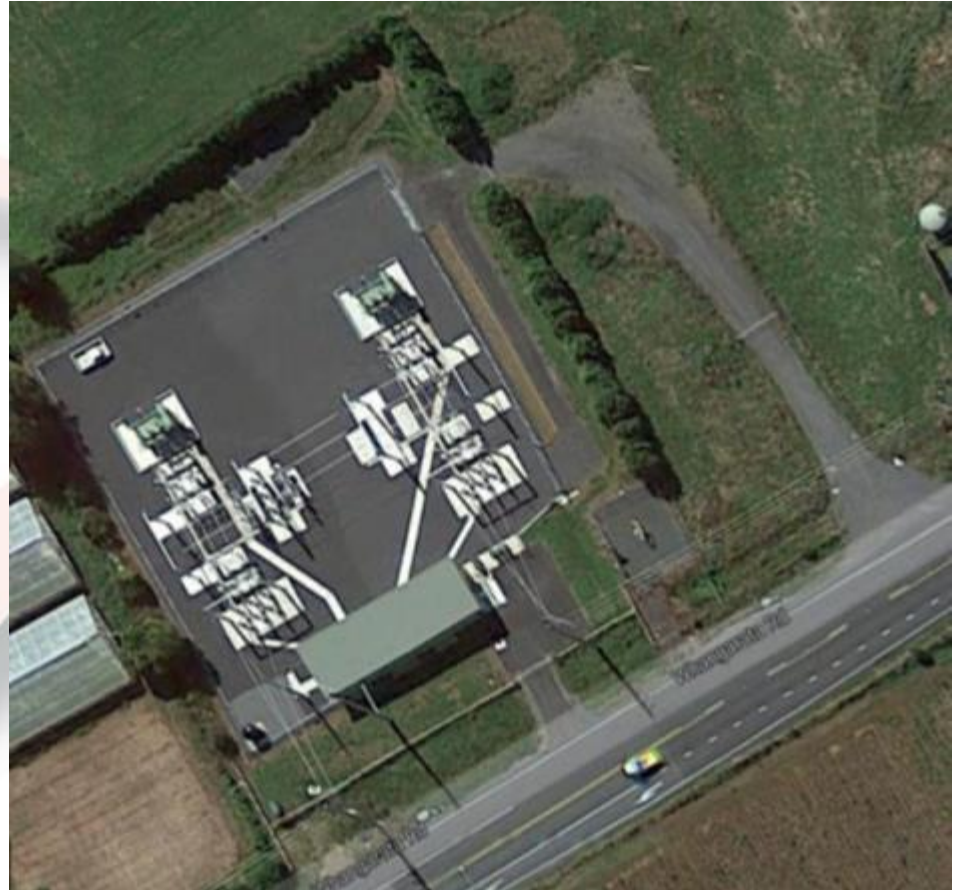


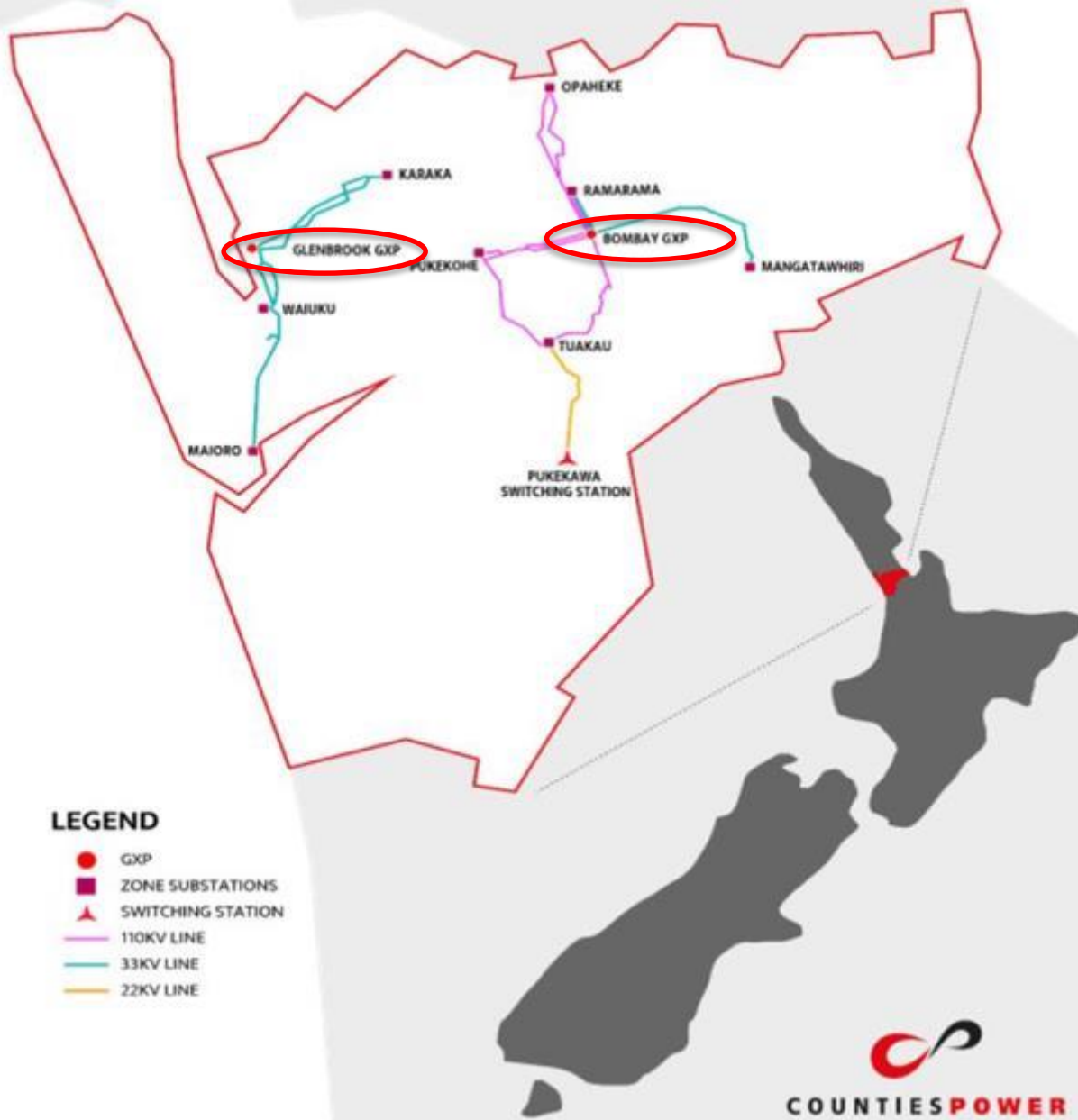
Supporting Franklin District Growth

Tuakau 110/22kV substation establishment

*Bary Babu,
Planning Engineer,
Counties Power*



COUNTIES POWER



Our Network Today

- 2,220 sq-km
- 39,905 ICPs
- 110MW MD
- 537GWh
- 9 zone substations
- 56 feeders
- 3,910 distribution substations



Overview

Identifying a Need

Drivers of that Need

Option Evaluation

Scope of Project

Contingency Plan

Site Selection

Construction Phase

Quality assurance of new equipment

Outcomes



Annual Network Review -Need for Projects

Demand Forecast

- Maximum demand
- Movements of Major Customers
- Local authority plans
- Historical growth trends

Flexibility to respond

Load flow studies to identify upcoming constraints

Major expansions



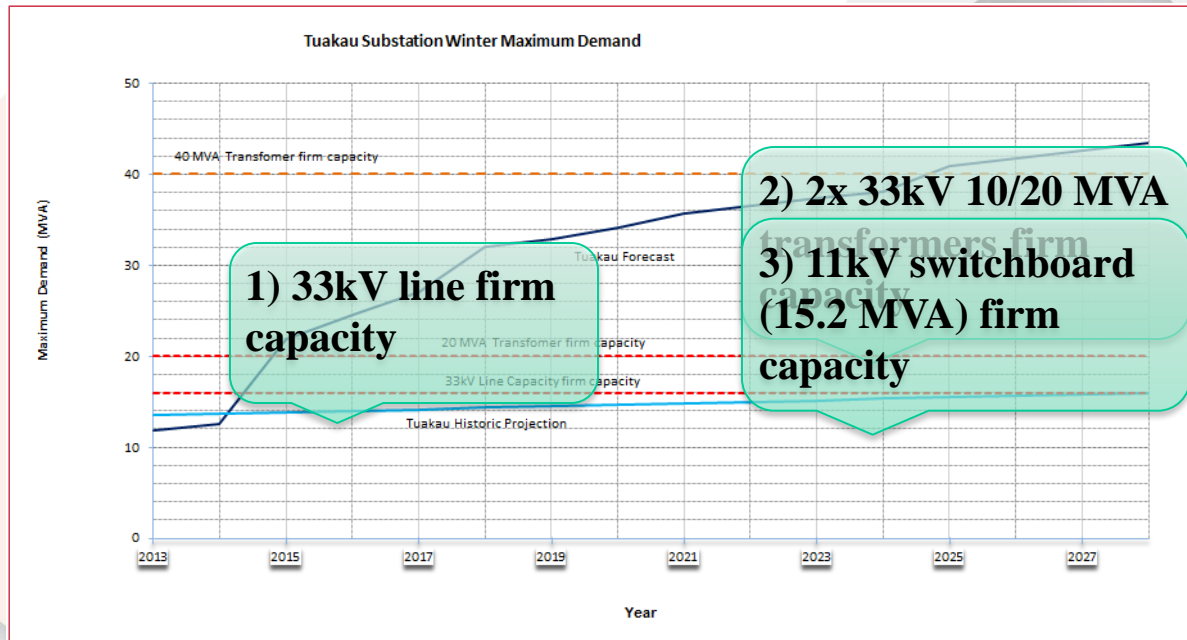
Development need in Tuakau Area



Projected major load increases for the substation are:

- 2013 WaterCare Services Waikato Water Treatment Plant (WWTP) expansion (4.8MW by 2015)
- 2014 Yashili Dairy Plant at Pokeno (3.7MW)
- 2015 Pokeno Development, 0.2MW per year from 2015

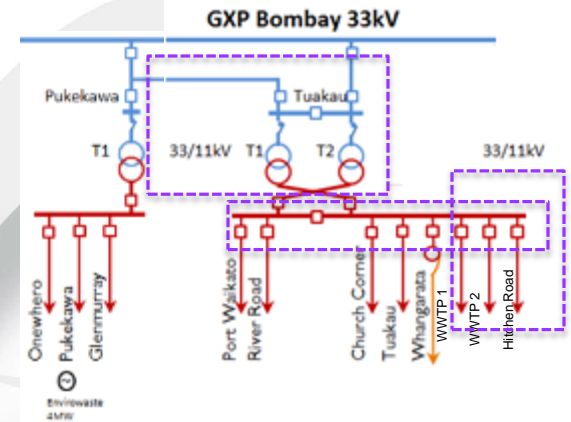
The Tuakau Substation projection highlights system constraints



Options considered

Option A: 33kV Substranmission

Three 33kV lines from Bombay
(requiring the total rebuilding of two 33kV lines, additional transformer and new switchgear)

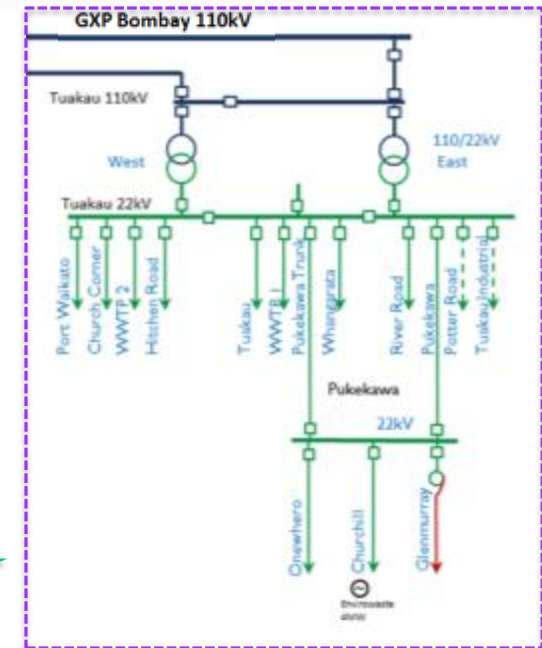


Option B: 110kV Substranmission

Alternative B1: Two 110kV lines from Bombay

Alternatives B2: One 110kV line from Bombay and one from Pukekohe

(Both alternatives only requiring one line to be rebuilt, installing 2x 20/40 MVA transformers and new switchgear)



Option B2

Transpower
Charges

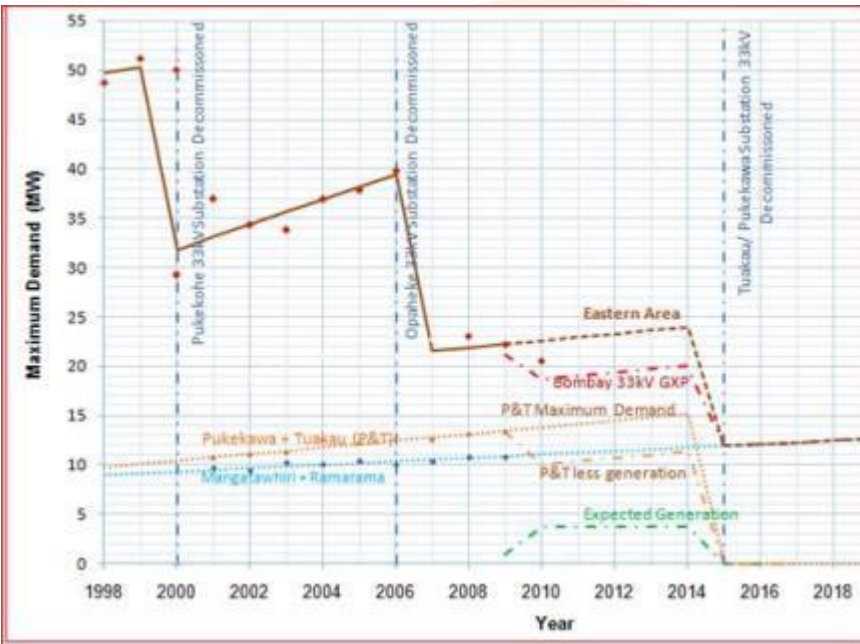
Distribution
Capacity

Load
Transfer



Effect of Project

■ Reduction of load on the 33kV Bombay GXP



■ Increase of load on the 110kV Bombay GXP



Scope of Project

Completion 2015

- Build new 110kV Tuakau Substation
- Build new 110kV Pukekohe–Tuakau Line
- New 110kV line bay and 110kV bus structure at Pukekohe
- Rebuild 110kV Bombay-Tuakau Line, 1929 wood pole line
- Relocate the Pukekohe 20/40MVA transformers to be installed at Tuakau
- Install two new 30/60MVA transformers at Pukekohe
- 22kV conversion of Tuakau feeders & Pukekawa feeders

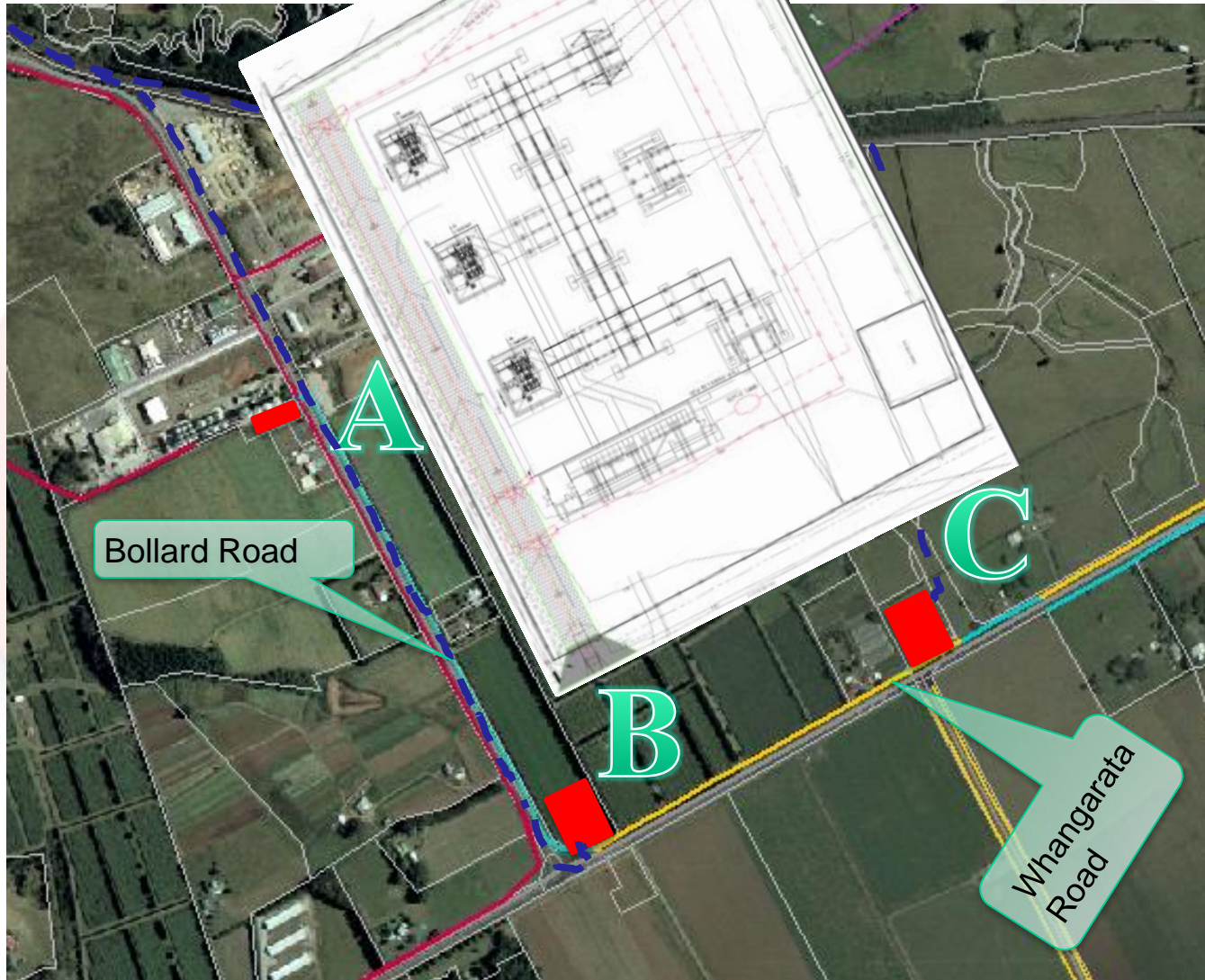


Precautions & Contingency Response during construction

- Very unlikely to have Substation fault.
- Most likely to have Line fault
 - Extensive inspection.
 - Ensure trip settings at Bombay above temporary high demands during backfeed.
 - Quick transfer of load plan
- Load transfers
 - Main urban feeders Tuakau and Church corner can be supported by Pukekohe Railway Feeder operating at 22kV
 - Industrial loads can be supported by Ramarama and Mangatawhiri substations
 - Mercer Feeder can supply Pukekawa load. Cooling fans added on autotransformer at Mangatawhiri to increase capacity of 5MVA auto transformer



Site Selection



Site Selection



Construction phase

Bombay Tuakau line
rebuild



Pukekohe-Tuakau 110kV line



Foundations for 110kV switchyard





THIS PROTECTIVE EQUIPMENT
MUST BE WORN
IN THIS AREA



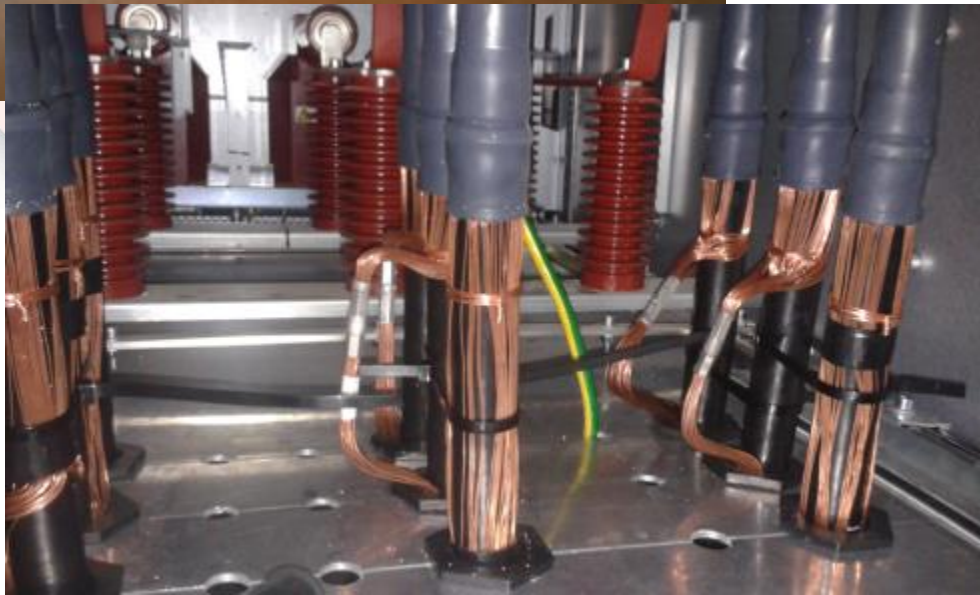
Relocate 20/40 MVA transformers from Pukekohe Substation to Tuakau Substation





Tuakau Substation Building







Quality assurance of new equipment and design

Most expensive equipment – 2x 30/60 MVA
110/22kV Transformers from PT CG Power
systems, Indonesia

Witnessing Factory Acceptance Tests (FAT) at
PT CG Transformer Factory



Witnessing Factory Acceptance Tests (FAT) at PT CG Transformer Factory

- Factory located in Indonesia
 - September 2014
- Independent Transformer inspector engaged for FAT
- Transformers were tested according to IEC 60076

Witnessing Factory Acceptance Tests (FAT) at PT CG Transformer Factory

- No Load Losses and Load Losses – Losses measured have to be within the guaranteed value
- Guaranteed no load loss value was 21kW

19.16kW



Witnessing Factory Acceptance Tests (FAT) at PT CG Transformer Factory

- Partial discharge testing
- Looking for breakdown in insulation or high electrical stress points that over time degrade metal resulting in failures
- Very common to find Partial discharge in the Bushings



Partial Discharge detected



Enlarged view of lead wrapped with insulating paper



Smooth surfaced caps for nuts

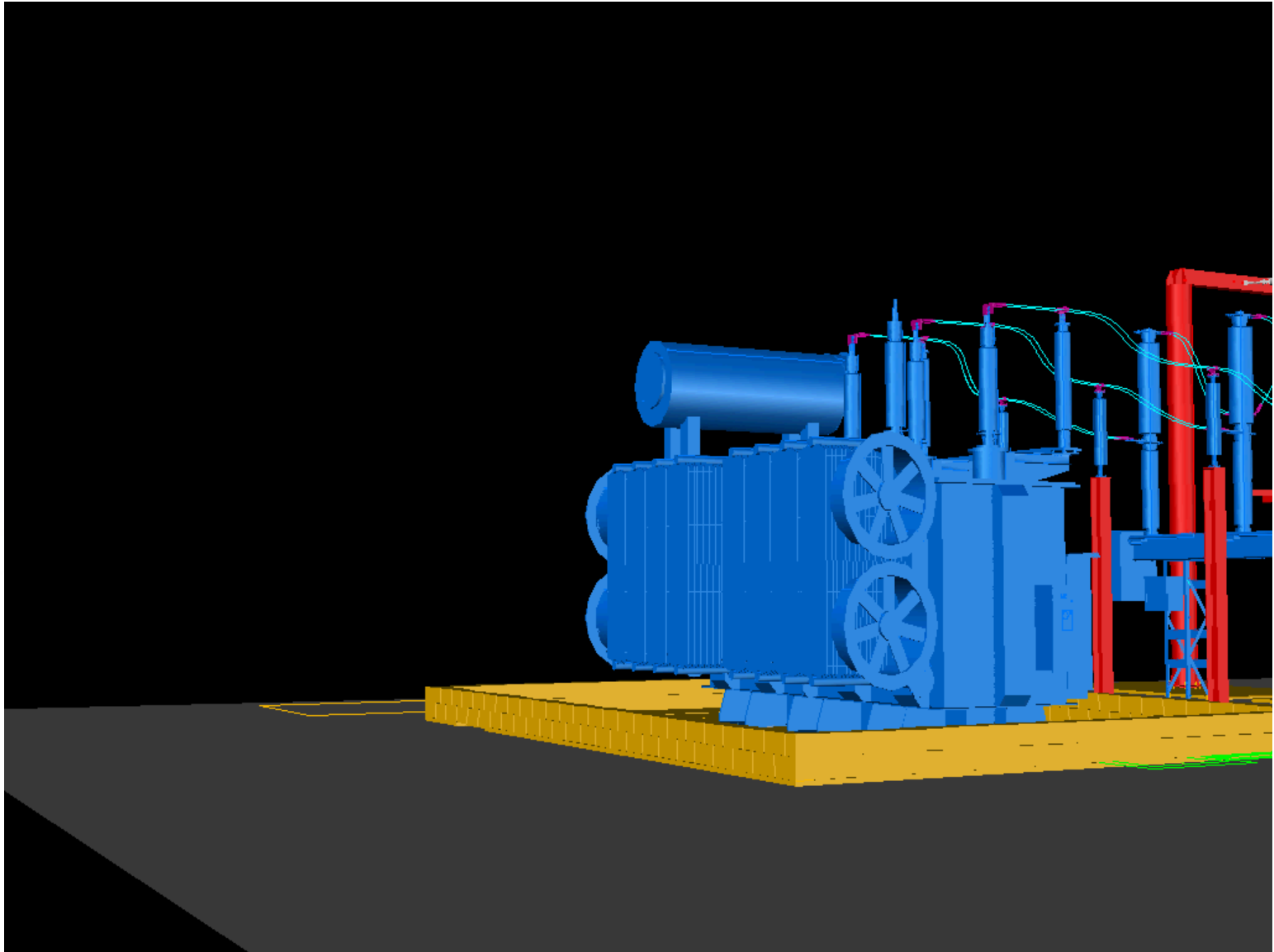
Unit one arrived from Cileungsi, Indonesia to Jellico Wharf, NZ on the “Shansi”. Inspected for damage



Transported from Wharf to Pukekohe substation







Outcome of project

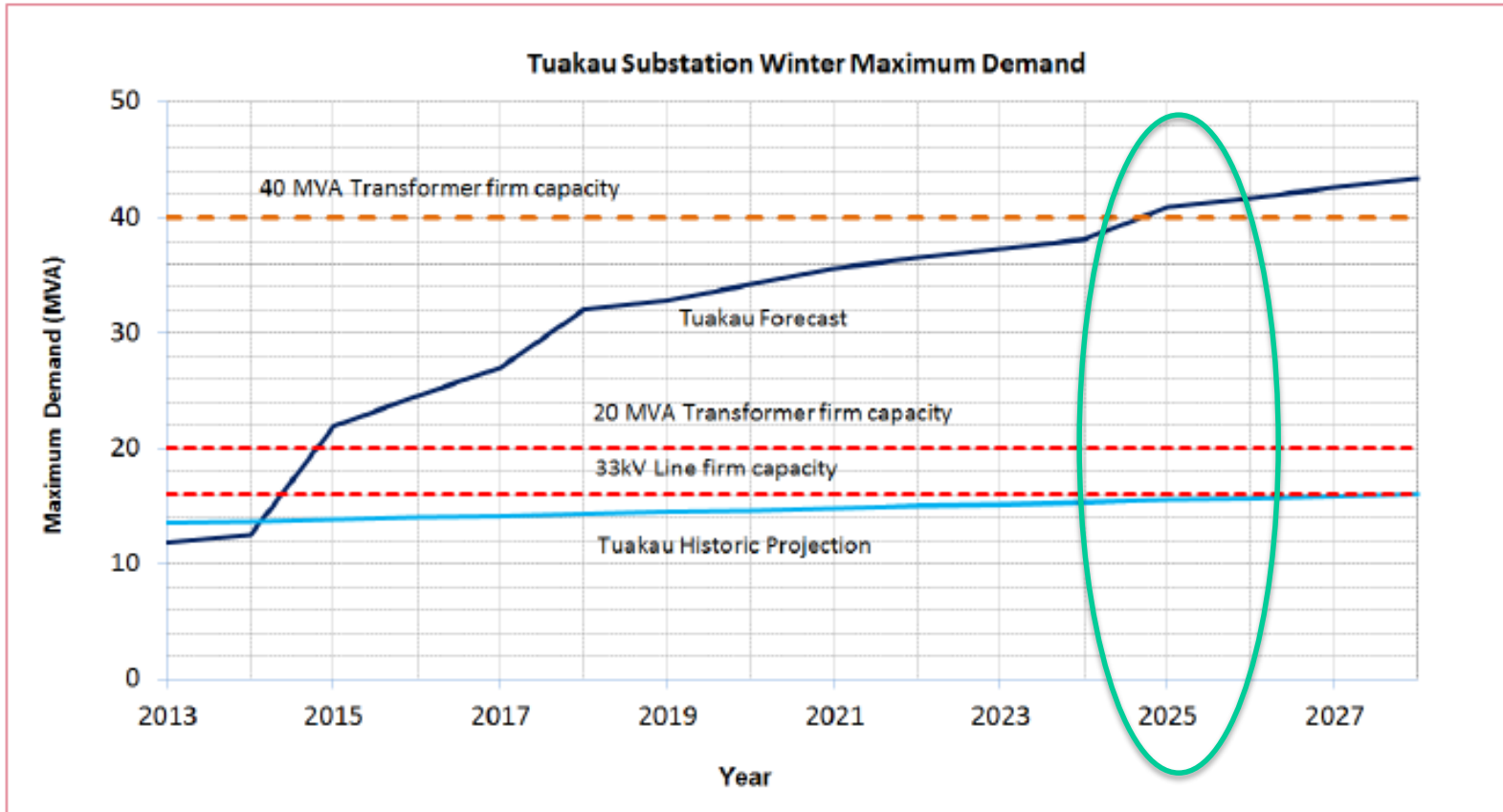


Figure 4-16: Winter Maximum Demand for Tuakau 110kV Substation

Outcome of project

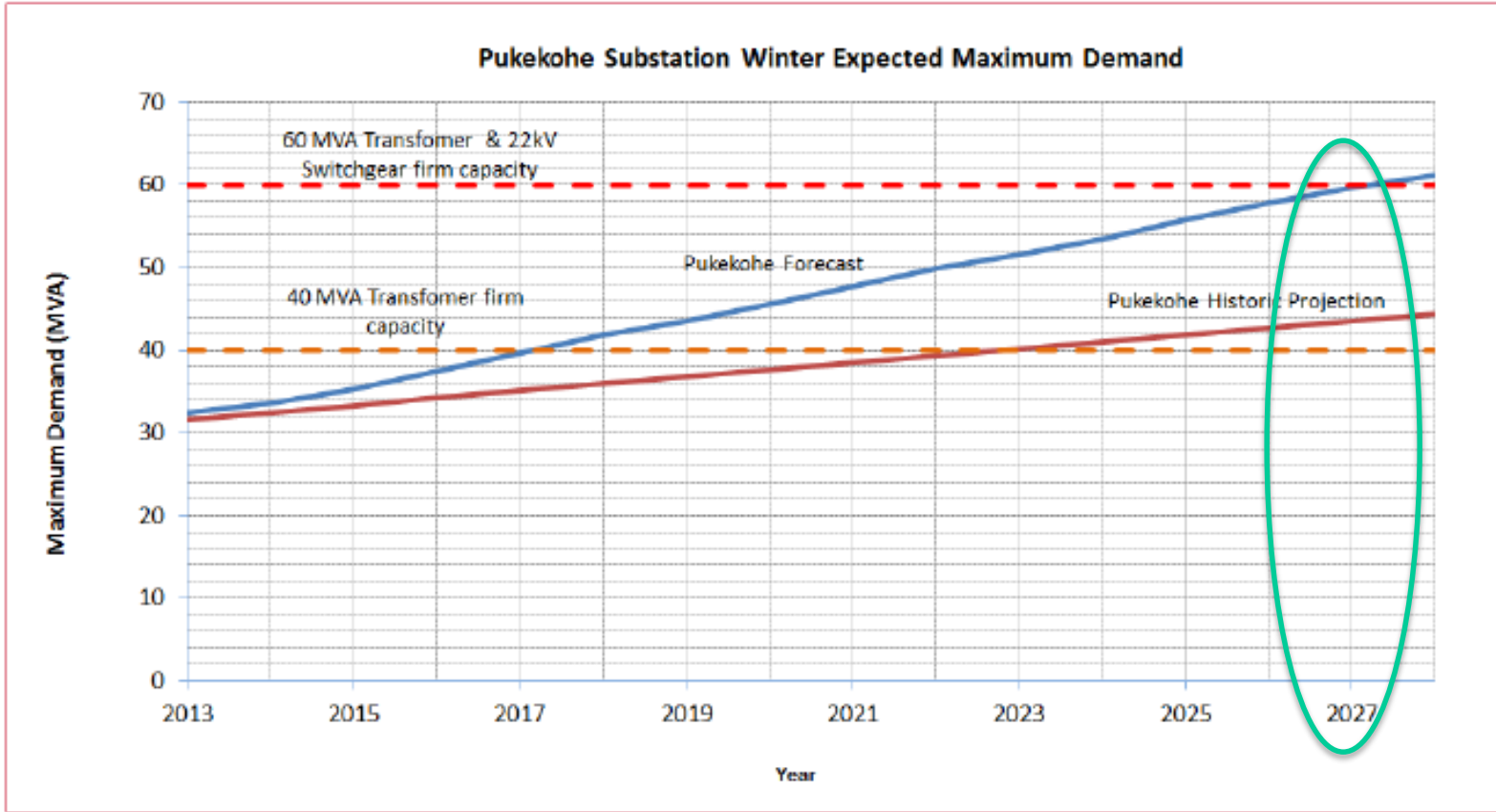


Figure 4-14: Winter Maximum Demand Pukekohe Substation

Pukekohe Substation



Tuakau Substation

End Of Presentation

Questions ?

