



TRANSGRID REVISED REVENUE PROPOSAL APPENDICES

An independent review

Prepared for



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APPENDIX A
TERMS OF REFERENCE

APPENDIX A: TERMS OF REFERENCE**Consultancy terms of reference – TransGrid
transmission determination 2009–14****Review of TransGrid's revised revenue proposal****Revised revenue proposal**

On 14 January 2009 TransGrid submitted a revised revenue proposal. The revised revenue proposal provides additional information to address matters raised in the Australian Energy Regulator (AER) draft decision and to demonstrate that the revised proposal satisfies the requirements of the National Electricity Rules (NER).

In relation to forecast capex TransGrid has implemented all aspects of the AER's draft decision with the exception of those related to:

- the costs associated with a number of projects subject to detailed review, including the:
 - Dumaresq – Lismore 330 kV line project
 - Cooma 132 kV substation replacement project
 - Beaconsfield West 132 kV GIS replacement project
- the instrument transformer replacement program
- the value and application of scoping factors and the extension of the findings on detailed sample project reviews to the remainder of the forecast capex allowance
- the value of and the application of cost escalations (this issue is also relevant to opex)
- cost estimation risk factors
- contingent project triggers.

The revised capital expenditure (capex) forecast also includes an estimated \$35 million (\$2007–08) of additional costs for assets that were detailed as contingent projects in the original revenue proposal but which now are being considered as part of the revised capex proposal.

In relation to forecast operating and maintenance expenditure (opex) TransGrid has implemented all aspects of the AER's draft decision with the exception of those related to:

- defect maintenance costs for new assets
- labour cost escalation
- self insurance
- debt and equity raising costs.

Review of revised revenue proposal

The AER seeks to engage Parsons Brinckerhoff Australia Pty Ltd (PB) to provide technical advice and to review certain aspects of TransGrid's revised revenue proposal. Specifically, PB is to review and provide comment on:

- the reassessed project scope and costs of the projects raised in section 3.3.1, 3.3.2 and 3.3.3 of the revised proposal:
 - the Dumaresq – Lismore 330 kV line project
 - the Cooma 132 kV substation replacement project
 - the Beaconsfield West 132 kV GIS replacement project
- the project scope and costs associated with the (\$35 million) Williamsdale 330/132 kV substation raised in section 3.3.4 of the revised proposal
- the replacement capex as raised in section 3.3.5 of the revised proposal, in particular, whether the arguments raised in relation to the instrument transformer replacement program is reasonable
- the scoping factors and the extension of the findings on detailed sample project reviews to the remainder of the forecast capex allowance raised in section 3.3.6 of the revised proposal, in particular, whether any argument raised in relation to this extension is reasonable
- the application of the weighting of the escalators over a fixed 5-year period as raised in section 3.3.8 of the revised proposal, in particular, whether the arguments raised in relation to the fixed application of the escalators is reasonable
- the application of cost estimation risk factor raised in section 3.3.9 of the revised proposal, in particular, whether the arguments raised in relation to the application of risk to projects is reasonable
- the contingent projects raised in section 3.3.10 of the revised proposal, in particular, whether the scope and revised triggers for the contingent projects are reasonable, objective and verifiable
- the defect maintenance costs on new assets raised in section 5.3.2 of the revised proposal, in particular, whether the arguments raised in relation to defect maintenance levels and costs are reasonable

PB is required to consider any new information provided by TransGrid and advise of any changes to the recommendations made in the reports "*TransGrid revenue reset: an independent review, 12 November 2008*" and "*TransGrid revenue reset: APR 2008 supplementary report, 12 November 2008*". PB should also have regard to submissions (expected by 16 February 2009) raised in relation to the above issues.

If any such changes are made PB must set out what new information has led to the revised recommendation. If no such changes are made PB must set out why TransGrid's responses and new information do not lead to a revised recommendation.

PB is to provide details of any modifications to TransGrid's revised opex and capex model as a result of any changes it recommends.

Review timeframe

The AER expects to release its final decision in April 2009. Given this timeline the draft consultancy report must be provided to the AER no later than 27 February 2009 and the final report no later than 17 March 2009.

The final consultancy report will be released publicly at the same time the AER's final decision is published.

Consultation process

PB will be required to consult with TransGrid during the course of the review. These consultations may include:

- written requests to TransGrid for additional information and documentation
- possible meetings with TransGrid and/or its consultants.

PB will also be required to liaise with AER staff and provide regular updates on:

- progress towards achieving the deliverables
- any impediments that have arisen to achieving those deliverables
- significant issues that have been identified.

APPENDIX B
WALLEROO-WILLIAMSDALE 330 KV TRANSMISSION LINE AND SUBSTATION

APPENDIX B: WALLEROO-WILLIAMSDALE 330 KV TRANSMISSION LINE AND SUBSTATION

The Walleroo-Williamsdale 330 kV Transmission Line and Substation project (Project ID 5564) is a committed augmentation project with an anticipated commissioning date in 2013 under all scenarios. Table B-1 shows the estimated capex for this project that has been included in the overall ex-ante allowance.

Table B-1 – Capex for Walleroo-Williamsdale 330 kV transmission line and substation

Expenditure \$m (real, 07/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Project 5564 (Median)	2.9	11.7	20.1	0.0	0.0	34.7
Project 5564 (Weighted Average)	2.9	11.7	20.1	0.0	0.0	34.7

Source: TransGrid, CAM V1.8_Committed deliverables 21bB.xls.

B.1 Project overview

The Australia Capital Territory (ACT) and surrounding areas are presently supplied from Canberra 330/132 kV Substation. Canberra substation is equipped with four 330/132 kV transformers and has sufficient capacity to meet the forecast load over TransGrid's 10 year planning horizon.

To ensure business and government continuity following a disruption in supply at Canberra substation, the ACT Government Regulatory Instrument DI2006-47 requires TransGrid to provide a second supply to the ACT, independent of Canberra substation by 2009. TransGrid are currently undertaking the Williamsdale Substation establishment project to meet this requirement.

In addition, an increase in the capacity of the supply following a special contingency is required to be in place by 1 July 2012. It is this condition that is to be satisfied by the Walleroo-Williamsdale 330 kV Transmission Line and Substation project.

The project involves:

- the establishment of a new 330 kV switching station between Yass and Canberra
- the construction of 3-4 km of new single circuit 330 kV transmission line to bypass the Canberra substation and connect with TransGrid's existing Canberra-Williamsdale line
- the installation of an additional transformer at Williamsdale.

This project is considered to be stage 2 of the existing Williamsdale substation establishment. On completion of the Walleroo-Williamsdale 330 kV Transmission Line and Substation project, TransGrid expects to comply with the jurisdictional requirements noted above.

This project was originally proposed as a contingent project with a trigger that planning approvals were obtained from the ACT Government which was not accepted by PB. In the AER's Draft Determination, the AER noted that: "...to the extent that the underlying need for

the investment already exists, TransGrid may wish to consider the appropriateness of this project as part of its capex allowance.”¹

B.2 Drivers (need or justification)

TransGrid has stated that the primary driver for this project is the need to comply with the requirements of the ACT Government Regulatory Instrument DI2006-47, in particular the need to provide increased capacity following a special contingency.

B.3 Strategic alignment and policy support

The establishment of Williamsdale substation and the increased capacity requirements are identified in TransGrid's Strategic Network Development Plan² and their Outline Plan for Canberra and the Far South Coast of NSW³. The project evaluation document⁴ identifies these alignments.

B.4 Alternatives

To address the identified need for the project, TransGrid has identified a range of options involving the provision of an additional 330 kV supply to Williamsdale, independent of the Canberra substation. Specifically, the Project Evaluation Summary document⁵ addresses the following options:

Option A – Bungendore-Williamsdale 330 kV Line

The construction of a Bungendore 330 kV switching station, Bungendore – Williamsdale transmission line and installation of a second transformer at Williamsdale 330/132 kV substation.

To implement this option the following works would be required:

- establishment of a new 330 kV Switching Station adjacent to the Canberra – Kangaroo Valley (No.6) transmission line in the vicinity of Bungendore. The switching station would have a breaker and a half configuration initially established as a three breaker mesh
- the cutting-in of No.6 Line between Canberra and Kangaroo Valley to the new switching station
- construction of a new 330 kV single circuit transmission line equipped with OPGW between Bungendore switching station and Williamsdale 330/132 kV substation. The single circuit would be strung with twin Mango conductors designed for 85°C operation
- construction of two additional 330 kV line switchbays at Williamsdale 330/132 kV substation
- installation of a 2nd 375 MVA 330/132 kV transformer and associated transformer switchbays at Williamsdale 330/132 kV substation.

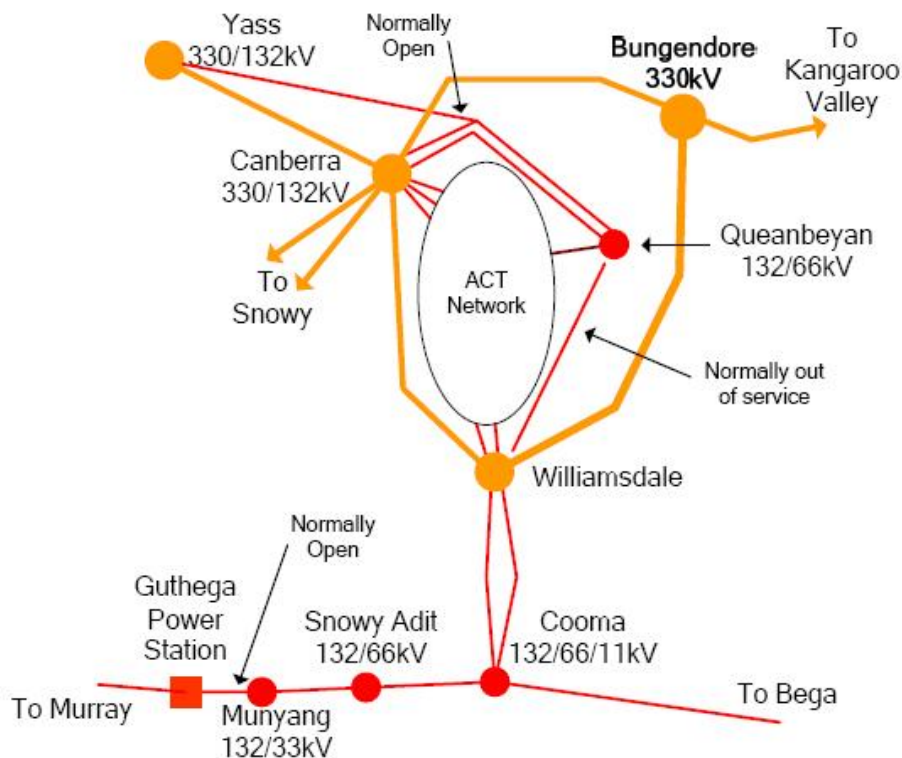
¹ TransGrid Transmission Determination 2009-10 to 2013-14 Draft Decision, Australian Energy Regulator, 31 October 2008 p. 82.

² Strategic Network Development Plan 2008, TransGrid, 2008 p. 45.

³ Outline Plan OLP 10 Supply to Canberra and the Far South Coast of NSW, TransGrid, November 2007, p. 6.

⁴ Project Evaluation Summary 5564, Williamsdale 330 kV Supply, TransGrid, January 2009, p. 9.

⁵ *ibid* p. 11-19.



This option was costed at between \$83.6m and \$105.6m with a NPV of -\$46.5m in the base case analysis.⁶

Option B – Wallaroo Switching Station

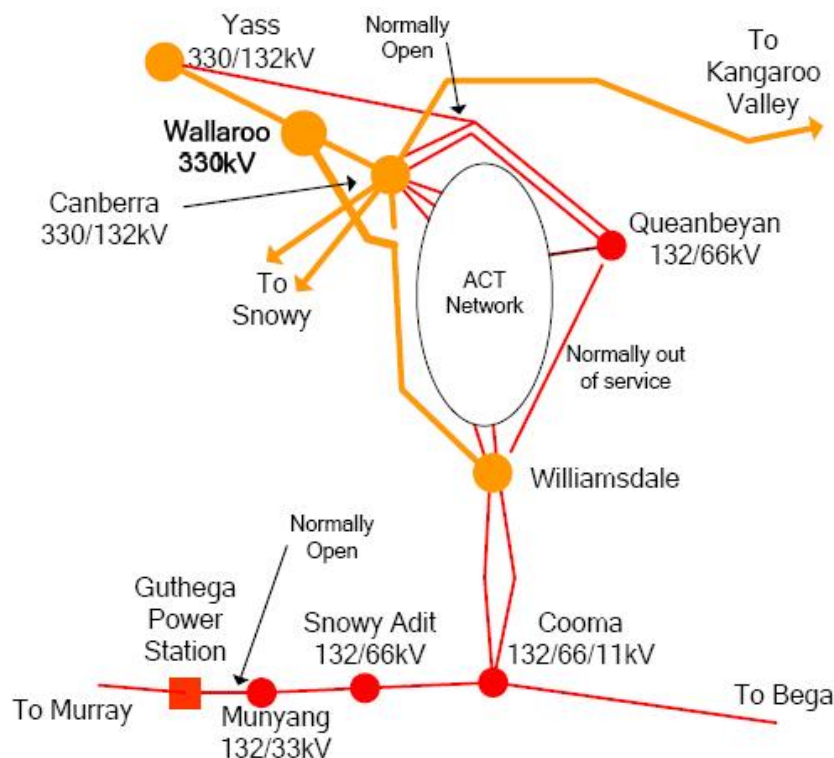
The establishment of a Wallaroo 330 kV switching station on the 09 Yass to Canberra 330 kV line, a single circuit 330 kV line to connect the Canberra to Williamsdale 330 kV (existing 97D / 978) line to the new switching station and installation of a second transformer at Williamsdale 330/132 kV substation.

To implement this option the following works are required:

- establishment of a new Wallaroo 330 kV Switching Station adjacent to the Yass – Canberra (No.9) transmission line. The switching station would have a breaker and a half configuration initially established as a three breaker mesh
- the cutting-in of No.9 Line between Canberra and Yass to the new switching station
- construction of a single circuit 330 kV line approximately 3 to 4 km long equipped with OPGW between a suitable point on the Canberra to Williamsdale 330 kV line and the new switching station. The single circuit would be strung with twin Mango conductors designed for 85°C operation
- installation of a 2nd 375 MVA 330/132 kV transformer and associated transformer switchbays at Williamsdale 330/132 kV substation.

⁶

ibid p. 29.



This option was costed at \$34.7m with a NPV of -\$19.7m in the base case analysis.⁷

Option C – Uriarra Switching Station

The establishment of a Uriarra Switching Station adjacent to the 01 Lower Tumut to Canberra line was initially considered instead of the Wallaroo Switching Station discussed in Option B. However, the tapping of load off 01 line disrupts sharing on the four lines between the Snowy Region and Yass/Canberra (No.01, 02, 03 and 07) and results in a reduction in the Snowy transfer limits. Therefore, this option was not considered further.

Option D – Yass-Williamsdale Single Circuit 330 kV Line

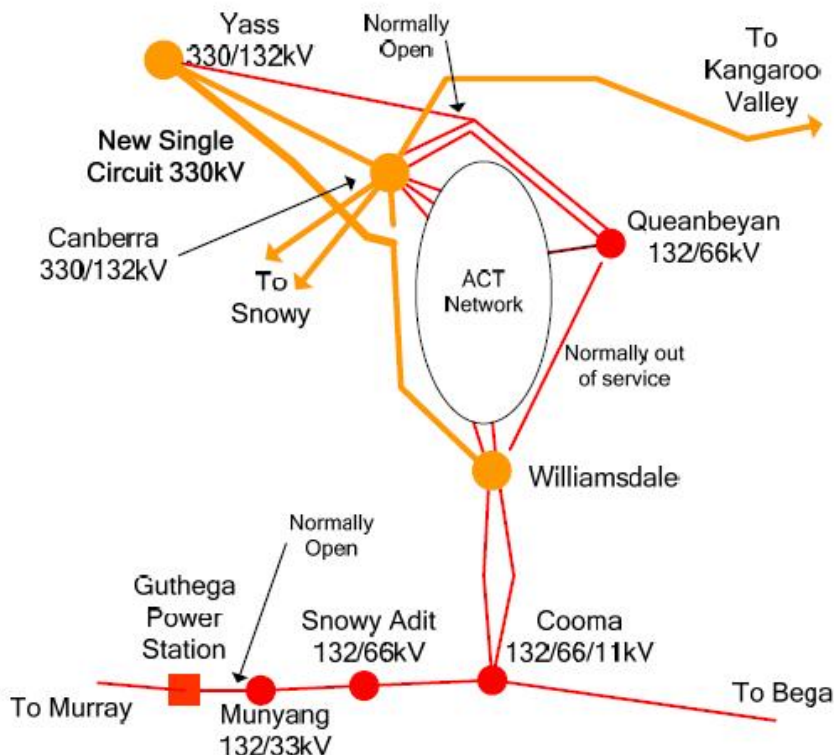
The installation of a second transformer at Williamsdale 330/132 kV substation and establishment of a new single circuit 330 kV transmission line between Yass and the Canberra – Williamsdale line (currently 978 and 97D being operated as double circuit 132 kV) would provide the 330 kV supply to Williamsdale, independent of Canberra 330/132 kV substation.

To implement this option the following works are required:

- installation of a 2nd 375 MVA 330/132 kV transformer and associated transformer switchbays at Williamsdale 330/132 kV substation
- construction of one (1) 330 kV line switchbay at Yass
- construction of a single circuit 330 kV line equipped with OPGW between Yass and a suitable point on the Canberra to Williamsdale 330 kV line. The single circuit would be constructed adjacent to the existing No.9 line and would be strung with twin Mango conductors designed for 85°C operation.

⁷

ibid p. 29.



This option was costed at \$56.5m with a NPV of -\$31.1m in the base case analysis.⁸

Option E – Yass-Canberra/Williamsdale Double Circuit 330 kV Line

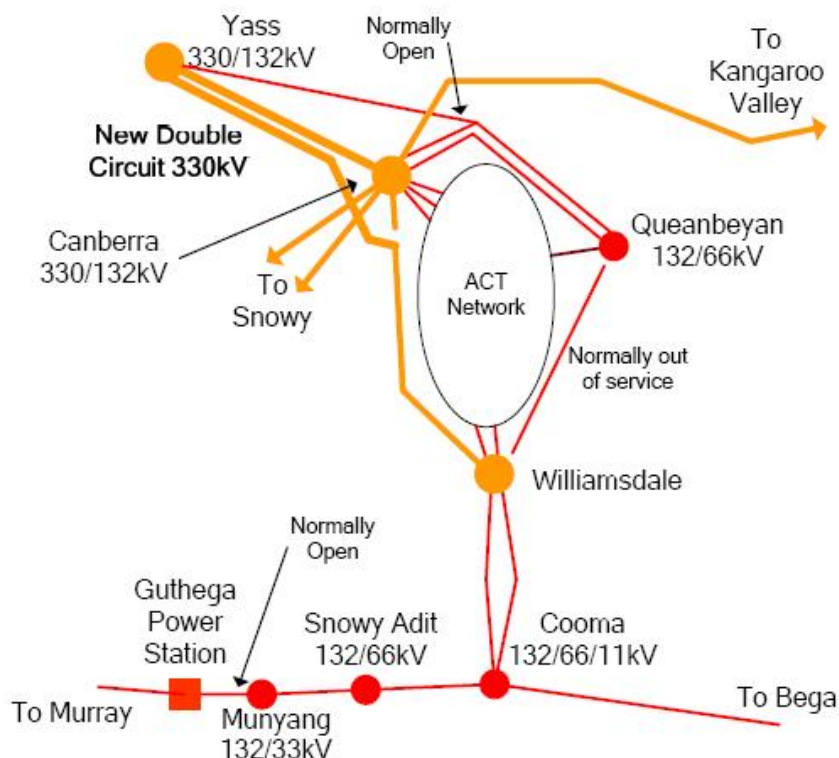
The provision of a 330 kV supply to Williamsdale, independent of Canberra 330 kV substation, can be achieved through the installation of a second transformer at Williamsdale 330/132 kV substation, the dismantling of the existing No.9 Yass – Canberra line and establishment of a new double circuit 330 kV transmission line between Yass and the Canberra. One circuit would be connected to Canberra Substation and the other connected outside of Canberra to form a Yass - Williamsdale line.

To implement this option the following works are required:

- installation of a 2nd 375 MVA 330/132 kV transformer and associated transformer bays at Williamsdale 330/132 kV substation
- construction of one 330 kV line switchbay at Yass
- dismantling of the existing No.9 Yass – Canberra 330 kV line
- construction of a double circuit 330 kV line equipped with OPGW between Yass and Canberra. One circuit would be connected to Canberra substation and the other connected to a suitable point on the Canberra to Williamsdale 330 kV line outside of Canberra to form a Yass – Williamsdale 330 kV line. The double circuit would be strung with twin Mango conductors designed for 85°C operation.

⁸

ibid p. 29.



This option was costed at \$70.0m with a NPV of -\$38.4m in the base case analysis.⁹

An additional option involving 330 kV supply to Williamsdale from the Canberra-Upper Tumut 330 kV line was considered. However, due to the need to traverse the Bimberi Conservation Area and Namadgi National Park for approximately 50 km, TransGrid excluded this option on the basis that it would be unlikely to obtain environmental approval given the availability of shorter line routes with less environmental impact.

B.5 Timing

The timing of this project is determined by the timeline contained in the jurisdictional requirements¹⁰ provided as an appendix to the project evaluation documentation. The provision of 375MVA capacity immediately following a special contingency is required by 1 July 2012.

B.6 Costs and scope

Table B-2 shows the base cost estimate for each of the options considered by TransGrid. A more detailed breakdown of the costs for the preferred option is shown in Table B-3.

⁹ ibid p. 29.

¹⁰ ibid p. 25.

Table B-2 – Base cost estimates and NPV of options for Williamsdale 330 kV supply

Option	Estimate ¹	NPV
Option A – Bungendore-Williamsdale 330 kV Line	\$83.6m to \$105.6m	-\$46.5m to -\$58.5m
Option B – Wallaroo Switching Station	\$34.7m	-\$19.7m
Option D – Yass-Williamsdale Single Circuit 330 kV Line	\$56.5m	-\$31.1m
Option E – Yass-Canberra/Williamsdale Double Circuit 330 kV Line	\$70.0m	-\$38.4m

Note 1: This estimate is in real 2006/07 dollars, and does not include real labour and material escalation impacts or any risk allowance.

Source: TransGrid 2008, 'Project Evaluation Summary 5564 Williamsdale 330 kV Supply', p.29.

Table B-3 – Base cost estimates for Option B – Wallaroo Switching Station

Work Scope Item	Estimate
Wallaroo switching station	\$17.8m
Cutting in No. 9 line	\$2.4m
Single circuit 330 kV from switching station to Canberra-Williamsdale line	\$3.4m
Property cost	\$1.0m
Williamsdale 2 nd transformer	\$10.1m
Total	\$34.7m

Source: TransGrid 2008, 'Project Evaluation Summary 5564 Williamsdale 330 kV Supply', p.29.

TransGrid notes that under Option B, approximately \$4.0m of the project expenditure is expected to be required prior to the project being presented for funding approval.

Furthermore, with regard to the 'property cost' line item, TransGrid notes:

"Property has provided an estimate for the purchase of a suitable switching station site of \$150,000. The majority of the new line route required for this project would be within the ACT, which has no formal means of payment for easement acquisition. Based on the experience of Williamsdale, an additional amount of money (\$850,000) has been allowed in the estimate to cover the risk that the outright purchase of property is required to achieve the line route."

B.7 PB analysis

This section presents PB's view of the project information provided by TransGrid in support of the expenditure for this proposed project. The following sections address each of the key issues when considering the prudence and efficiency of a proposed capital investment

Inclusion of project in the capex allowance

The contingent project trigger that was proposed by TransGrid in their original Revenue Proposal for the project related to obtaining planning and environmental approvals from the ACT government.

On the basis that significant progress has been made in obtaining the required approvals, and that the acquisition of the Williamsdale site has occurred in the period since the

submission of the original Revenue Proposal, PB considers that the level of certainty that the project will be required during the next Regulatory Control Period is such that the inclusion of the project in TransGrid's proposed forward capital expenditure program is now appropriate.

Drivers (need or justification)

The driver of this project has been stated by TransGrid to be the requirement to comply with the need to provide increased capacity following a special contingency in accordance with the ACT Government Regulatory Instrument DI2006-47.

Therefore, PB considers that the need for the project has been reasonably demonstrated by TransGrid.

Strategic alignment and policy support

PB notes that the replacement of the provision of additional capacity at Williamsdale is in accordance with the statutory obligations placed on TransGrid. Furthermore, PB is of the view that the project is in alignment with TransGrid's own policies and strategies as stated in the Strategic Network Development Plan¹¹ and the Outline Plan¹² for the area.

Alternatives

TransGrid has presented a total of six project options for the provision of additional capacity at Williamsdale. Two of these options have been excluded on the basis of reasonable technical and environmental considerations and the remaining options have been costed to enable the assessment of the highest NPV option. The options that were considered for costing are summarised in Table B-4

Table B-4 – Alternative options considered

Option
Option A – Bungendore-Williamsdale 330 kV Line
Option B – Wallaroo Switching Station
Option D – Yass-Williamsdale Single Circuit 330 kV Line
Option E – Yass-Canberra/Williamsdale Double Circuit 330 kV Line

Source: TransGrid 2008, 'Project Evaluation Summary 5564 Williamsdale 330 kV Supply', p.29.

Option A involves bypassing the Canberra Substation and the Canberra-Williamsdale 330 kV lines with a geographically separate 330 kV transmission line. Option B, D and E involve the use of the existing Yass-Canberra-Williamsdale 330 kV line routes.

Option B requires the establishment of a new switching station at Wallaroo with a short section of single circuit 330 kV Transmission Line constructed to bypass the existing Canberra Substation. In contrast, Options D and E avoids the need for the Wallaroo switching station by either the duplication of the Yass-Canberra single circuit 330 kV line or its reconstruction as dual circuit to provide a supply independent of the Canberra Substation.

PB notes that TransGrid has not explicitly addressed the provision of the additional 375MVA capacity through the 66 kV network as noted in the compliance table contained in the

¹¹ Strategic Network Development Plan 2008, TransGrid, 2008 p. 45.

¹² Outline Plan OLP 10 Supply to Canberra and the Far South Coast of NSW, TransGrid, November 2007, p. 6.

regulatory instrument. However, the configuration of the network around the ACT and its current reliance on the Canberra substation to supply Cooma is such that the provision of additional capacity at 330 kV is likely to be the only feasible option.

Therefore PB is satisfied that TransGrid has considered a reasonable range of alternative options to meet the stated need.

Timings

The driver of this project has been stated by TransGrid to be the requirement to comply with the need to provide increased capacity following a special contingency in accordance with the ACT Government Regulatory Instrument DI2006-47. Under this document TransGrid has an obligation to provide additional capacity by 1 July 2012.

Given the compliance nature of this project and the specific completion date required under the regulatory instrument, PB considers that the timing for the project has been reasonably demonstrated by TransGrid.

Costs and scope

TransGrid's comparative costing and NPVs of the feasible options are summarised in Table B-5

Table B-5 – Base cost estimates and NPV of options for Williamsdale 330 kV supply

Option	Estimate ¹	NPV
Option A – Bungendore-Williamsdale 330 kV Line	\$83.6m to \$105.6m	-\$46.5m to -\$58.5m
Option B – Wallaroo Switching Station	\$34.7m	-\$19.7m
Option D – Yass-Williamsdale Single Circuit 330 kV Line	\$56.5m	-\$31.1m
Option E – Yass-Canberra/Williamsdale Double Circuit 330 kV Line	\$70.0m	-\$38.4m

Note 1: This estimate is in real 2006/07 dollars, and does not include real labour and material escalation impacts or any risk allowance.

Source: TransGrid 2008, 'Project Evaluation Summary 5564 Williamsdale 330 kV Supply', p.29.

PB notes that the significantly lower estimated cost and higher NPV of Option B is consistent with the significant utilisation of existing infrastructure under this option. The primary purpose of Options B, D and E is to consider whether it is more efficient to construct a new switching station between Yass and Canberra or to duplicate or rebuild the existing 330 kV line.

On the basis of the costs presented by TransGrid, the length of the Yass-Canberra 330 kV line is such that the provision of the Wallaroo switching station and comparatively short line works to bypass the Canberra substation represents more efficient investment than the remaining options, which require far more extensive line construction.

Furthermore, TransGrid's preferred Wallaroo Switching Station (Option B) represents a significant reduction in the cost over the Bungendore-Williamsdale 330 kV line option (Option A) that was recommended in the original Application Notice prepared for the Southern Supply for the ACT. PB understands that the Wallaroo Switching Station option was developed following the clarification that the provision of two independent 330 kV transmission lines was not necessary to satisfy the requirements of the regulatory instrument. TransGrid states:

"Following consultation with the ACT jurisdiction, feasible options that enhance the capacity of Williamsdale may be developed that include either one or two independent 330 kV transmission lines to Williamsdale. "

Given the significant reduction in the capital cost required to satisfy the stated project need under Option B, PB considers that, of the options presented by TransGrid, Option B represents the most efficient scope and cost for meeting the stated need.

The costs of TransGrid's preferred option are reproduced in Table B-6.

Table B-6 – Base cost estimates for Option B – Wallaroo Switching Station

Work Scope Item	Estimate
Wallaroo switching station	\$17.8m
Cutting in No. 9 line	\$2.4m
Single circuit 330 kV from switching station to Canberra-Williamsdale line	\$3.4m
Property cost	\$1.0m
Williamsdale 2 nd transformer	\$10.1m
Total	\$34.7m

NOTES

1. The cost for the work scope has generally been estimated using the CAPEX Estimating Database.
2. Property has provided an estimate for the purchase of a suitable switching station site of \$150,000. The majority of the new line route required for this project would be within the ACT, which has no formal means of payment for easement acquisition. Based on the experience of Williamsdale, an additional amount of money (\$850,000) has been allowed in the estimate to cover the risk that the outright purchase of property is required to achieve the line route.
3. The estimates have an uncertainty of 25% due to the limited scope of the investigation.

Source: TransGrid 2008, 'Project Evaluation Summary 5564 Williamsdale 330 kV Supply', p.29.

PB has reviewed the cost estimate for the project summarised in the Table B-6 and is satisfied that the base estimate costs for the switching station, transformer and line work components are consistent with the scope of work proposed. However, PB notes TransGrid's statement that:

"...Based on the experience of Williamsdale, an additional amount of money (\$850,000) has been allowed in the estimate to cover the risk that the outright purchase of property is required to achieve the line route."

PB notes that this \$0.85m allowance represents a risk allowance above the quantifiable estimated costs for the project. PB is of the view that provision is already made for risk allowances on projects at a portfolio level in the risk process proposed by TransGrid and no further allowance should be made at project level. However, as this project has been identified by TransGrid as a committed project, PB recommends that no risk allowance be included for this project on the basis of TransGrid's publically stated process of excluding risk and escalation on committed projects¹³.

Therefore PB recommends that \$0.85m be removed from TransGrid's revised ex-ante capex proposal on the basis that it represents a risk allowance inconsistent with TransGrid's Capital Accumulation process.

B.8 Conclusion

PB has conducted a detailed review of the proposed Wallaroo-Williamsdale 330 kV transmission line and substation project, and we are of the opinion that the project is prudent. However, we are also of the view that the inclusion of a project level risk allowance does not

¹³

TransGrid Revenue Proposal 1 July 2009 – 30 June 2014, TransGrid, 31 May 2008 p. 53.

represent efficient investment. Therefore PB recommends the removal of the \$0.85m risk allowance on the project.

Table B-7 sets out PB's recommendation on the prudence and efficiency of the submitted expenditure associated with Walleroo-Williamsdale 330 kV transmission lines and substation project.

Table B-7 – PB recommendation for Walleroo-Williamsdale 330 kV Transmission Line and Substation project

Expenditure \$m (real, 07/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted	2.9	11.7	20.1	0.0	0.0	34.7
Proposed variation	-0.85	-	-	-	-	-
PB recommendation	2.1	11.7	20.1	0.0	0.0	33.9

Source: TransGrid, CAM V1.8_Committed deliverables 21bB.xls and PB analysis.