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# **Appendix A – WDT1200B**

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## **QUEUE CLUSTER 7 PHASE I REPORT**

**December 17, 2014**

This study has been completed in coordination with the California Independent System Operator Corporation (CAISO) per CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP)

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1. Interconnection Facilities, Network Upgrades and Distribution Upgrades
2. Escalated Cost and Time to Construct for Interconnection Facilities, Reliability Network Upgrades, Delivery Network Upgrades, and Distribution Upgrades
3. Allocation of Network Upgrades for Cost Estimates
4. Distribution Provider Interconnection Handbook
5. Short Circuit Calculation Study Results (Please refer to the Appendix H of the Bulk Area Report.or Attachment 1 of the Subtransmission Area Report)
6. Not Used
7. SCE Northern Hemisphere Import Nomogram
8. Subtransmission Area Report for Generation Reliability Study
9. Subtransmission Area Report for Reliability Study of Charging Energy Storage Facilities
10. Reliability Study of Charging Project Energy Storage Facilities

## A. Introduction

██████████ LLC the Interconnection Customer (IC), has submitted a completed Interconnection Request (IR) to Southern California Edison Company (SCE) for their proposed ██████████ (Project). The Project plans to have a total output of ██████████ MW at the generating facility. The project requested an interconnection to the ██████████. This report<sup>2</sup> focuses on ██████████ output portion of the Project whose requested Point of Interconnection (POI) is at the ██████████ located in Ventura County, California. The Project has a CAISO delivery point at ██████████. The IC requested Full Capacity Deliverability Status for the Project, and desires an In-Service Date (ISD) and Commercial Operation Date (COD) of November 30, 2016, and January 1, 2017 respectively. Such dates are specified in the Project Interconnection Request (IR). Actual ISD and COD will depend on design and construction requirements to interconnect the Project.

In accordance with Federal Energy Regulatory Commission (FERC) approved CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP) of Attachment I of SCE's Wholesale Distribution Access Tariff (WDAT), the Project was grouped with Queue Cluster 7 (QC7) Phase I projects to determine the impacts of the group.

A Bulk and Subtransmission Area Report have been prepared separately identifying the combined impacts of all projects in the group. This report focuses only on the impacts or impact contributions of the Project, and it is not intended to supersede any contractual terms or conditions specified in an Interconnection Agreement.

The report provides the following:

1. Distribution system impacts caused by the Project;
2. System reinforcements necessary to mitigate the adverse impacts caused by the Project under various system conditions;
3. A list of required facilities and a good faith estimate of the Project's cost responsibility and time to construct<sup>3</sup> these facilities. Such information is provided in Attachment 1 and Attachment 2 as separate documents in the Appendix A Project report package.

All the equipment and facilities comprising the Project located in ██████████ as disclosed by the IC in its IR, as may have been amended during the Interconnection Study process, which consists of ██████████ (iii) the associated infrastructure, (iv) meters and metering equipment, (v) appurtenant equipment, and (vi) auxiliary loads.

The Project shall consist of the Generating Facility and the IC's Interconnection Facilities as illustrated below in Figure A. Similarly, the Project information is summarized in Table A.1 below. The location of

<sup>1</sup> The results associated with the charging aspect of the Project can be found in Attachment 10.

<sup>2</sup> The results for the Project portion interconnecting to the Punt 12kV Circuit are provided in a separate report.

<sup>3</sup> It should be noted that construction is only part of the duration of months specified in the study, includes final engineering, licensing, etc, and other activities required to bring such facilities into service. These durations are from the execution of the Interconnection Agreement, receipt of: all required information, funding, and written authorization to proceed from the IC as will be specified in the Interconnection Agreement to commence the work.

the Project was assumed as specified in the IR provided by the IC. The Project shall not exceed the total net output.

Figure A.1: Project IC Facilities One-Line Diagram

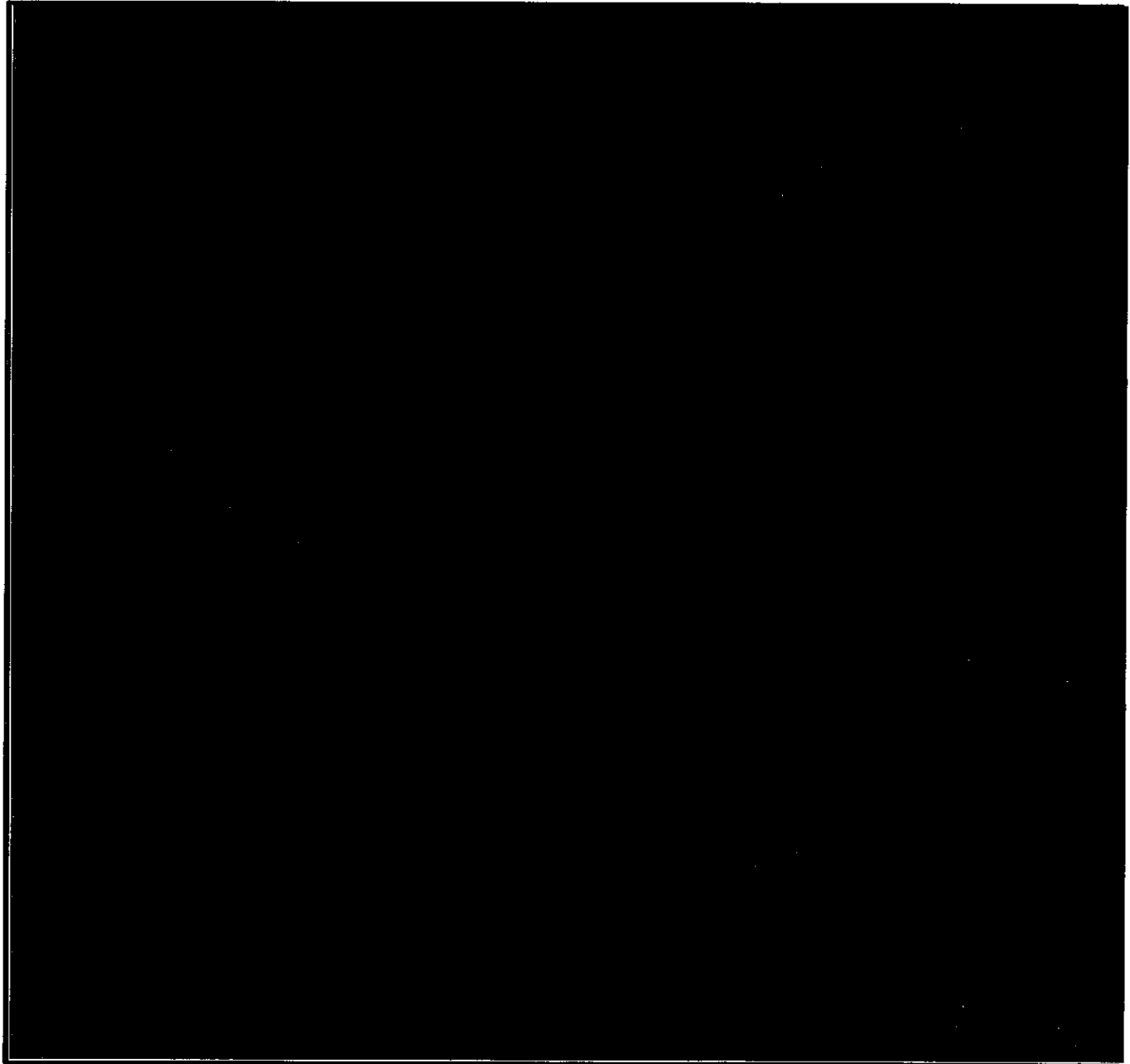




Table A.1: Project General Information

Project Location	[REDACTED] [REDACTED] [REDACTED]
Distribution Provider's Planning Area	SCE Northern Area
Number and Types of Generators	[REDACTED]
Interconnection Voltage	16kV
Maximum Generator Output	[REDACTED]
Generator Auxiliary Load	[REDACTED]
Maximum Output	[REDACTED]
Power Factor Range	[REDACTED] at POI per interconnection application
Step-up Transformer(s)	[REDACTED] [REDACTED] [REDACTED]
POI	[REDACTED] [REDACTED]
IC Requested COD	January 1, 2017

## B. Study Assumptions

For detailed assumptions regarding the group cluster analysis, please refer to the QC7 Phase I Bulk and Subtransmission Area Reports. Below are the assumptions specific to the Project:

1. The following is the Plan of Service (POS) assumed for the Project in the Phase I Study:

The project was modeled as interconnecting [REDACTED] of net generation to the SCE Distribution system at the proposed [REDACTED] via a line extension to the [REDACTED] at the point of change of ownership.

2. The following facilities will be installed by SCE and **are included** in this Phase I Study:

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

- 16kV Primary Metering, CTs, VTs and Associated Wiring
- Telemetry – Remote Terminal Unit (RTU)<sup>4</sup>

**NOTE:** With the Distribution Provider's consent, the IC is permitted to use SCE's retail metering CTs and PTs for their ISO metering.

3. The following Facilities will be installed by IC and **are not included** in this Phase I Study:

Ducts as required

- Ducts as required
- Structures as required
- Isolating circuit breaker
- Protection System requirements to comply with the SCE Interconnection Handbook
- Transformation as required
- Metering Equipment compliant with SCE Electrical Service Requirements

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<sup>4</sup> RTU is required for the Project to enable implementation of the storage control system. Refer to Attachment 10 for additional details.

- CAISO metering as required

**NOTE:** SCE will install metering voltage, and current transformers to be used for the SCE owned retail meters. The voltage and current transformers may be used for the customer CAISO metering.

4. The following SCE Distribution system Planning Criteria and Conditions were included in the Phase I Study:

- The thermal rating of any conductor, connector, or apparatus shall not exceed 100% of its normal rated capacity with all facilities in service (base case).
- The thermal rating of any conductor, connector, or apparatus shall not exceed 100% of its emergency rating under loss of one element (N-1) conditions.
- Operational flexibility and reliability of the distribution system shall be maintained at all times.
- Circuit voltage profiles shall be maintained to comply within CPUC's Rule 2 requirements.
- The power factor for the new generation facility was assumed to be within WDAT Tariff requirements of [REDACTED]
- Expected loading on the distribution system as projected by the SCE 2014 - 2023 distribution system plan was used.
- Distributed Generation resources connected to the distribution system are analyzed offline and online during peak load conditions as well as during minimum daytime load conditions as to determine worst case scenario.
- The short circuit contribution from the inverter systems was determined using inverter manufacturer documents.
- The Phase I Study assumes the upgrades triggered by previously queued projects, including Rule 21 projects under CPUC jurisdiction as In-Service, are included in the base case for the Phase I projects. If any previously queued projects were to withdraw, then the Phase I projects may be subjected to the cost identified for those previously queued projects.
- Current distribution standards are being updated to address generation interconnection systems. The proposed method of service in this report may change according on final design to comply with the updated distribution design standards.
- This study assumes that the IC generating facility will include all equipment, software, and appropriate controls necessary to maintain the generator output profile per SCE requirements. The IC will be responsible for maintaining designated voltage levels under all conditions, including but not limited to the conditions identified above. Upon execution of



the Interconnection Agreement, SCE will provide the IC 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.

5. Additional QC7 Phase I Study and/or Assumption Notes:

- The Project encompasses Energy Storage Facilities. The details pertaining to the Reliability Study for the charging of the Project's Energy Storage Facilities are provided in Attachment 9 and 10, which are separate documents included in this QC7 Phase I report package.
- The battery storage component of the Project will need to be metered separately. The IC should be prepared to install multiple sets of metering (i.e. separate sets of PTs & CTs and supporting metering equipment) for the Project. Additionally, the Project may also need to connect the battery storage component to a dedicated transformer.

**C. Reliability Standards, Study Criteria and Methodology**

Refer to Section B.1 SCE Distribution study assumptions above for the Reliability Standards, Study Criteria and Methodology applied in this study.

**D. Reliability Assessment Results**

**I. Steady State Power Flow Analysis Results – 220kV and above**

The group study indicated that the Project contributes to overloads/non-convergence problems on the Transmission system of the area. Consequently, the Project has been allocated the Network Upgrades listed below to help mitigate the power flow impacts on the Transmission system. The details of the analysis and overload levels are provided in the Bulk Area Report.

- [REDACTED]

Refer to the Scope of Network and Distribution Upgrades Section of the Bulk Area Report for associated costs and scope information.

**II. Steady State Power Flow Analysis Results – 66kV**

The Subtransmission study (Attachment 8) indicated that the Project does not contribute to any overloads/non-convergence problems on the Subtransmission system of the area. Consequently, the Project did not get allocated costs for any Subtransmission Upgrades.

**III. Steady State Power Flow Analysis Results – 33kV and below**

**1. Thermal Overloads**

The study indicated that the Project contributes to the following facility overloads or non-convergence problems. .

- Substation
  - i. Base Case – None
  - ii. N-1 – None
- Distribution Lines
  - i. Base Case – None
  - ii. N-1 – None

Note: Under emergency N-1 conditions, No thermal overloads were triggered by the Project. However, due to the dynamic distribution system conditions and configurations, SCE may deem it necessary to disconnect this project under N-1 conditions until the distribution system returns to normal conditions.

## 2. Voltage Performance

### a. Individual Project Power Factor Requirements

Based on the results of the Study, the Project will need to be designed to maintain a composite power delivery at continuous rated power at the POI at a power factor within the range of [REDACTED]. Additionally, the generation system must be designed to accommodate a VAR schedule provided by SCE. SCE will determine if the VAR schedule is necessary based on future re-arrangements of SCE's system.

### b. Distribution System Power Factor Requirements – 34.5kV or below

[REDACTED] is not expected to experience a voltage rise that exceeds Rule 2 requirements with the Project in service.

## 3. Relevant Project Notes

Under emergency N-1 conditions, (loss of a B-Bank, or loss of the [REDACTED]) no thermal overloads were triggered by the Project. However, due to the dynamic distribution system conditions and configurations, SCE may deem it necessary to open the source RCSG to remove the Santa Paula Energy Storage System from the SCE's distribution system, in order to reduce bank loading or line loading to its normal ratings. Once the SCE system is restored to normal, SCE would then close the RCSG and the generation system can resume normal operation.

## 4. Required Mitigations

No mitigations on the Distribution System were identified to be required by the Project.

## E. Short Circuit Duty Results

Short circuit studies were performed to determine the fault duty impact of adding the QC7 Phase I projects to the transmission system and to ensure system coordination. The fault duties were calculated with and without the projects to identify any equipment overstress conditions. Once overstressed circuit breakers are identified, the fault current contribution from each individual project in QC7 Phase I is determined. Each project in the cluster will be responsible for its share of the upgrade cost based on the rules set forth in CAISO Tariff Appendix DD.

### 1. Short Circuit Duty Study Input Data

The customer provided technical data for the identified inverter (specified in Section 2). If the technical data obtained from the inverter manufacturer by SCE illustrates differences in the Short Circuit Duty (SCD) parameters, then SCE utilized the manufacturer data of the inverter model specified by the IC in the application in the SCD study. SCE utilized the parameters provided by the IC.

"Inverter Based Generation" Data for Each generation unit:

Maximum Fault contribution: [REDACTED]

[REDACTED]

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

[REDACTED]

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

### 2. Short Circuit Duty Study Results

All bus locations where the QC7 Phase I projects increase the short-circuit duty 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 Bulk Area Report (Appendix H). These values have been used to determine if any equipment is overstressed as a result of the inclusion of QC7 Phase I interconnections and corresponding network upgrades, if any.

The responsibility to finance short circuit related Reliability Network Upgrades identified through a Group Study shall be assigned to all Interconnection Requests in that Group Study pro rata on the basis of short circuit duty contribution of each Generating Facility.

Please refer to the QC7 Phase I Bulk Area Report for the QC7 Phase I breaker evaluation identified overstressed circuit breakers at the SCE buses, and Attachment 2 for the pro-rata allocation with corresponding estimated costs (if any) for the Project, based on SCD contribution at each location.

3. **Preliminary Protection Requirements**

Protection requirements are designed and intended to protect the Distribution Provider's system only. The preliminary protection requirements were based upon the interconnection plan as shown in the one-line diagram depicted in line item #7 in Attachment 1.

The IC is responsible for the protection of its own system and equipment and must meet the requirements in the Distribution Provider Interconnection Handbook provided in Attachment 4.

**F. Deliverability Assessment Results**

1. **On Peak Deliverability Assessment**

The project contributes to the overloads listed in the Area Report Section E.1.2 Table E.1.

2. **Off Peak Deliverability Assessment**

For off-peak deliverability assessment, see Section E.2 in the Area Report.

3. **Required Mitigations**

The following Local Delivery Network Upgrade is required to support the requested Full Capacity Deliverability Status.

a. [REDACTED]

Refer to the Scope of Network and Distribution Upgrades Section of the Area Report for additional information.

**G. Interconnection Facilities, Network Upgrades, and Distribution Upgrades**

Please see **Attachment 1** for the Interconnection Facilities (IF), Reliability Network Upgrades (RNU), Delivery Network Upgrades (DNU) and Distribution Upgrades (DU) allocated to the Project. Please note that SCE will not "reserve" the identified IF's for the proposed POI. The identified scope/facilities will be allocated to the project upon the successful execution of the Generation Interconnection Agreement and SCE has completed the final design and engineering of the facilities according to tariff timelines.

**H. Cost and Construction Duration Estimates**

To determine the cost responsibility of each generation project in QC7 Phase I, the CAISO developed cost allocation factors (Attachment 3) for Reliability Network Upgrades, Local Delivery Network Upgrades and Area Delivery Network Upgrades. Attachment 2 provides the 'constant' 2014 dollars and their escalation to the estimated COD year for Interconnection Facilities, Reliability Network Upgrades, Delivery Network Upgrades, and Distribution Upgrades which the Project was allocated cost.

For the QC7 Phase I Study, the estimated COD is derived by assuming the duration of the work element will begin in December 2016, which accounts for the CAISO tariff scheduled completion date of the QC7

Phase II study plus: the TP Deliverability (TPD)<sup>5</sup> allocation, Annual Reassessment effort, and the interconnection agreement signing period and submittal of required funds by the IC.

The IC should note that any Local Delivery Network Upgrades and Area Delivery Network Upgrades allocated to the Project may be assessed 35% Income Tax Component of Contribution (ITCC) pending the results of the TPD allocation Process several months after the QC Phase II Study Reports are released, in addition to the 35% ITCC assessed for the IFs, DUs, and RNUs above the \$60K/MW repayment cap allocated to the Project. For your information, Attachment 2 contains a potential ITCC estimate<sup>6</sup> based on the Phase I cost in this study. It does not represent the “maximum ITCC exposure” of the Project. Attachment 3 provides an estimated non-reimbursable RNU cost that would be subject to ITCC, taking into account the Network Upgrade maximum cost responsibility. The maximum ITCC warranted by the Project will be addressed, calculated, and included during the Interconnection Agreement development phase once the IC submits the TPD Affidavit confirming the acceptance, partial acceptance, or denial of awarded deliverability assigned to the Project.

#### **I. Environmental Evaluation, Permitting, and Licensing**

Please see Appendix K of the QC7 Phase I Bulk Area Report.

#### **J. Affected Systems Coordination**

Please see Section H of the QC7 Phase I Bulk Area Report.

#### **K. Items not covered in this study**

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

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

##### **2. IC’s Technical Data**

The study accuracy and results for the QC7 Phase I Study are contingent upon the accuracy of the technical data provided by the IC. Any changes from the data provided could void the study results.

##### **3. Study Impacts on Neighboring Utilities**

Results or consequences of this QC7 Phase I 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 CAISO Controlled Grid, and sub-synchronous resonance (SSR).

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<sup>5</sup> Transmission Plan Deliverability: Deliverability supported by the CAISO’s Transmission Plan

<sup>6</sup> The maximum ITCC exposure applies ITCC (35%) to assigned IF and DU facilities, Network Upgrades that are not subject to transmission credits incremental to a repayment \$/MW cap or an award of 0 MW TPD Allocation, and that SCE will own the facilities in question. The maximum ITCC exposure is calculated by applying the following formula:  $(IF * 35\%) + ((RNU \text{ Costs} - (\text{Project MW} * (\$60k/MW))) * 35\%) + (LDNU * 35\%) + (ADNU * 35\%) + (DU * 35\%)$

Refer to Affected Systems Coordination Section of the Bulk Area Report.

4. Use of Distribution Provider Facilities

The IC is responsible for acquiring all property rights necessary for the IC's Interconnection Facilities, including those required to cross Distribution Provider facilities and property. This Interconnection Study does not include the method or estimated cost to the IC of Distribution Provider mitigation measures that may be required to accommodate any proposed crossing of Distribution Provider facilities. The crossing of Distribution Provider property rights shall only be permitted upon written agreement between Distribution Provider and the IC at Distribution Provider's sole determination. Any proposed crossing of Distribution Provider property rights will require a separate study and/or evaluation, at the IC's expense, to determine whether such use may be accommodated.

5. Distribution Provider Interconnection Handbook

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

6. 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.

7. System Protection Coordination

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

8. Standby Power and Temporary Construction Power

The QC7 Phase I Study does not address any requirements for standby power or temporary construction power that the Project may require prior to the In-Service Date of the Interconnection Facilities. Should the Project require standby power or temporary construction power from Distribution Provider prior to the In-Service Date of the Interconnection Facilities, the IC is responsible to make appropriate arrangements with Distribution Provider to receive and pay for such retail service.

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

The estimated licensing cost and durations applied to this Project are based on the Project scope details presented in this study. These estimates are subject to change as Project environmental and real estate elements are further defined. Upon execution of the Interconnection Agreement, 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.

10. Network/Non-Network Classification of Telecommunication 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 diverse telecommunication paths associated with the IC's generation tie line, excluding terminal equipment at both ends. In addition, the telecommunication requirements for SPS were assumed based on tripping of the generator breaker as opposed to tripping the circuit breakers at the Distribution Provider substation. Due to uncertainties related to telecommunication upgrades for the numerous projects in queue ahead of QC7 Phase I, telecommunication upgrades for higher queued projects were not considered in this study. Depending on the outcome of interconnection studies for higher queued projects, the telecommunication upgrades identified for QC7 Phase I may be reduced. Any changes in these assumptions may affect the cost and schedule for the identified telecommunication facilities.

#### 11. Applicability

This document has been prepared to identify the impact(s) contributions of the Project on the SCE electrical system; as well as establish the technical requirements to interconnect the Project to the POI that was evaluated in the QC7 Phase I Study for the Project. Nothing in this report is intended to supersede or establish terms/conditions specified in interconnection agreements agreed to by SCE, CAISO and the IC.

#### 12. Process for synchronization/trial operations and commercial operations of the Project

The IC is reminded that the CAISO has implemented a New Resource Implementation (NRI) process that ensures that a generation resource meets all requirements before synchronization/trial operations and commercial operations. The NRI uses a bucket system for deliverables from the IC that are required to be approved by the CAISO. The first step of this process is to submit an "ISO Initial Contact Information Request form" at least 7 months in advance of the planned initial synchronization. Subsequently an NRI project number will be assigned to the project for all future communications with the CAISO. The Distribution Providers 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 CAISO 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>

### 13. Potential Changes in Cost Responsibility

The IC is hereby placed on notice that interconnection of its proposed generating facility may be dependent upon certain Network Upgrades which are currently the cost responsibility of projects ahead of the proposed generating facility in the interconnection application queue. Section 14.2.2 of the GIDAP provides that should Network Upgrades required for queued-ahead projects be included in an executed GIA (or unexecuted GIA filed at FERC) at the time of withdrawal of the earlier queued generating facility, and the upgrades are determined to still be needed by later queued generating facilities, the financial responsibility for such upgrades falls to the Distribution Provider. However, if the Network Upgrades required by earlier queued generating facilities are not subject to an executed GIA (or unexecuted GIA filed at FERC) the financial responsibility for such upgrades may fall to the IC. Section 14.2.2 also discusses how Network Upgrades required by interconnection customers selecting Option (B) might be required to be reapportioned among interconnection customers selecting Option (B) in the case of withdrawals of earlier queued generating facilities. Changes in costs allocated to the IC could also arise as the result of the CAISO's reassessment process described in Section 7.4 of the GIDAP. SCE encourages the IC to review Sections 7.4 and 14.2.2 of the GIDAP for the rules and processes under which the financial responsibility might be reapportioned to the IC. Potential changes in the IC's cost responsibility resulting from application of the provisions of these Sections of GIDAP are not included in this Phase I study, nor are the potential impacts to the IC's maximum cost responsibility outlined.



#### 14. System Variability

This study does not include analysis related to the following system variability conditions:

- Generator ramp rate: Solar Photovoltaic generator's increasing output profile during sunrise, (i.e. system start-up)
- Generator output variability: Solar photovoltaic generator's output variability correlated with weather conditions, (i.e. cloud cover)
- Generator return-to-service: Solar photovoltaic generator's output profile following a system outage, (i.e. faulted condition)

**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

Queue #

WDT1200



	NU Total Cost (2014 \$k)	Project Allocation (%)	Allocated Cost (2014 \$k)	Allocated Cost (Escalated \$k)
[REDACTED]				
[REDACTED]				
[REDACTED]				
One-time costs associated with [REDACTED]	\$62	3.14%	\$2	\$3
[REDACTED] line upgrade	\$1,042	3.14%	\$33	\$38
<b>LDNU Total</b>			<b>\$35</b>	<b>\$41</b>
[REDACTED]				
[REDACTED] upgrade	\$8,253	0.00%	\$0	\$0
[REDACTED]				
[REDACTED]	\$2,881	3.13%	\$90	\$104
<b>RNU Total</b>			<b>\$90</b>	<b>\$104</b>
<b>Grand Total</b>			<b>\$125</b>	<b>\$145</b>

## **Attachment 4**

### **Distribution Provider Interconnection Handbook**

Preliminary Protection Requirements for Interconnection Facilities are outlined in the Distribution Provider Interconnection Handbook.

Please refer to separate document.

## **Attachment 5**

### **Short Circuit Calculation Study Results**

Please refer to the Appendix H of the Bulk Area Report, or Attachment 1 of the Subtransmission Area Report

**Attachment 6**

Not Used

**Attachment 7**

**SCE Northern Hemisphere Import Nomogram**

Please refer to separate document.



**Attachment 8**  
**Subtransmission Area Report for Generation Reliability Study**

Please refer to separate document.

**Attachment 9**

**Subtransmission Area Report for Reliability Study of Charging Energy Storage  
Facilities**

Please refer to separate document.

**Attachment 10**

**Reliability Study of Charging Project Energy Storage Facilities**

Please refer to separate document.

**Queue Cluster 7 Phase I- Attachment 1**  
**WDT1200B [REDACTED]**  
**Interconnection Facilities, Network Upgrades and Distribution Upgrades**

## Interconnection Facilities, Network Upgrades and Distribution Upgrades

To determine the cost responsibility of each project in QC7, the California Independent System Operator Corporation (CAISO) developed cost allocation factors (Attachment 3) for Reliability Network Upgrades and Local Delivery Network Upgrades. The CAISO developed the \$/MW cost rate for incremental Area Delivery Network Upgrades. The cost rate multiplied by the requested deliverable MW capacity provides the cost estimate for the Area Delivery Network Upgrades. The Interconnection Facilities are the sole cost responsibility of the Project. The Interconnection Facilities, Network Upgrades, and Distribution Upgrades allocated to the project are listed below<sup>1</sup>.

### 1. Interconnection Facilities.

- (a) **Interconnection Customer's Interconnection Facilities.** The Interconnection Customer shall:
- (i) [REDACTED]
  - (ii) Procure and construct underground duct banks and related structures required for Distribution Provider's Interconnection Facilities and Distribution Upgrades ("Civil Construction<sup>2</sup>") in accordance with specifications and designs provided by the Distribution Provider.
  - (iii) Obtain all necessary permits and easements associated with the installation of Civil Construction.
  - (iv) If applicable, provide the following:
    1. Completed Interconnection Customer information sheet.
    2. Street improvement plan(s).
    3. Unique address for Point of Interconnection.
    4. Public right-of-way (street) base map(s) as required by the interconnection.
    5. Site plot plan on a 30:1 scale digital file as follows:
      - a. Easements/lease agreement(s).
      - b. Grading plan(s).
      - c. Sewer and storm plot plan(s).
      - d. Landscape, sprinkler, pedestal location(s).
      - e. Complete construction of underground systems for the Distribution Provider's Interconnection Facilities and Distribution Provider's Distribution Upgrades.
  - (v) Acquire an agreement from the property owner at [REDACTED] for the Distribution Provider to have the following:

<sup>1</sup> Such descriptions are subject to modification to reflect the actual facilities that are constructed and installed following the Distribution Provider's final engineering and design, identification of field conditions, and compliance with applicable environmental and permitting requirements.

<sup>2</sup>The Interconnection Customer understands and acknowledges that the Civil Construction in support of the interconnection for the Project may be classified as the Interconnection Customer-constructed Distribution Provider interconnection facilities and/or Distribution Upgrades and may require transfer of ownership pursuant to Section 3 (1) under Appendix C of the GIA. The Interconnection Customer understands and acknowledges that it shall be responsible for the ITCC and ongoing monthly Interconnection Facilities Charge and/or Distribution Upgrades charge of the portion of Civil Construction and prior to the in-service date of the Civil Construction, Interconnection Customer shall provide to Distribution Provider the final invoiced costs of the portion of Civil Construction transferred to Distribution Provider and shall be an acceptable form to Distribution Provider.

## Interconnection Facilities, Network Upgrades and Distribution Upgrades

1. The right to enter property owner's premises for any purpose connected with the Distribution Provider's Interconnection Facilities or interconnection service.
  2. The right for the use of a Distribution Provider approved locking device if Interconnection Customer wants to prevent unauthorized access to Distribution Provider's Interconnection Facilities.
  3. The right for safe and ready access for Distribution Provider's personnel free from unrestrained animals.
  4. The right for unobstructed ready access for Distribution Provider's vehicles and equipment to install, remove, repair, and maintain its Interconnection Facilities.
  5. The right to remove Distribution Provider's Interconnection Facilities after termination of interconnection service.
- (vi) Install, in coordination with, and as specified by, the Distribution Provider, a dedicated T1 circuit from the local telephone company to support the Remote Terminal Unit ("RTU") communication to the Distribution Provider's energy management system in accordance with the Interconnection Handbook if a RTU is installed locally at the Generating Facility<sup>3</sup>.
- (vii) Designate, to the T1 circuit provider, the Distribution Provider as a representative authorized to report trouble to, and to initiate repairs with, the communication circuit provider on the Interconnection Customer's behalf in the event of an interruption of service on the communication circuit if a T1 circuit is required for the support of a RTU installed locally at the Generating Facility.
- (viii) Allow the Distribution Provider to review the Interconnection Customer's telecommunication equipment design and perform inspections to ensure compatibility with the Distribution Provider's RTU, or equipment related to an alternative approved by the Distribution Provider, and related terminal equipment; allow the Distribution Provider to perform acceptance testing of the telecommunication equipment and the right to request and/or to perform correction of installation deficiencies.
- (ix) Provide required data signals, make available adequate space, facilities, and associated dedicated electrical circuits within a secure building having suitable environmental controls for the installation of the Distribution Provider's RTU, or equipment related to an alternative approved by the Distribution Provider, in accordance with the Interconnection Handbook.
- (x) Make available adequate space, facilities, and associated electrical circuits within a secure building having suitable environmental controls for the installation of the Distribution Provider's telecommunications terminal equipment in accordance with the Interconnection Handbook if a RTU is installed locally at the Generating Facility.

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<sup>3</sup> Placeholder for FE footnote The cost and scope of telemetry may significantly increase to include a dedicated RTU, as required by SCE's Interconnection Handbook, in the event that the centralized RTU method is not feasible for this project.

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- (xi) Install all required ISO-approved compliant metering equipment at the Generating Facility, in accordance with Section 10 of the ISO Tariff.
- (xii) Allow the Distribution Provider to install, in the switchgear provided by the Interconnection Customer, revenue meters, voltage transformers ("VTs"), and current transformers ("CTs"), to meter retail load at the Generating Facility in accordance with the Distribution Provider's Electrical Service Requirements ("ESR") as described in the Interconnection Handbook.
- (xiii) Install all equipment necessary to comply with the power factor requirements of Article 9.6 of the GIA, including the ability to regulate power factor to a schedule (VAR schedule) in accordance with the Interconnection Handbook.
- (xiv) Provide switchboard drawings which shall comply with Distribution Provider's ESR which can be obtained at:  
<http://www.sce.com/AboutSCE/Regulatory/distributionmanuals/esr.htm>.
- (xv) Install disconnect facilities in accordance with the Distribution Provider's Interconnection Handbook to comply with the Distribution Provider's switching and tagging procedures.
- (xvi) Install a breaker within the Interconnection Customer's property line in accordance with the ESR to comply with the Distribution Provider's protection requirements.
- (xvii) Install all equipment and controls necessary to maintain the Generating Facility's output ramp rate within the parameters set forth, and provided to the Interconnection Customer, by the Distribution Provider.

(a) **Distribution Provider's Interconnection Facilities.** The Distribution Provider shall:

- (i) 

- (ii) **Telecommunications.**  
Install all required equipment (including terminal equipment) supporting the RTU including the communications interface with the Distribution Provider's energy management system. In accordance with the Interconnection Handbook, the Distribution Provider shall provide the required interface equipment at the Generating Facility necessary to connect the RTU to the Interconnecting Customer's T1 circuit if an RTU is installed locally at the Generating Facility. Notwithstanding that certain telecommunication equipment, including the telecommunications terminal

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equipment, will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution provider shall own, operate and maintain such telecommunication equipment as part of the Distribution Provider's Interconnection Facilities if an RTU is installed locally at the Generating Facility.

(iii) **Real Properties, Transmission Project Licensing, and Corporate Environmental Health and Safety.**

Obtain easements and/or acquire land, obtain licensing and permits, and perform all required environmental activities for the installation of the Distribution Provider's Interconnection Facilities, including any associated telecommunication equipment.

(iv) **Metering.**

Install revenue meters and appurtenant equipment required to meter the retail load at the Generating Facility. Notwithstanding that the meters and appurtenant equipment will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution Provider shall own, operate and maintain such facilities as part of the Distribution Provider's Interconnection Facilities.

(v) **Power System Control.**

Install one (1) RTU at the Generating Facility to monitor typical generation elements such as MW, MVAR, terminal voltage and circuit breaker status for the Generating Facility and plant auxiliary load, and transmit the information received thereby to the Distribution Provider's grid control center. Notwithstanding that the RTU will be located on the Interconnection Customer's side of the Point of Change of Ownership, the Distribution Provider shall own, operate and maintain the RTU as part of the Distribution Provider's Interconnection Facilities.

## 2. Network Upgrades.

(a) **Stand Alone Network Upgrades.**

None identified in this Phase I Study.

(b) **Other Network Upgrades.**

(i) **Distribution Provider's Reliability Network Upgrades.**

1. [REDACTED]  
Refer to Bulk Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

2. **Short Circuit Duty (SCD) Mitigation – RNU.**

Refer to Bulk Area Report for scope information and Attachment 2 for associated costs assigned to the Project.



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(ii) **Distribution Provider's Delivery Network Upgrades.**

See Bulk Area Report

1. **Area Delivery Network Upgrades.**

None identified in this Phase I Study.

2. **Local Delivery Network Upgrades.**

[REDACTED]

Refer to Bulk Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

3. **Distribution Upgrades.**

The Distribution Provider shall:

(a)

[REDACTED]

(b) **Real Properties, Transmission Project Licensing, and Corporate Environmental Health and Safety.**

Obtain easements and/or acquire land, obtain licensing and permits, and perform all required environmental activities for the installation of the Distribution Upgrades, including any associated telecommunication equipment.

(c) **Short Circuit Duty (SCD) Mitigation – DU.**

Refer to Bulk Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

4. **Affected System Upgrades.**

Not Used.

5. **Point of Change of Ownership.**

The Point of Change of Ownership shall be at the pull section of the new 16kV switchgear panel provided, installed, and owned by the Interconnection Customer.

6. **Point of Interconnection.** The Distribution Provider's [REDACTED] name .

7. **One-Line Diagram of Interconnection to [REDACTED] 16kV out of [REDACTED] 66/16kV Substation.**

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