

# Business Continuity Manual

## Business Continuity Plan: E4

### Power Distribution System

		Signature	Revision	Effective Date
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**A. System Description**  
**1.0 HV Distribution System**

**1.1 Terminal 1**

- 1.1.1 The incoming main high voltage power supply (11kV) for T1 are provided by CLP primary 132/11kV substation APA & APB supply via their respective CLP customer switching stations, A, B, C & CH. High voltage emergency power supply is feeding for T1 from the standby HV generators and Battery Energy Storage System (BESS) located at Generator House 1 (GH1).
- 1.1.2 Four main 11kV switch stations situated at different locations in Terminal 1 (T1), namely PA, PB, PC and PH. HV switchboards are dedicated to supplying the Ring Main Units (RMUs) and/or to the chillers in each substation.
- 1.1.3 There are 20 substations in T1, namely A1, A2, A3, A4, A6, B1, B2, B3, B4, B5, C1, C2, C3, C4, C5, C6, C7, C8, C8A and C9. Each substation houses the RMUs and HV/LV transformers, which are connected from their respective RMUs and feed to LV distribution boards.
- 1.1.4 The CLP distribution rooms are interconnected with HV switchboards in a HV/LV cabling network and the HV switchboards give input/output signals required by the HV Supervisory Control and Data Acquisition (SCADA) and Intelligent Protection, Automation, Control and Supervision (IPACS) systems.
- 1.1.5 HV SCADA system provides the remote monitoring, control, protection and automatic supply transfer functions for the HV distribution network in case of power failure. The IPACS system is the backup system for providing the automatic supply transfer function if the HV SCADA system fails.
- 1.1.6 Two under voltage relays and two three-phase 11kV/380V Voltage Transformers are installed at busbars on both sides of the 11kV switchboard. In case of CLP power failure, the four under voltage relays will be triggered and thus under voltage input signals will be sent to REF AS Bay Modules located inside HVSCADA/IPACS local panels in Substations PA, PB, PC and PH in T1, initiating the supply transfer and load shedding operations at 11kV switch stations.

**1.2 T1 Satellite Concourse (T1S)**

- 1.2.1 The incoming high voltage power supply (11kV) for T1S is provided by CLP customer switching station A through airfield substation EX.
- 1.2.2 The airfield SCADA system provides remote switching and monitoring functions for the HV distribution network.

## **2.0            LV Distribution System**

### **2.1        Terminal 1**

- 2.1.1. The low voltage sub-main distribution system consists of LV main switchboards, which distribute electrical power from the main transformers to various LV distribution boards. There are 20 LV switch stations in T1. Each LV switch station is supplied by at least two different HV power sources such that the lighting and general power in each zone can be fed from at least two different sources.
- 2.1.2. The LV distribution boards supply electricity to lighting and general power circuits to various locations.
- 2.1.3. For gantry lighting, lighting circuits of each zone are distributed from three gantry Lighting & Power (L&P) boards, which are supplied by different HV power sources. This setup ensures that only one-third of gantry lighting would be affected if there is a power interruption of either one of the HV power sources.
- 2.1.4. For public lighting and small power, L&P boards are responsible for each centralized zone and the L&P boards are supplied by different HV power sources. In case of power interruption, only one-third of L&P in the centralized zone would be affected.
- 2.1.5. The GBMS control circuits of L&P boards are protected by UPS. The control circuit supply of lighting circuits would not be disrupted in case of a power failure or voltage dip in the incoming sources.
- 2.1.6. For aircraft loading bridges and apron high mast lightings, power supplies are connected to 8 different HV switchboard bus sections, namely “PA-1”, “PA-2”, “PB-1”, “PB-2”, “PC-1”, “PC-2”, “PH-1” and “PH-2”, at Substations PA, PB, PC and PH respectively. In case of power failure from any one bus-section of HV switchboards, 87% of aircraft loading bridges and apron high mast lights can still be maintained and therefore the adverse impact in a concentrated zone would spread out.
- 2.1.7. For baggage handling system, power supply to the primary sorters, secondary sorters and delivery lines of BHS are connected to different transformers from different HV switching stations “PA”, “PB”, “PC” and “PH”. In case of power failure in any one of HV switching stations, 100% of Baggage Handling System can still be maintained in normal operation after supply changeover operation.

## **2.2. Terminal 1 Annex Building, Sky Bridge, Terminal 2, T1 Satellite Concourse, SkyPier Terminal, GTC & Ground Transportation Lounge**

- 2.2.1. The LV distribution boards serve to distribute lighting and general electrical power circuits to various locations.
- 2.2.2. The GBMS control circuits of L&P boards are protected by UPS. The control circuit supply of lighting circuits would not be disrupted in case of the power failure or voltage dip from the incoming sources.
- 2.2.3. The emergency power system consists of LV Generators and is used to backup main power supply. When the main power is lost, the Emergency Power System would automatically cut-in within 15 seconds and provide power supply to those equipment classified as “essential”.

## **2.3. Integrated Airport Center (IAC)**

- 2.3.1. The Integrated Airport Center is supplied by different CLPP LV feeders with essential supply backup by 2 nos. local LV emergency generators.
- 2.3.2. In case of either one supply power is unstable or loss, the auto changeover function would be activated to maintain the electrical power. When city main power recovers, manual operation for system resume to normal status is required.
- 2.3.3. In case of both supplies are loss, mobile LV generators could be mobilized and provide power to the IAC.
- 2.3.4. The LV distribution boards serve to distribute lighting and general electrical power circuits.
- 2.3.5. The critical loading are protected by 2 sets of 825kVA UPS. The electrical power would not be disrupted in case of the power failure or voltage dip from the incoming sources.

## **2.4. T1 Midfield Concourse**

- 2.4.1. The T1 Midfield Concourse is supplied by LV feeders by CLP Power (CLPP) via 11 LV Switchboard with essential supply backup by 8 nos. LV generators.
- 2.4.2. The emergency power system consists of LV Generators and is used to backup main power supply. When the main power is lost, the Emergency Power System would automatically cut-in

within 15 seconds and provide power supply to those equipment classified as “essential”.

- 2.4.3. The GBMS control circuits of L&P boards are protected by UPS, and the control circuit supply would not be disrupted in case of the power failure or voltage dip from the incoming sources. The public lighting is controlled by the Digital Addressable Lighting Interface (DALI )system which is designed to be fail-safe and will remain the last status in case of voltage dip.

## **B. Physical System Risk**

Risk	Description	Mitigation
Trespassers	Located in landside and airside with Access Control System (ACS)	In addition to ACS, Master Key System had been applied for the access control of the electrical plant rooms.
Fire	Protected by smoke detectors	Segregate the HV Sub-station into two compartments had been established.

## **C. Contingency Planning for Power Distribution System**

### **1.0 Criteria for activating contingency plan**

Below are the possible fault scenarios but not limited to the other unexpected fault conditions:-

1.1 Scenario 1 – YELLOW warning condition

CLP power healthy + HVSCADA/IPACS system failure + No activation of supply transfer

1.2 Scenario 2 – BROWN warning condition

CLP power healthy + HVSCADA/IPACS system failure + Activation of supply transfer due to false signal (Supply Transfer FULLY completed)

1.3 Scenario 3 – ORANGE warning condition

CLP power healthy + HVSCADA/IPACS system failure + Activation of supply transfer due to false signal (Supply Transfer PARTIALLY completed)

1.4 Scenario 4 – RED warning condition

CLP power failure + HVSCADA/IPACS system healthy

1.5 Scenario 5 – BLACK warning condition

CLP power failure + HVSCADA/IPACS system failure



## **2.0 CLP power failures denotes as :-**

- 2.1 CLP power failure at switch station PA only;
- 2.2 CLP power failure at switch station PB only ;
- 2.3 CLP power failure at switch station PC only ;
- 2.4 CLP power failure at switch station PH only ;
- 2.5 CLP power failure at more than two switch stations.

## **3.0 HVSCADA/IPACS system failures denotes as:-**

- 3.1 Supply Transfer (ST) Fail alarm received at FRTMO
- 3.2 ABB REF Bay Module failure
- 3.3 Both 2 PLCs fault alarm in Generator Interfacing Panel
- 3.4 Communication channel fail between two Bay Modules in the HVSCADA/IPACS panel

## **4.0 Services and manpower involved**

FRT Duty Authorized Person must hold a certificate of Registered Electrical Worker with Grade H and Permitted Work type (A/B/C). They shall be registered and authorized by TSI according to Procedure TS-I-P/T/003 “Electrical System – Operation and Maintenance”.

## **5.0 Contingency Procedures**

A minimum acceptable services standard in case of total power failure for incoming CLP power supplies and airport services are maintained under generator power supplies, which can be summarized as follow:

- 5.1 Maintain Terminal Temperature at 26°C,
- 5.2 Maintain at least 75% lighting during power interruption,
- 5.3 Maintain BHS 100% available after supply changeover,
- 5.4 Maintain supply to at least 7/8 loading bridge and high mast lighting;

## **6.0 Contingency Measures**

- 6.1 Scenario 1 – YELLOW warning condition  
Condition: CLP power healthy + HVSCADA/IPACS system FAILURE +  
No activation of supply transfer

Step	Immediate Action to be taken	Work Location	Responsible person
Y1	Alert FRT & Ad-hoc Emergency Team for YELLOW Warning condition.	FRTMO	Duty System Controller or his delegate
Y2	Call CLP System Control Center via hot line at FRTMO to confirm whether CLP power supply is healthy.	FRTMO	Duty System Controller or his delegate
Y3	Inform IAC, TOD, LD, AD, SOCC, AVSECO and Manager, Electrical Services Maintenance for HVSCADA/IPACS system failure.	FRTMO	Duty System Controller or his delegate
Y4	Switch OFF HVSCADA/IPACS system in HVSCADA/IPACS local panel	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
Y5	Put circuit breaker (C/B) control switch in LOCAL position in the affected PA/PB/PC/PH Substation.	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
Y6	In case of power failure, carry out emergency power restoration under manual switching sequence and/or start up emergency generator and BESS at GH1 by means of remote start push button installed at PH S/S if necessary.	11kV Switch Station PH, PA, PB & PC	Duty System Controller or his delegate Contractor Authorized Persons Ad-hoc Emergency Team's A.P.
Y7	Call maintenance contractor to take follow-up action and carry out fault rectification of the HVSCADA/IPACS system within 3 hours.	11kV Switch Station PA, PB, PC & PH	HVSCADA/IPACS Maintenance Team
Y8	If the HVSCADA/IPACS system is resumed, reinstate HVSCADA/IPACS & switchgear to normal status after obtain approval.	11kV Switch Station PA, PB, PC & PH	Duty System Controller or his delegate Contractor Authorized Persons Ad-hoc Emergency Team's A.P.
Y9	Inform IAC, TOD, LD, AD, SOCC, AVSECO, CLP System Control Center and Manager, Electrical Services Maintenance after HVSCADA/IPACS system resumed to normal condition.	FRTMO	Duty System Controller or his delegate

## 6.2 Scenario 2 – BROWN warning condition

Condition: CLP power healthy + HVSCADA/IPACS system FAILURE + Activation of supply transfer due to false signal (FULL supply transfer completed)

Step	Immediate Action to be taken	Work Location	Responsible person
B1	Alert FRT & Ad-hoc Emergency Team for BROWN Warning condition.	FRTMO	Duty System Controller or his delegate
B2	Call CLP System Control Center via hot line at FRTMO to confirm whether CLP power supply is healthy.	FRTMO	Duty System Controller or his delegate
B3	Inform IAC, TOD, LD, AD, SOCC, AVSECO and Manager, Electrical Services Maintenance for full supply transfer operation caused by HVSCADA/IPACS system failure.	FRTMO	Duty System Controller or his delegate
B4	Switch OFF HVSCADA/IPACS system in HVSCADA/IPACS local panel	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
B5	Put circuit breaker (C/B) control switch in LOCAL position in the affected PA/PB/PC/PH Substation.	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
B6	If the emergency generators and BESS at GH1 are triggered due to supply transfer operation, inform Electrical Maintenance Team to monitor the running status of emergency generator, BESS & fuel oil level in fuel tank	FRTMO GH1	Duty System Controller or his delegate
B7	By GBMS, reset the LV power supply for the affected L&P board & Tenant ACB.	GBMS W/S at FRTMO	Duty E&M members
B8	Closely monitor the load current which will not exceed emergency supply capacity.	FRTMO	Duty System Controller or his delegate
B9	If CLP power supply is healthy, inform IAC, TOD, LD, AD, SOCC, AVSECO & Manager, Electrical Services Maintenance for restore power supply from emergency supply source to CLP source.	FRTMO	Duty System Controller or his delegate
B10	Carry out the supply restoration at	PA/PB/PC/PH	FRT's Authorized

	the respective switch station from emergency supply source to CLP source manually under the instruction of Duty System Controller.	and other concerned HV/LV switch rooms	Person Ad-hoc Emergency Team's A.P.
B11	By GBMS, reset the LV power supply for the affected L&P board & Tenant ACB.	GBMS W/S at FRTMO	Duty E&M members
B12	If GBMS is mal-function, deploy FRT & Ad-hoc Emergency Team to check & manually reset the LV switchboard/L&P board/Tenant ACB/DB.	Affected LV switchboard/L&P board/Tenant ACB & DB	Duty E&M members FRT's member Ad-hoc Emergency Team
B13	HVSCADA/IPACS maintenance contractor to take follow-up action and carry out fault rectification of the HVSCADA/IPACS system within 3 hours.	11kV Switch Station PA, PB, PC & PH	HVSCADA/IPACS Maintenance Team
B14	If the HVSCADA/IPACS system is resumed, reinstate HVSCADA/IPACS & switchgear to normal status after obtain approval.	11kV Switch Station PA, PB, PC & PH HVSCADA/IPACS OWS at FRTMO	Duty System Controller or his delegate Contractor Authorized Persons Ad-hoc Emergency Team's A.P
B15	Inform IAC, TOD, LD, AD, SOCC, AVSECO, CLP System Control Center and Manager, Electrical Services Maintenance after HVSCADA/IPACS system resumed to normal condition.	FRTMO	Duty System Controller or his delegate

### 6.3 Scenario 3 – ORANGE warning condition

Condition: CLP power healthy + HVSCADA/IPACS system FAILURE + Activation of supply transfer due to false signal (PARTIAL supply transfer completed)

Step	Immediate Action to be taken	Work Location	Responsible person
O1	Alert FRT & Ad-hoc Emergency Team for ORANGE Warning condition.	FRTMO	Duty System Controller or his delegate
O2	Call CLP System Control Center via hot line at FRTMO to confirm whether CLP power supply is healthy.	FRTMO	Duty System Controller or his delegate
O3	Inform IAC, TOD, LD, AD, SOCC, AVSECO and Manager, Electrical	FRTMO	Duty System Controller or his delegate

	Services Maintenance for partial supply transfer operation caused by HVSCADA/IPACS system failure.		
O4	Switch OFF HVSCADA/IPACS system in HVSCADA/IPACS local panel	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
O5	Put circuit breaker (C/B) control switch in LOCAL position in the affected PA/PB/PC/PH Substation.	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
O6	Carry out the load shed & supply transfer operation at the respective switch station manually to resume the power supply under the instruction of Duty System Controller.	PA/PB/PC/PH and other concerned HV/LV switch rooms	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
O7	If the emergency generators and BESS at GH1 are triggered due to supply transfer operation, inform Electrical Maintenance Team to monitor the running status of emergency generator, BESS & fuel oil level in fuel tank	FRTMO GH1	Duty System Controller or his delegate Electrical Maintenance Team
O8	By GBMS, reset the LV power supply for the affected L&P board & Tenant ACB.	GBMS W/S at FRTMO	Duty E&M members
O9	Closely monitor the load current which will not exceed emergency supply capacity.	FRTMO	Duty System Controller or his delegate
O10	If CLP power supply is healthy, inform IAC, TOD, LD, AD, SOCC, AVSECO & Manager, Electrical Services Maintenance for restore power supply from emergency supply source to CLP source.	FRTMO	Duty System Controller or his delegate
O11	Carry out the supply restoration at the respective switch station from emergency supply source to CLP source manually under the instruction of Duty System Controller.	PA/PB/PC/PH and other concerned HV/LV switch rooms	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
O12	By GBMS, reset the LV power supply for the affected L&P board & Tenant ACB.	GBMS W/S at FRTMO	Duty E&M members
O13	If GBMS is mal-function, deploy FRT & Ad-hoc Emergency Team to check & manually reset the LV	Affected LV switchboard/L&P board/Tenant	Duty E&M members FRT's member Ad-hoc Emergency

	switchboard/L&P board/Tenant ACB/DB.	ACB & DB	Team
O14	HVSCADA/IPACS maintenance contractor to take follow-up action and carry out fault rectification of the IPACS system within 3 hours.	11kV Switch Station PA, PB, PC & PH	HVSCADA/IPACS Maintenance Team
O15	If the HVSCADA/IPACS system is resumed, reinstate HVSCADA/IPACS & switchgear to normal status after obtain approval.	11kV Switch Station PA, PB, PC & PH	Duty System Controller or his delegate Contractor Authorized Persons Ad-hoc Emergency Team's A.P.
O16	Inform IAC, TOD, LD, AD, SOCC, AVSECO, CLP System Control Center and Manager, Electrical Services Maintenance after HVSCADA/IPACS system resumed to normal condition.	FRTMO	Duty System Controller or his delegate

6.4 Scenario 4 – RED warning condition  
Condition: CLP power failure + HVSCADA/IPACS system healthy

Step	Immediate Action to be taken	Work Location	Responsible person
R1	Liaise with CLP System Control Center (SCC) via hot line at FRTMO for the following :- Exact scope/coverage of power failure; The power failure's location? Which CLP infeed cables and AA substations are affected? How long will the CLP power be resumed? Note : the answers to the above questions will assist Duty System Controller to assess the current situation better. This will help Duty System Controller to understand the impact to the Airport and hence make the best judgment/decision at that time.	FRTMO	Duty System Controller or his delegate
R2	Alert FRT, Ad-hoc Emergency Team & Electronic Team FRT for RED Warning condition.	FRTMO	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
R3	Check the C/B status after supply transfer operation via HVSCADA/IPACS system and the	HVSCADA/IPAC S OWS at FRTMO	Duty System Controller or his delegate FRT's Authorized

	affected switch rooms.	11kV Switch Station PA/PB/PC/PH	Person Ad-hoc Emergency Team's A.P.
R4	Inform IAC, TOD, LD, AD, SOCC, AVSECO and Manager, Electrical Services Maintenance for supply transfer operation caused by CLP power failure.	FRTMO	Duty System Controller or his delegate
R5	If the emergency generators and BESS at GH1 are triggered due to supply transfer operation, inform Electrical Maintenance Team to monitor the running status of emergency generator, BESS & fuel oil level in fuel tank	FRTMO GH1	Duty System Controller or his delegate E&M Team
R6	Reset the LV power supply by GBMS for the affected switchboard, L&P board & Tenant ACB according to its priority of impact.	GBMS W/S at FRTMO	Duty E&M members
R7	If GBMS is mal-function, deploy FRT & Ad-hoc Emergency Team to check & manually reset the LV switchboard/L&P board/Tenant ACB/DB.	Affected LV switchboard/L&P board/Tenant ACB & DB	Duty E&M members FRT's member Ad-hoc Emergency Team
R8	Closely monitor the load current which will not exceed emergency supply capacity. Otherwise, carry out load shed for non-essential load such as AHU, FCU, PCA, FGP.	FRTMO	Duty System Controller or his delegate
R9	Call CLP System Control Center (SCC) via hot line and ask for restoring time of CLP power supply.	FRTMO	Duty System Controller or his delegate
R10	If CLP power supply is resumed normal & stable, inform IAC, TOD, LD, AD, SOCC, AVSECO & Manager, Electrical Services Maintenance for restore power supply from emergency supply source to CLP source.	FRTMO	Duty System Controller or his delegate
R11	Carry out the supply restoration from emergency supply source to CLP source by HVSCADA/IPACS system/manual under the instruction of Duty System Controller.	PA/PB/PC/PH and other concerned HV/LV switch rooms	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
R12	Inform IAC, TOD, LD, AD, SOCC, AVSECO, CLP System Control Center and Manager, Electrical Services Maintenance after power resumed to normal condition.	FRTMO	Duty System Controller or his delegate

6.5 Scenario 5 – BLACK warning condition

Condition: CLP power FAILURE + HVSCADA/IPACS system FAILURE

Step	Immediate Action to be taken	Work Location	Responsible person
BK1	Liaise with CLP System Control Center (SCC) via hot line at FRTMO for the following :- Exact scope/coverage of power failure; The power failure's location? Which CLP infeed cables and AA substations are affected? How long will the CLP power be resumed? Note : the answers to the above questions will assist Duty System Controller to assess the current situation better. This will help Duty System Controller to understand the impact to the Airport and hence make the best judgment/decision at that time.	FRTMO	Duty System Controller or his delegate
BK2	Alert FRT & Ad-hoc Emergency Team for BLACK Warning condition.	FRTMO	Duty System Controller or his delegate
BK3	Inform IAC, TOD, LD, AD, SOCC, AVSECO and Manager, Electrical Services Maintenance for power interruption caused by CLP power failure & HVSCADA/IPACS system failure.	FRTMO	Duty System Controller or his delegate
BK4	Switch OFF HVSCADA/IPACS system in HVSCADA/IPACS local panel	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
BK5	Put circuit breaker (C/B) control switch in LOCAL position in the affected PA/PB/PC/PH Substation.	11kV Switch Station PA/PB/PC/PH	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
BK6	Immediately press the remote start push button to start up the emergency generator and BESS. Inform Electrical Maintenance Team to keep closely monitoring of the running status of generator, BESS & fuel oil level in fuel tank.	PH Substation	Duty System Controller or his delegate FRT's Authorized Person Ad-hoc Emergency Team's A.P. E&M Team
BK7	Carry out the load shed & supply transfer operation at the respective switch station by manually to resume the power supply under the	PA/PB/PC/PH and other concerned HV/LV switch rooms	FRT's Authorized Person Ad-hoc Emergency Team's A.P.



	instruction of Duty System Controller.		
BK8	Restore the power supply of HV & LV switch rooms according to its priority of impact	PA/PB/PC/PH and other concerned HV/LV switch rooms	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
BK9	By GBMS, reset the LV power supply for the affected LV switchboard, L&P board & Tenant ACB.	GBMS W/S at FRTMO	Duty E&M members
BK10	Closely monitor the load current which will not exceed emergency supply capacity.	FRTMO	Duty System Controller or his delegate
BK11	Call CLP System Control Center (SCC) via hot line and ask for restoring time of CLP power supply.	FRTMO	Duty System Controller or his delegate
BK12	If CLP power supply is resumed normal & stable, inform IAC, TOD, LD, AD, SOCC, AVSECO & Manager, Electrical Services Maintenance for restore power supply from emergency supply source to CLP source.	FRTMO	Duty System Controller or his delegate
BK13	Carry out the supply restoration from emergency supply source to CLP source by manual under the instruction of Duty System Controller.	PA/PB/PC/PH and other concerned HV/LV switch rooms	FRT's Authorized Person Ad-hoc Emergency Team's A.P.
BK14	HVSCADA/IPACS maintenance contractor to take follow-up action and carry out fault rectification of the HVSCADA/IPACS system within 3 hours.	11kV Switch Station PA, PB, PC & PH	HVSCADA/IPACS Maintenance Team
BK15	If the HVSCADA/IPACS system is resumed, reinstate HVSCADA/IPACS & switchgear to normal status after obtain approval.	11kV Switch Station PA, PB, PC & PH	Duty System Controller or his delegate Contractor Authorized Persons Ad-hoc Emergency Team's A.P.
BK16	Inform IAC, TOD, LD, AD, SOCC, AVSECO, CLP System Control Center and Manager, Electrical Services Maintenance after power & HVSCADA/IPACS resumed to normal condition.	FRTMO	Duty System Controller or his delegate

## **D Contingency Procedures during the passage of Tropical Cyclones**

- 1.0 When typhoon signal no. 1 or above is hoisted, maintenance contractor shall be alerted by TSI Typhoon Support Team or FRT Assistant Manager, Fault Response for performing the typhoon precautionary work such as electrical plant rooms inspection with checklist to ensure the electrical system are under normal condition when instructed.
- 2.0 TSI Typhoon Support Team shall coordinate with maintenance contractor to provide sufficient manpower as stipulated in the maintenance contract, with all necessary tools and equipment to perform the typhoon precautionary work in a safe and efficient manner.
- 3.0 After lowering of the typhoon signal and completion of the inspection of all electrical plant rooms and ensure the electrical system are under normal condition, TSI Typhoon Support Team may official dismiss maintenance contractor's typhoon precautionary team

## **E. Cyber Security**

System cyber security threat level based on the following risk rating:

Threat Level	System
Low	System uses no IT-based systems.
Medium	System uses some closed data-collection and/or alarm systems based on sensors or IoT devices.
High	System uses integrated SCADA systems, cloud-based data collections systems, or IP-based monitoring and control systems.

- Power Distribution System – Threat Level: High

### Rationale for threat level

Power Distribution System uses HVSCADA and IPACS system for monitoring the status of the HV distribution system and GBMS system for monitoring the status of the LV distribution system.

### Mitigation actions taken

Access to the locations of system workstations are restricted. Only authorized person is allowed to control the system. Further action may be taken on the results of the TS OT Systems Information System Cybersecurity Vulnerabilities survey.

In case of suspected cyber-attack, Risk & Cybersecurity Team of ITD shall be informed for further investigation.

**F. Interface with Other Operational Organizations during Contingency**

- 1.0 FRTMO
- 2.0 IAC
- 3.0 CLP Power System Control Center
- 4.0 TOD
- 5.0 LD
- 6.0 AD
- 7.0 CAD
- 8.0 SOCC
- 9.0 AVSECO

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