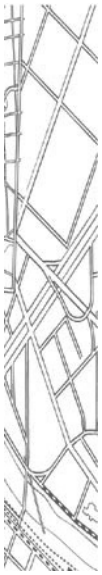
APPENDIX 5.

PARAMICS TRAFFIC MODELLING
MASSON WILSON & TWINEY



Traffic Report

Barangaroo - Road System Report

21 May 2008

Prepared for

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Executive Summary

Objectives

The purpose of this report is to describe:

- Paramics micro simulation traffic modelling that has been undertaken to determine traffic effects of the proposed Barangaroo development.
- Model options, including inputs,
- Model results and summary observations of traffic operations

The report provides a summary of traffic modelling undertaken for four options. It is not intended to provide a formal assessment of the merits of each option. This is left for separate project assessment process.

Options

Initially, base models were developed to represent AM and PM peak periods in 2007. Subsequently, copies of these Base models were modified to represent the following options:

- Option 1 – Barangaroo development as proposed in the Approved Concept Plan, with 4% mode share to car for office components (i.e., approximately in line with the Sydney LEP on-site parking allowances).
- Option 2 – as per Option 1, with a 10% mode share to car for office components.
- Option 3 – as per Option 1, with the left turn from York Street to Margaret Street banned. A further test, Option 3A, examined the effect of banning the left turn from York Street to Margaret Street (Option 3) in combination with reversing the one-way arrangement on Wynyard Lane.
- Option 4 – Barangaroo development as proposed in the Modified Concept Plan, with 4% mode share to car for office components.

Each of the above options included amended bus routes as proposed by the Barangaroo Bus Service Strategy.

Conclusions

Option 1

The road network copes with the additional traffic generated by Option 1 without obvious new traffic operational issues. There are some additional queues and average speeds are lower, but except for the queuing issues described above the network operation is not markedly different from at present.

Option 2

The additional traffic generated by Barangaroo in Option 2 exacerbates existing congestion in the network resulting in lock up conditions for some model runs. Overall the modelling indicates that the local road network would not be able to satisfactorily accommodate the additional traffic associated with this option.

Option 3 and 3A

Options 3 and 3A tested measures to reduce general traffic use of Margaret Street between York Street and George Street in order to expedite bus movements along Margaret Street to/from Barangaroo. The results showed some benefits but highlighted the need to examine possible measures for Margaret Street at a more micro level.

Option 4

The final scenario, Option 4, produced similar results to Option 1, showing reasonable traffic operations, although average network speeds were lower. This indicated that the Modified Concept Plan would operate without overloading the local road network.

Recommendations

The traffic modelling conducted in this analysis should be incorporated in the overall transport assessment being conducted for the Barangaroo Project in the form of a Transport Mobility and Accessibility Plan (T-Map).

Contents

1. Introduction

The Concept Plan for Barangaroo was approved in February 2007, subject to an associated Statement of Commitments. A requirement of these was to undertake detailed traffic analyses of the broader road system around the site using Paramics micro-simulation modelling software.

MWT was commissioned to prepare this traffic modelling by the Roads and Traffic Authority (RTA), on behalf of the Sydney Harbour Foreshore Authority (SHFA). This arrangement was necessary to permit the incorporation into the model of proprietary software developed by the RTA that controls the traffic signal control system (SCATS), as well as the practical need to access operational expertise from within the RTA with which to improve the realism of the modelling.

The purpose of this report is to describe:

- Specific requirements to undertake area wide traffic modelling
- Model options, including inputs,
- Model results and summary observations of traffic operations

It should be noted that this report provides a summary of traffic modelling undertaken for four options. It is not intended to provide a formal assessment of the merits of each option.

2. Requirement for traffic analysis

The Statement of Commitments for Barangaroo's Approved Concept Plan provides the following references to Paramics traffic modelling:

- *16. The Transport Management and Access Plan (TMAP) referred to in Commitment 7 is to be prepared following:*
  - *An assessment of the area wide traffic impacts of the development on the Sydney CBD road network using the RTA's Paramics traffic model (including effects of the changes to the bus services).*
  - *...*
  - *The Paramics model is to be used in an iterative manner during the preparation of a TMAP or equivalent to test:*
    - *Impact on traffic operation of changes to pedestrian movements and volume configurations;*
    - *Different bus access strategies; and*
    - *Variations in traffic generation estimates (depending on the relative attractiveness of pedestrian, rail and bus access).*

  The outcomes of the area wide traffic impact modelling are to form part of the consideration of the physical road transport infrastructure to be addressed in the preparation of the TMAP.[1]

This commitment is to be addressed and submitted to the Barangaroo Taskforce prior to the lodgement of any development application / project application other than for demolition or early / site preparation work.

[1] Source: Barangaroo Consolidated Concept Plan and Environmental Assessment page 184 and 185.

3. Description of modelling process

3.1 General outline of Paramics modelling

Paramics modelling is a relatively new form of traffic modelling which is termed microscopic simulation, as opposed to the more traditional macroscopic simulation methods. The main differences between these approaches to traffic modelling are:

- Micro-simulation modelling uses a spatially correct representation of the traffic system, including details such as traffic signal operation, the effect of queued traffic, number of lanes and sources of friction, such as parking acts and property accesses. The behaviour of interactions between individual vehicles within the road network is modelled.
- Macro-scopic simulation uses a less detailed mathematical representation of the road network, which applies global or average relationships between traffic demand and capacity to calculate travel times, rather than direct interactions between individual vehicles.

The Paramics software can be linked to the Sydney Coordinated Adaptive Traffic Signal System (SCATS) to simulate its particular method of controlling traffic. This improves the realism of modelled traffic behaviour, and such an application is termed a SCATSIM model.

This approach to traffic modelling has been applied extensive to the Sydney road network, including parts of the CBD over the recent past.

A major advantage of micro-simulation modelling is that it provides a visual representation of modelled traffic behaviour, so the modeller and review agencies can inspect traffic operations on the network. From a technical perspective, the major attraction of this type of model is its very high informational content, with detailed disaggregate representation of road network geometry and demand. In a congested location, like the CBD, the ability to capture the effect of queued vehicles and side friction on traffic is a major advantage of micro-simulation modelling.

3.2 Model standards

The model was developed to RTA requirements, both from a development assessment perspective, in terms of extent of model and time periods analysed, and from a technical perspective, in terms of the approach to implementing the model.

RTA technical requirements were met through the application of RTA modelling standards to the settings within the software, and, in the base case, to the goodness of fit of the model to observed conditions. These standards cover a number of input parameters, from vehicle dimension distributions, to vehicle acceleration characteristics and approaches to coding road links. In addition, it was an RTA requirement to reflect SCATS operation through the development of the model as a SCATSIM model.

A technical report describing model calibration was prepared by MWT and submitted to the RTA.

3.3 Model components

A Paramics model includes the following main functional elements:

- Road network, including a spatially accurate representation of road links, such as kerblines, kerbside parking, bus stop locations, lane lines, intersections and pedestrian facilities
- Traffic control measures, including traffic signals, coded to operate with their real world phasing arrangements
- Traffic demands, in the form of trip tables (also known as origin destination matrices), which include vehicles moving between specific zones, by vehicle classification (e.g., light vehicles and heavy vehicles)
- Fixed route vehicles, which are primarily in-service buses, are coded to their respective routes between bus stops and coded to match their timetabled frequency

It can also comprise modules that deal with specific matters of interest, such as an overtaking module for rural roads. These are described as 'plug-ins', which enhance the functionality of the core elements of the Paramics software.

3.4 Model development process

Prior to analysing the impact of changes to land use (such as Barangaroo) or changes in traffic network configuration, base models are usually established. These seek to represent existing traffic conditions, and are based on:

- Existing road network from RTA drawings, aerial photographs and site visits
- Existing traffic signal operations
- A matrix of existing traffic demands developed through a process of traffic count data collection and analysis
- Coding of fixed route vehicles

A process of matrix estimation is used to improve and refine the matrix of traffic demands (the trip table). This is done separately for AM and PM peak periods.

Once the existing models satisfactorily represent current traffic behaviour, they are converted to SCATSIM operation. This entails establishing communications between Paramics and SCATS software to permit SCATS to take control of the traffic signal controls within the modelled network.

To model the impact of a new development, a set of test or future models are developed. These start as copies of the existing model and are then modified primarily through:

- Amended traffic demands, which in Barangaroo's case reflect the estimated traffic generation of the site in future AM and PM peak periods (these are described in the next Chapter)
- Amended traffic networks, which reflect new access arrangements for the site, including changes to the mode of control of intersections, Barangaroo's proposed local road network
- Amended fixed route vehicle arrangements, in particular if bus routes are to be amended, these can be coded and tested (for Barangaroo these are described in the next Chapter)

3.5 Assessment of model results

Assessment of traffic impacts using Paramics can then be undertaken through:

- Visual inspection of traffic operations to identify locations with obviously poor performance
- Comparison of numerical changes in network performance, such as average speeds, between the base and option case models
- Comparison of changes in traffic flows on specific sections of streets between base and option case models

One of the advantages of the visual representation of traffic operation provided by Paramics is that it permits the analyst to visually assess 'fixes' designed to mitigate traffic impacts.

4. Description of Barangaroo Paramics traffic models

4.1 Extent of traffic model

Figure 4.1 shows the extent of the traffic network within the CBD that is covered by the Paramics network model and Figure 4.2 shows a snapshot of the model's network.

The model was developed to represent traffic behaviour during two periods on week days:

- AM peak – from 7.00am to 10.00am with a peak analysis period of 8.00am to 9.00am
- PM peak – from 4.00pm to 7.00pm with a peak analysis period of 5.00pm to 6.00pm

4.2 Model cases

Base models were developed to represent AM and PM peak periods in 2007.

Subsequently, copies of these Base models were modified to represent the following options:

- Option 1 – Barangaroo development as proposed in the Approved Concept Plan, with 4% mode share to car for office components (i.e., approximately in line with the Sydney LEP on-site parking allowances).
- Option 2 – as per Option 1, with a 10% mode share to car for office components.
- Option 3 – as per Option 1, with the left turn from York Street to Margaret Street banned. This option was developed and tested in response to concerns raised by the Ministry of Transport in relation to the ability of buses to travel along Margaret Street, especially eastbound (at present there are no scheduled services travelling eastbound on Margaret Street). By banning the left turn there is expected to be less general traffic using Margaret Street eastbound. A further test, Option 3A, examined the effect of banning the left turn from York Street to Margaret Street (Option 3) in combination with reversing the one-way arrangements on Wynyard Lane northbound from current one-way southbound arrangements.

- Option 4 – Barangaroo development as proposed in the Modified Concept Plan, with 4% mode share to car for office components (i.e., approximately in line with the Sydney LEP on-site parking allowances).

All the above options included amended bus routes as proposed by the Barangaroo Bus Service Strategy. These amendments are described in Section 4.5 below.

4.3 Traffic Generation

4.3.1 General

Traffic generation used in the Paramics modelling is similar to that developed in the Concept Plan apart from the following changes:

- Adjusted scheme land use to match the Consolidated Concept Plan and Modified Concept Plan
- On-street and off-street public parking

4.3.2 Approved Concept Plan

Development floor space for the Approved Concept Plan is summarised in the following table.

Table 1 – Approved Concept Plan Development Floorpsace by Block (sqm)

Development Block	Max GFA per block	Business	Residential	Retail	Tourist	Community
Block 8 HPM Headland Park – Munn Streets	5,800	0	0	0	5,800	0
Block 7 ML Munn – Little Clyde Streets	28,000	1,500	25,000	500	0	1,000
Block 6 LA Little Clyde – Agar Streets	3,000	500	0	0	0	2,500
Block 5 AH Agar – Healy Streets	29,200	17,700	10,000	1,500	0	0
Block 4 HB Healy – Bull Streets	74,500	54,500	15,000	5,000	0	0
Block 3 BN Bull – Napoleon Streets	56,000	35,000	10,000	11,000	0	0
Block 2 NM Napoleon –Margaret Streets	180,000	125,000	15,000	10,000	30,000	0
Block 1 MS Margaret – Shelley Streets	11,800	10,300	0	1,500	0	0
Cruise Ship Terminal	8,500	8,000	0	500	0	0
TOTAL	**396,800**	**252,500**	**75,000**	**30,000**	**35,800**	**3,500**

Traffic generation estimates for the case of 4% mode share for office components are summarised in the following table.

Table 2 – Approved Concept Plan Traffic Generation Estimates – 4% car mode share for office components (veh/hr)

Traffic Generating Component	AM Peak Hour			PM Peak Hour		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
Block 8 HPM [1] Headland Park – Munn Streets	2	9	12	9	2	12
Block 7 ML [1] Munn – Little Clyde Streets	8	28	36	18	5	23
Block 6 LA [1] Little Clyde – Agar Streets	0	0	0	0	0	0
Block 5 AH [1] Agar – Healy Streets	10	13	23	9	9	18
Block 4 HB [1] Healy – Bull Streets	26	22	48	16	24	40
Block 3 BN [1] Bull – Napoleon Streets	21	16	37	12	20	32
Block 2 NM [1] Napoleon –Margaret Streets	65	77	142	71	63	135
Block 1 MS [1] Margaret – Shelley Streets	4	1	5	1	4	5
Cruise Ship Terminal [2]	5	1	6	1	5	6
275 on-street parking spaces [3]	88	22	110	88	132	220
300 public parking spaces [4]	10	2	12	24	96	120
Service Vehicle Movements [5]	30	30	60	0	0	0
Coach Movements	0	0	0	10	10	20
TOTAL [6]	269	221	491	259	370	631

Note: 1) Parking generation rate of 0.26 vehicles/ space /hr used for commercial/retail floorspace (based upon surveys)
2) Cruise Ship Terminal replaced by 8,500 sqm GFA commercial/retail development
3) The 275 on-street short stay spaces and 300 off street spaces are assessed using 0.4 vehicles/ space /hr
4) Transport Concept Plan assumes that the public car park AM movements would be 10% of the PM movements
5) Service vehicle movements associated with commercial and retail facilities are likely to be small or medium rigid vehicles
6) Traffic generation rate of 0.24 veh/hr/unit used for residential development
7) Figures may not sum due to rounding errors within the spreadsheet

Traffic generation estimates for the case of 10% mode share for office components are summarised in the following table.

Table 3 – Approved Concept Plan Traffic Generation Estimates – 10% car mode share for office components (veh/hr)

Traffic Generating Component	AM Peak Hour			PM Peak Hour		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
Block 8 HPM [1] Headland Park – Munn Streets	2	9	12	9	2	12
Block 7 ML [1] Munn – Little Clyde Streets	9	28	37	18	6	24
Block 6 LA [1] Little Clyde – Agar Streets	0	0	0	0	0	0
Block 5 AH [1] Agar – Healy Streets	19	15	34	11	18	29
Block 4 HB [1] Healy – Bull Streets	54	29	83	23	53	76
Block 3 BN [1] Bull – Napoleon Streets	39	20	59	16	38	54
Block 2 NM [1] Napoleon –Margaret Streets	130	93	223	87	128	216
Block 1 MS [1] Margaret – Shelley Streets	10	2	12	2	10	12
Cruise Ship Terminal [1]	11	3	14	3	11	14
275 on-street parking spaces [2]	88	22	110	88	132	220
300 public parking spaces [3]	10	2	12	24	96	120
Service Vehicle Movements [4]	30	30	60	0	0	0
Coach Movements	0	0	0	10	10	20
TOTAL [5]	402	253	656	291	504	797

Note:
1) Parking generation rate of 0.26 vehicles/ space /hr used for commercial/retail floorspace (based upon surveys)
2) The 275 on-street short stay spaces are assessed using 0.4 vehicles/ space /hr
3) Transport Concept Plan assumes that the public car park AM movements would be 10% of the PM movements
4) Service vehicle movements associated with commercial and retail facilities are likely to be small or medium rigid vehicles
5) Traffic generation rate of 0.24 veh/hr/unit used for residential development
6) Figures may not sum due to rounding errors within the spreadsheet

4.3.3 Modified Concept Plan

In addition to testing the implications of traffic generated by the Approved Concept Plan, another set of analyses was conducted for the Modified Concept Plan. The land use of this proposal is similar to the Approved Concept Plan with the inclusion of an additional 120,000 sqm of commercial floorspace. The following table summarises the distribution of floorspace by use within the proposal.

Table 4 – Modified Concept Plan Proposed development mix of floorspace (sqm of GFA)

Block	Commercial	Hotel/ Tourist	Public	Residential	Retail	Total
8 HEADLAND-PARK-MUNN STREETS		5,800				5,800
7 MUNN - LITTLE CLYDE STREETS	1,500		1,000	25,000	500	28,000
6 LITTLE CLYDE-AGAR STREETS	500		2,500			3,000
5 AGAR-HEALY STEETS	27,900			10,000	1,500	39,400
4 HEALY-BULL STREETS	80,900			15,000	5,000	100,900
3 BULL-NAPOLEON STREETS	54,800			10,000	11,000	75,800
2 NAPOLEON-MARGARET STREETS	188,600	30,000		15,000	10,000	243,600
1 MARGARET-SHELLEY STREETS	10,300				1,500	11,800
Cruise Ship Terminal	8,500					8,500
Kiosks and Pavillions in Parkland			1,500		1,500	3,000
Total	***373,000***	***35,800***	***5,000***	***75,000***	***31,000***	***519,800***

Note – GFA is based on the model LEP provisions

From this floorspace, traffic generation was estimated based on the scheme's target 4% mode share for office components. The resultant traffic generation is summarised in the following table.

Table 5 – Weekday Peak Hour Traffic Generation

Development Block/Element	Max GFA per block	AM Peak Hour						PM Peak Hour					
		In		Out		Two-way		In		Out		Two-way	
		Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
275 short stay on-street spaces		**88**	**0**	**22**	**0**	**110**	**0**	**88**	**0**	**132**	**0**	**220**	**0**
300 public off-street spaces		**10**	**0**	**2**	**0**	**12**	**0**	**24**	**0**	**96**	**0**	**120**	**0**
Block 8 HPM Headland Park – Munn Streets	5,800	**2**	**0**	**9**	**0**	**12**	**0**	**9**	**10**	**2**	**10**	**12**	**20**
Block 7 ML Munn – Little Clyde Streets	28,000	8	2	28	2	36	4	18	0	5	0	23	0
Block 6 LA Little Clyde – Agar Streets	3,000	0	0	0	0	0	0	0	0	0	0	0	0
Block 5 AH Agar – Healy Streets	39,400	13	3	14	3	27	6	10	0	12	0	22	0
Block 4 HB Healy – Bull Streets	100,900	35	6	24	6	59	12	18	0	33	0	52	0
Block 3 BN Bull – Napoleon Streets	75,800	28	5	17	5	45	10	13	0	27	0	40	0
Block 2 NM Napoleon – Margaret Streets	243,600	87	15	82	15	169	30	76	0	85	0	162	0
Block 1 MS Margaret – Shelley Streets	11,800	4	0	1	0	5	0	1	0	4	0	5	0
Cruise Ship Terminal	8500	5	0	1	0	6	0	1	1	5	1	6	2
TOTAL	**516,800**	**280**	**30**	**202**	**30**	**482**	**60**	**260**	**11**	**402**	**11**	**662**	**22**

The following assumptions are used:

1) 1 residential unit provides an average of 100 sqm
2) Commercial & public trips split 80% in / 20% out during AM & 80% out / 20% in during PM
3) Residential & hotel trips split 80% out / 20% in during AM & 80% in / 20% out during PM
4) Public use parking assumed to generate at commercial rate during PM peak hour and at 10% of that level during AM peak hour.
5) Traffic generation rate of 0.24 veh/hr/unit used for residential development
6) Figures may not sum due to rounding errors within the spreadsheet

4.3.4 Summary of traffic generation by modelled option

Total traffic generation under each of the four modelled options are summarised in the table below.

Table 6 Summary of traffic generation by option (total veh/hr)

Option	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Option 1 – ACP 4% CMSOC	269	221	491	259	370	631
Option 2 – ACP 10% CMSOC	402	253	656	291	504	797
Option 3 – Opt 1 & LHT ban	269	221	491	259	370	631
Option 4 – MCP 4% CMSOC	310	232	542	271	413	684

Note: additional bus movements are not included in the above traffic generation estimates, but are included in the traffic models (refer to summary of these volumes in Section 4.5.1 below); CMSOC – car mode share for office components.

The above comparison indicates the following ranking in terms of increasing total additional traffic generation:

1. Option 1 & Option 3
2. Option 4
3. Option 2

4.4 Traffic distribution

The Approved Concept Plan's traffic distribution was applied to the traffic generation estimates to produce a set of demand matrices to be analysed by the Paramics model.

Table 7 – Traffic Distribution

Direction	Route	Distribution
North	Harbour Bridge	40.7%
East	Eastern Distributor	22.9%
East	William Street	1.5%
East	Oxford Street	4.1%
South	Harbour Street	8.6%
West	Western Distributor	21.8%
Sydney Inner	-	0.4%
Total		**100%**

The same traffic distribution has been applied in the Transport Concept Plan for the Approved Concept Plan, the Modified Concept Plan and in the Paramics modelling.

4.5 Bus Services

4.5.1 Bus Service Strategy for Barangaroo

Transport and Traffic Planning Associate's (TTPA) Barangaroo Bus Service Strategy describes amendments to city services to support Barangaroo. It does this through specific route amendments, as well as by taking advantage of anticipated improved accessibility as a consequence of more general CBD bus improvements.

The Barangaroo Bus Service Strategy proposes:

- Route 373 from Coogee and route 377 from Maroubra Bay are amended to turn down Hunter Street to George Street on their inbound trip. At George Street they would turn left to Margaret Street, then down Napoleon Street to Sussex Street. Their outward trip would travel up Napoleon Street and along Margaret Street to George Street, where they would turn left and then right down Bridge Street to Philip Street, from where they would access Elizabeth Street.
- Routes 422 from Tempe, 423 from Kingsgrove, 426 from Dulwich Hill and 428 from Canterbury would turn left from George Street (their current route) into Margaret Street, and then down Napoleon Street. Outbound trips would travel via Napoleon Street and Margaret Street to George Street where they would turn right to the south.
- Routes 412 and 413 from Campsie would travel down Napoleon Street to the site and then head south to their current terminus at King Street Wharf.

The Paramics modelling reflects the above strategy, with the following bus movements to and from the vicinity of Barangaroo.

	Inbound	***Outbound***	***Total***
AM peak hour			
373/377	12	6	18
412/413	7	5	12
422-428	20	16	36
Sub-total	*39*	*27*	*66*
PM peak hour			
373/377	7	12	19
412/413	6	7	13
422-428	14	20	34
Sub-total	*27*	*39*	*66*

(source: Barangaroo Bus Service Strategy)

4.5.2 Detail of bus servicing

Buses will require turn around and layover facilities, with routes 412 and 413 retaining use of their current facility at King Street. Routes, 373, 377, 422, 423, 426 and 428 will require a facility somewhere north of Napoleon Street.

It is possible that layover facilities will be located on Hickson Road, north of Napoleon Street. These details are dealt with in the Bus Service Strategy and TMAP.

From the perspective of traffic operations on the road network, Hickson Road north of Napoleon Street has adequate capacity to handle this type of facility and various configurations of bus movement are considered feasible, subject to finalisation of site design. Consequently, the precise configuration of bus routing, once these routes get to the intersection of Napoleon Street and Sussex Street is not considered material to the results of the modelling.

5. Model Results

5.1 Traffic network performance measures

The following table summarises traffic network statistics for the modelled options.

Table 8 Traffic network statistics, by vehicle class, by peak hour (VHT per hour, VKT per hour, trips per hour)

Network measure	AM					PM				
Option	**LV**	**HV**	**Bus**	**Total**	**Adj Total**	**LV**	**HV**	**Bus**	**Total**	**Adj Total**
VHT										
Base	1,374	49	77	1,501	1,505	1,319	59	65	1,443	1,455
Option 1	1,452	60	89	1,601	1,605	1,363	63	75	1,500	1,519
Option 2	1,625	65	91	1,781	1,789	1,656	67	81	1,804	1,845
Option 3	1,519	58	87	1,664	1,676	1,473	60	79	1,612	1,622
Option 4	1,590	57	90	1,737	1,755	1,540	69	80	1,690	1,708
VKT										
Base	35,078	1,103	1,334	37,516	37,616	37,194	1,283	1,194	39,671	39,902
Option 1	36,056	1,304	1,393	38,753	38,947	38,313	1,334	1,262	40,909	41,379
Option 2	36,133	1,218	1,359	38,711	38,835	38,435	1,334	1,200	40,970	41,651
Option 3	35,442	1,206	1,312	37,961	38,268	38,430	1,268	1,222	40,921	41,191
Option 4	35,834	1,182	1,357	38,373	39360	38,613	1,243	1,204	41,059	41,491
Trips										
Base	20,505	667	876	22,048	22,100	21,904	805	803	23,512	23,692
Option 1	21,152	761	895	22,808	22,857	22,588	819	842	24,249	24,506
Option 2	21,311	742	894	22,947	23,043	22,937	809	817	24,563	25,016
Option 3	20,923	735	882	22,540	22,668	22,716	784	829	24,329	24,486
Option 4	21,092	700	890	22,682	22,924	22,901	764	825	24,490	24,754

VHT – vehicle hours of travel; VKT – vehicle kilometres of travel; Trips – number of vehicle trips.
Adjusted totals take account of 'unreleased' trips. Results for Option 3A are not reported for reasons discussed in Section 5.3 below.

Using the estimates of VHT and VKT from the above table, average speeds were calculated to provide an indication of relative performance of the options. These speeds are summarised in the following table.

Table 9 Calculated average speeds by vehicle class, by peak hour (km/hr)

Network measure	AM					PM				
Option	LV	HV	Bus	Total	Adj Total	LV	HV	Bus	Total	Adj Total
Average Speed										
Base	25.5	22.6	17.2	25.0	25.0	28.2	21.9	18.3	27.5	27.4
Option 1	24.8	21.9	15.6	24.2	24.3	28.1	21.3	16.8	27.3	27.2
Option 2	22.2	18.8	15.0	21.7	21.7	23.2	19.8	14.8	22.7	22.6
Option 3	23.3	21.0	15.0	22.8	22.8	26.1	21.3	15.5	25.4	25.4
Option 4	22.5	20.6	15.1	22.1	22.3	25.1	18.0	15.0	24.3	24.3

Note - results for Option 3A are not reported for reasons discussed in Section 5.3 below.

It should be noted that the average total speed is very similar to the average adjusted total speed; reflecting the modest number of unreleased trips.

Average speeds in the evening peak hour partly reflects the effects of traffic using the modelled part of the Sydney Harbour Bridge: in the morning peak the bulk of bridge traffic is southbound and subject to queues at the toll plaza; in the evening the situation is reversed, with most bridge traffic heading north, unimpeded by tolling arrangements.

5.2 Traffic volumes

5.2.1 Approach to reporting

All vehicle traffic

The traffic model produces estimates of traffic volumes on individual road links in the city. By comparing changes in these volumes between base and options, an understanding of how volumes would change with the scheme operating can be developed. To this end a series of 'screenlines' were constructed within the model area so the reader can see changes on individual links and changes across broader screenlines.

These screenlines are:

Margaret Street Screenline which 'cuts' the following north-south roads and reports their traffic volumes immediately north of Margaret Street and Napoleon Street:

- Hickson Road
- Kent Street
- Clarence Street
- York Street
- George Street

The purpose of this screenline is to examine how the volume of northbound and southbound traffic changes as a result of the scheme in this north eastern quadrant CBD precinct.

Erskine Street Screenline which 'cuts' north-south roads and reports their traffic volumes immediately north of Erskine Street. The roads are:

- Sussex Street
- Kent Street
- Clarence Street
- York Street

The purpose of this screenline is similar to the Margaret Screenline, however, due to its location further south it would capture traffic effects of the scheme associated with traffic moving to and from the south.

King Street Screenline which 'cuts' north-south roads immediately north of King Street. The roads are:

- Sussex Street
- Kent Street
- Clarence Street
- York Street
- George Street

The purpose of this screenline is similar to the previous two screenlines, however, due to its greater distance from Barangaroo, it would be expected to show less marked re-balancing of traffic flows on links across the screenline.

Sussex Street Screenline which 'cuts' two east-west roads immediately east of Sussex Street. The roads are:

- Napoleon Street
- Erskine Street

This screenline provides a summary of the change in traffic volumes on the two main east-west links between the rest of the CBD and Barangaroo, in the immediate vicinity of the site.

Kent Street Screenline which 'cuts' two east-west roads immediately east of Kent Street. The roads are:

- Margaret Street
- Erskine Street

This screenline provides a summary of the change in traffic volumes on the two main east-west links between the rest of the CBD and Barangaroo, but a little further form the site.

Clarence Street Screenline which 'cuts' two east-west roads immediately east of Clarence Street. The roads are:

- Jamison Street
- Margaret Street
- Erskine Street

This screenline provides a summary of the change in traffic volumes on three important east-west links between the rest of the CBD and Barangaroo. At this

distance from the site, the proportional traffic effects of the scheme would be expected to be lower than the Kent Street Screenline.

York Street Screenline which 'cuts' two east-west roads immediately east of York Street. The roads are:

- Margaret Street
- Jamison Street
- Lang Street
- Grosvenor Street

This screenline provides a summary of the change in traffic volumes on the four major east-west links between the western side of the CBD (including Barangaroo) and the rest of the CBD.

The Sydney Harbour Bridge/Grosvenor Street Screenline cuts the north-south roads across northern part of the CBD (including the Sydney Harbour Bridge Ramps)

- SHB Kent Street ramp main
- SHB Kent Street ramp for bus and taxi
- SHB York Street ramp (with tidal flow: AM SB; PM NB)
- SHB Grosvenor Street main ramp
- SHB Grosvenor Street bus lane
- Gloucester Street
- Harrington Street
- George Street

Traffic volumes across this screenline provide an indication of total vehicle numbers moving north-south into and out of the CBD. Traffic feeds to and from the Harbour Bridge are critical to the reasonable network operation of a large part of the Inner Sydney road network.

<u>Bus volumes</u>

Due to the importance of the Paramics model in testing the proposed Barangaroo Bus Servicing Strategy, a series of bus volumes are reported along two corridors and across one screenline. These are:

The Margaret Street Corridor which is the main site access corridor from George Street to Hickson Road via Margaret Street and Napoleon Street, with volumes reported at the following locations:

- East of Sussex Street
- East of Kent Street
- East of Clarence Street
- East of York Street
- East of Carrington Street

The ***George Street Corridor*** around the intersection of Margaret Street, volumes are reported:

- North of Margaret Street

- North of Hunter Street
- South of Hunter Street

Margaret Street Screenline showing changes in volumes of buses across this line using:

- Clarence Street
- York Street
- George Street

For all vehicles and bus volumes the following section provides a summary of volume changes by screenline total for each option. Appendix A contains tables of volumes by road link across each screenline.

5.2.2 Traffic volumes changes – Option 1

Morning peak

Table 10 – Traffic changes across Screenlines Base and Option 1, AM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	2,998	2,565	3,083	2,804	85	239	3%	9%
Erskine St Screenline	2,626	1,677	2,590	1,740	-36	63	-1%	4%
King St Screenline	2,650	2,241	2,773	2,467	123	226	5%	10%
Sussex St Screenline	717	915	831	1,080	114	165	16%	18%
Kent St Screenline	428	833	435	982	7	149	2%	18%
Clarence St Screenline	656	1,308	671	1,438	15	130	2%	10%
York St Screenline	1,546	767	1,588	732	42	-35	3%	-5%
Grosvenor St Screenline	2,090	2,832	2,261	3,059	171	227	8%	8%

A feature of the traffic changes is the modest level of increases across screenlines when compared with the base. For screenlines close to the site that cover a few roads only, the proportional increase is more marked, for example, the Sussex Street and Kent Street Screenlines.

Table 11 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 1, AM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	28	38	28	38		
Margaret St E Kent St	0	0	28	38	28	38		
Margaret St E Clarence St	0	46	27	79	27	33		
Margaret St E York St	0	67	27	97	27	30		
Margaret St E Carrington St	0	28	26	63	26	35		
George Street Corridor								
George St N Margaret St	138	55	130	54	-8	-1	-6%	-2%
George St N Hunter St	166	54	188	77	22	23	13%	43%
George St S Hunter St	168	55	175	77	7	22	4%	40%
Margaret Street Screenline								
Clarence St N Margaret St	165	na	159	na	-6	na	-4%	na
York St N Margaret St	na	259	na	259	na	0	na	0%
George St N Margaret St	138	55	130	54	-8	-1	-6%	-2%
Total Screenline	303	314	289	313	-14	-1	-5%	0%

Afternoon peak

Table 12 – Traffic changes across Screenlines Base and Option 1, PM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	3,134	2,379	3,215	2,727	81	348	3%	15%
Erskine St Screenline	2,196	1,798	2,118	1,995	-78	197	-4%	11%
King St Screenline	2,587	2,962	2,588	3,233	1	271	0%	9%
Sussex St Screenline	484	1,060	583	1,164	99	104	20%	10%
Kent St Screenline	573	649	570	810	-3	161	-1%	25%
Clarence St Screenline	630	754	595	909	-35	155	-6%	21%
York St Screenline	1,054	994	1,063	1,003	9	9	1%	1%
Grosvenor St Screenline	2,418	2,279	2,506	2,348	88	69	4%	3%

Similar comments apply in the PM as in made about the AM. The modest reductions in northbound traffic across the Erskine Street screenline in both AM and PM are likely to reflect some traffic diverting from Sussex Street due to delays at the site access intersection (the existing situation sees this traffic stream enjoy priority and no delays at Napoleon Street).

Table 13 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 1, PM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	36	31	36	31		
Margaret St E Kent St	0	0	28	30	28	30		
Margaret St E Clarence St	0	106	28	150	28	44		
Margaret St E York St	0	130	25	157	25	27		
Margaret St E Carrington St	0	6	24	33	24	27		
George Street Corridor								
George St N Margaret St	95	120	84	125	-11	5	-12%	4%
George St N Hunter St	101	120	110	143	9	23	9%	19%
George St S Hunter St	101	120	103	141	2	21	2%	18%
Margaret Street Screenline								
Clarence St N Margaret St	184	na	189	na	5	na	3%	na
York St N Margaret St	na	174	na	171	na	-3	na	-2%
George St N Margaret St	95	120	84	125	-11	5	-12%	4%
Total Screenline	279	294	273	296	-6	2	-2%	1%

5.2.3 Traffic volumes changes – Option 2

Morning peak

Table 14 – Traffic changes across Screenlines Base and Option 2, AM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	2,998	2,565	3,030	2,715	32	150	1%	6%
Erskine St Screenline	2,626	1,677	2,555	1,743	-71	66	-3%	4%
King St Screenline	2,650	2,241	2,734	2,446	84	205	3%	9%
Sussex St Screenline	717	915	790	1,059	73	144	10%	16%
Kent St Screenline	428	833	418	1,013	-10	180	-2%	22%
Clarence St Screenline	656	1,308	636	1,440	-20	132	-3%	10%
York St Screenline	1,546	767	1,493	784	-53	17	-3%	2%
Grosvenor St Screenline	2,090	2,832	2,194	3,040	104	208	5%	7%

Changes in traffic volumes across these screenlines follow a similar pattern as in Option 1, albeit with larger increases and more substantial proportional increases as against the Base. Of note is that the northbound volume across the Erskine Street Screenline has not fallen by as much as in Option 1; this suggests that the general level of traffic in Option 2 is such that alternative routes (which attracted some traffic in Option 1) are also heavily loaded.

Table 15 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 2 AM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	27	36	27	36		
Margaret St E Kent St	0	0	27	37	27	37		
Margaret St E Clarence St	0	46	27	78	27	32		
Margaret St E York St	0	67	27	92	27	25		
Margaret St E Carrington St	0	28	27	58	27	30		
George Street Corridor								
George St N Margaret St	138	55	125	56	-13	1	-9%	2%
George St N Hunter St	166	54	181	80	15	26	9%	48%
George St S Hunter St	168	55	171	79	3	24	2%	44%
Margaret Street Screenline								
Clarence St N Margaret St	165	na	160	na	-5	na	-3%	na
York St N Margaret St	na	259	na	253	na	-6	na	-2%
George St N Margaret St	138	55	125	56	-13	1	-9%	2%
Total Screenline	303	314	285	309	-18	-5	-6%	-2%

Afternoon peak

Table 16 – Traffic changes across Screenlines Base and Option 2, PM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	3,134	2,379	3,229	2,715	95	336	3%	14%
Erskine St Screenline	2,196	1,798	2,165	1,957	-31	159	-1%	9%
King St Screenline	2,587	2,962	2,662	3,136	75	174	3%	6%
Sussex St Screenline	484	1,060	615	1,167	131	107	27%	10%
Kent St Screenline	573	649	564	797	-9	148	-2%	23%
Clarence St Screenline	630	754	604	906	-26	152	-4%	20%
York St Screenline	1,054	994	1,042	981	-12	-13	-1%	-1%
Grosvenor St Screenline	2,418	2,279	2,572	2,427	154	148	6%	6%

The modest declines in reported northbound traffic volumes across Kent, Clarence and York Streets' Screenlines indicates that the additional traffic in this option is slowing traffic operations (which is evident in the network-wide statistics in Table 8 and Table 9) to the point where service flows are being reduced.

Table 17 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 2, PM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	33	30	33	30		
Margaret St E Kent St	0	0	32	31	32	31		
Margaret St E Clarence St	0	106	31	130	31	24		
Margaret St E York St	0	130	31	135	31	5		
Margaret St E Carrington St	0	6	26	32	26	26		
George Street Corridor								
George St N Margaret St	95	120	84	122	-11	2	-12%	2%
George St N Hunter St	101	120	108	139	7	19	7%	16%
George St S Hunter St	101	120	102	135	1	15	1%	13%
Margaret Street Screenline								
Clarence St N Margaret St	184	na	179	na	-5	na	-3%	na
York St N Margaret St	na	174	na	159	na	-15	na	-9%
George St N Margaret St	95	120	84	122	-11	2	-12%	2%
Total Screenline	279	294	263	281	-16	-13	-6%	-4%

5.2.4 Traffic volumes changes – Option 3

Morning peak

Table 18 – Traffic changes across Screenlines Base and Option 3, AM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	2,998	2,565	2,979	2,748	-19	183	-1%	7%
Erskine St Screenline	2,626	1,677	2,603	1,851	-23	174	-1%	10%
King St Screenline	2,650	2,241	2,713	2,422	63	181	2%	8%
Sussex St Screenline	717	915	827	1,086	110	171	15%	19%
Kent St Screenline	428	833	419	975	-9	142	-2%	17%
Clarence St Screenline	656	1,308	746	1,515	90	207	14%	16%
York St Screenline	1,546	767	1,468	760	-78	-7	-5%	-1%
Grosvenor St Screenline	2,090	2,832	2,125	2,921	35	89	2%	3%

Traffic volume changes in this option exhibit similar patterns to Option 1. There are, however, some differences which would be reasonably expected to reflect the introduction of the left hand turn ban from York Street to Margaret Street. The most important difference relates to southbound traffic across the Grosvenor Street and Margaret Street Screenlines. In Option 3 both these volumes increase relative to the Base, but not by as much as in Option 1. This suggests that the additional delay associated with the re-routing of vehicles is having modest impacts on the volume of traffic entering the city. When the flow of eastbound buses along the Margaret Street Corridor is examined in the following table, they are almost the same for both Option1 and Option 3.

Table 19 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 3, AM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	28	36	28	36		
Margaret St E Kent St	0	0	25	36	25	36		
Margaret St E Clarence St	0	46	26	77	26	31		
Margaret St E York St	0	67	26	89	26	22		
Margaret St E Carrington St	0	28	26	57	26	29		
George Street Corridor								
George St N Margaret St	138	55	122	54	-16	-1	-12%	-2%
George St N Hunter St	166	54	175	75	9	21	5%	39%
George St S Hunter St	168	55	161	76	-7	21	-4%	38%
Margaret Street Screenline								
Clarence St N Margaret St	165	na	160	na	-5	na	-3%	na
York St N Margaret St	na	259	na	257	na	-2	na	-1%
George St N Margaret St	138	55	122	54	-16	-1	-12%	-2%
Total Screenline	303	314	282	311	-21	-3	-7%	-1%

Afternoon peak

Table 20 – Traffic changes across Screenlines Base and Option 3, PM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	3,134	2,379	3,195	2,623	61	244	2%	10%
Erskine St Screenline	2,196	1,798	2,142	2,108	-54	310	-2%	17%
King St Screenline	2,587	2,962	2,567	3,133	-20	171	-1%	6%
Sussex St Screenline	484	1,060	630	1,160	146	100	30%	9%
Kent St Screenline	573	649	596	742	23	93	4%	14%
Clarence St Screenline	630	754	661	976	31	222	5%	29%
York St Screenline	1,054	994	1,038	965	-16	-29	-2%	-3%
Grosvenor St Screenline	2,418	2,279	2,524	2,353	106	74	4%	3%

As with the morning peak, the evening peak is similar to changes in Option 1. Of some note is that eastbound traffic across Sussex Street, Kent Street and Clarence Street Screenlines is higher in Option 3 than Option 1 by about 120 vehicles per hour. This indicates that this traffic control measure may be having some success in facilitating this general movement.

The volume of eastbound buses along the Margaret Street Corridor (from east of Kent Street) in Option 3 is about 5 to 7 buses an hour higher in Option 3 than Option 1. While this is a small number, it suggests that there may be some benefits to buses of this traffic management proposal.

Table 21 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 3, PM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	37	32	37	32		
Margaret St E Kent St	0	0	34	32	34	32		
Margaret St E Clarence St	0	106	35	148	35	42		
Margaret St E York St	0	130	32	149	32	19		
Margaret St E Carrington St	0	6	30	33	30	27		
George Street Corridor								
George St N Margaret St	95	120	84	110	-11	-10	-12%	-8%
George St N Hunter St	101	120	108	130	7	10	7%	8%
George St S Hunter St	101	120	101	129	0	9	0%	8%
Margaret Street Screenline								
Clarence St N Margaret St	184	na	180	na	-4	na	-2%	na
York St N Margaret St	na	174	na	168	na	-6	na	-3%
George St N Margaret St	95	120	84	110	-11	-10	-12%	-8%
Total Screenline	279	294	264	278	-15	-16	-5%	-5%

5.2.5 Traffic volumes changes – Option 4

Morning peak

Table 22 – Traffic changes across Screenlines Base and Option 4, AM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	2,998	2,565	2,905	2,755	-93	190	-3%	7%
Erskine St Screenline	2,626	1,677	2,402	1,732	-224	55	-9%	3%
King St Screenline	2,650	2,241	2,553	2,392	-97	151	-4%	7%
Sussex St Screenline	717	915	778	1,052	61	137	9%	15%
Kent St Screenline	428	833	405	1,001	-23	168	-5%	20%
Clarence St Screenline	656	1,308	608	1,488	-48	180	-7%	14%
York St Screenline	1,546	767	1,460	750	-86	-17	-6%	-2%
Grosvenor St Screenline	2,090	2,832	2,175	3,010	85	178	4%	6%

Option 4, with additional traffic generated by the Modified Concept Plan's higher commercial floorspace, as with the other options shows modest changes in traffic volumes when compared with the Base. In general, the effect of this option is for service flows to increase by a smaller amount than in Option 1 (or to decline by slightly more) – this, along with the slower average network speeds reported in Table 8 and Table 9, suggests that traffic density has increased and that marginally less traffic is crossing the screenlines.

Table 23 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 4, AM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	28	38	28	38		
Margaret St E Kent St	0	0	27	38	27	38		
Margaret St E Clarence St	0	46	26	81	26	35		
Margaret St E York St	0	67	26	94	26	27		
Margaret St E Carrington St	0	28	26	59	26	31		
George Street Corridor								
George St N Margaret St	138	55	124	54	-14	-1	-10%	-2%
George St N Hunter St	166	54	178	76	12	22	7%	41%
George St S Hunter St	168	55	165	77	-3	22	-2%	40%
Margaret Street Screenline								
Clarence St N Margaret St	165	na	153	na	-12	na	-7%	na
York St N Margaret St	na	259	na	258	na	-1	na	0%
George St N Margaret St	138	55	124	54	-14	-1	-10%	-2%
Total Screenline	303	314	277	312	-26	-2	-9%	-1%

Afternoon peak

Table 24 – Traffic changes across Screenlines Base and Option 4, PM peak (veh/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret St Screenline	3,134	2,379	3,002	2,665	-132	286	-4%	12%
Erskine St Screenline	2,196	1,798	1,985	1,999	-211	201	-10%	11%
King St Screenline	2,587	2,962	2,506	3,142	-81	180	-3%	6%
Sussex St Screenline	484	1,060	628	1,069	144	9	30%	1%
Kent St Screenline	573	649	579	726	6	77	1%	12%
Clarence St Screenline	630	754	627	872	-3	118	0%	16%
York St Screenline	1,054	994	1,163	999	109	5	10%	1%
Grosvenor St Screenline	2,418	2,279	2,513	2,458	95	179	4%	8%

A similar pattern emerges in the evening for Option 4 as in the morning peak.

Table 25 – Bus volume changes along Margaret Street and George Street corridors and across Margaret Street Screenline, Option 4, PM peak (bus/hr)

	Base		Option		Change		%	
Screenline	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**	**NB/EB**	**SB/WB**
Margaret Street Corridor								
Napoleon St E Sussex St	0	0	35	31	35	31		
Margaret St E Kent St	0	0	31	31	31	31		
Margaret St E Clarence St	0	106	31	121	31	15		
Margaret St E York St	0	130	30	145	30	15		
Margaret St E Carrington St	0	6	28	32	28	26		
George Street Corridor								
George St N Margaret St	95	120	81	122	-14	2	-15%	2%
George St N Hunter St	101	120	106	142	5	22	5%	18%
George St S Hunter St	101	120	100	141	-1	21	-1%	18%
Margaret Street Screenline								
Clarence St N Margaret St	184	na	167	na	-17	na	-9%	na
York St N Margaret St	na	174	na	165	na	-9	na	-5%
George St N Margaret St	95	120	81	122	-14	2	-15%	2%
Total Screenline	279	294	248	287	-31	-7	-11%	-2%

5.3 Description of traffic operations

This section provides a brief synopsis of salient features of traffic operations in each of the options.

5.3.1 Option 1 – Approved Concept Plan 4% car mode share for office components

AM Peak

- Northbound traffic using Shelly Street south of Erskine Street is congested in the morning peak Base, with constant queuing and roughly 30 - 50 unreleased vehicles after 9.00am.
- In Option 1, an additional 100 vehicles generated by the development are added to the back of the queue of vehicles along this route from the Cross City Tunnel. However, the Barangaroo project opens Shelly Street north of Erskine Street so that northbound traffic would be able to access Sussex Street via Margaret Street west as well as via Erskine Street. This alleviates congestion along Shelley Street, allowing it to handle the additional traffic generated by the development. The traffic operations at this location are at least equal to the base case, if not slightly improved.
- Southbound is the peak morning direction for traffic across the Sydney Harbour Bridge. In the counter-peak direction, the additional 80+ vehicles coming from Barangaroo and exiting the city across the Bridge add to the queues of northbound traffic along Kent Street. These queues extend south along Kent Street from the on-ramp to the Bridge to near Napoleon Street. Transient queues also develop on Kent Street between Napoleon Street and Erskine Street. This results from additional demand seeking to exit the city via the bridge.

- These extra delays at the Kent Street on-ramp to the Sydney Harbour Bridge also result in slightly longer delays and queues for traffic coming south along Kent Street – especially those vehicles also seeking to access the Bridge.
- Barangaroo would generate an additional 150 or so vehicles coming south across the Sydney Harbour Bridge, and these seek to access the site via a right turn to Margaret Street from York Street. Examination of the network at this location indicates satisfactory traffic operations.

PM Peak

- Kent Street's northbound on-ramp to the Sydney Harbour Bridge is congested in the PM Base. There are constant queues on Kent Street south from the on-ramp to Margaret Street; occasionally these queues extend into Napoleon Street, halfway down the hill to Sussex Street.
- With additional northbound traffic generated by Barangaroo in the evening peak, the above congestion and queuing becomes worse. Longer queues of northbound vehicles develop along Kent Street, extending south to Napoleon Street and, from time to time, into Hickson Road. Significant queues of northbound vehicles also develop along Kent Street northbound between Margaret Street and King Street.
- The introduction of buses travelling east along Margaret Street and turning right into George Street, which is generally congested in the PM Base, also causes transient queuing on Margaret Street between George Street and York Street.

Conclusion *– the road network copes with the additional traffic generated by this option without obvious new traffic operational issues. There are some additional queues and average speeds are lower, but except for the queuing issues described above the network operation is not markedly different from at present.*

5.3.2 Option 2 – Approved Concept Plan 10% car mode share for office components

AM Peak

- A reasonably similar pattern of operational effects emerge as is the case in Option 1. However, these effects are noticeably more severe in terms of congestion and queues. For traffic coming to Barangaroo from the Sydney Harbour Bridge (i.e., along York Street then turning right to Margaret Street) the queuing is markedly more extensive and less transient.
- Traffic conditions in Shelly Street are similar to those in Option 1.
- The queue of vehicles in Kent Street northbound turning onto the Harbour Bridge on-ramp at times extends to the south of Margaret Street causing unacceptable blockages to traffic turning from York Street into Margaret Street.

PM Peak

- Severe queuing occurs along Hickson Road southbound as development-generated traffic attempts to make its way through the intersection of

Napoleon Street and Hickson Road to get onto the Sydney Harbour Bridge. This occurs even though a proportion of site generated traffic heading to the Sydney Harbour Bridge diverts to instead use the northern end of Hickson Road and Kent Street north. Queues of southbound traffic along Hickson Road extend from Napoleon Street as far north as High Street, and on occasion, beyond this point. This outcome is unsatisfactory.

- Along Kent Street, there are constant queues of northbound traffic between Margaret Street and King Street.

Conclusion *– the additional traffic generated by Barangaroo in this option exacerbates existing congestion in the network resulting in lock up conditions for some model runs. Overall the modelling indicates that the local road network would not be able to satisfactorily accommodate the additional traffic associated with this option.*

5.3.3 Option 3 – Approved Concept Plan 4% car mode share for office components with left turn from York Street to Margaret Street banned

AM Peak

- The left turn ban causes left turning traffic to divert southward along York Street, with vehicles turning left either into Wynyard Street or right into Erskine Street to loop around the block to access Margaret Street. This re-routing causes adverse operational problems in this area.

PM Peak

- Very similar operations to Option 1 with slightly higher delays and lower average travel speeds. The left turn ban in York Street has a less noticeable effect in the evening, as the southbound volume of traffic on York Street is lower (in the Base there are 800 vehicles per hour in the evening compared with about 1,450 vehicles per hour in the morning).

Conclusion *– banning the left hand turn from York Street to Margaret Street has both beneficial and counter-productive effects in the model. In the morning peak it has an adverse effect on southbound traffic operations along York Street. However the modelled effects seem disproportional to the number of vehicles impacted by the ban. In the evening peak it appears to have no obvious impact on traffic operations, but it does appear to facilitate eastbound bus movement along Margaret Street. At this stage the modelling is sufficiently positive to suggest a more detailed local examination of the turn ban. This could be done as a separate exercise.*

5.3.4 Option 3A – As for Option 3 with Wynyard Lane one-way northbound

AM Peak

The left turn ban from York Street into Margaret Street, in combination with changing Wynyard Lane from one-way southbound to one-way northbound causes more severe local congestion along Clarence Street, and eventually leads to congestion in other roads within this part of the network.

The congestion results from the effect of traffic which originates from both George Street and the Western Distributor re-routing to reach their destination in Wynyard Lane. Prior to the reversal of Wynyard Lane's one-way arrangement, traffic from George Street south would turn left into Margaret Street and then turn left again into Wynyard Lane. Traffic from the Western Distributor (south) would generally travel along Kent Street or Clarence Street to access Wynyard Lane via Margaret Street after crossing over York Street.

With Wynyard Lane one-way northbound, traffic from George Street would need to divert to Clarence Street. This traffic plus that from the Western Distributor would need to travel northward on Clarence or Kent streets. Then use Erskine Street eastbound before turning into York Street southbound to access Wynyard Street. The effects on traffic of the restriction on left turn from York Street to Margaret Street are also present in this model. The consequence of these changes was that the model tended to lock up before the end of the model period.

PM Peak

The impact of this option in the PM peak is quite minor as there is much less traffic affected by the changes. Operation appears to be very similar to Option 3.

Conclusion *– the changes modelled in both Option 3 and 3A are relatively minor in the context of the overall model. Because of this there is reduced confidence in the results of the model. This stems in part from the complexity of access movements to/from Wynyard Lane and in part from the way that the model trip table was developed. This involved an extensive series of traffic counts and then estimation of the trip generation, origin and destination of trips for different zones in the model area.*

Nevertheless Options 3 and 3A give encouragement that measures such as the reversal of Wynyard Lane or a restriction left turn movement into Margaret Street from York Street southbound could form part of an overall package of measures to expedite bus flow on Margaret Street between York Street and George Street.

The next step in formulating such a package would be to undertake a micro level traffic study of these measures plus parking and loading restrictions and intersection configuration in order to achieve the best possible result for buses.

5.3.5 Option 4 – Modified Concept Plan 4% car mode share for office components

AM & PM Peaks

- Very similar to Option 1 in terms of operations and constraints but with longer travel times and lower average speed.
- The network absorbs the additional 50+ vehicles that are generated by the higher commercial floorspace over and above Option 1's traffic without an immediately evident increase in congestion.

Conclusion *– like Option 1, this option results in reasonable traffic operations, although average network speeds are lower.*

Appendix A - Traffic Volumes

The tables in this appendix compare traffic volumes using links across screenlines. Each option is compared with the base case, for morning and evening peaks.

A.1.1 Traffic volumes changes – Option 1

Morning peak

Table 26 – Traffic changes, Margaret St screenline, Base and Option 1, AM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	NB	SB	NB	SB	NB	SB	NB	SB
Hickson Rd N Napoleon St	494	247	598	386	104	139	21%	56%
Kent St N Margaret St	660	356	643	291	-17	-65	-3%	-18%
Clarence St N Margaret St	907	na	887	na	-20	na	-2%	na
York St N Margaret St	na	1,454	na	1,564	na	110	na	8%
George St N Margaret St	937	508	955	563	18	55	2%	11%
Total	**2,998**	**2,565**	**3,083**	**2,804**	**85**	**239**	**3%**	**9%**

Table 27 – Traffic changes, Erskine St screenline, Base and Option 1, AM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	NB	SB	NB	SB	NB	SB	NB	SB
Sussex St N Erskine St	890	403	851	537	-39	134	-4%	33%
Kent St N Erskine St	675	322	711	278	36	-44	5%	-14%
Clarence St N Erskine St	1,061	na	1,028	na	-33	na	-3%	na
York St N Erskine St	na	952	na	925	na	-27	na	-3%
Total	**2,626**	**1,677**	**2,590**	**1,740**	**-36**	**63**	**-1%**	**4%**

Table 28 – Traffic changes, King St screenline, Base and Option 1, AM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	NB	SB	NB	SB	NB	SB	NB	SB
Sussex St N King St	429	862	466	1,027	37	165	9%	19%
Kent St N King St	711	na	744	na	33	na	5%	na
Clarence St N King St	798	na	802	na	4	na	1%	na
York St N King St	na	751	na	770	na	19	na	3%
George St N King St	712	628	761	670	49	42	7%	7%
Total	**2,650**	**2,241**	**2,773**	**2,467**	**123**	**226**	**5%**	**10%**

Table 29 – Traffic changes, Sussex St screenline, Base and Option 1, AM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	EB	WB	EB	WB	EB	WB	EB	WB
Napoleon St E Sussex St	476	377	582	580	106	203	22%	54%
Erskine St E Sussex St	241	538	249	500	8	-38	3%	-7%
Total	**717**	**915**	**831**	**1,080**	**114**	**165**	**16%**	**18%**

Table 30 – Traffic changes, Kent St screenline, Base and Option 1, AM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	171	588	191	741	20	153	12%	26%
Erskine St E Kent St	257	245	244	241	-13	-4	-5%	-2%
Total	**428**	**833**	**435**	**982**	**7**	**149**	**2%**	**18%**

Table 31 – Traffic changes, Clarence St screenline, Base and Option 1, AM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	293	429	291	409	-2	-20	-1%	-5%
Margaret St E Clarence St	193	562	215	724	22	162	11%	29%
Erskine St E Clarence St	170	317	165	305	-5	-12	-3%	-4%
Total	**656**	**1,308**	**671**	**1,438**	**15**	**130**	**2%**	**10%**

Table 32 – Traffic changes, York St screenline, Base and Option 1, AM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	307	265	359	305	52	40	17%	15%
Jamison St E York St	na	152	na	128	na	-24	na	-16%
Lang St E York St	209	326	202	281	-7	-45	-3%	-14%
Grosvenor St E York St	1,030	24	1,027	18	-3	-6	0%	-25%
Total	**1,546**	**767**	**1,588**	**732**	**42**	**-35**	**3%**	**-5%**

Table 33 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 1, AM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	889	na	982	na	93	na	10%	na
SHB Kent St ramp bus taxi	229	na	218	na	-11	na	-5%	na
SHB York (AM SB; PM NB)	na	855	na	1,016	na	161	na	19%
SHB Grosvenor St main	na	1,036	na	1,051	na	15	na	1%
SHB Grosvenor St bus lane	na	405	na	414	na	9	na	2%
Gloucester St N Gr'venor St	48	48	46	42	-2	-6	-4%	-13%
Harrington St N Gr'venor St	321	95	352	90	31	-5	10%	-5%
George St N Gr'venor St	603	393	663	446	60	53	10%	13%
Harbour Br Access sub-total	*1,118*	*2,296*	*1,200*	*2,481*	*82*	*185*	*7%*	*8%*
Balance sub-total	*972*	*536*	*1,061*	*578*	*89*	*42*	*9%*	*8%*
Screenline Total	**2,090**	**2,832**	**2,261**	**3,059**	**171**	**227**	**8%**	**8%**

Afternoon peak

Table 34 – Traffic changes, Margaret St screenline, Base and Option 1, PM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Hickson Rd N Napoleon St	341	383	480	591	139	208	41%	54%
Kent St N Margaret St	624	419	588	421	-36	2	-6%	0%
Clarence St N Margaret St	1,120	na	1,098	na	-22	na	-2%	na
York St N Margaret St	na	811	na	951	na	140	na	17%
George St N Margaret St	1,049	766	1,049	764	0	-2	0%	0%
Total	**3,134**	**2,379**	**3,215**	**2,727**	**81**	**348**	**3%**	**15%**

Table 35 – Traffic changes, Erskine St screenline, Base and Option 1, PM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N Erskine St	434	683	441	961	7	278	2%	41%
Kent St N Erskine St	616	423	554	361	-62	-62	-10%	-15%
Clarence St N Erskine St	1,146	na	1,123	na	-23	na	-2%	na
York St N Erskine St	na	692	na	673	na	-19	na	-3%
Total	**2,196**	**1,798**	**2,118**	**1,995**	**-78**	**197**	**-4%**	**11%**

Table 36 – Traffic changes, King St screenline, Base and Option 1, PM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N King St	265	1,495	293	1,729	28	234	11%	16%
Kent St N King St	689	na	620	na	-69	na	-10%	na
Clarence St N King St	898	na	924	na	26	na	3%	na
York St N King St	na	490	na	479	na	-11	na	-2%
George St N King St	735	977	751	1,025	16	48	2%	5%
Total	**2,587**	**2,962**	**2,588**	**3,233**	**1**	**271**	**0%**	**9%**

Table 37 – Traffic changes, Sussex St screenline, Base and Option 1, PM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Napoleon St E Sussex St	311	388	401	525	90	137	29%	35%
Erskine St E Sussex St	173	672	182	639	9	-33	5%	-5%
Total	**484**	**1,060**	**583**	**1,164**	**99**	**104**	**20%**	**10%**

Table 38 – Traffic changes, Kent St screenline, Base and Option 1, PM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	281	335	265	476	-16	141	-6%	42%
Erskine St E Kent St	292	314	305	334	13	20	4%	6%
Total	**573**	**649**	**570**	**810**	**-3**	**161**	**-1%**	**25%**

Table 39 – Traffic changes, Clarence St screenline, Base and Option 1, PM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	133	266	142	259	9	-7	7%	-3%
Margaret St E Clarence St	296	343	274	495	-22	152	-7%	44%
Erskine St E Clarence St	201	145	179	155	-22	10	-11%	7%
Total	**630**	**754**	**595**	**909**	**-35**	**155**	**-6%**	**21%**

Table 40 – Traffic changes, York St screenline, Base and Option 1, PM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	258	256	263	280	5	24	2%	9%
Jamison St E York St	na	27	na	45	na	18	na	67%
Lang St E York St	132	282	135	269	3	-13	2%	-5%
Grosvenor St E York St	664	429	665	409	1	-20	0%	-5%
Total	**1,054**	**994**	**1,063**	**1,003**	**9**	**9**	**1%**	**1%**

Table 41 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 1, PM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	991	na	1,067	na	76	na	8%	na
SHB Kent St ramp bus taxi	183	na	190	na	7	na	4%	na
SHB York (AM SB; PM NB)	424	na	404	na	na	na	na	na
SHB Grosvenor St main	na	533	na	534	na	1	na	0%
SHB Grosvenor St bus lane	na	759	na	891	na	132	na	17%
Gloucester St N Gr'venor St	14	150	15	147	1	-3	7%	-2%
Harrington St N Gr'venor St	280	318	301	294	21	-24	8%	-8%
George St N Gr'venor St	526	519	529	482	3	-37	1%	-7%
Harbour Br Access sub-total	*1,598*	*1,292*	*1,661*	*1,425*	*63*	*133*	*4%*	*10%*
Balance sub-total	*820*	*987*	*845*	*923*	*25*	*-64*	*3%*	*-6%*
Screenline Total	**2,418**	**2,279**	**2,506**	**2,348**	**88**	**69**	**4%**	**3%**

A.1.2 Traffic volumes changes – Option 2

Morning peak

Table 42 – Traffic changes, Margaret St screenline, Base and Option 2, AM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	NB	SB	NB	SB	NB	SB	NB	SB
Hickson Rd N Napoleon St	494	247	635	381	141	134	29%	54%
Kent St N Margaret St	660	356	667	304	7	-52	1%	-15%
Clarence St N Margaret St	907	na	863	na	-44	na	-5%	na
York St N Margaret St	na	1,454	na	1,501	na	47	na	3%
George St N Margaret St	937	508	865	529	-72	21	-8%	4%
Total	**2,998**	**2,565**	**3,030**	**2,715**	**32**	**150**	**1%**	**6%**

Table 43 – Traffic changes, Erskine St screenline, Base and Option 2, AM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	NB	SB	NB	SB	NB	SB	NB	SB
Sussex St N Erskine St	890	403	866	549	-24	146	-3%	36%
Kent St N Erskine St	675	322	713	280	38	-42	6%	-13%
Clarence St N Erskine St	1,061	na	976	na	-85	na	-8%	na
York St N Erskine St	na	952	na	914	na	-38	na	-4%
Total	**2,626**	**1,677**	**2,555**	**1,743**	**-71**	**66**	**-3%**	**4%**

Table 44 – Traffic changes, King St screenline, Base and Option 2, AM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	NB	SB	NB	SB	NB	SB	NB	SB
Sussex St N King St	429	862	467	1,053	38	191	9%	22%
Kent St N King St	711	na	713	na	2	na	0%	na
Clarence St N King St	798	na	822	na	24	na	3%	na
York St N King St	na	751	na	727	na	-24	na	-3%
George St N King St	712	628	732	666	20	38	3%	6%
Total	**2,650**	**2,241**	**2,734**	**2,446**	**84**	**205**	**3%**	**9%**

Table 45 – Traffic changes, Sussex St screenline, Base and Option 2, AM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	EB	WB	EB	WB	EB	WB	EB	WB
Napoleon St E Sussex St	476	377	552	582	76	205	16%	54%
Erskine St E Sussex St	241	538	238	477	-3	-61	-1%	-11%
Total	**717**	**915**	**790**	**1,059**	**73**	**144**	**10%**	**16%**

Table 46 – Traffic changes, Kent St screenline, Base and Option 2, AM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	171	588	193	768	22	180	13%	31%
Erskine St E Kent St	257	245	225	245	-32	0	-12%	0%
Total	**428**	**833**	**418**	**1,013**	**-10**	**180**	**-2%**	**22%**

Table 47 – Traffic changes, Clarence St screenline, Base and Option 2, AM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	293	429	283	427	-10	-2	-3%	0%
Margaret St E Clarence St	193	562	210	747	17	185	9%	33%
Erskine St E Clarence St	170	317	143	266	-27	-51	-16%	-16%
Total	**656**	**1,308**	**636**	**1,440**	**-20**	**132**	**-3%**	**10%**

Table 48 – Traffic changes, York St screenline, Base and Option 2, AM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	307	265	266	322	-41	57	-13%	22%
Jamison St E York St	na	152	na	138	na	-14	na	-9%
Lang St E York St	209	326	204	307	-5	-19	-2%	-6%
Grosvenor St E York St	1,030	24	1,023	17	-7	-7	-1%	-29%
Total	**1,546**	**767**	**1,493**	**784**	**-53**	**17**	**-3%**	**2%**

Table 49 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 2, AM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	889	na	978	na	89	na	10%	na
SHB Kent St ramp bus taxi	229	na	233	na	4	na	2%	na
SHB York (AM SB; PM NB)	na	855	na	1,032	na	177	na	21%
SHB Grosvenor St main	na	1,036	na	1,043	na	7	na	1%
SHB Grosvenor St bus lane	na	405	na	422	na	17	na	4%
Gloucester St N Gr'venor St	48	48	50	40	2	-8	4%	-17%
Harrington St N Gr'venor St	321	95	317	89	-4	-6	-1%	-6%
George St N Gr'venor St	603	393	616	414	13	21	2%	5%
Harbour Br Access sub-total	*1,118*	*2,296*	*1,211*	*2,497*	*93*	*201*	*8%*	*9%*
Balance sub-total	*972*	*536*	*983*	*543*	*11*	*7*	*1%*	*1%*
Screenline Total	**2,090**	**2,832**	**2,194**	**3,040**	**104**	**208**	**5%**	**7%**

Afternoon peak

Table 50 – Traffic changes, Margaret St screenline, Base and Option 2, PM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Hickson Rd N Napoleon St	341	383	468	523	127	140	37%	37%
Kent St N Margaret St	624	419	610	433	-14	14	-2%	3%
Clarence St N Margaret St	1,120	na	1,097	na	-23	na	-2%	na
York St N Margaret St	na	811	na	994	na	183	na	23%
George St N Margaret St	1,049	766	1,054	765	5	-1	0%	0%
Total	**3,134**	**2,379**	**3,229**	**2,715**	**95**	**336**	**3%**	**14%**

Table 51 – Traffic changes, Erskine St screenline, Base and Option 2, PM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N Erskine St	434	683	448	871	14	188	3%	28%
Kent St N Erskine St	616	423	581	397	-35	-26	-6%	-6%
Clarence St N Erskine St	1,146	na	1,136	na	-10	na	-1%	na
York St N Erskine St	na	692	na	689	na	-3	na	0%
Total	**2,196**	**1,798**	**2,165**	**1,957**	**-31**	**159**	**-1%**	**9%**

Table 52 – Traffic changes, King St screenline, Base and Option 2, PM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N King St	265	1,495	318	1,663	53	168	20%	11%
Kent St N King St	689	na	679	na	-10	na	-1%	na
Clarence St N King St	898	na	895	na	-3	na	0%	na
York St N King St	na	490	na	482	na	-8	na	-2%
George St N King St	735	977	770	991	35	14	5%	1%
Total	**2,587**	**2,962**	**2,662**	**3,136**	**75**	**174**	**3%**	**6%**

Table 53 – Traffic changes, Sussex St screenline, Base and Option 2, PM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Napoleon St E Sussex St	311	388	451	535	140	147	45%	38%
Erskine St E Sussex St	173	672	164	632	-9	-40	-5%	-6%
Total	**484**	**1,060**	**615**	**1,167**	**131**	**107**	**27%**	**10%**

Table 54 – Traffic changes, Kent St screenline, Base and Option 2, PM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	281	335	277	484	-4	149	-1%	44%
Erskine St E Kent St	292	314	287	313	-5	-1	-2%	0%
Total	**573**	**649**	**564**	**797**	**-9**	**148**	**-2%**	**23%**

Table 55 – Traffic changes, Clarence St screenline, Base and Option 2, PM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	133	266	112	274	-21	8	-16%	3%
Margaret St E Clarence St	296	343	283	478	-13	135	-4%	39%
Erskine St E Clarence St	201	145	209	154	8	9	4%	6%
Total	**630**	**754**	**604**	**906**	**-26**	**152**	**-4%**	**20%**

Table 56 – Traffic changes, York St screenline, Base and Option 2, PM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	258	256	289	251	31	-5	12%	-2%
Jamison St E York St	na	27	na	37	na	10	na	37%
Lang St E York St	132	282	105	268	-27	-14	-20%	-5%
Grosvenor St E York St	664	429	648	425	-16	-4	-2%	-1%
Total	**1,054**	**994**	**1,042**	**981**	**-12**	**-13**	**-1%**	**-1%**

Table 57 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 2, PM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	991	na	1,112	na	121	na	12%	na
SHB Kent St ramp bus taxi	183	na	178	na	-5	na	-3%	na
SHB York (AM SB; PM NB)	424	na	419	na	na	na	na	na
SHB Grosvenor St main	na	533	na	510	na	-23	na	-4%
SHB Grosvenor St bus lane	na	759	na	914	na	155	na	20%
Gloucester St N Gr'venor St	14	150	14	166	0	16	0%	11%
Harrington St N Gr'venor St	280	318	269	316	-11	-2	-4%	-1%
George St N Gr'venor St	526	519	580	521	54	2	10%	0%
Harbour Br Access sub-total	*1,598*	*1,292*	*1,709*	*1,424*	*111*	*132*	*7%*	*10%*
Balance sub-total	*820*	*987*	*863*	*1,003*	*43*	*16*	*5%*	*2%*
Screenline Total	**2,418**	**2,279**	**2,572**	**2,427**	**154**	**148**	**6%**	**6%**

A.1.3 Traffic volumes changes – Option 3

Morning peak

Table 58 – Traffic changes, Margaret St screenline, Base and Option 3, AM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Hickson Rd N Napoleon St	494	247	584	370	90	123	18%	50%
Kent St N Margaret St	660	356	623	318	-37	-38	-6%	-11%
Clarence St N Margaret St	907	na	939	na	32	na	4%	na
York St N Margaret St	na	1,454	na	1,510	na	56	na	4%
George St N Margaret St	937	508	833	550	-104	42	-11%	8%
Total	**2,998**	**2,565**	**2,979**	**2,748**	**-19**	**183**	**-1%**	**7%**

Table 59 – Traffic changes, Erskine St screenline, Base and Option 3, AM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N Erskine St	890	403	875	516	-15	113	-2%	28%
Kent St N Erskine St	675	322	672	320	-3	-2	0%	-1%
Clarence St N Erskine St	1,061	na	1,056	na	-5	na	0%	na
York St N Erskine St	na	952	na	1,015	na	63	na	7%
Total	**2,626**	**1,677**	**2,603**	**1,851**	**-23**	**174**	**-1%**	**10%**

Table 60 – Traffic changes, King St screenline, Base and Option 3, AM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N King St	429	862	470	1,036	41	174	10%	20%
Kent St N King St	711	na	680	na	-31	na	-4%	na
Clarence St N King St	798	na	797	na	-1	na	0%	na
York St N King St	na	751	na	734	na	-17	na	-2%
George St N King St	712	628	766	652	54	24	8%	4%
Total	**2,650**	**2,241**	**2,713**	**2,422**	**63**	**181**	**2%**	**8%**

Table 61 – Traffic changes, Sussex St screenline, Base and Option 3, AM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Napoleon St E Sussex St	476	377	578	530	102	153	21%	41%
Erskine St E Sussex St	241	538	249	556	8	18	3%	3%
Total	**717**	**915**	**827**	**1,086**	**110**	**171**	**15%**	**19%**

Table 62 – Traffic changes, Kent St screenline, Base and Option 3, AM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	171	588	179	720	8	132	5%	22%
Erskine St E Kent St	257	245	240	255	-17	10	-7%	4%
Total	**428**	**833**	**419**	**975**	**-9**	**142**	**-2%**	**17%**

Table 63 – Traffic changes, Clarence St screenline, Base and Option 3, AM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	293	429	359	435	66	6	23%	1%
Margaret St E Clarence St	193	562	231	727	38	165	20%	29%
Erskine St E Clarence St	170	317	156	353	-14	36	-8%	11%
Total	**656**	**1,308**	**746**	**1,515**	**90**	**207**	**14%**	**16%**

Table 64 – Traffic changes, York St screenline, Base and Option 3, AM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	307	265	192	296	-115	31	-37%	12%
Jamison St E York St	na	152	na	142	na	-10	na	-7%
Lang St E York St	209	326	273	305	64	-21	31%	-6%
Grosvenor St E York St	1,030	24	1,003	17	-27	-7	-3%	-29%
Total	**1,546**	**767**	**1,468**	**760**	**-78**	**-7**	**-5%**	**-1%**

Table 65 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 3, AM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	889	na	955	na	66	na	7%	na
SHB Kent St ramp bus taxi	229	na	215	na	-14	na	-6%	na
SHB York (AM SB; PM NB)	na	855	na	981	na	126	na	15%
SHB Grosvenor St main	na	1,036	na	1,027	na	-9	na	-1%
SHB Grosvenor St bus lane	na	405	na	391	na	-14	na	-3%
Gloucester St N Gr'venor St	48	48	59	35	11	-13	23%	-27%
Harrington St N Gr'venor St	321	95	288	81	-33	-14	-10%	-15%
George St N Gr'venor St	603	393	608	406	5	13	1%	3%
Harbour Br Access sub-total	*1,118*	*2,296*	*1,170*	*2,399*	*52*	*103*	*5%*	*4%*
Balance sub-total	*972*	*536*	*955*	*522*	*-17*	*-14*	*-2%*	*-3%*
Screenline Total	**2,090**	**2,832**	**2,125**	**2,921**	**35**	**89**	**2%**	**3%**

Afternoon peak

Table 66 – Traffic changes, Margaret St screenline, Base and Option 3, PM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Hickson Rd N Napoleon St	341	383	505	570	164	187	48%	49%
Kent St N Margaret St	624	419	538	447	-86	28	-14%	7%
Clarence St N Margaret St	1,120	na	1,104	na	-16	na	-1%	na
York St N Margaret St	na	811	na	898	na	87	na	11%
George St N Margaret St	1,049	766	1,048	708	-1	-58	0%	-8%
Total	**3,134**	**2,379**	**3,195**	**2,623**	**61**	**244**	**2%**	**10%**

Table 67 – Traffic changes, Erskine St screenline, Base and Option 3, PM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N Erskine St	434	683	472	995	38	312	9%	46%
Kent St N Erskine St	616	423	541	416	-75	-7	-12%	-2%
Clarence St N Erskine St	1,146	na	1,129	na	-17	na	-1%	na
York St N Erskine St	na	692	na	697	na	5	na	1%
Total	**2,196**	**1,798**	**2,142**	**2,108**	**-54**	**310**	**-2%**	**17%**

Table 68 – Traffic changes, King St screenline, Base and Option 3, PM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N King St	265	1,495	325	1,736	60	241	23%	16%
Kent St N King St	689	na	600	na	-89	na	-13%	na
Clarence St N King St	898	na	895	na	-3	na	0%	na
York St N King St	na	490	na	424	na	-66	na	-13%
George St N King St	735	977	747	973	12	-4	2%	0%
Total	**2,587**	**2,962**	**2,567**	**3,133**	**-20**	**171**	**-1%**	**6%**

Table 69 – Traffic changes, Sussex St screenline, Base and Option 3, PM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Napoleon St E Sussex St	311	388	432	528	121	140	39%	36%
Erskine St E Sussex St	173	672	198	632	25	-40	14%	-6%
Total	**484**	**1,060**	**630**	**1,160**	**146**	**100**	**30%**	**9%**

Table 70 – Traffic changes, Kent St screenline, Base and Option 3, PM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	281	335	298	466	17	131	6%	39%
Erskine St E Kent St	292	314	298	276	6	-38	2%	-12%
Total	**573**	**649**	**596**	**742**	**23**	**93**	**4%**	**14%**

Table 71 – Traffic changes, Clarence St screenline, Base and Option 3, PM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	133	266	144	298	11	32	8%	12%
Margaret St E Clarence St	296	343	322	496	26	153	9%	45%
Erskine St E Clarence St	201	145	195	182	-6	37	-3%	26%
Total	**630**	**754**	**661**	**976**	**31**	**222**	**5%**	**29%**

Table 72 – Traffic changes, York St screenline, Base and Option 3, PM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	258	256	257	276	-1	20	0%	8%
Jamison St E York St	na	27	na	47	na	20	na	74%
Lang St E York St	132	282	137	228	5	-54	4%	-19%
Grosvenor St E York St	664	429	644	414	-20	-15	-3%	-3%
Total	**1,054**	**994**	**1,038**	**965**	**-16**	**-29**	**-2%**	**-3%**

Table 73 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 3, PM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	991	na	1,063	na	72	na	7%	na
SHB Kent St ramp bus taxi	183	na	180	na	-3	na	-2%	na
SHB York (AM SB; PM NB)	424	na	400	na	na	na	na	na
SHB Grosvenor St main	na	533	na	545	na	12	na	2%
SHB Grosvenor St bus lane	na	759	na	905	na	146	na	19%
Gloucester St N Gr'venor St	14	150	16	143	2	-7	14%	-5%
Harrington St N Gr'venor St	280	318	307	257	27	-61	10%	-19%
George St N Gr'venor St	526	519	558	503	32	-16	6%	-3%
Harbour Br Access sub-total	*1,598*	*1,292*	*1,643*	*1,450*	*45*	*158*	*3%*	*12%*
Balance sub-total	*820*	*987*	*881*	*903*	*61*	*-84*	*7%*	*-9%*
Screenline Total	**2,418**	**2,279**	**2,524**	**2,353**	**106**	**74**	**4%**	**3%**

A.1.4 Traffic volumes changes – Option 4

Morning peak

Table 74 – Traffic changes, Margaret St screenline, Base and Option 4, AM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Hickson Rd N Napoleon St	494	247	574	361	80	114	16%	46%
Kent St N Margaret St	660	356	627	318	-33	-38	-5%	-11%
Clarence St N Margaret St	907	na	791	na	-116	na	-13%	na
York St N Margaret St	na	1,454	na	1,552	na	98	na	7%
George St N Margaret St	937	508	913	524	-24	16	-3%	3%
Total	**2,998**	**2,565**	**2,905**	**2,755**	**-93**	**190**	**-3%**	**7%**

Table 75 – Traffic changes, Erskine St screenline, Base and Option 4, AM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N Erskine St	890	403	875	548	-15	145	-2%	36%
Kent St N Erskine St	675	322	608	286	-67	-36	-10%	-11%
Clarence St N Erskine St	1,061	na	919	na	-142	na	-13%	na
York St N Erskine St	na	952	na	898	na	-54	na	-6%
Total	**2,626**	**1,677**	**2,402**	**1,732**	**-224**	**55**	**-9%**	**3%**

Table 76 – Traffic changes, King St screenline, Base and Option 4, AM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N King St	429	862	441	991	12	129	3%	15%
Kent St N King St	711	na	639	na	-72	na	-10%	na
Clarence St N King St	798	na	754	na	-44	na	-6%	na
York St N King St	na	751	na	740	na	-11	na	-1%
George St N King St	712	628	719	661	7	33	1%	5%
Total	**2,650**	**2,241**	**2,553**	**2,392**	**-97**	**151**	**-4%**	**7%**

Table 77 – Traffic changes, Sussex St screenline, Base and Option 4, AM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Napoleon St E Sussex St	476	377	551	575	75	198	16%	53%
Erskine St E Sussex St	241	538	227	477	-14	-61	-6%	-11%
Total	**717**	**915**	**778**	**1,052**	**61**	**137**	**9%**	**15%**

Table 78 – Traffic changes, Kent St screenline, Base and Option 4, AM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	171	588	181	788	10	200	6%	34%
Erskine St E Kent St	257	245	224	213	-33	-32	-13%	-13%
Total	**428**	**833**	**405**	**1,001**	**-23**	**168**	**-5%**	**20%**

Table 79 – Traffic changes, Clarence St screenline, Base and Option 4, AM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	293	429	251	447	-42	18	-14%	4%
Margaret St E Clarence St	193	562	208	773	15	211	8%	38%
Erskine St E Clarence St	170	317	149	268	-21	-49	-12%	-15%
Total	**656**	**1,308**	**608**	**1,488**	**-48**	**180**	**-7%**	**14%**

Table 80 – Traffic changes, York St screenline, Base and Option 4, AM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	307	265	312	311	5	46	2%	17%
Jamison St E York St	na	152	na	143	na	-9	na	-6%
Lang St E York St	209	326	176	276	-33	-50	-16%	-15%
Grosvenor St E York St	1,030	24	972	20	-58	-4	-6%	-17%
Total	**1,546**	**767**	**1,460**	**750**	**-86**	**-17**	**-6%**	**-2%**

Table 81 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 4, AM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	889	na	971	na	82	na	9%	na
SHB Kent St ramp bus taxi	229	na	218	na	-11	na	-5%	na
SHB York (AM SB; PM NB)	na	855	na	1,053	na	198	na	23%
SHB Grosvenor St main	na	1,036	na	1,020	na	-16	na	-2%
SHB Grosvenor St bus lane	na	405	na	414	na	9	na	2%
Gloucester St N Gr'venor St	48	48	77	29	29	-19	60%	-40%
Harrington St N Gr'venor St	321	95	313	73	-8	-22	-2%	-23%
George St N Gr'venor St	603	393	596	421	-7	28	-1%	7%
Harbour Br Access sub-total	*1,118*	*2,296*	*1,189*	*2,487*	*71*	*191*	*6%*	*8%*
Balance sub-total	*972*	*536*	*986*	*523*	*14*	*-13*	*1%*	*-2%*
Screenline Total	**2,090**	**2,832**	**2,175**	**3,010**	**85**	**178**	**4%**	**6%**

Afternoon peak

Table 82 – Traffic changes, Margaret St screenline, Base and Option 4, PM peak (veh/hr)

Margaret St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Hickson Rd N Napoleon St	341	383	475	582	134	199	39%	52%
Kent St N Margaret St	624	419	572	408	-52	-11	-8%	-3%
Clarence St N Margaret St	1,120	na	954	na	-166	na	-15%	na
York St N Margaret St	na	811	na	900	na	89	na	11%
George St N Margaret St	1,049	766	1,001	775	-48	9	-5%	1%
Total	**3,134**	**2,379**	**3,002**	**2,665**	**-132**	**286**	**-4%**	**12%**

Table 83 – Traffic changes, Erskine St screenline, Base and Option 4, PM peak (veh/hr)

Erskine St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N Erskine St	434	683	459	945	25	262	6%	38%
Kent St N Erskine St	616	423	547	402	-69	-21	-11%	-5%
Clarence St N Erskine St	1,146	na	979	na	-167	na	-15%	na
York St N Erskine St	na	692	na	652	na	-40	na	-6%
Total	**2,196**	**1,798**	**1,985**	**1,999**	**-211**	**201**	**-10%**	**11%**

Table 84 – Traffic changes, King St screenline, Base and Option 4, PM peak (veh/hr)

King St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Sussex St N King St	265	1,495	318	1,659	53	164	20%	11%
Kent St N King St	689	na	641	na	-48	na	-7%	na
Clarence St N King St	898	na	803	na	-95	na	-11%	na
York St N King St	na	490	na	492	na	2	na	0%
George St N King St	735	977	744	991	9	14	1%	1%
Total	**2,587**	**2,962**	**2,506**	**3,142**	**-81**	**180**	**-3%**	**6%**

Table 85 – Traffic changes, Sussex St screenline, Base and Option 4, PM peak (veh/hr)

Sussex St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Napoleon St E Sussex St	311	388	471	478	160	90	51%	23%
Erskine St E Sussex St	173	672	157	591	-16	-81	-9%	-12%
Total	**484**	**1,060**	**628**	**1,069**	**144**	**9**	**30%**	**1%**

Table 86 – Traffic changes, Kent St screenline, Base and Option 4, PM peak (veh/hr)

Kent St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Margaret St E Kent St	281	335	288	459	7	124	2%	37%
Erskine St E Kent St	292	314	291	267	-1	-47	0%	-15%
Total	**573**	**649**	**579**	**726**	**6**	**77**	**1%**	**12%**

Table 87 – Traffic changes, Clarence St screenline, Base and Option 4, PM peak (veh/hr)

Clarence St Screenline	Base		Option		Change		%	
Location	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**	**EB**	**WB**
Jamison St E Clarence St	133	266	143	278	10	12	8%	5%
Margaret St E Clarence St	296	343	287	455	-9	112	-3%	33%
Erskine St E Clarence St	201	145	197	139	-4	-6	-2%	-4%
Total	**630**	**754**	**627**	**872**	**-3**	**118**	**0%**	**16%**

Table 88 – Traffic changes, York St screenline, Base and Option 4, PM peak (veh/hr)

York St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
Margaret St E York St	258	256	274	250	16	-6	6%	-2%
Jamison St E York St	na	27	na	40	na	13	na	48%
Lang St E York St	132	282	132	265	0	-17	0%	-6%
Grosvenor St E York St	664	429	757	444	93	15	14%	3%
Total	**1,054**	**994**	**1,163**	**999**	**109**	**5**	**10%**	**1%**

Table 89 – Traffic changes, Harbour Bridge ramps and Grosvenor St screenline, Base and Option 4, PM peak (veh/hr)

SHB/Grosvenor St Screenline	Base		Option		Change		%	
Location	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**	**NB**	**SB**
SHB Kent St ramp main	991	na	1,059	na	68	na	7%	na
SHB Kent St ramp bus taxi	183	na	169	na	-14	na	-8%	na
SHB York (AM SB; PM NB)	424	na	436	na	na	na	na	na
SHB Grosvenor St main	na	533	na	608	na	75	na	14%
SHB Grosvenor St bus lane	na	759	na	862	na	103	na	14%
Gloucester St N Gr'venor St	14	150	17	162	3	12	21%	8%
Harrington St N Gr'venor St	280	318	300	300	20	-18	7%	-6%
George St N Gr'venor St	526	519	532	526	6	7	1%	1%
Harbour Br Access sub-total	*1,598*	*1,292*	*1,664*	*1,470*	*66*	*178*	*4%*	*14%*
Balance sub-total	*820*	*987*	*849*	*988*	*29*	*1*	*4%*	*0%*
Screenline Total	**2,418**	**2,279**	**2,513**	**2,458**	**95**	**179**	**4%**	**8%**