Interconnection Facilities Study

Generation Interconnection

J-Power USA

Orange Grove

Final

May 2, 2008

This study has been completed in coordination with
San Diego Gas & Electric per the Large Generator Interconnection Procedures

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1. Executive Summary

J-Power USA, the Interconnection Customer (IC), proposes to interconnect their 99 MW combustion turbine Orange Grove Project (Orange Grove or Project) to the California Independent System Operator Corporation (CAISO) Controlled Grid. The proposed In-Service Date is April 1, 2009 and the Commercial Operation Date is May 31, 2009. The proposed location of the Project is in San Diego County, California; along Highway 76 (Pala Road), east of Interstate 15. The Point of Interconnection is at the San Diego Gas and Electric (SDG&E) Pala 69 kV Substation. The Project occupies Queue Position #201 in the CAISO Controlled Grid Generation Queue.

CAISO issued an Interconnection System Impact Study (ISIS) Report for this Project on October 22, 2007 which provided an analysis of the system impacts.

SDG&E is the Participating Transmission Owner (PTO). In accordance with FERC's Large Generation Interconnection Procedures (LGIP), the IC, CAISO, and PTO agreed that an Interconnection Facilities Study (IFAS) was required to further study the impacts of the Project and determine the +/- 20 percent cost estimate, detailed work scope, and detailed schedule to construct the facilities necessary to interconnect the Project to the CAISO Controlled Grid. This IFAS was performed by the PTO under the direction of the CAISO. The IFAS:

A. Conducted additional power flow analyses to determine in which year the TL 683, Rincon-Lilac, upgrade is needed.

B. Re-examined transient stability with revised data provided by the IC.

C. Determined the impact the higher-queued project (Queue Position #173, 49.9 MW connected to the Pala 69 kV Substation) has on the upgrades required by the Orange Grove Project and what would be maximum funding exposure of the Orange Grove Project.

D. Determined +/- 20 percent accuracy cost estimates, detailed work scope, and detailed construction schedule for the Interconnection Facilities and Network Upgrades necessary to interconnect the Project to the CAISO Controlled Grid at full output.

There are three likely scenarios associated with the higher-queued project, Q173. These scenarios were modeled to determine the impact of Q173's timing, when the TL 683 upgrade is needed, and how the updated dynamic model affected the transient stability simulations. The upgrades for these scenarios were identified:

A. Orange Grove Interconnects After Q173

Per the LGIP, the ISIS used this methodology to model all higher-queued projects and dispatch the generators to simulate stressed conditions. No Reliability Network Upgrades will be required in this case, but there will be Delivery Network Upgrades. The other scenarios are compared to this scenario.

B. Orange Grove Interconnects Before Q173

If Q173 delays its In-Service Date beyond Orange Grove's In-Service Date, the Orange Grove Project will be responsible for additional costs for PTO's Interconnection Facilities and Reliability Network Upgrades.

C. Q173 Withdraws from the Queue

If Q173 withdraws from the Queue, the Orange Grove Project will be responsible for additional upgrades. The PTO's Interconnection Facilities and the Reliability Network Upgrades required will be the same as if Orange Grove interconnects before Q173 but the Delivery Network Upgrades will be fewer.

The estimated cost and time to construct for the Interconnection Facilities and Network Upgrades for each scenario studied are shown in Tables 1.1, 1.2, and 1.3.

Table 1.1: +/-20% Estimated Cost and Estimated Time to Construct
Orange Grove Interconnects After Q173

Type of Upgrade	Location	Description	Estimated Cost x 1,000[1]	Estimated Time to Construct[2]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in an existing line position • Vault outside of Pala Substation fence • Trench and install 150' of 6-6" conduit from termination stand to vault (the IC requested 3-6" spare conduit) • 150' per phase of cable from the termination stand to vault	$1,468	10 Months
Reliability Network Upgrades	None	None	$0	0
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	$13,341	11-19 Months[3]
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	$361	10 Months
	TL 691B (Monserate-Avocado Tap)	• Change relay settings at Monserate	$5	1 Month
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[4]	$350	10 Months
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	$57	10 Months
	TL 683 (Rincon-Lilac)	• Temporary SPS to prevent overload of TL 683 • Monitor TL 683 • If TL 683 exceeds rating • Trip TL 682 (Warners-Rincon) • SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform IC to reduce generation	$57	10 Months
Total			**$15,639**	**11-19 Months**

[1] All costs estimates are +/-20% estimates in "as year spent" dollars. Taxes, landscaping, walls, gates driveways, CAISO metering, and environmental and licensing costs are not included.
[2] Estimated time to construct includes time for design, equipment procurement, and construction. The estimate excludes time for environmental review and permitting. The time to construct attempts to account for restrictions in coordinating transmission system outages.
[3] For the extensive line reconductor, a range is provided because of the uncertain lead time for materials and anticipated construction restrictions due to outage coordination.
[4] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

Table 1.2: +/-20% Estimated Cost and Estimated Time to Construct
Orange Grove Interconnects Before Q173

Type of Upgrade	Location	Description	Estimated Cost x 1,000[5]	Estimated Time to Construct[6]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated bus for the new 69 kV line position • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in a new line position • Vault outside of Pala Substation fence • Trench and Install 3-6" conduit connecting existing conduit at Pala to vault • 250' per phase of cable from the termination stand to vault	$1,506	10 Months
Reliability Network Upgrades	Pala Substation	• Extend 69 kV Main Bus	$89	10 Month
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	$13,341	11-19 Months[7]
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	$361	10 Months
	TL 691B (Monserate-Avocado Tap)	• Change relay settings at Monserate	$5	1 Month
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.) [8]	$350	10 Months
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	$57	10 Months
	TL 683 (Rincon-Lilac)	• Temporary SPS to prevent overload of TL 683 • Monitor TL 683 • If TL 683 exceeds rating • Trip TL 682 (Warners-Rincon) • SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform IC to reduce generation	$57	10 Months
Total			**$15,766**	**11-19 Months**

[5] All costs estimates are +/-20% estimates in "as year spent" dollars. Taxes, landscaping, walls, gates, driveways, CAISO metering, and environmental and licensing costs are not included.
[6] Estimated time to construct includes time for design, equipment procurement, and construction. The estimate excludes time for environmental review and permitting. The time to construct attempts to account for restrictions in coordinating transmission system outages.
[7] For the extensive line reconductor, a range is provided because of the uncertain lead time for materials and anticipated construction restrictions due to outage coordination.
[8] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

Table 1.3: +/-20% Estimated Cost and Estimated Time to Construct
Q173 Withdraws from the Queue

Type of Upgrade	Location	Description	Estimated Cost x 1,000[9]	Estimated Time to Construct[10]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated bus for the new 69 kV line position • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in a new line position • Vault outside of Pala Substation fence • Trench and Install 3-6" conduit connecting existing conduit at Pala to vault • 250' per phase of cable from the termination stand to vault	$1,506	10 Months
Reliability Network Upgrades	Pala Substation	• Extend 69 kV Main Bus	$89	10 Month
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	$13,341	11-19 Months[11]
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	$361	10 Months
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[12]	$350	10 Months
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	$57	10 Months
Total			**$15,704**	**11-19 Months**

[9] All costs estimates are +/-20% estimates in "as year spent" dollars. Taxes, landscaping, walls, gates, driveways, CAISO metering, and environmental and licensing costs are not included.
[10] Estimated time to construct includes time for design, equipment procurement, and construction. The estimate excludes time for environmental review and permitting. The time to construct attempts to account for restrictions in coordinating transmission system outages.
[11] For the extensive line reconductor, a range is provided because of the uncertain lead time for materials and anticipated construction restrictions due to outage coordination.
[12] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

The construction schedule estimate to design, procure, and construct the facilities typically begins after the execution of the Large Generator Interconnection Agreement (LGIA) and does not include the time required for outage coordination, environmental review, and the permitting processes, if applicable. Required lead times depend on many factors, including whether an exemption(s) from the California Public Utilities Commission's (CPUC's) G.O. 131-D Permit to Construct (PTC) process, can be obtained. For example, absent an exemption, the process of obtaining a PTC could take one to two years, possibly even longer. SDG&E anticipates that the ability to obtain exemptions from the PTC process (in which case an Advice Letter filing with the CPUC should be sufficient for obtaining the CPUC's approval to proceed with construction) will be enhanced if the IC includes the full scope of the transmission and substation additions and upgrades in its application to the lead agency.

The proposed In-Service Date of April 1, 2009 and Commercial Operation Date of May 31, 2009 do not appear to be feasible considering the time needed to complete the LGIA, and construction of the Interconnection Facilities and Network Upgrades (including potential environmental review, permitting, design, procurement, and construction). The IC has the option of expediting the construction schedule by executing an Engineering & Procurement (E&P) Agreement to begin the design and procurement phases for the Interconnection Facilities and Network Upgrades. Per Section 9 of the LGIP, an E&P Agreement may be utilized prior to executing an LGIA. The E&P Agreement authorizes the PTO to commence engineering and procurement of long lead-time items necessary for the interconnection.

The transient stability analysis concluded that the WECC transmission system remained stable for all contingency simulations but there were frequency/voltage deviation violations. The violations were also observed in the pre-project cases at the 69 kV Pala load bus if Q173 is interconnected. The pre-project frequency violation is attributed to Q173 and Q173 would be responsible for mitigation. If Q173 is not interconnected, there were frequency deviation violations at the Orange Grove 69 kV, Orange Grove 13.8 kV, and Pala 69 kV buses. The study was performed with the data provided by the IC which were typical data for this kind of equipment. When and if more accurate data is available, another transient stability analysis must be performed to determine if the IC must mitigate the impact of the generator. If the detailed studies show criteria violations, or if more accurate data is not available, the IC will need to utilize its own equipment protection relays to trip the generators to eliminate frequency and voltage deviation violations on the SDG&E system. The tripping is needed for faults on the Pala 69 kV bus.

This Project does not appear to cause impairment of the tax-exempt status of the interest on Local Furnishing Bonds.

Operating procedures which may include curtailing the output of the Project during planned or forced outages may be required in order to operate reliably. However, identification of the operating procedures is outside the scope of this study.

A Deliverability Assessment still remains to be performed by the CAISO. This assessment will determine the Project's ability to deliver its energy to the CAISO Controlled Grid under peak load conditions. When the Deliverability Assessment is complete, the Project may be responsible for newly identified facility overloads.

2. Detailed Project Information and Point of Interconnection

The Project consists of two combustion turbines with a total output of 99 MW (net output to grid). The proposed location is in San Diego County, California; along Highway 76 (Pala Road), east of Interstate 15.

Due to unforeseen delays in the permitting of the Project, J-Power USA notified the CAISO on February 11, 2008 that the milestone dates will be adjusted as follows:

A. Proposed In-Service Date: April 1, 2009

B. Proposed Trial Operation Date: May 1, 2009

C. Proposed Commercial Operation Date: May 31, 2009

The requested Point of Interconnection is the 69 kV bus at SDG&E's Pala Substation. No alternative Point of Interconnection was identified.

A conceptual one-line diagram of the transmission system in the area of the proposed interconnection is shown in Figure 2.1. Figure 2.2 is a map of the transmission facilities in the vicinity of the Project and Figure 2.3 shows the proposed Project site. See Appendix A for the Proposed General Arrangement and Section View at Pala Substation, Appendix B for the Project Single-Line Diagram, Appendix C for the Project Yard Layout Plan, Appendix D for the Project Conceptual System One-Line, and Appendix E for the Project Plant Control System.

Figure 2.1: Conceptual One-line Diagram of the Transmission System

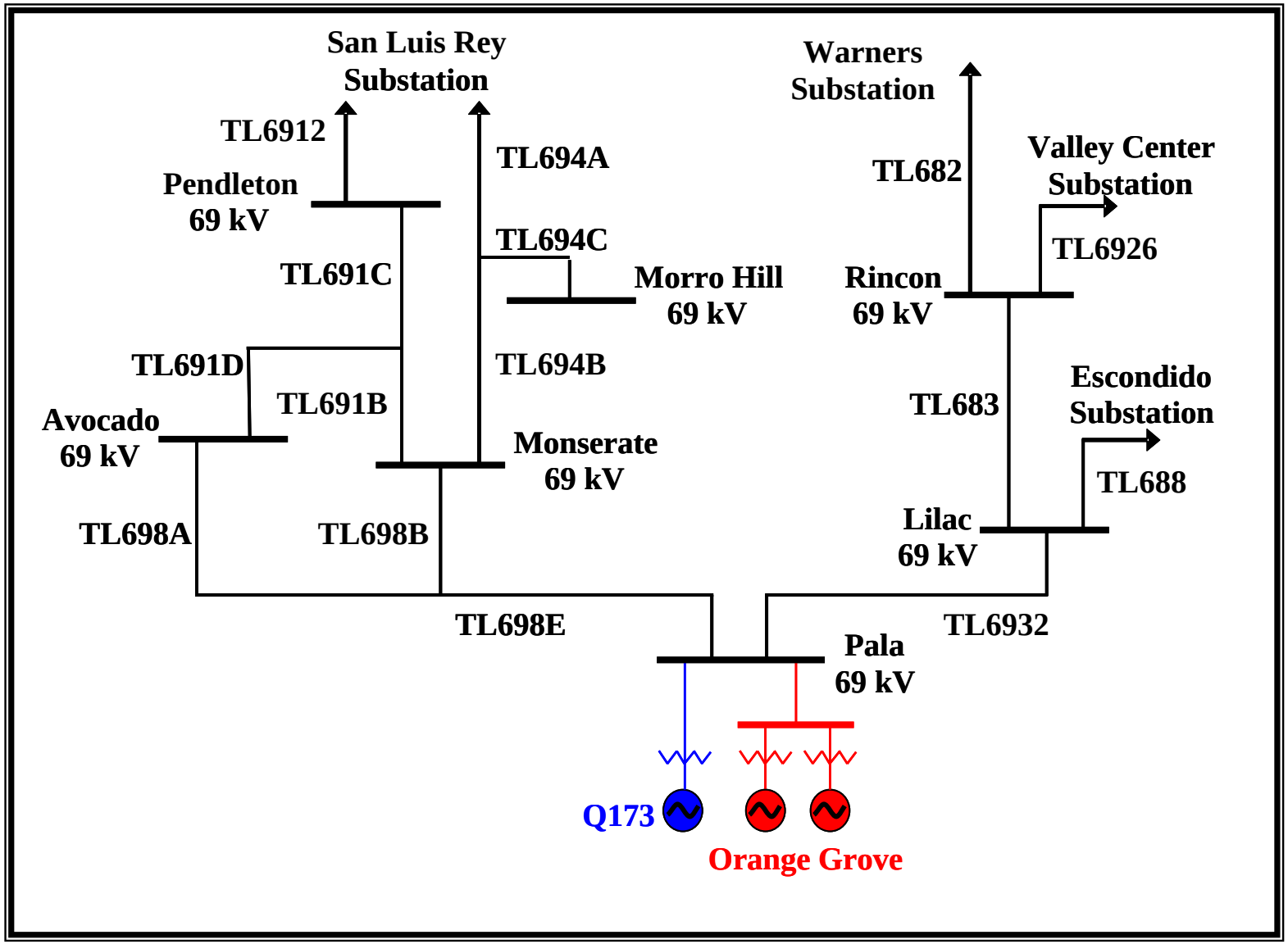


Figure 2.2: Map of Transmission Facilities in the Project Vicinity

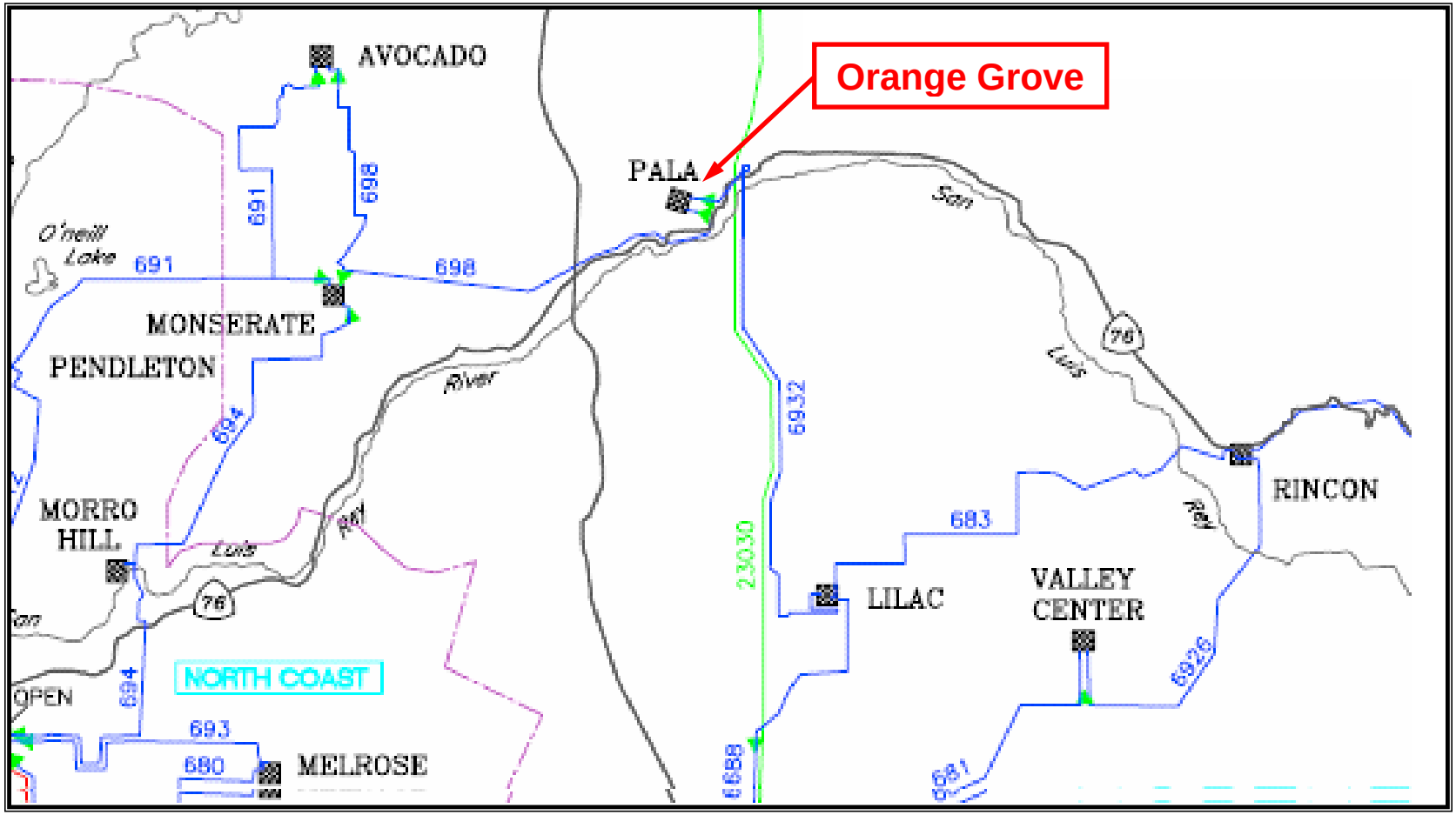
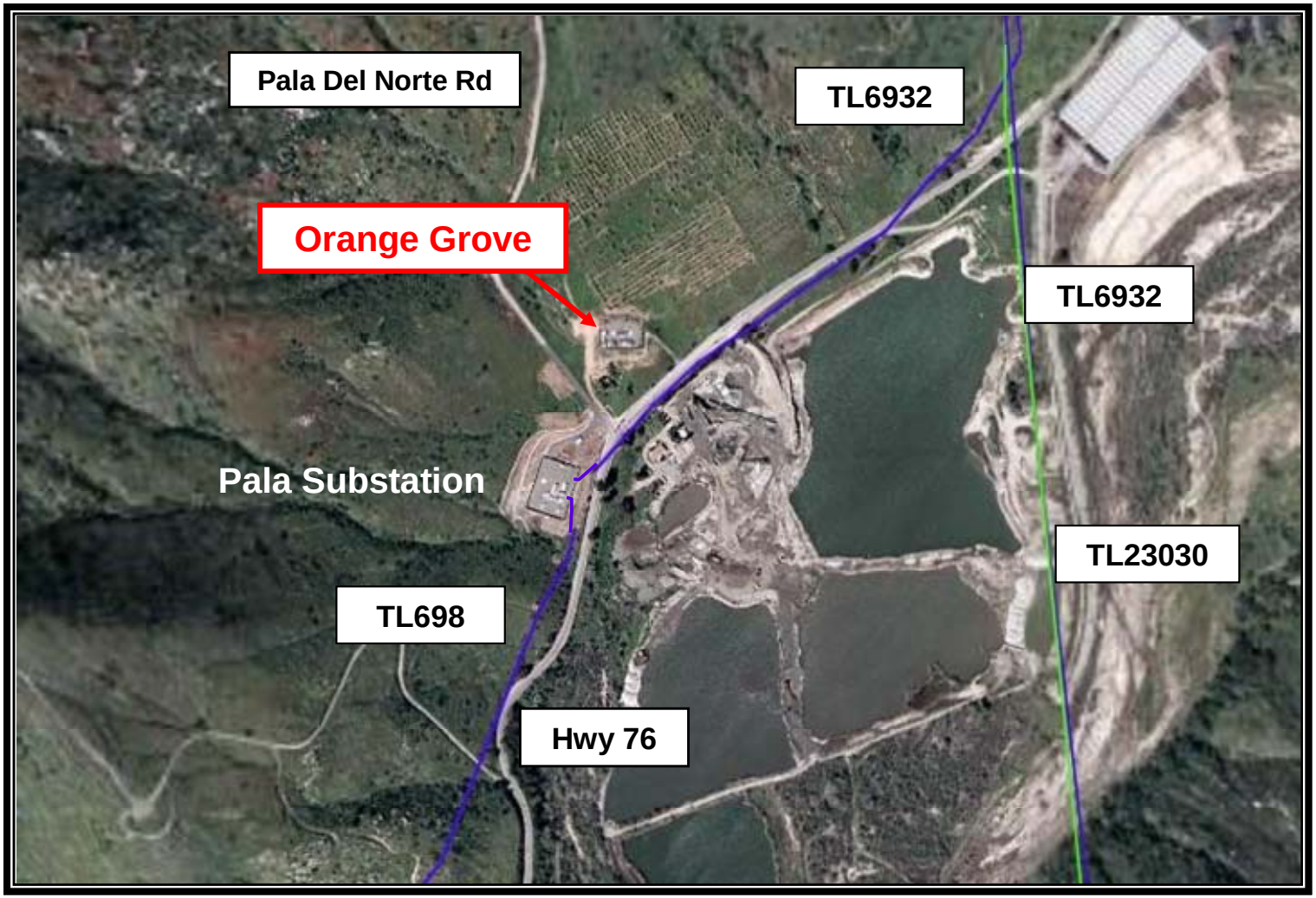


Figure 2.3: Proposed Project Site



3. Summary of Interconnection System Impact Study Results

The Interconnection System Impact Study (ISIS) issued on October 22, 2007 concluded that the addition of the Project at full output would:

A. Cause no facilities to overload for Category A (normal) conditions.

B. Cause six (6) facilities to overload for Category B or C (emergency) conditions:

1. TL 698E (Pala-Monserate Tap)
2. TL 698B (Monserate-Monserate Tap)
3. TL 691B (Monserate-Avocado Tap)
4. TL 6932 (Lilac-Pala)
5. TL 683 (Rincon-Lilac)
6. TL 682 (Warners-Rincon)

C. Cause no voltage limit violations.

D. Cause no overstress of PTO circuit breakers.

E. Cause no impairment of the tax-exempt status of the interest on Local Furnishing Bonds.

F. Cause frequency and voltage deviation violations at the 69 kV Pala load bus but the WECC transmission system would remain stable without any other criteria violations.

The mitigation measures proposed to eliminate the Category B and C overloads were:

A. TL 698E (Pala-Monserate Tap) - Reconductor TL 698E from Pala to Monserate Tap with 636 KCM ACSS and replace the Pala getaways with 3000 KCM Cu.

B. TL 698B (Monserate-Monserate Tap) - Replace the getaways at Monserate with 3000 KCM Cu and reconductor one span to 636 KCM ACSS.

C. TL 691B (Monserate-Avocado Tap) - Increase the relay settings at Monserate.

D. TL 6932 (Lilac-Pala) – Replace the getaways at Pala with 3000 KCM Cu and change relay settings at Lilac and Pala. (An existing project is scheduled to upgrade the other limiting elements on this line by June 2008. If the existing project is canceled, the IC will be responsible for replacing the Lilac breaker.)

E. TL 683 (Rincon-Lilac) – Advance the reconductor of TL 683 from Rincon to Lilac. Further study was needed to establish which year the reconductor is needed. This study showed that the overload might occur as soon as both Q173 and the Orange

Grove projects become operational, which is 2009. A temporary Special Protection System (SPS) may be used until the line is reconductored.

F. TL 682 (Warners-Rincon) – Implement a Special Protection System to monitor TL 682 and initiate tripping of TL 685, Warners-Santa Ysabel, for overload of TL 682. This SPS will be temporary until the line is reconductored.

G. Maximum Output without Delivery Network Upgrades – Limit the Project's generation output to 25 MW to eliminate the need for Delivery Network Upgrades.

The IC may have to implement a protection system which will trip generators for faults on the Pala bus to avoid frequency and voltage deviation violations at the 69 kV Pala load bus. Another transient stability analysis would be conducted when the IC provides revised data.

4. Deliverability Assessment Study Results

A Deliverability Assessment still remains to be performed by the CAISO. This assessment will determine the Project's ability to deliver its energy to the CAISO Controlled Grid under peak load conditions. The Deliverability Assessment will provide:

A. Deliverability Level with no Delivery Network Upgrades

B. Required Delivery Network Upgrades to support 100% Deliverability

CAISO will conduct the Deliverability Assessment in accordance with Sections 3.3.2 and 3.3.3 of the LGIP. For more information about Deliverability Assessment, please refer to http://www.caiso.com/181c/181c902120c80.html.

When the Deliverability Assessment is complete, the Project may be responsible for newly identified facility overloads.

5. Facility Study Assumptions

Under the direction of the CAISO, the PTO performed the additional analyses and provided the +/- 20 percent cost estimate, detailed work scope, and detailed schedule to construct the facilities necessary to interconnect the Project to the CAISO Controlled Grid using the following assumptions:

A. Unless otherwise noted, the assumptions used in the IFAS are the same as those used in the ISIS.

B. The proposed Commercial Operation Date was delayed to May 31, 2009 with an In-Service Date of April 1, 2009. SDG&E and CAISO acknowledge that these dates may not be met if all of the upgrades are to be constructed. However, CAISO and PTO will work with the IC to achieve the interconnection as quickly as possible.

C. Non-coincident peak substation loads for Rincon and Valley Center were used to determine the earliest the reconductor of TL 683, Rincon-Lilac, would be needed.

D. Revised data provided by the IC was used to re-examine the transient stability.

E. Modified scopes of work are provided based on if the project in Queue Position #173:

   1. Delays its In-Service Date beyond Orange Grove's In-Service Date or

   2. Withdraws from the Queue.

F. The PTO will install a vault outside of the Pala Substation fence. The IC will connect its Interconnection Facilities to this vault. The Point of Change of Ownership will be where the IC's cable enters the vault.

G. The IC will engineer, procure, construct, own, and maintain its project facility.

H. This study accounted for the planned generating facilities in PTO's service territory whose schedules are concurrent with or precede the Project's schedule.

6. Facilities Study Scope

This IFAS performed additional analyses to determine the full impact of the Project on the CAISO Controlled Grid. The IFAS also determined the +/- 20% cost estimates, detailed work scope, and detailed schedule to construct facilities for the PTO's Interconnection Facilities and Network Upgrades required to interconnect the Project to the CAISO Controlled Grid.

6.1 Additional Analyses

6.1.1 Steady-State Power Flow

TL 683, Rincon-Lilac, was identified as an overloaded facility in the power flow analysis performed in the ISIS in the 2012 Future Year but not in the 2008 Commercial Operation Date analysis. Additional power flow analyses were performed to determine which year the Project causes the overload of the 69 kV Rincon-Lilac transmission line. The non-coincident peak substation loads for Rincon and Valley Center were used in these power flow cases. This represents the "worst case" for loading on the Rincon-Lilac line with the outage of TL 681, Ash - Ash Tap - Felicita - Valley Center.

6.1.2 Transient Stability

Subsequent to the transient stability analysis performed in the ISIS, the IC provided data to better represent the equipment to be installed. Transient stability analysis with the revised data was performed for the following system contingencies for both the 2008 heavy summer and 2008-09 light winter cases for a study period of 10 seconds:

A. Three-phase fault on Pala 69 kV bus cleared after 6 cycles (no system elements removed post clearing).

B. Three-phase fault on Pala 69 kV bus cleared after 6 cycles by opening Pala-Lilac 69 kV transmission line.

C. Three-phase fault on Pala 69 kV bus cleared after 6 cycles by opening Pala-Monserate-Avocado 69 kV transmission line.

D. Three-phase fault on San Onofre 230 kV bus cleared after 6 cycles by tripping San Onofre units 2 and 3.

E. Three-phase fault on Palomar Energy 230 kV bus cleared after 6 cycles by tripping Palomar Energy units 1, 2, and 3.

F. Three-phase fault on Imperial Valley 500 kV bus cleared after 4 cycles by opening Imperial Valley-Miguel 500 kV transmission line.

6.1.3 Modified Work Scope

There are three likely scenarios associated with the higher-queued project, Q173, that also connects to the Pala Substation. The sequence of which project will be first to interconnect to the Pala Substation or whether Q173 withdraws from the Queue will affect the assignment of transmission upgrades. These scenarios were modeled to determine the impact of Q173 on Orange Grove's upgrades.

A. Orange Grove Interconnects After Q173

   The ISIS results were based on the order of the projects listed in the Queue, Orange Grove interconnecting after Q173. The other scenarios are compared to this.

B. Orange Grove Interconnects Before Q173

   In the event that Orange Grove interconnects to the Pala 69 kV bus before Q173, a modified scope of work for the Interconnection Facilities and the Reliability Network Upgrade is provided.

C. Q173 Withdraws from the Queue

   If Q173 withdraws from the Queue, the scope of work will vary for the Interconnection Facilities, Reliability Network Upgrades, and Delivery Network Upgrades. The scope of work for this scenario is also provided.

6.2 Cost and Time to Construct Estimate

The IFAS provides the +/- 20% accuracy cost estimates, detailed work scope, and detailed schedule to construct facilities for the Interconnection Facilities and Network Upgrades required to interconnect the Project to the CAISO Controlled Grid.

The development of the cost estimates, work scope, and schedule to construct encompasses the following evaluations:

6.2.1 Transmission Line Evaluation

SDG&E's Transmission Engineering group evaluated the proposed interconnection for potential impacts on SDG&E-owned transmission facilities. The evaluation included, but was not limited to, the following:

A. How best to connect the proposed generator in a safe, reliable, and cost-effective manner, while considering future system requirements and operational convenience.

B. The scope of any modifications necessary to accommodate the proposed interconnection.

6.2.2 Substation Evaluation

SDG&E's Substation Engineering group evaluated the proposed interconnection for potential impacts on SDG&E-owned substation facilities. The evaluation included, but was not limited to, the following:

A. How best to connect the proposed generator in a safe, reliable, and cost-effective manner, while considering future system requirements and operational convenience.

B. The scope of any modifications necessary to accommodate the proposed interconnection.

6.2.3 Land and Right-of-Way Evaluation

SDG&E evaluated the scope of the proposed modifications or extensions to SDG&E-owned transmission and substation facilities to determine if any additional land should be acquired.

6.2.4 System Protection Evaluation

SDG&E's System Protection group evaluated the proposed interconnection for potential impacts on the transmission system. The evaluation included, but was not limited to, the following:

A. Coordination with existing system protection philosophy and systems.

B. Development of new System Protection System (SPS), if applicable.

C. Modification to existing SPS, if applicable.

D. Communications requirements.

6.3 Local Furnishing Bonds (specific to SDG&E)

The ISIS determined that this Project does not appear to cause impairment of the tax-exempt status of the interest on Local Furnishing Bonds. Assumptions remained unchanged, so this Project still does not appear to cause impairment of the tax-exempt status of the interest on Local Furnishing Bonds.

7. Interconnection Facilities Study Results

7.1 Steady-State Power Flow Results

The non-coincident peak substation loads for Rincon and Valley Center were used in the heavy summer power flow cases for this IFAS. This modeling determined when the Orange Grove Project would be responsible for upgrading TL 683, Rincon-Lilac. Non-coincident peak loads are the forecasted peak loads at the substation, independent of the SDG&E system peak. Modeling these loads depicted the "worst case" for loading on TL 683 with the outage of TL 681, Ash - Ash Tap - Felicita - Valley Center. Coincident peak substation loads were used in the ISIS analysis and are typically used in SDG&E's cases. These substation loads are those which occur at the same time as SDG&E's system peak and may not represent the "worst case."

Modeling the non-coincident loads in COD 2008 heavy summer resulted in an overload of TL 683. The overload in the 2008 case only occurs when Q173 is also interconnected and generating. Subsequent to the power flow analysis being performed, the IC informed the CAISO that the Commercial Operation Date would be delayed to May 31, 2009. The results will be similar in 2009.

Table 7.1 summarizes the results of the steady-state power flow analysis with the outage of TL 681, Ash - Ash Tap - Felicita - Valley Center. The per unit loading on TL 683 is shown with the coincident and non-coincident peak loads for Rincon and Valley Center, with and without Q173 generating. Power flow plots with Q173 generating at Pala are in Appendix F.

Table 7.1: MVA2 Per Unit Loading on TL 683 with outage of Ash - Ash Tap - Felicita - VC

2008 Heavy Summer			
Scenario	**MVA2**	**Pre-Project**	**Post-Project**
Coincident Substation Peak Load w/Q173	55	0.872	0.978
Coincident Substation Peak Load w/o Q173	55	0.816	0.922
Non-Coincident Substation Peak Loads for Rincon & Valley Center with Q173	55	0.916	1.021
Non-Coincident Substation Peak Loads for Rincon & Valley Center without Q173	55	0.86	0.966

7.2 Transient Stability Study Results

The transient stability analysis was performed with an updated dynamic model provided by the IC (rexs instead of esac7b excitation system). Details of the machine dynamic models are included in Appendix G. The results are the same in this IFAS as the ISIS.

The transmission system was adequately damped and all generators remained synchronized for all transient stability simulations studied. Switching sequences for the transient stability simulations are included in Appendix H.

Frequency deviation violations were observed in both the pre and post-project cases at SDG&E's load bus (Pala 69 kV) and at Q173 13.8 kV generator bus for the three-phase faults on the Pala 69 kV bus in both 2008 heavy summer and 2008-09 light winter conditions. Additional frequency deviation violations were observed in the post-project cases at the Orange Grove 13.8 kV generator bus and voltage deviation violations were observed in the post-project cases at SDG&E's load bus (Pala 69 kV) for the same conditions. The frequency/voltage deviation violations were observed in the local area and did not migrate to adjacent systems. The frequency and voltage violations are shown in Table 7.2. Transient stability analysis results are shown in Appendix I and transient stability plots are shown in Appendix J.

An additional transient stability analysis was performed to determine if the Orange Grove Project would cause any transient stability violations without Q173. Frequency deviation violations were observed in post-project scenarios at the Orange Grove 69 kV, Orange Grove 13.8 kV, and Pala 69 kV buses without Q173 for the three-phase faults on the Pala 69 kV bus in both heavy summer and light winter conditions. The transient stability analysis results without Q173 are shown at the end of Appendix I and transient stability plots are shown at the end of Appendix J.

The transient stability analysis concluded that the WECC transmission system remained stable for all contingency simulations but there are frequency/voltage deviation violations. If Q173 is interconnected, there are frequency and voltage deviation violations at the 69 kV Pala load bus. The violations were also observed at the Pala bus in the pre-project cases. The pre-project frequency violation is attributed to Q173 and Q173 would be responsible for mitigation. If Q173 is not interconnected, there are frequency deviation violations at the Orange Grove 69 kV, Orange Grove 13.8 kV, and Pala 69 kV buses. Whether Q173 is interconnected or not, the IC must implement a protection scheme that will utilize its own equipment protection relays to trip the generators to eliminate frequency and voltage deviation violations on the SDG&E system. The Orange Grove generators need to be tripped for faults at the Pala 69 kV bus

Table 7.2: Transient Stability Frequency and Voltage Violations

Filename	EXTNUM/NAME/BASEKV	TYPE	ID	AREA	ZONE	INITIAL	MIN/MAX	DELTA	PERCDIFF	ATTIME	DURATION (Seconds)	DURATION (Cycles)
08hs-q201-pre-dyn_swt1_pa69	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.138	0.862	1.437	1.254	0.113	6.750
08hs-q201-pre-dyn_swt2_pa-li-tl6932	22623 PA49MW 13.8	fbug	1	22	225	60.000	58.987	1.013	1.689	1.254	0.150	9.000
08hs-q201-pre-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	vbug	1	22	225	0.985	0.663	0.322	32.655	1.179	0.038	2.250
08hs-q201-pre-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	fbug	1	22	225	60.000	58.986	1.014	1.690	1.254	0.150	9.000
08hs-q201-pst-dyn_swt1_pa69	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.061	0.939	1.564	1.254	0.150	9.000
08hs-q201-pst-dyn_swt1_pa69	22624 PALA 69	fbul	1	22	225	60.000	59.399	0.601	1.002	1.292	0.113	6.750
08hs-q201-pst-dyn_swt1_pa69	22627 PA99MW 69	fbus	1	22	225	60.000	59.398	0.602	1.004	1.292	0.113	6.750
08hs-q201-pst-dyn_swt1_pa69	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	59.072	0.928	1.547	1.254	0.188	11.250
08hs-q201-pst-dyn_swt1_pa69	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	59.072	0.928	1.547	1.254	0.188	11.250
08hs-q201-pst-dyn_swt2_pa-li-tl6932	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.066	0.934	1.556	1.329	0.188	11.250
08hs-q201-pst-dyn_swt2_pa-li-tl6932	22624 PALA 69	fbul	1	22	225	60.000	59.195	0.805	1.342	1.329	0.188	11.250
08hs-q201-pst-dyn_swt2_pa-li-tl6932	22627 PA99MW 69	fbus	1	22	225	60.000	59.192	0.808	1.347	1.329	0.188	11.250
08hs-q201-pst-dyn_swt2_pa-li-tl6932	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	58.915	1.085	1.808	1.329	0.188	11.250
08hs-q201-pst-dyn_swt2_pa-li-tl6932	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	58.915	1.085	1.808	1.329	0.188	11.250
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	vbug	1	22	225	1.005	0.699	0.306	30.492	1.217	0.038	2.250
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.062	0.939	1.564	1.329	0.225	13.500
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22624 PALA 69	vbul	1	22	225	1.016	0.696	0.320	31.520	1.217	0.075	4.500
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22624 PALA 69	fbul	1	22	225	60.000	59.226	0.774	1.290	1.329	0.188	11.250
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22627 PA99MW 69	vbus	1	22	225	1.017	0.697	0.320	31.475	1.217	0.075	4.500
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22627 PA99MW 69	fbus	1	22	225	60.000	59.222	0.778	1.297	1.329	0.188	11.250
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	58.936	1.064	1.773	1.329	0.225	13.500
08hs-q201-pst-dyn_swt3_av-mn-pa-tl698	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	58.936	1.064	1.773	1.329	0.225	13.500
08lw-q201-pre-dyn_swt2_pa-li-tl6932	22623 PA49MW 13.8	fbug	1	22	225	60.000	58.941	1.059	1.764	1.254	0.150	9.000
08lw-q201-pre-dyn_swt2_pa-li-tl6932	22624 PALA 69	fbul	1	22	225	60.000	59.398	0.602	1.003	1.254	0.113	6.750
08lw-q201-pre-dyn_swt2_pa-li-tl6932	22627 PA99MW 69	fbus	1	22	225	60.000	59.398	0.602	1.003	1.254	0.113	6.750
08lw-q201-pre-dyn_swt2_pa-li-tl6932	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	59.398	0.602	1.003	1.254	0.113	6.750
08lw-q201-pre-dyn_swt2_pa-li-tl6932	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	59.398	0.602	1.003	1.254	0.113	6.750
08lw-q201-pre-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	fbug	1	22	225	60.000	58.973	1.027	1.711	1.254	0.113	6.750
08lw-q201-pst-dyn_swt1_pa69	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.042	0.958	1.597	1.254	0.150	9.000
08lw-q201-pst-dyn_swt1_pa69	22624 PALA 69	fbul	1	22	225	60.000	59.408	0.592	0.987	1.292	0.113	6.750
08lw-q201-pst-dyn_swt1_pa69	22627 PA99MW 69	fbus	1	22	225	60.000	59.407	0.593	0.989	1.292	0.113	6.750
08lw-q201-pst-dyn_swt1_pa69	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	59.080	0.920	1.534	1.254	0.150	9.000
08lw-q201-pst-dyn_swt1_pa69	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	59.080	0.920	1.534	1.254	0.150	9.000
08lw-q201-pst-dyn_swt2_pa-li-tl6932	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.066	0.934	1.556	1.292	0.225	13.500
08lw-q201-pst-dyn_swt2_pa-li-tl6932	22624 PALA 69	fbul	1	22	225	60.000	59.194	0.806	1.344	1.329	0.188	11.250
08lw-q201-pst-dyn_swt2_pa-li-tl6932	22627 PA99MW 69	fbus	1	22	225	60.000	59.191	0.809	1.349	1.329	0.188	11.250
08lw-q201-pst-dyn_swt2_pa-li-tl6932	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	58.913	1.087	1.811	1.329	0.188	11.250
08lw-q201-pst-dyn_swt2_pa-li-tl6932	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	58.913	1.087	1.811	1.329	0.188	11.250

Table 7.2: Transient Stability Frequency and Voltage Violations (continued)

Filename	EXTNUM/NAME/BASEKV	TYPE	ID	AREA	ZONE	INITIAL	MIN/MAX	DELTA	PERCDIFF	ATTIME	DURATION (Seconds)	DURATION (Cycles)
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	vbug	1	22	225	1.023	0.713	0.310	30.312	1.217	0.038	2.250
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22623 PA49MW 13.8	fbug	1	22	225	60.000	59.076	0.924	1.540	1.292	0.225	13.500
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22624 PALA 69	vbul	1	22	225	1.041	0.718	0.323	31.028	1.217	0.075	4.500
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22624 PALA 69	fbul	1	22	225	60.000	59.229	0.771	1.285	1.329	0.188	11.250
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22627 PA99MW 69	vbus	1	22	225	1.041	0.719	0.323	30.984	1.217	0.075	4.500
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22627 PA99MW 69	fbus	1	22	225	60.000	59.226	0.774	1.290	1.329	0.188	11.250
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22628 PA99MWQ1 13.8	fbug	1	22	225	60.000	58.939	1.061	1.769	1.329	0.188	11.250
08lw-q201-pst-dyn_swt3_av-mn-pa-tl698	22629 PA99MWQ2 13.8	fbug	1	22	225	60.000	58.939	1.061	1.769	1.329	0.188	11.250

7.3 Modified Work Scope

Per the LGIP, the results in the ISIS were presented based on the order of the projects listed in the Queue. This methodology does not provide the IC with enough information about likely scenarios impacting the upgrades that may be the responsibility of the Project. The scopes of work for three scenarios are presented:

A. Orange Grove interconnects after Q173

B. Orange Grove interconnects before Q173

C. Q173 withdraws from the Queue

7.3.1 Orange Grove Interconnects After Q173

Per the LGIP, the ISIS used this methodology to model all higher-queued projects and dispatch the generators to simulate stressed conditions (Queue Study). The only higher-queued project which significantly impacts Orange Grove is Q173. Q173 is assumed to be interconnected to the Pala 69 kV bus at the time when the Orange Grove Project interconnects.

A. PTO's Interconnection Facilities

1. Install 69 kV circuit breaker

2. Install associated control and protection panels for the line position and add RTU points for control, monitoring, and alarming

3. Install underground cable termination and bus support stands and two 2000 amp disconnects in an existing line position

4. Install vault outside of Pala Substation fence

5. Trench and install 150' of 6-6" conduit from termination stand to vault (the IC requested 3-6" spare conduit)

6. Install 150' per phase of cable from the termination stand to vault

B. Reliability Network Upgrades

No Reliability Network Upgrades are attributed to the Orange Grove Project if Q173 is already interconnected.

C. Delivery Network Upgrades

1. TL 698E (Pala-Monserate Tap) - Reconductor TL 698E from Pala to Monserate Tap with 636 ACSS/AW, replace the Pala getaways with 3000 kcmil Cu, and change relay settings at Pala.

2. TL 698B (Monserate-Monserate Tap) - Replace Monserate getaways with 3000 kcmil Cu, reconductor one span to 636 ACSS/AW, and change relay settings at Monserate.

3. TL 691B (Monserate-Avocado Tap) - Change relay settings at Monserate.

4. TL 6932 (Lilac-Pala) - Replace the Pala getaways with 3000 kcmil Cu and change the relay settings at Lilac and Pala. (An existing project is scheduled to upgrade the other limiting elements on this line by June 2008. If the existing project is canceled, the IC will be responsible for replacing the Lilac breaker.)

5. TL 683 (Rincon-Lilac)

    a. Reconductor TL 683 from Rincon to Lilac with 636 ACSR/AW and change relay settings at Rincon and Lilac. Due to the length of time required to for this reconductor, a temporary Special Protection System (SPS) is recommended. SDG&E will investigate alternatives to the reconductor – evaluating reliability, cost, and future growth in the area.

    b. In lieu of the reconductor, implement a temporary SPS at Rincon to monitor TL 683 and initiate tripping of TL 682, Warners-Rincon, for overload of TL 683. SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform the IC to reduce generation. The use of this SPS should be temporary, until it is determined when the line needs reconductoring and the reconductoring is completed. The use of SPS might degrade the system reliability and it might not be sufficient when the load in the area increases. The final design of the SPS will be determined by SDG&E Operations and the CAISO Operations.

6. TL 682 (Warners-Rincon) – Implement an SPS at Warners to monitor TL 682 and initiate tripping of TL 685, Warners-Santa Ysabel, for overload of TL 682. SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation. The SPS should be temporary until the line is reconductored.

7. Maximum Output without Delivery Network Upgrades – Limit the Project's generation output to 25 MW to eliminate the need for Delivery Network Upgrades. The most limiting outage is the Lilac – Pala 69 kV line that might cause overload on the Pala-Monserate Tap 69 kV line.

7.3.2 Orange Grove Interconnects Before Q173

If the higher-queued project, Queue Position #173, delays its In-Service Date beyond Orange Grove's In-Service Date, the Orange Grove Project will be responsible for additional PTO's Interconnection Facilities and Reliability Network Upgrades but the Delivery Network Upgrades will be the same if Orange Grove interconnects after Q173:

A. PTO's Interconnection Facilities

1. Install 69 kV circuit breaker

2. Install associated bus for the new 69 kV line position

3. Install associated control and protection panels for the line position and add RTU points for control, monitoring, and alarming

4. Install underground cable termination and bus support stands and two 2000 amp disconnects in a new line position

5. Install vault outside of Pala Substation fence

6. Trench and install 3-6" conduit connecting existing conduit at Pala Substation fence to vault

7. Install 250' per phase of cable from the termination stand to vault (will use existing conduit from the termination stand to the Pala Substation fence and new conduit from the fence to the vault)

B. Reliability Network Upgrades

Bus supports and material to extend the 69 kV Main Bus to provide two more line positions

C. Delivery Network Upgrades

1. TL 698E (Pala-Monserate Tap) - Reconductor TL 698E from Pala to Monserate Tap with 636 ACSS/AW, replace the Pala getaways with 3000 kcmil Cu, and change relay settings at Pala.

2. TL 698B (Monserate-Monserate Tap) - Replace Monserate getaways with 3000 kcmil Cu, reconductor one span to 636 ACSS/AW, and change relay settings at Monserate.

3. TL 691B (Monserate-Avocado Tap) - Change relay settings at Monserate.

4. TL 6932 (Lilac-Pala) - Replace the Pala getaways with 3000 kcmil Cu and change the relay settings at Lilac and Pala. (An existing project is scheduled to upgrade the other limiting elements on this line by June 2008. If the existing project is canceled, the IC will be responsible for replacing the Lilac breaker.)

5. TL 683 (Rincon-Lilac)

   a. Reconductor TL 683 from Rincon to Lilac with 636 ACSR/AW and change relay settings at Rincon and Lilac. Due to the length of time required to for this reconductor, a temporary Special Protection System (SPS) is recommended. SDG&E will

investigate alternatives to the reconductor – evaluating reliability, cost, and future growth in the area.

b. In lieu of the reconductor, implement a temporary SPS at Rincon to monitor TL 683 and initiate tripping of TL 682, Warners-Rincon, for overload of TL 683. SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform the IC to reduce generation. The use of this SPS should be temporary, until it is determined when the line needs reconductoring and the reconductoring is completed. The use of SPS might degrade the system reliability and it might not be sufficient when the load in the area increases. The final design of the SPS will be determined by SDG&E Operations and the CAISO Operations.

6. TL 682 (Warners-Rincon) – Implement an SPS at Warners to monitor TL 682 and initiate tripping of TL 685, Warners-Santa Ysabel, for overload of TL 682. SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation. The use of SPS should be temporary until the line is reconductored.

7. Maximum Output without Delivery Network Upgrades – Limit the Project's generation output to 25 MW to eliminate the need for Delivery Network Upgrades. The most limiting outage is the Lilac – Pala 69 kV line that might cause overload on the Pala-Monserate Tap 69 kV line.

7.3.3 Q173 Withdraws From the Queue

If Q173 withdraws from the Queue, the Orange Grove Project will be responsible for additional upgrades. The PTO's Interconnection Facilities and the Reliability Network Upgrades required will be the same as if Orange Grove interconnects before Q173 but the Delivery Network Upgrades will be fewer:

A. PTO's Interconnection Facilities

1. Install 69 kV circuit breaker

2. Install associated bus for the new 69 kV line position

3. Install associated control and protection panels for the line position and add RTU points for control, monitoring, and alarming

4. Install underground cable termination and bus support stands and two 2000 amp disconnects in a new line position

5. Install vault outside of Pala Substation fence

6. Trench and install 3-6" conduit connecting existing conduit at Pala Substation fence to vault

7. Install 250' per phase of cable from the termination stand to vault (will use existing conduit from the termination stand to the Pala Substation fence and new conduit from the fence to the vault)

B. Reliability Network Upgrades

Bus supports and material to extend the 69 kV Main Bus to provide two more line positions

C. Delivery Network Upgrades

1. TL 698E (Pala-Monserate Tap) - Reconductor TL 698E from Pala to Monserate Tap with 636 ACSS/AW, replace the Pala getaways with 3000 kcmil Cu, and change relay settings at Pala.

2. TL 698B (Monserate-Monserate Tap) - Replace Monserate getaways with 3000 kcmil Cu, reconductor one span to 636 ACSS/AW, and change relay settings at Monserate.

3. TL 6932 (Lilac-Pala) - Replace the Pala getaways with 3000 kcmil Cu and change the relay settings at Lilac and Pala. (An existing project is scheduled to upgrade the other limiting elements on this line by June 2008. If the existing project is canceled, the IC will be responsible for replacing the Lilac breaker.)

4. TL 682 (Warners-Rincon) – Implement an SPS at Warners to monitor TL 682 and initiate tripping of TL 685, Warners-Santa Ysabel, for overload of TL 682. SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation.

5. Maximum Output without Delivery Network Upgrades – Limit the Project's generation output to 77 MW to eliminate the need for Delivery Network Upgrades. The most limiting outage is the Lilac – Pala 69 kV line that might cause overload on the Pala-Monserate Tap 69 kV line.

8. Estimated Costs

All costs provided are estimates based on necessary facilities identified in the Interconnection System Impact Study and this IFAS for a Commercial Operation Date of May 31, 2009. Charges for implementing the interconnection of the Project will be made based upon the actual costs incurred. Cost estimates developed within this study are considered to be +/- 20% accurate and include the following assumptions:

A. Project concepts are based on representations from the Interconnection Customer.

B. Project concepts are based on mandatory reliability criteria from applicable reliability and regulatory authorities (NERC, WECC, and CAISO).

C. Project concepts are based on sound engineering judgment.

D. All costs are based on SDG&E construction methods and techniques.

E. All costs are in “as year spent” dollars.

F. All costs included in this report are valid for 90 days only.

Table 8.1 summarizes the scope of transmission reinforcements and the associated +/- 20% cost of construction of the facilities identified in the interconnection studies assuming Orange Grove interconnects after Q173. Table 8.2 summarizes the costs assuming Orange Grove interconnects before Q173. Table 8.3 summarizes the costs assuming Q173 withdraws from the Queue. The cost estimates for reconductoring of the Lilac-Rincon and Rincon-Warners 69 kV transmission lines are not provided. It was assumed that temporary SPSs will be used instead of the reconductoring.

Table 8.1: +/-20% Cost Estimate Summary – Orange Grove Interconnects After Q173

Type of Upgrade	Location	Description	Estimated Cost x 1,000[13]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in an existing line position • Vault outside of Pala Substation fence • Trench and install 150' of 6-6" conduit from termination stand to vault (the IC requested 3-6" spare conduit) • 150' per phase of cable from the termination stand to vault	$1,468
Reliability Network Upgrades	None	None	$0
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	$13,341
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	$361
	TL 691B (Monserate-Avocado Tap)	• Change relay settings at Monserate	$5
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[14]	$350
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	$57
	TL 683 (Rincon-Lilac)	• Temporary SPS to prevent overload of TL 683 • Monitor TL 683 • If TL 683 exceeds rating • Trip TL 682 (Warners-Rincon) • SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform IC to reduce generation	$57
Total			**$15,639**

[13] All costs estimates are +/-20% estimates in "as year spent" dollars. Taxes, landscaping, walls, gates, driveways, CAISO metering, and environmental and licensing costs are not included.
[14] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

Table 8.2: +/-20% Cost Estimate Summary - Orange Grove Interconnects Before Q173

Type of Upgrade	Location	Description	Estimated Cost x 1,000[15]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated bus for the new 69 kV line position • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in a new line position • Vault outside of Pala Substation fence • Trench and Install 3-6" conduit connecting existing conduit at Pala to vault • 250' per phase of cable from the termination stand to vault	$1,506
Reliability Network Upgrades	Pala Substation	• Extend 69 kV Main Bus	$89
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	$13,341
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	$361
	TL 691B (Monserate-Avocado Tap)	• Change relay settings at Monserate	$5
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[16]	$350
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	$57
	TL 683 (Rincon-Lilac)	• Temporary SPS to prevent overload of TL 683 • Monitor TL 683 • If TL 683 exceeds rating • Trip TL 682 (Warners-Rincon) • SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform IC to reduce generation	$57
Total			**$15,766**

[15] All costs estimates are +/-20% estimates in "as year spent" dollars. Taxes, landscaping, walls, gates, driveways, CAISO metering, and environmental and licensing costs are not included.
[16] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

Table 8.3: +/-20% Cost Estimate Summary - Q173 Withdraws from the Queue

Type of Upgrade	Location	Description	Estimated Cost x 1,000[17]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated bus for the new 69 kV line position • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in a new line position • Vault outside of Pala Substation fence • Trench and Install 3-6" conduit connecting existing conduit at Pala to vault • 250' per phase of cable from the termination stand to vault	$1,506
Reliability Network Upgrades	Pala Substation	• Extend 69 kV Main Bus	$89
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	$13,341
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	$361
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[18]	$350
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	$57
Total			**$15,704**

[17] All costs estimates are +/-20% estimates in "as year spent" dollars. Taxes, landscaping, walls, gates, driveways, CAISO metering, and environmental and licensing costs are not included.
[18] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

8.1 Participating TO's Interconnection Facilities

The cost estimate for the PTO's Interconnection Facilities includes any substation and transmission line facilities required to interconnect the Orange Grove Project. The estimate does not include any facilities constructed, owned, and operated by the IC.

The PTO's Interconnection Facilities are all the facilities and equipment owned, controlled, or operated by SDG&E from the Point of Interconnection to the Point of Change of Ownership (see Figure 8.1). The Point of Interconnection is the 69 kV bus at the SDG&E Pala Substation. The Point of Change of Ownership is at the new vault located outside of the Pala Substation fence - specifically, where the IC's cable enters the vault.

A. Orange Grove Interconnects After Q173

The following PTO's Interconnection Facilities are needed to interconnect the Orange Grove Project to the Pala 69 kV bus via underground facilities, based on Q173 already interconnected to Pala Substation:

1. Install 69 kV circuit breaker
2. Install associated control and protection panels for the line position and add RTU points for control, monitoring, and alarming
3. Install underground cable termination and bus support stands and two 2000 amp disconnects in an existing line position
4. Install vault outside of Pala Substation fence
5. Trench and install 150' of 6-6" conduit from termination stand to vault (the IC requested 3-6" spare conduit)
6. Install 150' per phase of cable from the termination stand to vault

According to the current CAISO Tariff, the IC is obligated to fund $1,468 thousand for the PTO's Interconnection Facilities.

B-C. Orange Grove Interconnects Before Q173 or Q173 Withdraws from the Queue

Assuming Q173's In-Service Date is delayed beyond Orange Grove's In-Service Date or it withdraws from the queue, the following PTO's Interconnection Facilities are needed to interconnect the Orange Grove Project to the Pala 69 kV bus via underground facilities:

1. Install 69 kV circuit breaker
2. Install associated bus for the new 69 kV line position

3. Install associated control and protection panels for the line position and add RTU points for control, monitoring, and alarming

4. Install underground cable termination and bus support stands and two 2000 amp disconnects in a new line position

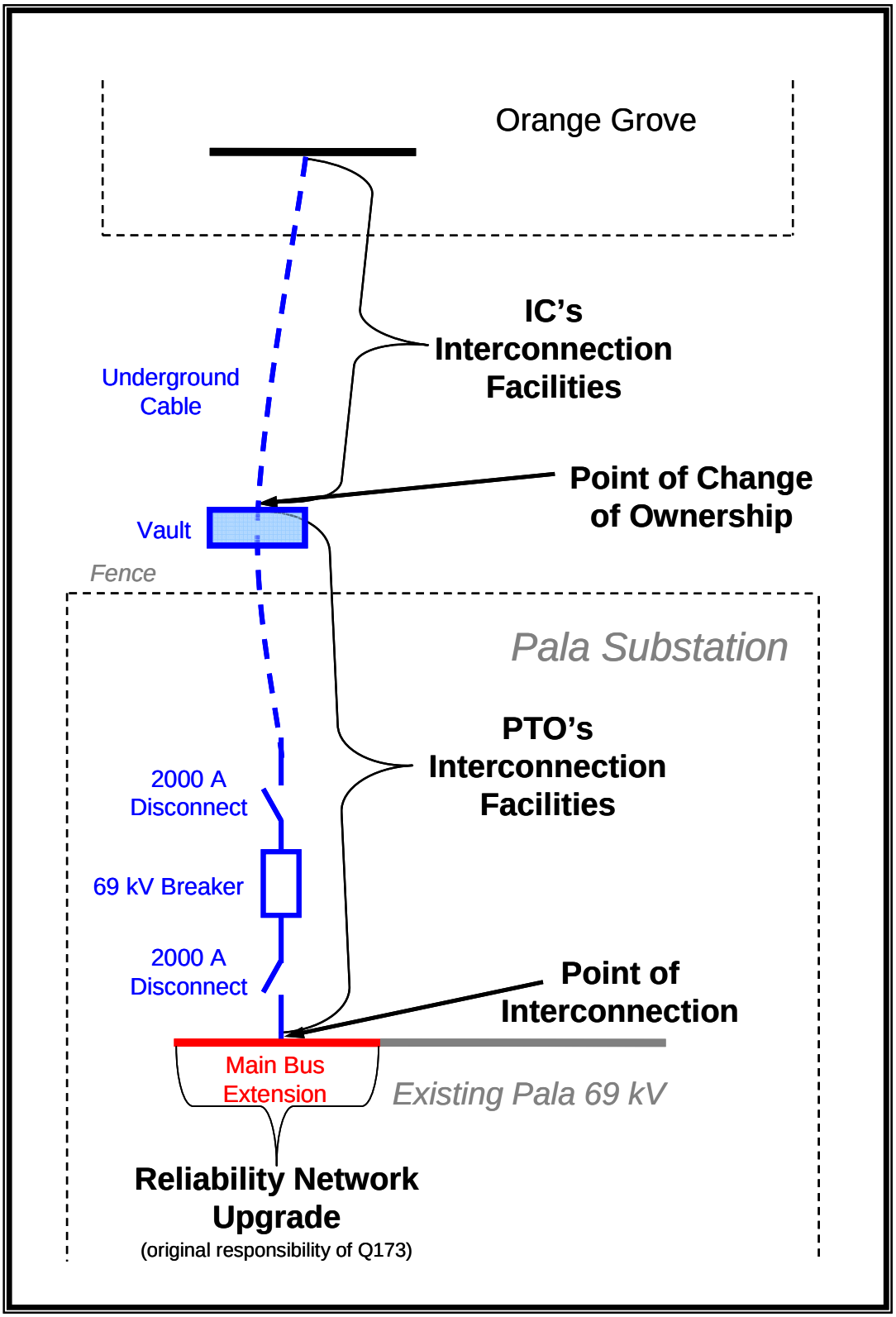
5. Install vault outside of Pala Substation fence

6. Trench and install 3-6" conduit connecting existing conduit at Pala Substation fence to vault

7. Install 250' per phase of cable from the termination stand to vault (will use existing conduit from the termination stand to the Pala Substation fence and new conduit from the fence to the vault)

If either one of these scenarios becomes reality, the IC will be obligated to fund $1,506 thousand for the PTO's Interconnection Facilities.

Figure 8.1: Interconnection Facilities and Reliability Network Upgrade



8.2 Reliability Network Upgrades

Reliability Network Upgrades are the transmission facilities at or beyond the Point of Interconnection necessary to interconnect the Project safely and reliably to the CAISO Controlled Grid. There is only one Reliability Network Upgrade associated with this Project and it is dependent on Q173. The first generator to interconnect to the Pala 69 kV bus must extend the bus (see Figure 8.1).

A. Orange Grove Interconnects After Q173

If Q173 is already interconnected to the Pala Substation when Orange Grove interconnects, there will be no Reliability Network Upgrades attributed to Orange Grove.

B-C. Orange Grove Interconnects Before Q173 or Q173 Withdraws from the Queue

Orange Grove will be responsible for extending the 69 kV Main Bus if Orange Grove interconnects before Q173. The project would consist of installing bus support and material to extend the 69 kV Main Bus to provide two more line positions. According to the current CAISO Tariff, the IC is obligated to advance $89 thousand to SDG&E for these Reliability Network Upgrades and will be reimbursed upon commercial operation of the plant.

8.3 Delivery Network Upgrades

Delivery Network Upgrades are the transmission facilities at or beyond the Point of Interconnection which relieve constraints on the CAISO Controlled Grid. For the Queue Study, the power flow analyses identified six (6) facilities requiring mitigation due to Category B emergency overloads resulting from the interconnection of the Project. The mitigation measures are proposed to eliminate the Category B overloads and will also eliminate the Category C overloads. Three of the Delivery Network Upgrades will not be needed if Q173 withdraws from the Queue.

According to the current CAISO Tariff, Delivery Network Upgrades are optional and the IC must choose which Delivery Network Upgrades (if any) are desired. The IC would advance the cost of the selected upgrades to SDG&E and will be reimbursed upon commercial operation of the plant.

A-B. Orange Grove Interconnects After Q173 or before Q173

The mitigation measures proposed to eliminate the Category B and C overloads if Orange Grove interconnects after Q173 are:

1. TL 698E (Pala-Monserate Tap) - Reconductor TL 698E from Pala to Monserate Tap with 636 ACSS/AW, replace the Pala getaways with 3000 kcmil Cu, and change relay settings at Pala.

2. TL 698B (Monserate-Monserate Tap) - Replace Monserate getaways with 3000 kcmil Cu, reconductor one span to 636 ACSS/AW, and change relay settings at Monserate.

3. TL 691B (Monserate-Avocado Tap) - Change relay settings at Monserate.

4. TL 6932 (Lilac-Pala) - Replace the Pala getaways with 3000 kcmil Cu and change the relay settings at Lilac and Pala. (An existing project is scheduled to upgrade the other limiting elements on this line by June 2008. If the existing project is canceled, the IC will be responsible for replacing the Lilac breaker.)

5. TL 683 (Rincon-Lilac)

    a. Reconductor TL 683 from Rincon to Lilac with 636 ACSR/AW and change relay settings at Rincon and Lilac. Due to the length of time required to for this reconductor, a temporary Special Protection System (SPS) is recommended. SDG&E will investigate alternatives to the reconductor – evaluating reliability, cost, and future growth in the area.

    b. In lieu of the reconductor, implement a temporary SPS at Rincon to monitor TL 683 and initiate tripping of TL 682, Warners-Rincon, for overload of TL 683. SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform the IC to reduce generation. The use of this SPS should be temporary only until the line is reconductored. The use of SPS might degrade the system reliability and it might not be sufficient when the load in the area increases. The final design of the SPS will be determined by SDG&E Operations and the CAISO Operations.

6. TL 682 (Warners-Rincon) – Implement an SPS at Warners to monitor TL 682 and initiate tripping of TL 685, Warners-Santa Ysabel, for overload of TL 682. SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation. The SPS should be temporary until the line is reconductored.

7. Maximum Output without Delivery Network Upgrades – Limit the Project's generation output to 25 MW to eliminate the need for Delivery Network Upgrades.

If the IC chooses to construct the mitigation measures, 1-4, and then implement the two SPS's, the total cost of the Delivery Network Upgrades is $14,171 thousand. The IC would have to advance the cost of the selected Delivery Network Upgrades and will be reimbursed upon commercial operation of the plant.

C. Q173 Withdraws from the Queue

If Q173 withdraws from the Queue and does not interconnect, Orange Grove will be responsible for fewer Delivery Network Upgrades. The overloads on TL 691B (Monserate-Avocado Tap 69 kV) and TL 683 (Rincon-Lilac 69 kV) are not apparent without Q173.

The mitigation measures proposed to eliminate the Category B and C overloads if Q173 withdraws from the Queue are:

1. TL 698E (Pala-Monserate Tap) - Reconductor TL 698E from Pala to Monserate Tap with 636 ACSS/AW, replace the Pala getaways with 3000 kcmil Cu, and change relay settings at Pala.

2. TL 698B (Monserate-Monserate Tap) - Replace Monserate getaways with 3000 kcmil Cu, reconductor one span to 636 ACSS/AW, and change relay settings at Monserate.

3. TL 6932 (Lilac-Pala) - Replace the Pala getaways with 3000 kcmil Cu and change the relay settings at Lilac and Pala. (An existing project is scheduled to upgrade the other limiting elements on this line by June 2008. If the existing project is canceled, the IC will be responsible for replacing the Lilac breaker.)

4. TL 682 (Warners-Rincon) – Implement an SPS at Warners to monitor TL 682 and initiate tripping of TL 685, Warners-Santa Ysabel, for overload of TL 682. SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation.

5. Maximum Output without Delivery Network Upgrades – Limit the Project's generation output to 77 MW to eliminate the need for Delivery Network Upgrades.

If the IC chooses to construct the mitigation measures, 1-3, and then implement the SPS for TL 682, the total cost of the Delivery Network Upgrades is $14,109 thousand. The IC would have to advance the cost of the selected Delivery Network Upgrades and will be reimbursed upon commercial operation of the plant.

9. Estimated Time to Construct

The estimate for the length of time that SDG&E needs to design, procure, and construct and/or upgrade a generation project's Interconnection Facilities and Network Upgrades is a +/-20% estimate of the total construction time. These estimates are dependent on many factors (when applicable), including but not limited to:

A. Whether an exemption can be obtained from the California Public Utilities Commission's (CPUC's) G.O. 131-D Certificate of Public Convenience and Necessity (CPCN) process.

B. Whether an exemption can be obtained from the CPUC's Permit to Construct (PTC) process.

C. Whether the IC includes the full scope of the transmission and substation additions and upgrades in its application to the lead agency for the California Environmental Quality Act (CEQA) review.

D. Whether the IC intends to fund the Delivery Network Upgrades.

E. Whether the IC chooses to build its own Interconnection Facilities.

The outcome of these processes and/or IC project/business decisions could increase cost and/or construction duration. Required lead times depend on many factors, including whether an exemption(s) from the California Public Utilities Commission's (CPUC's) G.O. 131-D Permit to Construct (PTC) process, can be obtained. For example, absent an exemption, the process of obtaining a PTC could take one to two years, possibly even longer. SDG&E anticipates that the ability to obtain exemptions from the PTC process (in which case an Advice Letter filing with the CPUC should be sufficient for obtaining the CPUC's approval to proceed with construction) will be enhanced if the IC includes the full scope of the transmission and substation additions and upgrades in its application to the lead agency.

SDG&E plans to file an Advice Letter with the CPUC once J-Power USA receives California Energy Commission approval with a finding of "no significant unavoidable environmental impacts" associated with SDG&E's activities. Construction by SDG&E will begin after the Advice Letter is received by the CPUC and the appropriate notice period has elapsed. SDG&E's experience is that the time frame for beginning construction on an unprotested Advice Letter is about 50 days from its filing. In addition to CPUC notification, other federal, state, and local permits may be required prior to beginning construction.

The estimated time to construct/upgrade the identified facilities summarized in Tables 9.1, 9.2, and 9.3 does not include the time needed for environmental review and permitting. The estimated time SDG&E needs to design, procure, and construct the facilities is listed in the tables. The estimate assumes the design and equipment procurement process is continuous and attempts to account for restrictions in coordinating transmission system outages to perform the work. Outages may not be possible during periods of high system demand or emergency conditions. The design phase does not typically start until successful completion of the Large Generator Interconnection Agreement (LGIA).

The proposed In-Service Date of April 1, 2009 and Commercial Operation Date of May 31, 2009 do not appear to be feasible considering the time needed to complete the LGIA, and construction of the Interconnection Facilities and Network Upgrades (including potential environmental review, permitting, design, procurement, and construction). The IC has the option of expediting the construction schedule by executing an Engineering & Procurement (E&P) Agreement to begin the design and procurement phases for the Interconnection Facilities and Network Upgrades. Per Section 9 of the LGIP, an E&P Agreement may be utilized prior to executing an LGIA. The E&P Agreement authorizes the PTO to commence engineering and procurement of long lead-time items necessary for the interconnection.

Table 9.1: +/-20% Estimated Time to Construct – Orange Grove Interconnects After Q173

Type of Upgrade	Location	Description	Estimated Time to Construct[19]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in an existing line position • Vault outside of Pala Substation fence • Trench and install 150' of 6-6" conduit from termination stand to vault (the IC requested 3-6" spare conduit) • 150' per phase of cable from the termination stand to vault	10 Months
Reliability Network Upgrades	None	None	0
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	11-19 Months[20]
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	10 Months
	TL 691B (Monserate-Avocado Tap)	• Change relay settings at Monserate	1 Month
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[21]	10 Months
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	10 Months
	TL 683 (Rincon-Lilac)	• Temporary SPS to prevent overload of TL 683 • Monitor TL 683 • If TL 683 exceeds rating • Trip TL 682 (Warners-Rincon) • SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform IC to reduce generation	10 Months
Total			**11-19 Months**

[19] Estimated time to construct includes time for design, equipment procurement, and construction. The estimate excludes time for environmental review and permitting. The time to construct attempts to account for restrictions in coordinating transmission system outages.
[20] For the extensive line reconductor, a range is provided because of the uncertain lead time for materials and anticipated construction restrictions due to outage coordination.
[21] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

Table 9.2: +/-20% Estimated Time to Construct - Orange Grove Interconnects Before Q173

Type of Upgrade	Location	Description	Estimated Time to Construct[22]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated bus for the new 69 kV line position • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in a new line position • Vault outside of Pala Substation fence • Trench and Install 3-6" conduit connecting existing conduit at Pala to vault • 250' per phase of cable from the termination stand to vault	10 Months
Reliability Network Upgrades	Pala Substation	• Extend 69 kV Main Bus	10 Month
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	11-19 Months[23]
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	10 Months
	TL 691B (Monserate-Avocado Tap)	• Change relay settings at Monserate	1 Month
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[24]	10 Months
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	10 Months
	TL 683 (Rincon-Lilac)	• Temporary SPS to prevent overload of TL 683 • Monitor TL 683 • If TL 683 exceeds rating • Trip TL 682 (Warners-Rincon) • SDG&E Operator will evaluate system conditions after tripping of TL 682 and may inform IC to reduce generation	10 Months
Total			**11-19 Months**

[22] Estimated time to construct includes time for design, equipment procurement, and construction. The estimate excludes time for environmental review and permitting. The time to construct attempts to account for restrictions in coordinating transmission system outages.
[23] For the extensive line reconductor, a range is provided because of the uncertain lead time for materials and anticipated construction restrictions due to outage coordination.
[24] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

Table 9.3: +/-20% Estimated Time to Construct - Q173 Withdraws from the Queue

Type of Upgrade	Location	Description	Estimated Time to Construct[25]
PTO's Interconnection Facilities	Pala Substation	• 69 kV circuit breaker • Associated bus for the new 69 kV line position • Associated control and protection panels for the line and add RTU points for control, monitoring, and alarming • Underground cable termination and bus support stands and 2-2000 amp disconnects in a new line position • Vault outside of Pala Substation fence • Trench and Install 3-6" conduit connecting existing conduit at Pala to vault • 250' per phase of cable from the termination stand to vault	10 Months
Reliability Network Upgrades	Pala Substation	• Extend 69 kV Main Bus	10 Month
Delivery Network Upgrades	TL 698E (Pala-Monserate Tap)	• Reconductor TL 698E with 636 ACSS/AW • Replace Pala getaways with 3000 kcmil Cu • Change relay settings at Pala	11-19 Months[26]
	TL 698B (Monserate-Monserate Tap)	• Replace Monserate getaways with 3000 kcmil Cu • Reconductor one span to 636 KCM ACSS/AW • Change relay settings at Monserate	10 Months
	TL 6932 (Lilac-Pala)	• Replace Pala getaways with 3000 kcmil Cu. • Change relay settings at Lilac • Change relay settings at Pala (An existing project to replace the TL 6932 breaker at Lilac is scheduled for completion by June 2008.)[27]	10 Months
Special Protection System (SPS)	TL 682 (Warners-Rincon)	• Temporary SPS to prevent overload of TL 682 • Monitor TL 682 • If TL 682 exceeds rating • Trip TL 685 (Warners-Santa Ysabel) • SDG&E Operator will evaluate system conditions after tripping of TL 685 and may inform IC to reduce generation	10 Months
Total			**11-19 Months**

[25] Estimated time to construct includes time for design, equipment procurement, and construction. The estimate excludes time for environmental review and permitting. The time to construct attempts to account for restrictions in coordinating transmission system outages.
[26] For the extensive line reconductor, a range is provided because of the uncertain lead time for materials and anticipated construction restrictions due to outage coordination.
[27] If SDG&E's planned project is canceled, the IC will be responsible for replacing the TL 6932 breaker at Lilac.

10. Re-Study

This IFAS was performed according to the assumptions shown in the Section titled "Study Assumptions." In the event that these assumptions are changed, an updating study may be required to re-evaluate the Project's impact on the CAISO Controlled Grid. The IC would be responsible for paying for any such updating study. Some of the changes that might prompt a re-study are:

A. Change in interconnection date.

B. Change in Project's MW size beyond the provisions set forth in the LGIP.

C. Change in interconnection plan.

D. Change in CAISO Controlled Grid Generation Queue – should a higher-queued project withdraw from the Queue.

E. Change in interconnection plans of higher-queued projects which could affect the upgrades required for this project.