

# **Department of Infrastructure**

Northern Central City Corridor Study

Strategy Elements Cost Estimate Validation

November 2002

SINCLAIR KNIGHT MERZ

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### 1. Introduction

To ensure that construction estimates developed as part of the Northern Central City Corridor Study (NCCCS) are robust and can be defended in any forum, a review of those estimates likely to come under critical scrutiny has been undertaken.

The particular estimates validated in this report are:

- £ Road tunnel from the Eastern Freeway near Hoddle Street to City Link near Racecourse Road/Flemington Road. The review of the above estimate can automatically flow on to the road tunnel estimate for a connection to the CBD.
- £ Heavy rail connection from near Victoria Park Station to the Doncaster Hill shopping complex.

As part of the validation process, a number of source documents have been utilised as well as construction costs for recent road tunnel projects in Melbourne. The source documents and projects referred to are:

- £ Draft report "Northern City Corridor Study, Route Concepts-Long List (1999)" prepared by VicRoads and the Department of Infrastructure that considered various connections (tunnel and surface roads) from the eastern end of the Eastern Freeway to City Link and the CBD.
- £ Report prepared by Professor E W Russell for the Victorian Minister of Transport in 1991 that considered the Eastern Corridor Transport Options, titled "On the Right Track, Freeways or Better Public Transport for Melbourne's East?"
- £ Construction costs for City Link tunnels (construction assumed to be in 1999 on average).
- £ Tender prices for the tunnels on the Eastern Freeway Extension (2002).

## 2. Road Tunnel Estimates

#### 2.1 VicRoads Estimate

VicRoads prepared an estimate for various tunnel connections in 1999 that formed the basis of the draft report "Northern City Corridor Study, Route Concepts-Long List". All estimates were prepared on a tunnel cost estimate of \$45M per kilometre of single tube, 2-lane tunnel (refer to spreadsheet attached as **Appendix A**).

Option A is the closest representation of the scheme tested in the NCCCS. The total estimated cost was \$904M made up from the following components:

Tunnelling	\$450M
Eastern Freeway Connection	\$ 50M
City Link Connection	\$100M
Traffic Management	\$ 5M
Design and Supervision (15%)	\$ 91M
Contingency (30%)	<u>\$208M</u>
TOTAL	\$904M

The two cost items related to connections at Eastern Freeway and City Link were based on significant reworking of the interchanges at these locations. For the scheme tested as part of the NCCCS, no major works are required at either location.

At the Eastern Freeway end, access/egress to/from the tunnel will only be from the freeway median with no other changes to the existing road network. At Racecourse/Flemington Road, the existing road network and ramps are proposed for access to City Link.

Thus, for the NCCCS cost estimate, neither of these costs need to be included.

The VicRoads estimate was produced in 1999. Escalation in cost based on the CPI between 1999 and 2001 is 11%. The equivalent tunnel cost in 2001 is therefore \$50M per single 2-lane tube. That is, \$100M per kilometre for the twin tube, 4-lane connection.

#### 2.2 City Link Experience

City Link tunnels were all 3-lane tunnels. The typical cost (varied for different tunnel sections) for deep driven tunnel was \$85M per kilometre of single tube, 3-lane tunnel. The break down of the unit tunnel cost is \$55M for excavation/civil work and \$30m for mechanical/electrical work.

The pro-rata rate for a 2-lane tunnel has been determined by:

Excavation/civil cost (55% roughly based on excavation area)	\$30M
Mechanical/electrical (80% based on smaller components)	<u>\$25M</u>
TOTAL	\$55M

The estimated cost for twin 2-lane tubes is therefore \$110M per kilometre. Assuming that most tunnel construction occurred in 1999, the equivalent 2001 cost is \$120M per kilometre of 4-lane tunnel.

Note that this cost includes project management and supervision costs. Assuming the 15% adopted by VicRoads and subtracting 4% for design indicates the above cost can be discounted by 11% to give a direct comparison with the tunnelling cost adopted by VicRoads. For comparison, the cost is \$107M per kilometre of 4-lane tunnel.

#### 2.3 Eastern Freeway Tenders

The range of recently submitted tender costs for the proposed Eastern Freeway tunnel was \$175M-215M per kilometre for twin 3-lane tunnels. Using the same factor as used for the City Link tunnels to derive a twin 2-lane tunnel cost (65% overall), the equivalent cost is in the range \$115M-\$140M per kilometre.

Adopting the approximate mid-range suggests \$130M per kilometre for twin 2-lane tunnels. Similar to City Link, this cost includes design, project management and supervision. For direct comparison, the rate can be discounted by 15%, the comparative cost being \$110M per kilometre of 4-lane tunnel.

#### 2.4 NCCCS Estimate

The tunnel cost adopted in the estimates to date has been \$70M per kilometre of 4-lane tunnel. In addition to this, the following cost items have been included:

- £ 8% for Project Management (Principals cost).
- $\pounds$  4% for design and investigation.
- £ Nominal amount (\$5M) for possible land acquisition (Racecourse Road?).
- £ 10% for site establishment and site supervision (Contractor cost).
- £ Costs associated with additional work in vicinity of interchanges (Nicholson St and Royal Pde).
- £ 25% contingency allowance.

#### 2.5 Summary Discussion

The following table summarises the estimated tunnels costs as determined from the various methods described in previous sections. Note that the contingency cost is applied to the base cost plus design and supervision costs.

Source of Cost	VicRoads	City Link	Eastern Fwy	NCCCS
Base Cost (\$M/km)	100	107	110	70
PM Cost (Principal)	Included?	Assume 8%	Assume 8%	8%
Design Cost	4%	Included	Included	4%
Site Costs	11%	Included	Included	10%
Contingency	30%	Included	Included	25%
All inclusive cost (\$M/km, 4-lane)	150	115	120	107

From the above comparison, it would appear that the current all-inclusive cost for tunnel construction is in the range \$115-\$120M per kilometre of 4-lane tunnel. Adopting a base tunnel cost of \$80M per kilometre for NCCCS would give an all-inclusive cost of \$122M per kilometre.

If \$80M per kilometre was used for tunnel construction, the overall cost for the various tunnel schemes tested in the study would vary from those already reported as follows (refer **Appendix B**).

Scheme Description	Current Estimate <sup>(1)</sup>	Varied Estimate <sup>(2)</sup>
Eastern to City Link, with I/Cs (G1 & G1a)	\$723M	\$810M
Eastern to City Link, no I/Cs (G4 & G4a)	\$592M	\$665M
Eastern to Victoria Parade (G3 & G3a)	\$370M	\$408M

#### <u>Notes</u>

(1) Estimate based on tunnel cost of \$70M per kilometre

(2) Estimate based on tunnel cost of \$80M per kilometre

## 3. Heavy Rail Estimate

#### 3.1 E W Russell Estimate

Professor Russell prepared a report for the Minister of Transport in 1991 that considered various public transport options to connect the existing system to the Doncaster Hill shopping complex. Included in the report were estimated costs of the options, including provision of heavy rail from near Victoria Park Station to Doncaster Hill. The option costed surface rail via Eastern Freeway to Bulleen Road then underground to Doncaster Hill and referred to as Option D (attached in **Appendix C**).

The unit rates used in this report are provided in the table below, including an equivalent 2001 cost based on a CPI increase of 26% from 1991 to 2001.

Cost Item	E W Russell (1991)	2001 Equivalent
Underground Station	\$40M	\$50M
Double Track (\$/m)	1500	1900
Overhead (\$/m)	600	760
Signalling (\$/m)	600	760
Rail Tunnel (\$M/km)	15	19
Sub-Stations (each)	\$1.5M	\$1.9

The total Option cost was estimated to be \$336M in 1991, which equates to \$423M in 2001.

#### 3.2 NCCCS Estimate

The unit rates adopted for the heavy rail scheme test in the NCCCS are tabulated below.

Cost Item	NCCCS Estimate
Underground Station	\$50M
Double Track (\$/m)	1900
Overhead (\$/m)	800
Signalling (\$/m)	800
Rail Tunnel (\$M/km)	20
Sub-Stations (each)	\$1.5M

The total estimated cost is \$430M (refer Appendix D).

#### 3.3 Discussion

The NCCCS estimate as provided in the initial cost estimate report closely correlates to the earlier estimate by Professor Russell in 1991 when the latter is updated to current prices. The scope of work costed is also identical.

Professor Russell's report also makes reference to cost estimates prepared by the Public Transport Users' Association (PTUA) that were significantly lower than those prepared by the PTC. The PTUA estimate for the rail link to East Doncaster (no figure quoted for rail link to Doncaster Hill) was \$240M in 1991 compared to the PTC estimate of \$567M for the same link. Because of this wide variance in cost estimates, Professor Russell convened a joint conference to explore the reasons behind the difference. The main reasons for the difference were found to be:

- £ \$6M per kilometre difference in tunnelling cost.
- £ Significant cost difference for each underground station (PTC \$40M each, PTUA \$10M each)
- f No contingency or design and administration costs included in the PTUA estimate.

Addressing each of these differences in turn, it is considered that the PTC estimate is more realistic for the reasons detailed below:

- £ The tunnelling cost of \$15M/km (\$19M/km in 2001) adopted in the Russell report aligns closely with known tunnelling costs for road projects in Melbourne recently, when factored down for the smaller tunnel tubes required for rail.
- £ The underground station cost of \$40M each adopted in the Russell report is based on the actual construction cost for Flagstaff Station.
- £ It is common practice and wise to include a contingency amount when developing estimates based on a preliminary scope and little or no design information. Similarly design and administration costs are real and need to be included.

## 4. Recommendations

Further investigation of unit rates adopted for cost estimating during the NCCCS indicates that:

- £ The cost of road tunnel construction should be increased by approximately 14% to reflect recent industry costs.
- £ The estimate for provision of heavy rail to Doncaster Hill is almost identical to an earlier estimate produced by Professor Russell and no change is recommended.
- £ Heavy rail costs produced by the PTUA in 1991 be considered as artificially low based on knowledge of recent tunnelling costs and the fact that no allowance was made for contingencies, design or administration costs.

## Appendix A VicRoads Tunnel Estimates

						OPTION					Γ			
COST ELEMENT	A	в	ပ	٥	ш	ш	ŋ	т	_	٦	¥	~	2	e
Tunnelling	450	459	669	711	579	468	414	309	750	771	338	522	360	261
Eastern Freeway Connection	50	50	50	50	50	50	50	50	50	50	50	50	50	50
City Link Connection	100	100	100	100	100	100	50	0	100	100	50	100	100	
Connection at CBD	0	0	50	50	100	50	100	100	50	100	100			50
Alex Pde Service Relocation					50	50		50			50			
Alex Pde Drain Replacement					50			50			50			
Intersection Modifications														
Other Costs					10	10		10			20			
Land Acquisition						6.5						3		
Traffic diversion during construction	5	5	15	15	25	15	35	25	15	25	40	15	15	10
Design & Supervision	91	92	137	139	145	112	97	89	145	157	105	104	79	56
TOTAL	950	950	1400	1400	1450	1150	1000	006	1450	1600	1050	1050	800	600
(includes 30% contingency)	2	}						}				8	}	}
	118	120	178	181	188	146	127	116	188	204	136	135	102	72
Cost & Contingency	904	918	1366	1384	1441	1121	970	888		1564	1043	1032	785	555
l ength of 2 lane deen trinnel	10	10.2	13.4	54	54	7 2	62	4 2		62		116	00	8
Longth of 2 long deen tunnel	2	1	- - -	- α 2 Γ	- u 0 0	i	1	i		, α 1 C		2	þ	2
Length of Shallow Tunnel			0.1	0.7	0.0				3.6	7.0				
					( ,									
- In Alexandra Parade Median					0.1	u 1		0.1			0.1			
- Ulluel Alexaliula Palaue Ioauways						0.	•				Ċ			
- Uther location							1.8				2.9			
Alexandra Parade Services Relocation: Alexandra Parade Drain Replacement:														
Cost of 9 Iane deen trinnel	450	459	603	243	243	324	970	189	108	279	C	522	360	261
Cost of 3 lane deep tunnel	ç c	ç o	96	468	216	0	20	000	552	492	00	0	20	0
Cost of single shallow tunnel - 6lane	0	0	0	0	120	0	135	120	0	0	338	0	0	0
Cost of duplicate shallow tunnels - 2x 3li	0	0	0	0	0	144	0	0	0	0	0	0	0	0
Total tunnel cost	450	459	669	711	579	468	414	309	750	171	338	522	360	261
Option sub-cost	904	918	1366	1384	1441	1121	970	888	1443	1564	1043	1032	785	555

**INITIAL COST ESTIMATE** 





## NORTHERN CITY CORRIDOR STUDY

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## **Route Concepts – Long List**

The following route concepts were developed during a brainstorming session with the Reference Group on Thursday 23 September 1999.

Note that these are concepts only, and should not be seen as specific proposals. Locations for interchanges between the tunnel and City Link have been selected as general indicators only, based upon their possible attractiveness for that concept. Separate work is being undertaken on possible interchange arrangements at City Link, Hoddle Street and intermediate locations.

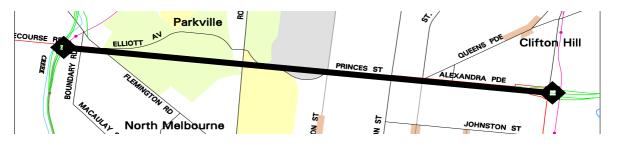
No lane configurations are implied in any of these concepts.

In the following diagrams depicting each of the concepts:

- š a solid thick line represents a tunnel fully constructed below surface level with limited disruption during construction,
- š a dashed thick line represents a tunnel immediately below surface level which could involve significant disruption during construction,
- š a solid diamond indicates a full freeway to freeway interchange,
- š a light coloured circle indicates a tunnel portal accessing the road system, and
- š a doughnut symbol indicates a partial interchange between the tunnel and the surface road system.

#### A. Direct Link to Racecourse Road

Direct tunnel link from Eastern Freeway at Hoddle Street to City Link at Racecourse Road.



Advantages	Disadvantages
Provides high level access between Eastern Freeway and City Link	Freeway/freeway connection at City Link may be difficult to achieve
Shortest length of tunnel Full route options retained at Hoddle Street	Existing surface level road system still required to perform its current distributor/access role
	No specific provision for improved access to CBD

### B. Direct Link to Macaulay Road

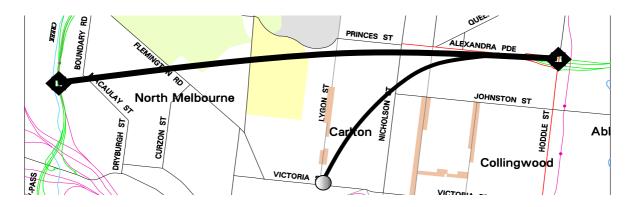
Direct tunnel link from Eastern Freeway at Hoddle Street to City Link near Macaulay Road

COURSE RD REALINGTION REALING	PRINCES ST ALEXANDRA PDE
Advantages Provides high level access between Eastern Freeway and City Link Full route options retained at Hoddle Street	Disadvantages Longer length of tunnel required Interchange required at City Link between the existing ramps at Dynan Road and Racecourse Road Existing surface level road system still required to perform its current distributor/access role No specific provision for improved access to CBD

### C. Direct Link to Macaulay Road + CBD Access Tunnel

This concept aims to also attract to the facility traffic that is bound for the CBD. It provides for a half diamond (easterly) interchange at Hoddle Street, with no direct connection to Alexandra Parade. The interchange at City Link could be at other locations.

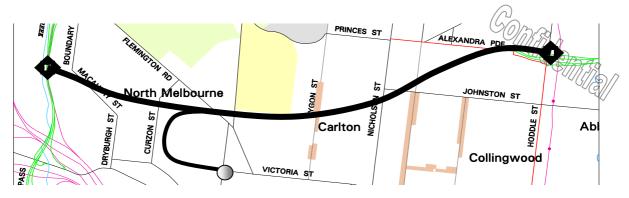
The key feature of this concept is that the tunnel splits to provide direct connection between the Eastern Freeway and the CBD.



Disadvantages
Length of tunnel significantly increased
Interchange required at City Link between
existing ramps at Dynan Road and at
Racecourse Road
No direct access from Eastern Freeway to
Alexandra Parade

### D. Direct Link to Macaulay Road + CBD Access "Hook" Tunnel

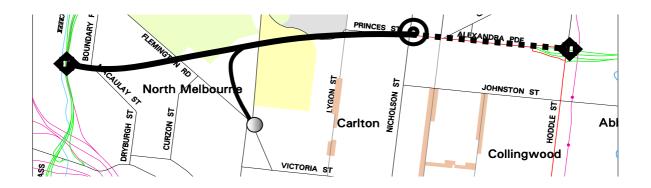
Direct tunnel link from Eastern Freeway at Hoddle Street to City Link near Macaulay Road, and with additional tunnels providing direct access to CBD by "reverse hook" to Victoria Street. The interchange at City Link could be at other locations.



Advantages	Disadvantages
Provides high level access between	Length and complexity of tunnel increased
Eastern Freeway and City Link	Interchange required at City Link between
Provides high level access between	the existing ramps at Dynan Road and
Eastern Freeway and the CBD	Racecourse Road
Access to City improved due to "counter peak" approach	Access to CBD is towards western side of CBD, already serviced by City Link
Reduces the existing surface level road system's distributor/access role	

# E. Tunnel Link to Macaulay Road with easterly half diamond interchange at Nicholson Street + CBD Access Tunnel

Cut and cover tunnel (shallow) from Eastern Freeway at Hoddle Street to Nicholson Street, then tunnel through to City Link near Macaulay Road, with a tunnel providing direct access to CBD at Elizabeth Street near Flemington Road. Easterly oriented ramps at Tunnel/Nicholson Street. Alexandra Parade still operates as a surface road. The interchange at City Link could be at other locations.



Advantages	Disadvantages
Provides high level access between	Interchange required at City Link between
Eastern Freeway and City Link	the existing ramps at Dynan Road and
Provides improved access between Eastern	Racecourse Road
Freeway and the CBD	Puts more pressure on already congested
Reduces Alexandra Parade's traffic role	Nicholson Street
	CBD access tunnel does not provide direct
	access to CBD

# F. Tunnel Link to north of Racecourse Road with easterly half diamond interchange at Nicholson Street

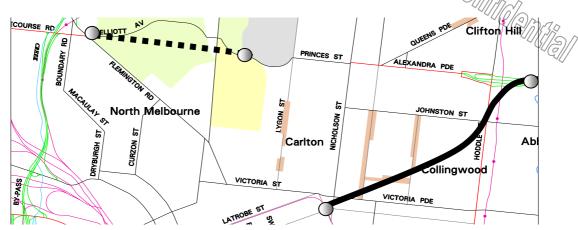
Cut and cover tunnel (shallow) from Eastern Freeway at Hoddle Street to Nicholson Street, with a tunnel from there to Tullamarine Freeway between Flemington Road and Brunswick Road. Easterly oriented ramps at Tunnel/Nicholson Street. Alexandra Parade still operates as a surface road.



Advantages	Disadvantages
Provides high level access between	Existing surface level road system
Eastern Freeway and City Link	generally required to perform its current
Reduces Alexandra Parade's traffic role	distributor/access role
	Access to CBD not improved

# G. Direct Tunnel Link from Eastern Freeway to CBD, with tunnel through Royal Park

Direct tunnel link from Eastern Freeway east of Hoddle Street to Lonsdale Street near Spring Street. Additional tunnel under Royal Park from Elliott Avenue east of Racecourse Road to Cemetery Road at Swanston Street.



Advantages	Disadvantages
High level access from Eastern Freeway to CBD Traffic relief through Royal Park	Existing surface level road system still required to perform its current distributor/access role Does not provide high level access between Eastern Freeway and City Link

# H. Tunnel Link from Eastern Freeway to CBD, with easterly half diamond interchange at Nicholson Street

Cut and cover tunnel (shallow) from Eastern Freeway at Hoddle Street to Nicholson Street, with a deep tunnel from there providing direct access to CBD (at CUB site near Swanston/Victoria).



Advantages	Disadvantages
High level access from Eastern Freeway to CBD	Does not provide high level access between Eastern Freeway and City Link
Reduces Alexandra Parade's traffic role Access to CBD tunnel from other parts of the road network	Existing surface level road system generally required to perform its current distributor/access role

#### I. Direct Link to Racecourse Road + access tunnel to CBD for both directions

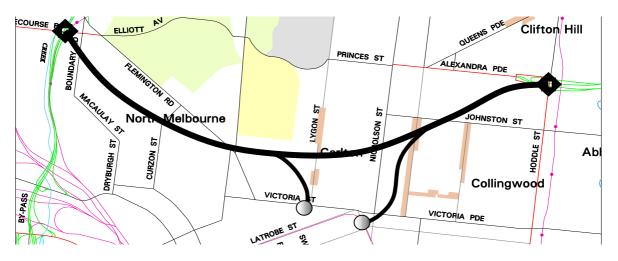
Direct tunnel link from Eastern Freeway at Hoddle Street to City Link at Racecourse Road, and with additional tunnels providing direct access to CBD (at CUB site near Swanston/Victoria) from both easterly and westerly arms of tunnel. The interchange at City Link could be at other locations



Advantages	Disadvantages
Provides high level access between	Length and complexity of tunnel increased
Eastern Freeway and City Link Provides high level access from Eastern Freeway and from City Link to CBD	Freeway/freeway connection at City Link may be difficult to achieve
	Potential congestion point at CBD access
Reduces the existing surface level road system's distributor/access role	

# J. Direct Link to Racecourse Road + access tunnels to CBD from each direction

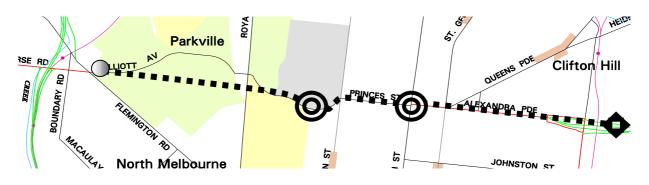
Direct tunnel link from Eastern Freeway at Hoddle Street to City Link at Racecourse Road, and with additional tunnels providing direct access to CBD at different locations for each tunnel approach (at CUB site near Swanston/Victoria for traffic from City Link side and at Lonsdale Street near Spring Street for traffic from Eastern Freeway side). The interchange at City Link could be at other locations



Advantages	Disadvantages
Provides high level access between Eastern	Length and complexity of tunnel increased
Freeway and City Link	Freeway/freeway connection at City Link
High level access from Eastern Freeway and from City Link to CBD	may be difficult to achieve
Reduces the existing surface level road system's distributor /access role	SOMMER SOM AND

### K. Shallow Tunnel to near Racecourse Road

Shallow "cut and cover" tunnel generally along existing surface level route between Eastern Freeway and City Link. Tunnel portals in Elliott Avenue near Flemington Road provide access to City Link. Interchanges at Swanston Street/Cemetery Road and Nicholson Street.



Advantages	Disadvantages
Provides high level access between Eastern Freeway and City Link	Freeway/freeway interchange at City Link not provided
Reduces traffic volumes on existing surface level road system	Access to CBD not improved

Long List 22/09/99

## Appendix B NCCCS Tunnel Estimates

м	DESCRIPTION OF WORK	QUANTITY	UNIT	RATE	AMOUNT		SUMMARY
1	Project Management		5			\$	42,466,714
	Project Management	Item		8%	42,466,714		
					,,	•	
3	Design and Investigation					\$	20,416,689
	Detailed Design & Investigation	Item		4%	20,416,689		
;	Land Acquisition					\$	5,000,000
	Acquire land	Item			\$ 5,000,000		
)	Construction					\$	510,417,230
<b>1.0</b> 1.1	GENERAL ITEMS Site Establishment	Item		5%	\$ 23,168,965	\$	46,337,930
	Site Management & Supervision (including QA)	Item		5%	\$ 23,168,965		
	STRUCTURES Bridge Construction		m²			\$	460,000,000
	Tunnel Construction (2 tunnels each 2 lane)	4.7	km	70,000,000	\$ 329,000,000		
	Tunnel Construction (I/C ramps, single lane)	3.0	km	27,000,000	\$ 81,000,000		
	Tunnel Portal, Eastern Freeway	Item			\$ 30,000,000		
2.5	Tunnel Portal, Elliott Avenue	Item			\$ 20,000,000		
3.00	ROADWORK (realign Alexandra/Royal @ I/C)						
3.01	Stripping topsoil	13,200	m²	5	\$ 66,000	\$	484,200
3.02	Excavation	6,600	m³	25	\$ 165,000		
	Disposal of excavated material	6,600	m³	15	\$ 99,000		
	Compaction of sub grade	13,200	m²	6	\$ 79,200		
3.05	Soft areas - excavation, remove and replace	Item			\$ 75,000		
4.00	PAVEMENT					\$	2,359,500
4.01	Deep Strength Asphalt	13,200	m²	175.00	\$ 2,310,000		
	Granular with Asphalt Surfacing		m²	125.00	\$ -		
4.03	Asphalt Surfacing (40mm)	3,300	m²	15.00	\$ 49,500		
5.00	DRAINAGE					\$	312,000
	subsoil drains 100mm dia	2,400	m	35	\$ 84,000	·	- ,
5.02	375 RCP (Class 2)	1,200	m	160	\$ 192,000		
5.03	Pits/Inspection Openings	24	no	1500	\$ 36,000		
6.00	SM2 & SM3 Kerb &channel	2,400	m	35	\$ 84,000	\$	84,000
7.00	POWER & LIGHTING						
	Design & Installation (60m spacing)	Item			\$ 100,000	\$	100,000
8.0	SIGNING	13,200	m²	1.50	\$ 19,800	\$	19,800
9.0	LINEMARKING	13,200	m²	1.50	\$ 19,800	\$	19,800
10.0	MISCELLANEOUS						
	Signalised intersection works	6	no	100,000	\$ 600,000	\$	600,000
	Other intersection works at Royal Pde	Item		,	\$ 100,000	\$	100,000
	TOTAL A - D					\$	578,300,633
	Contingency						
	Lower Bound Contingency (10%)	Item		10%		\$	57,830,063
	Upper Bound Contingency (30%)	Item		30%		\$	173,490,190
	PROJECT BUDGET						
	Lower Bound Estimate					\$	636,130,696
	Lower Bound Estimate Upper Bound Estimate					ъ \$	751,790,823

М	DESCRIPTION OF WORK	QUANTITY	UNIT	RATE	AMOUNT		SUMMARY
١	Project Management					\$	34,686,080
	Project Management	Item		8%	34,686,080		
}	Design and Investigation					\$	16,676,000
	Detailed Design & Investigation	Item		4%	16,676,000		
;	Land Acquisition					\$	5,000,000
	Acquire land	ltem			\$ 5,000,000	Ŵ	3,000,000
)	Construction				\$ 0,000,000	*	440,000,000
						\$	416,900,000
	GENERAL ITEMS Site Establishment	Item		5%	\$ 18,950,000	\$	37,900,000
	Site Management & Supervision (including QA)	Item		5%	\$ 18,950,000		
2.0	STRUCTURES					\$	379,000,000
2.1	Bridge Construction		m²			Ť	
	Tunnel Construction (2 tunnels each 2 lane) Tunnel Portal, Eastern Freeway	4.7 Item	km	70,000,000	\$ 329,000,000 \$ 30,000,000		
	Tunnel Portal, Elliott Avenue	Item			\$ 20,000,000		
	ROADWORK Stripping topsoil		m²	5	\$-	\$	-
	Excavation		m <sup>3</sup>	25	\$-		
	Disposal of excavated material		m³	15	\$-		
	Compaction of sub grade		m²	6	\$-		
3.05	Soft areas - excavation, remove and replace	Item					
4.00	PAVEMENT					\$	-
	Deep Strength Asphalt		m²	175.00	\$ -		
	Granular with Asphalt Surfacing		m² m²	125.00 15.00	\$- \$-		
4.03	Asphalt Surfacing (40mm)		111-	15.00	φ -		
	DRAINAGE					\$	-
	subsoil drains 100mm dia		m	35	\$ -		
	375 RCP (Class 2) Pits/Inspection Openings		m no	160 1500	\$- \$-		
0.00			110	1000			
6.00	SM2 & SM3 Kerb &channel		m	35	\$-	\$	-
	POWER & LIGHTING Design & Installation (60m spacing)	Item				\$	-
8.0	SIGNING		m²	1.50	\$-	\$	-
9.0	LINEMARKING		m²	1.50	\$-	\$	-
10.0	MISCELLANEOUS Signalised intersection works		no	100,000	\$-	\$	<u>.</u>
	Other intersection works at Royal Pde	Item		,	Ŧ	\$	-
	TOTAL A - D					\$	473,262,080
	Contingency						
	Lower Bound Contingency (10%) Upper Bound Contingency (30%)	Item Item		10% 30%		\$ \$	47,326,208 141,978,624
		item		30 /8		φ	1,370,024
	PROJECT BUDGET						
	Lower Bound Estimate					\$	520,588,288
	Upper Bound Estimate					\$	615,240,704

## Appendix C E W Russell Estimate

Option D			
Heavy Rail to Doncaster Shoppingtown via Eastern Freeway to Bulleen Road and Underground to Shonningtown	OPE	ORKS (cont)	COST
SUMMARY	7.1 7.1	Stations/ Interchanges 7.1 Above ground (includes platform, shelters, escalators and buildings)	
The work for the heavy rail option along the Clifton Hill rail alignment is		7.1.1 Chandler Hwy	\$1.5M
summar to triar required for the high performance train ie, an extra platform at Flinders Street, crossing works at Jolimont, a new station and crossing		7.1.2 Burke Road	\$1.5M
work at Victoria Park and escavation of the existing tunnel between Victoria Park and the freeway. The frain would frame the freeway		7.1.3 Bulleen Road	\$1.5M
median to Bulleen Road. There would be simple stops at Chandler High- way, Burke Road and at Bulleen Road. Each would involve bridge widen-	7.2	Underground (Based upon figures for Flagstaff Station)	ff
ing and the provision ofescalators down to the train stations. There would be new bridges over Merri Creek and the Verre Diror.	. <u>.</u>	7.2.1 High Street	\$40M
		7.2.2 Doncaster Central	\$40M
Immediately west of Bulleen Road, the train tracks would begin to grade downwards to travel underneath the freeway as far as Alfreda Avenue	8.0 Services	ses	\$2.0M
where the train would continue in tunnel to a new station at the corner of	9.0 Bridg	Bridgeworks	
t ugu outer and Village Avenue. Here there would be a deep underground station (NB. the station site is at the top of a hill) built underneath an at-	9.1	Merri Creek	\$3.0
grade car park. The train would then continue in tunnel to Doncaster	9.2	Yarra River	\$3.0M
park and bus interchange. Except for a short section of tunnel underneath	10.0 Civil	Civil Works	
the eastern golf club which may possibly be constructed by cut and cover, the 5km tunnel would need to be been at these meets the formed	10.1	Tunnel up to Victoria Park Station \$1	\$14M (Nom)
sets at a cost of $$40M$ required for this option. The infrastructure would	10.2	Relocation of Victoria Park Station \$	\$5M (Nom)
cost \$336M.	10.3	New junction at Victoria Park \$	\$5M (Nom)
SCOPE OF WORKS COPE	10.4	Underground tunnel from Bulleen Road to	
1.0 Development \$200,000		Doncaster Centra (Based upon \$15m/km) 5 route kms.	\$75M
2.0 Stabling (4 trains) \$410,000 (Nom)	10.5	mont station to	\$10M (Nom)
3.0 Track (12 route kms) \$1500/route m \$18.0M			
4.0 Overhead (12 route kms) \$600/route m	10.0	Increased platform capacity at runtees of and Princess Bridge stations	\$10M (Nom)
5.0 Substations	11.0 Road	Roadworks	
5.1 Substations 2 No. at \$1.5M each.	11.1	Eastern Fwy (east bound) east of	\$500.000 (Nom)
5.2 Tie stations 2 No. at \$900,000 each. \$1.8M	12.0 Misc	anine etc)	\$200.000
6.0 Signalling \$300/track m		Sub Total	\$250.00M

SCOPE OF WORKS (evc)     COST     Heary Rail to Blackburn Road / George Street East Doncaster SUMMAR       130     Design 6% of construction costs     \$15.00M     This option is standard and and evolute the standard and consultance of a construction costs       130     Contagenry 20%     \$5.00M     Standard and an evolute standard and consultance of a construction costs       150     Contagenry 20%     \$5.00M     Boyod Standard and and consultance of a construction costs       150     Contagenry 20%     \$5.00M     Boyod Standard and and consultance of construction costs       150     Contagenry 20%     \$5.00M     Boyod Standard and consultance of construction costs       150     Contagenry 20%     \$5.00M     Boyod Standard and Low Function the construction costs       150     Contagenry 20%     \$5.00M     Boyod And And Construction costs       151     Resources available.     Description function for the function for construction costs     \$5.00M       1     Resources available.     Boxod And Costy Costo And Costy Cost option Infrastruction costs     \$5.00M       2     4.0b tastis contributes stand cost of Workshop Noad. Corpoled of boto And the for the stand cost of the stand c				n mundo	1 1	
0     Delgn 65 of construction costs     55.00M     Standard       0     Project Management 6% of construction costs     55.00M     Standard       0     Contigency 20%     55.00M     Sub Total     230.00M       0     Contigency 20%     55.00M     Standard     Project Management 6% of construction costs     55.00M       0     Contigency 20%     55.00M     Standard     Project Management 6% of construction costs     55.00M       0     Contigency 20%     55.00M     Standard     Project Management 6% of construction costs     55.00M       0     Contigency 20%     55.00M     Standard     Project Management 6% of construction costs     55.00M       0     Contigency 20%     Standard     Standard     Project Management 6% of construction costs     55.00M       10     Vehicle Acquisition 41No. Conneng trans at \$100 Keach     Standard     Project Management 6% of construction costs     50.00M       500 M     Contigene standard     Fact Management for and the trans at a cost of 500 mildrary trans at a cost of	SCOF	PE OF WORKS (cont)	COST	Heavy Ra	il to Blackburn Road / George Street I	ast Doncaster
0     Project Management 6% of construction costs     \$15.00M     This option is similar in all regards to option D as far as Dun Suppringtown.       0     Contingency 20%     \$56.00M     \$56.00M     Baye of Suppringtown.       0     Contingency 20%     \$56.00M     Baye of Suppringtown.     Baye of Suppringtown.       0     Contingency 20%     TOTAL     \$55.00M     Baye of Suppringtown.     Baye of Suppringtown.       0     Contingency 20%     TOTAL     \$55.00M     Baye power of Suppringtown.     Baye Baye of Suppringtown.       0     Vahicle Acquisition. 4 No. Commeng trains at sci.or.     \$6.00M     Baye Baye of Baye Baye Baye Baye Baye Baye Baye Baye	13.0	Design 6% of construction costs	\$15.00M	SUN	MARY	
Sub Tuckal Sea0.0M     Sub Tuckal Sea0.0M     Sub Tuckal Sea0.0M     Sub Tuckal Sea0.0M       (0)     Contingency 20%     556.00M     556.00M     Expert Singlewown, the rain, would travel underground in turner underground station would area to the curr is sound may are sound sea provided.       (0)     Vehicle Acquisition, 4 No. Comeng trans at sound     50.0M     Exercise to the contribution of Downerser Flored at little weet of Curr parking and bus interclaspes of the provided on the provided.       (0)     Vehicle Acquisition, 4 No. Comeng trans at sound     50.0M     Exercise sound are provided.     Exercise sound are provided.       (1)     Vehicle Acquisition, 4 No. Comeng trans at sound the provided on the provided and bus interclaspes and carry intersection, an underground station would be provided on the Works land.     Exercise sound as the provided on the Works land.       (2)     Vehicle Acquisition at turnel to the control of the provided on the Works land.     Exercise sound as the provided on the Works land.       (3)     Vehicle Acquisition at the control of the trains at a case of \$50M under this option. Inflature resources area by the provided on the Works land.     Secore trains at a case of \$50M under this option. Inflature resources area by a control option area by a control	14.0	Project Management 6% of construction costs	\$15.00M	This	option is similar in all regards to option D a	far as Doncaster
(a) Contingency 20%     55.00M     55.00M     ToriAL     55.00M     ToriAL     55.00M       (b) Contingency 20%     TOTAL     53.00M     Beyond Stoppingtonn, the rank would be provided underrach houd a little wet of Church Road funder provided.       (c) Contingency 20%     TOTAL     53.00M     Biotoburn Road and George of the continger and and Second be provided underrach houd a little wet of Church Road on Biotoburn Road and George Street in Tast Derrosater. Just seast of Statistics would be provided on Biotoburn Road and George Street in Tast Derrosater. Just seast of Statistics would be provided on Biotoburn Road and George Street in Tast Derrosater. Just seast of Statistics would be provided on Biotoburn Road and George Street in Tast Derrosater. Just seast of Statistics would be fire trains at cast of 550M under this option. Infanter-tange and and Tastist would be provided on Biotoburn Road and Contact and Statistics would be provided on Biotoburn Road and Contact.       Science at a lot trains required.     Extert and a statistic seast of Statistics would be fire trains at a cast of 550M under this option. Infanter-tange and a statistic seast of Statistics would be fire trains at a cast of 550M under this option. Infanter-tange and a statistic seast of statistics would be firet trains at a cast of 550M under this option. Infanter-tange and statistic seast of statistics would be for trains at a cast of 550M under this option. Infantertange and statistic seast of statistics.       Sciencellitories statistic for tunneling.     Sciencellitories statistics for tunneling.     Sciencellitories statistics for tunneling.     Sciencellitories statistics for tunneling.       Sciencellitories stratistic for tunneling.     Sciencellitoris sta		Sub Total	\$280.00M	Shop	pingtown.	
TOTAL     \$354.00M       10     Vehicle Arquistion. 4 No. Conneg trains at \$10.0M each.     gato.M       10     Vehicle Arquistion. 4 No. Conneg trains at \$10.0M each.     gato.M       11     Barb Deport inter underground station would be provided underground station would be provided on bo \$50.0M each.     gato.M       50.0M each.     GRAND TOTAL     \$375.00M       50.0M reack.     Backburn Read and George Street in East Doncaster. Just east of this intersceiton, an underground station would be provided on bo this intersceiton, an underground station would be provided on bo this intersceiton, an underground station would be provided on bo this intersceiton, an underground station would be provided on bo this intersceiton, an underground station would be provided.     \$       500 contained     Sol continues station costs based upon Hageaff     10     Development     \$       501 conditions suitable for tunneling.     10     Development     \$     \$       601 conditions suitable for tunneling.     10     Development     \$     \$       10     Development     10     Development     \$     \$       10 <td< td=""><td>15.0</td><td>Contingency 20%</td><td>\$56.00M</td><td>Beyc</td><td>nd Shoppingtown, the train would travel underg</td><td>round in tunnel to</td></td<>	15.0	Contingency 20%	\$56.00M	Beyc	nd Shoppingtown, the train would travel underg	round in tunnel to
0     Vehicle Arquisition. 4 No. Comeng trains at \$100M     \$100M     Si00M each.     \$100M       S00M each.     GRAND TOTAL     \$3500M     \$100M       SSUMTTONS     GRAND TOTAL     \$3500M     Intertain would be provided.       SSUMTTONS     Resources available.     The train would be provided on bo would be inverted indeground in tunnel to the contracter. Just east of the train sequence.       SSUMTTONS     Resources available.     The train would be provided on bo would be inverted indeground station would be provided on bo would be interchange and carrpation.       Kara stabiling required.     Soil conditions suitable for tunneling.     Scope OF Works land, 3gain accomparted with a bus interchange and carrpation that the would cast based upon Flagstaff       Kara stabiling required.     Soil conditions suitable for tunneling.     Scope OF WORKS       Underground station costs based upon Flagstaff     1.0     Development       Kara stabiling required.     3.0     Overhead (3.5 route kms) \$600 route m       Kara stabiling required.     1.0     Development     \$600 route m       Kara stabiling required.     3.0     Overhead (3.5 route kms) \$600 route m     \$600 route m       Kara stabiling required.     1.0     Development     \$600 route m     \$600 route m       Kara stabiling required.     2.0     Track (3.5 route kms) \$600 route m     \$600 route m       Karion vork required at Jolimont to allow for loop		TOTAL	\$336.00M	cross furth	to the south of Doncaster Road a little west of c er underground station would be provided und	nurch koau anu a erneath Doncaster
CRAND TOTAL     \$376,00M       SSUMTIONS     The train would then travel underground in turnel to the corr       SSUMTIONS     Resources available.       Resources available.     No. trains required.       4 No. trains required.     There would be frow trains at a cost of \$50M under this option. Infra ture would cost \$57TM.       Kara stabling required.     There would be frow trains at a cost of \$50M under this option. Infra ture would cost \$57TM.       Soil conditions suitable for turneling.     SCOPE OF WORS       Underground station costs based upon Flagstaff     1.0       Dom. means nominal cost.     3.0       Orwerhaad (3.5 route kms) \$1500/route m     5       Kun work required at Jolimont to allow for loop access.     4.1       Substations     5.0       Signalling \$150/route m     5       Sol     Overhaad (3.5 route kms) \$600 route m       Autor trains at a cost of \$5000 ordeh     \$5       Nom. means nominal cost.     3.0       Civil work required at Jolimont to allow for loop access.     4.1       Sol     Signaling \$150/route m     5       Go     Underground Stations     5       Sol     Signaling \$150/route m     5       Sol     Signaling \$150/route m     5       Sol     Signaling \$150/route m     5       Sol     Underground Stations     5    <	16.0	Vehicle Acquisition. 4 No. Comeng trains at \$10.0M each.	\$40.0M	facil	Depot, just east of Wetherby Road. Car parking a ties would be provided.	d bus interchange
SGOMTTONS     biaccourn read and cerpary server ut action would be provided on Bo       Resources available.     this intersection, an interchange and carpa       4 No. trains required.     there would be fire trains at a ccst of \$50M under this option. Infra the would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M under this option. Infra there would be fire trains at a ccst of \$50M route m the station cost.           Nom. means nominal cost.         30         Overhead (35 route kms) \$500 route m the station so its interchange at planner its at a ccst of \$50M route m the station so its interchange at a ccst of \$50M route m the station so its interchange at a scene train at a ccst of \$50M route m the station so its interchange at a scene train at a ccst of \$50M route m the station so its intercha		GRAND TOTAL	\$376.00M	The	train would then travel underground in tunne	I to the corner of
Resources available.     this intersection, an underground station would be provided on bo works land, again accompanied with a bus interchange and car pa three would be five trains at a cust of \$50M under this option. Infra Extra stabiling required.       Soil conditions suitable for tunneling.     SCOFE OF WORKS       Underground station costs based upon Flagstaff     1.0       Development     5       Nom. means nominal cost.     3.0       Overhead (3.5 note kms) \$1500/ route m     5       Nom. means nominal cost.     3.0       Overhead (3.5 note kms) \$500 route m     5       At a substations is updated to 1991 dollars.     3.0       Nom. means nominal cost.     3.0       Civil work required at Jolimont to allow for loop access.     4.1       Substations I stations I No. \$1.5M each     4.2       The station of \$1.5M each     4.1       Sold Could and the stations I No. \$1.5M each     5.0       Sold Could and Stations     5.1       Work required at Jolimont to allow for loop access.     5.0       Substations I No. \$1.5M each     5.0       Substations I No. \$1.5M each     5.0       Substations     5.1       Substations     5.0       Substations     5.0       Substations     5.0       Substations     5.0       Substations     5.0       Substations     5.0 <td>ASSU</td> <td>SNOILJW</td> <td><del>, , , , , , , , , , , , , , , , , , , </del></td> <td>blac</td> <td>courn koad and George Street III East Duncaster.</td> <td>Just east of</td>	ASSU	SNOILJW	<del>, , , , , , , , , , , , , , , , , , , </del>	blac	courn koad and George Street III East Duncaster.	Just east of
4 No. trains required.       There would be five trains at a ccst of \$50M under this option. Infrature would cost \$471M.         Extra stabling required.       Soil conditions suitable for tunneling.         Soil conditions suitable for tunneling.       SCOFE OF WORKS         Underground station costs based upon Flagstaff       1.0       Development       \$         Underground station costs based upon Flagstaff       1.0       Development       \$         Nom. means nominal cost.       3.0       Overhead (3.5 route kms) \$1500/route m       \$         Nom. means nominal cost.       3.0       Overhead (3.5 route kms) \$500 route m       \$         Civil work required at Jolimont to allow for loop access.       3.0       Overhead (3.5 route kms) \$500 route m       \$         Civil work required at Jolimont to allow for loop access.       3.0       Overhead (3.5 route kms) \$500 route m       \$         At 1       Substations I No. \$I.3M each       4.1       Substations I No. \$I.3M each       \$         At 2       Tre stations I No. \$SU(300 each       \$       \$       \$       \$         At 3       Substations I No. \$SU(300 each       \$       \$       \$       \$       \$         At 4       Substations I No. \$I.0000       6       \$       \$       \$       \$       \$       \$       \$       \$<	1.	Resources available.	<del>ando, and e</del>	this Wor	ntersection, an underground station would be pr ks land, again accompanied with a bus interchan	wided on Board of ge and car park.
Extra stabling required. Soil conditions suitable for tunneling. Soil conditions suitable for tunneling. ScOPE OF WORKS Underground station costs based upon Hagstaff attion costs updated to 1991 dollars. Nom. means nominal cost. Nom. means nominal cost. Nom. means nominal cost. Soil vor krequired at Jolimont to allow for loop access. Civil work required at Jolimont to allow for loop access. Civil work required at Jolimont to allow for loop access. Soil Signalling \$150/track m 6.0 Underground Stations 6.1 Waldau 6.2 East Doncaster 7.0 Services 8.0 Tunneling 9.0 Misc. \$100,000	2.	4 No. trains required.	-	The	e would be five trains at a cost of \$50M under this	option. Infrastruc-
Soil conditions suitable for tunneling. Underground station costs based upon Flagstaff tation costs updated to 1991 dollars. Nom. means nominal cost. Nom. means nominal cost. Solution costs based upon Flagstaff tation costs updated to 1991 dollars. Nom. means nominal cost. Solution costs based upon Flagstaff Solution costs based upon Flagstaff Solution costs based upon Flagstaff Solution costs based upon Flagstaff Solution costs updated to 1991 dollars. Nom. means nominal cost. Solution costs pasted to 1991 dollars. Solution costs pasted to 1991 dollars. Solution to allow for loop access. A 1 Substations 1 No. \$10,000 each B 2 Signalling \$150/track m 6 0 Underground \$1ations 6 1 Waldau 6 2 East Doncaster 7 0 Services 8 0 Tunneling 9 Misc \$100,000	З.	Extra stabling required.		ture	would cost \$471M.	
Underground station costs based upon Flagstaff station costs updated to 1991 dollars. Nom. means nominal cost. Some at joinnont to allow for loop access. Civil work required at joinnont to allow for loop access. A.0 Everhead (3.5 route kms) \$1500/route m A.0 Everhead (3.5 route kms) \$1500/route m A.1 Substations I No. \$1500 route m A.2 Tre stations I No. \$900,000 each B.2 East Doncaster A.2 East Doncaster A.0 Evervices B.0 Trunelling B.0 Trunelling A.2 East Doncaster A.0 Evervices B.0 Trunelling A.2 Tre stations I No. \$900,000 each B.2 East Doncaster A.0 Misc \$100,000	4.	Soil conditions suitable for tunneling.	<del>ar is an</del> tiq <del>a</del> t	JJ¥	PE OF WORKS	COST
2.0       Track (3.5 route kms) \$1500/route m       \$         Nom. means norminal cost.       3.0       Overhead (3.5 route kms) \$600 route m       \$         A.1       Substations       4.1       Substations       \$         A.1       Substations       4.1       Substations       \$         B.5       Signalling \$150/track m       \$       \$         B.5       Signalling \$150/track m       \$       \$         B.6       Underground Stations       6.1       Waldau       \$         B.0       Services       \$       \$       \$       \$       \$         B.0       Misc \$100,000       \$ </td <td>5.</td> <td>Underground station costs based upon Flagstaff station costs undated to 1991 dollars</td> <td></td> <td>1.0</td> <td>Development</td> <td>\$50,000</td>	5.	Underground station costs based upon Flagstaff station costs undated to 1991 dollars		1.0	Development	\$50,000
Civil work required at Jolimont to allow for loop access. 3.0 Overhead (3.5 route kms) \$600 route m 4.1 Substations 1 No. \$1.5M each 4.2 The stations 1 No. \$900,000 each 5.0 Signalling \$150/track m 6.0 Underground Stations 6.1 Waldau 6.2 East Doncaster 7.0 Services 8.0 Tunnelling 9.0 Misc \$100,000	y	Mom means nominal cost		2.0	Track (3.5 route kms) $1500/$ route m	\$5.25M
4.0 Substations 4.1 Substations 1 No. 51.5M each 4.2 The stations 1 No. 51.5M each 4.2 The stations 1 No. 5900,000 each 5.0 Signalling \$150/track m 6.1 Waldau 6.1 Waldau 6.2 East Doncaster 7.0 Services 8.0 Tunnelling 9.0 Misc \$100,000	i r	Civil visual visiting tool.		3.0	Overhead (3.5 route kms) \$600 route m	\$2.1M
<ul> <li>4.1 Substations 1 No. \$1.5M each</li> <li>4.2 Tie stations 1 No. \$900,000 each</li> <li>\$900,000 each</li> <li>\$900,000 each</li> <li>\$900,000 each</li> <li>\$900,000 each</li> <li>\$900,000 each</li> <li>\$900,000</li> <li>\$1.5M each</li> <li>\$900,000</li> <li>\$900,000</li> </ul>		LIVII WULK TEHRITER ALJUIIIIUUII IU ALIUW IUI IUUP ALLE		4.0	Substations	
<ul> <li>4.2 Tie stations 1 No. \$900,000 each \$9</li> <li>5ignalling \$150/track m</li> <li>5ignalling \$150/track m</li> <li>5ignalling \$150/track m</li> <li>6.1 Waldau</li> <li>6.1 Waldau</li> <li>6.2 East Doncaster</li> <li>6.2 East Doncaster</li> <li>7 unnelling</li> <li>Misc \$100,000</li> </ul>						\$1.5M
Signalling \$150/track m \$ Underground Stations 6.1 Waldau 6.2 East Doncaster Services Tunnelling \$ Misc \$100,000						\$900,000
Underground Stations 6.1 Waldau 6.2 East Doncaster Services Tunnelling Misc \$100,000				5.0	Signalling \$150/track m	\$1.05M
<ul> <li>6.1 Waldau</li> <li>6.2 East Doncaster</li> <li>Services</li> <li>Tunnelling</li> <li>Misc \$100,000</li> </ul>				6.0	Underground Stations	
<ul> <li>6.2 East Doncaster</li> <li>Services</li> <li>Tunnelling</li> <li>Misc \$100,000</li> </ul>						\$40M
Services Tunnelling Misc \$100,000						\$40M
Tunnelling Misc \$100,000			<u></u>	7.0	Services	\$2.0M
Misc				8.0	Tunnelling	\$52.5M
				9.0		

## Appendix D NCCCS Heavy Rail Estimate

# NORTHERN CENTRAL CITY CORRIDOR STUDY Strategy F1c - Eastern Freeway Mass Rapid Transit (Heavy Rail Vehicles)

ITEM	DESCRIPTION OF WORK	QUANTITY	UNIT	RATE	AMOUNT		SUMMARY
A	Project Management	QUANTITI	UNIT	NATE	AMOONT	\$	25,488,320
	Project Management	Item		8%	25,488,320		
В	Design and Investigation					\$	12,254,000
	Detailed Design & Investigation	Item		4%	12,254,000		
С	Land Acquisition					\$	-
	Acquire land		m²				
D	Construction					\$	306,350,000
1.1	GENERAL ITEMS Site Establishment Site Management & Supervision (including QA)	ltem Item		5% 5%	\$ 13,925,000 \$ 13,925,000	\$	27,850,000
<b>2.0</b> 2.1	DONCASTER HILL STATION Underground Rail Station				\$ 50,000,000	\$	50,000,000
3.01 3.02 3.03 3.04 3.05 3.06	HEAVY RAIL INFRASTRUCTURE Track Overhead Signalling Rail Bridge to Freeway Median Merri Creek Bridge Yarra River Bridge Yarra River Bridge	8 8 2,000 1,000 1,500	km km m² m² m² Item	1900000 800000 2000 2000 2000 2000	<ul> <li>\$ 15,200,000</li> <li>\$ 6,400,000</li> <li>\$ 4,000,000</li> <li>\$ 2,000,000</li> <li>\$ 3,000,000</li> <li>\$ 7,000,000</li> </ul>	\$	44,000,000
	RAIL TUNNEL Bulleen Road to Doncaster Hill	4.5	km	40000000	\$ 180,000,000	\$	180,000,000
	NEW SUBSTATIONS Allowance for 3 sub stations	3	no	1500000	\$ 4,500,000	\$	4,500,000
6.0	SIGNING		m²		\$-	\$	-
7.0	-		m²		\$-	\$	-
<b>8.0</b> 8.1	Traffic Signal Priority (4 No.)		no		\$-	\$	-
	TOTAL A - D					\$	344,092,320
Е	Contingency						
	Lower Bound Contingency (10%) Upper Bound Contingency (30%)	ltem Item		10% 30%		\$ \$	34,409,232 103,227,696
	PROJECT BUDGET						
	Lower Bound Estimate Upper Bound Estimate					\$ \$	378,501,552 447,320,016
	Project Budget (75% Confidence)					\$	430,115,400