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Background Modelling Assumptions for the East-West Link Needs Assessment Study

Prepared for the East-West Link Needs Assessment Study Project Team

By
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East-West Link Needs Assessment Study – 07-021

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1.0 Introduction

This note sets out the background modelling assumptions that have been used in the analysis and evaluation of road and public transport network improvements, as part of the East-West Link Needs Assessment Study.

The key inputs and assumptions relate to:

- the future transport network (road and public transport networks);
- the land-use / demographic forecasts; and
- the overarching policy environment (pricing policies etc).

This note details these assumptions and the basis on which they were derived, for each of the forecast years (2011, 2021 and 2031).

The note concludes with a summary of results produced for each of the forecast years.

2.0 Base Case Network Assumptions

Detailed discussions were held with VicRoads and the Public Transport Division of DOI to determine likely road and public transport network developments and public transport operational changes through to 2031.

These developments and operational changes include:

All the MOTC identified upgrades including;

- M1 upgrade
- Smart Bus and local bus route upgrades
- Rail duplications and triplications
- Electrification of some rail lines
- Upgrades to park and ride facilities
- Dart

All major road projects already identified and any road upgrades that would be expected under a "business as usual" regime including;

- Deer Park Bypass
- Duplication and extension of some outer suburban roads such as Tarneit Road, Grieve Parade, Calder Park Drive

Other public transport and policy changes including;

- Removal of Zone 3 pricing
- Inclusion of CBD parking levy

Figure 1 shows the extent of road network improvements, up to the year 2031. New infrastructure is shown in blue, while upgrades to infrastructure are shown in orange.

Figures 2 and 3 show the public transport improvements assumed up to the year 2031. In Figure 2, new route coverage provided by added bus routes is shown blue, while upgrades to rail infrastructure and services are shown in orange. Figure 3 shows the Smart Bus routes which have been included in the model.

Figure 1: Improvements to Road Infrastructure (up to 2031)

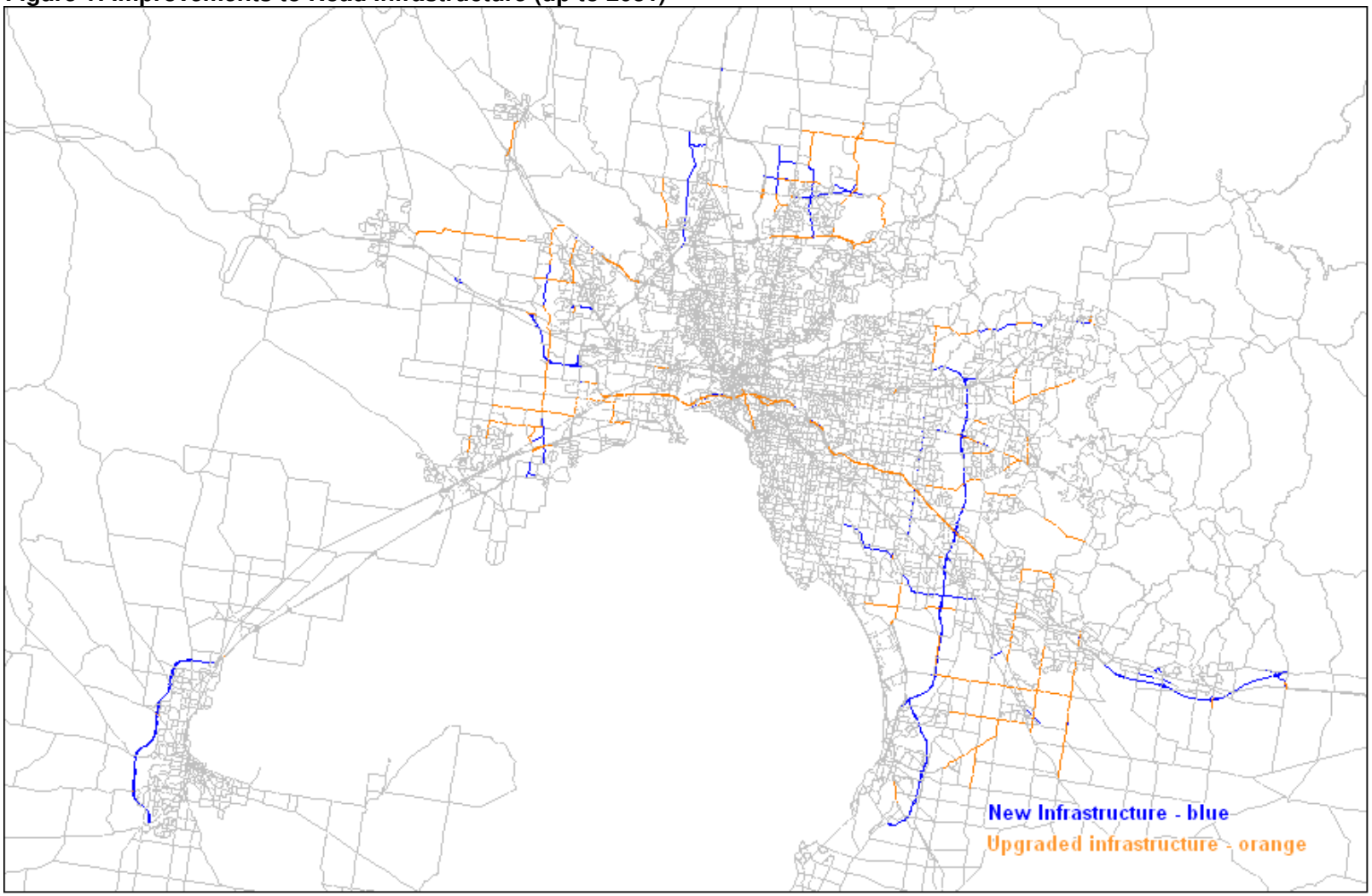


Figure 2: Improvements to Public Transport Services (up to 2031)

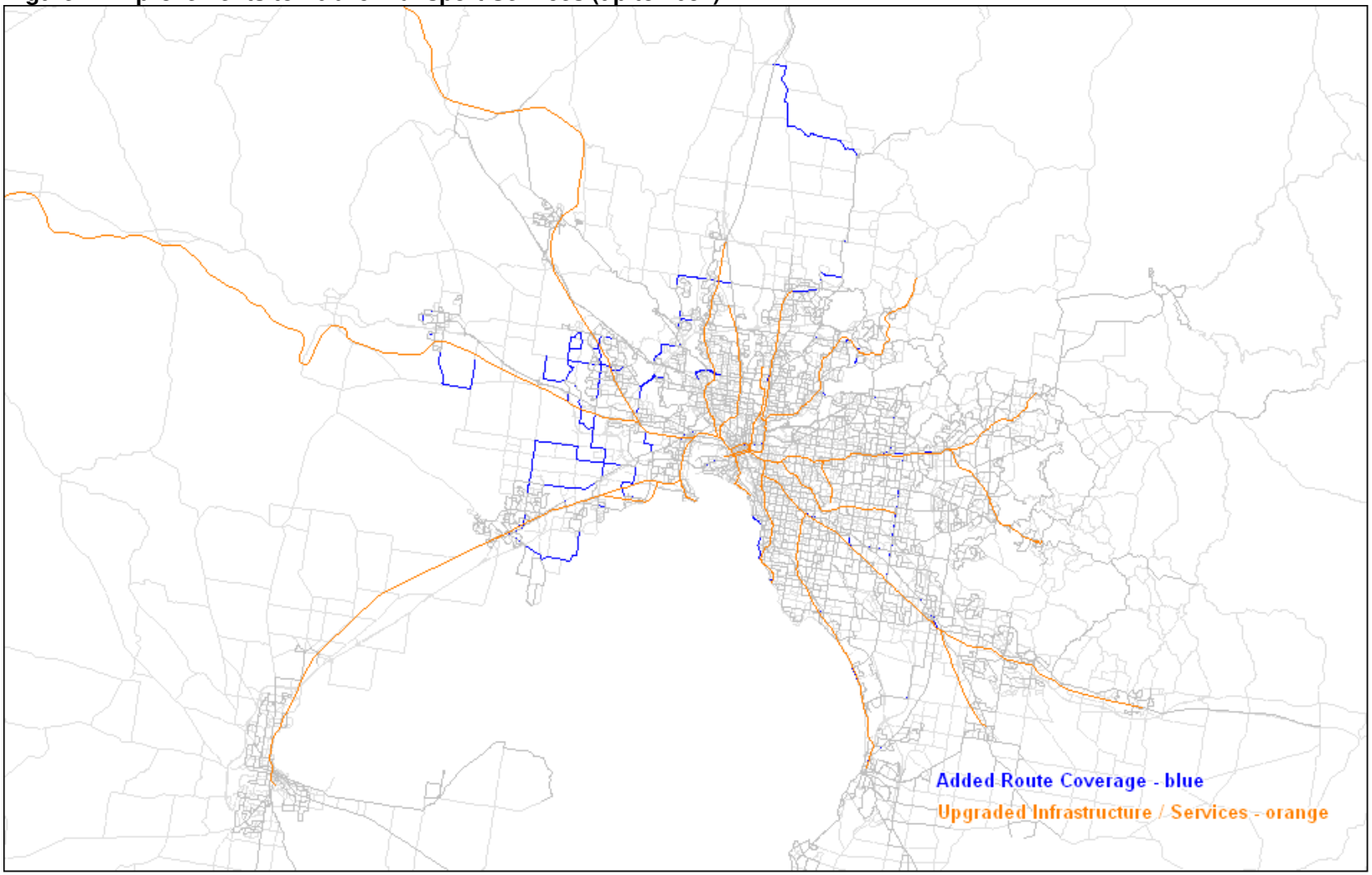
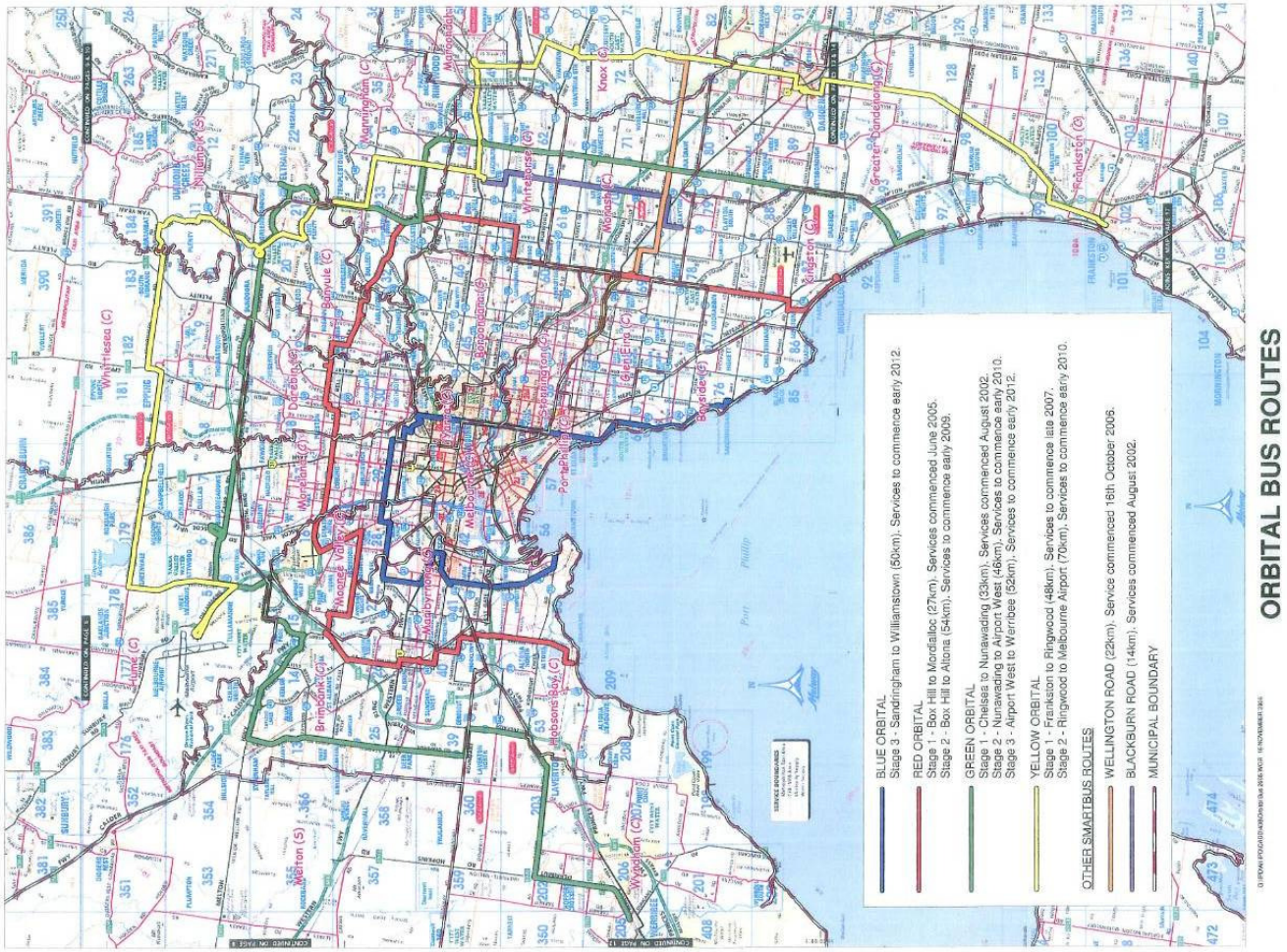


Figure 3: SmartBus Orbital Routes



3.0 Policy Issues

In addition to the infrastructure and operational changes envisaged or foreshadowed, it is necessary to get some understanding of the likely future directions in pricing and policy issues, some, if not all, of which are in the control of policy makers.

These include:

- real movements in public transport fares
- parking supply and pricing
- fuel price movements
- toll levels.

There are, in addition, influences beyond the influence of policy-makers directly involved in transport decision-making and strategic planning. This includes, for example, the increase in real income levels which might be extrapolated to affect the value-of-time, which would theoretically affect travel patterns and mode choice. Fuel price levels are also market-driven by and large.

VLC has conventionally assumed that there would, in effect, be no real increase in price/income levels other than for sensitivity testing purposes.

4.0 Future Land Use Assumptions

The nature and distribution of land-use is the key driver of the model (as it is in determining the scale and pattern of travel demand in the real world). The land use projections affect every aspect of the modelled demand estimates, particularly the trip generation and distribution stages with flow-on effects to mode split and trip assignment.

VLC recently produced revised population and employment forecasts for the modelled area – this includes MSD, Geelong, Ballarat and Bendigo – in consultation with DoI and DSE.

The review of the pre-existing DSE forecasts was deemed necessary when a number of internal inconsistencies were identified.

The revised forecasts, which have been endorsed by DoI and DSE, will provide the land-use / demographic context for this study.

In addition, as part of the East-West Link Needs Assessment study, VLC has been provided with demographic and land-use forecasts developed by SGS. This data relates to the “inner core” of Melbourne (ie. CBD and surrounds), and has been incorporated directly into VLC’s base case future models.

Table 1 summarises the revised forecasts, by LGA, for 2006, 2011, 2021 and 2031.

Table 1: Summary of Demographic and Land-Use Forecasts

	Year 2006		Year 2011		Year 2021		Year 2031	
LGA_Name	Population	Employment	Population	Employment	Population	Employment	Population	Employment
Ballarat (C)	85,353	34,113	88,046	34,405	96,874	37,341	104,810	39,971
Banyule (C)	112,879	31,448	115,301	39,700	116,968	41,183	119,049	43,243
Bass Coast (S)	27,969	7,440	29,570	7,401	35,476	8,900	42,001	10,536
Baw Baw (S)	33,178	10,787	33,522	10,952	37,135	12,174	41,041	13,509
Bayside (C)	84,774	22,339	88,370	27,535	91,297	28,446	93,374	29,453
Boroondara (C)	151,085	52,309	154,878	69,012	156,856	73,398	158,788	78,335
Brimbank (C)	171,196	38,918	173,207	37,533	179,356	43,149	182,676	46,347
Cardinia (S)	55,479	12,577	76,903	18,191	110,198	31,404	136,675	40,234
Casey (C)	211,970	35,328	231,054	45,059	264,878	61,798	295,552	73,145
Darebin (C)	123,702	37,614	127,649	40,983	129,581	37,083	132,066	33,658
Frankston (C)	116,639	29,068	118,798	39,028	124,008	44,023	129,687	48,981
Glen Eira (C)	117,920	28,780	125,723	35,230	131,605	36,722	136,342	38,156
Golden Plains (S)	16,154	2,235	17,590	2,343	19,874	2,823	21,963	3,114
Greater Bendigo (C)	91,622	32,148	99,394	34,061	112,111	37,312	123,122	40,105
Greater Dandenong (C)	123,343	62,463	124,644	84,687	133,921	94,864	143,231	104,072
Greater Geelong (C)	194,892	66,462	221,007	71,243	246,664	85,687	270,748	91,277
Hepburn (S)	14,208	3,666	14,525	3,848	15,314	4,091	16,197	4,284
Hobsons Bay (C)	80,337	26,568	84,507	29,450	88,712	30,866	92,344	32,067
Hume (C)	147,680	63,258	158,669	76,803	174,373	86,143	184,346	93,108
Kingston (C)	131,091	67,202	138,114	82,963	145,755	86,797	154,212	90,977
Knox (C)	144,594	53,180	149,283	74,841	151,985	81,027	156,894	95,528
Macedon Ranges (S)	38,840	8,143	40,913	8,397	47,800	9,668	55,136	11,074
Manningham (C)	107,632	21,277	112,240	27,412	118,476	30,330	125,808	33,704
Maribyrnong (C)	60,735	30,733	64,401	32,318	74,481	32,866	78,815	33,034
Maroondah (C)	97,460	35,550	104,507	45,113	114,806	50,075	124,344	54,752
Melbourne (C)	81,883	281,738	99,310	349,436	133,490	407,997	161,845	445,462
Melton (S)	75,155	8,611	105,850	11,023	143,697	14,229	167,561	18,046
Mitchell (S)	31,657	8,549	33,328	8,574	39,680	9,739	45,626	10,843
Monash (C)	155,659	80,267	161,894	99,424	169,571	106,417	176,463	111,405
Moonee Valley (C)	104,635	27,775	107,804	23,047	113,627	25,186	116,881	26,574
Moorabool (S)	25,443	4,989	26,976	5,139	31,249	5,940	35,635	6,738
Moreland (C)	130,704	30,761	136,021	28,908	142,042	23,032	145,522	20,956
Mornington Peninsula (S)	132,636	35,839	143,030	44,453	158,389	52,058	172,296	58,929
Mount Alexander (S)	16,269	5,591	16,811	5,757	17,585	6,093	18,433	6,324
Murrindindi (S)	13,598	4,184	13,965	4,249	14,957	4,496	15,860	4,707
Nillumbik (S)	58,496	10,133	58,984	14,239	60,540	15,185	63,390	17,957
Port Phillip (C)	82,751	65,052	91,096	71,594	102,872	79,740	112,502	87,157
Queenscliffe (B)	3,006	1,205	3,076	1,223	3,098	1,228	3,098	1,229
South Gippsland (S)	20,007	6,720	20,597	6,805	22,547	7,479	24,728	8,250
Stonnington (C)	87,598	42,199	92,922	55,229	98,328	64,350	103,100	71,259
Surf Coast (S)	21,813	5,481	25,868	6,035	30,424	7,350	34,268	8,083
Unincorporated Vic	66	32	58	31	52	28	51	27
Whitehorse (C)	138,272	55,428	144,922	69,596	150,874	77,419	154,981	82,787
Whittlesea (C)	123,908	31,395	152,460	30,130	181,426	34,845	194,729	37,418
Wyndham (C)	113,636	29,104	139,115	43,137	176,830	60,060	202,183	76,041
Yarra (C)	68,668	56,591	73,506	61,911	81,258	67,181	88,887	71,759
Yarra Ranges (S)	138,419	32,646	139,516	42,782	141,298	50,198	142,849	57,796
Totals	**4,165,011**	**1,637,896**	**4,479,923**	**1,961,230**	**4,932,337**	**2,208,421**	**5,300,108**	**2,412,410**

5.0 Indicative Model Outputs

This section serves only to indicate the nature of the major outputs available from the model.

Performance Indicators - Table 2 identifies the scale of change between the four base case years.

Link Volumes – Table 3 provides an example of the output data available for each road link in the model. There are approximately 25,000 links in each model run.

Table 2: Performance Indicators Summary

Performance Indicators Summary	Y_2006_BC	Z_2011_BC	Z_2021_BC	Y2_2031_BC
Public Transport				
Total Public Transport System Patronage (per day)				
• Tram	480,199	555,598	642,870	491,706
• Rail-Suburban	603,563	712,999	829,963	885,763
• Rail - V/Line	23,274	36,581	43,330	49,546
• Bus	283,657	353,312	452,311	699,167
Total	**1,390,693**	**1,658,490**	**1,968,474**	**2,126,182**
Passenger Kilometres (per day)				
• Tram	1,766,712	1,946,976	2,182,601	3,463,320
• Rail-Suburban	7,713,849	9,517,121	11,554,531	12,444,051
• Rail - V/Line	1,138,663	1,869,230	2,348,292	2,739,191
• Bus	1,753,306	2,360,686	3,162,110	2,346,194
Total	**12,372,530**	**15,694,013**	**19,247,533**	**20,992,757**
Passenger Hours (per day)				
• Tram	86,137	94,300	106,283	115,116
• Rail-Suburban	218,147	267,888	323,532	348,124
• Rail - V/Line	17,167	28,783	35,826	41,525
• Bus	58,379	77,801	105,082	114,823
Total	**379,830**	**468,772**	**570,722**	**619,589**
No. of Passenger Interchanges (per day)	440,729	532,853	648,093	707,911
No. of Passenger Trips (per day)	949,964	1,125,637	1,320,381	1,418,271
Revenue (per day)				
• Tram	$534,236	$620,790	$717,295	$518,145
• Rail-Suburban	$852,563	$930,616	$1,081,839	$1,150,372
• Rail - V/Line	$79,038	$123,761	$153,447	$177,562
• Bus	$333,444	$372,966	$479,105	$776,112
Total	**$1,799,281**	**$2,048,133**	**$2,431,686**	**$2,622,191**
Private/Commercial Vehicles				
Person Trips (per day)				
• Private Vehicle **	12,102,547	13,331,872	14,646,927	15,774,913
• Commercial Vehicle **	509,346	603,282	690,178	760,974
Vehicle Trips (per day)				
• Private Vehicle **	8,535,074	9,384,317	10,288,176	11,065,251
• Commercial Vehicle **	509,346	603,282	690,178	760,974
Person Kilometres (000's per day)				
• Private Vehicle ^	142,423.3	164,189.7	182,283.0	198,063.1
• Commercial Vehicle ^	11,489.1	13,846.8	16,151.6	17,974.6
Vehicle Kilometres (000's per day)				
• Private Vehicle ^	100,491.1	115,672.4	128,101.9	139,028.3
• Commercial Vehicle ^	11,489	13,847	16,152	17,975
Person Hours (per day)				
• Private Vehicle ^	2,886,752	3,296,452	3,734,101	4,134,062
• Commercial Vehicle ^	193,616	232,186	277,960	317,915
Vehicle Hours (per day)				
• Private Vehicle ^	2,039,595	2,325,515	2,627,814	2,905,632
• Commercial Vehicle ^	193,616	232,186	277,960	317,915
Operating Costs ($000's per day)				
• Private Vehicle ^	$24,915.9	$28,579.5	$31,631.6	$34,302.9
• Commercial Vehicle ^	$7,737.6	$9,268.1	$10,795.8	$12,003.9
Accident Rate (Crashes per day)				
• Number of Accidents (Total per Day) ^	31.24	34.87	38.62	41.58
• Accidents Costs ($ per Day) ^	$5,187,606	$5,845,103	$6,484,203	$7,000,455

Table 2: Performance Indicators Summary *(continued)*

Performance Indicators Summary	Y_2006_BC	Z_2011_BC	Z_2021_BC	Y2_2031_BC
Fuel Consumption (Litres per Day)				
• Private Vehicle	11,314,563	13,085,215	14,463,269	15,683,987
• Commercial Vehicle	3,631,909	4,391,041	5,089,328	5,640,854
Sub-Total	14,946,472	17,476,256	19,552,597	21,324,841
NO_x (tonnes per Day)				
• Private Vehicle	125.10	142.98	154.90	164.58
• Commercial Vehicle	55.79	67.20	77.41	85.26
Sub-Total	180.89	210.18	232.31	249.84
NMVOC (tonnes per Day)				
• Private Vehicle	74.19	78.21	72.46	63.42
• Commercial Vehicle	34.96	41.94	47.99	52.50
Sub-Total	109.14	120.15	120.45	115.92
SO_x (tonnes per Day)				
• Private Vehicle	3.822	4.333	4.628	4.845
• Commercial Vehicle	6.235	7.494	8.601	9.439
Sub-Total	10.057	11.827	13.229	14.284
CO_2 (tonnes per Day)				
• Private Vehicle	24,965.3	28,678.3	31,341.5	33,599.5
• Commercial Vehicle	8,621.0	10,363.3	11,896.2	13,057.6
Sub-Total	33,586.3	39,041.7	43,237.6	46,657.1
CH_4 (tonnes per Day)				
• Private Vehicle	9.856	11.050	11.571	11.850
• Commercial Vehicle	1.917	2.288	2.596	2.814
Sub-Total	11.773	13.338	14.166	14.664
N_20 (tonnes per Day)				
• Private Vehicle	2.062	2.472	2.893	3.311
• Commercial Vehicle	0.327	0.395	0.458	0.508
Sub-Total	2.389	2.867	3.351	3.819
CO (tonnes per Day)				
• Private Vehicle	1,023.73	1,097.53	1,053.94	970.28
• Commercial Vehicle	337.22	403.36	459.11	499.55
Sub-Total	1,360.95	1,500.89	1,513.05	1,469.84
Particulate Emissions (tonnes per Day)				
• Private Vehicle	5.025	5.784	6.405	6.951
• Commercial Vehicle	4.366	3.908	2.584	2.876
Sub-Total	9.390	9.691	8.989	9.827
Person Trip Statistics				
PT Passenger Trips (per day)				
• AM Peak **	225,950	262,581	310,140	317,027
• Off-Peak **	549,434	654,294	757,675	841,310
• PM Peak **	174,580	208,762	252,566	259,934
Total Vehicle Trips (per day) **	9,044,420	9,987,599	10,978,354	11,826,225
Passenger Trips Categorised (per day)				
• Total Persons in Cars **	12,102,547	13,331,872	14,646,927	15,774,913
• Total Persons in Comm. Vehicles **	509,346	603,282	690,178	760,974
• Total Persons on PT **	949,964	1,125,637	1,320,381	1,418,271
• Total Persons Walking/Cycling **	2,219,024	2,539,054	2,913,766	3,200,770
Total	**15,780,881**	**17,599,845**	**19,571,252**	**21,154,928**
Mode Splits (per day)				
• Total Persons in Cars **	79.25%	78.44%	77.57%	77.35%
Total Persons in CV **	-	-	-	-
• Total Persons on PT **	6.22%	6.62%	6.99%	6.95%
Total Persons Walk/Cycle **	14.53%	14.94%	15.43%	15.69%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**

* - All Trips shown include Intrazonal Trips

Table 3: Link Volumes Output by the Model (example)

Anode	6000
Bnode	11252
Dirn	2
Length	410
LinkID	600011252
FFSpeed_AB	40
FFSpeed_BA	40
Total_AB_AM	2510
Total_AB_MD	10353
Total_AB_PM	2391
Speed_AB_AM	21.82
Speed_AB_MD	31.22
Speed_AB_PM	26.03
CarVolume_AB_AM	2336
CarVolume_AB_MD	8879
CarVolume_AB_PM	2203
LcvVolume_AB_AM	57
LcvVolume_AB_MD	352
LcvVolume_AB_PM	48
HcvVolume_AB_AM	117
HcvVolume_AB_MD	1122
HcvVolume_AB_PM	140
Total_Car_AB	13418
Total_Lcv_AB	457
Total_Hcv_AB	1379
Total_AB	15254
Total_BA_AM	2228
Total_BA_MD	10770
Total_BA_PM	2665
Speed_BA_AM	26.54
Speed_BA_MD	30.34
Speed_BA_PM	21.66
CarVolume_BA_AM	2003
CarVolume_BA_MD	9199
CarVolume_BA_PM	2523
LcvVolume_BA_AM	69
LcvVolume_BA_MD	370
LcvVolume_BA_PM	49
HcvVolume_BA_AM	156
HcvVolume_BA_MD	1201
HcvVolume_BA_PM	93
Total_Car_BA	13725
Total_Lcv_BA	488
Total_Hcv_BA	1450
Total_BA	15663
Total_2Way	30917