Picton 33kV Dual Circuit Cross-Arm Replacement

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Marlborough Lines

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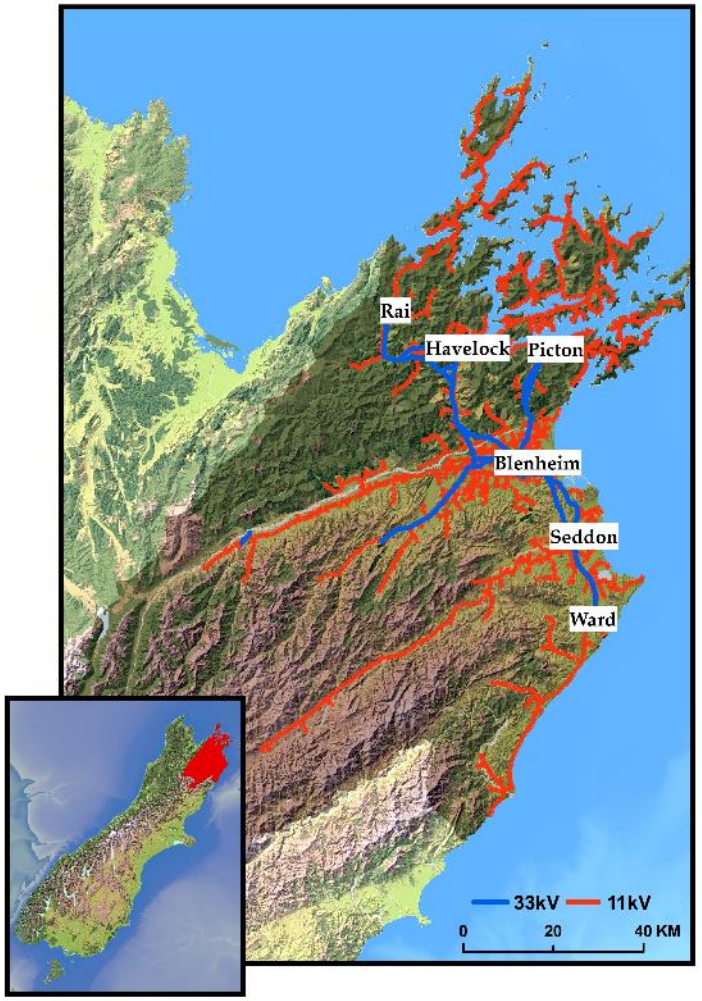
Introduction

- Marlborough Lines
  - Operational Area/Statistics
- Picton 33kV Dual Supply Maintenance Needs
- Solution
  - Installation of Temporary Generator Farm
  - Protection & Synchronising
  - Other complexities

Marlborough Lines Network

- Marlborough Lines network 33kV,11kV &400V
  - Single Transpower GXP
  - Townships of Blenheim, Havelock, Picton etc
  - Down the East Coast beyond Clarence River
  - Down the Wairau & Awatere Valleys
  - Marlborough Sounds
- Approx. 3400km of network supplying 25k consumers
  - Rugged Remote Network
- Trust owned. MEPT holds shares on behalf of beneficiaries



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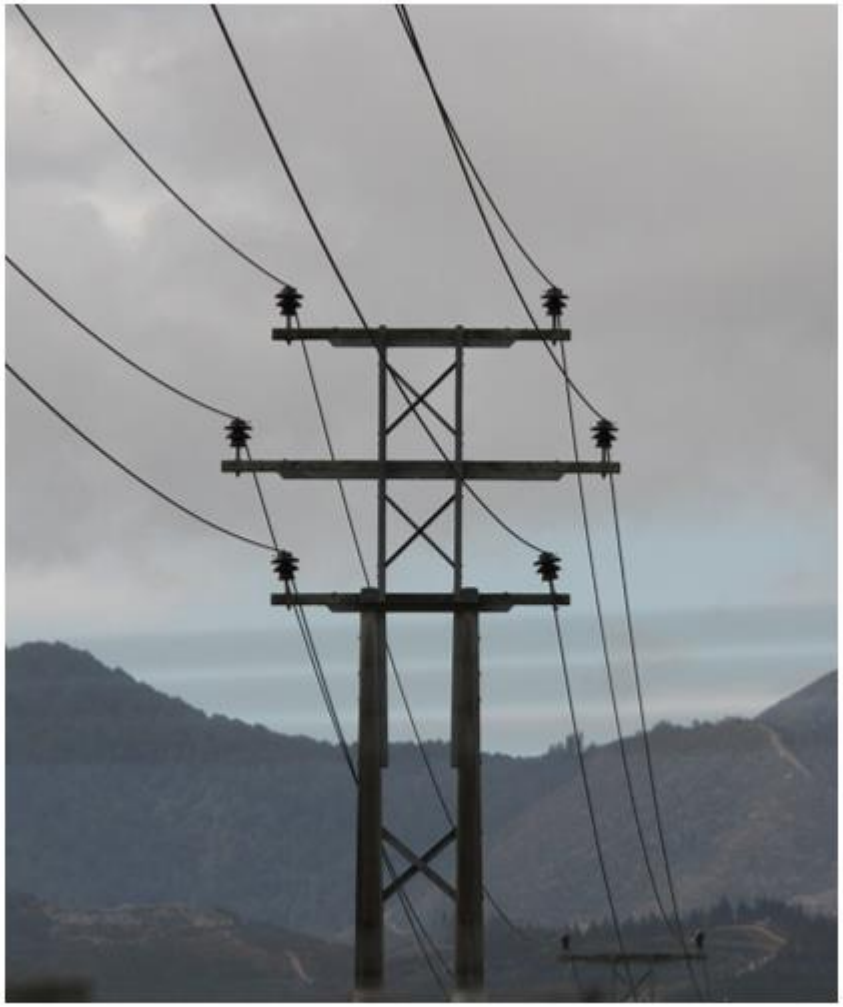
Map of Picton feeder

- Picton is supplied by a dual 33kV circuit, diverse in Para area but share pole structures between Blenheim & Tuamarina.
- The original line between Blenheim and Picton was completed in 1950 as before that Picton ran off its own electricity supply from a water wheel and diesel generation, since decommissioned.
- On the Picton feeder there are 3,325 connections.

Picton 33kV Dual Circuit

- Upgraded in 1972
- Land impacts
  - Farming land prior to 1980s Vineyard Boom
- 47 Structures
- Supplies Spring Creek Zone Sub
  - 1220 Customers



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Condition Assessment

- External Contractor
  - Asset Inspection Regime – 3 yearly
  - Ground Assessment Only
    - Moisture & UV
- Line Inspection Techniques
  - Aerial Drone Photography
  - Go Pro on Pokey Stick
  - Previously Removed Pole
- Poles and Steel Work ✓
- Crossarms X

Options?

- Needed to Act
- Line Rebuild/Replacement? - $$$
- Replace the Arms
  - Steel and Polymer Clamp
  - Total outage? - +3k customers
  - Live Line Procedure? – 50 pole sites & Industry Trend
  - Isolate and supply all load from alternate source? ✓
    - Indicative pricing
    - Experience with diesel generation

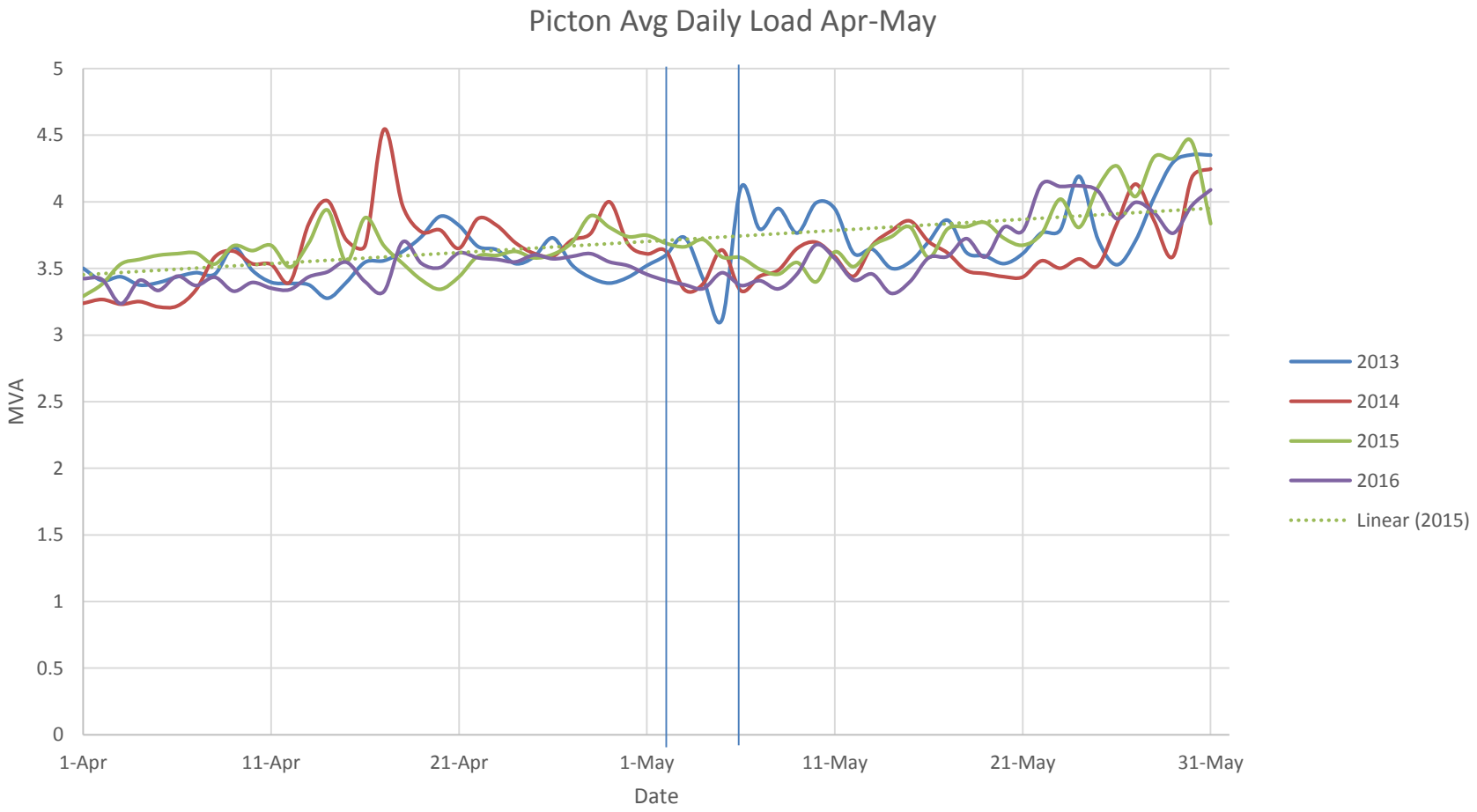
Project Timeline

- When?
- External Contracting Resources – MLL+
- Access Restriction
  - Wet Ground
  - ‘Sauvalanche’ Grape Harvest – Late May.
- Winter Load
- Target Date:
  - 2nd – 6th May

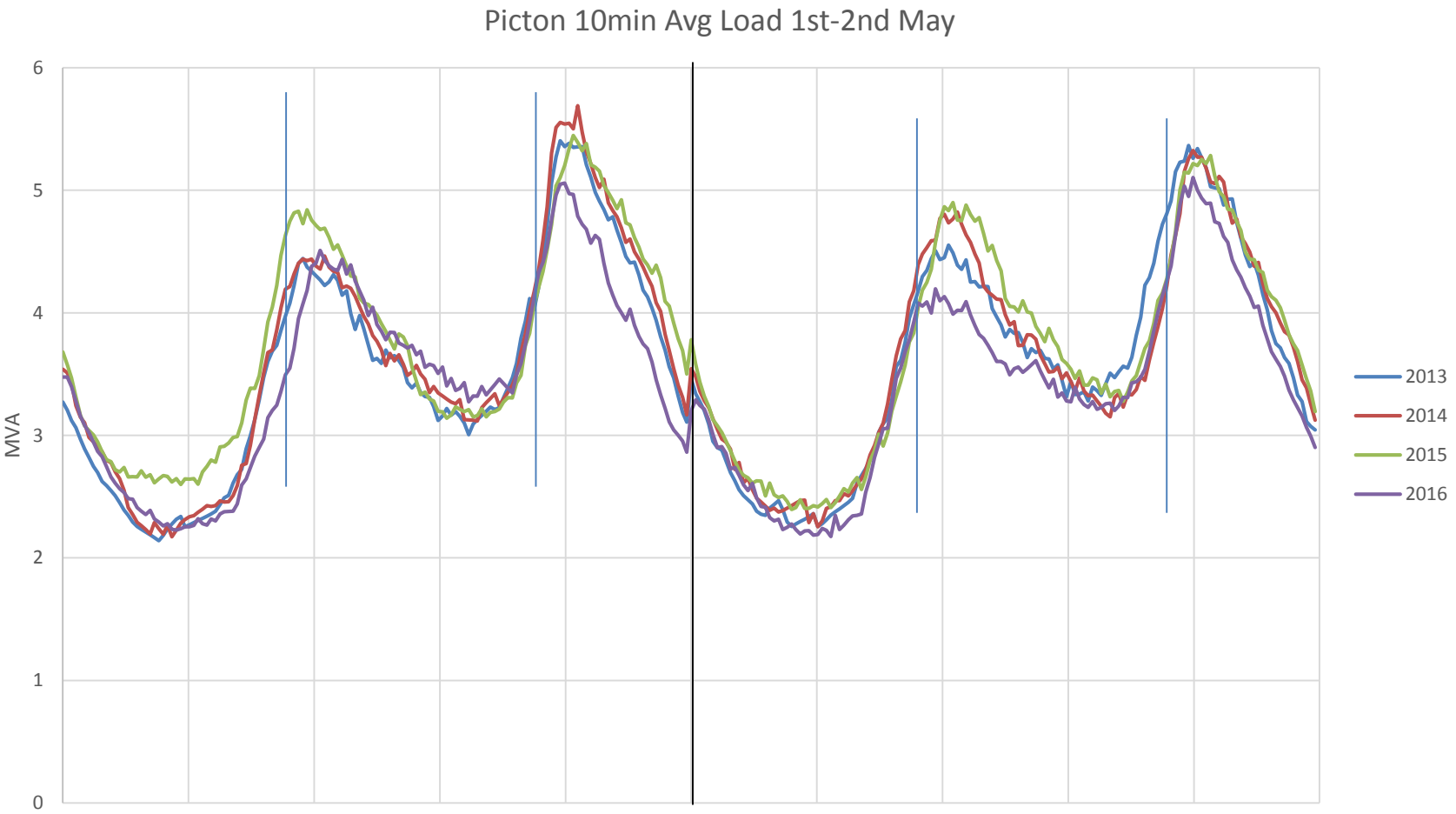
Data - Load Considerations

- Generator Sizing Considerations
  - Picton Peak Load
  - Work Hours 8am-5pm
  - Load Growth
  - Winter Load Forecast – Buffer
- Market Reconciliation
- Fuel Consumption

Data - Load Considerations



Data - Load Considerations

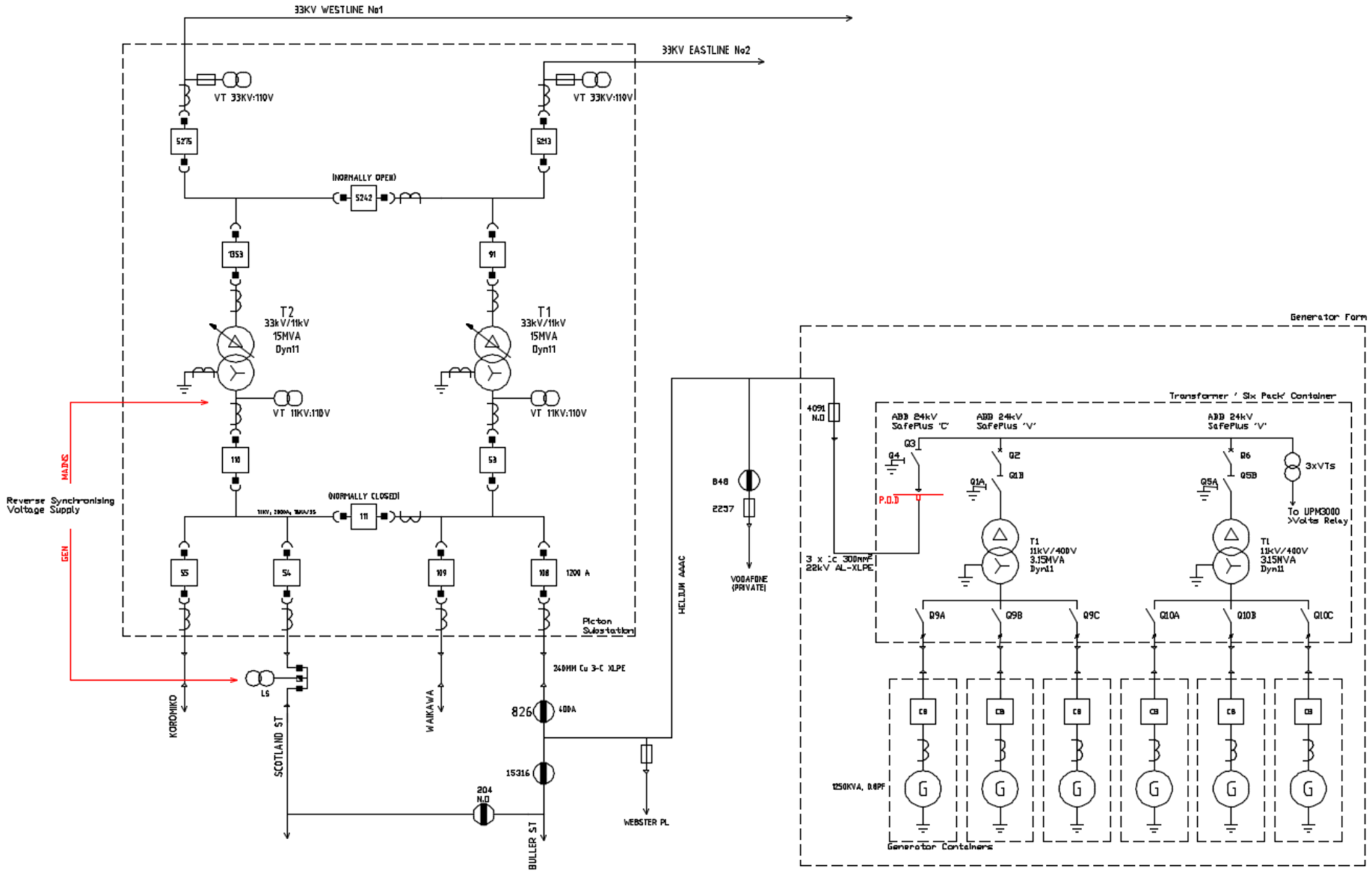


6MW Diesel Generation Farm

- 6MW Diesel Gen Farm
  - 6x Containerised 400V
    - 800kVA – 1500kVA
  - N-1 Capacity
  - 1x ‘Six Pack’
    - 6xLV CB connections
    - 2x3.15MVA Dyn11 TXs
    - 22kV Switches
  - 2x 1000L top-up tanks

Photo: Generators installed at Scotland Street Quarry

- Site Set-out
  - Earthing, Fuel bunding, Proximity to Sub, Volume


33KV WESTLINE No1
33KV EASTLINE No2
VT 33KV:110V
VT 33KV:110V
5275
5213
INORMALLY OPEN)
5242
1053
91
T2
33kV/11kV
15MVA
Dyn11
T1
33kV/11kV
15MVA
Dyn11
VT 11KV:110V
VT 11KV:110V
110
53
MAINS
Reverse Synchronising
Voltage Supply
GEN
(NORMALLY CLOSED)
111
55
54
109
108
1200 A
Picton
Substation
HELIUM AAAC
848
2237
VODAFONE
(PRIVATE)
4091
N.O
3 x 1C 300mm²
22kV AL-XLPE
Generator Farm
Transformer ' Six Pack' Container
ABB 24kV
SafePlus 'C'
ABB 24kV
SafePlus 'V'
ABB 24kV
SafePlus 'V'
Q3
Q4
Q2
Q1B
Q1A
P.O.D
Q6
Q5B
Q5A
3xVTs
To UPM3000
>Volts Relay
T1
11kV/400V
3.15MVA
Dyn11
T1
11kV/400V
3.15MVA
Dyn11
Q9A
Q9B
Q9C
Q10A
Q10B
Q10C
CB
G
1250KVA, 0.8PF
Generator Containers
LS
KOROWAKO
SCOTLAND ST
WAIKAWA
240MM Cu 3-C XLPE
826
400A
15316
204
N.O
BULLER ST
WEBSTER PL

Challenges

- Protection
  - Generator vs Network – System Modelling
    - Fault Current
    - Stalling
  - Back Feeding Zone Sub Tx
  - Over/Under Voltage on Gen Tx
  - CB108 Swap over
- Synchronising
  - Generator Loading Morning
  - Reverse Synchronising on Restore
  - Relay & SCADA control Commissioning. Voltage Matching VT
- MLL Gen fleet for voltage support at Spring Creek
- 11kV Line Upgrade between Sub and Gen Farm

Conclusion

- 47 Pole Sites Completed
- 3 Days vs 5 Days
- Approx. 22800L diesel
- 94270kWhs electricity
- Particularly Cold Mornings, exceeded N-1.
- 1 Network Fault & Protection Worked!
- DATA!!!

Thanks Team!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ElectroNet
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Questions?

Picton Loading – Generator & Network 30th April – 5th May 2017

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Go Pro

Additional


Mobile Power Unit
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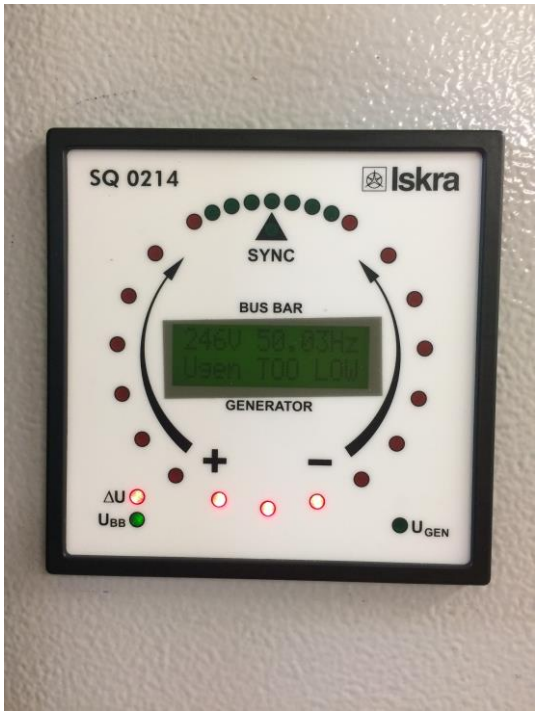
SQ 0214
Iskra
SYNC
BUS BAR
GENERATOR
ΔU
UBB
UGEN