

BOMBAY OTAHUHU REGIONAL MAJOR CAPEX PROJECT

ATTACHMENT D - STAKEHOLDER CONSULTATION SUMMARY

Transpower New Zealand Limited

May 2020

Keeping the energy flowing



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Glossary

Capex IM	Transpower Capital Expenditure Input Methodology Determination, New Zealand Commerce Commission ¹ .
Code	Electricity Industry Participation Code 2010.
Demand management	The use of demand reduction pre and/or post-contingency to ensure asset capability is not exceeded.
EDGS	Electricity Demand and Generation Scenarios.
GEIP	Good electricity industry practice.
Grid Reliability Standards	The grid reliability standards (GRS) are a set of standards against which the reliability performance of the existing grid (or future developments to it) can be assessed.
GXP	Grid exit point.
Investment Test	The Capex Input defines the 'Investment Test' (IT), being the detailed economic assessment required for Major Capex Projects.
Long-list consultation	Transpower's consultation document entitled Bombay to Otahuhu Regional Study Investigation Long List Consultation December 2018.
MBIE	Ministry of Business, Innovation and Employment.
MCA	Major Capex Allowance, as defined by the Capex IM, being the maximum amount Transpower can recover from customers in relation to this project
MCP	Major Capex Proposal, as defined by the Capex IM.
MW	Megawatt, one million watts, being the power conveyed by a current of one ampère through the difference of potential of one volt.
MWh	Megawatt hour of electrical energy.
n-1	A security standard that ensures with all facilities in service Transpower's transmission system remains in a satisfactory state following a single fault (e.g. a circuit outage).
P50	Expected peak demand forecast. P50 is the 50 th percentile of the peak demand forecast probability distribution.
Present Value	Future costs discounted to a present value using an assumed discount rate.
Prudent forecast	Prudent peak demand forecast. P90 is the 90 th percentile of our peak demand forecast for the first seven years, then grows at the same rate as the expected for all remaining years in the analysis period.
RFI	Request for information.
RFP	Request for proposal.

¹ See <https://comcom.govt.nz/regulated-industries/input-methodologies/transpower-ims>

Short-list consultation	Transpower’s consultation document entitled Bombay to Otahuhu Regional Study Investigation Short List Consultation December 2019.
SDDP	Stochastic dual dynamic programming – a market dispatch model used to determine the optimal dispatch of hydro, thermal and other renewable generation.
TPM	Transmission Pricing Methodology, defined in Schedule 12.4 of the Code.
Transpower	Transpower New Zealand Limited, owner and operator of New Zealand’s high-voltage electricity network (the national grid).

1 Introduction

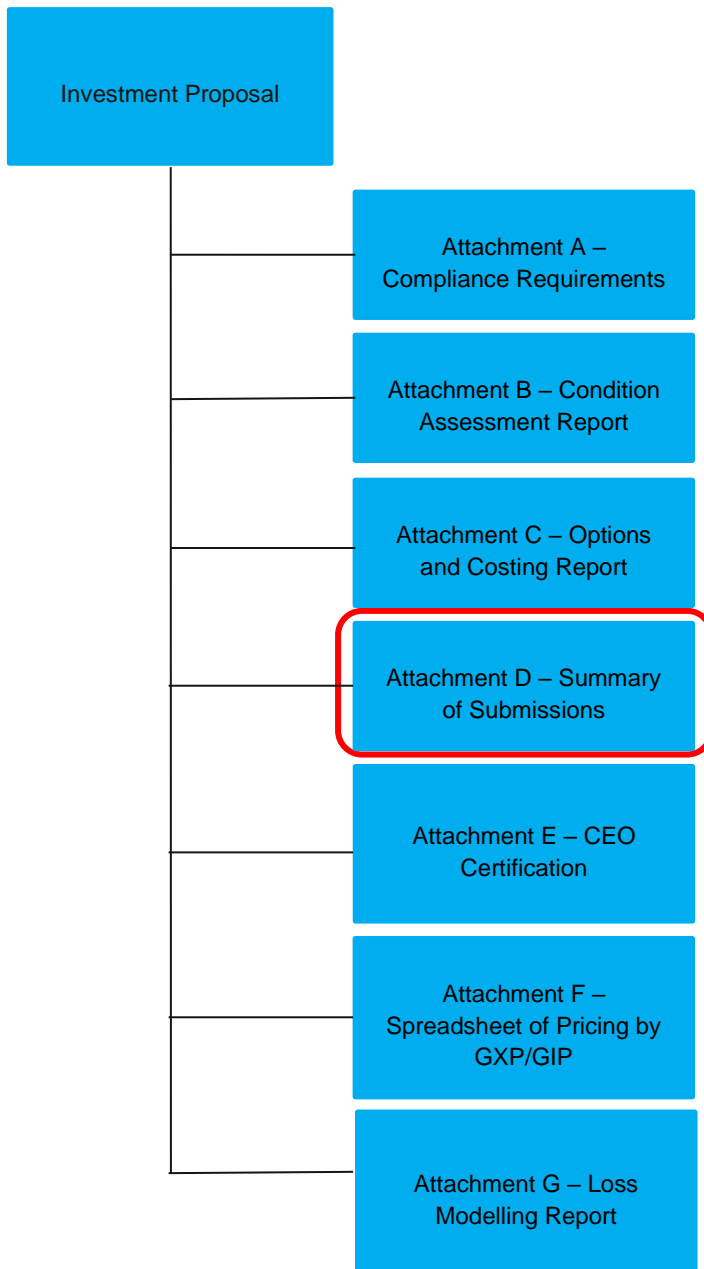
1.1 Purpose

The purpose of this document is to outline stakeholder consultation and feedback to Transpower on the Bombay Otahuhu Regional Major Capex Project Investigation and Transpower's response to that feedback.

1.2 Document structure

This document forms part of the Bombay Otahuhu Regional Major Capex Proposal application.

It is one of the supporting attachments for our main report ('Bombay Otahuhu Regional Major Capex Proposal') and should be read in conjunction with our main proposal.



1.3 Stakeholder engagement to date

Date	Activity
July 2015	Integrated transmission plan published
November 2018	Integrated transmission plan published
December 2018	Long-list consultation and invitation for information on non-transmission solutions
June 2019	RFP for NTS
December 2019	Consultation on short-list of options

Details of the long-list and short-list consultations can be found in the following sections, as originally published following these consultations. A summary of other stakeholder engagement activities is in the main proposal.

2 Long-list stakeholder consultation (December 2018): Summary of submissions with Transpower responses

This section summarises submissions received on Transpower's *Bombay Otahuhu Regional long-list consultation* of July 2018². We have endeavoured to summarise submitter's key points briefly. Please refer to their submissions for further detail, and to Appendix 5 for how we addressed issues raised.

Submissions were received from:

- Contact Energy Limited (**Contact**), an electricity generator and retailer
- **Counties Power**, an electricity distribution company in the south-west Auckland region
- Northpower Limited (**Northpower**) in its role as an electricity distributor in the upper North Island
- **Trustpower**, an electricity generator and retailer (which also supplies gas and telecommunications services). The content of Trustpower's submission is confidential to Transpower so is not referred to below.
- Vector Ltd (**Vector**), an electricity (and gas) distribution company in the Auckland region.

This section includes submitters' comments against the nine specific questions asked in the consultation report, plus any general comments of relevance to specific questions.

² The consultation paper, the non-confidential submissions and this document are available at <https://www.transpower.co.nz/bombay-otahuhu-regional-investigation>

2.1 Need and project scope

Q1 Are there any other issues relating to the need that we should incorporate into this project?

Most submitters either agreed to the need and scope or did not comment. Contact submitted that if transmission capacity was the preferred option, then they would support an increase in transmission capacity to remove transmission constraints and to meet current and future demand at Bombay and Wiri. Counties submitted that there was significant growth in the Wiri region, and that Counties would prefer the component 'establishment of a new 220/110KV GXP at the existing Drury Switching station' to be noted as highly likely to proceed.

Transpower response: *We thank participants for their feedback. We note Counties views on the Drury GXP option being likely to proceed.*

To obtain approval of an investment proposal from our regulator the Commerce Commission, Transpower must meet the requirements of the Capex IM for Major Capex Proposals (MCPs). This requires that the proposed investment has (amongst other things) a positive or maximum expected net electricity market benefit. That is, the test is a market benefit test rather than consumer benefit or national benefit. We will consider the appropriate transmission capacity as part of the investigation.

Q2 Are there other components we should consider in our long-list?

Most submitters supported our long list of components or did not comment. Counties provided some specific commentary on some components. Contact expressed a desire to participate in an RFP process for transmission alternatives. Vector suggested the inclusion of a new 110/33kV GXP in the vicinity of Jerry Green St, Wiri, supplied from Otahuhu or Mangere at 110kV and to decommission Wiri GXP.

Northpower asked for more detail around a potential transmission ring for the Auckland region via overhead lines from Coromandel and sub-marine cable towards Wellsford that could improve reliability to Auckland and Northland – particularly in the event of a volcanic eruption at Otahuhu.

Transpower response: *Transpower thanks participants for their feedback.*

- *We will proceed with an RFP for non-transmission solutions.*
- *We will add a new 110/33kV GXP supplied from Otahuhu/Mangere to our list of component options.*

This investigation is predominantly focused on addressing condition-based issues and demand growth in the Bombay area rather than all issues, but within that scope we will be considering reliability. Levels of reliability need to be justified economically, and our primary approach to this is through considering high impact low probability events (HILPs).

2.2 Criteria for short-listing

Q3 Are there other criteria we should consider when evaluating our long-list of options?

Most submitters agreed to or did not comment on our criteria for short-listing. Northpower commented on the need for sustainability, and Vector noted the importance of being mindful of changes in technology causing a risk of transmission stranding.

Transpower response: *Transpower thanks participants for their feedback.*

Although the primary driver for this investigation is condition related, future loading on the grid is an important consideration when developing a preferred solution. We agree that technology trends may impact on future grid loading. For example, battery storage is a promising technology for many grid services. This investigation will consider distributed energy resource management and other components that can reduce overall grid loading as a potential component of the solution, and the breadth of their potential benefit.

2.3 Demand forecasts

Q4 Is the use of our TPR 2018 demand forecast appropriate for this investigation? if not, we welcome specific information regarding changes.

Most submitters offered no suggestions for enhancing the demand forecasts, but Vector commented on the importance to be mindful of that new technologies and changes in customer behaviour could impact demand forecasts.

Transpower response: *Transpower thanks participants for their feedback.*

There is uncertainty in any forecast so Transpower will undertake sensitivity testing to low and high demand growth as required by the Capex IM. [Subsequent to this, as part of the Short-list consultation Transpower consulted using the up-to-date 2019 forecasts]

2.4 New generation

Q5 Are you aware of any new generation (other than solar PV) which would directly affect peak demand at Bombay or Wiri GXPs for this investigation?

Submitters did not offer any new generation that should be considered as part of the project.

2.5 Analysis period

Q6 Do you consider the proposed calculation period of out to 2050 appropriate for this investigation?

Northpower and Vector noted that transmission assets lives could extend beyond 2050 and the calculation period could be extended to cover the entire expected useful life of the proposed investments. Northpower continued that it is important to consider impacts to investment options where there are changes to the input assumptions which could impact on the analysis.

Transpower response: *Transpower thanks participants for their feedback.*

We will use the analysis period to 2050, unless we determine that the date of commissioning of our investment proposal is beyond 2030, in which case we will have to extend it commensurately to Capex IM requirements. We will undertake sensitivity analysis of our input assumptions to consider any impacts on the results of the investment test.

2.6 Value of unserved energy

Q7 Do you consider that our VoLL values of \$26,400/MWh for Bombay and \$27,800/MWh for Wiri to be appropriate for valuing unserved energy?

Submitters agreed to or were silent on the proposed value except for Vector who submitted caution was required in using VoLL to make decisions as it is subjective because it uses broad assumptions to derive values.

Transpower response: *Transpower thanks participants for their feedback.*

We agree that a \$/MWh unit for the expected cost of unserved energy is only an approximation. We undertake sensitivity analysis on our VoLL inputs to endeavour to account for this approximation.

2.7 Discount rate assumptions

Q8 Do you consider a discount rate of 7% appropriate for this investigation?

Submitters agreed to or were silent on the proposed discount rate assumptions.

2.8 Market costs and benefit assumptions

Q9 Are there other market costs or benefits which should be reflected in the analysis?

Submitters agreed to or were silent on the proposed discount rate assumptions, with Vector noting the importance of including costs reasonably incurred by other parties including affected lines companies and customers in its analysis.

Transpower response: *Transpower thanks participants for their feedback.*

To obtain approval of an investment proposal from our regulator the Commerce Commission, Transpower must meet the requirements of the Capex IM for Major Capex Proposals (MCPs). This requires that the proposed investment has (amongst other things) a positive or maximum expected net electricity market benefit. That is, the test is a market benefit test rather than consumer benefit or national benefit. We therefore cannot consider benefits other than electricity market benefits, or to parties other than electricity market participants, which includes electricity consumers.

3 RFP for Non-Transmission Solutions (May 2019)

As there was interest from proponents of non-transmission solutions, in May 2019 we issued an invitation for request for proposals for transmission alternatives in our document³ entitled *RFP for Non-transmission Solutions BOB-OTA Region*. The RFP requested proposals for NTS to address the load shortfall between the existing capacity of the Bombay-Otahuhu A line and the forecast load demand at Wiri GXP – or to economically defer the need for investment at either Bombay or Wiri.

³ The [RFP for Non Transmission Alternatives](https://www.transpower.co.nz/bombay-otahuhu-regional-investigation) are available at <https://www.transpower.co.nz/bombay-otahuhu-regional-investigation>

We had four respondent offers to the RFP, across a range of NTS solutions ranging from new embedded generation, assistance with developing a battery solution and demand-side management.

Our assessment of these offers found that they would either not be feasible physically, or would not be feasible economically to satisfy the shortfall between the existing line capacity and the forecasted load growth, or defer investment.

4 Short-list stakeholder consultation (December 2019) - Summary of submissions with Transpower responses

This section summarises submissions received on Transpower's *Bombay Otahuhu Regional long-list consultation* of December 2019⁴. We have endeavoured to summarise the submitters' key points. Please refer to their submissions for further detail, and to Appendix A.2 for how we addressed issues raised.

Submissions were received from:

- **Counties Power**, an electricity distribution company in the south-west Auckland region
- Vector Ltd (**Vector**), an electricity (and gas) distribution company in the Auckland region
- Mercury Energy (**Mercury**), an electricity generator and retailer.

This section includes submitters' comments on the eight questions asked in the consultation report, plus general comments of relevance. The sub-section numbers below correspond to the question number. We provide our response where appropriate.

4.1 Project need

Q1 Are there any other considerations relating to the need that we should incorporate into this project?

Counties Power agreed with our assessment of the need, the other respondents made no specific comment.

4.2 Derivation of short-list of options

Q2 Do you agree with our approach to the derivation of a short-list of investment options?

⁴ The consultation paper, the non-confidential submissions and this document are available at <https://www.transpower.co.nz/bombay-otahuhu-regional-investigation>

Mercury and Vector made no specific comments on the derivation of a short list of investment options. Counties Power agreed with our approach to derivation of short list, but had concern with the inclusion of load- shedding (although not the preferred solution) on the short list as a solution to manage load growth and do not believe it is appropriate for a transmission network.

Transpower response: *Transpower thanks participants for their feedback.*

We included post-contingency automatic load shedding on the short-list of options. Future load growth is met by accessing the full capacity of the transmission assets and using a special protection scheme (SPS) to manage unserved energy post a continent event on the line.

Inclusion of both load shedding and upgrade options on the short-list is important to allow a clear comparison to be made using the Investment Test of the associated costs and benefits of each option.

4.3 Economic assumptions

Q3 Do you have any comments on the economic assumptions we have used in our application of the Investment Test?

Counties Power considered the assumptions made were appropriate and both Vector and Mercury made no specific comment.

4.4 Quantified costs and benefits

Q4 Do you have any comments on our analysis of and quantification of costs and benefits for this project?

Respondents generally agreed with our approach but made some specific comments our analysis of costs and benefits including:

Counties Power queried whether the VoLL calculations included costs due to planned as well as unplanned operation of the system.

Transpower response: *Transpower thanks participants for their feedback.*

VoLL calculations only include lost load that occurs due to unplanned outages.

Vector noted that they consider that the value of maintaining resilience has not been adequately incorporated in the cost-benefit evaluation. In Vector’s view “a cost of unserved energy’ rationale should not be used to justify reducing an existing level of security of supply.”

Transpower response: *Transpower thanks participants for their feedback.*

Transpower's understanding of Vector's concern is that our analysis does not adequately reflect the risk and cost of High Impact Low Probability (HILP) events. In this case, Vector are concerned that our analysis ignores the fact that Wiri is currently connected via two lines and our proposal reduces that to one line. If that line was lost, the restoration time would be several days and Vector cannot backfeed all of Wiri's load through their own network.

It is true that our analysis typically considers the cost of having n-1 security only and that HILP events are not assessed. That is normal electricity industry practice, but where HILP or other events may increase risk and resultant costs significantly, they may be included. We use such an approach in high value situations such as assessing security of supply for CBDs. In this case and to assist Vector, we have assessed the present value of the expected cost of a single line outage (with restoration in 3 days) to be less than \$0.25 million. Inclusion of this extra cost would not affect our choice of preferred option.

Option 7 has been added to the short-list to account for this 'resilience benefit' of retaining the BOB-WIR line.

Vector noted that only a total transmission loss reduction figure is provided giving the impression that the existing Bombay-Wiri lines are a significant contributor to the total transmission losses.

Transpower response: *Transpower thanks participants for their feedback.*

The transmission loss reduction is actually a change in the national dispatch costs, as a result of removing the various 110kV lines. Both the Bombay-Wiri and lines south of Bombay contribute to this cost reduction.

Vector submitted that the length of the Bombay-Wiri circuit is approximately 25km long of the total 186km of 110kV transmission line proposed to be decommissioned and therefore the associated maintenance cost savings will be relatively small proportion of the total.

Transpower response: *Transpower thanks participants for their feedback.*

We agree and this is reflected in the Investment Test results.

Mercury supported the consideration of possible generation constraints affecting Karapiro and Arapuni-North. They also appreciate that "special protection schemes" will be installed, if necessary, to prevent generation constraints. They also noted that Karapiro's station capacity will increase to 112.5MW in 2024.

Transpower response: *Transpower thanks participants for their feedback.*

With respect to Karapiro: This project will have negligible affect on the ability of Karapiro to generate.

With respect to Arapuni: Bussing the Arapuni-Bombay circuit at Hamilton will slightly improve the balance on the three circuits going north from Arapuni.

- The Arapuni SPS will be altered to include all three of these circuits, to account for this change*
- There will be a slight increase in the n-1 capacity for generation connected to the north bus.*

4.5 Quantified costs and benefits

Q5 Do you have any comments on our analysis of and quantification of the Investment Test for this project?

Counties Power agreed our approach was appropriate and both Vector and Mercury made no specific comment.

4.6 Unquantified costs and benefits

Q6 Do you have any comments on our qualitative assessment of unquantified of costs and benefits for this project?

Counties Power supported our approach and Vector made no response to this question.

Mercury supported the inclusion of operational benefits in the assessment. They were also curious to know the impact of the proposed solution on the Upper North Island voltage stability.

Transpower response: *Transpower thanks participants for their feedback.*

We consider that operational benefits in terms of generation dispatch will be virtually unchanged by this project

The Waikato and Upper North Island voltage stability studies ('WUNI') have been undertaken using variations of the preferred BOB-OTA option.

- The base-case studies assumed a staged implementation of the Bombay-Otahuhu preferred option (initially one transformer at Bombay and no 110 kV circuit changes, then 110 kV circuit removal by 2029)*

- *WUNI studies also did a sensitivity check using the preferred Bombay-Otahuhu option (two transformers at Bombay and 110 kV circuits removed in 2023/4). Results indicated a reduction in the WUNI load limit due to the Bombay-Otahuhu preferred option, but this reduction was less than a single year's load growth so did not impact the timing of investments under the WUNI program.*

4.7 Approach to determine a preferred solution

Q7 Do you agree with our intended approach to determine a preferred solution and our intended application of the Investment Test?

Unless otherwise mentioned, respondents were generally supportive of our approach to determine a preferred solution.

Counties Power noted that the preferred option will result in the 110kV bus at Bombay GXP becoming a connection asset after the last Transpower 110kV circuit connected to it is decommissioned. This will result in a significant increase in Counties Power's Transpower connection charges which will be borne by Counties Power's customers.

Due to the proposed changes by to the Transmission Pricing Methodology (TPM) Counties request in writing who the beneficiaries will be from this investment so that Counties Power can understand how the transmission upgrade costs may be allocated under the proposed TPM.

Transpower response: *Transpower thanks participants for their feedback.*

The Electricity Authority are currently consulting on revisions to the existing TPM. It does seem likely that some form of benefit-based charge will be introduced, but it is not possible, at this time, to determine who the beneficiaries of this project might be, as those aspects of a benefit-based charge have yet to be determined.

Vector noted that Transpower's preferred option would provide Vector with a reduced level of security and an increase in transmission charges (due to the conversion of Wiri from an interconnection asset to a connection asset) while the total cost saving of this project to the wider transmission grid would be small which is a poor outcome for Vector and its customers.

Transpower response: *Transpower thanks participants for their feedback.*

The net benefit of the proposal is significantly higher than other options (Option 2 aside) so the economic imperative for the proposal is clear. We appreciate that, under the TPM, the costs of the proposal will be allocated

to Vector and Counties Power, but that does not change the economic result, which is clear.

Vector would like to see Transpower develop at least one option on the short-list that would maintain the existing level of security at Wiri and leave Vector no worse off from a commercial perspective.

Transpower *Transpower thanks participants for their feedback.*

response:

We have added Option 7 to our short-list options, which is basically the same as the proposal, but with the Wiri to Bombay line reconducted and retained. Our analysis indicates that the potential cost savings from increasing the security level at Wiri does not offset the extra cost of retaining the Wiri to Bombay line, so this option is not preferred.

Counties Power consider that for the proposed 2x 220/110kV transformers at Bombay, Transpower should also consider a 220kV bus as opposed to the hard tee 220kV connection.

Transpower *Transpower thanks participants for their feedback.*

response:

We did undertake analysis, while building our options, to consider the economics of installing a 220kV bus instead of a hard tee at Bombay. The higher cost of the 220kV bus was not economic. We note however, that load is forecast to grow significantly at Bombay. If the forecast comes to pass then it may be worthwhile revisiting this decision. The Bombay design means that a 220kV bus can be retroactively fitted.

5 Short-list stakeholder consultation briefing (24 January 2019)

This section records that during the short-list stakeholder consultation period Transpower undertook a briefing with representatives of effected lines companies to discuss the proposal.

Transpower representatives met separately with representatives from:

- **Counties Power**, an electricity distribution company in the south-west Auckland region
- Vector Ltd (**Vector**), an electricity (and gas) distribution company in the Auckland region.

At these briefings discussions took place between the parties around the contents of the short-list consultation document. The feedback arising from these briefings are captured in their formal submissions as recorded in section 4 above.

A.1 How we addressed issues raised in Long-list consultation submissions

In our summary of submissions, we undertook to take certain actions in response to feedback received. These issues and how we have addressed them are itemised in Table 1.

Table 1 - How we addressed submissions to the Long-list consultation.

Issue	Section	Comment
Counties expressed a view on the Drury GXP option which they would like Transpower to consider as likely to proceed.	2.1	Counties have subsequently advised us that the Drury GXP is still planned but the timing of the investment is still unclear.
A new 110/33kV connection that is supplied from Otahuhu/Mangere should be added to our list of component options.	2.1	We added this option to our long-list, and it was short-listed has been subsequently short-listed and considered with our investment options in this investigation.
Interest in an RFP for non-transmission solutions.	2.1	We have issued an RFP in May 2019 and have considered these as options in our analysis.
Batteries and other components that can reduce overall grid loading as a potential component of the solution, and the breadth of their potential benefit should be considered in this investigation.	2.2	Batteries were considered on our long-list of investment options but were not short-listed as they were not economic.
Due to the impact technology changes could have to future demand on the grid, Transpower should undertake sensitivity testing to low and high demand growth.	2.3	We have undertaken sensitivity analysis on our application of the Investment Test as part of this short-list consultation.
Sensitivity analysis of our input assumptions should be undertaken to consider any impacts on the results of the Investment Test.	2.5	We have undertaken sensitivity analysis on our application of the Investment Test as part of this short-list consultation.
Transpower should undertake sensitivity analysis on VoLL inputs.	2.6	We have undertaken sensitivity analysis on our application of the Investment Test as part of this short-list consultation.

A.2 How we addressed issues raised in Short-list consultation submissions

In our summary of submissions, we undertook to take certain actions in response to feedback received. These issues and how we have addressed them are itemised in Table 2.

Table 2 - How we addressed submissions to the Short-list consultation

Issue	Section	Comment
Who the beneficiary will be from this investment to understand how the transmission upgrade costs may be allocated under the proposed TPM	4.7	The Electricity Authority are currently consulting on revisions to the existing TPM. It does seem likely that some form of benefit-based charge will be introduced, but it is not possible, at this time, to determine who the beneficiaries of this project might be, as those aspects of a benefit-based charge have yet to be determined.
Vector would like to see Transpower develop at least one option on the short-list that would maintain the existing level of security.	4.7	We have included an additional option (Option 7) in our short-list which involves reconductoring the Bombay-Wiri line at a similar capacity rather than being removed. Reconductoring Bombay-Wiri retains the option of supplying Wiri from Bombay, should there be a double-circuit outage event (such as a tower failure) between Otahuhu and Wiri. Our analysis indicates that the potential cost savings from increasing the security level at Wiri does not offset the extra cost of retaining the Wiri to Bombay line, so this option is not preferred.