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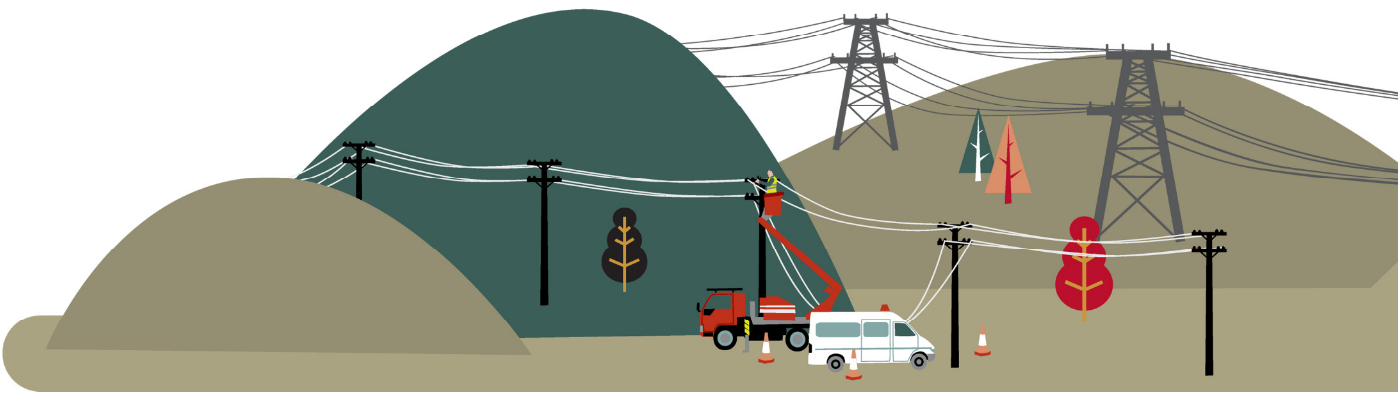
Final decision on Transpower's listed project application

Churton Park section of Oteranga Bay to Haywards A Line reconductoring project

The Commission: S Begg
Dr M Berry
Dr S Gale
Dr J Walker

Date of decision: 10 October 2018



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Purpose of this paper

1. On 11 May 2018, Transpower New Zealand Limited (Transpower) submitted an application proposing an increase in its base capex allowance to reconductor the Churton Park section of the Oteranga Bay to Haywards A line (**OTB-HAY A line**) (application).[1] A summary of the project is set out in Attachment A.

2. On 15 August 2018, we put out our draft decision on Transpower's application for consultation purposes. We received submissions from Meridian Energy Limited (Meridian) and Transpower, and a cross-submission from Transpower on Meridian's submission. We thank both submitters for these submissions, which we have taken account of in coming to our final decision.

3. This paper explains our final decision to approve an additional $25.5 million base capex allowance for Transpower's OTB-HAY A line reconductoring listed project.

Summary of Transpower's proposal

4. The project is to reconductor (replace the conductors) on the Churton Park section of the OTA-HAY A line. Transpower's conductor assessment shows that the existing conductors are corroding and approaching the end of their serviceable life.

5. Transpower's cost estimate for the forecast capex on the project is $23.5 million. In addition, it forecasts that there will be incremental High Voltage Direct Current (**HVDC**) reserve costs of $2 million (P50) which it expects to incur as a result of undertaking the work to deliver this project. Transpower therefore requested we approve:

    5.1 adding $23.5 million to Transpower's base capex allowance for the regulatory control period from 1 April 2015 to March 2020 (**RCP2**); and

    5.2 allowing Transpower to recover the actual incremental HVDC reserve costs it incurs, but not subjecting those costs to the Transpower incentive regime.

6. Transpower plans to commence work on this project in the fourth quarter of calendar year 2019 and aims to complete it in, or shortly after, the second quarter of calendar year 2020. This would place the expected commissioning dates for the reconductored line within the final year of the RCP2 regulatory period. As Transpower explained in its application, the capex is likely to be spent in the disclosure years ending 30 June 2019 and 2020.

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[1] Transpower, "*Churton Park section of Oteranga Bay to Haywards A line reconductoring*", May 2018. Transpower's application and supporting documents are available on our website: http://www.comcom.govt.nz/regulated-industries/electricity/electricity-transmission/transpower-individual-price-quality-regulation/transpowers-price-quality-path-from-2015-to-2020/

7. Transpower has scheduled this project for the same outage window as that in which Transpower will replace the valves of the HVDC Pole 2.

Our decision

8. In line with the expected commissioning disclosure year, our decision is to increase Transpower's base capex allowance by $25.5 million for the disclosure year ending 2020 as shown in Table 1.1 below. This amount comprises $23.5 million to fund Transpower's forecast reconductoring costs and $2 million covering the estimated incremental HVDC reserve costs risk directly attributable to this reconductoring project. As Transpower proposed, we decided not to subject these HVDC reserve costs to the Transpower incentive regime.

9. We set out our reasons for approving this amount in this paper.

10. Our final decision is consistent with our draft decision. In their submissions, Transpower fully supported our draft decision and Meridian was comfortable with our draft decision "as it relates to the forecast $23.5 million in forecast reconductoring costs". Meridian questioned, however, whether the incremental reserve costs were included in the cost benefits analysis used to rank Transpower's proposed solution against the alternatives and whether there should be an incentive on Transpower to limit the actual reserve costs that it will incur as part of the reconductoring work. We discuss Meridian's submission in paragraphs C118 - C123 of this paper.

11. Our decision increases the base capex allowance for RCP2 under the provisions for allowing additional funding for listed projects set out in the Transpower Individual Price Quality Path (**IPP**) and the Transpower Capital Expenditure Input Methodology Determination (**Capex IM**).[2,3,4]

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2 *Transpower Individual Price Quality Path determination 2015* [2014] NZCC 35, as amended and consolidated as at 13 December 2017, clause 12, Schedule I, available at: http://www.comcom.govt.nz/regulated-industries/electricity/electricity-transmission/transpower-individual-price-quality-regulation/transpowers-price-quality-path-from-2015-to-2020/.

3 *Transpower Capital Expenditure Input Methodology Determination 2012* [2012] NZCC 2, as amended and consolidated as at 28 February 2017, clause 3.2.4, available at: http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/transpower-input-methodologies/.

4 As set out in our Transpower Capital Expenditure Input Methodology Amendments Determination 2018 [2018] NZCC 8 (2018 amendments determination), we have recently made amendments to the Capex IM, including to its provisions for listed projects. However, under the transitional arrangements in clause 4.2(a) of the 2018 amendments determination, the amendments to Subpart 2 of Part 3 of the Capex IM (which includes the provisions for listed projects) do not apply in relation to RCP2. Because Transpower applied for the additional base capex for this listed project in RCP2, the requirements under clause 3.2.4 of the Capex IM in effect before the 2018 amendments determination came into force apply to this listed project.

Table 1.1 Our decision on base capex allowance

Base capex allowances*	Year ending:	**30 June 2020**
Current RCP2 allowance		213.1
Listed project allowance (capex commissioned)		25.5
Amended allowance		238.6

*$m in nominal prices

The regulation that applies to Transpower

12. We regulate the services that Transpower supplies to consumers under Part 4 of the Commerce Act 1986 (**Act**).[5] We determined the price and quality requirements that apply to these services for RCP2 in the IPP determination.

13. When setting the IPP we approved amounts of base capex for all of the disclosure years of RCP2, but excluded certain 'listed projects' from the base capex allowance.

14. We included five transmission line reconductoring base capex projects as 'listed projects' in a schedule to the IPP.[6] These projects were classified as listed projects at the time of the RCP2 IPP reset because:

    14.1 their costs were expected to exceed $20 million;

    14.2 the projects involved asset replacement and/or asset refurbishment; and

    14.3 the commissioning dates were anticipated to be within RCP2, but could not be forecast with specificity.[7]

15. The rules relating to listed projects are set out in the Capex IM. Under the Capex IM, Transpower may seek approval for additional base capex for listed projects in RCP2.[8] The Capex IM requires Transpower to seek approval for additional base capex for listed projects before the end of June 2018.[9]

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5 The service that Transpower provides is the transport of electricity through the national transmission network, also known as the national grid. The national grid connects large generators of electricity to large electricity consumers and electricity distribution businesses, which then connect to smaller electricity consumers.

6 These projects are listed in Schedule I of the IPP.

7 Capex IM, clause 2.2.3.

8 Capex IM, clause 3.2.4(1) and "Setting Transpower's individual price-quality path for 2015-2020 Final decision and reasons, 29 August 2014, par 2.21.

9 Capex IM, clause 3.2.4(1).

16. When seeking approval, Transpower must, among other things, outline its proposed investment, the justification for the investment, the options it has considered, and the costs and benefits of the investment options.[10]

17. We may then, at our discretion, approve an additional amount of base capex for the listed project over the remaining years of RCP2, following an evaluation in accordance with the relevant evaluation requirements in the Capex IM.[11]

18. Transpower has so far made two listed project applications. These include this application as well as the Central Park Wilton B line reconductoring listed project for which we provided an allowance in our June 2017 decision.[12]

Our evaluation framework

19. We assessed Transpower's proposal against the evaluation framework set out in the Capex IM.

20. The evaluation framework is outlined in Attachment B. It requires us to focus on three key areas of assessment.

    20.1 Assess whether Transpower has complied with the consultation requirements in the Capex IM.[13]

    20.2 Evaluate the application using the criteria in clause 6.1.1 of the Capex IM applicable to a base capex project that qualifies as an identified programme under the Capex IM.[14]

    20.3 Apply the same CPI and FX values as used for the original RCP2 proposal.[15]

Summary of reasons for our decision

21. In evaluating a reconductoring project like this listed project, our main focus is on determining that:

    21.1 a clear need driving the project has been identified;

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10 The information we require is set out in clause 3.2.4(2) and Schedule G of the Capex IM.

11 At least 22 months before the end of RCP2 – Capex IM, clause 3.2.4(4).

12 http://www.comcom.govt.nz/regulated-industries/electricity/electricity-transmission/transpower-individual-price-quality-regulation/transpowers-price-quality-path-from-2015-to-2020/.

13 Capex IM, clause 3.2.4(4) (a).

14 Capex IM, clause 3.2.4(4)(b). These include, amongst other things, whether Transpower has met the Input Methodology requirements, the extent what is proposed will promote the Part 4 purpose of the Act, and the relevant criteria in Schedule A of the Capex IM.

15 Capex IM, clause 3.2.4(5).

21.2 a range of options to deliver the project has been considered;

21.3 from that range of options, the best solution has been selected to deliver the project;

21.4 the timing to deliver the project is right; and

21.5 the forecast expenditure to deliver the project is appropriate.

22. We briefly summarise below our assessment of Transpower's listed project application against these considerations. We also point to sections in this paper where we provide more information on our assessment against these considerations (Attachment C).

There is a clear need driving the project

23. It is important that the HVDC transmission network has a high level of reliability and availability, and also retains its continuous and short-term capacity.

24. Transpower's conductor assessment showed that the existing conductors are corroding and approaching the end of their serviceable life. Replacing conductors that are corroding will restore the condition of the line to the current level of service.

25. For more information see paragraphs C17 to C20.

A range of options to deliver the project has been considered

26. Transpower considered and consulted on a range of potential options to deliver the project and has short-listed those that are technically feasible. Transpower also considered and consulted on options to mitigate market impact risks.

27. For more information on the short-listing process see paragraphs C48 to C53.

28. For more information on the consideration of options to mitigate market impact risk see paragraphs C76 to C107.

The best solution has been selected to deliver the project

29. Transpower selected the proposed solution on the basis of a cost-benefit analysis as well as a technical feasibility assessment. In that regard, we are satisfied the proposed solution will deliver the greatest benefits out of the short-listed options.

30. We are also satisified that Transpower's proposed approach to delivery will best address any associated market impact risks.

31. For more information on the short-listing process see paragraphs C48 to C53. For more information on the consideration of options to mitigate outage risk see paragraphs C76 to C107.

The timing to deliver the project is right

32. In order to deliver the project at the 'right time', Transpower used site-specific data on the extent and the rate of deterioration of conductors. We are satisfied this process

has helped determine, to the extent possible, that the replacement is scheduled for the right time.

33. For more information on timing see paragraphs C26 to C38.

34. In addition, Transpower has scheduled to deliver this project at the same time as it plans to replace the valves of Pole 2. Delivering both projects within the same outage window is least disruptive to the electricity market.

The forecast expenditure to deliver the project is appropriate

35. Transpower used a consultant to identify project scope and to estimate cost using Transpower's costing database. This process generally results in a reasonable assessment of the scope of works, because it is based on site investigations, rather than a desktop study.

36. We are satisfied that the process of estimating forecast expenditure is reasonable. However, we had a number of queries on some of the cost elements, which we discussed in a workshop with Transpower. We are satisfied our final decision provides for a forecast expenditure that is appropriate to undertake this project.

37. For more information on expenditure see paragraphs C66 to C71.

Attachment A: Overview of Churton Park section of Oteranga Bay to Haywards A line reconductoring listed project

A1 The HVDC transmission system transmits bulk electricity between the North and South Islands. Its main use is to transmit hydro electricity generated in the South Island to the North Island. However, in times of low South Island generation, the system transmits electricity generated in the North Island to the South Island.

A2 Figure A1 indicates the route of the HVDC system from Benmore to Haywards.

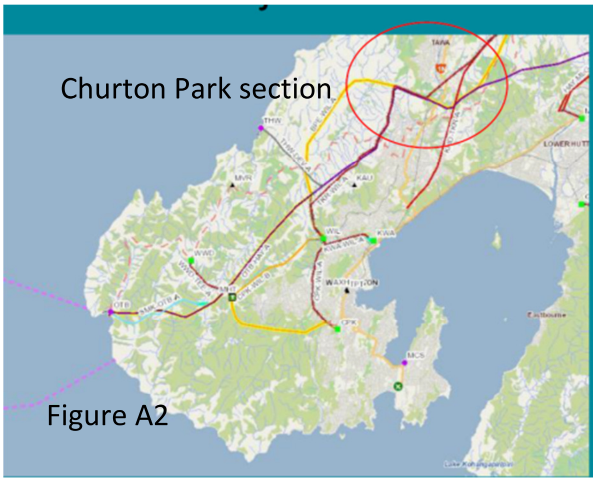
A3 The HVDC system consists of two converter stations, one at Benmore in the South Island and the other at Haywards near Wellington. Each convertor station has two poles, referred to as Pole 2 and Pole 3.

A4 Total capacity of the HVDC system is 1200 MW. The capacity of Pole 2 is 500 MW and that of Pole 3 is 700 MW. Capacity is limited by the ratings of the Cook Strait cables.

A5 610 km of 350 kV double circuit transmission line/cable connects the two convertor stations. The line is mostly overhead, but there is 40 km of cables across the Cook Strait between Oteranga Bay in Wellington and Fighting Bay in the Marlborough Sounds.

A6 This project is to reconductor the Churton Park section of the line that is showing signs of advanced corrosion.

A7 The Churton Park section of the line is 9.5 km long and has 26 towers, resulting in 25 spans. Figure A2 shows this section.



A8 This section of the line was commissioned in 1978 as a deviation when the Churton Park suburb was developed.

A9 The conductors of the remaining sections of the line were replaced between 2008 and 2012.

Attachment B: Evaluation framework

B1 In this Attachment, we outline the Capex IM's framework for evaluating listed projects. The Capex IM sets out the relevant criteria in a number of sections. We bring the criteria together in this Attachment and show the interrelation between the various clauses.

B2 Under the Capex IM's evaluation requirements for a listed project, we must:

B2.1 confirm that Transpower has met its consultation requirements;

B2.2 confirm that Transpower has applied the specified escalation and foreign exchange rates; and

B2.3 evaluate the application using the criteria in clause 6.1.1 of the Capex IM which are applicable to a base capex project that qualifies as an identified programme under the Capex IM.[16]

Consultation requirements

B3 The Capex IM sets out consultation requirements for Transpower and us. We were required to seek the views of interested parties on our draft decision.[17]

B4 Our evaluation included assessing whether Transpower met the consultation requirements set out in the Capex IM.

Consultation requirements for Transpower

B5 The Capex IM requires Transpower to consult with interested parties on listed project applications. Consultation must be commensurate with the nature, complexity, impact and significance of the project. These rules are set out in clauses 3.2.1 and 8.1.2 of the Capex IM respectively:

> 3.2.1 <u>Base capex projects or programmes with forecast cost of greater than $20 million</u>
>
> In respect of a base capex project or base capex programme involving forecast capital expenditure of greater than $20 million Transpower must, prior to undertaking the project or programme, undertake-
>
> (a) a cost-benefit analysis consistent with determining expected net electricity market benefit; and
>
> (b) consultation with interested persons in accordance with clause 8.1.2.
>
> 8.1.2 <u>Base capex projects or programmes forecast to cost more than $20 million</u>

[16] Capex IM, clause 3.2.4(4).
[17] Capex IM, clause 8.1.1(3).

For the purpose of clause 3.2.1(b), consultation by Transpower with interested persons must be-

(a) of a scope commensurate with the proposed project's or programme's nature, complexity, impact and significance; and

(b) undertaken by Transpower acting in accordance with the policies and processes specified in its base capex proposal.

Specified escalation and foreign exchange rates

B6 The Capex IM specifies that to approve additional base capex for a listed project, we must apply the same forecast CPI rate and forecast FX rates that were used to set the RCP2 base capex allowance.[18]

The relevant criteria set out in clause 6.1.1

B7 Clause 3.2.4(4)(b) of the Capex IM requires that we assess a listed project proposal against the criteria in clause 6.1.1 that would apply if the application was part of the original base capex proposal for RCP2, and as if the listed project was an identified programme in that proposal. Clause 6.1.1(2) of the Capex IM requires that we consider:

B7.1 whether the proposal is consistent with the Capex IM and the Transpower Input Methodologies;

B7.2 the extent that the proposal will promote the purpose of Part 4 of the Act; and

B7.3 whether, the data, analysis, and assumptions underpinning what is proposed are fit for the purpose of us exercising our powers under Part 4 of the Act, including consideration as to the accuracy and reliability of data, and the reasonableness of assumptions and other matters of judgement.[19]

B8 Additionally, clause 6.1.1(3) requires us to evaluate a base capex proposal in accordance with Schedule A of the Capex IM.[20]

Evaluation against Schedule A of the Capex IM

B9 Schedule A1 of the Capex IM sets out the requirements for general evaluation of base capex proposals, while Schedule A2 sets out the requirements for evaluating identified programmes.

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18 Capex IM, clause 3.2.4(5).

19 Capex IM, clause 6.1.1(2).

20 Capex IM, clause 6.1.1(3).

B10 Not all of the criteria in Schedule A1 are directly relevant to Transpower's listed project proposal, as Schedule A1 is designed to be used when considering a full base capex proposal – not an individual project. For example, Schedule A1(h) requires us to have regard to the overall deliverability of the base capex during the regulatory period. This is unlikely to be relevant to a specific project, except in circumstances where the project is sufficiently large to impact on the overall deliverability of the base capex package. Most of these criteria have also been thoroughly traversed as part of our IPP reset process and they also overlap with the criteria in Schedule A2 in certain instances.

B11 We therefore focussed our evaluation of the proposal against the criteria in Schedule A2 rather than on Schedule A1.

B12 The subclauses setting out the specific areas of evaluation in Schedule A2 are listed in paragraph C25 of this decision paper.

Attachment C: Summary of our evaluation

Purpose

C1 In this attachment we explain our evaluation of the application using the framework outlined in Attachment B.

Transpower has met the consultation requirements

C2 Transpower is required to consult with interested parties on listed projects, to the extent commensurate with the nature, complexity, impact and significance of the project.[21]

C3 We are satisfied that Transpower met its obligations to consult with interested parties through these consultations. Below we outline the steps Transpower took in consulting on its application.

C4 In December 2016, Transpower initiated the consultation process by consulting on its long list of options and inviting interested parties to propose feasible options it had not considered.[22] In response, Meridian, Mercury Energy (Mercury) and Contact Energy (Contact) asked Transpower to consider the wider implications of the project, but did not propose any other options for Transpower to consider.

C5 In particular, submitters asked Transpower to consider options to mitigate the market impact of the outages during construction. Suggestions included installing a bypass line, using more field staff to reduce the duration of outages, doing the work over two summers, postponing the outage in case of very dry or wet summers and using ‘Automatic Under-Frequency Load Shedding’ (**AUFLS**) to manage frequency and assist reserves.[23]

C6 In December 2017, Transpower consulted on its draft application. In their submissions, both Meridian and Contact asked Transpower to undertake an economic evaluation of the bypass line option and to retain the flexibility to return to bi-pole operation when necessary to balance generation.[24]

C7 On 23 February 2018, Transpower held an industry forum to discuss its findings on the outage options, including presenting the outcome of the economic evaluation it

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21 Capex IM, clauses 3.2.1 and 8.1.2.

22 Transpower “Long-list consultation: Oteranga Bay to Haywards A line (Churton Park section) reconductoring (December 2016)”. https://www.transpower.co.nz/oteranga-bay-haywards-churton-park-section-consultation

23 Transpower “Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment C: Stakeholder consultation summary”, pages 3 to 9.

24 Transpower “Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment C: Stakeholder consultation summary”, pages 10-11.

had undertaken in line with stakeholder requests. Some stakeholders, however, remained concerned about the duration of the proposed outage and continued to be of the view that Transpower should take mitigating actions. Transpower responded to these concerns, including exploring alternatives, as outlined in Attachment D of its application.[25,26]

Escalation and foreign exchange rates

C8 Transpower used the following cost escalators in this listed project application:

C8.1 Changes in the general rate of inflation as measured by CPI.

C8.2 Changes in foreign exchange rates, such as USD to NZD for materials used in the current listed project.

C9 Under the Capex IM, we must apply the forecasts for escalation factors used to determine the RCP2 base capex allowance.[27] Therefore, in assessing the allowance for this project, we had to use the forecast CPI and forecast FX determined when we set the IPP in 2014.

C10 We are satisfied that Transpower met this requirement.

C11 The applicable forecast CPI and forecast FX rates are shown in Table C1 below:

Table C1: CPI and FX used in the CPK WIL application

	1 July 2015 to 30 June 2016	1 July 2016 to 30 June 2017	1 July 2017 to 30 June 2018	1 July 2018 to 30 June 2019	1 July 2019 to 30 June 2020
CPI	1.80%	2.09%	2.06%	2.03%	2.00%
USD to NZD exchange rate	0.79	0.77	0.76	0.74	0.72

C12 The listed project allowance and cost escalators by financial year are given in Table C2 below:[28]

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25 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment C: Stakeholder consultation summary", page 31.

26 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D: Outage Modelling report.

27 Capex IM, clauses 3.2.4(4) and 3.2.4(5).

28 Note that these allowances exclude HVDC Reserve Costs, this is discussed below.

Table C2: Listed project capex annual allowance and cost escalators

Cost by financial year	2018 ($000)	2019 ($000)	2020 ($000)
Capex (real 2018$)	584	4,181	16,989
Inflation (CPI)	1	93	664
Exchange rates	0	0	0
Interest during construction	20	115	817
Total (2020$)	**605**	**4,389**	**18,471**

The application meets the criteria set out in clause 6.1.1 of the Capex IM

C13 In the following paragraphs, we provide a summary of our evaluation of the application against the criteria set out in clause 6.1.1 of the Capex IM. As mentioned in paragraph B7 above, these are:

C13.1 whether the proposal is consistent with the Capex IM and Transpower input methodologies;

C13.2 the extent that the proposal will promote the purpose of Part 4 of the Act;

C13.3 whether the data, analysis, and assumptions underpinning what is proposed are fit for purpose; and

C13.4 an evaluation in accordance with Schedule A of the Capex IM, as if the listed project was part of a base capex proposal.

The application is consistent with the input methodologies

C14 We had to consider the consistency of the application with the relevant input methodologies in making our decision.[29] In analysing the application we focused on assessing whether Transpower had provided the information specified in the Capex IM and the certification requirements.

C15 We are satisfied that the application is consistent with the relevant input methodologies.

C16 Transpower has provided a certified copy of the extract of the minutes of a meeting its Board of Directors held on 19 April 2017, and its CEO's certification dated 10 May 2018.[30]

The application promotes the purpose of Part 4 of the Act

C17 We consider that Transpower's proposed investment is in the long term interest of consumers.

C18 This section of the line is a small part of the HVDC transmission network which transmits bulk power between the North and South Islands and contributes to the efficiency of the electricity market. It is important that the HVDC transmission network has a high level of reliability and availability and also retains its continuous and short-term capacity.

C19 Replacing conductors that are corroding will improve the condition of the line to the level suitable to provide quality of service expected by the consumers the line services.

C20 The counterfactual of not investing is likely to increase the number of conductor failures and affect the availability of the HVDC system. Conductor failures could also pose a risk to public safety. A prudent operator should improve the condition of conductors to mitigate these risks.

Data, analysis and assumptions in the application are fit for purpose

C21 We are satisfied that the data, analysis and assumptions provided by Transpower are fit for purpose. The main data relevant to our evaluation are:

C21.1 data on condition assessment that determines the need for this project;

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[29] Capex IM, clause 6.1.1(2)(a).

[30] The CEO certification outlines that the information provided to us was derived from and accurately represents, in all material aspects, the relevant operations of Transpower and that the base capex in respect of the listed project was approved by Transpower in accordance with the applicable requirements of Transpower's capital expenditure approval policies. Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment E: Board and Chief Executive Certification"

C21.2 investigations identifying the scope of works and the expected cost of the project;

C21.3 data on the capacity of the investment options that Transpower considered; and

C21.4 assumptions relevant for the investment test set out in the Capex IM.

Summary of evaluation against criteria set out in Schedule A of the Capex IM

C22 Base capex proposals must be evaluated in accordance with the evaluation criteria set out in Schedule A of the Capex IM.

C23 Schedule A contains two key sets of criteria for the purposes of evaluating a base capex proposal:

C23.1 Schedule A1 sets out factors that we must have regard to in evaluating a base capex proposal as part of a IPP reset; and

C23.2 Schedule A2 sets out factors that we must evaluate when reviewing identified programmes.

Schedule A1

C24 The factors in Schedule A1 of the Capex IM are primarily concerned with the evaluation of a full base capex proposal, as part of an IPP reset. We have had regard to these factors and do not consider that there are any new matters raised in this listed project proposal that necessitate further analysis beyond what we undertook when we evaluated Transpower's base capex for RCP2 in 2014 (ie, beyond the matters considered in our evaluation against the criteria in Schedule A2).

Schedule A2

C25 Schedule A2 sets out the criteria for evaluating an identified project and states that in evaluating a base capex proposal, we will undertake a review of each identified programme, and such a review may include evaluation of at least the criteria set out in A2(a)-(j). We set out a summary of our evaluation against each criterion below.

(a) Whether policies regarding the need for the project and its priority demonstrate a risk-based approach consistent with good asset management practice

C26 We are satisfied that the relevant policies reflect good electrical industry practice (**GEIP**) and that Transpower applied them appropriately.

C27 Transpower's policy on managing transmission line conductors is outlined in document FS03 that Transpower supplied to us as part of its RCP2 proposal.[31] This document sets out the policy on replacing ageing conductors and specifies that:

> Conductor condition is assessed based on a combination of loss of section and loss of tensile strength. AAAC conductors are deemed to have reached replacement criteria at 15% loss of strength or section loss and at 10% for copper. For aluminium conductor with steel reinforcing (ACSR) conductors, the replacement criteria is set at 20% loss of tensile strength and 15% section loss. These values are generally in line with those used by other international utilities.[32]

C28 Conductor failure occurs when the conductor loading exceeds the tensile strength of the conductor causing the conductor to break. Transpower states that the replacement criteria for tensile strength are chosen to ensure there is sufficient strength in the conductor to meet the maximum design loads.[33]

C29 The conductors on this line are Aluminium Conductor Steel Reinforced conductors (**ACSR**), so the criteria for replacing ACSR conductors apply.[34] We did not evaluate whether the 20% loss of tensile strength and 15% section loss as set out in the above policy are appropriate values for replacement. Such reviews are performed as part of the IPP reset. Rather, we assessed whether the expected condition of the conductors met these requirements for replacement.

C30 Transpower used the following approaches to testing whether the conductors needed replacement:

C30.1 Cormon test.

C30.2 Close aerial survey.

C30.3 Accelerated corrosion test.

<u>Cormon test</u>

C31 The Cormon test is a sample based testing approach. The test uses a robotic device to self-propel along the conductor collecting data along the conductor. The results of the Cormon test are used to estimate the remaining thickness of coating on the steel core of the ACSR conductors and gauge the level of internal corrosion.

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31 The document is FS03 "TL conductors and insulators – Fleet Strategy", 16 October 2013.

32 Transpower, "FS03 TL conductors and insulators – Fleet Strategy", 16 October 2013, page 23.

33 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment A – Condition Assessment"; page 6.

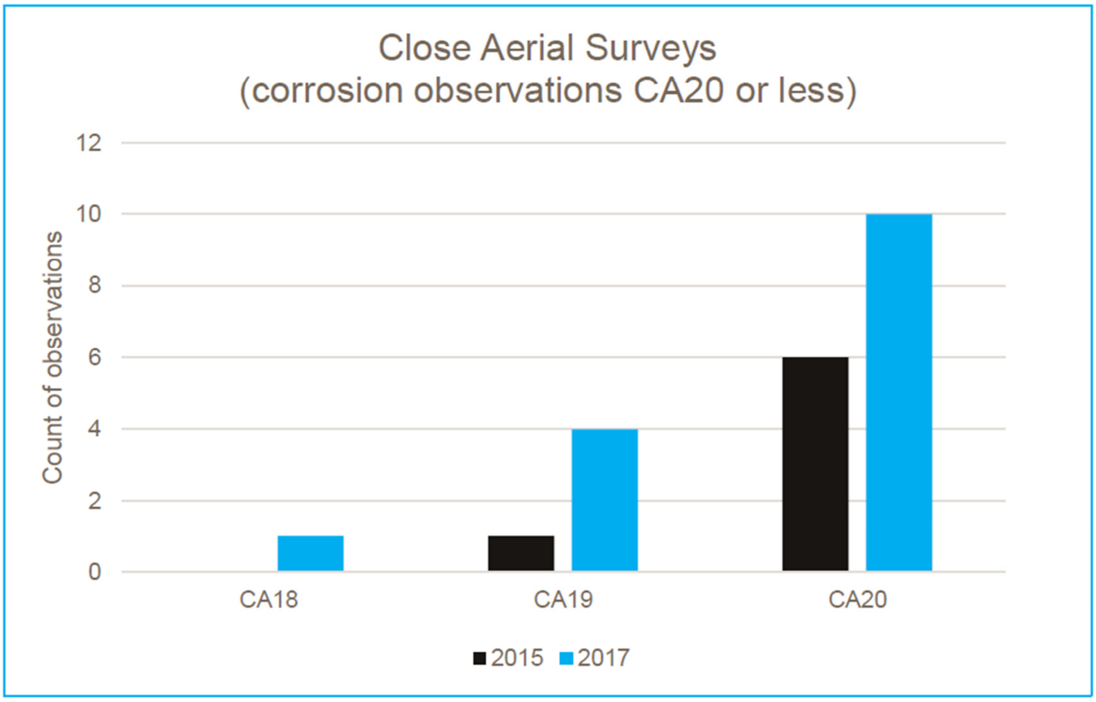
34 ACSR is a type of conductor used on overhead power lines.

C32 Transpower carried out a number of Cormon tests since 2006. The results of the Cormon test of two spans were presented in the application. We agree with Transpower that the results indicate that internal corrosion is occurring within the conductor.[35]

Close aerial survey

C33 The close aerial survey uses a helicopter to undertake an aerial survey of transmission lines. This method is used to identify conductor bulges, defects and markers.[36] Transpower has undertaken five close aerial surveys since 2012. The results were in Transpower's application and are replicated in Figure C1 below.[37]

Figure C1: Results of close aerial surveys in 2015 and 2017



C34 The above survey results show material increase in corrosion between 2015 and 2017, affirming that significant conductor deterioration is occurring. Between 2015 and 2017, the number of observations of CA20 or below doubled.[38,39]

35 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment A – Condition Assessment"; pages 9 - 11.

36 A marker is an area of conductor that shows signs of decolourisation and is an indicator of imminent conductor bulging due to internal corrosion.

37 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment A – Condition Assessment"; figure 4, page 11.

38 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment A – Condition Assessment"; figure 4, page 7.

Accelerated corrosion test

C35 Transpower performed accelerated corrosion tests on ex-service conductors to provide an indication of what happens as the conductor corrodes.[40] The results of the accelerated corrosion tests indicated that widespread corrosion of aluminium had started or was imminent.

Conclusion

C36 We are satisfied that Transpower's policy of timing replacement to when there is evidence of significant corrosion in the conductor reflects a risk-based approach and is consistent with GEIP.

C37 We are satisfied that Transpower has applied the policy satisfactorily, however, we acknowledge that there are uncertainties in assessing the condition of this type of conductor and the exact timing of replacement.

C38 We are also satisfied that the results of the above three assessment tests Transpower presented confirm that it is reasonable to replace the conductors within the timeframe Transpower proposes. We note that this section of the line is in a highly corrosive environment explaining the relatively short life of these conductors.

(b) Whether other relevant policies and planning standards were applied appropriately

C39 We are satisfied that Transpower applied other relevant policies appropriately.

C40 Policies on transmission line towers and transmission line foundations are two other main policies applicable to this project. In assessing the scope of this project, Transpower engaged Calibre New Zealand (**Calibre**) to scope the project in line with all policies on transmission lines.

C41 The study concluded that:

C41.1 14 towers require various degrees of strengthening;[41]

C41.2 one tower foundation may need to be strengthened; and[42]

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39 For Transmission line conductors Transpower uses a CA (condition assessment) scale from 100 (new) to 0. A CA score of 20 requires replacement.

40 The tests showed that aluminium corrosion rates increase significantly once galvanic corrosion (steel) is occurring. Aluminium corrosion further reduces the tensile strength of ACSR conductor since the tensile strength is provided by both the aluminium strands and the steel core. Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment A – Condition Assessment"; pages 5, 12-13.

41 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring"; Table 8.1, page 24.

C41.3 there are two ground clearance violations.[43]

C42 A further policy relevant to this project required Transpower to consider earth potential rise (**EPR**). Transpower engaged Mitton Consulting to investigate EPR.

C43 Mitton Consulting concluded that the risks associated with step and touch voltage hazards onto all affected towers are low. Also, risks associated with transferred voltages were considered low except at tower T59A, where the security fencing requires isolation. Stock fencing was also proposed as mitigation around towers T46A and T55.[44]

(c) Transpower's processes to determine the project's reasonableness and cost effectiveness including the use of cost-benefit studies

C44 When assessing the reasonableness and cost-effectiveness of a project, we assess whether the project delivers the right solution, at the right time and at the right cost. We are satisfied Transpower's proposed solution, to the extent possible, achieves this.

The right solution

C45 A project is more likely to deliver the 'right solution' if an appropriate number of feasible alternatives are considered. In paragraphs C49 to C53 below, we discuss Transpower's approach to considering alternatives. This process involved technical studies, consultation with the wider industry and using cost-benefit studies to select the proposed solution. We are satisfied that the process has helped ensure that Transpower will deliver the right solution.

The right time

C46 In order to deliver the project at the 'right time', Transpower used site specific data on the extent and the rate of deterioration of conductors, as discussed in paragraphs C30 to C38 above. We are satisfied this process has helped determine, to the extent possible, that the replacement is scheduled at the right time.

The right cost

C47 Transpower used a consultant to scope the project and estimate its costs. The consultant identified the scope and provided an estimate of cost using Transpower's

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42 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring"; page 27.

43 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring"; Table 7.2, page 13.

44 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring"; page 29.

costing database (TEES).[45] This process generally results in a reasonable estimate of costs because it is based on site investigations rather than a desktop study. We are satisfied that the process of estimating the costs is reasonable. We discuss our review of the estimated cost in paragraphs C69 to C71 below.

(d) Transpower's internal processes for challenging a need for an identified programme and the possible alternative solutions

C48 The main challenge for Transpower was to determine the optimal timing of this project because it had to prioritise a number of conductor replacement projects. Transpower determined the timing using the methodologies discussed above. We are satisfied with Transpower's approach and conclusions.

C49 We have reviewed the alternative solutions that Transpower considered and are satisfied that Transpower chose the appropriate solution.

C50 In its long list of consultation, Transpower consulted on options such as transmission alternatives, dismantling the line, building a new line, piecemeal replacement of sections and replacing the conductors.

C51 In assessing the long list of options, Transpower discounted some options immediately. Given the existing conductors are corroding and it is not good practice to leave them in service in their present condition, non-transmission solutions are not appropriate. Similarly, dismantling is not an option as this line is a key component of the HVDC link. Transpower then short-listed the following options for further studies and development:

C51.1 Replace with duplex ACSR/AC Moa @65^{o}C (like for like).

C51.2 Replace with duplex ACSR/AC Chukar @61^{o}C.

C51.3 Replace with triplex ACSR/AC Zebra @65^{o}C.

C51.4 Replace with duplex ACSR/AC Zebra @118^{o}C.

C51.5 Replace with triplex ACSR/AC Goat @80^{o}C.

C51.6 Replace with duplex AAAC Sulphur @81^{o}C.[46]

C52 Moa, Chukar, Zebra, Goat and Sulphur are types of conductors used for overhead power lines. The names reflect their manufacturer's specifications and material. The

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45 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring" (April 2018).

46 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment B – Options and Costing report"; Table 2, page 7.

temperature represents the maximum design temperature at which the conductors are to be operated.

C53 Based on a cost-benefit analysis and a technical feasibility assessment, Transpower evaluated the above options and selected reconductoring with duplex Moa.

Cost-benefit analysis

C54 The results of the cost-benefit analysis are summarised in Table C3.[47]

Table C3: Summary of cost-benefit studies

Option	Moa duplex	Sulphur duplex	Zebra duplex	Chukar duplex	Zebra triplex	Goat triplex
PV of cost ($m)	25.2	27.2	25.9	28.8	29.9	29.8
Capital cost ($m)	21.8	23.9	22.5	25.8	27.0	26.9
PV losses ($m)	2.5	3.2	4.7	2.3	3.2	4.1
Net benefit vs base case ($m)	-	-2.6	-2.9	-3.4	-5.3	-6.1
Transpower's ranking	1	2	3	4	5	6
Conductor Resistance ohms/km[48]	0.01726	0.02223	0.03232	0.01561	0.02155	0.02745
Short-term rating MW[49]	1008	944	<1000	1004	1006	<1000

C55 The economic test shows that the duplex Moa option will provide the highest net market benefits (and is also the least-cost option). Duplex Sulphur is the second most economic option. The existing conductor is also duplex Moa.

C56 We assessed the cost-benefit studies by reviewing the expected capital cost and losses of the options. Other elements that make up the present value (**PV**) of costs, such as timing of capex and associated operating expenditure, are similar for all options.

C57 A review of Transpower's costing showed that all options other than Moa would require significant strengthening of towers and their foundations. These would add

47 Transpower "Churton Park section of Oteranga Bay to Haywards A line reconductoring Listed project application" (May 2018); Table 1 page 16 and Table 5, page 20.

48 Transpower later revised some of these numbers in an email to us.

49 Transpower later revised some of these numbers in an email to us.

further cost and are the main reasons for the higher costs (in PV terms) of these options. [50]

C58 The expected energy losses also impact on the expected benefits of the different options. When assessing the reasonableness of relative losses, we compared the resistances of the investment options. Table C3 includes the resistance of each the different conductor options. We note that the expected benefits of each of the options are similar and low compared to the costs. The expected costs influence the ranking of options.

Technical feasibility assessment

C59 Cost-benefit analysis is not the only approach to selecting the preferred investment option. In addition, in order to not constrain the HVDC system, a short-term overload capacity of 1000 MW is required.[51] This consideration rules out Sulphur, duplex Zebra and Goat options, as shown in Table C3 above.

C60 We were concerned that the proposed investment is an ACSR conductor. Based on Transpower's experience, ACSR conductors have tended to deteriorate earlier than their expected lives in corrosive environments.[52]

C61 Sulphur AAAC conductors do not have a steel core so are less prone to corrosion and better suited to this environment.[53] We explored whether there were design solutions to accommodating this type of conductor.

C62 We asked Transpower to advise whether it had considered other design options for using the Sulphur conductor instead of Moa. Transpower's response is stated below:

> Transpower did not consider design options for reducing the short-term temperature rise as the investigation was not thought warranted when there was a conductor option available that met the short-term temperature rise. Additionally Sulphur has unquantifiable disadvantages in terms of property and environment risks from conductor movement exceeding that of our consents. This creates the risk that, even if the short-term temperature rise could be reduced, Sulphur could still be unsuitable and the investigation unnecessary.

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50 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment B – Options and Costing report"; Table 6, page 13.

51 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment B – Options and Costing report"; s2.2, page 8.

52 The conductors on this line were installed in 1991/92, giving them a service life of 28 years which is approximately half the expected life of ACSR conductors of 55 years. Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment A – condition assessment report"; page 8.

53 AAAC stands for 'All Aluminium Alloy conductors'

C63 Based on Transpower's response, we were satisfied that a Sulphur conductor was not suitable for this application because sulphur conductor blow-out (ie, sideways movement) would exceed the limits within the current consents. A technically feasible solution using sulphur conductors would have needed to mitigate these risks and would have thereby increased the cost of the project.

C64 Transpower's finding showed that premature deterioration of ACSR conductors generally occurs when grease is not applied properly during manufacturing ('grease holidays'). Transpower considers that improved manufacturing techniques and monitored grease application sufficiently mitigate any concerns regarding such grease holidays.

C65 Therefore, we support replacing the current conductors with ACSR Moa conductors on the basis that this is the most economic and technically feasible option.

(e) How grid outputs, key drivers, assumptions, and cost modelling were used to determine forecast capital expenditure

C66 Transpower engaged Calibre to prepare the scope of the project and estimate its costs. Calibre used desktop studies including TOWER models (a type of transmission line model) and site investigations to prepare the scope of works and Transpower's TEES database to estimate the capex of the project.

C67 In assessing Transpower's proposed cost, we were mindful of the assumptions Calibre used and the costing issues it faced, which were:

C67.1 TOWER models were not available for some types of towers.

C67.2 Some cost elements were not available in the TEES database as this database has to date been populated with very few HVDCspecific costs.

C67.3 Where matching cost elements were not available in TEES, Calibre estimated costs for these elements using the cost of nearest matching elements (where available).

C67.4 Calibre estimated the cost of risks in a series of workshops with Transpower.

C67.5 Calibre concluded that the cost of reconductoring this section of the line would be higher than a typical line because of short wiring runs, amount and complexity of enabling works, heavier conductor and insulation, urban environment and high level of resourcing.[54]

C68 We discuss our key findings on the cost estimate below.

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[54] Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring" (April 2018); pages 42-43.

(f) The capital costing methodology and formulation and the quantum of contingencies

C69 Calibre prepared the cost estimate using TEES, in conjunction with Transpower and its contractor Broadspectrum Limited (**Broadspectrum**).[55]

C70 We reviewed the cost options against the scope set out by Calibre.[56] We had a number of queries on some of the cost elements, which we discussed in a workshop with Transpower. We are satisfied our decision provides for a forecast expenditure that is appropriate to undertake this project.

C71 Accordingly, our decision is to approve capex of $23.5 million for this project. This amount excludes any additional HVDC reserve costs that Transpower may incur during construction.

(g) The effect of the forecast capital expenditure on other cost categories, including the relationship with operating expenditure

C72 All costs incurred for this project will be capitalised as per Transpower's practice, including the additional HVDC reserve costs due to construction outages. We are satisfied that these capex are unlikely to affect other cost categories, or opex, in RCP2.[57]

(h) Links with other projects or programmes, whether proposed or in progress

C73 Transpower has scheduled to deliver this project at the same time as it plans to replace the valves of Pole 2. While the two projects are separate and do not comprise scope for achieving any cost efficiencies, delivering them within the same outage window is least disruptive to the electricity market.

(i) Mechanisms for controlling actual capital expenditure with respect to the proposed base capex allowances and ensuring performance of proposed grid output targets

C74 The regulatory mechanism that incentivises Transpower to control capex is the 'base capex expenditure adjustment'.[58] This mechanism's intent is to share efficiency achievements between Transpower and its customers, and to allow Transpower to retain a portion of the savings it makes in delivering its capex.

C75 The critical grid output target is an optimal delivery of this project that minimises disruption to the HVDC transmission network to the greatest extent possible.

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55 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring" (April 2018); page 42.

56 Calibre "Solution Study report Oteranga Bay Haywards 350kV line Churton Park reconductoring" (April 2018); pages 9- 50.

57 Apart from the site investigations and Transpower overheads, other costs related to this project are not included in the base capex or opex allowances for RCP2.

58 Capex IM, clause B1.

Transpower considered a number of options for delivery and we discuss our views on these below.

(j) The efficiency of the proposed approach to procurement of associated goods and services

C76 Procurement includes procurement of material, engineering services and construction services. The main procurement issue for this project is the procurement of construction services and in particular, the strategy to deliver the works.

C77 This project requires an outage of at least one of the HVDC's poles for up to 14 weeks. Under wet South Island conditions, the outage could affect the efficiency of the electricity market. Transpower explored a range of options to minimise potential market impacts.

C78 When developing the project, Transpower explored the option of providing a full bypass during construction and concluded that a bypass line does not yield net benefits under most hydrological conditions. The estimated cost of a bypass line is $12 million and the expected benefits are $2.9 million.[59]

C79 We agree that a temporary bypass line is likely to be uneconomic. We also consider that the cost of building a line in a short timeframe could be disproportionally high because negotiating and obtaining easements in a short timeframe can be very expensive.

C80 As mentioned in paragraph C5, generator retailers were concerned with the expected market impact of this project and, during the pre-application consultation phase, asked Transpower to explore further options to reduce market impact risks.

C81 Transpower explored some additional options and concluded that the most economic option is to complete the works over January to April (the **proposed solution**).

C82 We support Transpower's plan to deliver the project according to the proposed solution.

C83 While Transpower used SDDP modelling (Stochastic Dual Dynamic Programming) in its economic analysis of the above options, we assessed the options qualitatively based on historical HVDC transfers, shown in Figure C2, and the characteristics of projects of this size and nature. Our intent was to assess whether the proposed delivery option is least cost, rather than testing Transpower's approach to costing the various options.

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59 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D – outage modelling report"; page 9.

C84 Table C4 below summarises all options Transpower has considered as well as our comments on these. It is followed by a more detailed analysis.

Table C4: Assessment of outage options

Transpower's options	Our comments
Complete the work in one summer over January to April	Agree that this is the most economic option.
Complete the work in one summer starting in December	Slightly more expensive to deliver. Potentially beneficial if December is a wet month. Feasibility depends on stakeholders' willingness to pay for the incremental cost associated with this option.
Split the work over two summers	This option is more expensive.
Reduce the duration of outages by using more resources	This option is more expensive and reduces outage duration only insignificantly.
Have a two week break between outages	This option is more expensive to deliver. Could be beneficial in wet or very wet summers. Easy to implement. Stakeholders could request this option if they are willing to pay for the extra cost of starting early and they accept the consequence of a delayed final completion of the project.
Partial pole bypass	Not feasible.
Delay the project depending on hydrology	Very expensive to delay a project that is already planned and resourced.

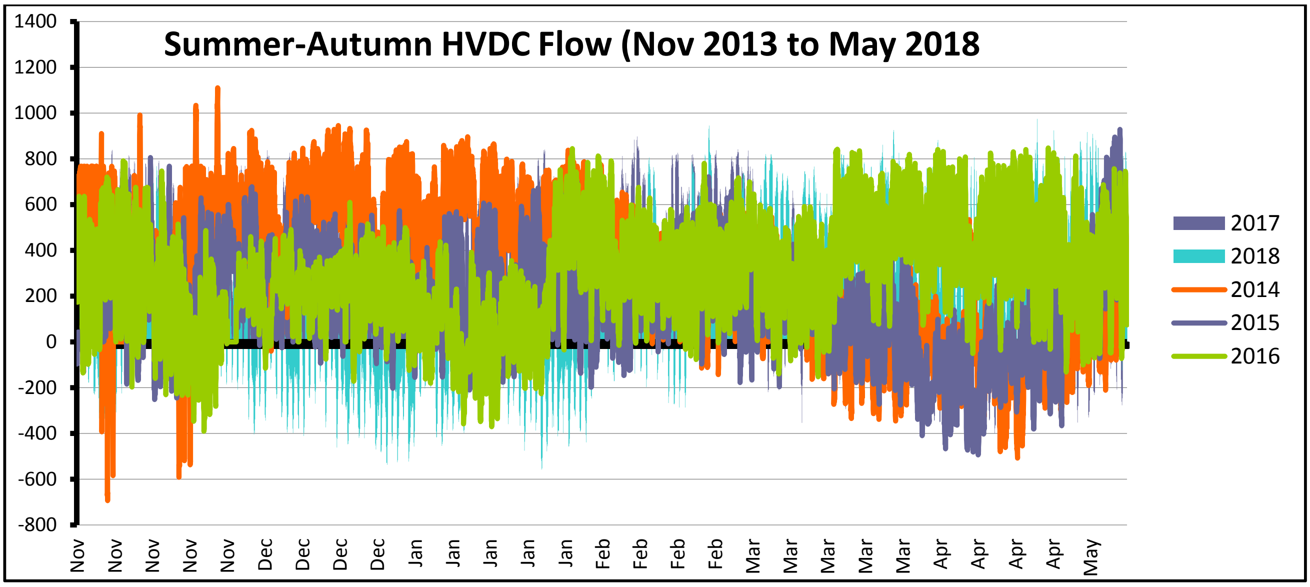
<u>Complete the work in one summer over January to April</u>

C85 Transpower's proposed solution is to deliver the project between January and April in 2020. This approach would require an outage of 14 weeks assuming average weather conditions. Transpower's studies concluded that this delivery option, on an economic basis, was the optimal time for construction.[60]

C86 We agree with this conclusion because the option minimises, and in some instances avoids, the additional costs that would accompany the other options Transpower considered – such as those due to weather related downtimes, splitting the delivery phase, deploying additional resources, and deferring part or the whole of the works. Based on these findings, we are satisfied that the proposed solution will yield the greatest economic benefit.

60 Calibre "OTAH-HAY 350 kV Churton Park Reconductoring Design Investigation and Constructability Appendix O - OTB-HAY A Reconductoring Constructability report", page 4.

Figure C2: Historical HVDC flow



Complete the work in one summer starting in December

C87 Mercury suggested that Transpower could bring the work forward and start in December for the work to be completed in March.

C88 Transpower concluded that the potential disadvantages from starting the project in December outweigh the advantages. In particular, works would have to start in early November with a view to completing phase one by the Christmas break, as otherwise one of the HVDC poles would be out of service over Christmas.

C89 Also, the crew would need to be mobilised twice and ongoing site monitoring and security would be required over the holiday period. Transpower estimated that the net benefits would reduce by $1.95 million due to the associated incremental costs.[61]

C90 Transpower subsequently advised us that it would need the time before Christmas to set up for wiring after Christmas in a safe manner. This would extend the outage time of one pole and add incremental costs.

Split the work over two summers

C91 Contact submitted that the work could be done over two summers.

61 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D – outage modelling report"; page 11.

C92 This option is not cost effective because of the need to mobilise and de-mobilise the project twice. Transpower advised that this option would require enabling and protective works to be re-established in the second year. We agree with this because the same access to property would be needed in both years, and there would be a similar level of disruption to property. Transpower estimated that this option would reduce the benefits by $1.3 million.[62]

C93 We also observe that there is no correlation between a particular month and HVDC transfer. For example, HVDC transfer could be low over January and February in one year, but high in the same months in another year.

C94 We agree with Transpower's assessment and further note that planning to deliver the work over two years would not necessarily provide any hydrological benefits.

Reduce the duration of outages by using more resources

C95 Meridian requested that Transpower consider reducing the duration of outage by hiring more linesmen.

C96 Transpower considered using two wiring crews and another crew for catenary support and scaffolding, and engaged Broadspectrum to compare this option with the proposed solution using two sets of crews.

C97 Broadspectrum concluded that using three wiring crews would reduce the outage by four days, but would add to the cost of the project.[63] Transpower estimated that this option would reduce the expected benefits by $1.8 million.[64]

C98 We agree with Broadspectrum's findings. We also note that this option is only available for the circuit supplying Pole 3 because the duration of the outage of the other circuit is determined by the Pole 2 VBE (Valve Based Electronics) replacement project.

Have a two week break between outages

C99 Another option stakeholders proposed is to pause the work for two weeks between the two outages.

C100 This option would allow South Island hydro storage to be released if the lakes are full. However, its disadvantage is that the wiring crew would need to be stood down

62 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D – outage modelling report"; page 12.

63 Calibre "OTAH-HAY 350 kV Churton Park Reconductoring Design Investigation and Constructability Appendix O - OTB-HAY A Reconductoring Constructability report", s4.2, pages 7-8.

64 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D – outage modelling report"; page 11.

for two weeks and the project would be completed two weeks later (both adding incremental costs to the project).

C101 Transpower's study showed that in wet and very wet years, the expected benefits of this option could exceed the expected additional costs (dispatch benefits).[65] However, under most hydrological scenarios, the net expected benefit is negative.

Partial pole bypass

C102 Stakeholders also suggested a partial bypass line as an option.

C103 Transpower states that the line route is such that reconductoring can be divided into three wiring sections. A bypass line could be constructed over one of these three wiring sections. Transpower has concluded that it is not practical to acquire property rights, and design and build a partial bypass line in the available timeframe.[66]

C104 We agree for the same reasons as those that apply to the full bypass line option set out in paragraph C79.

Delay the project depending on hydrology

C105 Stakeholders also asked Transpower to consider the option of making a decision to delay the work depending on hydrology.

C106 Transpower considered this option and advised that, although the project could be delayed, the Pole 2 VBE replacement cannot be delayed. This option therefore becomes similar to the option of delivering the project over two summers, except that there are significant additional costs that would result from stopping a project at short notice. Transpower estimated that this option would reduce the benefits by $2.7 million.

C107 We agree that this option is not cost effective with a net expected benefit of - $2.7 million.

Treatment of HVDC Reserve Costs

C108 As Transpower explained in its listed project application in more detail, as the HVDC asset owner, it has to pay its share of reserve costs. In business-as-usual situations (ie, both HDVC poles are in service), Transpower's exposure to high reserve costs is reduced because each pole can cover an outage of the other pole.

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65 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D – outage modelling report"; pages 12-13.

66 Transpower "Oteranga Bay to Haywards A line (Churton Park section) reconductoring Attachment D – outage modelling report"; page 14.

C109 Transpower explained in its application that:[67]

> When we are running a monopole, there is no self-coverage and all of the HVDC transfer is at risk. As a result, our allocation of the HVDC reserve costs will increase significantly as a result of undertaking this work.
>
> We intend to recover and capitalise the HVDC reserve costs as part of this project. However, the extent of these costs is heavily dependent on hydrological conditions. In wet years the flows on the HVDC are likely to be higher such that our allocation of the share of reserves will be higher. It is also likely less thermal generation plant will be operating which again is likely to increase our allocation of the total reserve costs. Our modelling suggests that reserve costs could be as low as $11 thousand or as large as $6 million with a 50th percentile of $1.9 million.

C110 With regards to treating these incremental HVDC reserve costs, Transpower suggested that:[68]

> Given the high level of dependence on hydrology associated with reserve costs that is beyond our control, we consider that they should not be considered within the incentive regime (i.e. Base Capex expenditure adjustment).
>
> This could be facilitated through use of the g term in Schedule B, Division 1 of the Capex IM.

C111 We agree. Our decision is that the incremental HVDC reserve costs will not be subject to the base capex incentives regime, as these costs are beyond Transpower's control.[69,70]

C112 Because we are required to determine a base capex allowance in respect of the yet-to-be-valued HVDC reserve costs, we have decided to add an estimate based on the P50 level of costs to the base capex allowance, and then to adjust this allowance in the base capex incentive mechanism through the 'g' factor in Schedule B, Division 1 of the Capex IM.

C113 The P50 HVDC reserve costs, including inflation and interest during construction, are shown in the table below:

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67 Transpower "Churton Park section of Oteranga Bay to Haywards A line reconductoring Listed project application" (May 2018); page 30.

68 Transpower "Churton Park section of Oteranga Bay to Haywards A line reconductoring Listed project application" (May 2018); page 34.

69 Transpower can only control reserve costs by restricting HVDC transfer capacity that can result in market inefficiencies. We discuss this further in paragraph C123.2.

70 Transpower advised us that the incremental HVDC reserve costs directly associated with this project will be attributed to capex as this is required by GAAP.

Table C5: Listed project reserve cost risk

Cost probability	P50 ($000)
Increased cost (real 2018$)	1,862
Inflation (CPI)	76
Interest during construction	46
Total contingency (2020$)	**1,983**

C114 The P50 costs of the listed project that are subject to the base capex incentive mechanisms are likely to change based on actual project costs and cost escalators. We will update the project cost of the base capex allowance when Transpower provides us with the details of actual costs at the conclusion of the project. We will scrutinise these costs with a view to ensure they only reflect incremental HVDC reserve costs that are directly attributable to this listed project.

C115 We note that inflation, as well as interest during construction of the project, has also been appropriately applied.

Effect on transmission charges

C116 Transpower estimated the annual incremental transmission charges resulting from its proposed investment (including the P50 estimate of reserve costs) will peak at $1.8 million in 2025 (in nominal terms).[71]

C117 Table C6 provides Transpower's estimate of how these incremental transmission charges will be allocated to HVDC customers.

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71 Transpower provides more information on this analysis in its listed project application. Transpower "Churton Park section of Oteranga Bay to Haywards A line reconductoring Listed project application" (May 2018); pages 35-37.

Table C6: Annual pro-rata increase in 2025 costs for HVDC customers ($)

HVDC customer	$ pa
Alpine Energy	2,156
Aurora Energy	10,173
Buller Electricity	13
Contact Energy	384,308
EA Networks (Electricity Ashburton)	0
Genesis Energy	101,032
Meridian Energy	1,256,410
PowerNet	12,642
TrustPower	31,633
Westpower	1,633
Total	**1,800,000**

Submissions on our draft decision

C118 As noted, we received two submissions on our draft decision, one from Meridian and the other from Transpower. [72,73] These are available on our website and we thank both submitters for engaging with our draft decision.[74]

C119 Transpower expressed support for our draft decision and commented on the approach of our evaluation and the challenges necessary for Transpower to further justify the application.

[72] Meridian "Meridian submission on reconductoring the Churton Park section of the Oteranga Bay to Haywards A line", 5 September 2018.

[73] Transpower "Listed Projects decision: Oteranga Bay - Haywards A lines" 5 September 2018.

[74] https://comcom.govt.nz/regulated-industries/electricity-lines/electricity-transmission/transpower-capital-investment-proposals/transpower-listed-projects/oteranga-bay-to-haywards-a-line-churton-park-section-reconductoring-listed-project

C120 Meridian stated that it is comfortable with our evaluation and the draft decision, but raised concerns relating to the incremental HVDC reserve costs. Meridian correctly noted that while the P50 estimate of increased reserve cost is $2 million, the cost could range from $11,000 to $6 million, and our draft decision would allow Transpower to recover the actual cost it incurs. Meridian believes that there are better ways of managing this cost, and submitted that:

C120.1 contrary to the apparent position of our draft decision, Transpower can influence the amount of HVDC reserve costs incurred, and that there are several options for doing this; and

C120.2 the most obvious of these other options – a bypass line – would eliminate additional reserve costs, and it did not appear that this benefit had been included in the economic assessment of the bypass line option.

C121 Transpower cross-submitted on Meridian’s submission and clarified that the reduced reserves cost were included in the cost-benefit studies for bypass line options.[75] Transpower likewise gave an update on the review of the classification of the HVDC risks as part of the System Operator’s review of the credible events risk setting framework.

C122 In its cross-submission, Transpower stated that reserves costs are a product of hydrology, system operation, and HVDC transfer capacity. Transpower stated that, as grid owner, it could only manage its exposure to reserves costs by making changes to the HVDC transfer capacity through its standing data on HVDC capability.

C123 We have considered the submissions and cross-submission on this matter, and have decided as follows:

C123.1 We confirm we are satisfied with the economic study for the bypass option. The expected cost of reserves is included in the economic assessment.[76] The bypass option does not eliminate the estimated $2 million of reserve costs entirely, so the NPV of the difference is $880,000.[77] A bypass line would only reduce reserve costs during the outage of the circuit supplying Pole 3. A bypass line would not reduce reserve costs during the outage of the circuit supplying Pole 2, because Pole 2 will be out of service for the scheduled VBE replacement.

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[75] Transpower “Listed Projects decision: Oteranga Bay - Haywards A lines”, 12 September 2018.

[76] Transpower Application, Attachment D – Table 1 shows all the cost elements included in the cost-benefit studies, and this includes the estimated reserve market costs of $2 million. Attachment D provides further details on the expected change in the reserve costs between the full bypass and base case options.

[77] In the cost-benefit analysis, we use the expected costs or expected benefits, rather than the maximum possible values.

C123.2 When making our draft decision, we considered whether we should subject the reserves costs to incentives. We decided against this because Transpower (as the asset owner) can control reserve costs by restricting HVDC transfer capacity. We were, and still are, concerned that restricting HVDC transfer capacity could lead to market inefficiencies. Our view remains that the efficiency of the market should not be unduly affected by this work, so Transpower should be fully reimbursed for the efficient costs it incurs in facilitating this outcome.