AER Information Request – PIAC RIT-T Dispute

North West Slopes NWSA and BOP.

16 September 2022

Background

On 1 August 2022, the Australian Energy Regulator (AER) received notice of dispute from the Public Interest Advocacy Centre (PIAC) about the following regulatory investment tests for transmission (RIT-T) undertaken by Transgrid:

- Maintaining Reliable Supply to the North West Slopes Area (NWSA); and
- Maintaining Reliable Supply to the Bathurst, Orange and Parkes Areas (BOP).

PIAC has raised the dispute under clause 5.16B of the National Electricity Rules (NER) on the grounds that it believes that Transgrid may have incorrectly applied the RIT-T in both the NWSA and the BOP Project Assessment Conclusions Reports (PACRs).

In accordance with clause 5.16B(d) of the NER, the AER is required to either reject the dispute or make and publish a determination on the dispute within 40 calendar days of receiving the dispute notice, unless the AER requests further information. This can be extended by up to 100 calendar days to account for the complexity or difficulty of the issues involved.

To assist its assessment of PIAC's notice of dispute, the AER is seeking responses and further information as detailed below. *Please identify any confidential information in your response and provide the reasons for claiming confidentiality.*

AER Questions

1.1. Reasonable scenarios

(i) Where ISP scenarios are not relevant, the RIT-T application guidelines provide further guidance regarding the development of reasonable scenarios. The guidelines expect RIT-T proponents to construct scenarios that are genuinely reasonable, in that they comprise of internally consistent parameters so that they can define a reasonable range of plausible states of the world.

Please explain the choice of variables (parameters) adopted in the scenarios in both the RIT-Ts in terms of why these variables are considered to be *internally consistent* such that the scenarios define a *reasonable range of plausible states of the world*.

The RIT-T assessments for BOP and NWSA both adopted three reasonable scenarios – a central, low and high scenario.

The **central scenario** represents Transgrid's best estimate of the key variables and parameters that may influence the selection of a preferred option. Each of these key variables and parameters are then changed at the same time to create an upper bound of plausible benefits (the **high benefits** scenario) and a lower bound of plausible benefits (the **low benefits** scenario).

Changing a combination of factors simultaneously within a scenario facilitates a strong stress test of the RIT-T outcome against an upper and lower bound of plausible outcomes. We therefore consider that the scenarios reflect a *reasonable range* of plausible states of the world.

While the central scenario incorporates the best estimate of each parameter, the true value for each parameter in the future could be higher or lower than the best estimate. This is the rationale for considering both high and low outcomes for each variable. We adopted a symmetric approach to developing the high and low scenarios for each variable included in the scenario, unless there is a specific reason to differ.

We have been engaging with our Transgrid Advisory Committee (TAC) on the general approach to constructing reasonable scenarios for non-ISP RIT-Ts where wholesale market benefits are not a key driver of the RIT-T outcome. The TAC has endorsed a default approach of using central, high and low scenarios, as described above (and as has been adopted for the BOP and NWSA), noting that the parameter values adopted for the high and low scenarios and the weightings given to these two scenarios should be consistent with these scenarios being upper and lower bounds of plausible outcomes.

We considered the combinations of parameters included in each scenario to be genuinely reasonable, whilst being at either the 'high' or 'low' end of plausible values for that parameter. For some parameters (eg, VCR), the high and low values represent the uncertainty in relation to the true value of the underlying parameter. For others, the value of the parameter will be driven by external factors (eg, economic growth). However, it is plausible to consider that the value of the parameters selected for the BOP and NWSA RIT-Ts could occur in the same state of the world (eg, recent experience of simultaneously low discount rates and high cost escalation for the delivery of infrastructure) – ie, each scenario reflects a *plausible state of the world*.

(ii) The RIT-T instrument requires that RIT-T proponents must form reasonable scenarios consistently with the requirements set out in the RIT–T instrument. Please explain how Transgrid has complied with these requirements, in developing reasonable scenarios for NWSA and BOP RIT-Ts, including with reference to paragraph 22 (j) of the RIT-T instrument.

Paragraph 22 (j) of the RIT-T instrument states that reasonable scenarios mean a set of variables that are not expected to change across each of the credible options or the base case, and also states that they may include a range of variables or parameters, as appropriate to the credible option under consideration.

The following parameters included in paragraph 22(j) were reflected in the scenarios used in the BOP and NWSA PACRs:

(a) a reasonable forecast of electricity demand reflecting assumptions regarding economic growth and climatic patterns – noting that spot load growth (as a result of economic conditions) is the most relevant element of demand growth for these RIT-Ts;

(f) reasonable forecasts of the value of electricity to consumers;

(g) discount rate (the lower boundary should be the regulated cost of capital).

In addition, the wholesale market benefits included in the scenarios reflected the inclusion of the following parameters listed in paragraph 22(j): (b),(c),(e), (h),(i),(i) and (j).

Further, paragraph 23 of the RIT-T instrument requires that where the identified need is reliability corrective action, the choice of reasonable scenarios must reflect any variables or parameters that are likely to affect the ranking of the credible options. On this basis we also determined that inclusion

of variations in the capital costs of network and non-network investments were appropriate parameters to include in the scenarios.

(iii) Please explain why the scenario weights in the PACRs have adopted the ISP scenario weights given the PACRs do not adopt the ISP scenarios and the PACRs acknowledge that market benefits, that use the ISP inputs and assumptions, reflect a small component of the estimated gross benefits and do not affect the ranking of the credible options.

In the BOP and NWSA PADRs a 50 per cent weighting was given to the (most likely) central scenario, with 25 per cent being given to each of the (less likely) high and low scenarios. This was consistent with the approach taken more generally (by Transgrid and other NSPs) to weighting high and low scenarios relative to the (more likely) central scenario.

For the PACRs, we followed the ISP scenario weightings for the associated ISP scenario used for the wholesale market modelling in each scenario. This is consistent with the remainder of the market modelling process which followed the IASR and ISP inputs wherever relevant. The ISP weights were adopted, in part, because we considered stakeholders may expect these weights to be used, given the PACR modelling used the ISP scenarios (the PADR modelling had only adopted the ISP central scenario).

Notwithstanding the decision to use the ISP weights in the main analysis reported in the PACR, we also reported the results of the NPV analysis assuming:[1]

- the same weights as used in the PADR (ie, 25:50:25); and
- changing the weights to 90 per cent central, 5 per cent high and 5 per cent low (in response to the concerns raised by PIAC in its submissions to the PADRs around the high and low scenarios being given too high a weight in the PADR).

(iv) Please confirm and explain the basis for including some of the estimated spot loads assumed to be 'anticipated' in all reasonable scenarios in the NWSA and BOP PACRs.

The 'low' scenarios for both BOP and NWSA incorporated 'anticipated' spot loads as follows:

- For BOP: [redacted] of anticipated spot load ([redacted] of total load included in this scenario)
- For NWSA: [redacted] of anticipated spot load [redacted] of total load included in this scenario)

The anticipated spot load was included in the low scenario in each case as we judged it to have a high probability of occurring, and in light of there also being several other spot loads and of being a low-end forecast for that anticipated spot load:

- In the case of BOP, the anticipated load in the low scenario is related to a portion of the [redacted] There are two other anticipated spot loads in the area ([redacted]), which make approximately [redacted] of the total load for the central scenario and are not included in the low.

[1] See sections 7.5.3 and 7.5.4 of the North West Slopes and BOP PACRs, respectively.

- In the case of North West Slopes, the anticipated spot load reflects [redacted]. It also excludes the other three anticipated spot loads in the area, which are included in the central scenario[2].

1.2. Estimated network capital costs

(i) The NWSA and BOP PACRs indicate there is a material degree of uncertainty in the costs of the credible options. Please confirm whether the estimated costs of the credible options reflect the probability weighted present value of the direct costs of the credible options, under a range of different cost assumptions and provide details of any methodology adopted, and if so, please set out the assumptions and method adopted.

Transgrid's cost estimates for credible options are prepared in accordance with the Augex overview paper submitted with our Revenue Proposal. For reference, sections 7.6 to 7.8 have been extracted and attached (refer "Augex Overview Paper extract.pdf")

In summary, the cost estimates are develop using the MTWO cost estimating system. All estimates in MTWO are to be developed to deliver a "P50" portfolio value for a total program of works (ie: there is an equal likelihood of over or underspending the estimate total). In accordance with industry best practice the cost estimate consists of a base estimate and a P50 allowances lump sum. For an Option Feasibility Studies (OFS) cost estimate the level of scope development and maturity of design inputs results in a cost estimate with an accuracy of +/-25%. This is consistent with our Prescribed Capital Investment Process, which has been provided as an attachment "Prescribed Network Capital Investment Process.pdf".

An accuracy of +/-25% is consistent with industry best practice and aligned with the accuracy range of a Class 4 Estimate defined in the AACE International (Association for the Cost Engineering) classification system.

Also provided is an extract from Cost Estimation initiation and inputs work instruction, "Confidential Cost Estimation Initiation and Inputs Work Instruction Appendix A and B.pdf", which covers our approach to costing for our Option Feasibility Study (OFS) documents.

(ii) Please provide details on the underlying methodology and assumptions used in determining the network capital cost assumptions for credible options in both BOP and NWSA PACRs, including the identification, magnitude and method for estimating any risk allowances or cost contingencies and any biodiversity offset costs.

Please refer to the answer to the question (i) above for the underlying methodology and assumptions.

Attached with this response are the following project specific files that contains the detailed breakdowns of the costs for all components of the network options, along with the scope allowances associated with the options:

> "NWSA network cost and assumptions-Confidential.zip"

> "BOP network cost and assumptions-Confidential.zip".

(iii) Please confirm whether the cost estimates for the network component exclude the escalation of any forecast materials costs and any other known costs and if these costs have been omitted from the analysis, please advise on the materiality of these costs in terms of credible option ranking for each scenario.

[2] There is no high demand forecast for NW Slopes: the central demand forecast is used in the central and high scenarios.

Our cost estimates were prepared in Real $2020-21 based on the information and pricing history available at the time which were incorporated into the PACR analysis. The analysis was performed in Real $2020-21 and the cost estimates did not include or forecast any real cost escalation for materials.

(iv) Please provide an NPV sensitivity analysis (updated NPV cash flow model) demonstrating the increase in estimated network of the preferred option that would be necessary to change the ranking of the credible options in the NWSA and BOP PACRs.

BOP

The ranking of the options in the BOP PACR is summarised in Table 1.

Table 1 – Ranking of options in BOP PACR

Rank	Option
1	Options 7A – 7E
2	Option 3
3	Option 4
4	Option 1C
5	Other network options

The preferred option in the BOP PACR (ie, Options 7A – 7E)[3] is a non-network solution in Stage 1 combined with a 132 kV line from Wellington to Parkes in Stage 2.

The highest ranked network-only option (Option 3) includes the same 132 kV Wellington-Parkes line component. Other components of Option 3 are also common to other credible options.

Further, some of the preferred option variants contain other network elements, which are also components of other credible options.[4]

Table 2 sets out the network components of Options 7A – 7E and Option 3 (the highest ranked network-only option) and identifies the other credible options that include those same components.

Table 2 – Network components of preferred option (7A-7E) and highest ranked network only option (Option 3), BOP PACR

Components	Relevant options
SVC at Panorama 132 kV (30 MVA)	**Option 3, stage 1** Option 4, stage 1
Syncons at Parkes 132 kV (2 * 25 MVA)	**Option 3, stage 1** Option 4, stage 1 **Option 7C, stage 1**
Syncon at Parkes (25 MVAr)	Option 5, stage 1 Option 6, stage 1 **Option 7E, stage 1**
Wellington to Parkes 132 kV line	**Option 3, stage 2** Option 5, stage 2

[3] The options 7A-7E differ in terms of the non-network solution adopted in the first stage, and these options are collectively identified as the 'preferred option' in the PACR, with the option ultimately progressed to be determined by the outcome of further discussions and commercial negotiations with the non-network proponents.

[4] Option 7C and Option 7E also include other network components in Stage 1, as set out in section 4 of the PACR and in Table 2, below.

Components	Relevant options
	Options 7A - 7E, stage 2

For each of the components listed in Table 2, the timing of investment is the same under each option where that component is used.

For this sensitivity we have therefore updated the NPV model to enable the costs of all or some of the network components of Options 7A – 7E and Option 3 to be varied.

Key outcomes of this sensitivity analysis for BOP:

In relation to the preferred option (Options 7A-7E):

- An increase in the costs of the Wellington to Parkes 132 kV line component affects Options 7A – 7E and Option 3 equally. Therefore, the rankings of Options 7A – 7E and Option 3 would not change following an increase in the costs of the Wellington to Parkes line.
- There is no realistic increase in the costs of the network components of Options 7A – 7E that would make any of the network only options preferred over Options 7A – 7E.[5]

In relation to the preferred network only option (Option 3):

- An increase of more than 30 per cent (or $35.8 million) in the cost of the Wellington to Parkes 132 kV line component would be required to change the ranking of the credible network only options (ie, to make Option 4 preferred over Option 3).
- An increase of more than 25 per cent (or $52.0 million) in the total cost of Option 3 would be required to change the ranking of the credible network only options (to make Option 1C preferred over Option 3).
- In both cases, Option 7A-7E remains preferred to a network only option because of the benefit of avoiding USE sooner for options that have a non-network component. The attached "BOP model question 2 iv" allows the user to investigate the effect of a change to the capital costs of any of the network components of the preferred options (as set out in Table 2, above). Instructions are contained at the top of the interface and results tab, and results can be viewed on this tab as well.

North West Slopes

The ranking of the options in the North West Slopes PACR is summarised in Table 3.

Table 3 – Ranking of options in North West Slopes PACR

Rank	Option
1	Options 5B and 5C
2	Option 3A
3	Option 5A
3	Options 1A, 1B, 3B and 3C
5	Options 2A-2D

[5] If the capital costs of the network components of Option 7C were to increase by more than 240 per cent, then Option 1C would be ranked above Option 7C. It would require a much greater increase in the network costs of Option 7A, 7B, 7D and 7E for any network only option to be preferred.

The preferred option identified in the PACR is a non-network solution involving a BESS at Gunnedah and the installation of a third transformer at Narrabri in the near-term. It also involves the rebuilding of the existing 969 line as a double circuit between Tamworth and Gunnedah and upgrading the 9UH line between Narrabri and Boggabri North over the longer-term, depending on outturn demand forecasts.

Option 5B and Option 5C were found to be effectively ranked equally as the preferred option. However, third party non-network proponents for options involving BESS (ie, Options 5A – 5C)[6] will be invited to participate in further discussions and commercial negotiations, which will in turn inform the proponent that will be offered a network support contract.

The highest ranked network-only option (Option 3A) includes the same rebuild of the existing 969 line as a double circuit and upgrade to the 9UH line. Other components of Option 3A are also common to other credible options.

Table 4 sets out the network components of Options 5A-5C and Option 3A and identifies the other credible options that include those same components.[7]

Table 4 – Network components of Options 5A-5C and Option 3A, North West Slopes PACR

Components	Relevant options	Timing
Third Narrabri transformer	**All credible options**	**2025/26**
Rebuild 969 line as a double circuit	**Option 3A, stage 1**	**2025/26**
	Options 3B and 3C, stage 1	2025/26
	Option 5A-5C, stage 2	**2029/30**
Upgrade 9UH line	**Option 3A, stage 1**	**2027/28**
	Option 1A, stage 1	2028/29
	Option 1B, stage 1	2026/27
	Option 3B, stage 1	2027/28
	Options 5A-5C, stage 2	**2029/30**
60 MVAr SVC at Narrabri	**Option 3A, stage 2**	**2029/30**
	Option 1A, stage 2	2029/30

For this sensitivity we have therefore updated the NPV model to enable the costs of all or some of the network components of Options 5A – 5C and Option 3A to be varied.

The analysis of key outcomes below assumes that if the costs of a component change for one option, then the costs of the same component in another option will change even if the timing differs. However, the attached model "NW Slopes model question 2 iv" enables the user to investigate the effect of different changes in the costs of a component based on the timing of that component.

Key outcomes of this sensitivity analysis for North West Slopes:

In relation to the highest ranked options (Options 5B and 5C):

6 The options 5A-5C differ in terms of the non-network solution adopted in the first stage, with the option ultimately progressed to be determined by the outcome of further discussions and commercial negotiations with the non-network proponents.

7 Options 2A-2D have been excluded for simplicity.

- All network components of Options 5A – 5C are shared with Option 3A. Therefore, if the costs of those components change, then the rankings between Options 5A – 5C and Option 3A will not change.
- An increase of more than 213 per cent increase in the costs of the network components of Option 5C would make Option 1B preferred over Option 5C.
- An increase of more than 295 per cent increase in the costs of the network components of Option 5B would make Option 1B preferred over Option 5B.

In relation to the preferred network only option (Option 3A):

- An increase of more than 25 per cent (or $35.6 million) in the cost of all network components of Option 3A would be required to change the ranking of the credible network only options (ie, to make Option 1B preferred over Option 3A).
- In this case, Option 5B and Option 5C remain preferred to a network only option because of the benefit of avoiding USE sooner for options that have a non-network component.

The attached "NW Slopes model question 2 iv" allows the user to investigate the effect of a change to the capital costs of any network components for preferred options (as set out in Table 4, above). Instructions are contained at the top of the 'Interface and results' tab, and results can be viewed on this tab as well.

(v) Please provide an NPV sensitivity analysis (updated NPV cash flow model) for a 25 per cent increase in estimated network costs of the credible options, excluding anticipated spot loads in each scenario (where low and high scenarios are adjusted to remove the impact of the change in network and non-network capital costs) in the NWSA and BOP PACRs.

As discussed within the answers of section 1.1, Transgrid has used its reasonable judgement for the inclusion of the various anticipated loads within the low, central and high scenarios for the BOP and NWSA projects.

The following sensitivity analysis addresses the outcome for the removal of all anticipated loads in all scenarios and the requested increase in estimated network costs of the credible options.

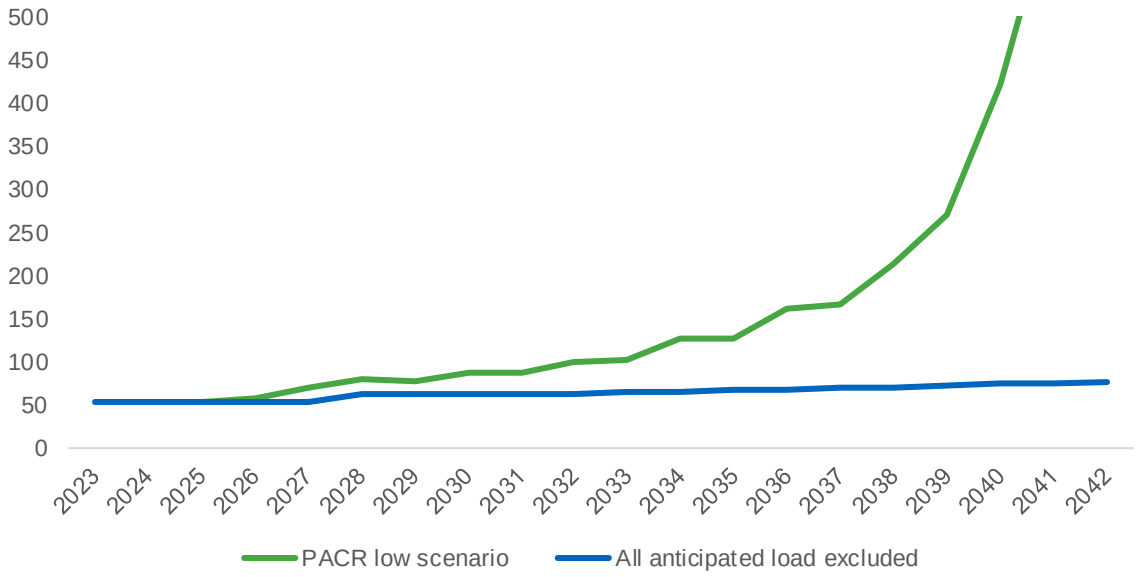
BOP

We have assessed the impact of a 25 per cent increase in estimated network costs using:

- a demand forecast that excludes all anticipated load in all scenarios; and
- the low demand forecast and the series of investments applicable to the low demand scenario in the PACR for each of the three scenarios.

The low demand scenario for BOP does include some anticipated spot load development. Figure 1 presents the difference between the BOP low demand scenario unserved energy forecast and a demand forecast that includes no anticipated load.

Figure 1 – Comparison of no anticipated demand and BOP PACR low scenario unserved energy forecast (MWh)



For this sensitivity we have assumed that all avoided unserved energy is included in the analysis. In the PACR, avoided unserved energy was zeroed out after 2027/28 to make the central, high and weighted results more readable. That approach does not affect the option rankings and is consistent with previous AER advice.[8] When anticipated spot loads are excluded, it is no longer necessary to zero out the unserved energy to make the results more readable. However, we have also presented the results continuing to zero out all avoided unserved energy in Figure 3 and Figure 5, below – for consistency with the PACR.

All anticipated load excluded

Figure 2 presents the results with the following changes relative to the core results:

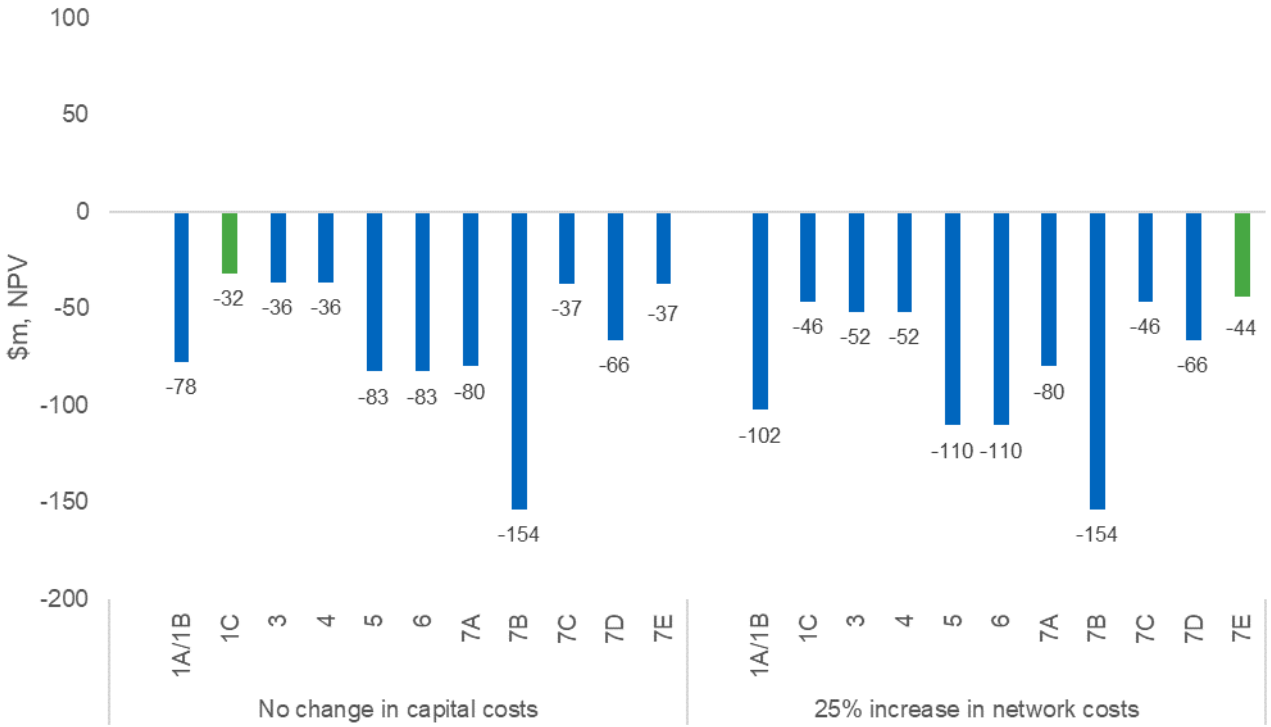
- removed the capital cost variation between scenarios for network and non-network components:
- the central capital cost estimate is used in each scenario (and then varied by 25% to generate the right hand side of Figure 2 and Figure 3 below);
- demand forecast with all anticipated load excluded in each scenario; and
- applied the series of investments and commissioning dates applicable for this level of load, which is identical to that used in the low demand scenario from the PACR.

We note that stage 2 of the non-network option (ie, Options 7A-7E) and stage 2 of Option 3 would not be commissioned under this sensitivity due to the exclusion of anticipated load in all scenarios – in both cases stage 2 is the 132kV line from Wellington to Parkes.

Figure 2 compares the weighted NPV results for this sensitivity with and without a 25 per cent increase in the estimated network costs of the credible options.

[8] See discussion on this point in the BOP PACR, section 6.1 and NW Slopes PACR, section 6.1.

Figure 2 – BOP weighted NPV results all anticipated demand excluded with and without 25 per cent increase in network costs, sensitivity 2(v)



The LHS of Figure 1 shows that the removal of all anticipated spot loads has a significant effect on the results relative to the results presented in the core model for the PACR. The weighted NPV of all options falls substantially, and all options are expected to deliver net costs.

The 25% increase in network capital costs has a much smaller effect compared to the effect of removing the anticipated spot loads included.

Without the 25 per cent increase in capital costs, Option 1C becomes the preferred option as a result of removing anticipated spot loads, delivering a weighted NPV of -$31.8 million. Option 3, Option 4, Option 7C and Option 7E are all projected to deliver $36 million to $37 million in net costs.

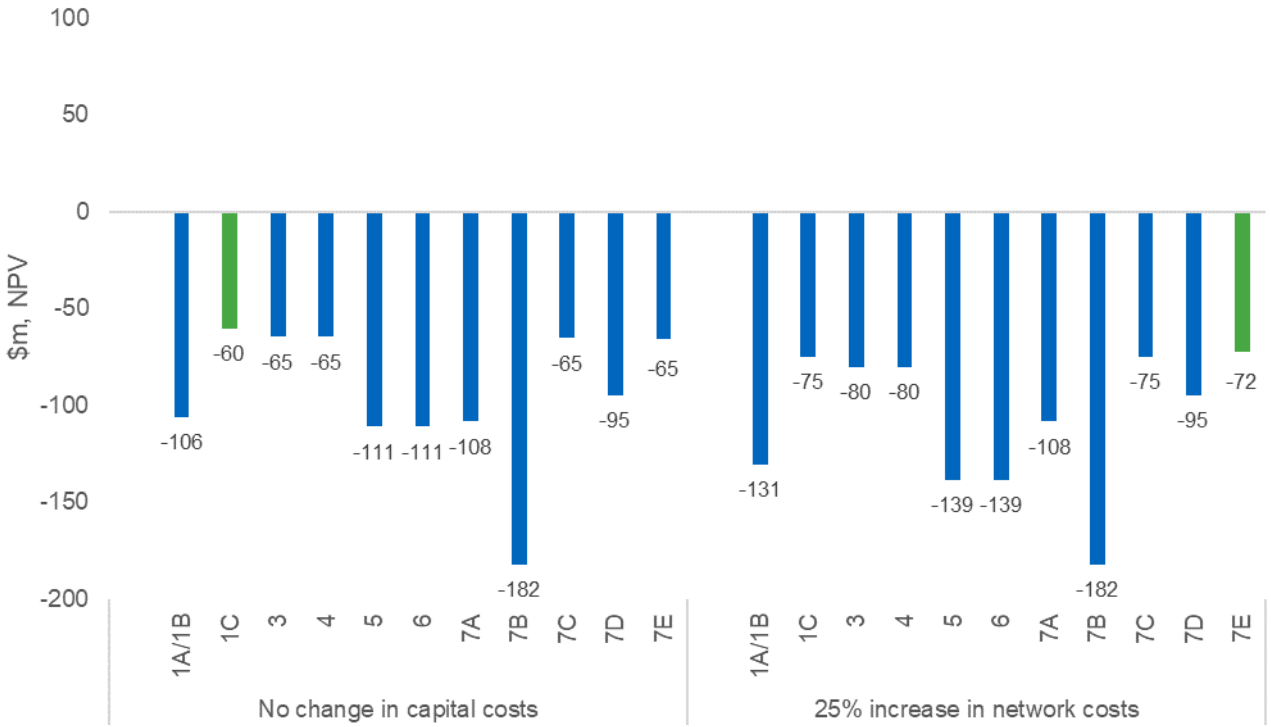
The 25 per cent increase in network costs has a greater effect on the network options (including Option 1C, Option 3 and Option 4) compared to the options involving NNO (ie, 7A-7E) because the former are comprised exclusively of network components. In this case, Option 7E becomes the preferred option with an expected net cost of $44 million.

With and without the 25 per cent increase in capital costs, Option 7E, Option 7C and Option 1C are ranked within $6 million of each other.

Charts and tables for all scenarios in this sensitivity can be found in the attached "BOP model question 2 v no anticipated load". The differences between scenarios in this case solely reflect differences in the discount rate, VCR and market modelling inputs and assumptions.

Figure 3 shows the weighted NPV results for this sensitivity where avoided unserved energy remains zeroed out after 2027/28. As noted above, this was done in the PACR to make the results of the central and high scenarios readable. Transgrid considers this approach to be less relevant for this sensitivity, but has provided this information for completeness.

Figure 3 – BOP weighted NPV results all anticipated demand excluded with and without 25 per cent increase in network costs, sensitivity 2(v), avoided unserved energy zeroed out after 2027/28



PACR low demand forecast

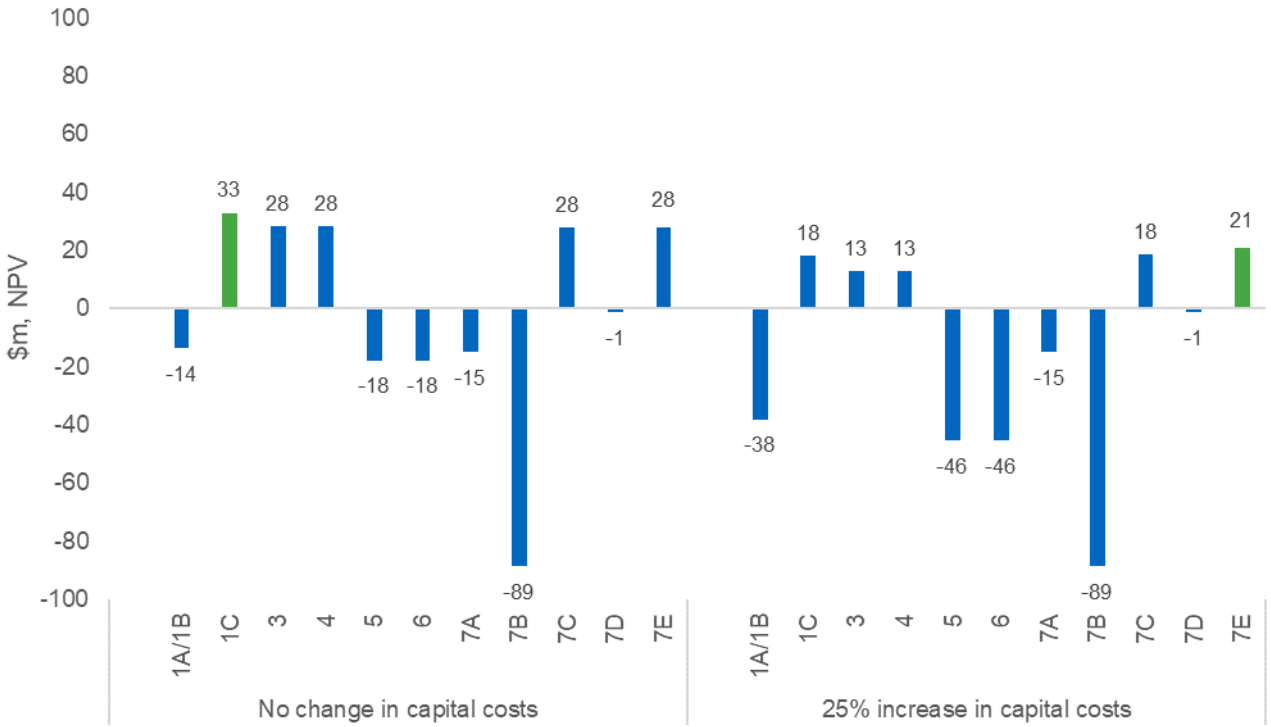
Figure 4 presents the results with the following changes relative to the core results:

- removed the capital cost variation between scenarios for network and non-network components:
- the central capital cost estimate is used in each scenario (and then varied by 25% to generate the second sensitivity below);
- low demand forecast used in each scenario; and
- applied the series of investments and commissioning dates applicable under the low demand forecast in the PACR.

We note that stage 2 of the non-network option (ie, Options 7A-7E) and stage 2 of Option 3 would not be commissioned under this sensitivity as a result of the low demand scenario being assumed in all scenarios – in both cases stage 2 is the 132kV line from Wellington to Parkes.

Figure 4 compares the weighted NPV results for this sensitivity with and without a 25 per cent increase in the estimated network costs of the credible options.

Figure 4 – BOP weighted NPV results based on low demand scenario and with and without 25 per cent increase in network costs, sensitivity 2(v)



The LHS of Figure 1 shows that the focus on the low demand scenario in the PACR has a significant effect on the results relative to the results presented in the core model for the PACR. The weighted NPV of all options falls substantially.

The 25% increase in network capital costs has a much smaller effect compared to the effect of reducing the amount of anticipated spot loads included.

Without the 25 per cent increase in capital costs, Option 1C becomes the preferred option as a result of assuming the low demand scenario, delivering a weighted NPV of $32.8 million. Option 3, Option 4, Option 7C and Option 7E are all projected to deliver approximately $28 million in net benefits.

The 25 per cent increase in network costs has a greater effect on the network options (including Option 1C, Option 3 and Option 4) compared to the options involving NNO (ie, 7A-7E) because the former are comprised exclusively of network components. In this case, Option 7E becomes the preferred option with a weighted NPV of $20.9 million.

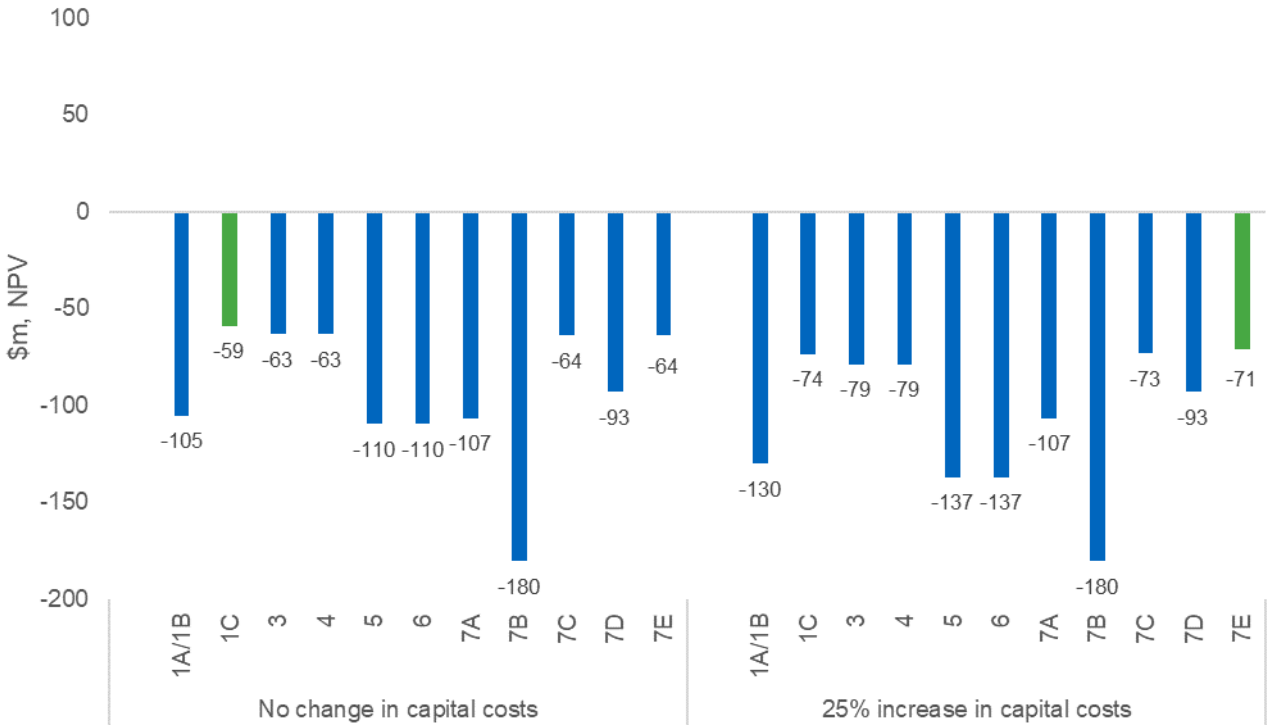
With and without the 25 per cent increase in capital costs, Option 7E, Option 7C and Option 1C are ranked within $5 million of each other.

Regardless of whether the network capital costs are 25 per cent higher or in line with core estimates, Option 7E has a positive NPV in the central and high scenarios and a negative NPV in the low scenario.

Charts and tables for all scenarios in this sensitivity can be found in the attached "BOP model question 2 v low demand". The differences between scenarios in this case solely reflect differences in the discount rate, VCR and market modelling inputs and assumptions.

Figure 5 shows the weighted NPV results for this sensitivity where avoided unserved energy remains zeroed out after 2027/28. As noted above, this was done in the PACR to make the results of the central and high scenarios readable. Transgrid considers this approach to be less relevant for this sensitivity, but has provided this information for completeness.

Figure 5 - BOP weighted NPV results based on low demand scenario and with and without 25 per cent increase in network costs, sensitivity 2(v), no avoided unserved energy after 2027/28



North West Slopes

In all scenarios, the removal of anticipated spot loads means that investments would not be required. Therefore, investment would not proceed in any of the reasonable scenarios regardless of a change in capital costs.

1.3. Demand forecasts

(i) Please provide the base case forecast demand profile for each scenario by its components (i.e. underlying demand and each spot load used in the BOP and NWSA PACRs).

Please refer to the following attached spreadsheets:

- "NWSA PACR forecast load-Confidential.xlsx"
- "BOP PACR demand profiles_Central Scenario-Confidential.xlsx" – Refer to the explanation for different load scenarios values, provided on each load tab for each load.

(ii) Please provide details regarding the methodology applied to estimate the demand forecasts for the BOP and NWSA PACRs (e.g., how the initial demand forecasts for the underlying demand and additional spot loads were derived and whether any growth adjustments were made to these initial demand forecasts over the modelling period, including the reasons for the adjustments). If relevant, please explain the basis of any growth adjustments to the spot loads over the modelling period and the impact on this assumption on the conclusions in the PACRs.

For the NWSA:

The analysis to determine an estimated demand forecast used one years' half hour historical load data from 2019 for the Narrabri, Gunnedah and Boggabri area loads as a base to scale to the load forecast. These were then scaled based on the following:

- The Essential Energy base forecasts as seen in Transgrid's 2022 Transmission Annual Planning Report, with the new or additional spot loads removed, were used for the base growth in each of the years, with spot loads added on based on their inclusion in any scenario against each of the next 20 years. This data can be seen in the "NWSA PACR forecast load-Confidential.xlsx" file under the "Loads and forecast components" sheet. The Narrabri and Gunnedah loads were scaled for every year based on these forecast load growths, then summated with the Boggabri area loads.

  Through scaling of the forecasts based on the historical loads, we reduced the overall load added in for the yearly profiles, as these industrial types of spot loads typically have a much flatter profile closer to its maximum load, but instead have been reduced through this conservative scaling method.

- An approximate years' model of the 110 MW Gunnedah East Solar Farm was then incorporated into the analysis to reduce the demand by subtracting it from the summated loads, to estimate what the yearly profile for the demand in the NWSA could be expected. The maximum expected demand based on those yearly scaled data formed the demand forecasts. The results can be seen in the "NWSA PACR forecast load-Confidential.xlsx" file under the "PACR NWSA demand forecast" sheet.

Through using this methodology, the overall expected unserved energy (EUE) was reduced, providing a more conservative estimate of risk to the network.

For BOP:

Please refer to the attachment:

- "BOP PACR demand profiles_Central Scenario-Confidential.xlsx" – Refer to the explanation for different load scenarios values, provided on each load tab for each load.

(iii) Please explain the method used for removing the Gunnedah East Solar Farm from the demand forecasts and whether this adjustment is material to the ranking of the credible options.

The methodology for incorporating the Gunnedah East Solar Farm into the analysis was a literal subtraction of a yearly profile for the solar farm based on a scaled version of the existing [redacted]. This ensured a more accurate adjustment of the scaled load data as discussed in the previous question (ii) above.

If the Gunnedah East Solar farm was not subtracted from the forecast, the overall demand for the project would be much larger, with EUE increased substantially. This would have increased the required levels of support required for the non-network solutions, increasing the overall size of the required solutions. This may have an influence on the rankings between the credible options as it may increase the size and therefore cost of the non-network options.

(iv) Please provide details on whether the following projects identified in the BOP and NWSA PACRs meet the definition of *committed* or *anticipated projects* by reference to each criterion as set out in the RIT-T instrument, with supporting evidence:

(A) The Vickery Coal Mine extension, [redacted] and the proposed Narrabri Gas Project stage 1 and stage 2, and any other spot load included in NWSA PACR.

Please refer to the following attachments:

[redacted]

(B) The planned connection of new mine/industrial loads and general load growth around Parkes NSW and NSW government's Parkes Special Activation Precinct (SAP), and any other spot load included in the BOP PACR.

Please refer to the following attachments:

[redacted]

(C) For each project, please confirm whether this project is an extension of an existing project or a new project.

Please refer to the above two answers in (a) and (b).

(v) Please confirm which scenarios include the Narrabri Gas Project stage 1 and which scenarios include both the Narrabri Gas Project stage 1 and stage 2.

The low scenario includes the NGP stage 1, while the central and high scenarios contain both stages of the project.

(vi) Please advise the basis for including Narrabri Gas Project in all scenarios in the NWSA PACR given Santos has not made a financial investment decision (FID) for this project and FID is not expected until quarter 4 2023.

[redacted]

The Narrabri Gas Project (NGP) was identified by the NSW Government as a Strategic Energy Project with natural gas identified as critical for energy security and reliability in NSW, with the NGP committing 100% of the gas to the domestic market. With the ACCC forecasting future domestic gas shortfalls, the Narrabri project will inject new supply into southern domestic markets and put downward pressure on gas prices for NSW businesses, manufacturers and families.

[redacted]

In order to ensure a reliable supply to the loads are available from operation commencement in 2026, significant works are required to be undertaken with the "Maintaining Reliable Supply to the North West Slopes Area" RIT-T developed to address these requirements. It is expected that all planning work including engineering design is required to be completed prior to the agreement being executed.

Considering the above, we have made the reasonable judgement to include the anticipated NGP within the RIT-T scenarios, which includes NGP stage 2 within the analysis in the central and high scenarios.

(vii) Please advise, if this is the case, the basis for including both the Narrabri Gas Project stage 1 and stage 2 in the central scenario for the NWSA PACR.

Please refer to the above answer to (vi).

(viii) Please provide an NPV sensitivity analysis (updated NPV cash flow model) where the Narrabri Gas Project is excluded from the low and central scenarios.

Removal of the Narrabri gas project under the low scenario means that low scenario investments would not be required. Consequently, the set of reasonable scenarios would be constructed differently in the absence of the Narrabri gas project.

Therefore, in this sensitivity analysis we have focussed solely on the central scenario.

Figure 6 and the attached "NWS model question 3 viii post 2029 avoided USE excluded" set out the results of this sensitivity analysis with avoided unserved energy zeroed out after 2028/29. Avoided unserved energy was zeroed out after 2028/29 in the PACR to improve the readability of results.

Figure 6 – North West Slopes central scenario NPV results without Narrabri gas, sensitivity 3 (viii), post 2028/29 avoided USE excluded

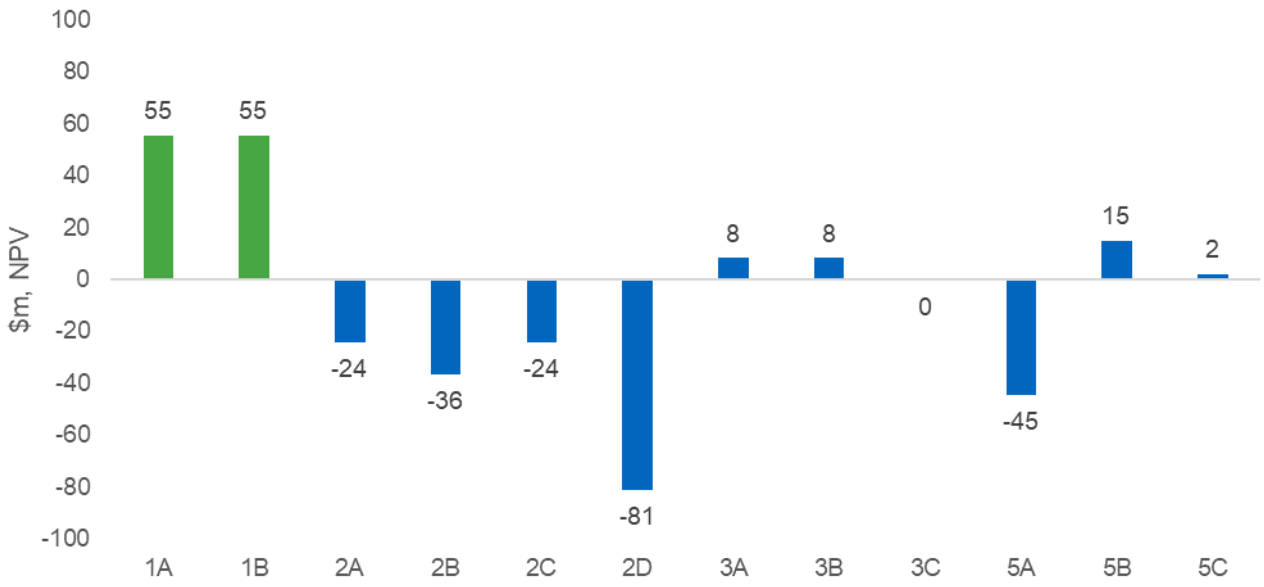
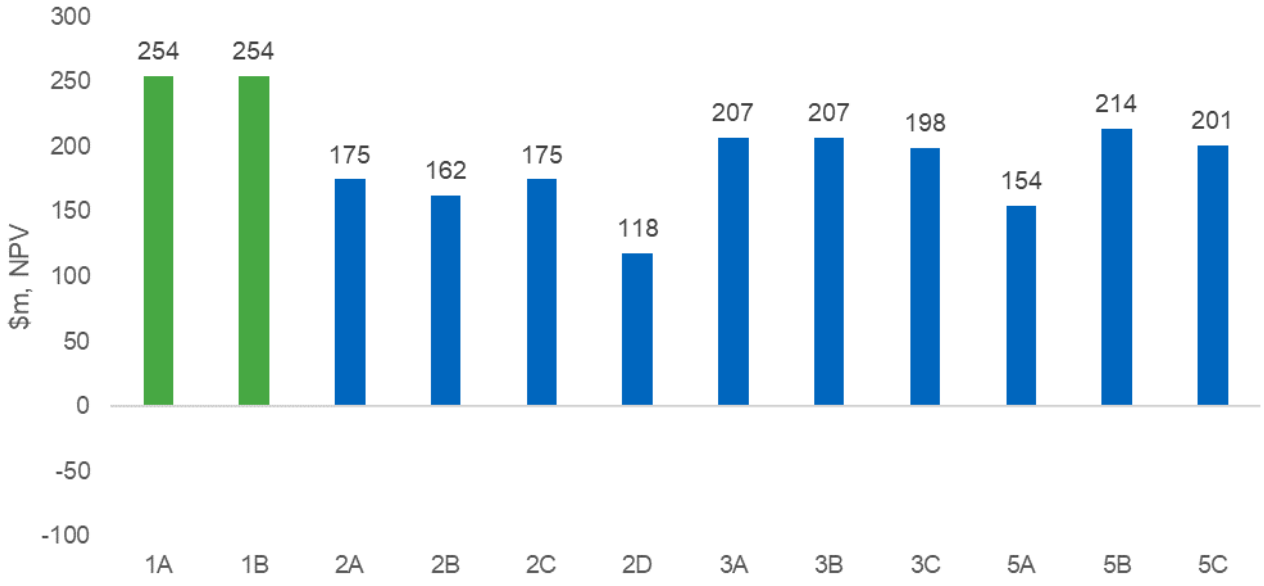


Figure 7 and the attached "NWS model question 3 viii all avoided USE included" set out the results of this sensitivity analysis with all avoided unserved energy benefits included.

Figure 7 – North West Slopes central scenario NPV results without Narrabri gas, sensitivity 3 (viii), all avoided USE included



The results show that Option 1 (ie, Option 1A or Option 1B) is the preferred option under this sensitivity. Option 1 involves building a 50 MVAr SVC at Gunnedah substation in 2025/26. This is the lowest cost option under this sensitivity.

Option 1A and Option 1B are equivalent under this sensitivity.

The preferred options from the PACR, Option 5B and Option 5C, are projected to deliver positive net benefits under this sensitivity of approximately $40 million and $53 million below Options 1A and 1B (the highest ranked options).

(ix) Please explain why the central scenario included the same anticipated spot loads as the high scenario in the NSWA PACR.

The high scenario originally included the [redacted] load, however, as the [redacted] was cancelled between the PSCR and PADR documents, the [redacted] load was removed from the high scenario, leaving the demands to be the same as the Central scenario.

(x) Please identify each spot load included in the demand forecast and the basis for including this forecast demand in each relevant scenario for the BOP PACR.

Please refer to the following attached spreadsheets for BOP:

- "BOP PACR demand profiles_Central Scenario -Confidential.xlsx" – Refer to the explanation for different load scenarios values, provided on each load tab for each load.

(xi) Please advise which scenarios include the 'Parkes Special Activation Precinct' and the basis for including this forecast demand in each relevant scenario for the BOP PACR.

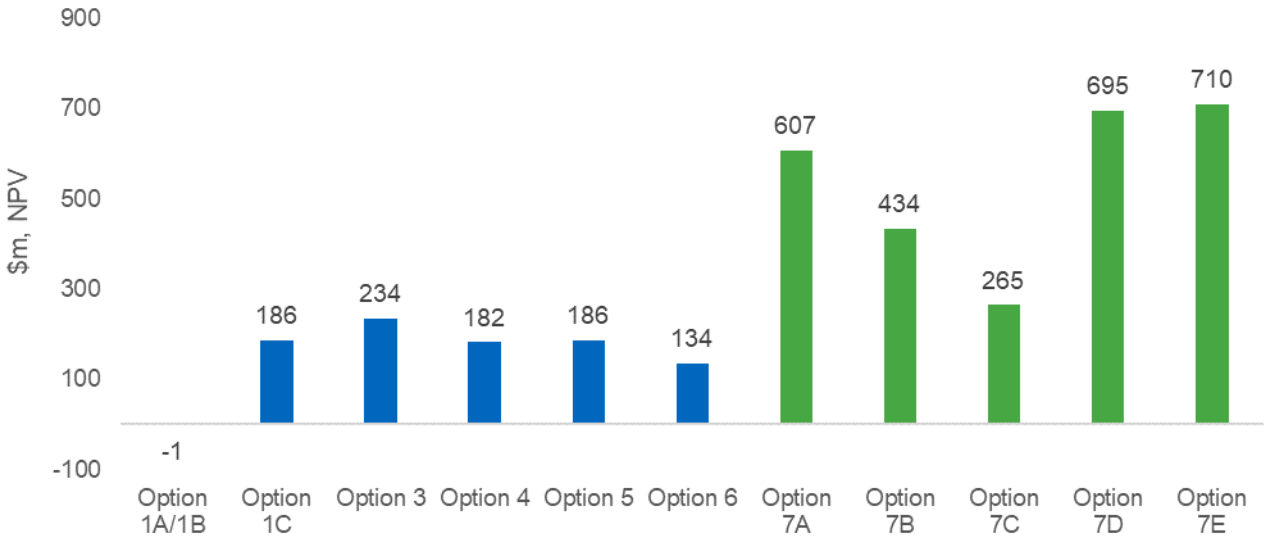
All scenarios, low, central and high include different load values for the Parkes SAP. The different assumptions that form the basis of loads are provided in the attached file "BOP PACR demand profiles_Central Scenario -Confidential.xlsx", in the "SAP" sheet.

(xii) Please provide an NPV sensitivity analysis (updated NPV cash flow model) where the Parkes Special Activation Project is excluded from all scenarios in the BOP PACR.

We have updated the unserved energy inputs and the series of investments under each option in each scenario to reflect the exclusion of Parkes SAP from the analysis.

Figure 8 presents the weighted NPV results of this sensitivity with avoided unserved energy after 2027/28 excluded from the analysis.

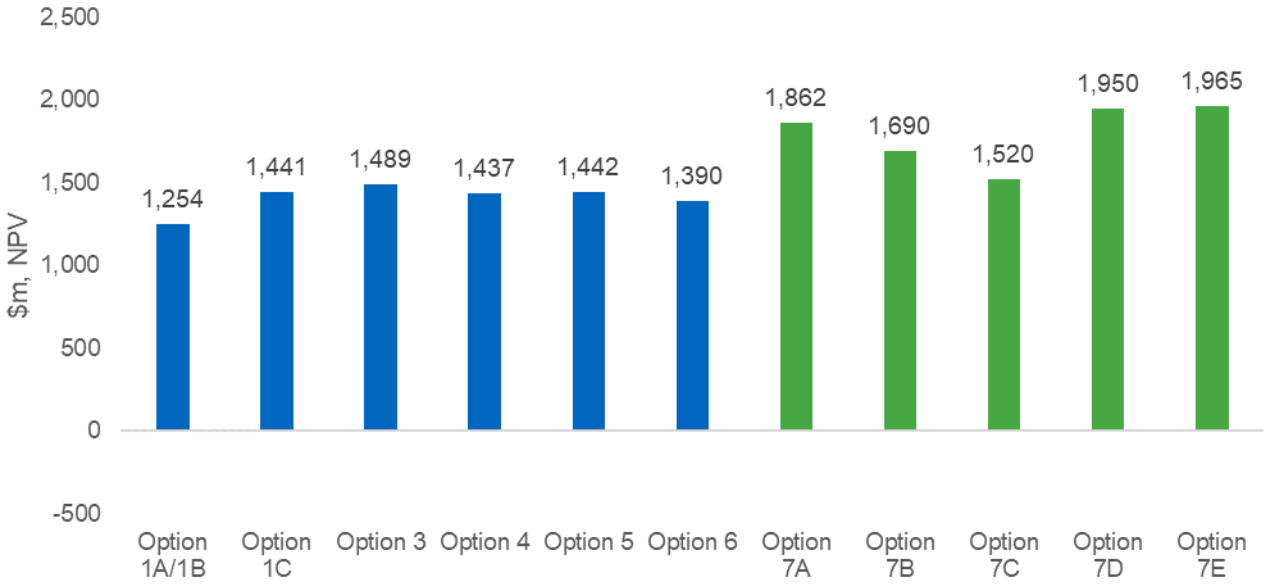
Figure 8 – BOP weighted NPV results with Parkes SAP excluded, sensitivity 3(xii), no avoided unserved energy after 2027/28



The attached model 'BOP model question 3 xii post 2028 avoided USE excluded' provides further detail including results for each reasonable scenario.

Figure 9 presents the weighted NPV results of this sensitivity with all avoided unserved energy included.

Figure 9 – BOP weighted NPV results with Parkes SAP excluded, sensitivity 3(xii), all avoided unserved energy included



The attached model 'BOP model question 3 xii all avoided USE included' provides further detail including results for each reasonable scenario.

The results demonstrate that Options 7A – 7E remain the highest ranked options with Parkes SAP excluded from the analysis. Further, Option 3 remains the preferred network option.

For all of these options, the Wellington to Parkes line in stage 2 would not be required in the absence of the Parkes SAP.

1.4. Value of Customer Reliability

(i) Please provide details regarding the method, inputs and assumptions used to calculate the load weighted VR estimates used in the central scenarios for the BOP and NSWA PACRs.

The AER develops estimates of VCR– the latest published estimates are $26/kWh for residential customers in NSW, $46/kWh for commercial customers and $66/kWh for industrial customers. [9]

At each location, an average VCR value is calculated based on the proportion of each type of customer – residential, commercial and industrial. The load weighted VCR estimate is then calculated as an average of the VCR at each location weighted by the level of demand, and used in the central scenario for the RIT-T.

We note that this approach is in line with the AER's preferred approach: [10] [11]

> *Importantly, any investment decisions where VCR is applied should use a VCR value reflective of the affected customer composition on the network.*

Table 5 and Table 6 present the calculations of the central load-weighted VCR used in the BOP PACR ($54.54/KWh) and North West Slopes PACR ($46.88/KWh), at a high level:

[9] See https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability/update.
[10] AER, *Application guidelines – Regulatory investment test for transmission*, August 2020, p 26.
[11] AER, *Values of Customer Reliability, Final Report on VCR Values Dec 2019,* section 7.1.1, p. 82.

Table 5 - BOP VCR calculation

	Residential	Commercial	Industrial	Combined (load weighted VCR)
BOP load breakdown	21.39%	16.02%	62.59%	100%
AER VCR estimate ($/KWh)	26.82	46.18	66.16	**54.54**

Table 6 – North West Slopes VCR calculation

	Residential	Commercial	Industrial	Combined (load weighted VCR)
NWS load breakdown	34.32%	28.90%	36.78%	100%
AER VCR estimate ($/KWh)	26.82	46.18	66.16	**46.88**

The load-weighted VCR value used is kept constant in real terms in each year of the analysis.

Transgrid has been engaging with its Transmission Advisory Committee (TAC) on the transparency provided for inputs for non-ISP RIT-Ts and has agreed to provide breakdowns similar to Table 4 going forward. We note that stakeholders have not previously asked for this information, and it was not requested in submissions to the PADRs for BOP and NWSA.

The VCR calculation attachments for BOP and North West Slopes provides a breakdown of the specific inputs and calculations used in calculating the central load weighted VCR estimates in more locational detail. (NW Slopes PACR VCR calculation.xlsx; BOP PACR VCR calculation.xlsx)

The AER recommends that sensitivity ranges of +/- 30 per cent be used when applying its VCR estimates in the context of network planning.[12] This is the basis for the higher and lower VCR values used in the BOP and North West Slopes RIT-T high and low scenarios.

1.5. Discount rates

(i) Please provide an NPV sensitivity analysis (updated NPV cash flow models) for each scenario using the central discount rate, the upper bound discount rate and the lower discount rate and advise if the adoption of a common discount rate between scenarios changes the rankings of the options.

BOP

The adoption of a common discount rate between scenarios does not change the rankings of the options for any of the central, upper bound, lower bound or 'updated regulated' discount rates.

Figure 10 shows the weighted NPV results using a discount rate of 5.5 per cent across all scenarios.

Please see attached "BOP model question 1.5 central rate" for results in each scenario.

[12] AER, *Values of Customer Reliability, Final Report on VCR Values Dec 2019,* section 7.1.1, p. 84.

Figure 10 – BOP weighted NPV results, 5.5 per cent discount rate in all scenarios

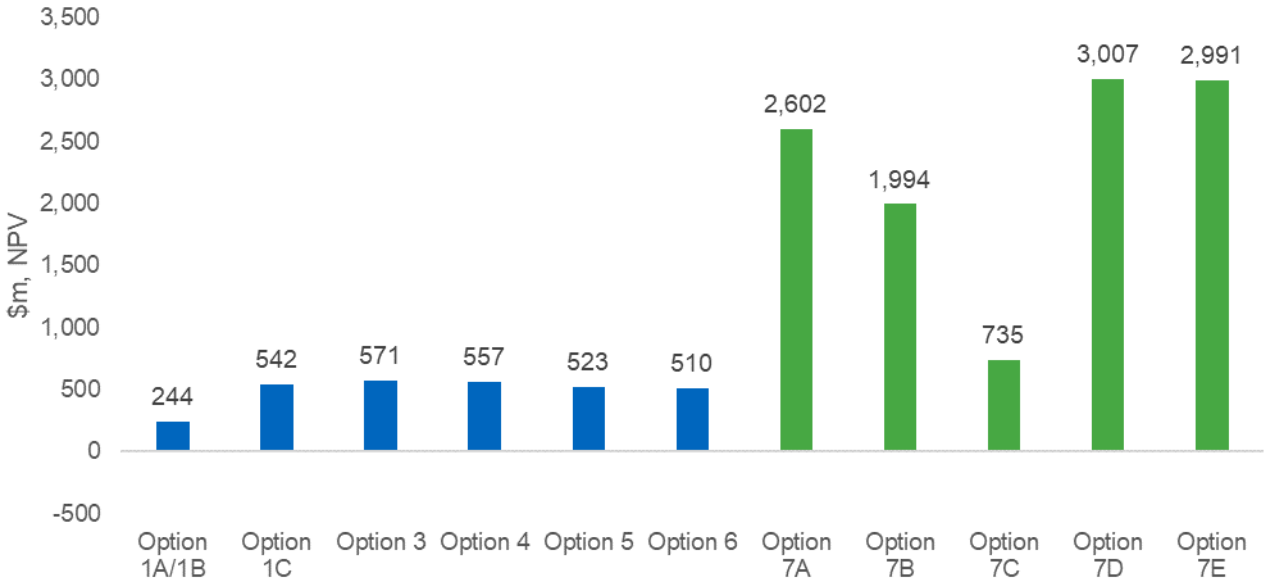


Figure 11 shows the weighted NPV results using a discount rate of 7.5 per cent across all scenarios.

Please see attached "BOP model question 1.5 upper bound rate" for results in each scenario.

Figure 11 – BOP weighted NPV results, 7.5 per cent discount rate in all scenarios

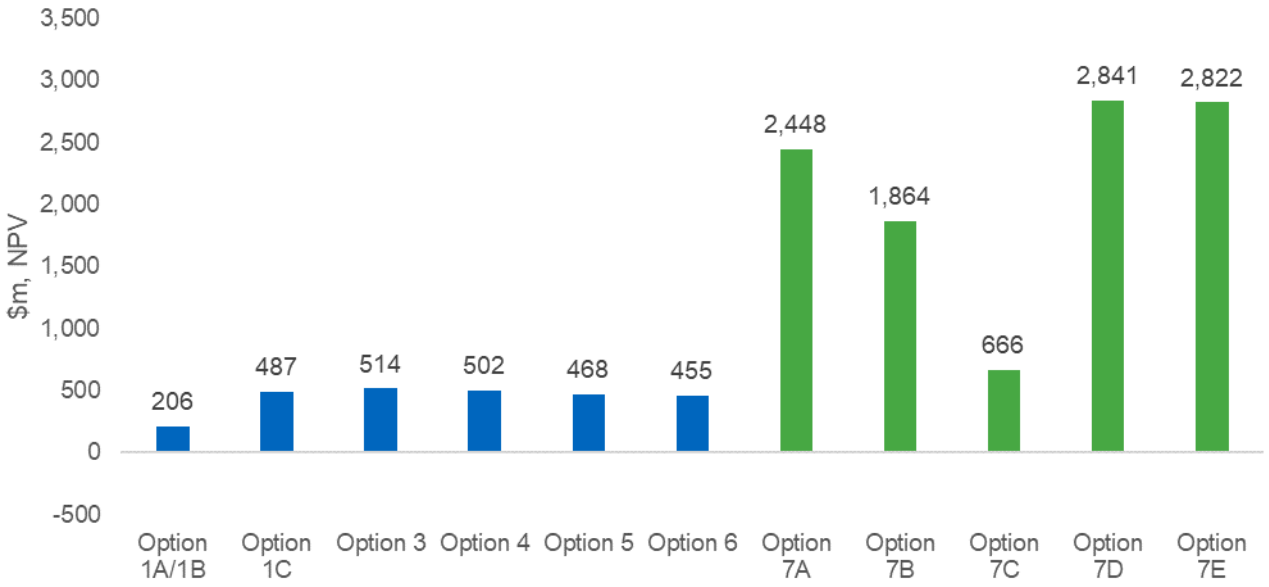


Figure 12 shows the weighted NPV results using a discount rate of 1.96 per cent across all scenarios. 1.96 per cent was the lower bound discount rate used in the BOP and North West Slopes PACRs and reflected the AER's final decision for AusNet services published 28 January 2022).

Please see attached "BOP model question 1.5 lower bound rate" for results in each scenario.

Figure 12 – BOP weighted NPV results, 1.96 per cent discount rate in all scenarios

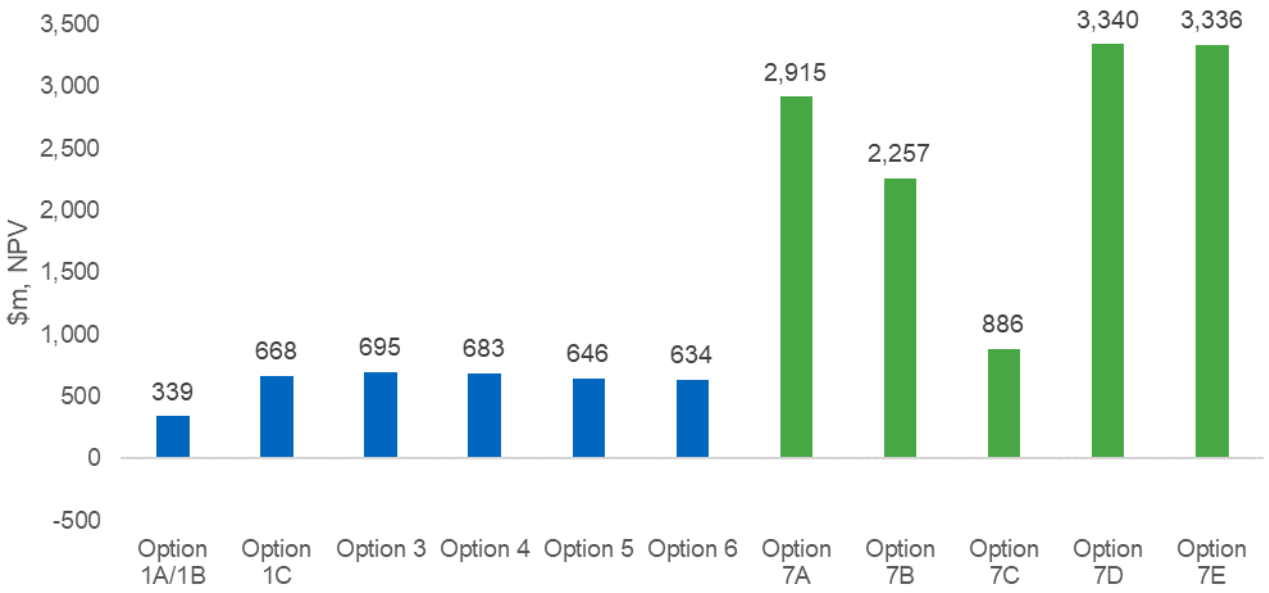
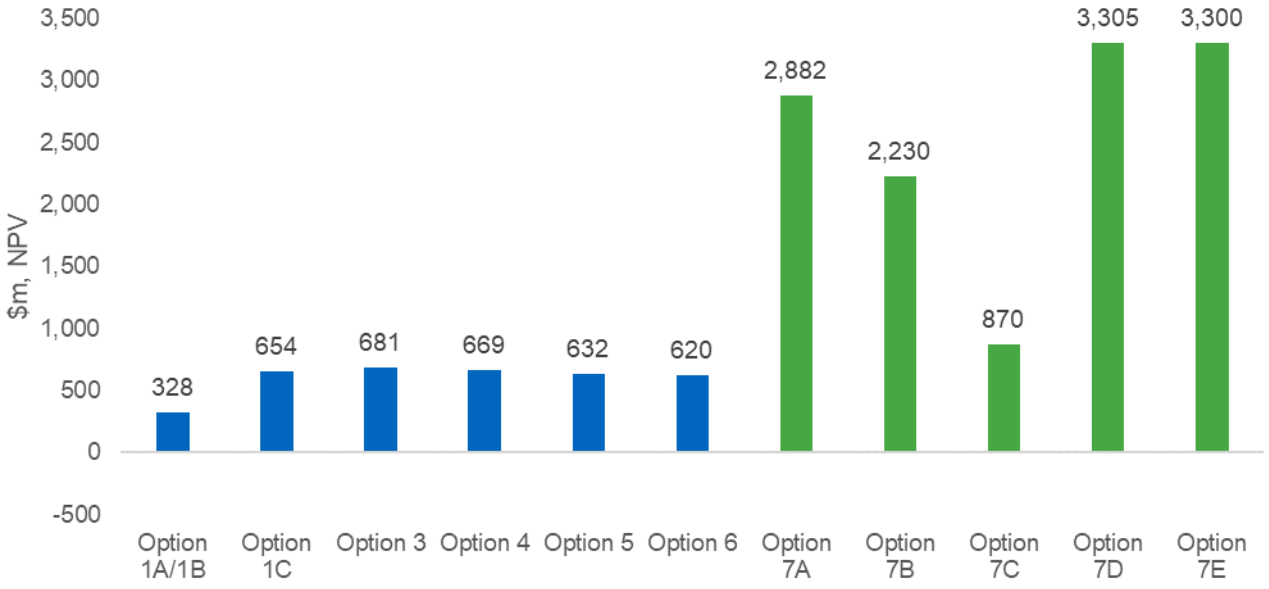


Figure 13 shows the weighted NPV results using a discount rate of 2.3 per cent across all scenarios. 2.3 per cent was the latest regulated rate published at the time of the BOP and NWSA PACRs (from the AER's final decision for Powerlink 2022-27, published 29 April 2022).

Please see attached "BOP model question 1.5 updated regulated rate" for results in each scenario.

Figure 13 – BOP weighted NPV results, 2.3 per cent discount rate in all scenarios



North West Slopes

The adoption of a common discount rate between scenarios does not change the rankings of the options for any of the central, upper bound, lower bound or 'updated regulated' discount rates.

Figure 14 shows the weighted NPV results using a discount rate of 5.5 per cent across all scenarios.

Please see attached "NWS model question 1.5 central rate" for results in each scenario.

Figure 14 – NWS weighted NPV results, 5.5 per cent discount rate in all scenarios

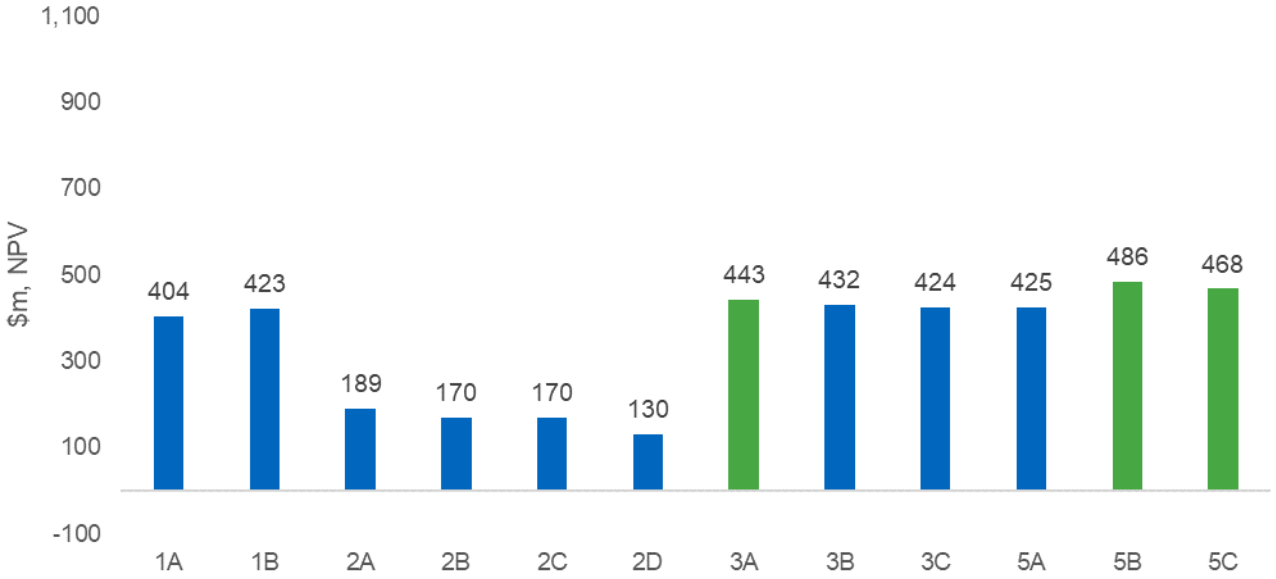


Figure 15 shows the weighted NPV results using a discount rate of 7.5 per cent across all scenarios

Please see attached "NWS model question 1.5 upper bound rate" for results in each scenario.

Figure 15 – NWS weighted NPV results, 7.5 per cent discount rate in all scenarios

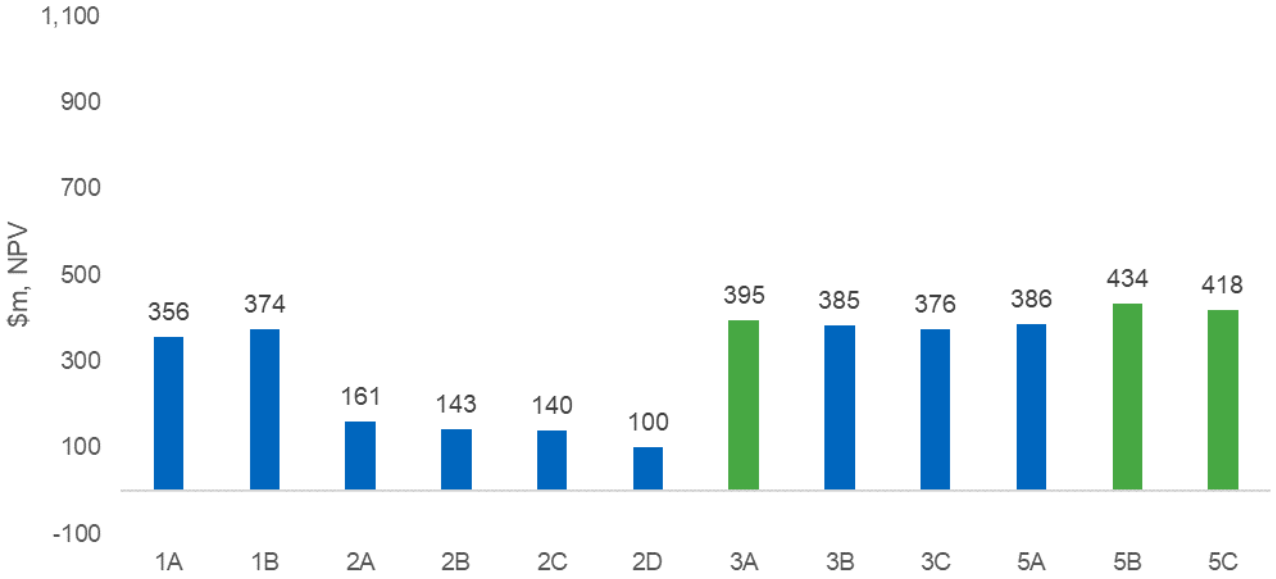


Figure 16 shows the weighted NPV results using a discount rate of 1.96 per cent across all scenarios. 1.96 per cent was the lower bound rate used in the BOP and North West Slopes PACRs.

Please see attached "NWS model question 1.5 lower bound rate" for results in each scenario.

Figure 16 – NWS weighted NPV results, 1.96 per cent discount rate in all scenarios

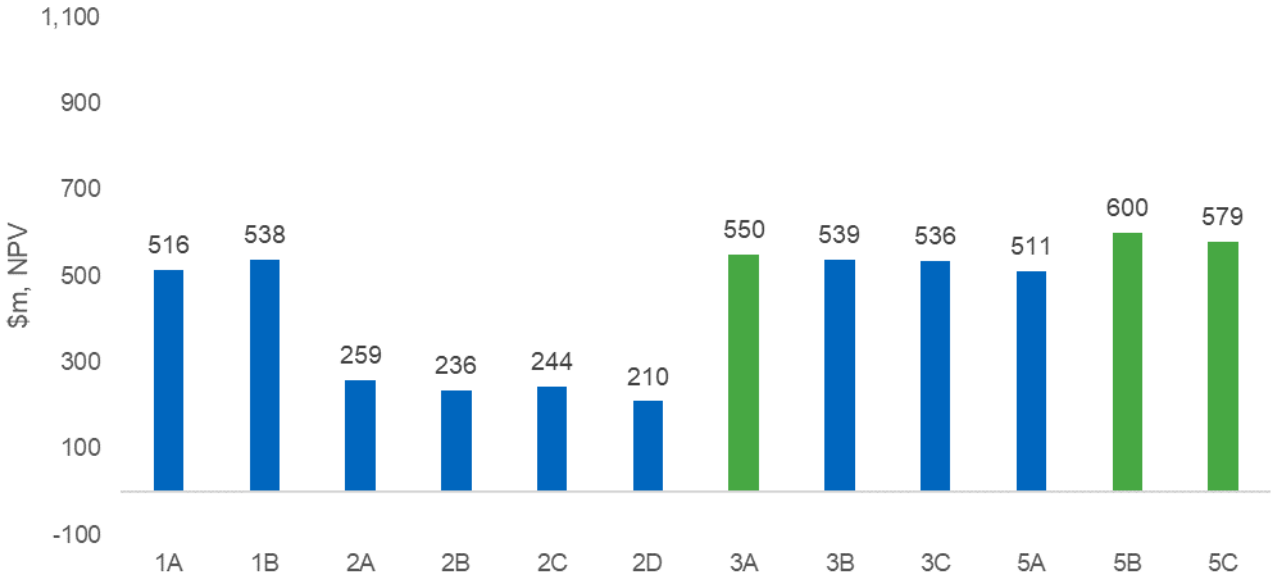


Figure 17 shows the weighted NPV results using a discount rate of 2.3 per cent across all scenarios. 2.3 per cent was the latest regulated rate published at the time of the BOP and NWSA PACRs (from the AER's final decision for Powerlink 2022-27, published 29 April 2022).

Please see attached "NWS model question 1.5 updated regulated rate" for results in each scenario.

Figure 17 – NWS weighted NPV results, 2.3 per cent discount rate in all scenarios