VERSION: FINAL

OCTOBER 3, 2025

IMPERIAL VALLEY COMPUTER MANUFACTURING LLC, (DATA CENTER #2) SYSTEM IMPACT STUDY

TRANSMISSION PLANNING

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1. EXECUTIVE SUMMARY

The Imperial Irrigation District (IID) received a request from Imperial Valley Computer Manufacturing LLC (Customer) for the interconnection of their Imperial Data Center Campus #2 (Project) in the Imperial Valley. The facility's proposed Point of Interconnection (POI) to the IID System is at the 92kV 'R' line between IID's El Centro switching station (ECSS) and Central substation. As part of this study, IID evaluated the interconnection of 80 MW of load to assess potential system impacts and infrastructure requirements. Commercial Operation Date (COD) is planned to be in service by the year 2027.

IID's Transmission Planning Department performed a System Impact Study (SIS) to evaluate the potential impact of integrating this Project into the IID transmission system. The study included power flow (steady-state), transient stability, and post-transient stability analysis. The scope of the analyses is to identify the transmission system impacts caused solely by the addition of the project and reinforcements necessary to mitigate the adverse impact of the Project under different system operating conditions. The following scenarios were studied accordingly:

- 2027 Heavy Summer
- 2027 Heavy Summer (Solar reduced)
- 2027 Light Spring (Early morning solar reduced)

Each scenario includes two versions, a pre-case and a post-case including the project load. All cases include all generation with an executed Generation Interconnection Agreement (GIA), planned IID transmission upgrades, as well as anticipated distribution projects as identified in the IID 2024-33 Capital Investment plan. The project was modeled as a new load with a value of 80 MW for the year 2027. The analysis tested the impact of the load addition on the reliability of IID's electrical system.

Note: IID Transmission Planning assumed that the majority of the power required to serve this load would be imported for the purposes of this study. IID currently does not have the capability to reliably support a large-scale load requiring continuous 24-hour service with existing resources. As such, this report does not represent a commitment by IID to serve the requested load.

2. PROJECT DESCRIPTION

The proposed Project consists of a large-scale data center campus, upwards of 80MW, that is to be placed in a land parcel near the 92kV 'R' line between IID's El Centro switching station and Central substation, which will serve as the POI for the Project. The Project had an assumed power factor of 0.99. The Figures 1, 2, & 3 below indicate the single line diagram, geographical location, and site plan of the Project.

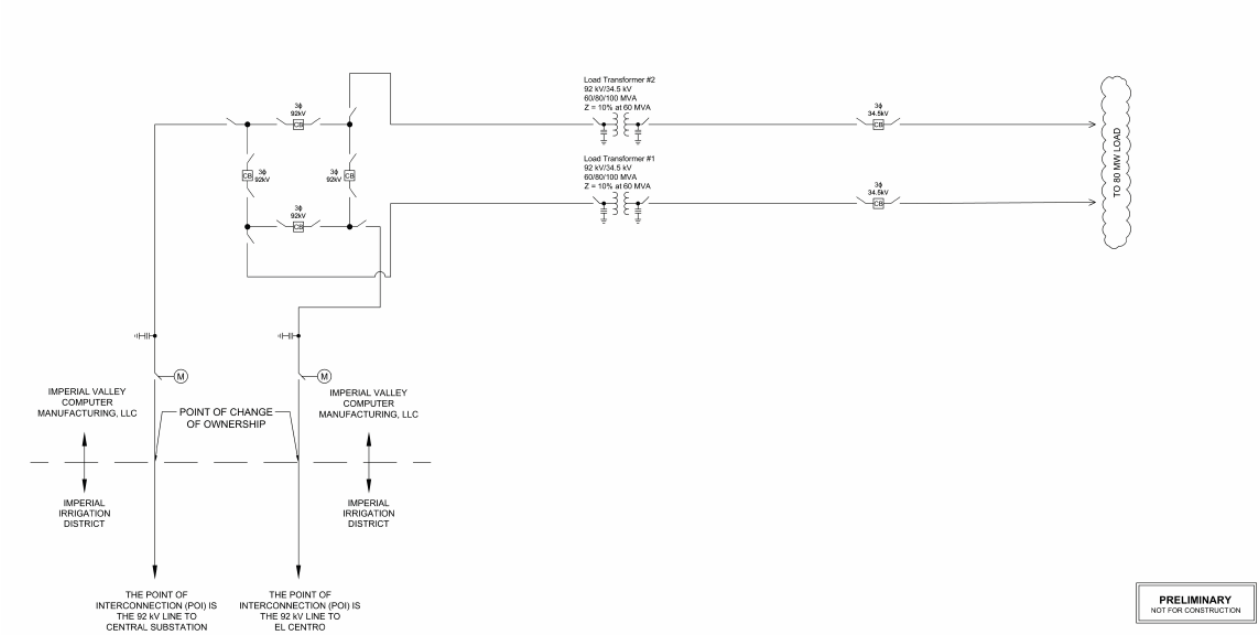

FIGURE 1: PROJECT SINGLE LINE DIAGRAM

FIGURE 2: PROJECT GEOGRAPHICAL LOCATION

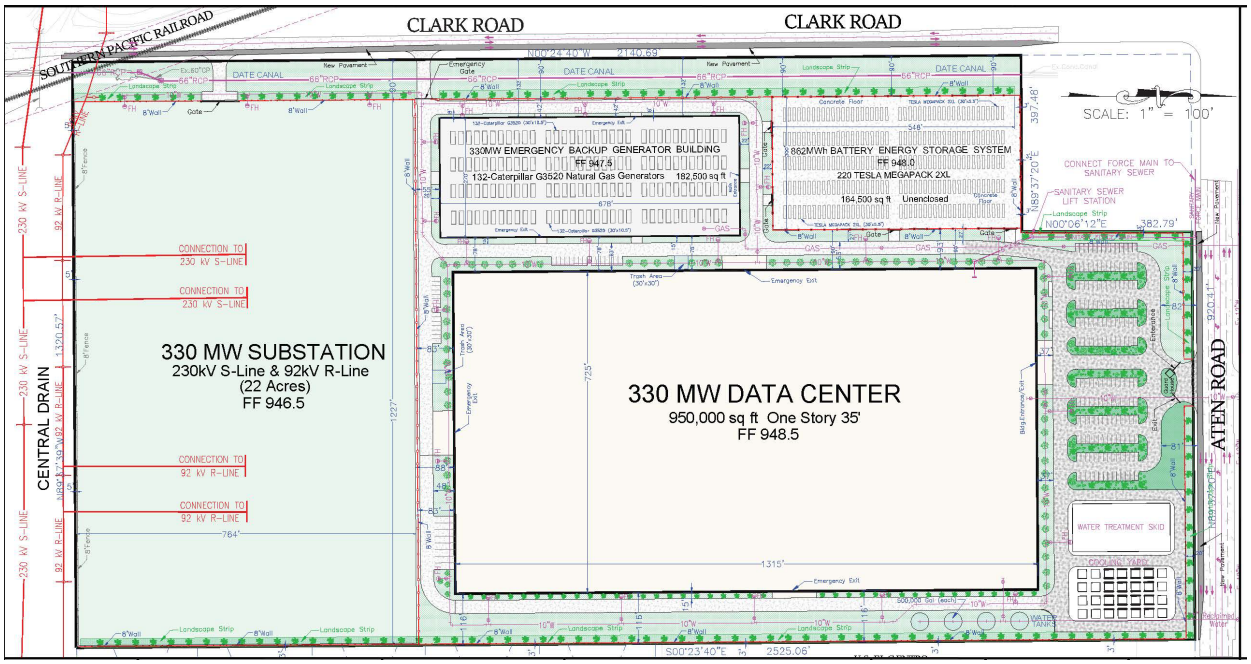

FIGURE 3: PROJECT SITE PLAN

3. STUDY DATA ASSUMPTIONS AND METHODOLOGY

3.1 BASE CASES AND ASSUMPTIONS

Various base cases were developed for this assessment with the intent to cover all critical operating scenarios, and to document all potential impacts that could be caused by the implementation of the Project. Any generation that had an executed Generation Interconnection Agreement (GIA), a Power Purchase Agreement (PPA), or a Tolling Agreement with the IID, and the project is in accordance with section 4.0 of IID's Planning Standards was included in the base cases. Distribution projects were included with either an executed Joint Power Agreement (JPA) or a finalized system impact study. The base cases were developed to represent the Heavy Summer operating conditions, representing high load with high generation output. A Heavy Summer sensitivity during the time frame of 1900-2100, representing high load with reduced solar output. Finally, Light Spring sensitivity, during the time frame of 0600-0800, representing moderate load with reduced solar output.

Table 1 below lists the WECC approved base cases that were used to model the IID system:

WECC Seed Case	PSLF Base Case Name	Description
Heavy Summer Peak Scenarios		
25HS4a.sav	27HS_IVCM_Peak_pre.sav	2027 Heavy Summer without Project (pre-case)
	27HS_IVCM_80MW_Peak.sav	2027 Heavy Summer with Project (80MW)
Heavy Summer Solar Reduced Scenarios		
25HS4a.sav	27HS_IVCM_Solar_Reduced_pre.sav	2027 Heavy Summer without Project (pre-case); 20% solar
	27HS_IVCM_80MW_Solar_Reduced.sav	2027 Heavy Summer with Project (80MW); 20% solar
Light Spring Early Morning Solar Reduced Scenarios		
26LSP1Sa.sav	27LSP_IVCM_Solar_Reduced_pre.sav	2027 Light Spring without Project (pre-case); 40% solar
	27LSP_IVCM_80MW_Solar_Reduced.sav	2027 Light Spring with Project (80MW); 40% solar

TABLE 1: SUMMARY OF BASE CASES ANALYZED

The GE PSLF version 23.0.8.2 software was used to analyze the pre and post Project study cases, with respect to the North American Electric Reliability Corporation (NERC) revised NERC TPL-001-5.1 standard, reflecting the use of P0-P7 outage categories and the corresponding WECC system performance criteria. GE PSLF was also used to check for system performance criteria violations in each of the post-Project cases when comparing to the corresponding pre-Project case. GE ProvisoHD was utilized to accumulate the power flow results in order to facilitate the comparison between pre and post Project cases. The base cases developed are designed to reflect the IID electrical system via loads, resources, topology and conditions expected when the project starts operation. While it is impossible to study all the IID transmission system flows and generation levels during all seasons, these pre-Project base cases represent extreme generation and transmission flows that will potentially expose any transmission constraints at the POI. However, the IID cannot guarantee that the Project can operate at its maximum rating year-round without impacting the transmission system, during times and seasons not studied.

3.2 METHODOLOGY

Steady state, transient stability and post-transient reactive margin analysis were performed for this assessment. Table 2 describes the type of analysis completed on each base case.

PSLF Base Case Name	Steady State	Transient Stability	Post Transient
27HS_IVCM_Peak_pre.sav	X	X	X
27HS_IVCM_80MW_Peak.sav	X	X	
27HS_IVCM_80MW_Peak_Mit.sav	X	X	X
27HS_IVCM_Solar_Reduced_pre.sav	X	X	
27HS_IVCM_80MW_Solar_Reduced.sav	X	X	
27HS_IVCM_80MW_Solar_Reduced_Mit.sav	X	X	
27LSP_IVCM_Solar_Reduced_pre.sav	X	X	
27LSP_IVCM_80MW_Solar_Reduced.sav	X	X	
27LSP_IVCM_80MW_Solar_Reduced_Mit.sav	X	X	

TABLE 2: DESCRIPTION OF THE ANALYSIS COMPLETED ON DEVELOPED BASE CASES VIA PSLF

3.2.1 Steady State Contingency Analysis

The assessment considered all of IIDs credible single and multiple contingencies, as well as the most severe multiple contingencies within the IID system. External contingencies that are known to cause the most severe impacts to the IID transmission system were analyzed also. The scope of the steady-state analysis consisted of thermal, voltage magnitude and angle difference violations. The full suite of NERC standard TPL-001-5.1 contingency sets, P1-P7, was analyzed.

3.2.2 Transient Stability Analysis

Transient stability analysis is a time-based simulation that assesses the performance of the power system shortly before, during, and after a transient disturbance. Initial conditions are characterized by the power flow case and model equations are used to simulate expected behavior from dynamic elements, such as generators and loads over time. Bus voltage and frequency plots are developed with an emphasis on all BES buses, and various non-BES buses in the IID system. These buses are the following:

- **BES Buses**
  - Alhambra Switching Station 161kV
  - Arkansas Switching Station 161kV
  - Avenue 58 161kV
  - Calipatria Switching Station 230kV
  - Coachella Switching 92kV
  - Coachella Valley 92kV
  - Coachella Valley 161kV
  - Coachella Valley 230kV
  - El Centro Switching Station 161kV
  - El Cento Switching Station 230kV
  - El Centro Switching Station 92kV
  - Highline 230kV
  - Hudson Ranch 230kV
  - Midway 230kV
  - Midway 92kV
  - Nelson Switching Station 230kV
  - Niland 161kV
  - Pilot Knob 161kV
  - Ramon 230kV
  - Sonora Switching Station 230kV
  - Yucca 161kV

- **Non-BES Buses**
  - Ave 42 92kV
  - Niland 92kV
  - Ramon 92kV
  - Ave. 58 92kV
  - El Centro 34.5kV
  - Blythe 161kV

Bus voltage plots provide a means of detecting out-of-step conditions and are useful to assess the magnitude and duration of post-disturbance voltage dips and peak-to-peak voltage oscillations. The voltage plots also indicate system damping response and the expected bus voltage following the disturbance. Bus frequency plots provide expected magnitude and duration of post-disturbance frequency swings, as well as indicating possible over-frequency or under-frequency conditions. Additionally, IID utilizes a dynamic criteria EPCL script to assist in evaluating if monitored buses meet WECC regional criteria as shown in Figures 4 and 5. The selected critical contingencies listed below in Table 3 were simulated for the transient stability analysis. This contingency list contains the most severe internal and external contingencies.

#	IID Critical Contingencies
1	P1 – Miguel - Eco 500kV Line Fault
2	P1 – Imperial Valley – N. Gila 500kV ck 1 Line Fault
3	P1 – Suncrest – Ocotillo 500kV ck 1 Line Fault
4	P1 – Imperial Valley – Ocotillo 500kV ck 1 Line Fault
5	P1 – Devers - Red Bluff 500kV Line Fault
6	P1 – Colorado River – Palo Verde 500kV Line Fault
7	P1 – Devers - Mirage 230kV Line Fault
8	P4 – Stuck Breaker # 8, Fault at N. Gila 500kV
9	P4 – Stuck Breaker # 9, Fault at N. Gila 500kV
10	P1 - Imperial Valley Data Center - Imperial Valley 230kV Line Fault
11	P1 - El Centro SS. - Imperial Valley Data Center 230kV Line Fault
12	P1 – Ramon Bank #1 92/230kV – Bus Fault / Loss of Transformer
13	P1 – Ramon - Mirage 230kV Line Fault
14	P1 – Coachella Valley - Mirage 230kV Line Fault
15	P1 – Coachella Valley - Midway 230kV Line Fault
16	P1 – Coachella Valley - Ramon 230kV Line Fault
17	P1 – El Centro Bank #1 161/230kV – Bus Fault / Loss of Transformer
18	P1 – El Centro Bank #4 92/230kV – Bus Fault / Loss of Transformer
19	P1 – El Centro Bank #5 92/230kV – Bus Fault / Loss of Transformer
20	P2 – Avenue 58 161kV – Bus Fault
21	P2 – Stuck Breaker El Centro S.S. (CKTB H40) 230kV
22	P2 – Stuck Breaker El Centro S.S. (CKTB H50) 230kV
23	P2 – Stuck Breaker El Centro S.S. (CKTB S10) 230kV
24	P2 – Stuck Breaker El Centro S.S. (CKTB S20) 230kV

25	P2 – Stuck Breaker El Centro S.S. (CKTB AOB, MOB, H20) 161kV
26	P2 – Stuck Breaker El Centro S.S. (CKTB X1EO, LOB) 161kV
27	P2 – Stuck Breaker El Centro S.S. (CKTB X1WO) 161kV
28	P5 – Delayed Fault Clearing at El Centro Steam REPU2
29	P5 – Delayed Fault Clearing at El Centro Steam REPU2 GSU
30	P5 – Delayed Fault Clearing at El Centro S. S. 161kV
31	P6 - Coachella Valley-Mirage & Ramon-Mirage 230kV Line Fault
32	P7 - Devers-Mirage Circuit 1&2 230kV Line Fault
33	P7 - Coachella Valley-Mirage & Coachella Valley-Ramon 230kV Line Fault

TABLE 3: CRITICAL CONTINGENCIES USED FOR TRANSIENT AND POST-TRANSIENT ANALYSIS

3.2.3 Post-Transient Analysis (Reactive Margin)

Post-transient stability analysis was performed on selected buses in the IID transmission system following selected, most severe, and critical outages. Moreover, governor power flow tools were used for the analysis. For each bus assessed, a synchronous condenser was modeled to determine the highest reactive power margin available on that bus. All BES and non-BES buses were monitored.
During post-transient simulations, the following assumptions were used:

- Loads were modeled as constant MVAs, during the post-transient time frame
- Reactive power output of the system swing generator was limited to its maximum capability
- No manual operator intervention was allowed to increase generator MVAR flow
- Remedial actions, such as generator dropping, load shedding, or blocking of automatic generator control were not considered for single outages

Positive reactive margin is desired at all of the buses. For the IID transmission system, the post-transient stability analysis criteria are the following:

- For transfer paths, all P0-P1 events shall demonstrate a positive reactive power margin at a minimum of 105 percent of transfer path flow.
- For transfer paths, all P2-P7 events shall demonstrate a positive reactive power margin at a minimum of 102.5 percent of transfer path flow.
- For load areas, all P0-P1 events shall demonstrate a positive reactive power margin at a minimum of 105 percent of forecasted peak load.
- For load areas, all P2-P7 events shall demonstrate a positive reactive power margin at a minimum of 102.5 percent of forecasted peak load.

Selected critical contingencies listed above in Table 3 were simulated for post-transient stability analysis. These contingencies included the most severe internal and external contingencies.

3.3 MODELING

The following section document the modeling methods used to represent the project in steady state and dynamics analyses.

3.3.1 Power Flow Modeling

Equivalent load of project:

- A 80MW equivalent load on the 92kV IVCM data center bus.

3.3.2 Dynamic Models

WECC approved models from the GE PSLF library was used to represent the Project. For this Project, dynamic stability models included models for the following:

- Commercial and Industrial Load
  - WECC Composite Load Model: **cmpldw**

3.3.3 Remedial Action Scheme Modeling

Various Remedial Action Schemes (RAS) were modeled in conjunction with the various projects included in the base cases. A summary of the internal automatic actions taken are described below:

- South R-Line RAS: Open breaker "RNO" at Dixieland will send a trip signal to Ocotillo Wells Solar.
- North R-Line RAS: Loss of Anza to Oasis and Ave 58 will send a trip signal to Seville 3.
- "K" line SPS: Loss of the "K" line, "N" Line, and the loss of the Niland 92/161kV transformer will send a trip signal to Colgreen.
- Path 42 RAS:
  - Loss of the 230kV "KN" line between Coachella Valley and Mirage and the 230kV "KS" line between Coachella Valley and Ramon will send a trip signal to the identified generation.
  - Loss of the 230kV "KN" line between Coachella Valley and Mirage and the 230kV "KS" line between Ramon and Mirage will send a trip signal to the identified generation.
  - Devers-Mirage 1 & 2: Loss of circuit numbers 1 and 2 will send a trip signal to the identified generation.
- Path 42 RAS N-1:
  - Loss of the 230kV "KN" line between Coachella Valley and Mirage will send a trip signal to the identified generation.
  - Loss of the 230kV "KS" line between Coachella Valley and Ramon will send a trip signal to the identified generation.
  - Loss of the 230kV "KS" line between Ramon and Mirage will send a trip signal to the identified generation.
  - Loss of the 230kV "KN" line between Coachella Valley and Midway will send a trip signal to the identified generation.
  - Loss of the 230kV "KS" line between Coachella Valley and Midway will send a trip signal to the identified generation.
- Coachella Valley – Midway RAS:
  - Loss of the 230kV "KN" line between Coachella Valley and Midway will send a trip signal to the identified generation.
  - Loss of the 230kV "KS" line between Coachella Valley and Midway will send a trip signal to the identified generation.
- Midway Transformer RAS N-1:
  - Loss of either bank #1 or bank #2 92/230kV Transformer at Midway will send a trip signal to the identified generation.
- El Centro 161kV Bus RAS N-1:
  - Loss of the 161kV Bus at El Centro Switching will send a trip signal to the identified generation.

3.4 SYSTEM UPGRADES/MITIGATIONS

- Southern 92kV R-Line Upgraded – Q2 2026 (Ocotillo Mitigation)
- Coachella Valley Switching Station Upgrade – Q2 2026 (TPL-001)
- 45MVAR Reactive Support at Ramon 230kV – Q2 2026 (IPP Mitigation)
- ECSS RAS N-1 – Q3 2025 (IPP Mitigation)
- Midway Transformer RAS – Q4 2025 (IPP Mitigation)

4. STUDY CRITERIA

Grid Reliability Criteria, which incorporates the WECC and NERC planning criteria, was used for this assessment. IID's standards and procedures were followed during the study process.

4.1 NERC RELIABILITY STANDARDS

The need for transmission upgrades and additions was determined in accordance with NERC Reliability Standards. These standards set forth criteria for system performance requirements, which must be met under specific set of operating conditions. The following NERC Reliability Standards are applicable to the Transmission Operators (TOs) as registered NERC Planning Authorities, Transmission Planners, and are the primary standards for the interconnection of new facilities and system performance:

- FAC-001: Facility Connection Requirements
- FAC-002: Coordination of Plans for New Facilities
- TPL-001-5.1: Transmission System Planning Performance Requirements

4.2 WECC RELIABILITY CRITERIA

The WECC TPL system performance criteria, TPL-001-WECC-CRT-4, sets forth additional requirements that must be met under various, but specific set of operating conditions and may be applicable to the TOs as Planning Authorities.

4.3 STEADY STATE STUDY CRITERIA

The system performance, with the addition of the Project, was evaluated under normal conditions and following losses of a single or multiple Bulk Electric System (BES) element(s), as defined by the applicable reliability standards and criteria. Figure 4: Listing of TPL-001-5.1 P1-P7 contingency descriptions summarizes the contingencies per NERC Reliability Standards, and WECC Regional Criteria.

Category	Initial Condition	Event [1]	Fault Type [2]	BES Level [3]	Interruption of Firm Transmission Service Allowed [4]	Non-Consequential Load Loss Allowed
P0 No Contingency	Normal System	None	N/A	EHV, HV	No	No
P1 Single Contingency	Normal System	Loss of one of the following: 1. Generator 2. Transmission Circuit 3. Transformer [5] 4. Shunt Device [6]	3Ø	EHV, HV	No[9]	No[12]
		5. Single Pole of a DC line	SLG			
P2 Single Contingency	Normal System	1. Opening of a line section w/o a fault [7]	N/A	EHV, HV	No[9]	No[12]
		2. Bus Section Fault	SLG	EHV	No[9]	No
				HV	Yes	Yes
		3. Internal Breaker Fault [8] (non-Bus-tie Breaker)	SLG	EHV	No[9]	No
				HV	Yes	Yes
		4. Internal Breaker Fault (Bus-tie Breaker) [8]	SLG	EHV, HV	Yes	Yes
P3 Multiple Contingency	Loss of generator unit followed by System adjustments[9]	Loss of one of the following: 1. Generator 2. Transmission Circuit 3. Transformer [5] 4. Shunt Device [6]	3Ø	EHV, HV	No[9]	No[12]
		5. Single pole of a DC line	SLG			
P4 Multiple Contingency *(Fault plus stuck breaker[10])*	Normal System	Loss of multiple elements caused by a stuck breaker [10](non-Bus-tie Breaker) attempting to clear a Fault on one of the following: 1. Generator 2. Transmission Circuit 3. Transformer [5] 4. Shunt Device [6] 5. Bus Section	SLG	EHV	No[9]	No
				HV	Yes	Yes
		6. Loss of multiple elements caused by a stuck breaker[10] (Bus-tie Breaker) attempting to clear a Fault on the associated bus	SLG	EHV, HV	Yes	Yes
P5 Multiple Contingency *(Fault plus relay failure to operate)*	Normal System	Delayed Fault Clearing due to the failure of a non-redundant relay[13] protecting the Faulted element to operate as designed, for one of the following: 1. Generator 2. Transmission Circuit 3. Transformer [5] 4. Shunt Device [6] 5. Bus Section	SLG	EHV	No[9]	No
				HV	Yes	Yes
P6 Multiple Contingency *(Two overlapping singles)*	Loss of one of the following followed by System adjustments.[9] 1. Transmission Circuit 2. Transformer [5] 3. Shunt Device[6] 4. Single pole of a DC line	Loss of one of the following: 1. Transmission Circuit 2. Transformer [5] 3. Shunt Device [6]	3Ø	EHV, HV	Yes	Yes
		4. Single pole of a DC line	SLG	EHV, HV	Yes	Yes
P7 Multiple Contingency *(Common Structure)*	Normal System	The loss of: 1. Any two adjacent (vertically or horizontally) circuits on common structure [11] 2. Loss of a bipolar DC line	SLG	EHV, HV	Yes	Yes

FIGURE 4*: LISTING OF TPL-001-5.1 P1-P7 CONTINGENCY DESCRIPTIONS*

4.3.1 Normal Overloads

Normal overloads are those that exceed 100 percent of normal facility rating under NERC Category P0 conditions (no contingencies). Normal overloads are identified in the Reliability Study power flow analysis, in accordance with the Reliability Standard, TPL-001-5.1. It is required that loading of all transmission system facilities be within their normal ratings under NERC Category P0 conditions.

4.3.2 Emergency Overloads

Emergency overloads are those that exceed 100 percent of emergency ratings under NERC and WECC Category P1-P7 contingency conditions. Emergency overloads are identified in the Reliability Study power flow analysis in accordance with Reliability Standards, TPL-001-5.1. It is required that loading of all transmission system facilities be within their emergency ratings under the Category P1-P7 contingency conditions.

4.3.3 Voltage Criteria

A voltage criteria violation occurs if a bus within the transmission system, of each TO, fails to meet the requirements defined in Table 4. For Voltage Criteria, bus voltages are relative to the nominal bus voltages of the system under study.

Voltage Level	Normal Conditions (P0)		Contingency Conditions (P1-P7)		Voltage Deviation	
	VMIN (p.u.)	VMAX (p.u.)	VMIN (p.u.)	VMAX (p.u.)	Load Buses (P1)	Non-Load (P1) & All Buses (P2-P7)
≤200kV	0.95	1.05	0.9	1.1	≤8%	≤10%
≥200kV	0.95	1.05	0.9	1.1	≤8%	≤10%
≥500kV	0.95	1.05	0.9	1.1	≤8%	≤10%

TABLE 1*: VOLTAGE CRITERIA*

The maximum total voltage deviation for P3 and P6 events will be measured from the voltage that exists after the initial condition and therefore takes into consideration only voltage deviation due to the second event. Buses within the IID controlled grid that cannot meet the requirements in Table 4 will be further investigated.

4.3 TRANSIENT STABILITY DATA

Transient stability analysis is a time-based simulation that assesses the performance of the power system shortly before, during, and quickly following a contingency. Transient stability studies were performed to verify the stability of the system following a system fault. Transient stability analysis was performed based on the WECC Disturbance-Performance Criteria, for selected system contingencies, using Version 23.0.8.2 of the GE PSLF software. Transient stability contingencies were simulated for a minimum of 10 seconds, including 1 second of pre-disturbance data. Unless specified, all faults were modeled as 3-phases with 4 cycles of breaker clearing time. System damping was assessed visually with the aid of stability plots.

4.4.1 Bus Voltage

Bus voltage plots provide a means of detecting out-of-step conditions and are useful to assess the magnitude and duration of post-disturbance voltage dips and peak-to-peak voltage oscillations. The voltage plots also indicate system damping response and the expected bus voltage following the disturbance. WECC Regional Criteria, TPL-001-WECC-CRT-4, requires that the following criteria be applied:

- Following fault clearing, the voltage shall recover to 80% of the pre-contingency voltage within 20 seconds of the initiating event for all P1 through P7 events, and for each applicable BES bus serving load.
- Following fault clearing and voltage recovery above 80%, voltage at each applicable BES bus serving load shall neither dip below pre-contingency voltage, for more than 30 cycles, nor remain below 80% of pre-contingency voltage for more than 2 seconds, for all P1 through P7 events.
- For contingencies without a fault (P2.1 category event), voltage dips at each applicable BES bus serving load shall neither dip below 70% of pre-contingency voltage, for more than 30 cycles, nor remain below 80% of pre-contingency voltage for more than two seconds.
- All oscillations that do not show positive damping within 30-seconds, after the start of the studied event, shall be deemed unstable.

- Figure 5 and 6 represent the acceptable recovery trajectory.

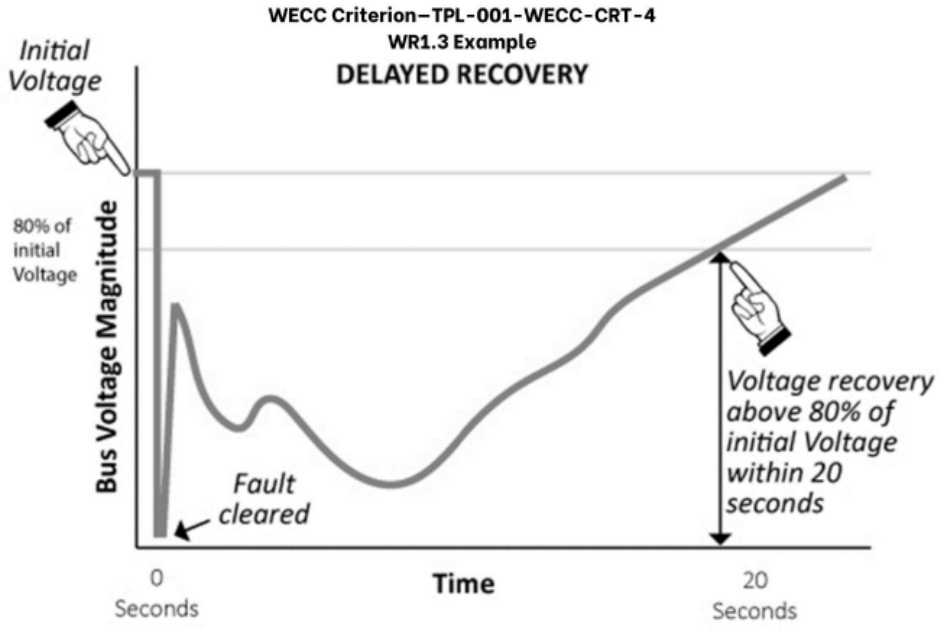

FIGURE 5*: WECC DIAGRAM REPRESENTING ADEQUATE VOLTAGE RECOVERY (DELAYED)*

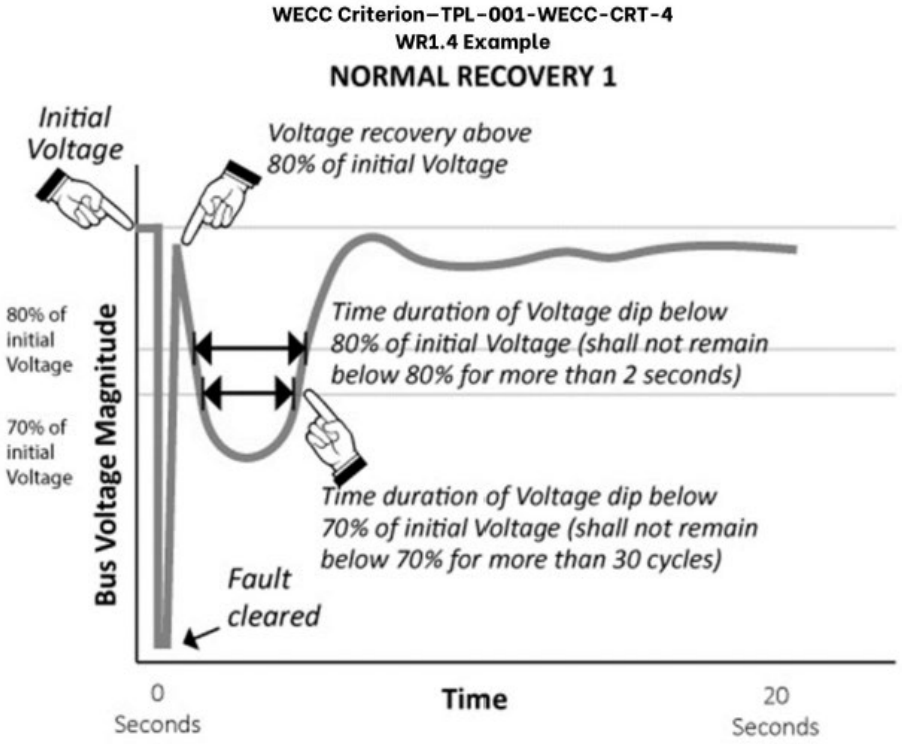

FIGURE 6*: WECC DIAGRAM REPRESENTING ADEQUATE VOLTAGE RECOVERY (NORMAL)*

4.4.2 Bus Frequency

Bus frequency plots provide expected magnitude and duration of post-disturbance frequency swings, and possible over-frequency or under-frequency conditions. WECC Regional Criteria, TPL-001-WECC-CRT-4, requires that the following be applied:

- All oscillations that do not show positive damping, within 30-seconds, after the start of the studied event, shall be deemed unstable.

4.5 REACTIVE MARGIN CRITERIA

Post-transient stability analysis was performed on selected buses in the IID transmission system, following selected critical outages. For each bus assessed, a synchronous condenser was modeled to extract reactive power, until the point where voltage collapse occurs. The maximum reactive power consumed prior to the voltage collapse is determined. Positive reactive margin is desired at all buses.

5. STUDY RESULTS

This System impact study modeled the new load with a total of 80MW for summer and light spring scenarios. The following analysis tested the impact of the load addition on the reliability of IIDs electrical system.

5.1 POWER FLOW ANALYSIS:

Power flow analysis was performed using the base cases identified in Table 1, under Section 3. System thermal and voltage performance were tested during normal and emergency (contingency) conditions, in order to compare pre-Project and post-Project scenarios. Identified impacts, if any, are caused solely by this Project.

Thermal and voltage performance of the system was evaluated for base cases under normal, (P0), single element outage, (P1, P2), and selected multiple element outages, (P3-P7). Thermal loadings were reported when a model transmission component was loaded above 95% of its continuous MVA rating, (P0), and above 95% of its emergency rating, (P1-P7). Generally, the concerns are raised when an element is found loaded above 100% of its normal or emergency rating; however, 95% was chosen to identify circuits that are also at the edge of an overload. Moreover, such circuits need to be closely monitored and can be placed as potential candidates for future upgrades.

Transmission voltage violations for normal, (P0), conditions were reported when per unit voltages were less than 0.95 or greater than 1.05. Transmission voltage violations, following single or multiple outages, were reported when per unit voltages were less than 0.90 or greater than 1.1. Voltage deviations were recorded whenever these deviations were greater than 8% for load serving buses and 10% non-load serving buses.

The steady state study results for each of the cases is described in the following sections, while the complete results can be found in Appendix B.

5.1.1 (2027) Heavy Summer Peak

5.1.1.1 Voltage and Thermal Performance

- The project caused buses in the base case to experience voltage exceedances or deviations with respect to voltage criteria on Table 4.

- The project caused thermal violations in IID's system. Thermal issues were found under P-1 and P-2 contingencies. The impacted elements include the following:
  - 92kV 'R' Line Dixieland Prison to Central
  - 92kV 'R' Line Dixieland to Dixieland Prison

5.1.2 (2027) Heavy Summer Peak Solar Reduced 20%

5.1.2.1 Voltage and Thermal Performance

- The project caused buses in the base case to experience voltage exceedances or deviations with respect to voltage criteria on Table 4.
- The project caused thermal violations in IID's system. Thermal issues were found under P-1 and P-2 contingencies. The impacted elements include the following:
  - 92kV 'R' Line Dixieland Prison to Central
  - 92kV 'R' Line Dixieland to Dixieland Prison

5.1.3 (2027) Light Spring Solar Reduced 40%

5.1.3.1 Voltage and Thermal Performance

- The project caused buses in the base case to experience voltage exceedances or deviations with respect to voltage criteria on Table 4.
- The project did not cause thermal violations in IID's system.

5.2 TRANSIENT STABILITY ANALYSIS

Transient stability was performed on the Heavy Summer and Light Spring pre- and post- Project base cases.

5.2.1 (2027) Heavy Summer Transient Stability Results

Simulation results showed that the Project did not cause impacts on IID system stability under any of the simulated contingencies.
Refer to Appendix C for the 2027 Heavy Summer Transient pre and post stability plots.

5.2.2 (2027) Heavy Summer Solar Reduced Transient Stability Results

Simulation results showed that the Project did not cause impacts on IID system stability under any of the simulated contingencies.
Refer to Appendix D for the 2027 Heavy Summer Solar Reduced transient pre and post stability plots.

5.2.3 (2027) Light Spring Solar Reduced Transient Stability Results

Simulation results showed that the Project did not cause impacts on IID system stability under any of the simulated contingencies.
Refer to Appendix D for the 2027 Light Spring Solar Reduced transient pre and post stability plots.

5.3 POST TRANSIENT STABILITY AND REACTIVE POWER MARGIN: HEAVY SUMMER

Post-transient stability was performed on selected buses in IID transmission system following selected critical outages. Results show that the Project did not cause impacts on IID System reactive margin under any of the simulated contingencies

Refer to Appendix E for complete post-transient voltage (reactive margin) results.

6. CONCLUSION

The System Impact Study modeled the new load with a total of 80MW for summer and light spring scenarios. The following analysis tested the impact of the load addition on the reliability of IID's electrical system. The Project's POI is located on the 92kV 'R' Line between IID's El Centro substation and Central substation. The study evaluated different seasons and generation scenarios for the Project's target year, using Heavy Summer and Light Spring cases. The steady state, transient, and post-transient analyses indicated that the Project can be deemed feasible. Nevertheless, the addition of the Project causes P-1 and P-2 overloads in different sections of IID's system in Heavy Summer scenarios. Below are the findings and impacted elements for this loading scenario:

80 MW load:

- 92kV 'R' Line Dixieland Prison to Central
- 92kV 'R' Line Dixieland to Dixieland Prison

Due to these impacted elements, the Project can be deemed feasible with some transmission infrastructure upgrades. The following upgrades must be installed in the new IVCM substation:

- One static var device rated 75 MVAR, configured in three switching blocks of 25MVAR each for reactive power support and voltage stability.

Please note that IID currently does not have the capability to reliably support a large-scale load requiring continuous 24-hour service. As such, this report does not represent a commitment by IID to serve the amount of requested load.