DIRECTLINK JOINT VENTURE

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8 February 2005

Mr Sebastian Roberts
General Manager, Regulatory Affairs – Electricity
Australian Competition and Consumer Commission
470 Northbourne Avenue
CANBERRA ACT 2600

Attention: Mr Sabesh Shivasabesan, Director - Electricity, Regulatory Affairs Division

Dear Mr Roberts

Re: Application for Conversion to a Prescribed Service and a Maximum Allowable Revenue to June 2015

On 14 January 2005, the Directlink Joint Venturers provided the Commission with their submission on the PB Associates report *Review of Directlink Conversion Application – Final Report* that the Commission published on its website on 26 November 2004.

In that submission, the Directlink Joint Venturers indicated that they were in the process of recalculating Alternatives 0/1/2's network deferral benefits to reflect the matters raised in their submission—in particular, the planned upgrade Line 966—and would advise the Commission within a week. Since that time, the Directlink Joint Venturers' consultant Burns and Roe Worley ('**BRW**') has worked to confirm the additional costing estimates necessary and to take account of relevant information in the PB Associates report *TransGrid's Forward Capital Expenditure Requirements 2004/05 to 2008/09* that the ACCC published on its website on 28 January 2005. Several of the views PB Associates expressed in its TransGrid report contradict or supplement views PB Associates put in its report on Directlink.

BRW's advice is enclosed with this letter (**Attachment 1**). BRW provides revised costing estimates for the alternative projects and a calculation of their network deferral benefits after having regard to:

- The inclusion of costs associated with reliability enhancements to Directlink;
- The inclusion of costs to provide post contingent support;
- The local transmission communications, SCADA and metering works;
- The upgrade of Line 966;
- The new Glen Innes to Tenterfield 132 kV circuit required as part of the Lismore to Dumaresq 330 kV line project; and

- The Armidale to Port Macquarie 330 kV development.

Unless BRW clearly indicates otherwise, its advice is based on its own independent and detailed assessment of the facts before it, and BRW can provide evidence to verify its conclusions. Given the major financial implications for the Directlink Joint Venturers, we trust that the Commission will also base its decision on a balanced assessment of firm evidence that the Directlink Joint Venturers have had the opportunity to examine and respond.

We have inserted BRW's revised costs and network deferral benefits into our Regulatory Test calculations. We have also inserted TransÉnergie US's revised calculations of the inter-regional benefits for Alternative 3 given its limitations that your consultant Intelligent Energy Systems has brought to light. Our results are shown in **Attachment 2** in the same form as Tables 4.7-4.12 in our revised application of 22 September 2004.

In summary, our results indicate that Alternative 2 satisfies the Regulatory Test. It maximises the market benefits to all those who produce, consume and transport electricity in the NEM in all the credible market scenarios examined.

Table 1

PROJECT RANKINGS FOR CREDIBLE MARKET DEVELOPMENT SCENARIOS

No.	Gen. bid	DR	Econ. growth	Proj. cost	1st ranking		2nd ranking		3rd ranking		4th ranking		5th ranking	
					Proj	RNB	Proj	RNB	Proj	RNB	Proj	RNB	Proj	RNB
4	LRMC	9%	High	100%	Alt 2	148.2	Alt 0	132.8	Alt 1	47.9	Alt 5	0.0	Alt 3	-36.3
5	LRMC	9%	Med	100%	Alt 2	84.4	Alt 0	69.0	Alt 5	0.0	Alt 1	-15.9	Alt 3	-24.5
6	LRMC	9%	Low	100%	Alt 2	3.2	Alt 5	0.0	Alt 0	-12.2	Alt 3	-39.6	Alt 1	-97.2
11	SRMC	9%	Med	100%	Alt 2	6.6	Alt 5	0.0	Alt 0	-8.8	Alt 3	-28.2	Alt 1	-93.8
12A	LRMC	9%	Med	110%	Alt 2	76.1	Alt 0	76.4	Alt 5	0.0	Alt 3	-31.0	Alt 1	-34.3
12B	LRMC	9%	Med	90%	Alt 2	92.8	Alt 0	61.7	Alt 1	2.5	Alt 5	0.0	Alt 3	-18.0

Source: BRW, TEUS & The Allen Consulting Group. Note: 'RNB' means net market benefits relative to Alternative 5, expressed in $M.

Of the 20 sensitivity test scenarios studied, Alternative 2 maximises the net market benefits in 14 cases and has the second highest net market benefits in 5 cases.

The capital cost of Alternative 2 is $156.8M in July 2005 dollars. This cost is $3.6M higher than that stated in our revised application because it now includes BRW's estimates of the cost of implementing post-contingent network support and the local transmission communications, SCADA and metering works that have been identified during recent discussions with NEMMCO.

The relevant characteristics of Directlink are set out in Table 2 (in the form of Table 6.1 in the revised application) for the purposes of calculating depreciation.

Table 2 (Table 6.1)

OPENING ASSET VALUE INPUTS TO DIRECTLINK REVENUE MODEL—ORC VALUES

	Directlink	
	ORC Value ($M)	ACCC Standard Asset Lives (yrs)
Substation costs	96.8	40
Transmission costs	60.0	50
Easement costs	0.0	∞
Total capital cost (incl. IDC)	156.8	

Values are in July 2005 dollars.

As Directlink would have been in service for about 5.0 years by the July 2005, the Directlink Joint Venturers have anticipated that the Commission would apply the normal ODRC approach, that is, to scale down the ORC to reflect Directlink's time in service. This stance is reflected in the revenue projections set out in Table 3 (in the form of Table 6.2 in the revised application) below.

Table 3 (Table 6.2)

OPENING ASSET VALUE INPUTS TO DIRECTLINK REVENUE MODEL—ODRC VALUES

	Directlink	
	ODRC Value ($M)	Remaining Life (yrs)
Substation costs	84.7	35.0
Transmission costs	54.0	45.0
Easement costs	0.0	∞
Total capital cost (depreciated)	138.7	

Values are in July 2005 dollars

Our calculations indicate that Directlink's opening asset value should be $138.7M. As Directlink and Alternative 2 provide the same level of total market benefits, this valuation is consistent with both the Commission's Murraylink asset valuation methodology and the alternative asset valuation methodology put forward by the Directlink Joint Venturers in November last year.

We would be happy to clarify or discuss any of the matters raised in our submission with Commission staff and their consultants.

Yours sincerely

Dennis Stanley
Directlink Joint Venture Manager

Encl.

ATTACHMENT 1

Burns and Roe Worley, *Letter to Dennis Stanley of the Directlink Joint Venturers*, 8 February 2005.

Burns and Roe Worley

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8 February 2005

Directlink Joint Venture Manager
PO Box 518
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Attention: Dennis Stanley

RE: BRW Draft Explanation to Review of Costs and Deferment Benefits

Dear Dennis

In response to the issues raised in PB Associates report "Review of Directlink Conversion Application Final Report" of 26 November 2004, BRW has reviewed the costing of the alternative projects and the related impact on the associated deferment benefits. BRW has also taken into consideration relevant aspects from PB Associates' review "TransGrid's Forward Capital Expenditure Requirements" of 27 January 2005 as noted in this letter.

1 Inclusion of costs associated with reliability enhancements to the existing Directlink

Costs provided by the DJV amounting to $3.74 M for enhancement of the reliability of the existing Directlink have been incorporated in Alternative 0.

2 Inclusion of costs to provide post contingent support

The DJV has advised BRW that the DJV is committed to working with TransGrid to design and implement an upgrade to Directlink's control and protection to enable Directlink to provide post-contingent network support. BRW agrees with the DJV that this is a small cost to pay for a capability that will ensure that Directlink's local network support does not have an impact on its capability to provide inter-regional market benefits.

Costs of $2.6 M (excluding contingency and IDC) for a post contingent support control scheme have been included in Alternatives 0, 1 and 2.

3 Local transmission communications, SCADA and metering works

During the DJV's discussion with NEMMCO over recent months, the DJV has identified the need for the communications, SCADA systems and metering associated with the transmission assets immediately adjacent to Directlink to be upgraded at a cost of $0.5 M (excluding contingency and

IDC). BRW believes that this is a conservative estimate of the costs involved and has added it to BRW's estimates for in Alternatives 0, 1 and 2. Similar but more likely limited upgrades would be required with Alternative 3 and BRW has included an estimated cost of $0.3 M for these works.

4 Upgrade of Line 966

BRW's modelling has indicated that Line 966 would be overloaded in a post-contingent condition from 2003/04 and that, to avoid this without the use of Directlink support, any upgrading of the line would need to have been completed in 2003.

While Directlink currently provides non-firm network support to northern NSW, TransGrid would have an increasing need to uprate Line 966 to avoid post-contingent overloading unless Directlink starts to provide firm network support. As a component of its proposed load-driven capital expenditure plan submitted to the ACCC in November 2004, TransGrid indicated that it intended upgrading Line 966 at a cost of $10.9M during the current regulatory period for the purpose of increasing the capacity of the far north coast 132 kV system and alleviating 'unacceptably low voltages on outage of critical elements at times of high demand'[1].

PB Associates has reviewed TransGrid's capital expenditure plan, and BRW agrees with PB Associates' written opinion that Directlink can defer the upgrading of Line 966.[2]

> "PB Associates has reviewed the information provided and has formed the view that this project can be deferred by Directlink well past the present regulatory period and hence should not be included in the current capital works program."

In fact, BRW's modelling shows that Directlink's network support can avoid the need for Line 966 to be upgraded to increase its capacity. Directlink can alleviate any overload on Line 966 until after the completion of the Dumaresq – Lismore 330 kV in 2017, which will provide a long term solution.

BRW concurs with the Directlink Joint Venturers that the deferral benefits of Directlink and its alternative projects should recognise this. BRW has discussed with TransGrid the scope of the work TransGrid intended to carry out to upgrade Line 966 and accepts TransGrid's estimate of $10.9M (2004 cost base, exclusive of IDC) as reasonable for the scope of works proposed. For the purposes of its deferral benefits recalculation, BRW has adjusted TransGrid's 2004 based cost so that has a 2005 base.

During a meeting with PB Associates and ACCC staff on 3 February 2005, PB Associates put the view that TransGrid will upgrade Line 966 in 2006 anyway for the purposes of asset replacement due to the line's poor condition and that Directlink will not defer the upgrade of Line 966. BRW disagrees with PB Associates' view in this regard. To BRW's knowledge, TransGrid's condition-related asset replacement plans for the coming regulatory period do not include an upgrade of Line 966. BRW has no evidence (such as a line condition report from TransGrid) that Line 966 is in poor condition and in need of replacement. BRW also understands that PB Associates has no conclusive evidence either.

5 Addition of Second Glen Innes - Tenterfield 132 kV circuit

In the light of statements made in PB Associates' review of Directlink's alternative projects, BRW has considered in more detail the options for retention of an N-1 supply to Tenterfield following

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[1] TransGrid, "Revised Transmission Capital Investment Program 2004-2009, Section 5 of 10, Customer Demand (Load) Driven Reliability Capital Expenditure", November 2004, p. 9.

[2] PB Associates, "TransGrid's Forward Capital Expenditure Requirements 2004/05 to 2008/09", January 2005, p. 80.

dismantling of the Tenterfield – Lismore 132 kV line during the construction of the Dumaresq – Lismore 330 kV line. A second Glen Innes - Tenterfield 132 kV circuit has been assessed as the lowest cost option assuming that there are no environmental constraints to its construction and that TransGrid's planned Glen Innes – Inverell 132 kV augmentation has been completed. A 330 kV Tenterfield substation option could be a lower cost alternative in the event of any significant environmental constraint to a line development or if the Glen Innes – Inverell 132 kV augmentation has not been completed. The second circuit (or a substation) would have to be constructed at the same time as the Dumaresq – Lismore 330 kV line.

The O&M costs for the second Glenn Innes – Tenterfield circuit significantly offset savings in 132 kV O&M costs through removal of the Tenterfield – Lismore 132 kV line. Taking into account the higher O&M costs for 330 kV substations and lines, relative to those for 132 kV facilities, BRW has assessed that there would be no saving in overall O&M costs as a result of the removal of the existing Tenterfield – Lismore 132 kV line.

6 Armidale – Port Macquarie 330 kV development

BRW's modelling has been based on the assumption that the 330 kV augmentation to Port Macquarie would be in commissioned on 2008/09 – this assumption was given by TransGrid in the consultations regarding the modelling assumptions. As this was an initial assumption, BRW has not carried out detailed modelling to investigate the voltage conditions at Port Macquarie. Currently capacitor banks at Port Macquarie and Taree support the voltage at Port Macquarie and the current development of the 330 kV supply to Coffs Harbour will also improve the voltage situation. The proposed 330 kV development to Port Macquarie will resolve this issue. Limited studies by BRW have indicated that Directlink can provide a degree of support to improving the voltage conditions at Port Macquarie prior to the 330 kV developments to Coffs Harbour and Port Macquarie.

PB Associates has indicated in its TransGrid report[3] that voltage control schemes based on coordination of the reactive plant and tap changers at the Lismore and Coffs Harbour substations and the dispatch of Directlink importing power from Queensland could relieve contingent low voltages and overloads in the Port Macquarie area. PB Associates also indicates that, based on studies carried out by TransGrid at PB Associates' request, the Port Macquarie 330 kV augmentation could be deferred by two years through such coordinated voltage control schemes. BRW understands from its consultations with TransGrid in relation to the modelling assumptions that, whilst PB Associates does not see any significant technical difficulty with implementing a control scheme of this type, TransGrid currently has some reservations about the use of such schemes in this application.

BRW has included an estimate of the potential benefit of a two-year deferment of the Port Macquarie 330 kV augmentation as input into the overall analysis even though BRW has not carried out modelling of this condition to the same extent as PB Associates and TransGrid. BRW would only be able to independently confirm the two-year deferment identified by PB Associates after more detailed modelling and after having undertaken an assessment of the technical feasibility of the necessary voltage control scheme.

[3] PB Associates, "TransGrid's Forward Capital Expenditure Requirements 2004/05 to 2008/09", January 2005, pp. 71-2.

6 Revised cost estimates for alternative projects

Detailed cost estimates for the alternative incorporating the changes described above have been provided as an attachment to this letter. These are identical in format and a replacement to those included in Section 7 of BRW's report dated 22 September 2004.

The following table summarises the revised costs of the alternative projects relacing the corresponding table from the executive summary of BRW's report dated 22 September 2004.

	Capital	IDC	Life-cycle O&M	Total Cost
Alternative 0	$172.2M	n/a	$31.4M	$203.6M
Alternative 1	$244.0M	$13.1M	$31.4M	$288.6M
Alternative 2	$146.6M	$10.2M	$31.4M	$188.2M
Alternative 3	$68.3M	$6.6M	$29.3M	$104.2M
Alternative 5				
Upgrade of Line 966	$11.3M	$0.5M	-	$11.9M
Lismore – Dumaresq 330 kV	$172.1M	$12.7M	$17.6M	$202.5M
Port Macquarie 330 kV	$127.3M	$9.4M	$16.9M	$153.6M
Greenbank 275 kV	$50.8M	$2.4M	$16.8M	$70.1M

The costs of the second Glen Innes – Tenterfield 132 kV circuit are included in the summary costs for the Lismore – Dumaresq 330 kV line. All costs have a July 2005 base and interest during construction and life-cycle O&M have been calculated on based on a 9% real discount rate. The cost of Alternative 5 can be calculated by taking account of the timing of each component for each load growth scenario and each discount rate.

7 Deferral benefits for the alternative projects

The following table summarises the revised deferral benefits for the alternative projects replacing the corresponding Table 4.3.5 from BRW's report dated 22 September 2004.

	Deferral Benefit		
	Low	Medium	High
AT 9% DISCOUNT RATE			
Alternative 0	$146.0M	$137.5M	$139.3M
Alternative 1	$146.0M	$137.5M	$139.3M
Alternative 2	$146.0M	$137.5M	$139.3M
Alternative 3	$68.9M	$71.9M	$75.4M
Alternative 5	$354.1M	$373.0M	$388.4M
AT 7% DISCOUNT RATE			
Alternative 0	$132.4M	$122.9M	$122.2M
Alternative 1	$132.4M	$122.9M	$122.2M
Alternative 2	$132.4M	$122.9M	$122.2M
Alternative 3	$60.6M	$62.7M	$65.0M
Alternative 5	$375.3M	$391.5M	$404.1M
AT 11% DISCOUNT RATE			
Alternative 0	$156.2M	$149.2M	$153.9M
Alternative 1	$156.2M	$149.2M	$153.9M
Alternative 2	$156.2M	$149.2M	$153.9M
Alternative 3	$76.2M	$80.2M	$85.0M
Alternative 5	$337.5M	$358.6M	$376.7M

Yours sincerely
Burns and Roe Worley

R McD Touzel
General Manager Consulting

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PROJECT COSTS

Present Value of Costs (Capital + O&M + IDC)

Table 7.1 (a) - Present Value of the Alternative Project Costs (in July 2005 dollars, 9%, 7% and 11% real discount rates)

Direct Link Alternatives Cost Analysis PRESENT VALUE SUMMARY	ALTERNATIVE 0 DC INTERCONNECTION MODIFIED DIRECTLINK UNDERGROUND	ALTERNATIVE 1 DC INTERCONNECTION DC LIGHT TECHNOLOGY UNDERGROUND	ALTERNATIVE 2 DC INTERCONNECTION TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND	ALTERNATIVE 3 132kV AC INTERCONNECTION WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND	ALTERNATIVE 5 330kV Lismore-Dumaresq Greenbank, Port Macquarie, 132kV line & uprating 966
Component Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
PRESENT VALUE TOTAL COST - 9%	**203.6**	**288.6**	**188.2**	**104.2**	**438.0**
Present Value Capital Cost (including contingency)	172.2	244.0	146.6	68.3	361.7
Present Value Interest During Construction (IDC) Cost		13.1	10.2	6.6	25.1
Present Value Operations and Maintenance (O&M) Cost	31.4	31.4	31.4	29.3	51.4
PRESENT VALUE TOTAL COST - 7%	**211.2**	**293.2**	**193.4**	**109.6**	**444.7**
Present Value Capital Cost (including contingency)	172.2	244.0	146.6	68.3	361.5
Present Value Interest During Construction (IDC) Cost		10.2	7.9	5.1	19.5
Present Value Operations and Maintenance (O&M) Cost	38.9	38.9	38.9	36.2	63.6
PRESENT VALUE TOTAL COST - 11%	**198.3**	**286.2**	**185.3**	**100.9**	**435.2**
Present Value Capital Cost (including contingency)	172.2	244.0	146.6	68.3	361.5
Present Value Interest During Construction (IDC) Cost		16.1	12.6	8.2	30.8
Present Value Operations and Maintenance (O&M) Cost	26.2	26.2	26.2	24.4	42.8

Table 7.1 (a) continued – Breakdown of Alternative 5 Components

Direct Link Alternatives Cost Analysis PRESENT VALUE SUMMARY	ALTERNATIVE 5 COMPONENTS				
	330kV Lismore-Dumaresq	GREENBANK	132KV Line Uprate No 966 Armidale to Koolkhan	132kV Line Reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes	Port Macquarie 33kV line from Armidale & 330/132kV Substation
Component Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
PRESENT VALUE TOTAL COST - 9%	**175.7**	**70.1**	**11.9**	**26.8**	**153.6**
Present Value Capital Cost (including contingency)	148.0	50.8	11.3	24.2	127.3
Present Value Interest During Construction (IDC) Cost	10.1	2.4	0.5	2.6	9.4
Present Value Operations and Maintenance (O&M) Cost	17.7	16.9	NA	Not Estimated	16.9
PRESENT VALUE TOTAL COST - 7%	**177.7**	**73.6**	**11.8**	**26.2**	**155.5**
Present Value Capital Cost (including contingency)	148.0	50.8	11.3	24.2	127.3
Present Value Interest During Construction (IDC) Cost	7.9	1.9	0.4	2.0	7.3
Present Value Operations and Maintenance (O&M) Cost	21.8	20.9	NA	Not Estimated	20.9
PRESENT VALUE TOTAL COST - 11%	**175.0**	**67.8**	**12.0**	**27.4**	**152.9**
Present Value Capital Cost (including contingency)	148.0	50.8	11.3	24.2	127.3
Present Value Interest During Construction (IDC) Cost	12.4	2.9	0.7	3.2	11.6
Present Value Operations and Maintenance (O&M) Cost	14.7	14.1	NA	Not Estimated	14.1

Notes for Table 7.1(a):

1. The cost of Alternative 0 is based upon the actual capital cost of Directlink. The Directlink Joint Venturers have advised BRW that they may be required to purchase additional spares to maintain an appropriate level of reliability. The actual capital cost of Directlink does not yet include the cost of those spares.

2. A contingency is included in the total estimated costs based on 10% of the capital cost. This is included to represent a cost component that an EPC contractor would include in the price of an EPC contract given the uncertainties associated with the base costs of other components and their sources. That is, BRW has used the same approach to the pricing of an EPC contract that an EPC contractor itself would use.

3. O&M cost is the total cost over the next 40 years discounted to present values.

4. IDC is an additional cost component that would be borne by the principal or an EPC contractor, depending on the payment terms of the contract. In the latter case, an IDC component would be included in the contract price. IDC has been calculated based on the following assumptions:

	Alternative 1 and 5		Alternative 2 and 3	
TIME TO IMPLEMENT	4 years		5 years	
Planning and Development	Through Years 1 and 2		Through Years 1 to 3	
Planning approval	End Year 2		End Year 3	
Easement acquisition	End Year 3		End Year 4	
Management	Years 1 through 4		Years 1 through 5	
Procurement	End Year 3	(65% cost split)	End Year 4	(65% cost split)
Construction	Through Year 4	(35% cost split)	Through Year 5	(35% cost split)

   The longer implementation time used for alternatives 2 and 3 is due to the additional project development and planning approval time anticipated to establish an overhead line.

5. The present value cost for the alternative projects assumes for costing purposes that they are all commissioned in July 2005. This places all cost on a common base date. The impact of timing of Alternative 5 is taken into account in the cash flows used to calculate the total costs and deferral benefits. The NSW component of Alternative 5 will be commissioned in 2005 in the high growth case and in 2006 for the medium and low growth cases and the present value of the costs of Alternative 5 in each case is shown in table 7.1 (b) below.

Operation and Maintenance Costs (O&M)

Table 7.2 – Summary of Operations and Maintenance Annual Expenditure (in July 2005 dollars)

Directlink Alternatives Cost Analysis **O&M**	**ALTERNATIVE 0** **DC INTERCONNECTION** **DC LIGHT TECHNOLOGY**	**ALTERNATIVE 1** **DC INTERCONNECTION** **DC LIGHT TECHNOLOGY UNDERGROUND**	**ALTERNATIVE 2** **DC INTERCONNECTION** **TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND**	**ALTERNATIVE 3** **132 kV AC INTERCONNECTION** **WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND**	**ALTERNATIVE 5** **330kV Lismore-Dumaresq, Greenbank,Port Macquarie, 132kVline & uprating 966**
O&M Component Costs **(Jul 2005 dollars excl GST)**	**Total** **Cost $M**	**Total** **Cost $M**	**Total** **Cost $M**	**Total** **Cost $M**	**Total** **Cost $M**
ANNUAL TOTAL COST	**2.931**	**2.931**	**2.931**	**2.732**	**4.795**
General management (with assistant)	0.31	0.31	0.31	0.31	**0.47**
Operating management costs (1)	0.20	0.20	0.20	0.20	**0.30**
Operations (5)	0.62	0.62	0.62	0.62	**0.94**
Commercial / regulatory (1)	0.20	0.20	0.20	0.20	**0.30**
Financial management (with assistant)	0.22	0.22	0.22	0.22	**0.33**
Maintenance costs	0.36	0.36	0.36	0.29	**0.95**
Audit fees	0.03	0.03	0.03	0.03	**0.05**
Legal fees	0.05	0.05	0.05	0.05	**0.07**
Insurance	0.31	0.31	0.31	0.19	**0.47**
Energy	0.31	0.31	0.31	0.31	**0.47**
Communications	0.16	0.16	0.16	0.16	**0.23**
Corporate overheads	0.10	0.10	0.10	0.10	**0.16**
Other costs	0.05	0.05	0.05	0.05	**0.08**

Table 7.2 continued – Breakdown of Alternative 5 Components

Directlink Alternatives Cost Analysis O&M	ALTERNATIVE 5 COMPONENTS				
	330kV Lismore-Dumaresq	Greenbank	132KV Line Uprate No 966 Armidale to Koolkhan	132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes	Port Macquarie 33kV line from Armidale & 330/132kV Dubstation
O&M Component Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
ANNUAL TOTAL COST	**1.647**	**1.574**	**NA**	**NA**	**1.574**
General management (with assistant)	0.16	0.16	NA		0.16
Operating management costs (1)	0.10	0.10	NA		0.10
Operations (5)	0.31	0.31	NA		0.31
Commercial / regulatory (1)	0.10	0.10	NA	Not Estimated	0.10
Financial management (with assistant)	0.11	0.11	NA		0.11
Maintenance costs	0.36	0.29	NA		0.29
Audit fees	0.02	0.02	NA		0.02
Legal fees	0.02	0.02	NA		0.02
Insurance	0.16	0.16	NA		0.16
Energy	0.16	0.16	NA		0.16
Communications	0.08	0.08	NA		0.08
Corporate overheads	0.05	0.05	NA		0.05
Other costs	0.03	0.03	NA		0.03

Notes for Table 7.2:

1. Breakdown of Directlink's forecast O&M is based on information provided by Country Energy and reviewed by BRW.
2. Maintenance costs have been pro-rata based on the complexity of the equipment.

3. Maintenance costs shown are for typical years. There will be an increase in annual costs of approximately $0.2 M over two years for some equipment replacements on a 10 year cycle.
4. Insurance costs have been pro-rata based on the capital cost of the project.
5. Debt and equity issuance costs have not been included in the forecast O&M expenditure.

Capital Costs

Table 7.3(a) – Total Capital Costs of the Alternative Projects by Component (in July 2005 dollars)

Directlink Alternatives Cost Analysis PROJECT CAPITAL	**ALTERNATIVE 1 DC INTERCONNECTION DC LIGHT TECHNOLOGY UNDERGROUND**	**ALTERNATIVE 2 DC INTERCONNECTION TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND**	**ALTERNATIVE 3 132 kV AC INTERCONNECTION WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND**	**ALTERNATIVE 5 330kV Lismore-Dumaresq, Greenbank,Port Macquarie, 132kVline & uprating 966**
Project Component Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
TOTAL COST (incl Contingency)	**244.0**	**146.6**	**68.3**	**361.5**
Contingency % 10	**22.2**	**13.3**	**6.2**	**32.9**
PROJECT COST	**221.8**	**133.3**	**62.1**	**328.8**
Development	3.1	4.2	4.2	8
Approvals	5.7	6.8	6.8	14.5
Easements and Site Acquisitions	2.6	2.6	3.1	61.7
Project Management	1.3	1.3	1.3	4.1
Equipment Spares	4.0	2.3	0.9	3.8
Installed Equipment	205.0	116.1	45.8	236.7

Table 7.3 (a) continued – Breakdown of Alternative 5 Components

Directlink Alternatives Cost Analysis O&M			ALTERNATIVE 5 COMPONENTS				
			330kV Lismore-Dumaresq	Greenbank	132KV Line Uprate No 966 Armidale to Koolkhan	132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes	Port Macquarie 33kV line Armidale & 330/132kV Dubstation
O&M Component Costs (Jul 2005 dollars excl GST)			**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
ANNUAL TOTAL COST			**148.0**	**50.8**	**11.3**	**24.2**	**127.3**
Contingency	**%**	**10**	13.5	4.6	1	2.2	**11.6**
PROJECT COMPONENT COSTS			*134.5*	*46.2*	*10.3*	*22.0*	*115.8*
Development			3.1	0.1	0.1	1.6	3.1
Approvals			5.7	0.1	0.1	2.8	5.7
Easements and Site Acquisitions			39.6			1.3	20.8
Project Management			1.3	0.1	0.1	1.3	1.3
Equipment Spares			1.7	0.2		0.3	1.7
Installed Equipment			83.1	45.7	10.1	14.7	83.2

Notes for Table 7.3 (a):

1. The total cost of the Greenbank alternative is based on Powerlink's costing and the breakdown of costs for Greenbank has been estimated by BRW.
2. No easement costs have been included for the Greenbank augmentation.

Table 7.3 (b) – Total Capital Costs of the Alternative Projects by Asset Class (in July 2005 dollars, 9% real discount rate)

Directlink Alternatives Cost Analysis PROJECT CAPITAL	**ALTERNATIVE 1 DC INTERCONNECTION DC LIGHT TECHNOLOGY UNDERGROUND**	**ALTERNATIVE 2 DC INTERCONNECTION TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND**	**ALTERNATIVE 3 132 kV AC INTERCONNECTION WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND**	**ALTERNATIVE 5 330kV Lismore-Dumaresq, Greenbank,Port Macquarie, 132kVline & uprating 966**
Project Component Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
TOTAL COST (incl Contingency and IDC)	**257.1**	**156.8**	**74.7**	**386.6**
Substation	161.0	99.0	21.8	47.3
IDC - Substation	9.0	7.4	2.3	4.4
Transmission	73.8	37.3	35.6	225.6
IDC - Transmission	4.1	2.8	3.8	20.6
Easements & Approvals	9.1	10.3	10.9	88.7

Table 7.3 (b) continued – Breakdown of Alternative 5 Components

Directlink Alternatives Cost Analysis PROJECT CAPITAL	**ALTERNATIVE 5 COMPONENTS**				
	330kV Lismore-Dumaresq	**Greenbank**	**132KV Line Uprate No 966 Armidale to Koolkhan**	**132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes**	**Port Macquarie 33kV line Armidale & 330/132kV Dubstation**
Project Component Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
TOTAL COST (incl Contingency and IDC)	**158.1**	**53.3**	**11.9**	**26.8**	**136.8**
Substation	13.6	10.2		4.1	19.4
IDC - Substation	1.4	0.5		0.6	1.9
Transmission	84.5	35.6	11.3	15.5	78.8
IDC - Transmission	8.7	1.9	0.5	2.1	7.6
Easements & Approvals	49.9	5.1	0.1	4.6	29.2

Notes for Tables 7.3 (a) and 7.3 (b):

1. A contingency is included in the total cost based on 10% of the capital cost as explained previously.
2. Equipment spares is based on 2% of the capital cost of the installed equipment.
3. Installed equipment costs based on the sum of the individual plant items (see Table 7.3 (c)).
4. All other costs pro-rata based on the project complexity and easement requirements.
5. Greenbank cost has been split as a 20/70/10 across categories Substation/Transmission/Easements and Approvals
6. Interest during construction is based on a 9% real discount rate
7. IDC has been apportioned between substation and transmission. No IDC is assumed for easements (or approvals)

Table 7.3(c) – Total Capital Costs of the Alternative Projects by Equipment Type (in July 2005 dollars)

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT CAPITAL	**ALTERNATIVE 1** **DC INTERCONNECTION** **DC LIGHT TECHNOLOGY** **UNDERGROUND**	**ALTERNATIVE 2** **DC INTERCONNECTION** **TRADITIONAL DC TECHNOLOGY** **OVERHEAD/UNDERGROUND**	**ALTERNATIVE 3** **132kV AC INTERCONNECTION** **WITH PHASE SHIFTERS** **OVERHEAD/UNDERGROUND**	**ALTERNATIVE 5** **330kV Lismore-Dumaresq** **Greenbank, Port Macquarie,** **132kV line & uprating 966**
Installed Equipment Costs (Jul 2005 dollars excl GST)	**Total** **Cost $M**	**Total** **Cost $M**	**Total** **Cost $M**	**Total** **Cost $M**
132/110kV 200MVA Phase Shift Transformer (3 phase)				
132/110kV 200MVA Phase Shift Transformer (4x1 phase)			11.9	
132kV 50MVAr Synchronous Condenser & Transformer		4.2		
110kV 25MVAr Synchronous Condenser & Transformer		2.6		
132/110kV 200MVA Auto-Transformer (3 phase unit)				
132/110kV 200MVA Auto-Transformer (4x1 phase unit)				
132 or 110kV Switching Bay	1.2	1.2	3.1	0.6
DC Converter station (Conventional) with Harmonic filtering and VAr compensation		74.4		
DC Converter station (Light)	137.2			
HVDC Underground Cable (Conventional)		20.3		
HVDC Underground Cable (Light)	58.3			
HVDC Overhead Pole Line		5.1		
132kV or 110kV AC Single Circuit Overhead Pole Line			5.1	12.5
Uprate 132kV Overhead Pole Line				10.1
330kV Single Circuit Overhead Tower Line				142.4
275kV Single Circuit Overhead Tower Line				
110kV AC Underground Cable (3 x 1/c)	4.6	4.6		
132kV AC Underground Cable (3 x 1/c)			24.0	
275kV Switching Bay (breaker and half)/2				
330kV Switching bay				15.6
60MVAr 330kV Line Reactor Bank				2.1
132 or 110kV 25MVAr Capacitor Bank (excluding CB)			0.3	
132 or 110kV 50MVAr Capacitor Bank (excluding CB)			0.5	
275kV 120MVAr Capacitor Bank (excluding CB)				

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT CAPITAL	ALTERNATIVE 1 DC INTERCONNECTION DC LIGHT TECHNOLOGY UNDERGROUND	ALTERNATIVE 2 DC INTERCONNECTION TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND	ALTERNATIVE 3 132kV AC INTERCONNECTION WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND	ALTERNATIVE 5 330kV Lismore-Dumaresq Greenbank, Port Macquarie, 132kV line & uprating 966
Installed Equipment Costs (Jul 2005 dollars excl GST)	Total Cost $M	Total Cost $M	Total Cost $M	Total Cost $M
275/110kV, 250 MVA Transformer				
330/132kV, 345 MVA Transformer				3.1
New Substation Yard Establishment				1.5
Protection and control upgrades	0.5	0.5	0.5	1.6
Post contingent control scheme	2.6	2.6		
Communications & SCADA Upgrade	0.5	0.5	0.3	1.6
Greenbank Installed Equipment (TNSP Estimate)				50.1

Table 7.3 (c) continued – Breakdown of Alternative 5 Components

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT CAPITAL	ALTERNATIVE 5 COMPONENTS				
	330kV Lismore-Dumaresq	**Greenbank**	**132KV Line Uprate No 966 Armidale to Koolkhan**	**132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes**	**Port Macquarie 330kV line from Armidale & 330/132kV Substation**
Installed Equipment Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
132/110kV 200MVA Phase Shift Transformer (3 phase)					
132/110kV 200MVA Phase Shift Transformer (4x1 phase)					
132kV 50MVAr Synchronous Condenser & Transformer					
110kV 25MVAr Synchronous Condenser & Transformer					
132/110kV 200MVA Auto-Transformer (3 phase unit)					
132/110kV 200MVA Auto-Transformer (4x1 phase unit)					
132 or 110kV Switching Bay				0.6	
DC Converter station (Conventional) with Harmonic filtering and VAr compensation					
DC Converter station (Light)					
HVDC Underground Cable (Conventional)					
HVDC Underground Cable (Light)					
HVDC Overhead Pole Line					
132kV or 110kV AC Single Circuit Overhead Pole Line				12.5	
Uprate 132kV Overhead Pole Line			10.1		
330kV Single Circuit Overhead Tower Line	73.8				68.6
275kV Single Circuit Overhead Tower Line					
110kV AC Underground Cable (3 x 1/c)					
132kV AC Underground Cable (3 x 1/c)					
275kV Switching Bay (breaker and half)/2					
330kV Switching bay	6.2				9.4
60MVAr 330kV Line Reactor Bank	2.1				
132 or 110kV 25MVAr Capacitor Bank (excluding CB)					
132 or 110kV 50MVAr Capacitor Bank (excluding CB)					
275kV 120MVAr Capacitor Bank (excluding CB)					

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT CAPITAL	ALTERNATIVE 5 COMPONENTS				
	330kV Lismore-Dumaresq	**Greenbank**	**132KV Line Uprate No 966 Armidale to Koolkhan**	**132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes**	**Port Macquarie 330kV line from Armidale & 330/132kV Substation**
Installed Equipment Costs (Jul 2005 dollars excl GST)	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**	**Total Cost $M**
275/110kV, 250 MVA Transformer					
330/132kV, 345 MVA Transformer					3.1
New Substation Yard Establishment				0.5	1.0
Protection and control upgrades	0.5			0.5	0.5
Post contingent control scheme					
Communications & SCADA Upgrade	0.5			0.5	0.5
Greenbank Installed Equipment (TNSP Estimate)		50.1			

Notes for Table 7.3 (c):

1. All costs include cost of purchase, delivery, installation, testing and commissioning.
2. Unit costs and quantities are provided in Table 7.3 (d)
3. Cost for Greenbank installed equipment derived from TNSP total project estimate.

Table 7.3(d) – Installed Equipment Unit Costs and Quantities of the Alternative Projects (in July 2005 dollars)

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT QUANTITIES			ALTERNATIVE 1 DC INTERCONNECTION DC LIGHT TECHNOLOGY UNDERGROUND	ALTERNATIVE 2 DC INTERCONNECTION TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND	ALTERNATIVE 3 132kV AC INTERCONNECTION WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND	ALTERNATIVE 5 330kV Lismore-Dumaresq Greenbank, Port Macquarie, 132kV line & uprating 966
Installed Equipment Unit Costs (Jan 2005 dollars excl GST)	Unit Measure	Unit Cost $M	Quantity	Quantity	Quantity	Quantity
132/110kV 200MVA Phase Shift Transformer (3 phase)	No.	6.2				
132/110kV 200MVA Phase Shift Transformer (4x1 phase)	No.	11.9			1.0	
132kV 50MVAr Synchronous Condenser & Transformer	No.	4.2		1.0		
110kV 25MVAr Synchronous Condenser & Transformer	No.	2.6		1.0		
132/110kV 200MVA Auto-Transformer (3 phase unit)	No.	1.8				
132/110kV 200MVA Auto-Transformer (4x1 phase unit)	No.	3.5				
132 or 110kV Switching Bay	No.	0.6	2.0	2.0	5.0	1.0
DC Converter station (Conventional) with Harmonic filtering and VAr compensation	No.	37.2		2.0		
DC Converter station (Light)	No.	68.6	2.0			
HVDC Underground Cable (Conventional)	km	1.2		17.0		
HVDC Underground Cable (Light)	km	1.0	59.0			
HVDC Overhead Pole Line	km	0.2		33.0		
132kV or 110kV AC Single Circuit Overhead Pole Line	km	0.2			33.0	80.0
Uprate 132kV Overhead Pole Line	No.	10.1				1.0
330kV Single Circuit Overhead Tower Line	km	0.3				415.0
275kV Single Circuit Overhead Tower Line	km	0.2				
110kV AC Underground Cable (3 x 1/c)	km	1.1	4.0	4.0		
132kV AC Underground Cable (3 x 1/c)	km	1.1			21.0	
275kV Switching Bay (breaker and half)/2	No.	1.3				
330kV Switching bay	No.	1.6				10.0
60MVAr 330kV Line Reactor Bank	No.	1.0				2.0
132 or 110kV 25MVAr Capacitor Bank (excluding CB)	No.	0.3			1.0	
132 or 110kV 50MVAr Capacitor Bank (excluding CB)	No.	0.5			1.0	
275kV 120MVAr Capacitor Bank (excluding CB)	No.	1.3				

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT QUANTITIES			ALTERNATIVE 1 DC INTERCONNECTION DC LIGHT TECHNOLOGY UNDERGROUND	ALTERNATIVE 2 DC INTERCONNECTION TRADITIONAL DC TECHNOLOGY OVERHEAD/UNDERGROUND	ALTERNATIVE 3 132kV AC INTERCONNECTION WITH PHASE SHIFTERS OVERHEAD/UNDERGROUND	ALTERNATIVE 5 330kV Lismore-Dumaresq Greenbank, Port Macquarie, 132kV line & uprating 966
Installed Equipment Unit Costs (Jan 2005 dollars excl GST)	Unit Measure	Unit Cost $M	Quantity	Quantity	Quantity	Quantity
275/110kV, 250 MVA Transformer	No.	2.1				
330/132kV, 345 MVA Transformer	No.	3.1				1.0
New Substation Yard Establishment	No.	1.0				1.5
Protection and control upgrades	No.	0.5	1.0	1.0		3.0
Post contingent control scheme	No.	2.6	1.0	1.0		
Communications & SCADA Upgrade	No.	0.5	1.0	1.0		3.0
Greenbank Installed Equipment (TNSP Estimate)	No.	50.8				1.0

Table 7.3 (d) continued – Breakdown of Alternative 5 Components

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT CAPITAL			Alternative 5 Components				
			330kV Lismore-Dumaresq	Greenbank	132KV Line Uprate No 966 Armidale to Koolkhan	132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes	Port Macquarie 330kV line from Armidale & 330/132kV Substation
Installed Equipment Quantities (Jul 2005 dollars excl GST)	Unit Measure	Unit Cost $M	Quantity	Quantity	Quantity	Quantity	Quantity
132/110kV 200MVA Phase Shift Transformer (3 phase)	No.	6.2					
132/110kV 200MVA Phase Shift Transformer (4x1 phase)	No.	11.9					
132kV 50MVAr Synchronous Condenser & Transformer	No.	4.2					
110kV 25MVAr Synchronous Condenser & Transformer	No.	2.6					
132/110kV 200MVA Auto-Transformer (3 phase unit)	No.	1.8					
132/110kV 200MVA Auto-Transformer (4x1 phase unit)	No.	3.5					
132 or 110kV Switching Bay	No.	0.6				1.0	
DC Converter station (Conventional) with Harmonic filtering and VAr compensation	No.	37.2					
DC Converter station (Light)	No.	68.6					
HVDC Underground Cable (Conventional)	km	1.2					
HVDC Underground Cable (Light)	km	1.0					
HVDC Overhead Pole Line	km	0.2					
132kV or 110kV AC Single Circuit Overhead Pole Line	km	0.2				80.0	
Uprate 132kV Overhead Pole Line	No.	10.1			1.0		
330kV Single Circuit Overhead Tower Line	km	0.3	215.0				200.0
275kV Single Circuit Overhead Tower Line	km	0.2					
110kV AC Underground Cable (3 x 1/c)	km	1.1					
132kV AC Underground Cable (3 x 1/c)	km	1.1					
275kV Switching Bay (breaker and half)/2	No.	1.3					
330kV Switching bay	No.	1.6	4.0				6.0
60MVAr 330kV Line Reactor Bank	No.	1.0	2.0				
132 or 110kV 25MVAr Capacitor Bank (excluding CB)	No.	0.3					

Direct Link Alternatives Cost Analysis INSTALLED EQUIPMENT CAPITAL			Alternative 5 Components				
			330kV Lismore-Dumaresq	Greenbank	132KV Line Uprate No 966 Armidale to Koolkhan	132kV Line reinforcement Glen Innes to Tenterfield & 132kV Bay at Glen Innes	Port Macquarie 330kV line from Armidale & 330/132kV Substation
Installed Equipment Quantities (Jul 2005 dollars excl GST)	Unit Measure	Unit Cost $M	Quantity	Quantity	Quantity	Quantity	Quantity
132 or 110kV 50MVAr Capacitor Bank (excluding CB)	No.	0.5					
275kV 120MVAr Capacitor Bank (excluding CB)	No.	1.3					
275/110kV, 250 MVA Transformer	No.	2.1					
330/132kV, 345 MVA Transformer	No.	3.1					1.0
New Substation Yard Establishment	No.	1.0				0.5	1.0
Protection and control upgrades	No.	0.5	1.0			1.0	1.0
Post contingent control scheme	No.	2.6					
Communications & SCADA Upgrade	No.	0.5	1.0			1.0	1.0
Greenbank Installed Equipment (TNSP Estimate)	No.	50.8		1.0			

Notes for Table 7.3 (d):

1. All costs include cost of purchase, delivery, installation, testing and commissioning.
2. Unit costs in Table 7.3 (d) were obtained from equipment suppliers and/or NSPs supplemented/verified against BRW's unit cost database.

ATTACHMENT 2

Tables to replace Table 4.7-4.12 in the Directlink Joint Venturers' revised *Application for Conversion to a Prescribed Service and a Maximum Allowable Revenue to June 2015* of 22 September 2004.

Table 4.7

TOTAL COSTS OF THE ALTERNATIVE PROJECTS FOR EACH SCENARIO ($M)

No.	Type of scenario	Value of USE	Gen. bidding	Disc. rate	Econ. growth	Alt proj cost	Alternative 0	Alternative 1	Alternative 2	Alternative 3	Alternative 5
							Total cost	Total cost	Total cost	Total cost	Total cost
1	Sensitivity	29,500	LRMC	11%	High	100%	198.4	286.3	185.4	100.9	376.7
2	Sensitivity	29,500	LRMC	11%	Med	100%	198.4	286.3	185.4	100.9	358.6
3	Sensitivity	29,500	LRMC	11%	Low	100%	198.4	286.3	185.4	100.9	337.5
4	Credible	29,500	LRMC	9%	High	100%	203.6	288.6	188.2	104.2	388.4
5	Credible	29,500	LRMC	9%	Med	100%	203.6	288.6	188.2	104.2	373.0
6	Credible	29,500	LRMC	9%	Low	100%	203.6	288.6	188.2	104.2	354.1
7	Sensitivity	29,500	LRMC	7%	High	100%	211.1	293.1	193.4	109.6	404.1
8	Sensitivity	29,500	LRMC	7%	Med	100%	211.1	293.1	193.4	109.6	391.5
9	Sensitivity	29,500	LRMC	7%	Low	100%	211.1	293.1	193.4	109.6	375.3
10	Sensitivity	29,500	SRMC	11%	Med	100%	198.4	286.3	185.4	100.9	358.6
11	Credible	29,500	SRMC	9%	Med	100%	203.6	288.6	188.2	104.2	373.0
12	Sensitivity	29,500	SRMC	7%	Med	100%	211.1	293.1	193.4	109.6	391.5
12A	Credible	29,500	LRMC	9%	Med	110%	206.8	317.4	207.1	114.6	397.0
12B	Credible	29,500	LRMC	9%	Med	90%	200.5	259.7	169.4	93.8	348.9
13	Sensitivity	10,000	LRMC	11%	High	100%	198.4	286.3	185.4	100.9	376.7
14	Sensitivity	10,000	LRMC	11%	Med	100%	198.4	286.3	185.4	100.9	358.6
15	Sensitivity	10,000	LRMC	11%	Low	100%	198.4	286.3	185.4	100.9	337.5
16	Sensitivity	10,000	LRMC	9%	High	100%	203.6	288.6	188.2	104.2	388.4
17	Sensitivity	10,000	LRMC	9%	Med	100%	203.6	288.6	188.2	104.2	373.0
18	Sensitivity	10,000	LRMC	9%	Low	100%	203.6	288.6	188.2	104.2	354.1
19	Sensitivity	10,000	LRMC	7%	High	100%	211.1	293.1	193.4	109.6	404.1
20	Sensitivity	10,000	LRMC	7%	Med	100%	211.1	293.1	193.4	109.6	391.5
21	Sensitivity	10,000	LRMC	7%	Low	100%	211.1	293.1	193.4	109.6	375.3
22	Sensitivity	10,000	SRMC	11%	Med	100%	198.4	286.3	185.4	100.9	358.6
23	Sensitivity	10,000	SRMC	9%	Med	100%	203.6	288.6	188.2	104.2	373.0
24	Sensitivity	10,000	SRMC	7%	Med	100%	211.1	293.1	193.4	109.6	391.5

Source: BRW & The Allen Consulting Group

Table 4.8

NETWORK DEFERRAL BENEFITS OF THE ALTERNATIVE PROJECTS FOR EACH SCENARIO ($M)

No.	Type of Scenario	Value of USE	Gen. bidding	Disc. rate	Econ. growth	Alt proj cost	Alternative 0	Alternative 1	Alternative 2	Alternative 3	Alternative 5
							Network def.	Network def.	Network def.	Network def.	Network def.
1	Sensitivity	29,500	LRMC	11%	High	100%	139.0	139.0	153.9	85.0	376.7
2	Sensitivity	29,500	LRMC	11%	Med	100%	149.2	149.2	149.2	80.2	358.6
3	Sensitivity	29,500	LRMC	11%	Low	100%	156.2	156.2	156.2	76.2	337.5
4	Credible	29,500	LRMC	9%	High	100%	139.3	139.3	139.3	75.4	388.4
5	Credible	29,500	LRMC	9%	Med	100%	137.5	137.5	137.5	71.9	373.0
6	Credible	29,500	LRMC	9%	Low	100%	146.0	146.0	146.0	68.9	354.1
7	Sensitivity	29,500	LRMC	7%	High	100%	122.2	122.2	122.2	65.0	404.1
8	Sensitivity	29,500	LRMC	7%	Med	100%	122.9	122.9	122.9	62.7	391.5
9	Sensitivity	29,500	LRMC	7%	Low	100%	132.4	132.4	132.4	60.6	375.3
10	Sensitivity	29,500	SRMC	11%	Med	100%	149.2	149.2	149.2	80.2	358.6
11	Credible	29,500	SRMC	9%	Med	100%	137.5	137.5	137.5	71.9	373.0
12	Sensitivity	29,500	SRMC	7%	Med	100%	122.9	122.9	122.9	62.7	391.5
12A	Credible	29,500	LRMC	9%	Med	110%	148.0	148.0	148.0	75.8	397.0
12B	Credible	29,500	LRMC	9%	Med	90%	127.1	127.1	127.1	68.0	348.9
13	Sensitivity	10,000	LRMC	11%	High	100%	153.9	153.9	153.9	85.0	376.7
14	Sensitivity	10,000	LRMC	11%	Med	100%	149.2	149.2	149.2	80.2	358.6
15	Sensitivity	10,000	LRMC	11%	Low	100%	156.2	156.2	156.2	76.2	337.5
16	Sensitivity	10,000	LRMC	9%	High	100%	139.3	139.3	139.3	75.4	388.4
17	Sensitivity	10,000	LRMC	9%	Med	100%	137.5	137.5	137.5	71.9	373.0
18	Sensitivity	10,000	LRMC	9%	Low	100%	146.0	146.0	146.0	68.9	354.1
19	Sensitivity	10,000	LRMC	7%	High	100%	122.2	122.2	122.2	65.0	404.1
20	Sensitivity	10,000	LRMC	7%	Med	100%	122.9	122.9	122.9	62.7	391.5
21	Sensitivity	10,000	LRMC	7%	Low	100%	132.4	132.4	132.4	60.6	375.3
22	Sensitivity	10,000	SRMC	11%	Med	100%	149.2	149.2	149.2	80.2	358.6
23	Sensitivity	10,000	SRMC	9%	Med	100%	137.5	137.5	137.5	71.9	373.0
24	Sensitivity	10,000	SRMC	7%	Med	100%	122.9	122.9	122.9	62.7	391.5

Source: BRW & The Allen Consulting Group. Note: 'Network def.' means market benefits derived from deferring the default reliability augmentations relative to Alternative 5.

Table 4.9

INTER-REGIONAL BENEFITS OF THE ALTERNATIVE PROJECTS FOR EACH SCENARIO ($M)

No.	Type of Scenario	Value of USE	Gen. bidding	Disc. rate	Econ. growth	Alt proj cost	Alternative 0	Alternative 1	Alternative 2	Alternative 3	Alternative 5
							Inter-regional	Inter-regional	Inter-regional	Inter-regional	Inter-regional
1	Sensitivity	29,500	LRMC	11%	High	100%	170.5	170.5	170.5	-4.9	0.0
2	Sensitivity	29,500	LRMC	11%	Med	100%	124.8	124.8	124.8	8.3	0.0
3	Sensitivity	29,500	LRMC	11%	Low	100%	54.2	54.2	54.2	-1.9	0.0
4	Credible	29,500	LRMC	9%	High	100%	197.1	197.1	197.1	-7.5	0.0
5	Credible	29,500	LRMC	9%	Med	100%	135.1	135.1	135.1	7.8	0.0
6	Credible	29,500	LRMC	9%	Low	100%	45.4	45.4	45.4	-4.3	0.0
7	Sensitivity	29,500	LRMC	7%	High	100%	234.1	234.1	234.1	-11.2	0.0
8	Sensitivity	29,500	LRMC	7%	Med	100%	143.4	143.4	143.4	7.1	0.0
9	Sensitivity	29,500	LRMC	7%	Low	100%	23.3	23.3	23.3	-8.1	0.0
10	Sensitivity	29,500	SRMC	11%	Med	100%	55.1	55.1	55.1	5.3	0.0
11	Credible	29,500	SRMC	9%	Med	100%	57.2	57.2	57.2	4.1	0.0
12	Sensitivity	29,500	SRMC	7%	Med	100%	59.4	59.4	59.4	2.6	0.0
12A	Credible	29,500	LRMC	9%	Med	110%	135.1	135.1	135.1	7.8	0.0
12B	Credible	29,500	LRMC	9%	Med	90%	135.1	135.1	135.1	7.8	0.0
13	Sensitivity	10,000	LRMC	11%	High	100%	162.7	162.7	162.7	-2.9	0.0
14	Sensitivity	10,000	LRMC	11%	Med	100%	102.9	102.9	102.9	1.2	0.0
15	Sensitivity	10,000	LRMC	11%	Low	100%	65.3	65.3	65.3	4.9	0.0
16	Sensitivity	10,000	LRMC	9%	High	100%	187.0	187.0	187.0	-4.1	0.0
17	Sensitivity	10,000	LRMC	9%	Med	100%	107.9	107.9	107.9	0.2	0.0
18	Sensitivity	10,000	LRMC	9%	Low	100%	60.5	60.5	60.5	4.8	0.0
19	Sensitivity	10,000	LRMC	7%	High	100%	220.4	220.4	220.4	-5.8	0.0
20	Sensitivity	10,000	LRMC	7%	Med	100%	108.4	108.4	108.4	-1.1	0.0
21	Sensitivity	10,000	LRMC	7%	Low	100%	44.5	44.5	44.5	4.3	0.0
22	Sensitivity	10,000	SRMC	11%	Med	100%	35.8	35.8	35.8	1.1	0.0
23	Sensitivity	10,000	SRMC	9%	Med	100%	30.4	30.4	30.4	-0.1	0.0
24	Sensitivity	10,000	SRMC	7%	Med	100%	20.1	20.1	20.1	-1.7	0.0

Source: TEUS. Note: 'Inter-regional.' means the inter-regional market benefits of the alternative project relative to those of Alternative 5.

Table 4.10

TOTAL MARKET BENEFITS FOR EACH SCENARIO ($M)

No.	Type of Scenario	Value of USE	Gen. bidding	Disc. rate	Econ. growth	Alt proj cost	Alternative 0	Alternative 1	Alternative 2	Alternative 3	Alternative 5
							Total benefits	Total benefits	Total benefits	Total benefits	Total benefits
1	Sensitivity	29,500	LRMC	11%	High	100%	309.5	309.5	309.5	80.1	376.7
2	Sensitivity	29,500	LRMC	11%	Med	100%	274.1	274.1	274.1	88.5	358.6
3	Sensitivity	29,500	LRMC	11%	Low	100%	210.4	210.4	210.4	74.3	337.5
4	Credible	29,500	LRMC	9%	High	100%	336.5	336.5	336.5	68.0	388.4
5	Credible	29,500	LRMC	9%	Med	100%	272.7	272.7	272.7	79.7	373.0
6	Credible	29,500	LRMC	9%	Low	100%	191.4	191.4	191.4	64.6	354.1
7	Sensitivity	29,500	LRMC	7%	High	100%	356.3	356.3	356.3	53.8	404.1
8	Sensitivity	29,500	LRMC	7%	Med	100%	266.2	266.2	266.2	69.8	391.5
9	Sensitivity	29,500	LRMC	7%	Low	100%	155.7	155.7	155.7	52.5	375.3
10	Sensitivity	29,500	SRMC	11%	Med	100%	204.3	204.3	204.3	85.5	358.6
11	Credible	29,500	SRMC	9%	Med	100%	194.8	194.8	194.8	76.0	373.0
12	Sensitivity	29,500	SRMC	7%	Med	100%	182.2	182.2	182.2	65.3	391.5
12A	Credible	29,500	LRMC	9%	Med	110%	283.1	283.1	283.1	83.6	397.0
12B	Credible	29,500	LRMC	9%	Med	90%	262.2	262.2	262.2	75.8	348.9
13	Sensitivity	10,000	LRMC	11%	High	100%	316.6	316.6	316.6	82.1	376.7
14	Sensitivity	10,000	LRMC	11%	Med	100%	252.2	252.2	252.2	81.4	358.6
15	Sensitivity	10,000	LRMC	11%	Low	100%	221.4	221.4	221.4	81.1	337.5
16	Sensitivity	10,000	LRMC	9%	High	100%	326.3	326.3	326.3	71.3	388.4
17	Sensitivity	10,000	LRMC	9%	Med	100%	245.4	245.4	245.4	72.1	373.0
18	Sensitivity	10,000	LRMC	9%	Low	100%	206.5	206.5	206.5	73.7	354.1
19	Sensitivity	10,000	LRMC	7%	High	100%	342.6	342.6	342.6	59.1	404.1
20	Sensitivity	10,000	LRMC	7%	Med	100%	231.2	231.2	231.2	61.5	391.5
21	Sensitivity	10,000	LRMC	7%	Low	100%	176.8	176.8	176.8	64.9	375.3
22	Sensitivity	10,000	SRMC	11%	Med	100%	185.0	185.0	185.0	81.3	358.6
23	Sensitivity	10,000	SRMC	9%	Med	100%	168.0	168.0	168.0	71.8	373.0
24	Sensitivity	10,000	SRMC	7%	Med	100%	143.0	143.0	143.0	61.0	391.5

Source: BRW, TEUS & The Allen Consulting Group.

Table 4.11

RELATIVE NET MARKET BENEFITS FOR EACH SCENARIO ($M)

No.	Type of Scenario	Value of USE	Gen. bidding	Disc. rate	Econ. growth	Alt proj cost	Alternative 0		Alternative 1		Alternative 2		Alternative 3		Alternative 5	
							RNB	Rank	RNB	Rank	RNB	Rank	RNB	Rank	RNB	Rank
1	Sensitivity	29,500	LRMC	11%	High	100%	111.1	2	23.2	3	139.0	1	-20.8	5	0.0	4
2	Sensitivity	29,500	LRMC	11%	Med	100%	75.7	2	-12.2	4	88.7	1	-12.5	5	0.0	3
3	Sensitivity	29,500	LRMC	11%	Low	100%	12.0	2	-75.9	5	25.0	1	-26.6	4	0.0	3
4	Credible	29,500	LRMC	9%	High	100%	132.8	2	47.9	3	148.2	1	-36.3	5	0.0	4
5	Credible	29,500	LRMC	9%	Med	100%	69.0	2	-15.9	4	84.4	1	-24.5	5	0.0	3
6	Credible	29,500	LRMC	9%	Low	100%	-12.2	3	-97.2	5	3.2	1	-39.6	4	0.0	2
7	Sensitivity	29,500	LRMC	7%	High	100%	145.3	2	63.2	3	163.0	1	-55.8	5	0.0	4
8	Sensitivity	29,500	LRMC	7%	Med	100%	55.2	2	-26.8	4	72.9	1	-39.9	5	0.0	3
9	Sensitivity	29,500	LRMC	7%	Low	100%	-55.4	3	-137.4	5	-37.7	2	-57.1	4	0.0	1
10	Sensitivity	29,500	SRMC	11%	Med	100%	5.9	2	-82.0	5	18.9	1	-15.4	4	0.0	3
11	Credible	29,500	SRMC	9%	Med	100%	-8.8	3	-93.8	5	6.6	1	-28.2	4	0.0	2
12	Sensitivity	29,500	SRMC	7%	Med	100%	-28.8	3	-110.9	5	-11.2	2	-44.4	4	0.0	1
12A	Sensitivity	29,500	LRMC	9%	Med	110%	76.4	1	-34.3	5	76.1	2	-31.0	4	0.0	3
12B	Sensitivity	29,500	LRMC	9%	Med	90%	61.7	2	2.5	3	92.8	1	-18.0	5	0.0	4
13	Sensitivity	10,000	LRMC	11%	High	100%	118.2	2	30.3	3	131.2	1	-18.8	5	0.0	4
14	Sensitivity	10,000	LRMC	11%	Med	100%	53.8	2	-34.1	5	66.8	1	-19.6	4	0.0	3
15	Sensitivity	10,000	LRMC	11%	Low	100%	23.1	2	-64.8	5	36.1	1	-19.8	4	0.0	3
16	Sensitivity	10,000	LRMC	9%	High	100%	122.7	2	37.8	3	138.1	1	-32.9	5	0.0	4
17	Sensitivity	10,000	LRMC	9%	Med	100%	41.8	2	-43.1	5	57.2	1	-32.1	4	0.0	3
18	Sensitivity	10,000	LRMC	9%	Low	100%	2.9	2	-82.1	5	18.3	1	-30.5	4	0.0	3
19	Sensitivity	10,000	LRMC	7%	High	100%	131.5	2	49.5	3	149.2	1	-50.5	5	0.0	4
20	Sensitivity	10,000	LRMC	7%	Med	100%	20.2	2	-61.9	5	37.9	1	-48.1	4	0.0	3
21	Sensitivity	10,000	LRMC	7%	Low	100%	-34.3	3	-116.3	5	-16.6	2	-44.8	4	0.0	1
22	Sensitivity	10,000	SRMC	11%	Med	100%	-13.4	3	-101.3	5	-0.4	2	-19.6	4	0.0	1
23	Sensitivity	10,000	SRMC	9%	Med	100%	-35.7	4	-120.6	5	-20.3	2	-32.4	3	0.0	1
24	Sensitivity	10,000	SRMC	7%	Med	100%	-68.1	4	-150.1	5	-50.4	3	-48.7	2	0.0	1

Source: BRW, TEUS & The Allen Consulting Group. Note: 'RNB' means net market benefits relative to Alternative 5.

Table 4.12

RANKINGS OF ALTERNATIVE PROJECTS FOR EACH SCENARIO ($M)

No.	Type of Scenario	Value of USE	Gen. bidding	Disc. rate	Econ. growth	Alt proj cost	First rank		Second rank		Third rank		Fourth rank		Fifth rank	
							Proj	RNB	Proj	RNB	Proj	RNB	Proj	RNB	Proj	RNB
1	Sensitivity	29,500	LRMC	11%	High	100%	Alt 2	139.0	Alt 0	111.1	Alt 1	23.2	Alt 5	0.0	Alt 3	-20.8
2	Sensitivity	29,500	LRMC	11%	Med	100%	Alt 2	88.7	Alt 0	75.7	Alt 5	0.0	Alt 1	-12.2	Alt 3	-12.5
3	Sensitivity	29,500	LRMC	11%	Low	100%	Alt 2	25.0	Alt 0	12.0	Alt 5	0.0	Alt 3	-26.6	Alt 1	-75.9
4	Credible	29,500	LRMC	9%	High	100%	Alt 2	148.2	Alt 0	132.8	Alt 1	47.9	Alt 5	0.0	Alt 3	-36.3
5	Credible	29,500	LRMC	9%	Med	100%	Alt 2	84.4	Alt 0	69.0	Alt 5	0.0	Alt 1	-15.9	Alt 3	-24.5
6	Credible	29,500	LRMC	9%	Low	100%	Alt 2	3.2	Alt 5	0.0	Alt 0	-12.2	Alt 3	-39.6	Alt 1	-97.2
7	Sensitivity	29,500	LRMC	7%	High	100%	Alt 2	163.0	Alt 0	145.3	Alt 1	63.2	Alt 5	0.0	Alt 3	-55.8
8	Sensitivity	29,500	LRMC	7%	Med	100%	Alt 2	72.9	Alt 0	55.2	Alt 5	0.0	Alt 1	-26.8	Alt 3	-39.9
9	Sensitivity	29,500	LRMC	7%	Low	100%	Alt 5	0.0	Alt 2	-37.7	Alt 3	-57.1	Alt 0	-55.4	Alt 1	-137.4
10	Sensitivity	29,500	SRMC	11%	Med	100%	Alt 2	18.9	Alt 0	5.9	Alt 5	0.0	Alt 3	-15.4	Alt 1	-82.0
11	Credible	29,500	SRMC	9%	Med	100%	Alt 2	6.6	Alt 5	0.0	Alt 0	-8.8	Alt 3	-28.2	Alt 1	-93.8
12	Sensitivity	29,500	SRMC	7%	Med	100%	Alt 5	0.0	Alt 2	-11.2	Alt 0	-28.8	Alt 3	-44.4	Alt 1	-110.9
12A	Credible	29,500	LRMC	9%	Med	110%	Alt 2	76.1	Alt 0	76.4	Alt 5	0.0	Alt 3	-31.0	Alt 1	-34.3
12B	Credible	29,500	LRMC	9%	Med	90%	Alt 2	92.8	Alt 0	61.7	Alt 1	2.5	Alt 5	0.0	Alt 3	-18.0
13	Sensitivity	10,000	LRMC	11%	High	100%	Alt 2	131.2	Alt 0	118.2	Alt 1	30.3	Alt 5	0.0	Alt 3	-18.8
14	Sensitivity	10,000	LRMC	11%	Med	100%	Alt 2	66.8	Alt 0	53.8	Alt 5	0.0	Alt 3	-19.6	Alt 1	-34.1
15	Sensitivity	10,000	LRMC	11%	Low	100%	Alt 2	36.1	Alt 0	23.1	Alt 5	0.0	Alt 3	-19.8	Alt 1	-64.8
16	Sensitivity	10,000	LRMC	9%	High	100%	Alt 2	138.1	Alt 0	122.7	Alt 1	37.8	Alt 5	0.0	Alt 3	-32.9
17	Sensitivity	10,000	LRMC	9%	Med	100%	Alt 2	57.2	Alt 0	41.8	Alt 5	0.0	Alt 3	-32.1	Alt 1	-43.1
18	Sensitivity	10,000	LRMC	9%	Low	100%	Alt 2	18.3	Alt 0	2.9	Alt 5	0.0	Alt 3	-30.5	Alt 1	-82.1
19	Sensitivity	10,000	LRMC	7%	High	100%	Alt 2	149.2	Alt 0	131.5	Alt 1	49.5	Alt 5	0.0	Alt 3	-50.5
20	Sensitivity	10,000	LRMC	7%	Med	100%	Alt 2	37.9	Alt 0	20.2	Alt 5	0.0	Alt 3	-48.1	Alt 1	-61.9
21	Sensitivity	10,000	LRMC	7%	Low	100%	Alt 5	0.0	Alt 2	-16.6	Alt 0	-34.3	Alt 3	-44.8	Alt 1	-116.3
22	Sensitivity	10,000	SRMC	11%	Med	100%	Alt 5	0.0	Alt 2	-0.4	Alt 0	-13.4	Alt 3	-19.6	Alt 1	-101.3
23	Sensitivity	10,000	SRMC	9%	Med	100%	Alt 5	0.0	Alt 2	-20.3	Alt 3	-32.4	Alt 0	-35.7	Alt 1	-120.6
24	Sensitivity	10,000	SRMC	7%	Med	100%	Alt 5	0.0	Alt 3	-48.7	Alt 2	-50.4	Alt 0	-68.1	Alt 1	-150.1

Source: BRW, TEUS & The Allen Consulting Group. Note: 'RNB' means net market benefits relative to Alternative 5.