCE's direction.
- The estimated costs provided in this study assume that the IC will perform part of the environmental scope of work that would normally be performed by SCE for SCE-owned IFs and DUs, if applicable, to interconnect the Generating Facility. The IC shall provide SCE a signed declaration summarizing the actual costs for work performed by the IC within thirty (30) calendar days from the Generating Facility's ISD. The IC acknowledges and accepts that these costs will be subject to an Interconnection Facilities Charge, a Distribution Facilities Charge, if applicable, and Income Tax Component of Contribution ("ITCC").
- As a requirement for Interconnection Customers electing to share the responsibility to perform the Environmental Activities for SCE-owned IFs, DUs as disclosed in Section D.4, and to ensure proper accounting of costs used in the calculation of the Income Tax Component of Contribution ("ITCC") and Operations & Maintenance ("O&M") charges, referred to as an Interconnection Facilities Charge and/or a Distribution Upgrades Charge, if applicable in the forthcoming GIA for the Generating Facility, the IC is required to complete and submit an Environmental Services Costs Declaration for SCE-owned IFs and/or DUs required to interconnect the Generating Facility. An authorized representative of the IC will sign the Form attesting to the actual costs spent on environmental services work that would otherwise have been performed by SCE for SCE-owned IF and/or DUs required to interconnect the Generating Facility.

The declaration shall be provided to SCE by a specified date in the Generating Facility's forthcoming GIA Appendix B - Milestone table. Should the IC fail to provide the declaration by the specified deadline, SCE will hold the IC in default of the GIA pursuant to the terms therein. The costs declared by the IC in the declaration, once approved, will be used by SCE to adjust the ITCC and the applicable monthly O&M

charges for the Generation Facility and will be reflected via an amendment to the GIA upon true-up.

The information stated in the declaration is subject to review and/or audit by SCE pursuant to the terms and conditions in the forthcoming GIA. Should an audit be deemed necessary by SCE, the IC will need to provide supporting documentation (copies of invoices/receipts) to substantiate the costs stated in the declaration within ten (10) business days from receipt of notice.

- b. SCE's Reliability Network Upgrades ("RNUs") and Delivery Network Upgrades ("DNUs") assigned to the Generating Facility: No Environmental activities were assumed as no environmental impacts were identified based on the RNUs and DNUs that will be installed by SCE disclosed in Attachment 1.
- c. For further details on the environmental evaluation and permitting/licensing requirements for generation interconnection projects, refer to Appendix K of the Area report.

5. Energy Storage Considerations:

- SCE currently offers ACDS pursuant to SCE's WDAT Energy Storage filing under Docket No. ER19-2505<sup>4</sup> accepted by FERC and effective October 30, 2019<sup>5</sup>. Interconnection customers will be assessed an As-Available Monthly Contract Demand Charge per kW (monthly rate) in addition to the mitigation costs identified in this Study. The monthly rate is based on the POI and the type of facilities used by the IC's Generating Facility to charge its BESS from SCE's Distribution System. Please refer to Attachment 2 of this Study for the monthly rate assigned to the IC's Generating Facility.
- SCE plans to deploy the Constraint Management System ("CMS") to implement real time charging restrictions for BESS projects electing to receive ACDS on an interim basis while the Distributed Energy Resource Management System ("DERMS") is completed. However, there are certain situations where a BESS project will not be able to participate in either CMS or DERMS. These situations include but are not limited to:
  1. the project does not intend to use a dedicated RTU
  2. the ACDS study results identified thermal overloads on subtransmission lines
  3. inability to monitor overloaded facilities properly to enable ACDS

Any project that falls into one of the situations listed above, will not be able to participate in either CMS or DERMS and the only means available to the BESS project to receive ACDS is through a safety charging schedule provided to the IC that will be updated on an as-needed basis as new BESS projects interconnect, or at a very minimum once a year to adjust the charging schedule in accordance to the annual load forecast.

BESS projects deemed CMS compatible, will be added to the CMS on an interim basis until such time the project is migrated over to the DERMS once its operational

- For additional energy storage considerations refer to the Distribution Assessment Report.

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<sup>4</sup> Link: <https://www.ferc.gov/CalendarFiles/20200124142753-ER19-2505-001.pdf>

<sup>5</sup> FERC accepted SCE's proposed WDAT revisions effective October 30, 2019 subject to refund, and established hearing and settlement judge procedures

6. Other Items to Consider:

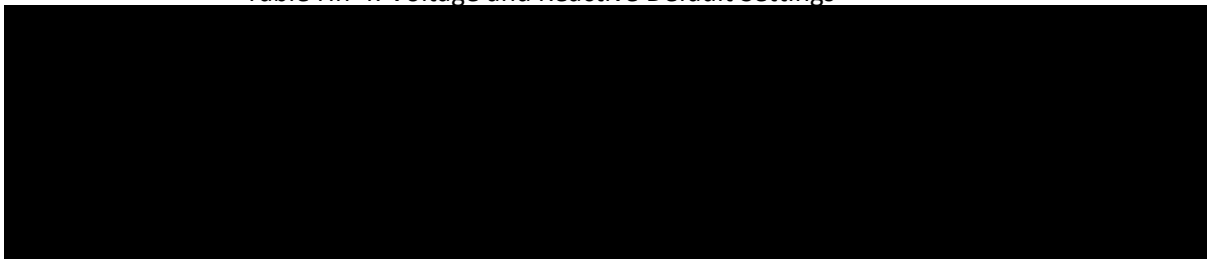
- Final metering requirements will be identified as part of the execution the Generating Facility and could result in modifications to the Generating Facility.

## E. TECHNICAL REQUIREMENTS<sup>6</sup>

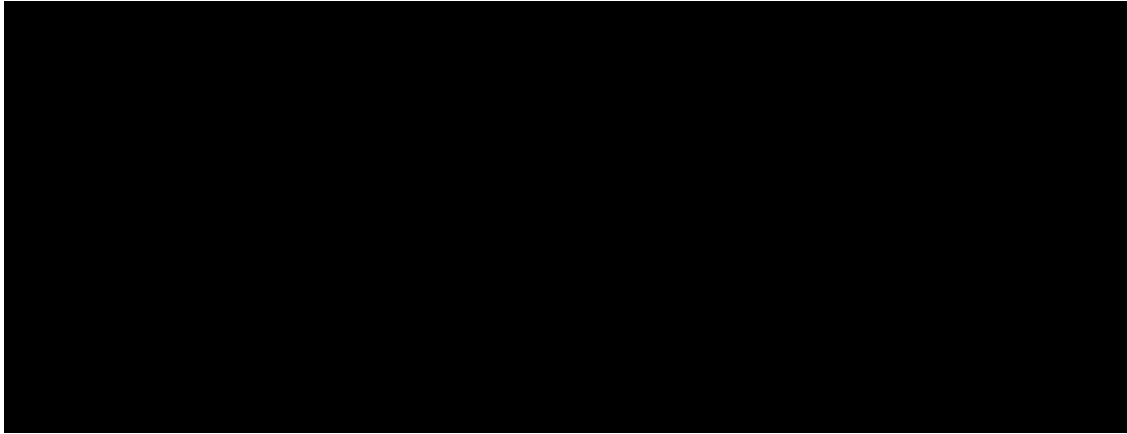
### 1. Operational Requirements

- a. The IC shall operate the Generating Facility and the ICs IFs in accordance with the ISO Tariff; the Applicable Reliability Standards; and Applicable Reliability Council requirements.
- b. The Generating Facility shall be operated so as to prevent or protect against the following adverse conditions on SCE’s Electric System: inadvertent and unwanted re-energizing of a utility dead line or bus; interconnection while out of synchronization; overcurrent; voltage imbalance; ground faults; generated alternating current frequency outside permitted safe limits; power factor or reactive power outside permitted limits; and abnormal waveforms.
- c. The Generating Facility will be required to comply with SCE’s voltage regulation requirements as stated in SCE’s Rule 2 at the Point of Change of Ownership (“POCO”) while in parallel with SCE’s Distribution System. This will require limiting export and charging ramp rate for inverter/converter-based technology in order to avoid unnecessary flicker that may impact other customers. SCE will provide the IC with the required ramp rate control parameters and other necessary information to allow the IC to develop its generation and storage control limit following execution of the GIA. Ongoing changes to the ramp rate control scheme may be required as determined by changes in the distribution system topology or other changes in the distribution system. SCE would review and approve the ramp rates to ensure:
  - i. Compliance with SCE’s Rule 2 requirements; and
  - ii. Parallel operation with SCE’s Distribution System does not cause a voltage fluctuation at the POCO greater than plus/minus 5% of the prevailing voltage level of SCE’s electric system at the POCO; and
  - iii. The Generating Facility meets SCE’s flicker requirement which are based on IEEE 1547-4.1.3, IEEE 1547-4.3.2, and IEEE 519-1992.
- d. Generating Facilities that utilize inverter-based technology will be required to operate under the control of automatic voltage regulation in accordance with Rule 21 Section Hh requirements as shown in Rule 21 Table Hh-4 and Figure Hh-1 and below.

Table Hh-4: Voltage and Reactive Default Settings

A large black rectangular redaction box covers the content of Table Hh-4, which would contain the voltage and reactive default settings mentioned in the caption.

<sup>6</sup> The IC is advised that it shall comply with mandatory regulatory standards of but not limited to FERC/NERC/WECC/CPUC and there may be technical requirements in addition to those that outlined above in Section C of this report that are included in the SCE’s Interconnection Handbook or that will be addressed in the Generating Facility’s GIA.



The voltage set points are to be used as the basis for setting up the automatic voltage control mode (with its automatic voltage regulator in service and controlling voltage) of the Generating Facility in order to maintain scheduled voltage at a reference point.

e. **Power Factor Requirements**

- i. For asynchronous generators, the Generating Facility will be required to maintain a composite power delivery at continuous rated power output at the POI (as measured by meters installed at or near the POCO). At that point, the generator must provide dynamic reactive power within the power factor range of 0.95 leading to 0.95 lagging. The Generating Facility may meet the dynamic reactive power requirement by utilizing a combination of the inherent dynamic reactive power capability of the inverter, dynamic reactive power devices, and static reactive power devices to make up for losses.
- ii. For synchronous generators, the Generating Facility will be required to maintain a composite power delivery at continuous rated power output at the terminals of the Electric Generating Unit at a power factor within the range of 0.95 leading to 0.90 lagging.

2. **Other Requirements**

- a. Per the WDAT Section 3.13, all inverters shall meet the UL1741 and UL1741SA certification standards utilizing requirements set in Rule 21. These standards require the Generating Facility to provide for the following functions:
  - i. Low Voltage Ride-Through (“LVRT”) Capability
  - ii. Frequency Disturbance Ride-Through Capability
  - iii. Reactive Power Priority

If the inverters/converters selected do not currently meet these requirements, certification by a Nationally Recognized Testing Laboratory (“NRTL”) is required prior to commissioning of the Generating Facility which is a precursor to obtaining the Permit to Operate (“PTO”). Conditional PTO’s will not be granted due to lack of NRTL certification(s).

- b. The Generating Facility must comply with the harmonic current limits outlined in IEEE 519-2014 and is subject to the provisions of CPUC Rule 2.E, allowing SCE to require the IC to mitigate potential interference with service to other SCE customers. If the harmonic

interference is deemed to be caused by the IC, further mitigation, not included as part of this study, may be deemed necessary.

## F. RELIABILITY STANDARDS, STUDY CRITERIA AND METHODOLOGY

- **Study Criteria**

The interconnection studies were conducted to ensure that both the ISO Grid and SCE Distribution System comply with the applicable planning and reliability standards. Refer to the Area Report for additional details of the applicable reliability standards, study criteria, and methodology pertaining to the ISO grid. For additional details pertaining to SCE’s distribution system, refer to the Subtransmission Assessment Report (Attachment 7) and the Distribution Assessment Report (Attachment 8).

- **SCE Short Circuit Duty Study Methodology**

All bus locations where the Phase II projects increased the Short Circuit Duty (“SCD”) by 0.1 kA or more and where duty was found to be in excess of 60% of the minimum breaker nameplate rating are listed in the Area Report (Appendix H). These values have been used to determine if any SCE equipment is overstressed and associated mitigation.

The responsibility to finance the SCD mitigation(s) identified in the Phase II Study due to increases in SCD, shall be assigned pro rata to all projects requiring the SCD mitigation based on their respective SCD contribution.

- **Coordination with Affected Systems**

Per GIP section 3.7, SCE will notify the Affected System Operators that are potentially affected by an IC’s IR or group of interconnection requests subject to a Group Study. SCE will coordinate the conduct of any studies required to determine the impact of the IR on Affected Systems with Affected System Operators and, if possible, include those results (if available) in its applicable Interconnection Study within the time frame specified in the GIP. SCE will include such Affected System Operators in all meetings held with IC as required by the GIP. IC will cooperate with SCE in all matters related to the conduct of studies and the determination of modifications to Affected Systems. A transmission provider which may be an Affected System shall cooperate with SCE with whom interconnection has been requested in all matters related to the conduct of studies and the determination of modifications to Affected Systems.

## G. STUDY RESULTS

1. **ISO controlled facilities (Bulk Level Facilities)**

- a. Generation Export Analysis

- i. Steady State Power Flow Reliability Assessment

[REDACTED]

- ii. Transient Analysis

[REDACTED]

b. Deliverability Assessment

Section I – Deliverability Assessment Results of this report provides information on any Delivery Network Upgrades (Local or Area) assigned to the Generating Facility, if any.

c. SCD Analysis

i. SCE-owned Facilities

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED] facility

ii. SCE's Ground Grid Duty Concerns

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

d. As-Available Charging Analysis

[REDACTED]  
[REDACTED]  
[REDACTED]

2. Non-ISO controlled Subtransmission System (66 kV or 115 kV)

a. Generation Export Analysis

i. Steady State Power Flow Analysis

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

ii. Post Transient Voltage Stability Analysis

[REDACTED]  
[REDACTED]  
[REDACTED]

b. SCD Analysis

i. SCE-owned Facilities

[REDACTED]  
[REDACTED]  
[REDACTED]



ii. SCE's Ground Grid Duty Concerns

[REDACTED]

c. As-Available Charging Analysis

1. Thermal Overloads

[REDACTED]

2. As-Available Charging Restrictions of the Generating Facility

[REDACTED]

3. Non-ISO controlled Distribution System (50 kV and below)

a. Generation Export Generation Export Analysis

i. Steady State Power Flow Analysis

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Please refer to Attachment 1 and Attachment 2 for additional scope and costs information.

ii. Voltage Analysis

The study determined that the addition of the Generating Facility does not result in any CPUC Rule 2 Voltage requirements under maximum generating operating conditions at unity power factor during minimum and peak loading conditions.

iii. Protection

[Redacted]

- i. [Redacted]

b. SCD Duty Analysis

[Redacted]

c. As-Available Charging Analysis

1. Thermal Overloads

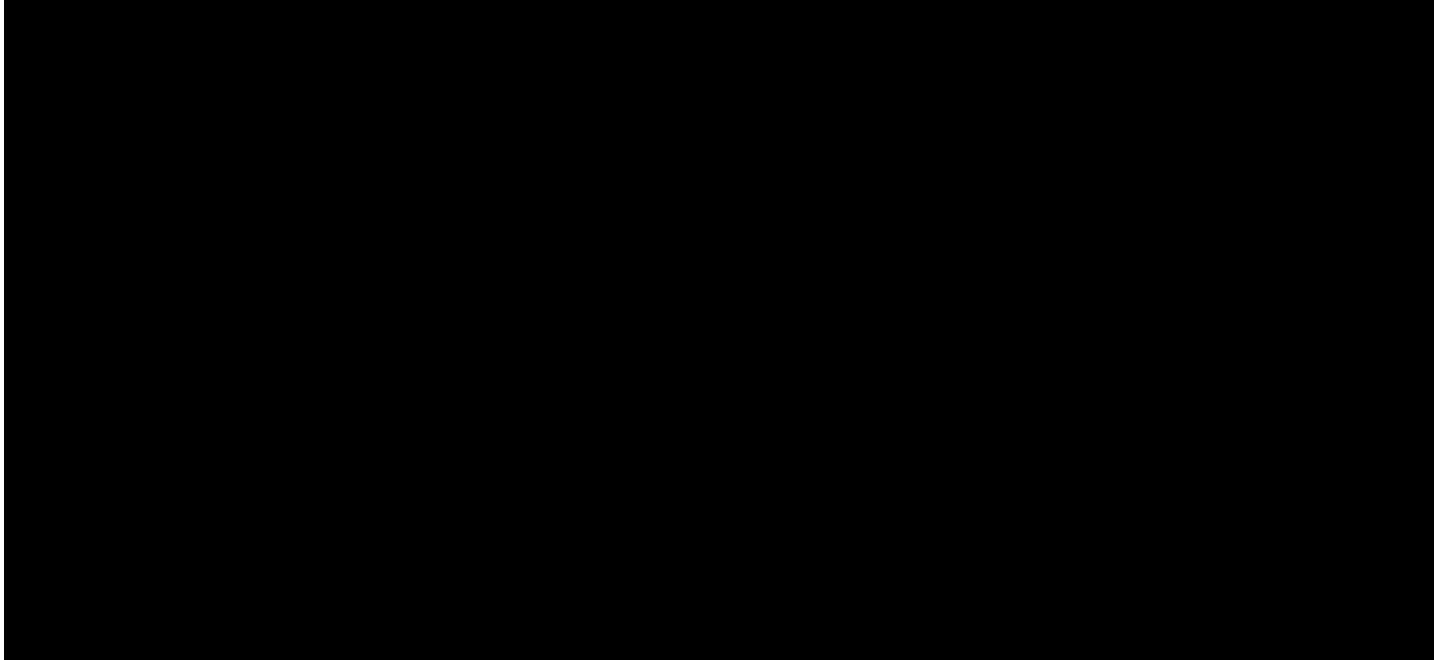
[Redacted]

[Redacted]

2. As-Available Charging Restrictions

[Redacted]

Table 2-1: Bolsa 66/12 kV Substation  
Substation Available Capacity based on 2021 Forecast Load



**3. As-Available Charging Restrictions of the Generating Facility**

The system overloads identified above under As-Available Charging of the Generating Facility results in As-Available charging limitations.

Accordingly, to prevent the system overloads specified above under As-Available Charging of the Generating Facility, it is necessary to monitor the following SCE system facilities:

■ [REDACTED]

■ [REDACTED]

**4. Implementation of ACDS Charging Restrictions for the Generating Facility**

The Generating Facility is in a CMS ready location. The SCE system facilities that require monitoring to provide ACDS service to the generating facility have the existing data points and/or have data points made available as a result of the generation interconnection that are necessary to properly inform the CMS and DERMS of their real time status. Therefore, the Generating Facility does qualify to be added to CMS and then migrated over to DERMS once its operational.

The IC is advised that should CMS not be operational prior to the Generating Facility's COD, charging restrictions to the Generating Facility will be implemented utilizing a safety charging schedule until such time CMS is placed in-service.

Refer to Attachment 1 and Attachment 2 for scope description and associated cost responsibility for this item.

NOTE 1: The Generating Facility is required to participate in CMS to prevent thermal overloads and unstable conditions resulting from As-Available charging. Such participation shall be in accordance with SCE protocols. In accordance with Good Utility Practice, SCE will provide the IC advance notice of any required CMS associated scope and cost beyond that which has already been identified in the Phase II Interconnection Study.

NOTE 2: The IC is advised that there could be instances where the Generating Facility could become non-CMS eligible and instead be required to utilize a safety charging schedule to implement the charging limitations for the Generating Facility. An example of such circumstance could be when topology changes occur to the source A-system of the Generating Facility. The A-system topology changes, which can be attributed to different factors (generators coming online, new load project, SCE load growth projects) could result in the SCE system facilities that require monitoring not having the necessary data points to properly inform CMS of their real time status.

## H. AFFECTED SYSTEMS SCD RESULTS

The SCD studies performed for the Bulk System, Subtransmission System, and Distribution System have identified SCD impacts on Affected Systems. Specific to this Generating Facility, the corresponding SCD contribution to the Affected Systems is provided below.



Refer to the Area Report, Subtransmission Assessment Report, and Distribution Assessment Report for additional details.

## I. DELIVERABILITY ASSESSMENT RESULTS

### 1. On Peak Deliverability Assessment

The Generating Facility does not contribute to any deliverability constraint.

### 2. Off- Peak Deliverability Assessment

The Generating Facility does not contribute to any deliverability constraint.

### 3. Required Mitigations

No Delivery Network Upgrades are required.

## J. INTERCONNECTION FACILITIES, NETWORK UPGRADES, AND DISTRIBUTION UPGRADES

Please see Attachment 1 for SCE’s IF’s, RNU’s, Delivery Network Upgrades<sup>7</sup> (DNU’s), and DU’s allocated to the Generating Facility for physical interconnection, to provide for the requested MW export at the POI taking into account the requested Deliverability, and in support of ACDS. Please note that SCE considered current system configuration, approved SCE sponsored projects, and all queued generation in determining scope for IFs and/or Plan of Service but will not “reserve” the identified scope of upgrades for the proposed POI unless a GIA is executed per the specified timelines shown in Table L.1.

## K. COST AND CONSTRUCTION DURATION ESTIMATE

### I. Cost Estimate

The Generating Facility’s estimated interconnection costs, adjusted for inflation and provided in 'constant' 2020 dollars escalated to the Generating Facility’s feasible COD (as identified below in Table L.1), are provided in Attachment 2 and the Generating Facility’s allocated cost for shared network upgrades are provided in Attachment 3 to this Appendix A report. Furthermore, Attachment 2 includes the IC’s Generating Facilities Charging Capacity rate as it relates to ACDS. The interconnection costs will be documented in the forthcoming GIA for the Generating Facility. However, should there be a delay in executing the GIA beyond 2021, a new cost estimate adjusted for inflation will be required and reflected into the GIA.

### II. Preliminary Durations for SCE Engineering, Design, and Construction to enable interconnection of the Generating Facility

The duration shown in Table K.1 represents the estimated time needed for SCE to design, procure, and construct the applicable facilities with the start date of the duration based on the effective date of the GIA; and necessarily include timely receipt of all required information and written authorizations to proceed (“ATP”), and timely receipt of construction payments and financial security postings and other milestones. The durations for the facilities identified for the Generating Facility is as follows:

Table K.1 Estimated Execution Duration for Generating Facility

Facilities	Description	Duration	Notes
Interconnection Facilities (IF)	Facilities described in Section 1.b of Attachment 1	██████████	2,3
Reliability Network Upgrades (RNU)	No required RNUs were identified in the Phase II Interconnection Study	NA	NA
Area Delivery Network Upgrades (ADNU)	Because the Generating Facility elected to proceed	NA	NA

<sup>7</sup> At the IC’s discretion, the IC or parties other than SCE pursuant to Section 10.2 under GIP may construct an Option (B) Generating Facility Area Delivery Network Upgrades (ADNUs) not allocated TP Deliverability. If SCE does not construct the ADNUs, the IC is not required to make the third Interconnection Financial Security posting to SCE pursuant to Section 4.8.4.2.1 under GIP.

	under Option A, no Area Delivery Network Upgrades were identified for the Generating Facility in the Phase II Interconnection Study		
Local Delivery Network Upgrades (LDNU)	No required LDNUs identified in the Phase II Interconnection Study	NA	NA
Distribution Upgrades (DU)	DUs described in Section 3 of Attachment 1	██████████	1,2,3

**SCE Notes for SCE Facilities Timelines Identified in Table K.1:**

**1. Construction Duration Estimates for Identified Upgrades**

Any construction durations identified in this section may vary. During the cluster study process, SCE includes all queued and active generation projects without regard to corresponding desired in-service dates or actual status to identify system upgrades, including SCD related upgrades, and a duration for SCE to build them. Such duration affects the ISD for this specific Generating Facility. As status for queued projects change (withdrawals, downsizing, suspensions, or deferred in-service dates), SCE may be able to accelerate in-service dates for projects affected by status changes. Furthermore, SCE will only begin design/construction of an identified system upgrade when enough projects 1) execute and fund a GIA and/or a Letter of Agreement with SCE and 2) those projects trigger the need for an upgrade.

**2. Coordination of Environmental Work.**

Where this study assumes that the IC will perform environmental work related to the installation of SCE’s IFs, and DUs as specified in this report, the IC is advised that any durations provided above assume so and that the IC will perform this environmental work and Civil Construction related to the installation of SCE’s IFs and/or DUs specified in this report and will perform them in parallel with SCE’s preliminary design and engineering. The IC is expected to engage SCE to obtain concurrence prior to commencement of any environmental work and during execution of that work. Since SCE will be using the IC’s environmental documents and/or work products, IC delays producing them may delay SCE’s ability to obtain required permits and/or license(s). Such delays would likely cause additional delays in the commencement of SCE’s final engineering, procurement, and construction. These delays could increase any durations identified in this report and push out the feasible ISD provided in Table L.1 ISD and COD Assessment.

3. All civil construction related to SCE’s IF and DUs must be completed and approved by SCE inspectors prior to SCE scheduling the electrical construction of the Interconnection Facilities and Distribution Upgrades.

III. Other Potential Costs to the Generating Facility

- a. The IC will be required to procure and construct underground duct banks and related structures required for SCE’s IF and DUs (Civil Construction<sup>8</sup>) in accordance with specifications and designs provided by SCE.

**L. IN-SERVICE DATE AND COMMERCIAL OPERATION DATE ASSESSMENT**

An ISD and COD assessment was performed for the Generating Facility to establish SCE’s estimate of the earliest achievable ISD based on the cluster study process timelines and the time required for SCE to complete the facilities needed to enable physical interconnection as an Interim Deliverability or Energy Only Deliverability interconnection (as applicable) for the Generating Facility. This date may be different from the IC’s requested ISD and will be the basis for establishing the associated milestones in the draft GIA.

**1. ISD Estimation Details**

For the QC12 Phase II Interconnection Study, the estimated earliest achievable ISD is derived by the time requirements to complete the following:

1. QC12 Interconnection Study Process
2. Tender a draft GIA
3. Negotiate and execute the GIA
4. Longest duration associated with the facilities required to interconnect the Generating Facility (i.e., IF, RNU, and DU), per the durations specified in table K.1. above.

Table L.1 below illustrates this calculation.

Table L.1: ISD and COD Assessment

Action or Assumption	Calendar Days or Months for Calculation	Item Description
		Issuance of Phase II Interconnection Study Report
Add:	30 CD	Phase II Results Meetings
<b>Starting Point:</b>		<b>For WDTs the assumption is that the TPD Results issued and IC response provided before starting the draft GIA (the IC does have the option to start the GIA negotiation earlier)</b>
Add:	30 CD	Earliest reasonable Tender draft GIA
Add:	90 CD	GIA negotiation time, execution, and related activities

<sup>8</sup> The IC understands and acknowledges that the Civil Construction in support of the interconnection for the Generating Facility may be classified as the IC-constructed SCE IF and/or DUs and may require transfer of ownership pursuant to Section 3 (1) under Appendix C of the GIA. The IC understands and acknowledges that it shall be responsible for the ITCC and ongoing monthly IF Charge and/or DUs charge of the portion of Civil Construction and prior to the ISD of the Civil Construction, IC shall provide SCE the final invoiced costs of the portion of Civil Construction transferred to SCE and shall be an acceptable form to SCE.





if applicable, which will be used to revise the draft GIA (if under negotiation) or amend the GIA (if already executed).

## **M. TIMING OF FULL CAPACITY DELIVERABILITY STATUS, INTERIM DELIVERABILITY, AREA CONSTRAINTS, AND OPERATIONAL INFORMATION**

The Generating Facility would be granted its requested FCDS only if the Generating Facility receives TPD allocation in the forthcoming TPD Allocation Study. Furthermore, timing of obtaining the requested FCDS is dependent on the completion of Delivery Network Upgrades identified below in this report, which may be updated in any subsequent annual reassessment. Until such time that these Delivery Network Upgrades are completed and placed into service, the Generating Facility may be granted Interim Deliverability Status based on annual system availability. The sections below provide a discussion of the timing of FCDS, Interim Deliverability, Area Constraints, and Operational Information.

### **1. System Upgrades Required for Full Capacity Deliverability Status**

In order to provide for Full Capacity Deliverability Status, the following facilities are required in addition to the Reliability Network Upgrades described in Section 2.(b) of Attachment 1:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

### **2. Interim Operational Deliverability Assessment for Information Only**

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

deliverability status as granted by the Transmission Plan Deliverability allocation.

### **3. Area Constraints**

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

## **N. ADDITIONAL STUDY ANNOTATIONS**

### **1. Conceptual Plan of Service**

The results provided in this study are based on conceptual engineering and a preliminary Plan of Service (POS) and are not sufficient for permitting of facilities. The POS is subject to change as part of final engineering and design.

### **2. Ramp Rate Requirements**

This study does not include analysis related to the following system variability conditions, et. al.

- i. Generating Facility ramp rate: inverter-based generator's output profile are capable of discharging and charging at high rates from no output to full output.
- ii. Generating Facility output variability: inverter-based generator's output profile are capable of changing abruptly and frequently.

These fast rates of change can negatively impact SCE's distribution system voltage profile and other customers. This study assumes that the Interconnection Customer's generating facility will include all equipment, software, and appropriate controls necessary to maintain the generator output profile per SCE requirements. The Interconnection Customer will be responsible for maintaining designated voltage levels under all conditions, including but not limited to the conditions identified above. Upon execution of the GIA, SCE will provide the Interconnection Customer with the required ramp rate control parameters. The ramp rate controls will be a function of the generation penetration on the distribution system, as well as SCE's distribution system configuration (additional parameters maybe considered, as need). Changes to the ramp rate control scheme may be required as determined by increased generation, changes in the distribution system topology, or other changes in the distribution system.

### **3. IC's Technical Data**

The study accuracy and results for the QC12 Phase II Interconnection Study were contingent upon the accuracy of the IR technical data provided by each IC during the Interconnection Study Cycle. Any changes from the data provided as allowed under GIP should were submitted in Attachment B within ten (10) Business Days following the Phase I Interconnection Study Results Meeting. Any changes from the data provided would need to be evaluated under a Material Modification Assessment (MMA) to determine if such change(s) results in a material impact to queued-behind generation.

### **4. Study Impacts on Affected Systems**

Results or consequences of this Phase II Study may require additional studies, facility additions, and/or operating procedures to address impacts to neighboring utilities and/or regional forums. For example, impacts may include but are not limited to WECC Path Ratings, short-circuit duties outside of the ISO Controlled Grid, and sub-synchronous resonance (SSR). Refer to Affected Systems Coordination Section H of the Area Report and Table F.1 above in Section F for additional information.

### **5. Use of SCE's Facilities**

#### **a. Crossing of SCE-owned Lines and Property**

The IC is responsible for acquiring all property rights necessary for the IC's Interconnection Facilities, including those required to cross the SCE's facilities and property. This Interconnection Study does not include the method or estimated cost to the IC of SCE mitigation measures that may be required to accommodate any proposed crossing of SCE's facilities. The crossing of SCE's property rights shall only be permitted upon written agreement between SCE and the IC at SCE's sole determination. Any proposed crossing of SCE property rights will require a separate study and/or evaluation, at the IC's expense, to determine whether such use may be accommodated. If the IC's Facilities result in the need to modify SCE's existing facilities, SCE recommends that the IC identify and include a description of such modifications in the IC's environmental study reports submitted to the lead agency permitting the Generating Facility. An interconnection customer may initiate this process by contacting SCE's Land Management Department at this link:

<https://www.sce.com/partners/real-estate-and-locations/secondary-land-use>.

**b. Utilizing SCE Property or ROW**

In instances where a site deposit is provided in lieu of site control documents for the location of a Generating Facility, and the site plan for the Generating Facility included in the IR package depicts the Generating Facility location on SCE owned property or utilizing SCE ROW; the IC will be required to provide an alternative site or submit a secondary land use request to SCE's Land Management Department for review and approval. A secondary land use request to support third party generation development is unlikely to get approved by SCE, but nevertheless the IC can submit a secondary land use request to SCE's Land Management Department for a review and approval at this link:

<https://www.sce.com/partners/real-estate-and-locations/secondary-land-use>.

**6. SCE's Interconnection Handbook**

The IC shall be required to adhere to all applicable requirements in SCE's Interconnection Handbook. These include, but are not limited to, all applicable protection, voltage regulation, VAR correction, harmonics, switching and tagging, and metering requirements.

**7. Western Electricity Coordinating Council ("WECC") Policies**

The IC shall be required to adhere to all applicable WECC policies including, but not limited to, the WECC Generating Unit Model Validation Policy.

**8. System Protection Coordination**

Adequate Protection coordination will be required between SCE-owned protection and IC-owned protection. If adequate protection coordination cannot be achieved, then modifications to the IC-owned facilities (i.e., Generation-tie or Substation modifications) may be required to allow for ample protection coordination.

**9. Standby Power and Temporary Construction Power**

The Phase II Study does not address any requirements for standby power or temporary construction power that the Generating Facility may require prior to the ISD of the IF's. Should the Generating Facility require standby power or temporary construction power from SCE prior to the ISD of the IFs, the IC is responsible to make appropriate arrangements with SCE to receive and pay for such retail service. SCE recommends that the IC identify and include a description of such facilities in the IC's environmental study reports submitted to the lead agency permitting the Generating Facility.

**10. Licensing Cost and Estimated Time to Construct Estimate (Duration)**

The estimated licensing cost and durations applied to this Generating Facility are based on the Generating Facility scope details presented in this Phase II study. These estimates are subject to change as the Generating Facility's environmental and real estate elements are further defined. Upon execution of the GIA, additional evaluation including but not limited to preliminary engineering, environmental surveys, and property right checks may enable licensing cost and/or duration updates to be provided.

**11. Network/Non-Network Classification of Telecommunication Facilities**

a. Non-Network (IFs) Telecommunications Facilities: The cost for telecommunication facilities that were identified as part of the IC's Interconnection Facilities was based on an assumption that these facilities would be sited, licensed, and constructed by the IC. The IC will own, operate, maintain, and construct main and diverse telecommunication paths associated with the IC's generation tie line, excluding terminal equipment at both ends. In addition, the telecommunication requirements for the RAS were assumed based on tripping

of the generator's breaker in lieu of tripping the circuit breakers and opening the IC's gen-tie at the SCE's substation.

- b. Network (Network Upgrades) Telecommunications Upgrades: Due to uncertainties related to telecommunication upgrades for the numerous projects in queues ahead of this Generating Facility, telecommunication upgrades for earlier higher queued projects without a signed GIA and these upgrades have not been constructed were not considered in this study. Depending on the scope of these earlier higher queued projects, the cost of telecommunication upgrades identified for Phase II may be reduced. Any changes in these assumptions may affect the cost and schedule for the identified telecommunication upgrades.

## **12. Ground Grid Analysis**

A detailed ground grid analysis will be required as part of the final engineering for the Generating Facility at the SCE substations whose ground grids were flagged with duty concerns.

## **13. SCE Technical Requirements**

The IC is advised that there may be technical requirements in addition to those that outlined above in Section C of this report that will be addressed in the Generating Facility GIA.

## **14. Applicability**

This document has been prepared to identify the impact(s) contributions of the Generating Facility on the SCE electrical system; as well as establish the technical requirements to interconnect the Generating Facility to the POI that was evaluated in the Phase II Study for the Generating Facility. Nothing in this report is intended to supersede or establish terms/conditions specified in GIAs agreed to by the SCE, ISO, and the IC.

## **15. Process for Initial Synchronization Date/Trial Operation Date and COD of the Generating Facility**

The IC is reminded that the ISO has implemented a New Resource Implementation (NRI) process that ensures that a generation resource meets all requirements before Initial Synchronization Date/Trial Operation Date and COD. The NRI uses a bucket system for deliverables from the IC that are required to be approved by the ISO. The first step of this process is to submit an "ISO Initial Contact Information Request form" at least seven (7) months in advance of the planned Initial Synchronization Date. Subsequently an NRI project number will be assigned to the Generating Facility for all future communications with the ISO. SCE have no involvement in this NRI process except to inform the IC of this process requirement. Further information on the NRI process can be obtained from the ISO Website using the following links:

New Resource Implementation webpage:

<http://www.caiso.com/participate/Pages/NewResourceImplementation/Default.aspx>

NRI Checklist:

<http://www.caiso.com/Documents/NewResourceImplementationChecklist.xls>

NRI Guide:

<http://www.caiso.com/Documents/NewResourceImplementationGuide.doc>

## **16. Future Charging Restrictions**

Charging restrictions not identified in this study may occur in the future if the underlying operating assumptions prove to be significantly different than the conditions evaluated in this study.

## **17. ISO Market Dispatch**

This study did not evaluate any potential limitations that may be driven by the ISO market under real-time operating conditions.

**18. Interconnection Request to Third-Party Owned Facilities**

Generating Facility's requesting to interconnect to a Third party owned facility will need to obtain written approval from the owner(s) of the facility prior to execution of the GIA.

- 19.** Please note that SCE has made its best efforts to convey as much information as possible based on information provided by the IC about its proposed Generating Facility. The information contained herein may indicate to ICs that a project of its magnitude may be better suited to interconnect at higher voltage levels or downsize as to not incur significant amount of restrictions. Any determination to change POIs or downsize is purely at the IC's discretion and would be subject to a SCE's material modification review pursuant to the tariff.

**20. Transmission Voltage Reference**

Identification of facility voltages (220 kV) in this Phase II Study are shown consistent with SCE System Operating Bulletin 123. However, all studies were predicated on the base voltages reflected in the WECC base cases. For the SCE bulk power system, the WECC base cases reflect 230 kV and 500 kV base voltages; consequently, all per-unit calculations presented were based on 230 kV and 500 kV voltages.

- 21.** The IC is advised that SCE reserves its right to issue an addendum or revision to this report, if applicable to comply with future tariff amendments filed and accepted by FERC associated with the treatment of energy storage devices interconnected or proposing to interconnect to the Distribution System.

**Attachment 1:**  
**Interconnection Facilities, Network Upgrades and Distribution Upgrades**  
Please refer to separate document

**Attachment 2:**  
**Escalated Cost and Time to Construct for Interconnection Facilities, Reliability Network Upgrades,  
Delivery Network Upgrades, and Distribution Upgrades**  
Please refer to separate document

**Attachment 3:  
Allocation of Network Upgrades for Cost Estimates and Maximum Network  
Upgrade Cost Responsibility**

Not Applicable



**Attachment 4:**

**SCE's Interconnection Handbook**

Preliminary Protection Requirements for Interconnection Facilities are outlined in the SCE's Interconnection Handbook at the following link:

[https://library.sce.com/content/dam/sce-doelib/documents/business/generating-your-own-power/grid-interconnections/SCE\\_InterconnectionHandbook.pdf](https://library.sce.com/content/dam/sce-doelib/documents/business/generating-your-own-power/grid-interconnections/SCE_InterconnectionHandbook.pdf)

**Attachment 5:**  
**Short-Circuit Duty Calculation Study Results**  
Please refer to the Appendix H of the Area Report

**Attachment 6:  
Not Used**

**Attachment 7:**  
**Subtransmission Assessment Report**  
Please refer to separate document

**Attachment 8:**  
**Distribution Assessment Report**  
Please refer to separate document