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# **Appendix A – WDT1288**

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Revision to  
**Queue Cluster 8 Phase II Report**

**December 27, 2016**

**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)**

Table of Contents

**A. Introduction ..... 1**

**B. Study Assumptions..... 5**

**C. Reliability Standards, Study Criteria and Methodology ..... 7**

**D. Power Flow Reliability Assessment Results ..... 7**

**E. Short-Circuit Duty Results ..... 9**

**F. Preliminary Protection Requirements ..... 10**

**G. Transient Stability Evaluation..... 10**

**H. Power Factor Requirements..... 10**

**I. Deliverability Assessment Results ..... 10**

**J. In-Service Date and Commercial Operation Date Assessment ..... 11**

**K. Timing of Full Capacity Deliverability Status, Interim Deliverability, Area Constraints, and Operational Information ..... 13**

**L. Distribution Provider’s Interconnection Facilities, Network Upgrades, and Distribution Upgrades ..... 13**

**M. Cost and Construction Duration Estimates ..... 13**

**N. SCE Technical Requirements ..... 14**

**O. Subsynchronous Interaction Evaluations..... 14**

**P. Environmental Evaluation, Permitting, and Licensing..... 14**

**Q. Affected Systems Coordination ..... 15**

**R. Items not covered in this study ..... 15**

Attachments:

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. Not Used
4. SCE Interconnection Handbook
5. Short-Circuit Duty Calculation Study Results (see Appendix H of the Bulk Area Report)
6. Interconnection Customer Provided Dynamic Data
7. Not Used.
8. Subtransmission Assessment Report – Chino 66 kV System

**Interconnection Study Document History**

<b>Project No.</b>	<b>Project Name</b>	<b>No</b>	<b>Date</b>	<b>Document Title</b>	<b>Description of Document</b>
WDT1288	██████████	2	December 27, 2016	Addendum #1 to Queue Cluster 8 Phase II Appendix A Final Report	The purpose of this report is to update Attachment 2 of the Appendix A report.
WDT1288	██████████	1	November 23, 2016	Queue Cluster 8 Phase II Appendix A Final Report	Report to disclose results of QC8 Phase II cluster.

## A. Introduction

██████████ the Interconnection Customer (IC), has submitted a completed Interconnection Request (IR) to the Southern California Edison Company (SCE) for their proposed ██████████ (Project). The Project requested a Point of Interconnection (POI) at Southern California Edison Company's (SCE) Ganessa-Simpson 66 kV Line. The IC elected Option A with Full Capacity Deliverability Status (FCDS) for its Project. The IC desires an In-Service Date (ISD) of March 01, 2018 and a Commercial Operation Date (COD) of June 01, 2018. Such dates are specified in the Project's Attachment B to the Generator Interconnection Study Process Agreement. Actual ISD and COD will depend on licensing, engineering, detailed design, and construction requirements to interconnect the Project after the Generator Interconnection Agreement (GIA) has been executed and filed at the Federal Energy Regulatory Commission (FERC) for acceptance.

In accordance with FERC approved SCE's WDAT Attachment I Generator Interconnection Procedures, the Project was grouped with other Queue Cluster 8 (QC8) Phase II projects to determine the impacts of the group as well as impacts of the Project on the ISO Grid.

An Area Report and Subtransmission Assessment Report have been prepared separately identifying the combined impacts of all projects in the group on the ISO Controlled Grid and to distribution facilities served out of Chino 66 kV Subtransmission System, respectively. This Appendix A report focuses only on the impacts or impact contributions specific to the Project, and is not intended to supersede any contractual terms or conditions that may be specified in a GIA.

The report provides the following:

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

All the equipment and facilities comprising the Project's Generating Facility are located in Pomona, California, as disclosed by the IC in its IR. The Generating Facility, as may have been amended during the Interconnection Study process, is a synchronous Generating Facility which consists of replacing the existing ██████████ and supporting infrastructure with (i) ██████████ with a rated output of ██████████ that will be limited to not exceed 98.9 MW at the generator terminal, (ii) the associated infrastructure and step-up transformers, (iii) meters and metering equipment, (iv) appurtenant equipment, and (v) ██████████ of auxiliary loads.

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<sup>1</sup> It should be noted that construction is only part of the duration of months specified in the study, which includes detailed 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 from the IC as will be specified in the GIA to commence the work.

<sup>2</sup> Revised to reflect the appropriate scope associated with the facilities required to interconnect the project.

<sup>3</sup> Revised to reflect the appropriate costs associated with the facilities required to interconnect the project

Based on the technical data provided for the the synchronous generator, the total internal project losses were identified to be 0.2 MW. The losses on the generation tie line (gen-tie line) were estimated to be 0.1 MW. These study findings will result in limiting the Project’s net output at the POI to 92.782 MW, which is a [REDACTED]

[REDACTED] To ensure POI delivery does not exceed 92.8 MW, the Project will need to install or demonstrate that a control system will be put in place which will manage output as measured at the high side of the main transformer bank.

The Project shall consist of the Generating Facility and the IC’s Interconnection Facilities as illustrated below in Figure A.1 and summarized in Table A.1. A map illustrating the location of the Project is provided in Figure A.2.

Figure A.1: Project Plan of Service & IC Facilities One-Line Diagram

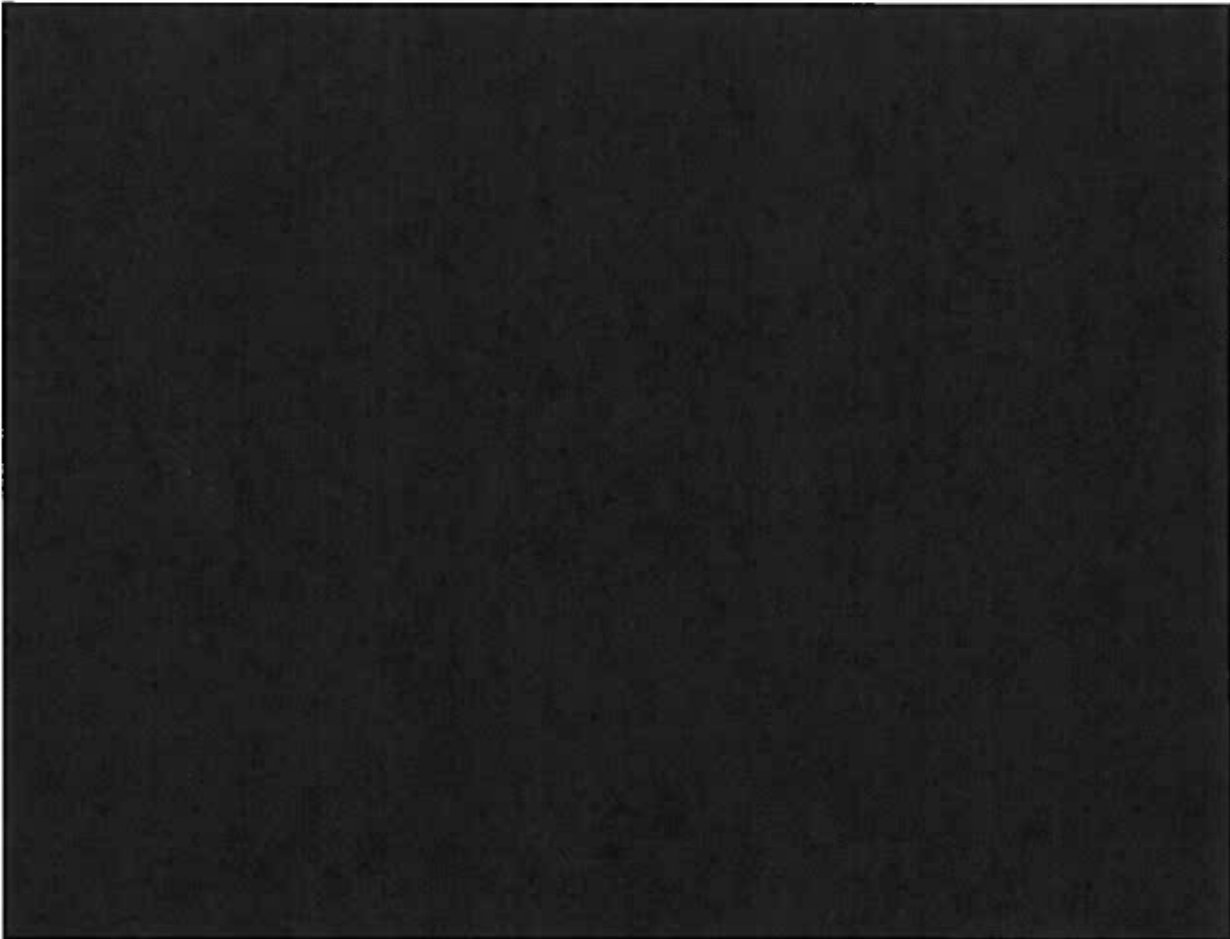


Figure A.2: Project Location Map

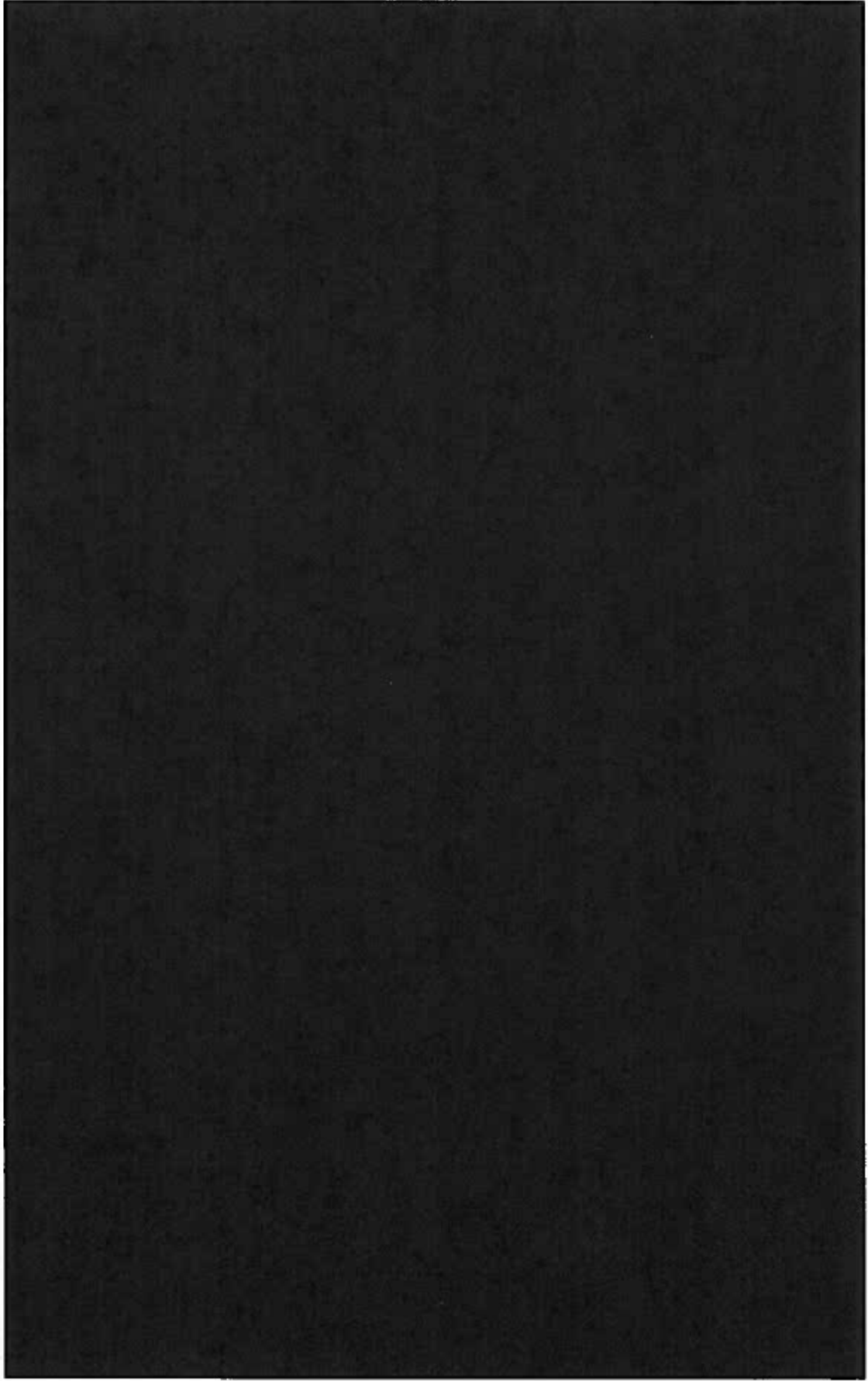


Table A.1 Project General Information per IR

Project Location	[REDACTED]
Distribution Provider's Planning Area	Distribution Provider's Metro Area
POI	Distribution Provider's Ganesha-Simpson 66 kV Line
Interconnection Voltage	66 kV
Requested Maximum Project Output and Distribution Service as Measured at POI	92.8 MW (see Note 1)
Number and Types of Generators	[REDACTED]
Power Factor Range	[REDACTED]
Step-Up Transformer(s)	[REDACTED]
Gen-Tie	0.2 miles of 397.5 Aluminum Conductor Steel Reinforced (ACSR) and 0.28 miles of 653 & 336 ACSR.
Generator Auxiliary Load	[REDACTED]
Internal Generating Facility Losses	0.2 MW
Maximum Net Output (Metered on High-Side of Main Transformer) to ensure POI does not exceed 92.8 MW.	92.9 MW (see Notes 2 and 3)
Estimated Losses on Gen-Tie Facilities	0.1 MW
ISD	March 01, 2018
Initial Synchronization Date/Trial Operation	May 01, 2018
COD	June 01, 2018

Note 1: The MW output at the POI varies under different operating conditions.

Note 2: The IC is reminded that this value is tied to the generation tie-line losses. The estimated Maximum Net Output at POI and Generation Tie-Line Losses values illustrated above are contingent upon the accuracy of the technical data provided by the IC in the Appendix B, and are subject to change should the IC change its generation tie line parameters during the final engineering and design phase of the Project.

Note 3: The IC's Interconnection Request identifies that the Project net output, as measured at high-side of main transformer bank, will be limited to remain within the maximum requested 92.8 MW value at the POI. The IC will need to install a control system or demonstrate how the Project's net output will be limited to 92.8 MW

## B. Study Assumptions

For detailed assumptions regarding the group cluster analysis at the transmission and subtransmission levels, please refer to the applicable Area Report and Subtransmission Assessment Report. Below are the assumptions specific to the Project.

1. The Plan of Service (POS) is defined as the facilities needed to interconnect the Project to SCE's Distribution System. The following is the POS assumed for the Project:

The Project was modeled as interconnecting to the Ganesha-Simpson 66 kV Line.

NOTE: [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

2. The following facilities will be installed by SCE and are included in this Interconnection Study report:

- [REDACTED]
- Construction of a new 66 kV single circuit breaker substation (SCE WDT1288).
- New 66 kV tap connection from SCE WDT1288 to the existing [REDACTED]
- Lightwave, channel banks, and associated equipment at [REDACTED] and SCE WDT1288 Substation and at the Generating Facility.
- The segment of the Project 66 kV line inside the SCE WDT1288 Substation Property line.
- The required retail load meter.
- The extension of each of the two generators-owned fiber optic cables inside the SCE WDT1288 substation.
- [REDACTED] and SCE WDT1288.

NOTE: SCE installation does not include metering potential transformers (PTs) and current transformers (CTs), and metering cabinet. The SCE meters will be connected to the generator – owned CTs and PTs to be installed for their ISO metering.

3. The following facilities will be installed by the IC and are not included in this Interconnection Study report:

- The 66 kV generation tie-line from the Generating Facility to the last structure outside the SCE WDT1288 Substation property line.
- The fiber optic cables to provide two diversely routed telecommunication paths required for the line protection relays.
- The required CAISO metering equipment (PTs and CTS and CAISO meters).

NOTE: The metering PT and CTs installed for the ISO metering will also be used for the SCE owned retail load meters.



- The following line protection relays to be installed at the Generating Facility end of the [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]

4. Environmental Activities, Permits, and Licensing.

i. Internal Substation Scope:

- SCE will perform all environmental surveys/studies, monitoring, and mitigation of all SCE internal substation construction activities.

ii. Customer-Dedicated 66 kV/115 kV Switchyard Scope:

- IC will perform all environmental surveys/studies, monitoring, and mitigation unless special circumstances require otherwise.

iii. 66 kV Generation Tie Line Scope:

- These assumptions assume that SCE will file for an “expedited” Permit to Construct by attaching the IC’s final CEQA document with SCE’s scope of work incorporated in lieu of a Proponent’s Environmental Assessment.
- These assumptions assume Environmental Services (ES) will act as the environmental liaison between SCE’s team and the IC’s team, and the lead for regulatory agency communication. These assumptions include, but are not limited to, the following ES activities, as applicable.
- SCE’s scope of work will not require a California Public Utilities Commission license.
- SCE will act as the environmental liaison between the SCE team and IC team, and the lead for regulatory agency communication.
  - Collaborate with the IC during the environmental study phase on 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) and National Environmental Policy Act (NEPA) documents, technical studies, surveys, and other environmental documentation addressing SCE’s scope of work (IC to include SCE’s scope of work in their environmental document).
  - Review of internal (SCE/ESD) existing technical documents when available
  - Regulatory agency communication, consultation, and reporting
  - Permit acquisition
  - Support SCE team in developing the project description, including scope changes during permitting/pre-construction or construction.
  - Communicate scope changes to the IC’s environmental team, discuss/approve subsequent actions including new surveys as necessary
  - Prepare Environmental Requirements for Construction Clearance
  - Develop communication plan

- Construction monitoring oversight
  - General Order 131-D Consistency Determination and Environmental Evaluation
  - Environmental Awareness/Worker Environmental Awareness Program (WEAP) training
  - Pre-construction coordination field visit
  - Construction and post-construction site assessments
- IC performs all environmental studies and prepares draft environmental permit applications related to the installation of SCE’s Interconnection Facilities and Upgrades. The IC’s responsibilities include, 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, performing cultural resources inventories (survey and recording), performing testing and evaluation and/or data recovery of archaeological sites as applicable, and providing the appropriate documentation in the form of inventory reports, research design and/or data recovery reports as applicable, cultural and paleontological monitoring when/if required, and arranging curation agreements for artifacts and fossil specimens collected, performing a California Natural Diversity Database search, performing a habitat assessment, performing 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, performing pre-construction biological resource surveys, performing biological resource monitoring during construction, performing cultural and paleontological monitoring during construction, mitigation costs including, but not limited to, offsite/compensatory mitigation and onsite restoration, and developing mitigation plans or other environmental reports or submittals, if required, to support installation of SCE’s Interconnection Facilities and Upgrades.
  - Prior to commencing work and during execution of work, the IC must collaborate and obtain ES concurrence on all work outlined above. Should the IC-performed environmental studies, surveys, or monitoring not meet the Federal or State industry standards in accordance with Applicable Laws and Regulations, and as determined by ES, the IC shall be obligated to remedy deficiencies under SCE/ES’s direction, or ES shall undertake additional environmental studies, surveys, or monitoring at the sole expense of the IC. If these scenarios occur, the estimate must be updated to reflect the changes to the assumptions.

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

The generator interconnection studies were conducted to ensure the ISO Grid complies with the North American Electric Reliability Corporation (NERC) reliability standards, WECC regional criteria, and the ISO planning standards. Refer to Section C of the Area Report for details of the applicable reliability standards, study criteria, and methodology.

### **D. Power Flow Reliability Assessment Results**

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

The study indicated that the Project does not contribute to any overloads/non-convergence problems on the Bulk Electric System requiring Reliability Network Upgrades to mitigate.

Consequently, the Project did not get allocated costs for any Network Upgrades. Refer to enclosed Area Report in the report package for the Phase II power flow analysis results.

**1. Thermal Overloads**

There were no power flow overload issues identified on the Bulk Electric System with the inclusion of the Project.

**2. Power Flow Non-Convergence**

There were no non-convergence issues identified with the inclusion of the Project operating at the required power factor range.

**3. Voltage Performance**

The Project is required to provide power factor regulation capability [REDACTED] to alleviate power flow non-convergence and maintain the transmission transfer capability.

**4. Required Mitigations**

No mitigation, beyond power factor regulation capability, is required by the Project on the transmission system.

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

The Chino 66 kV Subtransmission Assessment indicated that the Project contributes to overloads/non-convergence problems on the Chino 66 kV Subtransmission System. Consequently, the project will be allocated costs for identified upgrades at the subtransmission level. Refer to enclosed Subtransmission Assessment in the report package for the Phase II power flow analysis results.

**1. Thermal Overloads**

With the inclusion of the Project, the studies determined that the existing 66 kV line segment that connects the [REDACTED] to the 66 kV line which leads to [REDACTED] in excess of maximum [REDACTED]. The details of the power flow analysis are provided in the Subtransmission Assessment Report.

**2. Power Flow Non-Convergence**

There were no non-convergence issues identified with the inclusion of the Project operating at the required power factor range.

**3. Voltage Performance**

The Project is required to provide power factor regulation capability [REDACTED] to alleviate power flow non-convergence and maintain the transmission transfer capability.

**4. Required Mitigations**

To address the thermal overload identified, a reconductor of the overloaded 66 kV line segment is required.

## E. Short-Circuit Duty Results

Short-circuit studies were performed to determine the fault duty impact of adding the Phase II projects to the transmission System and to ensure system coordination. The fault duties were calculated with and without the projects to identify any equipment overstressed conditions. Once overstressed circuit breakers caused by the inclusion of the QC8 projects and/or queued-ahead generation were identified, the fault current contribution from each individual project in QC8 Phase II were determined. Each project in the cluster will be responsible for its share of the upgrade cost based on the rules set forth in Section 4 of the GIP.

### 1. Short-Circuit Duty Study Input Data

The IC provided technical data for the identified GE-LMS100 is as follows:

#### Synchronous Generation Data for Each Generation Unit

●	[REDACTED]
●	[REDACTED]
●	[REDACTED]

#### Generation Tie-Line:

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

#### Generation and Step-Up Transformers Information:

Technical details are provided in Table A.1.

### 2. Short-Circuit Duty Study Results

All bus locations where the Phase II projects increase the 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 equipment is overstressed as a result of the inclusion of Phase II interconnections and corresponding Network Upgrades and Distribution Upgrades, if any.

The responsibility to finance short-circuit related Reliability Network Upgrades (RNU) and Distribution Upgrades (DU) identified through this SCD study shall be assigned to all Interconnection Requests in this QC8 PII study pro rata on the basis of SCD contribution of each Generating Facility.

Please refer to in the Area Report for the Phase II breaker evaluation discussion, which 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. SCE Substations with Ground Grid Duty Concerns

The short-circuit studies flagged SCE-owned substations beyond the Project's POI with ground grid duty concerns that necessitate a ground grid study.

The Project's contribution to all locations external to the Chino 66 kV Subtransmission System were found to be minimal. However, the Project's contribution within the Chino 66 kV Subtransmission System was identified to be significant at two locations. Consequently, the Project will be assigned cost to perform detailed ground grid studies at the following two locations:

- [REDACTED]
- [REDACTED]

The ground grid study costs allocated to the Project are reflected in Attachment 2 of this Appendix A report.

#### 4. Potential Affected Systems – SCD Results

The SCD incremental increase to neighboring utilities due to the addition of all QC8 Phase II projects are provided in the Area Report (Section J.2). The studies determined this project does not provide any incremental duty to neighboring utilities.

#### F. Preliminary Protection Requirements

Protection requirements are designed and intended to protect the Distribution Provider's electrical 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 Generating Facility and must meet the requirements in the SCE Interconnection Handbook provided in Attachment 4.

#### G. Transient Stability Evaluation

With the Project providing [REDACTED] correction as measured at the POI, transient stability performance was found to be acceptable. Refer to Sections C.3 and D.2 of the Area Report, for additional details pertaining to the transient stability evaluation criteria and assessment results, respectively.

#### H. 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] at generator terminals for synchronous generators. Additionally, the generation system must be designed to accommodate a Voltage/VAR schedule provided by SCE. SCE will determine if the Voltage and/or VAR schedule is necessary based on future re-arrangements of SCE's Transmission System.

#### I. Deliverability Assessment Results

##### 1. On Peak Deliverability Assessment

The Project does not contribute to any deliverability constraint.

##### 2. Off- Peak Deliverability Assessment

Refer to off-peak reliability assessment.

##### 3. Required Mitigations

No Delivery Network Upgrades are required.

## **J. In-Service Date and Commercial Operation Date Assessment**

The information provided by the IC in Appendix B indicates that the requested ISD and COD is March 1, 2018 and June 1, 2018, respectively. To determine if these dates could be met, an ISD and COD assessment was performed which considered both the QC8 Phase II Interconnection Study process timelines as well as the facilities needed to enable an energy only interconnection of the Project. Details pertaining to FCDS and Interim Deliverability are provided below in Section K.

### **1. QC8 Interconnection Process Timelines**

To enable physical interconnection, a Generation Interconnection Agreement (GIA) is required. As part of the interconnection Study cycle, a GIA is tendered following completion of the final Phase II Interconnection Study with the timing for tendering such GIA impacted by the CAISO's Transmission Planning Deliverability (TPD) Allocation Study and the CAISO's Annual Reassessment, if applicable

The TPD Allocation Study process is scheduled to be completed by April 2017 and if no changes to scope requirements are identified, a letter is provided by the CAISO at the end of April 2017 outlining the TPD Allocation Study results. However, if changes to scope requirements are identified as part of the CAISO's Annual Reassessment Study process, updates to scope, cost, and schedule are developed and provided in a Reassessment Study Report issued by the end of July 2017. For Projects seeking a GIA with Partial Capacity Deliverability Status (PCDS) or FCDS pursuant to the TPD Allocation Study process, GIA negotiations may commence after the issuance of the letter at the end of April 2017<sup>4</sup>, which outlines the TPD Allocation Study results, or upon issuance of the Reassessment Study Report at the end of July 2017, which updates scope, cost, and schedule. Assuming a three (3) month timeframe for GIA negotiations, after the GIA is tendered, the earliest that an executable GIA can be provided to the IC is August 2017, which is contingent on the IC's acceptance of the TPD Allocation Study results. If the Reassessment Study process affects the Project, an executable GIA is not expected until November 2017. The timeline for executing a GIA could be further delayed if the IC elects to "park" its IR until the following year's allocation of TP Deliverability.

### **2. System Upgrade Timelines for Interconnection**

The ISD and COD assessment identified that the following facilities are required in order to interconnect the Project. The month durations shown represent the estimated amount of time needed to design and construct the facilities with the start date of the duration based on the effective date of the GIA, IC granting authorization to proceed (ATP), and IC posting financial security:

#### **a. Distribution Provider's Interconnection Facilities**

These facilities involve the new SCE WDT1288 substation, all facilities located within this new substation, the 66 kV tap extension to connect the new substation to the existing Ganessa-Simpson 66 kV line and Distribution Provider's facilities located at the IC's Project

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<sup>4</sup> The TPD Allocation Study Process is estimated to be completed in April 2017. The actual date may vary.

that are necessary to complete physical interconnection of the Project and ensure adequate line protection. Please refer to Section 1.b of Attachment 1 for details related to these facilities.

b. Reliability Network Upgrades

SCD operational mitigation was identified taking into account new generation projects that have executed GIAs, approved Distribution Provider's Transmission Network Upgrades fully permitted and under construction, and new generation projects including the QC8 Phase II projects, which do not yet have an executed GIA. The study results for these operational studies are provided in Section II of the Generation Sequencing Implementation Short-Circuit Duty evaluation (Appendix G). Based on the study results, replacement of four (4) Vincent 500 kV circuit breakers (triggered by QC3&4) are required to be in place in order to enable interconnection of the Project. Replacement of the four (4) Vincent 500 kV circuit breakers has not been initiated, because this upgrade is required only when sufficient generation projects (with executed GIAs in good standing) achieve ISD. The identification of the need for the Vincent 500 kV circuit breaker upgrades is based on the assumption that all queued generation projects actually materialize and are interconnected, but the true need occurs only when sufficient queued generation achieves ISD. This SCD mitigation will be continuously evaluated as part of ongoing GIA negotiations with queued generation projects to properly define the actual trigger of SCD mitigation based on the actual execution of GIAs and development of generation facilities.

c. Voltage Support Mitigation

No required voltage support upgrades were identified to enable this Project to interconnect.

d. Distribution Upgrades – 36 months

Plan of Service Distribution Upgrades involve [REDACTED]  
[REDACTED]  
[REDACTED] Please refer to Section 3 of Attachment 1 for details.

3. Conclusion

Based on the GIA execution timelines and milestone timelines to design and construct the facilities noted above, the IC's requested ISD of March 1, 2018 and COD of June 1, 2018 are not achievable. Such conclusion is consistent with the conclusions provided in the Project's Phase I Interconnection Study report. Assuming the earliest that an executable GIA can be provided to the IC is August 2017, which is contingent on the IC's acceptance of the 2017 TPD Allocation Study results, the ISD should be modified to reflect August 31, 2020 and the COD should be modified to reflect a date after the ISD. To modify such dates, the IC will need to submit a request for material evaluation following section 4.5.7.2 of the SCE's WDAT Attachment I Generator Interconnection Procedures (GIP).

## **K. Timing of Full Capacity Deliverability Status, Interim Deliverability, Area Constraints, and Operational Information**

The Project would be granted its requested FCDS only if the Project 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 the these Delivery Network Upgrades are completed and placed into service, the Project 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, if any, described in Section J.2 of this report:

- a. Triggered Delivery Network Upgrades – None
- b. Delivery Network Upgrades Triggered by Earlier Queued Projects – None
- c. Approved Transmission Upgrades – None
- d. Transmission Upgrades outside the CAISO Controlled Grid - None

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

The operational deliverability assessment was performed for study years 2017 ~ 2020 by modeling the Transmission and generation in service in the corresponding study year. For details of the Transmission and generation assumption, refer to Section E.3 of the Bulk Area Report . No deliverability issues were identified. The Project will have the deliverability status as granted by the Transmission Plan Deliverability allocation.

## **L. Distribution Provider’s Interconnection Facilities, Network Upgrades, and Distribution Upgrades**

Please see Attachment 1 for the Distribution Provider’s Interconnection Facilities (IFs), RNUs, DNUs, and DUs 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 GIA and SCE has completed the detailed design and engineering of the facilities according to tariff timelines.

## **M. Cost and Construction Duration Estimates**

To determine the cost responsibility of each generation project in Phase II, the ISO developed cost allocation factors (Attachment 3) for RNUs, Local Delivery Network Upgrades (LDNUs), and Area Delivery Network Upgrades (ADNUs). Attachment 2 provides the 'constant' 2016 dollars and their escalation to the estimated COD year for IFs, RNUs, DNU, and DUs, which the Project was allocated cost.



The IC should note that any RNUs above the \$60k/MW repayment cap allocated to the Project may be assessed 35% Income Tax Component of Contribution (ITCC), in addition to the 35% ITCC assessed to the Distribution Provider's IFs and DUs assigned to the Project. For your information, Attachment 2 contains a potential ITCC estimate<sup>5</sup> based on the final Phase II cost in this study. It does not represent the "maximum ITCC exposure" to the Project. Attachment 2 provides an estimated non-reimbursable RNU cost that would be subject to ITCC, taking into account the maximum cost responsibility for Network Upgrades. The maximum ITCC assessed to the Project will be addressed, calculated, and included during the GIA development phase after the IC submits the TP Deliverability Allocation Study Process options form confirming to accept, decline, or park the allocation of deliverability awarded to the Project.

#### **N. SCE Technical Requirements**

The IC is responsible for the protection of its own system and equipment and must meet the requirements in the SCE Interconnection Handbook provided in Attachment 4. In addition, the IC is responsible for complying with IEEE Std 519-2014 Recommended Practice and Requirements for Harmonic Control in Electric Power Systems on SCE's Distribution/Subtransmission/Transmission System.

#### **O. Subsynchronous Interaction Evaluations**

Certain generators or inverter/converter based generators when interconnected within electrical proximity of series capacitor banks on the transmission system are susceptible to sub-synchronous interaction (SSI) conditions which must be evaluated. Sub-synchronous interaction evaluations include sub-synchronous resonance (SSR) and sub-synchronous torsional interactions (SSTI) for conventional generation units, and sub-synchronous control instability (SSCI) for asynchronous generators using power electronic devices (e.g. solar photovoltaic and wind turbines).

For projects interconnecting at the 220 kV voltage level and above in close electrical proximity of series capacitor banks on the transmission system a study will need to be performed to evaluate the SSI between generating facilities and the transmission system.

The IC is 100% responsible for any studies related to the SSR or SSTI. The only study that SCE will perform (at the IC's expense) is for SSCI; to ensure that the Project does not damage SCE's control systems.

The SSCI study will require that the IC provide a detailed PSCAD model of its Generating Facility and associated control systems, along with the manufacturer representative's contact information. The study will identify any mitigation(s) that will be required as part of project execution and need to be completed prior to initial synchronization of the Generating Facility. The study and the proposed mitigation(s) shall be at the expense of the IC.

It is the IC's responsibility to select, purchase, and install synchronous/asynchronous generators that are compatible with the series compensation in the study area.

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

Please see Appendix K of the Bulk Area Report.

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<sup>5</sup> The maximum ITCC exposure applies ITCC (35%) to the assigned DUs and Distribution Provider's IF. For Network Upgrades, costs that are not subject to transmission credits and/or exceed the \$60k/MW cap will be subject to ITCC (35%). For an Option (A) or Option (B) Generating Facility: the maximum ITCC exposure is calculated by applying the following formula:  $(IF * 35\%) + ((RNU \text{ Costs} - (\text{Project MW} * \{\$60k/MW\})) * 35\%) + (DU * 35\%)$ .

## **Q. Affected Systems Coordination**

Please see Section H of the Area Report.

## **R. 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 POS and are not sufficient for permitting of facilities. The POS is subject to change as part of detailed engineering and design.

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

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

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

Results or consequences of this Phase II Interconnection 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 Western Electricity Coordinating Council (WECC) path ratings, SCD outside of the ISO Grid, and SSR. Refer to Affected Systems Coordination Section of the Area Report for additional information.

### **4. Use of and/or Crossing Distribution Provider's Facilities**

The IC is responsible for acquiring all property rights necessary for the IC's Interconnection Facilities, including those required to cross the Distribution Provider's property. This Phase II 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's property. The crossing of Distribution Provider property rights shall only be permitted upon written agreement between the Distribution Provider and the IC at the Distribution Provider's sole determination. Any proposed crossing of the Distribution Provider's property rights will require a separate study and/or evaluation, at the IC's expense, to determine whether such use may be accommodated.

### **5. SCE Interconnection Handbook**

The IC shall be required to adhere to all applicable requirements in the SCE 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 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.

#### 8. Standby Power and Temporary Construction Power

The QC8 Phase II Study does not address any requirements for standby power or temporary construction power that the Project may require prior to the ISD of the Interconnection Facilities. Should the Project require standby power or temporary construction power from the Distribution Provider prior to the ISD of the IF, the IC is responsible to make appropriate arrangements with the 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's scope details presented in this Phase II study. These estimates are subject to change as Project'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.

#### 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's breaker in lieu of tripping the circuit breakers at the Distribution Provider's substation. Due to uncertainties related to telecommunication upgrades for the numerous projects in queue ahead of Phase II Area Report. Phase II, 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 Phase II may be reduced. Any changes in these assumptions may affect the cost and schedule for the identified telecommunication facilities.

#### 11. Ground Grid Analysis

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

#### 12. Applicability

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

#### 13. 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

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 CAISO. 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 Project for all future communications with the CAISO. The Distribution Provider 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>

#### 14. Potential Changes in Cost Responsibility

The IC is advised that interconnection of its proposed Generating Facility may be dependent upon the construction of certain Network Upgrades, which are currently the obligation of projects ahead of its proposed Generating Facility in the interconnection application queue. These other potential network upgrades are referenced in Section B.5 of the Area Report and outlined in Attachment 2 to the ICs final Phase I or Phase II Study Report (Appendix A).

Whether the IC becomes responsible for all or a portion of these other potential network upgrades depends upon several factors, some of which are unknown at the time of this study. However, in an effort to alert the IC to its maximum cost responsibility for Network Upgrades, were these other potential network upgrades to become the obligation of the IC, SCE has included the IC's proportionate cost responsibility for these upgrades under the other potential network upgrades section in Attachment 2 to this report. The IC is not required to post Interconnection Financial Security for these other potential network upgrades, but the prospective obligation to finance and construct these other potential network upgrades is included in the IC's maximum cost responsibility. The obligation to finance and construct these other potential network upgrades is governed by Sections 4.6.8 and 10.3.2 of the GIP and 14.2.2 of the GIDAP. Both the GIP and GIDAP contain similar language, which is summarized as follows:

- i. If the earlier-queued generating facilities that have cost responsibility for the other potential network upgrades withdraw prior to executing a GIA (or the filing of an unexecuted GIA at FEREC), the following will occur:

- ii. The ISO and SCE will evaluate whether the other potential network upgrades are still needed to support the interconnection for later-queued generating facilities
- iii. The ISO and SCE will reapportion the cost of the other potential network upgrades to the later-queued generating facilities that require the upgrades
- iv. Steps (a and b) will occur as a result of the ISO's Annual Reassessment as set forth in Section 7.4 of GIDAP and Section 6.2.9.2 of the ISO's GIDAP business practice manual
- v. The reapportioned cost of the other potential network upgrades will be reflected in the reassessment report as outlined in the ISO's Annual Reassessment process, which will be reflected in the GIAs of the responsible parties
  
- vi. Please refer to Section 10.3.2 of the GIP and Section 14.2.2 of the GIDAP for additional requirements regarding treatment of other potential network upgrades for ICs that select an Option (B) Generating Facility.

15. Additional limitations may be driven by the ISO market and distribution system operations.

16. Please note that the Distribution Provider has made its best efforts to convey as much information as possible based on information provided by the IC about its proposed project. 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 Distribution Provider's material modification review pursuant to the tariff.

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

**Attachment 2**  
**Revised 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  
Not Used**

**No network upgrade costs were assigned to the project**



**Attachment 4**

**SCE Interconnection Handbook**

Preliminary Protection Requirements for Interconnection Facilities are outlined in the SCE Interconnection Handbook (separate document)

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



**Attachment 7**  
**Not Used.**

**Attachment 8**  
**Subtransmission Assessment Report**  
Please refer to separate document