



WDAT 880 ISP

*WDAT
INDEPENDENT SYSTEM IMPACT STUDY*

August 15, 2012



SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONALSM Company

Prepared by:

*Jad Farah
Roger Salas, P.E.
Distribution Field Engineering*

Approved by:

*Russell Ragsdale
Distribution Field Engineering Manager*

SOUTHERN CALIFORNIA EDISON COMPANY

EXECUTIVE SUMMARY

[REDACTED] applied to Southern California Edison ("SCE") for interconnection and wholesale distribution service for its proposed [REDACTED] Turbine pursuant to SCE's Wholesale Distribution Access Tariff ("WDAT") Generator Interconnection Procedures. SCE performed an Independent System Impact Study as requested by [REDACTED] for a 480V interconnection and distribution service from an existing 12kV distribution line ("Taiwan 12kV"). The interconnection is to be located approximately 6.2 miles from the Modena Substation on the Taiwan 12kV circuit out of SCE's Modena 66/12kV Substation. The request is for a WDAT Landfill Gas Oxidizer Turbine generating facility with a total capacity of 1.95 MW. The initial request is for service to commence by October 1, 2012.

The new generation, consisting of [REDACTED] generator, [REDACTED]. This generating facility would receive interconnection service from SCE's existing 12 kV circuitry on Taiwan 12 kV out of Modena Substation via an underground line to the applicant owned 480V switchgear. The generated power would be delivered to the California Independent System Operator ("CAISO") grid at the 220 kV bus of SCE's Villa Park Substation.

The purpose of this Independent System Impact Study is to determine the effect of the proposed generation on the SCE distribution system and the portion of SCE's electrical system that is part of the CAISO controlled grid, and to identify in general additional Interconnection Facilities, Distribution Upgrades, additions or modifications, or other facilities required to provide the requested service. The study was performed in two parts: Part A (performed by SCE's Distribution Field Engineering department) examines impacts related to that part of the SCE distribution system energized at less than 220 kV, while Part B (performed by SCE's Generation Interconnection Planning department) examines impacts and facilities related to the portion of the SCE electrical system energized at 220 kV and above (the bulk power system), and impacts and facilities associated with the CAISO controlled portion of the SCE grid. This is the Part A study report; a detailed report of the Part B study results is included as Attachment B.

The Part A study was performed for expected year 2011 through 2020 projected peak load conditions as well as 2011 through 2020 minimum load conditions.

The Part A Independent System Impact Study consisted of a power flow analysis, three-phase short circuit duty analysis based on most current thevenin equivalents and circuit voltage profile analysis. The analysis were performed to determine whether the energy associated with the [REDACTED] Project can be transmitted through SCE's distribution system to the ISO grid at the 220 kV bus of Villa Park Substation without creating the need for modifications to SCE's distribution system and/or to the ISO grid. The study showed that, with the [REDACTED] Project on-line:

- For both peak load and light load conditions, the addition of the [REDACTED] WDAT 880ISP project resulted in no violations of SCE's thermal loading criteria under base case and N-1 conditions for the SCE distribution System.

- The addition of the [REDACTED] 880ISP project resulted in a voltage rise exceeding allowable Rule 2 limits.
- The addition of the [REDACTED] WDAT 880ISP project resulted in additional protection requirements.
- The addition of the [REDACTED] WDAT 880ISP project did not result in the increase of three phase short circuit duties of 0.1kA or more at [REDACTED] distribution substation.
- Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows:

Interconnection Facilities	\$ 309.0K
Distribution upgrades	\$ 0 K
Telemetry Requirements	\$ 14.5 K ¹
CEH&S	\$ 466.9K
ITCC (35%)	\$ 276K
<hr/> Total non-binding order of magnitude cost estimate	\$ 1.066M

¹ Cost Estimate based on centralized RTU method; the cost and scope of telemetry may significantly increase to include a dedicated RTU as required by SCE's Interconnection Handbook with an approximate cost of \$155,000 in the event that Centralized RTU method is not feasible for this project.

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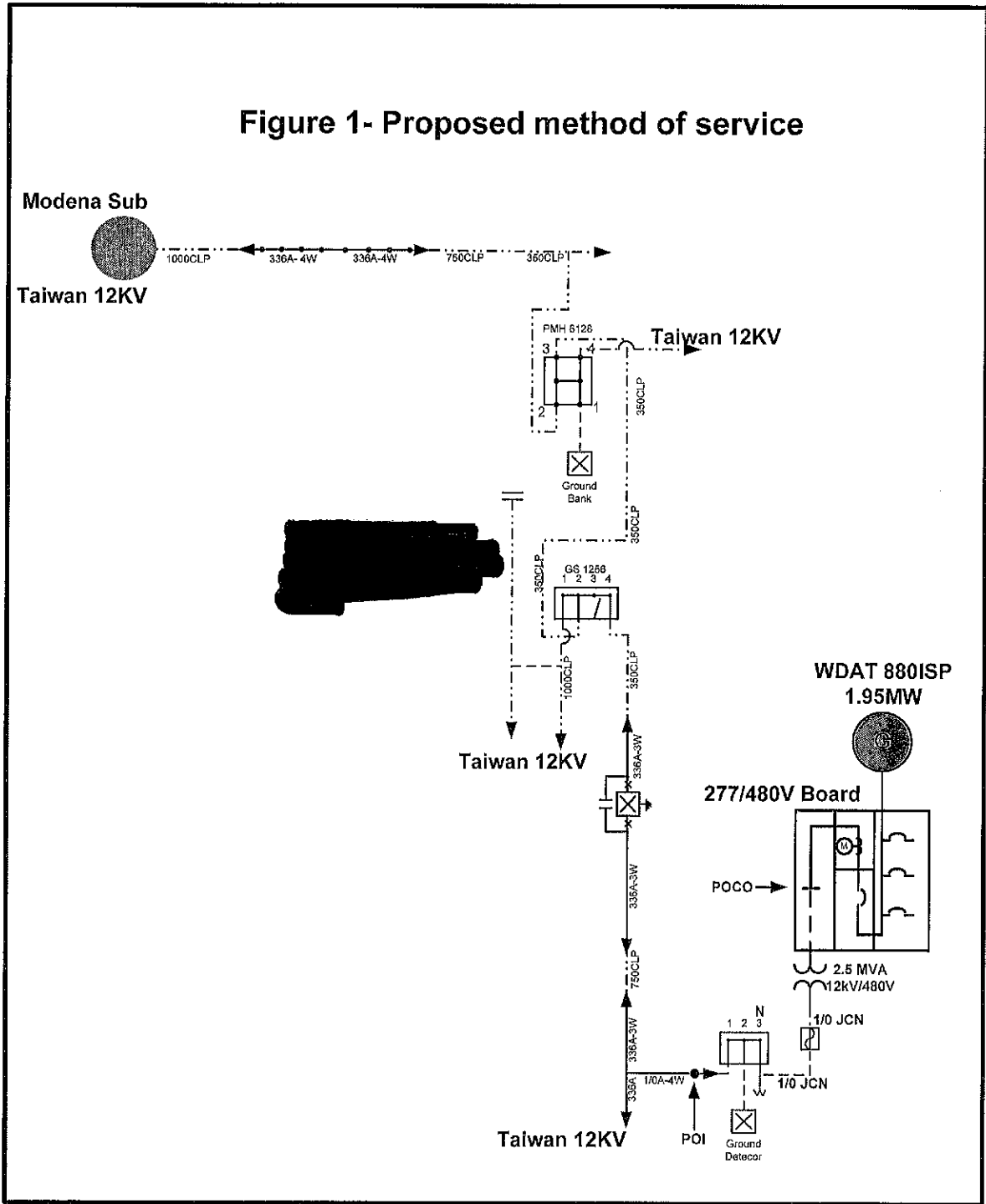
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I. INTRODUCTION TO PART A

[REDACTED] applied to Southern California Edison ("SCE") for interconnection and wholesale distribution service for its proposed [REDACTED] pursuant to SCE's Wholesale Distribution Access Tariff ("WDAT") Generator Interconnection Procedures. SCE performed an Independent System Impact Study as requested by Flex OC Renewables LLC for a 480V interconnection and distribution service from an existing 12kV distribution line ("Taiwan 12kV"). The interconnection is to be located approximately 6.2 miles from the Modena Substation on the Taiwan 12kV circuit out of SCE's Modena 66/12kV Substation. The request is for a WDAT [REDACTED] generating facility with a total capacity of 1.95 MW. The initial request is for service to commence by [REDACTED].

The new generation, consisting of [REDACTED] generator, [REDACTED] [REDACTED] This generating facility would receive interconnection service from SCE's existing 12 kV circuitry on Taiwan 12 kV out of Modena Substation via an underground line to the applicant owned 480V switchgear. The generated power would be delivered to the California Independent System Operator ("CAISO") grid at the 220 kV bus of SCE's Villa Park Substation.

Figure 1- Proposed method of service



The purpose of this Independent System Impact Study is to determine the impact of the proposed generation addition on the SCE distribution system and to identify in general additional Interconnection Facilities, Distribution Upgrades, additions or modifications, or other facilities required to provide the requested service. This study was performed for expected year 2011 through 2020 peak load conditions as well as low demand conditions.

II. PART A: SYSTEM IMPACT STUDY CONDITIONS & METHODOLOGY

Planning Criteria

The thermal rating of any conductor, connector, or apparatus should not exceed 100% of its normal rated capacity with all facilities in service (base case).

The thermal rating of any conductor, connector, or apparatus should not exceed 100% of its emergency rating under N-1 conditions.

Operational flexibility and reliability of the distribution system shall be maintained at all times.

Circuit voltage profiles should be maintained to comply within CPUC's Rule 2 requirements.

System Conditions

The power factor for the new generation facility was assumed to be within WDAT requirements of 0.95 lagging or leading.

The generation system must be designed to accommodate a VAR Schedule provided by SCE if necessary by a re-arrangement of SCE's distribution system.

Expected loading on the distribution system as projected by the SCE 2011 - 2020 plan was used.

Distributed Generation resources connected to the distribution system are analyzed offline and online during peak load conditions as well as during minimum daytime load conditions as to determine worst case scenario.

The Short circuit contribution from the synchronous generator was provided by the IC.

III. PART A: SYSTEM IMPACT STUDY RESULTS

Short Circuit Analysis

Using the short circuit data from the synchronous generator being utilized in generation system, it was calculated that the short circuit contribution at one (1) 12 kV substation bus was more than 0.1 kA; thus a breaker analysis was required due to this generation. The circuit breaker analysis concluded that zero (0) 12 kV breakers replacements are required as part of this project.

System Protection Consideration

It is a requirement that the generation protection system is capable of detecting a phase-to-ground fault condition in the SCE systems and that the neutral stability of the SCE distribution system is maintained in the event of an accidental isolation of the generator from the SCE system.

To accomplish these requirements, a ground bank will be required to be installed at location in the distribution circuit where the grounded-neutral conductor [REDACTED] on the SCE distribution system is located. The ground bank will be sized to prevent an excessive neutral shift which would create an overvoltage on the unfaulted phases of the SCE's distribution system.

A ground detector will also be required on the SCE side of the point of interconnection at the generation location. The ground detector will be used to send a voltage trip signal into customer

protection relays.

Thermal Loading

The line section of the Taiwan 12 kV between the customer's facility and the 480 V Point of Interconnection is expected to experience an incremental reverse power flow of approximately 1.95 MW during minimum loading. Of that 1.95 MW, approximately no flow will be back into the 12 kV bus at Modena 66/12 kV Substation during minimum loading due to the absorption of the power flow by the local load.

Distribution Voltage Control

The section of the Taiwan 12 kV circuit near the project area is expected to experience voltage rise of 2.17% which would exceed the allowable CPUC Rule 2 requirements by 0.51% as a result to the addition of the [REDACTED] WDAT 880ISP Project under the generating facilities conditions of maximum generation and unity power factor. This voltage rise could be mitigated by operating the generating facility to consume reactive power (VARs). Therefore, the [REDACTED] Project must be operated at power factor range of 95% lagging or absorb 0.64 MVARs at the point of interconnection. An overvoltage is also calculated under N-1 conditions which occurs when the Taiwan breaker opens and portion of the Taiwan circuit is transferred to another distribution circuit. In the event of an N-1 condition, the [REDACTED] Project will be switched off if SCE deems it necessary until the distribution system is returned to normal condition.

IV. PART A: GENERAL DESCRIPTION OF IDENTIFIED UPGRADES

Distribution Upgrades

Distribution Upgrades are not required to interconnect this generation facility.

Interconnection Facilities

Interconnection Facilities will be required to interconnect the system. Interconnection facilities include installing a new ground bank, a new ground detector, the installation of a new 3 way padmounted Gas switch with automation, PME 4 for fusing, one new 2500 KVA 277/480 V padmounted transformer, a 12 kV line extension of approximately 740 feet of 1/0 JCN between existing 12kV line extension and applicant's 480 V switchgear, metering CTs, meters, and associated wiring.

Telemetry requirements

Real-time telemetry will be required. In order to meet the telemetry requirements SCE is planning to utilize a new method telemetry which utilizes a centralized RTU concept. The new telemetry method is under development and it anticipated that it will be ready for this project. The cost estimate to comply with the telemetry requirements using the new method is \$14.5 K. The cost and scope of telemetry may significantly increase to include a dedicated RTU as required by SCE's Interconnection Handbook with an approximate cost of \$155,000 in the event that Centralized RTU method is not feasible for this project.

Corporate Environment, Health and Safety

Obtain licensing and permits and perform all required environmental activities for the construction of the following project elements if applicable:

Install 740' of 1/0JCN between WDT880ISP and the existing SCE Taiwan 12 kV line

For SCE facilities and scope of work not subject to CPUC's GO 131-D, SCE will follow the requirements of all applicable environmental laws and regulations and issue an in-house Environmental Clearance before commencement of construction activities. The cost estimates provided assume that SCE will perform all required environmental activities for SCE facilities and scope of work from the siting through the post-construction phases. However, it is recommended for SCE facilities and scope of work to be included in the Generator's Environmental Licensing and Permitting documents to streamline the environmental process and avoid unnecessary delays in construction. The responsibilities for performing certain environmental activities may be negotiated during or after the Interconnection Agreement process.

Customer Equipment

The interface protection will be provided by the applicant and will include a 480 V circuit breaker which is to be installed on an applicant-owned 277/480 V 3-phase/4-wire switchgear.

Drawings required by the Electrical Service Requirement (ESR) shall be submitted, reviewed, modified, and approved by SCE prior to release for fabrication/purchase of the equipment.

Applicant generation interconnection equipment must comply with SCE's Interconnection Handbook in regards to generation protection and lockable-visible disconnecting means at the point of interconnection.

Application will be required to purchase a relay which will accept the voltage input from the SCE's ground detector and which will trip the generation in case of a phase-ground fault in the SCE system.

Additionally, the applicant will be responsible for the installation and costs of certain underground facilities (i.e., ducts, structures, etc.) to the extent required by the final design. The construction of the underground facilities will be as per SCE's project drawings

V. NON-BINDING ORDER OF MAGNITUDE COST ESTIMATE

- Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows:

Interconnection Facilities/Automation	\$ 309.0K
• Primary Riser Pole	
• 740' 1/0JCN UG 12kV Line Extension	
• Switch Automation	
• 3 Way Padmounted Gas Switch	
• Metering	
• Associated Wiring	
• PME 4 Switch	

- 2500 kVA SCE owned transformer
- Install a new Ground Bank
- Install a new ground detector

CEH&S	\$ 466.9K
12kV Distribution Upgrades	\$ 0.0 K
<ul style="list-style-type: none"> • None 	
Telemetry Requirements	\$ 14.5 K ¹
<ul style="list-style-type: none"> • Add the generation data points into the Energy Management system 	
ITCC (35%)	\$ 276K
<hr/>	
Total non-binding order of magnitude cost estimate	\$ 1.066M

VI. PART A: SUMMARY

The Part A Independent System Impact Study showed:

1. Distribution Upgrades are not required to interconnect this generation facility.
2. Interconnection Facilities will be required to interconnect the system. Interconnection facilities include installing a new ground bank, a new ground detector, the installation of a new 3 way padmounted Gas switch with automation, PME 4 for fusing, one new 2500 KVA 277/480 V padmounted transformer, a 12 kV line extension of approximately 740 feet of 1/0 JCN between existing 12kV line extension and applicant's 480 V switchgear, metering CTs, meters, and associated wiring
3. Real time telemetry will be required. In order to meet the telemetry requirements SCE is planning to utilize a new method of telemetry which utilizes a centralized RTU concept that provides watts and VAR flow from the generation facility to the SCE distribution system.
4. Corporate Environment, Health and Safety

Obtain licensing and permits and perform all required environmental activities for the construction of the following project elements if applicable:

Install 740' of 1/0JCN to the project's location between WDT880ISP and the existing SCE Taiwan 12 kV line

For SCE facilities and scope of work not subject to CPUC's GO 131-D, SCE will follow the requirements of all applicable environmental laws and regulations and issue an in-

¹ Cost Estimate based on centralized RTU method; the cost and scope of telemetry may significantly increase to include a dedicated RTU as required by SCE's Interconnection Handbook with an approximate cost of \$155,000 in the event that Centralized RTU method is not feasible for this project.

house Environmental Clearance before commencement of construction activities. The cost estimates provided assume that SCE will perform all required environmental activities for SCE facilities and scope of work from the siting through the post-construction phases. However, it is recommended for SCE facilities and scope of work to be included in the Generator's Environmental Licensing and Permitting documents to streamline the environmental process and avoid unnecessary delays in construction. The responsibilities for performing certain environmental activities may be negotiated during or after the Interconnection Agreement process.

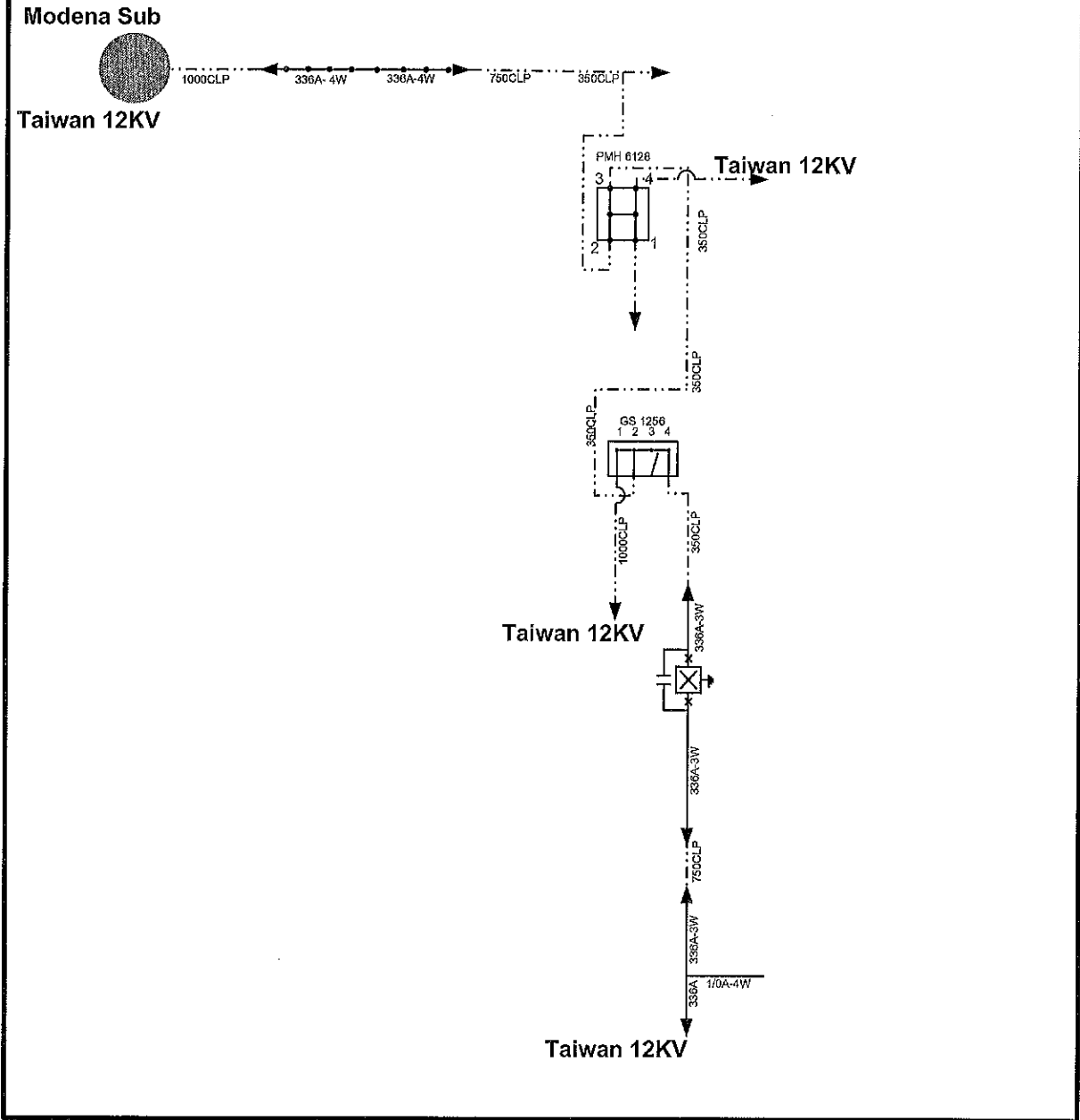
5. Non-binding order of magnitude cost estimates for the required interconnection facilities and system upgrades are as follows:

Interconnection Facilities	\$ 309.0K
Distribution upgrades	\$ 0 K
Telemetry Requirements	\$ 14.5 K ¹
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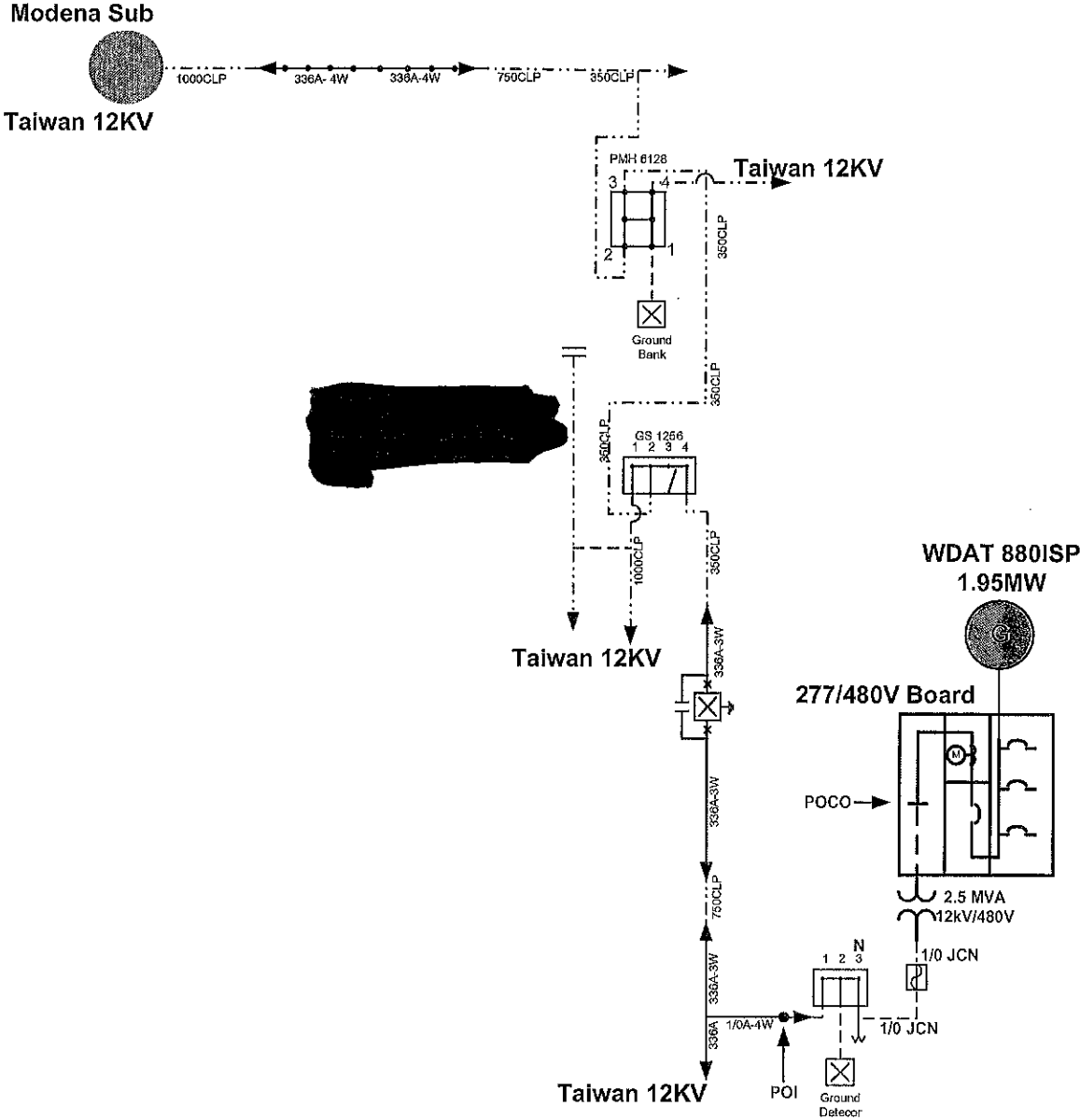
5. This Independent System Impact Study is based on various technical data previously provided by the applicant. If any of that information changes significantly, as determined by SCE, the results of this study may no longer be appropriate and may necessitate a new study.
6. The Independent System Impact Study is based on applicant's queue position. Additional studies may be needed if any changes occur in the projects ahead in the queue.
7. Interconnection service pursuant would be expected to commence within 8 months from the execution Agreement.
8. A Facilities Study detailing required scope and cost of the identified upgrades is required to proceed with the project.
9. Current distribution standards are being updated to address generation interconnection systems. The proposed method of service on this report may change according on final design to comply with the updated distribution design standards.
10. Applicant is responsible for the installation of Underground Structures and conduits needed for the interconnection.
11. Upgrades identified are general and preliminary descriptions only. The costs indicated are non-binding order of magnitude only. The schedule is projected and preliminary.

¹ Cost Estimate based on centralized RTU method; the cost and scope of telemetry may significantly increase to include a dedicated RTU as required by SCE's Interconnection Handbook with an approximate cost of \$155,000 in the event that Centralized RTU method is not feasible for this project.

A1- System without Proposed project



A2- System with Proposed Project



ATTACHMENT B – BULK POWER SYSTEM IMPACT STUDY REPORT

CAISO Controlled Bulk System

Short Circuit Duty:

Based on the size and point of interconnection of the Project it is assumed that the SCD impacts will be limited to the SCE distribution system. The results for the distribution SCD analysis are included in the Part A (distribution assessment) of this report. The SCD impacts of the project on the CAISO controlled transmission system are assumed to be negligible.

Power Flow Study:

This project individually will not contribute to any power flow issues in the Metro Area bulk system. The existing system has sufficient transmission capability to accommodate the project without any significant upgrades or modification to existing Special Protection System (SPS).