

Table 38: Operating Cost Parameters

Variable	Bus	BRT	LRT
On-vehicle crew costs (\$/hr)	\$30.00*	\$30.00*	\$76.40
Standard vehicle operating costs (\$/km)	\$1.03	\$1.03	\$1.71
Articulated vehicle operating costs (\$/km)	\$1.29	\$1.29	
Proportion of articulated vehicles	5%	5%	
Overheads (% on other costs)	21%	21%	17.5%

Vehicle operating costs, overheads and profit margins are based on ATC (2006c). Hourly bus wages are based on ACTION Buses. All values were indexed to June 2011 prices using changes in the Producer Price Index (vehicle operating costs) and Average Weekly Earnings (light rail crew costs). The proportion of articulated vehicles used reflects the current composition of the ACTION Bus fleet (ACTION Bus Wiki 2012).

Table 39: Dead Running and Layover Assumptions

Variable	Bus	BRT	LRT
Peak dead running allowance	25%	25%	20%
Off-peak dead running allowance	25%	5%	5%
Layover allowance	5 min	5 min	5 min

Peak dead-running statistics are based on current ACTION Buses levels of dead running whilst LRT levels of dead running are based on ATC (2006d). Off-peak dead-running is assumed to be equal to peak dead running for standard bus services whilst ATC (2006d) estimates have been used for BRT and LRT off-peak dead running. Layover allowances are based on ATC (2006d). Average service speeds are assumptions.

Table 40 shows the final operating cost rates used by mode, which were kept constant in real terms for all years.

Table 40: Operating Cost Rate

Variable	Bus	BRT	LRT
Operating Cost Rate (\$/km)	\$3.98	\$3.47	\$6.06

Operating cost rates were estimated by Deloitte based on ATC Guideline rates.

5. Economic Model Parameters – Benefits

Benefits ramp up - Describe how benefits ramp up over the construction period. What source and/or assumptions inform this ramp up?

No ramp-up has been applied to the benefits. It would be anticipated that as an established transport corridor (albeit with significant anticipated population growth at the northern end), a ramp-up period would likely to be small in effect (>90% of benefits) and short in duration (less than 2 years).

Cost and benefit time streams - Attach an appendix showing the time stream for each benefit and cost component (\$M, real, undiscounted)

Cost and benefit streams over the appraisal period are provided at the end of this template.

Generalised trip cost - has generalised trip cost (GTC) been calculated on an origin – destination (OD) basis within the demand model, or using aggregate outputs from the demand model?

All travel time based benefits have been based directly off demand and time skims provided by SMEC. Travel times were disaggregated by mode and type of user using the set of equations shown below to facilitate the application of the 'rule of half'.



Equation 3: Assessing Changes in Travel Time for a Given Mode k

$$\text{Change in GJT (continuing users)}_k = \sum_{vi,j} Q_{\text{continuing},ij} (C_{\text{after},ij} - C_{\text{before},ij})$$

$$\text{Change in GJT (new users)}_k = \sum_{vi,j} Q_{\text{new},ij} (C_{\text{after},ij})$$

$$\text{Change in GJT (lost users)}_k = \sum_{vi,j} Q_{\text{lost},ij} (-C_{\text{before},ij})$$

Q: number of users

C: generalised journey time (composite of IVT, wait, walk, boarding time and transfers)

i: origin travel zone

j: destination travel zone

k: mode

All other benefits are based on aggregate outputs from CSTM, which ultimately are based on changes in demand and travel time by each origin-destination pair.

Value of travel time: Commuter travel - What is the value of travel time used for this initiative? Does this value differ between modes? Is this value based on resource cost or willingness to pay? Business travel - Has a specific value been applied to business travel? If so, what was this value?

A common value of time has been adopted for all modelled trip purposes using the methodology outlined by Austroads (2011). The Austroads approach assumes that values of time are a proportion of average earnings, assuming that:

- For personal travel, the value of time is 40% of the average hourly wage
- For business travel, the value of time for business travel (excluding commercial vehicle travel) is valued at 128% of the average hourly wage.
- Using the Austroads approach and May 2011 total ACT ordinary weekly earnings for full time adults (seasonally adjusted) of \$1306.90, the value of time was calculated to be \$16.78 per passenger hour.

Growth - Has any rate of escalation been applied to these values?

The value of time has been assumed to remain constant in real terms over the appraisal period.

Source - What are the sources for the values used and any assumptions incorporated into the value of travel time?

Earnings data has been sourced from the ABS. The following table outlines the approach and assumptions used to calculate the average value of time:

Table 41: Derivation of Value of Time

Variable	Value
May 2011 total ordinary weekly earnings for full time adults, seasonally adjusted	\$1,306.90
Assumed working hours per week	38
Average hourly wage	\$34.39 per hour
Personal value of time (40% of average hourly wage) per passenger hour	\$13.76 per hour
Business value of time (128% of average hourly wage) per passenger hour	\$44.02 per hour
Assumed proportion of business travel	10.0%
Weighted value of time per passenger hour	\$16.78 per hour



Weightings - Describe the weightings which have been used to calculate the generalised trip cost.
Wait / Access / Egress - What weighting has been applied to egress time? What is the source for this?
Transfer - What transfer penalty has been applied? What is the source of this? **Boarding penalty** - Has a boarding penalty been applied during the demand modelling and / or economic appraisal? If so, what is the magnitude of this boarding penalty (minutes) and how does it differ between modes?

Generalised journey time skims extracted from CSTM weight any transfers as well as any walk, wait or boarding time incurred whilst travelling on public transport. The following table outlines the weights used within CSTM:

Table 42: CSTM Out-of-Vehicle Time Weights

Time Component	Weight relative to IVT
In-vehicle time	1.00
Walk access time	1.15
Wait time	1.20
Boarding time	1.20
Interchange penalty	7 minutes

Source: MRC (2009) – ACT Strategic Public Transport Network Plan

Benefit parameters - List the value and source of all benefit parameters relevant to the appraisal. For example decongestion; Vehicle Operating Costs (for all classes of vehicles); Crash costs etc.

The following parameters were sourced to assess the following benefit streams:

- Travel time savings
- Incremental fare revenue
- Incremental parking costs
- Unperceived vehicle operating costs
- Road damage
- Environmental externalities

All values are in 2011 prices.

Table 43: Key Benefit Parameters

Variable	Value	Source
Value of time	\$16.78 per passenger hour	Austrroads (2011) ⁹
Unperceived vehicle operating costs	14.9 cents per vehicle km	RTA (2009) ¹⁰
Incremental fare revenue		
Incremental fare	\$1.19 per trip	ACTION Buses MyWay data
Incremental parking revenue		
2011 Parking Costs		
City	\$0.750 per vehicle trip per hour	MCR (2009)
Other town centres	\$0.375 per vehicle trip per hour	MCR (2009)
2021 BAU Parking Costs		
City	\$0.980 per vehicle trip per hour	Project assumption

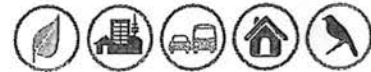


Variable	Value	Source
Other town centres	\$0.490 per vehicle trip per hour	Project assumption
2021 Do-Something Parking Costs		
City	\$1.880 per vehicle trip per hour	Project assumption
Other town centres	\$0.940 per vehicle trip per hour	Project assumption
2031 BAU Parking Costs		
City	\$1.690 per vehicle trip per hour	Project assumption
Other town centres	\$0.840 per vehicle trip per hour	Project assumption
2031 Do-Something Parking Costs		
City	\$2.850 per vehicle trip per hour	Project assumption
Other town centres	\$1.430 per vehicle trip per hour	Project assumption
Road damage		
Car	0.241 cents per vehicle km	RailCorp (2010) ¹¹
Bus	2.830 cents per vehicle km	RailCorp (2010)
Air Pollution		
Car	2.880 cents per vehicle km	ARRB (2011) ¹²
Bus	32.386 cents per vehicle km	ARRB (2011)
Light rail	0.394 cents per vehicle km	ARRB (2011)
Greenhouse Gas Emissions		
Car	2.269 cents per vehicle km	ARRB (2011)
Bus	13.344 cents per vehicle km	ARRB (2011)
Light rail	0.031 cents per vehicle km	ARRB (2011)
Noise Pollution		
Car	0.943 cents per vehicle km	ARRB (2011)
Bus	2.269 cents per vehicle km	ARRB (2011)
Light rail	0.166 cents per vehicle km	ARRB (2011)
Accident Costs		
Car	\$58,139 per million vehicle km	RTA (2009)
Bus	\$93,975 per million vehicle km	RTA (2009)
Light rail	per million vehicle km	RailCorp (2010)

Related initiatives - Are the benefits and costs closely related to, dependent upon or potentially influenced by another initiative(s)? If so, explain how that has been accounted for in the BCR.

As part of the Frequent Network, the Project Corridor may form part of a broader network of BRT or LRT services in the long term.

However, at the time of the appraisal the impact of other potential initiatives (e.g. City to Belconnen Transitway) were not assessed collectively with the Project Options.



Appraisal Summary Table 2: Monetised Cost Benefit Analysis Results

The following demand metrics are provided in Table 44 for the first and final model years, 2011 and 2031:

- Number of trips by mode
- Average journey time by mode
- PT mode share
- Public transport fare revenue
- Number of kilometres travelled by mode
- Number of hours travelled by mode

Table 44: High Level Demand Model Results

Year	2011	2031				
Land Use	BAU	BAU			Higher Density	
Mode	BAU	BAU	BRT	LRT	BRT	LRT
Passenger trips						
Public transport	16,900	38,400	43,600	43,700	43,700	43,800
Car	239,300	291,300	286,500	286,300	285,600	285,400
Total passenger trips	256,200	329,700	330,100	330,000	329,300	329,200
Average journey time (mins)						
Public transport	62.3	57.4	55.7	55.5	53.6	53.5
Car	12.4	12.8	12.5	12.5	11.4	11.4
PT Mode Share	6.6%	11.6%	13.2%	13.3%	13.3%	13.3%
PT Fare Revenue	\$20,100	\$45,600	\$51,800	\$52,100	\$52,000	\$52,200
Passenger kilometres travelled						
Public transport	210,100	506,100	591,700	596,500	574,400	579,300
Car (driver only)	1,870,800	2,072,900	2,032,600	2,030,300	1,959,600	1,957,400
Passenger hours						
Public transport	17,500	36,700	40,400	40,400	39,000	39,100
Car	49,400	62,300	59,500	59,400	54,300	54,200
Total passenger hours	66,900	99,000	99,900	99,800	93,300	93,300
Change in passenger hours						
PT passenger hours - cont users			-1,100	-1,200	-800	-800
PT passenger hours - new users			6,400	6,600	16,500	16,600
PT passenger hours - lost users			-1,600	-1,600	-13,400	-13,400
Car passenger hours - cont users			-1,500	-1,500	-3,000	-3,000
Car passenger hours - new users			1,700	1,800	18,400	18,300
Car passenger hours - lost users			-3,000	-3,100	-23,400	-23,400

Estimates rounded to nearest hundred



Total % age changes by demand metric between 2011 and 2031 are shown below:

Table 45: Change in Demand Metrics (2031 versus 2011)

Land Use	BAU			Higher Density	
	BAU	BRT	LRT	BRT	LRT
Passenger trips					
Public transport	127.0%	157.8%	158.9%	158.5%	159.5%
Car	21.7%	19.7%	19.6%	19.3%	19.2%
Total passenger trips	28.7%	28.8%	28.8%	28.5%	28.5%
Average journey time (mins)					
Public transport	-7.7%	-10.6%	-10.9%	-13.9%	-14.1%
Car	3.6%	0.7%	0.5%	-7.9%	-8.1%
PT Mode Share (percentage point change)	5.0%	6.6%	6.7%	6.7%	6.7%
PT Fare Revenue	127.0%	157.8%	158.9%	158.5%	159.5%
Passenger kilometres travelled					
Public transport	140.9%	181.6%	183.9%	173.4%	175.8%
Car (driver only)	10.8%	8.6%	8.5%	4.7%	4.6%
Passenger hours					
Public transport	109.5%	130.6%	130.7%	122.5%	123.0%
Car	26.1%	20.5%	20.3%	9.9%	9.6%
Total passenger hours	47.9%	49.3%	49.2%	39.4%	39.3%

Benefit Cost Analysis Results

Table 46 to Table 49 provide headline benefit-cost analysis results for the following four options:

- BRT under a business as usual land use scenario
- LRT under a business as usual land use scenario
- BRT under a higher density land use scenario
- LRT under a higher density land use scenario

All values are based on 2011 prices.

Table 46: Benefit-Cost Analysis Results (BRT under a Business As Usual Land Use Scenario)

Metric	Real Discount Rate		
	4%	7%	10%
BCR	2.71	1.98	1.48
NPV (\$m)	\$536.2	\$243.3	\$98.7
NPVI	\$1.50	\$0.68	\$0.28
IRR	14.6%	14.6%	14.6%



Table 47: Benefit-Cost Analysis Results (LRT under a Business As Usual Land Use Scenario)

Metric	Real Discount Rate		
	4%	7%	10%
BCR	1.43	1.02	0.75
NPV (\$m)	\$283.2	\$10.8	-\$110.1
NPVI	\$0.35	\$0.01	-\$0.14
IRR	7.2%	7.2%	7.2%

Table 48: Benefit-Cost Analysis Results (BRT under a Higher Density Land Use Scenario)

Metric	Real Discount Rate		
	4%	7%	10%
BCR	6.65	4.78	3.51
NPV (\$m)	\$1,774.4	\$939.1	\$514.8
NPVI	\$4.95	\$2.62	\$1.44
IRR	26.7%	26.7%	26.7%

Table 49: Benefit-Cost Analysis Results (LRT under a Higher Density Land Use Scenario)

Metric	Real Discount Rate		
	4%	7%	10%
BCR	3.31	2.34	1.69
NPV (\$m)	\$1,512.7	\$701.1	\$302.5
NPVI	\$1.88	\$0.87	\$0.38
IRR	15.7%	15.7%	15.7%

Monetised Cost and Benefits

Table 50 to Table 53 provide a breakdown of benefits and costs for the following four options:

- BRT under a business as usual land use scenario
- LRT under a business as usual land use scenario
- BRT under a higher density land use scenario
- LRT under a higher density land use scenario

All values are based on 2011 prices.



Table 50: Breakdown of Discounted Costs and Benefits (BRT under a Business As Usual Land Use Scenario)

Cost/Benefit Element	Value in \$m (Discounted at 7%)	Contribution
Capital expenditure	215.3	86.6%
Operating and maintenance expenditure	33.2	13.4%
Total Costs	248.5	100.0%
Change in generalised journey time	133.9	27.2%
Incremental fare revenue	52.0	10.6%
Incremental parking revenue	198.3	40.3%
Unperceived vehicle operating cost savings	57.1	11.6%
Avoided accident costs	21.7	4.4%
Avoided air pollution	8.4	1.7%
Avoided greenhouse gas emissions	7.6	1.5%
Avoided noise pollution	3.4	0.7%
Avoided road damage	0.7	0.1%
Residual value	8.7	1.8%
Total Benefits	491.8	100.0%

Table 51: Breakdown of Discounted Costs and Benefits (LRT under a Business As Usual Land Use Scenario)

Cost/Benefit Element	Value in \$m (Discounted at 7%)	Contribution
Capital expenditure	469.8	89.6%
Operating and maintenance expenditure	54.3	10.4%
Total Costs	524.1	100.0%
Change in generalised journey time	150.0	28.0%
Incremental fare revenue	53.8	10.1%
Incremental parking revenue	198.2	37.1%
Unperceived vehicle operating cost savings	60.4	11.3%
Avoided accident costs	23.8	4.4%
Avoided air pollution	11.7	2.2%
Avoided greenhouse gas emissions	9.3	1.7%
Avoided noise pollution	3.8	0.7%
Avoided road damage	1.0	0.2%
Residual value	22.9	4.3%
Total Benefits	534.9	100.0%



Table 52: Breakdown of Discounted Costs and Benefits (BRT under a Higher Density Land Use Scenario)

Cost/Benefit Element	Value in \$m (Discounted at 7%)	Contribution
Capital expenditure	215.3	86.6%
Operating and maintenance expenditure	33.2	13.4%
Total Costs	248.5	100.0%
Change in generalised journey time	622.6	52.4%
Incremental fare revenue	51.7	4.3%
Incremental parking revenue	192.7	16.2%
Unperceived vehicle operating cost savings	174.0	14.7%
Avoided accident costs	67.7	5.7%
Avoided air pollution	31.1	2.6%
Avoided greenhouse gas emissions	25.6	2.2%
Avoided noise pollution	10.9	0.9%
Avoided road damage	2.6	0.2%
Residual value	8.7	0.7%
Total Benefits	1,187.6	100.0%

Table 53: Breakdown of Discounted Costs and Benefits (LRT under a Higher Density Land Use Scenario)

Cost/Benefit Element	Value in \$m (Discounted at 7%)	Contribution
Capital expenditure	469.8	89.6%
Operating and maintenance expenditure	54.3	10.4%
Total Costs	524.1	100.0%
Change in generalised journey time	633.7	51.7%
Incremental fare revenue	53.3	4.4%
Incremental parking revenue	192.5	15.7%
Unperceived vehicle operating cost savings	177.2	14.5%
Avoided accident costs	69.7	5.7%
Avoided air pollution	34.5	2.8%
Avoided greenhouse gas emissions	27.2	2.2%
Avoided noise pollution	11.3	0.9%
Avoided road damage	2.9	0.2%
Residual value	22.9	1.9%
Total Benefits	1,225.2	100.0%



Detailed Monetised Benefits

Table 54 details real but undiscounted benefits by scenario by benefit stream for 2021 and 2031 incremental to the base case. A year-by-year breakdown of benefits as well as cost for each option is provided at the end of this document.

Table 54: Real Undiscounted Benefits by Scenario for Selected Years (\$m)

Benefit Stream	BRT (BAU)		LRT (BAU)		BRT (BAU)		LRT (BAU)	
	2021	2031	2021	2031	2021	2031	2021	2031
Change in generalised time	\$10.9	\$22.3	\$12.6	\$24.6	\$12.6	\$24.6	\$40.2	\$115.3
Unperceived VOC savings	\$5.8	\$8.5	\$6.1	\$9.0	\$6.1	\$9.0	\$20.2	\$24.3
Road damage	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.3	\$0.4
Incremental fare revenue resource cost adjustment	\$4.9	\$8.0	\$5.1	\$8.3	\$5.1	\$8.3	\$4.8	\$8.4
Incremental parking revenue resource cost adjustment	\$26.6	\$23.7	\$26.6	\$23.7	\$26.6	\$23.7	\$25.0	\$23.7
Avoided accident costs	\$2.2	\$3.2	\$2.4	\$3.5	\$2.4	\$3.5	\$8.0	\$9.6
Avoided air pollution	\$0.8	\$1.3	\$1.2	\$1.7	\$1.2	\$1.7	\$3.9	\$4.7
Avoided greenhouse gas emissions	\$0.7	\$1.2	\$0.9	\$1.4	\$0.9	\$1.4	\$3.1	\$3.7
Avoided noise pollution	\$0.3	\$0.5	\$0.4	\$0.6	\$0.4	\$0.6	\$1.3	\$1.5
Residual value	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

Table 55: Derivation of Generalised Journey Time Benefits

Element	BRT under a BAU Land Use Scenario	LRT under a BAU Land Use Scenario	BRT under a Higher Density Land Use Scenario	LRT under a Higher Density Land Use Scenario
Demand model output	Generalised journey time in in-vehicle travel time equivalent terms, disaggregated by continuing, new and lost users and by mode			
Valuation parameter used and source	Value of passenger time of \$16.78 (based on Austroads 2011 methodology and ABS AWE data)			
Algorithm used	<p>For each mode (k) the value of time savings was assessed using the following equation:</p> $\Delta GJT (\text{continuing users})_k = \Delta GJT (\text{new users})_k + \Delta GJT (\text{lost users})_k \times \text{value of time}$ <p>Change in generalised journey time for continuing, new and lost users were assessed by origin-destination pair:</p> $\Delta GJT (\text{continuing users})_k = \sum_{o,d} Q_{o,d} (GJT_{o,d}^{2021} - GJT_{o,d}^{2031})$ $\Delta GJT (\text{new users})_k = \sum_{o,d} Q_{new,o,d} (GJT_{o,d}^{2021})$ $\Delta GJT (\text{lost users})_k = \sum_{o,d} Q_{lost,o,d} (GJT_{o,d}^{2021})$			
\$M (undiscounted) in 2021	\$10.9	\$12.6	\$12.6	\$40.2



Table 56: Derivation of Unperceived Vehicle Operating Cost Benefits

Element	BRT under a BAU Land Use Scenario	LRT under a BAU Land Use Scenario	BRT under a Higher Density Land Use Scenario	LRT under a Higher Density Land Use Scenario
Demand model output	Changes in car vehicle kilometres			
Valuation parameter used and source	\$0.149 per vehicle kilometre (based on RTA 2009)			
Algorithm used	Δ Unperceived VOC = Δ Car VKT \times \$0.149			
\$M (undiscounted) in 2021	\$5.8	\$6.1	\$6.1	\$20.2

Table 57: Derivation of Road Damage Benefits

Element	BRT under a BAU Land Use Scenario	LRT under a BAU Land Use Scenario	BRT under a Higher Density Land Use Scenario	LRT under a Higher Density Land Use Scenario
Demand model output	Changes in car and bus vehicle kilometres			
Valuation parameter used and source	\$0.00241 per kilometre for cars and \$0.02830 per kilometre for buses (based on RTA 2009)			
Algorithm used	Δ Road Damage = Δ Car VKT \times \$0.00241 + Δ Bus VKT \times \$0.02830			
\$M (undiscounted) in 2021	\$0.1	\$0.1	\$0.1	\$0.3

Table 58: Derivation of Incremental Fare Revenue Resource Correction

Element	BRT under a BAU Land Use Scenario	LRT under a BAU Land Use Scenario	BRT under a Higher Density Land Use Scenario	LRT under a Higher Density Land Use Scenario
Demand model output	Change in public transport patronage			
Valuation parameter used and source	\$1.19 per trip (based on analysis of MyWay bus fare data provided by ACTION Buses)			
Algorithm used	Incremental fare revenue = Δ public transport trips \times \$1.19			
\$M (undiscounted) in 2021	\$26.6	\$26.6	\$26.6	\$25.0



Table 59: Derivation of Environmental Externality (Air Pollution, Greenhouse Gas and Noise Pollution) Benefits

Element	BRT under a BAU Land Use Scenario	LRT under a BAU Land Use Scenario	BRT under a Higher Density Land Use Scenario	LRT under a Higher Density Land Use Scenario
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Demand model output Change in car, bus and light rail vehicle kilometres

Valuation parameter used and source Valuations are in cents per vehicle kilometre (ARRB 2011). Rail externality rates have been used for light rail.

Externalities	Car	Buses	Light Rail
Air pollution	2.880	32.386	0.394
Greenhouse	2.269	13.344	0.031
Noise	0.943	2.269	0.166

Algorithm used
 Externality benefit (for cars) = $\Delta \text{VKT} \times (0.00288 + 0.00269 + 0.00943)$
 Externality benefit (for buses) = $\Delta \text{VKT} \times (0.32386 + 0.13344 + 0.02269)$
 Externality benefit (for light rail) = $\Delta \text{VKT} \times (0.00394 + 0.00031 + 0.00166)$

\$M (undiscounted) in 2021 \$1.80 \$2.50 \$2.50 \$8.30

Table 60: Derivation of Parking Revenue Resource Correction

Element	BRT under a BAU Land Use Scenario	LRT under a BAU Land Use Scenario	BRT under a Higher Density Land Use Scenario	LRT under a Higher Density Land Use Scenario
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Demand model output Change in car trips to selected travel zones (City, Belconnen Town Centre, Woden Town Centre, Tuggeranong Town Centre and Queanbeyan Town Centre)

Valuation parameter used and source Parking rates are an input into CSTM. The following rates (for a 2 hour period) were assumed for 2021 and 2031:

Town Centre	2021			2031		
	BAU	Do-Something	Differential	BAU	Do-Something	Differential
Civic	\$1.97	\$3.75	\$1.78	\$3.38	\$5.70	\$2.33
Belconnen	\$0.98	\$1.88	\$0.89	\$1.69	\$2.85	\$1.16
Woden	\$0.98	\$1.88	\$0.89	\$1.69	\$2.85	\$1.16
Tuggeranong	\$0.98	\$1.88	\$0.89	\$1.69	\$2.85	\$1.16
Queanbeyan	\$0.98	\$1.88	\$0.89	\$1.69	\$2.85	\$1.16

Algorithm used Incremental parking revenue (by centre) = continuing car trips \times Δ price + Δ car trips \times price

\$M (undiscounted) in 2021 \$26.6 \$26.6 \$26.6 \$25.0



Appraisal Summary Table 3: Benefit-Cost Ratio Sensitivity Testing

The following sensitivity tests were undertaken:

- Lower discount rate (4%)
- Higher discount rate (10%)
- Lower construction costs (30%)
- Higher construction costs (+30%)
- Lower car demand annualisation factor (270)
- Higher car demand annualisation factor (330)
- Longer evaluation period (50 years)
- No discounting

The results of the sensitivity tests for all options are shown in Table 61:

Table 61: Sensitivity Test Results

Sensitivity Test Number	Variation	BRT with BAU Land Use	LRT with BAU Land Use	BRT under Higher Density Land Use	LRT under Higher Density Land Use
	Starting result	1.98	1.02	4.78	2.34
1	Low discount rate (4%)	2.71	1.43	6.65	3.31
2	High discount rate (10%)	1.48	0.75	3.51	1.69
3	Low capital costs (-30%)	2.66	1.38	6.44	3.18
4	Higher capital costs (+30%)	1.58	0.81	3.80	1.85
5	Low car annualisation factor (270)	1.80	0.93	4.34	2.13
6	High car annualisation factor (330)	2.16	1.11	5.22	2.55
7	50 year evaluation period	2.13	1.08	5.25	2.55
8	No discount rate	4.14	2.26	10.33	5.21
9	No parking revenue benefits	1.18	0.64	4.00	1.97
10	Low cost and high benefits (Combination of 3 & 6)	2.90	1.50	7.04	3.47
11	High cost and low benefits (Combination of 4 & 5)	1.44	0.75	3.45	1.69



Appraisal Summary Table 4: Non-Monetised Benefits and Costs

Cost/Benefit	Description	Rating
Improved highway travel time reliability	The Project is expected to generate some improvement in highway travel time reliability benefits as the Project will generate some mode shift from the highway network to the public transport network. In turn, the resultant reduction in road congestion should also serve to reduce highway travel time variability.	Moderately beneficial
Public transport travel time reliability	<p>The provision of a dedicated right of way for public transport services is likely to lead to an improvement in travel time reliability of services. With services separated from general traffic, services are less exposed to prevailing road congestion and incidents, leading to more services running on-time and where services do run late, average delays are likely to be lower. With improved flow, buses are less likely to bunch up, improving the effectiveness of providing a high service frequency.</p> <p>Over time improvements in travel time reliability can generate spillover impacts. Improvements in reliability can potentially increase public transport patronage and bring about associated spillover benefits including road decongestion, avoided environmental impacts and avoided accident costs.</p> <p>Over the medium to long term, improved reliability would allow ACTION Buses to reduce timetable slack and layover time that would otherwise compensate for unreliability. In turn, improved timetable scheduling and resourcing could contribute to improving the overall robustness and reliability of the network, as well as improving the efficiency of operations by more efficient placement of assets and maximising their utilisation through better allocation and acquisition of fleet, labour, equipment and other resources.</p>	Highly beneficial
Passenger amenity benefits	<p>Relative to conventional bus services, BRT and LRT operations are generally perceived by users and non-users to be more desirable. These amenity benefits arise from improvements in service attributes over and above savings in generalised journey time including:</p> <ul style="list-style-type: none"> • Greater visibility • Improved network legibility • Improved ride comfort • Wider range of facilities e.g. security, improved lighting <p>These amenity improvements may be sufficiently high to generate additional demand above predicted demand levels.</p> <p>Given the preliminary nature of the feasibility analysis commissioned by ESDD, no formal product definition was prepared from which to quantitatively assess the level of passenger amenity benefits. Should the Project proceed to a more detailed feasibility stage, a formal product definition would provide opportunities to assess the level of passenger amenity benefits from an investment in BRT or LRT.</p>	Moderately beneficial



Cost/Benefit	Description	Rating
Park and ride opportunities	<p>The Project team has identified a need to make, subject to further investigation, a provision for park and ride sites. Park and ride facilities increase the catchment range of a rapid transit system by drawing demand from areas that may otherwise be poorly serviced by feeder services. It may also generate demand from passengers who may choose not to use feeder services to access the rapid transit network.</p> <p>Through improvements in accessibility to the rapid transit system, park and ride facilities may generate additional demand. This said, further investigation is required to ensure that the economic benefits of providing park and ride facilities does not divert significant demand away from feeder services and that the incremental benefits exceed to the costs of developing, maintaining and operating the park and ride sites.</p>	Moderately beneficial
Improved walk and cycling access	<p>The Project makes a provision footpath and cycle path works to improve active transport infrastructure and improve walk/cycle accessibility to the rapid transit corridor.</p> <p>Through improvements in accessibility to the rapid transit system, improved walking and cycling facilities may increase the potential level of demand for BRT and LRT services.</p>	Slightly beneficial



Appraisal Summary Table 5: Information Sources

ACT Chief Minister and Cabinet Directorate (undated), Planning data statistics, accessible from http://www.actpla.act.gov.au/tools_resources/research_based_planning_for_a_better_city/planning_data

ACTION Bus Wiki, *ACTION Fleet Summary*, http://www.actbus.net/fleetwiki/index.php?title=ACTION_Fleet_Summary

ARRB (2011), *Guide to Project Evaluation – Part 4: Project Evaluation Data (Update RUE Unit Values)*, Austroads Project TP1672, August 2011

ATC (2006a), *National Guidelines for Transport System Management in Australia – Volume 1*

ATC (2006b), *National Guidelines for Transport System Management in Australia – Volume 2*

ATC (2006c), *National Guidelines for Transport System Management in Australia – Volume 3*

ATC (2006d), *National Guidelines for Transport System Management in Australia – Volume 4*

ATC (2006e), *National Guidelines for Transport System Management in Australia – Volume 5*

ATO (2011), *Taxation Ruling RT 2011/2 Income tax: effective life of depreciating assets (applicable from 1 July 2011)*, accessible from <http://law.ato.gov.au/atolaw/view.htm?rank=find&criteria=AND~Taxation~basic~exact::AND~Ruling~basic~exact::AND~TR~basic~exact::AND~2011%2F2~basic~exact&target=EA&style=java&sdoid=TXR/TR20112/NAT/ATO/00001&recStart=1&PiT=99991231235958&Archived=false&recnum=2&tot=7&pn=ALL::ALL>

Austroads (2011), *Updating Austroads RUE Unit Values and Related Methodologies*, Austroads Publication Number AP–R373/11, February 2011

MRC (2009), *ACT Strategic Public Transport Network Plan Final Report*

RailCorp (2010), *A Compendium of CityRail Travel Statistics*, Seventh Edition, June 2010.

RTA (2009), *Economic Analysis Manual: Appendix B – Economic Parameters for 2009*.



Costs, Risks and Funding

Staging

Can the initiative be staged to reduce risks/improve manageability?

During the option development process, some consideration was given to staging with the primary aim of optimising economic returns.

Further work is proposed during the feasibility and forward design stage to consider further staging options and their impacts on feasibility, design and procurement.

Risk Management

Have risks been formally identified, assessed and addressed through a management strategy?

Overview

A preliminary Risk Management Strategy was prepared as part of the preparation of a pre-feasibility business case to the ACT Government in April 2012. The preliminary Risk Management Strategy identified potential risks and mitigation strategies.

A detailed Risk Management Strategy will be developed once the Project enters the feasibility and forward design stage. It is envisaged that the Detailed Risk Management Strategy will consider risks associated with procurement and transactional processes, with the entire strategy peer reviewed when developed.

Risk Management Governance

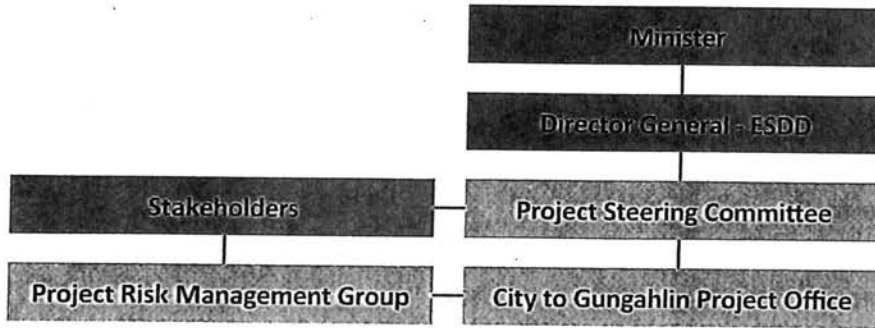
A high level provisional risk management governance structure for future stages of the Project are illustrated in Figure 23. The preliminary Risk Management Strategy outlined a provisional governance arrangement in order for the Project team to identify, manage and mitigate risks as the Project progresses to a feasibility and forward design stage. The provisional Risk Management Governance arrangements comprises of three key entities in order of importance:

- *City to Gungahlin Project Office (Project Team)*: responsible for managing and implementing the Risk Management Strategy
- *Project Steering Committee*: oversight and certification of the Risk Management Strategy and a potential high level conduit for key stakeholders to provide input into the development of the Risk Management Strategy
- *Project Risk Management Group*: a second conduit through which stakeholders can provide input into the development of the Risk Management Strategy with membership aimed at an officer level

The provisional risk management governance structure makes provision for the Gungahlin to City Project Office, established in the 2012-13 Budget by the Land Development Agency. The Gungahlin to City Project Office recognises the link between transit and the redevelopment of the corridor. The Project Office will coordinate current and future projects of various directorates within the corridor, including transit corridor feasibility and design, redevelopment of public housing and corridor planning studies to explore development scenarios to support higher densities and the like.



Figure 23: High Level Provisional Risk Management Governance Structure



Risk Management Strategy Scope

The preliminary Risk Management Strategy considered:

- Identification of the risks associated with each future stage of the Project
- Assessment of the impact and likelihood of each of these risks on the Project
- Establishment of an appropriate mitigation mechanism for each risk management
- Monitoring and reporting of each of these risks over the course of the Project
- Documentation of each risk within the associated Project Risk Register

The preliminary Risk Management Strategy and the associated Risk Register has been developed by the Project Team. Its development has considered:

- Typical risks associated with rapid transit projects similar to the Project
- Consultation undertaken with stakeholders
- Project specific issues known to the Project team

The Risk Register documents key risks and their consequence, assessed in terms of its impact and likelihood. The likelihood and impact assessment provided a rating for each identified risk ranging from 'Low to 'Severe'. Table 62 and Table 63 outline risks and potential mitigation strategies identified during the development of the preliminary risk register.



Table 62: Risk Identification and Assessment Table

Risk	Political Impact	Impact on Outputs and Service Delivery	Impact on Budget and Costs	Impact on Schedule	Community Acceptance	Risk Probability	Impact on Project
Limited technical expertise to design and construct BRT and LRT systems	Significant adverse reaction to poor design and customer experience	Delivery of infrastructure assets below expectations	Increased capital and operating costs	Longer design time	Potential adverse impacts on service delivery, reducing customer experience and acceptance	Possible	Major
Limited operational expertise to operate BRT and LRT	Potential adverse reaction to poor customer experience	Poor service quality or unrealised improvements in service quality	Potential impacts on operating costs associated with inefficient practices or remedial measures		Potential adverse impacts on service delivery, reducing customer experience and acceptance	Possible	Moderate
Non-compliant designs	Significant adverse reaction from specific stakeholders	Higher costs associated with remedial design work to meet higher specification	Increased capital and potentially higher operating and maintenance costs	Longer design time		Possible	Moderate
Inability to deliver upon projected growth assumptions	Higher densities within the project corridor may encounter political resistance in response to community pressure	Lower than forecast public transport demand and/or higher car usage	Lower farebox revenue, increasing the funding required to finance operating deficits	Longer payback period	Higher densities within the project corridor may encounter localised community opposition	Likely	Major
Inability to secure upfront financing	Inability to secure financing may force the abandonment of the Project due to cost	Inability to deliver the project	Higher costs associated to restart Project should funding become available later.	Postponement or indefinite deferral of Project	Community opposition associated with deferral or dropping of Project	Possible	Major



Risk	Political Impact	Impact on Outputs and Service Delivery	Impact on Budget and Costs	Impact on Schedule	Community Acceptance	Risk Probability	Impact on Project
Poor information dissemination amongst stakeholder audiences	Significant adverse reaction from specific stakeholders	Higher costs associated with remedial design work to meet higher specification	Increased capital and potentially higher operating and maintenance costs	Longer design time		Unlikely	Minor
Poor integration of BRT and LRT services with existing services	Adverse reaction in response to poor design and customer experience	Higher operational costs associated with modifying operating plan			Potential adverse impacts on service delivery, reducing customer experience and acceptance	Possible	Minor
Transport Product exceeds budget	Significant adverse reaction due to cost overruns	Higher costs associated with over specification	Higher costs associated with over specification		Adverse reaction in response to cost overruns	Likely	Moderate
Changes to project scope or objectives	Adverse reaction in response to delays in program		Higher costs associated with respecification	Longer design time	Adverse reaction in response to delays in program	Likely	Moderate
Project does not deliver customer requirements	Significant adverse reaction to poor design and customer experience	Lower than forecast public transport demand and/ or higher car usage due to poor service delivery and infrastructure design	Potential costs associated with remedial service or infrastructure treatments		Potential adverse impacts on service delivery, reducing customer experience and acceptance	Possible	Major
Patronage is substantially different from forecast	Significant adverse reaction in response to lower than expected demand forecasts		No impact on costs apart from costs associated with overservicing the corridor		Adverse reaction in response to overallocation of resources	Possible	Moderate



Risk	Political Impact	Impact on Outputs and Service Delivery	Impact on Budget and Costs	Impact on Schedule	Community Acceptance	Risk Probability	Impact on Project
ESDD staff not available as required or in required numbers to provide input and direction to the project execution	Adverse reaction in response to potential delays in program		Potential costs associated with longer program and sourcing of alternative staff or resources	Potential delays in program	Adverse reaction in response to potential delays in program	Possible	Major
Stakeholders have unrealistic expectations of the Project and its specifications	Significant adverse reaction from specific stakeholders		Higher costs associated with overspecification			Possible	Moderate
Not all risks are identified	Potential significant adverse reaction in the event of a significant risk materialising	Potential adverse impacts on service delivery	Potential adverse impacts on costs	Potential adverse impacts on program	Potential significant adverse reaction in the event of a significant risk materialising	Possible	Moderate

Table 63: Risk Management Strategy Table

Risk	Potential Project Risk	Risk Management Priority	Risk Management Strategy
Limited technical expertise to design and construct BRT and LRT systems	Major	High	<ul style="list-style-type: none"> Development of a robust procurement strategy to identify preferred designers, contractors and constructors Development of a peer review process to certify design and operating plans Consideration of a shadow operator model to advise on key design and operational aspects
Limited operational expertise to operate BRT and LRT	Moderate	High	<ul style="list-style-type: none"> Consider an open market tender to operate BRT and LRT services Development of a robust procurement strategy to identify experienced operators Upskilling and training of operationally focused TAMS staff to benchmark and monitor operational performance Upskilling and training of ACTION Buses staff Where internal training and upskilling are insufficient, consider external recruitment or engagement of consultants to benchmark performance



Risk	Potential Project Risk	Risk Management Priority	Risk Management Strategy
Non-compliant design	Moderate	High	<ul style="list-style-type: none"> Involve key stakeholders as part of the draft and detailed concept design stages through the Steering Committee and a Project Control Group Development of a product definition report to specifically specify Project attributes and agreed upon by stakeholders to avoid overscoping and to obtain agreement between stakeholders on key design parameters
Inability to deliver upon projected growth assumptions	Major	Severe	<ul style="list-style-type: none"> Development of an integrated land use and transport strategy with community signoff Undertaking of extensive community consultation within the project corridor with respect to planned increases in density Formation of a Special Purpose Authority with legislated power to implement land use strategies Formation of a Special Purpose Authority empowered to acquire and develop land within the corridor Engage commercial property experts early to appropriately influence design Implementation of planning reforms and planning controls to encourage appropriate and timely development around stations
Inability to secure upfront financing	Major	High	<ul style="list-style-type: none"> Consider alternative modes and staging strategies to spread funding requirements Diversify funding sources to include farebox strategies, parking levies, redevelopment
Poor information dissemination amongst stakeholder audiences	Minor		<ul style="list-style-type: none"> Communication plan to ensure information dissemination Regular meetings with the project control and reference groups
Poor integration of BRT and LRT services with existing services	Minor	Medium	<ul style="list-style-type: none"> Developing and implementing physical (e.g. lifts/ramps/escalators) and non-physical measures (real time info) to facilitate travel and transfers Communication plan to involve the community in designing routing and frequency Undertaking on-board surveys to better understand demographic profile of current bus users Undertaking analysis of MyWay fare data to better understand travel patterns
Transport Product exceeds budget	Moderate	High	<ul style="list-style-type: none"> Engage specialist infrastructure advisors to ensure capital costs are accurately priced and subjected to a probabilistic risk assessment Further refinement and execution of the Risk Management Strategy to manage identified risks Cost benchmarking referencing comparable projects Development of sub-options to allow for the scaling down of non-essential elements of the Product



Risk	Potential Project Risk	Risk Management Priority	Risk Management Strategy
Changes to project scope or objectives	Moderate	High	<ul style="list-style-type: none"> • Ensure alignment of Government intentions with current or emerging government strategies and policies • Product Definition includes analysis of alternative designs and options within designs • Undertake stakeholder and community consultation on a reasonably broad range of designs and options to meet community issues
Project does not deliver customer requirements	Major	High	<ul style="list-style-type: none"> • Undertake further market analysis on existing datasets (e.g. MyWay) to uncover travel patterns within study corridor • Commission focus groups and surveys to investigate and interrogate community preferences and willingness to pay • Consider engaging a shadow operator to report upon customer preferences
Patronage is substantially different from forecast	Moderate	High	<ul style="list-style-type: none"> • Undertake further market analysis on existing datasets (e.g. MyWay) to uncover travel patterns within study corridor • Commission focus groups and surveys to investigate and interrogate community preferences, willingness to pay and willingness to trade-off between costs and service quality • Undertake a peer review of the demand modelling process • Ensure concept designs can cater for optimistic levels of demand
ESDD staff not available as required or in required numbers to provide input and direction to the project execution	Major	High	<ul style="list-style-type: none"> • Develop a resourcing strategy to identify required skills, the number of personnel required and staff that could fill positions • Consider up skilling and training for staff • Consider contractors and consultants to fill positions or provide contingent cover
Stakeholders have unrealistic expectations of the Project and its specifications	Moderate	High	<ul style="list-style-type: none"> • Involve key stakeholders as part of the draft and detailed concept design stages through the Steering Committee and a Project Control Group • Development of a product definition report to specifically specify Project attributes and agreed upon by stakeholders to avoid over scoping and to obtain agreement between stakeholders on key design parameters • Undertake frequent briefings
Not all risks are identified	Moderate	High	<ul style="list-style-type: none"> • Further refine Risk Management Strategy that develops a systematic approach to identifying risks, managing risks • Undertake both internal and external peer risk reviews periodically



Construction Risks

Does the initiative pose any significant construction risks due to its location, geology, design, etc.? Are those risks reflected in the construction cost estimate? Are those risks reflected in the initiative's cost estimate and cost/benefit analysis?

The Project Corridor is an established road corridor through an area that is relatively flat.

The key construction risks identified to date include impact to utilities, the local environment, and traffic delays. Site surveys, desktop studies and stakeholder consultation has been undertaken to understand these risks to the level of detail suitable for a pre-feasibility study, as such suitable contingency has been allowed for these risks in the capital cost estimate.

These risks have been quantified within the construction costs estimates that form the basis of the economic appraisal.

All construction cost estimates will be revised with a more accurate account of project risks, informed by more detailed design and specifications during the Feasibility and Forward Design stage.

Is there sufficient capacity (including relevant skills and expertise) to ensure the delivery of the initiative and realisation of benefits?

The Project team that will be responsible for delivering the Project will be formed in a manner to ensure the appropriate resources are selected that are capable of delivering the scope identified to provide the benefits predicted in the transport demand modelling and economic assessment.

Further consideration to the resourcing needs both within the ACT Government and its agencies as well as the need for external advisory services will be considered during the initial stages of the Feasibility and Forward Design Stage once the Terms of Reference and the scope of the stage have been formalised.

Will delivery require associated works to enable initiative to succeed in practical terms?

No major associated works have been identified. All works have been identified in the planning work undertaken to date for development as an integrated package.

How will interface risks with the initiative be managed?

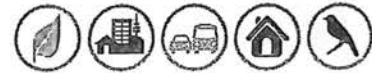
The ACT Government, as proponent, is establishing the Gungahlin to City Project Office to manage the delivery of the project. This dedicated team will liaise with all relevant ACT Government agencies as well as Commonwealth Government agencies and other stakeholders and have primary responsibility for coordination.

What requirements will need to be satisfied prior to construction of the initiative, including relevant planning and environmental approvals, land acquisition?

Approval will be required from National Capital Authority (NCA) for any changes to roads of national significance, which includes Northbourne Avenue.

If impact avoidance of Commonwealth listed species or Threatened Ecological Communities (TEC) are found to occur within the area of proposed works and impacts were unavoidable, a referral to the Minister under the EPBC Act would be required to ensure adequate assessment of impacts on Matters of National Environmental Significance.

Approval will also be required from other ACT Agencies, including Treasury, ACT Planning and Land Authority, Roads ACT, Territory and Municipal Services, Parks and City Services, and ACTION buses. Part of the role of the Project Office will be to ensure all relevant approval processes are followed at the appropriate stages of the project.



Environmental Risks

A high level desktop assessment of potential environmental risks and likely future environmental assessment needs was undertaken as part of the preparation of an ACT Government Business Case prepared in April 2012. The desktop assessment identified the following environmental risks:

Heritage

Non-indigenous heritage items are located at the southern end of Northbourne Avenue and include the Sydney and Melbourne buildings and in Haig Park. The Project is likely to have a minimal impact on these items.

Land Use and Landscape Character

The character of much of the Project Corridor and its immediate surroundings will not be detrimentally affected by the Project due as the Project's impacts will be confined largely to the existing and established road corridor.

Northbourne Avenue between Antill St to Alinga St will be impacted on by the loss of median and significant trees. This loss will be offset by an increase in pedestrian verge and high quality landscaping and treatments. Investments along the Avenue are aimed at improving the character of Northbourne Avenue and will be notable and significant.

Further consultation with the National Capital Authority on the design of any transport improvements within the Project Corridor will be required to ensure that the design is consistent with the National Capital Plan. In particular, treatments along Northbourne Avenue will need to be design and completed to a high level of quality to reflect the ceremonial role bestowed upon the Avenue within the National Capital Plan.

Ecology

Commonwealth and ACT listed endangered species and threatened ecological communities have been recorded immediately adjacent to the existing road corridor.

In terms of ecological constraints, online data covering 2 km either side of the existing Project Corridor were reviewed resulting in the identification of a range of recorded Territory and Commonwealth protected and threatened species and communities. Records included:

- Threatened Flora—1 threatened flora species. There is the potential for suitable habitat for nine additional threatened ACT/Commonwealth protected flora species to occur in proximity of the Project Corridor
- Threatened Fauna—13 threatened fauna species have been recorded within proximity of the Project Corridor. There is the potential for suitable habitat for twenty-three additional threatened ACT/Commonwealth protected fauna species to occur in proximity of the Project Corridor
- Threatened Ecological Communities—2 Threatened Ecological Communities (TECs) have been recorded in proximity of the Project Corridor. These TECs are protected under ACT and Commonwealth legislation

Targeted site surveys will be required to reconfirm these records and establish the environmental impacts of the project.

Soils, Geology and Groundwater

The project is not likely to have any significant impacts on soils, geology and groundwater.

Noise, Vibration and Air Quality

The Project will reduce the number of car movements along the corridor but the resulting increase in bus or light rail movements has the potential to generate increased peak intermittent noise and vibration (in the case of light rail). This is likely to negatively impact on properties fronting Northbourne Avenue.



The reduction of vehicles movements along the corridor as a result of the Project is likely to result in improvements to localised air quality.

Should the Project proceed to the Feasibility and Forward Design stage, the following assessments will be undertaken:

- Detailed assessment of environmental risks
- Land use and planning approvals required, including the need for a formal Environmental Impact Statement
- Associated community engagement and consultation

Need for Government Funding

Should the Project proceed into the Feasibility and Forward Design Stage, further feasibility, design and planning work will need to be commissioned by the ACT Government to assess the Project's feasibility in detail. Full government funding for the next stage of the Project's development is considered appropriate. The Feasibility and Forward Design Stage will be aimed at:

Table 64: Proposed Feasibility and Forward Design Works

Development Area	Possible Investigations
Option development	<p>More detailed project staging analysis to assess the appropriate timing of the investment to ensure that enhanced public transport capacity when it is warranted by the growth in demand</p> <p>Further definition of the transport modes to be used Frequent Network is required to ensure that options and treatments applied along the Project Corridor will align with treatments and investments applied across the remainder of the Frequent Network</p>
Detailed design	<p>Product definition including vehicle options and LRT/BRT infrastructure and operational specifications</p> <p>Detailed design of the Project Corridor, Dickson Station and the Gungahlin Terminus</p>
Cost estimation	<p>Refinement of the capital cost estimates, which should be based on a detailed design and include an appropriate project contingency as a result of a probability based project risk assessment process</p>
Public transport operations	<p>Rationalisation of the assumed bus network to ensure the appropriate level of bus service is provided, to maximise the level of integration of rapid transit within the current network and to ensure that operating costs and the level of operating subsidy for public transport services are optimised</p>
Land use	<p>Refined land use analysis to ensure that the population and employment distributional and growth impacts are assessed in detail, reflect a sustainable level of growth in terms of demand and supply, and are reflected in the demand assessment and economic benefits quantification</p> <p>Refined land value capture analysis to ensure all of the potential revenue sources are captured to contribute to the funding of the project</p>
Demand modelling	<p>Detailed strategic modelling of the preferred option to ensure the service characteristics of the proposed options (BRT or LRT or a combination of the two) are appropriately reflected. This may involve the commissioning of stated preference studies to better assess the willingness to pay for (or alternatively the willingness to use) BRT and LRT services</p> <p>Model validation and calibration using updated demand data including 2011 Journey to Work data</p>
Environmental Assessment	<p>Confirm whether an Environmental Impact Statement will need to be prepared for the Project</p>



Development Area	Possible Investigations
Planning approvals	Confirm what planning approvals will be required to progress the Project
Governance	Consider what governance arrangements will be required to facilitate the integrated development of the Project Corridor, with a specific emphasis on the integration of land use and transport outcomes
Procurement	<p>Development of an appropriate procurement strategy to fully scope the optimum approach to the future development of the project</p> <p>Further investigation is required to identify components of the Project that are most amenable for private sector involvement and assess the financial attractiveness of private sector involvement using a Public Sector Comparator approach to assess value for money.</p>

The Feasibility and Forward Design Stage is projected to cost \$30 million over 2013–14 and 2014–15.

Funding from the Commonwealth Government will enhance the ACT Government's ability to accelerate the Feasibility and Forward Design Stage and investigate potential measures regarding an integrated land use-transport governance framework for the Project.

Need for Commonwealth Government Funding

Partial funding for the Feasibility and Forward Design Stage is sought from the Commonwealth Government on the basis that:

- **Consistent with National Building II objectives:** The Project directly addresses three Nation Building II objectives: Connecting People, Safety and Innovation
- **Consistent with the objectives of projects funded under the Commonwealth Government's Liveable Cities Program:** The Project aims at exploring opportunities for cooperation between the ACT Government and the private sector to directly address issues including climate change, affordable housing, traffic congestion and a growing, ageing population
- **Corridor of national significance:** Northbourne Avenue, which forms a large part of the Project Corridor, has been identified within the National Capital Plan as a corridor of national significance. Proposed investments as part of the Project are aimed at reinforcing the nationally significant ceremonial role of the Avenue. A number of design elements are likely to be required that are over and above the requirements for typical rapid transit projects in order to meet the requirements of the National Capital Plan.
- **Opportunity to develop an integrated land use-transport governance structure:** A number of parties including the Productivity Commission, Infrastructure Australia and COAG have outlined the need for improved governance in relation to the development of Australia's cities. The ACT Government's commitment to the establishment of the Gungahlin to City Project Office, aimed at coordinating transport, redevelopment of public housing and land use planning, provides a potential special-purpose vehicle to promote and realise potential transport and land use outcomes outlined within this submission.



Delivery Strategy

The process currently underway establishes the concept design for the project and its feasibility. The next stage of the project cycle for which funding is required is Feasibility and Forward Design. Further detailed feasibility analysis and detailed design work will be required prior to procurement. Table 65 outlines a provisional timeline between the detailed feasibility process and the commencement of construction. The timeline will be refined during the Feasibility and Forward Design Stage.

Table 65: Provisional Delivery Program

Key Milestones	Potential Timing
Functional Brief Lodged	1st month
Select Design/Feasibility Consultants	4th month
Design Option Studies	7th month
Preliminary Sketch Plan	15th month
Consultation Completion	12 - 15th month
Final Sketch Plan	21st month
DA Lodged	21th month
DA Approved	22th month
EIS Required	To be confirmed
EIS Complete	To be confirmed
Document ready	27th month
Tendering and Evaluation	28 - 30th month
Construction Contracts Signed	31st month
Construction Begins	32nd month

A number of assets and related services will need to be procured under the Project to firstly develop the design, construct the works and then to operate the transport services. In keeping with ACT Government procurement processes, the fundamental principles of the future procurement will be to ensure that the items procured are:

- Fit for purpose
- Represent value for money for the ACT Government
- In accordance with ACT procurement guidelines.

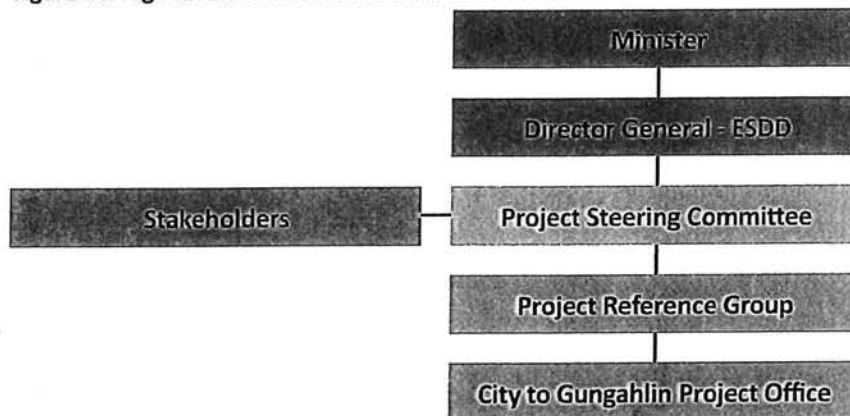
The Feasibility and Forward Design Stage will consider the nature and level of involvement of the private sector to develop and finance the Project.



Governance Strategy

Proposed governance arrangements to discuss key issues and Project direction are already in place. The provisional governance arrangements broadly reflect governance arrangement to date, with the exception that the Gungahlin to City Project Office now takes the place as the lead project team, in lieu of ESDD. The Project Steering Committee will ensure senior executive commitment to the Project with direct input from the Minister for ESDD as well as from key stakeholders. A Project Reference Group will deal with day-to-day issues and to highlight key issues for the Steering Committee's consideration. Figure 24 outlines at a high level the provisional governance structure for the Feasibility and Forward Design stage.

Figure 24: High Level Provisional Governance Structure



As the Project moves to the Feasibility and Forward Design stage, a detailed governance plan will be developed that sets out in detail the governance arrangements for the planning and procurement of the project and includes the roles and responsibilities associated with specific governance bodies in order to assist in the project's delivery and achievement of outcomes.

Specific details on membership will be dependent on the potential level of private sector involvement. Potential stakeholders may include:

- Environment and Sustainable Development Directorate
- Territory and Municipal Services Directorate
- Treasury Directorate
- Chief Minister and Cabinet Directorate
- Economic Development Directorate
- Community Services Directorate
- National Capital Authority

Depending on the level of private sector funding, alternative governance arrangements may be explored. For instance, the Gold Coast Light Rail project established an authority of multiple agencies and consortium partners. Associated Gateway procedures will also be revisited by Treasury should this occur.

Should Commonwealth Government funding be secured, current governance arrangements will also be reviewed to allow for greater involvement from the Commonwealth Government.



Economic Appraisal Table: BRT under a Business As Usual Land Use Scenario

All values in June 2011 prices. All valuations with respect to base case. All figures in millions

	COSTS				BENEFITS							
	Capital expenditure	(Changes in) bus operating costs	Rapid transit (BRT or LRT) operating costs	Asset maintenance	Highway travel time savings	Public transport travel time savings	Savings in generalised time	Unperceived VOC savings	Road damage	Incremental fare revenue resource cost adjustment	Incremental parking revenue resource cost adjustment	Avoided accident costs
2011	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2012	\$5.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2013	\$7.6	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2014	\$19.9	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2015	\$58.9	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2016	\$110.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2017	\$74.8	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2018	\$0.0	\$0.0	\$2.6	\$0.5	\$23.0	-\$15.4	\$7.6	\$4.0	\$0.0	\$3.4	\$18.6	\$1.5
2019	\$0.0	\$0.0	\$3.0	\$0.5	\$26.3	-\$17.6	\$8.7	\$4.6	\$0.1	\$3.9	\$21.3	\$1.7
2020	\$0.0	\$0.0	\$3.4	\$0.5	\$29.6	-\$19.8	\$9.8	\$5.2	\$0.1	\$4.4	\$23.9	\$2.0
2021	\$0.0	\$0.0	\$3.7	\$0.5	\$32.8	-\$22.0	\$10.9	\$5.8	\$0.1	\$4.9	\$26.6	\$2.2
2022	\$0.0	\$0.0	\$3.7	\$0.5	\$34.7	-\$22.6	\$12.0	\$6.0	\$0.1	\$5.2	\$26.3	\$2.3
2023	\$0.0	\$0.0	\$3.7	\$0.5	\$36.5	-\$23.3	\$13.1	\$6.3	\$0.1	\$5.5	\$26.0	\$2.4
2024	\$0.0	\$0.0	\$3.7	\$0.5	\$38.3	-\$24.0	\$14.3	\$6.6	\$0.1	\$5.8	\$25.7	\$2.5
2025	\$0.0	\$0.0	\$3.7	\$0.5	\$40.1	-\$24.7	\$15.4	\$6.9	\$0.1	\$6.2	\$25.5	\$2.6
2026	\$0.0	\$0.0	\$3.7	\$0.5	\$41.9	-\$25.3	\$16.6	\$7.1	\$0.1	\$6.5	\$25.2	\$2.7
2027	\$7.3	\$0.0	\$3.7	\$0.5	\$43.7	-\$26.0	\$17.7	\$7.4	\$0.1	\$6.8	\$24.9	\$2.8
2028	\$0.0	\$0.0	\$3.7	\$0.5	\$45.5	-\$26.7	\$18.8	\$7.7	\$0.1	\$7.1	\$24.6	\$2.9
2029	\$0.0	\$0.0	\$3.7	\$0.5	\$47.4	-\$27.4	\$20.0	\$7.9	\$0.1	\$7.4	\$24.3	\$3.0
2030	\$0.0	\$0.0	\$3.7	\$0.5	\$49.2	-\$28.1	\$21.1	\$8.2	\$0.1	\$7.7	\$24.0	\$3.1
2031	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.1
2032	\$22.5	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.1
2033	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2034	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2035	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2036	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2037	\$22.2	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2038	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2039	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2040	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2041	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2042	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2043	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2044	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2045	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2046	\$0.0	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
2047	\$29.8	\$0.0	\$3.7	\$0.5	\$51.0	-\$28.7	\$22.3	\$8.5	\$0.1	\$8.0	\$23.7	\$3.2
Total	\$358.2	\$0.0	\$109.5	\$13.5	\$1,355.8	-\$791.3	\$564.5	\$227.9	\$2.8	\$211.3	\$720.2	\$86.7



				UNDISCOUNTED				DISCOUNTED				
Avoided air pollution	Avoided greenhouse gas emissions	Avoided noise pollution	Residual value	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit	Discount factor	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit
\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	1.000	\$0.0	\$0.0	\$0.0	\$0.0
\$0.0	\$0.0	\$0.0	\$0.0	\$5.1	\$0.0	\$0.0	-\$5.1	0.935	\$4.7	\$0.0	\$0.0	-\$4.7
\$0.0	\$0.0	\$0.0	\$0.0	\$7.6	\$0.0	\$0.0	-\$7.6	0.873	\$6.6	\$0.0	\$0.0	-\$6.6
\$0.0	\$0.0	\$0.0	\$0.0	\$19.9	\$0.0	\$0.0	-\$19.9	0.816	\$16.2	\$0.0	\$0.0	-\$16.2
\$0.0	\$0.0	\$0.0	\$0.0	\$58.9	\$0.0	\$0.0	-\$58.9	0.763	\$45.0	\$0.0	\$0.0	-\$45.0
\$0.0	\$0.0	\$0.0	\$0.0	\$110.1	\$0.0	\$0.0	-\$110.1	0.713	\$78.5	\$0.0	\$0.0	-\$78.5
\$0.0	\$0.0	\$0.0	\$0.0	\$74.8	\$0.0	\$0.0	-\$74.8	0.666	\$49.8	\$0.0	\$0.0	-\$49.8
\$0.5	\$0.5	\$0.2	\$0.0	\$0.0	\$3.1	\$36.6	\$33.5	0.623	\$0.0	\$1.9	\$22.8	\$20.9
\$0.6	\$0.6	\$0.3	\$0.0	\$0.0	\$3.4	\$41.8	\$38.4	0.582	\$0.0	\$2.0	\$24.3	\$22.3
\$0.7	\$0.7	\$0.3	\$0.0	\$0.0	\$3.8	\$47.0	\$43.2	0.544	\$0.0	\$2.1	\$25.6	\$23.5
\$0.8	\$0.7	\$0.3	\$0.0	\$0.0	\$4.2	\$52.3	\$48.1	0.508	\$0.0	\$2.1	\$26.6	\$24.4
\$0.8	\$0.8	\$0.4	\$0.0	\$0.0	\$4.2	\$53.9	\$49.7	0.475	\$0.0	\$2.0	\$25.6	\$23.6
\$0.9	\$0.8	\$0.4	\$0.0	\$0.0	\$4.2	\$55.6	\$51.4	0.444	\$0.0	\$1.9	\$24.7	\$22.8
\$0.9	\$0.9	\$0.4	\$0.0	\$0.0	\$4.2	\$57.2	\$53.1	0.415	\$0.0	\$1.7	\$23.7	\$22.0
\$1.0	\$0.9	\$0.4	\$0.0	\$0.0	\$4.2	\$58.9	\$54.7	0.388	\$0.0	\$1.6	\$22.8	\$21.2
\$1.0	\$1.0	\$0.4	\$0.0	\$0.0	\$4.2	\$60.5	\$56.4	0.362	\$0.0	\$1.5	\$21.9	\$20.4
\$1.1	\$1.0	\$0.4	\$0.0	\$7.3	\$4.2	\$62.2	\$50.7	0.339	\$2.5	\$1.4	\$21.1	\$17.2
\$1.1	\$1.0	\$0.5	\$0.0	\$0.0	\$4.2	\$63.8	\$59.7	0.317	\$0.0	\$1.3	\$20.2	\$18.9
\$1.2	\$1.1	\$0.5	\$0.0	\$0.0	\$4.2	\$65.5	\$61.3	0.296	\$0.0	\$1.2	\$19.4	\$18.1
\$1.3	\$1.1	\$0.5	\$0.0	\$0.0	\$4.2	\$67.2	\$63.0	0.277	\$0.0	\$1.2	\$18.6	\$17.4
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.258	\$0.0	\$1.1	\$17.8	\$16.7
\$1.3	\$1.2	\$0.5	\$0.0	\$22.5	\$4.2	\$68.8	\$42.1	0.242	\$5.4	\$1.0	\$16.6	\$10.2
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.226	\$0.0	\$0.9	\$15.5	\$14.6
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.211	\$0.0	\$0.9	\$14.5	\$13.6
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.197	\$0.0	\$0.8	\$13.6	\$12.7
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.184	\$0.0	\$0.8	\$12.7	\$11.9
\$1.3	\$1.2	\$0.5	\$0.0	\$22.2	\$4.2	\$68.8	\$42.5	0.172	\$3.8	\$0.7	\$11.8	\$7.3
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.161	\$0.0	\$0.7	\$11.1	\$10.4
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.150	\$0.0	\$0.6	\$10.3	\$9.7
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.141	\$0.0	\$0.6	\$9.7	\$9.1
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.131	\$0.0	\$0.5	\$9.0	\$8.5
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.123	\$0.0	\$0.5	\$8.4	\$7.9
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.115	\$0.0	\$0.5	\$7.9	\$7.4
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.107	\$0.0	\$0.4	\$7.4	\$6.9
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.100	\$0.0	\$0.4	\$6.9	\$6.5
\$1.3	\$1.2	\$0.5	\$0.0	\$0.0	\$4.2	\$68.8	\$64.6	0.094	\$0.0	\$0.4	\$6.4	\$6.1
\$1.3	\$1.2	\$0.5	\$99.8	\$29.8	\$4.2	\$168.6	\$134.6	0.088	\$2.6	\$0.4	\$14.8	\$11.8
\$34.2	\$30.8	\$13.8	\$99.8	\$358.2	\$123.0	\$1,992.0	\$1,510.8	14.035	\$215.3	\$33.2	\$491.8	\$243.3

NPV = \$243.3 BCR = 1.98



Economic Appraisal Table: LRT under a Business As Usual Land Use Scenario

All values in June 2011 prices. All valuations with respect to base case. All figures in millions.

	COSTS				BENEFITS								
	Capital expenditure	(Changes in) bus operating costs	Rapid transit (BRT or LRT) operating costs	Asset maintenance	Highway travel time savings	Public transport travel time savings	Savings in generalised time	Unperceived VOC savings	Road damage	Incremental fare revenue resource cost adjustment	Incremental parking revenue resource cost adjustment	Avoided accident costs	
2011	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2012	\$5.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2013	\$7.6	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2014	\$19.9	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2015	\$58.9	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2016	\$110.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2017	\$74.8	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2018	\$0.0	\$0.0	\$2.6	\$0.5	\$42.2	-\$14.7	\$27.5	\$13.9	\$0.2	\$3.3	\$17.5	\$5.4	
2019	\$0.0	\$0.0	\$3.0	\$0.5	\$48.2	-\$16.8	\$31.4	\$15.9	\$0.2	\$3.7	\$20.0	\$6.2	
2020	\$0.0	\$0.0	\$3.4	\$0.5	\$54.2	-\$18.9	\$35.3	\$17.9	\$0.3	\$4.2	\$22.5	\$7.0	
2021	\$0.0	\$0.0	\$3.7	\$0.5	\$60.2	-\$21.0	\$39.2	\$19.9	\$0.3	\$4.7	\$25.0	\$7.7	
2022	\$0.0	\$0.0	\$3.7	\$0.5	\$67.2	-\$20.6	\$46.7	\$20.3	\$0.3	\$5.0	\$24.9	\$7.9	
2023	\$0.0	\$0.0	\$3.7	\$0.5	\$74.2	-\$20.2	\$54.1	\$20.7	\$0.3	\$5.4	\$24.8	\$8.0	
2024	\$0.0	\$0.0	\$3.7	\$0.5	\$81.3	-\$19.8	\$61.5	\$21.1	\$0.3	\$5.7	\$24.7	\$8.2	
2025	\$0.0	\$0.0	\$3.7	\$0.5	\$88.3	-\$19.4	\$68.9	\$21.5	\$0.3	\$6.1	\$24.5	\$8.4	
2026	\$0.0	\$0.0	\$3.7	\$0.5	\$95.3	-\$18.9	\$76.3	\$21.9	\$0.3	\$6.4	\$24.4	\$8.5	
2027	\$7.3	\$0.0	\$3.7	\$0.5	\$102.3	-\$18.5	\$83.8	\$22.3	\$0.3	\$6.8	\$24.3	\$8.7	
2028	\$0.0	\$0.0	\$3.7	\$0.5	\$109.3	-\$18.1	\$91.2	\$22.7	\$0.3	\$7.1	\$24.1	\$8.8	
2029	\$0.0	\$0.0	\$3.7	\$0.5	\$116.3	-\$17.7	\$98.6	\$23.0	\$0.3	\$7.5	\$24.0	\$9.0	
2030	\$0.0	\$0.0	\$3.7	\$0.5	\$123.3	-\$17.3	\$106.0	\$23.4	\$0.4	\$7.8	\$23.9	\$9.1	
2031	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2032	\$22.5	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2033	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2034	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2035	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2036	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2037	\$22.2	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2038	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2039	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2040	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2041	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2042	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2043	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2044	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2045	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2046	\$0.0	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
2047	\$29.8	\$0.0	\$3.7	\$0.5	\$130.4	-\$16.9	\$113.4	\$23.8	\$0.4	\$8.2	\$23.8	\$9.3	
Total	\$358.2	\$0.0	\$109.5	\$13.5	\$3,278.5	-\$529.6	\$2,748.9	\$669.7	\$10.0	\$212.7	\$708.5	\$260.5	



				UNDISCOUNTED				Discount factor	DISCOUNTED			
Avoided air pollution	Avoided greenhouse gas emissions	Avoided noise pollution	Residual value	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit		Capital costs	Operating and Maintenance Costs	All benefits	Net benefit
\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	1.000	\$0.0	\$0.0	\$0.0	\$0.0
\$0.0	\$0.0	\$0.0	\$0.0	\$5.1	\$0.0	\$0.0	-\$5.1	0.935	\$4.7	\$0.0	\$0.0	-\$4.7
\$0.0	\$0.0	\$0.0	\$0.0	\$7.6	\$0.0	\$0.0	-\$7.6	0.873	\$6.6	\$0.0	\$0.0	-\$6.6
\$0.0	\$0.0	\$0.0	\$0.0	\$19.9	\$0.0	\$0.0	-\$19.9	0.816	\$16.2	\$0.0	\$0.0	-\$16.2
\$0.0	\$0.0	\$0.0	\$0.0	\$58.9	\$0.0	\$0.0	-\$58.9	0.763	\$45.0	\$0.0	\$0.0	-\$45.0
\$0.0	\$0.0	\$0.0	\$0.0	\$110.1	\$0.0	\$0.0	-\$110.1	0.713	\$78.5	\$0.0	\$0.0	-\$78.5
\$0.0	\$0.0	\$0.0	\$0.0	\$74.8	\$0.0	\$0.0	-\$74.8	0.666	\$49.8	\$0.0	\$0.0	-\$49.8
\$2.5	\$2.0	\$0.9	\$0.0	\$0.0	\$3.1	\$73.2	\$70.1	0.623	\$0.0	\$1.9	\$45.6	\$43.7
\$2.8	\$2.3	\$1.0	\$0.0	\$0.0	\$3.4	\$83.7	\$80.2	0.582	\$0.0	\$2.0	\$48.7	\$46.7
\$3.2	\$2.6	\$1.1	\$0.0	\$0.0	\$3.8	\$94.1	\$90.3	0.544	\$0.0	\$2.1	\$51.2	\$49.1
\$3.5	\$2.9	\$1.2	\$0.0	\$0.0	\$4.2	\$104.6	\$100.4	0.508	\$0.0	\$2.1	\$53.2	\$51.0
\$3.6	\$3.0	\$1.3	\$0.0	\$0.0	\$4.2	\$112.9	\$108.8	0.475	\$0.0	\$2.0	\$53.7	\$51.7
\$3.7	\$3.0	\$1.3	\$0.0	\$0.0	\$4.2	\$121.3	\$117.1	0.444	\$0.0	\$1.9	\$53.9	\$52.0
\$3.8	\$3.1	\$1.3	\$0.0	\$0.0	\$4.2	\$129.6	\$125.5	0.415	\$0.0	\$1.7	\$53.8	\$52.1
\$3.8	\$3.2	\$1.3	\$0.0	\$0.0	\$4.2	\$138.0	\$133.8	0.388	\$0.0	\$1.6	\$53.5	\$51.9
\$3.9	\$3.2	\$1.4	\$0.0	\$0.0	\$4.2	\$146.4	\$142.2	0.362	\$0.0	\$1.5	\$53.0	\$51.5
\$4.0	\$3.3	\$1.4	\$0.0	\$7.3	\$4.2	\$154.7	\$143.3	0.339	\$2.5	\$1.4	\$52.4	\$48.5
\$4.1	\$3.3	\$1.4	\$0.0	\$0.0	\$4.2	\$163.1	\$158.9	0.317	\$0.0	\$1.3	\$51.6	\$50.3
\$4.1	\$3.4	\$1.4	\$0.0	\$0.0	\$4.2	\$171.4	\$167.2	0.296	\$0.0	\$1.2	\$50.7	\$49.5
\$4.2	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$179.8	\$175.6	0.277	\$0.0	\$1.2	\$49.7	\$48.6
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.258	\$0.0	\$1.1	\$48.6	\$47.5
\$4.3	\$3.5	\$1.5	\$0.0	\$22.5	\$4.2	\$188.1	\$161.4	0.242	\$5.4	\$1.0	\$45.4	\$39.0
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.226	\$0.0	\$0.9	\$42.5	\$41.5
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.211	\$0.0	\$0.9	\$39.7	\$38.8
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.197	\$0.0	\$0.8	\$37.1	\$36.3
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.184	\$0.0	\$0.8	\$34.7	\$33.9
\$4.3	\$3.5	\$1.5	\$0.0	\$22.2	\$4.2	\$188.1	\$161.8	0.172	\$3.8	\$0.7	\$32.4	\$27.9
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.161	\$0.0	\$0.7	\$30.3	\$29.6
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.150	\$0.0	\$0.6	\$28.3	\$27.7
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.141	\$0.0	\$0.6	\$26.4	\$25.9
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.131	\$0.0	\$0.5	\$24.7	\$24.2
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.123	\$0.0	\$0.5	\$23.1	\$22.6
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.115	\$0.0	\$0.5	\$21.6	\$21.1
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.107	\$0.0	\$0.4	\$20.2	\$19.7
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.100	\$0.0	\$0.4	\$18.9	\$18.4
\$4.3	\$3.5	\$1.5	\$0.0	\$0.0	\$4.2	\$188.1	\$184.0	0.094	\$0.0	\$0.4	\$17.6	\$17.2
\$4.3	\$3.5	\$1.5	\$99.8	\$29.8	\$4.2	\$287.9	\$253.9	0.088	\$2.6	\$0.4	\$25.2	\$22.2
\$120.2	\$98.5	\$42.0	\$99.8	\$358.2	\$123.0	\$4,970.8	\$4,489.6	14.035	\$215.3	\$33.2	\$1,187.6	\$939.1

NPV = \$939.1 BCR = 4.78



Economic Appraisal Table: BRT under a Higher Density Land Use Scenario

All values in June 2011 prices. All valuations with respect to base case. All figures in millions.

	COSTS				BENEFITS								
	Capital expenditure	(Change in) bus operating costs	Rapid transit (BRT or LRT) operating costs	Asset maintenance	Highway travel time savings	Public transport travel time savings	Savings in generalised time	Unperceived VOC savings	Road/damage	Incremental fare revenue/resource cost adjustment	Incremental parking revenue/resource cost adjustment	Avoided accident costs	
2011	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2012	\$11.3	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2013	\$16.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2014	\$36.6	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2015	\$129.3	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2016	\$248.5	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2017	\$172.8	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2018	\$0.0	\$0.0	\$3.0	\$2.4	\$24.3	-\$15.5	\$8.8	\$4.3	\$0.1	\$3.6	\$18.6	\$1.7	
2019	\$0.0	\$0.0	\$3.5	\$2.4	\$27.8	-\$17.7	\$10.1	\$4.9	\$0.1	\$4.1	\$21.3	\$1.9	
2020	\$0.0	\$0.0	\$3.9	\$2.4	\$31.2	-\$19.9	\$11.3	\$5.5	\$0.1	\$4.6	\$23.9	\$2.2	
2021	\$0.0	\$0.0	\$4.3	\$2.4	\$34.7	-\$22.1	\$12.6	\$6.1	\$0.1	\$5.1	\$26.6	\$2.4	
2022	\$0.0	\$0.0	\$4.3	\$2.4	\$36.5	-\$22.7	\$13.8	\$6.4	\$0.1	\$5.4	\$26.3	\$2.5	
2023	\$0.0	\$0.0	\$4.3	\$2.4	\$38.2	-\$23.2	\$15.0	\$6.7	\$0.1	\$5.8	\$26.0	\$2.6	
2024	\$0.0	\$0.0	\$4.3	\$2.4	\$40.0	-\$23.8	\$16.2	\$7.0	\$0.1	\$6.1	\$25.7	\$2.7	
2025	\$0.0	\$0.0	\$4.3	\$2.4	\$41.8	-\$24.4	\$17.4	\$7.3	\$0.1	\$6.4	\$25.4	\$2.9	
2026	\$0.0	\$0.0	\$4.3	\$2.4	\$43.5	-\$24.9	\$18.6	\$7.5	\$0.1	\$6.7	\$25.1	\$3.0	
2027	\$10.9	\$0.0	\$4.3	\$2.4	\$45.3	-\$25.5	\$19.8	\$7.8	\$0.1	\$7.0	\$24.9	\$3.1	
2028	\$0.0	\$0.0	\$4.3	\$2.4	\$47.1	-\$26.1	\$21.0	\$8.1	\$0.1	\$7.3	\$24.6	\$3.2	
2029	\$0.0	\$0.0	\$4.3	\$2.4	\$48.8	-\$26.7	\$22.2	\$8.4	\$0.1	\$7.7	\$24.3	\$3.3	
2030	\$0.0	\$0.0	\$4.3	\$2.4	\$50.6	-\$27.2	\$23.4	\$8.7	\$0.1	\$8.0	\$24.0	\$3.4	
2031	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2032	\$25.3	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2033	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2034	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2035	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2036	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2037	\$14.6	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2038	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2039	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2040	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2041	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2042	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2043	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2044	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2045	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2046	\$0.0	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
2047	\$138.2	\$0.0	\$4.3	\$2.4	\$52.3	-\$27.8	\$24.6	\$9.0	\$0.1	\$8.3	\$23.7	\$3.5	
Total	\$803.5	\$0.0	\$127.4	\$72.7	\$1,399.5	-\$772.1	\$627.5	\$241.0	\$3.9	\$218.6	\$719.6	\$94.8	



				UNDISCOUNTED				DISCOUNTED				
Avoided air pollution	Avoided greenhouse gas emissions	Avoided noise pollution	Residual value	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit	Discount factor	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit
\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	1.000	\$0.0	\$0.0	\$0.0	\$0.0
\$0.0	\$0.0	\$0.0	\$0.0	\$11.3	\$0.0	\$0.0	-\$11.3	0.935	\$10.5	\$0.0	\$0.0	-\$10.5
\$0.0	\$0.0	\$0.0	\$0.0	\$16.0	\$0.0	\$0.0	-\$16.0	0.873	\$13.9	\$0.0	\$0.0	-\$13.9
\$0.0	\$0.0	\$0.0	\$0.0	\$36.6	\$0.0	\$0.0	-\$36.6	0.816	\$29.9	\$0.0	\$0.0	-\$29.9
\$0.0	\$0.0	\$0.0	\$0.0	\$129.3	\$0.0	\$0.0	-\$129.3	0.763	\$98.6	\$0.0	\$0.0	-\$98.6
\$0.0	\$0.0	\$0.0	\$0.0	\$248.5	\$0.0	\$0.0	-\$248.5	0.713	\$177.2	\$0.0	\$0.0	-\$177.2
\$0.0	\$0.0	\$0.0	\$0.0	\$172.8	\$0.0	\$0.0	-\$172.8	0.666	\$115.1	\$0.0	\$0.0	-\$115.1
\$0.8	\$0.7	\$0.3	\$0.0	\$0.0	\$5.5	\$38.8	\$33.4	0.623	\$0.0	\$3.4	\$24.2	\$20.8
\$1.0	\$0.8	\$0.3	\$0.0	\$0.0	\$5.9	\$44.4	\$38.5	0.582	\$0.0	\$3.4	\$25.8	\$22.4
\$1.1	\$0.8	\$0.4	\$0.0	\$0.0	\$6.3	\$49.9	\$43.6	0.544	\$0.0	\$3.4	\$27.1	\$23.7
\$1.2	\$0.9	\$0.4	\$0.0	\$0.0	\$6.8	\$55.5	\$48.7	0.508	\$0.0	\$3.4	\$28.2	\$24.8
\$1.2	\$1.0	\$0.4	\$0.0	\$0.0	\$6.8	\$57.2	\$50.4	0.475	\$0.0	\$3.2	\$27.2	\$24.0
\$1.3	\$1.0	\$0.4	\$0.0	\$0.0	\$6.8	\$58.9	\$52.2	0.444	\$0.0	\$3.0	\$26.2	\$23.2
\$1.4	\$1.1	\$0.4	\$0.0	\$0.0	\$6.8	\$60.7	\$53.9	0.415	\$0.0	\$2.8	\$25.2	\$22.4
\$1.4	\$1.1	\$0.5	\$0.0	\$0.0	\$6.8	\$62.4	\$55.7	0.388	\$0.0	\$2.6	\$24.2	\$21.6
\$1.5	\$1.2	\$0.5	\$0.0	\$0.0	\$6.8	\$64.2	\$57.4	0.362	\$0.0	\$2.4	\$23.3	\$20.8
\$1.5	\$1.2	\$0.5	\$0.0	\$10.9	\$6.8	\$65.9	\$48.2	0.339	\$3.7	\$2.3	\$22.3	\$16.3
\$1.6	\$1.2	\$0.5	\$0.0	\$0.0	\$6.8	\$67.6	\$60.9	0.317	\$0.0	\$2.1	\$21.4	\$19.3
\$1.6	\$1.3	\$0.5	\$0.0	\$0.0	\$6.8	\$69.4	\$62.6	0.296	\$0.0	\$2.0	\$20.5	\$18.5
\$1.7	\$1.3	\$0.6	\$0.0	\$0.0	\$6.8	\$71.1	\$64.4	0.277	\$0.0	\$1.9	\$19.7	\$17.8
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.258	\$0.0	\$1.7	\$18.8	\$17.1
\$1.7	\$1.4	\$0.6	\$0.0	\$25.3	\$6.8	\$72.9	\$40.8	0.242	\$6.1	\$1.6	\$17.6	\$9.9
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.226	\$0.0	\$1.5	\$16.4	\$14.9
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.211	\$0.0	\$1.4	\$15.4	\$13.9
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.197	\$0.0	\$1.3	\$14.4	\$13.0
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.184	\$0.0	\$1.2	\$13.4	\$12.2
\$1.7	\$1.4	\$0.6	\$0.0	\$14.6	\$6.8	\$72.9	\$51.5	0.172	\$2.5	\$1.2	\$12.5	\$8.9
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.161	\$0.0	\$1.1	\$11.7	\$10.6
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.150	\$0.0	\$1.0	\$11.0	\$9.9
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.141	\$0.0	\$0.9	\$10.2	\$9.3
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.131	\$0.0	\$0.9	\$9.6	\$8.7
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.123	\$0.0	\$0.8	\$8.9	\$8.1
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.115	\$0.0	\$0.8	\$8.4	\$7.6
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.107	\$0.0	\$0.7	\$7.8	\$7.1
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.100	\$0.0	\$0.7	\$7.3	\$6.6
\$1.7	\$1.4	\$0.6	\$0.0	\$0.0	\$6.8	\$72.9	\$66.1	0.094	\$0.0	\$0.6	\$6.8	\$6.2
\$1.7	\$1.4	\$0.6	\$262.1	\$138.2	\$6.8	\$335.0	\$190.0	0.088	\$12.1	\$0.6	\$29.3	\$16.6
\$46.8	\$37.0	\$15.3	\$262.1	\$803.5	\$200.1	\$2,266.6	\$1,263.1	14.035	\$469.8	\$54.3	\$534.9	\$10.8

NPV = \$10.8 BCR = 1.02



Economic Appraisal Table: LRT under a Higher Density Land Use Scenario

All values in June 2011 prices. All valuations with respect to base case. All figures in millions.

	COSTS				BENEFITS								
	Capital expenditure	(Changes in) bus operating costs	Rapid transit (BRT or LRT) operating costs	Asset maintenance	Highway travel time savings	Public transport travel time savings	Savings in generalised time	Unperceived VOC savings	Road damage	Incremental fare revenue resource cost adjustment	Incremental parking revenue resource cost adjustment	Avoided accident costs	
2011	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2012	\$11.3	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2013	\$16.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2014	\$36.6	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2015	\$129.3	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2016	\$248.5	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2017	\$172.8	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	
2018	\$0.0	\$0.0	\$3.0	\$2.4	\$42.7	-\$14.6	\$28.1	\$14.2	\$0.2	\$3.4	\$17.5	\$5.6	
2019	\$0.0	\$0.0	\$3.5	\$2.4	\$48.8	-\$16.6	\$32.1	\$16.2	\$0.3	\$3.8	\$20.0	\$6.4	
2020	\$0.0	\$0.0	\$3.9	\$2.4	\$54.9	-\$18.7	\$36.1	\$18.2	\$0.3	\$4.3	\$22.5	\$7.2	
2021	\$0.0	\$0.0	\$4.3	\$2.4	\$61.0	-\$20.8	\$40.2	\$20.2	\$0.3	\$4.8	\$25.0	\$8.0	
2022	\$0.0	\$0.0	\$4.3	\$2.4	\$68.1	-\$20.5	\$47.7	\$20.7	\$0.3	\$5.2	\$24.9	\$8.1	
2023	\$0.0	\$0.0	\$4.3	\$2.4	\$75.3	-\$20.1	\$55.2	\$21.1	\$0.3	\$5.5	\$24.8	\$8.3	
2024	\$0.0	\$0.0	\$4.3	\$2.4	\$82.5	-\$19.8	\$62.7	\$21.5	\$0.3	\$5.9	\$24.6	\$8.4	
2025	\$0.0	\$0.0	\$4.3	\$2.4	\$89.7	-\$19.5	\$70.2	\$21.9	\$0.4	\$6.3	\$24.5	\$8.6	
2026	\$0.0	\$0.0	\$4.3	\$2.4	\$96.9	-\$19.1	\$77.7	\$22.3	\$0.4	\$6.6	\$24.4	\$8.8	
2027	\$10.9	\$0.0	\$4.3	\$2.4	\$104.0	-\$18.8	\$85.2	\$22.7	\$0.4	\$7.0	\$24.2	\$8.9	
2028	\$0.0	\$0.0	\$4.3	\$2.4	\$111.2	-\$18.5	\$92.7	\$23.1	\$0.4	\$7.4	\$24.1	\$9.1	
2029	\$0.0	\$0.0	\$4.3	\$2.4	\$118.4	-\$18.1	\$100.2	\$23.5	\$0.4	\$7.7	\$24.0	\$9.2	
2030	\$0.0	\$0.0	\$4.3	\$2.4	\$125.6	-\$17.8	\$107.7	\$23.9	\$0.4	\$8.1	\$23.9	\$9.4	
2031	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2032	\$25.3	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2033	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2034	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2035	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2036	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2037	\$14.6	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2038	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2039	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2040	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2041	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2042	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2043	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2044	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2045	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2046	\$0.0	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
2047	\$138.2	\$0.0	\$4.3	\$2.4	\$132.7	-\$17.5	\$115.3	\$24.3	\$0.4	\$8.4	\$23.7	\$9.6	
Total	\$803.5	\$0.0	\$127.4	\$72.7	\$3,335.4	-\$540.1	\$2,795.3	\$682.3	\$11.1	\$219.5	\$707.8	\$268.5	



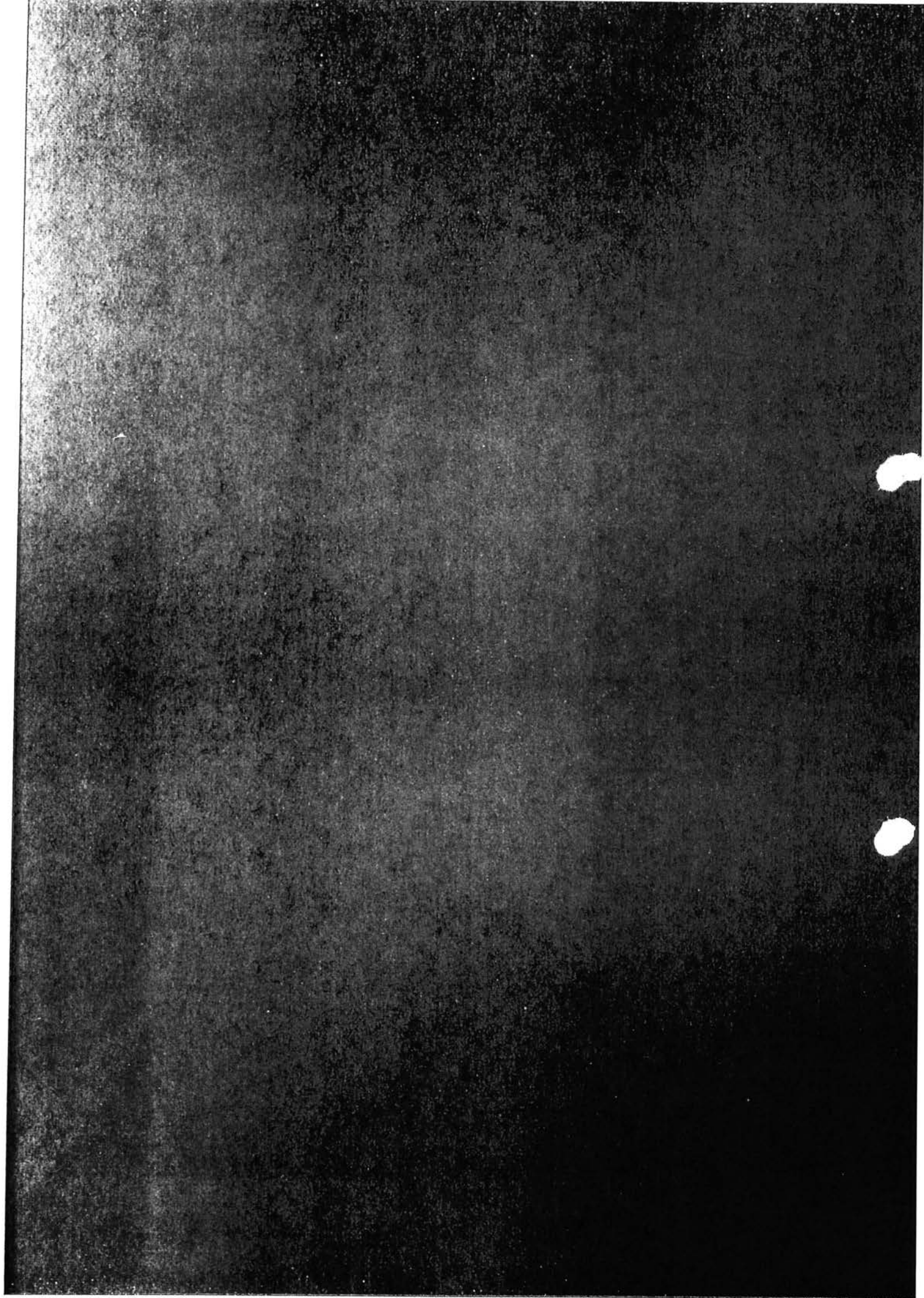
				UNDISCOUNTED				DISCOUNTED				
Avoided air pollution	Avoided greenhouse gas emissions	Avoided noise pollution	Residual value	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit	Discount factor	Capital costs	Operating and Maintenance Costs	All benefits	Net benefit
\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	1.000	\$0.0	\$0.0	\$0.0	\$0.0
\$0.0	\$0.0	\$0.0	\$0.0	\$11.3	\$0.0	\$0.0	-\$11.3	0.935	\$10.5	\$0.0	\$0.0	-\$10.5
\$0.0	\$0.0	\$0.0	\$0.0	\$16.0	\$0.0	\$0.0	-\$16.0	0.873	\$13.9	\$0.0	\$0.0	-\$13.9
\$0.0	\$0.0	\$0.0	\$0.0	\$36.6	\$0.0	\$0.0	-\$36.6	0.816	\$29.9	\$0.0	\$0.0	-\$29.9
\$0.0	\$0.0	\$0.0	\$0.0	\$129.3	\$0.0	\$0.0	-\$129.3	0.763	\$98.6	\$0.0	\$0.0	-\$98.6
\$0.0	\$0.0	\$0.0	\$0.0	\$248.5	\$0.0	\$0.0	-\$248.5	0.713	\$177.2	\$0.0	\$0.0	-\$177.2
\$0.0	\$0.0	\$0.0	\$0.0	\$172.8	\$0.0	\$0.0	-\$172.8	0.666	\$115.1	\$0.0	\$0.0	-\$115.1
\$2.8	\$2.2	\$0.9	\$0.0	\$0.0	\$5.5	\$74.8	\$69.3	0.623	\$0.0	\$3.4	\$46.6	\$43.2
\$3.2	\$2.5	\$1.0	\$0.0	\$0.0	\$5.9	\$85.5	\$79.6	0.582	\$0.0	\$3.4	\$49.8	\$46.3
\$3.5	\$2.8	\$1.2	\$0.0	\$0.0	\$6.3	\$96.2	\$89.8	0.544	\$0.0	\$3.4	\$52.3	\$48.9
\$3.9	\$3.1	\$1.3	\$0.0	\$0.0	\$6.8	\$106.9	\$100.1	0.508	\$0.0	\$3.4	\$54.3	\$50.9
\$4.0	\$3.2	\$1.3	\$0.0	\$0.0	\$6.8	\$115.3	\$108.6	0.475	\$0.0	\$3.2	\$54.8	\$51.6
\$4.1	\$3.2	\$1.3	\$0.0	\$0.0	\$6.8	\$123.8	\$117.1	0.444	\$0.0	\$3.0	\$55.0	\$52.0
\$4.2	\$3.3	\$1.4	\$0.0	\$0.0	\$6.8	\$132.3	\$125.6	0.415	\$0.0	\$2.8	\$54.9	\$52.1
\$4.3	\$3.4	\$1.4	\$0.0	\$0.0	\$6.8	\$140.8	\$134.0	0.388	\$0.0	\$2.6	\$54.6	\$52.0
\$4.3	\$3.4	\$1.4	\$0.0	\$0.0	\$6.8	\$149.3	\$142.5	0.362	\$0.0	\$2.4	\$54.1	\$51.7
\$4.4	\$3.5	\$1.4	\$0.0	\$10.9	\$6.8	\$157.8	\$140.1	0.339	\$3.7	\$2.3	\$53.4	\$47.4
\$4.5	\$3.5	\$1.5	\$0.0	\$0.0	\$6.8	\$166.2	\$159.5	0.317	\$0.0	\$2.1	\$52.6	\$50.5
\$4.6	\$3.6	\$1.5	\$0.0	\$0.0	\$6.8	\$174.7	\$168.0	0.296	\$0.0	\$2.0	\$51.7	\$49.7
\$4.6	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$183.2	\$176.4	0.277	\$0.0	\$1.9	\$50.7	\$48.8
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.258	\$0.0	\$1.7	\$49.5	\$47.8
\$4.7	\$3.7	\$1.5	\$0.0	\$25.3	\$6.8	\$191.7	\$159.6	0.242	\$6.1	\$1.6	\$46.3	\$38.6
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.226	\$0.0	\$1.5	\$43.3	\$41.7
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.211	\$0.0	\$1.4	\$40.4	\$39.0
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.197	\$0.0	\$1.3	\$37.8	\$36.5
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.184	\$0.0	\$1.2	\$35.3	\$34.1
\$4.7	\$3.7	\$1.5	\$0.0	\$14.6	\$6.8	\$191.7	\$170.4	0.172	\$2.5	\$1.2	\$33.0	\$29.3
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.161	\$0.0	\$1.1	\$30.8	\$29.8
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.150	\$0.0	\$1.0	\$28.8	\$27.8
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.141	\$0.0	\$0.9	\$26.9	\$26.0
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.131	\$0.0	\$0.9	\$25.2	\$24.3
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.123	\$0.0	\$0.8	\$23.5	\$22.7
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.115	\$0.0	\$0.8	\$22.0	\$21.2
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.107	\$0.0	\$0.7	\$20.6	\$19.8
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.100	\$0.0	\$0.7	\$19.2	\$18.5
\$4.7	\$3.7	\$1.5	\$0.0	\$0.0	\$6.8	\$191.7	\$184.9	0.094	\$0.0	\$0.6	\$18.0	\$17.3
\$4.7	\$3.7	\$1.5	\$262.1	\$138.2	\$6.8	\$453.8	\$308.9	0.088	\$12.1	\$0.6	\$39.7	\$27.0
\$132.8	\$104.7	\$43.5	\$262.1	\$803.5	\$200.1	\$5,227.5	\$4,224.0	14.035	\$469.8	\$54.3	\$1,225.2	\$701.1

NPV = \$701.1 BCR = 2.34



Footnotes

- 1 Colliers International (2011) Global CBD Parking Rate Survey
- 2 ACT Government (2010) Time to Talk Canberra 2030
- 3 ABS (2011) Population estimates based on 2006 Census
- 4 CMCD (undated)
- 5 ACTPLA (2009)
- 6 CMD (undated)
- 7 Colliers International (2011) Global CBD Parking Rate Survey
- 8 ACT Government (2010) Time to Talk Canberra 2030
- 9 Austroads (2011), Updating Austroads RUE Unit Values and Related Methodologies, Austroads Publication Number AP-R373/11, February 2011
- 10 RTA (2009), Economic Analysis Manual: Appendix B – Economic Parameters for 2009.
- 11 RailCorp (2010), A Compendium of CityRail Travel Statistics, Seventh Edition, June 2010.
- 12 ARRB (2011), Guide to Project Evaluation – Part 4: Project Evaluation Data (Update RUE Unit Values), Austroads Project TP1672, August 2011



Project Board meeting paper

Meeting agenda item #	6
Meeting date and time	Meeting #1, date to be confirmed
Date submitted	1 May 2013
Copy to	
From	Adam Boersma, Project Board Secretary
Manager	Glenn Bain
Subject	Project Board operations
Relevant decision or action number	Not applicable
Related papers	Attachment A: briefing paper on operations and meeting principles Attachment B: Project Board paper template
Endorsed by the Project Director	Yes

Purpose of this paper

To seek Project Board approval for the key elements of noted in Attachment A, which addresses Project Board operations and meeting principles.

Background

The Project Board will be administered by a Project Board Charter. The Charter draws on the Governance Framework, but adds further detail on how the Board will be administered.

The key elements of this subject are summarised in Attachment A, which following Board approval would form the basis of the Project Board Charter.

Results of consultation across government

Significant cross-government consultation occurred for the Governance Framework document (refer to Board meeting #1, Item 3).

No such consultation has occurred for this agenda item given that the recommendation concerns principally Board members only.

Government budget impact

None.