Appendix A – WDT1188

[redacted]

[redacted]

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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A. Introduction

[redacted]the Interconnection Customer (IC), has submitted a completed Interconnection Request (IR) to Southern California Edison Company (SCE) for their proposed [redacted] (Project). The Project plans to have a total [redacted] The Project's requested Point of Interconnection (POI) is Southern California Edison Company's (SCE) Johanna 66kV Substation located in Orange County, California. The Project has a CAISO delivery point at Johanna 220kV Substation bus. The IC requested Full Capacity Deliverability Status for the Project, and desires an In-Service Date (ISD) and Commercial Operation Date (COD) of 3/30/2018 and 6/01/2018 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. Transmission and/or Subtransmission 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[1] 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 Santa Ana, California, as disclosed by the IC in its IR, as may have been amended during the Interconnection Study process, which consists of (i) [redacted] (ii) the associated infrastructure, (iii) meters and metering equipment, (iv) appurtenant equipment, and (v) auxiliary loads.

The Project shall consist of the Generating Facility and the IC's Interconnection Facilities as illustrated below in Figure A-1. Similarly, the Project information is summarized in Table A.1 below. The location of the Project was assumed as specified in the IR provided by the IC. The Project shall not exceed the total net output.

[1] 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.

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

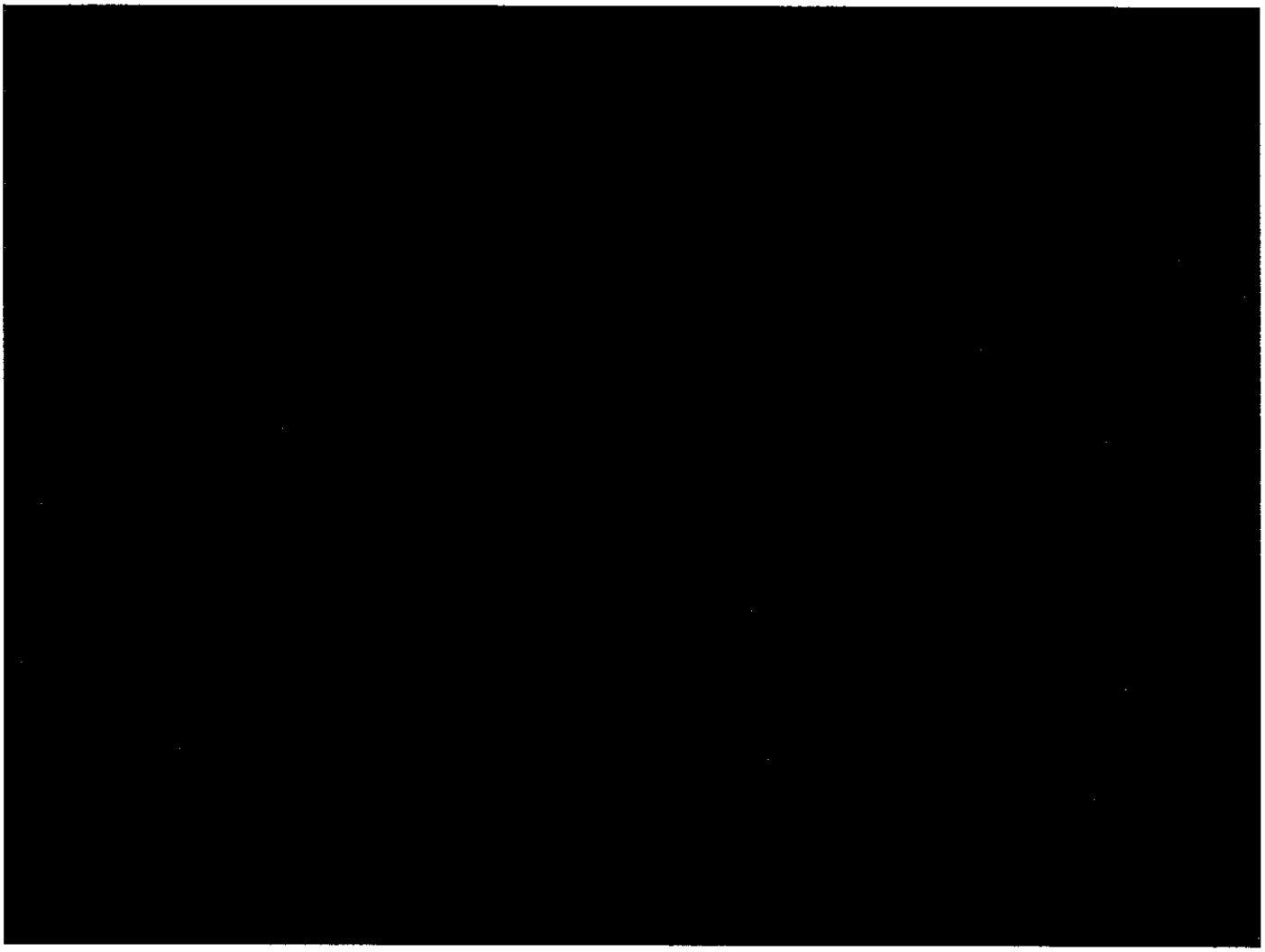


Table A.1: Project General Information

Project Location	[redacted]
Distribution Provider's Planning Area	SCE Metro Bulk system
Number and Types of Generators	[redacted]
Interconnection Voltage	66kV
Maximum Generator Output	[redacted]
Generator Auxiliary Load	[redacted]
Maximum Net Output	[redacted]
Power Factor Range	[redacted]
Step-up Transformer(s)	[redacted]
POI	[redacted]
IC Requested COD	6/01/2018

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 via one 66kV generation tie-line (gen-tie) to SCE's Johanna 66kV Substation.

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

   - The new 66kV position at Johanna Substation.
   - The segment of a 66kV generation tie-line inside the Johanna 66kV substation property line.
   - The segments of each one of the two telecommunication paths inside the Johanna Substation property line.
   - Lightwave, channel and associated equipment at Johanna Substation and at the Generating Facility.
   - The required retail load meters.

   NOTE: SCE installation does not include metering voltage and current transformers, and metering cabinet. The SCE meters will be connected to the generator – owned voltage and current transformers to be installed for their CAISO metering.

3. The following facilities are to be installed by the Interconnection Customer and **are not included** in this Phase I Study:

   - The 66kV generation tie-line from the Generating Facility to the last structure outside the Johanna 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 (voltage and current transformers and CAISO meters) and metering cabinet for SCE revenue meter.

     NOTE: The metering voltage and current transformers installed for the CAISO metering will also be used for the SCE owned retail meters.

   - The following 66kV line protection relays to be installed at the Generating Facility end of the 66kV generation tie-line:
     - [redacted]
     - [redacted]

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

   - The Project will need to participate in a new Johanna Area SPS.
   - It should be noted that the new design and any modifications to the Johanna Area SPS need to be presented to the WECC RASRS for approval. The WECC RASRS currently meets up to three (3) times a calendar year to review new and modified SPS systems. It should also be taken into account that engineering and design for any modification to this SPS for the Distribution Provider and generator facilities must be finalized prior to presenting to the WECC RASRS for approval.

C. Reliability Standards, Study Criteria and Methodology

The generator interconnection studies will be conducted to ensure the CAISO-controlled grid is in compliance with the North American Electric Reliability Corporation (NERC) reliability standards, WECC regional criteria, and the CAISO planning standards. Refer to Section C of the Bulk Area Report for details of the applicable reliability standards, study criteria and methodology.

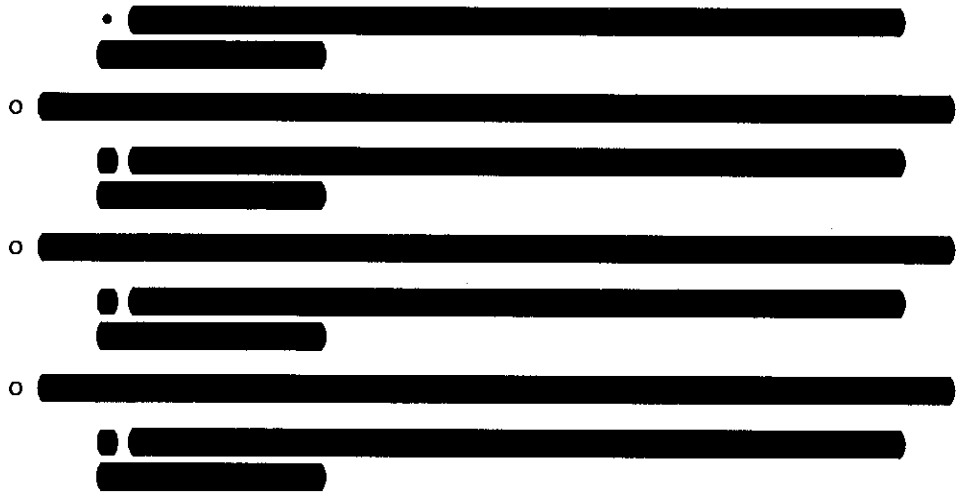
D. Reliability Assessment Results

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

1. Thermal Overloads

   The group study indicated that the Project contributes to the following facility overloads or non-convergence problems. The details of the analysis and overload levels are provided in the Bulk Area Report.

   - Category "A" (All facilities in service, N-0)
     - None
   - Category "B" (loss of a single element, N-1)
     - [redacted]
     - [redacted]
   - Category "C" (loss of multiple elements, N-2)
     - [redacted]
     - [redacted]



2. Power Flow Non-Convergence

   There were no non-convergence issues under certain contingencies identified with the inclusion of the Project due to the limited system capacity.

3. Voltage Performance

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

4. Required Mitigations

   A combination of congestion management, the Project providing power factor regulation capability at the POI, and SPS to trip the Project under identified contingency outage conditions is required to mitigate the power flow impacts of the Project described above. The Reliability Network Upgrades discussed in the Bulk Area Report and assigned to the Project are as follows:

   a. Add Project to the new Johanna Area SPS.

   The Project will need to be added as a participant to the new Johanna Area SPS under the following outages:

   i.

   ii.

   iii.

   iv.

   v.

vi. [redacted]

vii. [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

1. Thermal Overloads

   The group study indicated that the Project contributes to the following facility overloads or non-convergence problems. The details of the analysis and overload levels are provided in the Sub transmission Area Report.

   - Category "A" (All facilities in service, N-0)
     - None
   - Category "B" (loss of a single element, N-1)
     - None
   - Category "C" (loss of multiple elements, N-2)
     - None

2. Power Flow Non-Convergence

   There were no non-convergence issues under certain contingencies identified with the inclusion of the Project due to the limited system capacity.

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

   A combination of congestion management, the Project providing [redacted] power factor regulation capability at the POI, and SPS to trip the Project under identified contingency outage conditions is required to mitigate the power flow impacts of the Project described above. Refer to section 3.3 in the Subtransmission Area Assessment Report.

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.

"Synchronous Gen" Data for each generation unit:

X"1 - positive sequence subtransient reactance: [redacted]
X"2 - negative sequence subtransient reactance: [redacted]
X"0 - zero sequence subtransient reactance: [redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

This generation tie-line impedance was based on Distribution Provider calculation of generation tie-line electrical parameters utilizing tower and line conductor characteristics provided by the IC.

1. Short Circuit Duty Limitation Authentication

   The Project[redacted]Project output to not exceed[redacted](POI) which is Southern California Edison Company's (SCE) Johanna 66kV Substation located in Orange County California. As part of the Phase II Study, the IC will need to provide detailed information outlining the control system to be used that will ensure the net output of the Project is not exceeded.

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 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. Transient Stability Evaluation

Limited transient stability studies were conducted using full loop base cases to ensure that the transmission system remains in operating equilibrium, as well as operating in a coordinated fashion; through abnormal operating conditions after the QC7 Phase I projects begin operation. The generator dynamic data used in the study for the Project is shown in Attachment 6.

1. Transient Stability Evaluation Results – 220kV and above

   Refer to section D in the Bulk Area Report for results.

2. Transient Stability Evaluation Results – 66kV

   A number of selected line and generator outages within the Metro Bulk system consistent with Category B and Category C requirements were simulated as part of the transient stability evaluation. The transient stability evaluation found that with all proposed system upgrades listed above, the QC7 Phase I projects in SCE's Metro Bulk system would not cause the transmission system to go unstable under Category B and Category C outages.

G. Reactive Power Deficiency Analysis

Reactive Power Deficiency Analysis was conducted using full loop base cases to ensure that there is enough reactive support such that the system (66kV and above) remains in operating equilibrium, as well as operating in a coordinated fashion; through abnormal operating conditions after the QC7 Phase I projects begin operation.

1. Area Study Reactive Power Deficiency Results – 220kV and above

   Refer to section D in the Bulk Area Report for results.

2. Area Study Reactive Power Deficiency Results – 66kV

   With the addition of all QC7 Phase I projects in the Metro area, there is severe voltage degradation to the system under base case conditions. As such, all QC7 Phase I projects in the Metro area are required to provide reactive capability consistent with Tariff requirements. They are also required to maintain 0.95 lead/lag power factor while in operation.

   The study concluded that the reactive power requirements for the Eastern system is acceptable with the combination of all network upgrades identified with all generating facilities in QC7

Phase I in the Eastern area required to be designed to provide [redacted] power factor at their Point of Interconnection.

3. 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 0.95 lead/lag at POI for asynchronous generation and [redacted] at generator terminals fro synchronous generators . 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 Transmission system.

H. Deliverability Assessment Results

1. **On Peak Deliverability Assessment**

   The Project contributes to the following overloads:

   - Johanna – Santiago 220kV overload under single outage of TOT702 – Santiago 220kV line
   - Ellis – Johanna 220kV overload under single outage of Johanna – Santiago 220kV line

2. **Refer to the Section E.1 of the area report for more details.Off Peak Deliverability Assessment**

   For off-peak condition studies, see Section D.1.1. Table D.2 and Section D.1.3 Table D.4 in the Area Report.

3. **Required Mitigations**

   The following Reliability and Local Network Upgrades are required:

   - Upgrade Johanna-Santiago No. 1& No. 2 220kV line to match conductor rating (2B-1590).
   - Loop-In TOT702-Santiago 220kV Line into Johanna Substation to form TOT702 – Johanna 220kV line and Johanna – Santiago #2 220kV line.
   - Implement Johanna Area SPS

I. 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.

J. 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)[2] 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[3] 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.

K. SCE Technical Requirements

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.

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

L. Environmental Evaluation, Permitting, and Licensing

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

M. Affected Systems Coordination

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

N. Items not covered in this study

1. Conceptual Plan of Service

[2] Transmission Plan Deliverability: Deliverability supported by the CAISO's Transmission Plan

[3] 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: [redacted]

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).

   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.

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 # WDT1188

	NU Total Cost (2014 $k)	Project Allocation(%)	Allocated Cost (2014 $k)	Allocated Cost (Escalated $k)
= LDNU				
[redacted]Loop-in: Loop in Q1080 -[redacted] [redacted]#1 & #2 terminal equipment	$7,954	2.68%	$213	$244
One-time costs associated with [redacted]line upgrades	$70	1.98%	$1	$2
One-time costs associated with [redacted]loop-in	$35	2.68%	$1	$2
Upgrade[redacted]and No.2 220kV transmission lines:Upgrade transmission lines to match[redacted]g	$16,581	1.98%	$328	$375
LDNU Total			**$543**	**$623**
= RNU				
[redacted]upgrade	$8,253	0.70%	$58	$67
Ground grid study to support SCD mitigation	$35	100.00%	$35	$41
[redacted]	$2,052	1.70%	$35	$40
RNU Total			**$128**	**$148**
Grand Total			**$671**	**$771**

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

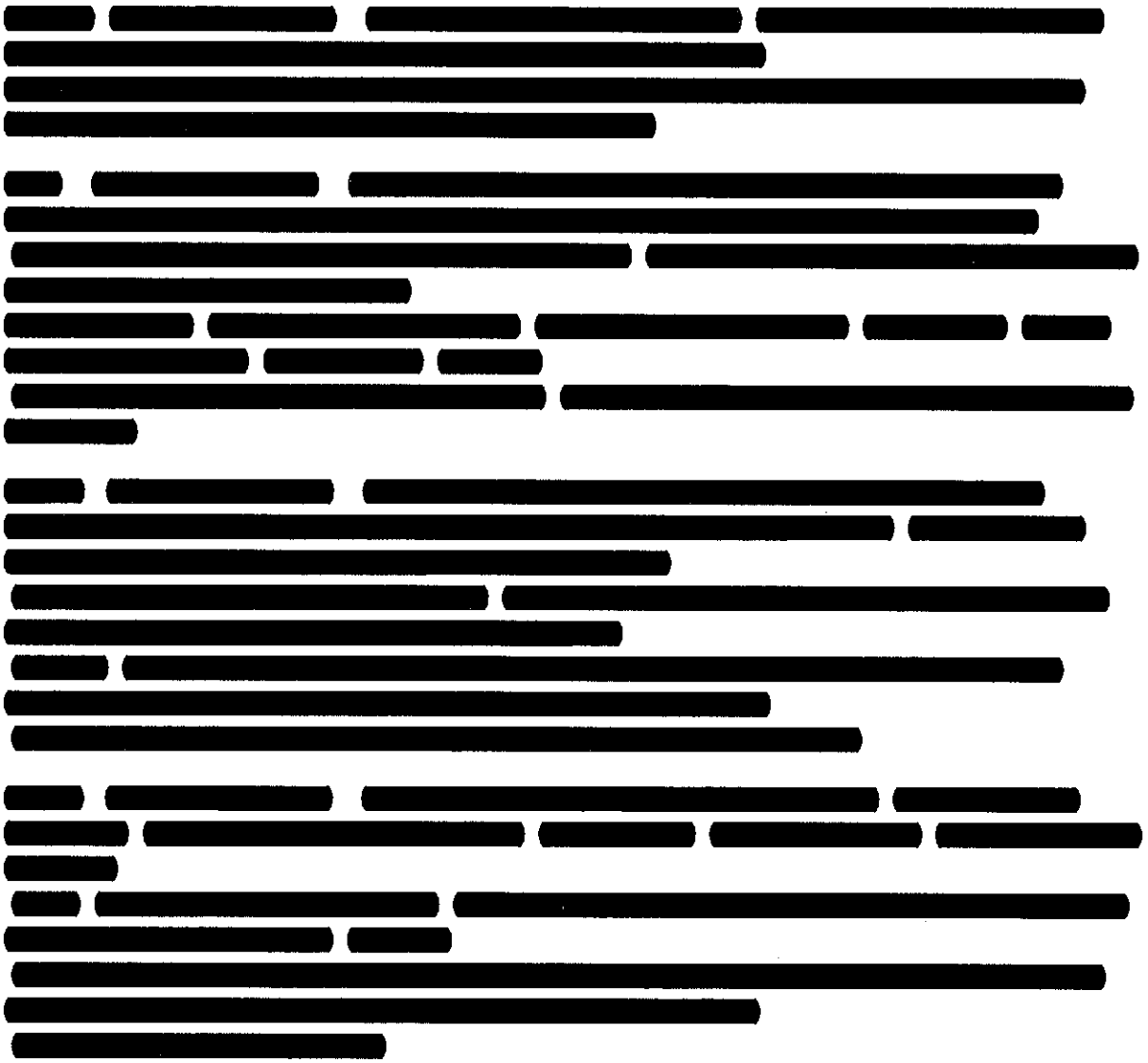
Short Circuit Calculation Study Results

Please refer to the Appendix H of the Bulk Area Report.

Attachment 6

Customer Provided Project Dynamic Data

The following data was submitted by the IC for Dynamic simulation:



Attachment 7

Not Used.

Attachment 8

Subtransmission Area Report for Generation Reliability Study

Please refer to separate document.

Queue Cluster 7 Phase I - Attachment 1

[redacted]

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[1].

1. Interconnection Facilities.

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

(i) [redacted]

(ii) Install a new underground 0.2 mile 66kV generation tie-line from the Generating Facility to a position designated by the Distribution Provider, outside of the Distribution Provider's [redacted] Substation, where Interconnection Customer shall install an above ground structure designed and engineered in accordance with the Distribution Provider's specifications ("Last Structure"). This generation tie-line will be referred to as the [redacted] 66kV Line. The right-of-way for [redacted] 66kV Line shall extend up to the edge of the [redacted] Substation property line.

(Note: The [redacted] 66kV Line name is subject to change by the Distribution Provider based upon its transmission line naming criteria. Should the [redacted] 66kV Line name be changed, [redacted] GIA may be amended to reflect such change.)

(iii) Install fiber optic cable on [redacted] 66kV Line to a point designated by the Distribution Provider near the Distribution Provider's [redacted] Substation to provide one of two telecommunication paths required for the line protection scheme, and the Remote Terminal Units ("RTU"). A minimum of eight (8) strands within the fiber optic cable shall be provided for the Distribution Provider's exclusive use into [redacted] Substation.

(iv) Install appropriate fiber optic cable from the Generating Facility to a point designated by the Distribution Provider near the Distribution Provider's [redacted] Substation to provide the second telecommunication path required for the line protection scheme. A minimum of eight (8) strands

[1] 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.

within the fiber optic cable shall be provided for the Distribution Provider's exclusive use. The telecommunication path shall meet the Applicable Reliability Standards criteria for diversity.

(v) Own, operate and maintain both telecommunication paths (including the fiber optic cables and appurtenant facilities), with the exception of the terminal equipment at both [redacted] Substation and at the Generating Facility, which terminal equipment will be installed, owned, operated and maintained by the Distribution Provider.

(vi) Allow the Distribution Provider to review the Interconnection Customer's telecommunication equipment design and perform inspections to ensure compatibility with the Distribution Provider's terminal equipment and protection engineering requirements; 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.

(vii) 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 in accordance with the Interconnection Handbook.

(viii) 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 telecommunications terminal equipment in accordance with the Interconnection Handbook.

(ix) Extend the fiber optic cables for the two telecommunication paths to an Interconnection Customer provided and installed patch panel located adjacent to the Distribution Provider's telecommunications terminal equipment specified above.

(x) Install all required CAISO-approved compliant metering equipment at the Generating Facility, in accordance with Section 10 of the CAISO Tariff.

(xi) Install a revenue metering cabinet and revenue metering equipment (typically, voltage and current transformers) at the Generating Facility to meter the Facility retail load, as specified by the Distribution Provider. The metering cabinet must be placed at a location that would allow twenty-four hour access for the Distribution Provider's metering personnel.

(xii) Allow the Distribution Provider to install, in the revenue metering cabinet provided by the Interconnection Customer, revenue meters and appurtenant equipment required to meter the retail load at the Generating Facility.

(xiii) Install relay protection to be specified by the Distribution Provider to match the relay protection used by the Distribution Provider at [redacted] Substation, in order to protect the WDT1188 – [redacted] 66kV Line, as follows:

1. Two (2) current differential relays connected via diversely routed dedicated digital communication channels to Johanna Substation. The make and type of current differential relays will be specified by

the Distribution Provider during final engineering of the Distribution Provider's Interconnection Facilities.

(xiv) Install disconnect facilities in accordance with the Distribution Provider's Interconnection Handbook to comply with the Distribution Provider's switching and tagging procedures.

(xv) Install necessary relays and satellite clock to support the SPS requirements for the Generating Facility. The make and type of SPS relays and satellite clock will be specified by the Distribution Provider during final engineering of the Distribution Provider's Interconnection Facilities.

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

(i) **Johanna Substation.**

1. Install the interconnection facilities portion for a new 66kV position to terminate the [redacted] 66kV Line. This work includes the following:
   a. One (1) dead-end substation structure.
   b. Three (3) 66kV voltage transformers with steel pedestal support structures.
   c. One (1) 66kV line drop.
2. Install the following relays to protect the [redacted] 66kV Line:
   a. Two (2) current differential relays connected via diversely routed dedicated digital communications channels to the Generating Facility.

(ii) **WDT1188 – [redacted] 66kV Line.**

Install an appropriate number of 66kV sub-transmission structures including insulator/hardware assemblies between the Last Structure and the dead-end substation structure at [redacted] Substation. The actual number and location of the sub-transmission structures and spans of conductor will be determined by the Distribution Provider following completion of final engineering of the Distribution Provider's Interconnection Facilities. The Phase I Interconnection Study assumed two (2) tubular steel pole (TSP) risers, three (3) vaults, and approximately 12,000 ft. of 1750 kcmil aluminum of conductor.

(iii) **Telecommunications.**

1. Install all required lightwave, channel, and associated equipment (including terminal equipment), supporting protection, SPS and SCADA requirements at the Generating Facility and [redacted] Substation for the interconnection of the Generating Facility. Notwithstanding that certain telecommunication equipment, including

the telecommunications terminal 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.

2. Install appropriate length of fiber optic cable, including conduit and vaults, from the point designated by the Distribution Provider near the Distribution Provider's [redacted] Substation to extend the fiber optic cable into the communication room at [redacted] Substation. The actual location and length of fiber optic cable and conduit, and location and number of vaults, will be determined during final engineering of the Distribution Provider's Interconnection Facilities.
3. Install appropriate length of fiber optic cable, including conduit and vaults, to extend the Interconnection Customer's diverse telecommunications from the point designated by the Distribution Provider near the Distribution Provider's [redacted] Substation into the communication room at [redacted] Substation. The actual location and length of fiber optic cable and conduit, and location and number of vaults, will be determined during final engineering of the Distribution Provider's Interconnection Facilities.

(iv) **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 for the WDT1188 - [redacted] 66kV Line.

(v) **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.

(vi) **Power System Control.**
Install one (1) RTU at the Generating Facility to monitor typical battery storage 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.

Interconnection Facilities, Network Upgrades and Distribution Upgrades

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]
Install six (6) G.E. N60 logic processing relays successor to send additional tripping signals to the generation project.

b. [redacted]
Install two (2) G.E. N60 logic processing relays to send additional tripping signals to the generation project.

c. **Telecommunication.**
Install required Lighwave, router, channel, CRIAR and associated equipment (including terminal equipment), supporting the SPS requirements.

d. **Power System Controls (PSC).**
Install two (2) RTUs at [redacted] Substation and expand the existing point list at [redacted] Substation to support the new [redacted] Area SPS.

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.

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

1. **Area Delivery Network Upgrades.**
None identified in this Phase I Study.

2. **Local Delivery Network Upgrades.**

a. **Upgrade [redacted] No.1 and No. 2 220kV Transmission Line.**
Refer to Bulk Area Report for scope information and Attachment 2 for associated costs assigned to the Project.

b. [redacted] **220kV Loop-in.**
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]

(i) Install the interconnection facilities portion for a new 66kV position to terminate the [redacted] This work includes the following:
   a. Two (2) 66kV circuit breakers.
   b. Four (4) sets of 66kV disconnect switches.
   c. Extend the 66kV bus.

(b) **Power Systems Controls.**
(i) Points additions to the existing RTU at [redacted] to accommodate new relay, protection, status, and alarm.

(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.**

(a) **WDT1188 – [redacted]6kV Line:** The Point of Change of Ownership shall be the point where the conductors of the WDT1188 – [redacted] 66kV Line are attached to the Last Structure, which will be connected on the side of the Last Structure facing [redacted] Substation. The Interconnection Customer shall own and maintain the Last Structure, the conductors, insulators and jumper loops from such Last Structure to the Interconnection Customer's Facility. The Distribution Provider will own and maintain [redacted] Substation, as well as all circuit breakers, disconnects, relay facilities and metering within [redacted] Substation, together with the line drop, in their entirety, from the Last Structure to [redacted] Substation. The Distribution Provider will own the insulators that are used to attach the Distribution Provider-owned conductors to the Last Structure.

(b) **Telecommunication fiber optic cable:** The Point of Change of Ownership shall be the point where the fiber optic cable for the WDT1188 – [redacted] is attached to the Last Structure.

(c) **Telecommunication diverse fiber optic cable:** The Point of Change of Ownership shall be the point at an Interconnection Customer installed and owned pole located at a position designated by the Distribution Provider outside the Distribution Provider's substation, or a Distribution Provider owned vault, where the Interconnection Customer's fiber optic cable is connected to the Distribution Provider's fiber optic cable.

6. **Point of Interconnection.** The Distribution Provider's [redacted] 66kV Substation at the 66kV bus.

7. **One-Line Diagram of Interconnection to [redacted]6kV Substation.**

Interconnection Facilities, Network Upgrades and Distribution Upgrades