Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

REPORT

Yukon Government
DST Consulting Engineers

Faro Mine
Site Wide Electrical Mapping

February 2016

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QUALITY MANAGEMENT SIGN-OFF

Signature .....

Date Feb 14/16 15-2016-001

Table of Contents

1 Introduction

Faro Mine Complex was operational from 1969 to 1989, mining lead and zinc. The Faro Mine site is 2500 hectares in size and consists of several key areas such as the three mine pits, two office/shop areas and the tailings pond. As the mine works towards total closure, there are many clean-up tasks required. Part of this process is a condition assessment of the existing electrical works and their functionality. This project is a starting point for that assessment.

DST Engineering, on behalf of the Yukon Government, contracted Associated Engineering (AE) to undertake a site-wide mapping of the electrical infrastructure at the Faro Mine. No condition assessment of the infrastructure was conducted during this mapping exercise. This mapping project is intended to produce a single set of up-to-date data and drawings to document the full extent of the electrical infrastructure on site.

2 Mapping Scope

The mapping study documents the electrical system from the Yukon Energy Corporation (YEC) Main Service Breaker to panel level, including a list of all motors over 10 hp. This includes an overall site survey and layout, as well as a comprehensive single line diagram (see drawings in Appendix A).

Any restricted areas, including the Mill area, Grum Office and Grum Workshops, were not surveyed or mapped. Although accessible, the old Office Building and Stores were not surveyed. The Truck Bays and Workshops were surveyed since these are still in use.

In general, information was collected from equipment where visible and safe to do so without the need to de-energize. Transformer nameplate information was collected primarily with the help of the staff from the care-and-maintenance contractor, using a truck with extendible boom and man-bucket. Initially it was intended to collect fuse data in this same manner, but it became apparent that the fuse holders could not be opened and re-closed without destroying the fuses inside in the process. This fuse information is critical to form a complete understanding of the performance of the electrical system – obtaining this information will be a major consideration for the condition assessment phase and will require re-fusing of all opened fuse holders.

It was not possible to de-energize the two main substations due to a scheduling problem with YEC. Therefore, it was not possible to obtain direct nameplate information for circuit breakers, potential transformers and current transformers located inside the energized switchgear. However, it was possible to obtain information about the circuit breakers and switchgear itself from a test report on this equipment by Orbis Engineering dated 2010.

Information on the conductor sizes, both overhead and underground, was collected where visible or from long-term employee knowledge.

Equipment labels are shown on the drawings and in the schedule, where such labels exist in the field. Unlabeled equipment is not labelled on the drawings and is described, but not labelled, in the schedules.

3 Equipment Lists

The tables detailing the electrical equipment found on site can be found in Appendix B.

Certification Page

This report presents our findings regarding the Yukon Government DST Consulting Engineers Faro Mine Site Wide Electrical Mapping.

Respectfully submitted,
Associated Engineering

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Feb 12, 2016

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LV/LDL/lp

Appendix A - Drawings

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE

LAYOUT SYMBOLS

CABLE, CONDUIT & WIRE

- CONDUIT RUN ON SURFACE (WALL OR CEILING)
- CONDUIT RUN IN SLAB (OR BELOW GRADE)
- CONDUIT CAPPED
- CONDUIT GOING UP
- CONDUIT GOING DOWN
- FLEXIBLE CONDUIT
- CONDUIT HOME RUN c/w NUMBER OF WIRES
- CONDUIT SEAL WP-WEATHERPROOF, EP-EXPLOSION PROOF
- CONDUIT UNION
- CONDUIT EXPANSION JOINT
- CONDUIT BEND
- BARE GROUND WIRE
- OVERHEAD POWER SERVICE ENTRANCE
- OVERHEAD TELEPHONE SERVICE ENTRANCE
- JUNCTION BOX - CEILING SPACE
- JUNCTION BOX - FLUSH MOUNTED
- JUNCTION BOX - WALL MOUNTED
- JUNCTION BOX - MOTOR / EQUIPMENT
- MULTI-CABLE TRANSIT (MCT)
- SPARE WIRE LOOP
- CABLE OR CONDUIT DESIGNATION PC-POWER CC-CONTROL TC-TELEPHONE HC-HEATING IC-INSTRUMENTATION (PC-101)
- PANEL "A", CIRCUIT "10", SWITCH "b" (A10-b)

POWER

- POWER TRANSFORMER (XFMR)
- MAIN DISTRIBUTION PANEL "A" (PNL "A")
- LIGHTING OR BRANCH PANEL "A" (PNL "A")
- SPLITTER (SPLTR)
- MOTOR AND/OR EQUIPMENT TAG c/w NAME, PLANT AREA & NUMBER (MUA2D 5005)
- MOTOR (M)
- MOTORIZED DAMPER (D)
- MOTOR OPERATED VALVE (MOV)
- SOLENOID OPERATED VALVE (SOV)
- ELECTRIC HEATER
- SINGLE RECEPTACLE
- DUPLEX RECEPTACLE
- SPLIT DUPLEX RECEPTACLE
- ISOLATED GROUND RECEPTACLE
- GROUND FAULT (GFCI) RECEPTACLE
- ABOVE COUNTER DUPLEX RECEPTACLE
- ABOVE COUNTER SPLIT DUPLEX RECEPTACLE
- ABOVE COUNTER GROUND FAULT (GFCI) RECEPTACLE
- FLOOR MOUNTED SINGLE RECEPTACLE
- FLOOR MOUNTED DUPLEX RECEPTACLE
- EXPLOSION PROOF SINGLE RECEPTACLE
- EXPLOSION PROOF DUPLEX RECEPTACLE
- SPECIAL SINGLE PHASE RECEPTACLE
- SPECIAL THREE PHASE RECEPTACLE
- OVERHEAD REEL DUPLEX RECEPTACLE
- SINGLE PHASE POWER CONNECTION
- THREE PHASE POWER CONNECTION
- WELDING RECEPTACLE (W)

LIGHTING

- FIXTURE TYPE "A" (A)
- SURFACE MOUNTED OR SUSPENDED FLUORESCENT FIXTURE
- RECESSED FLUORESCENT FIXTURE
- SURFACE MOUNTED OR SUSPENDED 610 x 610 FLUORESCENT FIXTURE
- RECESSED 610 x 610 FLUORESCENT FIXTURE
- FLUORESCENT STRIP FIXTURE
- WALL MOUNTED FLUORESCENT FIXTURE
- SURFACE MOUNTED OR SUSPENDED UNSWITCHED FLUORESCENT FIXTURE
- RECESSED UNSWITCHED FLUORESCENT FIXTURE
- AREA LIGHTING FIXTURE
- SURFACE MOUNTED OR SUSPENDED LUMINAIRE
- LUMINAIRE ON EMERGENCY POWER
- RECESSED LUMINAIRE
- RECESSED LUMINAIRE ON EMERGENCY POWER
- WALL MOUNTED LUMINAIRE
- POLE MOUNTED LUMINAIRE
- CEILING MOUNTED EXIT SIGN c/w DIRECTION ARROW
- WALL MOUNTED EXIT SIGN c/w DIRECTION ARROW
- TENON MOUNTED LUMINAIRE
- EMERGENCY LIGHTING UNIT c/w BATTERY PACK, CHARGER AND TWO HEADS
- WALL MOUNTED SINGLE EMERGENCY LIGHTING HEAD c/w JUNCTION BOX
- WALL MOUNTED DOUBLE EMERGENCY LIGHTING HEAD c/w JUNCTION BOX
- 1 LAMP BALLAST (REMOTE MOUNTED) (B)
- 2 LAMP BALLAST (REMOTE MOUNTED)

FIRE ALARM

- FIRE ALARM PANEL AND/OR ANNUNCIATOR
- BREAK GLASS STATION (F or PS)
- FIRE ALARM BELL (F)
- FIRE ALARM HORN AND STROBE c/w CANDELA LEVEL (F cd)
- FIRE ALARM PHONE
- FIRE ALARM SPEAKER (F)
- SMOKE DETECTOR
- SMOKE DETECTOR - DUCT MOUNTED
- COMBINATION HEAT DETECTOR
- HEAT DETECTOR - FIXED TEMPERATURE (T)
- HEAT DETECTOR - RATE-OF-RISE (T)
- FIRE ALARM STROBE LIGHT c/w CANDELA LEVEL (F cd)
- END-OF-LINE RESISTOR
- FLOW SWITCH (FS)
- PRESSURE SWITCH (PS)
- TAMPER SWITCH (Z)
- GAS DETECTOR (G)
- INFRARED DETECTOR (IN)
- ULTRAVIOLET DETECTOR (U)
- MAGNETIC DOOR RELEASE (D)
- ELECTRIC DOOR LOCK (L)
- PRE-SIGNAL BUZZER (F)
- CONTROL RELAY MODULE (CR)
- ISOLATOR BASE MODULE (I)
- ADDRESSABLE ALARM RELAY MODULE (ARM)

COMMUNICATIONS

- TELEPHONE TERMINAL BOARD (TTB)
- TELEPHONE OUTLET - WALL MOUNTED
- TELEPHONE OUTLET - FLOOR MOUNTED
- INTERCOM HANDSET OUTLET - WALL MOUNTED
- ITS LAN DATA OUTLET
- SPEAKER - CEILING MOUNTED (S)
- SPEAKER - WALL MOUNTED (S)
- VIDEO CONTROLLER (VC)
- SECURITY CAMERA (C)

GROUNDING

- GROUND BUS
- GROUND COMPRESSION CONNECTION
- EQUIPMENT GROUND CONNECTION
- THERMIT WELD GROUND CONNECTION
- GROUND ROD
- GROUND WELL & ROD
- GROUND GRID w/ RODS ONLY
- GROUND GRID w/ WELLS & RODS

CONTROL

- SINGLE POLE SWITCH (SWITCH "a") PANEL "A" CIRCUIT "x" (S^{a}_{Ax})
- 2 SWITCHES IN 2 GANG BOX
- 3 SWITCHES IN 3 GANG BOX
- 4 SWITCHES IN 4 GANG BOX
- TWO POLE SWITCH (S_{2})
- THREE WAY SWITCH (S_{3})
- FOUR WAY SWITCH (S_{4})
- SWITCH c/w PILOT LIGHT (S^{x}_{M})
- MANUAL MOTOR SWITCH (S^{M})
- MANUAL MOTOR SWITCH c/w PILOT LIGHT (S^{M}_{P})
- KEY OPERATED SWITCH (S_{K})
- EXPLOSION PROOF SWITCH (S_{EP})
- WEATHERPROOF SWITCH (S_{WP})
- LOW VOLTAGE SWITCH (CIRCUIT "a") (S^{a})
- LOW VOLTAGE SWITCH (K-KEY OPERATED, P-PILOT LIGHT) ($S_{K,P}$)
- DIMMER SWITCH (S_{D})
- SPECIAL LOW VOLTAGE SWITCH UNIT (SEE SPECIFICATIONS) (S_{LV})
- LOW VOLTAGE SWITCHING RELAY CABINET (RC)
- MOTION SENSOR SWITCH (M)
- PHOTOELECTRIC CELL (P)
- DISCONNECT SWITCH - FUSED
- DISCONNECT SWITCH - UNFUSED
- MANUAL MOTOR STARTER
- MAGNETIC MOTOR STARTER
- COMBINATION MAGNETIC STARTER
- LOW VOLTAGE THERMOSTAT (T)
- LINE VOLTAGE THERMOSTAT (T)
- HUMIDSTAT (H)
- ON-OFF CONTROL STATION (OI)
- HAND-OFF-AUTO SELECTOR SWITCH (HOA)
- LOCKOUT STOP CONTROL STATION (LO)
- LOCAL-OFF-REMOTE CONTROL STATION (LOR)
- SELECTOR SWITCH (HOA, LOR, LO or OA)
- START-STOP PUSHBUTTON AND SELECTOR SWITCH (HOA, LOR, LO or OA)
- LOCKOUT STOP PUSHBUTTON (LOS)
- START-STOP PUSHBUTTON
- START-STOP PUSHBUTTON c/w PILOT LIGHT & LOCKOUT STOP
- START-JOG-STOP PUSHBUTTON
- EMERGENCY SHUTDOWN PUSHBUTTON (ESD)
- THERMISTOR CONTROL TRIPPING UNIT
- TIME SWITCH (TS)
- LOW VOLTAGE TRANSFORMER (XX=TRANSFORMER NUMBER) (LVT XX)

SINGLE LINE DIAGRAM / SCHEMATIC SYMBOLS

- EQUIPMENT BUS
- BUS EXTENSION / CONNECTION
- 4160 V 1200 A 150 MVA (52) POWER CIRCUIT BREAKER
- 4160 V 1200 A 150 MVA (52) DRAWOUT POWER CIRCUIT BREAKER
- AMMETER SWITCH (AS)
- VOLTMETER (VS)
- TRANSDUCER (TD)
- XXX:X CURRENT TRANSFORMER c/w RATIO & QUANTITY
- XXX:X ZERO SEQUENCING CURRENT TRANSFORMER c/w RATIO & QUANTITY
- XXX:X BUSHING TYPE CURRENT TRANSFORMER c/w RATIO & QUANTITY
- V-V POTENTIAL TRANSFORMER c/w VOLTAGE RATING & QUANTITY
- KEY OPERATED INTERLOCK (K)
- MOTOR OPERATED SWITCH (M)
- DIGITAL METERING SYSTEM (DMS)
- UTILITY POWER METER (M)
- LIGHTNING ARRESTER w/ GROUNDED GAP
- LIGHTNING ARRESTER w/ GROUNDED GAP AND SURGE CAPACITOR
- V-V DRAWOUT FUSED CURRENT TRANSFORMER
- DELTA-DELTA TRANSFORMER
- DELTA-WYE GROUND TRANSFORMER
- DELTA-WYE RESISTOR GROUND TRANSFORMER
- OPEN DELTA
- CLOSED DELTA
- THREE PHASE WYE
- THREE PHASE WYE TO GROUND
- THREE PHASE ZIGZAG TO GROUND
- THREE PHASE WYE w/ RESISTOR TO GROUND
- MALE & FEMALE DISCONNECT DEVICE
- 225 AF 100 AT 3P CIRCUIT BREAKER
- 225 AF 100 AT 3P DRAWOUT CIRCUIT BREAKER
- NON-FUSED DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- FUSED HRC DISCONNECT SWITCH
- LOAD BREAK DISCONNECT SWITCH
- FUSED LOAD BREAK DISCONNECT SWITCH
- HORN GAP SWITCH
- INTERRUPTER SWITCH
- FUSED INTERRUPTER SWITCH
- GROUND SWITCH
- MAGNETIC ELEMENT

- X kVAR CAPACITOR FOR PF CORRECTION c/w kVAR RATING
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- PLC PROGRAMMABLE LOGIC CONTROLLER
- REACTOR
- HARMONIC FILTER
- TRANSFER SWITCH
- FLEX CONNECTOR
- J JUNCTION BOX MOUNTED NEAR MOTOR
- RTD RESISTANCE TEMPERATURE DETECTOR
- FVNR MAGNETIC STARTER c/w SIZE
- FVR (REVERSING) STARTER c/w SIZE
- TWO SPEED STARTER c/w SIZE
- THERMAL OVERLOAD RELAY
- XXX:X ELECTRONIC OVERLOAD c/w RATIO & QUANTITY
- HZ VARIABLE SPEED DRIVE
- S/S SOFT START REDUCED VOLTAGE
- GENERATOR
- SQUIRREL CAGE MOTOR
- MOTORIZED VALVE
- PANEL "A" LIGHTING OR POWER PANEL
- VALVE TRAVEL LIMIT SWITCH-NORMALLY OPEN
- VALVE TRAVEL LIMIT SWITCH-NORMALLY CLOSED
- SPECIAL SINGLE PHASE RECEPTACLE
- SPECIAL THREE PHASE RECEPTACLE
- W WELDING RECEPTACLE
- X kW MOTOR SPACE HEATER
- SOLID STATE SURGE ARRESTER
- TVSS TRANSIENT VOLTAGE SURGE SUPPRESSION
- CTS CURRENT TRANSFORMER SHORTING BLOCK
- 29-1 PT-CT TEST BLOCK
- TB TEST BLOCK
- GROUND TO EARTH
- BATTERY
- QTY 50 PROTECTIVE RELAY c/w QUANTITY (1 LINE)
- QTY 50/51 PROTECTIVE RELAY c/w QUANTITY (2 LINE)
- RELAY SHUNT

- X HP SINGLE or THREE PHASE MOTOR
- MOV MOTOR OPERATED VALVE
- R101 RELAY COIL (1 LINE)
- R 101 RELAY COIL (2 LINE)
- R 4RT 101 RELAY COIL (3 LINE)
- TD TD_ 0-30 SECS TIMING RELAY COIL w/ TDE -TIME DELAY ENERGIZED, TDD -TIME DELAY DE-ENERGIZED & TIME RANGE
- LC LIGHTING CONTACTOR COIL
- M MOTOR STARTER COIL
- CR CONTROL RELAY
- RA AUXILIARY RELAY
- PFR POWER FAILURE RELAY
- OTR OVERLOAD TRIP RELAY
- CC CLOSING COIL
- HC HOLDING COIL
- A INDICATING PILOT LIGHT c/w LENS COLOR R=RED, G=GREEN, A=AMBER, Y=YELLOW, W=WHITE
- ETM ELAPSED TIME METER
- O/L MOTOR OVERLOAD CONTACT
- TEST SUPPLY PLUG
- x A FUSE c/w FUSE No. or AMP RATING
- DUMMY FUSE
- X kW HTR ELECTRIC HEATER c/w KILOWATT RATING
- X kW MOTOR SPACE HEATER c/w KILOWATT RATING
- X OHMS RESISTOR c/w RESISTANCE RATING
- SERIES COIL OR SOLENOID VALVE
- TC TEMPERATURE CONTROLLER
- SURGE SUPPRESSOR
- SUPPRESSOR MOTOR SURGE SUPPRESSOR
- X X A FUSE ASSEMBLY w/ INDICATING LIGHT c/w FUSE NUMBER AND CURRENT RATING
- G INDICATING LIGHT PUSH TO TEST c/w COLOR TYPE
- SEMICONDUCTOR DIODE
- 113 WIRE WITH WIRE NUMBERS
- MECHANICAL CONNECTION
- WIRES CROSSOVER
- WIRES CONNECTED
- FIELD CONNECTION
- NORMALLY CLOSED MUSHROOM HEAD PUSHBUTTON - MOMENTARY
- NORMALLY OPEN PUSHBUTTON - MOMENTARY
- NORMALLY CLOSED PUSHBUTTON - MOMENTARY

- H1 XXX H2 / X1 XXX X2 CONTROL POWER TRANSFORMER
- THREE POLE CIRCUIT BREAKER (CONTROL SCHEMATIC ONLY)
- THREE POLE DISCONNECT SWITCH (CONTROL SCHEMATIC ONLY)
- SINGLE POLE SINGLE THROW DISCONNECT SWITCH
- SINGLE POLE DOUBLE THROW DISCONNECT SWITCH
- ON OFF TWO (2) POSITION SELECTOR SWITCH (ON-OFF SWITCH SHOWN IN ON POSITION)
- H O A THREE (3) POSITION SELECTOR SWITCH (HAND-OFF-AUTO SHOWN IN HAND POSITION)
- C 1 2 3 DUAL TRANSFER SWITCH
- FLOW SWITCH NORMALLY OPEN OR CLOSED
- LEVEL SWITCH NORMALLY OPEN OR CLOSED
- LIMIT SWITCH NORMALLY OPEN OR CLOSED
- PRESSURE SWITCH NORMALLY OPEN OR CLOSED
- TEMPERATURE SWITCH NORMALLY OPEN OR CLOSED
- TERMINALS - TYPE AND LOCATION ASSIGNMENT DESIGNATED BY PROJECT DESIGN

ABBREVIATIONS

BD	- BUS DUCT
CB	- CIRCUIT BREAKER
DB	- DUCT BANK
DS	- DISCONNECT SWITCH
MCC	- MOTOR CONTROL CENTRE
PDP	- POWER DISTRIBUTION PANEL
PNL	- BRANCH PANEL BOARD
SWB	- SWITCHBOARD
T	- TRANSFORMER
UPS	- UNINTERRUPTIBLE POWER SUPPLY

NOTES:
1. THIS DRAWING IS GENERAL IN NATURE. NOT ALL SYMBOLS, ABBREVIATIONS ARE USED IN THESE CONTRACT DRAWINGS.

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FARO MINE COMPLEX

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SCALE: N.T.S.

ELECTRICAL LEGEND

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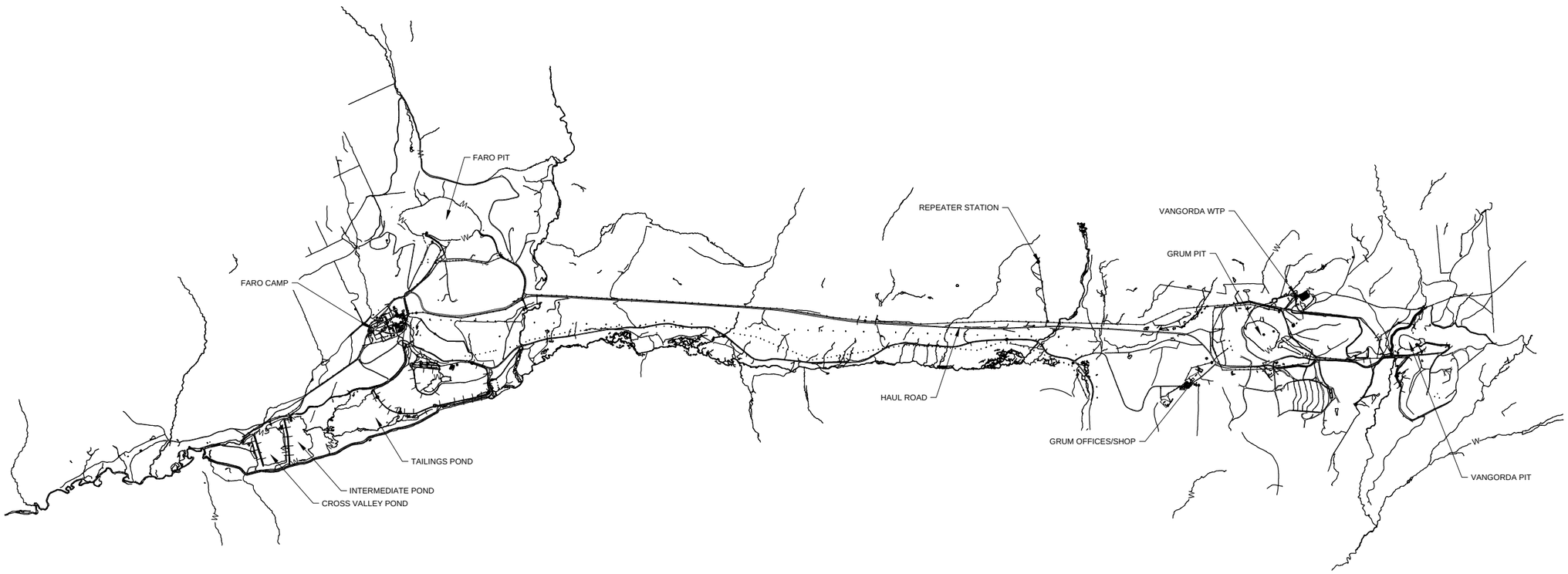

PLAN 1:35 000

OVERALL SITE PLAN

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OVERALL SITE PLAN

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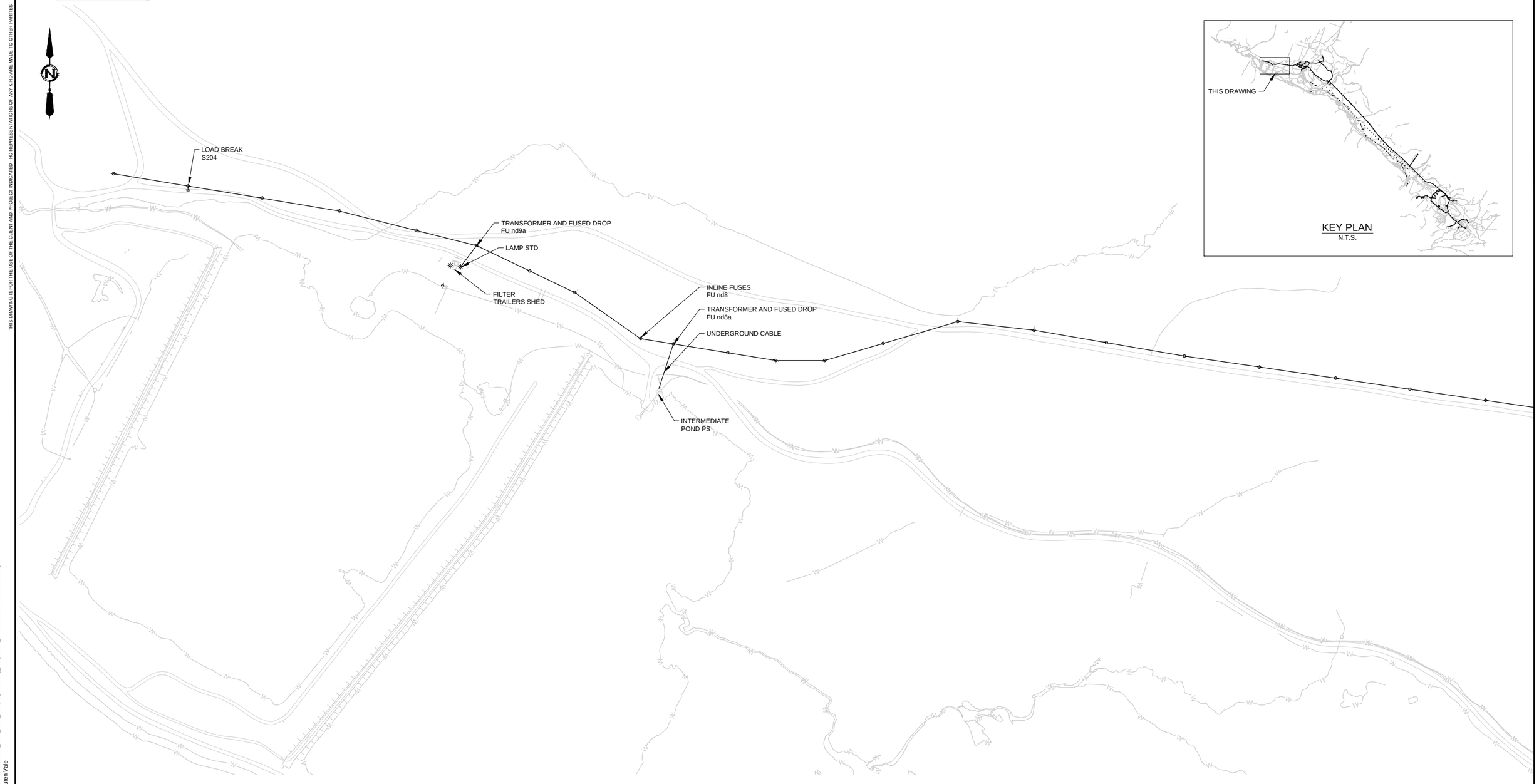

PLAN 1:2500
SITE PLAN

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SITE PLAN SHT 1 OF 14

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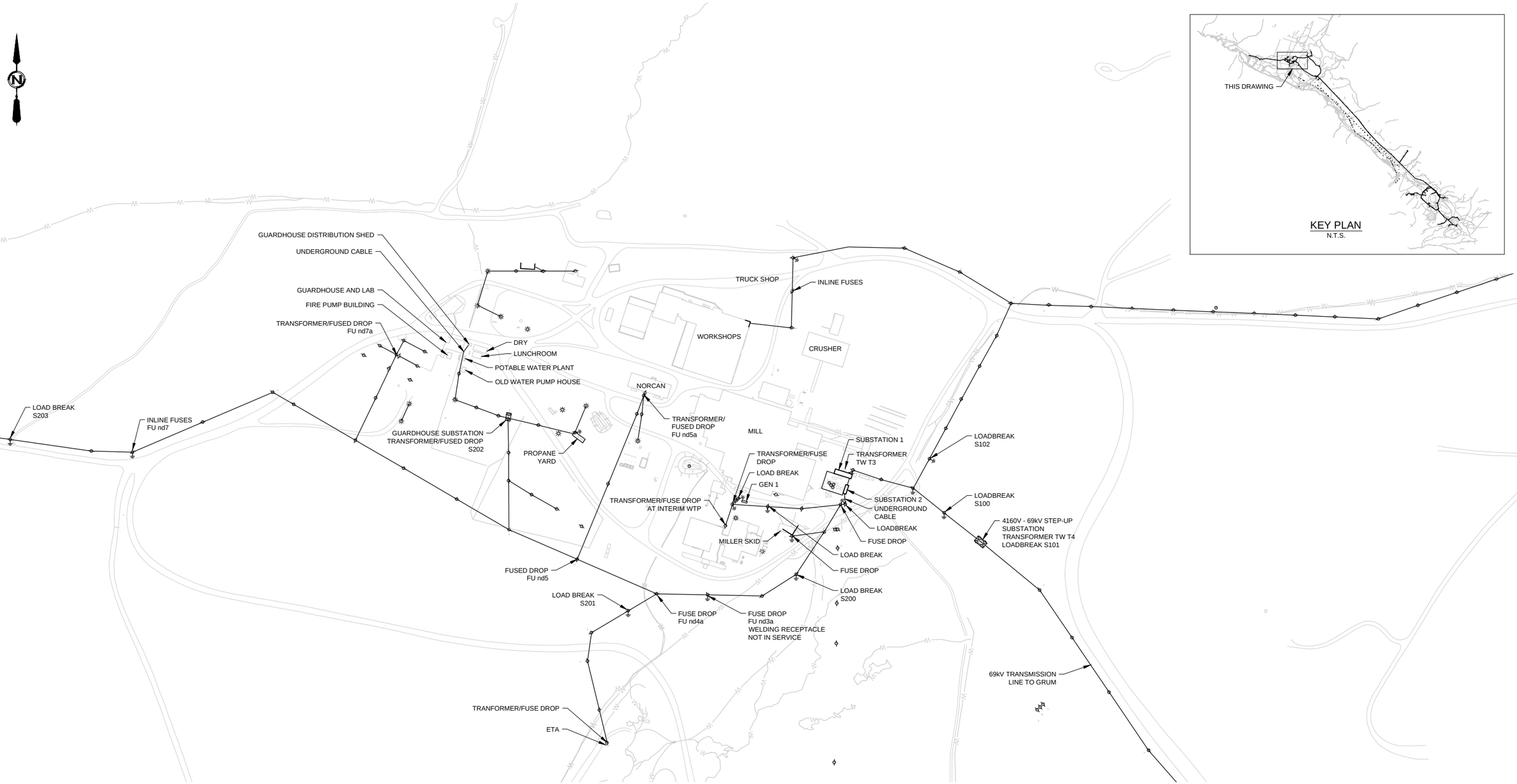

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SITE PLAN

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SITE PLAN

KEY PLAN
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FARO MINE COMPLEX

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SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 3 OF 14

DRAWING	REVISION	SHEET
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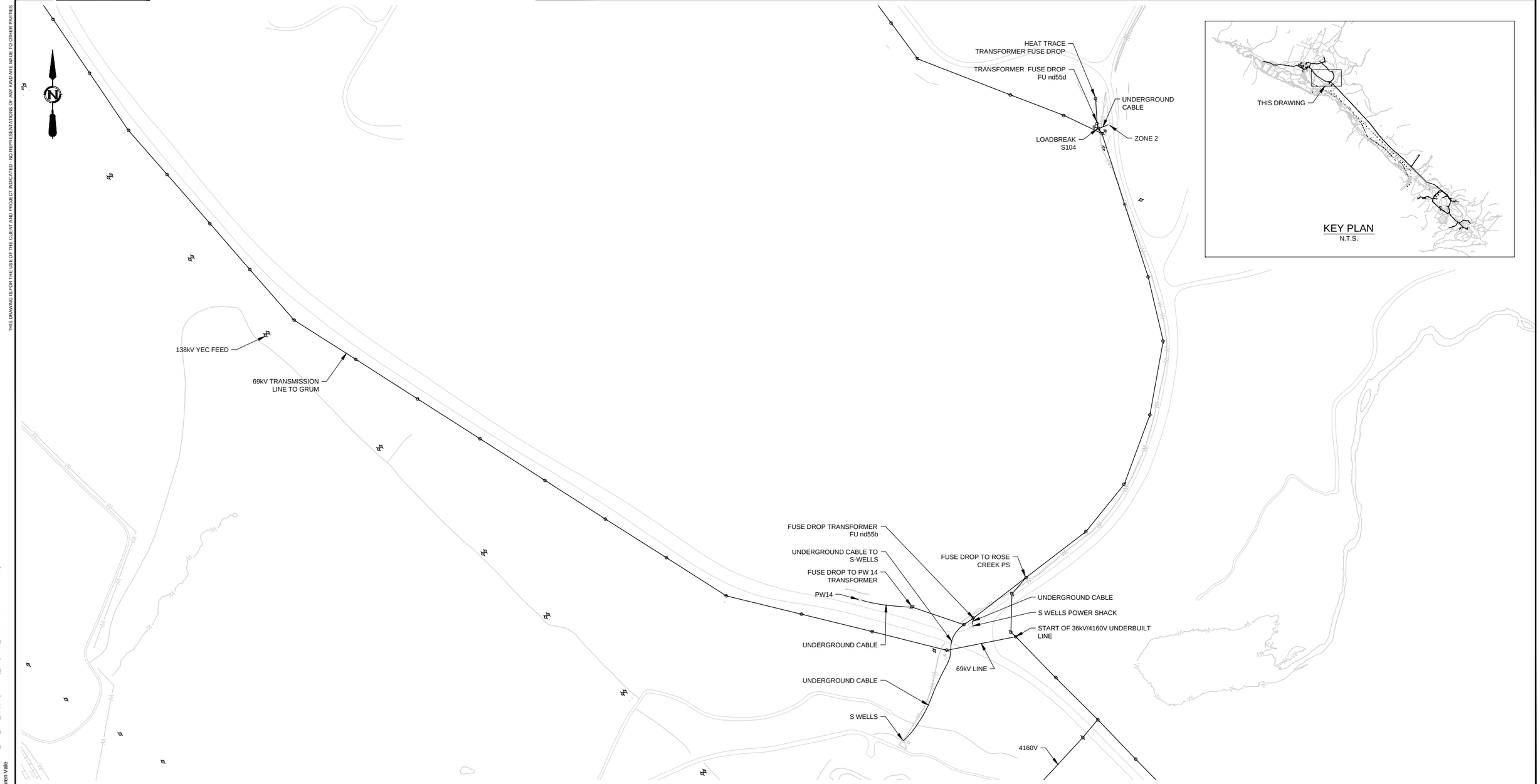

PLAN 1:2500
SITE PLAN

KEY PLAN
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FARO MINE COMPLEX

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SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 4 OF 14

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PLAN 1:2500

SITE PLAN

KEY PLAN
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SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 5 OF 14

DRAWING	REVISION	SHEET
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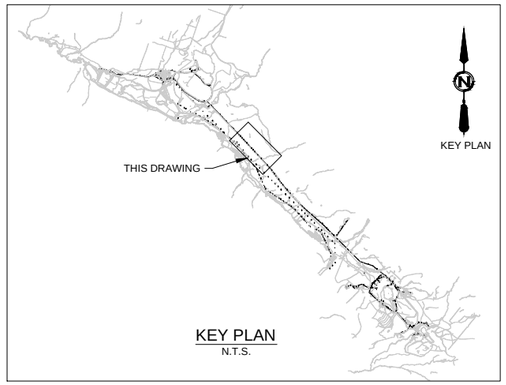

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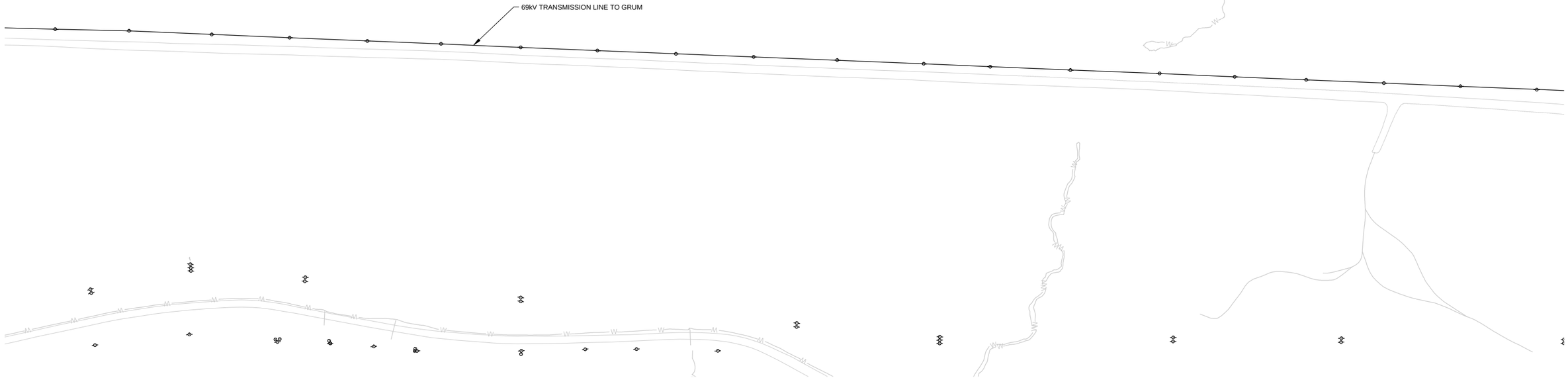

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SITE PLAN

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YUKON GOVERNMENT

FARO MINE COMPLEX

20152159-00

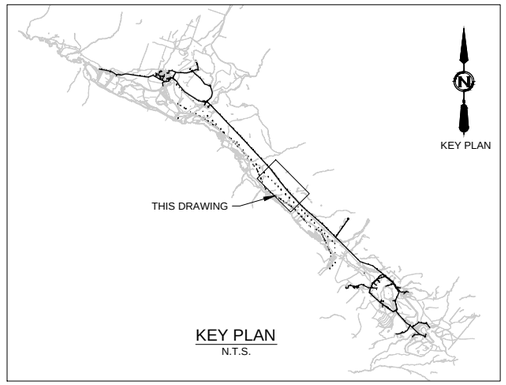
SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 6 OF 14

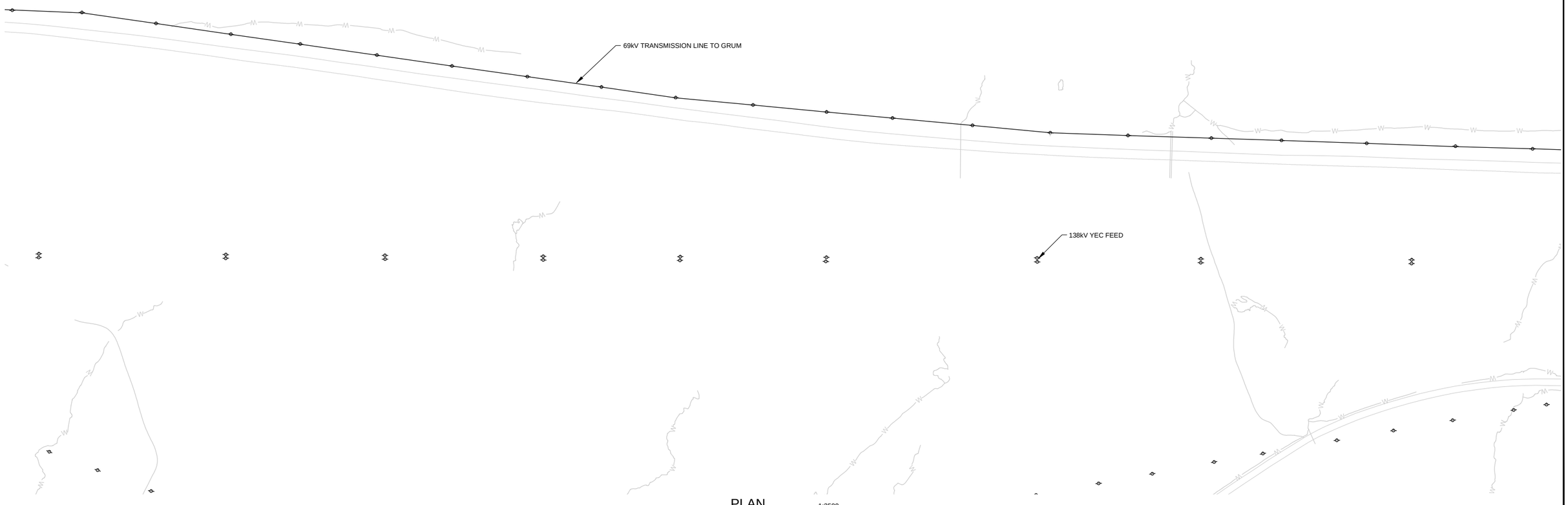
DRAWING	REVISION	SHEET
2159-00-E-107	D	8 / 19

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



KEY PLAN
N.T.S.



PLAN 1:2500
SITE PLAN

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YUKON GOVERNMENT

FARO MINE COMPLEX

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SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 7 OF 14

DRAWING	REVISION	SHEET
2159-00-E-108	D	9 / 19

IF NOT 50 mm ADJUST SCALES
50 mm

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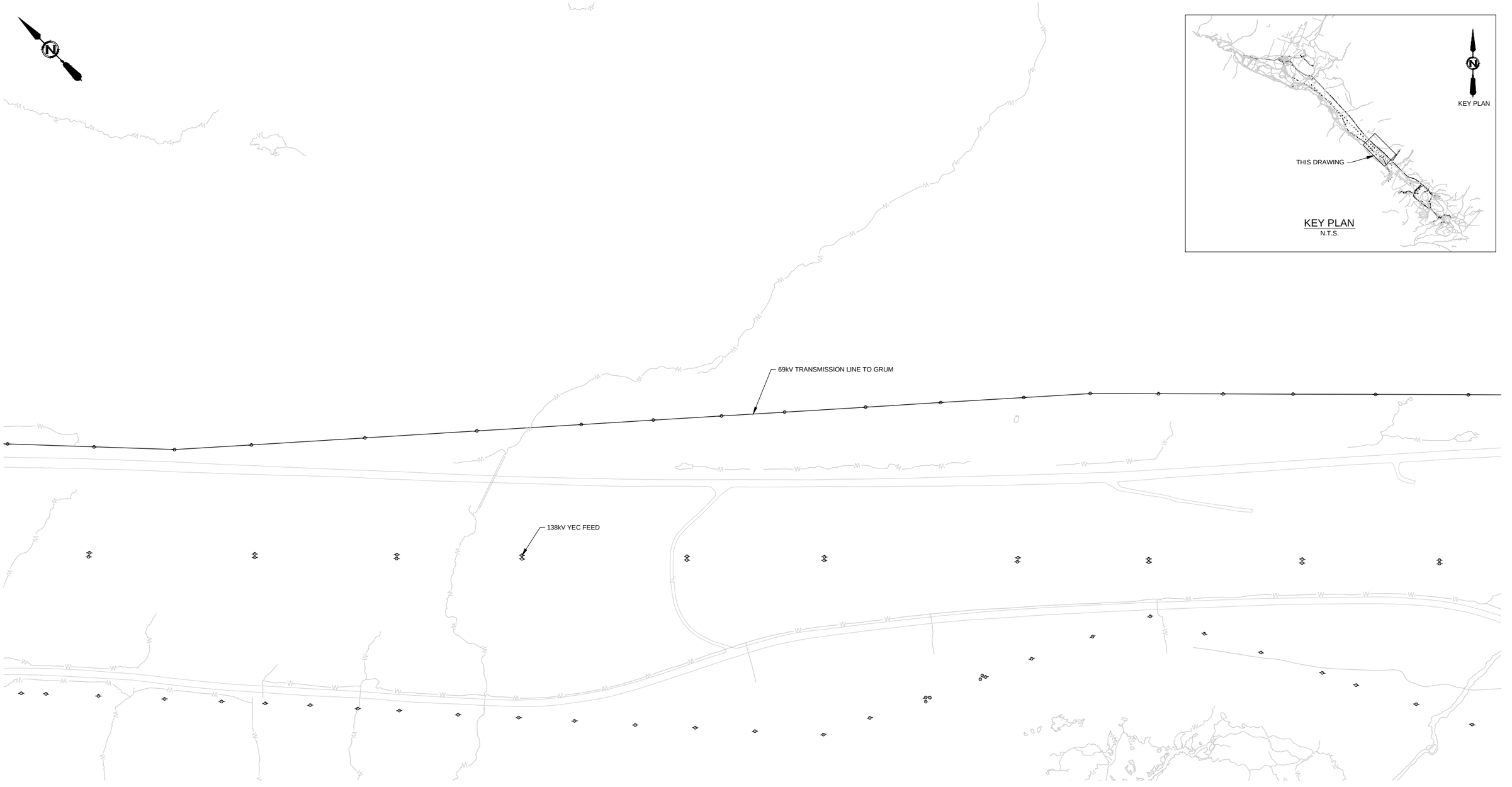

KEY PLAN
N.T.S.

PLAN 1:2500
SITE PLAN

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A	2015DEC	L. VALE	L. VALE	ISSUED FOR REPORT

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SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 8 OF 14

DRAWING	REVISION	SHEET
2159-00-E-109	D	10 / 19

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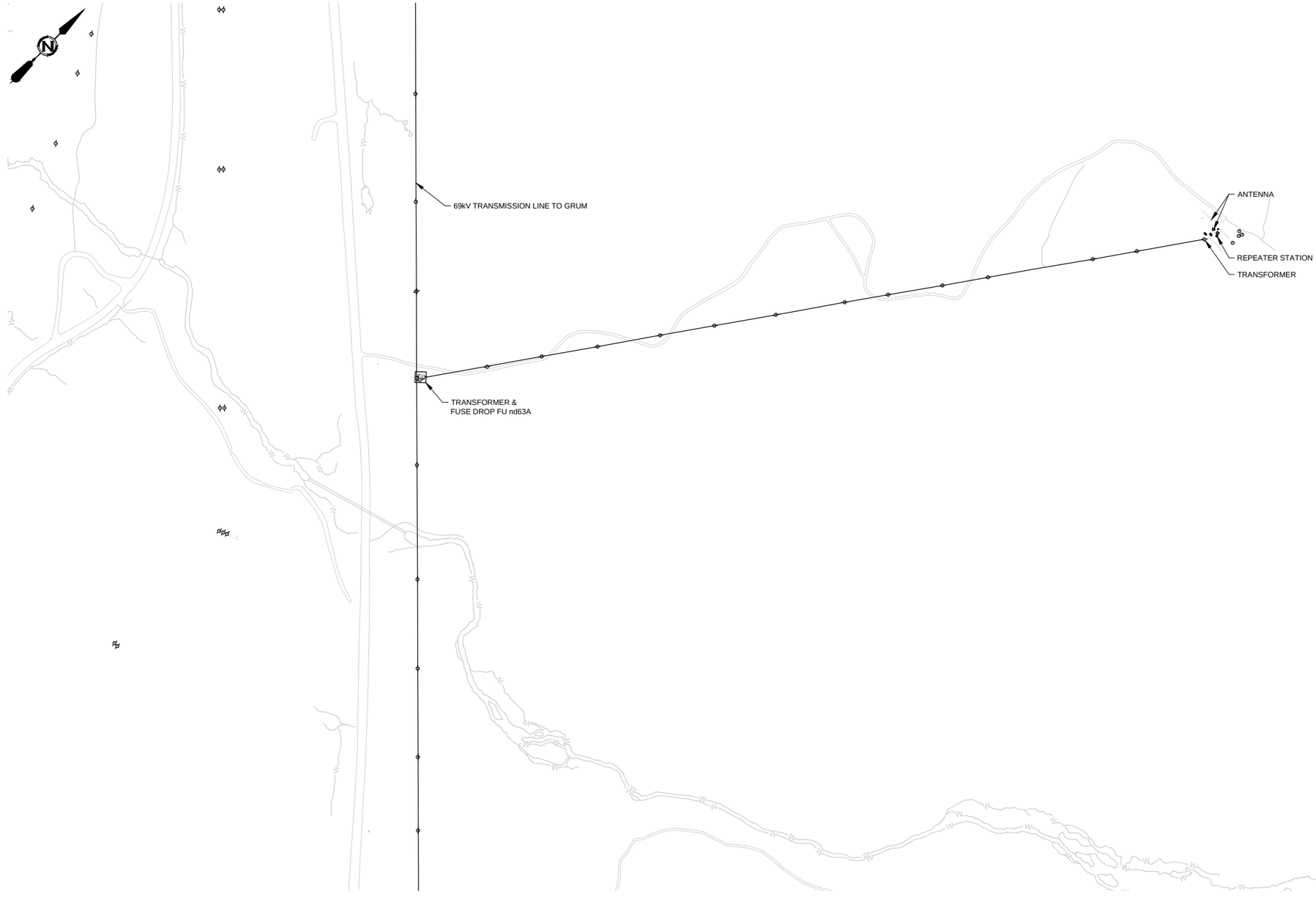
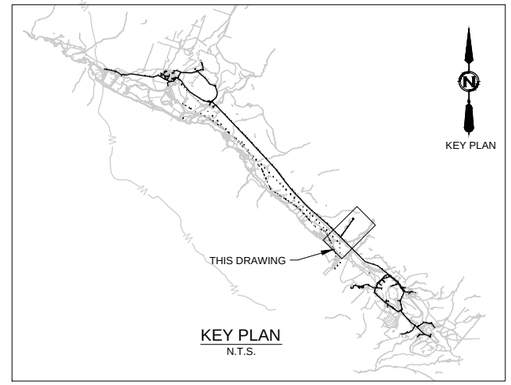


PLAN 1:2500
SITE PLAN



KEY PLAN
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FARO MINE COMPLEX

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SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 9 OF 14

DRAWING	REVISION	SHEET
2159-00-E-110	D	11 / 19

IF NOT 50 mm ADJUST SCALES
50 mm

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PLAN 1:2500
SITE PLAN

KEY PLAN
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FARO MINE COMPLEX

20152159-00

SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 10 OF 14

DRAWING	REVISION	SHEET
2159-00-E-111	D	12 / 19

IF NOT 50 mm ADJUST SCALES
50 mm

SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE

KEY PLAN
N.T.S.

PLAN 1:2500
SITE PLAN

Associated Engineering

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REV	DATE	DESIGN	DRAWN	DESCRIPTION
D	2015FEB	L. VALE	L. VALE	ISSUED FOR FINAL REPORT
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A	2015DEC	L. VALE	L. VALE	ISSUED FOR REPORT

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FARO MINE COMPLEX

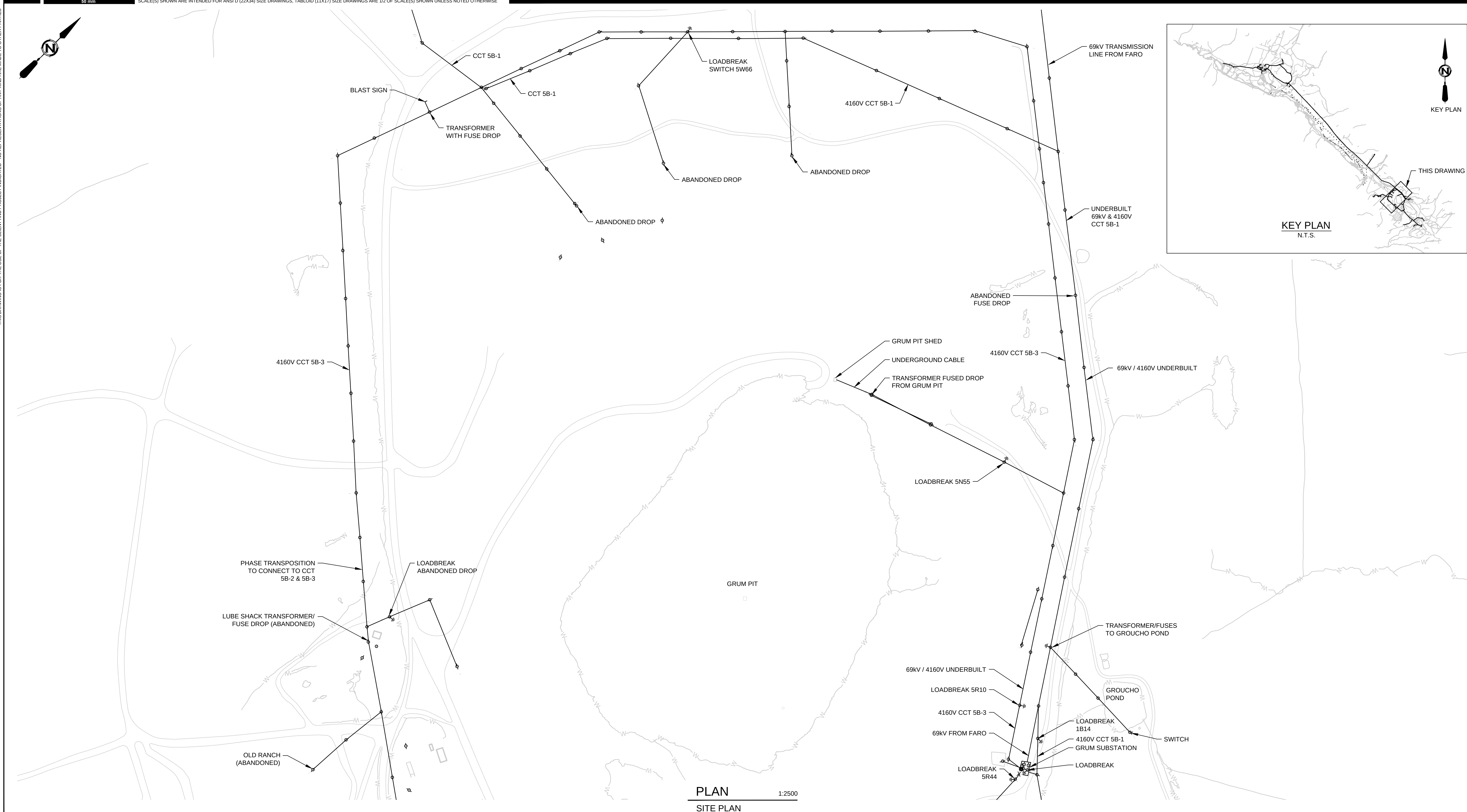
2015159-00

SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 11 OF 14

DRAWING	REVISION	SHEET
2159-00-E-112	D	13 / 19

IF NOT 50 mm ADJUST SCALES
50 mm
SCALE(S) SHOWN ARE INTENDED FOR ANSI D (22X34) SIZE DRAWINGS, TABLOID (11X17) SIZE DRAWINGS ARE 1/2 OF SCALE(S) SHOWN UNLESS NOTED OTHERWISE



PLAN 1:2500
SITE PLAN

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D	2015FEB	L. VALE	L. VALE	ISSUED FOR FINAL REPORT
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A	2015DEC	L. VALE	L. VALE	ISSUED FOR REPORT

YUKON GOVERNMENT

FARO MINE COMPLEX

20152159-00

SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 12 OF 14

DRAWING	REVISION	SHEET
2159-00-E-113	D	14 / 19

\\S-BUR-FS-01\projects\20152159\00_Faro_Elec_Mapping\Working_Dwgs\600_Electrical\2159-00-e-113.dwg
DATE: 2016-02-11, Lauren Vale

IF NOT 50 mm ADJUST SCALES
50 mm

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PLAN 1:2500
SITE PLAN

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YUKON GOVERNMENT

FARO MINE COMPLEX

20152159-00

SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 13 OF 14

DRAWING	REVISION	SHEET
2159-00-E-114	D	15 / 19

IF NOT 50 mm ADJUST SCALES
50 mm

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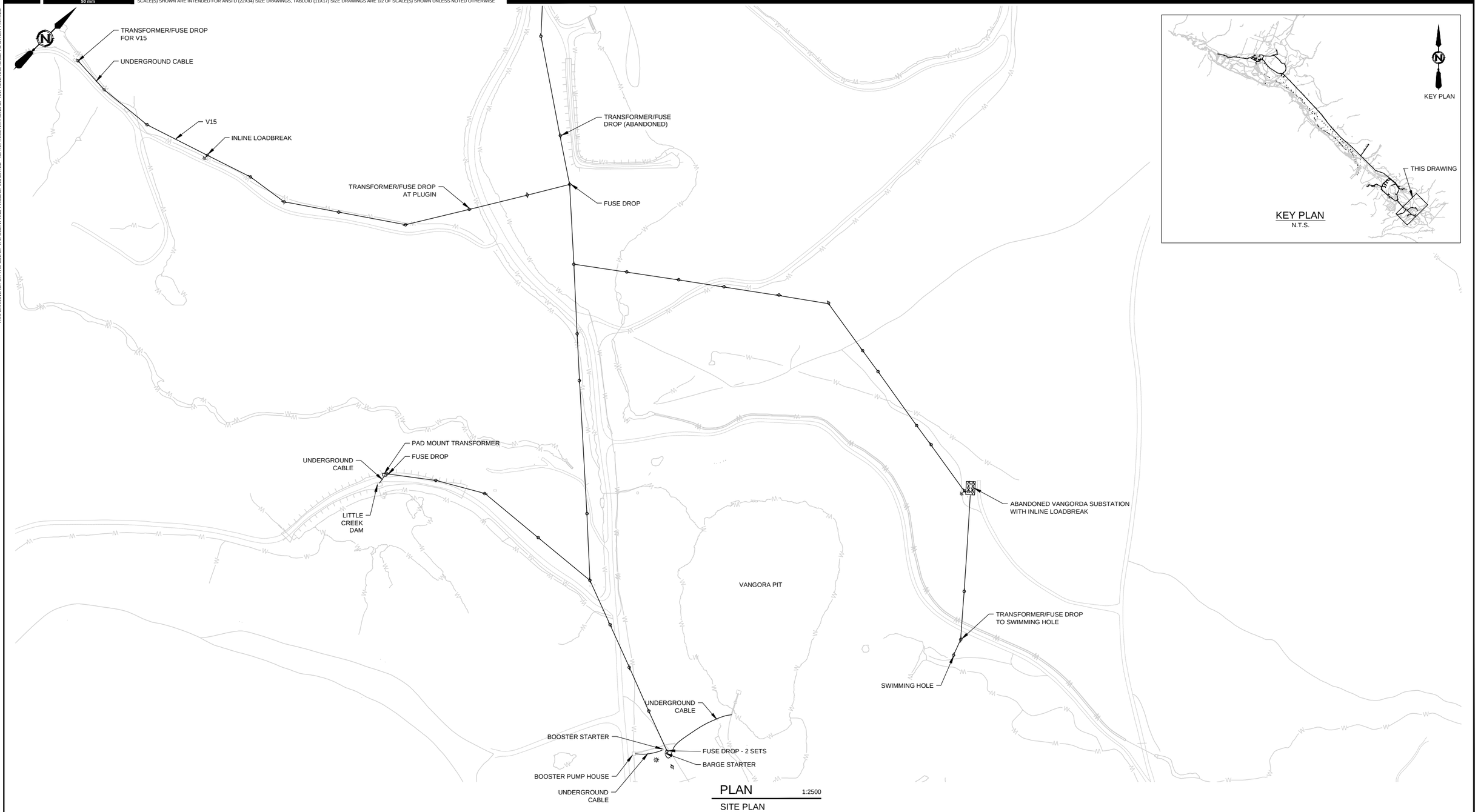

PLAN 1:2500

SITE PLAN

KEY PLAN
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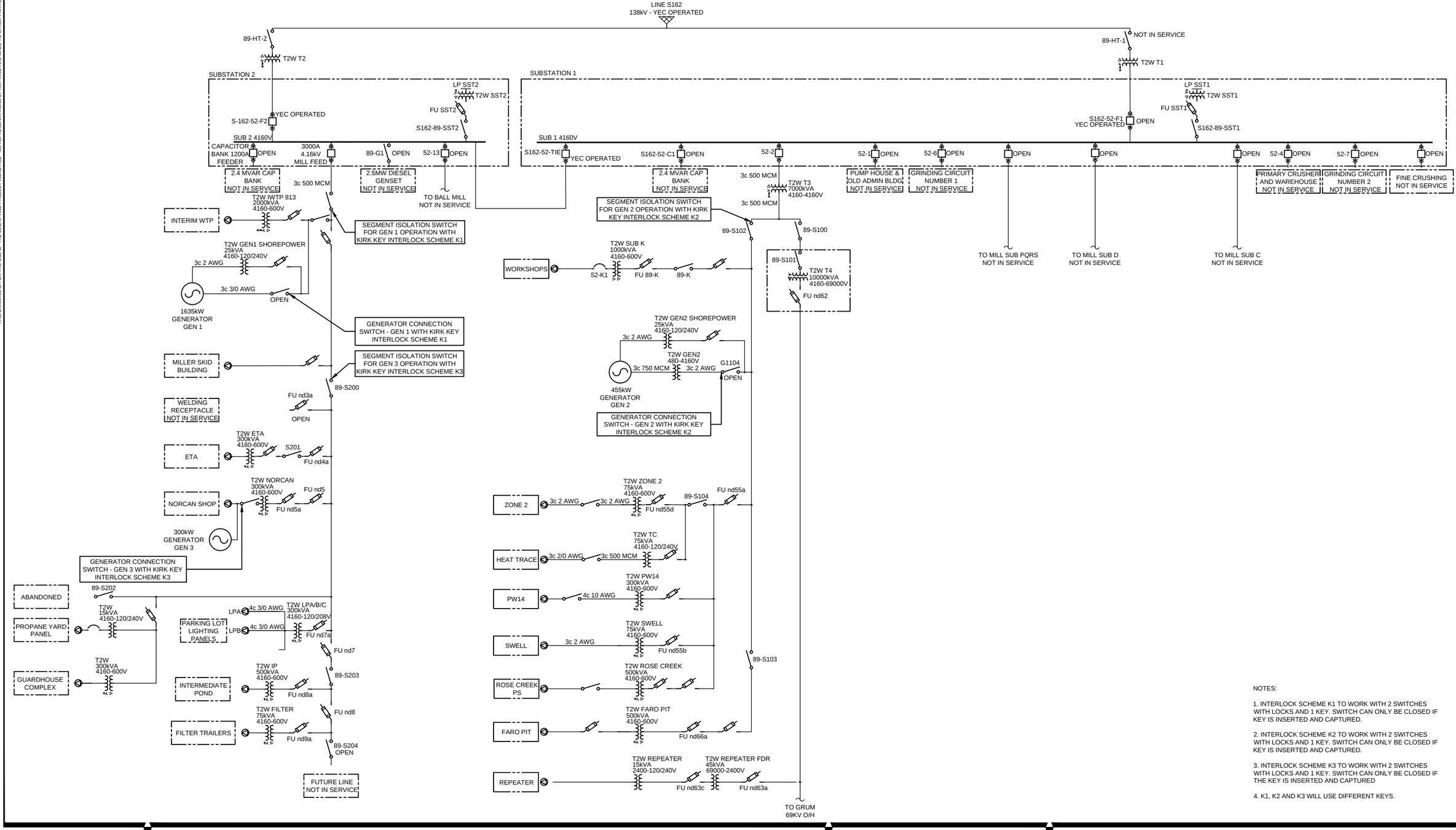
FARO MINE COMPLEX

20152159-00

SCALE: AS SHOWN

ELECTRICAL
SITE PLAN SHT 14 OF 14

DRAWING	REVISION	SHEET
2159-00-E-115	D	16 / 19



NOTES:

1. INTERLOCK SCHEME K1 TO WORK WITH 2 SWITCHES WITH LOCKS AND 1 KEY. SWITCH CAN ONLY BE CLOSED IF KEY IS INSERTED AND CAPTURED.

2. INTERLOCK SCHEME K2 TO WORK WITH 2 SWITCHES WITH LOCKS AND 1 KEY. SWITCH CAN ONLY BE CLOSED IF KEY IS INSERTED AND CAPTURED.

3. INTERLOCK SCHEME K3 TO WORK WITH 2 SWITCHES WITH LOCKS AND 1 KEY. SWITCH CAN ONLY BE CLOSED IF THE KEY IS INSERTED AND CAPTURED

4. K1, K2 AND K3 WILL USE DIFFERENT KEYS.

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FARO MINE COMPLEX

20152159-00

SCALE: N.T.S.

ELECTRICAL
FARO SINGLE LINE DIAGRAM

DRAWING	REVISION	SHEET
2159-00-E-601	D	17 / 19

IF NOT 50 mm ADJUST SCALES
50 mm

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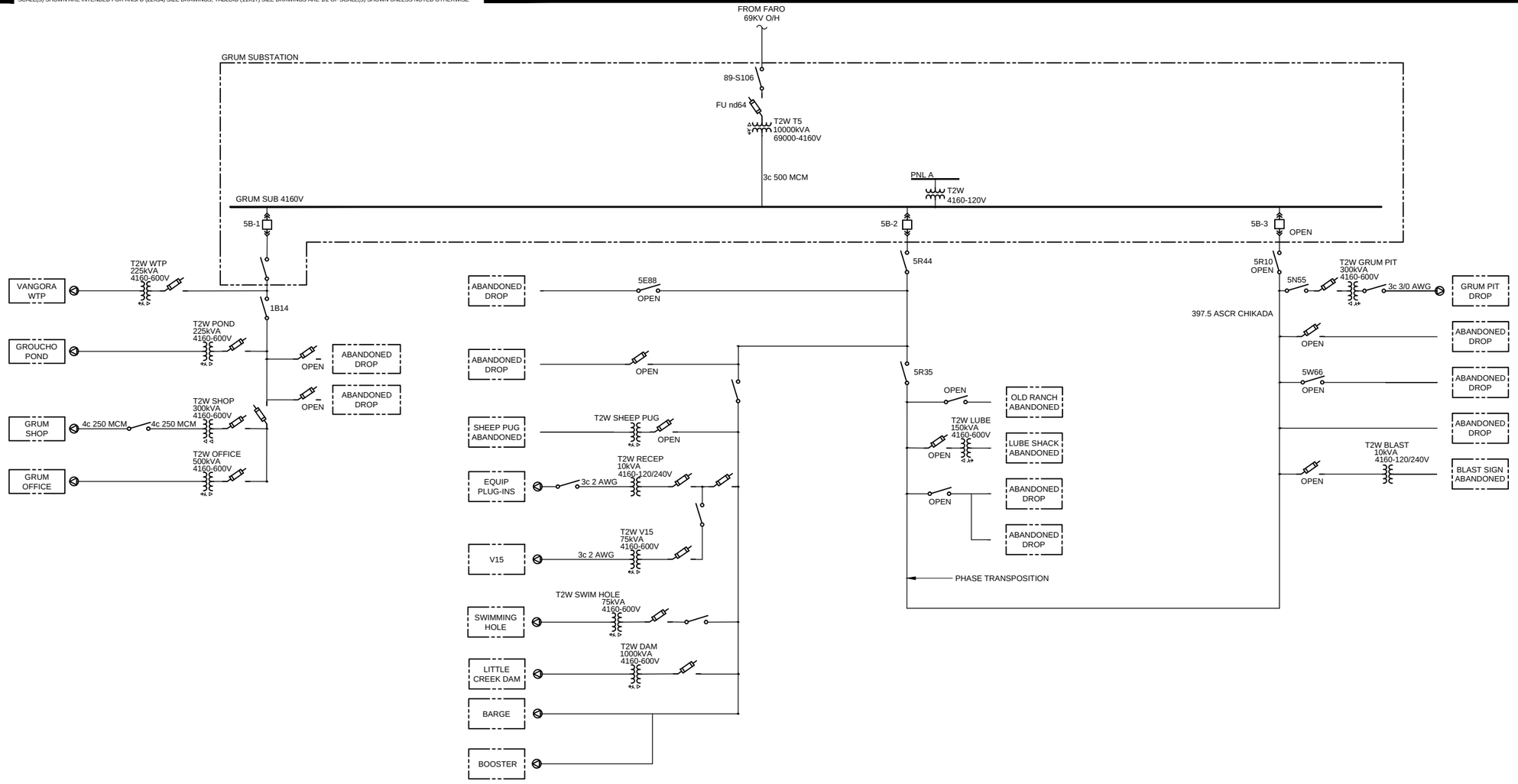

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YUKON GOVERNMENT

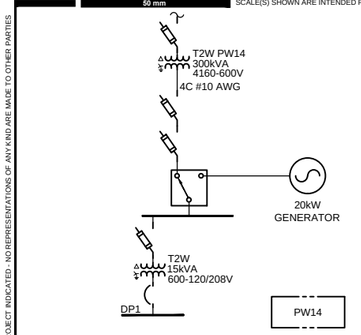
FARO MINE COMPLEX

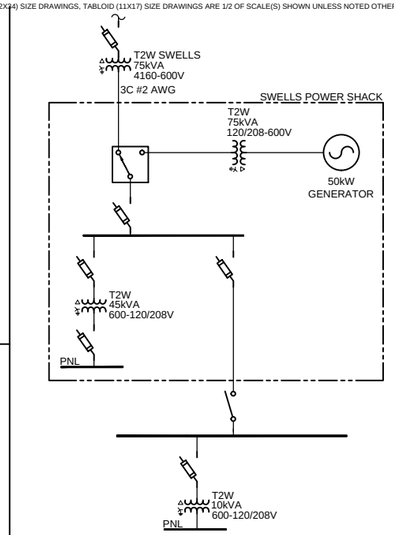
20152159-00

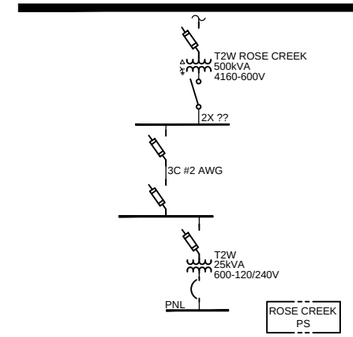
SCALE: N.T.S.

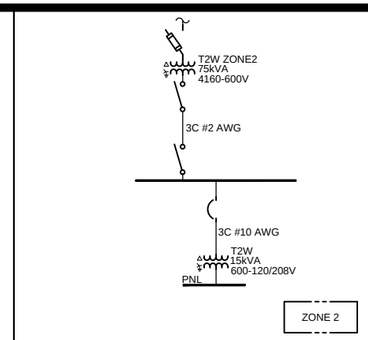
ELECTRICAL
GRUM/VANGORA SINGLE LINE DIAGRAM

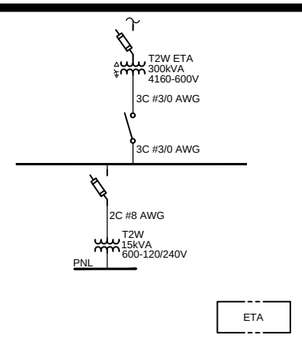
DRAWING	REVISION	SHEET
2159-00-E-602	D	18 / 19

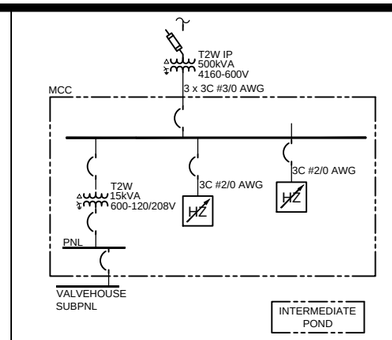


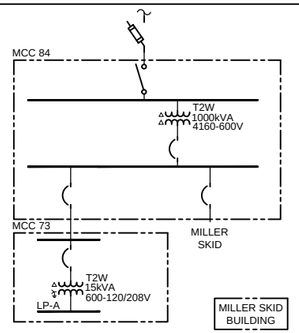


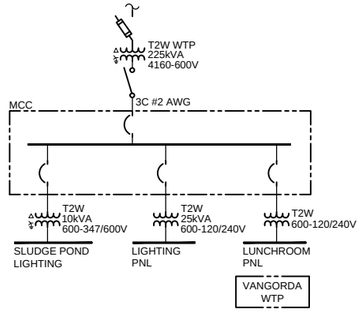


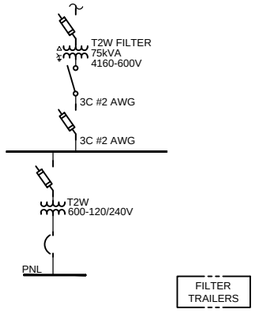


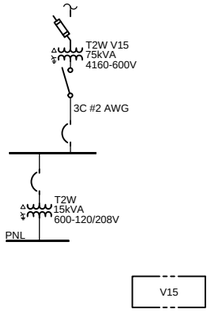


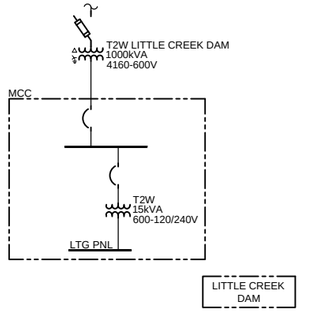


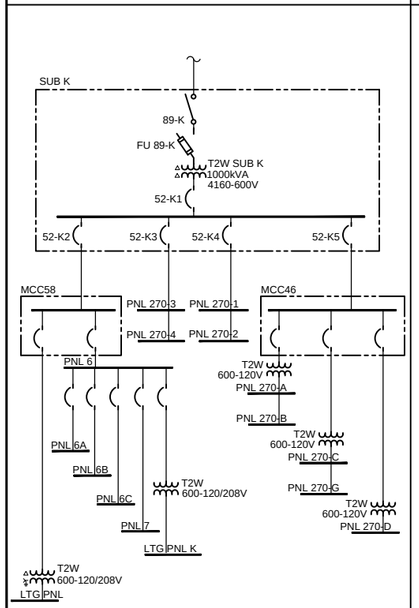


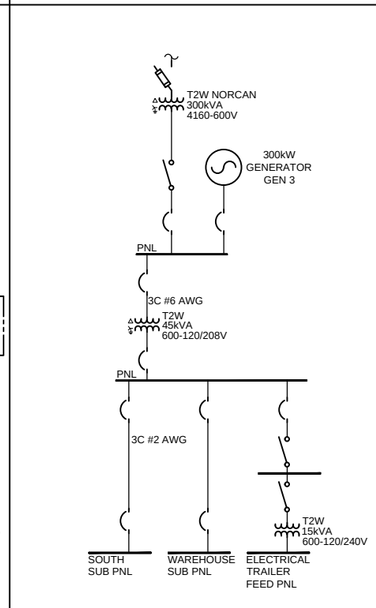


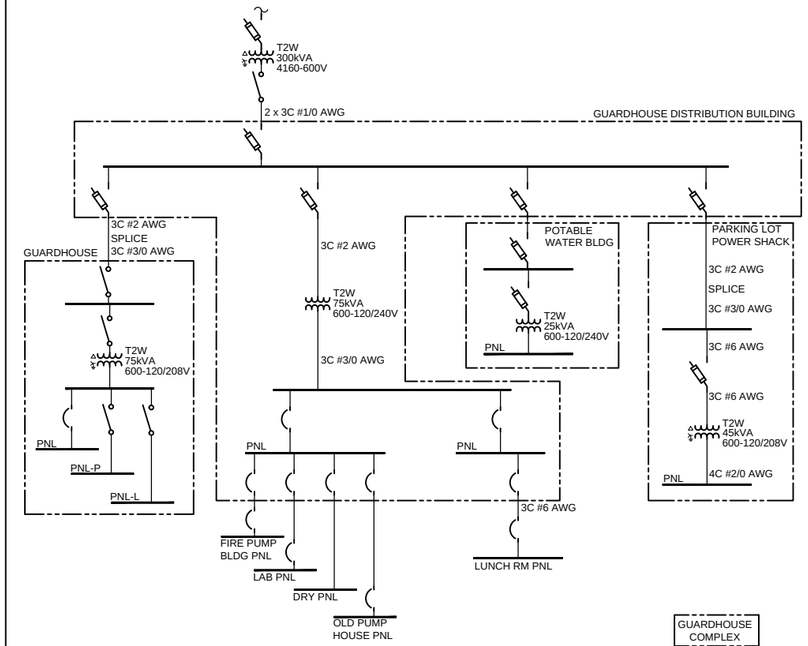


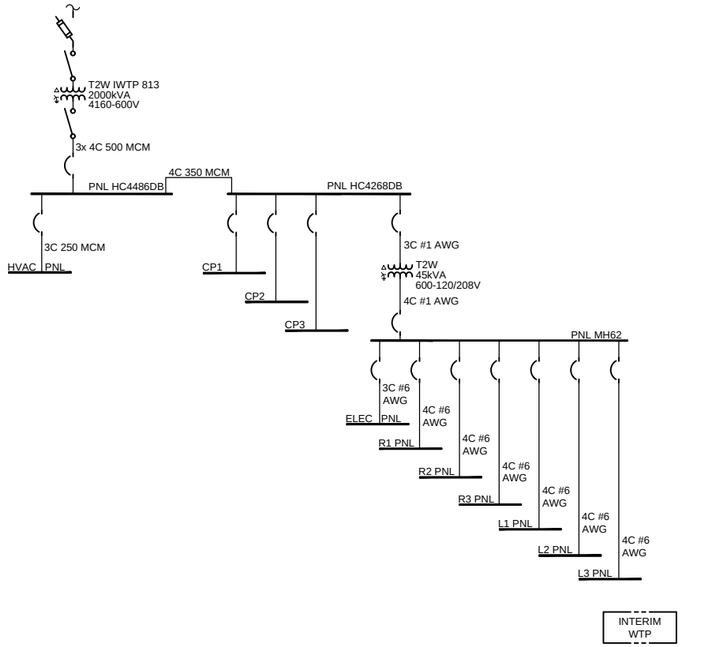












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YUKON GOVERNMENT

FARO MINE COMPLEX

20152159-00

SCALE: N.T.S.

ELECTRICAL
INDIVIDUAL BUILDING SINGLE LINE DIAGRAMS

DRAWING	REVISION	SHEET
2159-00-E-603	D	19 / 19

Appendix B - Equipment Lists

Location	Mounting	Connection	Primary Voltage	Secondary Voltage	Phases	Impedance	kVA	Model	Manufacturer	Year of Production	Notes
69kV Step up Substation (T4)	Padmount	Delta - wye	4160	69000	3	8.03%	10000		Ohio Transfomer Inc		Cannot read impedance off pictures
Electrical Trailer Feed From Norcan	Wallmount	Single phase	600	120/240	1	2.50%	15	BA-0434-X	Delta		
Equip Plug-in (Vangorda)	Single pole	Single phase	4160	120/240	1	1.80%	10	81-4-1	Northwest Transfomer		
ETA Small Power	Padmount	Single phase	600	120/240	1		15				Cannot read label
ETA well	3 bank pole	Delta - wye	4160	600	3	1.30%	300	2087/1	Beaver Electrical Machinery Ltd	1991	
Faro Pit	Padmount	Delta - wye	4160	600	3	5.79%	500		Delta		
Filter Trailer Shack	Single Pole		4160	600	3		75		Mark Electric		Label on far side of xfmr, could not access for suitable picture
Filter Trailer Shack Small Power		Single phase	600	120/240	1						No pictures
Gen 1 Shorepower	Single pole	Single phase	4160	120/240	1	1.90%	25	CO0430152	Betz Transfomers		
Gen 2 Shorepower	Single Pole	Single phase	4160	120/240	1	1.90%	25	CO0430151	Betz Transfomers		
Gen 2 Step-Up	Padmount		480	4160	3						No exterior labels on transformer
Groucho Pond Feed	3 bank pole	Delta - wye	4160	600	3	1.40%	225	200658-2	McGraw Edison Power Systems	1982	
Grum Blasting Sign (Abandoned)	Single pole	Single phase	4160	120/240	1		10				Fuses pulled, not in use
Grum Lube Shack (Abandoned)	Single pole	Single phase	4160	120/240	1		150				Fuses pulled, not in use
Grum Offices	Single platform	Delta - wye	4160	600	3	8.06%	500	Moloney Transfomer	Mark Electric	Aug 31/89	
Grum Pit	3 bank pole	Delta - wye	4160	600	3	1.50%	300	2087/4	Beaver Electrical Machinery Ltd	1991	
Grum Shop	3 bank pole	Delta - delta	4160	600	3	1.67%	300	2-109322	Ferranti Packard	1967	
Grum Sub (T5)	Padmount	Delta - wye	69000	4160	3	5.00%	10000	C-03065-5-1	Pennsylvania (McGraw-Edison)		
Grum Sub Small Power			4160	120							Located in switchgear cabinet. No pictures.
Guardhouse	Floor mount	Delta - wye	600	120/208	3	5.30%	75	3759K	Hammond Manufacturing		
Guardhouse Dist Bldg	Floor mount	Single phase	600	120/240	1	3.50%	75	MS75A2	Marcus		
						1.70%		80A1-1689	Westinghouse		
						1.40%		970304	TER Electric Supply Co Inc		
Parking lot	3 bank platform	Delta - wye	4160	120/208	3	2.40%	300	070308	TER Electric Supply Co Inc		Three bank of three different transformers
Guardhouse Complex	3 bank platform	Delta - wye	4160	600	3	3.15%	300	114901	Boundary Electric Ltd		
Heat trace (TC3/TC4)	Single pole	Single phase	4160	120/240	1		75				
Interim WTP	Padmount	Delta - wye	4160	600	3	5.39%	2000	Sealed-Tank Type	Surplec HV	2011	
Interim WTP Small Power	Floor mount	Delta - wye	600	120/208	3	4.80%	45	MT45A1	Marcus		
Intermediate Pond	3 bank pole	Delta - wye	4160	600	3	1.50%	500	091009-11	TER Electric Supply Co Inc		
Intermediate Pond Small Power	MCC	Delta - wye	600	120/208	3	5.90%	15	BA3015VCSP	BEMAG Inc		
Little Creek Dam	Padmount	Delta - wye	4160	600	3	5.87%	1000	110350	Woden	1972	
Little Creek Dam Small Power	MCC	Single phase	600	120/240	1		15				
Miller Skid Bldg MCC 73	MCC	Delta - wye	600	120/208	3		15				
Miller Skid Bldg MCC 84	MCC	Delta - delta	4160	600	3	5.50%	1000	14714-1	Polygon Transformer		
Norcan Shop	3 bank platform	Delta - wye	4160	600	3	1.30%	300	2087/2	Beaver Electrical Machinery Ltd	1991	
Norcan Shop Small Power	Wallmount	Delta - wye	600	120/208	3	4.50%	45	86-7977	Tracon Engineering Inc		
Parking Lot Power Shack	Floor mount	Delta - wye	600	120/208	3	4.80%	45	MT45A1	Marcus		
Potable Water Bldg	Floor mount	Single phase	600	120/240	1	3.32%	25	BE 5-53618-1S	Beaver Electrical Machinery Ltd		
Propane Yard Drop	Single platform	Single phase	4160	120/240	1		15				Label on far side of xfmr, could not access for suitable picture
PW14	3 bank pole	Delta - wye	4160	600	3	1.53%	300	CP1411108898	Cooper Transfomer Products	Sept/14	
PW14 Small Power	Floor mount	Delta - wye	600	120/208	3	5.60%	15	UA3015V	BEMAG Inc		
Repeater Feeder	Padmount	Single phase	69000	2400	1		200	C3375			Label missing off xfmr
Repeater	Single pole	Single phase	2400	120/240	1	2.20%	25				Could not access on pole
Rose Creek PS	Padmount	Delta - wye	4160	600	3	1.70%	500		Ferranti-Packard Transfomers Ltd	1976	No exterior labels on transformer
Rose Creek PS Small Power	Floor mount	Single phase	600	120/240	1	6.00%	25	SVR25T-G8A	Beaver Electrical Machinery Ltd		
Sheep Pug (Abandoned)	3 bank pole				3						Fuses pulled, not in use, one transformer faulty
Substation 1 (T3)	Padmount	Delta - wye	4160	4160	3	5.00%	7000	2-350150	Ferranti-Packard Transfomers Ltd	1981	
Substation 1 Small Power (SST1)	Floor mount		4160	120/208	3						No pictures
Substations 2 Small Power (SST2)	MCC		4160	120/240	1						In MCC, No pictures of label
Swell Power Shack	3 bank pole	Delta - wye	4160	600	3	1.70%	75	091001-11	TER Electric Supply Co Inc		
Swell Power Shack Gen	Floor mount	Delta - wye	120/208	600	3	2.10%	75	RET75H5-ST	Marcus		
Swell Power Shack Small Power	Floor mount	Delta - wye	600	120/208	3	3.20%	45	6372-196	Marcus		
Swell Small Power	Floor mount	Delta - wye	600	120/208	3	5.60%	10	MT10A1	Marcus		
Swimming Hole	Single pole	Delta - wye	4160	600	3	2.90%	75	2269/2	Moloney Electric Corp	1992	
V15 PS	3 bank pole	Delta - wye	4160	600	3	1.80%	75	CO0907101	Boundary Electric Ltd		
V15 PS Small Power	Floor mount	Delta - wye	600	120/208	3	5.70%	15	XMK015PB	Hammond Power Solutions Inc		
Vangorda WTP	3 bank platform	Delta - wye	4160	600	3	4.82%	225	6675/1	British Columbia Transformer Co Ltd	1973	

Location	Mounting	Connection	Primary Voltage	Secondary Voltage	Phases	Impedance	kVA	Model	Manufacturer	Year of Production	Notes
Vangorda WTP Ltg Panel	MCC	Single phase	600	120/240	1		25				
Vangorda WTP Lunchrm Panel	Wallmount	Single phase	600	120/240	1				Canadian General Electric		No pictures
Vangorda WTP Sludge Pond Ltg	Wallmount	Wye-Wye	600	600	3	3.50%	10	3101-490 4T	Marcus		
Workshops beside MCC 58	Wallmount	Delta - wye	600	120/208	3		30	K 30 9 N	Hammond		Does not appear to be connected to anything
Workshops Electrical Room1	Floor mount		600	120							No pictures of label
Workshops Electrical Room2	Floor mount		600	120							No pictures of label
Workshops Lighting Panel Feed	Wallmount	Delta - wye	600	120/208	3	4.50%		810259	Westinghouse		Located across from MCC 58 feeding unnamed lighting panel
Workshops Lighting Panel K Feed	Wallmount	Delta - wye	600	120/208	3				Canadian General Electric		Unable to get clear picture of label, couldn't read
Workshops Main (Sub K)	MCC	Delta - delta	4160	600	3	5.40%	750/1000	286968	Canadian General Electric	1968	ANN/ANF
Workshops Panel 270-D Feed			600	120							Didn't find onsite
Zone II PS	Single pole	Delta - wye	4160	600	3	2.90%	75	2269/1	Moloney Electric Corp	1992	
Zone II PS Small Power	Floor mount	Delta - wye	600	120/208	3	5.70%	15	XMK015PB	Hammond Power Solutions Inc		

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MOTORS OVER 10 HP

Name	Type	Manufacturer	Model	Starter Model	Size (hp)	Control
Barge Pump	K	Canadian General Electric	119290	Raffin Electric	350	Constant Speed
Booster Pump	K	Canadian General Electric	119290	Raffin Electric	350	Constant Speed
Booster/Barge Spare	K	Canadian General Electric	119290		350	Not In Service
Faro Pit	TKKH	Toshiba	4J5350L151878	Toshiba VF-AS1	350	VFD
Groucho Pond		Flygt		Integral	15	Constant Speed
Grum Pit Pump	XFP150M-CB2PT104014-60F	Sulzer	AXL34T3171K1112	Integral	80	Constant Speed
Grum Pit Pump Spare	XFP150M-CB2PT104014-60F	Sulzer	AXL34T3171J3112		80	Not In Service
Grum Sludge Pit					75	
Intermediate Pond Pump #1	RU1	US Motors	09700755-166	Yaskawa GPD 506/P5	150	VFD
Intermediate Pond Pump #2	RU1	US Motors	09700755-100	Yaskawa GPD 506/P5	150	VFD
Intermediate Pond Pump Spare	RU1	US Motors	14744954-100		150	Not In Service
Intermediate WTP B8-001	AEHH-8N	OPTIM TEFC	PDH04045M	Integral	40	Constant Speed
Intermediate WTP B8-002	AEHH-8N	OPTIM TEFC	PDH04045M	Integral	40	Constant Speed
Intermediate WTP B8-003	AEHH-8N	OPTIM TEFC	PDH04045M	Integral	40	Constant Speed
Intermediate WTP P3-011	Inverter Duty Motor	WEG W22	01518ET3H254T-W22	Integral	15	Constant Speed
Intermediate WTP P3-012	Inverter Duty Motor	WEG W22	01518ET3H254T-W22	Integral	15	Constant Speed
Intermediate WTP P3-021	Inverter Duty Motor	WEG W22	01518ET3H254T-W22	Integral	15	Constant Speed
Intermediate WTP P3-022	Inverter Duty Motor	WEG W22	01518ET3H254T-W22	Integral	15	Constant Speed
Intermediate WTP P9-542	Inverter Duty Motor	WEG W22	01518ET3H254T-W22	Integral	15	Constant Speed
Intermediate WTP P9-543	Inverter Duty Motor	WEG W22	01518ET3H254T-W22	Integral	15	Constant Speed
Little Creek Dam		Flygt		Integral	30	Constant Speed
Little Creek Dam	RUE	US Motors	686160/X10X2290474R-1		125	Not In Service
Little Creek Dam	RUE	US Motors	686160/Y05X2290468R-2		125	Not In Service
Little Creek Dam	RU	US Motors	T08T1440400R-2		125	Not In Service
Miller Skid Bldg	TKKH	Toshiba	4F5200L3A2NX	Toshiba VF-AS1	200	VFD
Norcan Shop	SC	MagneTek	6-355815-01	Integral	10	Constant Speed
Rose Creek	85S100-9	Grundfos	12B80009 P11117	ALM	10	VFD
Swells				Yaskawa A1000	15	VFD
V15	150S150-8	Grunfos	2366238120		15	VFD
Vangorda WTP Cyclone Air		Can't Access			40	Constant Speed
Vangorda WTP P662-411		No Name Plate		Integral	10	Constant Speed
Vangorda WTP P662-412	AFEACR	Teco Induction Motor	DZ490151004	Integral	25	Constant Speed

Name	Model	Manufacturer	kVA	kW	Voltage	Phases
Gen 1 - WTP OH	D518252	Detriot Diesel	2044	1635	4160	3
Gen 2 - Rental	BGS 00203	Caterpillar	569	455	480	3
Gen 3 - Norcan Shop	DFCB-5565265	Cummins	375	300	600	3
PW14	G14K481913	Stamford	25	20	600	3
S-Wells Power Shack	F8815	Simmax	62.5	50	120/208	3

Name	Location	Model	Manufacturer	Year of Production	Total Load Capacity	Voltage	Phases	# CCTS	# Unused CCTS
Power in Ctrl Pnl	Barge Shed	Uncovered				120/240	1	12	1
Power in Ctrl Pnl	Booster Shed	No Pictures				120/240	1	12	2
Small Power	Dry Bldg	CPL122	Cutler Hammer		125A	120/240	1	12	8
Small Power	ETA	Behind Cage	Square D			120/240	1		
Small Power	Filter Trailer Shack	QOC24UC	Square D		60A	120/240	1	24	8
Small Power	Fire Pump Bldg	QOC32U125C	Square D		60A	120/240	1	32	15
Shore Power	Gen 1	QOC24MC	Square D		100A	120/240	1	24	10
RPSAA	Gen 2	YS2036	Westinghouse	12/93	100A	120/208	3	42	3
PNL A	Grum Sub	NBA	Westinghouse		100A	120/208	3	12	0
SWGR	Grum Sub	34B2264	Westinghouse			4160	3	5	2
Panel L	Guardhouse	342-OF	Federal Pioneer		200A	120/240	3	42	11
Panel P	Guardhouse	No Label			100A	120/240	1	24	1
Small Power	Guardhouse	QOC24UC	Square D		60A	120/240	1	24	4
Distribution Pnl	Guardhouse Dist Bldg	QOC402UC	Square D		200A	120/240	1	40	30
Lunchroom Feed Pnl	Guardhouse Dist Bldg	QOC402UC	Square D		200A	120/240	1	40	38
Local Equip Plug ins	Guardhouse Sub	QOC32U125C	Square D		100A	120/240	1	32	26
Not in Use	Guardhouse Sub	NBLP 42-4L	Federal Pioneer		225A	120/240	3	42	Unclear
Elec	Interim WTP	EQ424BQ100	Siemens		100A	120/240	3	24	17
HC4268DB	Interim WTP	HCP326812N	Square D		1200A	600	3	42	11
HC4486DB	Interim WTP	HCR5486120	Square D		1200A	600	3	62	2
L1	Interim WTP	EQ424BQ100	Siemens		100A	120/240	3	24	17
L2	Interim WTP	EQ424BQ100	Siemens		100A	120/208	3	24	16
L3	Interim WTP	EQ424BQ100	Siemens		100A	120/208	3	24	20
MH62	Interim WTP	NQMB4LA	Square D		400A	120/208	3	42	11
R1	Interim WTP	EQ424BQ100	Siemens		100A	120/208	3	24	14
R2	Interim WTP	EQ424BQ100	Siemens		100A	120/208	3	24	18
R3	Interim WTP	EQ424BQ100	Siemens		100A	120/208	3	24	15
MCC	Intermediate Pond	F10998848-009	Square D		800A	600	3	19	13
MCC Small Power Pnl	Intermediate Pond	NQOD430M100CU	Square D		100A	120/208	3	30	18
Valvehouse Pnl	Intermediate Pond	QO8L100RB	Square D		100A	120/240	1	8	1
Small Power	Lab	QOC60UC	Square D		200A	120/240	1	60	23
Ltg Pnl	Little Creek Dam	In MCC				120/240	1		
MCC	Little Creek Dam	06B208700	Westinghouse	09/90	800A	600V	3	11	1
Small Power	Lunchroom	QOC24MB-1	Square D		125A	120/240	1	24	1
LP-A	Miller Skid Bldg	PL-1	Westinghouse	92/01/17	225A	120/208	3	18	1
MCC73	Miller Skid Bldg	75016-C	Allen-Bradley		800A	5000V	3		
MCC84	Miller Skid Bldg	75917-C	Allen-Bradley		800A	5000V	3		
600V PNL	Norcan	ITI	Westinghouse		225A	600	3	12	3
Norcan Shop	Norcan	NQODQB	Square D		200A	120/240	1	42	2
South Subpanel	Norcan	QOC32U125C	Square D		100A	120/240	1	32	9
Warehouse Subpanel	Norcan	Couldn't find on site							
Distribution Pnl	Old Pump House	QOC24UC	Square D		60A	120/240	1	24	11
Electrical Trailer Feeder	Outside Norcan	QO??	Square D		100A	120/240	1	16	10
LPA	Parking Lot	QBM-442	Square D		225A	120/208	3	42	9
LPB	Parking Lot	No Label	Square D		225A	120/208	3	42	23
Distribution Pnl	Parking Lot Power Shack	QOC42UC	Square D		375A	120/208	1	42	7
Small Power	Potable Water Plant	QOC24UC	Square D		100A	120/240	1	24	3
Distribution Pnl	Propane Yard	QOC20U100C	Square D		100A	120/240	1	20	13
DP1	PW14	EQ424BQ100	Siemens		60A	120/208	3	24	9
Distribution Pnl	Repeater	QO8MB-1	Square D		100A	120/240	1	12	4
Distribution Pnl	Repeater	Missing Cover	Square D		2 x 60A 2P	120/240	1	8	4
Solar Panel Distribution	Repeater	QO8L100	Square D		100A	120/240	1	8	2
Small Power	Rose Creek	EQ	Siemens		100A	120/240	1	24	10
DC Panel	Substation 1	No Label				DC		16	0
S126-89-9-LP1	Substation 1	86078572	Canadian General Electric		225A	120/208	3	30	7
SWGR 1	Substation 1		Canadian General Electric		3000A	4160	3		
SWGR 2	Substation 1	L8259	Lima		3000kVA	4160	3	6	2
Distribution Pnl	Substation 2	NBLP 24-4L	Federal Pioneer		100A	120/240	3	24	0
SWGR	Substation 2		CES			4160	3		
Small Power	Swell	QOC24UC	Square D		100A	120/208	3	24	6
Small Power	Swell Power Shack	QOC30UC	Square D		100A	120/208	3	30	21
Small Power	V15	EQ418100	Siemens		100A	120/240	1	18	8
Ltg Pnl	Vangorda WTP	NBA	Westinghouse	Jul-89	225A	120/240	1	24	0
Lunchrm Pnl	Vangorda WTP	BC12100	CEB		40A	120/240	1	12	2
MCC	Vangorda WTP	06B205710	Westinghouse	07/89		600	3	24	3
Label Missing (6C?)	Workshop	70386139	Canadian General Electric		225A	600	3	36	18
Lighting Panel K	Workshop	ANLB	Canadian General Electric		225A	120/240	3	42	8
Lighting(P-270-D?)	Workshop	ANLB	Canadian General Electric		225A	120/240	3	36	0
MCC46	Workshop		Canadian General Electric					25	0
MCC58	Workshop	R7092C	Canadian General Electric		1000A	600	3	22	2
P-270-5(Fed from MCC 3?)	Workshop	70387519	Canadian General Electric		225A	600	3	16	2
P-270-A	Workshop	ANLB	Canadian General Electric		100A	120/240	3	24	0
P-270-B	Workshop	ANLB	Canadian General Electric		100A	120/240	3	30	0
P-270-C	Workshop	ANLB	Canadian General Electric		100A	120/240	3	30	12
PNL 270-1	Workshop	70387519	Canadian General Electric		400A	600	3	20	0
PNL 270-2	Workshop	70387519	Canadian General Electric		400A	600	3	20	0
PNL 270-3	Workshop	70387519	Canadian General Electric		400A	600	3	18	2
PNL 270-4	Workshop	70387319	Canadian General Electric		400A	600	3	20	0
Power Panel 6	Workshop	70386139	Canadian General Electric		400A	600	3	42	6
Power Panel 6A	Workshop	70386139	Canadian General Electric		225A	600	3	36	21
Power Panel 6B	Workshop	70386139	Canadian General Electric		225A	600	3	36	15
Sub K	Workshop		S&C		600A	4160/600	3	12	3
Uncovered (Power Panel 7?)	Workshop					120/240	1	18	0
Welding Shop Ltg Pnl	Workshop	ANLB	Canadian General Electric		100A	120/240	3	24	1
P-270-G	Workshop Offices	Abandoned	No pictures			120/240	1		
Small Power	Zone 2	EQ418100	Siemens		100A	120/240	3	18	12

Name	Location	Model	Manufacturer	Year of Production	Catalog Number	Max kV	BIL kV	Cont. Amp Rating	Inter. Current	Fault Close Amp Rating	Other Notes
	1.5MW Generator Disconnect	Omni-Rupter	S&C Electric Co.	2015	147433R4	29	150	900	900	42kA	
	1st Pole Outside Sub 2	Omni-Rupter	S&C Electric Co.	2014	147433R4	29	150	900	900	42kA	
G1104	500kW Rental Generator Disconnect	Omni-Rupter	S&C Electric Co.	2015	147433R4	29	150	900	900	42kA	
89-S100	69kV Line Isolation Switch		Patton & Cooke			25	150	1200			
89-S101	69kV Step-up substation	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
	Abandoned drop on CCT 5B-2 betw Phase transposition & Lube Shack	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
	Abandoned Loadbreak in Vangorda Sub		Patton & Cooke		MTA-36912-V	69	350	1200			
89-S200	Between Miller Skidd Bldg and Welding Recep	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
5W-66	CCT 5B-2 between Vangorda spur & Blast Sign	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
5R-35	CCT 5B-2 between Vangorda spur & Old Ranch	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
5R-10	CCT 5B-3 outside Grum Sub	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
89-S204	End of line past filter trailers	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
89-S102	Faro Pit Line Isolation Switch	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
5E-88	Grum Pit Abandoned drop	Alduti-Rupter	S&C Electric Co.	1995	137413R8	25		600			
5N-55	Grum Pit Drop	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
89-S106	Grum Substation - 69kV isolation switch	MTA	Patton & Cooke		MTA-36912-V?	69	350	1200			
	Grum Substation - CCT 5B-1 isolation switch	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
89-S202	Guard House Substation	RT	Patton & Cooke		RT-372	7.5	95	200		12kA	
	Inline Loadbreak to Swimming Hole - Abandoned Vangorda Sub	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
S-201	Next to mine access rd on line to ETA	Alduti-Rupter	S&C Electric Co.	1990	137413R8	25		800			
	Old Ranch abandoned drop	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
89-S203	On way to Intermediate Pond	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
89-S103	Outside Faro Pit	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
1B-14	Outside Grum Sub - Before 5kV / 69kV Underbuild	Omni-Rupter	S&C Electric Co.		137413R8	25		600			
5R-44	Outside Grum Sub - CCT 5B-2 isolation switch	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
	V15 Loadbreak	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
	Vangorda Line Isolation Inline Loadbreak	Omni-Rupter	S&C Electric Co.		147423	25		600		20kA	
	WTP Spur Line before the standby generator		Cooper Power Systems	2013	M2GC2SC2ARSU	29	150	900	900	20kA	
89-S104	Zone 2	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Packout Material Number F2899

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MEDIUM VOLTAGE SWITCHGEAR

Name	Location	Model	Manufacturer	Year of Production	Catalog Number	Rated kV	BIL kV	Cont. Amp Rating	Short Circuit Current	Phases	Control Power	Other Notes
CB 5B-1	Grum Substation	50-DH-P-250	Westinghouse	1969		4.16	60	1200	32000	3P3W	125VDC	
CB 5B-2	Grum Substation	50-DH-P-250	Westinghouse	1969		4.16	60	1200	32000	3P3W	125VDC	
CB 5B-3	Grum Substation	50-DH-P-250	Westinghouse	1969		4.16	60	1200	32000	3P3W	125VDC	
Grum Substation Switchgear	Grum Substation	Porcel-Line DHP	Westinghouse	Not Available	Not Available	4.16	Not Available	Not Available	Not Available	Not Available	Not Available	
Station Service	Grum Substation	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
Auxillary	Substation 1											Station Service PTs
Bus Tie Breaker (S162-52-TIE)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	To Sub 2
Capacitor Bank Breaker (S162-52-C1)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Fine Crushing	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Grinding CCT No 1 (52-6)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Grinding CCT No 2 (52-7)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Main Breaker (S162-52-F1	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	
Mill Services & Flotation #1	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Mill Services & Flotation #2	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Mill Services & Flotation #3	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Mine Feeder (52-2)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	To Faro Pit & 69kV Line
Primary Crusher & Warehouse (52-4)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Pumphouse & Admin Building (52-1)	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	Not In Service
Substation 1 Switchgear	Substation 1	M-26	General Electric			4.16	60	3000	N/A	3ph3w		
Utility	Substation 1	A2M-4.16-250	General Electric			4.16	60	1200	37500	3ph3w	125VDC	
1200A Disconnect Diesel Generator (89-G1)	Substation 2	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not In Service
3000A Mill Feed (52-13)	Substation 2	5.35	Federal Pioneer	1980		4.16	60	3000	41000	3ph3w	125VDC	Not In Service
4.16kV Incoming (S-162-52-F2)	Substation 2	5.35	Federal Pioneer	1980		4.16	60	3000	41000	3ph3w	125VDC	
3000A 4.16kV Mill Feed	Substation 2	5.35	Federal Pioneer	1980		4.16	60	3000	41000	3ph3w	125VDC	To WTP and Guard House
Capacitor Bank 1200A Feeder	Substation 2	5.35	Federal Pioneer	1980		4.16	60	3000	41000	3ph3w	125VDC	Not In Service
Station Service (S162-89-SST2)	Substation 2	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	
Substation 2 Switchgear	Substation 2	DSD2	Federal Pioneer	1981		5	60	3000	250MVA	3ph3w		

Name	Location	Function	Model	Manufacturer	Year of Production	Catalog Number	Characteristic	Tap Range	Inst. Range	Tap Setting	Time Dial Range	Time Dial Setting	Inst. Pickup
1.5MW Generator	Generator Enclosure	Undervoltage	BE1-27 A3E E1L A0N1F	Basler			Definite Time	55V - 160V	N/A	Not Available	30s	30	N/A
1.5MW Generator	Generator Enclosure	Time O/C Voltage Restrained	BE1-51/27R B1E Z1R A0N1F	Basler			Not Available	0.5A - 12A	N/A	3.25A	0s	0	N/A
1.5MW Generator	Generator Enclosure	Under Frequency	BE1-81 T1E E1D A0N1F	Basler			Definite Time	40Hz - 70Hz	N/A	-3.0 Hz	90 cycles	90 cycles	N/A
CB 5B-1	Grum Substation	Time Overcurrent	IAC-53-B-26-A	Canadian General Electric			Very Inverse	1.5A - 6A	20A - 80A	1.5A	0.5-10	2	40
CB 5B-2	Grum Substation	Time Overcurrent	IAC-53-B-26-A	Canadian General Electric			Very Inverse	1.5A - 6A	20A - 80A	2.5A	0.5-10	3	40
CB 5B-3	Grum Substation	Time Overcurrent	IAC-53-B-26-A	Canadian General Electric			Very Inverse	1.5A - 6A	20A - 80A	1.5A	Not Available	2	Not Available
Auxillary	Substation 1	Power Measurement	3710 ACM	Power Measurement Ltd			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bus Tie Breaker	Substation 1	Time Overcurrent	IAC-53-B-1A	Canadian General Electric			Very Inverse	4A - 16A	10A - 40A	4	10-40	3	40
Bus Tie Breaker	Substation 1	Ground Fault	PM2gn0.90-304	Brown Boveri			Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Capacitor Bank Breaker	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	2.5A - 10A	20A - 80A	N/A	N/A	N/A	N/A
Capacitor Bank Breaker	Substation 1	Voltage Relay	2574	Asea			N/A	40V-80V	N/A	N/A	N/A	N/A	N/A
Capacitor Bank Breaker	Substation 1	Time Overcurrent	IAC-53-A-3-A	Canadian General Electric			Very Inverse	0.5A - 2A	N/A	N/A	N/A	N/A	N/A
Capacitor Bank Breaker	Substation 1	Voltage Relay	IAV-51-D-2-A	Canadian General Electric			N/A	10 - 40	N/A	N/A	N/A	N/A	N/A
Fine Crushing	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Fine Crushing	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Grinding CCT No 1	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Grinding CCT No 2	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Grinding CCT No 2	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Grinding CCT No 2	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Main Breaker	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Main Breaker	Substation 1	Ground Fault (Time)	IAC-53-A-2-A	Canadian General Electric			Very Inverse	1.5A - 6A	N/A	N/A	N/A	N/A	N/A
Main Breaker	Substation 1	Aux Tripping Relay	TR-1	Westinghouse			N/A	0.2A - 2A	N/A	Not Available	N/A	N/A	N/A
Main Breaker	Substation 1	Restricted Earth Fault	CAG 14AF32A	GEC			N/A	1A - 4A	N/A	1A	N/A	N/A	N/A
Mill Services & Flotation #1	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Mill Services & Flotation #1	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Mill Services & Flotation #2	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Mill Services & Flotation #2	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Mill Services & Flotation #3	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Mill Services & Flotation #3	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Mine Feeder	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	8	0.5-10	2	40
Mine Feeder	Substation 1	Ground Fault (Inst)	PJC-12A1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	Not Available
Mine Feeder	Substation 1	Instantaneous OC	RXIG21 / RXKB1	ASEA			N/A	N/A	1A - 3A	N/A	N/A	N/A	2
Primary Crusher & Warehouse	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Primary Crusher & Warehouse	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Pumphouse Condensor & Admin Building Fdr	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Pumphouse Condensor & Admin Building Fdr	Substation 1	Ground Fault (Inst)	PJC-12D1A	Canadian General Electric			N/A	N/A	0.5A - 2A	N/A	N/A	N/A	N/A
Utility	Substation 1	Time Overcurrent	IAC-53-B-4-A	Canadian General Electric			Very Inverse	4A - 16A	20A - 80A	N/A	N/A	N/A	N/A
Utility	Substation 1	Undervoltage	IAV-54-E-1-A	Canadian General Electric			N/A	55 - 140V	N/A	N/A	N/A	N/A	N/A
Utility	Substation 1	Restricted Earth Fault	CAG 14AF32A	GEC			N/A	0.5A - 2A	N/A	0.5A	N/A	N/A	N/A
4.16kW Feeder	Substation 2	Instantaneous Overcurrent	RXIL23 - RK412114DN	ASEA			N/A	5A - 10A	N/A	8A	Not Available	0.6	N/A
4.16kW Feeder	Substation 2	Ground Fault (Time)	RXIL23 - RK412114DN	ASEA			N/A	5A - 10A	N/A	8A	Not Available	0.6	N/A
3000A Mill Feed	Substation 2	Time Overcurrent	CO9-C411BA1	Westinghouse			Very Inverse	4A - 12A	10A - 40A	N/A	N/A	N/A	N/A
3000A Mill Feed	Substation 2	Ground Fault (Time)	CO9-A011AA11	Westinghouse			Very Inverse	0.5A - 2.5A		N/A	N/A	N/A	N/A
4.16kV Mill Feed	Substation 2	Time Overcurrent	CO9-B411BA1	ABB			Very Inverse	2A - 6A	10A - 40A	2A	0.5-11	2	12.5
4.16kV Mill Feed	Substation 2	Ground Fault (Time)	CO9-A011AA11	Westinghouse			Very Inverse	0.5A - 2.5A		0.5A	Not Available	2	N/A
Bus Tie Cell	Substation 2	Power Measurement	3710 ACM	Power Measurement Ltd			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capacitor Bank Breaker	Substation 2	Time Overcurrent	CO9-C411BA1	Westinghouse			Very Inverse	4A - 12A	10A - 40A	N/A	N/A	N/A	N/A
Capacitor Bank Breaker	Substation 2	Ground Fault (Time)	CO9-A011AA11	Westinghouse			Very Inverse	0.5A - 2.5A		N/A	N/A	N/A	N/A
Station Service	Substation 2	Phase Loss Relay	FCX 103b/2	Brown Boveri			N/A	0.15 - 1.5	N/A	0.6	Not Available	9.9	N/a