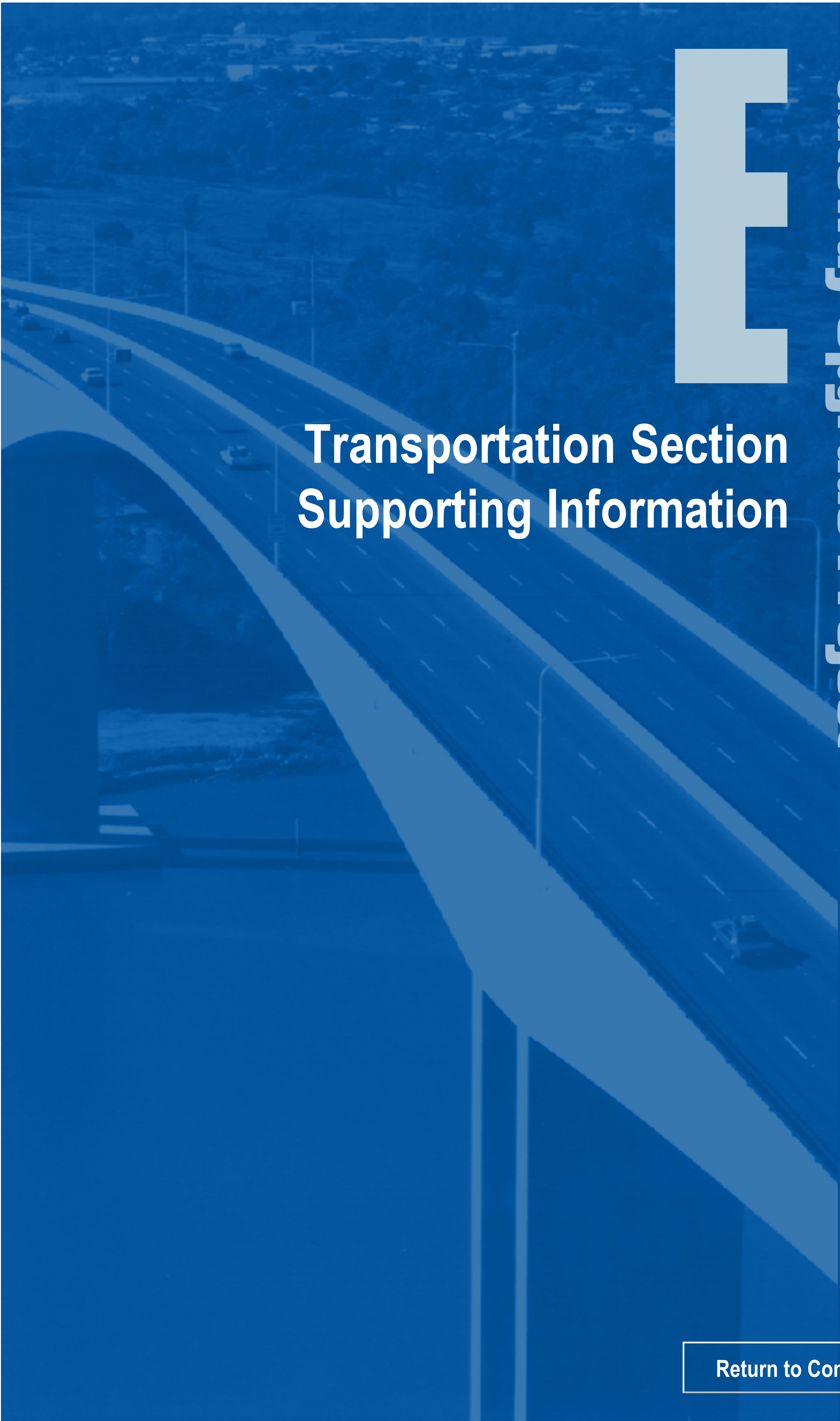

Gateway Upgrade Project

E

Transportation Section Supporting Information

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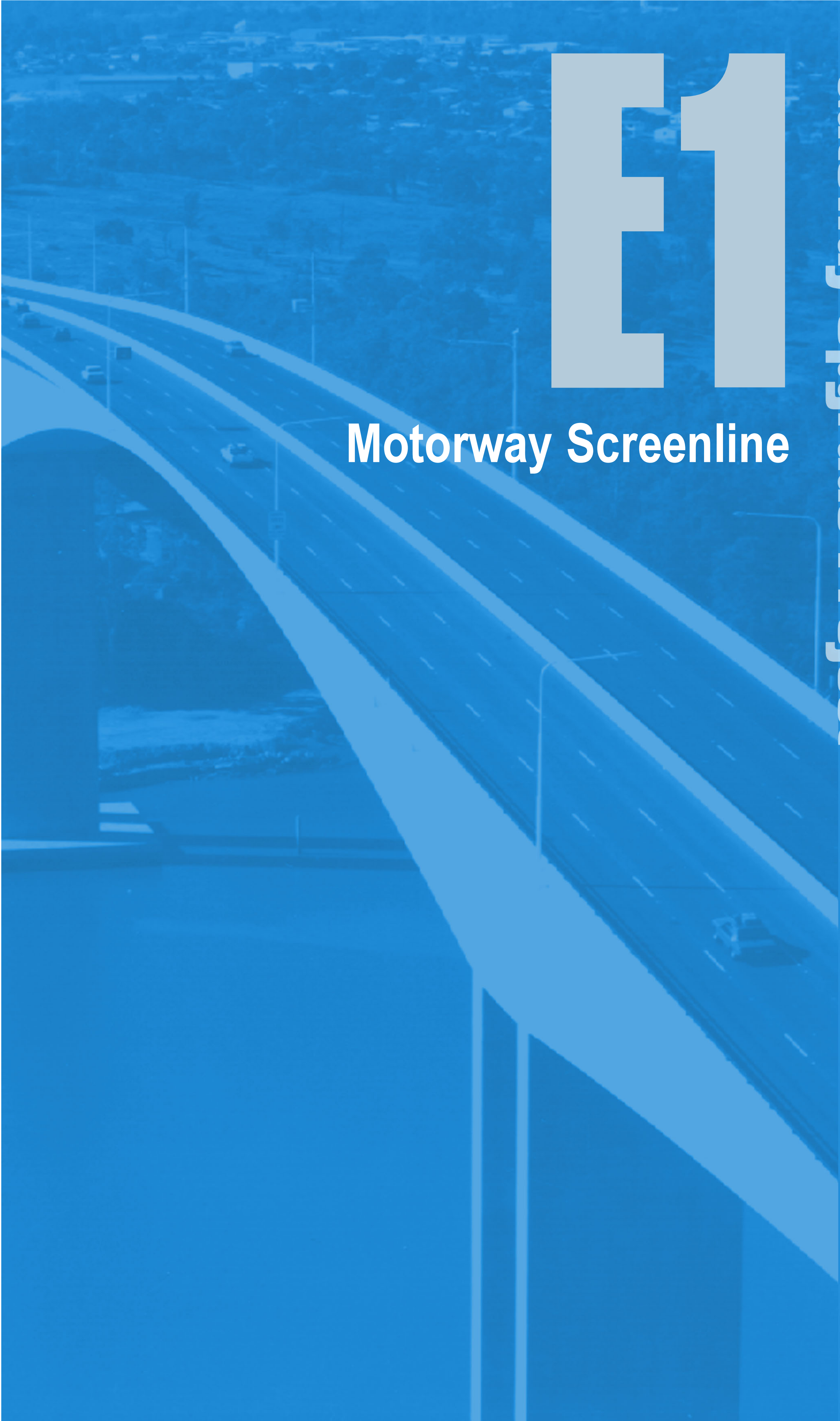

E1

Motorway Screenline

Gateway Upgrade Project

Appendix E1

Table E1 Motorway East Screenline (N-S) (Screenline 1)

Location	Traffic Lanes	Morning Peak Flow	Morning Peak Flow / Mid-Block Capacity	Evening Peak Flow	Evening Peak Flow / Mid-Block Capacity
Eastbound					
Nudgee Rd	1	175	0.08	132	0.06
Airport Dve	2	6,099	1.09	3,555	0.63
Kingsford Smith Dve	2	2,473	0.44	1,083	0.19
Curtin Ave	1	846	0.40	320	0.15
Cullen Ave	1	1,009	0.48	367	0.17
Lytton Rd	1	2,207	0.92	1,913	0.80
Port of Brisbane Mwy	2	1,993	0.26	736	0.10
Wynnum Rd	2	2,631	0.51	4,968	0.96
Belmont Rd	1	69	0.03	582	0.29
London Rd	1	34	0.03	539	0.45
Old Cleveland Rd	2	3,168	0.57	5,332	0.95
Mt Grav-Capalaba Rd	2	2,278	0.47	4,579	0.95
Total	**18**	**22,983**	**0.49**	**24,106**	**0.52**
Westbound					
Nudgee Rd	1	142	0.06	179	0.08
Airport Dve	2	1,799	0.32	3,790	0.68
Kingsford Smith Dve	2	1,139	0.20	2,311	0.41
Curtin Ave	1	69	0.03	223	0.11
Cullen Ave	1	369	0.18	911	0.43
Lytton Rd	2	1,209	0.25	1,627	0.34
Port of Brisbane Mwy	2	2,265	0.30	3,064	0.40
Wynnum Rd	2	4,899	0.94	2,330	0.45
Belmont Rd	1	1,096	0.55	1,223	0.61
London Rd	1	382	0.32	0	0.00
Old Cleveland Rd	2	5,416	0.97	2,626	0.47
Mt Grav-Capalaba Rd	2	4,643	0.97	2,220	0.46
Total	**19**	**23,428**	**0.48**	**20,503**	**0.42**

Table Note: Control on road network capacity in urban areas tends to be exerted by intersections rather than mid-blocks.

Table E2 Motorway West Screenline (N-S) (Screenline 2)

Location	Traffic Lanes	Morning Peak Flow	Morning Peak Flow/ Mid-Block Capacity	Evening Peak Flow	Evening Peak Flow/ Mid-Block Capacity
Eastbound					
Childs Rd	1	137	0.06	173	0.08
Nudgee Rd	1	96	0.04	204	0.09
Toombul Rd	2	1,549	0.39	1,508	0.38
East-West Arterial	2	4,792	0.96	4,180	0.84
Kingsford Smith Dve	2	3,357	0.60	3,486	0.62
Lytton Rd	1	2,394	0.85	2,189	0.78
Wynnum Rd	2	2,173	0.39	3,792	0.68
Meadowlands Rd	1	633	0.28	1,673	0.73
Old Cleveland Rd	2	2,633	0.47	4,745	0.85
Mt Grav-Capalaba Rd	2	2,710	0.48	4,925	0.88
Total	**16**	**20,474**	**0.50**	**26,876**	**0.65**
Westbound					
Childs Rd	1	140	0.06	105	0.05
Nudgee Rd	1	203	0.08	89	0.04
Toombul Rd	2	2,037	0.51	1,554	0.39
East-West Arterial	2	3,836	0.77	3,546	0.71
Kingsford Smith Dve	2	2,753	0.49	2,523	0.45
Lytton Rd	2	1,810	0.32	2,133	0.38
Wynnum Rd	2	3,988	0.71	2,090	0.37
Meadowlands Rd	1	1,356	0.59	336	0.15
Old Cleveland Rd	2	5,248	0.94	2,800	0.50
Mt Grav-Capalaba Rd	2	5,217	0.93	2,514	0.45
Total	**17**	**26,588**	**0.60**	**17,691**	**0.40**

Table Note: control on road network capacity in urban areas tends to be exerted by intersections rather than mid-blocks.

Table E3 Brisbane River Crossings Screenline (E-W) (Screenline 3)

Location	Traffic Lanes	Morning Peak Flow	Morning Peak Flow/ Mid-Block Capacity	Evening Peak Flow	Evening Peak Flow/ Mid-Block Capacity
Northbound					
Gateway Bridge	3	8,327	0.77	6,293	0.58
Story Bridge	3	9,572	0.94	6,924	0.68
Captain Cook Bridge	4	13,914	0.97	7,427	0.52
Victoria Bridge	1	1,677	1.00	988	0.59
William Jolly Bridge	2	4,325	0.83	3,968	0.76
Walter Taylor Bridge	1	2,822	1.28	2,294	1.04
Centenary Bridge	2	7,614	1.00	5,709	0.75
Moggill Ferry	-	182	-	161	-
Colleges Crossing	1	725	0.30	529	0.22
Kholo Bridge	1	59	0.03	65	0.03
Total	**18**	**49,217**	**0.87**	**34,358**	**0.61**
Southbound					
Gateway Bridge	3	6,113	0.57	7,714	0.71
Story Bridge	3	6,456	0.63	6,933	0.68
Captain Cook Bridge	4	9,155	0.64	12,319	0.86
Victoria Bridge	1	1,595	0.89	938	0.52
William Jolly Bridge	2	4,390	0.84	2,089	0.40
Walter Taylor Bridge	1	2,329	1.06	2,426	1.10
Centenary Bridge	2	5,958	0.78	7,329	0.96
Moggill Ferry	-	200	-	148	-
Colleges Crossing	1	700	0.29	456	0.19
Kholo Bridge	1	78	0.04	54	0.03
Total	**18**	**36,974**	**0.65**	**40,407**	**0.71**

Table Note: control on road network capacity in urban areas tends to be exerted by intersections rather than mid-blocks.

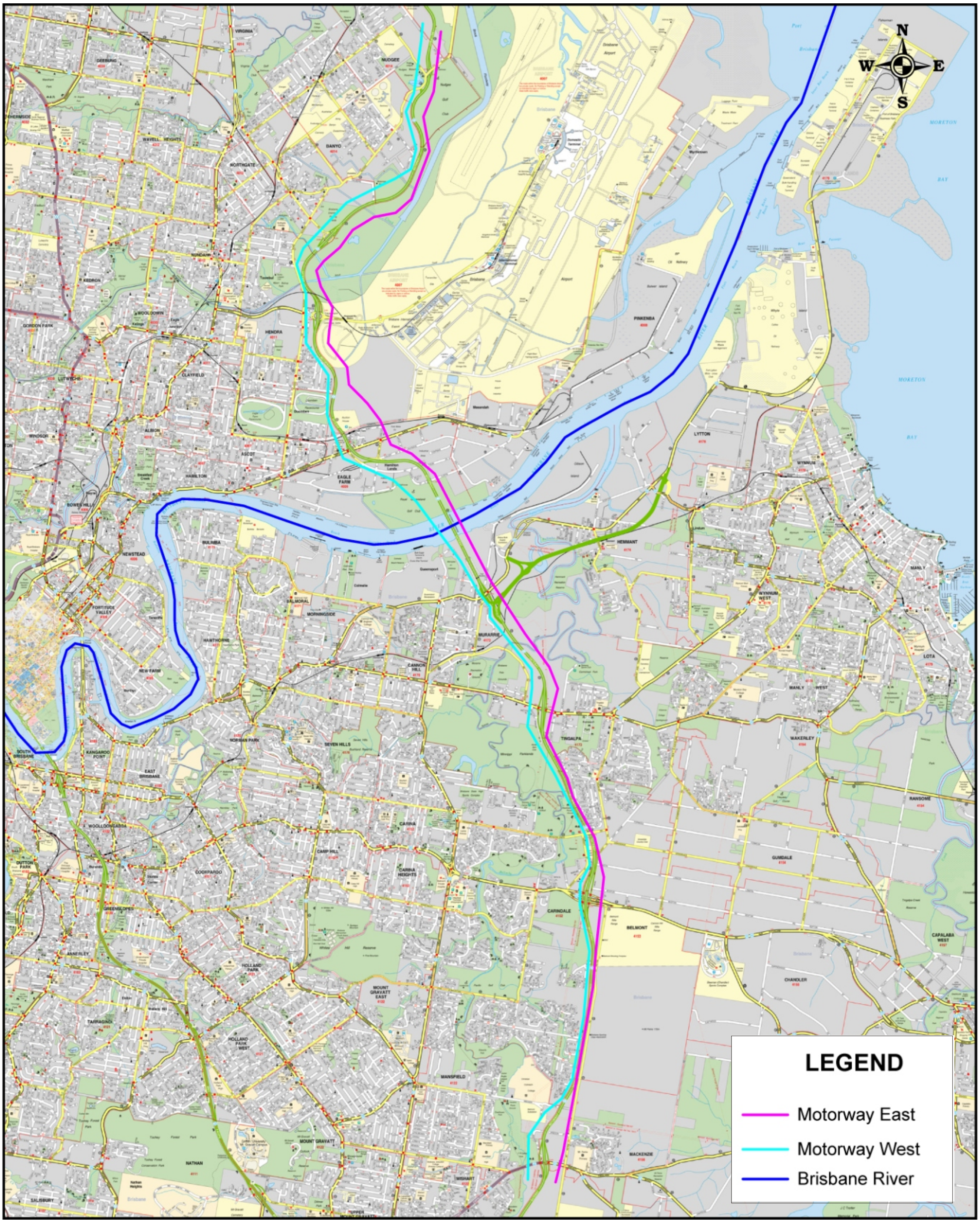

FIGURE E1
Screenline Locations

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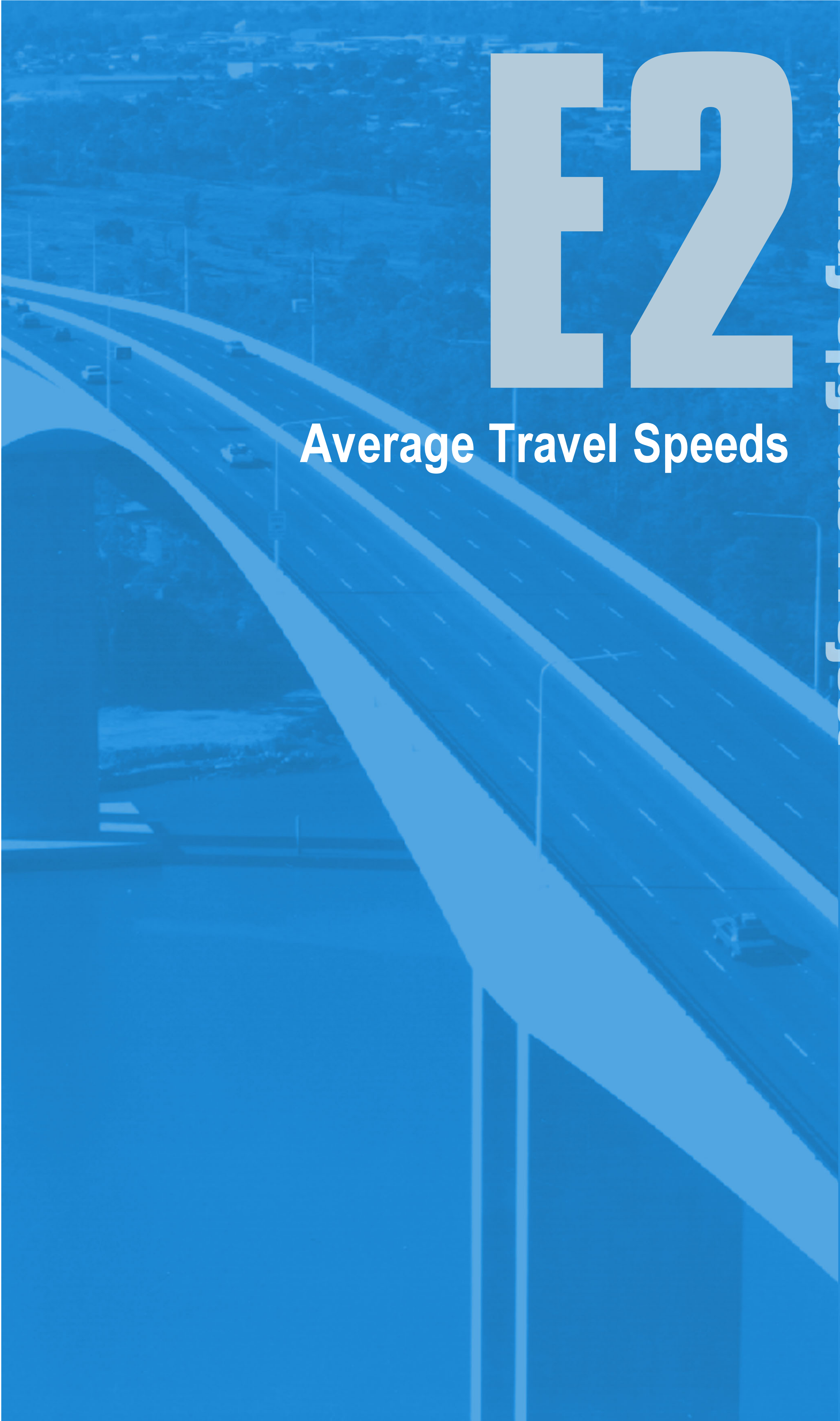

E2

Average Travel Speeds

Gateway Upgrade Project

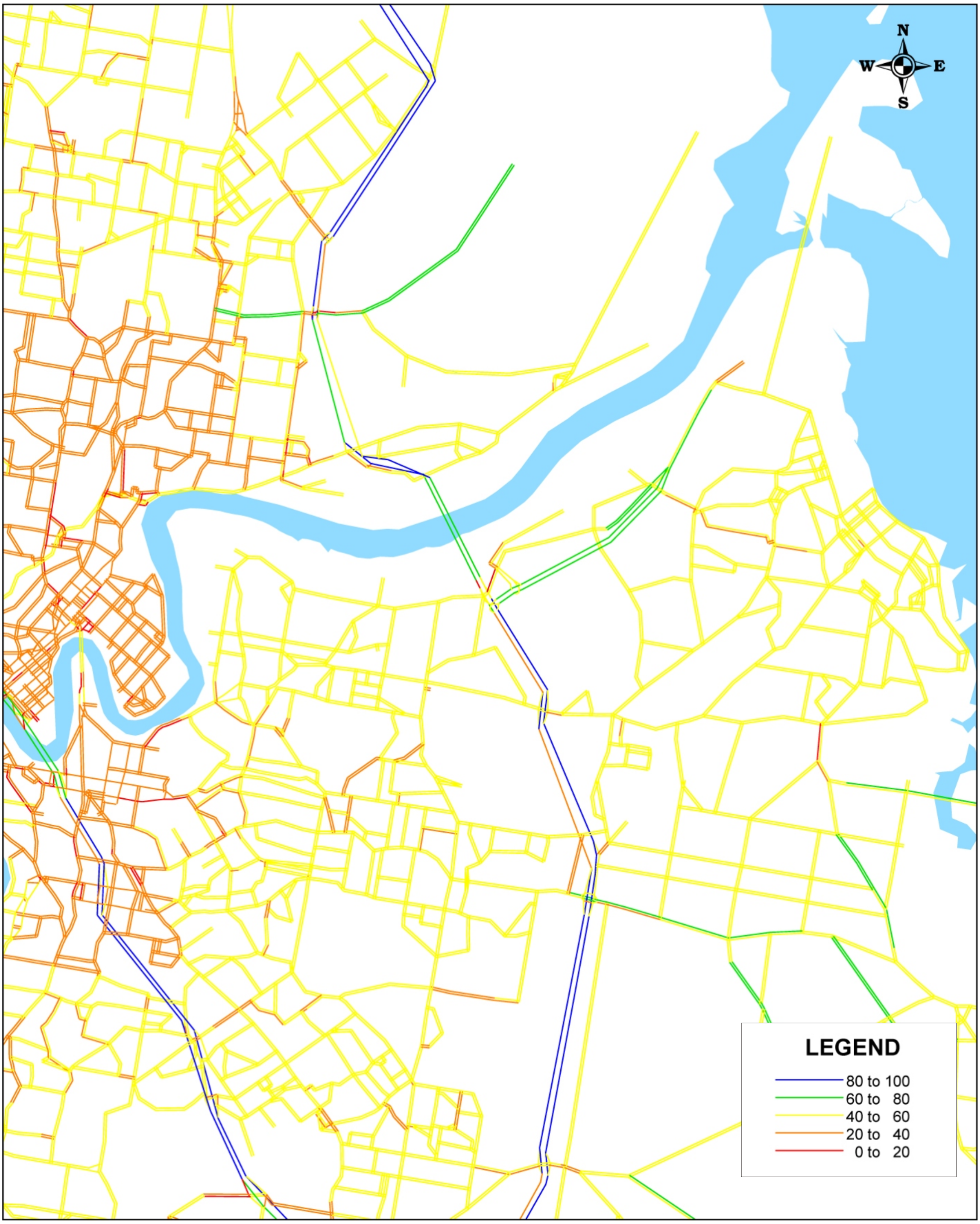

FIGURE E2
Average Travel Speeds
Modelled 2003 Morning Peak

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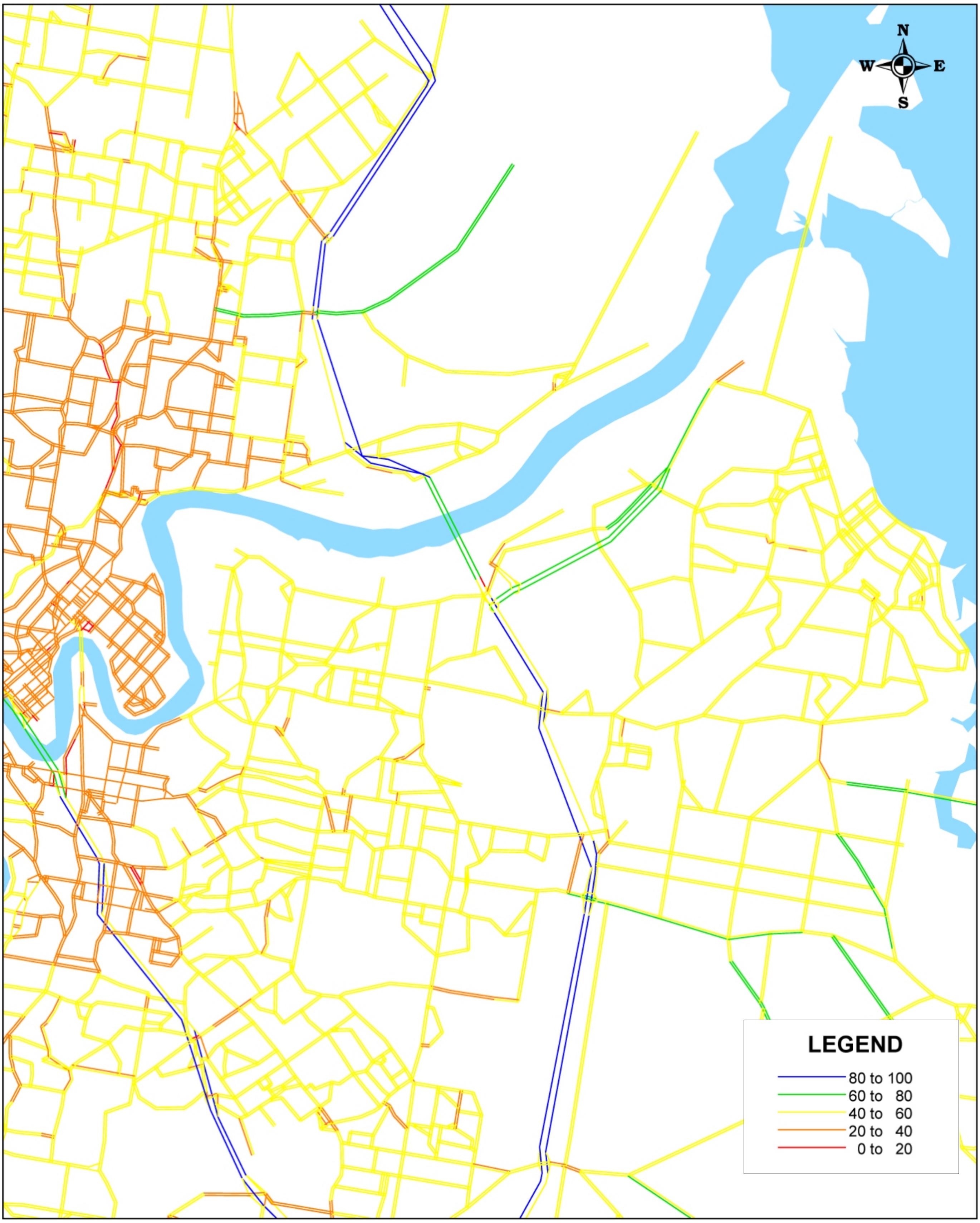

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FIGURE E3
Average Travel Speeds
Modelled 2003 Evening Peak

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FIGURE E4
Average Travel Speeds
Modelled 2003 Morning Peak Arterial Roads

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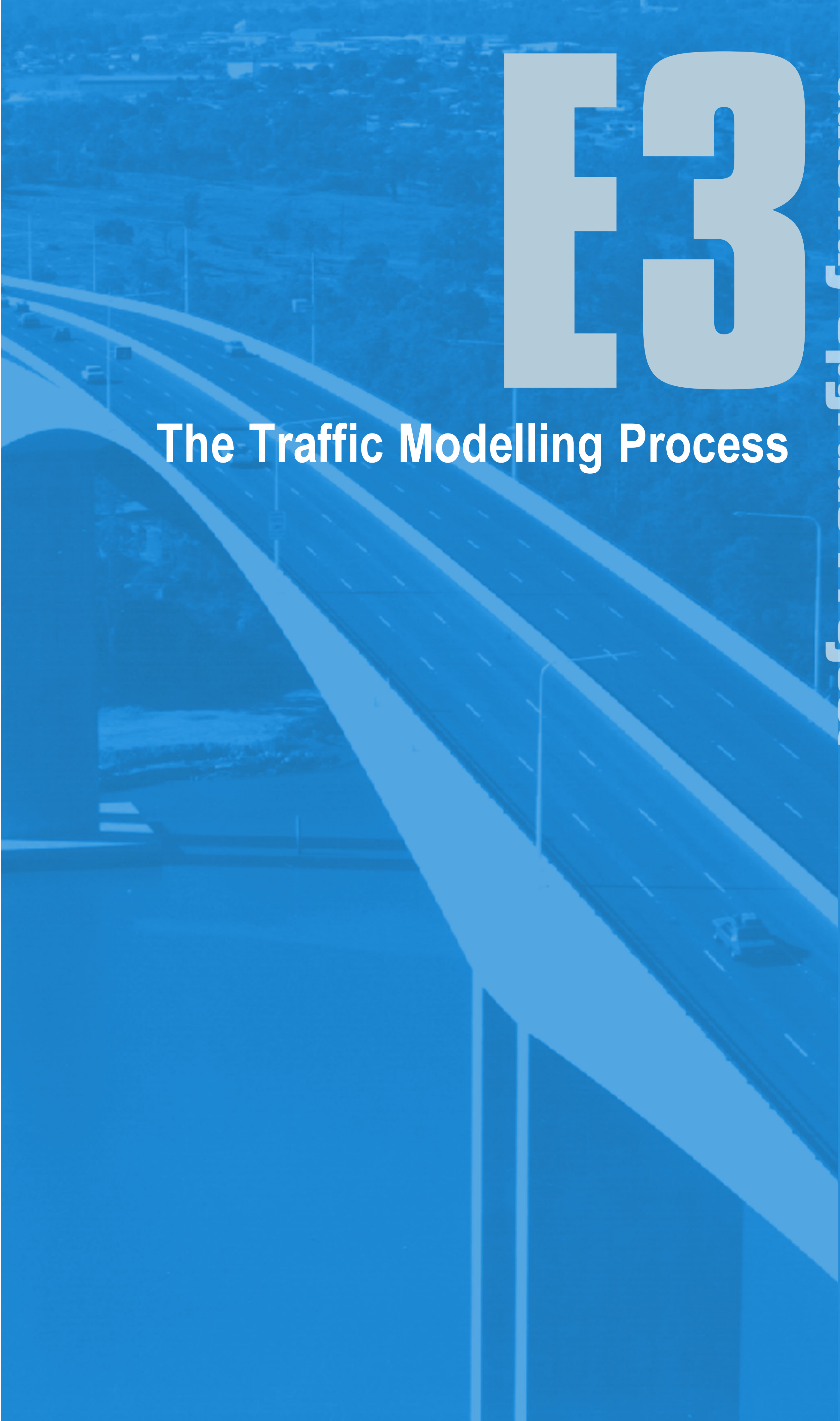
Queensland Government
Department of Main Roads
Australian Government
Department of Transport and Regional Services
Connell Wagner

FIGURE E5
Average Travel Speeds
Modelled 2003 Evening Peak Arterial Roads



E3

The Traffic Modelling Process

Gateway Upgrade Project

Appendix E3 The Traffic Modelling Process

This Appendix provides an overview of the traffic modelling process and components. The process used to forecast traffic flows on the road system involved a number of steps using the Brisbane Strategic Transport Model (BSTM), a set of computer based models and proprietary software.

1. Brisbane Strategic Transport Model (BSTM)

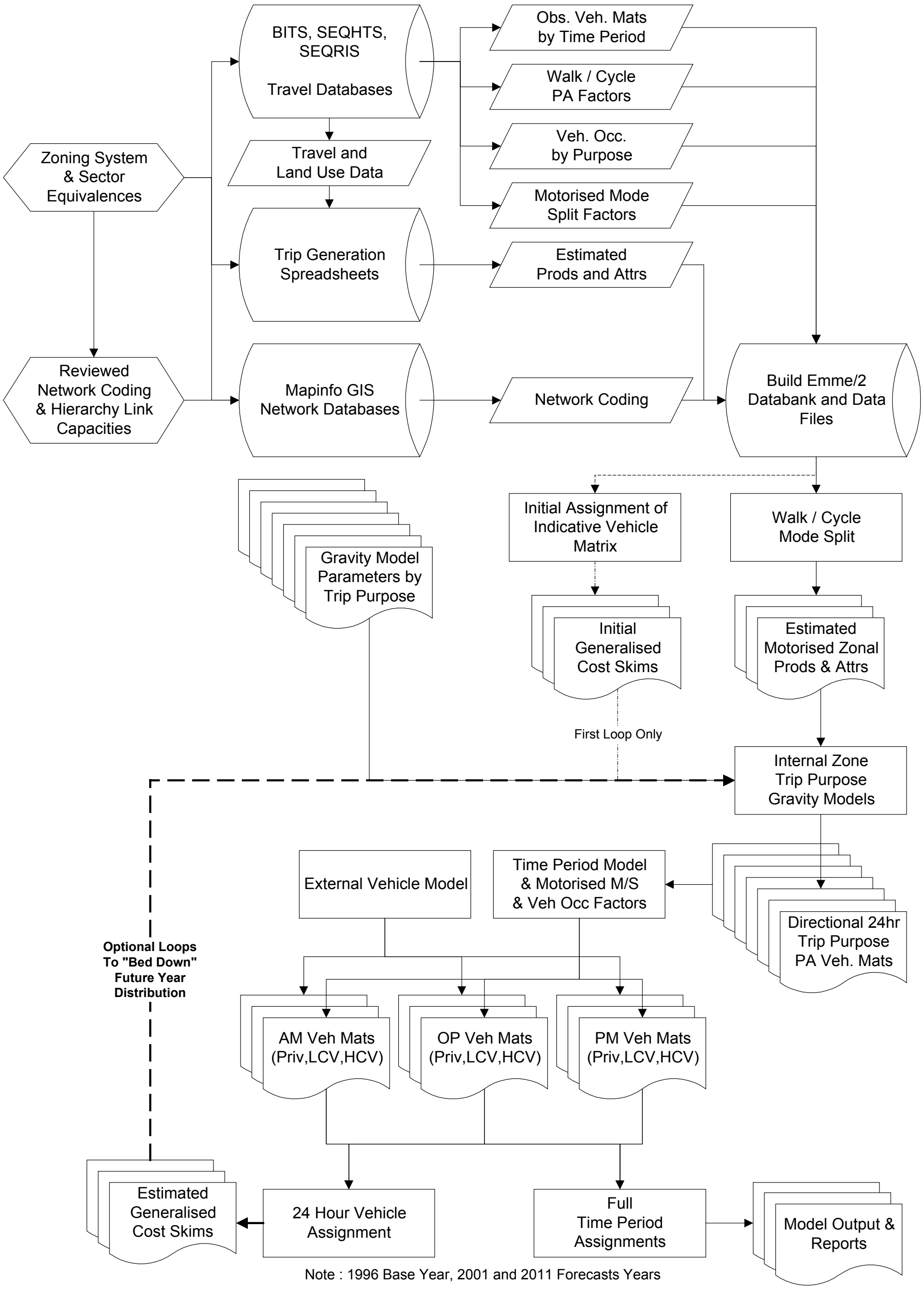
The BSTM was developed in 2000 and is a conventional four-step transport model (ie trip generation, trip distribution, mode choice and trip assignment). The BSTM was initially calibrated and validated to 1996 conditions and has been progressively updated and modified to reflect current conditions.

The general characteristics of the BSTM are:

- Primarily a road based model with simplistic treatment of public transport travel (ie to be split from private travel prior to trip assignment);
- Model is strategic in nature, although the zoning system is relatively fine (ABS Census Collector District based);
- The travel times on a road link vary depending on the traffic volume, the number of mid-block lanes and the road type, according to “speed-flow” relationships. No intersection delays are explicitly modelled;
- Covers the entire Brisbane Statistical Division (BSD), with an internal primary study area covering the Brisbane City Council legislative boundary. Local authority areas surrounding Brisbane but within the BSD are treated in less detail;
- The model structure is such that it can be augmented with more rigorous “plug-in” components (eg Toll diversion model); and
- Models three separate time periods; the morning peak two hour period, the evening peak two hour period and the offpeak period comprised of the remainder of the day.

A diagrammatic representation of the model structure and development is given in Figure E3.1.

Figure E3.1 BSTM Model Structure



Note : 1996 Base Year, 2001 and 2011 Forecasts Years

Source: SKM (2000). Brisbane Strategic Transport Model, Final Technical Report

The BSTM is predominately implemented within EMME/2 or TRIPS software packages with inputs from both Excel spreadsheets and MapInfo.

For this EIS, all four major steps of the model (i.e. trip generation, trip distribution, mode choice and trip assignment) were implemented within the EMME/2 package, controlled by a hierarchical set of internally documented macros (EMME/2 run scripts or programs).

2. BSTM Model Enhancements

The development of the BSTM traffic model used for the assessment of the GUP involved a number of processes as described in Section 5 of the EIS. This section provides more details on the background of enhancements to the model and its application to the GUP.

2.1 Network Assumptions

The EMME/2 road networks used in this EIS are based on the networks used in the Planning Study. These networks were audited to identify any coding inconsistencies and to review the validation of traffic volumes.

The process employed to create the EMME/2 transport networks is one in which the base year network (2001) is used as the building block for all other networks. Future year networks and network option testing is then conducted via importing a number of network modification files to add, modify or delete the required nodes, links, centroids and centroid connectors to build the required network via a customised Microsoft Excel spreadsheet.

Each network link contains coded characteristics of free flow speed, capacity and j parameter (used in the speed-flow or volume-delay function) which are based on the road classification (Motorway, Arterial, Suburban, District and Local), traffic impedance (low, medium and high) and road type (divided and undivided). These parameters have not been modified as part of this investigation from the values used in the Planning Study.

The baseline road network adopted in the modelling was the situation, as it existed in 2003. The reason for this is principally related to the availability of recent reliable traffic count data and the impacts the construction of the Port of Brisbane Motorway had on traffic patterns in the corridor.

For the future base case called the "Do Minimum" examined in the EIS, Appendix E5 contains a summary of the other network road improvements (as they may affect the GUP) assumed to have been completed for each forecast year. It should be noted that these projects are not committed by any road authority. It is merely a list of projects identified by the study team as possible future improvements to the road network to form a basis for assessing the impacts of the GUP on traffic patterns. This process of project identification is required in order to present a proper comparison of the road network in the future for when the GUP is considered. Failure to do this would overstate the benefits or otherwise of the GUP.

2.2 Demographics

As a component of the Planning Study, a revision of demographics was conducted within the Gateway primary study area and to incorporate updated data from recent studies. In summary, the following processes were conducted:

- The Australian TradeCoast (ATC) area was disaggregated into a finer zone system using updated population and employment forecasts provided by the Planning, Information and Forecasting Unit (PIFU); and
- Revised demographic data from recent studies for the Pine Rivers and Ipswich Local Government Areas (LGAs) was incorporated.

For this EIS, these changes were reviewed and modifications carried out where required. A number of new sources of demographic and land use data have become available since the work conducted in the Planning Study, including:

- New population and dwelling forecasts by SLA01 (2001) – PIFU;
- New population forecasts by LGA01 (2006-2026) – PIFU; and
- 2001 Census data.

Using the latest available data, updated demographics forecasts for the entire BSD has been used in the analysis conducted in this EIS.

2.3 Special Trip Generators

The special generator process used in previous versions of the BSTM have been enhanced to better represent the atypical trip generation characteristics of the areas represented in the model (unique time split and trip generation/distribution characteristics) using a control total approach. Considerable work was conducted to construct a specific Brisbane Airport and ancillary business employment special generator using person and vehicle generation spreadsheet to enable independent analysis of this area and to integrate with the BSTM. The airport special generator process disaggregates the vehicle trips into a number of groups as follows:

- Employees;
- Air passengers;
- Business (servicing airport);
- Business (Commercial); and
- Freight.

The result of this process was a largely unchanged weekday vehicle generation for the airport, however the distribution of trips throughout the day was changed such that trips in the morning and evening peak were reduced and offpeak trips increased in relation to previous BSTM versions to reflect the observed flatter profiles for airport-related traffic.

2.4 Route Choice Research

IMIS-JEA-MWT conducted research relating to HCV operations and both private vehicle and HCV route choice, with a particular focus on regular users of the Gateway corridor to improve the confidence of forecasts using the BSTM.

Route choice is an important concept in establishing traffic forecasts for the Gateway corridor. Factors that influence route choice include:

- Average travel times;
- Tolls;
- Travel time reliability, variability;
- Vehicle operating costs;
    - Fuel;
    - Other (Tyres etc);
- Safety;
- Convenience;
- Toll budget (weekly or annual travel; and
- Payment Type (electronic toll collection or cash-based).

In previous surveys, private motorists have demonstrated a poor understanding of the operating costs of their vehicles and these are therefore omitted from route choice experiments. They are, however, an important component of the route choice of heavy commercial vehicle operators.

2.5 Commercial Vehicles

Commercial vehicles currently represent 14% of weekday traffic crossing the Gateway Bridge. It is likely that commercial vehicle trips will be subject to continuing high growth rates in the Gateway corridor in addition to being impacted by a number of strategic/logistical changes. Industry trends impacting the modelling of commercial vehicles in the future include:

- Unlikely to see an increase in vehicle sizes;
- More likely to be an increased off peak travel component;
- Push for small inventories; and
- Optimised supply chains (business location).

Classified traffic surveys were conducted in the ATC region east of the Gateway Bridge to improve the calibration of commercial vehicle movements. In combination with surveys of a subset of businesses in this area, the classified surveys were used to review the form and variables used in the BSTM commercial vehicle trip generation equations. This trip end research was found to statistically explain the commercial vehicle trip making behaviour in the ATC, increasing the degree of confidence in the commercial vehicle trip tables. This enabled the segregation of these vehicles as a separate vehicle class in the multiclass equilibrium assignment process with different toll level, value of time and constants than private vehicles.

2.6 Toll Diversion

Drivers' choice of route for a particular trip is influenced by a number of factors (ie variables), in particular, average travel time, extra time (above the average travel time), travel distance, road condition and tolls. Research in several countries has established that the utility (ie value) which drivers' place on a particular route for a trip can be described by a linear function of the form:

Utility = Constant + $\alpha_1 *$ Average time + $\alpha_2 *$ Extra time + $\alpha_3 *$ Distance + $\alpha_4 *$ Toll

where:
Constant reflects the influence of other factors (eg safety).
α_1, α_2, α_3 and α_4 are parameters which reflect the relative importance of each of the associated variables. (eg α_1 reflects the importance of "average time").

The "composite value of time" is given by the ratio (α_1/α_4) from the above function. Therefore, the generalised time difference between a tolled route such as the Gateway and an untolled route is given by:

Generalised time difference = Travel Time Savings – (Value of Time × Toll – Constant – Adjustments)

It is typically necessary to apply several "adjustments" to the raw parameter estimates (developed from Stated Preference surveys) in order to obtain a route choice model which will reflect actual behaviour and deliver reliable estimates of tolled volumes. There are three primary forms of adjustment, these being:

- adjusting estimates from drivers' stated preferences (SP) to also reflect revealed preferences (RP);
- identifying and correcting for "political" bias, if any; and
- adjusting network model times to reflect drivers' perceived times.

The first two are incorporated in the parameter estimates $\alpha_{1,}$ α2 etc. However, the third adjustment depends on the assignment model chosen (say EMME/2 or TRIPS) as each of these models will give slightly different modelled travel times which can then be adjusted against the survey respondents' perceived times.

Once established, the "adjusted" estimates of parameters can be applied using the "composite value of time" to convert the toll to a time equivalent, this is then added to the actual travel time to obtain a generalised time for each "vehicle class".

Previous versions of the BSTM assigned vehicles to the road network using a single path equilibrium assignment with generalised times. For this EIS, the BSTM separately assigned the morning peak, off peak and evening peak time period demands, disaggregated by separate "vehicle classes" to the road network using a multiclass equilibrium assignment with generalised times. Each "vehicle class" had a different toll level, value of time and constants. The two vehicle classes used in the EIS were Private Vehicles and Heavy Commercial Vehicles (which corresponded to the HCV demand in the BSTM).

E4

Population Forecast Sectors

Gateway Upgrade Project

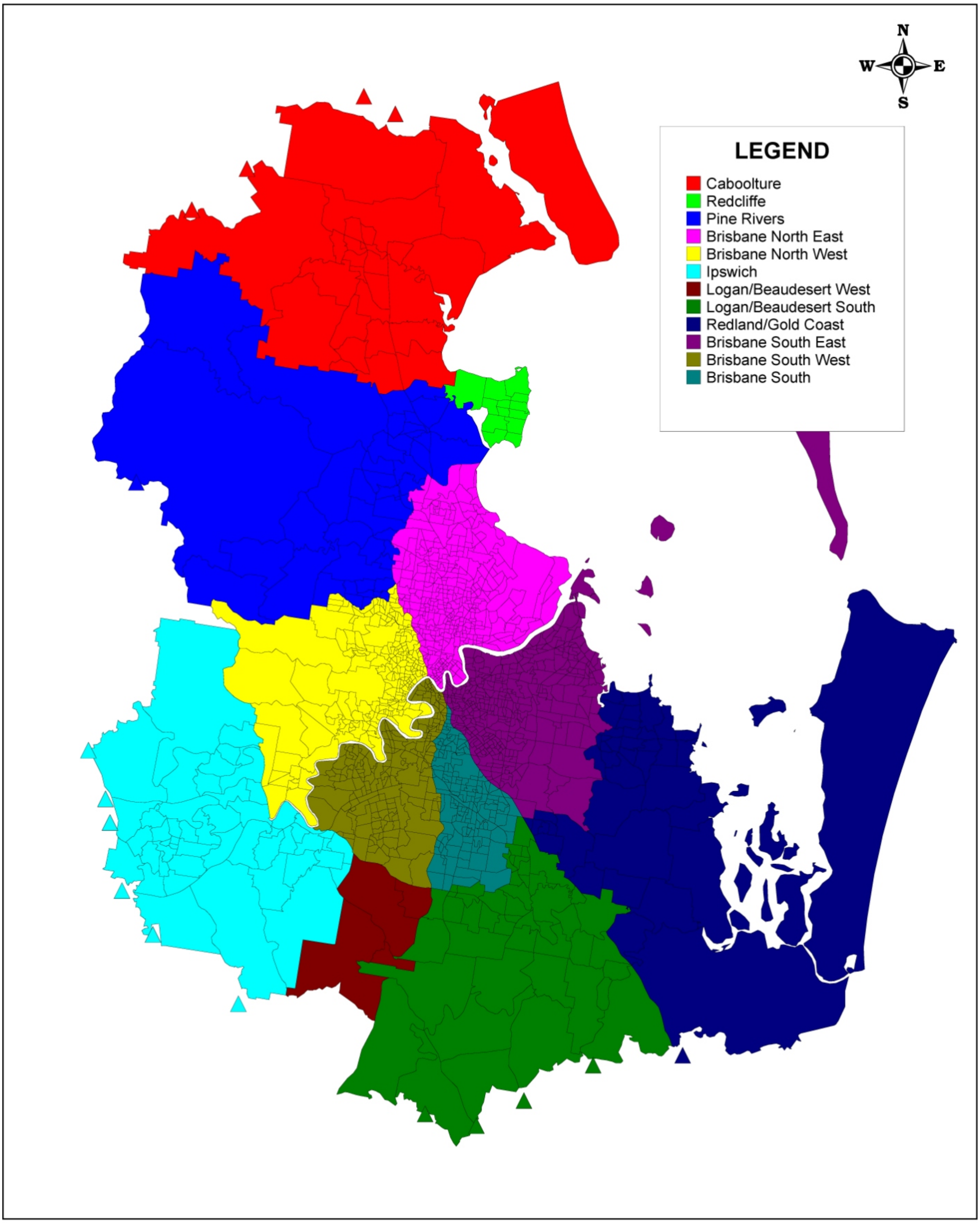


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FIGURE E6
12 Sector System

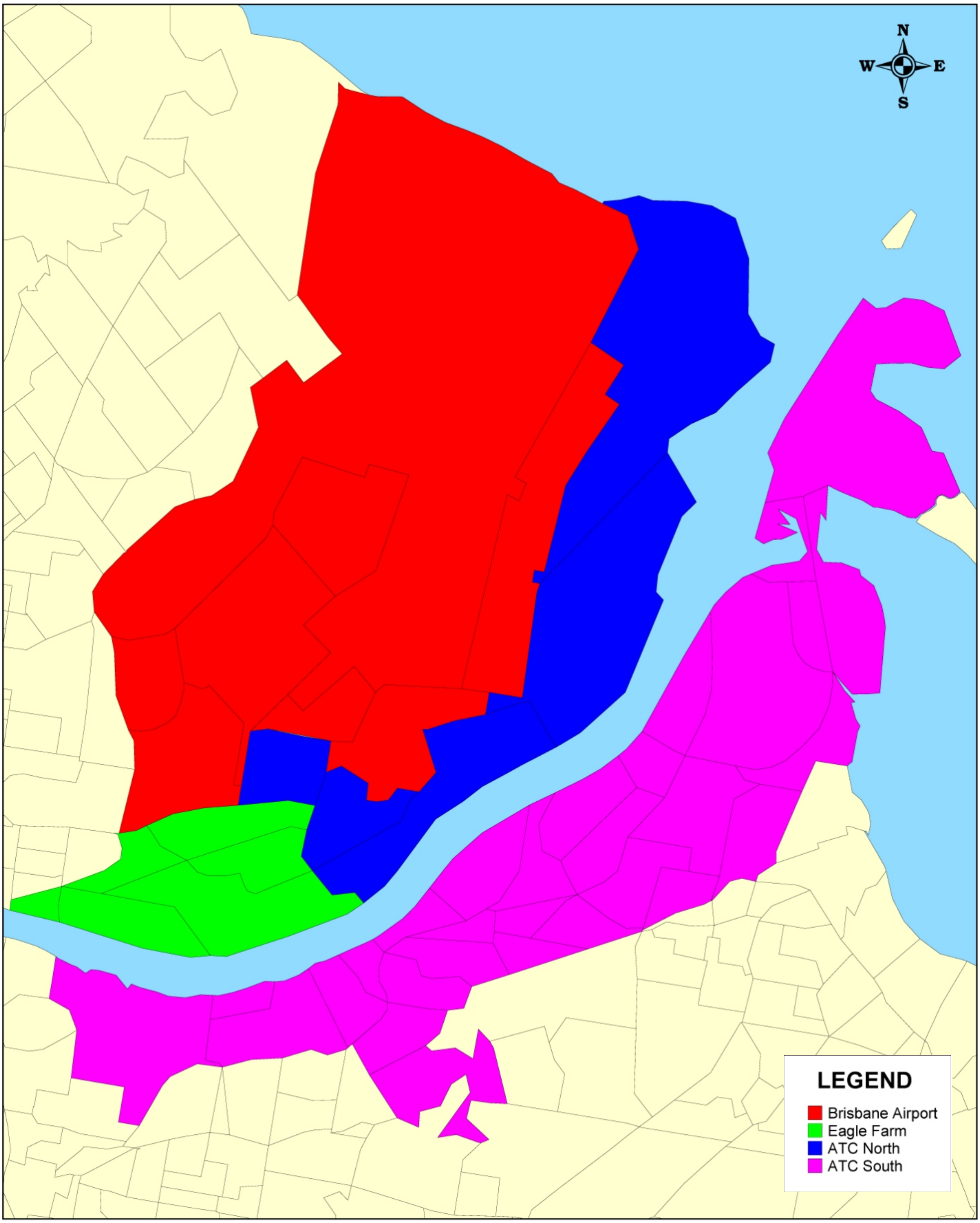

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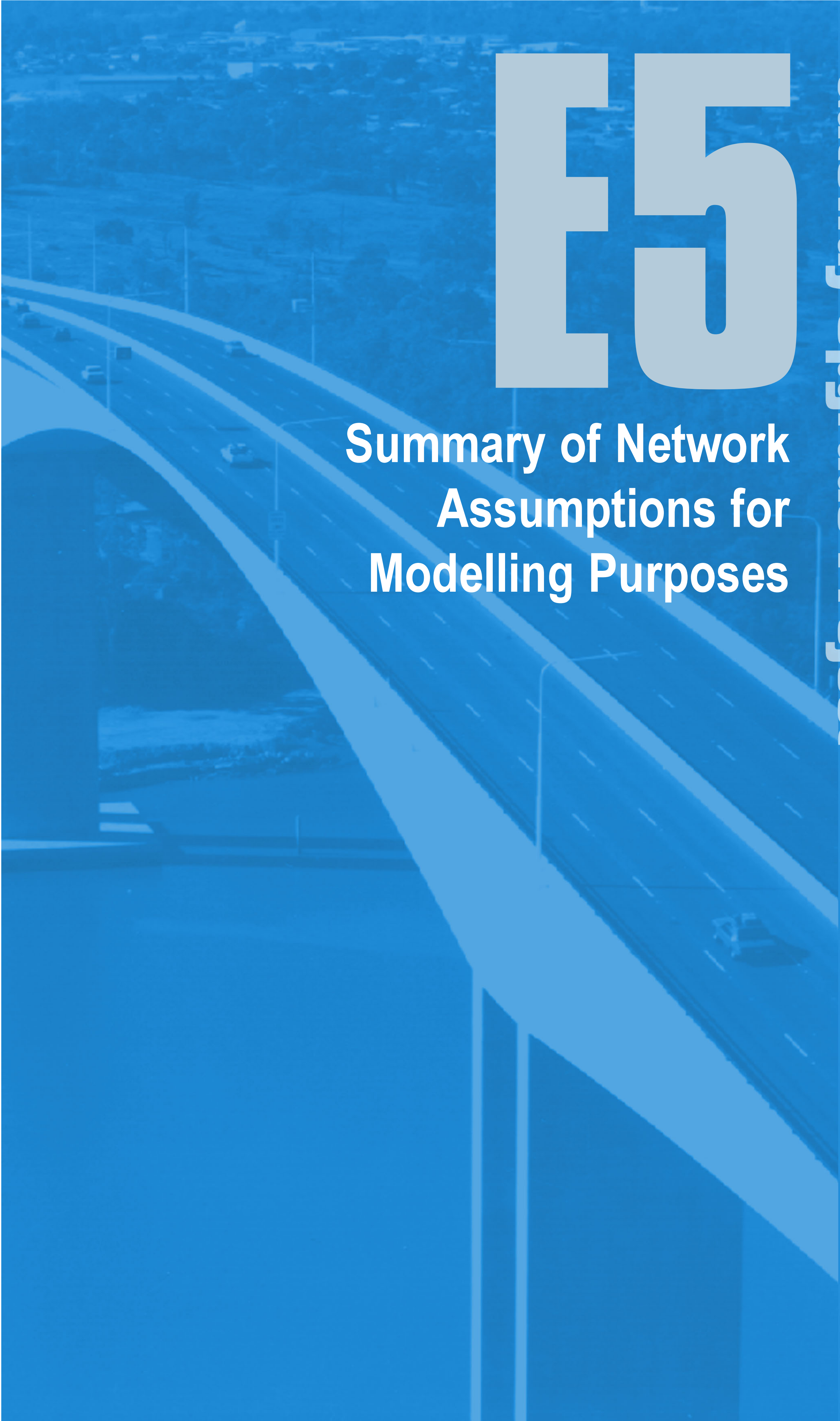
FIGURE E7
Australia TradeCoast Sub-sectors



E5

Summary of Network Assumptions for Modelling Purposes

Gateway Upgrade Project

Appendix E5

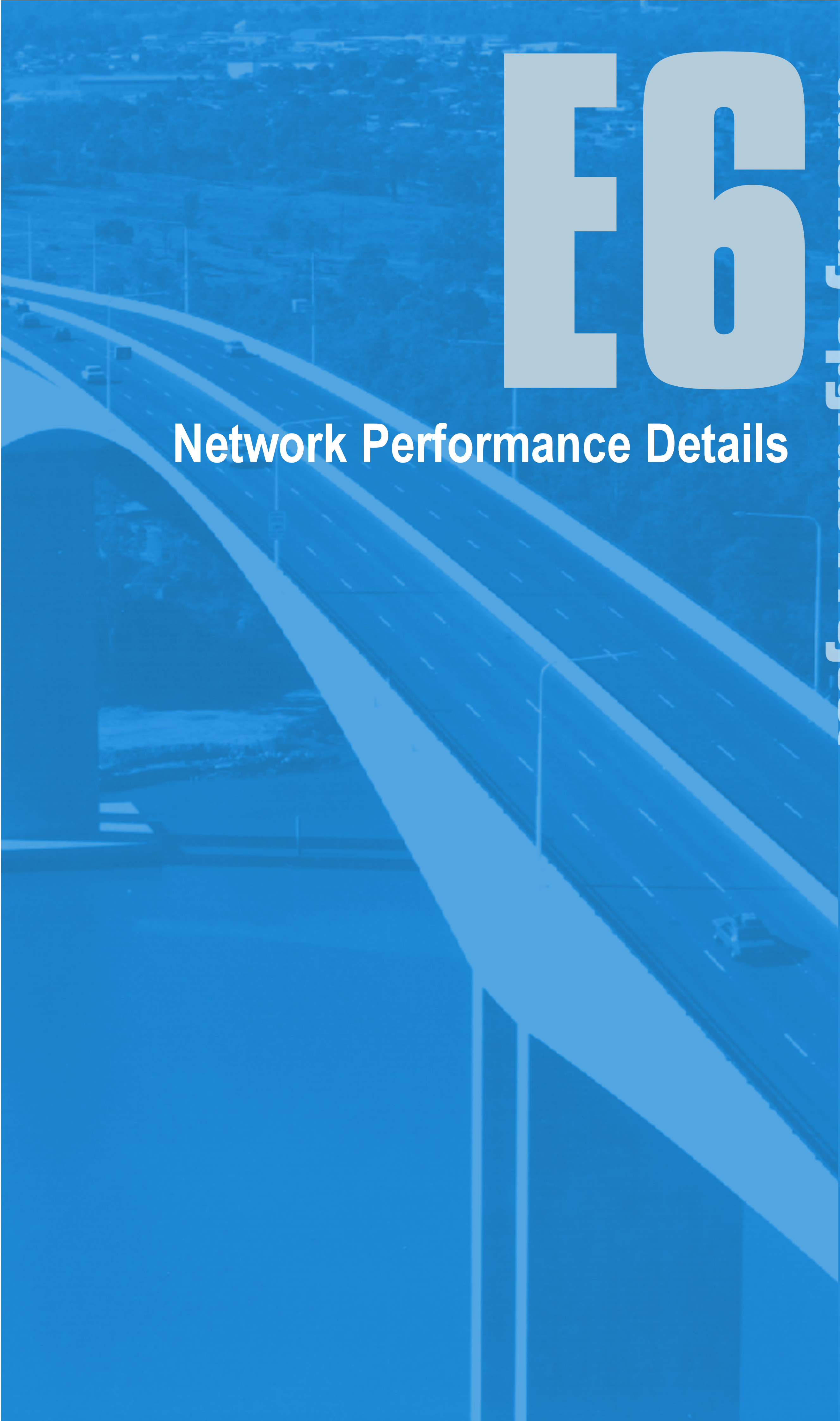
Table E4 Summary of Network Assumptions for Modelling Purposes

No.	Project Description
	2006 Network Changes
1	Airport Drive - 6 laning (stage 1)
2	Linkfield Road Connection
3	Bruce Hwy (Dohles Rocks Rd to Boundary Rd) - 6 laning
4	Robinson Road East (Murphy Rd to Newman Rd)
5	Nudgee Road (Kingsford Smith Dr to Toombul Rd)
6	Compton Road Upgrade (Gateway Mwy to BCC Boundary)
7	Green Camp Road (Manly Rd to New Cleveland Rd)
8	Progress Road (Ipswich Mwy to Inala Ave)
9	Paradise Road (Learoyd Rd to Johnson Rd)
10	Brisbane-Beenleigh Rd (complete 4-laning)
11	Redland Bay Rd (Windemere Rd to Vienna Rd) - duplicate
12	Old Cleveland Road bus lanes (South East Busway to Camp Hill)
13	Caboolture Northern Bypass (Stage 2)
14	Hamilton Road Connection (Becketts Rd to Gympie)
15	Milton Rd / Sylvan Rd / Croydon St
16	Wondall Road (Manly Rd to Radford Rd)
	2011 Network Changes
17	Waterworks Rd / Jubilee Tce (STOBROI)
18	Inala Ave (Blunder Rd to Watson Rd)
19	Beckett Rd (Rode Rd to Albany Creek Rd)
20	Newnham Rd (Creek Rd to Logan Rd)
21	Pickering Street / Sicklefield St (Grade Seperation of Rail)
22	Johnson Road (Mt Lindesay Hwy to Woogaroo Rd)
23	Tilley Road Extension (New Cleveland Rd to Kianawah Rd)
24	Rode Road (Old Northern Rd to Edinburgh Castle Rd)
25	Bracken Ridge Rd (Hoyland St to Deagon Deviation)
26	Logan Road (Montague St to Kessels Rd)
27	Telegraph Road
28	Newmarket Road / Ennogerra Road (STOBROI)
29	Coonan Street / Moggill Road (STOBROI)
30	Manly Road (Wynnum Rd to Preston Rd)
31	Blunder Road (Crossacres to Stapylton)
32	Stapylton Road (Wadeville St to Johnson Rd)
33	Archerfield Road (Ipswich Rd to Progress Rd)

No.	Project Description
34	Coonan Street (Westminster St to Hanlan St)
35	Beenleigh Road (Boundary Rd to BCC Boundary)
36	Boundary Road Rail Xing (Beenliegh Rd to Orange Grove Rd)
37	Oxley Road (Ipswich Mwy to Sherwood Rd)
38	Bridgeman Road (Albany Creek Rd to Millar Rd)
39	Trouts Road
40	Boundary Road Connection
41	Beatty Road / Sherbrooke Road (Granard Rd to King Ave)
42	Wynnum Road (Gateway Mwy to (Manly Rd not)Preston Rd)
43	Rickett Road (BCC Boundary to Green Camp Rd)
44	Ipswich Mwy (Rocklea to Riverview) - 6 laning
45	Airport Drive - 6 laning (complete)
46	Mango Hill North South Arterial Rd (Deception Bay Rd to Gateway Arterial)
47	Pacific Motorway transit lanes (Gateway Mwy to Albert River)
48	Gympie Road transit lanes (Royal Brisbane Hospital to Chermside)
49	Mt Lindsay Highway (Johnson Road to Chambers Flat Road) - 4 laning
50	Centenary Highway (Ipswich Motorway to Logan Motorway) - 4 laning
51	Mt Gravatt-Capalaba Road/Mt Cotton Road (east of Gateway Motorway) - duplication
52	Bruce Hwy (Boundary Rd to Morayfield Rd) - 6 laning
53	Bruce Hwy (Morayfield Rd to Bribie Island Rd) - 6 laning
54	Augusta Pky and Jones Rd (Redbank Plains Rd to Centenary Hwy) - 4 laning
55	South West Transport Corridor (Springfield to Ripley Rd) - 4 lanes
56	Moggill Rd upgrade (Kenmore Rd to Pinjarra Rd)
57	Samford Road (Cobalt St - Ferny Way)
58	Beams Road (Gympie Rd to Sandgate Rd)
59	Dawson Parade (Samford Rd)
60	Creek Road / Newnham Street (STOBROI)
61	Hanford Road (Depot Rd to Gympie Rd)
62	Centenary Hwy / Western Fwy (Ipswich Mwy to Mt Cootha)
	2016 Network Changes
63	Appleby Road (Albany Creek Rd to Stafford Rd)
64	Mt Gravatt- Capalaba Road (Mt Cotton Rd to Moreton Bay Rd)
65	Settlement Road (Samford Rd to Waterworks Rd)
66	Belmont Road (Manly Rd to Meadowlands Rd)
67	Wadeville Street (Stapylton Rd to Forest Lake Bvld)
68	Beams Road (Bridgeman Rd to Gympie Rd)
69	Benson Street / High Street (STOBROI)
70	Shand Street (Stafford Rd to Pickering St)

No.	Project Description
71	Beaudesert Road (Johnson Rd to Granard Rd)
72	Kingsford Smith Drive / Eagle Farm Road (Gateway Mwy to Eagle Farm Rd)
73	Campbell Street (Rail x-ing Improvements)
74	Illaweena Street (Beaudesert Rd to Gowan Rd)
75	Wacol Station Road (Ipswich Mwy to Sumners Rd)
76	Meadowlands Road (Belmont Rd to Preston Rd)
77	New Cleveland Road (Manly Rd to Greencamp Rd)
78	New Cleveland Road (Greencamp Rd to Old Clevland Rd)
79	Gympie Road bus lanes (Royal Brisbane Hospital to Chermside)
80	Pine to Caboolture Road local arterial (west of Bruce Highway) - duplication
81	Redbank Plains Rd (Kruger Pde to Collingwood Dr) - 4 laning
82	South West Transport Corridor (Ripley Rd to Cunningham Hwy) - 2 lanes
83	West Ipswich Bypass (Cunningham Hwy to Warrego Hwy) - 2 lanes
84	Sherwood Road (Oxley Rd to Sherwood Rd)
85	Freeman Road (Garden Rd to Blunder Rd)
86	Ermelo Road (Garden Rd to New Cleveland Rd)
87	Toombul Road (Nudgee Rd to Melton Rd)
88	Fairfield Road (Sherwood Rd to Annerley Rd)
	2021 Network Changes
89	Mango Hill North South Arterial Rd (Caboolture-Bribie Island Rd to Deception Bay Rd)
90	Centenary Highway (Ipswich Motorway to Logan Motorway) - 6 laning
91	Centenary Highway (Augusta Pwy to Logan Mwy) - 4 laning
92	Bruce Hwy (Bribie Island Rd to Model extent) - 6 laning
	2021+ Network Changes
93	Western Brisbane Bypass

Table Note:
These projects are not committed in terms of their funding and most have not been through a formal planning process. They are used for network modelling purposes only.



E6

Network Performance Details

Gateway Upgrade Project

Appendix E6

Table E5 Future Road Network Vehicle Kilometres Travelled (VKT)

Year	Vehicle Class	No GUP	With GUP	Percentage Change
Whole of Brisbane Statistical Division				
2003	Cars	37,090,811	37,090,811	0.0%
	Trucks	2,766,952	2,766,952	0.0%
2011	Cars	43,972,931	43,906,609	-0.2%
	Trucks	3,485,003	3,479,552	-0.2%
2021	Cars	52,447,964	52,310,088	-0.3%
	Trucks	4,283,655	4,270,943	-0.3%
Within Gateway Cordon				
2003	Cars	3,101,600	3,101,600	0.0%
	Trucks	415,009	415,009	0.0%
2011	Cars	3,908,172	3,973,218	1.7%
	Trucks	597,343	608,364	1.8%
2021	Cars	4,720,284	4,906,093	3.9%
2021	Trucks	763,646	795,173	4.1%

Table Note: Average Weekday data.

Table E6 Future Road Network Vehicle Hours Travelled (VHT)

Year	Vehicle Class	No GUP	With GUP	Percentage Change
Whole of Brisbane Statistical Division				
2003	Cars	41,111,729	41,111,729	0.0%
	Trucks	2,711,359	2,711,359	0.0%
2011	Cars	48,117,039	47,272,945	-1.8%
	Trucks	3,398,120	3,322,854	-2.2%
2021	Cars	62,501,785	59,459,946	-4.9%
	Trucks	4,588,378	4,351,072	-5.2%
Within Gateway Cordon				
2003	Cars	3,046,137	3,046,137	0.0%
	Trucks	382,156	382,156	0.0%
2011	Cars	4,198,471	3,811,696	-9.2%
	Trucks	601,455	563,108	-6.4%
2021	Cars	7,730,373	5,708,492	-26.2%
2021	Trucks	1,070,364	923,326	-13.7%

Table Note: Average Weekday data.

Table E7 Future Road Network Vehicle Kilometres Travelled (VKT)

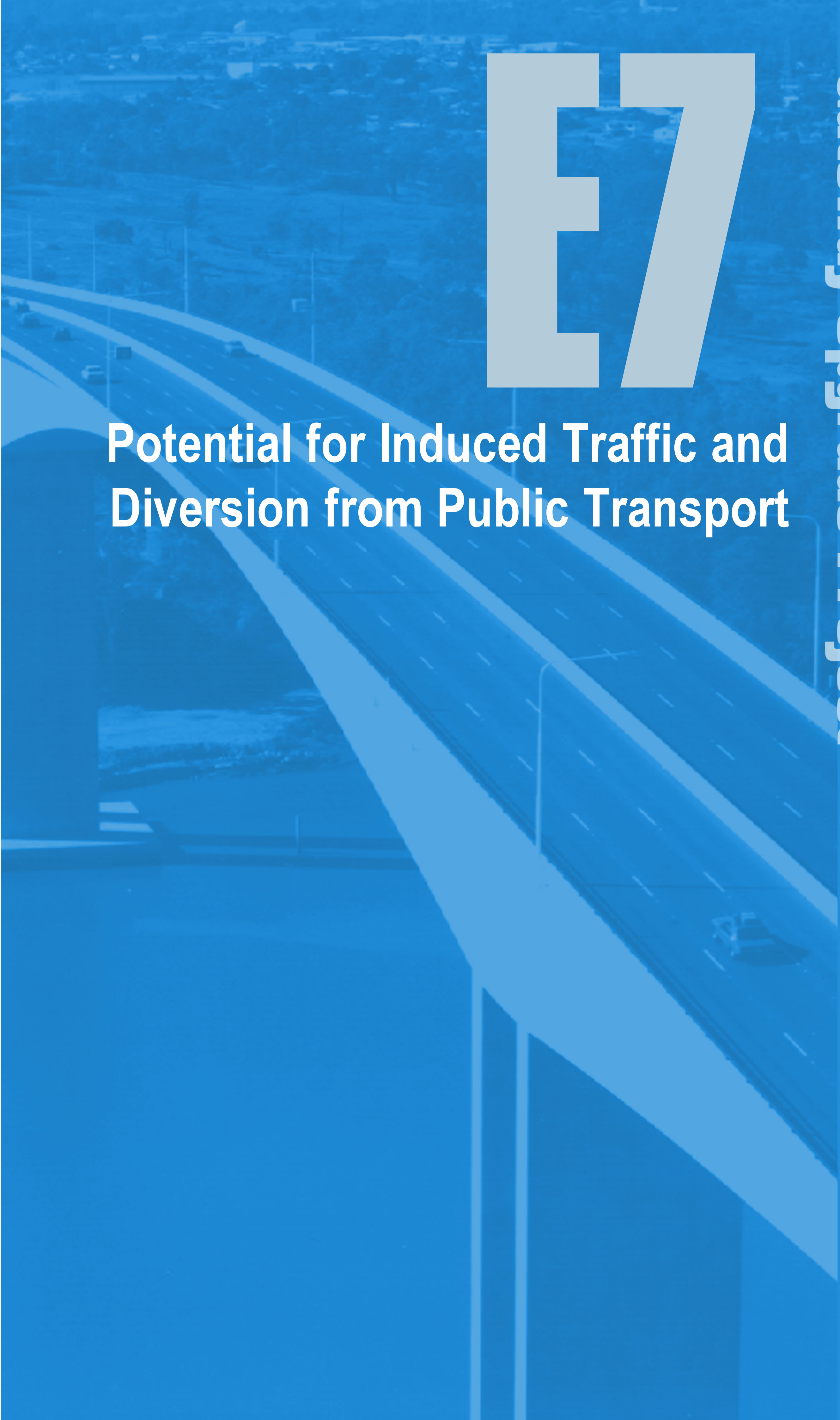
Year	Vehicle Class	No GUP	With GUP	Percentage Change
BCC Controlled Roads				
2003	Cars	11,306,159	11,306,159	0.0%
	Trucks	688,085	688,085	0.0%
2011	Cars	12,659,792	12,395,950	-2.1%
	Trucks	842,131	819,883	-2.6%
2021	Cars	14,294,956	13,796,450	-3.5%
	Trucks	1,037,006	980,180	-5.5%
State Controlled Roads inside BCC				
2003	Cars	10,175,249	10,175,249	0.0%
	Trucks	1,001,376	1,001,376	0.0%
2011	Cars	12,018,670	12,204,938	1.5%
	Trucks	1,290,977	1,307,665	1.3%
2021	Cars	14,352,773	14,716,363	2.5%
	Trucks	1,578,370	1,625,314	3.0%
State Controlled Roads outside BCC				
2003	Cars	11,429,675	11,429,675	0.0%
	Trucks	954,369	954,369	0.0%
2011	Cars	14,229,921	14,232,875	0.0%
	Trucks	1,197,425	1,197,197	0.0%
2021	Cars	17,565,401	17,559,712	0.0%
	Trucks	1,475,064	1,472,135	-0.2%
Council Controlled Roads outside of BCC				
2003	Cars	4,179,728	4,179,728	0.0%
	Trucks	123,122	123,122	0.0%
2011	Cars	5,064,548	5,072,846	0.2%
	Trucks	154,471	154,807	0.2%
2021	Cars	6,234,834	6,237,563	0.0%
	Trucks	193,216	193,314	0.1%

Table Note: Average Weekday data.

Table E8 Future Road Network Vehicle Hours Travelled (VHT)

Year	Vehicle Class	No GUP	With GUP	Percentage Change
BCC Controlled Roads				
2003	Cars	16,729,802	16,729,802	0.0%
	Trucks	1,004,304	1,004,304	0.0%
2011	Cars	18,576,890	17,945,030	-3.4%
	Trucks	1,224,674	1,169,705	-4.5%
2021	Cars	23,146,232	20,779,477	-10.2%
	Trucks	1,618,000	1,459,031	-9.8%
State Controlled Roads inside BCC				
2003	Cars	9,356,558	9,356,558	0.0%
	Trucks	841,373	841,373	0.0%
2011	Cars	11,094,591	10,873,592	-2.0%
	Trucks	1,101,876	1,081,556	-1.8%
2021	Cars	14,539,789	13,840,066	-4.8%
	Trucks	1,562,064	1,485,199	-4.9%
State Controlled Roads outside BCC				
2003	Cars	9,571,144	9,571,144	0.0%
	Trucks	709,145	709,145	0.0%
2011	Cars	11,746,131	11,740,175	-0.1%
	Trucks	872,304	871,708	-0.1%
2021	Cars	16,107,908	16,137,195	0.2%
	Trucks	1,146,874	1,145,519	-0.1%
Council Controlled Roads outside of BCC				
2003	Cars	5,454,225	5,454,225	0.0%
	Trucks	156,537	156,537	0.0%
2011	Cars	6,699,426	6,714,148	0.2%
	Trucks	199,267	199,885	0.3%
2021	Cars	8,707,855	8,703,209	-0.1%
	Trucks	261,439	261,323	0.0%

Table Note: Average Weekday data.



E7

Potential for Induced Traffic and Diversion from Public Transport

Gateway Upgrade Project

Appendix E7 Potential for Induced Traffic and Diversion from Public Transport

This Appendix deals with the potential for the GUP to induce traffic through the provision of increased capacity or reduced travel times or to cause trips to be made by private vehicle rather than public transport. Mechanisms for such changes to trip making arising from a new road project include:

- trip redistribution which could occur as relative travel times to competing attractions are changed such that some trips are switched from closer to more remote destinations with a consequent increase in trip length;
- land use changes induced as a response to improved accessibility with consequential additional traffic generated by these changes;
- a discretionary trip that would otherwise not have been made, being made because the trip was made more convenient; and/or
- change of mode from another mode to private vehicle which could occur because an improved road system increases the relative attractiveness of private vehicle travel.

Two other related effects are also of interest. One is switching of the route used so that traffic on a particular corridor may increase once a road is improved although the total number and origins and destinations of trips does not change. The other is the switching of a trip from off peak to peak because peak hour travel would become easier.

The first of these related effects is considered directly in the traffic modelling process and is discussed in detail in Section 5 of the EIS. The second is not considered in traditional traffic models and is difficult to take account of quantitatively. However, as the total number of trips taking place over a day would not change, there would be limited effects on the environment. To the extent that drivers would be more easily able to travel when they wished during the day there would be a community benefit.

The sections below consider separately potential traffic inducement (the first three dot points above) and potential modal shifts (the fourth).

1. Discussion of Trip Inducement Mechanisms

This section first provides findings of background research and then considers specifically each of the potential trip induction mechanisms listed above.

1.1 Background Research

Of late the question of induced traffic due to road development has been the matter of research in the United Kingdom, the United States and Australia. The document of most relevance to Australia is ARR Research Report 229 *Induced Demand and Road Investment – An Initial Appraisal* (ARRB Transport Research Ltd, 1997) by James Luk and Edward Chung. This presents data from all three countries.

It finds the level of induced demand is a function of many factors and is a complex issue. In particular, for a specific project, any induced traffic depends on the predevelopment level of congestion and hence the extent of latent demand.

An area wide investigation in the United Kingdom (UK) cited in ARR 229 suggests that a ten per cent increase in motorway capacity would lead to a one per cent increase in traffic under conditions in the UK. In the long term, with travel and land use adjustments, this could increase to 20 per cent, again in the UK. A California area wide study cited in ARR 229 suggests that this effect would be 32 per cent initially but up to 50 per cent with long term land use adjustments. These results apply over a wide area and represent aggregate effects of the induced traffic production mechanisms discussed above arising from changes to a road network as a whole. Researchers stress that they cannot necessarily be applied to an individual project. It should be added that the prevailing conditions in these countries are different to those in Australia and Brisbane, in particular.

An Australian case study for the South Eastern Arterial in Melbourne, also cited in ARR 229, found no "unexplained" travel, (ie no induced demand) associated with that project. None of the studies covered toll roads. Naturally any toll on a new facility would reduce its attractiveness to discretionary travellers such that any induced traffic would be diminished.

The ARR 299 report does indicate that new road projects with capacity constraints at either end tend to have induced demand suppressed by virtue of limited access capacity. This was the case for the South Eastern Arterial, although the study did not quantity the scale of this constraint. It would also be the case for the GUP due to limitations on access capacity at either end of the upgraded motorway. Notwithstanding this, if the UK research (as adjusted for Australia) was applied to the GUP proposal, then the potential level of induced traffic would be ten per cent (assuming minimal landuse responses as discussed above).

On the other hand it is noted that traffic modelling for the GUP has found that the proposed toll would discourage some nine per cent of traffic at opening and five per cent of traffic by 2021 that would otherwise use it if the facility were toll-free. This suggests that the toll would also continue to be a deterrent against induced traffic.

Specific mechanisms as outlined in the introduction to this appendix that might apply to the GUP are considered below.

1.2 Completely New Trips

This mechanism is not amenable to direct quantitative analysis as these trips arise from a person undertaking an activity that involves travel rather than a different activity that does not or no activity at all. Typically such activity options relate to leisure pursuits such as recreation or shopping.

Trips such as these are not traditionally examined in detail in a transport study, as their numbers are not usually high in comparison to other trips. In addition, to do so would involve use of an "activity choice" model which would quantify the probability of an individual choosing between a range of activity options, some of which would involve travel and some of which would not. An example would be watching television versus going to the beach. The likelihood of the decision changing from a non-travel option to a travel option as a result of a transport improvement would depend on the cost and time saving occurring as a result of the improvement.

Potential point-to-point travel time savings using the GUP could be as high as 20 minutes or more depending on the time of day. Activity choice modelling has not been progressed to the point at which the effects of such a travel improvement could be reliably used to determine quantitatively the number of trips that might switch from a non travel related activity to a travel related activity.

1.3 Effects of Landuse Changes

Land use changes stimulated by the GUP would be expected to create more travel demand, some of which would be satisfied by private vehicle travel. Again, no quantitative model is available to predict the extent of land use changes. However, it is noted that the GUP would be unlikely to influence land use in inner east areas, which are already fully developed. In areas in the ATC area, it would reinforce the structure which the National Highway System is designed to promote, supporting the regional movement of people and freight.

It should be bourn in mind that land use activity 'induced' by new infrastructure is likely to be strictly induced in a very narrow geographic sense. In reality, much of this activity exists and would be diverted from other locations. For example, in the UK, anecdotal evidence suggests that much of the 'induced' land use development along the M4 and M40 corridors is probably land use diverted from London, as a result of poor accessibility within that conurbation. In Brisbane's case, it is likely such activity would be diverted from within the same airshed.

1.4 Traffic Distributional Effects

Redistribution of trips would occur over time as people adjusted their place of residence, place of work or place of recreation to take advantage of the improved transport infrastructure. The most likely effect will be to encourage residential development in Eastern Brisbane, and to promote through greater activity the employment area of the ATC. Overall, it is expected that some redistribution of trip origins and destinations would occur.

1.5 Potential Mode Shift Effects

As indicated, there is the potential for some trips to be made by private vehicle rather than public transport. This influence would be moderated by other factors such as vehicle availability, parking cost and availability and relative costs (in terms of time, out-of-pocket expenses, comfort and convenience) between road and public transport travel.

The basic premise of mode choice analysis is that a person chooses between alternative modes of transport by comparing trip attributes, which are weighted by the importance that person places on each attribute in the choice process. A typical list of attributes is shown in Table E9 along with a classification of the attributes that would change as a result of building the GUP.

Table E9 Travel Attributes Considered in Choosing a Transport Mode

Trip Attribute	No GUP	Does the attribute change with GUP?	Comment
Private vehicle Trips			
In-vehicle time	Yes	Change	Travel time savings as a result of GUP.
Petrol and running costs	Yes	Change	A marginal decrease in cost in line with travel time savings.
Gateway Bridge toll charge	Yes	Change	Once indexed to inflation in 2011. The toll is an out of pocket expense to consider.
Parking Costs	Yes	Same	
Public Transport Trips			
Walk access and egress times	Yes	Same	No major changes to public transport services proposed as part of the GUP.
Waiting time and service frequency	Yes	Same	
Total in-vehicle time	Yes	Same	
Number of transfers	Yes	Same	
Fares	Yes	Same	

As can be seen in Table E9, the GUP would only change a few of the possible trip choice attributes. For private vehicle trips, in-vehicle time, petrol costs, and equivalent toll time (i.e. the cost of the toll converted to time) would change, whereas for public transport trips, none of the attributes would be affected. Overall the modal shift effects of the project would be minimal due to a low provision of public transport services in the corridor.

1.6 Conclusions

It is concluded that there is likely to be some induced traffic as a result of the GUP. However, the quantity would most likely be small because:

- of capacity constraints on approach routes as explained above; and
- the toll would be a deterrent to discretionary trips.

Similarly the GUP is likely to cause only small mode shifts from public transport to private vehicles as:

- private vehicle travel to/from the CBD is most heavily influenced by parking costs and availability and this is not likely to change;
- the GUP toll would offset some of the travel time savings; and
- minimal existing public transport services in the corridor.

The numerical analysis conducted in the initial phases of the traffic modelling and discussed above indicates that a fixed trip table approach is appropriate because the estimates of induced trips actually indicate a suppression of some projected traffic. The traditional fixed trip table analysis is the appropriate method as it incorporates the only positive estimate of induced traffic, and as such, is likely to be slightly conservative.