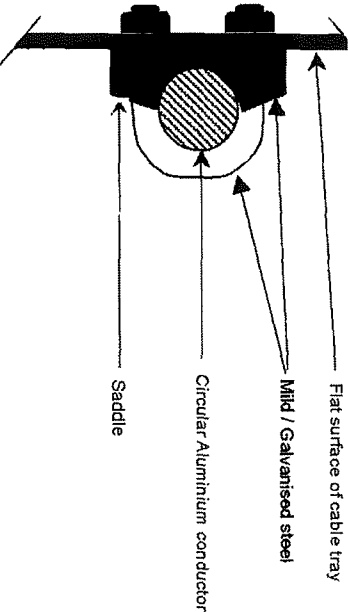


4. SCOPE OF WORK

Contractor is required to perform the following scope:

- Complete all the scope as per the table below
- Copper earthing network are to be replaced with aluminium conductors
- Standard copper earthing size at Lethabo is 3 x 50mm and 3 x 25mm. Earthing must be replaced with equivalent aluminium conductors as per Table 2, unless where specific sizes are specified by Lethabo. Aluminium bars can also be used where applicable
- Bi-metal lugs or washers needs to be used where copper to aluminium connections are made
- To ensure a proper, low impedance bond in the case of a circular aluminium conductor that must be bonded to the flat surface of a cable tray, an aluminium saddle must be used as indicated in the figure below. This must be done at intervals of every 20-30cm.



- Aluminium conductors are not to be installed directly in the ground. Alternative methods must be proposed by the contractor where applicable
- Where practical, isothermic welding must be used for connections
- Each area must be tested by the Contractor upon completion before being accepted. Only readings below 10 milliohm will be accepted.
- Upon completion, the Contractor is to provide a detailed data book. The databook must contain the following as a minimum; photos before and after installation per area, actual installed distances, specifications of conductor used, bonding method, test results, test equipment, etc.
- On the 380V Switchgear back of the panels the copper bar is 50mmx5mm (250mm²). The aluminum bar size that can be used is 80x5 mm². Each panel tier is 600mm.
- Connect all the earth wires at the back of the 380V Switchgear panels to the aluminum bar and use Bi-metal lugs and washers.

Plant Area	Plant Description	Action	Earthing Conducto r/bar (m)
Unit 1 Ground Floor	Unit 1-3 TRFR 5&6	Clean and re-tighten	
Unit 1 Ground Floor	BFP Ejector PMP B Panel	Clean and re-tighten	
Unit 1 Ground Floor	Main Turbine Ejector	Clean and re-tighten	

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	PMP A		
Unit 1 LV Room	Unit LV switchgear room	Clean and re-tighten	
Unit 1 LV Room	20KVA Bypass isolator transformer	Clean and re-tighten	
Unit 1 LV Room	20KVA Unit 3 isolator A	Clean and re-tighten	
Unit 1 LV Room	UPS battery Cabin B	Install earthing conductor	90
Unit 1 LV Room	20KVA Unit 3 UPS B	Clean and re-tighten	
Unit 1 LV Room	UPS battery Cabin A	Install earthing conductor	90
Unit 1 LV Room	Unit 1 and 2 synchronize power panel	Clean and re-tighten	
Unit 1 MV Room	Gen TRFR Yard Communication Kiosk	Clean and re-tighten	
Unit 1 MV Room	Panel 01MY01	Clean and re-tighten	
Unit 1 MV Room	Alarm panel No.1	Clean and re-tighten	
Unit 1 MV Room	Welding Socket	Clean and re-tighten	
Unit 1 MV Room	Measurement Panel	Clean and re-tighten	
Unit 1 Milling Plant	Mill E	Clean and re-tighten	
Unit 2 Ground Floor	CCP 1-3 TRFR 3&4	Clean and re-tighten	
Unit 2 Ground Floor	BFPT Ejector PMP A	Clean and re-tighten	
Unit 2 Ground Floor	BFPT Ejector PMP B	Install earthing conductor	2
Unit 2 Ground Floor	Main Turbine Ejector PMP A	Install earthing conductor	4
Unit 2 Ground Floor	Main Turbine Ejector PMP B	Install earthing conductor	4
Unit 2 Ground Floor	Main Turbine Ejector PMP C	Install earthing conductor	4
Unit 2 Ground Floor	Main Turbine Ejector PMP D	Install earthing conductor	4
Unit 2 Milling Plant	Mill A	Clean and re-tighten	
Unit 2 Milling Plant	Mill B	Clean and re-tighten	
Unit 2 Milling Plant	Mill C	Clean and re-tighten	
Unit 2 Equipment Room	U1&2 CP Panel	Clean and re-tighten	
Unit 3 Ground Floor	Unit 1-3 TRFR 5&6 Panel	Clean and re-tighten	
Unit 3 LV Room	Boiler feed pump barring gear	Clean and re-tighten	

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Unit 3 LV Room	20KVA bypass isolator transformer	Install earthing conductor	4
Unit 3 LV Room	20KVA Unit 3 UPS A	Clean and re-tighten	
Unit 3 LV Room	UPS battery Cabin B	Clean and re-tighten	
Unit 3 LV Room	20KVA Unit 3 UPS B	Clean and re-tighten	
Unit 3 LV Room	UPS battery Cabin A	Install earthing conductor	90
Unit 3 MV Room	Gen TRFR Yard Communication Kiosk	Clean and re-tighten	
Unit 3 MV Room	Welding socket	Verify the earthing and reinstate	4
Unit 3 MV Room	3.3kV Service board 3A & 3B bus zone	Clean and re-tighten	
Unit 3 MV Room	3MY01 Cubicle	Clean and re-tighten	
Unit 3 MV Room	Alarm panel 1	Clean and re-tighten	
Unit 3 Equipment Room	20kV ACB Comp C&D Control PLC	Clean and re-tighten	
Unit 3 Equipment Room	Panel 04HH101 (AVR)	Clean and re-tighten	
Unit 4 Ground Floor	BFPPT Ejector PMP A	Clean and re-tighten	
Unit 4 Ground Floor	BFPPT Ejector PMP A	Clean and re-tighten	
Unit 4 Ground Floor	Main Turbine Ejector PMP A	Clean and re-tighten	
Unit 4 Ground Floor	Main Turbine Ejector PMP B	Clean and re-tighten	
Unit 4 Ground Floor	Main Turbine Ejector PMP C	Clean and re-tighten	
Unit 4 Ground Floor	Main Turbine Ejector PMP D	Clean and re-tighten	
Unit 4 LV Room	20KVA bypass isolator transformer	Clean and re-tighten	
Unit 4 LV Room	20KVA Unit UPS A	Clean and re-tighten	
Unit 4 LV Room	Battery Cabin B	Install earthing conductor	90
Unit 4 LV Room	20KVA Unit UPS B	Clean and re-tighten	
Unit 4 LV Room	UPS isolator distribution board	Clean and re-tighten	
Unit 4 LV Room	Battery Cabin A	Install earthing conductor	90
Unit 3 MV Room	Gen TRFR Yard Communication Kiosk	Clean and re-tighten	
Unit 3 MV Room	Welding socket	Verify the earthing and reinstate	4
Unit 5 Ground Floor	BFPPT Ejector PMP A	Perform earth mat continuity test	

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Unit 5 LV Room	20KVA bypass isolator transformer	Install earthing conductor	
Unit 5 LV Room	20KVA Unit UPS A	Clean and re-tighten	4
Unit 5 LV Room	Battery Cabin B	Install earthing conductor	90
Unit 5 LV Room	Battery Cabin A	Install earthing conductor	90

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Unit 5 MV Room	3.3kV service board 5C and 5D buszone	Clean and re-tighten	
Unit 5 MV Room	Gen transformer yard coms kiosk	Clean and re-tighten	
Unit 5 MV Room	Measurement panel	Clean and re-tighten	
Unit 5 MV Room	3.3kV service board 5A & 5B bus zone	Clean and re-tighten	
Unit 5 MV Room	05HR20	Clean and re-tighten	
Unit 5 Equipment Room	Unit 6 Main Protection Panel	Clean and re-tighten	
Unit 6 Ground Floor	BFPPT Ejector PMP A	Clean and re-tighten	
Unit 6 LV Room	Boiler Feed pump barring gear	Clean and re-tighten	
Unit 6 LV Room	20KVA bypass isolator transformer	Clean and re-tighten	
Unit 6 LV Room	20KVA Unit UPS A	Clean and re-tighten	
Unit 6 LV Room	Battery Cabin B	Install earthing conductor	90
Unit 6 LV Room	Battery Cabin A	Install earthing conductor	90
Unit 6 MV Room	3.3kV service board 6C and 6D buszone	Clean and re-tighten	
Unit 6 MV Room	Measurement panel	Clean and re-tighten	
Unit 6 MV Room	06MY01	Clean and re-tighten	
Unit 6 MV Room	Alarm Panel 1	Clean and re-tighten	
Unit 6 MV Room	Alarm Panel 2	Clean and re-tighten	
Unit 6 Milling Plant	Mill B	Clean and re-tighten	
Unit 6 Equipment Room	Zoom Monitoring Panel	Clean and re-tighten	
Unit 6 Equipment Room	Panel 06JL01 – 06JL09	Clean and re-tighten	
Unit 6 Equipment Room	06HG01	Clean and re-tighten	
Unit 6 Equipment Room	06HG02	Clean and re-tighten	
Unit 6 Equipment Room	06HG03	Clean and re-tighten	
Unit 6 Equipment Room	06HG04	Clean and re-tighten	

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Unit 6 Equipment Room	Sergi Panel	Clean and re-tighten	
Unit 6 Equipment Room	06HI001	Clean and re-tighten	

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Unit 6 Equipment Room	Soot Blower	Clean and re-tighten	
Unit 6 Equipment Room	Hydrastep	Clean and re-tighten	
Fire Pump House	Portable Water Pump 1	Clean and re-tighten	
Fire Pump House	Portable Water Pump 2	Clean and re-tighten	
Fire Pump House	ENS pump house, earth	Install earthing conductor	4
CW Pump House East	CW pump 6B	Clean and re-tighten	
CW Pump House East	Plug Socket	Connect the earthing conductor	
CW Pump House East	CW pump 5B	Clean and re-tighten	
CW Pump House East	CW pump 4B	Clean and re-tighten	
CW Pump House East	CW pump 4A	Clean and re-tighten	
CW Pump House East	CW pump 6A	Clean and re-tighten	
CW East Switchgear	DP Unit feeding 04 C/J/K	Install earthing conductor	4
CW East Switchgear	DP Unit feeding 06 C/J/K	Install earthing conductor	4
CW East Switchgear	DP Unit feeding 20GAB	Re-connect the earthing conductor	
Substation East	20MWQ1	Clean and re-tighten	
FOP West Substation	Bulk oil plant west 10HFC2	Clean and re-tighten	
FOP West Substation	4 way power supply	Install earthing conductor	4
FOP West Substation	220V DC battery trip	Clean and re-tighten	
FOP West Substation	Unit 1 fuel oil transformer B	Clean and re-tighten	
FOP West Substation	Unit 2 fuel oil transformer A	Clean and re-tighten	
FOP West Substation	Unit 3 fuel oil transformer A	Clean and re-tighten	
FOP West Substation	Unit 1 fuel oil transformer A	Clean and re-tighten	
FOP West Substation	Unit 2 fuel oil transformer B	Clean and re-tighten	
FOP West Substation	Unit 3 fuel oil transformer B	Clean and re-tighten	

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FOP West Substation	11/0.4kV fuel oil com plant transformerA	Clean and re-tighten	
FOP West Substation	11/0.4kV fuel oil com plant transformerB	Clean and re-tighten	
FOP West Substation	Unit 1 380V fuel oil plant BD A	Replace Earthing bar with aluminum bar across the board	6
FOP West Substation	Unit 2 380V fuel oil plant BD A	Replace Earthing bar with aluminum bar across the board	6
FOP West Substation	Unit 3 380V fuel oil plant BD A	Replace Earthing bar with aluminum bar across the board	6
FOP West Substation	Unit 1 380V fuel oil plant BD B	Replace Earthing bar with aluminum bar across the board	6.6
FOP West Substation	Unit 2 380V fuel oil plant BD B	Replace Earthing bar with aluminum bar across the board	6.6
FOP West Substation	Unit 3 380V fuel oil plant BD B	Replace Earthing bar with aluminum bar across the board	6.6
FOP West Substation	380V fuel oil plant common BD A	Replace Earthing bar with aluminum bar across the board	4
FOP West Substation	380V fuel oil plant common BD B	Replace Earthing bar with aluminum bar across the board	4
FOP East Substation	11/0.4kV coal plant east transformer B	Clean and re-tighten	

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FOP East Substation	Unit 4 fuel oil transformer B	Clean and re-tighten	
FOP East Substation	Unit 5 fuel oil transformer A	Clean and re-tighten	
FOP East Substation	Unit 6 fuel oil transformer B	Clean and re-tighten	
FOP East Substation	Unit 4 380V fuel oil plant BD A	Replace Earthing bar with aluminum bar across the board	6
FOP East Substation	Unit 5 380V fuel oil plant BD A	Replace Earthing bar with aluminum bar across the board	6
FOP East Substation	Unit 6 380V fuel oil plant BD A	Replace Earthing bar with aluminum bar across the board	6
FOP East Substation	Unit 4 380V fuel oil plant BD B	Replace Earthing bar with aluminum bar across the board	6.6
FOP East Substation	Unit 5 380V fuel oil plant BD B	Replace Earthing bar with aluminum bar across the board	6.6
FOP East Substation	Unit 6 380V fuel oil plant BD B	Replace Earthing bar with aluminum bar across the board	6.6
FOP East Substation	380V Coal Plant East BD A	Replace Earthing bar with aluminum bar across the board	6
FOP East Substation	380V Coal Plant East BD B	Replace Earthing bar with aluminum bar across the board	6
Coal Ash Substation	Telemetry	Clean and re-tighten	
Compressor House	Lighting Board	Clean and re-tighten	
Compressor House	Compressor dust cooling panel	Clean and re-tighten	
Compressor House	Local control panel 2	Clean and re-tighten	
RAW Wtr Switchgear	Booster pump 4	Install earthing conductor	4
RAW Wtr Switchgear	A6T control	Clean and re-tighten	
RAW Wtr Switchgear	CCW control	Clean and re-tighten	
WTP West Switchgear	380V 10kVA water UPS B	Clean and re-tighten	
WTP West Switchgear	380V 10kVA water UPS A	Clean and re-tighten	
Water Treatment Plant	Demin Blower Motor 1	Re-connect the earthing conductor	

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Water Treatment Plant	Demin Blower Motor 3	Re-connect the earthing conductor	
Water Treatment Plant	CP Regen/Dilution Pump 6	Re-connect the earthing conductor	
LP Service Building	Compressor 1	Perform earth mat continuity test	
LP Service Building	LCP control 1	Perform earth mat continuity test	
LP Service Building	LCP control 2	Clean and re-tighten	
LP Service Building	LCP control 3	Clean and re-tighten	
LP Service Building	Diesel 1 and 2 control	Clean and re-tighten	
LP Service Building	Air heater washing panel	Install earthing conductor	4
LP Service Building	HP pot water pump 1	Re-connect the earthing conductor	
LP Service Building	Boiler feed water make up LP demin	Clean and re-tighten	
LP Service Building	00USQ01WQQ1	Clean and re-tighten	
LP Service Building	Close CCT cooling pump 1	Install earthing conductor	4
H2 Plant	H2 plant zone 2	Clean and re-tighten	
H2 Plant	Tanks X3	Clean and re-tighten	

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Fuel Oil Plant East	Pressure Pump 5B	Clean and re-tighten	
Fuel Oil Plant West	Pressure Pump 3A	Re-connect the earthing conductor	
Fuel Oil Plant West	Pressure Pump 3B	Re-connect the earthing conductor	
Fuel Oil Plant West	Pressure Pump 2A	Install earthing conductor	4
Fuel Oil Plant West	Pressure Pump 1A	Re-connect the earthing conductor	
Fuel Oil Plant West	Pressure Pump 1B	Re-connect the earthing conductor	
U1 Precipitators Sub A	220V battery tripping Unit	Clean and re-tighten	
	380V Precip Board A	Replace Earthing bar with aluminum bar across the board	14.4
	380V Ash Bunker Board A	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board A	Replace Earthing bar with aluminum bar across the board	7.8
	Battery Tripping Unit	Replace Earthing bar with aluminum across the board	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wires and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U1 Precipitators Sub B	Alarm Panel	Clean and re-tighten	
	380V Precip Board B	Replace Earthing bar with aluminum across the board	14.4

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	380V Ash Bunker Board B	Replace Earthing bar with aluminum across the board	6
	380 V Dust Handling Board B	Replace Earthing bar with aluminum across the board	7.8
	Battery Tripping Unit	Clean and re-tighten	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U2 Precipitators Sub A	220V battery tripping Unit	Clean and re-tighten	
	380V Precip Board A	Replace Earthing bar with aluminum across the board	14.4
	380V Ash Bunker Board A	Replace Earthing bar with aluminum across the board	6
	380 V Dust Handling Board A	Replace Earthing bar with aluminum across the board	7.8
	Battery Tripping Unit	Replace Earthing bar with aluminum across the board	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	

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U2 Precipitators Sub B	Alarm Panel	Clean and re-tighten	
	380V Precip Board B	Replace Earthing bar with aluminum across the board	14.4
	380V Ash Bunker Board B	Replace Earthing bar with aluminum across the board	6
	380 V Dust Handling Board B	Replace Earthing bar with aluminum across the board	7.8
	Battery Tripping Unit	Clean and re-tighten	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wreir and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U3 Precipitators Sub A	220V battery tripping Unit	Clean and re-tighten	
	380V Precip Board A	Replace Earthing bar with aluminum across the board	14.4
	380V Ash Bunker Board A	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board A	Replace Earthing bar with aluminum bar across the board	7.8
	Battery Tripping Unit	Replace Earthing bar with aluminum across the board	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wreir and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2	

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		Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U3 Precipitators Sub B	Alarm Panel	Clean and re-tighten	
	380V Precip Board B	Replace Earthing bar with aluminum bar across the board	14.4
	380V Ash Bunker Board B	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board B	Replace Earthing bar with aluminum bar across the board	7.8
	Battery Tripping Unit	Clean and re-tighten	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wire and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U4 Precipitators Sub A	220V battery tripping Unit	Clean and re-tighten	
	380V Precip Board A	Replace Earthing bar with aluminum bar across the board	14.4
	380V Ash Bunker Board A	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board A	Replace board Earthing bar with bar aluminum across the board	7.8
	380V Dust Handling Distribution Board	Replace Earthing bar with aluminum bar across the board	1.2
	Battery Tripping Unit	Replace Earthing bar with aluminum across the	

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		board	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U4 Precipitators Sub B	Alarm Panel	Clean and re-tighten	
	380V Precip Board B	Replace Earthing bar with aluminum bar across the board	14.4
	380V Ash Bunker Board B	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board B	Replace Earthing bar with aluminum bar across the board	7.8
	380V Dust Handling Distribution Board	Replace Earthing bar with aluminum bar across the board	1.2
	Battery Tripping Unit	Clean and re-tighten	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U5 Precipitators Sub A	220V battery tripping Unit	Clean and re-tighten	
	380V Precip Board A	Replace Earthing bar with aluminum bar across the	14.4

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		board	
	380V Ash Bunker Board A	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board A	Replace Earthing bar with aluminum bar across the board	7.8
	380V Dust Handling Distribution Board	Replace Earthing bar with aluminum bar across the board	1.2
	Battery Tripping Unit	Replace Earthing bar with aluminum across the board	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U5 Precipitators Sub B	Alarm Panel	Clean and re-tighten	
	380V Precip Board B	Replace Earthing bar with aluminum bar across the board	14.4
	380V Ash Bunker Board B	Replace Earthing bar with aluminum bar across the board	6
	380 V Dust Handling Board B	Replace Earthing bar with aluminum bar across the board	7.8
	380V Dust Handling Distribution Board	Replace Earthing bar with aluminum bar across the board	1.2
	Battery Tripping Unit	Clean and re-tighten	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum	

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	Earthing on ESP Cable Rack on the ESP Roof	(x 28 per Casing) i.e. 2 Casings	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
U6 Precipitators Sub A	220V battery tripping Unit	Clean and re-tighten		
	380V Precip Board A	Replace Earthing bar with aluminum bar across the board	14.4	
	380V Ash Bunker Board A	Replace Earthing bar with aluminum bar across the board	6	
	380 V Dust Handling Board A	Replace Earthing bar with aluminum bar across the board	7.8	
	380V Dust Handling Distribution Board	Replace Earthing bar with aluminum bar across the board	1.2	
	Battery Tripping Unit	Replace Earthing bar with aluminum across the board		
	Alarm panel	Clean and re-tighten		
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wire and Plate rappers)		
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings		
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack		
U6 Precipitators Sub B	Alarm Panel	Clean and re-tighten		
	380V Precip Board B	Replace Earthing bar with aluminum bar across the board	14.4	
	380V Ash Bunker Board B	Replace Earthing bar with aluminum bar across the board	6	
	380 V Dust Handling Board B	Replace Earthing bar with aluminum bar across the board	7.8	
	380V Dust Handling	Replace Earthing bar with	1.2	

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	Distribution Board	aluminum bar across the board	
	Battery Tripping Unit	Clean and re-tighten	
	Alarm panel	Clean and re-tighten	
	ESP rapper motors	Replace All rapper motor earthing conductor with aluminum (x 40 motors i.e. Wirer and Plate rappers)	
	Support Insulator Heater junction box	Replace earthing conductor with aluminum (x 28 per Casing) i.e. 2 Casings	
	Earthing on ESP Cable Rack on the ESP Roof	Install earthing conductor on cable rack on the ESP roof and weld to earth bar on the vertical portion of the rack	
Unit 1 & 2 Zone 22	Hydraulic drive T7B	Install earthing conductor	
Unit 1 & 2 Zone 22	Hydraulic drive T7A	Clean and re-tighten	
Unit 3 & 4 Zone 22	Hydraulic drive T7D	Clean and re-tighten	
Unit 3 & 4 Zone 22	Hydraulic drive T7C	Clean and re-tighten	
Unit 5 & 6 Zone 22	Hydraulic drive T7E	Clean and re-tighten	

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Ash Dump House	380V board A and B	Clean and re-tighten	
Ash Dump House	Battery tripping Unit	Clean and re-tighten	
Ash Dump House	24V DC panel	Install earthing conductor	4
Ash Sub 6	Conveyor tensioner motor WA26D005	Install earthing conductor	150
Ash Sub 6	Substation earth strap	Install earthing conductor	150
11/188KV Station Tfr	SERGI Panel	Clean and re-tighten	
11/188KV Station Tfr	TRFR Meter and JB	Clean and re-tighten	
Coal Plant	T1 A and B motor	Install earthing conductor	4
Units	U1-6 Seal Air Fan Motor	Install earthing conductor	4
Units	U1-6 Aircon Plant Rooms	Install earthing conductor	4
Units	LV room cable tunnel	Install earthing conductor	4
Units	U1-6 MT/BFPT Water Ejector Pumps	Install earthing conductor	4
Units	Equipment rooms cable tunnels	Install earthing conductor	4
Units	Plate rappers U1-6	Install earthing conductor	4
Units	U1,3,4 and 6 Precipitator Substation	Install earthing conductor	4
Units	U1-6 Boiler 73ML	Install earthing conductor	4
Essential Plant	East and West Fuel Plant Boards	Install earthing conductor	4
Essential Plant	Fuel Oil Common Plant Board	Install earthing conductor	4
Essential Plant	Effluent Pump House	Install earthing conductor	4
Essential Plant	WC 18 & 28 conveyor structures	Install earthing conductor	4

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Table 2: Typical Equivalent Aluminium Substitute Networks for a 3mm x 50mm Copper Network

No of Conductors	Conductor Name	Equivalent Copper Area (mm ²)	Aluminium Area (mm ²)	Conductor Diameter (mm)	% Over-design
1 x	BEAR	161,3	264,4	23,45	8
2x	LEOPARD	80,65	131,37	15,81	8
2x	CYOTE	80,65	131,37	15,89	8
2x	TIGER	80,65	131,23	16,52	8
2x	WOLF	96,77	158,06	18,13	29
3x	HARE	64,52	104,98	14,16	29
3x	DOG	64,52	104,69	14,15	29
3x	HYENA	64,52	105,95	14,57	29
3x	OTTER	51,65	83,92	12,66	3

The following should be noted:

- Installing 2 or 3 conductors will take longer than installing a single conductor and may therefore be more costly.
- Depending on the availability of off-cuts of the conductors mentioned these may be used to save in cost, when applied for short / small earthing networks.
- Aluminium Conductors Steel Reinforced (ACSR) conductors contain steel in the centre which makes difficult to introduce sharp, 90° bends.

5. APPENDIX A: DRAWINGS

Earthing System PDF drawings will be forwarded via the email.

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