Powerco CPP – Portfolio Overview Document

Portfolio Name	Kereone – Walton 33kV Subtransmission Enhancement
Expenditure Class	Capex
Expenditure Category	Growth & Security
As at Date	12 June 2017

Expenditure Forecast[1,2]	Pre CPP	FY19	FY20	FY21	FY22	FY23	Post CPP	CPP Period Total	Project Total
Pre-Internal Cost Capitalisation and Efficiency Adjustments[3] *(2016 Constant NZ$(M))*	$0.0	$0.0	$0.0	$1.1	$3.5	$1.5	$0.0	$6.1	$6.1
Post-Internal Cost Capitalisation and Efficiency Adjustments *(2016 Constant NZ$(M))*	$0.0	$0.0	$0.0	$1.2	$3.7	$1.5	$0.0	$6.3	$6.3

Description

Project need overview	The subtransmission network supplying Walton, Waharoa and Browne Street substations, does not meet desired security of supply standards due to capacity constraints of the existing circuits and insufficient capacity in the alternative supply feeds.

Proposed solution

Project solution overview	As part of Powerco's overall network development strategy for the Waihou and Hinuera areas, Powerco is proposing to install a new 33kV cable link between the Kereone Tee and the Walton 33/11kV substation. Once built, Walton substation will be permanently transferred to the Waihou GXP, as opposed to being fed from the Piako GXP (present situation). As a result of this enhancement, the existing 33kV

[1] Forecast expenditure is based on Powerco's financial year (i.e. FY18 is for the period April 2017 through March 2018). Expenditures do not consider general price level changes over time (i.e. are in real or constant terms).
[2] Only includes Growth & Security Expenditure. Some projects discuss and rely on the replacement of assets that are at "end of life". However, the replacement cost for these assets is accounted for in the Replacement Expenditure category.
[3] All other forecast expenditure / cost estimates in this POD are pre-internal cost capitalisation and efficiency adjustments, consistent with this forecast.

	overhead line that runs south-east from the Piako GXP would be able to support a significant portion of the consumer load supplied by the Waharoa and Browne Street substations during the loss of the Hinuera GXP or the loss of the Hinuera to Browne Street 33kV overhead line.

Need Identification

Background	The zone substations within Powerco's Hinuera Area are supplied via a 33kV network out of the Hinuera GXP as shown in Figure 1 and Figure 3. The network is characterised by long single circuit 33kV lines and only has a single 33kV link to adjacent GXPs (Piako and Waihou GXPs in the north). The network supplies a number of industrial consumers which include Fonterra (Tirau), Open Country Cheese (Waharoa), Buttermilk (Putaruru), Icepak (Waharoa), Kiwi Lumber (Putaruru) and Pacific Pine (Putaruru). Over the last decade the Hinuera GXP has experienced steady growth. A significant portion of the load relates to the dairy industry, which means that the electrical demand is spring/summer peaking.

Underlying Drivers and Investment Triggers	The Hinuera Area has a number of network constraints as follows: 1. Transpower's Hinuera GXP is supplied via a ≈20km long, single circuit, 110kV, overhead line from the Karapiro power station. The peak demand on the Hinuera GXP is ≈43MW. The existing transmission network would not meet the requirements of Powerco's Security-of-Supply Standard, which would require a (N-1), no break (a security class of AAA[4]). 2. The Hinuera GXP's supply transformers have exceeded their (N-1) capacity. Again, this would not meet the requirements of Powerco's Security-of-Supply Standard. 3. Maintenance on the Hinuera 110/33kV GXP and incoming 110kV line is becoming increasingly difficult due to the inability to supply consumer load (from the Piako GXP, via the 33kV link to the north). During maintenance activities many of the consumers experience a planned outage which disrupts their businesses. 4. The combined 2014 peak demand on the Walton, Waharoa & Browne Street substations was ≈20MVA[5]. The substations are supplied via a single circuit, ≈35km, 33kV line that runs between the Hinuera and Piako GXPs. During a line contingency, between the Piako GXP & Walton or the Hinuera GXP & Browne Street, the remaining 33kV network cannot support all three substations during moderate network loading periods (thermal and delivery voltage constraints). The existing 33kV network does not meet the requirements of Powerco's Security-of-Supply Standard, which recommends a security class of AAA[4] for the combined load of the three substations[6]. Figure 1 illustrates this constraint. Over the period 2007 through 2014 the Walton, Waharoa and Browne-Street substations have collectively experienced a growth in peak demand of ≈3% per annum. The future growth in peak demand is forecast to be ≈2% and this does not include OCDL's[7] expansion proposal, which includes the installation of a second 33/11kV transformer installed at the Waharoa substation.
Timing of the need	Constraint 1 and 4 (above) presently exist and need to be addressed now. Powerco is progressing two projects to resolve constraint 1. The first project involves a new 110/33kV substation at Putaruru[8] which will begin in 2019. The second project is the subject of this POD (a 33kV cable between Kereone and Walton), will also resolve constraint 4, and construction is expected to start in 2020.

[4] AAA – Supply is uninterrupted in the event of the outage of one major element of the sub-transmission network. Load can be transferred to other substations without interruption by switching on the network if necessary to avoid exceeding ratings (Powerco - Standard 310S001 – Security of Supply Classification – Zone Substations).
[5] Historically the diversity for the Walton, Waharoa and Brown Street substations has been 0.85.
[6] The Walton, Waharoa & Browne-Street substations have individual security classes of A1, AA & AA+.
[7] Open Country Dairy Ltd who own the Open Country Cheese factory at Waharoa.
[8] POD-G3 Putaruru GXP.

Demand Forecast | Waikato Area

HINUERA SUBSTATIONS			FORECAST MAXIMUM DEMAND [MVA]						
SUBSTATION	CLASS CAPACITY	GROWTH	2016	2017	2018	2019	2020	2025	2030
Browne St	10.6	1.3%	9.9	10.0	10.1	10.3	10.4	11.0	11.6
Lake Rd	0.0	0.4%	5.9	6.0	6.0	6.0	6.0	6.1	6.3
Putaruru	0.0	0.5%	11.6	11.7	11.7	11.8	11.9	12.2	12.4
Tirau	0.0	0.5%	9.5	9.5	9.6	9.6	9.7	9.9	10.1
Tower Rd	0.0	1.6%	9.8	9.9	10.1	10.2	10.4	11.1	11.8
Waharoa	0.0	2.1%	7.8	8.0	8.1	8.3	8.4	9.2	10.0

PIAKO SUBSTATIONS			FORECAST MAXIMUM DEMAND [MVA]						
SUBSTATION	CLASS CAPACITY	GROWTH	2016	2017	2018	2019	2020	2025	2030
Farmer Rd	0.0	0.2%	5.9	6.0	6.0	6.0	6.0	6.1	6.1
Inghams	3.6	0.0%	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Mikkelsen Rd	19.2	0.3%	15.2	15.2	15.2	15.3	15.3	15.5	15.7
Morrinsville	0.0	0.5%	10.7	10.8	10.8	10.9	10.9	11.2	11.4
Piako	15.2	1.0%	15.0	15.2	15.3	15.5	15.6	16.3	17.0
Tahuna	0.8	0.3%	5.7	5.8	5.8	5.8	5.8	5.9	6.0
Tatua	1.2	0.0%	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Waitoa	18.8	0.0%	12.7	12.7	12.7	12.7	12.7	12.7	12.7
Walton	0.0	0.1%	5.9	5.9	5.9	5.9	5.9	6.0	6.0

Waikato GXPS			FORECAST MAXIMUM DEMAND [MVA]						
SUBSTATION	TX FIRM CAPACITY	GROWTH	2016	2017	2018	2019	2020	2025	2030
Hinuera GXP	40.0[9]	1.1%	46.9	47.4	47.9	48.4	48.9	51.4	53.9
Piako GXP	40.0	0.8%	32.7	33.0	33.3	33.6	33.8	35.2	36.6

Notes:

1. Class capacity is similar to Firm Capacity in that it represents the capacity that can be delivered following the first outage of any major equipment. Unlike Firm Capacity it considers the long term deliverable capacity after allowing for switching and network reconfiguration (11kV & 33kV) post-fault conditions.
2. All maximum demand values are in MVA.
3. Purple shaded cells indicate that the substation's Class Capacity has been exceeded and network enhancements should be considered.
4. The Piako GXP is equipped two transformer units (40MVA & 60 MVA). The 40MVA is only temporary as it is earmarked for the new Putaruru GXP. It will be replaced with a new 60MVA unit.
5. The Hinuera GXP is equipped with 1 x 30MVA and 1 x 50MVA transformer units. N-1 capacity is 37/40MVA summer /winter.
6. The Piako GXP was commissioned in 2013.

[9] Transpower TPR 2015. Hinuera Transformer, n-1 capacity of 37/40 MVA (summer/winter)

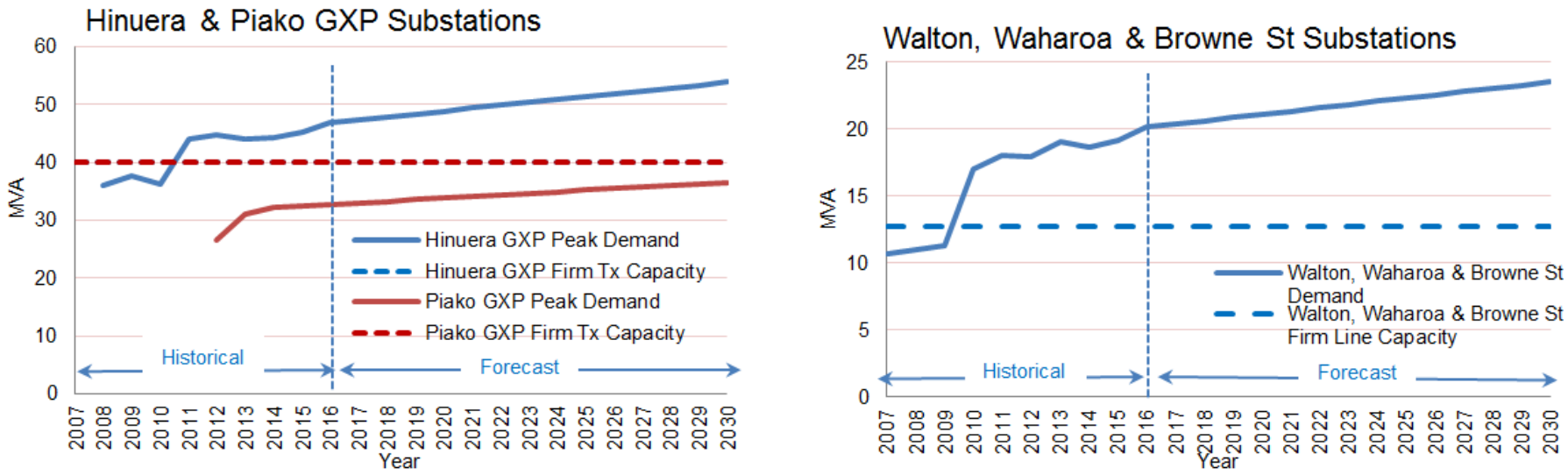

Figure 1: Hinuera/Piako GXP and Walton/Waharoa/Browne St Zone Substation Demand Forecast Graphs

Options Analysis | Long List of Project Options | High Level Assessment	
Assessment Process	A wide range of potential options are available for the resolution of electrical network constraints. However, depending on local conditions many of the options can have fatal flaws. On this basis a two tier Options Analysis is followed. In the first instance all potential options are considered against a set of high level criteria. Those options that are identified as having significant challenges and not favourable are not considered further. A significant issue that Powerco often faces is the reality of trying to secure landowner easements and or public support for projects that the local community or landowners are opposed to. For this reason the costs associated with easements/consents are often difficult to estimate and the consenting/land-acquisition stage of a project can take a significant period. Given this fact Powerco assesses the risk / likelihood of securing development rights for individual projects (within a realistic timeframe) during the high level assessment stage.
Long List of Options	The following table contains a list of the high level project options that are potentially available to resolve the specific network constraints that have been identified. The four non-network options (Nos. 2, 3, 4 & 5) are not shortlisted on the following basis: • Fossil fuelled generation (i.e. diesel generation) is technically viable but not shortlisted due to the cost and environmental/consenting challenges. During network contingencies on the Hinuera GXP there would be shortfall of ≈20MW[10] that would need to be "made up" using stand-by generation. The capital cost of a 20MW standby diesel generation plant is estimated to range from $30M to $40M[11,12]. Additional diesel generators would need to be installed as the demand for electricity increases. • Powerco has not identified any viable renewable generation options that would provide the required security of supply[13]. • Fuel switching and demand side response (DSR) are not considered to be viable due to the large load involved. • Powerco currently uses a mains-borne ripple control system to manage significant amounts of hot water cylinder load on its network. During peak loading periods most hot water cylinders are turned off. • Energy storage solutions could be technically feasible, but are not economically viable at the size required to provide viable back-up for extended periods. For example, an emerging technology that could be employed is storage batteries installed in domestic premises. However, the capital costs associated with 20MW[9] of domestic batteries with two hours capacity are estimated to be >$68M[14]. Alternatively, a grid-scale battery solution providing 20MW for two hours would, at current rates, cost >$55M. Many outages could be addressed within two hours and peak demand periods are also usually less than two hours duration. Storage solutions at this size however would not provide sufficient back-up for extended outages lasting for several hours.

[10] This is the present shortfall during peak loading periods after backup via the Kereone-Walton 33kV line. This amount is predicted to increase in the future.
[11] Excludes the ongoing maintenance and operational costs (i.e. diesel).
[12] Diesel generation plant is estimated to range from $1,500/kW to $2,000/kW, depending on whether it is high, medium or low speed plant.
[13] Typical plant might involve wind turbines or photovoltaic arrays. Both of these generators have an intermittent output which cannot be relied upon unless there is significant penetration and diversity.
[14] The installed costs of domestic battery storage systems are currently around $10k - $12k for a 7kWh unit.

	Five network reinforcement options were identified (Nos. 6, 7, 8, 9 & 10) as potential solutions to the network constraints and issues. Options 6 and 7 involve re-conductoring/thermally-upgrading the existing 33kV lines and installing a 33kV shunt capacitor bank at the Browne Street substation. Options 8 and 9 involve replacing specific 33kV overhead lines with underground cables, thermally-upgrading other overhead 33kV lines and installing a shunt 33kV capacitor bank at the Walton substation. Option 10 involves installing a new 33kV cable between Kereone and Walton and installing a shunt 33kV capacitor bank at the Walton substation.

Long List of Options | High Level Assessment

Kereone-Walton 33kV Cable Project		*Long list of projects and high level assessment*	*Assessment Criteria*						
PROJECT FOCUS	**No.**	**PROJECT**	Safety	Fit	Feasible	Practical	GEIP	Security	Cost	**Short-list**
Do Nothing	1	Allow the electrical demand & risk of consumer non-supply to increase	✓	✗	✗	✗	✗	✗	✓	✗
Non-network	2	Distributed Generation (DG) including peak lopping generation	✓	✗	✓	✓	✓	✓	✗	✗
	3	Fuel switching to reduce electrical demand	✓	✓	✗	✗	✓	✓	✗	✗
	4	Demand Side Response (DSR)	✓	✓	✗	✗	✓	✓	✗	✗
	5	Energy storage	✓	✓	✓	✓	✗	✓	✗	✗
Network Reinforcement	6	Reconductor Kereone-Walton & Thermally Upgrade Piako-Kereone	✓	✓	✓	✓	✓	✓	✗	✓
	7	Thermally Upgrade Piako-Walton	✓	✓	✓	✓	✓	✓	✗	✓
	8	Replace Sections of Piako-Walton Line with Cable	✓	✓	✓	✓	✓	✓	✓	✓
	9	Replace Kereone-Walton with Cable & Thermally Upgrade Piako-Kereone	✓	✓	✓	✓	✓	✓	✓	✓
	10	New Kereone-Walton Cable (supply Walton from Waihou GXP)	✓	✓	✓	✓	✓	✓	✓	✓

Key:

Safety	Health and Safety: Any significant implications in terms of Safety or Health - new products or compounds or practices, or requires difficult live line access etc.
Fit	Fit for Purpose: Does the option address the need appropriately and does it fit with other developments in the vicinity.
Feasible	Technically Feasible: Consider the complexity, future adaptability, and whether it aligns with company standards, strategies and policies.
Practicality	Practical to Implement: Are there potential environmental or property issues which may be insurmountable. Can it be achieved in the required time frame.
GEIP	Good Electricity Industry Practice (GEIP): Good practice (technically and environmentally) and in terms of AM practice (capacity, age, technological, safety)
Security	Security and Reliability: Does the option provide adequate levels of security and appropriate reliability considering the demand, load type and future growth.
Cost	Some options will intuitively be known to be far more expensive than other options, and this may preclude them.

Options Analysis | Short List of Options

Option	Capital Cost[15]	Description
Option 6 *(Re-conductor Kereone-Walton & Thermally Upgrade Piako-Kereone)*	**$10.6M**	This option involves the following network enhancements: • Re-conductor the existing Kereone-Walton 33kV Dog conductor line with a higher capacity conductor (e.g. Neon AAAC at 70°C). • Re-conductor Ferret sections of the WLN-2 11kV feeder with Dog conductor. This feeder is underbuilt on the Kereone-Walton 33kV overhead line. • Thermally upgrade the existing Piako-Kereone 33kV line to operate at 70°C. • Thermally upgrade the existing Walton-Waharoa 33kV line to operate at 70°C. • Install a 5MVar, 33kV capacitor bank at Browne Street substation. After having implemented the above enhancements in 2025 the Piako-Kereone 33kV line is predicted to become thermally overloaded whilst trying to back-feed Browne St during a Hinuera GXP outage, or during the loss of the Hinuera—Browne St 33kV circuit. Given this fact an additional 33kV circuit is assumed to be installed between Piako and Waharoa in 2025.
Option 7 *(Thermally Upgrade Piako-Kereone)*	**$10.5M**	This option is identical to Option 6 with exception that the dog conductor section on the Kereone-Walton 33kV circuit is not replaced. This means that an additional 33kV circuit needs to be installed between Piako and Waharoa in 2023.
Option 8 *(Replace Sections of Piako-Walton Line with Cable)*	**$7.0M**	This option involves the following network enhancements: • Replace the existing Piako to Walton 33kV overhead line with a ≈19km, 630mm^{2}AL cable. • Thermally upgrade the existing Walton-Waharoa 33kV line to operate at 70°C. • The installation of a 5 MVar, 33kV capacitor bank at the Walton substation in 2022 to support network voltages.
Option 9 *(Replace Kereone-Walton with Cable & Thermally Upgrade Piako-Kereone)*	**$3.8M**	This option involves the following network enhancement: • Replace the existing Kereone to Walton 33kV overhead line with a ≈9km, 630mm^{2}AL cable. • Thermally upgrade the Piako—Kereone 33kV overhead line to operate at 70°C. • Thermally upgrade the Walton-Waharoa 33kV overhead line to operate at 70°C. • The installation of a 5 MVar, 33kV capacitor bank at the Walton substation in 2018 to support network voltages.

[15] The total capital cost of each project. The costs do not consider the time value of money and do not include the economic value of other factors (i.e. network losses and consumer outage costs).

Option 10 ***(New Kereone-Walton Cable)***	**$6.1M**	This option involves the following network enhancements (refer to Figure 2 and Figure 4): • Install a high-capacity, ≈9km, 630mm2AL cable between Kereone and Walton, removing the existing tee arrangement at Kereone so that Walton is supplied permanently from the Waihou GXP (on the same supply line as Inghams). • The new 33kV cable would terminate at the Walton substation, which will have its buswork extended, new line breakers and a new bus section breaker added to facilitate the supply of the Waharoa and Browne Street substations from the Piako GXP during network contingencies. • Install a 5 MVar, 33kV, shunt capacitor bank at the Walton substation (the final switching stages to be confirmed). During normal operating conditions the 33kV bus section breaker at Walton would be open, so that the new 33kV cable bypasses Walton and acts as a direct back-up supply link into Waharoa. If an outage occurs on the normal supply to the Inghams or Walton substations, the bus section breaker would be closed and the Piako GXP would then supply the Waharoa, Walton and Inghams substations.

Option Analysis | Advantages vs Disadvantages

The following sections summarise the advantages/disadvantages associated with the short listed options. The intention being to also capture project risks and inter-dependencies.

Option	Advantages	Disadvantages
Option 6 *(Re-conductor Kereone-Walton & Thermally Upgrade Piako-Kereone)*	• Improves steady-state delivery voltages to Walton and post contingency delivery voltages to Waharoa and Browne Street. • Takes advantage of the existing overhead 33kV network.	• The highest capital cost (in comparison to the other options), due to the need to install an additional 33kV cable in the medium term. • The electrical losses are relatively high (before the 33kV cable is installed). • The consumer outage costs would be relatively high (before the Piako-Waharoa 33kV cable is installed).
Option 7 *(Thermally Upgrade Piako-Kereone)*		
Option 8 *(Replace Sections of Piako-Walton Line with Cable))*	• Improves steady-state delivery voltages to Walton and post contingency delivery voltages to Waharoa and Browne Street.	• Has moderately high capital expenditure cost. • The 33kV cable would be routed, as much as possible, along the road reserve to minimise private landowner compensation costs. However, there would be some property and consenting risks. • The consumer outage costs would be moderate. • Early retirement of existing overhead 33kV lines.
Option 9 *(Replace Kereone-Walton with Cable & Thermally Upgrade Piako-Kereone)*	• Improves steady-state delivery voltages to Walton and post contingency delivery voltages to Waharoa and Browne Street. • Has the lowest capital cost in comparison to the other options.	• The consumer outage costs are predicted to be the highest in comparison to all the other options. • Early retirement of existing overhead 33kV lines.
Option 10 *(New Kereone-Walton Cable)*	• Improves steady-state delivery voltages to Walton and post contingency delivery voltages to Waharoa and Browne Street. • Has a relatively low capital cost in comparison to the other options	• Property and consenting risks associated with planned upgrade and substation expansion. • Is expected to have relatively low consumer outage costs in comparison to all the other options.

Preferred Option(s)	
Preferred Option	**Option 10 - New Kereone-Walton Cable**
Reasons for choosing Option	Option 10 is preferred, which involves the installation of a new Kereone-Walton 33kV underground cable and reactive support at Walton. The capital cost of Option 10 is marginally higher than the least capital cost Option 9. However, Option 10 is the most economic option due to the benefits that flow from installing an additional 33kV circuit that links the Piako/Waihou GXPs with the Hinuera GXP. The new 33kV cable (coupled with the capacitor bank) will address network capacity/voltage issues and together with the proposed Putaruru GXP project[8] will resolve the existing Hinuera GXP back-up constraint (Item 1 on Page 3).

Option 10| Detailed Costs[16]

Item	Description	Actual Cost	Projected Cost
A	Property & Consent Costs		
A.1	Land/easements/consultation	-	$10,000
B	Investigation and Reporting Costs		
B.1	Preliminary investigations including CDR	-	$50,000
C	Substation Costs		
C.1	Walton Substation Enabling Works	-	$1,044,525
C.2	Walton Substation 33kV Capacitor Bank	-	$532,425
D	Line and Cable Costs		
D.1	Kereone-Walton 33kV Cable Cost	-	$4,491,825
E	Committed/Historical Costs (A+B+C+D)	$0	
F	Historical AMG (A+B+C+D)		$6,128,775
G	Anticipated Final Cost (E+F)		**$6,128,775**

[16] Excludes Powerco's internal/overhead costs.

Option 10 | Implementation Plan				
Project or Action	**Start Year[1]**	**End Year[1]**	**NZ $'000[1]**	**Details / Comments**
Project costs to date	-	FY14	$0	Costs that have already occurred.
Land/easements/consultation	FY21	FY21	$10	Investigative work to establish a sensible cable route within the road reserve.
Preliminary investigations including CDR	FY21	FY21	$50	Investigative work to undertake a CDR for the project and confirm the size of the capacitor bank, the switching steps and the ripple/harmonic rejection requirements
Walton Substation Enabling Works	FY21	FY21	$1,045	Upgrade of the Walton 33/11kV substation in order to terminate the 33kV underground cable, install 3 x 33kV line breakers, install a 33kV bus coupler & install a shunt capacitor bank.
Walton Substation 33kV Capacitor Bank	FY22	FY23	$532	Containerised 33kV capacitor bank to be installed on a concrete foundation pad at the Walton substation.
Kereone-Walton 33kV Cable Cost	FY22	FY23	$4,492	A ≈9km, single circuit, 33kV cable installed in road reserve between Kereone and Walton, including the overhead/underground structure at Kereone.
Total Project Costs ➔	**FY21**	**FY23**	**$6,129**	Includes Only Growth & Security Expenditure.

Supporting Documents and Models

Planning documents ***Standards | Policies*** ***Reviews and Consultant reports*** ***Concept Designs | Estimates***	1. Kereone - Walton Upgrade Project Options Analysis_Final 2. Kereone-Walton Upgrade Project Economic Spreadsheet_Final. 3. Kereone-Walton 33kV Cable and Capacitor Bank – Concept Cost Estimate (CCE), Jacobs report VH00012-RPT-EEE-014 dated May 2015. 4. Kereone-Walton Project Costs 27-10-2016 5. Powerco's 2013 and 2016 Asset Management Plan (AMP). 6. Transpower's Annual Planning Report (APR) 7. Powerco Network Development Plan 2017 (NDP) 8. "*310S001 Security-of-Supply Classifications – Zone Substations*", Powerco Standard. 9. "*393S041 Zone Substation Transformer Ratings*", Powerco Standard. 10. "*393S035 Electrical Network Conductor Rating Standard*", Powerco Standard.

Notes/Assumptions

Generic Assumptions in relation to Options Costs	• Costs are expressed in 2016 (real) dollars. • The capital costs fall within the Growth and Security expenditure categories only. • The capital costs only include Powerco's capital expenditure (not Transpower or other parties). • The costs include all costs associated with the proposed projects (or alternate options) regardless of whether those costs fall within the CPP period or not, although they do not include any sunk costs (committed already). • Reliability costs are the NPV of the Value of Loss Load calculation for each option
Specific Assumptions in Relation to Options Costs	• The costs in this POD may differ from those in the detailed Options Analysis document. This is because some of the costs have been further reviewed and refined to confirm the preferred solution. The refined costs have been checked against the estimates used in the Options Analysis to ensure that it does not materially impact the Option Analysis outcomes and that the preferred solution still ranks higher than alternatives • Property and consenting costs are usually a high risk area involving considerable uncertainty. The proposed underground cables are installed, where possible, in road reserve.

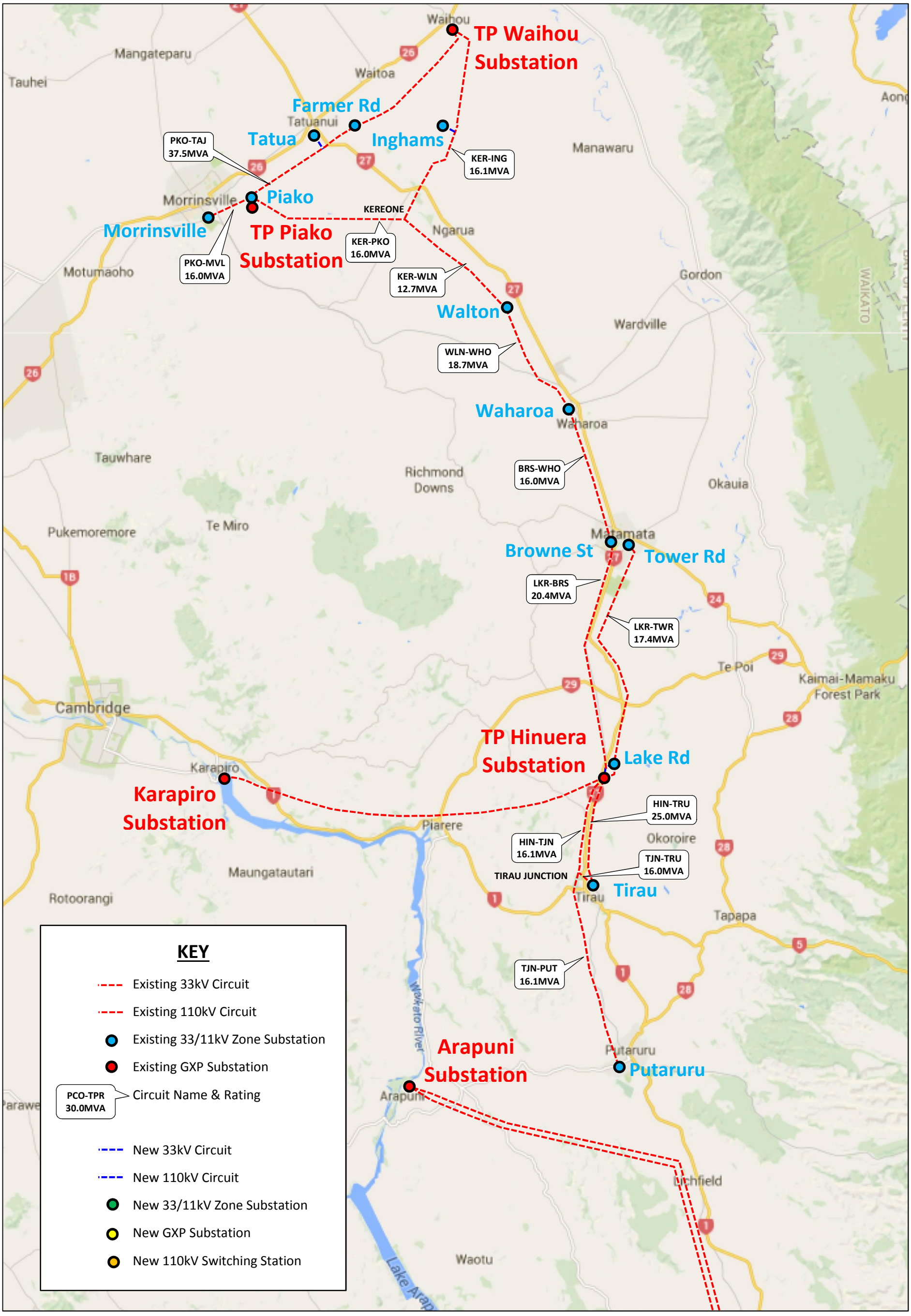

Figure 1 Existing Hinuera & Piako GXP Sub-transmission Networks: Geographic Diagram

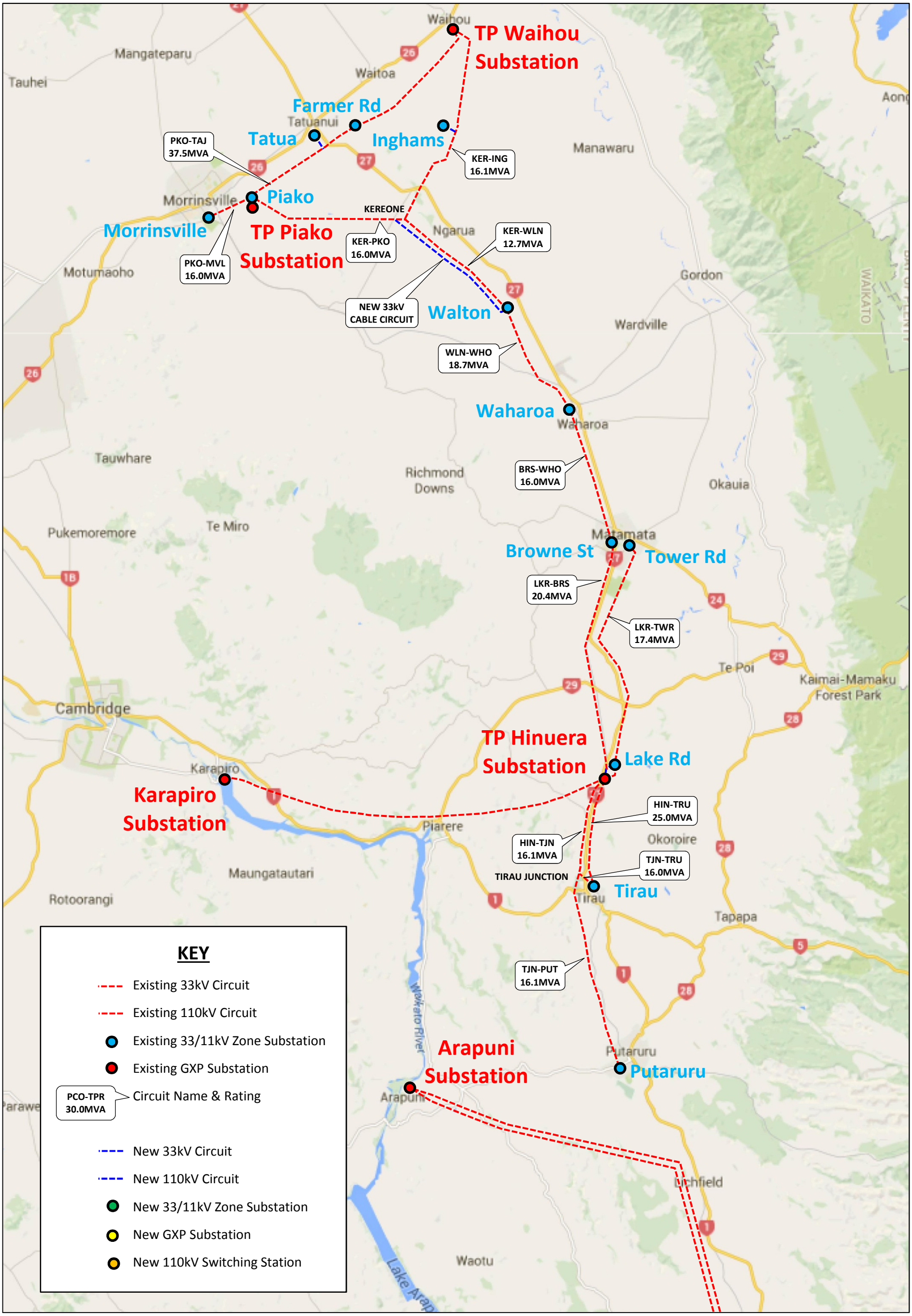

Figure 2: Option 10 Kereone-Walton 33kV Cable - Geographic Diagram

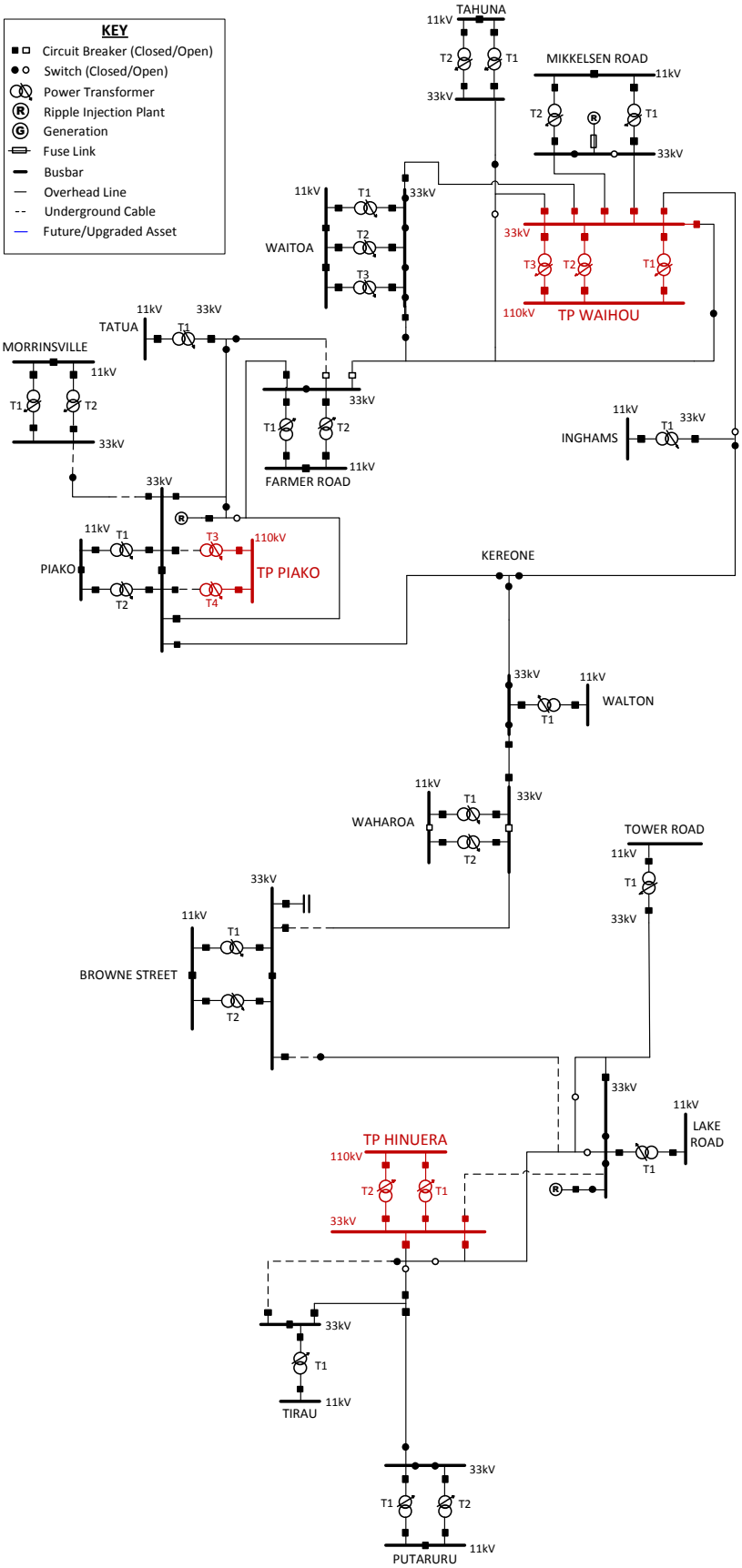

Figure 3 Existing Hinuera & Piako GXP Sub-transmission Networks: Single-Line Diagram

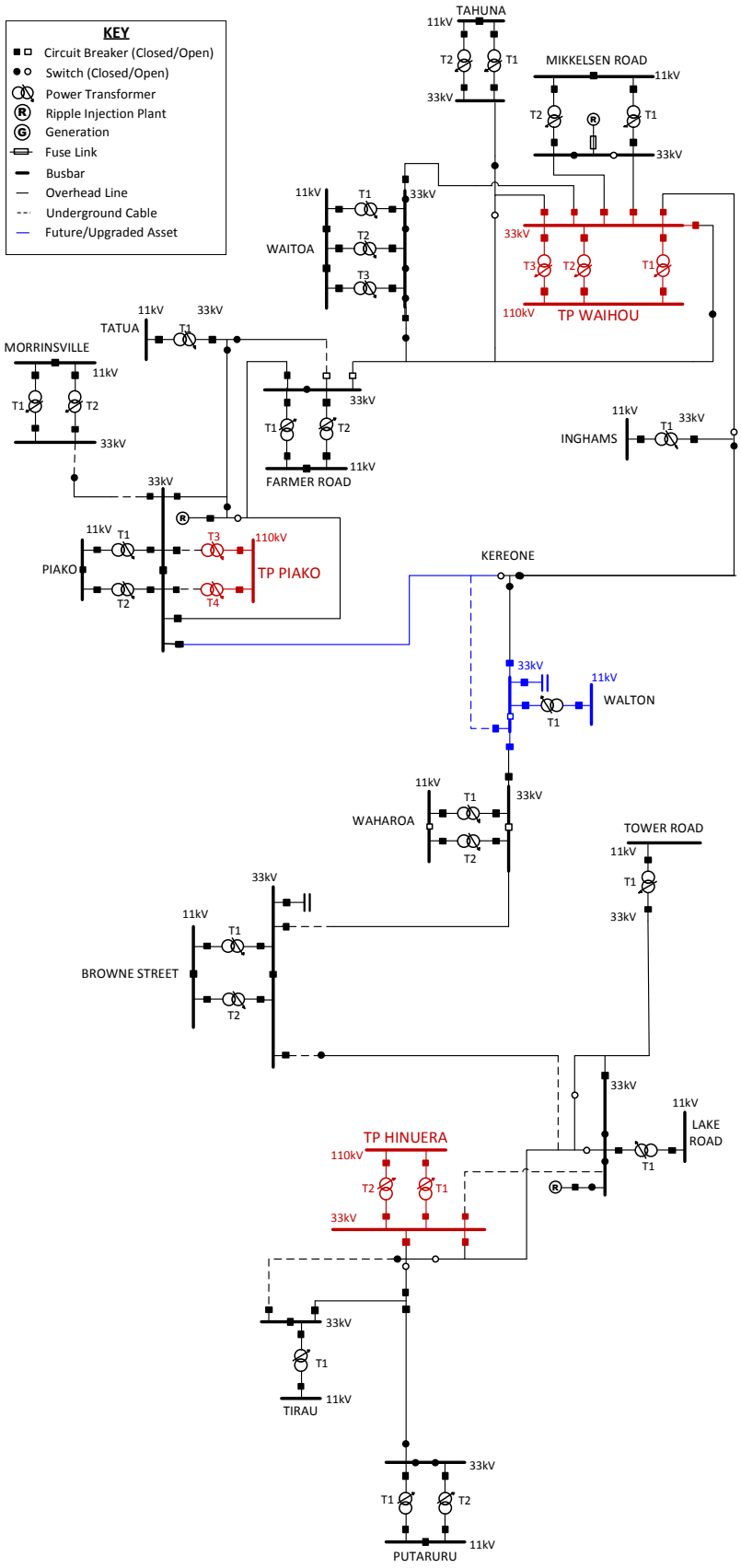

Figure 4: Option 10 Kereone-Walton 33kV Cable – Single Line Diagram