Submission to Infrastructure Australia

M5 Expansion

Preliminary Overview Report - Supplement

Version 1.0 (14-Nov-2008)

Motorway Projects Branch

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Approved by:	General Manager Motorway Projects Branch	Paul Goldsmith	14-Nov-08

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Drafts		

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1.1 Purpose of Report

On 31 October 2008 the NSW Government provided to Infrastructure Australia a submission detailing the profiling and appraisal of an indicative preferred option for expanding the capacity of the M5 transport corridor between General Holmes Drive, Mascot and Camden Valley Way, Prestons to encourage Australia's economic growth whilst maintaining or improving Sydney's environmental and social development.

The submission was based upon preliminary investigations and design work undertaken for a feasibility study to be completed by March/April 2009.

The purpose of this report is to provide supplementary information to further support the submission of 31 October detailing further evaluation of strategic options, including financial and economic modelling and development of the indicative preferred option.

1.2 Background

On 13 May 2008 the Minister for Infrastructure, Transport, Regional Development and Local Government, the Hon. Anthony Albanese, announced $5 million funding in 2007-2008 for feasibility studies into the potential improvements to the M5 Transport Corridor from Port Botany/Sydney Airport to South West Sydney.

On 14 May 2008 the then NSW Premier, Morris Iemma, announced a further contribution of $10 million to investigate the viability of the M5 East Duplication. The study corridor is detailed in Figure 1

The preliminary identification and development work has been progressing for the preparation of the feasibility assessment based upon the methodology detailed below.

- Needs assessment of Sydney transport network to meet current and future transport demand
- Development of Study Objectives
- Identification of strategies for meeting future transport demand and development of strategic alternatives
- Assessment of the capabilities of the strategic alternatives to meet the study objectives through a Strategic Merit Test process
- Identification of short-list of strategic options for further evaluation
- Development of preliminary concepts for the short-listed strategic options
- Preliminary environmental assessment and traffic modelling of strategic options
- Multi-criteria analysis of short list of strategic options
- Rapid Economic Appraisal of shortlist of strategic options
- Identification of Indicative Preferred Option(s)

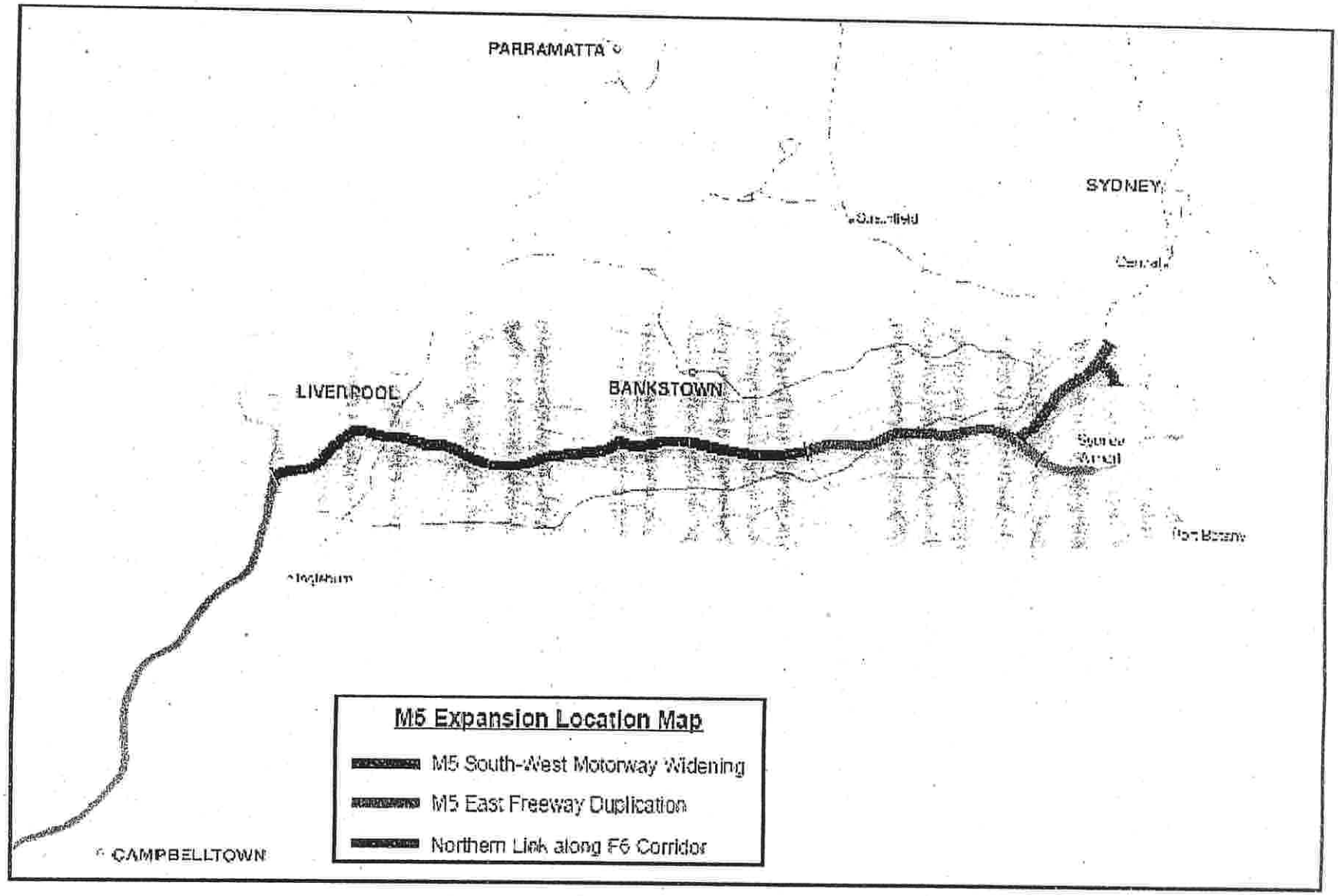

Figure 1 - Study corridor

potential strategies and actions which could be applied to the transport corridor to develop a set of strategic options which may meet the current and future transport demand. Through a Strategic Merit Test process the strategic alternatives were evaluated against the study objectives to identify a short list of strategic options for further evaluation.

The section of the M5 corridor between King Georges Road, Beverly Hills and Camden Valley Way, Prestons is owned and operated by the private sector company, Interlink Roads. Interlink Roads have provided to the RTA an unsolicited proposal to increase the capacity of the M5 South West Motorway to three lanes in each direction. The RTA is currently in discussions with regards to this proposal. As a consequence this report will be focused on enhancements to the M5 East freeway between General Holmes Drive, Mascot and King Georges Road, Beverly Hills.

On this basis the strategic options identified for the expansion of the M5 East freeway comprise:

Section 1	**M5 East Motorway – Port Botany and Airport to Bexley Road, Bexley**
Option A	Widen existing tunnels to three lanes between Marsh Street and Bexley Road.
Option B	New two lane westbound tunnel constructed between Marsh Street and west of Bexley Road. Existing westbound tunnel converted to a tidal flow tunnel
Option C	New twin two lanes tunnels between Foreshore Road and west of Bexley Road
Option D	New twin two lanes tunnels between Southern Cross Drive and west of Bexley Road
Option E	New three lane westbound tunnel between Marsh Street and west of Bexley Road Existing westbound tunnel converted to eastbound tunnel Existing eastbound tunnel provides access only to Princes Highway and Marsh Street

Figures 1 to 5 detail the main features of Options A to E.

Section 2	**M5 East Motorway - Bexley Road, North Bexley and King Georges Road, Beverley Hills** Dependent upon the strategic option selected from Section 1 and the location of the tunnel portal between Bexley Road and King Georges Road, the remaining Motorway to King Georges Road would be widened to provide sufficient lanes in each direction to balance tunnel capacity and the traffic flow onto the expanded M5 South West Motorway

Figure 2 - Strategic Option A – Widen existing tunnel to three lanes in each

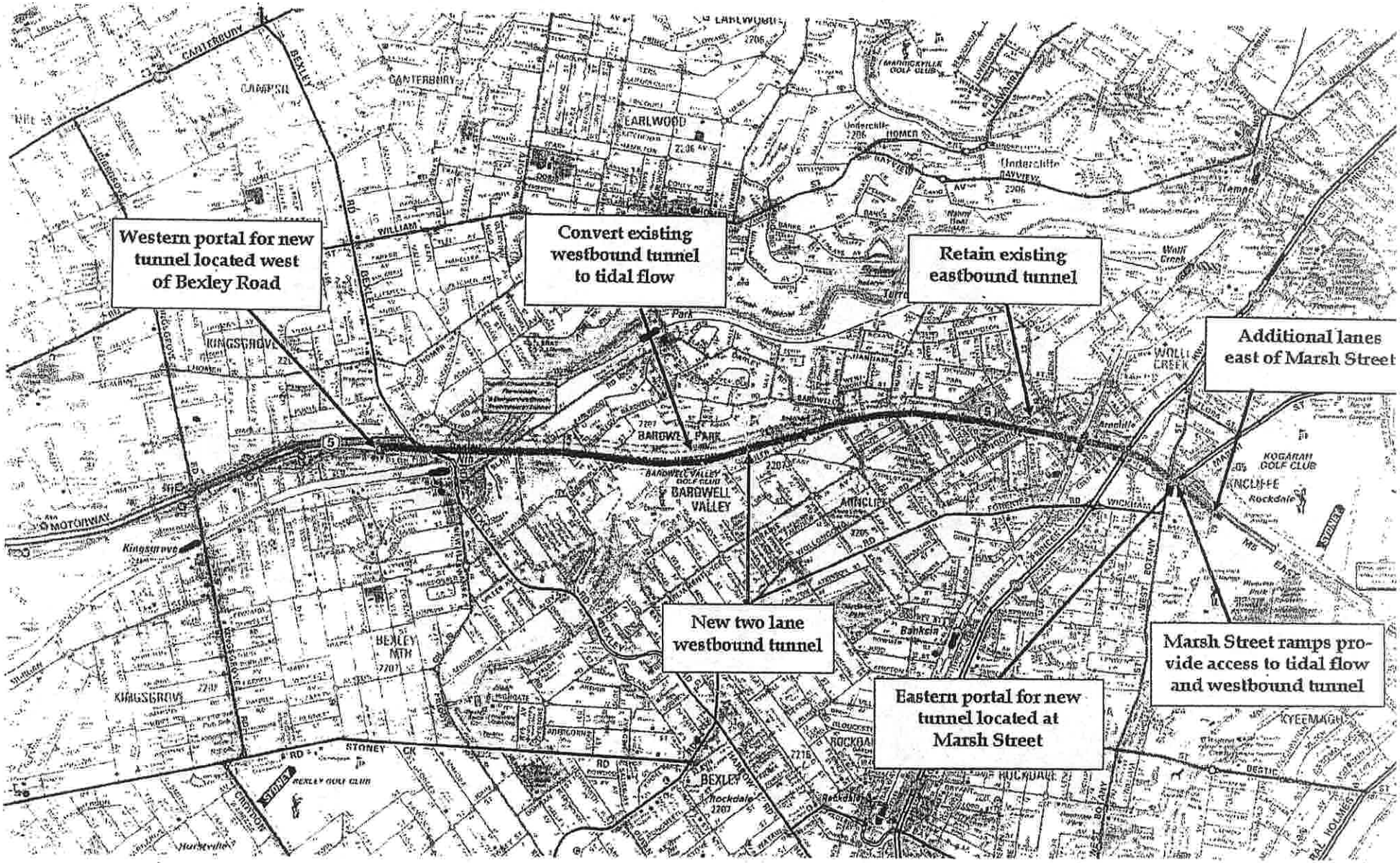

Figure 3 - Strategic Option b - Two lane tidal flow tunnel

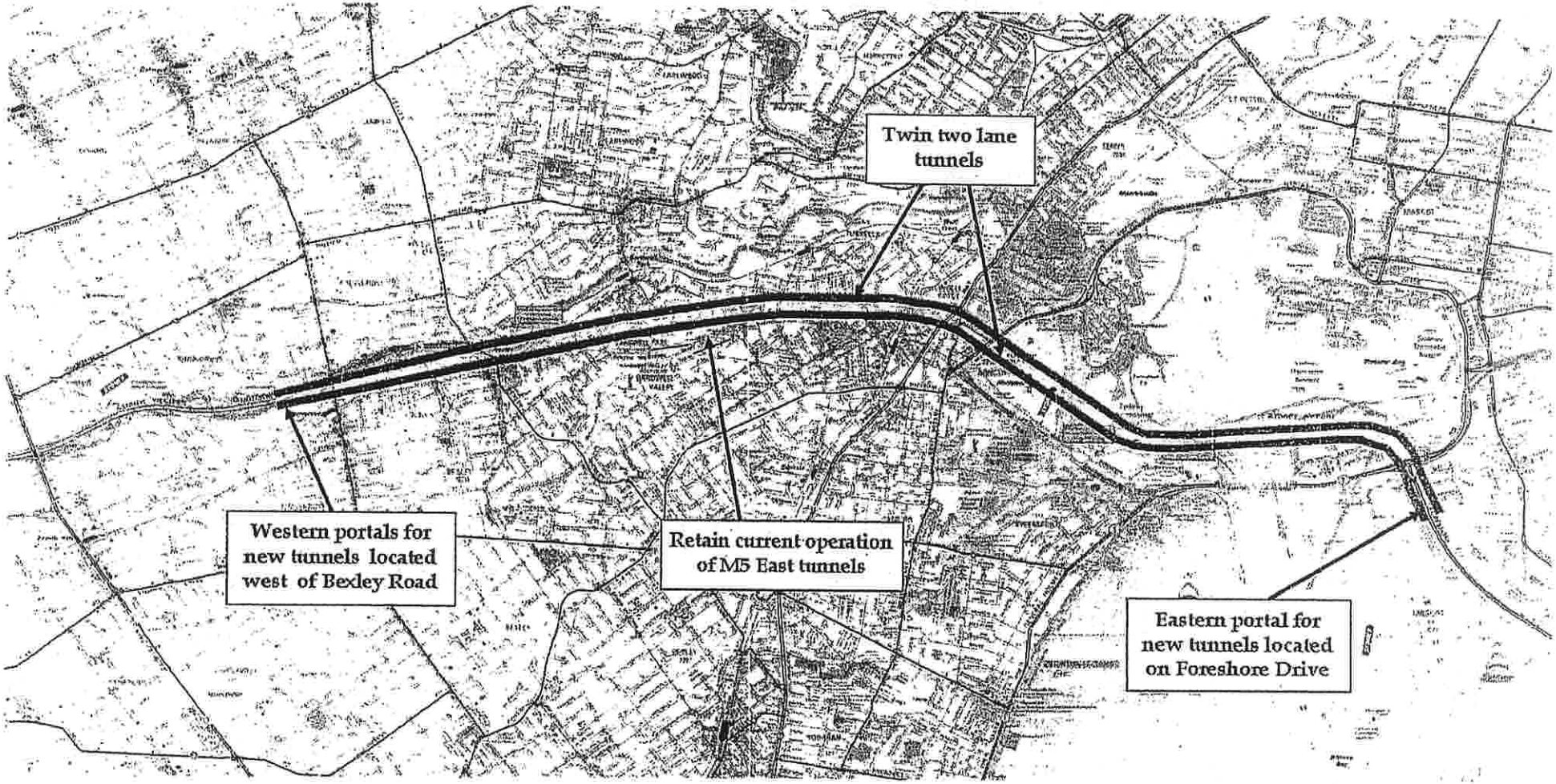

Figure 4 - Strategic Option C - Twin two lane tunnels from M5 East freeway, west of Bexley

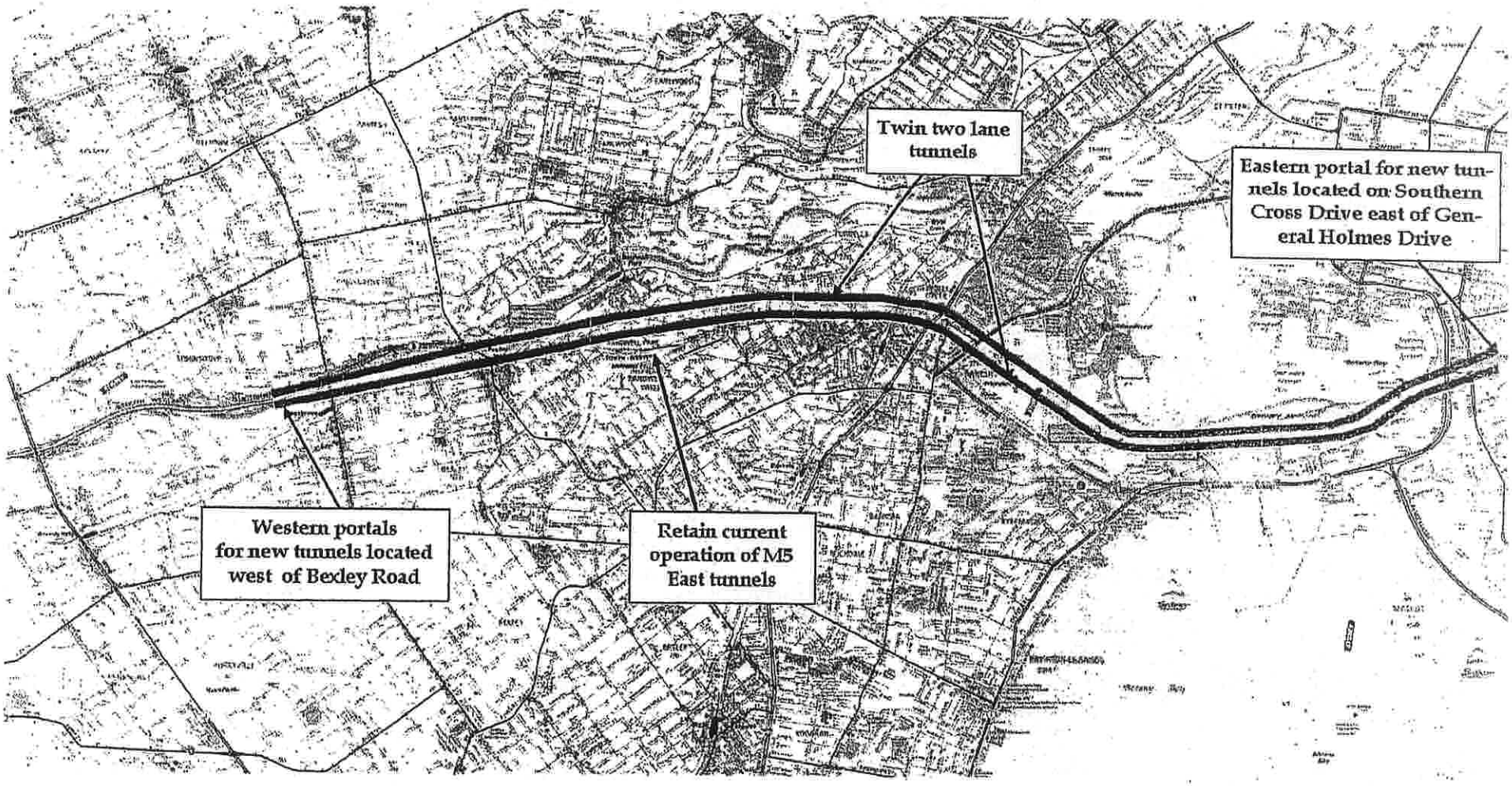

Figure 5 - Strategic Option D - Twin two lane tunnels from M5 East freeway, west of Bexley

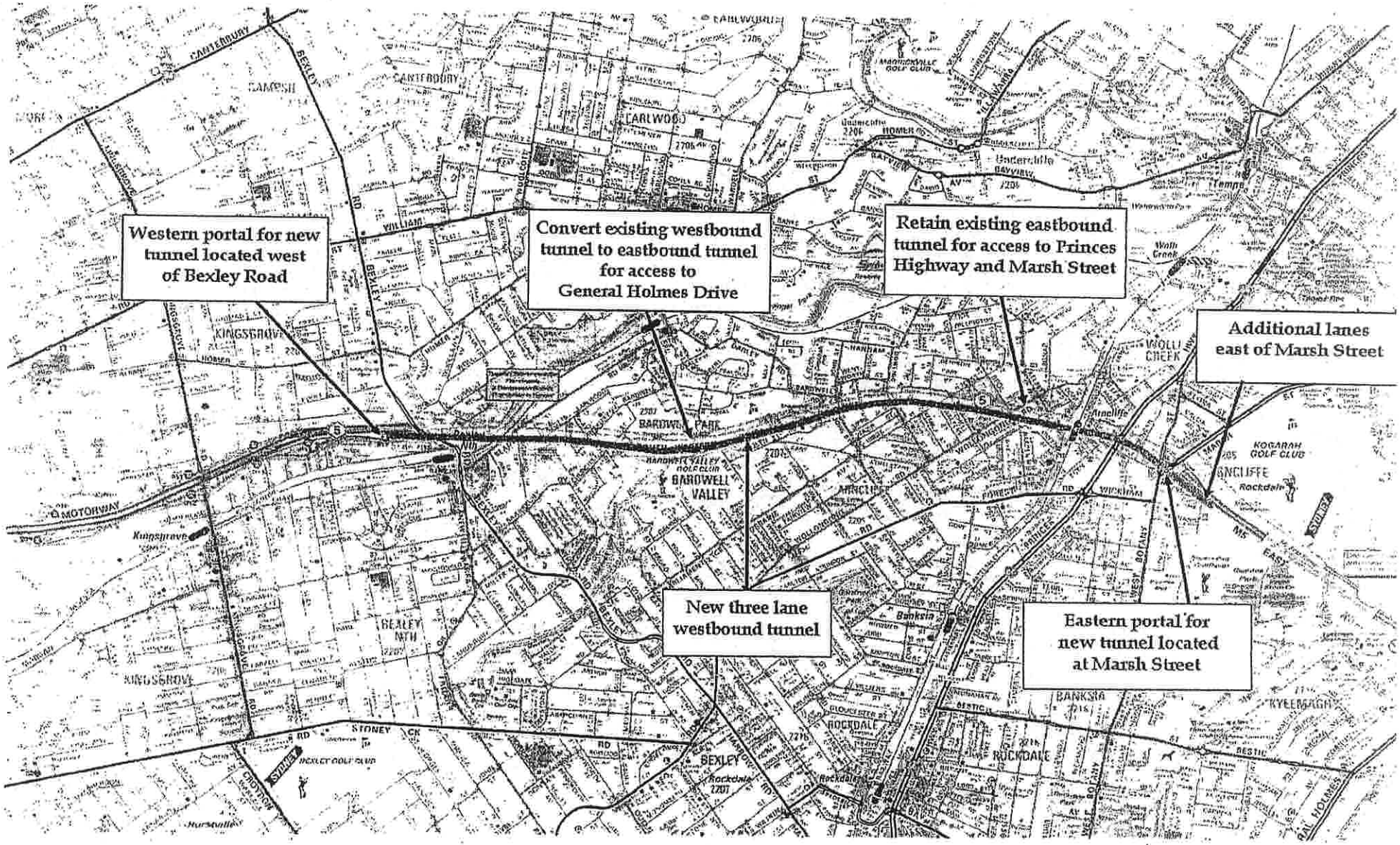

Figure 6 - New three lane westbound tunnel

A rapid economic analysis of Option E , as the indicative preferred option, was included in the Preliminary Overview Report submitted to Infrastructure Australia on 31 October 2008. This report includes similar rapid economic analysis of the remaining strategic options and an evaluation of all options combining the outcomes of the multi-criteria analysis and the rapid economic appraisal.

Options B, C, D and E can include an eastern surface road connection utilizing the existing F6 transport corridor reservation (termed the Northern Link in this report). The optimum concept design for this section will be confirmed by April 2009. An early strategic cost estimate and benefits estimates for this section are included at Section 5 of this report.

Preliminary traffic modelling has been undertaken on the strategic options to assess the change in traffic volumes along the corridor over time, as measured by traffic volumes, vehicle kilometres travelled (VKTs) and vehicle hours travelled (VHTs) in 2006, 2016 and 2026.

The modelling used in this submission includes TDC 2006 Trips Tables (using the 2001 base case) with traffic generation for Sydney Airport derived from the Sydney Airport 2003 Masterplan and accompanying documents.

For this modelling the trips distribution to the airport is based on the TDC Airport trip distribution which is in turn derived from Journey to Work Data. This provided a reasonable estimate of distribution when compared to the regional trip distribution provided by Sydney Airport.

This modelling also assumes that the trip distribution to Sydney Airport remains constant over time. In the 2003 Masterplan or accompanying documentation SACL do not provide any estimates of how this distribution is likely to change into the future.

Currently the model is being updated to include figures from the Sydney Airport 2008 Masterplan, and updated trip distribution based on interview surveys undertaken at the airport.

The 1-hour AM and PM peak traffic volumes from the preliminary traffic modelling of the "Do Nothing" alternative and the strategic options are detailed in Table 1 and Table 2 respectively. Additionally Table 3 contains a summary of the change in vehicle kilometres travelled and vehicle hours travelled for the options.

The traffic volumes indicate that by 2106 the existing M5 East tunnel will be operating significantly over its theoretical capacity during peak periods, with this situation degrading further by 2026. The outcomes of the high traffic volumes will be increased congestion, which is reflected in the increase in VKTs, reduced travel speeds, reflected by the increase in VHTs and a resultant potential for increased incidents in the tunnel potentially requiring closure of the tunnel.

The traffic modelling for the strategic options indicate:

"Do Nothing"	The M5 East is already at capacity and would be operating significantly above theoretical capacity by 2016 (114% and 115%), with performance deteriorating further by 2026 (121% and 120%).
Option A	In 2016 the eastbound and westbound tunnels will be operating near their theoretical capacity during peak periods (95% and 94%)and will be operating at capacity during peak periods in 2026 (105% and 102%)
Option B	In 2016, during peak periods, both the eastbound and westbound tunnels show an acceptable level of utilisation (90% and 93%) however this option leads to nominally exceeding the theoretical capacity of the tunnels by 2026 (112% and 104%). This options has the best level of contrapeak utilisation (at 61% to 68% by 2016 and 51% to 82% by 2026).

theoretical capacity. In the contrapeak direction the tunnels are significantly under utilised with utilisation rates of less than 30% in 2016 and not reaching 50% utilisation by 2026. By 2026 the tunnels are operating at an acceptable utilisation level, with the highest in the AM peak of 95 to 96%. In the mean time the existing tunnels are operating at or near capacity in the peak periods, particularly in 2026.

Option E

In 2016 the westbound tunnel in the PM peak is operating near capacity (95%) whilst the eastbound in the AM peak is operating at a much lower utilisation (75%). By 2026 the westbound tunnel is operating nominally over capacity (102%) with the eastbound remaining at acceptable utilisation of 85%. As with Options C and D, both eastbound and westbound tunnels are underutilized in the contrapeak direction. However, utilisation levels of the westbound tunnel in the contrapeak are higher than in Options C and D (at above 50%).

Overall Options C and D, based on the preliminary traffic modelling, are significantly under utilised in the contrapeak directions not even reaching 50% utilisation by 2026. Additionally, the westbound tunnel is utilised at less than 50% of its theoretical capacity in 2016 and this only increases to less than 70% in 2026.

The network statistic from the preliminary traffic modelling include vehicle kilometres travelled (VKT) and vehicle hours travelled (VHT) are summarised in Table 3. The main observations from these statistics are:

- All options indicate a minimal change in VKT's in 2016, in the range between 0.44% and 0.48% for AM peak and between -0.02% and 001% in the PM peak,, as compared to the Do Nothing modelling
- Similarly an even smaller change in VKT's is indicated in 2026 with AM peak changing between 0.02% and 0.04% for the AM peak and 0.00% and 0.06% for the PM peak
- All options indicate a reduction in vehicle hours travelled in 2016 and 2026 for both the AM and PM peaks

Overall the preliminary traffic modelling of the strategic options indicate although there is an increase in the volume of traffic travelling on the M5 corridor there is only a minor increase in the vehicle kilometres travelled across the Sydney road network and a reduction in the vehicle hours travelled, which could be interpreted to conclude that traffic on the M5 corridor will have reduced travel times.

As an indication of the change in travel times Table 1 below details the predicted change in the average travel speed on the M5 East freeway between the 20026 "Do Nothing" case and Option E. These results indicate a continued reduction in travel speed between 2006 and 2026 under the "Do Nothing" case.

With the introduction of the M5 expansion Option E there is a significant increase in the travel speed over both the AM and PM peak periods.

Table 1 - Strategic options traffic volumes 2016 and 2026 AM 1 hour peak[1]

	2016						2026					
AM Peak	Do Nothing	Option A	Option B	Option C	Option D	Option E	Do Nothing	Option A	Option B	Option C	Option D	Op
Eastbound Tunnel	4,561	5,689	3,422	3,322	3,320	3,108	4,859	6,285	3,706	3,728	3,668	3,
Westbound Tunnel[2]	2,339	3,221	1,990	2,149	2,012	2,838	2,447	3,993	2,046	2,374	2,039	3,
Tidal Flow Tunnel			2,445 (61%)						2,987 (75%)			
New Eastbound Tunnel				3,311 (83%)	3,386 (85%0					3,842 (96%)	3,994 (99%)	
New Westbound Tunnel				579 (14%)	785 (20%)	3,236 (54%)				1,211 (30%)	1,586 (40%)	4, (6
Total Eastbound Traffic	**4,561 (114%)**	**5,689 (95%)**	**5,412 (90%)**	**6,633 (83%)**	**6,706 (84%)**	**5,946 (75%)**	**4,859 (121%)**	**6,285 (105%)**	**6,693 (112%)**	**7,570 (95%)**	**7,662 (96%)**	**6, (8**
Total Westbound Traffic	**2,339 (58%)**	**3,221 (54%)**	**2,445 (61%)**	**2,728 (34%)**	**2,797 (35%)**	**3,236 (54%)**	**2,447 (61%)**	**3,993 (67%)**	**2,046 (51%)**	**3,585 (45%)**	**3,625 (45%)**	**4, (6**

Table 2 - Strategic option traffic volumes 2016 and 2016 PM 1 hour peak

	2016						2026					
PM Peak	Do Nothing	Option A	Option B	Option C	Option D	Option E	Do Nothing	Option A	Option B	Option C	Option D	Opt
Eastbound Tunnel	3,750	2,835	2,737	2,080	2,111	1,683	3,944	3,559	3,288	2,536	2,582	2,
Westbound Tunnel	4,590	5,651	3,110	4,183	3,912	1,134	4,785	6,142	3,472	4,309	4,149	1,
Tidal Flow Tunnel			2,453 (61%)						2,746 (68%)			
New Eastbound Tunnel				829 (21%)	807 (20%)					1,220 (31%)	1,158 (29%)	
New Westbound Tunnel				1,314 (33%)	1,823 (46%)	5,651 (94%)				2,409 (60%)	2,744 (69%)	6, (10
Total Eastbound Traffic	**3,750 (94%)**	**2,835 (47%)**	**2,737 (68%)**	**2,909 (36%)**	**2,918 (36%)**	**2,817 (35%)**	**3,944 (99%)**	**3,559 (59%)**	**3,288 (82%)**	**3,756 (47%)**	**3,740 (46%)**	**3, (43**
Total Westbound Traffic	**4,590 (115%)**	**5,651 (94%)**	**5,563 (93%)**	**5,497 (69%)**	**5,735 (72%)**	**5,651 (95%)**	**4,785 (120%)**	**6,142 (102%)**	**6,218 (104%)**	**6,718 (84%)**	**6,893 (86%)**	**6, (10**

[1] Percentage in brackets indicates tunnel utilisation based upon 2,000 vehicles per hour per lane under free flow conditions

[2] C[illegible] 1 E – The existing westbound tunnel is converted t[illegible] dditional eastbound tunnel.

Table 3 - Strategic Options VKT's and VHT's

			Do Nothing	Option A	Option B	Option C	Option D	Option E
Vehicle Kilometres Travelled (,000 VKT's)	2016	AM Peak	7,447	7,481 (0.46%)	7,480 (0.44%)	7,483 (0.48%)	7,483 (0.48%)	7,483 (0.48%)
		PM Peak	7,552	7,551 (-0.02%)	7,551 (-0.02%)	7,553 (0.01%)	7,553 (0.01%)	7,551 (-0.02%)
	2026	AM Peak	8,652	8,654 (0.02%)	8.654 (0.02%)	8,656 (0.04%)	8.655 (0.03%)	8.655 (0.03%)
		PM Peak	8,627	8,628 (0.00%)	8,628 (0.01%)	8,633 (0.06%)	8,632 (0.05%)	8,627 (0.00%)
Vehicle Hours Travelled (,000 VHT's)	2016	AM Peak	248	245 (-1.11%)	245 (-0.89%)	244 (-1.52%)	244 (-1.65%)	245 (-1.19%)
		PM Peak	230	228 (-0.63%)	228 (-0.48%)	228 (-0.79%)	227 (-0.95%)	228 (-0.64%)
	2026	AM Peak	324	321 (-1.20%)	321 (-0.93%)	318 (-1.81%)	318 (-1.94%)	320 (-1.33%)
		PM Peak	290	288 (-0.75%)	289 (-0.60%)	287 (-1.19%)	287 (-1.32%)	288 (-0.73%)

Table 4 – Comparison of 2026 travel speeds between "Do Nothing" and Option E

	2006 Base Case (kph)	2026 "Do Nothing" Case (kph)	2026 "With Expansion" Case (kph)
AM Peak			
Eastbound	42.4	34.2	62.0
Westbound	51.0	38.6	66.3
PM Peak			
Eastbound	69.7	53.1	78.7
Westbound	40.6	27.6	41.2

As reported in the Preliminary Overview Report, a multi-criteria analysis of the strategic options was carried out. The analysis involved the development of assessment criteria followed by rating of the options against the criteria. A workshop was held to assign ratings to the strategic options, with participants drawn from fields of expertise covering all criteria. The outcomes of the workshop are detailed below in Table 8.

The principal conclusions from the multi-criteria analysis were:

- Impacts on the biophysical environment are relatively similar and primarily minimal for each option.
- The impacts on air quality are relatively similar and neutral for all options
- Option E provided the beneficial outcome of reduced impact on the existing Wolli Creek floodplain.
- The social impacts across each option are also similar. While option D offered a slightly better accessibility benefit, option E provided the least detrimental impacts.
- From a delivery perspective, there was some distinction amongst the options. Option A was clearly not deliverable as the construction techniques required extended closure of the tunnel, while options B and E were the least difficult options to deliver.
- Aside from option A, all options were found to have comparable benefits and disadvantages with regards to transport efficiency. Option E had a marginal advantage in this category as it was found to have more benefits.
- In achieving government strategy, there was a slight differentiation, though options B and E had the least number of negative impacts compared to the other options, particularly with regards to supporting management of demand and mode shift to public transport along the corridor.

In conclusion, the MCA identified option A as not being acceptable for progression to further evaluation. While the four remaining options showed a high degree of similarity in the rating there were distinguishing characteristics which resulted in variations in criteria ratings across the options. It was concluded that the four remaining options could progress to further evaluation and appraisal, although there were several key characteristics that distinguished option E as the better performing option against the selection criteria

Rating	Highly Beneficial	Moderately Beneficial	Slightly Beneficial	Neutral	Slightly Detrimental	Moderately Detrimental	Highly Detrimental
Option							
Option A – Widen Existing Tunnel							
Environment				3	2		
Social				5			
Delivery							3
Transport Efficiency				2			1
Achieving Gov't goal				1	3		
Option A Total				**11**	**5**		**4**
Option B – New two lane tidal flow tunnel between Marsh Street and Bexley Road							
Environment				3	2		
Social				2	3		
Delivery				1	2		
Transport Efficiency			1	2			
Achieving Gov't goal			1	1	2		
Option B Total			**2**	**9**	**9**		
Option C – New twin two lane tunnels from M5 East Freeway at Bexley North to Foreshore Road							
Environment				3	1	1	
Social				2	2	1	
Delivery						3	
Transport Efficiency			1	2			
Achieving Gov't goal	1					3	
Option C Total	**1**		**1**	**7**	**3**	**8**	
Option D – New twin two lane tunnels from M5 East Freeway at Bexley North to Southern Cross Drive							
Environment				3	1	1	
Social			1	1	1	2	
Delivery						3	
Transport Efficiency			1	1	1		
Achieving Gov't goal	1				1	2	
Option D Total	**1**		**2**	**5**	**4**	**8**	
Option E – New three lane westbound tunnel between Marsh Street and M5 East Freeway Convert existing westbound tunnel to second eastbound tunnel							
Environment			1	2	2		
Social			1	2	2		
Delivery				1	2		
Transport Efficiency			2	1			
Achieving Gov't goal			1	1	2		
Option E Total			**5**	**7**	**8**		

5.1 Conclusions from options appraisal

The key outcomes from the multi-criteria analysis and rapid economic assessment of the strategic options are detailed below in Table 9 with a comparative assessment of the options.

The conclusion from the appraisal of the strategic options developed through this process is that Option E is the preferred indicative option principally as:

- Option A is not considered a feasible options due to significant impacts on the Sydney road network during construction
- This option provides the greatest value for money of all the options with a BCR of 1.63
- The estimated cost of the option is $2 billion, approximately $120 million higher than then lowest cost option and $1.35 billion cheaper than the other two alternatives
- The option provides an improved connection between the key centres in the west and south-west of Sydney and those in the south-eastern Sydney, specifically the CBD, Sydney Airport and Port Botany
- Option E increases the road capacity of the corridor in both the peak and contra peak direction which is balanced with the current and predicted future traffic demand
- The environmental and social impacts are consistent across all options
- Road network impacts during construction and operation are consistent with Options B, C and D

6.1 Future Motorways and Freeway

Although the feasibility study is focussed on the identification of enhancements to the M5 transport corridor there is a need to consider the development of this corridor in the context of the limitation of the surrounding road network and the need for future enhancements to the arterial and motorway network.

The current study has investigated the connections to western and south-western Sydney to meet the future demand from:

- the predicted growth in container transport into and out of Port Botany;
- increased movements to and from Sydney Airport
- predicted population and employment growth along and around the corridor.

The M5 transport corridor is the key east-west connection to the main north-south interstate road freight corridor along the eastern seaboard of Australia (Hume Highway/Westlink M7/Pacific Higway). Key centres in western Sydney also need improved connections to Port Botany and Sydney Airport, specifically the Western Sydney Employment Hub and the South West Growth Centre. These areas are currently connected to South Sydney by the M4 Motorway, Parramatta Road, Eastern Distributor and Southern Cross Drive or the arterial network through Marrickville and St Peters.

The M4 Motorway extends eastwards from the M7 to Strathfield, approximately 15km West of the Sydney CBD. The NSW Government has identified the extension the M4 Motorway into the CBD as a priority, with a Motorway standard link to Port Botany and Sydney Airport as a future extension route.

The F6 transport corridor is a road reservation set aside to provide for a future connection from Waterfall in Sydney's South to the southern end of the inner CBD. It is to cater for the existing and predicted future congestion on the existing southern route into the CBD over the Georges River through the primarily residential areas of San Souci, Rockdale and Brighton-le-Sands via General Holmes Drive and Princes Highway.

The NSW Government has identified both these future projects as future enhancements to the arterial road network and Motorway network of Sydney. The timing for the F6 corridor has not been determined at this stage and may not be considered for delivery until the late 2010's. Conversely the M4 extension has been included in the NSW Government's submission to Infrastructure Australia for funding.

The M4 extension submission separated the project into two stages:

- Stage 1 comprises the construction of connection between the existing M4 Motorway to the CBD, known as the CBD Link
- Stage 2 comprises the construction of a connection between Victoria Road, Gladesville to Port Botany and the Airport with connections to the CBD link, known as the Ports Link

CBD to north of Campbell Road. A grade separated intersection is provide between the M4 extension and Campbell Road to enable freight traffic to access Port Botany via Botany Road, O'Riordan Street, Joyce Drive, General Holmes Drive and Foreshore Drive. Access to Sydney Airport is provided by a surface road south of the Campbell road interchange which travels over the Alexandria Canal to connect with Airport Drive.

The development of the M5 expansion provides the opportunity for developing connections between the M5 expansion with the future F6 corridor and the M4 extension, particularly the Ports Link.

The development of these connections will also support improved access to the international and domestic terminals at Sydney Airport. The existing route between the M5 East and these terminals, Marsh Street, Airport Drive and Joyce Drive through to General Holmes Drive are operating at capacity during peak periods. The predicted increase in passenger movements through Sydney Airport is anticipated to increase congestion along this route.

Additionally, this route becomes increasingly congested during periods when incidents or breakdowns occur in the Airport Tunnel, General Holmes Drive, north of the Airport Tunnel or on Southern Cross Drive as this route and the Princes Highway are the only viable alternative into the CBD from southern and inner south-west of Sydney.

6.2 Development of M5 Expansion surface road link

Preliminary concept development has been undertaken to identify alternatives with the key transport objectives of:

- Providing future connections between the indicative preferred option for the M5 expansion (Option E),the M4 extension (Ports Link) and the future F6 Freeway
- Separating commuter traffic from traffic accessing the domestic and international terminals to improve access to the airport
- Providing an alternative route into the CBD for traffic from south and inner south-west of Sydney
- Increase network reliability by incorporating alternative routes into the road network in the south/south-west of Sydney to cater for incidents on the existing road network.
- Provide an alternative access to Port Botany for freight

Strategic alternatives developed to meet these objectives involved:

- Widening the existing Princes Highway and connecting to the M4 extension at Campbell Street; or
- Provision of new surface road/viaduct connection between Marsh Street, Arncliffe and Euston Road, St Peters.

Of these two strategic alternatives the widening of Princes Highway is not considered acceptable because of the detrimental impact on existing commercial land uses on both sides which of this key arterial road. An indicative option for the surface road link is shown in Figure 7.

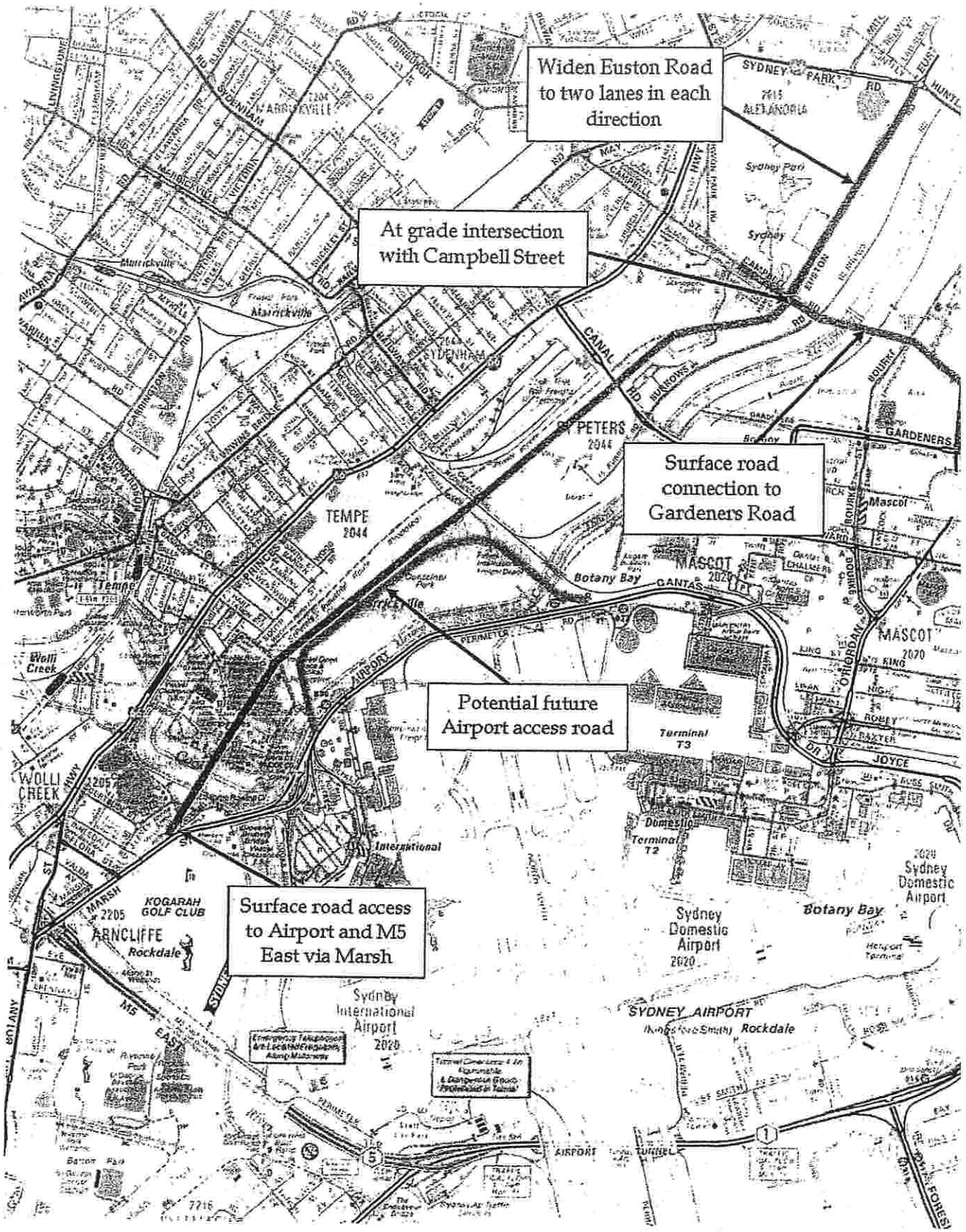

Figure 7 - Surface road link

resulting from the inclusion of the surface road link into the road network. The outputs from this traffic modelling are contained in

	2016		2026	
AM Peak	OPTION E (M5 Expansion)	OPTION E (M5 Expansion and surface works)	OPTION E (M5 Expansion)	OPTION E (M5 Expansion and surface works)
Eastbound Tunnel	3,108	2,000	3,609	2,093
Westbound Tunnel[3]	2,838	3,340	3,219	3,344
New Westbound Tunnel	3,236	3,294	4,018	3,615
Total Eastbound Traffic	**5,946**	**5,340**	**6,828**	**5,437**
Total Westbound Traffic	**3,236**	**3,294**	**4,018**	**3,615**
Surface link NB		1,722		2,255
Surface link SB		103		273

	2016		2026	
PM Peak	OPTION E (M5 Expansion)	OPTION E (M5 Expansion and surface works)	OPTION E (M5 Expansion)	OPTION E (M5 Expansion and surface works)
Eastbound Tunnel	1,683	1,677	2,044	1,993
Westbound Tunnel[4]	1,134	1,107	1,434	1,452
New Westbound Tunnel	5,651	5,655	6,143	6,124
Total Eastbound Traffic	**2,817**	**2,784**	**3,478**	**3,445**
Total Westbound Traffic	**5,651**	**5,655**	**6,143**	**6,124**
Surface link NB		280		543
Surface link SB		303		320

The traffic modelling indicates a reduction in traffic in the AM peak with the inclusion of the surface road link between Marsh Street and Euston Road, while only minor changes occur in the PM peak. The reduction in AM peak may be as a consequence of tolling the surface road link.

Further traffic modelling will be undertaken utilising the Sydney Strategic Travel Model from the Transport Data Centre which is currently being updated for 2006 census data. This review of the traffic modelling will assess redistribution of traffic and the low traffic levels which are predicted in this period and the low utilisation of the link in the PM peak.

[3] Option E – The existing westbound tunnel is converted to an additional eastbound tunnel.
[4] Option E – The existing westbound tunnel is converted to an additional eastbound tunnel.

6.5 Rapid economic appraisal of the M5 Expansion surface road link

A strategic estimate of cost was prepared for surface road component of the M5 expansion. This component was costed separately as it is at an early stage of concept development and design. The strategic cost estimate for the M5 expansion tunnel-only is included so that the marginal added cost of the surface elements can be understood.

A rapid economic appraisal was carried out on the current indicative preferred option for the surface road component based on the outputs from the traffic model used for the assessment of the strategic options for the M5 expansion. The outcomes of the rapid economic appraisal are contained below in Table 1010. This option and associated costs will be further tested and refined by April 2009.

* The Wider Economic Benefits have been calculated based upon 30% additional overall benefits.

** Preliminary Overview Report reported Government contribution as 1,476 million, revised contribution is based on updated calculation

The table indicates that the surface works have a positive impact on the direct user benefits expected from the project. However, the additional cost is proportionally higher resulting in a slightly lower benefit cost ratio. This increase in benefits has occurred as the preliminary traffic modelling indicated minimal traffic volumes in the PM peak along the link. This is compared to quite substantial flows in the AM peak (approximately one third of the eastbound tunnel traffic) travelling towards the CBD.

Details of the financial and economic assessment of Option E are contained in Appendix B while for Option E with the surface road link are contained in Appendix C.

been undertaken. As part of the preparation of the feasibility study:

- the transport model will be updated based on the revised Sydney Traffic Model from the Transport Data Centre incorporating 2006 census data
- traffic modelling will be reviewed to identify anomalies in either the road network or the traffic model which may be constraining the PM flows from the CBD
- identification of potential improvements to the existing arterial road network between Euston Road and the CBD
- investigation of improved connections between the M5 East tunnel and the Northern Link

Although the inclusion of the surface components in the indicative preferred option indicates low traffic volumes during the PM peak and an influences on the traffic in the M5 East tunnel the inclusion of this link should also consider other benefits which may be gained through:

- increased travel time reliability by providing an improved alternative route into the CBD and Port Botany during incidents and breakdowns along the existing General Holmes Drive/Airport Tunnel/Southern Cross Drive route
- potential for improved access to Sydney Airport and to Port Botany by separating general peak hour traffic and traffic with a destination or origin at the international or domestic terminals
- strategic network development by providing for future connections to the M4 extension (Ports Link) and the F6 corridor

These considerations are all matters which are not drawn out by conventional traffic modelling techniques but which all improve Australia's position as a global city by providing a more reliable transport network for goods and people and maintaining productivity. Additionally, the provision of the Northern Link also maintains the global perspective of future enhancements to the Motorway and Freeway network by catering for connections to the M4 extension (Ports Link) and the F6 corridor.

6.4 Integration with the M4 extension

As noted above the M4 extension has also be the subject of a submission to Infrastructure Australia. The overall scope of this project at this stage of its development comprises two main parts:

- An east-west tunnel connecting the eastern end of the existing M4 Motorway at Strathfield with the City West Link at Rozelle (CBD Link)
- a north-south tunnel, connecting Victoria Road at Gladesville with Campbell Road, Tempe, with a tunnel or surface connection with the CBD Link near Rozelle

The submission to Infrastructure Australia identified these links as two potential stages for delivery of the project with the CBD link as Stage 1 and the Ports Link as Stage 2.

As both the M5 expansion project and the M4 extension project are servicing the same key centres of Port Botany and Sydney Airport it is anticipated that there may be a degree of

redistribution of traffic from these centres, particularly freight traffic from Port Botany. A consequence of this interaction may be to:

- impact on the economic benefits generated by the two projects, including the staging of the M4 extension
- the ability to deliver the projects as Public Private Partnerships
- the level and timing of any Government contributions required to deliver the projects
- the timing of the delivery of the full M4 extension, the staged delivery of the M4 extension and the delivery of the M5 expansion

Preliminary traffic modelling has been undertaken to assess the potential redistribution of traffic as a result of the delivery of M4 extension (as a single project and in two stages) and the M5 expansion. The alternatives investigated covered the following scenarios:

Scenario 1	M4 Extension delivered as a single project	
Scenario 2	Stage 1	M4 extension - CBD Link
	Stage 2	M5 Expansion
		M4 extension – Ports Link
Scenario 3	Stage 1	M4 extension – CBD Link
		M5 expansion
	Stage 2	M4 extension – Ports Link
Scenario 4	M5 expansion only	

The traffic volumes from this modelling are detailed in Table 12 and Table 13

A rapid economic appraisal has been undertaken to investigate the potential impacts of the interaction between the M4 extension, and its staging, and the M5 expansion (Option E, tunnel work only).

The following Table 11 details the outcomes of the rapid economic appraisal of these three scenarios. The M5 expansion only is included for comparison purposes.

Table 12 - M4 extension/M5 expansion staging 1 hour AM peak traffic volumes 2006 and 2026

	2016				2026		
AM Peak	Do Nothing	Scenario 2 Stage 1	Scenario 3 Stage 1	Scenario 4 Option E	Do Nothing	Scenario 2 and 3 Stage 2	Scen Opti
Eastbound Tunnel	4,561	4,466	2,891	3,108	4,859	3,064	
Westbound Tunnel[5]	2,339	2,290	2,901	2,838	2,447	2,786	
New Westbound Tunnel			2,608	3,236		2,946	
M5 Total Eastbound Traffic	4,561	4,466	5,792	5,946	4,859	5,850	
M5 Total Westbound Traffic	2,339	2,290	2,608	3,236	2,447	2,946	
M4 Ext Eastbound Traffic		4,167	3,997			5,540	
M4 Ext Westbound Traffic		2,260	2,149			4,044	

Table 13- M4 extension/M5 expansion staging 1 hour PM peak traffic volumes 2006 and 2026

	2016				2026		
PM Peak	Do Nothing	Scenario 2 Stage 1	Scenario 3 Stage 1	Scenario 4 Option E	Do Nothing	Scenario 2 and 3 Stage 2	Scena Opti
Eastbound Tunnel	3,750	3,672	1,419	1,683	3,944	1,369	
Westbound Tunnel	4,590	4,562	930	1,134	4,785	879	
New Westbound Tunnel			5,376	5,651		5,396	
M5 Total Eastbound Traffic	3,750	3,672	2,349	2,817	3,944	2,148	
M5 Total Westbound Traffic	4,590	4,562	5,376	5,651	2,447	5,396	
M4 Ext Eastbound Traffic		2,533	2,912			4,392	
M4 Ext Westbound Traffic		3,925	3,764			5,842	

[5] Option E – The existing westbound tunnel is converted to an additional eastbound tunnel.

- The delivery of the CBD link when compared with the "Do Nothing" case causes limited reduction in the existing M5 East tunnel approximately 100 vehicles in the eastbound AM peak and 30 vehicles in the westbound PM peak
- There is limited redistribution of traffic from the M4 extension to the M5 when the two projects are delivered concurrently, in the order of 150 vehicles eastbound in the AM peak and 280 vehicles in the westbound PM peak.
- The redistribution of traffic in 2026, with the introduction of the Ports Link, results in a greater reduction in M5 East traffic with redistribution of eastbound traffic of approximately 1000 vehicles AM peak and 1300 vehicles in the PM peak while there are approximately 750 vehicles less in the westbound in the PM peak.
- The economic analysis, based upon the current traffic modelling, indicates that, although there is a degree of redistribution of traffic between the two projects, the concurrent delivery of the projects provides greater value for money when compared to the BCR for the individual projects
- The analysis also indicates that a staged delivery of the M4 extension, with the M5 expansion, continues to provide comparable value for money in lieu of providing the full M4 extension.

The funding by the Federal and State Governments has been provided to prepare a feasibility study for enhancements to the M5 transport corridor by April 2009. At this stage preliminary works have been undertaken to:

- Assess the current and future transport demand to identify the need for improvements in Sydney's transport network along the M5 corridor to maintain and improve Sydney's and Australia's productivity and reinforce Sydeny's current status as a global city
- Identify strategic options to meet the current and future transport demand along the M5 transport corridor
- Evaluation of the strategic options through the Strategic Merit Test to identify a short list of options which potentially meet the objectives of the Federal and State Governments
- Evaluation of the short listed alternatives through a multi-criteria analysis and rapid economic appraisal to identify an indicative preferred option for further development and investigation.

In order to prepare the feasibility study, further confirmation of the assessment of strategic alternatives, investigation and evaluation of the strategic options to confirm the indicative preferred options and detailed concept development and technical assessment undertaken on this option.

To this end the following activities will be undertaken to achieve these outcomes:

- Finalise the review of the Sydney Transport Model by the Transport Data Centre to provide inputs to the traffic model
- Update traffic modelling of the strategic options to assess changes in traffic flows on the Sydney road network for each option
- Revise economic and financial modelling of the options to update economic and financial parameters for these options including benefit cost ratios, potential government contributions
- Review the evaluation of strategic options to confirm the indicative preferred option
- Undertake an assessment of the wider economic benefits of the indicative preferred option
- Undertake further concept development of the indicative preferred option, including:
    - Developing the connections between the indicative preferred option and the M5 East freeway in the vicinity of Bexley Road, Bexley North and Marsh Street, Arncliffe
    - Developing further the Northern Link including improved connections between the southern end of the Northern Link and eastern portals of the M5 East tunnel.

- Undertake environmental, economic, financial and technical investigations and assessments as required to determine the feasibility of the indicative preferred option
- Assess the alternative methods available for procurement and delivery of the indicative preferred option.