Gore
District Council

GORE GROWTH STUDY MODEL

Building the 2006 Transportation Model

Technical Background Report

Prepared by

GABITES PORTER

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1. INTRODUCTION

1.1 Objectives

In 2011 Gore District Council commissioned Gabites Porter to create a conventional three-step transportation model for Gore District, Balclutha District and the rest of Southland Region. The resulting Gore Growth Study (GGS) model was to be an extension of the Invercargill Model developed by Gabites Porter for Invercargill City Council in 2007.

The primary objective of this model was to provide a tool to analyse movements of light and heavy commercial vehicles across the study area resulting from potential mining developments in the vicinity of Gore. As such, the focus is on developing a multi-class vehicle driver model to be used as a tool to assess regional traffic flows on the rural strategic local road networks.

The document "Terms of Reference V3.1 (March 2011)" provides further useful background which lead to the initial decision to construct the model and provides examples of how it may be used.

This model is not intended to replace the Invercargill TRACKS Transportation Model which should continue to be used for urban assessments within the City.

This report outlines the technical background for the model.

1.2 Summary of the Model

This section provides a brief overview of the model with a more detailed description in subsequent sections.

Geographic Coverage

The study area encompasses the Gore and Clutha Districts and most of the Southland region, including Invercargill.

The study area covers:

- A population of approximately 107,000
- Approximately 41,600 households
- Contains 833 internal zones and 4 external zones

The Road Network

The network was taken from the Council's GIS system and included all the roads within the study area. The road network is shown in **Figure 2** and includes 21,529 links and 8,407 nodes.

Modelling Techniques

This is a standard three-step model comprising vehicle driver trip generation, distribution and assignment. This model form has been approved for use in a number of other models developed throughout New Zealand an Australia. The three steps used in this model are outlined below.

Private/Internal Trip Generation

Person trip productions are calculated from 20 household categories which includes 5 households categories and four vehicle ownership categories. Trip rates were adapted from our Taupo transportation model, which is based on the 'category model' derived from the 1991 Auckland Home Interview Survey (HIS) data. Existing land use data was obtained from the 2006 census undertaken by Statistics New Zealand.

Trip Distribution

Trip ends are formed into origin/destination matrices using a standard gravity model. A function of travel time is used for spatial separation.

Assignment

Assignment of trips to the network uses an incremental time slice process. This does not have the convergence issues associated with an equilibrium assignment, and permits intersection delays to be directly calculated during the assignment process. Intersection delays are calculated using the algorithms in ARR123 (SIDRA) and Tanner's queuing theory extended by Fisk and Tan, and later by Gabites Porter.

External Traffic

The base model uses NZTA counts at the external points as an input to the model.

Vehicle Types

Vehicle types used in the model include cars and commercial vehicles, both heavy and light. Commercial vehicles equations have been sourced from the 24-hour Christchurch Commercial Vehicle Survey (1993). LGV were combined with other light trip purposes into a light vehicle matrix and HGV were kept separate to enable a multiclass assignment.

Software Platform

The model has been developed using TRACKS. This is the proprietary land use and transport planning software developed, maintained and marketed by Transportation & Traffic Systems Ltd. It has been assumed that the reader is familiar with the software, and has read the User Manual as this includes the theoretical background to the algorithms and model structures.

1.3 Study Approach

The transportation model developed for this study followed a three-step process of trip generation, distribution and assignment. The generation step used a household category model and regression equations for trip productions, with regression derived equations for attractions. The distribution step used a standard doubly constrained gravity model to distribute trips, with the distribution functions based on time. The assignment step used a capacity restraint technique, with trip paths based on behavioural costs, and delays calculated on links and at intersections. The model is intended as a tool to assess and evaluate network and land use options.

A transportation model for a given time period comprises a group of linked mathematical formulae that approximate the traffic network and the general behaviour of drivers using it. It is accepted that the analysis may not take into account extremes of human behaviour, nor will it reflect all the subtle complexities of the transport system. Nevertheless the model that has been developed is capable of identifying the more significant factors and is adequate to test adjustments to the road network and land use system, which are likely to show the greatest benefit in relation to their costs.

The following period models were developed, with the following applications in mind.

Transportation Model	**Modelling**	**Application**
Morning Peak	One peak hour Between (0700 – 0900 hrs)	▪ Central area access routes ▪ Intersection performance ▪ Design issues ▪ Site specific issues
Inter Peak	One peak hour Between (1100 – 1300 hrs)	▪ Central area access routes ▪ Intersection performance ▪ Design issues ▪ Site specific issues ▪ Shopping traffic
Evening Peak	One peak hour Between (1600 – 1800 hrs)	▪ Peak outbound traffic flows ▪ Central area egress routes ▪ Intersection performance ▪ Site specific issues

The matrices are for the full two hour period, but the assignments are one hour traffic flows for each peak period. (AM Peak 8-9am, Inter Peak 12-1pm, PM Peak 5-6pm)

Further applications include deficiency analysis on Rural Roads and City approaches, heavy vehicle routing investigations and economics through identifying potential benefits associated with upgrading various routes.

While each period model is statistically independent from one another, it is possible to aggregate the results from all periods to represent a typical weekday. In turn this can be expanded to form an entire year for the purposes of evaluating annualised economics.

Modelling necessitates a series of compromises because of the constraints of current techniques, or because data is not available by which to utilise the techniques, or because resources are not available at the time.

Nevertheless, a model is a `living' tool, which can and should be improved incrementally over the years as needs dictate and resources permit.

1.4 Report Content

This report, as its title suggests is designed as a technical document. It is intended to be a reference volume of how the transportation model was built and, we believe, contains all the information necessary to completely build the analytical system. It highlights the assumptions made, the techniques adopted, and the relationships used. It also demonstrates the extent to which the model used was validated in terms of how well it replicates actual traffic flows.

2. MODEL OVERVIEW

2.1 Model Form

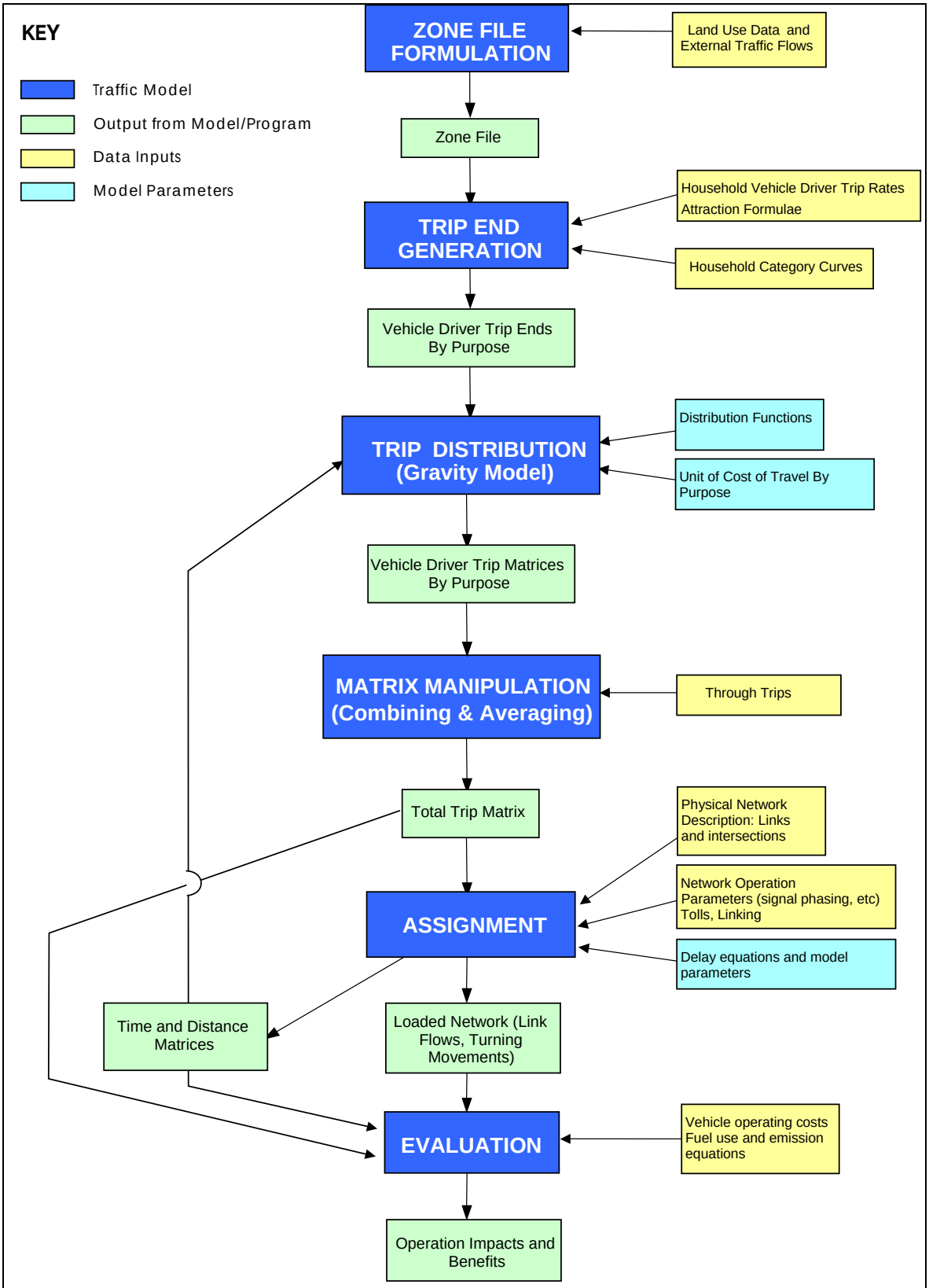
Planning of a land use transport system requires that the system can be adequately modelled and the effects of any change can be reliably forecast.

A useful method is to build mathematical models that simulate travel behaviour. The land use and traffic modelling used for this study comprises of four sequential stages. That is, trip generation, trip distribution, trip assignment and evaluation.

Trip End Generation	The generation of trip ends for each sub area (zone) within the study area. The trip ends were generated according to the pattern of households, schools and employment activity, and then allocated accordingly. The model was based on vehicle trips rather than person trips. Subsequently the modal split phase was inherent in the trip end generation rather than following the distribution stage.
Trip Distribution	The conversion of trip ends to trips distributed within the study area according to a function of activity and travel cost.
Trip Assignment	The loading of trips onto the road network as traffic flows between zones.
Evaluation	The final stage of the process where operational impacts are assessed.

The relationship between the different components are summarised schematically in **Figure 1**.

There is an iterative process where the interzonal times and distances which result from the assignment phase feed back into the trip distribution phase. The process can be started by assuming times and distances as initial impacts to distribution, or by assuming initial trips as the input to the assignment. In any event, the assignment/distribution loop is repeated until there is little or no change in the vehicle hours and vehicle kilometres of travel between iterations. This process is known as 'converging' the network.



GGS Transportation Model	**Vehicle Driver Model Components**	**Figure 1**
Gabites Porter		

2.2 The Study Area

The 2006 landuse study area, illustrated in **Figure 2** overleaf, consists of the Gore and Clutha Districts and most of the Southland region, including Invercargill.

2.3 The Road Network

The road network used in the model was based on the 2007 Invercargill model for the City. The remainder of the study area was obtained from a GIS database provided by Gore District Council. All State Highways were included, as well as all other strategic roads. Some minor local roads with very low levels of traffic (i.e. backcountry, gravel roads) were removed in order to speed up the network coding and model processing time. The resulting road network is shown in **Figure 2.**

Because the network is a true representation of a road, distances have been calculated directly from the three dimensional co-ordinate data. Link distances are calculated directly from the GIS based centrelines. Curves are accordingly defined as a series of small straights – often less than 10 metres long.

All other components of network coding were prepared from visual inspection or from publicly available aerial photos. This included:

- Link lanes
- Link free flow speeds
- Approach controls
- Approach lanes and discipline

Based on their locations, state highways are given the appropriate link types first, followed by the fine-tuning of collector/arterial roads and local roads.

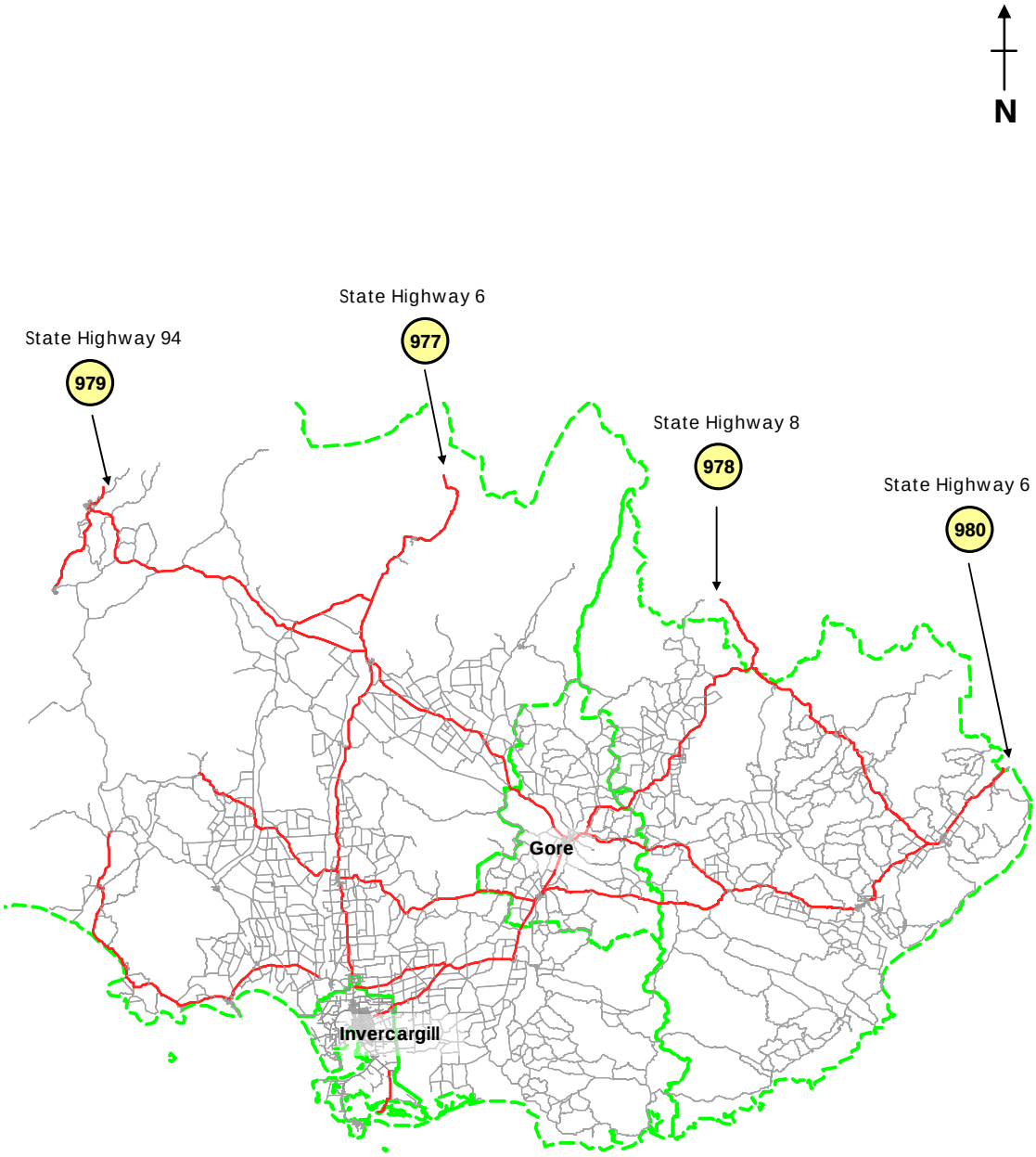
All the roundabout, signalised and priority intersections were coded into the network for the State Highways and the main towns and settlements. As the network is GIS based, the movement conflicts for priorities are calculated from geometry after the approach control and lane disciplines are coded. It is not necessary for the user to define which movement conflicts with which. Conflicting movements are automatically identified within the software from the geometry of the network.

Due to the predominantly rural nature of the study area, the remaining priority intersections on minor roads were calculated automatically by the software based on their geometry. This approximation was deemed appropriate as traffic volumes on these roads are very low and intersection delays virtually non-existent.

The data entry programs in aaSIDRA 2.1 are used to code signalised intersection files.

2.4 Mode Share

At this stage, only a three-step vehicle driver model has been developed. This has the implicit assumption that the existing mode share i.e. vehicle driver, passenger and public transport, as a proportion of the total trips is maintained in the future.



GGS Transportation Model	**Study Area and External Zones**	**Figure 2**
Gabites Porter		

3. LAND USE DATA

3.1 Existing (2006) Land Use

Key land use variables used in the model, were compiled from 2006 Census meshblocks (as provided by Statistics New Zealand) to traffic zone level updated to 2006. The resulting zone system was composed of 980 zones (including 833 internal zones and 4 externals, the rest being used as spare zones) and is illustrated in **Appendix One**.

Table 1 summarises the landuse variables used and the 2006 land use totals that apply to the study area. The lookup table for zone to 2006 census meshblock are shown in **Appendix Two;** the zonal land use values used for the model are included in **Appendix Three.**

3.2 Landuse Summary

Table 1 summarises the 2006 land use totals that apply to the study area.

2006 Landuse Data			Table 1
Main Land Use Categories	**Description of Land Use Categories**	**Code**	**Study Area Totals 2006**
Residential	Total Households	(HH)	41,607
	Persons		107,016
	Persons per Household		2.67
	Vehicles		70,546
	Vehicles per Household		1.73
	Total Population		**107,016**
Jobs[1]	Retail	(RET)	11,402
	Office[2]	(OFF)	7,378
	Manufacturing	(MAN)	7,865
	Community[3]	(COM)	10,047
	Others	-	9,881
	Total Jobs		**46,573**
	Number of jobs in Invercargill CBD		**9039**
Education	Secondary School rolls	(SCH)	19,607
	Tertiary rolls	(TER)	3,504
	Total Education		**23,111**

[1] At the workplace meshblock the number of jobs available are represented by ANZSIC classification
[2] Includes Finance, Insurance, Property, Business, Government, Administration
[3] Includes Health and Community, Cultural and Recreational, Personal and Other Services

4. TRIP END GENERATION

Trip end generation is divided into three main categories – private, commercial and external.

4.1 Household Category Curves

In line with recent NZ transportation models, a 'category model' approach to trip end generation was adopted. For the category model the two variables of persons per household and vehicle availability per household were used to determine the total number of vehicle trips made within the study area on an average weekday. Twenty categories were used – five person categories by four vehicle availability categories. The curves describing the percentage of households within each category for a specific household composition are shown in **Figure 3.** Trip productions are calculated from 15 household categories of 1, 2, 3, 4 and 5+ persons by 0, 1, and 2 cars calibrated from the 1991 Auckland Home Interview Survey.

The curves in **Figure 3** are calibrated with persons per household, or vehicles per household plotted against the proportion of households in that category. These are subject to the constraints that the sum of proportions at any point must equal 1.0, and that when multiplying out the proportions for each category the average for the category was maintained.

The assumption inherent in the use of these surveys is that the two variables (persons/HH and cars/HH) are not highly cross-correlated. Certainly, experience has shown that persons and cars are not as highly correlated as employees and cars. The second reason for adopting these variables was the need to have categories that can be readily forecast, of which persons and cars are reasonably straightforward.

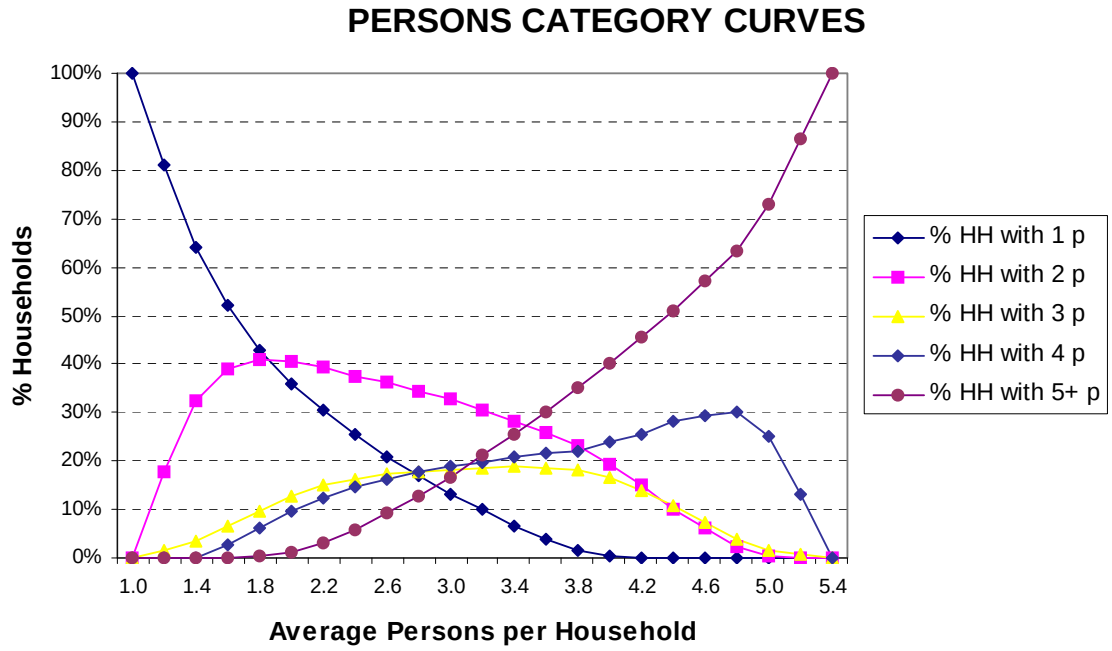
The number of households in each of the twenty categories for a zone depend on the average persons per household and cars per household giving a combined probability, $\rho_{i,j}$, where i and j are category model variables.

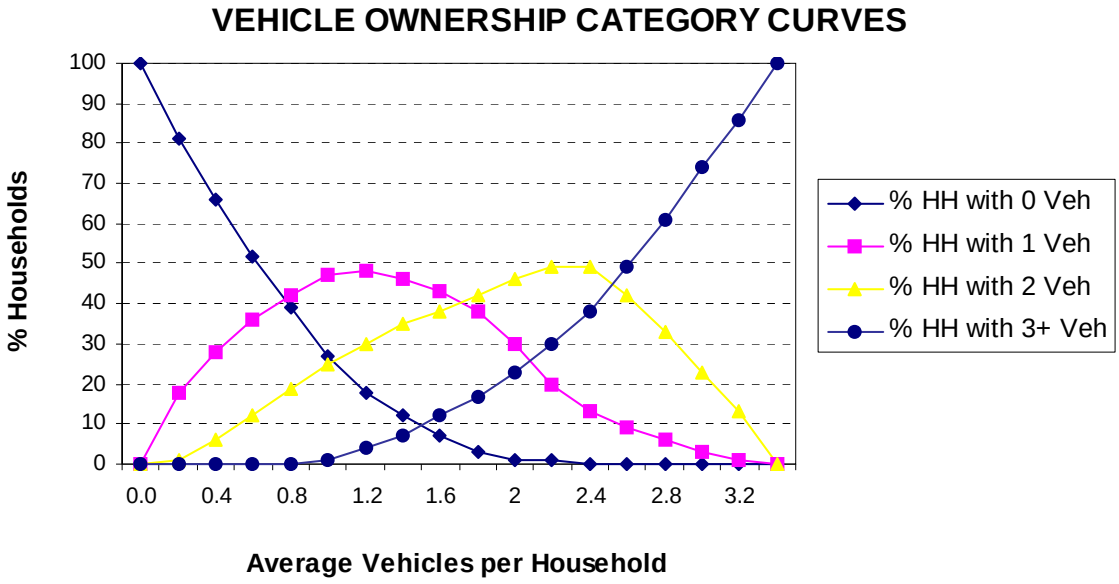
e.g. $\rho_{1,2+} = \rho_1 \times c_{2+}$

where

$\rho_{1,2+}$ = proportion of households in category 1 person, and 2+ cars
ρ_1 = proportion of households with one person
c_{2+} = proportion of households with 2+ cars.

For all internal zones the average number of vehicles and persons per household were provided in the land use zone files for 2006.





GGS Transportation Model	**Adopted Household Category Curves**	**Figure 3**
Gabites Porter		

4.2 One Hour Model Period Factors

As indicated in Sections 4.3.1, 4.3.2 and 4.3.3 the three calculated time period matrices are factored to produce one-hour matrices that are representative of the AM peak, Interpeak and PM peak periods.

In the case of the AM and PM Peaks, the total average flow for each two-hour trip generation period (7-9am and 4-6pm respectively) was divided by the flow calculated in the modelled hour (8-9am and 5-6pm respectively). The Inter Peak period required the division of the total flow for the two-hour generation period (11am – 1pm) by the modelled hour (12-1pm) flow to get its period factor.

The factors have been derived from aggregated traffic volumes across four traffic counts which were chosen as they had substantial volumes and consistent consecutive seven-day counts by hour. The locations used are:

- SH1 North of Awarua (SH1S00935))
- SH1 at Clinton, south of Cemetery (01S00818)
- SH1 South of Gore (001S0863)
- SH6 Winton, Telemetry Site 46 (00601147)

Note that all four of these counts are for key regional arterial as is consistent with the purpose of the model. No urban counts were included as these have a different profile. There does not apprear to be any variation, spacially, of the peaks throughout the model area.

As specified earlier in this report, this model is not intended to replace the Invercargill TRACKS Transportation Model which should continue to be used for urban assessments within the City.

Factors used to convert one-hour periods to the full period are shown in **Table 2.**

Period Conversion Factors	Table 2
Period	**Factor**
Morning Peak	1.74
Inter Peak	1.69
Evening Peak	1.93

4.3 Private Trip End Productions

The private trips were divided into separate purposes, as shown in **Table 3** below.

Trip Purposes	Table 3
Trips purpose	**Trip direction**
HBW = Home Based Work	HTW = Home to Work WTH = Work to Home
HBE = Home Based Education	HTE = Home to Education ETH = Education to Home
HBS = Home Based Shopping	HTS = Home to Shop STH = Shop to Home
HBSP = Home Based Serve Passenger	HSP = Home to Serve Passenger SPH = Serve Passenger to Home
HBO = Home Based Other	HTO = Home to Other OTH = Other to Home
NHB = Non Home Based	

These purposes were applied over all time periods for consistency, but in some cases the resulting number of trips are insignificant.

Experience has shown that where possible 'from home' and 'to home' trips should be modelled separately in order to preserve the directionality of the trips. This is particularly important in the interpeak period where these purposes are of similar order and in the evening peak, which is more diverse than the morning peak.

It is plausible that a household which does not have a vehicle available may still generate a small number of trips. This would be the case where a car is loaned from another source (friend, family member at another household or use of a company car) later in the day.

Private car driver trip ends were adapted from the Invercargill TRACKS Transportation Model, which is based on the 'category model' derived from the 1991 Auckland Home Interview Survey (HIS) data. Considering the age and geographical source of the data, it may be necessary to incorporate factoring of trip production coefficients to reflect contemporary travel behaviour specific to the Southland area in 2006. This has been carried out through some slight adjustments being made in the calibration process to match local conditions.

4.3.1 Morning Peak Private Trip End Productions

Private car driver trip ends were produced by using the 'category model' derived from the Auckland Home Interview Survey (HIS) data. The morning peak period generation is for the two hours for trips beginning between 7am and 9am. Generation was carried out as 'Home to' and 'to Home' purposes to reflect the tidal movement of trips.

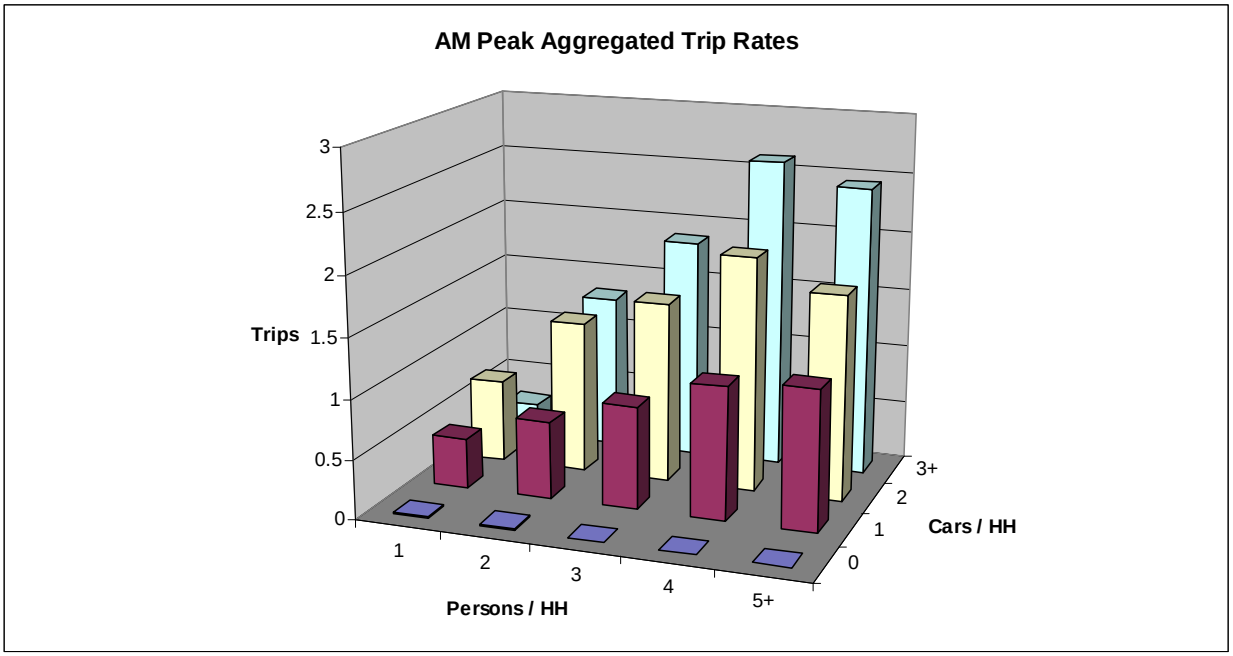
Note that the resulting two-hour trip matrix is later converted to a one-hour matrix (by dividing by a factor of 1.74, see Section 4.2) when the total trip matrix is formed.

The trip rates used are shown in **Table 4** and **Table 5** below.

Morning Peak Period 'Home To' and 'Non-Home Based' Trip End Production Rates by Purpose and Category								Table 4
Category	**Persons /HH**	**Cars/ HH**	**Trip Purpose**					
			HTW	**HTE**	**HTS**	**HSP**	**HTO**	**NHB**
1	1	0	0.006	0	0	0	0.002	0
2	1	1	0.2899	0.018	0.0203	0.0102	0.0392	0.0234
3	1	2	0.5144	0.032	0.047	0.0335	0.0335	0.0171
4	1	3+	0.1594	0.0496	0	0	0.0471	0.0199
5	2	0	0	0	0	0.0048	0	0
6	2	1	0.3055	0.0123	0.0315	0.1054	0.0664	0.0894
7	2	2	0.9694	0.0187	0.0314	0.0431	0.1164	0.0827
8	2	3+	1.1435	0.0213	0.0311	0	0.0536	0.018
9	3	0	0	0	0	0	0	0
10	3	1	0.3575	0.0446	0.0472	0.1496	0.068	0.1109
11	3	2	0.8214	0.1475	0.0169	0.1727	0.1231	0.2026
12	3	3+	1.3972	0.1053	0.061	0.0351	0.1201	0.0973
13	4	0	0	0	0	0	0	0
14	4	1	0.3545	0.0287	0.0356	0.2878	0.088	0.181
15	4	2	0.8874	0.045	0.0495	0.3677	0.117	0.2374
16	4	3+	1.3783	0.2886	0.0833	0.2313	0.1557	0.3178
17	5+	0	0	0	0	0	0	0
18	5+	1	0.3239	0.0762	0.0215	0.276	0.1733	0.1537
19	5+	2	0.65	0.1019	0.0073	0.4166	0.0793	0.3056
20	5+	3+	1.2154	0.1073	0.1422	0.2847	0.3146	0.2554

Morning Peak Period 'To Home' Trip End Production Rates by Purpose and Category							Table 5
Category	**Persons /HH**	**Cars/ HH**	**Trip Purpose**				
			WTH	**ETH**	**STH**	**SPH**	**OTH**
1	1	0	0	0	0	0	0
2	1	1	0.0048	0	0.0037	0.0031	0.0085
3	1	2	0	0	0.0077	0.0163	0
4	1	3+	0	0	0	0	0
5	2	0	0	0	0	0.0048	0
6	2	1	0.0026	0	0.0103	0.0215	0.0094
7	2	2	0.0037	0	0.0069	0.0099	0.0053
8	2	3+	0.0147	0	0.0311	0	0
9	3	0	0	0	0	0	0
10	3	1	0.008	0.0061	0.0082	0.0626	0
11	3	2	0	0	0.0054	0.03	0.007
12	3	3+	0.0249	0	0	0.0237	0.0064
13	4	0	0	0	0	0	0
14	4	1	0.0089	0	0	0.1231	0.0064
15	4	2	0.0102	0	0.0085	0.24	0.0138
16	4	3+	0.0127	0	0.058	0.0765	0.015
17	5+	0	0	0	0	0	0
18	5+	1	0	0	0.0113	0.1401	0
19	5+	2	0	0.0064	0	0.1654	0
20	5+	3+	0	0	0.0442	0.0822	0

When the morning peak rates are summed across purposes, as shown below, an upward trend in household trips is prominent as both household size and car ownership rates increases.



4.3.2 Inter Peak Private Trip End Productions

Private car driver trip ends were produced by using the 'category model' derived from the Auckland Home Interview Survey (HIS) data. The Inter peak period generation is for the two hours for trips beginning between 11am and 1pm. Generation was carried out as 'Home to' and 'to Home' purposes to reflect the tidal movement of trips.

Note that the resulting two-hour trip matrix is later converted to a one-hour matrix (by dividing by a factor of 1.69) when the total trip matrix is formed.

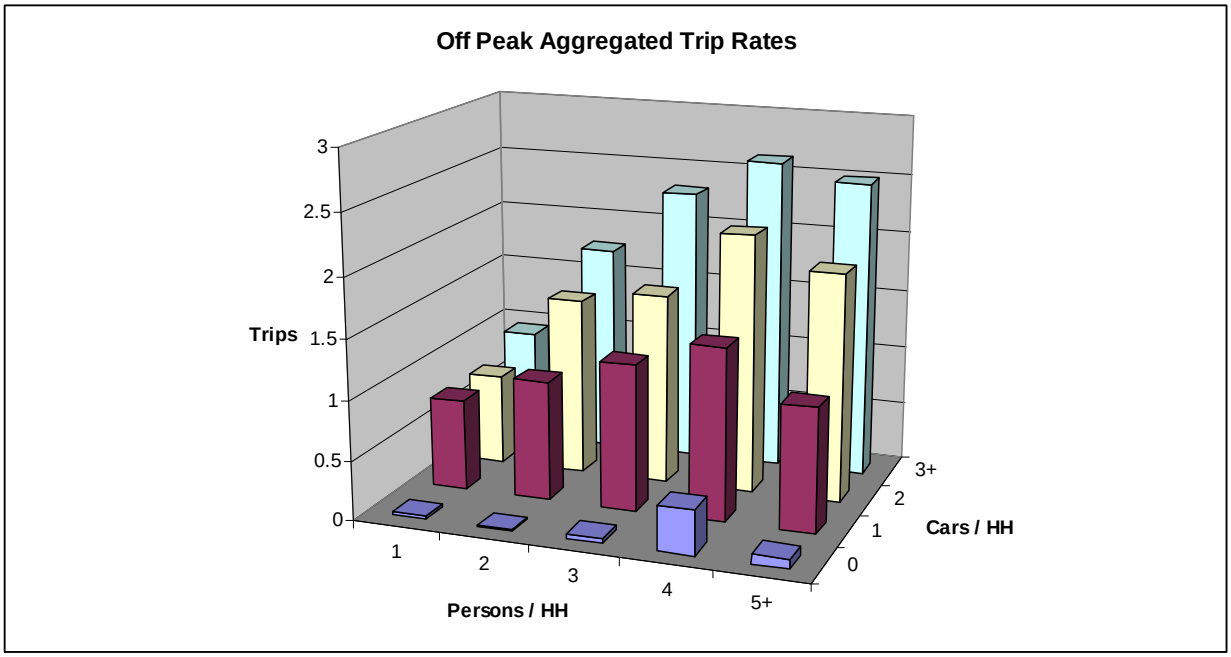
The trip rates used are shown in **Table 6** and **Table 7** below.

Inter Peak Period 'Home To' and 'Non-Home Based' Trip End Production Rates by Purpose and Category — **Table 6**

Category	Persons /HH	Cars/ HH	Trip Purpose					
			HTW	HTE	HTS	HSP	HTO	NHB
1	1	0	0	0	0.0005	0	0.0047	0.0185
2	1	1	0.0137	0.0032	0.0674	0.0074	0.1454	0.4375
3	1	2	0.0125	0.0092	0.0363	0	0.129	0.5087
4	1	3+	0.0233	0	0.0302	0	0.1355	0.6851
5	2	0	0.0012	0	0	0	0	0.0074
6	2	1	0.0136	0.0041	0.1089	0.0188	0.2065	0.5033
7	2	2	0.0403	0.0046	0.0951	0.0072	0.1941	1.0251
8	2	3+	0.0358	0.0067	0.0986	0.0164	0.1106	1.3856
9	3	0	0	0	0.009	0	0	0.0279
10	3	1	0.0298	0.0109	0.0653	0.0234	0.1798	0.7923
11	3	2	0.0375	0.0101	0.1007	0.0217	0.2313	1.0508
12	3	3+	0.0747	0.0146	0.1574	0.0236	0.2959	1.5385
13	4	0	0	0	0	0	0.3734	0
14	4	1	0.0365	0.0064	0.0761	0.059	0.178	0.9062
15	4	2	0.0514	0.0144	0.0917	0.0663	0.1796	1.5734
16	4	3+	0.0818	0.0548	0.1568	0.0214	0.2706	1.7188
17	5+	0	0.0752	0	0	0	0	0
18	5+	1	0.0202	0.0096	0.1058	0.0208	0.1543	0.5399
19	5+	2	0.0185	0.024	0.1384	0.0646	0.2905	1.1047
20	5+	3+	0.0836	0.0323	0.1358	0.0443	0.2542	1.7157

Inter Peak Period 'To Home' Trip End Production Rates by Purpose and Category							Table 7
Category	**Persons /HH**	**Cars/ HH**	**Trip Purpose**				
			WTH	**ETH**	**STH**	**SPH**	**OTH**
1	1	0	0	0	0.0005	0	0.0007
2	1	1	0.0018	0.0018	0.0563	0.0041	0.0236
3	1	2	0.0017	0.0017	0.0373	0.0015	0.0186
4	1	3+	0.0057	0.0057	0.0406	0	0.0143
5	2	0	0	0	0	0.0006	0
6	2	1	0.0004	0.0004	0.0949	0.0115	0.0381
7	2	2	0.0033	0.0033	0.0777	0.0054	0.034
8	2	3+	0	0	0.0678	0	0.0308
9	3	0	0	0	0	0	0
10	3	1	0.0059	0.0059	0.0578	0.0171	0.0332
11	3	2	0.0059	0.0059	0.0782	0.0119	0.0489
12	3	3+	0.0047	0.0047	0.1193	0.0153	0.0578
13	4	0	0	0	0	0	0
14	4	1	0.0056	0.0056	0.0704	0.0366	0.0591
15	4	2	0.0131	0.0131	0.0897	0.0358	0.041
16	4	3+	0.0497	0.0497	0.1364	0.0258	0.0578
17	5+	0	0	0	0	0	0
18	5+	1	0.0118	0.0118	0.1009	0.0241	0.0386
19	5+	2	0.0168	0.0168	0.1268	0.0581	0.0587
20	5+	3+	0.0132	0.0132	0.1112	0.031	0.0575

When the Interpeak rates are summed across purposes, as shown below, an upward trend in household trips is prominent as both household size and car ownership rates increases.



4.3.3 Evening Peak Private Trip End Productions

Private car driver trip ends were similarly produced for the evening peak. The evening peak period generation is for trips which began between the two hours from 4pm to 6pm. Generation was carried out as 'Home to' and 'to Home' purposes to reflect the tidal movement of trips.

Note that the resulting two-hour trip matrix is later converted to a one-hour matrix (by dividing by a factor of 1.93) when the total trip matrix is formed (for further explanation see Section 4.3).

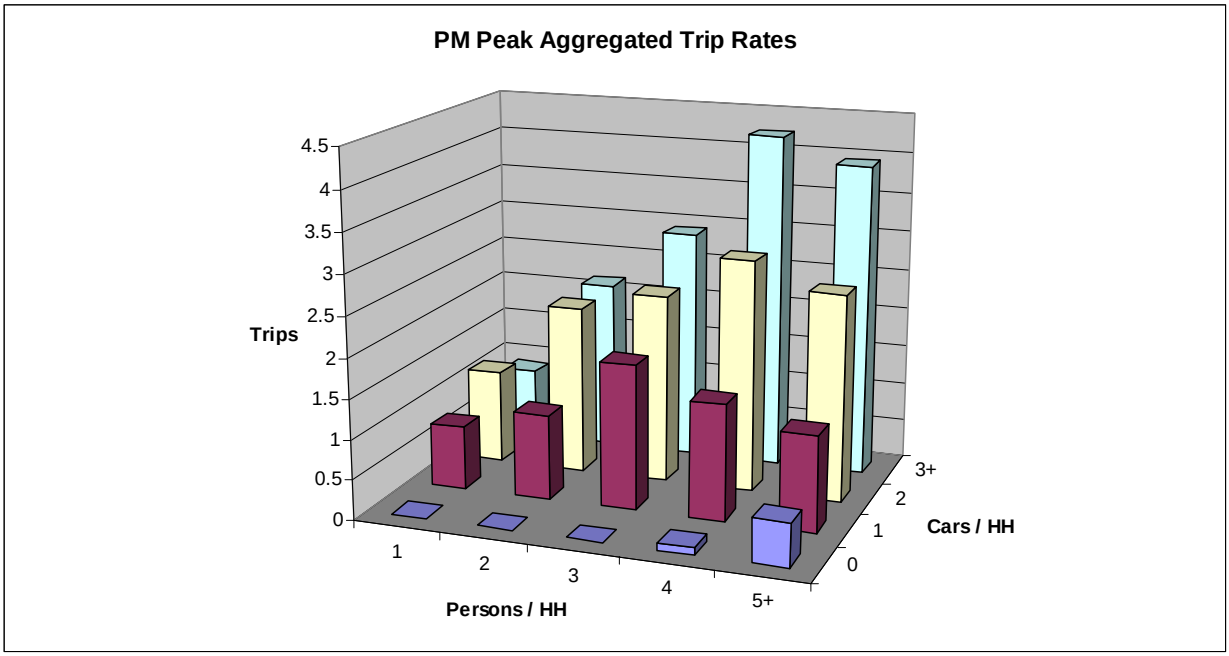
The trip rates used are shown in **Table 8** and **Table 9** below.

Evening Peak Period 'Home To' and 'Non-Home Based' Trip End Production Rates by Purpose and Category — **Table 8**

Category	Persons /HH	Cars/ HH	Trip Purpose					
			HTW	HTE	HTS	HSP	HTO	NHB
1	1	0	0	0	0	0	0	0.0022
2	1	1	0.0144	0.003	0.0306	0.009	0.0716	0.2255
3	1	2	0.026	0	0.0403	0.0185	0.0911	0.3443
4	1	3+	0	0	0.0646	0	0	0.404
5	2	0	0	0	0	0	0	0
6	2	1	0.0167	0.0047	0.0443	0.0294	0.1224	0.2098
7	2	2	0.0327	0.0015	0.0759	0.0223	0.1333	0.549
8	2	3+	0	0	0.021	0.0265	0.149	0.7087
9	3	0	0	0	0	0	0	0
10	3	1	0.0062	0.026	0.0822	0.1346	0.1733	0.3923
11	3	2	0.0122	0	0.1197	0.0621	0.1183	0.5011
12	3	3+	0.0407	0.0281	0.09	0.0168	0.1286	0.6239
13	4	0	0	0	0.0856	0	0	0
14	4	1	0.0267	0.0074	0.1033	0.1478	0.1034	0.1838
15	4	2	0.0518	0.0252	0.1573	0.2514	0.0706	0.6219
16	4	3+	0.0447	0.0106	0.2952	0.0979	0.3519	0.9624
17	5+	0	0	0	0	0	0	0
18	5+	1	0	0	0.0597	0.0833	0.1286	0.253
19	5+	2	0.0435	0.0442	0.1311	0.2147	0.1286	0.739
20	5+	3+	0.0557	0.023	0.2651	0.0836	0.3296	1.1181

Evening Peak Period 'To Home' Trip End Production Rates by Purpose and Category							Table 9
Category	Persons /HH	Cars/ HH	Trip Purpose				
			WTH	ETH	STH	SPH	OTH
1	1	0	0.0028	0	0	0	0
2	1	1	0.2306	0.0092	0.1281	0.0205	0.0547
3	1	2	0.3456	0.0484	0.072	0.0405	0.1502
4	1	3+	0.2109	0.0608	0.1328	0	0
5	2	0	0	0	0	0	0
6	2	1	0.3177	0.0081	0.125	0.0615	0.1244
7	2	2	0.8752	0.0062	0.2598	0.0405	0.1328
8	2	3+	0.8357	0	0.1716	0.029	0.2092
9	3	0	0	0	0	0	0
10	3	1	0.3656	0.0328	0.2661	0.1482	0.1893
11	3	2	0.9154	0.0754	0.2133	0.1561	0.2025
12	3	3+	1.4257	0.0659	0.341	0.0301	0.119
13	4	0	0	0	0	0	0
14	4	1	0.4022	0.0189	0.1415	0.1838	0.1374
15	4	2	0.7853	0.0243	0.3163	0.303	0.3204
16	4	3+	1.4459	0.1771	0.5017	0.1048	0.2522
17	5+	0	0.5417	0	0	0	0
18	5+	1	0.2945	0.0197	0.138	0.0712	0.1571
19	5+	2	0.5865	0.0106	0.2272	0.2836	0.1937
20	5+	3+	1.3191	0.0624	0.3301	0.1377	0.2192

When the PM peak rates are summed across purposes, as shown below, an upward trend in household trips is prominent as both household size and car ownership rates increases.



4.4 Private Trip Attractions

Attractions were derived by regression equations according to various weightings of land use information and based on a number of similar studies undertaken throughout New Zealand.

The attraction equations used are based on the existing Invercargill TRACKS Transportation Model but have been tuned in the calibration process to closely model private trip behaviour in the broader study area (e.g. reducing the impact of the Invercargill CBD jobs variable as the study area is far larger). The level of this tuning of attraction equations was undertaken using engineering judgement and based on the knowledge that not all areas of the expanded model are attracted to Invercargill CBD parking. Initial testing showed that excessive interaction between outlying townships and Invercargill occurred as a result of CBD Parking attraction. This coefficient was removed from the attraction equations.

The following land uses were used as the independent variables:

HH - Number of Households
SCH - School Roll
TER - Tertiary Roll
RET - Retail Jobs
OFF - Office Jobs
MAN - Manufacturing Jobs
COM - Community Jobs
TOT - Total Jobs
CBD - Invercargill CBD Jobs

4.4.1 Morning Peak Private Trip Attractions

HTW = 0.013TER + 0.332RET + 0.228MAN + 0.254COM + 0.162TOT
WTH = 0.013TER + 0.332RET + 0.228MAN + 0.254COM + 0.162TOT
HTE = 0.05SCH + 0.06TER
ETH = 0.05SCH + 0.06TER
HTS = 0.1RET + 0.045TOT
STH = 0.1RET + 0.045TOT
HSP = 0.043HH + 0.127SCH + 0.017TOT
SPH = 0.043HH + 0.127SCH + 0.017TOT
HTO = 0.028HH + 0.045TOT
OTH = 0.028HH + 0.045TOT
NHB = 0.033HH + 0.059SCH + 0.144COM + 0.082TOT

4.4.2 Interpeak Private Trip Attractions

HTW = 0.05HH + 0.115TOT
WTH = 0.05HH + 0.115TOT
HTE = 0.081SCH + 0.075TER
ETH = 0.081SCH + 0.075TER
HTS = 1.051RET
STH = 1.051RET
HSP = 0.148HH + 0.05SCH + 0.022TOT
SPH = 0.148HH + 0.05SCH + 0.022TOT
HTO = 0.207HH + 0.077TOT
OTH = 0.207HH + 0.077TOT
NHB = 0.447HH + 0.1SCH + 0.047TER + 1.707RET + 1OFF + 0.5MAN + 0.834COM

4.4.3 Evening Peak Private Trip Attractions

HTW = 0.1HH + 0.033TER + 0.187RET + 0.244MAN + 0.14TOT
WTH = 0.1HH + 0.033TER + 0.187RET + 0.244MAN + 0.14TOT
HTE = 0.076TER + 0.031COM
ETH = 0.076TER + 0.031COM
HTS = 0.099HH + 0.171RET
STH = 0.099HH + 0.171RET
HSP = 0.066HH + 0.06RET
SPH = 0.066HH + 0.06RET
HTO = 0.06HH + 0.037TOT
OTH = 0.06HH + 0.037TOT
NHB = 0.2HH + 0.067TER + 0.628RET + 0.418OFF

4.5 Goods Vehicle Trips

Light and Heavy Goods Vehicle movements are important components of transport models. This study has incorporated a general background level of goods vehicle activity by modelling these trips as two separate purposes.

Regression equations were used to provide both productions and attractions for goods vehicles. For internal to internal trips it is difficult to determine whether the origin or destination generates the demand for the trip. Hence the same equation is used to generate both the productions and attractions.

The LGV and HGV equations and originate from the 24-hour Christchurch Commercial Vehicle Survey (1993). This survey serves as the most appropriate source of commercial vehicle generation available to Gabites Porter. The 24-hour equations were disaggregated into periods according to the proportion of commercial trips in each period from the Christchurch Transportation Study model, and then adjusted for local conditions in the validation process. The equations applied are:

AM Peak (7-9AM)

LGV = 0.034HH+0.057COM+0.064MAN+0.245RET
HGV = 0.017HH+0.022COM+0.100MAN+0.088RET

Inter Peak (9-4PM)

LGV = 0.141HH+ 0.239COM+0.268MAN+1.021RET
HGV = 0.074HH+0.095COM+0.427MAN+0.379RET

PM Peak (4-6PM)

LGV = 0.020HH+0.035COM+0.039MAN+0.148RET
HGV = 0.011HH+0.013COM+0.060MAN+0.054RET

While the model provides background levels of HGV traffic, theradditional options for including development related HGV trips have been included:

1. Adding relevant jobs in landuse file for zone of interest
2. Manually calculated matrix of HGV trips added to background HGV matrix prior to assignment. This is used if a number of trips between particular locations (eg a mine or port) can be easily predicted or identified.

4.6 External Trips

For vehicle trips entering or leaving the study area there were 4 external stations. The productions were taken as the traffic volumes at the study area boundary. Note that the generated and assigned volumes are both for one hour. External traffic comprises both external to internal (inbound) traffic and internal to external (outbound) traffic.

It is assumed that the quantity of through traffic in the Study Area is negligible so all inbound and outbound trips are non-through. **Table 10** shows the total traffic flows at each of the external stations.

External Traffic Counts							Table 10
Zone No.	Description	AM (8-9)		INT (12-1)		PM (5-6)	
		In	Out	In	Out	In	Out
977	State Highway 6	68	49	87	83	70	104
978	State Highway 8	44	39	64	62	67	90
979	Milford Hway (SH94)	3	81	26	36	63	11
980	State Highway 1	218	173	159	207	264	321
ALL EXTERNAL STATIONS		333	342	336	388	464	526

The heavy goods vehicle component of external trips have been isolated based on traffic count data which establishes that:

- For SH1 20% of AM, 16% of interpeak and 9% of PM peak trips are heavy vehicles.
- For other external stations the traffic composition includes approx half this proportion of heavy vehicles and as such it is assumed that 10% of AM, 8% of interpeak and 4.5% of PM peak trips are heavy vehicles.

The external traffic destinations are distributed by the following regression equations. These attractions equations have been assumed from the 2006 Invercargill TRACKS Transportation Model.

Morning Peak

Inbound Externals = 0.015HH+0.031SCH+0.010TER+0.181RET+0.123MAN+0.154COM +0.106TOT

Outbound Externals = 0.015HH+0.031SCH+0.010TER+0.181RET+0.123MAN+0.154COM +0.106TOT

Interpeak

Inbound Externals = 0.217HH+0.003SCH+0.02TER+1.301RET+0.316COM+0.024TOT

Outbound Externals = 0.217HH+0.003SCH+0.02TER+1.301RET+0.316COM+0.024TOT

Evening Peak

Inbound Externals = 0.078HH+0.014TER+0.243RET+0.098OFF+0.082MAN+0.053TOT

Outbound Externals = 0.078HH+0.014TER+0.243RET+0.098OFF+0.082MAN+0.053TOT

4.7 Total Trip End Generation

Based on the relationships given in the preceding sections the trip end totals for each period are shown in **Table 11-13**, the numbers characterise trips made within two hours of each respective period.

2006 Trip End Production Summary - AM Peak (7-9AM)					Table 11
Trip Purpose		**Trip Ends**	**% of Private**	**Private Trips/HH**	**% of TOTAL**
Home Based Work	HTW	25,261	56%	0.609	
	WTH	209	0%	0.005	
Home Based Education	HTE	2,048	5%	0.049	
	ETH	26	0%	0.001	
Home Based Shop	HTS	1,380	3%	0.033	
	STH	385	1%	0.009	
Home Based Serve Passenger	HSP	5,273	12%	0.127	
	SPH	2,164	5%	0.052	
Home Based Other	HTO	3,467	8%	0.084	
	OTH	218	0%	0.005	
Non Home Based	NHB	4,623	10%	0.111	
Private Total		**45,055**	**100%**	**1.09**	**83%**
Ext Inbound (1 Hr)	NIX	269			
Ext Outbound (1 Hr)	NOX	333			
Externals Total (2 HR)		**1,047**			**2%**
Light Commercials		**5,255**			**10%**
Heavy Commercials		**2,687**			**5%**
TOTAL 2 HR TRIPS		**54,044**			
Total Households		**41,461**			

2006 Trip End Production Summary – Off Peak (9-11AM)					Table 12
Trip Purpose		**Trip Ends**	**% of Private**	**Private Trips/HH**	**% of TOTAL**
Home Based Work	HTW	1,268	2%	0.031	
	WTH	247	0%	0.006	
Home Based Education	HTE	384	1%	0.009	
	ETH	247	0%	0.006	
Home Based Shop	HTS	3,514	6%	0.085	
	STH	3,021	6%	0.073	
Home Based Serve Passenger	HSP	902	2%	0.022	
	SPH	590	1%	0.014	
Home Based Other	HTO	7,415	14%	0.179	
	OTH	1,463	3%	0.035	
Non Home Based	NHB	35,646	65%	0.860	
Private Total		**54,698**	**100%**	**1.32**	**87%**
Ext Inbound (1 Hr)	NIX	312			
Ext Outbound (1 Hr)	NOX	432			
Externals Total (2 HR)		**1,259**			**2%**
Light Commercials		**4,445**			**7%**
Heavy Commercials		**2,354**			**4%**
TOTAL 2 HR TRIPS		**62,756**			**100%**
Total Households		**41,461**			

2006 Trip End Production Summary – PM Peak (4-6PM)					Table 13
Trip Purpose		**Trip Ends**	**% of Private**	**Private Trips/HH**	**% of TOTAL**
Home Based Work	HTW	899	1%	0.022	
	WTH	23,753	33%	0.573	
Home Based Education	HTE	342	0%	0.008	
	ETH	1,175	2%	0.028	
Home Based Shop	HTS	3,352	5%	0.081	
	STH	7,866	11%	0.190	
Home Based Serve Passenger	HSP	2,781	4%	0.067	
	SPH	3,896	5%	0.094	
Home Based Other	HTO	4,792	7%	0.116	
	OTH	6,129	8%	0.148	
Non Home Based	NHB	17,240	24%	0.416	
Private Total		**72,224**	**100%**	**1.74**	**91%**
Ext Inbound (1 Hr)	NIX	438			
Ext Outbound (1 Hr)	NOX	474			
Externals Total (2 HR)		**1,754**			**2%**
Light Commercials		**3,160**			**4%**
Heavy Commercials		**1,987**			**3%**
TOTAL 2 HR TRIPS		**79,125**			**100%**
Total Households		**41,461**			

5. TRIP DISTRIBUTION AND THE COSTS OF TRAVEL

5.1 The Gravity Distribution Model

The gravity model form chosen for this work was

$$T_{ij} = P_i.K_i\ A_j.L_i\ f(c_{ij})$$

subject to the double constraints of

$$K_i = \frac{P_i}{\Sigma_j T_{ij}}$$

$$L_j = \frac{A_j}{\Sigma_j T_{ij}}$$

Where:

T_{ij} = Trips between zones i and j
P_i = Productions at zone i
A_j = Attractions at zone j
$f(c_{ij})$ = Function of the travel cost between zones i and j
$K_i\ L_j$ = Balancing factors

The balancing factors are successively applied until there is convergence. Some 10 iterations were used, and all purposes converged so that there was no difference between iterations to five decimal places.

The derivation of P_i and A_j has been discussed earlier. This section will deal with the distribution function $f(c_{ij})$ and the costs of travel.

5.2 The Distribution Function

Trip distribution is time only based. In other NZ modelling applications, a time-based distribution was found to give a better fit than using a generalised cost derived from both time and distance costs

The time only distribution function can be approximated to an exponential line of the form:

$$f(c_{ij}) = e^{-\alpha t_{ij}}$$

Where:

$f(c_{ij})$ = function of time only cost of travel between zone i and zone j
t_{ij} = time between zone i and zone j
α = exponent

The distribution function values used (α) are shown in **Table 14**. It should be noted that the alpha values are the same for 'from home' and 'to home' purposes.

Time Based Distribution Function Exponents			Table 14
Trip Purpose	**Morning Peak**	**Interpeak**	**Evening Peak**
Home Based Work	0.205	0.205	0.205
Home Based Education	0.41	0.41	0.41
Home Based Shop	0.205	0.205	0.205
Home Based Serve Passenger	0.205	0.205	0.205
Home Based Other	0.205	0.205	0.205
Non Home Based	0.205	0.205	0.170
Light Goods Vehicles	0.15	0.15	0.15
Heavy Goods Vehicles	0.09	0.09	0.09
Externals Inbound	0.05	0.05	0.05
Externals Outbound	0.05	0.05	0.05

The above distribution exponents have been adjusted during the calibration process from those used in the Invercargill model. The Home Based exponents have been increased by approximately 14% so as to slightly shorten the home based trip length. Trip length frequency analysis showed that the Invercargill exponents resulted in excessively long trip lengths when applied to an expanded model area. The 14% global increase in exponent resulted in a better trip length fit, see **Section 6**.

6. TRIP LENGTH FREQUENCY ANALYSIS

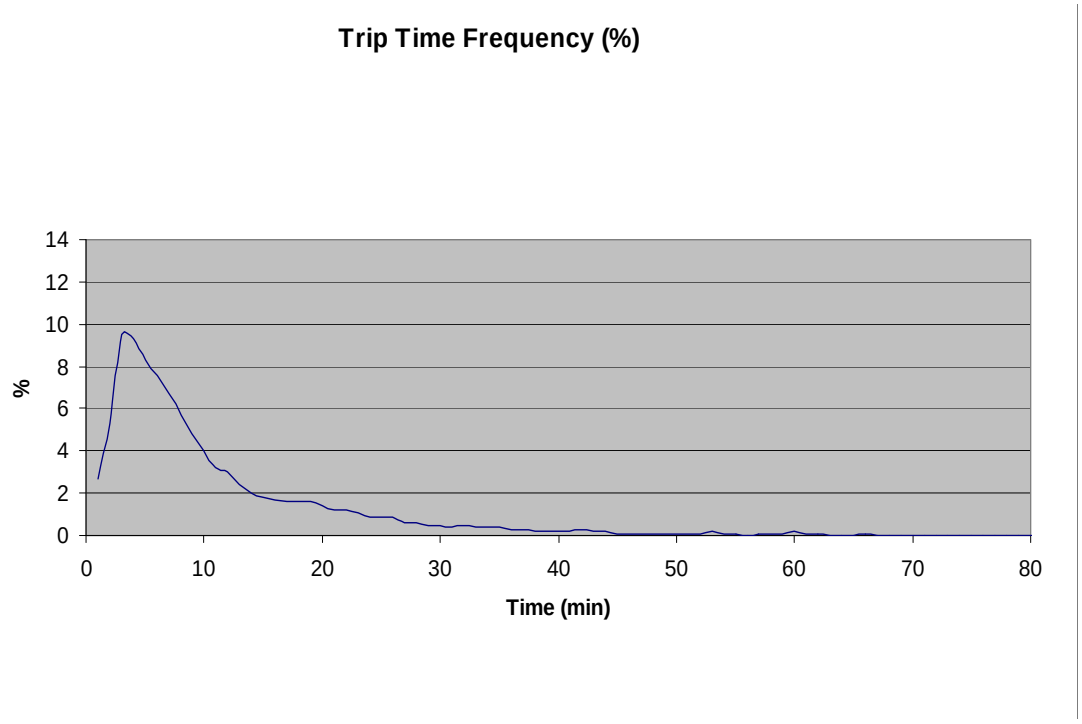
Trip length frequency analysis for all trips has been undertaken for each period, with results shown in the following **Figure 4, Figure 5** and **Figure 6** for the morning peak, interpeak and evening peak respectively. The resultant trip length profiles are displayed for both time and distance.

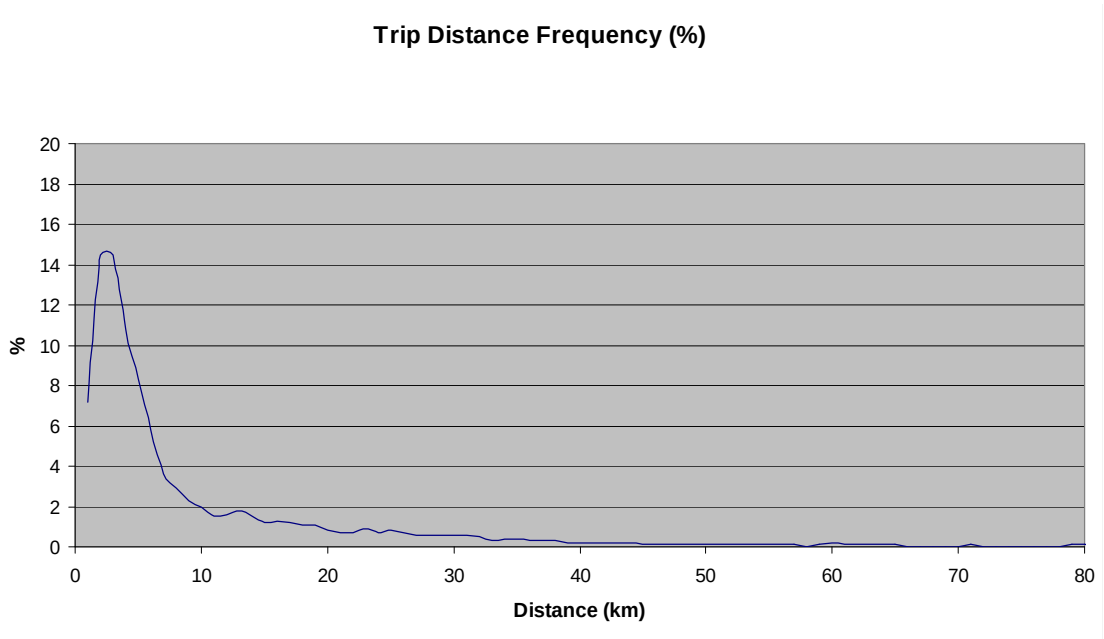
The trip length profiles show that around 78% of all offpeak and 73% of peak period trips are shorter than 10km. Average trips lengths are 10.6 km for the morning peak, 8.7 km for the interpeak and 9.7 km for the evening peak.

Further to this, 71% of all offpeak and 65% of peak period trips take less than 15 minutes to complete, and 82% of all offpeak and 77% of peak period trips are of less than 10 minutes duration. Average trips lengths relating to time travelled are 11.8 minutes for the morning peak, 10.0 minutes for the interpeak and 11.1 minutes for the evening peak. The high proportion of short urban trips and relatively low number of long regional trips indicated in the profile plots are consistent with these values.

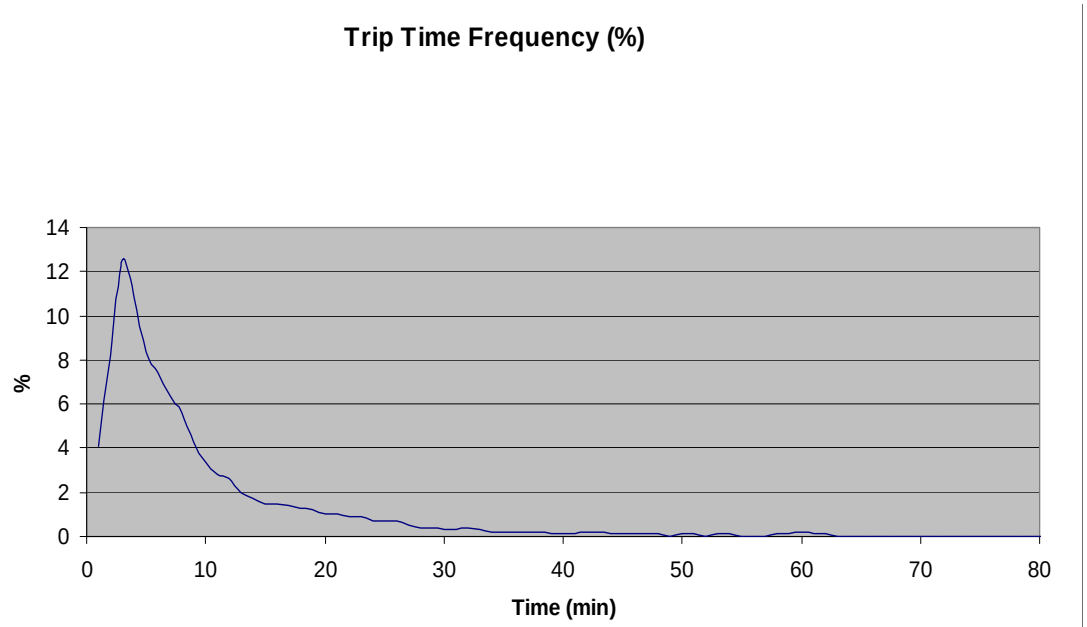
Journey to Work data has been extracted from Statistics New Zealand 2006 census data and have been geocoded against the closest zone in the model. The resultant all day surveyed matrix of Journey to Work trips has been analysed using the morning peak time and distance matrices to extract a trip length profile. This has been compared against the modelled Home to Work trip length frequency profile for the morning peak period.

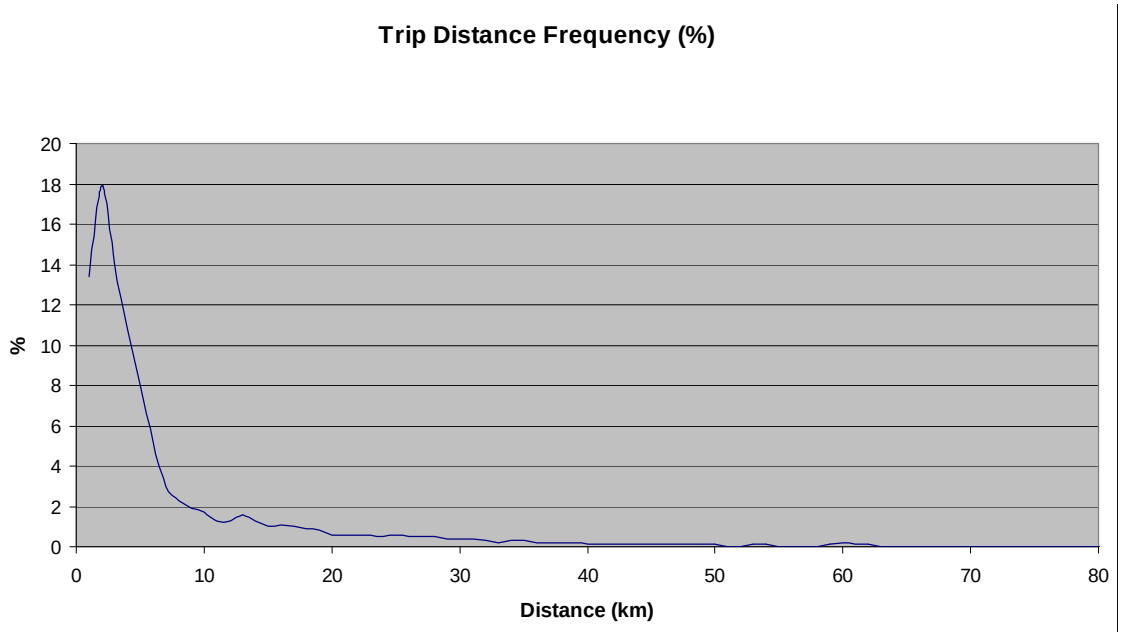
Analysis of the 1989 Dunedin Household Interview survey indicates that approx 70% of Journey to Work trips occur in the morning peak period. As such, this is not an exact match of trip patterns, it is very similar and the close fit of the profiles for both travel time and distance as shown in **Figure 7** show this is modelled appropriately.



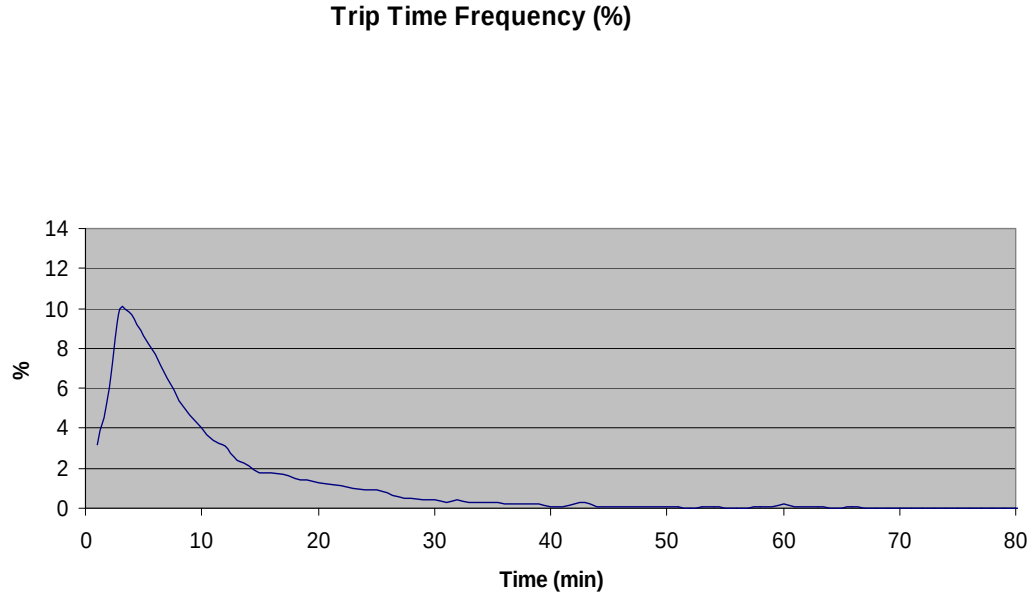


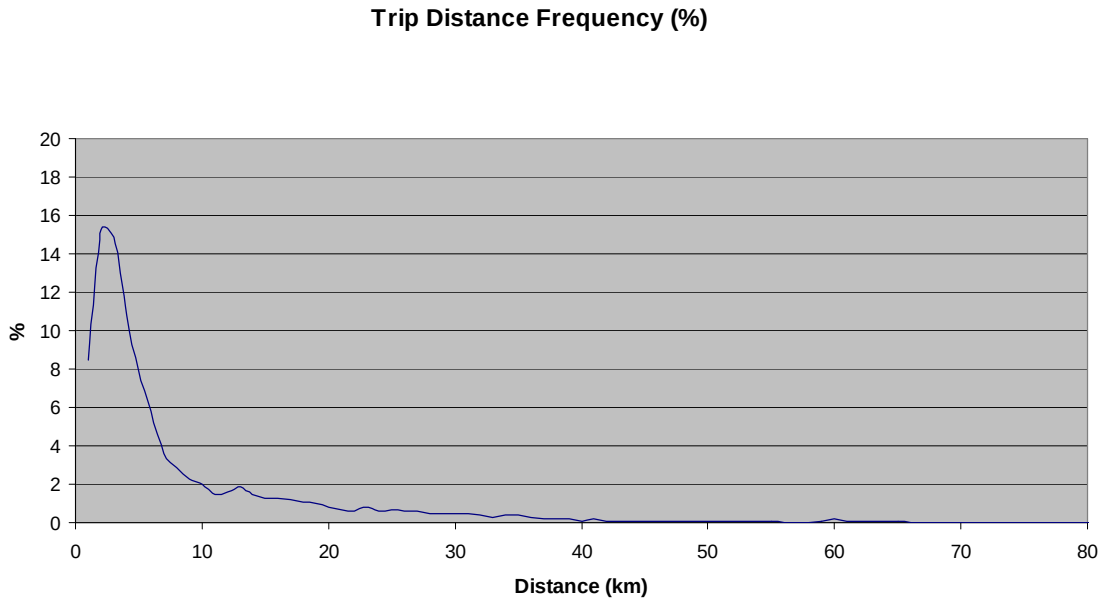
GSS Transportation Model	**AM Peak Trip Length Frequencies**	**Figure 4**
Gabites Porter		



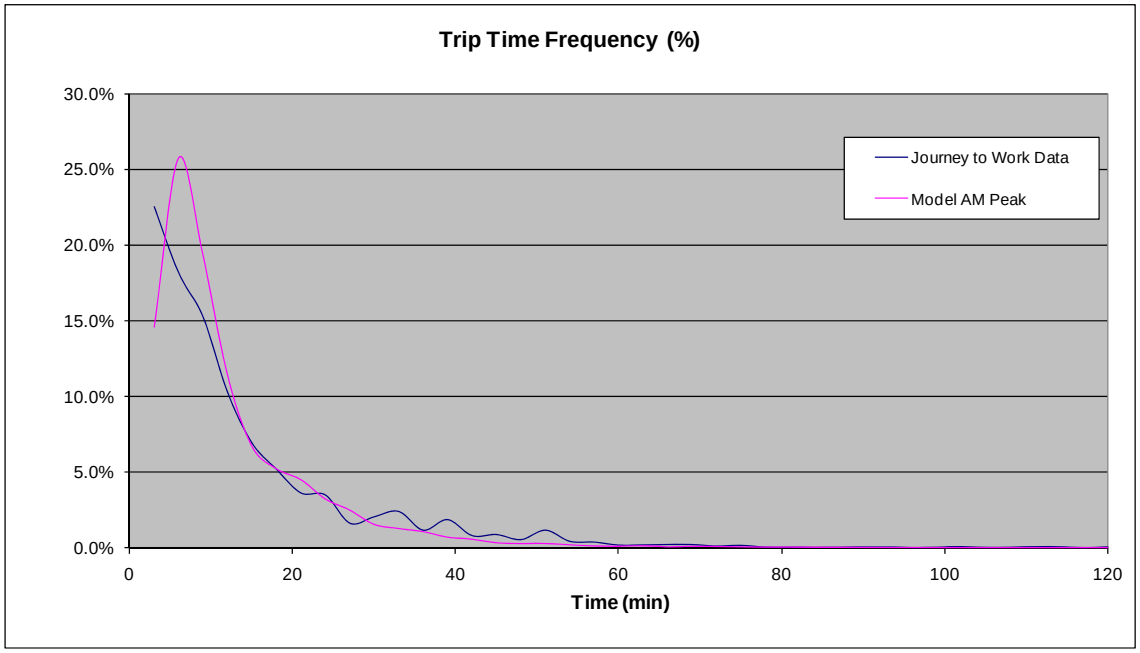


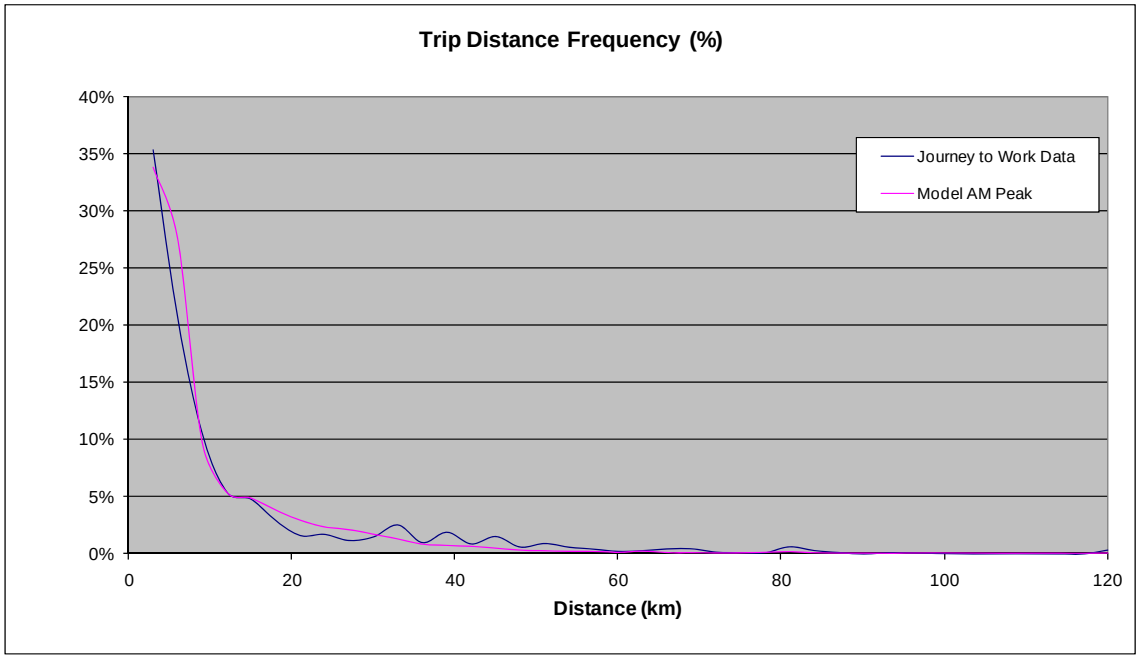
GSS Transportation Model	**Interpeak Trip Length Frequencies**	**Figure 5**
Gabites Porter		





GSS Transportation Model	**PM Peak Trip Length Frequencies**	**Figure 6**
Gabites Porter		





GSS Transportation Model Gabites Porter	**Census Journey to Work versus Model HTW Comparison**	**Figure 7**

7. TRIP ASSIGNMENT

7.1 Costs of Travel

The perceived cost of travel which feeds into the path building process for the vehicle assignment stage of the model has been developed using guidelines from the New Zealand Transport Agency Economic Evaluation Manual (EEM). The primary focus of the model is on the rural arterial road network, subsequently the value of time has been extracted from Table A4.3 of the EEM at $25.34 per hour for rural strategic weekday travel for all vehicles. This has been converted to 42.23 cents per minute and then updated from 2002 dollars to 2009 dollars using a conversion factor of 1.22 from Table A12.2 of the EEM, to produce a value of 58.89 cents per minute. This is essentially a resource cost but has also been assumed as the perceived cost of travel. Whilst Table A11.1 provides guidelines that perceived cost is 15% higher than resource cost for non-working travel time, heavy vehicles in particular are likely to be heavily dominated by working travel time, and therefore no further adjustment to the cost has been made.

The second component of perceived cost relates to the vehicle operating costs. The assignment is a multi-class model whereby light and heavy vehicles are assigned separately and can assume different perceived costs of travel. Based on Table A5.1 through Table A5.5 of the EEM it is assumed that at an average open road speed of 90 kph and gradient of 0%, the cost per km is as follows (in July 2008 dollars):

- 25.7 cents per km for Light vehicles (Table A5.1)
- 58.0 cents per km for Medium Commercial Vehicles (Table A5.3)
- 114.5 cents per km for Heavy Commercial Vehicles Type I (Table A5.4)
- 178.8 cents per km for Heavy Commercial Vehicles Type II (Table A5.5)

Assuming an approximate split (based on Christchurch Heavy Vehicle Survey data) for the heavy vehicle matrix composition of 50% MCV, 25% HCV Type I and 25% HCV Type II, this equates to 73.6 cents per km for heavy vehicles. Table A12.2 of the EEM specified that no conversion factor is required to adjust VOC values for 2008 to 2009, however from Table A11.1, the guidelines specify that perceived cost for VOC is 20% higher than resource costs. As such the above values have been adjusted to 30.8 cents for light vehicles and 88.3 cents for heavy vehicles. These are coupled with the above perceived travel time cost as an input to the path building routine in the TRACKS assignment module.

7.2 Loading Profile

The total traffic matrix is assigned to the road network using an incremental time dependent assignment procedure with multiple iterations and a loading profile for different time periods. Traffic is loaded in time slices onto the network at flow rates that approximate the traffic flow profile over the time period modelled. The TRACKS assignment program ASSIGN version 6.3 was used.

Interzonal time and distance matrices were extracted during the assignment process and is a weighted sum corresponding to the points on the loading profile.

Available traffic count data in representative major routes in the study area were used to produce average flow profiles for the AM, PM and Inter Peak periods based on 15 minute traffic counts during the peak hours. The quarter hourly flows were then sorted from smallest to largest and incremental profiles were developed to model traffic flow

by loading traffic in a small number of steps. The loading profiles for the period models are in **Table 15, Table 16** and **Table 17**.

The assignment procedure is explained in the TRACKS user manual. However, in summary, a proportion of the matrix is loaded in each iteration where the profile is derived from traffic counts over the modelled period. As a consequence the profiles for each period are different. In effect, where there are a number of iterations before a skim it is an incremental assignment for that proportion of traffic. Times and distances are accumulated at that point. If iterations are successively skimmed, then the assignment is an 'all or nothing' for the proportion being loaded.

Morning Peak Period Assignment Parameters **Table 15**

Assignment Increment	% Trip Matrix Loaded	% of Peak Hourly Flow Rate Experienced	Steady State Time (Minutes)	Perceived Assignment Costs	
1	10	10		58.89 c/min	Light 30.84 c/km Heavy 88.32 c/km
2	10	20			
3	10	30			
4	10	40			
5	10	50			
6	10	60			
7	10	70			
8	7	77	15		
9	7	84			
10	6	90	15		
11	4	94	15		
12	4	98			
13	2	100	15		

Inter Peak Period Assignment Parameters **Table 16**

Assignment Increment	% Trip Matrix Loaded	% of Peak Hourly Flow Rate Experienced	Steady State Time (Minutes)	Perceived Assignment Costs	
1	13	13		58.89 c/min	Light 30.84 c/km Heavy 88.32 c/km
2	10	23			
3	10	33			
4	10	43			
5	10	53			
6	10	63			
7	10	73			
8	10	83	30		
9	7	90			
10	6	86	15		
11	4	100	15		

Evening Peak Period Assignment Parameters					Table 17
Assignment Increment	**% Trip Matrix Loaded**	**% of Peak Hourly Flow Rate Experienced**	**Steady State Time (Minutes)**	**Perceived Assignment Costs**	
1	13	13		58.89 c/min	Light 30.84 c/km Heavy 88.32 c/km
2	10	23			
3	10	33			
4	10	43			
5	10	53			
6	10	63			
7	10	73			
8	10	83	30		
9	3	86			
10	4	90	15		
11	4	94			
12	3	97			
13	3	100	15		

7.3 Network Links

Travel Journey times were established by a combination of link times and delays at intersections. The simplest form of calculating journey times used in New Zealand in the 1960's and 70's where all delay (link and intersection) was attributed to a link. Speed/flow, or volume/delay relationships were derived for various types of road. Selection of the appropriate curve was made on the basis of a number of variables that were physically described the road.

Results from surveys in the 1988 Wellington GATS Study first allowed link only delays to be empirically separated from intersection delays. The volume delay relationships used in this study were for delays on links only and were based on those analytically derived by Akcelik:1 using a time dependent Davidson model. As a result, these curves give 'link only' delays, allowing intersection delays to be separately calculated. The J_A parameter, or friction factor, in Akcelik's equation for travel time was set for each link type so that $V_{capacity}/V_{free\ flow} = 0.5$. This is consistent with standard traffic theory and Fisk's behavioural model and matches the data collected in Wellington. As a result these curves give 'link only' times, allowing intersection delays to be separately calculated. Each link in the network is given a volume delay curve depending of the speed limit, function and characteristic of the road the link represents. A steady state period of one hour was used.

Akcelik's formula is:

$$t = t_o \{ 1 + 0.25\, r_f [(x - 1) + ((x-1)^2 + (8J_A x) / (Qt_o r_f))^{1/2}]\}$$

Where:

- t = travel time per unit distance (e.g., secs/km)
- t_o = minimum (zero flow) travel time per unit distance (e.g., secs/km)
- J_A = delay (side friction, los) parameter
- x = q/Q = degree of saturation
- q = demand (arrival) flow rate (veh/sec)
- Q = capacity (veh/sec) per lane
- r_f = ratio of flow period T_f, to minimum travel time t_o

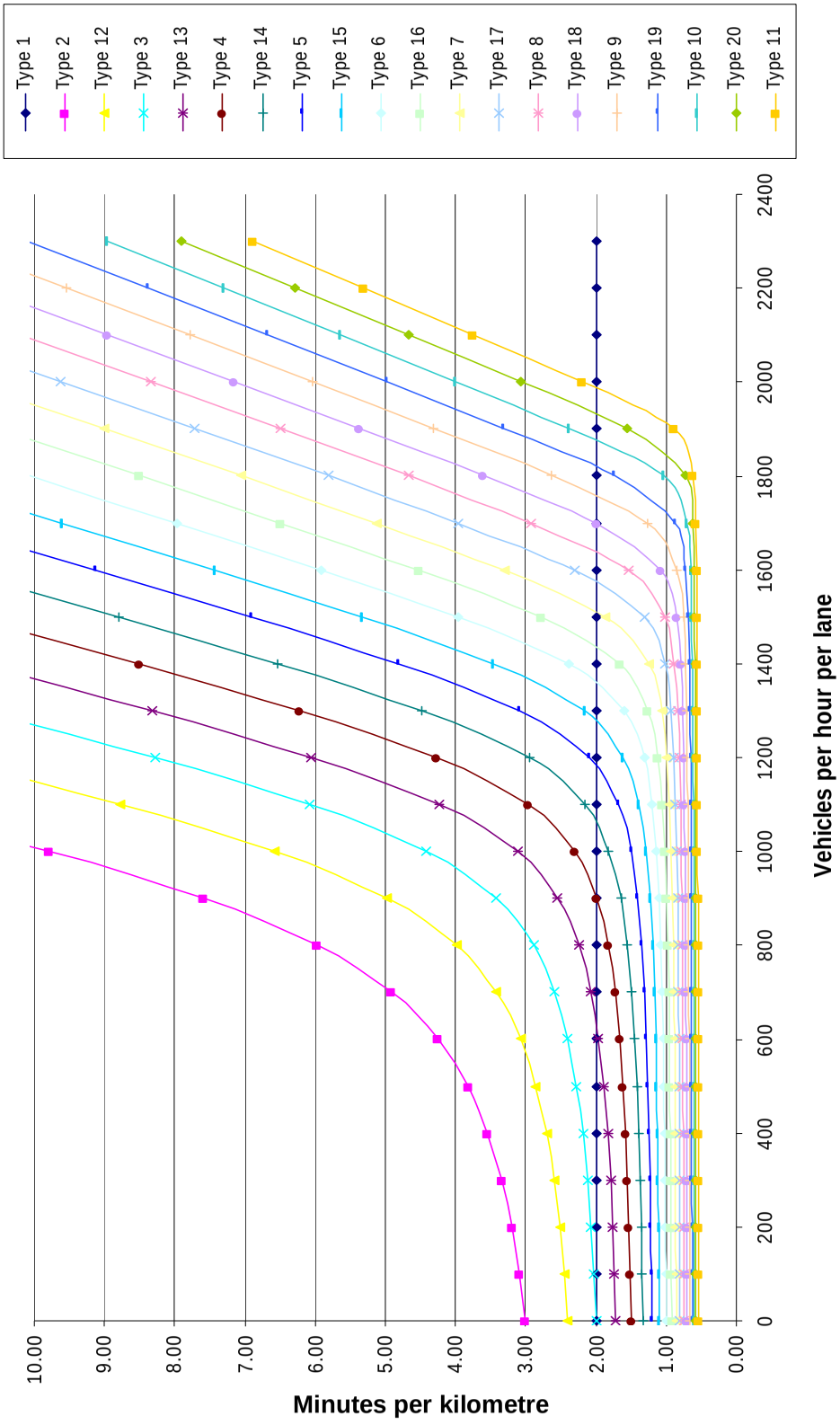
Twenty curves were developed with free flow times at 5km/hr intervals. The capacities and J_A values used for each curve are given below. Curve number 1 is a flat line for a centroid connector.

The resulting volume/delay curves used for this study are shown in **Table 18** and **Figure 8**.

Each link in the network was allocated a curve from an assessment of the free flow speed, its capacity and the environmental conditions of the link.

New future links should be coded by assessing the environment in which the link will operate, and choosing a curve with an appropriate free flow speed and capacity, given the way in which link with a similar curve operate under current traffic condition. During evaluation of a project it would be useful to test the sensitivity of the choice of curves on traffic flows, and benefits.

Link Types				Table 18
Speed (kph)	**Capacity (vph)**	**Free Flow Time (t_0) min/km**	**J_a**	**Link Type**
20	900	3	10.55	2
25	1000	2.4	7.1	12
30	1100	2	5.2	3
35	1200	1.71	3.9	13
40	1300	1.5	3	4
45	1400	1.33	2.35	14
50	1500	1.2	1.9	5
55	1500	1.09	1.52	15
60	1600	1	1.25	6
65	1600	0.92	1.02	16
70	1700	0.86	0.84	7
75	1800	0.8	0.67	17
80	1900	0.75	0.54	8
85	2000	0.71	0.44	18
90	2000	0.67	0.34	9
95	2200	0.63	0.26	19
100	2200	0.6	0.2	10



GGS Transportation Model	**Volume – Delay Curves**	**Figure 8**
Gabites Porter		

7.4 Network Intersections

a) Priority Intersections

Delays at priority intersections are calculated at the movement level. That is, left, right and through movements on all legs have delays calculated specifically.

The approach lanes at each intersection are coded as one of eight movement types as shown below. From the intersection geometry, determined from the link coordinates, the opposing traffic flows are calculated.

1. Left, Through and Right
2. Left and Right
3. Left
4. Left free
5. Left and Through
6. Through
7. Through and Right
8. Right

The way each lane type was treated came from the publication titled, "Performance Analysis of Priority Intersections - A Practitioner's Guide" by Gabites Porter: (1991).

The delays were determined by a queuing theory model. The queuing theory formulation adopted is that described by Fisk:(1989) which uses an M/M/1 model (indicates a queuing system with negative exponential distributions for arrival headway and service times, with one service channel) and a coordinate transformation approximation to allow for over saturated conditions.

The formulation is:

$$d = \begin{cases} r/\mu\,(1 - r) & \text{steady state conditions, } r<1 \\ (r - 1)\,t/2 & \text{deterministic conditions, } r>1 \end{cases}$$

Where: $r = q_2 / \mu$

$$\mu = \frac{q_1 e^{-q_1 t}}{1 - e^{-q_1 b}}$$

t = duration of time period over which a steady state is assumed

q_1 = major road flow rate

q_2 = minor road flow rate, always defined as approach being delayed

t = critical gap

b = move-up time for minor road traffic.

μ = mean service rate

r = traffic intensity

Fisk shows that the delay equation can be written:-

$$d = \frac{-(2 + \mu t - r\mu t) + \sqrt{(2 + \mu t - r\mu t)^2 + 8r\mu t}}{4\mu} + \frac{1}{\mu}$$

when the coordinate transform is included and this formulation is used.

The following critical gaps and moveup times were used:

Critical gap and move up time values		Table 19
Lane Type	**Critical Gap (sec)**	**Moveup Time (sec)**
Left turn-non-priority	5	3
Left turn-priority	5	3
Thru/Right-non-priority	5	3
Thru/Right-priority	5	3
Merge	3	2
Bottleneck	3	2
Roundabout	4	3

Other parameters used include:

Tracking Headway	1.2 seconds
Lane Sharing Convergence Parameter	0.01
Number of external iterations	50
Number of internal iterations (lane sharing algorithm)	200

b) Signalised Intersections

Movement using the formulations in ARR123, including eqn 6.4, 6.3 and 6.1 shown below, calculates delays at signalised intersections. While ARR123 is the basis for SIDRA it does not give exactly the same results, especially for the more recent versions of SIDRA.

A general formula for the average delay per vehicle, d (in seconds) is

$$d = D/q \qquad \text{eqn (6.4)}$$

D = total delay (veh/hr/hr)
q = flow rate (veh/s)

$$D = \frac{qc(1-}{2(1-y)} + N_0 x \qquad \text{eqn (6.3)}$$

Where:

qc = average number of arrivals in vehicles/cycle
q = flow (veh/sec)
c = cycle time (sec)
u = green time ratios= g/c
y = flow ratio = q/s
s = saturation flow (veh/sec)
N_O = average overflow queue (vehicles)
x = q/Q = degree of saturation

$$N_0 = \begin{cases} \frac{QT_f}{4}\left[z + \sqrt{z^2 + \frac{12(x - x_0)}{QT_f}}\right] & \text{for } x > x_0 \\ 0 & \text{for } x \le x_0 \end{cases} \qquad \text{eqn (6.1)}$$

Where:

Q = capacity (veh/hr)
T_f = flow period (hours)
z = x - 1
x_o = degree of saturation below which the average overflow queue is approximately zero = 0.67 + sg/600

Signalised intersections were modelled specifically and each required a SIDRA input data file.

c) Geometric Delays

The delays calculated above are the stopped delays for vehicles. As vehicle decelerate to stop or negotiate a corner a geometric delay is encountered. The geometric delay is calculated from the formulations in Gabites Porter: (1991).

8. MODEL CONVERGENCE

8.1 Assignment and Distribution Loop

Time and distance matrices are required as inputs for trip distribution. As assigning the trips to the network generates these matrices, after each assignment the trip distribution needs to be re-run and the trips re-assigned until the time and distance matrices converge.

In practice, it is unlikely that absolute convergence occurs. The assignment and distribution steps are run iteratively until the totals of both the time and distance matrices between successive runs remain close to each other and relatively constant.

The totals for the time and distance matrices for two successive Assignment/Distribution Loops (after many previous runs) are shown below in **Table 20** where:

TVM = Total Vehicle Minutes

TVK = Total Vehicle Kilometres

2006 Convergence **Table 20**

PERIOD	AM Peak		Interpeak		PM Peak	
	TVM	TVK	TVM	TVK	TVM	TVK
Last Run	339,880	316,925	339,800	305,949	418,926	382,268
Previous Run	339,833	316,934	339,899	306,021	418,876	382,267
Absolute Difference	47	9	99	71	50	1
% Diff	0.01%	<0.01%	0.03%	0.02%	0.01%	<0.01%

The percentage change in generalised user cost between consecutive loops should be less than 1%. As the total vehicle minutes and total vehicle kilometres change less than 1% between runs (shown above), and unit time and distance costs are constant between runs, generalised user cost also changes less than 1% between runs.

When validating the model it is difficult to get a long series of runs prior to convergence because of the continual changing of the model components to get a better fit, even though these changes were often small. In general the model re-converged after two or three iterations. The periods were then run several times after convergence and remained stable.

For any model, if the network is heavily congested, convergence may not occur. Although the network is currently stable, when any changes are made to the network (e.g. option testing or land use), then convergence must be checked to ensure the network is still stable. In the unlikely event of the network not stabilising, modifications will have to be made to the network so that it will converge. These modifications should then be incorporated into the option or year being tested.

9. MODEL VALIDATION

9.1 General

One of the requirements of model building is that the model should replicate actual conditions, that is the travel patterns and traffic flows that existed in March 2006. The process is called validation. The primary test is the ability of the model to replicate traffic flow measured in early 2006. In addition, network travel times were checked against floating car surveys.

9.2 Network Screenline Validation

Flow comparisons are tested using a number of statistical measures. Traffic counts were grouped into screenlines, and the following measures calculated.

- Comparisons of individual links
- Comparisons of total trips over each screenline
- Percentage difference
- Correlation coefficient
- % Root mean square
- *GEH*.

The correlation coefficient is a first order measure of the co-relation, using the formula:

$$P_{x,y} = \frac{\frac{1}{n} \Sigma (x_i - \bar{x_i})(y_i - \bar{y_i})}{\sigma_x \sigma_y}$$

The *GEH* is a form of the Chi-squared statistic that incorporates both relative and absolute errors. It is designed to be more tolerant of the large percentage differences in lower flows. The form of the statistic is: Where *m* is the modelled flow and *o* is the observed count.

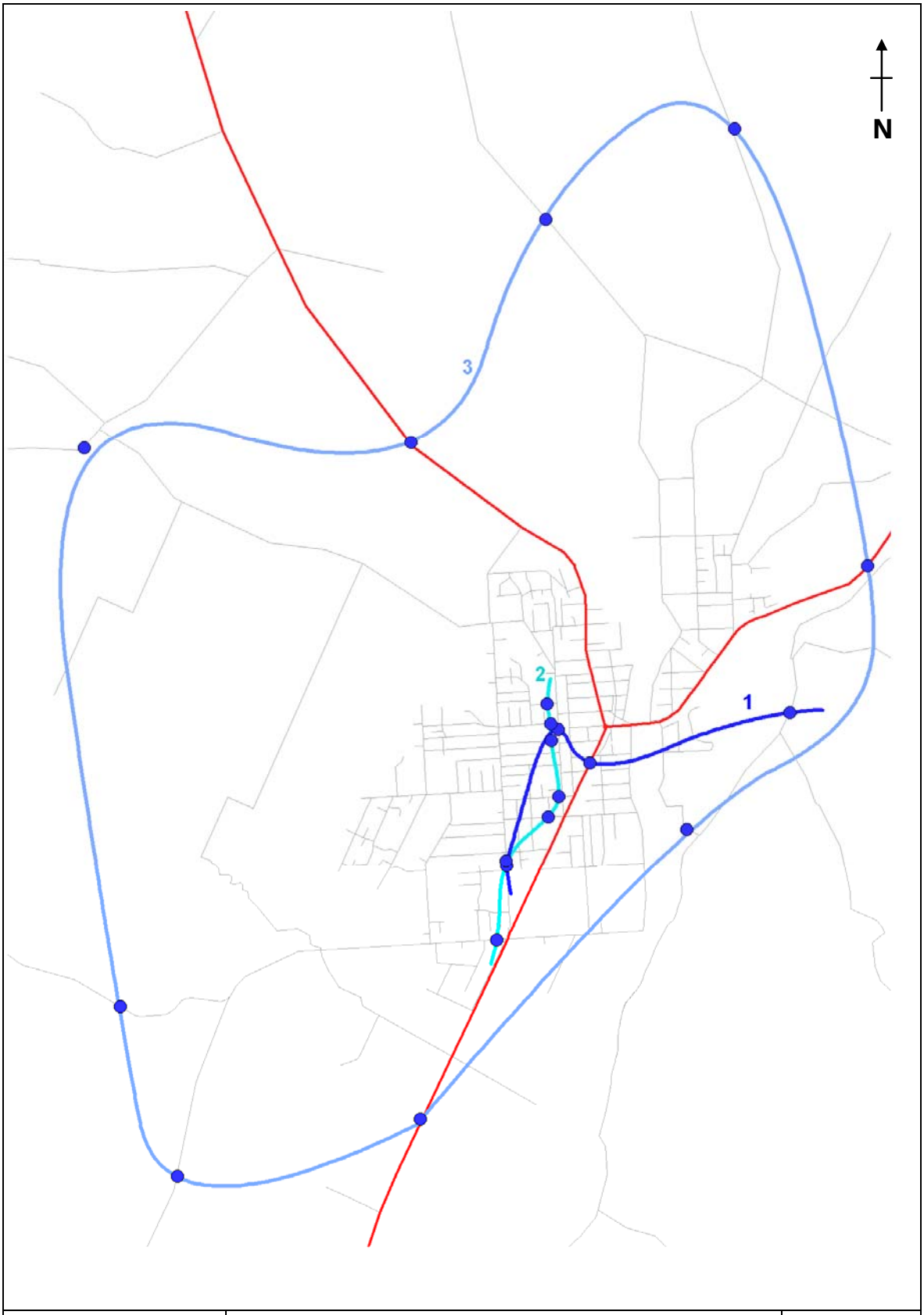
$$GEH = \sqrt{\frac{2(m-o)^2}{m+o}}$$

The NZTA Economic Evaluation Manual (EEM) guidelines for overall validation are summarised in **Table 21.** The PEM looks for major link volumes (i.e. those carrying more than 30,000 vpd) to be within 20% of observed values and that the error tolerance for links with lower volumes is greater. Table 19 reflects this. As a matter of principle, screenline and individual count validation for this study will exceed the guidelines expressed in the EEM.

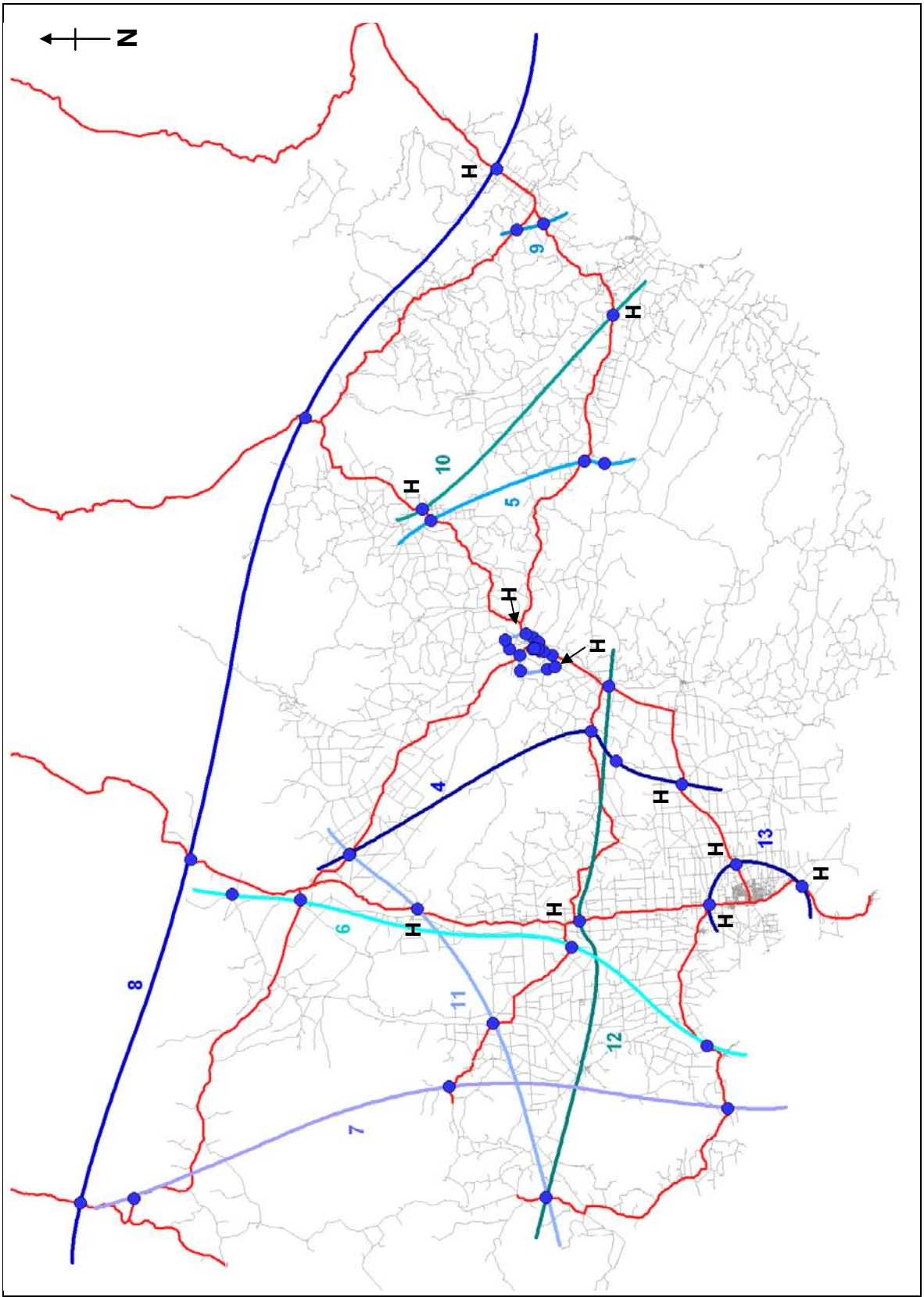
Model Traffic Flow Validation Guidelines				Table 21
Screenline Totals				
Traffic Flow	± 10%			
Correlation Coefficient	>0.8			
GEH	<4			
% RMS	<30			
GEH	<5	<7	<10	<12
(modified for 1hr flows only)	60%	80%	95%	100%
Overall Network Totals % RMS	<30			

13 screenlines were used in this model for validation, which are illustrated in **Figure 9** and **Figure 10** overleaf.

Section 9.3 presents **Table 22** through **Table 24** containing the detailed network validation statistics for the screenlines in each of the three models developed including the validation of HGV's. The full screenline printouts of observed (count) versus modelled (volume) traffic volumes for all screenlines and miscellaneous counts can be found in **Appendix 4**. The full printouts include validation statistics for each individual site and detailed statistics, by direction, for each screenline total.



GGS Transportation Model Gabites Porter	**Model Validation Screenlines – Gore Area**	**Figure 9**



GGS Transportation Model	**Model Validation Screenlines – Rest of the Model**	**Figure 10**
Gabites Porter		

9.3 Screenline Validation Results

Based on the EEM model fitness guideline in **Table 21**, overall the modelled traffic flows replicate actual counts for all designated screenlines during the morning peak, interpeak and evening peak.

With saying that, not all screenlines are successfully validated against the recommended criteria. Where compliance is met for the morning peak, one screenline for the interpeak and three for the evening peak have a value of more than 4. Please note that the EEM criteria states that the "screenline flows should have a GEH less than 4.0 in most cases". Across all three periods 36 out of 39 screenlines comply which is a significant majority of 95% of screenlines exhibiting a GEH of no greater than 4.

Scatterplots of all counts for each period are shown in **Figure 11** at the end of this sub section. CORDON, as part of the TRACKS suite, was used to execute the Screenline validation process. The output files produced by CORDON is attached as **Appendix Four**.

9.3.1 Morning Peak Validation

Morning Peak Network Screenline Validation				Table 22
Screenline 1				
Count		1081		
Volume		1087		
Change		6		
%		101		
Correlation Coefficient		0.991		
% RMS		13.32		
GEH Total		0.2		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	87.5	100	100	100
Screenline 2				
Count		1125		
Volume		1038		
Change		-87		
%		92		
Correlation Coefficient		0.804		
% RMS		31.62		
GEH Total		2.6		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	85.7	92.9	100	100
Screenline 3				
Count		1090		
Volume		1138		
Change		48		
%		104		
Correlation Coefficient		0.992		
% RMS		17.34		
GEH Total		1.4		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 4				
Count		392		
Volume		347		
Change		-45		
%		89		
Correlation Coefficient		0.920		
% RMS		42.95		
GEH Total		2.3		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	66.7	83.3	100	100

Table 22 Continued				
Screenline 5				
Count	257			
Volume	249			
Change	-8			
%	97			
Correlation Coefficient	0.995			
% RMS	16.96			
GEH Total	0.5			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 6				
Count	456			
Volume	527			
Change	71			
%	116			
Correlation Coefficient	0.821			
% RMS	58.56			
GEH Total	3.2			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	83.3	91.7	100	100
Screenline 7				
Count	269			
Volume	317			
Change	48			
%	118			
Correlation Coefficient	0.991			
% RMS	32.57			
GEH Total	2.8			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	66.7	66.7	100	100
Screenline 8				
Count	707			
Volume	0.991			
Change	32.57			
%	0.991			
Correlation Coefficient	0.998			
% RMS	16.24			
GEH Total	1.3			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 9				
Count	464			
Volume	448			
Change	-16			
%	97			
Correlation Coefficient	1.000			
% RMS	12.57			
GEH Total	0.7			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100

Table 22 Continued				
Screenline 10				
Count		269		
Volume		284		
Change		15		
%		106		
Correlation Coefficient		1.000		
% RMS		18.11		
GEH Total		0.9		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 11				
Count		316		
Volume		303		
Change		-13		
%		96		
Correlation Coefficient		0.741		
% RMS		36.83		
GEH Total		0.7		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	87.5	100	100	100
Screenline 12				
Count		676		
Volume		630		
Change		-46		
%		93		
Correlation Coefficient		0.996		
% RMS		11.36		
GEH Total		1.8		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	83.3	100	100	100
Screenline 13				
Count		1567		
Volume		1520		
Change		-47		
%		97		
Correlation Coefficient		0.992		
% RMS		10.64		
GEH Total		1.2		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	83.3	100	100	100
All Counts				
Count		8412		
Volume		8257		
Change		-155		
%		98		
Correlation Coefficient		0.982		
% RMS		19.57		
GEH Total		1.7		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	89.	95.1	100	100

9.3.2 Inter Peak Validation

Inter Peak Network Screenline Validation				Table 23
Screenline 1				
Count		1278		
Volume		1175		
Change		-103		
%		92		
Correlation Coefficient		0.989		
% RMS		30.74		
GEH Total		2.9		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 2				
Count		1069		
Volume		1120		
Change		51		
%		105		
Correlation Coefficient		0.841		
% RMS		28.20		
GEH Total		1.5		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 3				
Count		1122		
Volume		1187		
Change		65		
%		106		
Correlation Coefficient		0.970		
% RMS		29.52		
GEH Total		1.9		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 4				
Count		368		
Volume		316		
Change		-52		
%		86		
Correlation Coefficient		0.937		
% RMS		37.06		
GEH Total		2.8		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100

Table 23 Continued				
Screenline 5				
Count	283			
Volume	274			
Change	-9			
%	97			
Correlation Coefficient	0.488			
% RMS	38.81			
GEH Total	0.5			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 6				
Count	436			
Volume	412			
Change	-24			
%	94			
Correlation Coefficient	0.887			
% RMS	39.39			
GEH Total	1.2			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 7				
Count	260			
Volume	210			
Change	-50			
%	81			
Correlation Coefficient	0.902			
% RMS	42.14			
GEH Total	3.3			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 8				
Count	788			
Volume	774			
Change	-14			
%	98			
Correlation Coefficient	0.999			
% RMS	6.12			
GEH Total	0.5			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 9				
Count	535			
Volume	460			
Change	-75			
%	86			
Correlation Coefficient	1.000			
% RMS	25.55			
GEH Total	3.4			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100

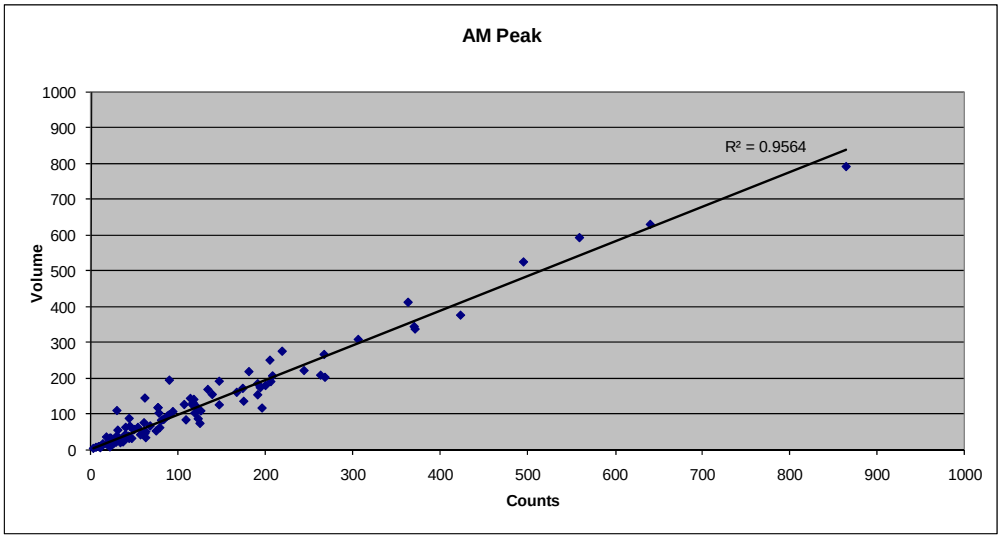
Table 23 Continued				
Screenline 10				
Count	336			
Volume	332			
Change	-4			
%	99			
Correlation Coefficient	1.000			
% RMS	37.08			
GEH Total	0.2			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 11				
Count	299			
Volume	289			
Change	-10			
%	97			
Correlation Coefficient	0.911			
% RMS	26.73			
GEH Total	0.6			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 12				
Count	611			
Volume	566			
Change	-45			
%	93			
Correlation Coefficient	0.968			
% RMS	16.06			
GEH Total	1.9			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 13				
Count	1271			
Volume	1460			
Change	189			
%	115			
Correlation Coefficient	0.994			
% RMS	19.21			
GEH Total	5.9			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
All Counts				
Count	8448			
Volume	8311			
Change	-137			
%	98			
Correlation Coefficient	0.970			
% RMS	24.91			
GEH Total	1.5			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100

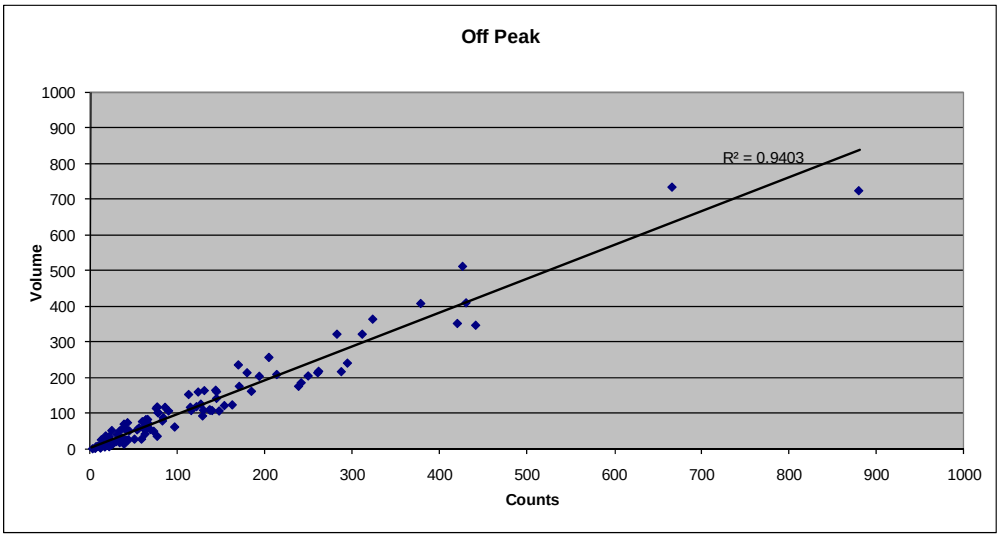
9.3.3 Evening Peak Validation

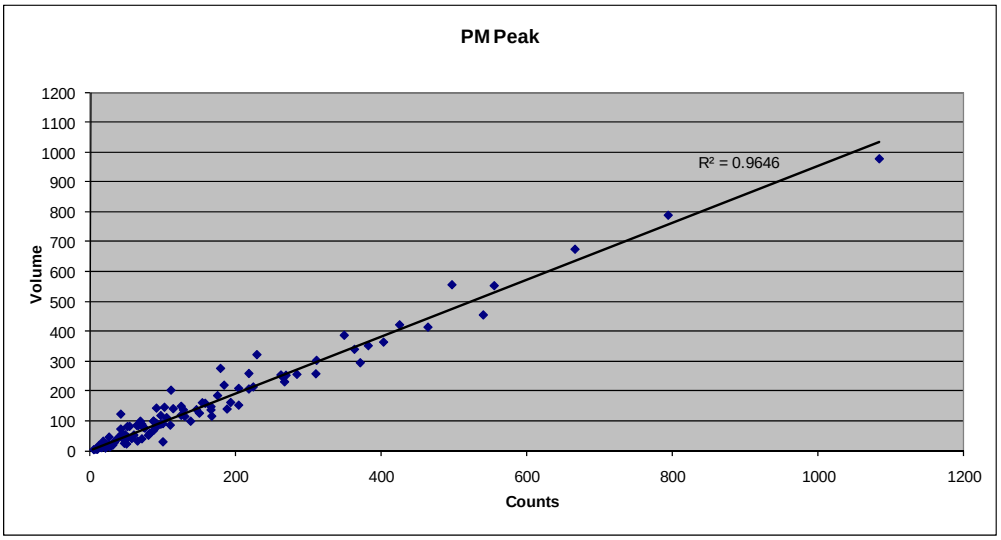
Evening Network Screenline Validation				Table 24
Screenline 1				
Count		1305		
Volume		1358		
Change		53		
%		104		
Correlation Coefficient		0.987		
% RMS		16.85		
GEH Total		1.5		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	87.5	100	100	100
Screenline 2				
Count		1260		
Volume		1344		
Change		84		
%		107		
Correlation Coefficient		0.775		
% RMS		32.72		
GEH Total		2.3		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	85.7	92.9	100	100
Screenline 3				
Count		1346		
Volume		1499		
Change		153		
%		111		
Correlation Coefficient		0.975		
% RMS		30.98		
GEH Total		4.1		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	94.4	100	100	100
Screenline 4				
Count		520		
Volume		421		
Change		-99		
%		81		
Correlation Coefficient		0.984		
% RMS		34.47		
GEH Total		4.6		
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100

Table 24 Continued				
Screenline 5				
Count	347			
Volume	325			
Change	-22			
%	94			
Correlation Coefficient	-0.505			
% RMS	39.02			
GEH Total	1.2			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 6				
Count	527			
Volume	519			
Change	-8			
%	98			
Correlation Coefficient	0.960			
% RMS	27.61			
GEH Total	0.3			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 7				
Count	309			
Volume	269			
Change	-40			
%	87			
Correlation Coefficient	0.923			
% RMS	42.51			
GEH Total	2.4			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	83.3	83.3	100	100
Screenline 8				
Count	959			
Volume	965			
Change	6			
%	101			
Correlation Coefficient	1.000			
% RMS	2.28			
GEH Total	0.2			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 9				
Count	684			
Volume	589			
Change	-95			
%	86			
Correlation Coefficient	1.000			
% RMS	25.28			
GEH Total	3.8			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100

Table 24 Continued				
Screenline 10				
Count	358			
Volume	392			
Change	34			
%	109			
Correlation Coefficient	1.000			
% RMS	30.03			
GEH Total	1.8			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 11				
Count	362			
Volume	311			
Change	-51			
%	86			
Correlation Coefficient	0.947			
% RMS	26.00			
GEH Total	2.8			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 12				
Count	874			
Volume	784			
Change	-90			
%	90			
Correlation Coefficient	1.000			
% RMS	14.62			
GEH Total	3.1			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
Screenline 13				
Count	1965			
Volume	1906			
Change	-59			
%	97			
Correlation Coefficient	0.998			
% RMS	12.36			
GEH Total	1.3			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	100	100	100	100
All Counts				
Count	10564			
Volume	10340			
Change	-218			
%	98			
Correlation Coefficient	0.983			
% RMS	19.96			
GEH Total	2.1			
GEH Link Grouping	<5	<7	<10	<12
% in GEH Group	96.1	98	100	100







GGS Transportation Model	**Scatterplots of All 2006 Counts for Morning Peak, Interpeak and Evening Peak**	**Figure 11**
Gabites Porter		

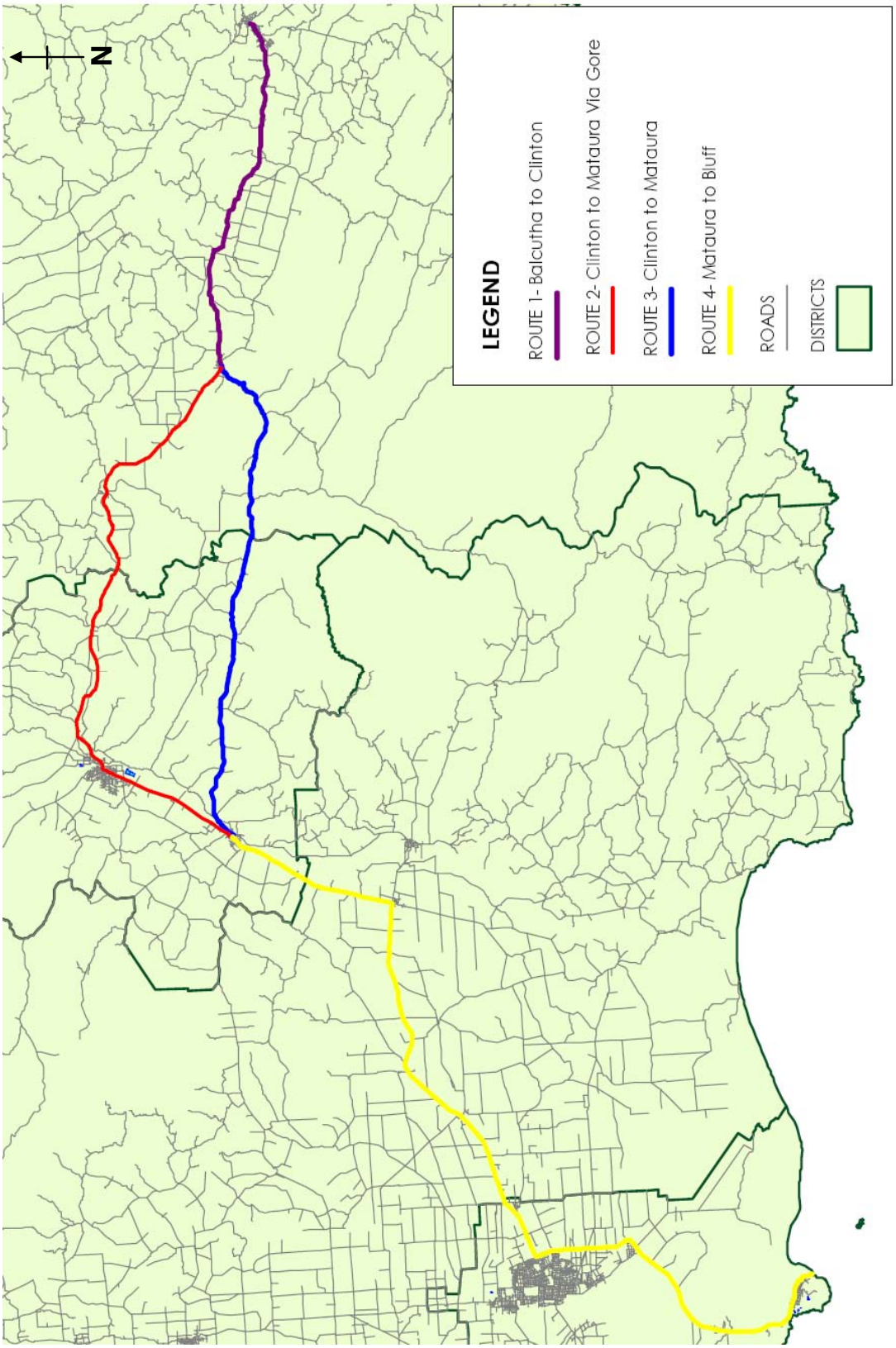
9.3.4 Travel Time Validation

One of the primary uses of a transportation model is to compare the network operation of one roading scenario to another. To do this, travel times on the network and the corresponding vehicle operating costs are looked at. These then form an integral part of any economic assessment for benefit/cost analysis.

Hence, to have confidence in a model, it must realistically estimate the observed travel times on the road network. To validate this, surveys of the travel time for a vehicle over a set path or journey, taking into account both travel speed and delays at intersections, are performed. The resulting average speed over the journey is then compared to the modelled speed for the same journey. It must be remembered that the model is representing an "average weekday" situation. When surveying on any particular day there are many factors that may affect traffic flows such as accidents, weather, faulty traffic signals and road works. Hence surveyed values are in themselves only an approximation.

During the course of the study, floating car travel time surveys were undertaken to establish vehicle speeds on the road network. Four routes were selected for the floating car travel time survey, which are illustrated in **Figure 12**. The vehicle travelled at a speed reflective of the average speed of the other vehicles and followed the general procedure for car following i.e. neutral regarding overtaking or being overtaken. This allowed the calculation of an average speed for each route in each direction. The comparison between survey and model results is included in **Table 25.**

It should be noted that the link types used along the routes of the travel time surveys were not adjusted to reflect the surveyed speeds except for a short semi-urdan length of SH1 outside of Gore. This indicates that traffic in the rural areas of the model are operating at near posted speed limit speeds.



GGS Transportation Model	**Travel Time Survey Routes**	**Figure 12**
Gabites Porter		

Travel Time Survey and Model Results (in minutes)							Table 25
From	To	Surveyed			Modelled		
		Average	95% Lower CI	95% Upper CI	AMPK	OFPK	PMPK
Route 1 - SH1 Balclutha to Clinton (sample = 6 each direction) = 32.4km							
Balcutha - Smith St	Clinton - Gore Rd	**24**	23.0	24.4	23.8	23.6	23.8
Clinton - Gore Rd	Balcutha - Smith St	**24**	23.2	24.6	23.7	23.9	24.0
Route 2 – Clinton to Mataura via Gore (sample = 3 each direction) = 53.1km							
Clinton - Gore Rd via Gore	Gore - River St	**28**	27.0	29.3	28.1	28.1	28.0
Gore - River St	Mataura - Bridge St	**10**	9.5	10.9	10.2	10.2	10.3
Total		**38**	**37.1**	**39.7**	**38.4**	**38.3**	**38.3**
Mataura - Bridge St	Gore - River St	**10**	10.0	10.6	10.2	10.3	10.3
Gore - River St	Clinton - Gore Rd	**28**	27.3	29.4	27.9	28.1	28.2
Total		**39**	**36.9**	**40.4**	**38.2**	**38.4**	**38.5**
Route 3 - Clinton to Mataura (sample = 3 each direction) = 43.2km							
Clinton - Gore Rd	Mataura - Bridge St	**30**	28.6	30.6	28.7	28.7	28.7
Route 4 – Mataura to Bluff (sample = 6 each direction) = 77.0km							
Mataura - Bridge St	Edendale Corner	**10**	9.9	10.7	10.2	10.1	10.2
Edendale Corner	Rockdale Corner	**23**	22.4	23.4	22.7	22.6	22.6
Rockdale Corner	Motu Rimu Rd	**8**	7.6	8.1	7.8	7.8	7.8
Motu Rimu Rd	Bluff - Foreshore Rd	**13**	13.0	13.6	13.2	13.2	13.2
Total		**54**	**53.6**	**55.1**	**54.0**	**53.7**	**53.8**
Bluff - Foreshore Rd	Motu Rimu Rd	**13**	12.6	13.7	13.3	13.3	13.3
Motu Rimu Rd	Rockdale Rd	**9**	7.4	10.1	7.9	7.9	8.0
Rockdale Rd	Edendale Corner	**22**	21.9	22.9	22.4	22.5	22.7
Edendale Corner	Mataura - Bridge St	**10**	10.0	10.4	10.1	10.2	10.3
Total		**54**	**53.1**	**55.8**	**53.8**	**53.9**	**54.3**

9.4 HGV Validation

Table 26 summarises the Heavy Goods vehicle validation for all periods. Appendix 4 contains the output files. The locations of the count sites are displayed on **Figure 10** with an "H" symbol.

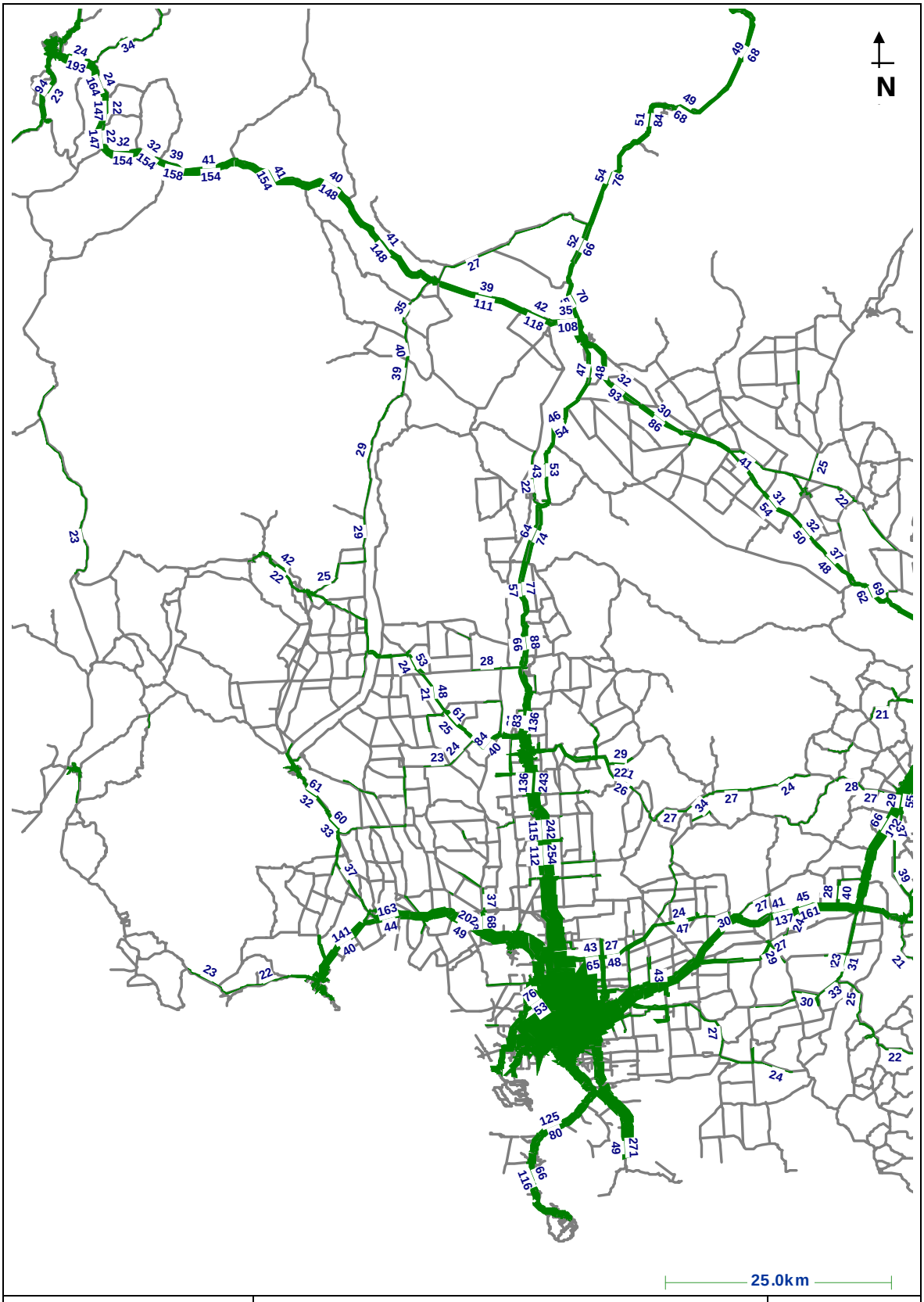
Heavy Vehicle Goods Validation Results						Table 26
	Count			Modelled		
SH COUNT LOCATION	AMPK	OFPK	PMPK	AMPK	OFPK	PMPK
Invercargill Nth of Rockdale Rd 01S00919	48	55	36	70	64	46
Invercargill Nth of Awarua Radio St 01S00935	36	31	14	38	34	24
Balclutha Te Houka 01S00791	9	13	13	24	22	16
GORE - Telemetry Site 45 01S00854	35	37	32	34	32	24
Past Saleyards Rd 01S00863	47	32	36	58	54	40
Nth Tapanui-past Heriot Rd 09000026	15	11	10	4	4	3
01S00899Dacre near transmitting station	13	11	18	20	18	14
00601147WINTON - Telemetry Site 46	55	44	37	37	34	24
Mid Dome 00601086	17	9	11	14	16	9
Nth Milburn-before Lime Works Rd 01S00755	74	65	46	66	62	47
Dipton 00601117	21	18	20	10	10	7
Total	**370**	**326**	**273**	**375**	**350**	**254**
Change				5	24	-19
Percentage				**101**	**107**	**93**
GEH				0.3	1.3	1.2

10. RESULTS

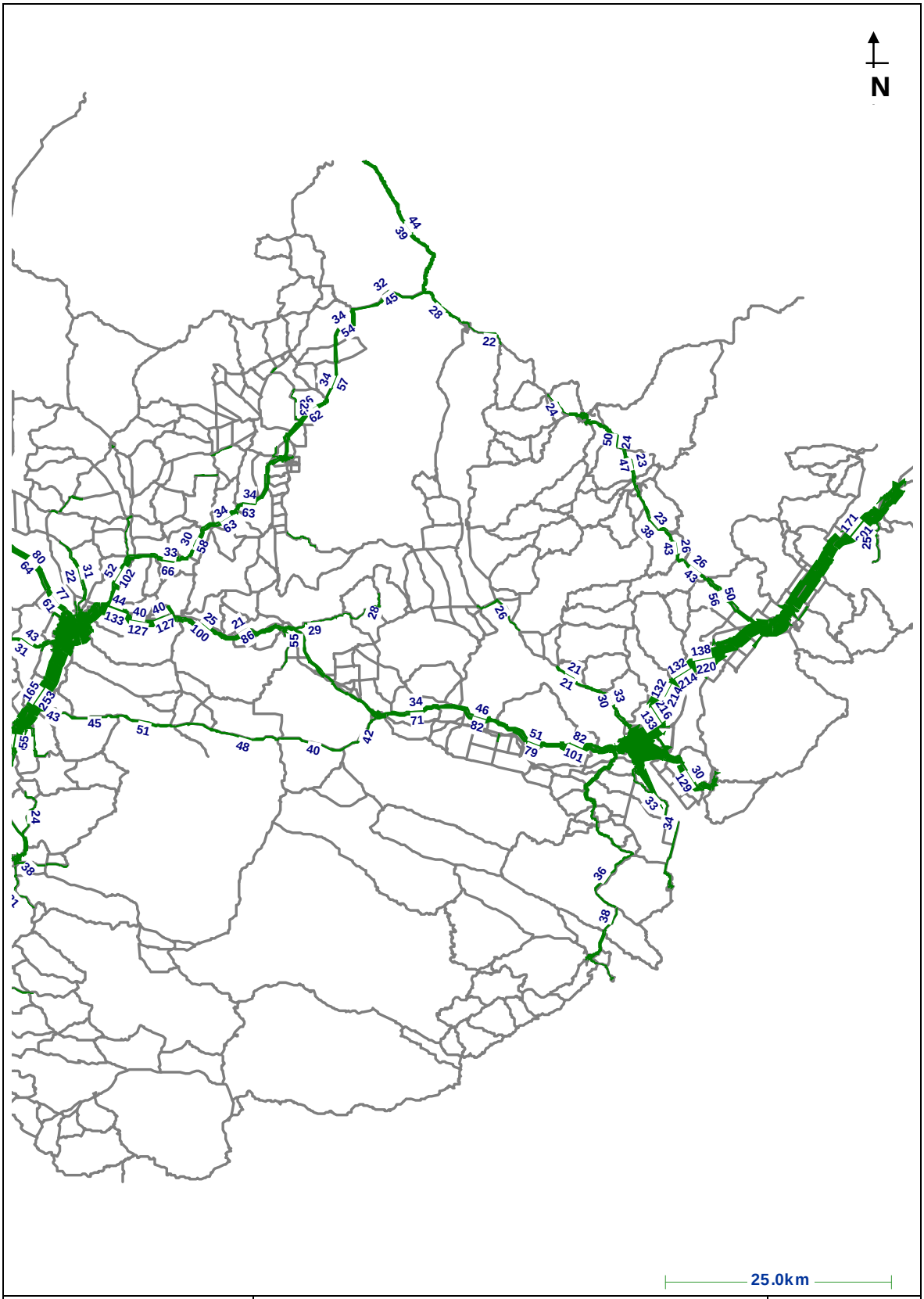
10.1 Traffic Volume and Levels of Service Plots

This section presents traffic volumes and levels of service (LOS) plots illustrating results from the assignment. Traffic volumes plots are presented in **Figure 13** to **Figure 20** and LOS plots are presented in **Figure 21** to **Figure 26**. Highway Capacity Manual LOS boundaries have been applied as specified in **Appendix Five**. Intersections and links with LOS C or worse are documented in this section.

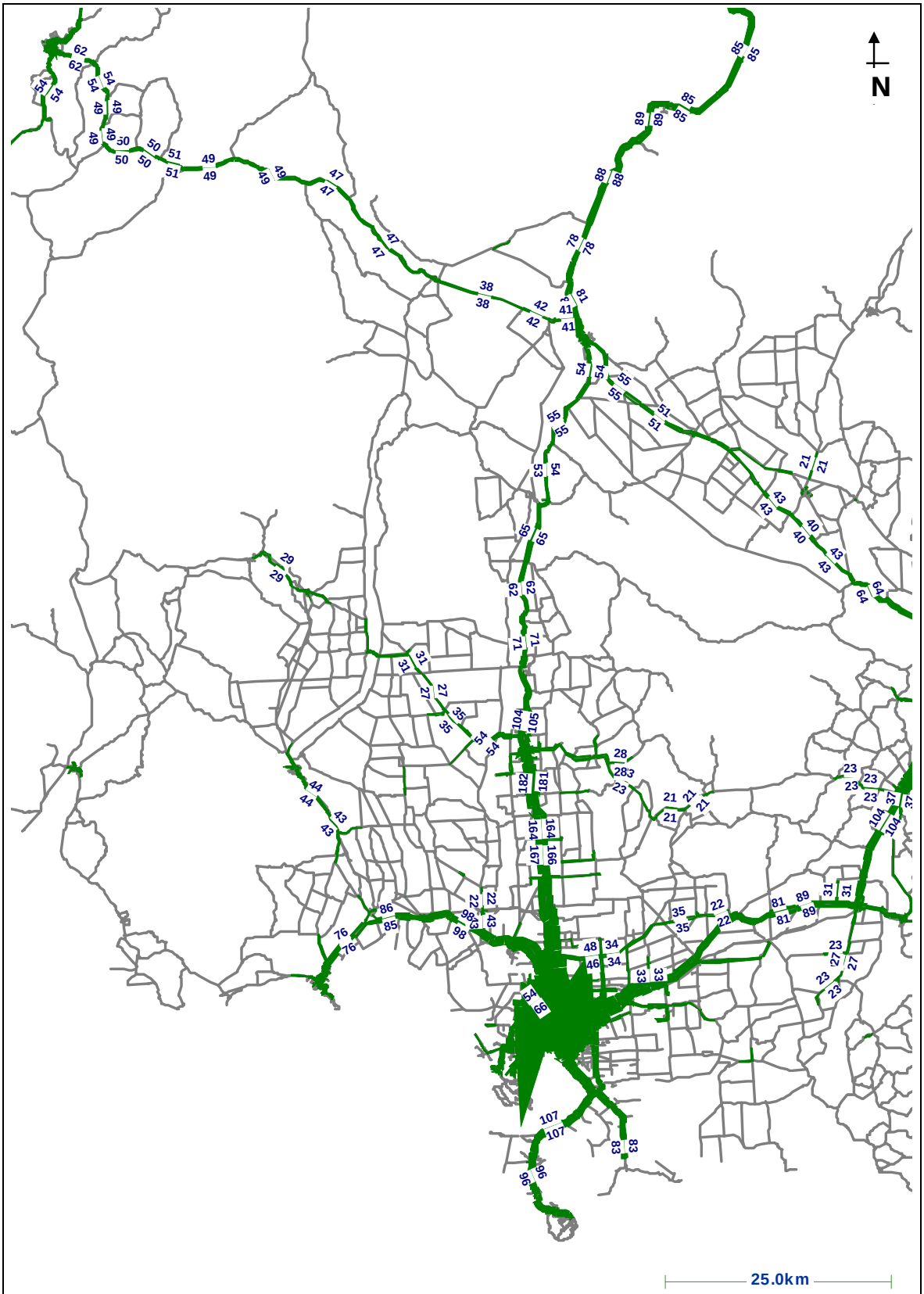
Results show low levels of congestion across the study area with the worst affected junctions on the State Highway network only reaching a LOS C during all periods. Only a few junctions within Invercargill reach a LOS D during the morning peak, and E during the interpeak and evening peak.



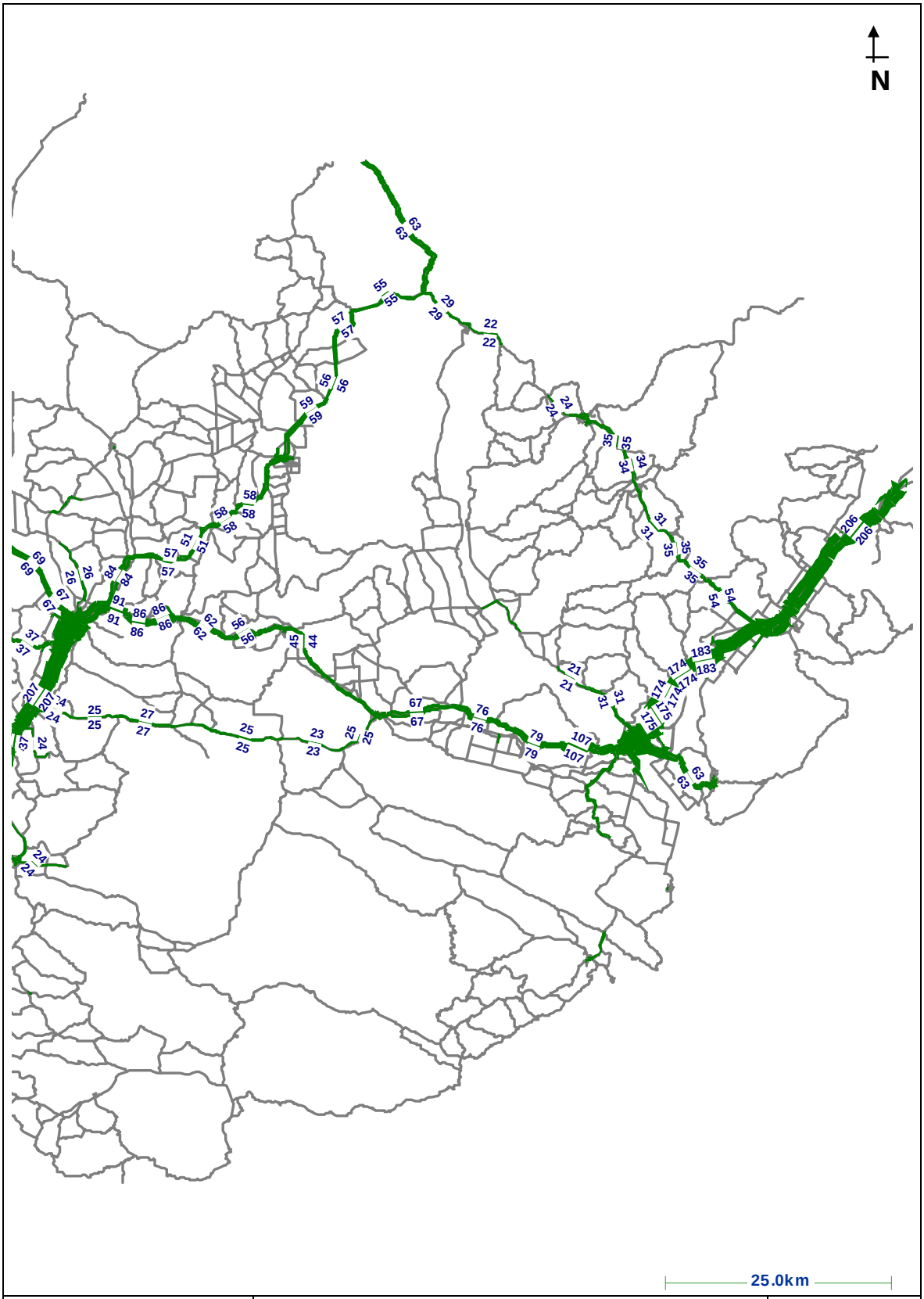
GGS Transportation Model	**Traffic Volumes – West Area 2006 AMP**	**Figure 13**
Gabites Porter		



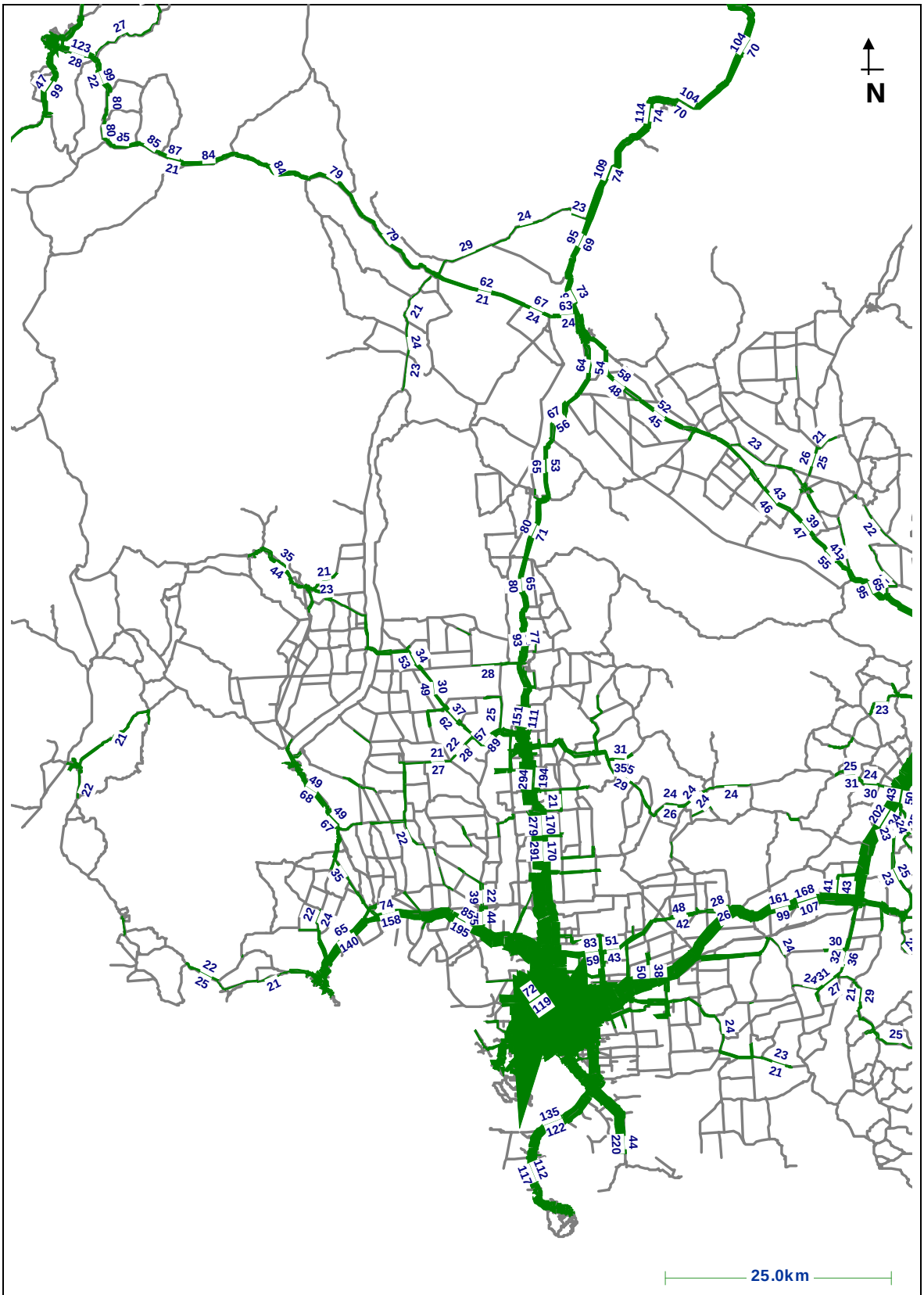
GGS Transportation Model	**Traffic Volumes – East Area 2006 AMP**	**Figure 14**
Gabites Porter		



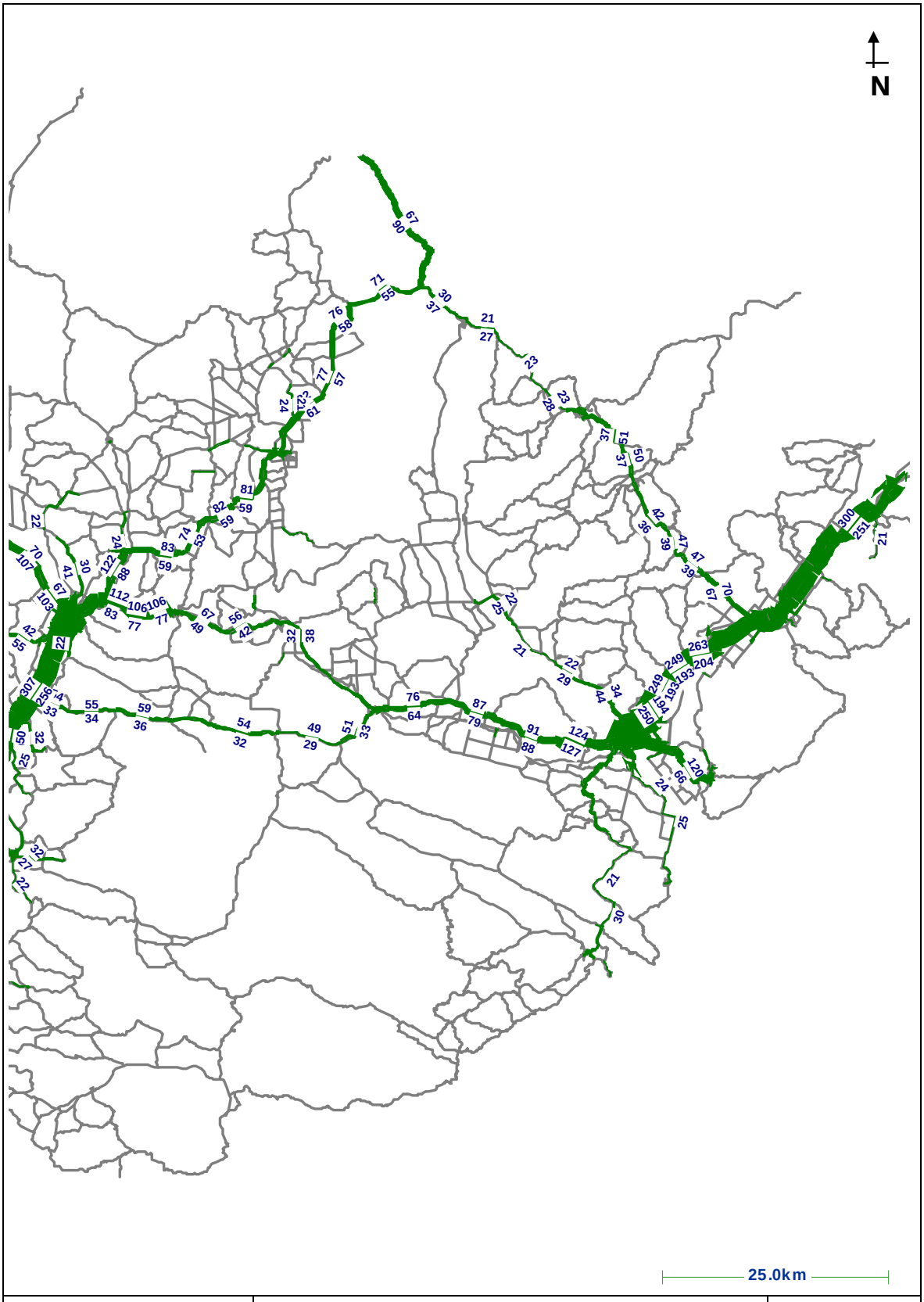
GGS Transportation Model	**Traffic Volumes – West Area 2006 INP**	**Figure 15**
Gabites Porter		



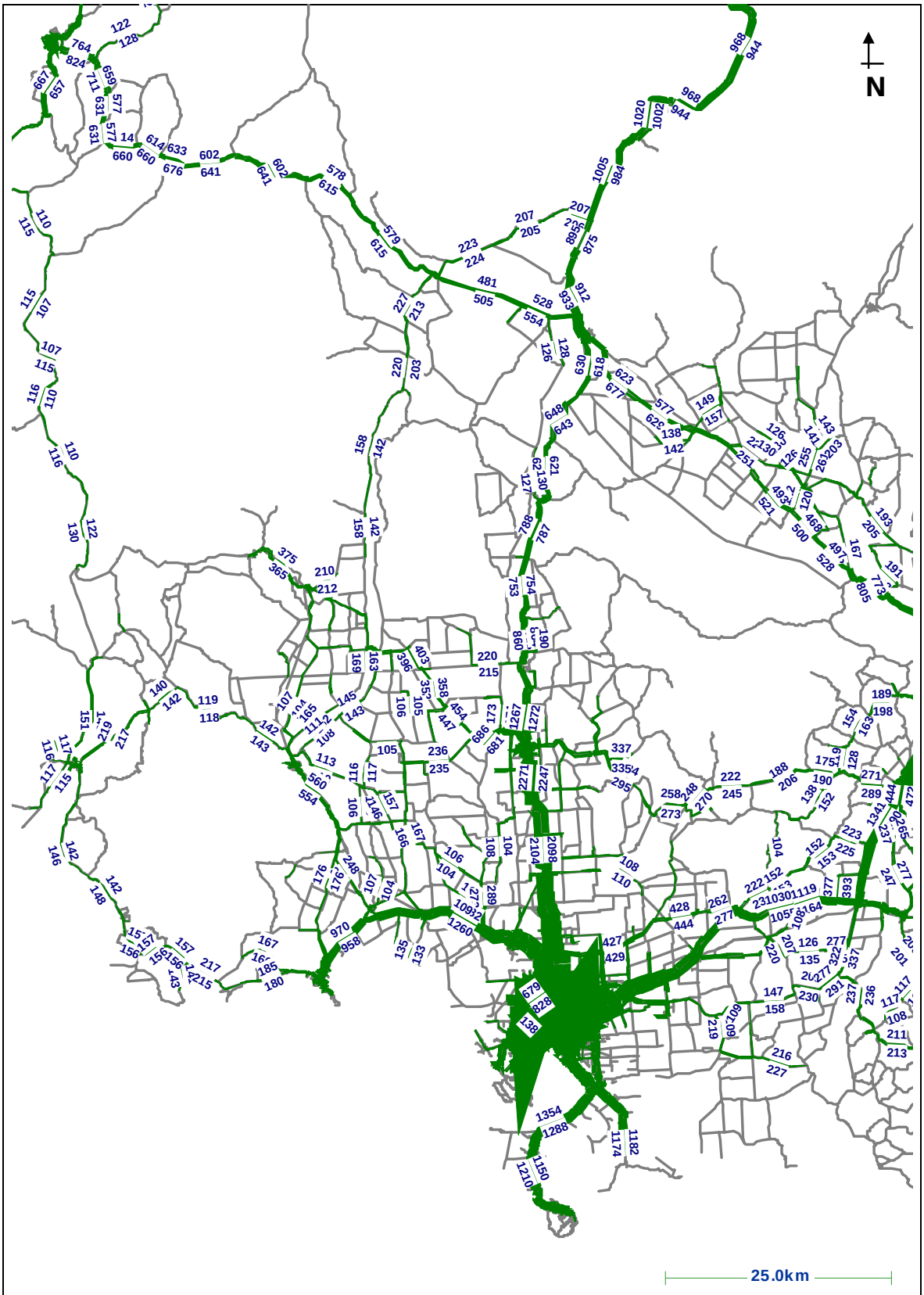
GGS Transportation Model	**Traffic Volumes – East Area 2006 INP**	**Figure 16**
Gabites Porter		



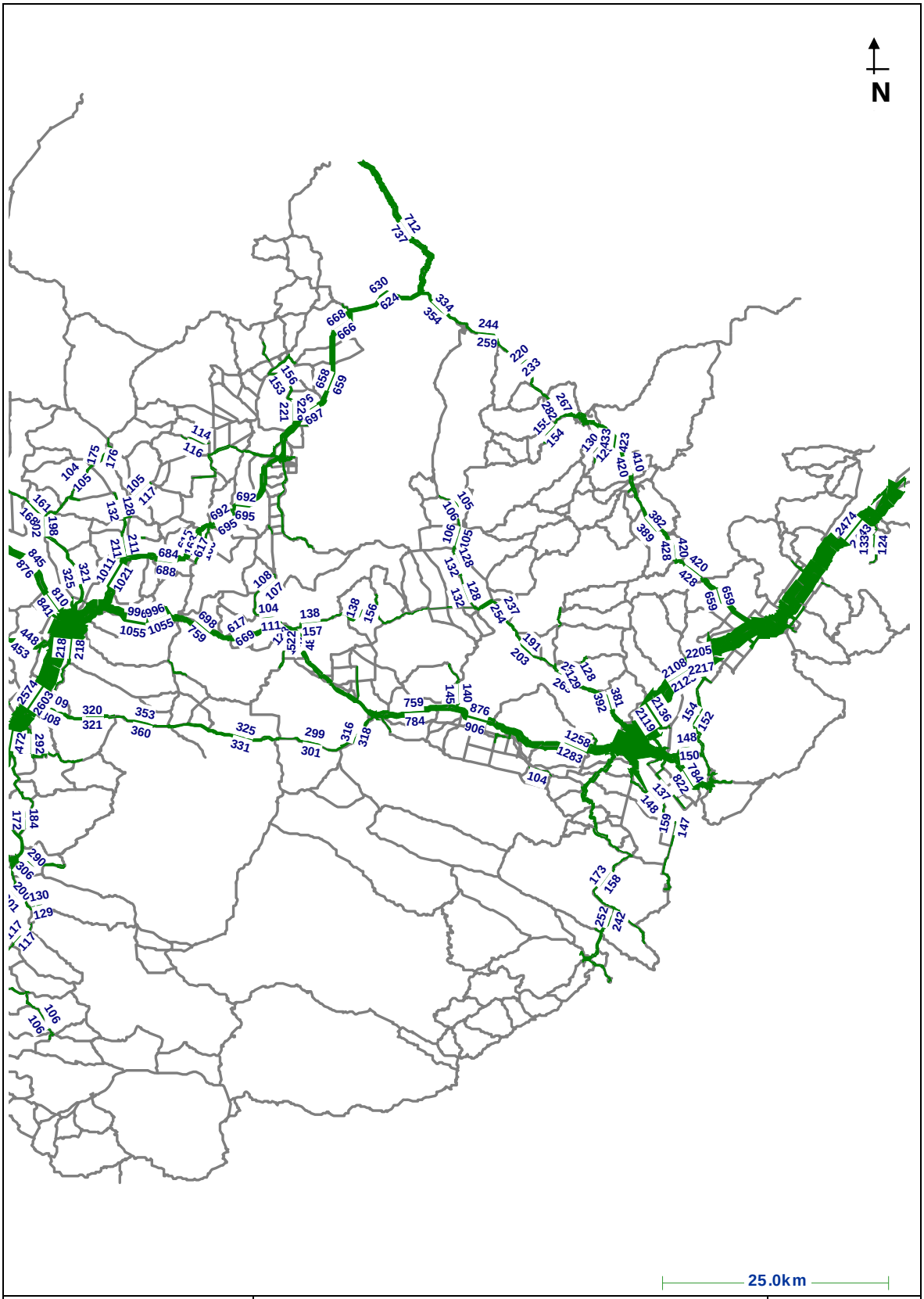
GGS Transportation Model	**Traffic Volumes – West Area 2006 PMP**	**Figure 17**
Gabites Porter		



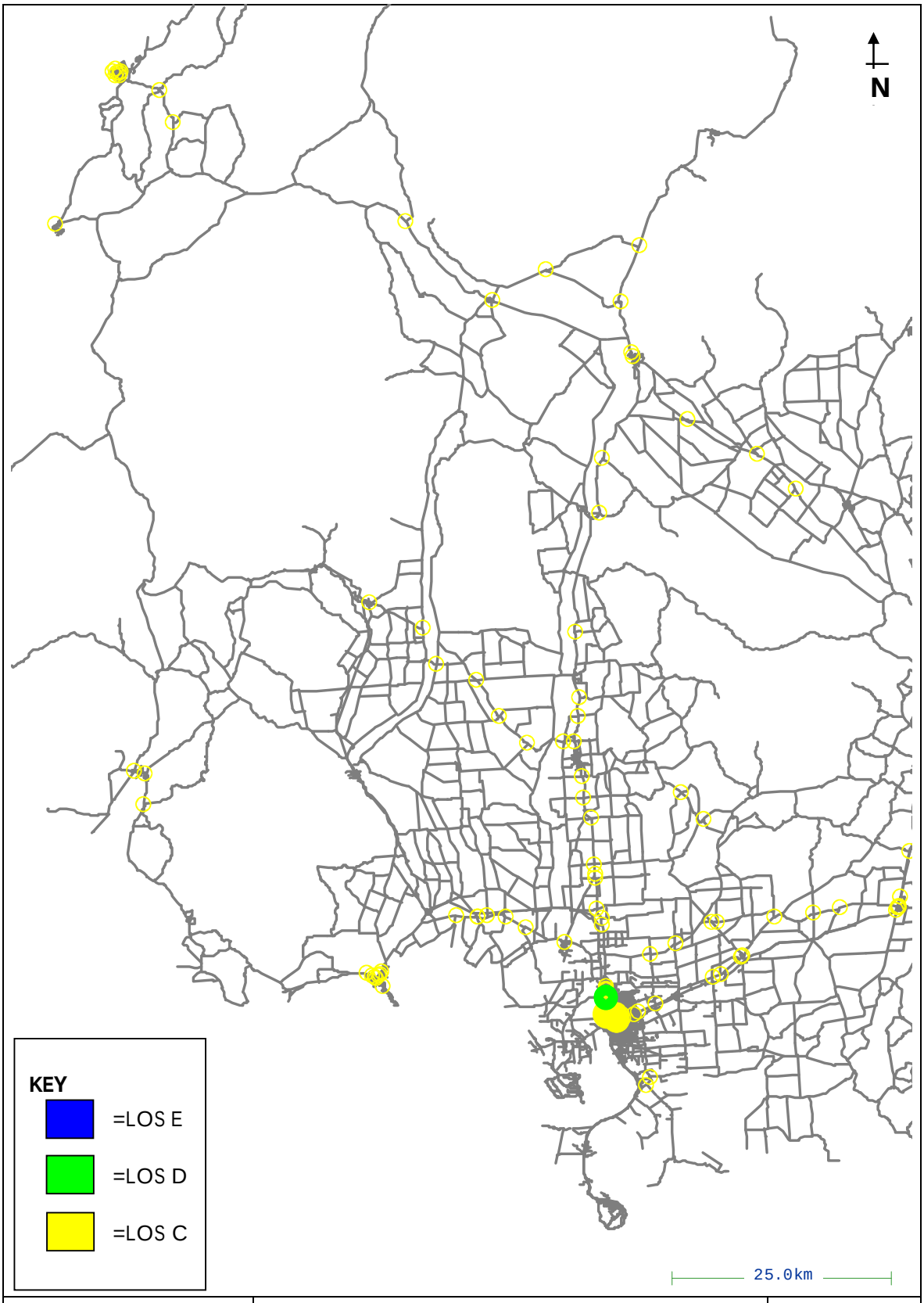
GGS Transportation Model	**Traffic Volumes – East Area 2006 PMP**	**Figure 18**
Gabites Porter		



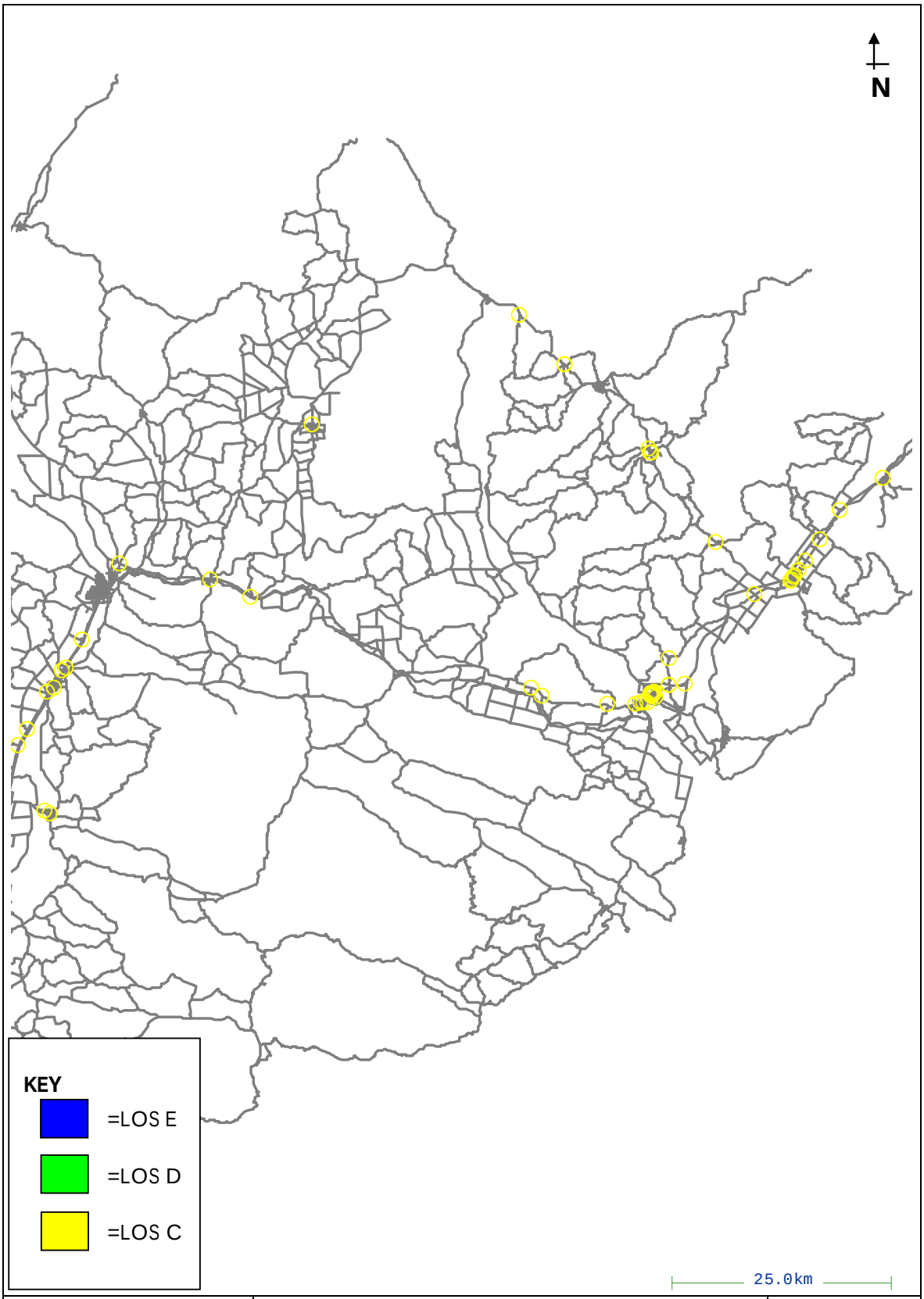
GGS Transportation Model	**Traffic Volumes – West Area 2006 24HR**	**Figure 19**
Gabites Porter		



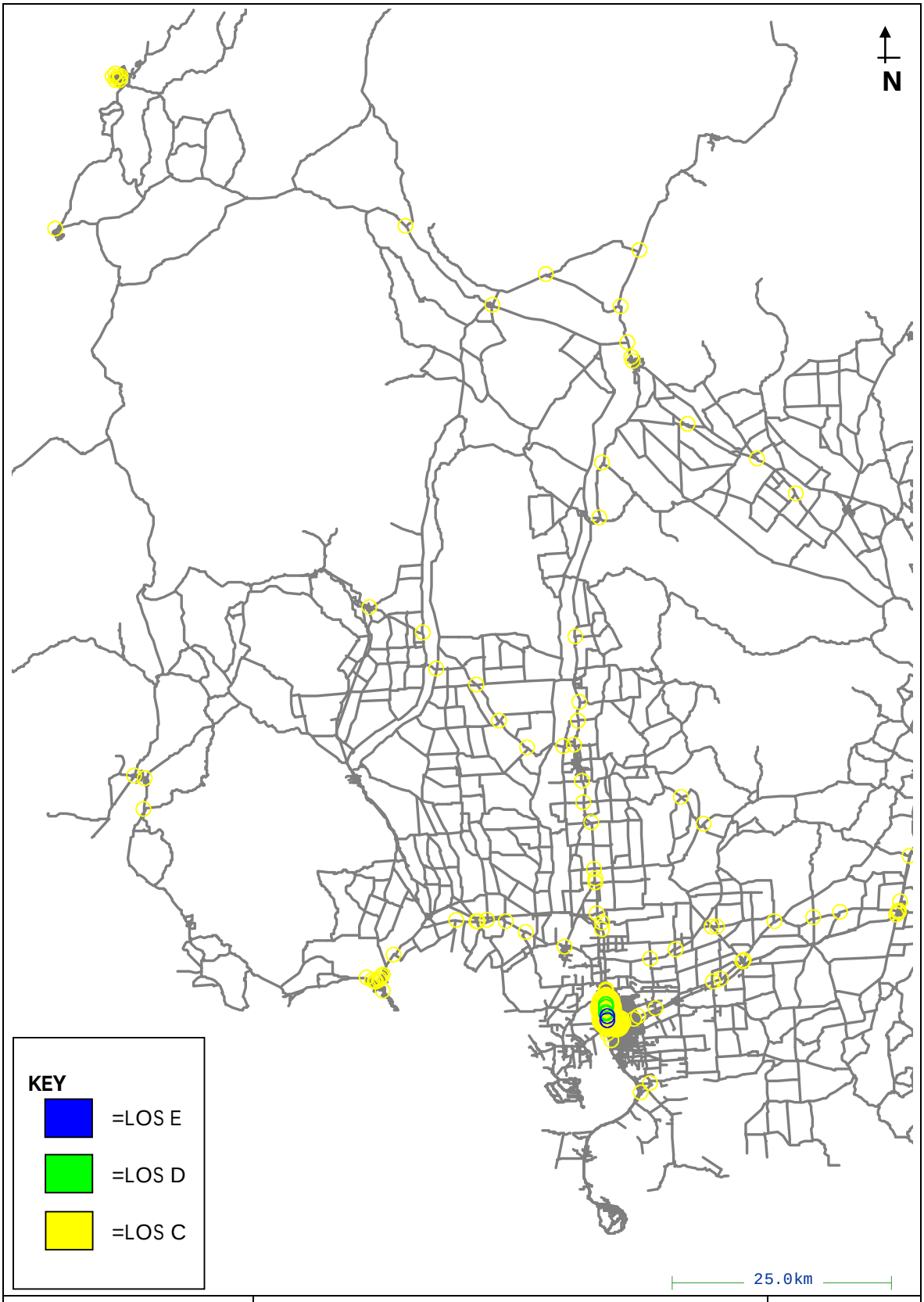
GGS Transportation Model	**Traffic Volumes – East Area 2006 24HR**	**Figure 20**
Gabites Porter		



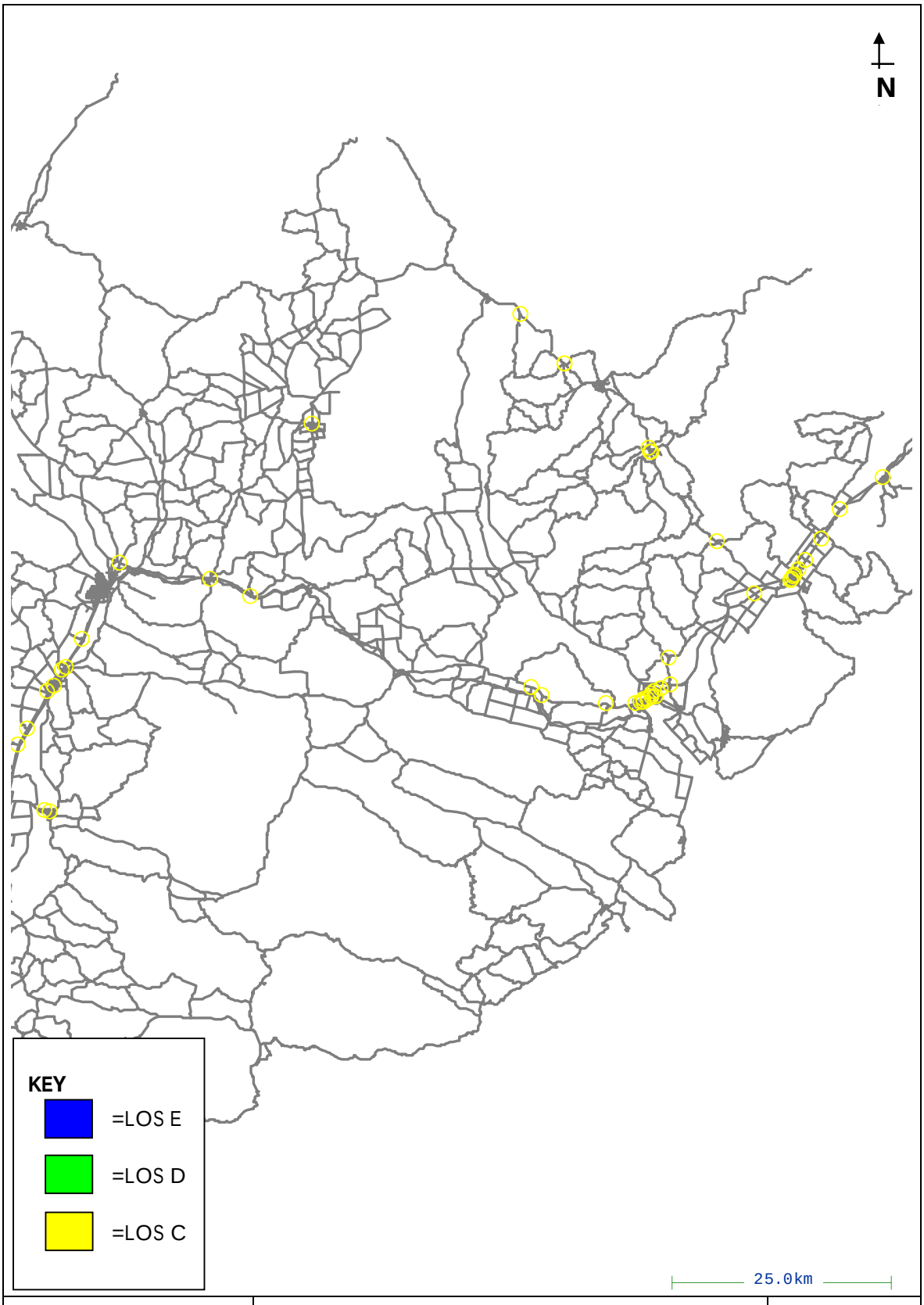
GGS Transportation Model	**Levels of Service – West Area 2006 AMP**	**Figure 21**
Gabites Porter		



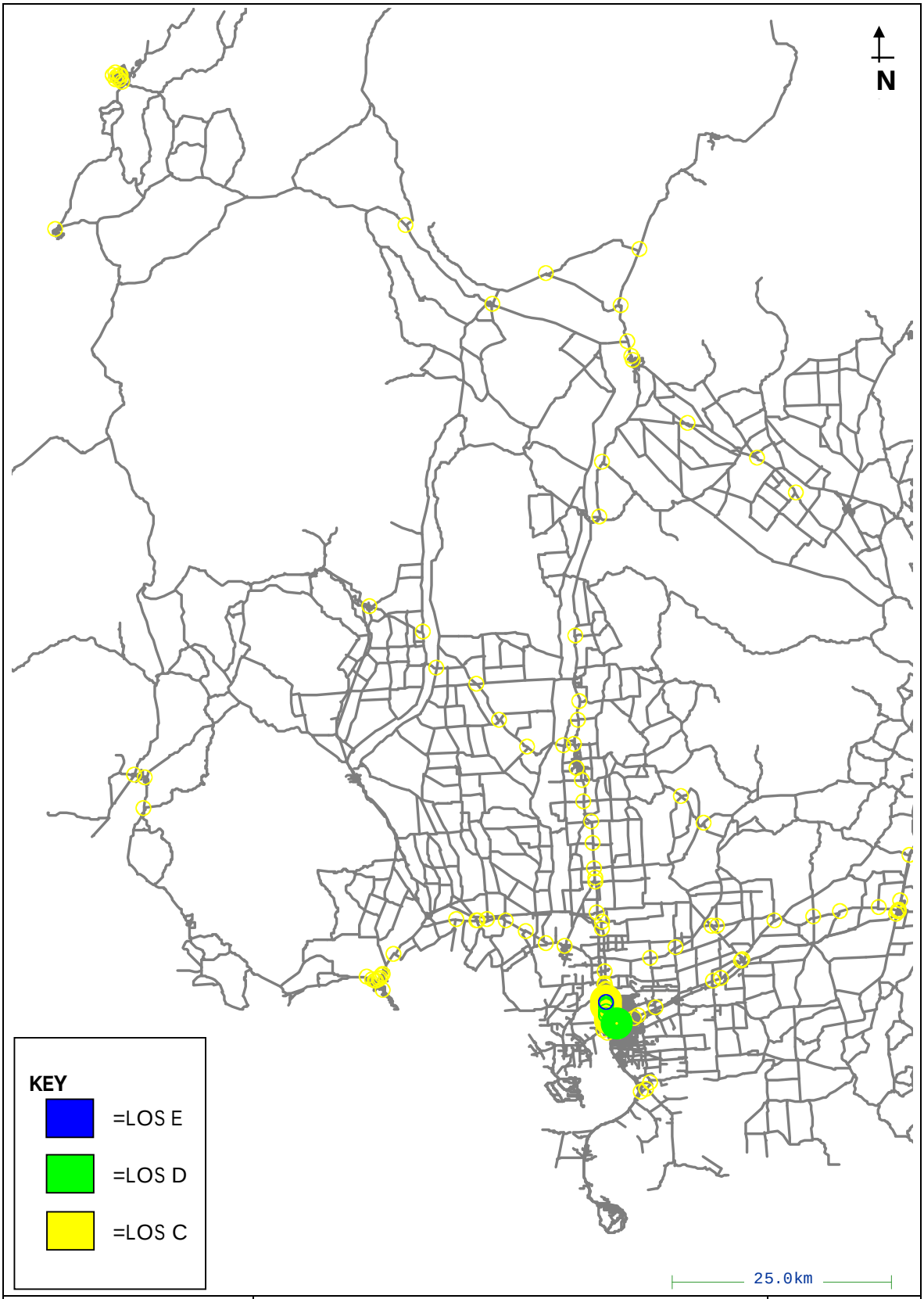
GGS Transportation Model	**Levels of Service – East area 2006 AMP**	**Figure 22**
Gabites Porter		



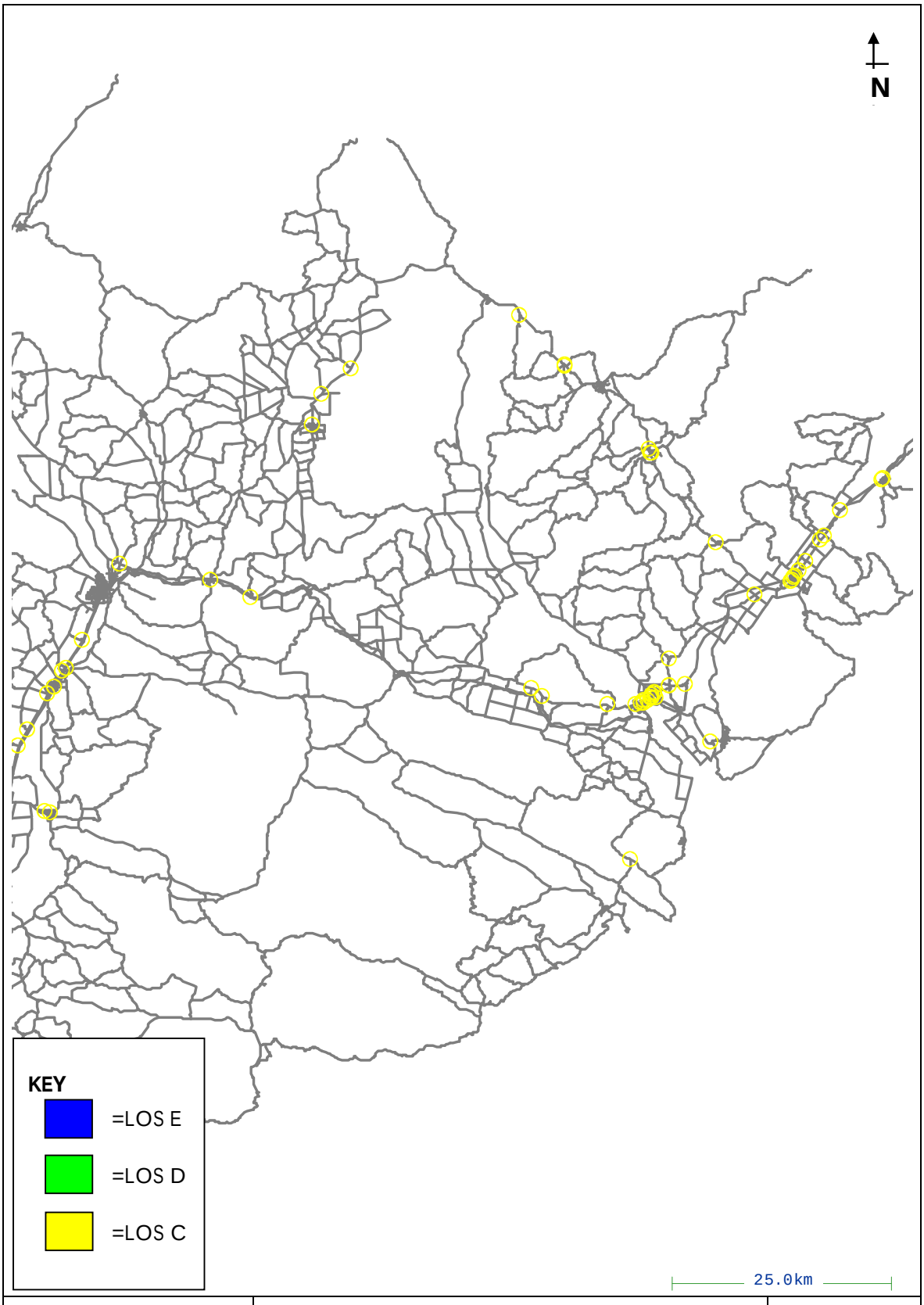
GGS Transportation Model	**Levels of Service – West Area 2006 INP**	**Figure 23**
Gabites Porter		



GGS Transportation Model	**Levels of Service – East area 2006 INP**	**Figure 24**
Gabites Porter		



GGS Transportation Model	**Levels of Service – West Area 2006 PMP**	**Figure 25**
Gabites Porter		



GGS Transportation Model	**Levels of Service – East area 2006 PMP**	**Figure 26**
Gabites Porter		

11. CONCLUSION

The 2006 Gore Growth Study (GGS) Transportation Model has three independent time periods – Morning Peak, Interpeak and Evening Peak – to model changes in travel patterns during the day and to conform to the NZTA Economic Evaluation Manual (EEM). Furthermore, the modelling process integrates the assigning of traffic at intersections and calculates delays by specific turning movements.

The 2006 GGS 3-Step Transportation Model developed by Gabites Porter:

- Has been developed using TRACKS, which is the proprietary land use and transport planning software developed, maintained and marketed by Transportation and Traffic Systems Ltd.
- Consists of 980 zones, with 833 zones utilised as internal zones to reflect the appropriate landuse.
- Covers the Gore and Clutha Districts and most of the Southland region, including Invercargill.
- Includes trips made by private and commercial vehicles ; and
- Has followed these stages of development: vehicle driver trip generation, distribution and assignment.

Overall, the 2006 GGS traffic model has been validated to the levels required by the Land Transport NZ Economic Evaluation Manual (EEM) guidelines for overall validation. across the three modelled periods are in compliance with the EEM requirements. The guidelines specify that the majority of screenlines must have GEH values of below 4, and a total of 36 out of 39 tested screenlines meet this requirement.

Additional validation of travel times across the key State Highway and heavy vehicle bypass routes show that the model time lie within calculated confidence intervals for travel time in each modelled period. Heavy goods vehicle volumes have also been validated for each period at key State Highway locations.

This model will provide a useful indication of demands, travel patterns and traffic impacts in the study area. It is suitable for the broad assessment of travel patterns in the area, and as such is capable of meeting strategic-level transport modelling demands.

For specific area projects and assessments for plan changes in particular locations, it is recommended that model refinement and Local Area Validation should be considered in order to achieve an appropriate level of detail for the model application. The model outputs may need to be considered in conjunction with other forms of information and assessment in order to capture a full picture.

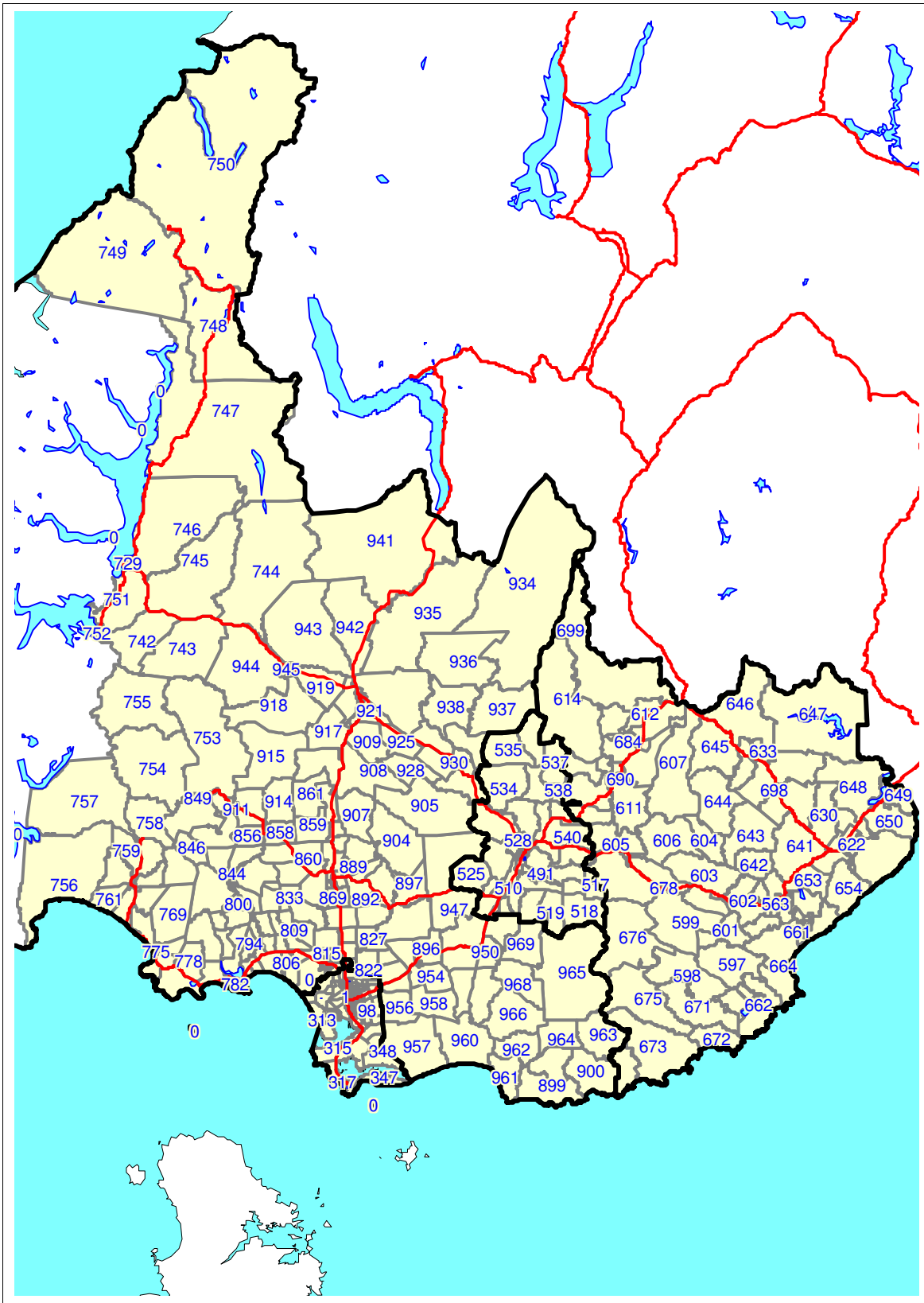
No intersection turning movements survey has been completed, however it is suggested that this should be considered where appropriate for specific model applications.

APPENDICES

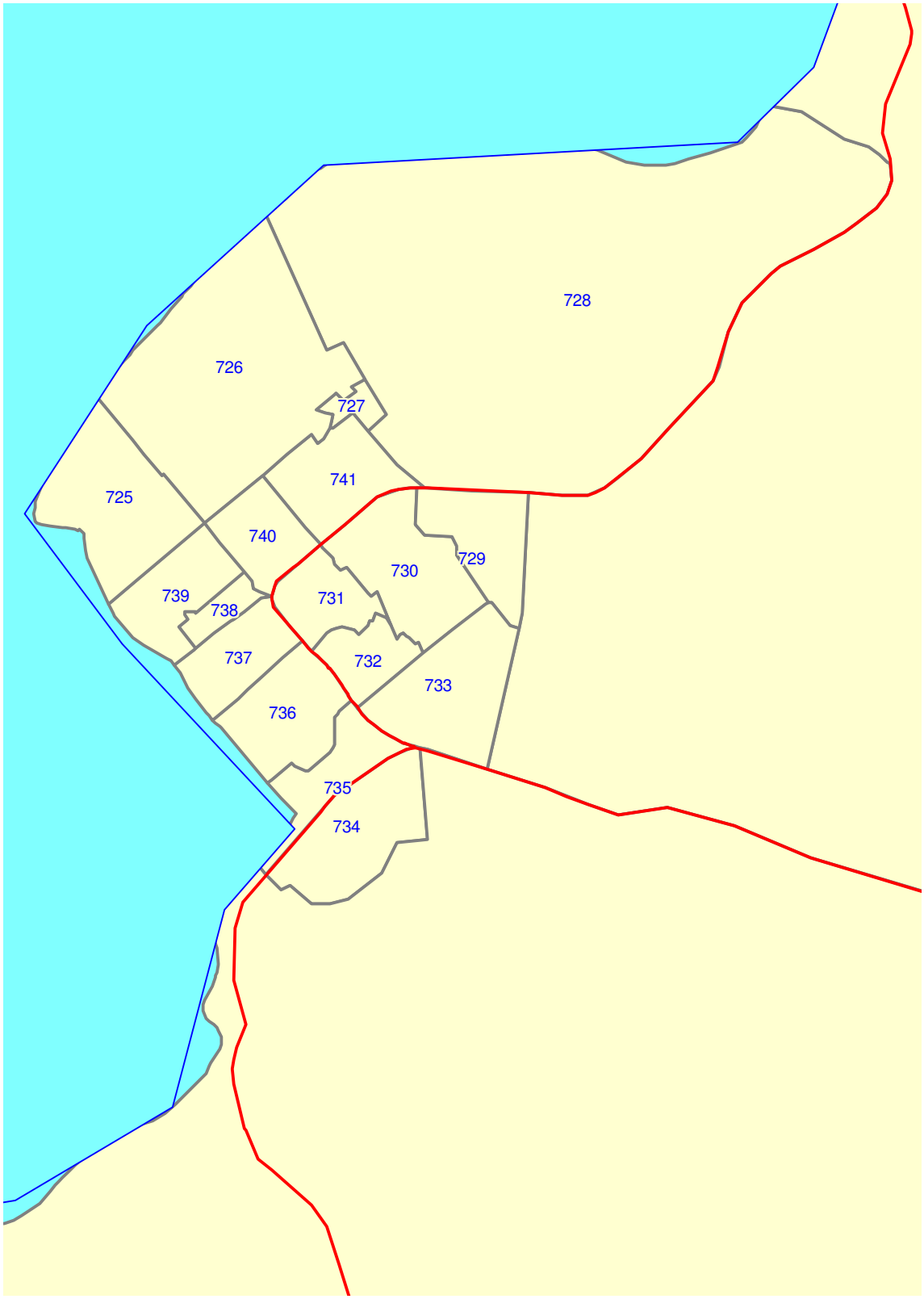
1. Study Area Zone Structure
2. Zone to Meshblock Lookup Tables
3. 2006 Landuse Zone Files
4. Screenline Validation Output Files
5. LOS Criteria



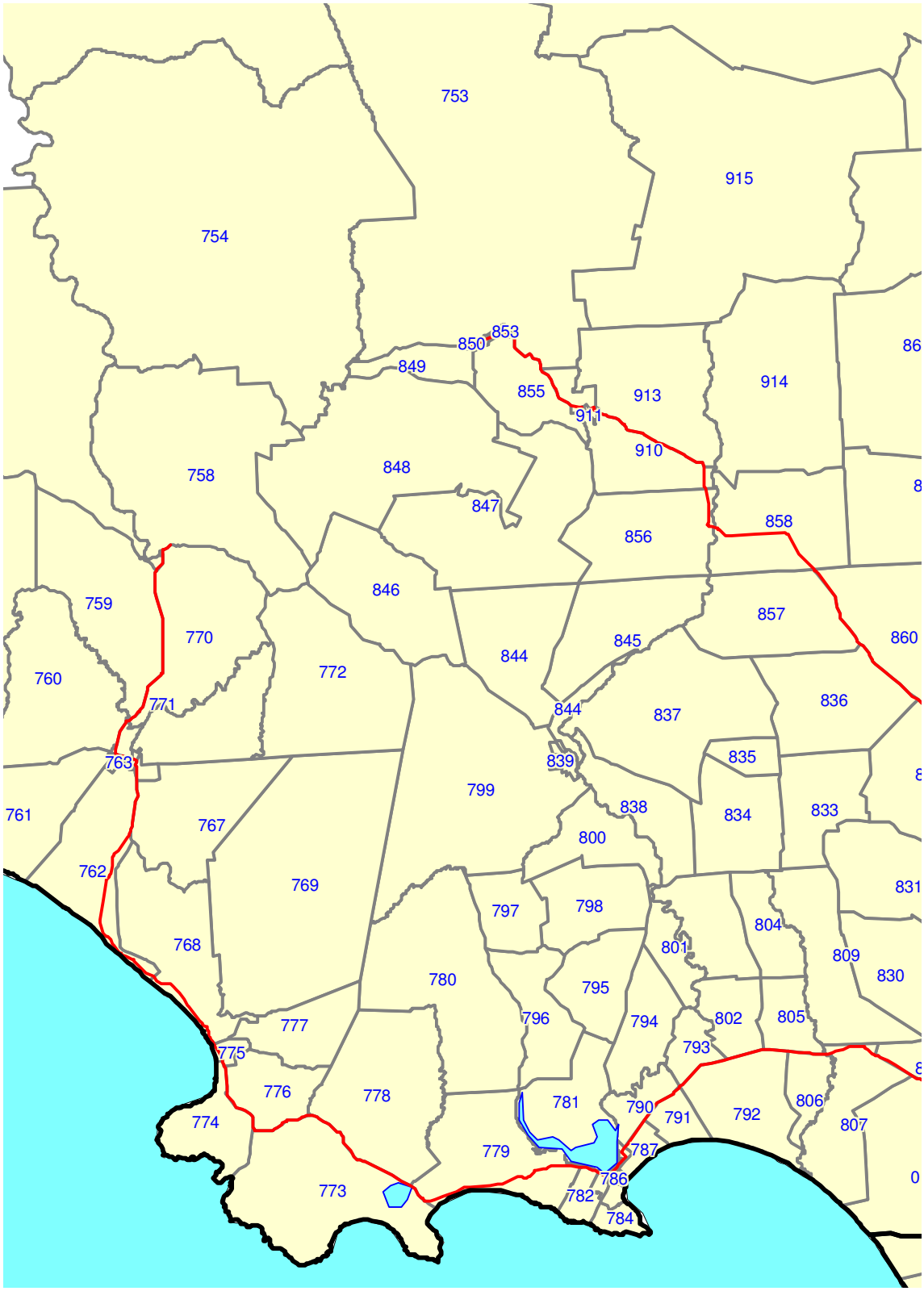

APPENDIX ONE
Study Area Zone Structure



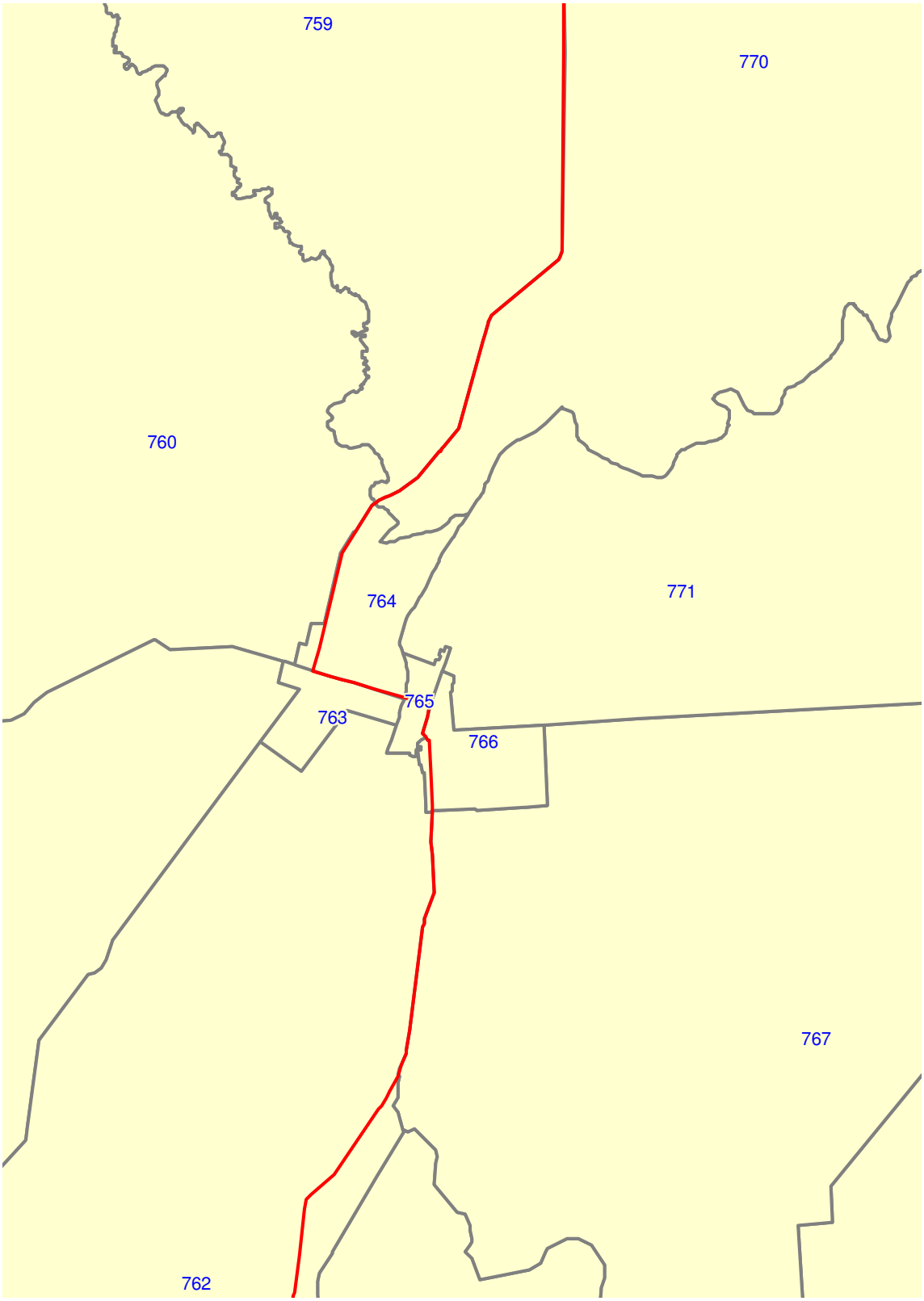
GGS Transportation Model	**ZONES**	**Figure 1**
Gabites Porter	**Overview**	



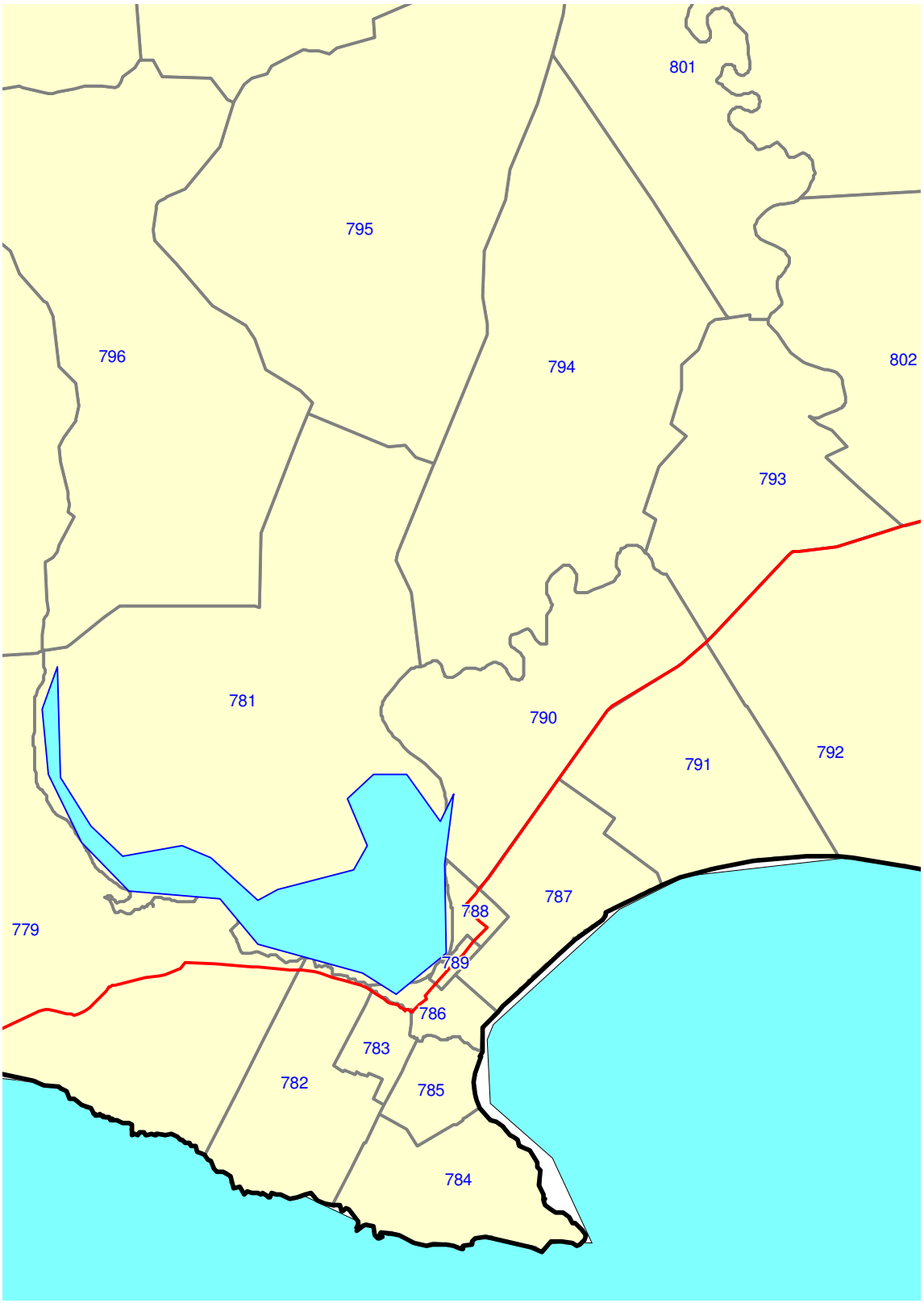
GGS Transportation Model	**ZONES** **Te Anau**	**Figure 2**
Gabites Porter		



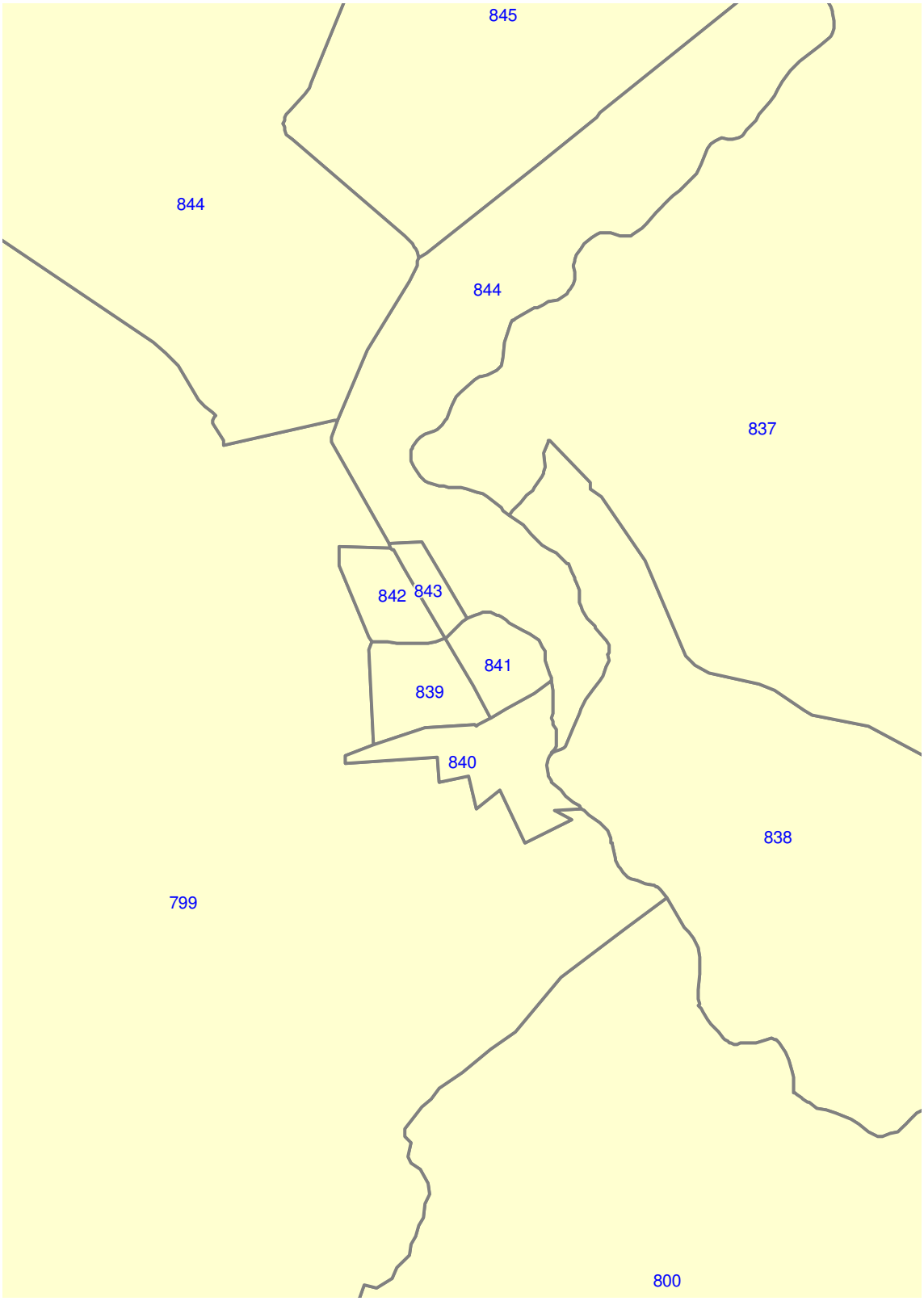
GGS Transportation Model	**ZONES** **South West Overview**	**Figure 3**
Gabites Porter		



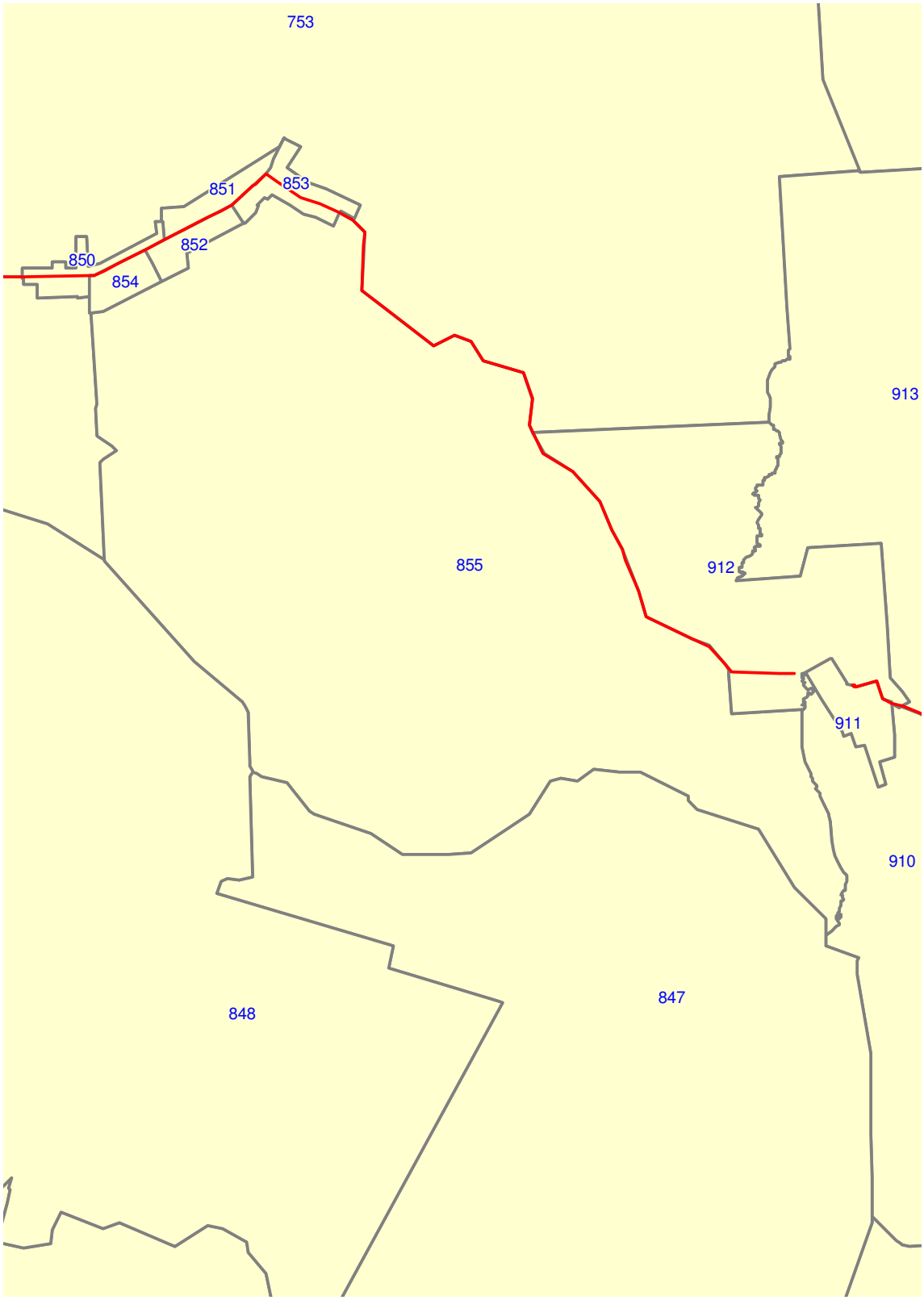
GGS Transportation Model	**ZONES** **Tuatapere**	**Figure 4**
Gabites Porter		



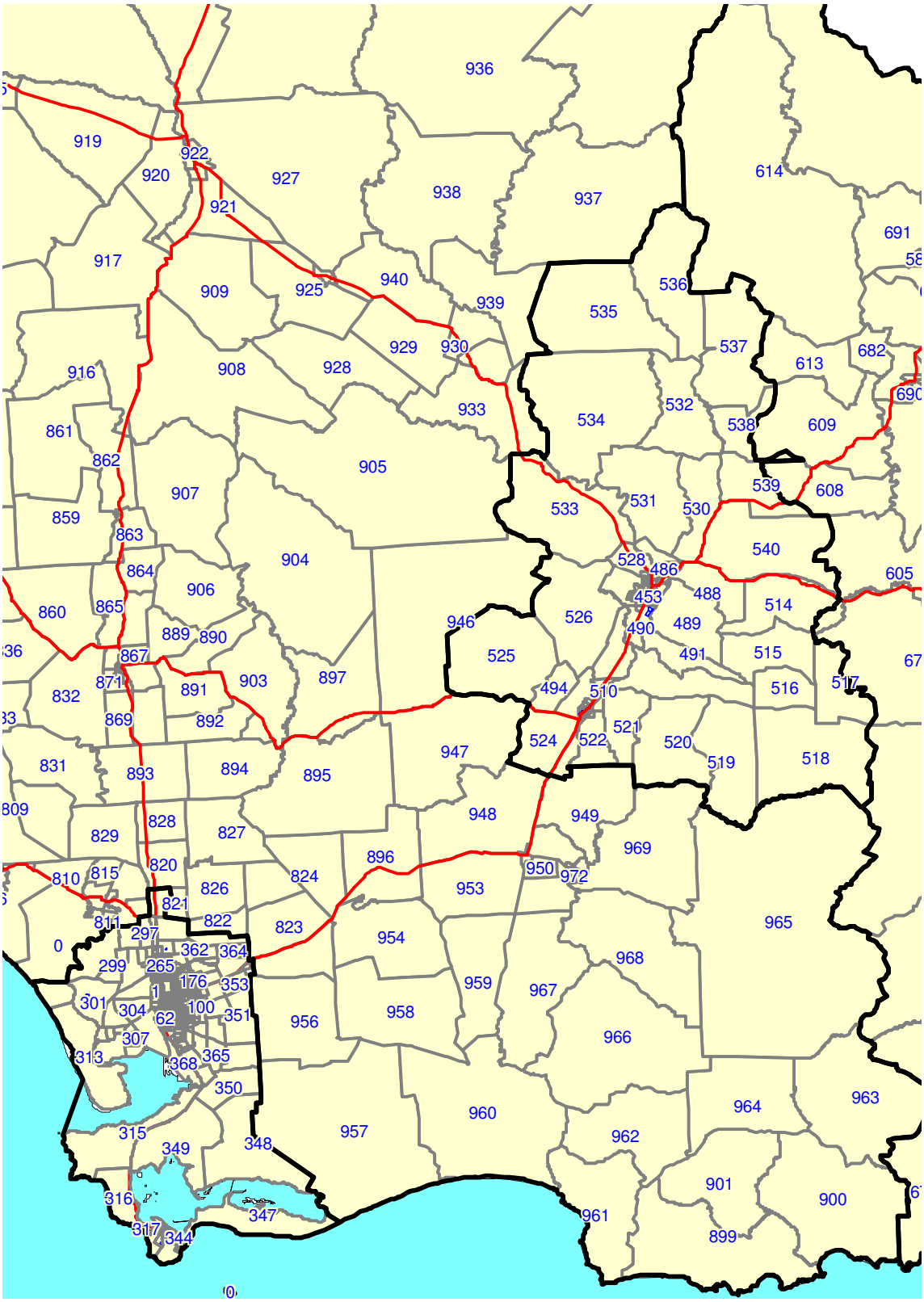
GGS Transportation Model	**ZONES** **Riverton**	**Figure 5**
Gabites Porter		



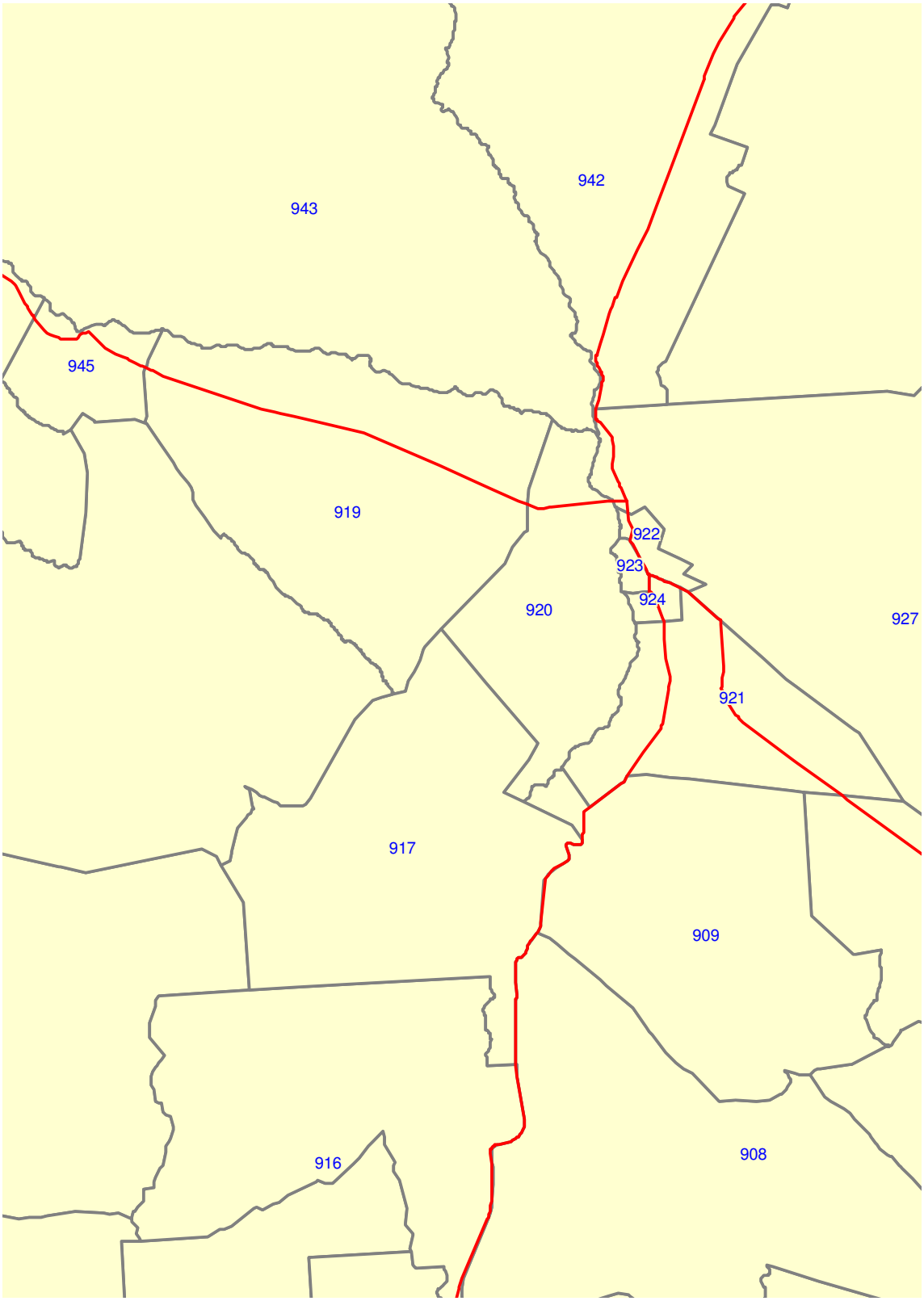
GGS Transportation Model	**ZONES** **Otautau**	**Figure 6**
Gabites Porter		



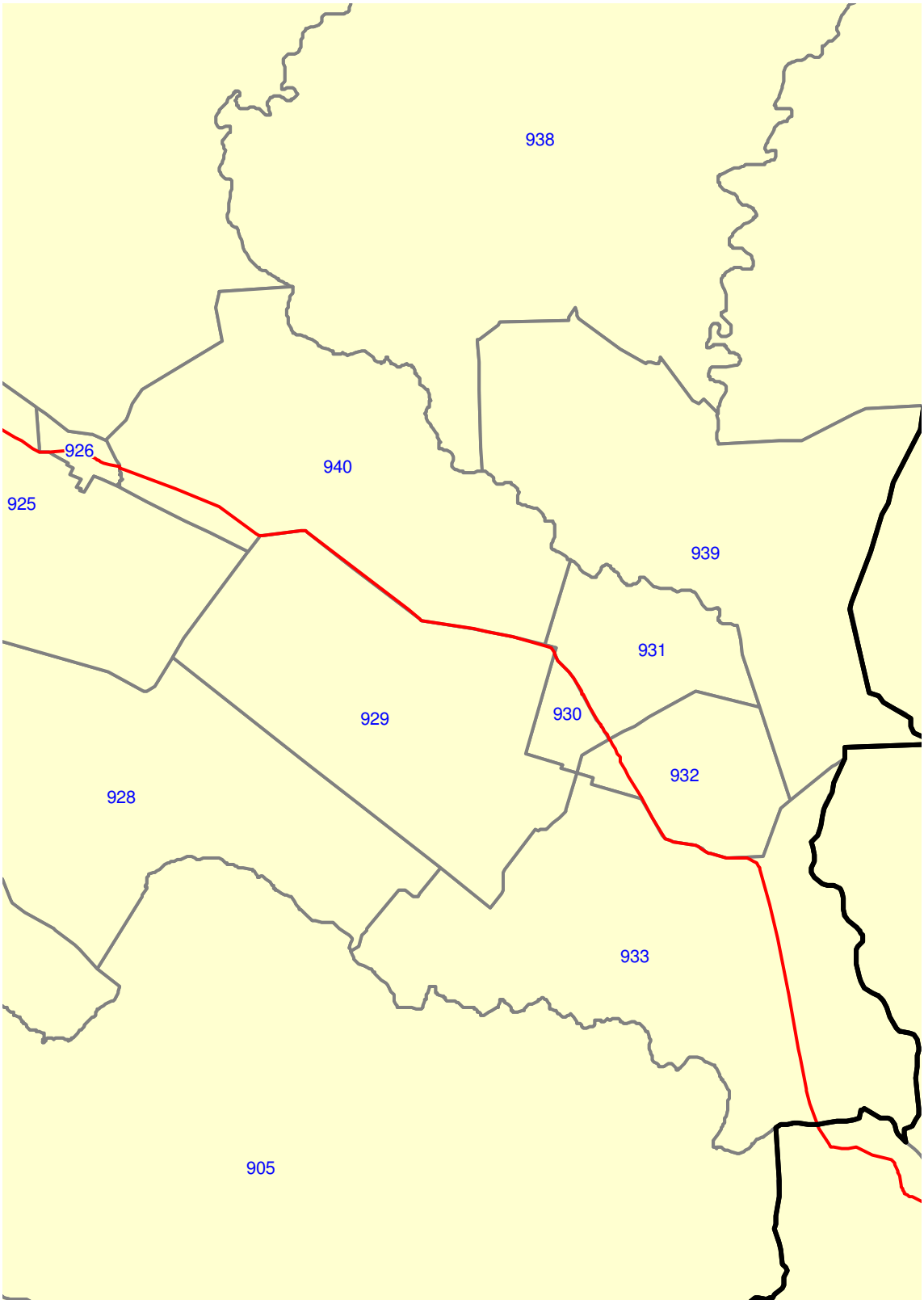
GGS Transportation Model	**ZONES** **Ohai and Nightcaps**	**Figure 7**
Gabites Porter		



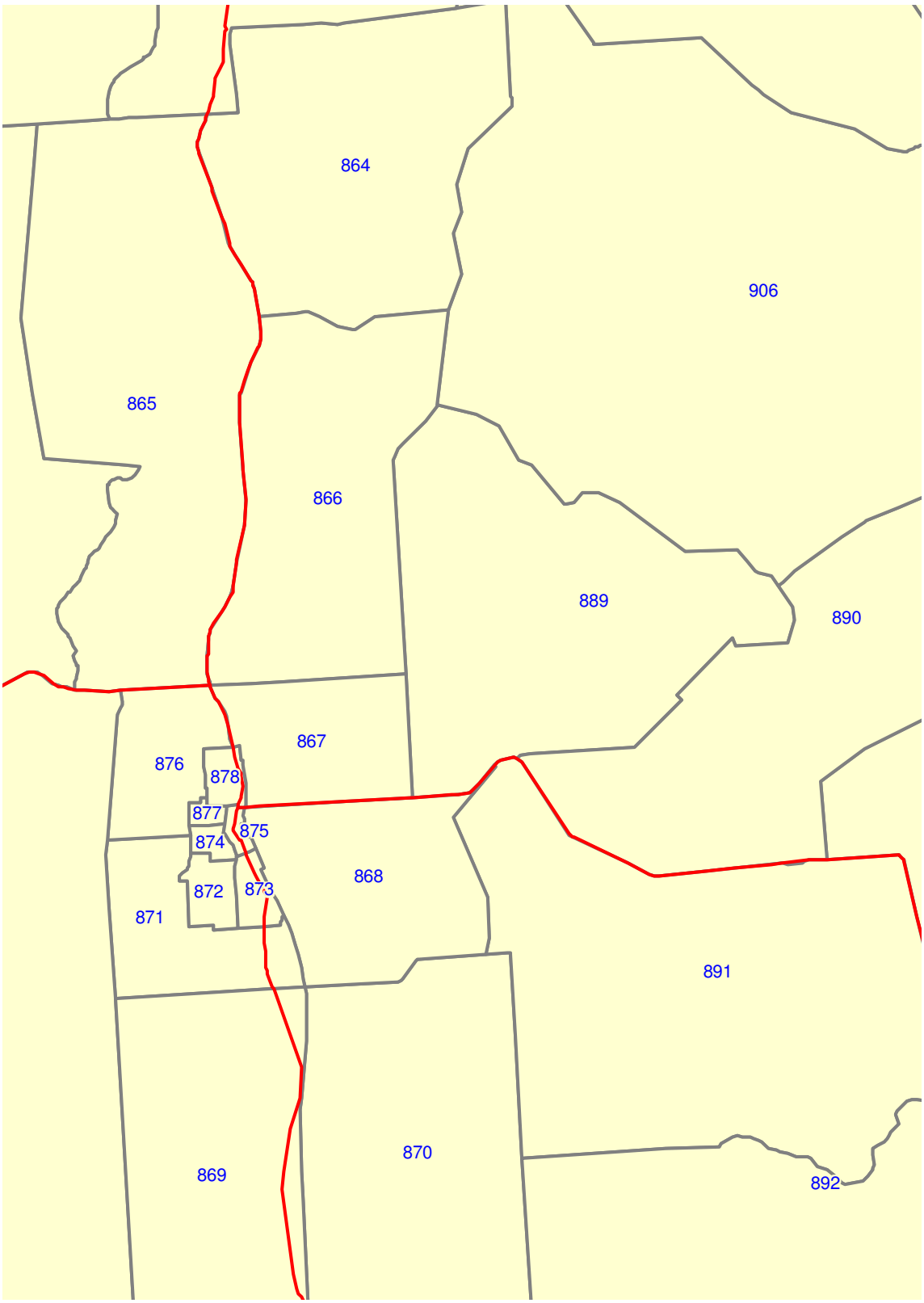
GGS Transportation Model	**ZONES**	**Figure 8**
Gabites Porter	**Central Overview**	



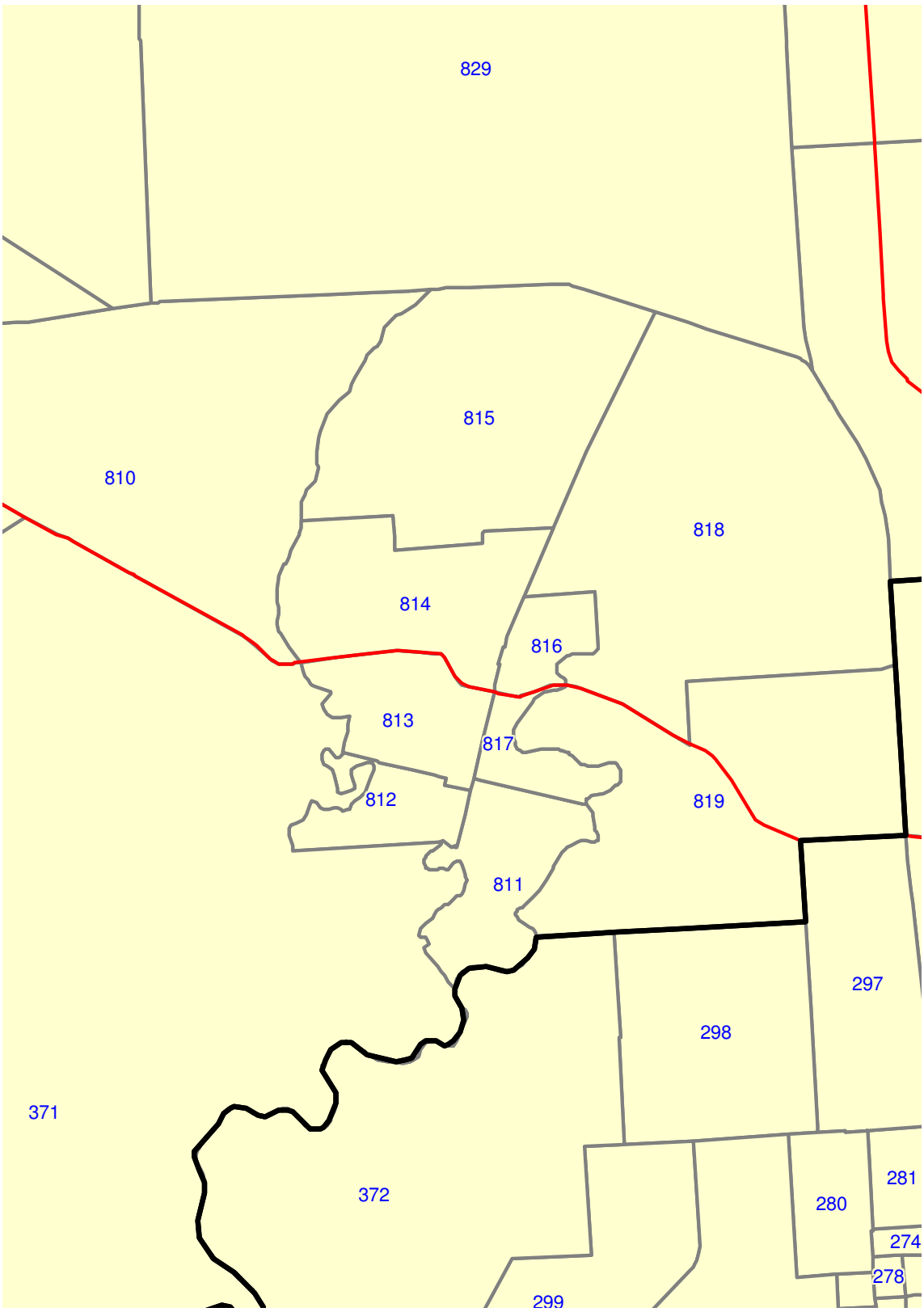
GGS Transportation Model	**ZONES** **Mossburn and Lumsden**	**Figure 9**
Gabites Porter		



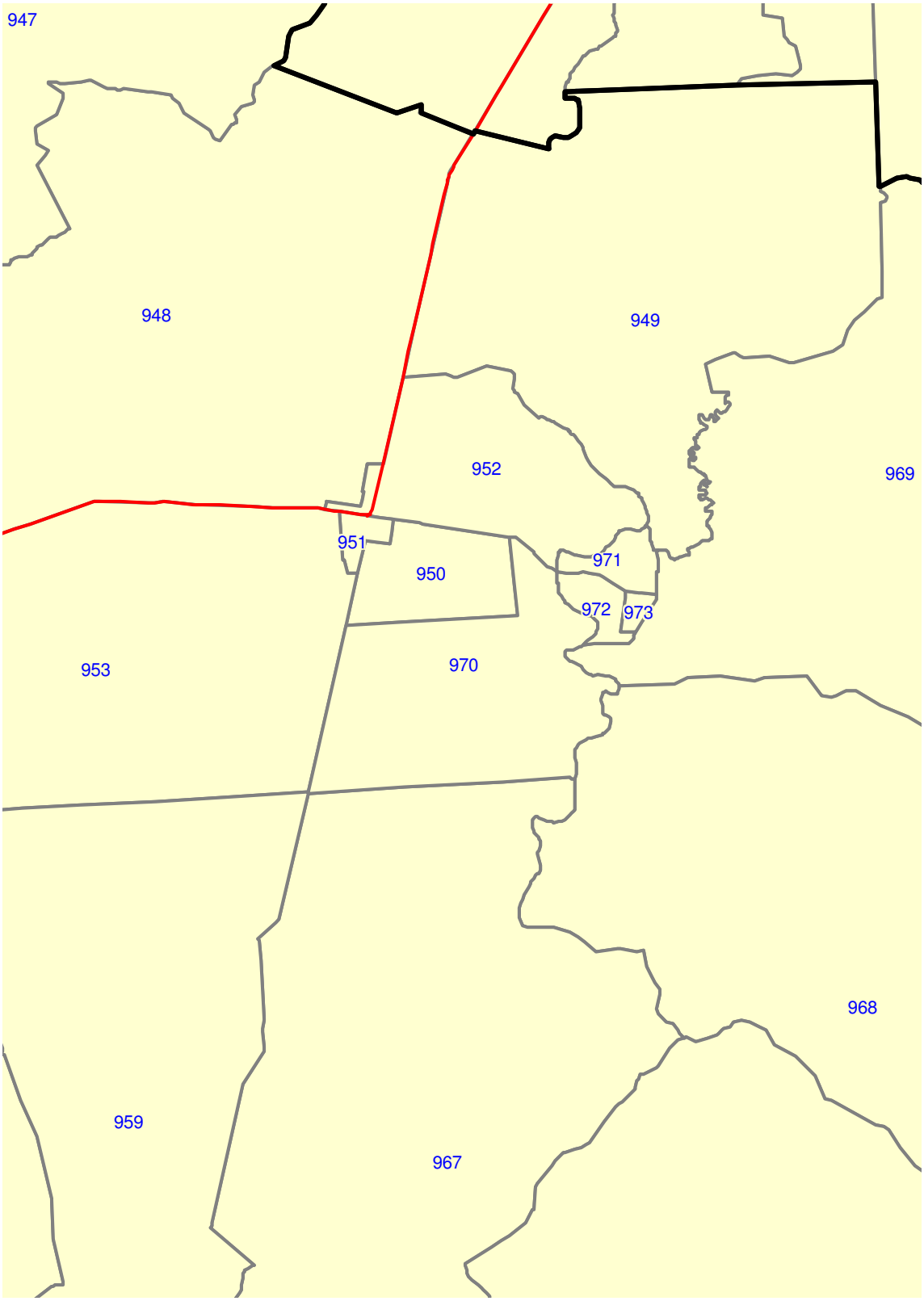
GGS Transportation Model	**ZONES** **Riversdale**	**Figure 10**
Gabites Porter		



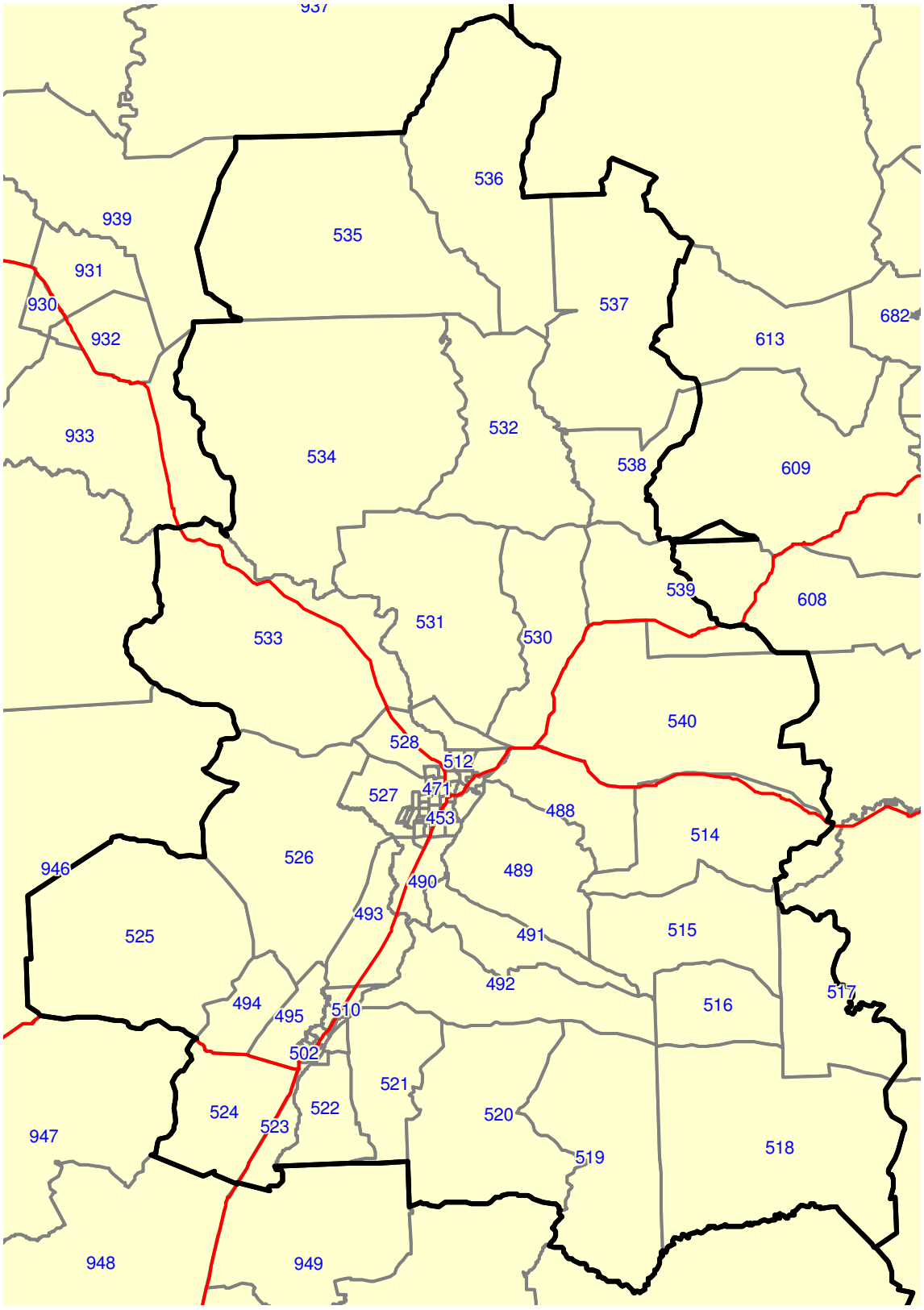
Dunedin City Council	**ZONES** **Winton**	**Figure 11**
Gabites Porter		



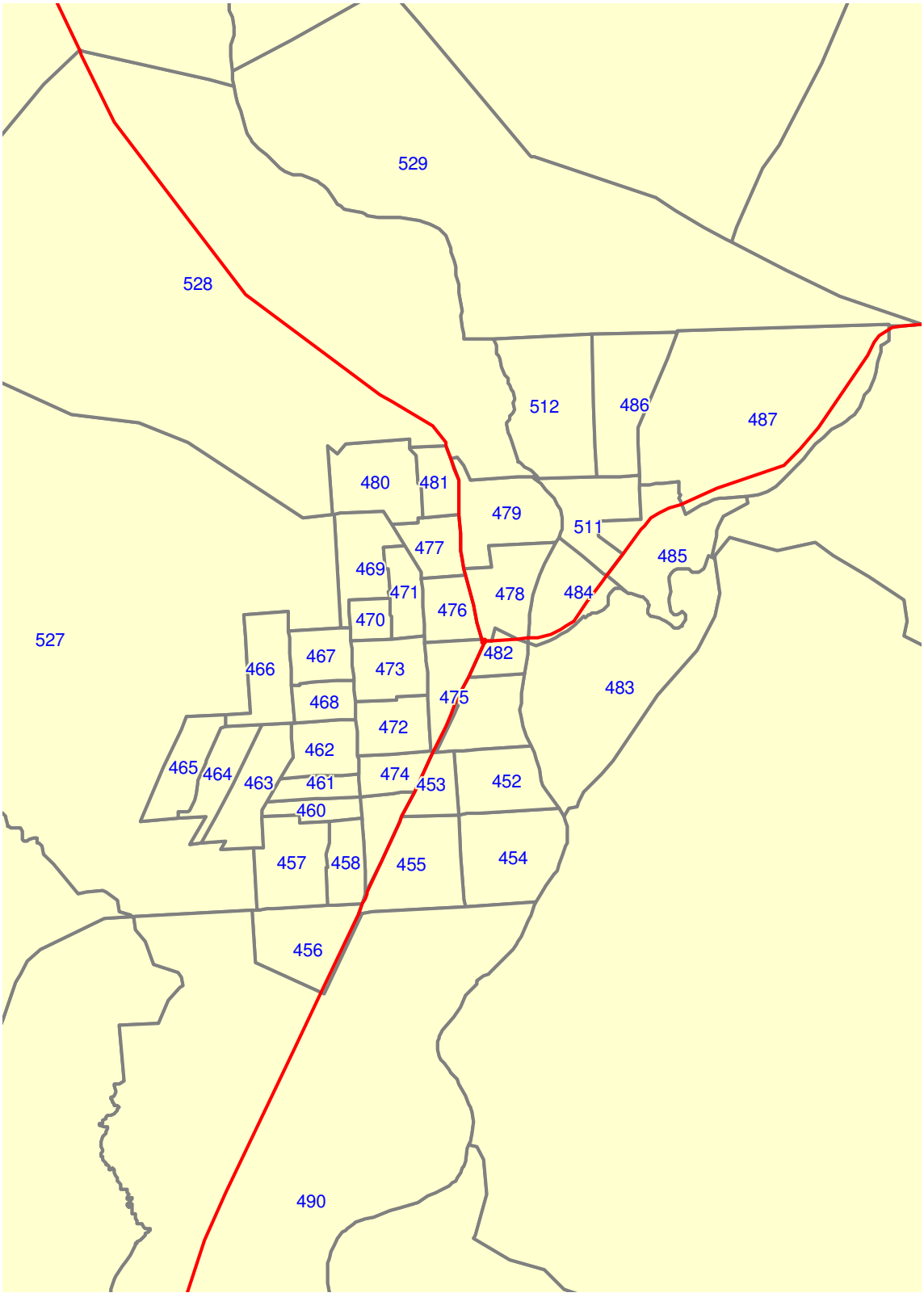
GGS Transportation Model	**ZONES** **Wallacetown**	**Figure 12**
Gabites Porter		



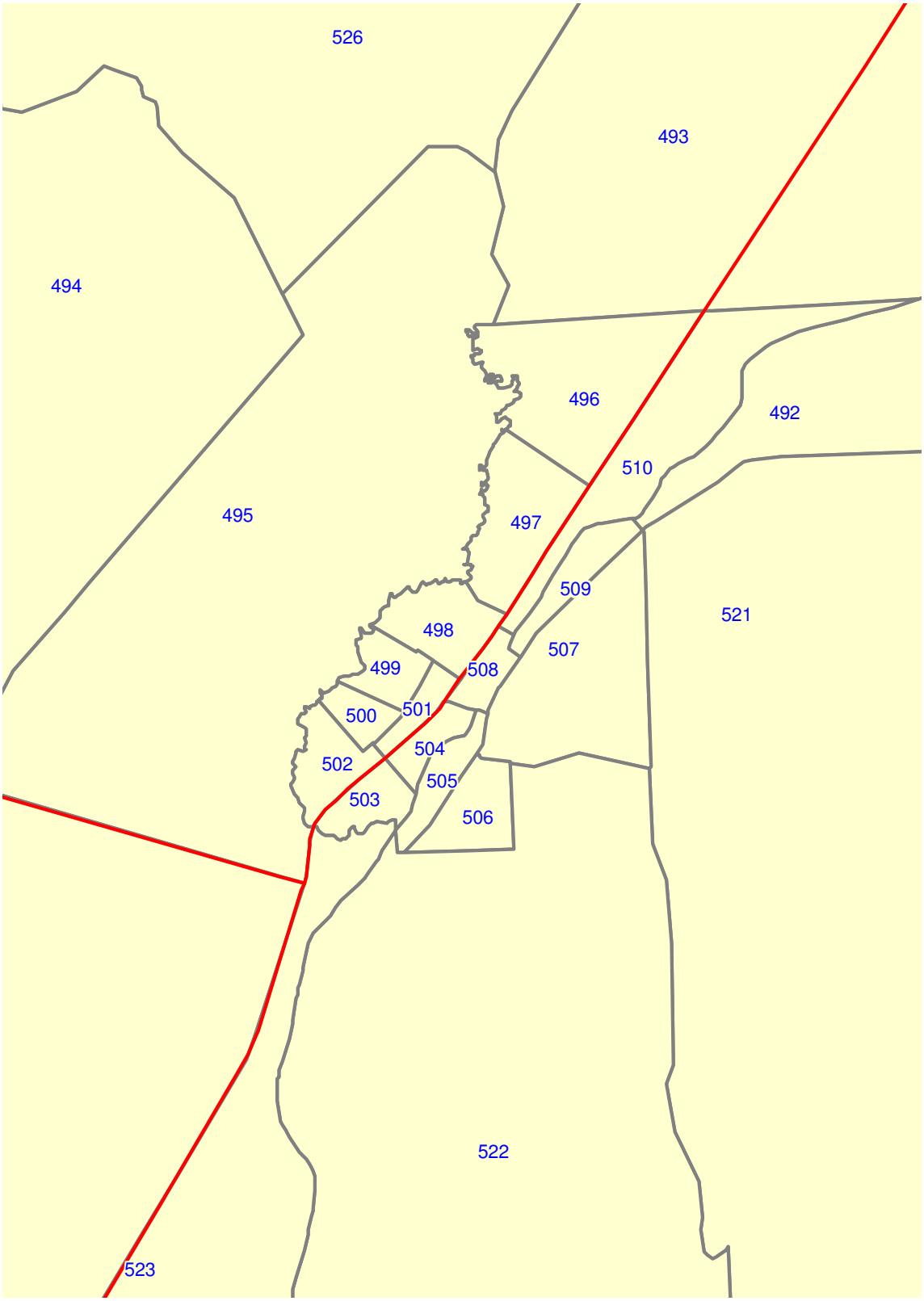
GGS Transportation Model	**ZONES** **Edendale and Wyndham**	**Figure 13**
Gabites Porter		



GGS Transportation Model	**ZONES** **Gore District**	**Figure 14**
Gabites Porter		

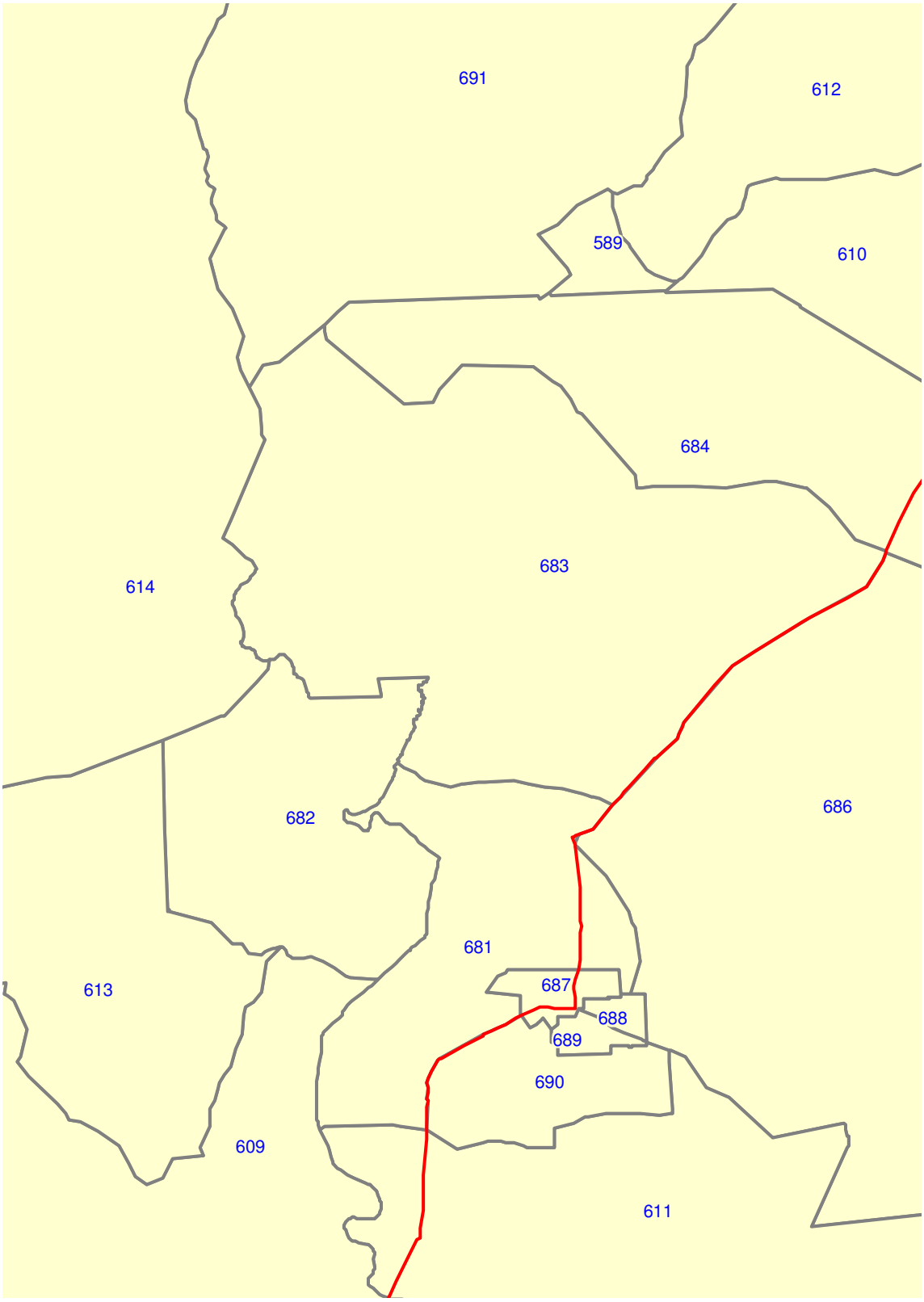


aikato Regional Transportation Model	**ZONES GORE**	**Figure 15**
Gabites Porter		

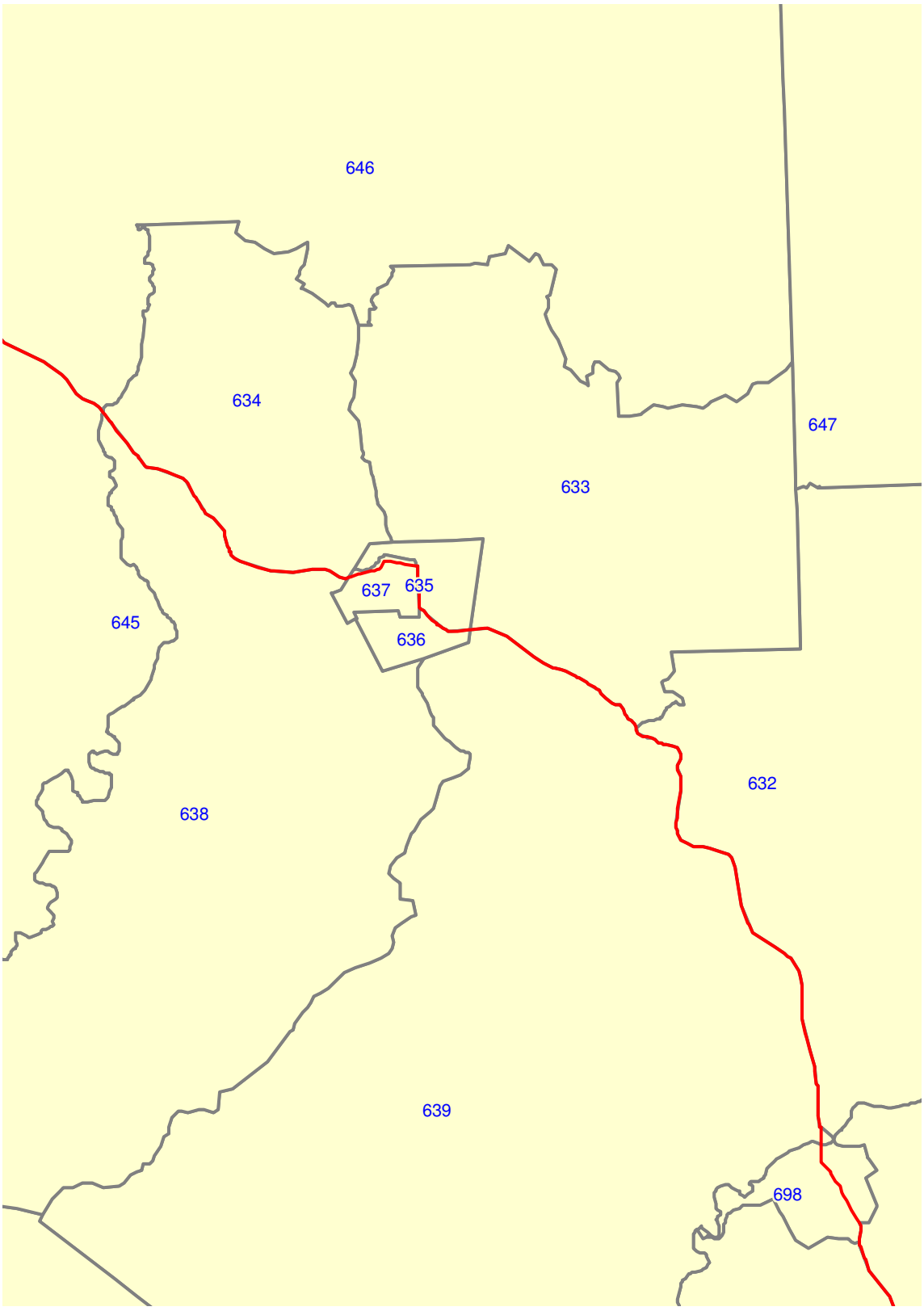


GGS Transportation Model	**ZONES**	**Figure 16**
Gabites Porter	**Maraura**	

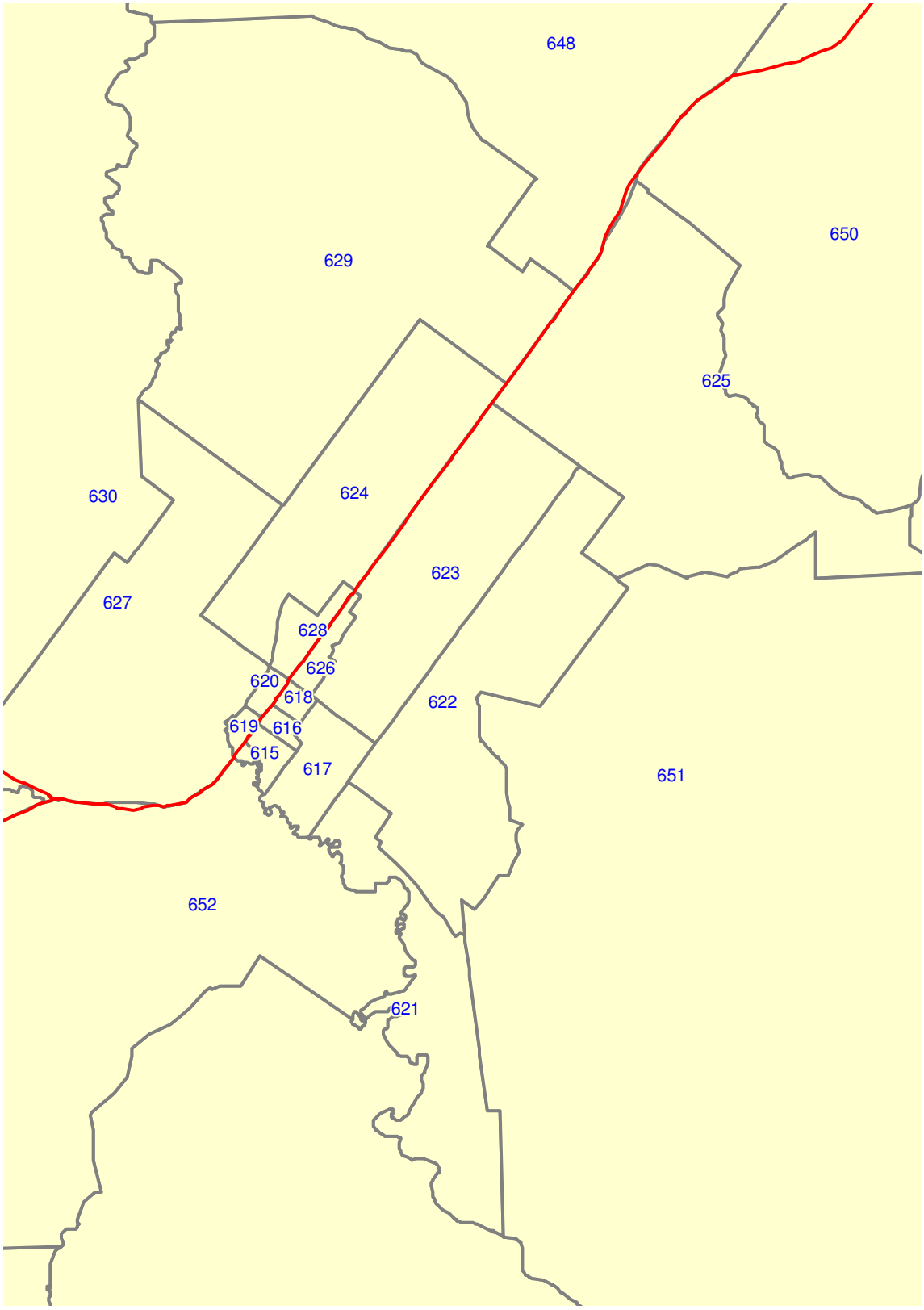
GGS Transportation Model	**ZONES** **Clutha District**	**Figure 17**
Gabites Porter		



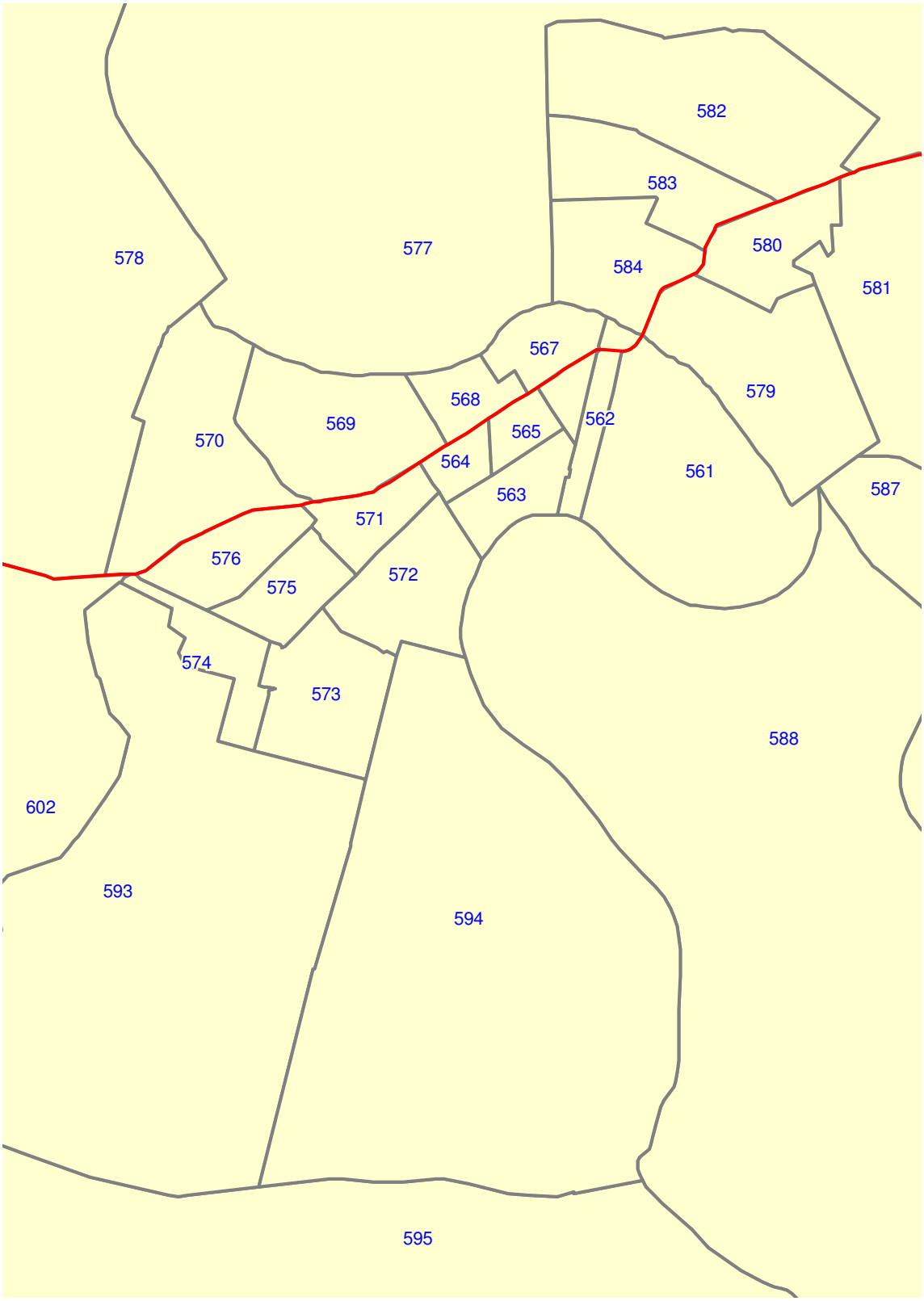
GGS Transportation Model	**ZONES** **Heriot, Kelso and Tapanui**	**Figure 18**
Gabites Porter		



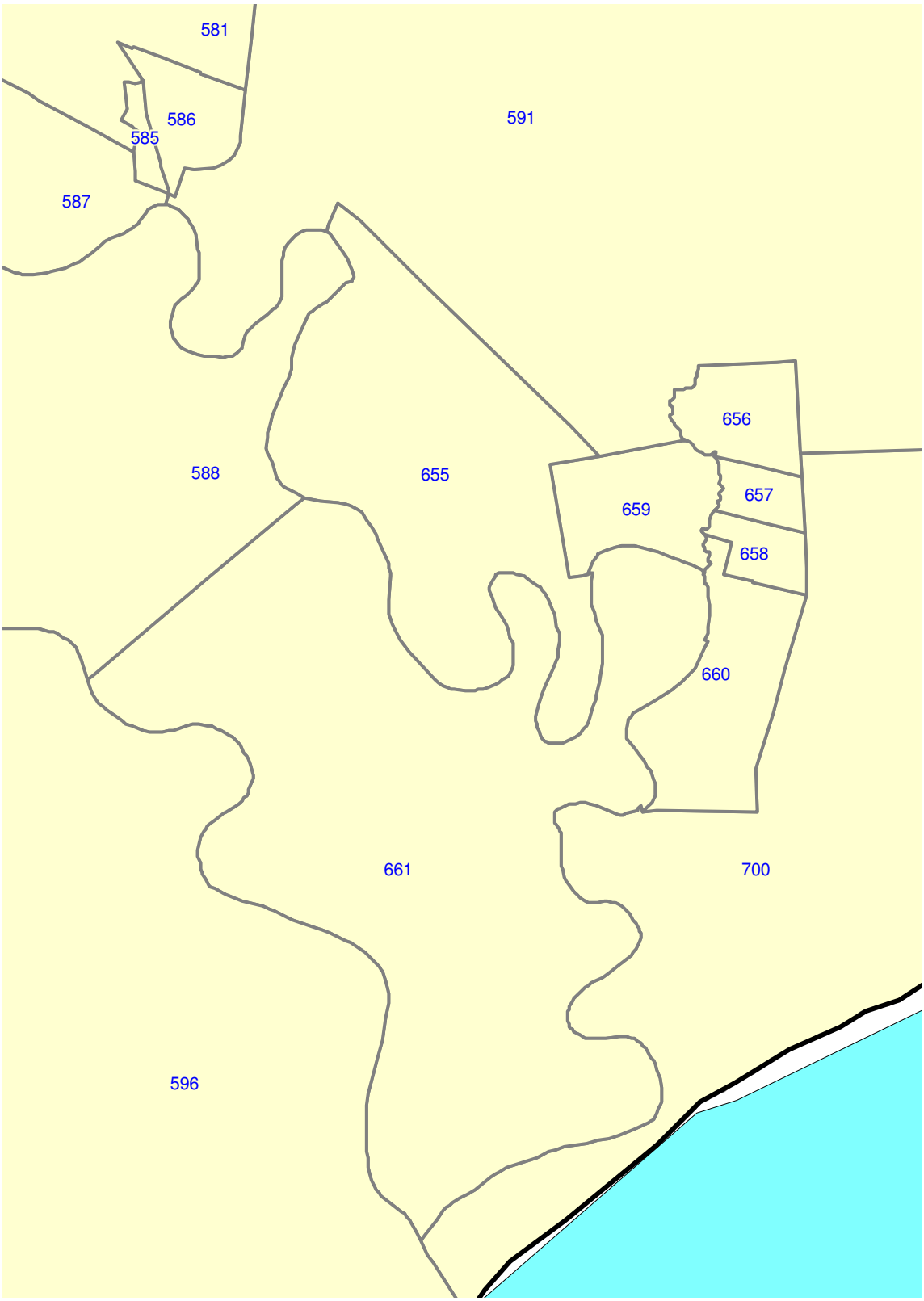
GGS Transportation Model	**ZONES** **Lawrence**	**Figure 19**
Gabites Porter		



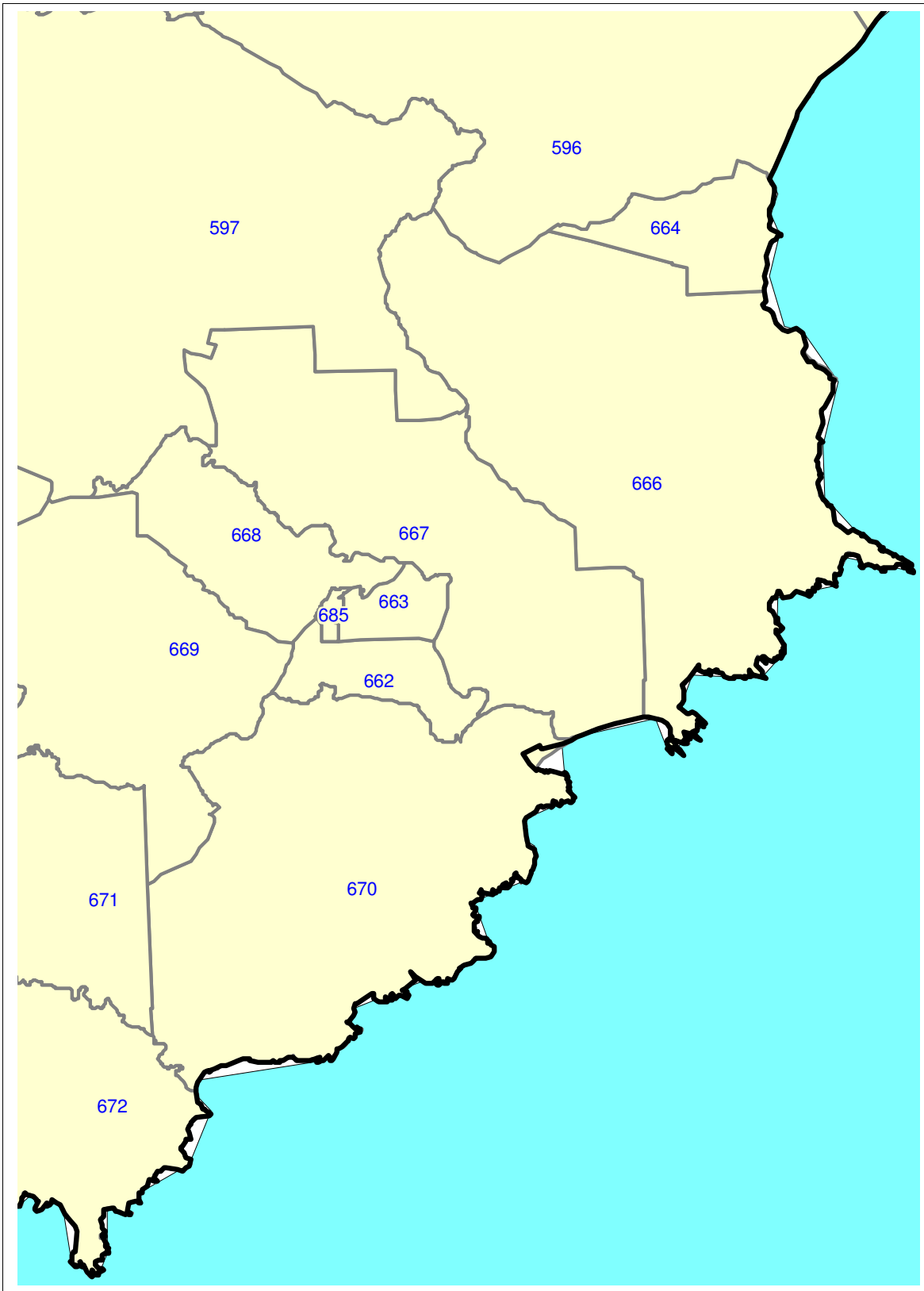
GGS Transportation Model	**ZONES** **Milton**	**Figure 20**
Gabites Porter		



GGS Transportation Model	**ZONES** **Balcutha**	**Figure 21**
Gabites Porter		



GGS Transportation Model	**ZONES** **Kaitangata**	**Figure 22**
Gabites Porter		



GGS Transportation Model	**ZONES** **Owaka**	**Figure 23**
Gabites Porter		

APPENDIX TWO
Zone to Meshblock Lookup Tables

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
1	3104300	46	3105200	80	3160700	100	3141300	122	3145600
2	3116000	47	3105000	80	3153500	101	3141100	123	3145900
2	3106000	48	3104900	81	3153700	101	3141000	123	3145800
3	3106100	49	3105400	81	3160800	101	3140900	124	3144800
4	3106400	49	3105300	81	3153800	102	3146900	124	3145000
5	3106700	50	3110400	82	3153400	102	3146700	125	3144900
6	3106200	51	3110600	83	3153000	102	3146800	125	3144600
7	3106500	52	3110500	83	3153300	103	3147501	125	3144700
8	3106800	53	3110700	84	3152800	103	3147600	126	3144500
9	3106900	54	3111800	84	3153100	104	3147502	126	3144400
10	3106600	54	3112000	84	3152900	105	3146600	127	3144100
11	3106300	55	3112100	85	3152700	106	3140800	127	3144000
12	3107100	55	3111900	85	3152600	107	3140700	127	3143900
13	3107200	56	3112300	86	3152302	108	3140600	128	3144300
14	3107300	57	3111200	86	3152301	109	3140200	128	3144200
15	3107400	57	3111300	86	3152200	109	3140500	129	3148300
16	3107600	58	3112200	87	3152100	109	3140100	129	3147900
17	3107800	58	3110900	87	3152000	109	3140400	130	3148800
18	3108000	59	3111000	88	3150401	110	3140300	130	3148900
19	3108200	59	3111100	88	3150402	111	3145200	131	3148500
19	3107000	60	3110800	89	3151900	111	3139800	131	3148600
20	3104400	61	3105600	89	3151200	111	3145100	132	3148400
21	3108600	61	3105500	90	3151100	111	3139700	132	3148700
21	3108500	62	3112500	90	3151800	112	3145300	133	3148000
22	3108100	62	3112400	90	3151700	112	3145400	133	3147700
23	3107900	63	3112600	90	3151000	112	3140000	134	3148200
24	3108800	64	3112800	91	3153200	112	3139900	134	3148100
25	3107700	64	3112700	91	3152400	113	3141800	134	3147800
26	3109000	65	3112900	91	3150800	113	3141700	135	3143600
27	3107500	66	3113200	92	3150700	113	3141500	136	3143500
28	3109200	67	3113000	92	3150600	113	3141602	136	3143700
29	3109300	67	3113100	92	3150500	114	3142400	137	3143300
30	3109100	68	3113500	92	3150900	114	3142300	137	3143400
31	3108900	68	3113400	93	3150300	114	3142200	137	3143200
32	3108400	69	3113600	94	3149600	114	3142100	137	3143100
32	3108300	70	3113700	94	3150200	115	3146100	138	3143000
33	3109400	71	3114000	94	3149700	115	3146000	138	3142900
34	3104500	72	3114100	95	3150000	116	3145500	138	3142800
35	3104600	72	3114600	95	3149800	116	3146400	138	3142700
36	3104700	73	3113800	95	3149900	116	3146500	139	3142500
37	3104800	73	3113900	96	3150102	117	3147000	139	3142600
38	3109600	73	3113300	96	3150101	117	3147100	140	3137400
39	3109900	74	3114500	97	3153600	117	3147200	140	3135700
40	3109700	74	3114300	98	3154000	118	3149500	140	3136600
41	3110000	75	3114400	98	3141903	118	3149400	140	3136500
42	3109800	75	3114200	98	3161100	118	3147300	141	3137500
42	3110100	76	3114700	99	3161200	118	3147400	141	3138600
43	3111700	77	3114800	99	3142000	119	3149100	141	3138500
43	3111500	78	3115000	99	3161500	120	3149000	142	3143800
44	3111600	78	3114900	99	3141902	120	3149200	142	3138802
44	3111400	79	3151600	99	3141901	120	3149300	142	3138700
45	3110300	79	3151502	100	3141601	121	3146200	142	3138902
45	3110200	79	3151501	100	3141200	121	3146300	142	3138801
46	3105100	79	3151400	100	3141400	122	3145700	143	3139000

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	Meshblock	Zone	2006 MB
143	3138901	171	3133100	197	3126700	224	3123200	254	3118500
143	3139100	172	3132200	197	3126800	224	3123300	255	3120100
144	3133600	172	3132100	198	3127100	224	3123400	256	3120000
144	3133900	173	3132500	198	3126900	225	3122700	256	3119900
145	3134000	173	3132600	198	3127000	225	3122800	257	3118200
145	3134100	173	3132400	199	3126400	226	3122300	257	3118300
146	3133700	174	3130500	199	3127200	227	3122200	258	3118600
146	3133800	174	3130700	200	3125800	227	3122100	258	3118700
147	3133400	174	3130600	200	3125700	228	3121200	259	3117600
148	3133500	174	3130400	201	3125900	228	3121300	259	3117800
148	3134200	175	3132300	201	3126000	229	3121100	260	3119800
149	3134700	175	3132700	202	3126100	230	3120800	260	3117500
149	3134600	176	3130000	202	3126200	230	3120700	260	3117300
150	3134400	176	3130100	203	3126300	231	3120600	261	3119700
150	3134300	177	3118900	204	3129800	232	3121000	261	3119600
150	3134500	178	3132000	205	3129600	232	3120900	262	3119500
151	3139200	178	3130300	205	3129700	233	3120300	263	3119400
152	3139300	179	3129900	206	3129000	234	3121400	264	3103900
153	3139400	179	3130200	206	3129100	234	3120500	264	3119300
154	3139500	180	3131100	207	3128900	234	3120400	265	3103800
154	3139600	181	3131500	208	3128600	235	3121500	266	3104000
155	3132900	181	3131900	208	3128700	236	3121900	266	3102700
155	3161301	182	3131800	208	3128800	236	3122000	267	3102500
155	3132800	182	3131700	209	3129500	236	3121600	267	3102600
156	3135400	183	3131300	209	3129400	236	3121700	268	3102300
156	3135500	183	3131600	210	3129300	236	3121800	268	3102400
157	3135100	183	3131400	210	3128500	237	3117000	269	3101500
157	3135200	184	3131000	211	3124900	237	3116100	270	3101200
158	3136100	184	3130900	211	3124800	238	3115800	271	3102200
158	3135600	184	3131200	211	3124500	238	3115900	271	3102100
158	3135300	185	3128000	212	3125200	239	3115700	272	3101900
159	3117700	185	3137800	212	3125500	239	3115600	272	3102000
159	3117400	186	3127900	212	3125600	240	3115500	273	3100900
159	3117200	186	3127800	213	3125400	240	3115400	273	3101800
160	3136400	187	3137700	213	3125300	241	3115300	274	3100000
160	3137300	187	3136800	213	3125000	242	3115100	275	3100200
161	3136300	188	3136900	213	3125100	243	3115200	275	3100300
161	3137200	188	3136700	214	3124400	244	3116900	275	3101100
162	3137100	189	3128200	214	3124700	244	3116700	275	3101000
162	3136200	189	3128400	215	3124300	245	3116600	276	3101300
163	3137000	190	3127600	215	3124600	245	3116800	276	3101400
163	3136000	190	3127700	216	3123800	246	3117100	276	3100700
164	3138200	191	3128300	217	3123500	247	3116200	276	3100800
164	3138400	191	3128100	218	3123600	247	3116400	277	3100600
164	3138300	192	3135800	219	3123900	248	3118100	277	3100500
165	3137900	192	3135900	220	3124000	248	3117900	278	3100100
165	3138000	193	3134900	221	3123700	249	3116500	279	3100400
165	3138100	193	3135000	222	3122500	250	3116300	280	3082500
166	3101600	194	3127500	222	3122900	250	3118000	280	3099900
166	3101700	194	3127400	222	3124100	251	3119000	281	3099500
167	3081500	195	3127300	222	3124200	251	3119100	281	3099000
168	3133000	195	3134800	223	3122600	252	3119200	282	3099600
169	3133200	196	3126600	223	3123000	253	3118800	283	3099300
170	3133300	196	3126500	223	3123100	253	3118400	283	3099400

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
284	3099100	308	3084002	337	3156700	373	3090700	466	3058900
284	3099200	309	3083300	337	3156800	373	3090900	466	3059000
285	3081700	309	3084700	338	3157600	374	3091100	466	3059700
285	3098900	309	3083203	339	3157700	375	3091202	466	3059800
286	3091302	310	3083202	340	3155800	375	3092402	467	3059100
286	3091301	310	3083201	341	3155300	376	3161801	467	3059200
286	3099800	311	3082802	341	3155700	440	3079300	467	3059300
287	3099700	311	3083000	342	3155200	444	3091000	468	3059400
288	3102800	311	3083703	343	3155400	446	3092401	468	3059500
288	3103600	311	3083101	344	3155500	447	3161802	468	3059600
289	3103700	311	3083102	344	3155600	447	3092500	469	3061600
290	3102900	311	3082900	345	3156000	448	3161901	469	3061700
290	3103500	312	3083702	345	3155900	448	3162000	469	3061900
291	3103000	312	3083701	346	3156200	449	3162200	469	3063100
291	3103100	313	3079401	347	3159800	449	3162100	470	3062000
292	3103400	314	3083802	347	3159702	450	3162301	470	3062100
293	3103202	314	3084201	348	3159600	451	3061400	471	3061800
293	3103201	314	3083801	348	3162302	451	3064300	471	3062200
294	3103300	315	3160102	349	3159500	451	3064400	472	3060400
294	3103203	315	3160200	349	3159901	452	3064500	472	3060500
295	3091700	315	3160000	350	3159400	452	3064600	472	3060600
295	3120200	315	3160101	351	3161600	452	3064700	472	3060700
296	3091400	316	3160400	352	3161302	453	3064800	473	3060000
297	3081600	316	3160300	353	3161400	454	3064900	473	3060100
297	3081400	316	3160500	354	3161902	454	3065000	473	3060200
298	3081900	317	3158200	355	3093100	455	3057400	473	3060300
299	3082200	318	3158400	356	3093000	455	3057500	474	3058000
300	3082400	318	3158300	357	3091900	455	3057600	474	3058100
301	3082801	319	3158500	358	3091802	455	3057700	474	3058400
301	3082100	319	3158600	359	3129200	456	3057200	474	3058500
301	3082700	320	3166501	360	3122400	456	3057300	475	3061000
301	3082300	321	3156300	361	3091801	457	3056400	475	3061100
301	3082600	322	3158800	362	3091500	457	3056500	475	3061300
302	3083501	322	3158700	363	3091600	457	3056600	475	3061500
302	3083502	323	3158900	364	3092900	457	3056700	476	3060800
302	3083403	323	3159300	365	3153900	458	3056800	476	3062600
302	3083401	324	3159000	365	3161000	458	3056900	476	3062700
302	3083402	325	3157200	366	3161700	458	3057000	477	3062300
303	3104100	326	3159200	367	3160900	459	3057100	477	3062400
303	3104200	327	3159100	368	3152500	459	3058800	477	3062500
304	3105800	328	3156100	368	3160600	460	3058600	477	3063900
304	3105700	329	3157900	368	3151300	460	3058700	478	3060900
305	3105900	329	3158000	369	3080800	461	3058200	478	3062900
306	3084602	330	3157800	369	3080700	461	3058300	478	3063000
306	3084601	331	3157400	369	3080600	462	3057800	478	3064100
307	3084501	331	3158100	369	3080500	462	3057900	479	3062800
307	3084400	332	3157300	369	3080900	463	3056100	479	3063800
307	3084300	333	3157100	371	3079402	463	3056200	479	3064000
307	3084202	333	3157000	372	3081800	463	3056300	480	3063200
307	3084100	334	3156400	372	3082000	464	3055800	480	3063300
307	3084502	334	3156500	373	3081100	464	3056000	480	3063400
308	3083902	335	3156600	373	3081200	465	3055700	480	3063600
308	3084001	336	3156900	373	3081300	465	3055900	481	3063500
308	3083901	336	3157500	373	3090500	465	3059900	481	3063700

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
482	3061200	505	3070200	532	3050800	570	2994600	594	2997000
482	3064200	505	3070300	533	3049702	570	3002002	594	2997100
483	3053702	506	3070400	533	3052001	571	2994800	595	2996700
483	3065700	506	3070500	533	3052002	571	2994900	595	2996800
483	3065800	507	3069900	533	3052100	571	2995000	596	2997400
484	3065400	507	3070100	534	3050200	571	2995100	596	2997500
484	3065500	508	3068200	534	3050500	572	2995300	596	2997600
484	3065600	508	3070000	534	3051000	573	2995900	596	2997800
485	3053602	509	3069700	534	3051100	574	2995500	596	2997901
485	3065200	509	3069800	535	3047600	574	3002202	597	2996500
485	3066800	510	3067300	535	3048201	575	2995200	597	2997902
486	3066000	511	3065100	535	3048202	575	2995600	597	2998300
486	3066300	511	3065300	536	3047700	575	2995700	598	2998200
486	3066400	511	3066900	536	3047900	576	2994700	599	2996300
486	3066500	511	3067000	536	3048000	576	2995400	599	3001100
486	3066600	512	3065900	537	3004002	577	2982100	600	2996100
487	3066100	514	3003602	537	3004102	578	3002001	600	2996200
487	3066200	514	3054900	537	3047802	579	2992200	600	3001700
487	3066700	514	3055000	537	3048100	579	2992300	600	3002700
488	3051703	515	3055100	537	3050400	579	2992400	601	2996400
488	3051704	515	3055200	537	3050700	580	2991900	602	2996600
488	3053601	516	3055300	538	3004402	580	2992000	602	3001900
489	3053701	517	3055400	538	3050900	580	2992100	602	3002100
490	3052500	518	3055500	539	3003402	581	2983800	603	3001600
491	3053800	518	3055600	539	3004403	581	2984000	603	3001800
492	3053900	519	3054200	539	3051400	582	2991101	603	3002500
493	3053200	520	3054100	540	3003503	582	2991102	604	2981700
493	3053300	520	3054500	540	3003603	582	2991200	604	3003000
494	3053500	521	3054000	540	3051800	582	2991300	604	3003100
495	3053400	521	3054401	540	3054800	583	2991400	604	3003300
496	3067100	522	3054301	561	2992700	583	2991500	605	3003502
496	3067200	522	3054302	561	2992800	583	2991600	605	3003601
497	3067400	523	3087802	562	2992500	584	2991700	605	3003900
497	3067500	523	3087803	562	2992600	584	2991800	606	3002300
497	3067600	524	3087501	563	2994400	585	2982700	606	3002900
498	3067700	524	3087503	564	2994000	585	2982900	606	3003200
498	3067800	525	3052700	564	2994200	586	2982800	607	3002800
498	3067900	525	3052800	565	2993800	586	2983000	607	3011203
499	3068000	526	3052300	565	2993900	586	2983700	607	3011601
499	3068300	526	3052900	565	2994300	587	2984100	607	3011602
499	3068400	526	3053000	565	2995800	588	2984300	608	3003401
500	3068500	526	3053100	565	2996000	588	2984400	608	3003501
500	3068700	527	3052400	565	3002203	589	3012300	609	3004401
500	3069200	528	3052200	566	2993600	589	3012400	609	3004500
501	3068100	529	3051502	566	2993700	590	2983300	609	3004600
501	3068600	529	3051602	566	2994100	590	2983400	610	3011400
501	3068800	529	3051702	567	2992900	590	2983500	610	3012100
502	3069300	530	3051300	567	2993400	591	2983600	611	3013300
503	3069400	530	3051701	567	2993500	591	2986002	611	3013400
503	3069500	531	3051200	568	2993200	592	2983100	611	3013500
503	3069600	531	3051501	568	2993300	592	2983200	612	3011300
504	3068900	531	3051601	569	2993000	592	2983900	612	3012000
504	3069000	532	3050300	569	2993100	593	2996900	613	3004101
504	3069100	532	3050600	570	2994500	593	3002201	613	3004200

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
614	3004001	637	3010600	659	2985801	682	3013800	735	3169500
614	3011700	637	3010700	659	2985802	683	3012700	736	3169100
614	3011800	638	3007900	660	2984600	683	3013700	736	3169200
614	3047801	639	3008800	660	2984700	684	3012200	736	3169300
615	2989200	639	3009000	660	2984800	684	3012600	737	3168200
615	2989400	640	3009200	661	2984500	684	3013600	737	3168300
615	2989600	640	3009300	662	2998800	685	2999200	737	3168400
615	2989700	641	2982400	663	2998700	685	2999400	737	3168500
616	2988900	641	2982500	663	2999300	686	3012800	738	3167400
616	2989100	641	2982600	663	2999500	686	3012900	738	3167500
616	2989500	641	2985901	664	2997200	686	3013200	739	3167100
617	2987300	642	2982000	664	2997300	687	3013900	739	3167200
617	2987400	643	2981600	664	2997701	687	3014000	739	3167300
617	2989800	643	2981800	666	2997702	688	3014100	740	3167800
618	2988600	643	2981901	666	2998000	688	3014200	740	3167900
618	2989000	643	2981902	666	2998100	688	3014300	741	3168000
618	2990800	644	2981500	667	2998500	689	3014400	741	3168100
618	2990900	644	3008000	668	2998400	689	3014500	742	3172500
618	2991000	644	3008100	668	2998600	689	3014600	742	3172600
619	2988700	645	3007600	669	2998900	689	3014700	743	3170201
619	2988800	645	3007700	669	2999000	690	3013100	743	3172900
619	2989300	645	3007800	670	2999101	691	3011900	744	3041001
620	2988400	646	3007401	670	2999102	691	3012500	744	3170101
620	2988500	646	3007402	670	2999102	697	2987502	744	3170102
620	2990600	647	3008201	671	3000200	697	2987900	744	3172802
620	2990700	647	3008202	671	3000300	698	3008900	745	3172700
621	2987200	647	3008300	671	3000500	699	3004701	745	3172803
622	2986902	647	3008400	672	3000400	699	3005101	745	3172804
623	2986700	648	2987501	672	3000600	699	3010900	746	3173501
623	2986800	648	2987600	673	2999701	699	3011000	746	3173502
624	2986400	649	2976302	673	2999902	699	3011100	747	3173401
625	2988300	649	2988000	673	3000000	699	3011201	747	3173403
626	2990000	650	2988100	674	2999801	700	2986200	747	3173404
626	2990300	650	2988200	674	2999802	725	3166800	748	3174700
626	2990400	651	2986901	674	2999901	725	3166900	748	3175100
626	2990500	651	2987700	674	3097702	725	3167000	749	3175000
627	2986500	651	2987800	674	3097803	726	3167601	749	3175300
627	2986600	652	2987000	674	3097804	726	3167602	749	3175400
628	2989900	652	2987100	675	2999600	726	3167700	750	2416402
628	2990100	653	2985903	675	3000100	727	3167603	750	3174400
628	2990200	653	2985904	676	3000900	727	3167604	750	3174500
629	2986300	653	2986001	676	3001000	728	3173503	750	3174600
630	2982300	654	2986101	677	3000800	728	3173504	750	3174800
631	2982200	654	2986102	677	3003700	729	3168800	750	3174900
631	3009100	655	2984200	677	3003800	730	3168700	750	3175200
632	3008500	656	2985600	678	3000700	730	3168901	750	3175801
632	3008600	656	2985700	678	3001200	731	3168600	750	3175900
632	3008700	657	2985300	678	3001300	731	3168902	750	3176100
633	3007300	657	2985400	678	3001400	732	3168903	751	3171900
634	3007500	657	2985500	678	3001500	732	3168904	751	3172000
635	3010300	658	2984900	679	3002400	732	3168905	751	3172100
635	3010400	658	2985000	679	3002600	733	3169000	752	3172200
636	3010800	658	2985100	681	3013000	734	3169600	752	3172300
637	3010500	658	2985200	682	3004300	735	3169400	752	3172400

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
753	3181800	776	3189500	800	3178500	823	3092500	843	3176300
753	3182200	777	3189400	801	3186301	823	3092600	843	3176500
753	3182300	778	3187300	801	3186302	823	3092700	844	3177700
754	3182000	779	3187500	802	3184900	823	3092800	844	3177800
754	3182100	779	3187600	802	3185100	824	3089300	844	3178300
755	3181700	779	3187700	803	3184601	824	3089400	845	3178100
755	3181900	780	3187200	803	3184602	824	3089500	845	3178200
756	3192400	780	3187400	804	3184700	824	3089900	846	3177602
756	3193400	781	3186701	804	3184800	825	3092200	846	3193800
757	3192300	781	3186702	805	3185000	825	3092300	847	3177601
758	3191800	782	3187801	805	3185200	826	3090400	847	3182800
758	3191900	782	3187802	806	3185600	826	3092100	848	3182700
758	3192000	783	3189700	807	3078700	827	3076900	848	3192100
758	3192200	783	3189800	807	3078900	827	3077000	849	3182400
759	3192500	783	3189900	807	3079100	827	3092000	850	3180600
759	3192600	784	3187902	808	3079200	828	3077100	850	3180700
760	3192800	784	3187903	808	3079300	828	3077200	851	3181300
760	3193000	784	3187904	808	3080300	829	3077400	851	3181400
761	3193100	785	3190000	809	3078100	829	3077500	852	3181100
761	3193300	785	3190100	809	3078500	829	3078600	852	3181200
762	3188600	785	3190201	810	3078800	830	3078200	853	3181500
762	3188700	785	3190202	810	3079000	830	3078400	853	3181600
762	3193200	786	3191000	811	3080402	831	3077900	854	3180800
763	3194400	786	3191100	811	3080403	831	3078000	854	3180900
763	3194500	786	3191300	811	3080404	831	3078300	854	3181000
764	3192900	786	3191500	812	3080102	832	3074703	855	3182500
764	3194200	787	3185900	812	3080105	832	3074900	856	3179000
764	3194300	787	3191200	812	3080106	832	3077701	856	3179100
765	3194102	788	3190300	813	3080103	832	3077800	857	3182901
765	3194600	788	3190400	813	3080104	833	3077600	857	3183001
765	3194700	788	3190500	813	3080200	833	3077702	857	3183002
766	3194103	789	3190600	814	3079602	834	3183700	858	3179400
766	3194800	789	3190700	814	3079603	834	3183800	858	3179500
766	3194900	789	3190800	814	3079604	835	3183400	859	3071100
767	3188300	789	3190900	815	3079500	835	3183500	859	3071300
767	3188400	790	3185700	816	3079901	836	3074400	860	3074100
768	3188800	791	3185800	816	3079902	836	3074500	860	3074300
768	3188900	792	3185400	817	3080001	836	3183200	861	3070901
769	3188500	792	3185500	817	3080002	837	3182902	861	3070902
770	3192700	793	3185300	818	3079700	837	3183100	862	3071000
770	3193500	793	3186900	818	3079800	837	3183300	862	3071200
771	3194000	794	3186800	818	3080500	838	3183600	863	3071400
771	3194101	795	3186400	819	3080600	839	3176600	863	3072100
772	3193600	795	3186500	819	3080700	839	3176700	864	3072200
772	3193700	796	3186600	819	3080800	839	3176900	864	3072300
772	3193900	796	3187100	819	3080900	839	3177200	864	3072400
773	3188000	797	3186000	820	3077300	840	3177100	865	3074200
773	3188100	797	3187000	820	3081000	840	3177500	865	3074600
773	3188200	798	3186100	820	3090300	841	3176800	866	3072600
774	3189300	798	3186201	821	3090600	841	3177000	866	3073000
774	3189600	798	3186202	821	3090800	841	3177300	867	3073100
775	3189000	799	3177900	821	3091000	841	3177400	868	3075100
775	3189100	799	3178000	822	3091201	842	3176200	868	3075200
776	3189200	800	3178400	822	3092401	842	3176400	868	3085400

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
869	3075000	896	3090100	912	3179600	929	3049300	942	3041800
870	3075300	896	3090200	912	3179700	930	3048900	943	3041101
870	3075400	897	3074000	912	3179800	930	3049900	943	3041600
871	3074801	897	3076200	912	3179900	931	3048400	943	3041700
871	3074802	897	3076300	912	3182600	931	3048500	944	3170202
872	3084900	897	3088400	913	3178700	931	3049000	944	3170300
872	3085200	897	3088600	914	3179300	931	3050000	944	3170400
872	3085700	899	3097100	915	3178600	932	3049100	945	3170700
872	3085800	899	3097200	915	3179200	932	3049200	945	3170800
873	3085500	899	3097300	916	3046700	932	3050100	945	3170900
873	3085600	900	3097400	916	3070600	933	3049500	946	3052600
873	3085900	900	3097500	916	3070700	933	3049600	946	3087201
874	3084800	900	3097600	916	3070800	934	3022901	946	3087301
874	3085000	900	3097703	917	3045900	934	3042400	946	3088501
874	3085100	900	3097704	917	3171204	934	3042500	947	3087202
874	3087000	901	3096800	917	3171205	934	3042600	947	3087302
875	3085300	901	3096900	917	3171700	934	3042800	947	3087400
875	3086600	901	3097000	918	3170500	934	3043500	947	3087600
875	3086700	903	3073700	918	3170600	935	3040800	947	3088502
875	3087100	903	3073800	918	3171201	935	3040900	947	3088900
876	3074702	903	3073900	918	3171203	935	3041901	948	3087504
876	3074704	903	3076000	919	3171000	935	3041902	948	3087700
876	3086200	903	3076100	919	3171100	935	3042000	948	3087900
877	3086300	904	3072000	919	3171300	935	3042100	948	3088000
877	3086800	904	3073600	919	3171500	936	3042700	948	3088100
877	3086900	905	3049701	920	3171400	936	3042900	949	3054402
878	3086000	905	3049800	920	3171600	936	3043000	949	3054601
878	3086100	905	3051900	921	3044801	936	3043100	949	3087804
878	3086400	905	3071600	921	3044802	936	3043200	950	3164800
878	3086500	906	3072500	922	3043600	937	3043300	950	3166200
889	3072800	906	3072700	922	3044000	937	3043400	950	3166300
889	3072901	906	3073400	922	3044100	937	3047401	951	3165700
890	3072902	907	3071700	922	3044300	937	3047403	951	3165800
890	3073200	907	3071800	923	3043700	938	3046901	951	3165900
890	3073300	907	3071900	923	3043800	938	3046902	951	3166000
890	3073500	908	3046200	923	3044200	938	3047000	951	3166100
891	3075500	908	3046300	924	3043900	938	3047100	952	3088200
891	3075600	908	3046500	924	3044400	938	3047200	952	3165600
891	3075700	908	3046600	924	3044500	939	3047300	953	3088300
892	3075800	908	3071500	925	3045100	939	3047402	953	3164400
892	3075900	909	3045001	925	3045500	939	3047500	953	3164500
893	3076400	909	3045002	925	3045600	939	3048600	954	3090000
893	3076500	909	3046001	926	3045300	940	3045200	954	3163900
893	3076600	909	3046002	926	3045400	940	3048300	954	3164000
894	3076700	909	3046400	926	3045700	941	3040402	954	3164200
894	3076800	909	3046800	926	3045800	941	3040602	954	3164300
895	3088700	910	3178800	927	3044601	941	3041002	955	3161802
895	3088800	910	3178900	927	3044602	941	3041003	955	3161901
895	3089000	911	3180000	927	3044700	941	3041200	955	3162100
895	3089100	911	3180100	927	3044900	941	3041300	955	3162800
895	3089200	911	3180200	928	3046100	941	3041400	955	3162900
896	3089600	911	3180300	928	3049400	941	3042300	956	3162000
896	3089700	911	3180400	929	3048700	942	3041102	956	3162200
896	3089800	911	3180500	929	3048800	942	3041500	956	3163000

Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB	Zone	2006 MB
956	3163100	960	3095100	962	3096400	967	3094500	970	3165000
957	3162301	960	3095200	963	2999702	967	3094800	971	3054602
957	3162400	960	3162500	963	3096600	967	3165100	971	3097901
957	3162601	960	3162700	963	3097801	967	3165200	971	3097902
957	3162602	960	3163800	964	3096500	967	3165300	971	3098200
958	3163200	961	3095400	964	3096701	968	3093400	971	3098500
958	3163300	961	3095500	964	3096702	968	3094300	972	3098001
958	3163400	961	3095600	965	3093800	968	3094400	972	3098002
958	3163500	961	3095700	965	3093900	969	3054700	972	3098103
958	3163600	961	3095800	965	3094000	969	3093200	972	3098104
958	3164100	961	3095900	965	3094100	969	3093300	973	3098300
959	3163700	962	3095300	965	3094200	969	3093500	973	3098400
959	3164600	962	3096000	966	3094600	969	3093600	973	3098600
959	3164700	962	3096100	966	3094700	969	3093700	973	3098700
959	3165400	962	3096200	966	3094900	970	3098102	973	3098800
959	3165500	962	3096300	966	3095000	970	3164900		

APPENDIX THREE
2006 LANDUSE ZONE FILES

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\ZONEDTV5.20
Gore 2006 TRANSPORTATION MODEL
06GG24.ZND
980
People/HH
Cars/HH
1.  Households
2.  School Roll
3.  Tertiary Roll
4.  Retail Trade
5.  Office
6.  Manufacturing
7.  Community
8.  Total Jobs
9.  CBD Jobs
10.
11. spare
12. spare
13. spare
14. spare
15AMPEAK Externals inbound
16AMPEAK Externals outbound
17OFFPEAK Externals inbound
18OFFPEAK Externals outbound
19PMPEAK Externals inbound
20PMPEAK Externals outbound
21AMPEAK Externals thrus
22AMPEAK Externals thrus
23OFFPEAK Externals thrus
24OFFPEAK Externals thrus
25PMPEAK Externals thrus
26PMPEAK Externals thrus HH    SCH    TER     RT     OF     MA     CO    TOT    CBD
   1    0.000  0.000      0      0      0    269     25    148      3    590    590
   2    4.000  1.667      3      0    646    291     98     10     49    485    485
   3    1.000  1.667      3      0      0     43     66     20     37    192    192
   4    1.000  1.667      3      0      0    102     29     42     26    215    215
   5    0.000  0.000      0      0      0     80    303      6     39    439    439
   6    2.333  1.667      9      0      0     41     28     10     68    153    153
   7    0.000  0.000      0      0      0     98     59      0     20    185    185
   8    0.000  0.000      0      0      0     76    176      3      3    286    286
   9    3.000  1.667      3      0      0    115     70     58      3    254    254
  10    1.833  0.500     18      0      0     48      6     48      0    114    114
  11    1.800  1.111     45      0      0      9      6      4      8     33     33
  12    1.500  0.800     60      0      0      9      6      4      8     36     36
  13    1.923  1.128     39      0      0      4      2      1      2     13     13
  14    2.091  0.909     33      0      0     10      7      4      9     39     39
  15    1.875  1.458     24      0      0      6      6      3      7     29     29
  16    0.000  0.000      0      0      0      0     75      0    138    215    215
  17    0.000  0.000      0      0      0      3    259      0     98    368    368
  18    4.000  1.667      3      0      0     55    197     10     69    338    338
  19    0.000  0.000      0      0      0     99     61     39     97    374    374
  20    0.000  0.000      0      0      0    119     10    105     41    400    400
  21    8.667  1.667      9      0      0    325    197    163    140    830    830
  22    2.000  1.667      3      0      0    221    259      6    137    641    641
  23    0.000  0.000      0      0      0     16    225      0     85    358    358
  24    4.000  1.667      3      0      0    190    137      0      3    338    338
  25    0.000  0.000      0      0      0     72      0      3    206    296    296
  26    2.000  1.667     12      0      0      9      6      4      8     36     36
  27    3.000  1.667      3    166      0      0      3      0     49     52     52
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28	1.000	1.667	3	0	0	173	3	0	13	225	225
29	2.375	1.458	24	0	0	79	3	0	67	150	150
30	0.000	0.000	0	0	2461	13	13	0	130	156	156
31	0.000	0.000	0	0	0	195	13	3	3	218	218
32	0.000	0.000	0	0	0	26	26	10	7	75	75
33	0.000	0.000	0	0	0	40	117	13	3	182	182
34	0.000	0.000	0	0	0	92	7	186	25	413	413
35	0.000	0.000	0	0	0	27	0	3	0	43	43
36	0.000	0.000	0	0	0	35	0	0	0	49	49
37	2.286	0.571	21	0	0	22	10	10	3	56	56
38	0.000	0.000	0	127	0	4	4	2	4	19	19
39	2.000	0.429	21	0	0	6	0	25	0	49	49
40	5.000	1.667	3	0	0	9	6	4	8	36	36
41	2.091	0.697	33	0	0	5	5	3	6	23	23
42	1.962	0.795	78	0	0	7	7	4	8	36	36
43	2.320	1.307	75	0	0	6	3	3	43	55	
44	1.900	0.967	60	0	0	2	1	1	2	10	
45	2.036	0.631	84	0	0	1	1	1	1	6	
46	3.111	0.741	27	0	0	57	3	34	26	134	
47	2.000	1.667	3	0	0	36	12	12	0	121	
48	0.000	0.000	0	0	0	11	0	9	7	39	
49	1.000	1.667	3	0	0	55	0	6	0	125	
50	4.000	1.667	3	0	0	30	0	25	0	71	
51	3.000	1.667	3	0	0	4	7	46	0	58	
52	1.909	0.455	33	0	0	4	2	1	2	13	
53	2.091	1.424	33	0	0	0	0	0	0	3	
54	2.476	1.095	63	0	0	0	0	0	0	0	
55	2.050	0.733	60	0	0	9	6	4	8	36	
56	2.286	0.429	21	0	0	1	1	1	1	6	
57	2.684	1.386	57	0	0	0	0	0	0	3	
58	2.400	0.900	60	0	0	1	1	1	1	10	
59	2.250	1.167	36	0	0	9	6	4	8	36	
60	5.000	1.667	3	0	0	11	0	24	0	52	
61	3.000	1.667	3	0	0	43	8	8	1	69	
62	2.176	1.059	51	0	0	1	1	1	1	10	
63	2.000	0.978	45	0	0	5	5	2	4	20	
64	2.400	1.000	60	0	0	1	1	1	1	10	
65	2.600	1.567	30	0	0	10	7	4	8	33	
66	2.333	1.139	36	0	0	0	0	0	0	0	
67	1.765	0.980	51	0	0	0	0	0	0	0	
68	2.643	1.357	42	0	0	0	0	0	0	3	
69	2.800	1.467	30	0	0	0	0	0	0	0	
70	2.000	1.128	39	0	0	0	0	0	0	0	
71	2.308	0.846	39	0	0	1	1	1	1	7	
72	2.316	1.228	57	0	0	0	0	0	0	7	
73	2.619	1.651	63	0	0	3	1	1	2	17	
74	2.706	1.431	51	0	0	0	0	0	0	0	
75	2.867	1.778	45	0	0	0	0	0	0	0	
76	2.938	1.354	48	0	0	10	7	4	8	33	
77	2.263	1.105	57	335	0	0	12	0	49	60	
78	0.000	0.000	0	0	0	37	17	54	691	831	
79	2.655	1.448	174	0	0	1	1	1	1	14	
80	2.714	1.667	21	0	0	2	1	1	2	14	
81	2.722	1.963	54	0	0	1	1	1	1	13	
82	2.654	1.346	78	0	0	5	5	2	4	17	
83	2.576	1.505	99	0	0	5	2	1	2	17	
84	3.000	1.952	63	0	0	5	2	1	2	14	
85	2.579	1.614	114	0	0	0	0	0	0	3	
86	2.632	1.412	114	0	0	1	1	1	1	7	
87	2.657	1.562	105	0	0	0	0	0	0	7	
88	3.083	2.000	36	0	0	0	0	0	0	3	
89	2.808	1.692	78	0	0	2	2	2	2	14	

90	2.691	1.800	165	0	0	7	8	4	9	35
91	2.871	1.559	93	0	0	2	1	1	2	10
92	2.406	1.495	192	0	0	1	1	1	1	17
93	2.563	1.438	48	0	0	4	2	1	2	13
94	2.727	1.523	132	0	0	1	1	1	1	13
95	2.479	1.535	144	0	0	2	1	1	2	13
96	2.750	1.642	120	0	0	0	0	0	3	66
97	2.769	2.308	39	0	0	21	0	0	3	50
98	3.111	1.667	27	0	0	10	8	4	9	37
99	3.235	2.176	51	0	0	1	1	1	1	10
100	2.277	1.652	141	0	0	2	1	1	2	16
101	2.575	1.692	120	0	0	9	8	5	10	39
102	2.707	1.356	174	0	0	7	6	3	6	33
103	2.782	1.479	165	0	0	6	6	3	4	23
104	2.810	1.333	63	591	0	0	0	0	71	72
105	3.111	1.519	81	0	0	0	3	0	55	59
106	3.067	1.844	45	0	0	0	0	0	0	3
107	2.923	2.154	39	0	0	2	1	1	2	10
108	2.867	1.733	45	0	0	0	0	0	0	3
109	2.708	1.861	72	0	0	0	0	0	0	3
110	2.800	2.167	30	375	0	4	4	2	3	16
111	2.500	1.467	90	0	0	2	2	2	2	20
112	2.933	1.600	90	0	0	10	8	5	9	39
113	2.656	1.563	183	0	0	1	1	1	1	13
114	2.143	1.405	42	0	0	0	0	0	0	6
115	2.667	1.543	81	0	0	0	0	0	0	7
116	2.957	1.246	69	274	0	11	11	7	13	56
117	2.674	1.295	129	0	0	2	1	1	2	16
118	2.702	1.340	141	0	0	0	0	0	0	7
119	2.778	1.519	27	416	0	7	0	0	55	62
120	1.941	0.980	102	0	0	0	0	0	0	7
121	2.750	1.771	48	0	0	1	1	1	1	7
122	2.280	1.347	75	0	0	0	0	0	0	7
123	2.667	1.556	63	0	0	0	0	0	0	3
124	2.700	1.533	60	0	0	4	2	1	2	17
125	2.409	1.470	66	0	0	0	0	0	0	7
126	2.583	1.306	72	0	0	0	0	0	0	7
127	3.471	1.490	51	0	0	6	3	2	3	23
128	2.800	1.633	60	0	12	1	1	1	41	50
129	2.846	1.654	78	0	0	4	4	2	3	20
130	2.188	1.323	96	0	0	4	4	2	3	16
131	2.438	1.292	96	0	0	4	4	2	3	20
132	2.216	0.883	111	0	0	8	8	5	8	36
133	2.185	1.432	81	0	0	104	1	1	14	125
134	2.379	1.310	87	0	0	0	0	0	0	7
135	2.778	1.778	27	0	196	4	4	2	4	20
136	2.438	1.417	48	0	0	2	1	1	2	10
137	2.429	1.571	84	0	0	4	4	2	4	23
138	1.970	1.303	99	0	0	10	8	5	9	40
139	1.789	1.000	57	1172	0	13	3	0	123	145
140	2.400	1.333	90	0	0	109	5	1	2	128
141	2.147	0.922	102	0	0	2	1	1	2	13
142	2.513	0.718	117	0	0	19	8	5	145	198
143	2.410	1.598	117	0	0	5	5	3	6	26
144	2.476	1.651	63	0	0	11	8	6	10	43
145	2.769	2.026	78	0	0	1	1	1	1	7
146	2.692	1.885	78	0	0	2	1	1	2	10
147	2.750	1.750	36	0	0	2	1	1	2	10
148	2.531	1.656	96	0	0	1	1	1	1	10
149	2.667	1.580	81	0	0	2	1	1	2	13
150	2.824	1.941	51	0	0	0	0	0	0	3
151	0.000	0.000	0	0	0	29	7	51	0	172

152	2.474	1.789	57	0	0	29	3	97	7	179
153	2.556	2.000	27	431	0	3	3	35	127	172
154	5.000	1.667	3	0	0	0	0	0	0	3
155	2.500	1.500	18	0	0	4	2	1	2	20
156	2.091	1.242	66	0	0	5	5	3	4	23
157	2.842	1.281	57	0	0	5	5	3	6	26
158	1.950	1.358	120	0	0	2	1	1	2	16
159	2.140	1.457	129	0	0	9	9	4	8	39
160	2.538	1.308	78	0	0	6	5	3	5	26
161	2.571	1.560	84	0	0	0	0	0	0	7
162	2.565	1.725	69	0	0	2	1	1	2	13
163	2.200	1.483	60	0	0	1	1	1	1	10
164	2.529	1.333	51	0	0	0	0	0	0	3
165	2.368	1.579	114	0	0	1	1	1	1	13
166	2.552	1.770	87	0	0	1	1	1	1	10
167	2.333	1.889	27	0	0	7	8	4	8	31
168	1.625	1.333	24	0	0	0	3	3	42	49
169	2.636	1.606	33	0	0	4	2	1	2	13
170	2.364	0.909	33	265	0	6	7	3	7	30
171	2.900	0.800	30	0	0	0	0	0	0	3
172	2.391	1.435	69	0	0	0	0	0	0	7
173	2.588	1.265	102	0	0	2	1	1	2	16
174	2.205	1.291	117	0	0	0	0	0	0	3
175	2.200	1.467	60	0	0	108	0	0	3	115
176	2.276	1.575	87	0	0	1	1	1	1	10
177	2.667	2.278	18	0	0	4	2	1	2	13
178	2.444	1.037	54	0	0	11	8	6	9	44
179	2.706	1.745	51	0	0	0	0	0	0	3
180	2.727	1.273	33	0	0	0	0	0	0	0
181	2.250	1.217	60	0	0	0	0	0	0	0
182	2.611	1.648	54	0	0	1	1	1	1	7
183	2.522	1.232	69	0	0	0	0	0	0	3
184	1.958	0.889	72	0	0	0	0	0	0	3
185	2.200	1.480	75	0	0	2	1	1	2	10
186	2.429	1.500	84	0	0	2	1	1	2	13
187	2.857	1.857	63	0	0	0	0	0	0	7
188	2.320	1.453	75	0	0	0	0	0	0	3
189	2.684	1.596	57	0	0	1	1	1	1	10
190	2.611	1.593	54	0	0	0	0	0	0	7
191	2.067	1.689	45	0	0	0	0	0	0	0
192	2.722	1.796	54	0	0	2	2	2	2	13
193	2.176	1.549	51	0	0	9	9	4	8	36
194	2.077	1.410	78	0	0	2	1	1	2	13
195	2.087	1.246	69	0	0	2	1	1	2	13
196	1.750	1.183	120	0	0	7	7	4	8	30
197	1.885	1.103	78	0	0	4	2	1	2	17
198	2.050	1.517	60	0	0	2	1	1	2	13
199	2.333	1.194	36	0	0	1	1	1	1	7
200	2.364	1.773	66	0	0	3	2	2	3	17
201	2.200	1.560	75	0	0	7	7	4	8	30
202	2.043	1.551	69	0	0	0	0	0	0	3
203	2.400	1.933	15	293	0	6	6	3	7	23
204	2.333	1.722	36	0	0	2	1	1	2	10
205	2.944	1.667	54	0	0	0	0	0	0	7
206	3.375	1.667	24	0	0	13	6	3	7	81
207	2.500	1.722	36	260	0	9	7	5	8	34
208	2.333	1.361	72	0	0	0	0	0	0	7
209	2.412	1.490	51	0	0	0	0	0	0	7
210	2.625	1.375	48	0	0	1	1	1	1	10
211	2.690	1.885	87	0	0	1	1	1	1	10
212	2.528	1.806	108	0	0	2	1	1	2	17
213	1.854	1.215	144	0	0	50	19	20	37	137

214	2.000	1.453	75	0	0	120	2	1	2	134
215	2.042	1.042	72	0	0	8	7	4	9	33
216	2.611	1.944	54	0	0	4	4	2	3	16
217	2.688	1.979	48	0	0	1	1	1	1	7
218	2.476	1.889	63	0	0	4	2	1	2	13
219	2.200	1.533	45	191	0	7	6	3	7	30
220	2.737	1.842	57	0	0	4	4	2	4	20
221	2.944	1.889	54	0	0	6	5	3	7	23
222	2.594	1.552	96	0	0	0	0	0	0	3
223	2.667	1.900	90	0	0	0	0	0	0	7
224	2.528	1.685	108	0	0	3	2	2	3	16
225	2.559	1.696	102	0	0	1	1	1	1	10
226	0.000	0.000	0	600	0	3	0	0	191	197
227	2.265	1.578	102	0	0	1	1	1	1	10
228	2.320	1.573	75	0	0	0	0	0	0	3
229	2.850	1.900	60	0	0	0	0	0	0	3
230	2.391	1.681	69	0	0	1	1	1	1	7
231	2.350	1.683	60	0	0	1	1	1	1	7
232	3.056	1.963	54	0	0	4	2	1	2	16
233	3.088	2.314	102	1200	0	4	12	0	23	46
234	2.091	2.242	33	0	0	0	0	0	0	3
235	2.714	1.952	21	274	0	7	6	3	7	30
236	2.787	1.872	141	0	0	0	0	0	0	13
237	1.000	1.667	3	0	0	23	16	0	43	81
238	2.250	1.389	36	0	0	38	32	3	82	156
239	3.000	1.933	30	0	0	51	24	1	4	81
240	3.500	1.667	6	0	53	71	107	3	214	403
241	0.000	0.000	0	0	0	3	3	0	106	111
242	2.250	1.208	24	0	0	50	15	7	0	78
243	1.923	1.436	39	0	0	9	6	4	8	36
244	2.083	1.347	72	0	0	63	10	10	10	98
245	2.417	1.569	72	0	0	40	2	8	9	62
246	0.000	0.000	0	0	0	0	0	0	0	0
247	1.946	1.126	111	0	0	11	11	6	10	46
248	2.655	1.632	87	0	0	8	8	4	8	36
249	2.684	1.719	57	119	0	9	6	4	8	36
250	2.842	1.825	57	0	0	10	8	6	9	39
251	2.077	1.231	39	396	0	10	0	0	48	62
252	0.000	0.000	0	980	0	3	3	0	106	114
253	3.143	1.857	63	0	0	1	1	1	1	7
254	3.091	1.970	33	0	0	0	0	0	0	3
255	3.118	2.039	51	0	0	4	2	1	2	13
256	2.895	2.140	57	0	0	1	1	1	1	10
257	2.737	2.000	57	0	0	0	0	0	0	7
258	3.143	1.587	63	0	0	4	2	1	2	16
259	2.542	1.736	72	0	0	16	4	1	24	52
260	2.760	2.027	75	0	0	2	1	1	2	16
261	2.913	1.942	69	0	0	0	0	0	0	7
262	2.250	1.667	72	0	0	1	1	1	1	7
263	2.750	1.667	48	0	0	2	1	1	2	10
264	2.625	2.333	24	0	0	37	21	47	0	116
265	2.000	1.667	6	0	0	168	67	101	14	398
266	1.667	1.667	9	0	0	37	16	31	7	111
267	2.240	1.387	75	0	0	6	5	3	7	26
268	2.435	1.594	69	0	0	36	1	1	11	52
269	2.111	1.296	27	0	0	0	0	0	0	0
270	3.333	2.333	18	0	0	0	0	0	0	3
271	2.036	1.488	84	0	0	1	1	1	1	7
272	2.409	1.591	66	0	0	19	77	0	0	105
273	2.357	1.595	42	0	0	0	0	0	0	3
274	2.500	1.722	36	314	0	9	7	4	8	36
275	2.370	1.685	162	0	0	2	2	2	2	16

276	2.420	1.594	207	0	0	1	1	1	1	13
277	2.896	1.986	144	0	0	4	4	2	4	23
278	2.765	1.745	51	0	0	2	1	1	2	10
279	0.000	0.000	0	0	0	0	0	0	0	0
280	4.000	1.667	6	0	0	4	2	1	2	13
281	3.000	1.533	15	0	0	20	6	95	0	121
282	3.813	1.354	48	71	0	23	0	3	116	144
283	3.571	1.619	84	0	0	68	7	3	77	169
284	2.739	1.681	69	0	0	2	1	1	2	13
285	3.733	1.978	45	0	0	14	11	21	31	106
286	3.333	1.972	36	0	0	7	6	3	6	27
287	2.306	1.748	147	187	0	0	3	0	41	50
288	2.364	1.667	66	0	0	11	9	4	9	43
289	3.029	0.912	102	0	0	10	3	0	122	146
290	2.462	1.402	117	0	0	8	8	4	8	36
291	2.741	1.926	81	0	0	0	0	0	0	3
292	3.200	2.178	45	0	0	1	1	1	1	7
293	2.575	2.050	120	0	0	1	1	1	1	10
294	2.500	2.167	60	0	0	1	1	1	1	10
295	3.250	2.875	24	0	0	0	0	0	0	3
296	2.167	2.500	18	0	0	5	2	1	2	14
297	2.923	2.564	39	0	0	3	2	2	4	17
298	2.846	2.359	39	0	0	5	5	2	5	20
299	2.500	2.389	36	0	0	6	6	3	7	24
300	3.143	2.929	42	0	0	6	6	3	6	29
301	2.786	1.857	42	0	0	4	2	2	4	24
302	2.736	2.321	159	283	0	4	3	3	40	63
303	6.000	1.667	3	0	0	0	0	0	0	3
304	1.500	1.667	6	0	0	3	28	6	0	92
305	0.000	0.000	0	0	0	6	0	49	0	69
306	2.583	2.000	36	0	0	0	0	0	0	3
307	2.679	2.126	159	0	0	3	2	2	3	27
308	3.159	2.144	132	0	0	2	2	2	2	13
309	3.162	2.595	111	0	0	15	13	8	15	66
310	3.048	2.286	63	0	0	3	2	2	3	17
311	2.789	2.123	171	0	0	6	5	3	4	23
312	2.577	2.154	78	0	0	2	1	1	2	13
313	1.632	1.140	57	0	0	6	6	3	7	24
314	3.143	1.667	21	0	0	0	0	0	0	3
315	2.385	2.154	39	0	0	13	10	59	1	89
316	2.600	1.933	30	0	0	4	3	2	3	21
317	3.250	1.667	12	0	0	0	0	0	0	4
318	2.222	1.426	54	0	0	5	2	1	3	19
319	2.478	1.246	69	0	0	5	2	1	3	19
320	2.000	1.667	3	0	0	4	4	4	4	77
321	2.000	1.667	3	0	0	4	0	110	3	121
322	2.667	1.519	27	0	0	0	0	0	0	4
323	2.467	1.178	45	0	0	0	0	0	0	4
324	2.000	1.667	9	36	0	1	1	1	1	8
325	2.583	1.083	36	0	0	0	0	0	0	4
326	2.000	1.074	27	0	0	0	0	0	0	4
327	2.200	1.200	15	0	0	0	0	0	0	4
328	1.000	1.667	3	0	0	0	0	0	0	0
329	2.222	1.630	27	0	0	0	0	0	0	4
330	3.750	1.458	24	0	0	0	0	0	0	0
331	2.500	1.125	24	0	0	0	0	0	0	4
332	1.800	1.100	30	0	0	1	1	1	1	8
333	2.400	0.800	15	0	0	1	1	1	1	11
334	2.333	1.667	18	0	0	5	4	3	4	23
335	2.000	1.667	3	0	0	20	6	21	5	72
336	3.667	1.667	9	0	0	10	7	4	7	34
337	2.083	1.361	36	0	0	29	8	24	15	102

338	2.286	0.857	21	168	0	5	4	3	4	19
339	2.333	0.667	18	0	0	1	1	1	1	8
340	2.000	1.667	9	0	0	0	0	0	0	0
341	2.273	1.424	33	0	0	0	0	0	0	4
342	2.182	0.818	33	0	0	0	0	0	0	0
343	1.818	0.818	33	0	0	0	0	0	0	4
344	2.067	1.511	45	0	0	0	0	0	0	4
345	2.292	1.653	72	0	0	4	2	3	4	19
346	2.286	1.524	21	0	0	5	4	3	4	19
347	0.000	0.000	0	0	0	0	14	550	0	571
348	2.333	1.667	18	0	0	3	1	1	2	14
349	2.545	1.667	33	0	0	4	3	2	3	18
350	3.400	2.000	15	0	0	0	0	51	0	64
351	2.846	2.308	39	0	0	5	5	2	5	18
352	2.462	2.359	39	0	0	10	8	5	9	41
353	3.000	2.074	27	0	0	3	1	1	2	11
354	2.889	2.519	27	0	0	0	0	118	0	125
355	2.000	1.667	9	0	0	5	5	2	5	18
356	2.900	2.367	30	0	0	3	1	1	3	10
357	2.308	1.974	39	0	0	6	5	3	7	28
358	3.000	2.944	18	0	0	0	0	0	0	3
359	2.444	2.111	27	0	0	6	6	3	7	27
360	2.929	2.214	42	0	0	0	0	0	0	3
361	3.400	3.000	15	0	0	0	0	0	0	0
362	2.765	2.235	51	0	0	2	1	1	2	10
363	3.231	2.051	39	0	0	3	1	1	3	10
364	2.967	2.422	90	141	0	3	7	4	17	49
365	3.167	1.778	18	88	0	2	1	1	2	14
366	4.000	1.667	9	0	0	3	1	1	2	11
367	2.846	2.436	39	0	0	5	2	1	2	14
368	3.500	1.667	6	0	0	1	1	58	1	73
369										
370										
371	0.000	0.000	0	0	0	0	0	0	0	0
372	2.714	1.667	21	0	0	5	1	1	1	179
373	2.843	2.248	153	0	0	17	163	6	7	219
374	3.000	2.347	75	0	0	46	4	11	8	106
375	2.750	2.167	24	0	0	0	0	0	0	7
376	3.500	1.667	6	0	0	6	7	3	8	25
377										
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399										

1.667	1.667	9	0	0	72	23	13	7	124
2.320	1.427	75	0	0	2	1	1	2	13
2.333	1.278	18	0	0	30	0	0	4	41
2.556	1.741	27	0	0	0	0	0	0	6
2.765	1.569	51	0	0	1	1	1	1	6
2.154	1.692	39	0	0	47	0	29	3	150
2.487	1.641	117	0	0	10	10	5	10	46
2.393	1.869	84	272	0	8	8	4	8	39
1.926	1.160	81	0	0	1	1	1	1	10
2.636	1.606	66	313	0	9	7	4	8	39
2.333	1.259	81	0	0	4	5	2	3	20

462	2.560	1.653	75	607	0	17	1	1	88	114
463	2.417	1.542	72	389	0	12	1	1	46	68
464	2.436	1.949	117	0	66	5	3	2	3	20
465	2.778	2.083	108	0	0	3	2	2	3	20
466	2.810	2.016	126	0	0	7	6	3	6	33
467	2.538	1.479	117	0	0	3	2	2	3	16
468	2.394	1.404	99	0	0	4	5	2	3	23
469	2.429	1.794	126	0	0	2	2	2	2	20
470	2.385	1.372	78	0	0	2	2	2	2	13
471	2.250	1.450	60	108	0	5	5	3	6	29
472	1.714	0.952	189	177	0	12	12	8	90	130
473	2.239	1.390	213	0	0	15	12	7	13	59
474	2.750	1.417	96	0	0	3	2	2	73	89
475	1.500	1.667	6	0	0	383	208	0	77	703
476	1.588	0.941	51	0	0	200	37	8	32	306
477	2.265	1.490	102	0	0	4	2	2	4	23
478	3.000	1.667	6	0	0	79	32	37	51	237
479	2.000	1.250	48	0	0	16	0	7	0	49
480	2.475	1.915	177	0	0	7	8	5	6	36
481	2.083	1.778	72	0	0	2	1	1	2	10
482	1.000	1.667	3	0	0	131	49	13	26	260
483	2.571	1.238	21	0	0	16	0	13	0	59
484	2.370	1.531	81	0	0	5	6	3	6	30
485	2.733	1.733	45	119	0	6	6	3	5	26
486	2.500	2.006	168	0	0	1	1	1	1	20
487	2.278	1.954	108	0	0	1	1	1	1	13
488	2.600	1.667	15	0	0	2	1	1	2	10
489	3.000	2.286	21	0	0	6	6	3	7	24
490	2.714	2.405	42	0	0	3	3	190	9	229
491	5.000	1.667	6	0	0	2	1	1	2	10
492	2.429	1.857	21	0	0	6	6	3	7	24
493	2.545	1.970	33	0	0	11	11	5	11	48
494	3.000	3.250	12	0	0	4	2	1	2	13
495	2.900	2.267	30	0	0	5	5	3	6	23
496	3.000	1.667	18	0	0	7	7	5	7	35
497	2.636	1.242	33	0	0	11	9	6	9	49
498	2.455	1.697	66	0	0	0	0	0	0	7
499	2.500	1.313	48	147	0	0	0	0	0	0
500	2.417	1.542	72	0	0	0	0	0	0	10
501	2.105	1.298	57	0	0	9	5	2	4	31
502	2.714	2.286	21	0	0	0	0	0	0	3
503	1.958	1.264	72	0	0	6	4	3	5	28
504	2.833	1.056	18	0	0	10	10	6	10	52
505	2.100	0.967	30	0	0	0	0	0	0	0
506	2.304	1.551	69	0	0	1	1	1	1	7
507	2.607	1.774	84	0	0	0	0	0	0	3
508	0.000	0.000	0	0	0	14	12	257	6	292
509	2.632	1.456	57	0	0	0	0	0	0	7
510	0.000	0.000	0	0	0	0	0	0	0	3
511	2.513	1.376	117	0	0	0	0	0	0	7
512	2.364	1.697	33	0	0	2	1	1	2	10
513										
514	2.667	2.127	63	34	0	6	6	10	20	80
515	2.500	1.667	18	19	0	5	5	2	3	21
516	3.000	1.667	12	0	0	5	5	2	3	17
517	3.000	1.667	9	0	0	5	5	2	3	17
518	3.000	1.667	12	0	0	5	2	1	2	17
519	2.333	1.667	9	0	0	5	2	1	2	14
520	3.600	1.667	15	0	0	7	6	3	6	28
521	3.333	2.111	18	0	0	5	5	2	3	21
522	3.333	1.667	9	0	0	2	1	1	2	13
523	3.000	1.667	9	0	0	2	1	90	2	105

524	3.667	2.111	18	0	0	4	2	1	2	16
525	3.333	2.389	36	0	0	7	7	3	7	72
526	2.783	2.159	69	0	0	14	12	6	10	52
527	4.400	2.100	30	0	0	0	3	0	53	65
528	3.000	2.333	24	0	0	51	3	0	3	65
529	2.571	1.667	21	0	0	4	2	2	4	23
530	2.455	2.515	33	0	0	9	9	4	8	36
531	2.640	2.213	75	23	0	16	16	9	20	79
532	2.714	2.016	63	24	0	22	20	11	21	95
533	2.765	2.098	51	0	0	10	9	5	10	46
534	3.174	2.130	69	21	0	21	19	9	20	88
535	2.857	2.238	42	0	0	14	10	6	11	52
536	2.429	1.667	21	0	0	7	5	3	5	29
537	3.067	1.711	45	97	0	17	14	8	18	72
538	3.000	1.722	18	0	0	5	3	2	3	20
539	4.833	1.667	18	0	0	9	5	2	5	28
540	3.250	2.521	48	0	0	15	13	8	15	70
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561	2.615	1.128	39	219	0	80	0	0	32	139
562	2.412	1.490	51	0	0	14	10	6	11	54
563	2.444	1.000	27	0	0	3	0	53	3	57
564	1.889	1.395	81	0	0	15	14	9	15	64
565	2.725	1.717	120	60	0	40	42	17	42	183
566	2.000	1.667	15	0	0	68	29	12	21	166
567	5.500	1.667	12	0	0	159	31	12	147	392
568	1.889	1.148	54	0	0	25	55	17	10	112
569	1.804	1.261	138	0	0	46	8	9	22	112
570	2.769	1.949	78	0	0	1	1	1	1	14
571	2.432	1.550	111	0	0	6	6	4	5	27
572	2.222	1.630	27	556	0	6	4	36	3	44
573	3.133	2.044	45	0	0	1	1	1	1	7
574	3.267	2.289	45	0	0	4	47	1	21	81
575	2.639	1.537	108	336	0	9	10	9	69	112
576	2.800	1.840	75	0	0	26	3	9	3	47
577	3.250	2.125	24	0	0	4	4	2	3	16
578	3.200	2.200	15	0	0	4	2	1	2	13
579	2.553	1.986	141	0	0	9	7	5	8	41
580	2.865	1.703	111	0	0	3	0	0	44	64
581	2.833	1.972	36	84	0	1	1	1	1	10
582	2.431	1.745	153	0	0	3	2	3	3	20
583	2.422	1.570	135	0	0	13	12	9	15	61
584	2.381	1.683	63	0	0	11	8	6	10	47
585	2.706	2.098	51	43	0	5	2	1	4	14

586	3.000	2.016	63	0	0	0	5	84	0	106
587	0.000	0.000	0	0	0	0	0	0	0	0
588	2.556	2.037	27	0	0	6	3	2	4	23
589	2.154	1.282	39	0	0	9	6	4	7	38
590	2.500	1.667	24	0	0	0	0	0	0	6
591	2.625	2.125	24	0	0	9	9	5	9	39
592	2.286	2.190	21	0	0	0	0	0	0	3
593	2.000	1.667	12	0	0	1	1	1	1	10
594	2.000	1.667	6	0	0	0	16	417	0	424
595	4.077	2.538	39	0	70	4	4	9	37	80
596	3.148	2.062	81	208	0	22	18	10	18	89
597	2.417	1.944	36	0	0	7	6	5	8	36
598	3.667	2.333	18	0	0	9	6	5	7	33
599	3.500	2.375	24	0	0	9	7	5	8	40
600	2.833	2.148	54	57	0	13	12	8	14	63
601	2.857	1.857	21	0	0	4	4	2	4	20
602	2.750	2.083	72	30	0	17	17	9	17	80
603	2.818	2.091	66	0	0	13	8	6	9	96
604	2.810	1.825	63	129	0	21	16	11	19	89
605	3.000	2.200	30	0	0	9	6	5	8	40
606	3.038	1.795	78	0	0	1	4	1	1	126
607	2.600	1.889	45	0	0	6	0	0	0	56
608	2.400	2.100	30	19	0	11	7	6	9	43
609	2.938	2.271	48	0	0	13	12	7	12	56
610	2.833	1.833	36	0	0	1	4	1	4	54
611	2.385	2.077	39	0	0	9	5	57	5	92
612	2.667	1.704	27	0	0	6	3	2	4	22
613	2.500	1.867	30	0	0	10	9	6	10	46
614	3.067	2.333	45	0	0	18	14	9	15	75
615	2.372	1.419	129	81	0	8	7	5	7	41
616	2.583	1.463	108	0	0	19	10	29	26	104
617	2.692	1.821	39	0	0	2	2	2	2	17
618	2.424	1.687	99	0	0	14	14	7	12	63
619	2.529	1.333	51	0	0	45	15	10	32	119
620	2.475	1.333	120	0	0	14	2	8	18	75
621	2.700	1.800	30	51	0	4	4	2	3	16
622	2.833	2.333	18	0	0	1	1	1	1	7
623	2.875	1.917	24	0	0	5	5	3	5	26
624	2.714	2.286	21	0	0	4	2	1	2	13
625	2.778	1.963	27	0	0	3	10	3	0	46
626	2.650	1.839	180	0	0	15	13	9	17	75
627	3.222	2.296	27	0	0	5	5	3	6	29
628	2.471	1.627	51	371	0	5	5	52	65	194
629	2.750	1.667	12	0	0	5	5	3	6	23
630	2.250	2.083	24	0	0	6	6	3	6	29
631	2.286	2.190	21	0	0	6	6	4	7	32
632	2.667	2.074	27	0	0	6	5	3	6	29
633	3.000	1.667	6	0	0	0	0	0	0	3
634	2.500	1.667	6	0	0	1	1	1	1	6
635	2.308	1.436	39	0	0	6	5	3	6	23
636	2.190	1.413	63	120	0	3	10	3	47	81
637	2.345	1.437	87	0	0	49	5	51	9	136
638	3.000	1.889	27	0	0	6	6	3	6	29
639	3.000	2.033	30	0	0	6	6	4	7	32
640	3.600	2.667	15	0	0	4	4	2	3	16
641	2.680	1.947	75	0	0	17	15	9	16	81
642	3.111	2.333	27	0	0	9	7	4	8	39
643	3.000	2.000	54	0	0	14	15	9	16	62
644	2.524	2.254	63	0	0	18	16	10	17	77
645	3.167	1.944	36	0	0	13	12	7	15	54
646	2.000	1.667	6	0	0	1	1	1	1	10
647	2.333	1.389	54	0	0	7	6	4	8	41

648	3.000	2.444	45	0	0	13	11	8	13	55
649	2.462	1.846	39	0	0	4	2	1	2	16
650	2.457	2.181	105	0	0	10	10	5	9	46
651	2.333	1.815	27	0	0	7	6	4	8	33
652	2.643	2.500	42	0	0	11	6	44	7	88
653	2.375	1.667	24	0	0	9	5	3	5	33
654	2.000	1.667	15	0	0	3	2	2	3	16
655	2.750	1.917	12	0	0	4	4	2	4	20
656	2.813	2.146	48	0	0	0	0	0	0	7
657	2.559	1.902	102	127	0	3	1	1	3	14
658	2.618	1.618	102	0	0	6	6	4	5	31
659	2.600	1.333	15	0	0	3	1	1	3	14
660	2.105	1.368	57	0	0	1	1	1	1	14
661	3.125	2.458	24	0	0	8	6	4	7	33
662	2.067	1.778	45	0	0	4	2	1	2	13
663	2.522	1.565	69	0	0	6	5	3	41	79
664	1.975	1.650	120	0	0	6	4	3	4	28
665										
666	3.714	2.190	21	0	0	5	5	3	4	23
667	2.667	2.407	27	0	0	4	4	2	4	20
668	2.600	1.667	15	0	0	6	3	2	4	23
669	3.000	1.667	15	0	0	3	2	2	3	17
670	2.400	1.933	15	0	0	4	4	2	4	20
671	3.600	1.667	15	0	0	3	2	2	3	20
672	3.000	1.667	12	0	0	3	2	2	3	17
673	2.250	1.542	24	0	0	4	4	2	4	27
674	0.000	0.000	0	56	0	5	5	3	6	30
675	1.875	1.083	24	8	0	4	4	2	3	17
676	2.846	2.077	39	0	0	4	5	1	2	60
677	3.000	2.123	57	0	0	16	12	9	16	70
678	2.463	1.512	123	88	0	23	14	9	16	84
679	2.917	1.944	36	0	0	5	8	3	6	66
680										
681	3.200	2.400	15	0	0	0	0	21	38	70
682	1.500	1.667	12	0	0	0	0	0	0	3
683	3.125	1.875	24	0	0	9	6	4	7	35
684	2.500	2.125	24	0	0	5	5	3	4	22
685	2.071	1.536	84	0	0	14	9	6	10	50
686	2.455	1.909	33	0	0	10	7	5	9	41
687	2.273	1.556	99	342	0	66	11	5	13	110
688	2.152	1.505	99	0	0	4	5	3	5	24
689	2.525	1.608	120	0	0	11	12	8	14	55
690	2.333	1.833	18	0	0	6	6	3	6	29
691	2.800	2.133	30	0	0	10	10	5	10	38
692										
693										
694										
695										
696										
697	2.371	1.914	105	0	0	31	3	0	6	59
698	2.714	2.286	21	36	0	4	4	2	3	16
699	2.684	2.053	57	0	0	11	8	5	10	92
700	3.200	2.200	15	0	0	5	5	3	6	23
701										
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724										
725	2.571	1.857	63	0	0	11	9	4	9	44
726	2.692	1.846	39	0	0	4	2	1	2	17
727	2.500	1.667	12	0	0	0	0	0	0	7
728	3.000	1.667	12	0	0	2	1	1	2	10
729	2.500	1.667	6	0	0	20	7	28	12	157
730	2.938	2.000	48	0	0	10	8	5	9	41
731	2.714	1.333	42	0	0	15	13	7	15	68
732	2.786	1.881	84	0	0	1	1	1	1	14
733	4.000	1.667	6	0	0	4	2	1	2	14
734	8.000	1.667	3	0	0	1	1	1	1	7
735	2.615	1.615	39	0	0	10	8	4	9	44
736	2.763	1.798	114	0	0	87	11	6	12	150
737	5.000	1.667	6	0	0	211	23	3	19	280
738	1.750	1.667	12	0	0	80	6	4	12	113
739	2.455	1.394	66	0	0	54	2	2	63	130
740	2.577	1.577	78	0	0	27	5	1	19	61
741	2.387	1.763	93	387	0	12	10	4	45	82
742	2.579	1.807	57	0	0	17	4	2	3	84
743	2.250	1.667	12	0	0	4	4	2	3	16
744	2.500	1.667	12	0	0	3	2	2	3	16
745	2.850	2.300	60	0	0	5	5	3	12	84
746	2.600	2.222	90	0	0	10	10	3	6	84
747	8.000	1.667	3	0	0	1	1	1	1	10
748	0.000	0.000	0	0	0	0	0	0	0	5
749	0.000	0.000	0	0	0	0	0	0	0	5
750	14.333	1.667	9	0	0	18	16	7	22	145
751	2.889	2.358	81	0	0	18	13	4	11	88
752	3.290	2.194	93	0	0	25	18	9	10	100
753	2.400	2.233	30	0	0	11	7	5	9	49
754	2.700	1.900	30	9	0	12	8	5	11	49
755	2.000	1.667	9	0	0	2	2	2	2	13
756	3.333	1.667	9	0	0	2	1	1	2	10
757	2.857	1.667	21	0	0	5	5	3	7	26
758	3.059	1.784	51	0	0	18	16	9	15	69
759	2.400	1.667	15	0	0	5	3	2	3	20
760	1.833	1.667	18	0	0	4	4	2	3	20
761	2.333	1.556	27	0	0	5	5	3	4	23
762	2.636	1.909	33	0	0	9	9	4	7	39
763	2.480	1.680	75	0	0	6	7	3	7	30
764	2.474	1.702	57	0	0	6	7	3	5	26
765	2.524	1.206	63	198	0	4	4	0	44	67
766	2.000	1.422	45	0	0	25	8	36	15	97
767	3.167	1.667	18	0	0	5	3	2	3	20
768	3.667	1.667	9	0	0	3	2	2	3	16
769	0.000	0.000	0	0	0	0	0	0	0	0
770	2.714	2.238	21	30	0	13	9	5	10	49
771	3.000	1.667	12	0	0	3	2	2	3	16

772	3.000	2.417	24	0	0	12	12	7	13	59
773	2.563	1.458	48	0	0	11	10	5	10	46
774	2.286	1.619	21	0	0	4	2	1	2	13
775	2.600	1.433	30	0	0	3	2	2	3	16
776	3.600	1.667	15	0	0	6	3	2	4	23
777	0.000	0.000	0	0	0	0	0	0	0	0
778	2.000	1.667	12	0	0	2	1	1	2	10
779	2.923	1.846	39	0	0	14	10	7	11	56
780	2.000	1.667	12	0	0	1	1	1	1	10
781	3.000	2.125	24	0	0	8	6	4	7	32
782	2.462	1.718	39	0	0	0	0	0	0	7
783	2.361	1.833	108	0	0	1	1	1	1	13
784	2.111	1.500	108	0	0	9	7	4	8	46
785	2.431	1.723	195	0	0	4	3	3	4	26
786	2.143	1.190	84	403	0	8	10	4	73	115
787	1.833	1.667	18	0	0	2	1	1	2	10
788	3.286	1.452	42	0	0	18	4	2	50	86
789	2.579	1.526	57	0	0	24	18	12	19	96
790	4.250	2.417	12	0	0	4	2	1	2	13
791	2.750	1.667	12	0	0	4	2	1	2	13
792	2.833	1.667	18	0	0	6	6	4	7	29
793	3.333	1.667	9	0	0	1	1	1	1	10
794	3.167	1.611	18	0	0	5	5	3	6	26
795	3.250	2.167	24	0	0	8	8	4	6	32
796	2.750	1.667	12	0	0	4	4	2	3	19
797	3.000	1.667	3	0	0	1	1	1	1	7
798	2.600	1.667	15	0	0	1	1	1	1	13
799	3.091	2.030	33	0	0	6	3	2	4	23
800	3.250	1.667	12	0	0	8	4	2	4	26
801	2.667	1.667	9	0	0	1	1	1	1	10
802	2.643	1.667	42	45	0	7	2	52	2	74
803	2.875	1.625	24	0	0	7	6	4	8	32
804	3.333	2.000	18	0	0	4	4	2	3	19
805	3.714	2.190	21	0	0	4	2	2	4	19
806	3.250	3.917	12	0	0	4	4	2	3	16
807	3.000	2.083	36	0	0	6	6	4	6	32
808	3.667	2.259	27	0	0	3	2	2	3	16
809	2.786	2.286	42	0	0	11	9	4	9	42
810	2.769	1.667	39	63	0	5	5	3	5	26
811	3.500	1.667	6	0	0	0	0	0	0	3
812	2.636	1.879	33	0	0	0	0	0	0	7
813	2.769	2.085	117	0	0	9	8	5	9	40
814	2.625	2.125	24	0	0	7	7	5	8	36
815	3.500	1.667	12	0	0	2	1	1	2	10
816	0.000	0.000	0	0	0	5	5	2	5	25
817	2.579	2.123	57	46	0	5	2	1	2	18
818	3.000	1.667	18	0	0	1	1	1	1	10
819	2.778	2.000	27	0	0	4	3	481	4	514
820	2.952	2.206	63	0	0	18	16	10	19	81
821	2.842	2.070	57	0	0	2	1	1	2	14
822	2.588	2.039	51	0	0	6	5	3	6	29
823	2.857	1.786	84	0	0	13	12	7	13	63
824	2.867	2.222	45	0	0	14	11	6	12	58
825	2.889	1.963	27	0	0	2	1	1	2	13
826	3.000	2.258	66	0	0	8	8	4	7	35
827	2.632	2.018	57	0	0	12	11	6	13	55
828	2.579	1.982	57	0	0	5	1	1	5	55
829	2.375	1.889	72	0	0	13	11	5	10	48
830	2.571	1.738	42	0	0	9	8	4	9	39
831	2.647	2.059	51	0	0	12	11	6	13	52
832	2.810	2.254	63	0	0	18	16	8	16	72
833	2.667	2.259	27	0	0	6	6	3	6	32

834	3.000	1.879	33	35	0	9	10	5	11	45
835	2.455	1.455	33	62	0	6	5	3	6	29
836	3.000	2.810	42	0	0	14	14	7	14	62
837	2.688	1.833	48	0	0	17	15	8	15	71
838	2.875	2.208	24	0	0	8	6	4	7	32
839	2.048	1.254	63	0	0	8	9	5	11	42
840	2.727	1.955	66	0	0	8	9	4	9	42
841	2.636	1.515	66	0	0	7	6	77	6	123
842	2.563	1.479	48	177	0	9	7	3	7	38
843	2.526	1.719	57	0	0	6	4	2	3	23
844	2.722	2.056	54	0	0	6	3	2	4	61
845	2.909	1.879	33	0	0	10	7	5	9	42
846	2.500	1.667	18	0	0	6	5	3	5	26
847	2.800	2.022	45	0	0	13	8	5	9	49
848	3.000	2.185	27	0	0	10	10	5	10	39
849	1.500	1.667	6	0	0	4	4	2	3	16
850	2.700	1.067	30	0	0	7	6	4	6	30
851	2.500	2.167	12	0	0	1	1	1	1	11
852	2.556	0.963	27	0	0	7	6	4	7	30
853	2.000	1.667	12	0	0	0	0	0	0	0
854	2.778	1.778	54	0	0	0	0	0	0	4
855	2.333	1.667	9	0	0	1	1	1	1	6
856	2.667	2.056	36	0	0	13	10	6	12	52
857	2.500	1.944	36	50	0	10	7	4	8	42
858	3.083	2.139	36	0	0	12	12	6	13	55
859	2.778	2.315	54	0	0	8	6	7	7	79
860	2.733	1.933	45	0	0	4	4	2	4	59
861	2.833	2.056	18	0	0	4	4	2	4	20
862	3.556	2.111	27	0	0	8	6	3	6	33
863	2.300	2.100	30	0	0	7	6	4	8	33
864	3.067	1.778	45	154	0	6	6	4	7	36
865	2.857	2.143	42	0	0	9	7	4	8	36
866	3.000	2.111	27	0	0	6	6	4	7	33
867	2.714	2.000	21	0	0	6	0	92	3	118
868	2.714	2.524	42	0	0	5	3	9	3	70
869	3.000	2.444	27	0	0	3	0	17	0	49
870	3.000	2.389	36	0	0	12	10	6	10	52
871	2.667	2.206	63	0	0	3	2	2	4	17
872	2.231	1.624	117	0	0	8	7	5	10	40
873	2.396	1.912	159	272	0	35	4	35	77	194
874	2.242	1.566	198	0	0	6	6	4	5	32
875	2.571	1.333	21	0	0	213	40	18	79	399
876	2.400	1.667	15	545	0	1	1	1	1	14
877	2.355	1.699	93	0	0	2	2	2	3	14
878	2.258	1.663	291	0	0	14	17	32	70	144
879										
880										
881										
882										
883										
884										
885										
886										
887										
888										
889	3.000	3.250	12	0	0	5	5	3	6	26
890	2.615	1.846	39	23	0	9	9	5	7	39
891	3.000	1.633	30	0	0	10	7	5	9	49
892	3.500	1.667	12	0	0	5	5	3	4	23
893	2.955	2.515	66	68	0	16	16	8	17	71
894	3.200	2.378	45	0	0	14	12	7	14	61
895	3.500	2.267	60	23	0	24	19	10	19	94

896	2.889	2.296	54	19	0	17	12	6	10	57
897	2.900	2.067	30	0	0	5	5	3	5	29
898										
899	3.000	1.722	36	0	0	14	12	7	13	56
900	2.154	1.718	39	0	0	10	7	4	6	40
901	2.692	1.821	39	0	0	13	9	4	7	43
902										
903	2.714	1.667	42	0	0	16	16	8	16	79
904	2.667	2.278	36	0	0	10	10	5	10	49
905	2.900	2.300	30	0	0	11	8	5	10	48
906	3.455	1.727	33	0	0	10	9	5	8	43
907	2.733	1.956	45	0	0	13	13	7	12	56
908	3.727	1.879	33	0	0	9	9	5	8	43
909	3.375	2.042	24	0	0	8	8	4	8	50
910	2.727	2.061	33	0	0	9	6	3	6	32
911	2.214	1.405	84	104	0	12	12	7	11	61
912	2.421	1.684	57	53	0	8	7	5	7	37
913	2.778	2.111	27	0	0	3	3	0	0	42
914	2.500	1.800	30	0	0	0	3	0	0	45
915	3.077	2.103	39	0	0	14	12	7	14	58
916	2.667	2.019	54	70	0	17	10	7	13	69
917	2.429	1.667	21	0	0	9	7	4	7	42
918	2.750	1.708	48	0	0	15	12	7	11	55
919	3.100	1.667	30	0	0	13	13	6	12	59
920	2.667	1.667	18	0	0	4	4	2	4	23
921	3.250	1.875	24	0	0	6	6	4	8	33
922	2.429	1.648	105	0	0	10	9	6	10	50
923	2.000	1.533	30	0	0	23	6	3	3	57
924	2.478	1.652	69	268	0	7	6	5	57	87
925	2.727	1.879	33	0	0	12	9	7	11	50
926	2.350	1.767	60	52	0	10	10	6	10	47
927	2.750	2.458	48	0	0	20	17	11	20	83
928	2.900	2.033	30	0	0	11	8	4	9	43
929	3.286	1.905	21	0	0	8	7	5	9	42
930	2.818	1.909	66	0	0	14	12	7	13	61
931	2.375	1.542	48	148	0	11	8	6	10	51
932	2.565	1.783	69	0	0	6	3	2	4	27
933	2.643	2.190	42	0	0	12	10	6	10	51
934	2.625	1.667	24	0	0	8	6	4	8	36
935	3.200	1.367	30	29	0	14	12	7	13	63
936	2.042	1.514	72	38	0	8	8	5	9	43
937	2.545	1.909	33	0	0	6	6	4	8	33
938	2.400	1.773	75	0	0	21	19	11	19	86
939	2.923	2.051	39	0	0	14	12	6	12	59
940	3.333	2.444	27	0	0	13	11	6	12	52
941	2.045	1.864	66	0	0	11	8	4	8	46
942	2.200	1.911	45	0	0	11	11	7	13	53
943	2.714	2.381	42	0	0	14	14	8	14	66
944	2.643	1.619	42	0	0	15	13	9	15	62
945	2.571	1.869	84	65	0	26	8	39	13	102
946	2.714	2.381	21	0	0	4	4	2	4	22
947	3.111	1.981	54	29	0	18	13	8	17	77
948	2.833	1.922	90	12	0	18	17	10	18	198
949	3.000	2.167	60	31	0	17	13	8	13	62
950	2.409	1.833	66	0	0	7	5	3	5	32
951	2.273	1.485	132	102	0	17	7	6	19	94
952	2.467	1.911	45	0	0	2	10	172	8	216
953	2.706	1.980	51	0	0	18	16	10	17	75
954	2.657	1.876	105	77	0	19	12	182	14	277
955	2.607	2.179	84	125	0	17	13	7	11	63
956	3.067	1.967	90	0	0	22	16	11	19	89
957	3.294	2.059	51	0	0	18	16	10	17	79

958	2.897	2.000	87	54	0	29	25	14	27	118						
959	2.765	1.882	51	0	0	15	15	8	14	69						
960	2.542	1.681	72	0	0	20	17	11	20	92						
961	2.375	1.417	48	16	0	6	4	3	4	30						
962	2.778	1.685	54	99	0	16	12	8	13	69						
963	3.000	1.667	15	0	0	5	5	3	4	23						
964	3.625	2.417	24	0	0	10	7	5	9	40						
965	2.550	1.717	60	0	0	16	13	8	13	66						
966	2.950	2.600	60	0	0	21	19	11	22	89						
967	2.741	1.938	81	22	0	24	22	13	26	112						
968	2.786	2.095	42	0	0	12	11	7	12	50						
969	2.909	1.879	66	0	0	19	14	8	14	76						
970	2.600	2.467	30	0	0	8	6	4	9	36						
971	2.417	1.764	72	480	0	3	3	3	66	92						
972	2.455	1.515	33	0	0	3	1	1	2	11						
973	2.588	1.500	102	0	0	20	19	11	19	89						
974																
975																
976																
977											68	49	87	83	70	104
978											44	39	64	62	67	90
979											3	81	26	36	63	11
980											218	173	159	207	264	321

APPENDIX FOUR
SCREENLINE VALIDATION OUTPUT FILES

```
+-------------------------------------------+
| TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
|  TRACKS +-------------------------+ TRACKS  |
| S TRACKS|                         |S TRACKS |
| KS TRACK|   Program  :     CORDON  |KS TRACK |
| CKS TRAC|   Version  :      V7.08  |CKS TRAC |
| ACKS TRA|                         |ACKS TRA |
| RACKS TR|   Date run :  22-JUN-11  |RACKS TR |
| TRACKS T|   Time run :   16:26:00  |TRACKS T |
|  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
| S TRACKS+-------------------------+S TRACKS |
| KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
+-------------------------------------------+
+-------------------------------------------+
|            TRACKS Licenced to             |
|  Gabites Porter                           |
|         at :   Christchurch, N.Z.         |
+-------------------------------------------+
           Build Date : 18/05/11 07:32
           Parameter version : V5.20
```

```
 Network Period Factor :  1.000

  Cordon Period Factor :  1.000

     GEH Period Factor :  1.000

   CSV Output File : GM06CL.CSV


 Cordon Data File  : GM06am.DATINVERCARGILL MODEL
 Loaded Network    : GM06NL.000     *GGS AM - 2006 ALL
                    **** Links in network


 Cordon Number :  1
 Description   : *1  NORTH GORE
```

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
4955	6257	11.	2	-9.	18.2	3.5	11.	4	-7.	36.4	2.6	22.	6	-16.	27.3	*Macgibbon Rd (351)
4183	8372	82.	39	-43.	47.6	5.5	118.	139	21.	117.8	1.9	200.	178	-22.	89.0	*Ardwick St (76)
6730	8322	85.	107	22.	125.9	2.2	134.	167	33.	124.6	2.7	219.	274	55.	125.1	*Broughton St (16)
8370	7356	396.	409	13.	103.3	0.6	244.	220	-24.	90.2	1.6	640.	629	-11.	98.3	*SH1 Central Gore 001S0858 Mar 2008 Before Ashton t

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Number of links =     4 Number of forward links =     4 Number of back links =     4
```

TOTALS	FORWARD	BACK	TOTALS
COUNT	574.	507.	1081.
VOLUME	557.	530.	1087.
CHANGE	-17.	23.	6.
%	97.	105.	101.
CORREL.			
COEFF.	0.990	0.962	0.991
%RMS	20.45	21.15	13.32
r^2	0.979	0.926	0.981
GEH	0.7	1.0	0.2

GEH	<5	<7	<10	<12	>12
#	7	8	8	8	0
%	87.5	100.0	100.0	100.0	0.0

Cordon Number : 2
Description : *2 WEST GORE

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
7363	7364	24.	17	-7.	70.8	1.5	11.	6	-5.	54.5	1.7	35.	23	-12.	65.7	*Onslow St (106)
7856	8372	133.	109	-24.	82.0	2.2	58.	43	-15.	74.1	2.1	191.	152	-39.	79.6	*Devon St (96)
2728	4183	68.	85	17.	125.0	1.9	40.	40	0.	100.0	0.0	107.	125	18.	116.8	*William St (115)
7351	5654	144.	106	-38.	73.6	3.4	119.	101	-18.	84.9	1.7	263.	207	-56.	78.7	*Eccles St (65)
8541	6250	74.	81	7.	109.5	0.8	40.	61	21.	152.5	3.0	114.	142	28.	124.6	*Crombie St (66)
6730	8322	85.	107	22.	125.9	2.2	134.	167	33.	124.6	2.7	219.	274	55.	125.1	*Broughton St (16)
6722	4087	128.	50	-78.	39.1	8.3	68.	65	-3.	95.6	0.4	196.	115	-81.	58.7	*Charlton Rd (7)

Number of links = 7 Number of forward links = 7 Number of back links = 7

TOTALS	FORWARD	BACK	TOTALS
COUNT	656.	470.	1125.
VOLUME	555.	483.	1038.
CHANGE	-101.	13.	-87.
%	85.	103.	92.
CORREL.			
COEFF.	0.606	0.937	0.804
%RMS	41.27	27.95	31.62
r^2	0.367	0.878	0.646
GEH	4.1	0.6	2.6

GEH	<5	<7	<10	<12	>12
#	13	13	14	14	0
%	92.9	92.9	100.0	100.0	0.0

Cordon Number : 3
Description : *3

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
2707	5637	158.	162	4.	102.5	0.3	205.	249	44.	121.5	2.9	363.	411	48.	113.2	*SH1 South of Gore 001S0863	Past Saleyards Rd
3812	2712	12.	6	-6.	50.0	2.0	9.	7	-2.	77.8	0.7	21.	13	-8.	61.9	*Bowmar Rd (261)	
4948	4452	38.	43	5.	113.2	0.8	23.	31	8.	134.8	1.5	61.	74	13.	121.3	*Waimumu Rd (262)	
4950	5647	16.	8	-8.	50.0	2.3	10.	7	-3.	70.0	1.0	26.	15	-11.	57.7	*Reaby Rd (365)	
7868	8450	85.	70	-15.	82.4	1.7	121.	119	-2.	98.3	0.2	206.	189	-17.	91.7	*SH94 Gore 09400001	Gore boundary

4467	4976	10.	6	-4.	60.0	1.4	12.	9	-3.	75.0	0.9	22.	15	-7.	68.2	*Knapdale Rd (384)	
3849	5697	10.	22	12.	220.0	3.0	22.	31	9.	140.9	1.7	31.	53	22.	171.0	*Whiteering Rd (437)	
7890	4027	183.	222	39.	121.3	2.7	123.	85	-38.	69.1	3.7	306.	307	1.	100.3	*SH1 North of Gore 001S0854	Telemetry Site 45
6784	5652	36.	27	-9.	75.0	1.6	18.	34	16.	188.9	3.1	54.	61	7.	113.0	*Ontario St (143	

Number of links = 9 Number of forward links = 9 Number of back links = 9

TOTALS	FORWARD	BACK	TOTALS
COUNT	548.	543.	1090.
VOLUME	566.	572.	1138.
CHANGE	18.	29.	48.
%	103.	105.	104.
CORREL.			
COEFF.	0.986	0.965	0.992
%RMS	26.79	36.16	17.34
r^2	0.972	0.930	0.984
GEH	0.8	1.2	1.4

GEH	<5	<7	<10	<12	>12
#	18	18	18	18	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 4
Description : *4

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
4413	4408	129.	48	-81.	37.2	8.6	139.	153	14.	110.1	1.2	268.	201	-67.	75.0	*SH1 Dacre 001S0899	East of Old Dunedin R
4926	4915	18.	11	-7.	61.1	1.8	29.	19	-10.	65.5	2.0	47.	30	-17.	63.8	*SH96 Glencoe 09600009	Near Hedgehope Stream
5675	5926	33.	86	53.	260.6	6.9	44.	30	-14.	68.2	2.3	77.	116	39.	150.6	*SH94 09400059	

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS
COUNT	180.	212.	392.
VOLUME	145.	202.	347.
CHANGE	-35.	-10.	-45.
%	81.	95.	89.
CORREL.			
COEFF.	0.117	0.999	0.920
%RMS	114.38	22.19	42.95
r^2	0.014	0.997	0.847
GEH	2.7	0.7	2.3

GEH	<5	<7	<10	<12	>12
#	4	5	6	6	0
%	66.7	83.3	100.0	100.0	0.0

Cordon Number : 5
Description : *5

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
6340	6339	46.	61	15.	132.6	2.1	44.	35	-9.	79.5	1.4	90.	96	6.	106.7	*SH90 Tapanui 9000032 Nov 2006	South of Tapanui
6300	4250	48.	64	16.	133.3	2.1	40.	29	-11.	72.5	1.9	88.	93	5.	105.7	*SH1 Clinton 01S00818	West of Clinton (sout
4025	4498	45.	42	-3.	93.3	0.5	34.	18	-16.	52.9	3.1	79.	60	-19.	75.9	*SH93 Clinton 9300001	South of Clinton

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS
COUNT	139.	118.	257.
VOLUME	167.	82.	249.
CHANGE	28.	-36.	-8.
%	120.	69.	97.
CORREL.			
COEFF.	0.832	0.999	0.995
%RMS	33.78	38.47	16.96
r^2	0.693	0.997	0.991
GEH	2.3	3.6	0.5

GEH	<5	<7	<10	<12	>12
#	6	6	6	6	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 6
Description : *6

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
5214	2748	41.	20	-21.	48.8	3.8	22.	12	-10.	54.5	2.4	63.	32	-31.	50.8	*SH97 Lowther 9700004 Between Irthing Rd to
7025	4064	32.	35	3.	109.4	0.5	30.	108	78.	360.0	9.4	62.	143	81.	230.6	*SH94 Lumsden 9400064 Lumsden - past SH6
7621	5918	17.	18	1.	105.9	0.2	14.	15	1.	107.1	0.3	31.	33	2.	106.5	*Dipton Casebrook Rd (3007)
4576	8109	3.	3	0.	100.0	0.0	3.	2	-1.	66.7	0.6	6.	5	-1.	83.3	*Dipton Mossburn Rd (3015)
4338	5429	90.	84	-6.	93.3	0.6	57.	40	-17.	70.2	2.4	147.	124	-23.	84.4	*SH96 Oreti 9600056 Nov 2006 Oreti Hotel
4212	5980	85.	146	61.	171.8	5.7	62.	44	-18.	71.0	2.5	147.	190	43.	129.3	*SH99 Riverton 9900027 Riverton - near racec

Number of links = 6 Number of forward links = 6 Number of back links = 6

TOTALS	FORWARD	BACK	TOTALS
COUNT	268.	188.	456.
VOLUME	306.	221.	527.
CHANGE	38.	33.	71.
%	114.	118.	116.
CORREL.			
COEFF.	0.884	0.396	0.821
%RMS	64.95	117.69	58.56
r^2	0.782	0.157	0.675
GEH	2.2	2.3	3.2

GEH	<5	<7	<10	<12	>12
#	10	11	12	12	0
%	83.3	91.7	100.0	100.0	0.0

Cordon Number : 7
Description : *7

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
5907	4566	91.	24	-67.	26.4	8.8	90.	193	103.	214.4	8.7	181.	217	36.	119.9	*SH94 Te Anau 9400136 East of Te Anau
5455	8243	24.	42	18.	175.0	3.1	21.	22	1.	104.8	0.2	45.	64	19.	142.2	*SH96 Ohai 9600089 Crawfords Tunnel
6498	5264	25.	22	-3.	88.0	0.6	18.	14	-4.	77.8	1.0	43.	36	-7.	83.7	*SH99 Colac 9900039 East of Colac Bay Rd

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS
COUNT	140.	129.	269.
VOLUME	88.	229.	317.
CHANGE	-52.	100.	48.
%	63.	178.	118.
CORREL.			
COEFF.	-0.431	1.000	0.991
%RMS	105.22	169.51	32.57
r^2	0.186	1.000	0.983
GEH	4.9	7.5	2.8

GEH	<5	<7	<10	<12	>12
#	4	4	6	6	0
%	66.7	66.7	100.0	100.0	0.0

Cordon Number : 8
Description : *8

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
2709	7614	3.	3	0.	100.0	0.0	81.	81	0.	100.0	0.0	84.	84	0.	100.0	*SH94 Te Anau 9400172 Retford Stream
5948	4186	68.	76	8.	111.8	0.9	49.	54	5.	110.2	0.7	117.	130	13.	111.1	*SH6 Lowther 00601082 Five Rivers Telemetry
8196	4034	44.	44	0.	100.0	0.0	39.	39	0.	100.0	0.0	83.	83	0.	100.0	*SH8 Alexandra 800394 Raes Junction - befor
7586	5884	249.	205	-44.	82.3	2.9	174.	170	-4.	97.7	0.3	423.	375	-48.	88.7	*SH1 Milburn 01S00755 North of Milburn - be

Number of links = 4 Number of forward links = 4 Number of back links = 4

TOTALS	FORWARD	BACK	TOTALS
COUNT	364.	343.	707.
VOLUME	328.	344.	672.
CHANGE	-36.	1.	-35.
%	90.	100.	95.
CORREL.			
COEFF.	0.995	0.999	0.998
%RMS	28.37	4.31	16.24
r^2	0.990	0.999	0.996
GEH	1.9	0.1	1.3

GEH	<5	<7	<10	<12	>12
#	8	8	8	8	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 9
Description : *9

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
4061	3862	195.	209	14.	107.2	1.0	175.	134	-41.	76.6	3.3	370.	343	-27.	92.7	*SH1 Milton 01S00765 Milton - Telemetry Si
8240	4061	44.	50	6.	113.6	0.9	50.	55	5.	110.0	0.7	94.	105	11.	111.7	*SH8 Milton 800459 Junction with SH1

Number of links = 2 Number of forward links = 2 Number of back links = 2

TOTALS	FORWARD	BACK	TOTALS

```
 COUNT      239.      225.      464.
 VOLUME     259.      189.      448.
 CHANGE      20.      -36.      -16.
   %        108.       84.       97.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS      12.75     36.71     12.57
  r^2      1.000     1.000     1.000
  GEH        1.3       2.5       0.7

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 10
 Description   : *10

                    FORWARD                         BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  5795  4035      48.     64     16. 133.3   2.1      30.     37      7. 123.3   1.2      78.    101     23. 129.5   *SH90 Tapanui 9000026 Nov 2006 North of Tapanui
  4508  5052      82.    101     19. 123.2   2.0     109.     82    -27.  75.2   2.8     191.    183     -8.  95.8   *SH1 Balclutha 01S00791        West of Balclutha (Te

Number of links =     2 Number of forward links =     2 Number of back links =     2

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      130.      139.      269.
 VOLUME     165.      119.      284.
 CHANGE      35.      -20.       15.
   %        127.       86.      106.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS      38.21     40.13     18.11
  r^2      1.000     1.000     1.000
  GEH        2.9       1.8       0.9

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 11
 Description   : *11

                    FORWARD                         BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4306  4209      14.     11     -3.  78.6   0.8      24.     18     -6.  75.0   1.3      38.     29     -9.  76.3   *SH99 Clifden 9900089     Clifden - near school
  4195  6099      38.     31     -7.  81.6   1.2      37.     20    -17.  54.1   3.2      75.     51    -24.  68.0   *SH96 Wreys Bush 9600075  Wreys Bush
  4004  4200      63.     58     -5.  92.1   0.6      63.     49    -14.  77.8   1.9     126.    107    -19.  84.9   *SH6 Dipton 601117        Dipton
  5926  5675      33.     30     -3.  90.9   0.5      44.     86     42. 195.5   5.2      77.    116     39. 150.6   *SH94 Lumsden 09400059    East of SH6

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      148.      168.      316.
 VOLUME     130.      173.      303.
 CHANGE     -18.        5.      -13.
   %         88.      103.       96.
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CORREL.
 COEFF.    0.996     0.500     0.741
 %RMS      14.97     65.71     36.83
  r^2      0.992     0.250     0.549
  GEH        1.5       0.4       0.7

  GEH  <5    <7   <10   <12   >12
  #     7     8     8     8     0
  %  87.5 100.0 100.0 100.0   0.0

 Cordon Number : 12
 Description   : *12

                    FORWARD                          BACK                            TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4306  4209      14.     11     -3.  78.6   0.8      24.     18     -6.  75.0   1.3      38.     29     -9.  76.3   *SH99 Clifden 9900089   Clifden - near school
  7709  6066     204.    177    -27.  86.8   2.0     167.    159     -8.  95.2   0.6     371.    336    -35.  90.6   *SH6 Winton 601147      Winton - Telemetry Si
  3942  4126     142.    193     51. 135.9   3.9     125.     72    -53.  57.6   5.3     267.    265     -2.  99.3   *SH1 Mataura 01S00875    Mataura south of SH96

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      360.      316.      676.
 VOLUME     381.      249.      630.
 CHANGE      21.      -67.      -46.
   %        106.       79.       93.
CORREL.
 COEFF.    0.919     0.933     0.996
 %RMS      34.05     36.21     11.36
  r^2      0.845     0.870     0.992
  GEH        1.1       4.0       1.8

  GEH  <5    <7   <10   <12   >12
  #     5     6     6     6     0
  %  83.3 100.0 100.0 100.0   0.0

 Cordon Number : 13
 Description   : *13

                    FORWARD                          BACK                            TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  2760  2774      92.     80    -12.  87.0   1.3     116.    125      9. 107.8   0.8     208.    205     -3.  98.6   *SH1 Awarua 01S00935 Nov 2006 North of Awarua radio
  1419  1530     301.    352     51. 116.9   2.8     194.    172    -22.  88.7   1.6     495.    524     29. 105.9   *SH1 (01S00919)  from Invercargill model
  1031  1019     305.    199   -106.  65.2   6.7     559.    592     33. 105.9   1.4     864.    791    -73.  91.6   *SH6 Lorneville 601168   Lorneville - south of

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      698.      869.     1567.
 VOLUME     631.      889.     1520.
 CHANGE     -67.       20.      -47.
   %         90.      102.       97.
CORREL.
 COEFF.    0.818     0.997     0.992
 %RMS      35.94      9.93     10.64
  r^2      0.670     0.995     0.985
```

GEH 2.6 0.7 1.2

GEH	<5	<7	<10	<12	>12
#	5	6	6	6	0
%	83.3	100.0	100.0	100.0	0.0

Cordon Number : 14
Description : *14

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
4955	6257	11.	2	-9.	18.2	3.5	11.	4	-7.	36.4	2.6	22.	6	-16.	27.3	*Macgibbon Rd (351)	
4183	8372	82.	39	-43.	47.6	5.5	118.	139	21.	117.8	1.9	200.	178	-22.	89.0	*Ardwick St (76)	
6730	8322	85.	107	22.	125.9	2.2	134.	167	33.	124.6	2.7	219.	274	55.	125.1	*Broughton St (16)	
8370	7356	396.	409	13.	103.3	0.6	244.	220	-24.	90.2	1.6	640.	629	-11.	98.3	*SH1 Central Gore 001S0858 Mar 2008	Before Ashton St
7363	7364	24.	17	-7.	70.8	1.5	11.	6	-5.	54.5	1.7	35.	23	-12.	65.7	*Onslow St (106)	
7856	8372	133.	109	-24.	82.0	2.2	58.	43	-15.	74.1	2.1	191.	152	-39.	79.6	*Devon St (96)	
2728	4183	68.	85	17.	125.0	1.9	40.	40	0.	100.0	0.0	107.	125	18.	116.8	*William St (115)	
7351	5654	144.	106	-38.	73.6	3.4	119.	101	-18.	84.9	1.7	263.	207	-56.	78.7	*Eccles St (65)	
8541	6250	74.	81	7.	109.5	0.8	40.	61	21.	152.5	3.0	114.	142	28.	124.6	*Crombie St (66)	
6722	4087	128.	50	-78.	39.1	8.3	68.	65	-3.	95.6	0.4	196.	115	-81.	58.7	*Charlton Rd (7)	
2707	5637	158.	162	4.	102.5	0.3	205.	249	44.	121.5	2.9	363.	411	48.	113.2	*SH1 South of Gore 001S0863	Past Saleyards Rd
3812	2712	12.	6	-6.	50.0	2.0	9.	7	-2.	77.8	0.7	21.	13	-8.	61.9	*Bowmar Rd (261)	
4948	4452	38.	43	5.	113.2	0.8	23.	31	8.	134.8	1.5	61.	74	13.	121.3	*Waimumu Rd (262)	
4950	5647	16.	8	-8.	50.0	2.3	10.	7	-3.	70.0	1.0	26.	15	-11.	57.7	*Reaby Rd (365)	
7868	8450	85.	70	-15.	82.4	1.7	121.	119	-2.	98.3	0.2	206.	189	-17.	91.7	*SH94 Gore 09400001	Gore boundary
4467	4976	10.	6	-4.	60.0	1.4	12.	9	-3.	75.0	0.9	22.	15	-7.	68.2	*Knapdale Rd (384)	
3849	5697	10.	22	12.	220.0	3.0	22.	31	9.	140.9	1.7	31.	53	22.	171.0	*Whiteering Rd (437)	
7890	4027	183.	222	39.	121.3	2.7	123.	85	-38.	69.1	3.7	306.	307	1.	100.3	*SH1 North of Gore 001S0854	Telemetry Site 45
6784	5652	36.	27	-9.	75.0	1.6	18.	34	16.	188.9	3.1	54.	61	7.	113.0	*Ontario St (143	
4413	4408	129.	48	-81.	37.2	8.6	139.	153	14.	110.1	1.2	268.	201	-67.	75.0	*SH1 Dacre 001S0899	East of Old Dunedin R
4926	4915	18.	11	-7.	61.1	1.8	29.	19	-10.	65.5	2.0	47.	30	-17.	63.8	*SH96 Glencoe 09600009	Near Hedgehope Stream
5675	5926	33.	86	53.	260.6	6.9	44.	30	-14.	68.2	2.3	77.	116	39.	150.6	*SH94 09400059	
6340	6339	46.	61	15.	132.6	2.1	44.	35	-9.	79.5	1.4	90.	96	6.	106.7	*SH90 Tapanui 9000032 Nov 2006	South of Tapanui
6300	4250	48.	64	16.	133.3	2.1	40.	29	-11.	72.5	1.9	88.	93	5.	105.7	*SH1 Clinton 01S00818	West of Clinton (sout
4025	4498	45.	42	-3.	93.3	0.5	34.	18	-16.	52.9	3.1	79.	60	-19.	75.9	*SH93 Clinton 9300001	South of Clinton
5214	2748	41.	20	-21.	48.8	3.8	22.	12	-10.	54.5	2.4	63.	32	-31.	50.8	*SH97 Lowther 9700004	Between Irthing Rd to
7025	4064	32.	35	3.	109.4	0.5	30.	108	78.	360.0	9.4	62.	143	81.	230.6	*SH94 Lumsden 9400064	Lumsden - past SH6
7621	5918	17.	18	1.	105.9	0.2	14.	15	1.	107.1	0.3	31.	33	2.	106.5	*Dipton Casebrook Rd (3007)	
4576	8109	3.	3	0.	100.0	0.0	3.	2	-1.	66.7	0.6	6.	5	-1.	83.3	*Dipton Mossburn Rd (3015)	
4338	5429	90.	84	-6.	93.3	0.6	57.	40	-17.	70.2	2.4	147.	124	-23.	84.4	*SH96 Oreti 9600056 Nov 2006	Oreti Hotel
4212	5980	85.	146	61.	171.8	5.7	62.	44	-18.	71.0	2.5	147.	190	43.	129.3	*SH99 Riverton 9900027	Riverton - near racec
5907	4566	91.	24	-67.	26.4	8.8	90.	193	103.	214.4	8.7	181.	217	36.	119.9	*SH94 Te Anau 9400136	East of Te Anau
5455	8243	24.	42	18.	175.0	3.1	21.	22	1.	104.8	0.2	45.	64	19.	142.2	*SH96 Ohai 9600089	Crawfords Tunnel
6498	5264	25.	22	-3.	88.0	0.6	18.	14	-4.	77.8	1.0	43.	36	-7.	83.7	*SH99 Colac 9900039	East of Colac Bay Rd
2709	7614	3.	3	0.	100.0	0.0	81.	81	0.	100.0	0.0	84.	84	0.	100.0	*SH94 Te Anau 9400172	Retford Stream
5948	4186	68.	76	8.	111.8	0.9	49.	54	5.	110.2	0.7	117.	130	13.	111.1	*SH6 Lowther 00601082	Five Rivers Telemetry
8196	4034	44.	44	0.	100.0	0.0	39.	39	0.	100.0	0.0	83.	83	0.	100.0	*SH8 Alexandra 800394	Raes Junction - befor
7586	5884	249.	205	-44.	82.3	2.9	174.	170	-4.	97.7	0.3	423.	375	-48.	88.7	*SH1 Milburn 01S00755	North of Milburn - be
4061	3862	195.	209	14.	107.2	1.0	175.	134	-41.	76.6	3.3	370.	343	-27.	92.7	*SH1 Milton 01S00765	Milton - Telemetry Si
8240	4061	44.	50	6.	113.6	0.9	50.	55	5.	110.0	0.7	94.	105	11.	111.7	*SH8 Milton 800459	Junction with SH1
5795	4035	48.	64	16.	133.3	2.1	30.	37	7.	123.3	1.2	78.	101	23.	129.5	*SH90 Tapanui 9000026 Nov 2006	North of Tapanui
4508	5052	82.	101	19.	123.2	2.0	109.	82	-27.	75.2	2.8	191.	183	-8.	95.8	*SH1 Balclutha 01S00791	West of Balclutha (Te
4306	4209	14.	11	-3.	78.6	0.8	24.	18	-6.	75.0	1.3	38.	29	-9.	76.3	*SH99 Clifden 9900089	Clifden - near school
4195	6099	38.	31	-7.	81.6	1.2	37.	20	-17.	54.1	3.2	75.	51	-24.	68.0	*SH96 Wreys Bush 9600075	Wreys Bush
4004	4200	63.	58	-5.	92.1	0.6	63.	49	-14.	77.8	1.9	126.	107	-19.	84.9	*SH6 Dipton 601117	Dipton
5926	5675	33.	30	-3.	90.9	0.5	44.	86	42.	195.5	5.2	77.	116	39.	150.6	*SH94 Lumsden 09400059	East of SH6
7709	6066	204.	177	-27.	86.8	2.0	167.	159	-8.	95.2	0.6	371.	336	-35.	90.6	*SH6 Winton 601147	Winton - Telemetry Si
3942	4126	142.	193	51.	135.9	3.9	125.	72	-53.	57.6	5.3	267.	265	-2.	99.3	*SH1 Mataura 01S00875	Mataura south of SH96

```
  2760  2774      92.     80    -12.  87.0   1.3     116.    125      9. 107.8   0.8     208.    205     -3.  98.6   *SH1 Awarua 01S00935 Nov 2006     North of Awarua radio
  1419  1530     301.    352     51. 116.9   2.8     194.    172    -22.  88.7   1.6     495.    524     29. 105.9   *SH1 (01S00919)  from Invercargill model
  1031  1019     305.    199   -106.  65.2   6.7     559.    592     33. 105.9   1.4     864.    791    -73.  91.6   *SH6 Lorneville 601168     Lorneville - south of

Number of links =    51 Number of forward links =    51 Number of back links =    51

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     4345.     4069.     8412.
 VOLUME    4160.     4097.     8257.
 CHANGE    -185.       28.     -155.
   %         96.      101.       98.
CORREL.
 COEFF.    0.930     0.962     0.982
 %RMS      38.00     33.02     19.57
  r^2      0.865     0.925     0.964
  GEH        2.8       0.4       1.7

  GEH  <5    <7   <10   <12   >12
  #    91    97   102   102     0
  %  89.2  95.1 100.0 100.0   0.0


 CORDON terminated successfully
```

AM Peak Period Heavy Vehicles

```
                          +-------------------------------------------+
                          | TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
                          |  TRACKS +-------------------------+ TRACKS  |
                          | S TRACKS|                         |S TRACKS |
                          | KS TRACK|   Program  :     CORDON  |KS TRACK |
                          | CKS TRAC|   Version  :      V7.08  |CKS TRAC |
                          | ACKS TRA|                         |ACKS TRA |
                          | RACKS TR|   Date run :  22-JUN-11  |RACKS TR |
                          | TRACKS T|   Time run :   16:22:04  |TRACKS T |
                          |  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
                          | S TRACKS+-------------------------+S TRACKS |
                          | KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
                          +-------------------------------------------+
                          +-------------------------------------------+
                          |            TRACKS Licenced to             |
                          |  Gabites Porter                           |
                          |         at :   Christchurch, N.Z.         |
                          +-------------------------------------------+
                                     Build Date : 18/05/11 07:32
                                     Parameter version : V5.20


 Network Period Factor :  1.000


  Cordon Period Factor :  1.000


     GEH Period Factor :  1.000
```

CSV Output File : GM06CH.CSV

Cordon Data File : GM06am.HGVINVERCARGILL MODEL
Loaded Network : GM06NL.HGV *GGS AM - 2006 HEAVY VEHICLES
**** Links in network

Cordon Number : 1
Description : 1 SH Spot Counts

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
1419	1530	26.	35	9.	134.6	1.6	22.	35	13.	159.1	2.4	48.	70	22.	145.8	01S00919Invercargill Nth of Rockdale Rd
2760	2774	18.	19	1.	105.6	0.2	18.	19	1.	105.6	0.2	36.	38	2.	105.6	01S00935Invercargill Nth of Awarua Radio Station
4508	5052	5.	12	7.	240.0	2.4	4.	12	8.	300.0	2.8	9.	24	15.	266.7	01S00791Balclutha Te Houka
7890	4027	15.	17	2.	113.3	0.5	20.	17	-3.	85.0	0.7	35.	34	-1.	97.1	01S00854GORE - Telemetry Site 45
2707	5637	25.	29	4.	116.0	0.8	22.	29	7.	131.8	1.4	47.	58	11.	123.4	01S00863Past Saleyards Rd
5795	4035	4.	2	-2.	50.0	1.2	11.	2	-9.	18.2	3.5	15.	4	-11.	26.7	09000026Nth Tapanui-past Heriot Rd
4413	4408	7.	10	3.	142.9	1.0	6.	10	4.	166.7	1.4	13.	20	7.	153.8	01S00899Dacre near transmitting station
7709	6066	30.	18	-12.	60.0	2.4	25.	19	-6.	76.0	1.3	55.	37	-18.	67.3	00601147WINTON - Telemetry Site 46
5948	4186	8.	8	0.	100.0	0.0	9.	6	-3.	66.7	1.1	17.	14	-3.	82.4	00601086Mid Dome
7586	5884	27.	32	5.	118.5	0.9	47.	34	-13.	72.3	2.0	74.	66	-8.	89.2	01S00755Nth Milburn-before Lime Works Rd
4078	4004	12.	5	-7.	41.7	2.4	9.	5	-4.	55.6	1.5	21.	10	-11.	47.6	00601117 (Dipton)

Number of links = 11 Number of forward links = 11 Number of back links = 11

TOTALS	FORWARD	BACK	TOTALS
COUNT	177.	193.	370.
VOLUME	187.	188.	375.
CHANGE	10.	-5.	5.
%	106.	97.	101.
CORREL.			
COEFF.	0.834	0.781	0.841
%RMS	38.41	44.84	36.69
r^2	0.696	0.610	0.707
GEH	0.7	0.4	0.3

GEH	<5	<7	<10	<12	>12
#	22	22	22	22	0
%	100.0	100.0	100.0	100.0	0.0

CORDON terminated successfully

INTER Peak Period All Vehicles

```
+--------------------------------------------+
| TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
|  TRACKS +-------------------------+ TRACKS  |
| S TRACKS|                         |S TRACKS |
| KS TRACK|   Program  :     CORDON  |KS TRACK |
| CKS TRAC|   Version  :      V7.08  |CKS TRAC |
| ACKS TRA|                         |ACKS TRA |
| RACKS TR|   Date run :  17-JUN-11  |RACKS TR |
| TRACKS T|   Time run :   10:23:44  |TRACKS T |
|  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
| S TRACKS+-------------------------+S TRACKS |
| KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
+--------------------------------------------+
+--------------------------------------------+
|            TRACKS Licenced to              |
|  Gabites Porter                            |
|         at :   Christchurch, N.Z.          |
+--------------------------------------------+
           Build Date : 16/05/11 07:32
           Parameter version : V5.20
```

Network Period Factor : 1.000

Cordon Period Factor : 1.000

GEH Period Factor : 1.000

CSV Output File : GI06CL.CSV

Cordon Data File : GI06in.DATGGS MODEL
Loaded Network : GI06NL.000 *GGS OFF - 2006 ALL
**** Links in network

Cordon Number : 1
Description : *1 NORTH GORE

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
4955	6257	6.	4	-2.	66.7	0.9	11.	4	-7.	36.4	2.6	16.	8	-8.	50.0	*Macgibbon Rd (351)
4183	8372	100.	110	10.	110.0	1.0	114.	124	10.	108.8	0.9	213.	234	21.	109.9	*Ardwick St (76)
6730	8322	84.	124	40.	147.6	3.9	85.	120	35.	141.2	3.5	169.	244	75.	144.4	*Broughton St (16)
8370	7356	439.	400	-39.	91.1	1.9	441.	368	-73.	83.4	3.6	880.	768	-112.	87.3	*SH1 Central Gore 001S0858 Mar 2008 Before Ashton t

Number of links = 4 Number of forward links = 4 Number of back links = 4

TOTALS	FORWARD	BACK	TOTALS
COUNT	629.	651.	1278.
VOLUME	638.	616.	1254.
CHANGE	9.	-35.	-24.

```
   %        101.       95.       98.
CORREL.
 COEFF.    0.992     0.987     0.990
 %RMS      20.85     29.04     24.69
  r^2      0.984     0.975     0.980
  GEH        0.4       1.4       0.7

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  2
 Description   : *2  WEST GORE

                    FORWARD                          BACK                            TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  7363  7364      20.     13     -7.  65.0   1.7      23.     13    -10.  56.5   2.4      43.     26    -17.  60.5   *Onslow St (106)
  7856  8372     102.     86    -16.  84.3   1.7      82.     87      5. 106.1   0.5     184.    173    -11.  94.0   *Devon St (96)
  2728  4183      46.     73     27. 158.7   3.5      65.     78     13. 120.0   1.5     112.    151     39. 134.8   *William St (115)
  7351  5654     141.    126    -15.  89.4   1.3     153.    133    -20.  86.9   1.7     294.    259    -35.  88.1   *Eccles St (65)
  8541  6250      63.     88     25. 139.7   2.9      59.     79     20. 133.9   2.4     123.    167     44. 135.8   *Crombie St (66)
  6730  8322      84.    124     40. 147.6   3.9      85.    120     35. 141.2   3.5     169.    244     75. 144.4   *Broughton St (16)
  6722  4087      78.     77     -1.  98.7   0.1      66.     76     10. 115.2   1.2     144.    153      9. 106.2   *Charlton Rd (7)

Number of links =     7 Number of forward links =     7 Number of back links =     7

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      534.      533.     1069.
 VOLUME     587.      586.     1173.
 CHANGE      53.       53.      104.
   %        110.      110.      110.
CORREL.
 COEFF.    0.827     0.890     0.869
 %RMS      31.59     26.37     27.78
  r^2      0.684     0.792     0.755
  GEH        2.2       2.2       3.1

  GEH  <5    <7   <10   <12   >12
  #    14    14    14    14     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  3
 Description   : *3

                    FORWARD                          BACK                            TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  2707  5637     185.    215     30. 116.2   2.1     193.    214     21. 110.9   1.5     378.    429     51. 113.5   *SH1 South of Gore 001S0863           Past Saleyards Rd
  3812  2712       6.      7      1. 116.7   0.4       6.      8      2. 133.3   0.8      12.     15      3. 125.0   *Bowmar Rd (261)
  4948  4452      25.     39     14. 156.0   2.5      17.     40     23. 235.3   4.3      42.     79     37. 188.1   *Waimumu Rd (262)
  4950  5647      16.      8     -8.  50.0   2.3      21.      8    -13.  38.1   3.4      38.     16    -22.  42.1   *Reaby Rd (365)
  7868  8450     150.    111    -39.  74.0   3.4     137.    112    -25.  81.8   2.2     287.    223    -64.  77.7   *SH94 Gore 09400001                     Gore boundary
  4467  4976      13.      8     -5.  61.5   1.5       8.      8      0. 100.0   0.0      21.     16     -5.  76.2   *Knapdale Rd (384)
  3849  5697      13.     29     16. 223.1   3.5      12.     29     17. 241.7   3.8      24.     58     34. 241.7   *Whiteering Rd (437)
  7890  4027     138.    168     30. 121.7   2.4     144.    168     24. 116.7   1.9     282.    336     54. 119.1   *SH1 North of Gore 001S0854           Telemetry Site 45
  6784  5652      18.     37     19. 205.6   3.6      21.     37     16. 176.2   3.0      38.     74     36. 194.7   *Ontario St (143

Number of links =     9 Number of forward links =     9 Number of back links =     9
```

```
 TOTALS   FORWARD    BACK      TOTALS

 COUNT      564.      559.     1122.
 VOLUME     622.      624.     1246.
 CHANGE      58.       65.      124.
   %        110.      112.      111.
CORREL.
 COEFF.    0.959     0.974     0.967
 %RMS      36.67     30.60     33.50
  r^2      0.920     0.949     0.936
  GEH        2.4       2.7       3.6

  GEH  <5    <7   <10   <12   >12
  #    18    18    18    18     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  4
 Description   : *4

                    FORWARD                          BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4413  4408     113.    129     16. 114.2   1.5     128.    129      1. 100.8   0.1     241.    258     17. 107.1   *SH1 Dacre 001S0899               East of Old Dunedin R
  4926  4915      26.     16    -10.  61.5   2.2      24.     16     -8.  66.7   1.8      50.     32    -18.  64.0   *SH96 Glencoe 09600009            Near Hedgehope Stream
  5675  5926      33.     50     17. 151.5   2.6      44.     50      6. 113.6   0.9      77.    100     23. 129.9   *SH94 09400059

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      172.      196.      368.
 VOLUME     195.      195.      390.
 CHANGE      23.       -1.       22.
   %        113.       99.      106.
CORREL.
 COEFF.    0.975     0.993     0.986
 %RMS      31.32     10.88     19.48
  r^2      0.950     0.987     0.972
  GEH        1.7       0.1       1.1

  GEH  <5    <7   <10   <12   >12
  #     6     6     6     6     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  5
 Description   : *5

                    FORWARD                          BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  6340  6339      36.     63     27. 175.0   3.8      39.     63     24. 161.5   3.4      75.    126     51. 168.0   *SH90 Tapanui 9000032 Nov 2006        South of Tapanui
  6300  4250      68.     60     -8.  88.2   1.0      68.     60     -8.  88.2   1.0     136.    120    -16.  88.2   *SH1 Clinton 01S00818             West of Clinton (sout
  4025  4498      31.     31      0. 100.0   0.0      41.     31    -10.  75.6   1.7      72.     62    -10.  86.1   *SH93 Clinton 9300001                 South of Clinton

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      135.      148.      283.
```

```
 VOLUME     154.      154.      308.
 CHANGE      19.        6.       25.
   %        114.      104.      109.
CORREL.
 COEFF.    0.534     0.368     0.462
 %RMS      44.25     38.99     40.76
  r^2      0.285     0.135     0.213
  GEH        1.6       0.5       1.5

  GEH  <5    <7   <10   <12   >12
  #     6     6     6     6     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  6
 Description   : *6

                    FORWARD                         BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  5214  2748      43.     19    -24.  44.2   4.3      33.     19    -14.  57.6   2.7      76.     38    -38.  50.0   *SH97 Lowther 9700004              Between Irthing Rd to
  7025  4064      33.     43     10. 130.3   1.6      30.     43     13. 143.3   2.2      63.     86     23. 136.5   *SH94 Lumsden 9400064                 Lumsden - past SH6
  7621  5918      10.     10      0. 100.0   0.0      13.     10     -3.  76.9   0.9      23.     20     -3.  87.0   *Dipton Casebrook Rd (3007)
  4576  8109       3.      1     -2.  33.3   1.4       2.      1     -1.  50.0   0.8       5.      2     -3.  40.0   *Dipton Mossburn Rd (3015)
  4338  5429      77.     59    -18.  76.6   2.2      62.     59     -3.  95.2   0.4     139.    118    -21.  84.9   *SH96 Oreti 9600056 Nov 2006             Oreti Hotel
  4212  5980      67.     88     21. 131.3   2.4      63.     88     25. 139.7   2.9     130.    176     46. 135.4   *SH99 Riverton 9900027                   Riverton - near
racec

Number of links =     6 Number of forward links =     6 Number of back links =     6

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      233.      203.      436.
 VOLUME     220.      220.      440.
 CHANGE     -13.       17.        4.
   %         94.      108.      101.
CORREL.
 COEFF.    0.862     0.924     0.893
 %RMS      43.78     41.99     41.50
  r^2      0.742     0.853     0.797
  GEH        0.9       1.2       0.2

  GEH  <5    <7   <10   <12   >12
  #    12    12    12    12     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  7
 Description   : *7

                    FORWARD                         BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  5907  4566      66.     67      1. 101.5   0.1      96.     67    -29.  69.8   3.2     162.    134    -28.  82.7   *SH94 Te Anau 9400136                East of Te Anau
  5455  8243      20.     31     11. 155.0   2.2      20.     31     11. 155.0   2.2      40.     62     22. 155.0   *SH96 Ohai 9600089                 Crawfords Tunnel
  6498  5264      33.     16    -17.  48.5   3.4      25.     16     -9.  64.0   2.0      58.     32    -26.  55.2   *SH99 Colac 9900039                   East of Colac
Bay Rd

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS
```

```
 COUNT      119.      141.      260.
 VOLUME     114.      114.      228.
 CHANGE      -5.      -27.      -32.
   %         96.       81.       88.
CORREL.
 COEFF.    0.843     0.940     0.910
 %RMS      36.14     48.59     35.97
  r^2      0.711     0.883     0.828
  GEH        0.5       2.4       2.0

  GEH  <5    <7   <10   <12   >12
  #     6     6     6     6     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  8
 Description   : *8

                    FORWARD                         BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  2709  7614      26.     31      5. 119.2   0.9      36.     31     -5.  86.1   0.9      62.     62      0. 100.0   *SH94 Te Anau 9400172                Retford Stream
  5948  4186      87.     89      2. 102.3   0.2      83.     89      6. 107.2   0.6     170.    178      8. 104.7   *SH6 Lowther 00601082             Five Rivers Telemetry
  8196  4034      64.     63     -1.  98.4   0.1      62.     63      1. 101.6   0.1     126.    126      0. 100.0   *SH8 Alexandra 800394             Raes Junction - befor
  7586  5884     181.    207     26. 114.4   1.9     249.    207    -42.  83.1   2.8     430.    414    -16.  96.3   *SH1 Milburn 01S00755                  North of
Milburn - be

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      358.      430.      788.
 VOLUME     390.      390.      780.
 CHANGE      32.      -40.       -8.
   %        109.       91.       99.
CORREL.
 COEFF.    0.997     0.994     0.999
 %RMS      17.14     22.95      5.24
  r^2      0.993     0.987     0.999
  GEH        1.7       2.0       0.3

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number :  9
 Description   : *9

                    FORWARD                         BACK                          TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4061  3862     182.    186      4. 102.2   0.3     238.    186    -52.  78.2   3.6     420.    372    -48.  88.6   *SH1 Milton 01S00765              Milton - Telemetry Si
  8240  4061      62.     58     -4.  93.5   0.5      53.     57      4. 107.5   0.5     115.    115      0. 100.0   *SH8 Milton 800459                   Junction with SH1

Number of links =     2 Number of forward links =     2 Number of back links =     2

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      244.      291.      535.
 VOLUME     244.      243.      487.
 CHANGE       0.      -48.      -48.
```

```
   %        100.       84.       91.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS       4.64     35.84     17.94
  r^2      1.000     1.000     1.000
  GEH        0.0       2.9       2.1

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 10
 Description   : *10

                    FORWARD                          BACK                             TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  5795  4035      39.     64     25. 164.1   3.5      37.     64     27. 173.0   3.8      76.    128     52. 168.4   *SH90 Tapanui 9000026 Nov 2006          North of Tapanui
  4508  5052     113.    123     10. 108.8   0.9     147.    123    -24.  83.7   2.1     260.    246    -14.  94.6   *SH1 Balclutha 01S00791           West of Balclutha (Te

Number of links =     2 Number of forward links =     2 Number of back links =     2

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      152.      184.      336.
 VOLUME     187.      187.      374.
 CHANGE      35.        3.       38.
   %        123.      102.      111.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS      35.43     39.27     32.05
  r^2      1.000     1.000     1.000
  GEH        2.7       0.2       2.0

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 11
 Description   : *11

                    FORWARD                          BACK                             TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4306  4209      20.     14     -6.  70.0   1.5      19.     14     -5.  73.7   1.2      39.     28    -11.  71.8   *SH99 Clifden 9900089             Clifden - near school
  4195  6099      33.     23    -10.  69.7   1.9      29.     23     -6.  79.3   1.2      62.     46    -16.  74.2   *SH96 Wreys Bush 9600075                Wreys Bush
  4004  4200      66.     62     -4.  93.9   0.5      55.     62      7. 112.7   0.9     121.    124      3. 102.5   *SH6 Dipton 601117                      Dipton
  5926  5675      44.     50      6. 113.6   0.9      33.     50     17. 151.5   2.6      77.    100     23. 129.9   *SH94 Lumsden 09400059                  East of SH6

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      163.      136.      299.
 VOLUME     149.      149.      298.
 CHANGE     -14.       13.       -1.
   %         91.      110.      100.
CORREL.
 COEFF.    0.958     0.904     0.937
 %RMS      19.43     33.92     23.36
```

```
  r^2      0.917     0.818     0.878
  GEH        1.1       1.1       0.1

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 12
 Description   :

                     FORWARD                          BACK                           TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4306  4209      20.     14     -6.  70.0   1.5     19.     14     -5.  73.7   1.2     39.     28    -11.  71.8   *SH99 Clifden 9900089              Clifden - near school
  7709  6066     168.    173      5. 103.0   0.4    143.    173     30. 121.0   2.4    311.    346     35. 111.3   *SH6 Winton 601147                 Winton - Telemetry Si
  3942  4126     132.    130     -2.  98.5   0.2    129.    130      1. 100.8   0.1    261.    260     -1.  99.6   *SH1 Mataura 01S00875              Mataura south of SH96

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      320.      291.      611.
 VOLUME     317.      317.      634.
 CHANGE      -3.       26.       23.
   %         99.      109.      104.
CORREL.
 COEFF.    1.000     0.987     0.996
 %RMS       5.34     22.18     12.74
  r^2      0.999     0.974     0.992
  GEH        0.2       1.5       0.9

  GEH  <5    <7   <10   <12   >12
  #     6     6     6     6     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 13
 Description   : *13

                     FORWARD                          BACK                           TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  2760  2774      90.     90      0. 100.0   0.0     89.     90      1. 101.1   0.1    179.    180      1. 100.6   *SH1 Awarua 01S00935 Nov 2006      North of Awarua radio
  1419  1530     222.    293     71. 132.0   4.4    204.    294     90. 144.1   5.7    426.    587    161. 137.8   *SH1 (01S00919)  from Invercargill model
  1019  1031     343.    388     45. 113.1   2.4    323.    392     69. 121.4   3.6    666.    780    114. 117.1   *SH6 Lorneville 601168             Lorneville - south of

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      655.      616.     1271.
 VOLUME     771.      776.     1547.
 CHANGE     116.      160.      276.
   %        118.      126.      122.
CORREL.
 COEFF.    0.984     0.978     0.981
 %RMS      27.22     39.06     32.93
  r^2      0.968     0.957     0.963
  GEH        4.3       6.1       7.4

  GEH  <5    <7   <10   <12   >12
```

```
 #     5     6     6     6     0
 %  83.3 100.0 100.0 100.0   0.0

Cordon Number : 14
Description   : *14
```

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
1019	1031	343.	388	45.	113.1	2.4	323.	392	69.	121.4	3.6	666.	780	114.	117.1	*SH6 Lorneville 601168	Lorneville - south of
1419	1530	222.	293	71.	132.0	4.4	204.	294	90.	144.1	5.7	426.	587	161.	137.8	*SH1 (01S00919) from Invercargill	model
2707	5637	185.	215	30.	116.2	2.1	193.	214	21.	110.9	1.5	378.	429	51.	113.5	*SH1 South of Gore 001S0863	Past Saleyards Rd
2709	7614	26.	31	5.	119.2	0.9	36.	31	-5.	86.1	0.9	62.	62	0.	100.0	*SH94 Te Anau 9400172	Retford Stream
2728	4183	46.	73	27.	158.7	3.5	65.	78	13.	120.0	1.5	112.	151	39.	134.8	*William St (115)	
2760	2774	90.	90	0.	100.0	0.0	89.	90	1.	101.1	0.1	179.	180	1.	100.6	*SH1 Awarua 01S00935 Nov 2006	North of Awarua radio
3812	2712	6.	7	1.	116.7	0.4	6.	8	2.	133.3	0.8	12.	15	3.	125.0	*Bowmar Rd (261)	
3849	5697	13.	29	16.	223.1	3.5	12.	29	17.	241.7	3.8	24.	58	34.	241.7	*Whiteering Rd (437)	
3942	4126	132.	130	-2.	98.5	0.2	129.	130	1.	100.8	0.1	261.	260	-1.	99.6	*SH1 Mataura 01S00875	Mataura south of SH96
4004	4200	66.	62	-4.	93.9	0.5	55.	62	7.	112.7	0.9	121.	124	3.	102.5	*SH6 Dipton 601117	Dipton
4025	4498	31.	31	0.	100.0	0.0	41.	31	-10.	75.6	1.7	72.	62	-10.	86.1	*SH93 Clinton 9300001	South of Clinton
4061	3862	182.	186	4.	102.2	0.3	238.	186	-52.	78.2	3.6	420.	372	-48.	88.6	*SH1 Milton 01S00765	Milton - Telemetry Si
4183	8372	100.	110	10.	110.0	1.0	114.	124	10.	108.8	0.9	213.	234	21.	109.9	*Ardwick St (76)	
4195	6099	33.	23	-10.	69.7	1.9	29.	23	-6.	79.3	1.2	62.	46	-16.	74.2	*SH96 Wreys Bush 9600075	Wreys Bush
4212	5980	67.	88	21.	131.3	2.4	63.	88	25.	139.7	2.9	130.	176	46.	135.4	*SH99 Riverton 9900027	Riverton - near racec
4306	4209	20.	14	-6.	70.0	1.5	19.	14	-5.	73.7	1.2	39.	28	-11.	71.8	*SH99 Clifden 9900089	Clifden - near school
4338	5429	77.	59	-18.	76.6	2.2	62.	59	-3.	95.2	0.4	139.	118	-21.	84.9	*SH96 Oreti 9600056 Nov 2006	Oreti Hotel
4413	4408	113.	129	16.	114.2	1.5	128.	129	1.	100.8	0.1	241.	258	17.	107.1	*SH1 Dacre 001S0899	East of Old Dunedin R
4467	4976	13.	8	-5.	61.5	1.5	8.	8	0.	100.0	0.0	21.	16	-5.	76.2	*Knapdale Rd (384)	
4508	5052	113.	123	10.	108.8	0.9	147.	123	-24.	83.7	2.1	260.	246	-14.	94.6	*SH1 Balclutha 01S00791	West of Balclutha (Te
4576	8109	3.	1	-2.	33.3	1.4	2.	1	-1.	50.0	0.8	5.	2	-3.	40.0	*Dipton Mossburn Rd (3015)	
4926	4915	26.	16	-10.	61.5	2.2	24.	16	-8.	66.7	1.8	50.	32	-18.	64.0	*SH96 Glencoe 09600009	Near Hedgehope Stream
4948	4452	25.	39	14.	156.0	2.5	17.	40	23.	235.3	4.3	42.	79	37.	188.1	*Waimumu Rd (262)	
4950	5647	16.	8	-8.	50.0	2.3	21.	8	-13.	38.1	3.4	38.	16	-22.	42.1	*Reaby Rd (365)	
4955	6257	6.	4	-2.	66.7	0.9	11.	4	-7.	36.4	2.6	16.	8	-8.	50.0	*Macgibbon Rd (351)	
5214	2748	43.	19	-24.	44.2	4.3	33.	19	-14.	57.6	2.7	76.	38	-38.	50.0	*SH97 Lowther 9700004	Between Irthing Rd to
5455	8243	20.	31	11.	155.0	2.2	20.	31	11.	155.0	2.2	40.	62	22.	155.0	*SH96 Ohai 9600089	Crawfords Tunnel
5675	5926	33.	50	17.	151.5	2.6	44.	50	6.	113.6	0.9	77.	100	23.	129.9	*SH94 09400059	
5795	4035	39.	64	25.	164.1	3.5	37.	64	27.	173.0	3.8	76.	128	52.	168.4	*SH90 Tapanui 9000026 Nov 2006	North of Tapanui
5907	4566	66.	67	1.	101.5	0.1	96.	67	-29.	69.8	3.2	162.	134	-28.	82.7	*SH94 Te Anau 9400136	East of Te Anau
5926	5675	44.	50	6.	113.6	0.9	33.	50	17.	151.5	2.6	77.	100	23.	129.9	*SH94 Lumsden 09400059	East of SH6
5948	4186	87.	89	2.	102.3	0.2	83.	89	6.	107.2	0.6	170.	178	8.	104.7	*SH6 Lowther 00601082	Five Rivers Telemetry
6300	4250	68.	60	-8.	88.2	1.0	68.	60	-8.	88.2	1.0	136.	120	-16.	88.2	*SH1 Clinton 01S00818	West of Clinton (sout
6340	6339	36.	63	27.	175.0	3.8	39.	63	24.	161.5	3.4	75.	126	51.	168.0	*SH90 Tapanui 9000032 Nov 2006	South of Tapanui
6498	5264	33.	16	-17.	48.5	3.4	25.	16	-9.	64.0	2.0	58.	32	-26.	55.2	*SH99 Colac 9900039	East of Colac Bay Rd
6722	4087	78.	77	-1.	98.7	0.1	66.	76	10.	115.2	1.2	144.	153	9.	106.2	*Charlton Rd (7)	
6730	8322	84.	124	40.	147.6	3.9	85.	120	35.	141.2	3.5	169.	244	75.	144.4	*Broughton St (16)	
6784	5652	18.	37	19.	205.6	3.6	21.	37	16.	176.2	3.0	38.	74	36.	194.7	*Ontario St (143	
7025	4064	33.	43	10.	130.3	1.6	30.	43	13.	143.3	2.2	63.	86	23.	136.5	*SH94 Lumsden 9400064	Lumsden - past SH6
7351	5654	141.	126	-15.	89.4	1.3	153.	133	-20.	86.9	1.7	294.	259	-35.	88.1	*Eccles St (65)	
7363	7364	20.	13	-7.	65.0	1.7	23.	13	-10.	56.5	2.4	43.	26	-17.	60.5	*Onslow St (106)	
7586	5884	181.	207	26.	114.4	1.9	249.	207	-42.	83.1	2.8	430.	414	-16.	96.3	*SH1 Milburn 01S00755	North of Milburn - be
7621	5918	10.	10	0.	100.0	0.0	13.	10	-3.	76.9	0.9	23.	20	-3.	87.0	*Dipton Casebrook Rd (3007)	
7709	6066	168.	173	5.	103.0	0.4	143.	173	30.	121.0	2.4	311.	346	35.	111.3	*SH6 Winton 601147	Winton - Telemetry Si
7856	8372	102.	86	-16.	84.3	1.7	82.	87	5.	106.1	0.5	184.	173	-11.	94.0	*Devon St (96)	
7868	8450	150.	111	-39.	74.0	3.4	137.	112	-25.	81.8	2.2	287.	223	-64.	77.7	*SH94 Gore 09400001	Gore boundary
7890	4027	138.	168	30.	121.7	2.4	144.	168	24.	116.7	1.9	282.	336	54.	119.1	*SH1 North of Gore 001S0854	Telemetry Site 45
8196	4034	64.	63	-1.	98.4	0.1	62.	63	1.	101.6	0.1	126.	126	0.	100.0	*SH8 Alexandra 800394	Raes Junction - befor
8240	4061	62.	58	-4.	93.5	0.5	53.	57	4.	107.5	0.5	115.	115	0.	100.0	*SH8 Milton 800459	Junction with SH1
8370	7356	439.	400	-39.	91.1	1.9	441.	368	-73.	83.4	3.6	880.	768	-112.	87.3	*SH1 Central Gore 001S0858 Mar 2008	Before Ashton St
8541	6250	63.	88	25.	139.7	2.9	59.	79	20.	133.9	2.4	123.	167	44.	135.8	*Crombie St (66)	

```
Number of links =    51 Number of forward links =    51 Number of back links =    51

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     4174.     4275.     8448.
 VOLUME    4450.     4437.     8887.
 CHANGE     276.      162.      439.
   %        107.      104.      105.
CORREL.
 COEFF.    0.974     0.956     0.970
 %RMS      25.26     30.97     26.31
  r^2      0.950     0.914     0.940
  GEH        4.2       2.5       4.7

  GEH  <5    <7   <10   <12   >12
  #   101   102   102   102     0
  %  99.0 100.0 100.0 100.0   0.0


 CORDON terminated successfully
```

Off Peak Period Heavy Vehicles

```
                +-------------------------------------------+
| TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
|  TRACKS +-------------------------+ TRACKS  |
| S TRACKS|                         |S TRACKS |
| KS TRACK|   Program  :     CORDON  |KS TRACK |
| CKS TRAC|   Version  :      V7.08  |CKS TRAC |
| ACKS TRA|                         |ACKS TRA |
| RACKS TR|   Date run :  22-JUN-11  |RACKS TR |
| TRACKS T|   Time run :   16:25:23  |TRACKS T |
|  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
| S TRACKS+-------------------------+S TRACKS |
| KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
+-------------------------------------------+
+-------------------------------------------+
|             TRACKS Licenced to            |
|  Gabites Porter                           |
|         at :   Christchurch, N.Z.         |
+-------------------------------------------+
            Build Date : 18/05/11 07:32
            Parameter version : V5.20


 Network Period Factor :  1.000


  Cordon Period Factor :  1.000


     GEH Period Factor :  1.000
```

CSV Output File : GI06CH.CSV

Cordon Data File : GI06in.HGVGGS MODEL
Loaded Network : GI06NL.HGV *GGS OFF - 2006 HEAVY VEHICLES
**** Links in network

Cordon Number : 1
Description : 1 SH Spot Counts

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
1419	1530	29.	32	3.	110.3	0.5	26.	32	6.	123.1	1.1	55.	64	9.	116.4	01S00919Invercargill Nth of Rockdale Rd
2760	2774	13.	17	4.	130.8	1.0	18.	17	-1.	94.4	0.2	31.	34	3.	109.7	01S00935Invercargill Nth of Awarua Radio Station
4508	5052	7.	11	4.	157.1	1.3	6.	11	5.	183.3	1.7	13.	22	9.	169.2	01S00791Balclutha Te Houka
7890	4027	19.	16	-3.	84.2	0.7	18.	16	-2.	88.9	0.5	37.	32	-5.	86.5	01S00854GORE - Telemetry Site 45
2707	5637	17.	27	10.	158.8	2.1	15.	27	12.	180.0	2.6	32.	54	22.	168.8	01S00863Past Saleyards Rd
5795	4035	4.	2	-2.	50.0	1.2	7.	2	-5.	28.6	2.4	11.	4	-7.	36.4	09000026Nth Tapanui-past Heriot Rd
4413	4408	5.	9	4.	180.0	1.5	6.	9	3.	150.0	1.1	11.	18	7.	163.6	01S00899Dacre near transmitting station
7709	6066	24.	17	-7.	70.8	1.5	20.	17	-3.	85.0	0.7	44.	34	-10.	77.3	00601147WINTON - Telemetry Site 46
5948	4186	4.	8	4.	200.0	1.6	5.	8	3.	160.0	1.2	9.	16	7.	177.8	00601086Mid Dome
7586	5884	35.	31	-4.	88.6	0.7	30.	31	1.	103.3	0.2	65.	62	-3.	95.4	01S00755Nth Milburn-before Lime Works Rd
4078	4004	10.	5	-5.	50.0	1.8	8.	5	-3.	62.5	1.2	18.	10	-8.	55.6	00601117 (Dipton)

Number of links = 11 Number of forward links = 11 Number of back links = 11

TOTALS	FORWARD	BACK	TOTALS
COUNT	167.	159.	326.
VOLUME	175.	175.	350.
CHANGE	8.	16.	24.
%	105.	110.	107.
CORREL.			
COEFF.	0.877	0.875	0.883
%RMS	34.60	36.08	33.74
r^2	0.769	0.766	0.779
GEH	0.6	1.2	1.3

GEH	<5	<7	<10	<12	>12
#	22	22	22	22	0
%	100.0	100.0	100.0	100.0	0.0

CORDON terminated successfully

PM Peak Period All Vehicles

```
+-------------------------------------------+
| TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
|  TRACKS +-------------------------+ TRACKS  |
| S TRACKS|                         |S TRACKS |
| KS TRACK|   Program  :     CORDON  |KS TRACK |
| CKS TRAC|   Version  :      V7.08  |CKS TRAC |
| ACKS TRA|                         |ACKS TRA |
| RACKS TR|   Date run :  23-JUN-11  |RACKS TR |
| TRACKS T|   Time run :   13:19:12  |TRACKS T |
|  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
| S TRACKS+-------------------------+S TRACKS |
| KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
+-------------------------------------------+
+-------------------------------------------+
|            TRACKS Licenced to             |
|  Gabites Porter                           |
|        at :   Christchurch, N.Z.          |
+-------------------------------------------+
           Build Date : 18/05/11 07:32
           Parameter version : V5.20
```

Network Period Factor : 1.000

Cordon Period Factor : 1.000

GEH Period Factor : 1.000

CSV Output File : GP06CL.CSV

Cordon Data File : GP06pm.DATGGS MODEL
Loaded Network : GP06NL.000 *GGS PM - 2006 ALL
**** Links in network

Cordon Number : 1
Description : *1 NORTH GORE

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
4955	6257	12.	4	-8.	33.3	2.8	9.	3	-6.	33.3	2.4	20.	7	-13.	35.0	*Macgibbon Rd (351)
4183	8372	135.	131	-4.	97.0	0.3	129.	113	-16.	87.6	1.5	264.	244	-20.	92.4	*Ardwick St (76)
6730	8322	115.	181	66.	157.4	5.4	113.	139	26.	123.0	2.3	228.	320	92.	140.4	*Broughton St (16)
8370	7356	369.	367	-2.	99.5	0.1	424.	420	-4.	99.1	0.2	793.	787	-6.	99.2	*SH1 Central Gore 001S0858 Mar 2008 Before Ashton St

Number of links = 4 Number of forward links = 4 Number of back links = 4

TOTALS	FORWARD	BACK	TOTALS
COUNT	631.	675.	1305.

VOLUME	683.	675.	1358.
CHANGE	52.	0.	53.
%	108.	100.	104.
CORREL.			
COEFF.	0.972	0.995	0.987
%RMS	24.39	10.73	16.85
r^2	0.946	0.990	0.974
GEH	2.0	0.0	1.5

GEH	<5	<7	<10	<12	>12
#	7	8	8	8	0
%	87.5	100.0	100.0	100.0	0.0

Cordon Number : 2
Description : *2 WEST GORE

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
7363	7364	19.	18	-1.	94.7	0.2	32.	25	-7.	78.1	1.3	51.	43	-8.	84.3	*Onslow St (106)
7856	8372	93.	88	-5.	94.6	0.5	124.	117	-7.	94.4	0.6	217.	205	-12.	94.5	*Devon St (96)
2728	4183	69.	80	11.	115.9	1.3	41.	121	80.	295.1	8.9	110.	201	91.	182.7	*William St (115)
7351	5654	122.	118	-4.	96.7	0.4	187.	138	-49.	73.8	3.8	309.	256	-53.	82.8	*Eccles St (65)
8541	6250	57.	72	15.	126.3	1.9	96.	87	-9.	90.6	0.9	153.	159	6.	103.9	*Crombie St (66)
6730	8322	113.	181	68.	160.2	5.6	115.	139	24.	120.9	2.1	228.	320	92.	140.4	*Broughton St (16)
6722	4087	120.	83	-37.	69.2	3.7	72.	77	5.	106.9	0.6	192.	160	-32.	83.3	*Charlton Rd (7)

Number of links = 7 Number of forward links = 7 Number of back links = 7

TOTALS	FORWARD	BACK	TOTALS
COUNT	593.	667.	1260.
VOLUME	640.	704.	1344.
CHANGE	47.	37.	84.
%	108.	106.	107.
CORREL.			
COEFF.	0.767	0.678	0.775
%RMS	38.50	41.94	32.73
r^2	0.588	0.459	0.600
GEH	1.9	1.4	2.3

GEH	<5	<7	<10	<12	>12
#	12	13	14	14	0
%	85.7	92.9	100.0	100.0	0.0

Cordon Number : 3
Description : *3

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
2707	5637	235.	302	67.	128.5	4.1	261.	252	-9.	96.6	0.6	496.	554	58.	111.7	*SH1 South of Gore 001S0863	Past Saleyards Rd
3812	2712	11.	9	-2.	81.8	0.6	15.	9	-6.	60.0	1.7	25.	18	-7.	72.0	*Bowmar Rd (261)	
4948	4452	24.	42	18.	175.0	3.1	43.	55	12.	127.9	1.7	68.	97	29.	142.6	*Waimumu Rd (262)	
4950	5647	23.	10	-13.	43.5	3.2	26.	11	-15.	42.3	3.5	49.	21	-28.	42.9	*Reaby Rd (365)	
7868	8450	82.	158	76.	192.7	6.9	96.	116	20.	120.8	1.9	178.	274	96.	153.9	*SH94 Gore 09400001	Gore boundary
4467	4976	15.	11	-4.	73.3	1.1	9.	8	-1.	88.9	0.3	24.	19	-5.	79.2	*Knapdale Rd (384)	
3849	5697	23.	41	18.	178.3	3.2	17.	30	13.	176.5	2.7	41.	71	30.	173.2	*Whiteering Rd (437)	
7890	4027	179.	150	-29.	83.8	2.3	223.	212	-11.	95.1	0.7	402.	362	-40.	90.0	*SH1 North of Gore 001S0854	Telemetry Site 45
6784	5652	25.	43	18.	172.0	3.1	37.	40	3.	108.1	0.5	63.	83	20.	131.7	*Ontario St (143	

Number of links = 9 Number of forward links = 9 Number of back links = 9

TOTALS	FORWARD	BACK	TOTALS
COUNT	617.	727.	1346.
VOLUME	766.	733.	1499.
CHANGE	149.	6.	153.
%	124.	101.	111.
CORREL.			
COEFF.	0.943	0.992	0.975
%RMS	57.12	15.07	30.98
r^2	0.889	0.984	0.950
GEH	5.7	0.2	4.1

GEH	<5	<7	<10	<12	>12
#	17	18	18	18	0
%	94.4	100.0	100.0	100.0	0.0

Cordon Number : 4
Description : *4

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
4413	4408	204.	179	-25.	87.7	1.8	166.	114	-52.	68.7	4.4	370.	293	-77.	79.2	*SH1 Dacre 001S0899	East of Old Dunedin R
4926	4915	34.	14	-20.	41.2	4.1	30.	17	-13.	56.7	2.7	64.	31	-33.	48.4	*SH96 Glencoe 09600009	Near Hedgehope Stream
5675	5926	39.	45	6.	115.4	0.9	47.	52	5.	110.6	0.7	86.	97	11.	112.8	*SH94 09400059	

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS
COUNT	277.	243.	520.
VOLUME	238.	183.	421.
CHANGE	-39.	-60.	-99.
%	86.	75.	81.
CORREL.			
COEFF.	0.988	0.969	0.984
%RMS	24.95	46.99	34.47
r^2	0.977	0.939	0.968
GEH	2.4	4.1	4.6

GEH	<5	<7	<10	<12	>12
#	6	6	6	6	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 5
Description : *5

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
6340	6339	36.	62	26.	172.2	3.7	65.	82	17.	126.2	2.0	101.	144	43.	142.6	*SH90 Tapanui 9000032 Nov 2006	South of Tapanui
6300	4250	58.	47	-11.	81.0	1.5	79.	50	-29.	63.3	3.6	137.	97	-40.	70.8	*SH1 Clinton 01S00818	West of Clinton (sout
4025	4498	50.	33	-17.	66.0	2.6	59.	51	-8.	86.4	1.1	109.	84	-25.	77.1	*SH93 Clinton 9300001	South of Clinton

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS

COUNT	144.	203.	347.
VOLUME	142.	183.	325.
CHANGE	-2.	-20.	-22.
%	99.	90.	94.
CORREL.			
COEFF.	-0.644	-0.252	-0.505
%RMS	48.55	36.11	39.02
r^2	0.415	0.063	0.255
GEH	0.2	1.4	1.2

GEH	<5	<7	<10	<12	>12
#	6	6	6	6	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 6
Description : *6

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
5214	2748	24.	15	-9.	62.5	2.0	46.	23	-23.	50.0	3.9	70.	38	-32.	54.3	*SH97 Lowther 9700004 Between Irthing Rd to
7025	4064	39.	63	24.	161.5	3.4	31.	24	-7.	77.4	1.3	70.	87	17.	124.3	*SH94 Lumsden 9400064 Lumsden - past SH6
7621	5918	22.	11	-11.	50.0	2.7	11.	16	5.	145.5	1.4	32.	27	-5.	84.4	*Dipton Casebrook Rd (3007)
4576	8109	3.	1	-2.	33.3	1.4	4.	2	-2.	50.0	1.2	7.	3	-4.	42.9	*Dipton Mossburn Rd (3015)
4338	5429	66.	57	-9.	86.4	1.1	99.	89	-10.	89.9	1.0	165.	146	-19.	88.5	*SH96 Oreti 9600056 Nov 2006 Oreti Hotel
4212	5980	59.	71	12.	120.3	1.5	124.	147	23.	118.5	2.0	183.	218	35.	119.1	*SH99 Riverton 9900027 Riverton - near racec

Number of links = 6 Number of forward links = 6 Number of back links = 6

TOTALS	FORWARD	BACK	TOTALS
COUNT	213.	315.	527.
VOLUME	218.	301.	519.
CHANGE	5.	-14.	-8.
%	102.	96.	98.
CORREL.			
COEFF.	0.894	0.966	0.960
%RMS	39.98	29.95	27.61
r^2	0.798	0.934	0.922
GEH	0.3	0.8	0.3

GEH	<5	<7	<10	<12	>12
#	12	12	12	12	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 7
Description : *7

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
5907	4566	104.	123	19.	118.3	1.8	99.	28	-71.	28.3	8.9	203.	151	-52.	74.4	*SH94 Te Anau 9400136 East of Te Anau
5455	8243	25.	35	10.	140.0	1.8	25.	44	19.	176.0	3.2	50.	79	29.	158.0	*SH96 Ohai 9600089 Crawfords Tunnel
6498	5264	35.	18	-17.	51.4	3.3	21.	21	0.	100.0	0.0	56.	39	-17.	69.6	*SH99 Colac 9900039 East of Colac Bay Rd

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS

COUNT	164.	145.	309.
VOLUME	176.	93.	269.
CHANGE	12.	-52.	-40.
%	107.	64.	87.
CORREL.			
COEFF.	0.964	-0.176	0.923
%RMS	35.42	107.53	42.51
r^2	0.930	0.031	0.852
GEH	0.9	4.8	2.4

GEH	<5	<7	<10	<12	>12
#	5	5	6	6	0
%	83.3	83.3	100.0	100.0	0.0

Cordon Number : 8
Description : *8

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
2709	7614	63.	63	0.	100.0	0.0	11.	11	0.	100.0	0.0	74.	74	0.	100.0	*SH94 Te Anau 9400172	Retford Stream
5948	4186	70.	74	4.	105.7	0.5	104.	109	5.	104.8	0.5	174.	183	9.	105.2	*SH6 Lowther 00601082	Five Rivers Telemetry
8196	4034	67.	67	0.	100.0	0.0	90.	90	0.	100.0	0.0	157.	157	0.	100.0	*SH8 Alexandra 800394	Raes Junction - befor
7586	5884	244.	250	6.	102.5	0.4	310.	301	-9.	97.1	0.5	554.	551	-3.	99.5	*SH1 Milburn 01S00755	North of Milburn - be

Number of links = 4 Number of forward links = 4 Number of back links = 4

TOTALS	FORWARD	BACK	TOTALS
COUNT	444.	515.	959.
VOLUME	454.	511.	965.
CHANGE	10.	-4.	6.
%	102.	99.	101.
CORREL.			
COEFF.	1.000	1.000	1.000
%RMS	3.75	4.62	2.28
r^2	1.000	0.999	1.000
GEH	0.5	0.2	0.2

GEH	<5	<7	<10	<12	>12
#	8	8	8	8	0
%	100.0	100.0	100.0	100.0	0.0

Cordon Number : 9
Description : *9

		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
4061	3862	256.	199	-57.	77.7	3.8	283.	254	-29.	89.8	1.8	539.	453	-86.	84.0	*SH1 Milton 01S00765	Milton - Telemetry Si
8240	4061	59.	70	11.	118.6	1.4	86.	66	-20.	76.7	2.3	145.	136	-9.	93.8	*SH8 Milton 800459	Junction with SH1

Number of links = 2 Number of forward links = 2 Number of back links = 2

TOTALS	FORWARD	BACK	TOTALS
COUNT	315.	369.	684.
VOLUME	269.	320.	589.
CHANGE	-46.	-49.	-95.

```
   %         85.       87.       86.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS      36.86     19.09     25.28
  r^2      1.000     1.000     1.000
  GEH        2.7       2.6       3.8

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 10
 Description   : *10

                    FORWARD                          BACK                           TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  5795  4035      37.     61     24. 164.9   3.4      53.     80     27. 150.9   3.3      90.    141     51. 156.7   *SH90 Tapanui 9000026 Nov 2006         North of Tapanui
  4508  5052     119.    127      8. 106.7   0.7     149.    124    -25.  83.2   2.1     268.    251    -17.  93.7   *SH1 Balclutha 01S00791           West of Balclutha (Te

Number of links =     2 Number of forward links =     2 Number of back links =     2

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      156.      202.      358.
 VOLUME     188.      204.      392.
 CHANGE      32.        2.       34.
   %        121.      101.      109.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS      32.43     36.43     30.03
  r^2      1.000     1.000     1.000
  GEH        2.4       0.1       1.8

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 11
 Description   : *11

                    FORWARD                          BACK                           TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4306  4209      16.     13     -3.  81.2   0.8      14.      9     -5.  64.3   1.5      30.     22     -8.  73.3   *SH99 Clifden 9900089              Clifden - near school
  4195  6099      35.     23    -12.  65.7   2.2      46.     34    -12.  73.9   1.9      81.     57    -24.  70.4   *SH96 Wreys Bush 9600075                 Wreys Bush
  4004  4200      76.     60    -16.  78.9   1.9      89.     75    -14.  84.3   1.5     165.    135    -30.  81.8   *SH6 Dipton 601117                       Dipton
  5926  5675      47.     52      5. 110.6   0.7      39.     45      6. 115.4   0.9      86.     97     11. 112.8   *SH94 Lumsden 09400059                   East of SH6

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      174.      188.      362.
 VOLUME     148.      163.      311.
 CHANGE     -26.      -25.      -51.
   %         85.       87.       86.
CORREL.
 COEFF.    0.928     0.961     0.947
 %RMS      27.65     24.60     26.00
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  r^2      0.861     0.923     0.896
  GEH        2.0       1.9       2.8

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 12
 Description   : *12

                     FORWARD                          BACK                            TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  4306  4209      16.     13     -3.  81.2   0.8     14.      9     -5.  64.3   1.5     30.     22     -8.  73.3   *SH99 Clifden 9900089            Clifden - near school
  7709  6066     197.    183    -14.  92.9   1.0    266.    229    -37.  86.1   2.4    463.    412    -51.  89.0   *SH6 Winton 601147                Winton - Telemetry Si
  3942  4126     178.    143    -35.  80.3   2.8    203.    207      4. 102.0   0.3    381.    350    -31.  91.9   *SH1 Mataura 01S00875             Mataura south of SH96

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      391.      483.      874.
 VOLUME     339.      445.      784.
 CHANGE     -52.      -38.      -90.
   %         87.       92.       90.
CORREL.
 COEFF.    0.991     0.989     1.000
 %RMS      20.52     16.49     14.62
  r^2      0.983     0.977     0.999
  GEH        2.7       1.8       3.1

  GEH  <5    <7   <10   <12   >12
  #     6     6     6     6     0
  % 100.0 100.0 100.0 100.0   0.0

 Cordon Number : 13
 Description   : *13

                     FORWARD                          BACK                            TOTAL
 NODE1 NODE2    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %   GEH    COUNT  VOLUME  CHANGE    %

  2760  2774      90.    122     32. 135.6   3.1    127.    135      8. 106.3   0.7    217.    257     40. 118.4   *SH1 Awarua 01S00935 Nov 2006      North of Awarua radio
  1419  1530     317.    288    -29.  90.9   1.7    348.    385     37. 110.6   1.9    665.    673      8. 101.2   *SH1 (01S00919)  from Invercargill model
  1031  1019     721.    638    -83.  88.5   3.2    362.    338    -24.  93.4   1.3   1083.    976   -107.  90.1   *SH6 Lorneville 601168           Lorneville - south of

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1128.      837.     1965.
 VOLUME    1048.      858.     1906.
 CHANGE     -80.       21.      -59.
   %         93.      103.       97.
CORREL.
 COEFF.    0.999     0.973     0.998
 %RMS      17.60     11.36     12.36
  r^2      0.998     0.948     0.995
  GEH        2.4       0.7       1.3

  GEH  <5    <7   <10   <12   >12
```

```
 #     6     6     6     6     0
 % 100.0 100.0 100.0 100.0   0.0

Cordon Number : 14
Description   : *14 ALL COUNTS
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		FORWARD					BACK					TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%		
4955	6257	12.	4	-8.	33.3	2.8	9.	3	-6.	33.3	2.4	20.	7	-13.	35.0	*Macgibbon Rd (351)	
4183	8372	135.	131	-4.	97.0	0.3	129.	113	-16.	87.6	1.5	264.	244	-20.	92.4	*Ardwick St (76)	
6730	8322	115.	181	66.	157.4	5.4	113.	139	26.	123.0	2.3	228.	320	92.	140.4	*Broughton St (16)	
8370	7356	369.	367	-2.	99.5	0.1	424.	420	-4.	99.1	0.2	793.	787	-6.	99.2	*SH1 Central Gore 001S0858 Mar 2008	Before Ashton St
7363	7364	19.	18	-1.	94.7	0.2	32.	25	-7.	78.1	1.3	51.	43	-8.	84.3	*Onslow St (106)	
7856	8372	93.	88	-5.	94.6	0.5	124.	117	-7.	94.4	0.6	217.	205	-12.	94.5	*Devon St (96)	
2728	4183	69.	80	11.	115.9	1.3	41.	121	80.	295.1	8.9	110.	201	91.	182.7	*William St (115)	
7351	5654	122.	118	-4.	96.7	0.4	187.	138	-49.	73.8	3.8	309.	256	-53.	82.8	*Eccles St (65)	
8541	6250	57.	72	15.	126.3	1.9	96.	87	-9.	90.6	0.9	153.	159	6.	103.9	*Crombie St (66)	
6722	4087	120.	83	-37.	69.2	3.7	72.	77	5.	106.9	0.6	192.	160	-32.	83.3	*Charlton Rd (7)	
2707	5637	235.	302	67.	128.5	4.1	261.	252	-9.	96.6	0.6	496.	554	58.	111.7	*SH1 South of Gore 001S0863	Past Saleyards Rd
3812	2712	11.	9	-2.	81.8	0.6	15.	9	-6.	60.0	1.7	25.	18	-7.	72.0	*Bowmar Rd (261)	
4948	4452	24.	42	18.	175.0	3.1	43.	55	12.	127.9	1.7	68.	97	29.	142.6	*Waimumu Rd (262)	
4950	5647	23.	10	-13.	43.5	3.2	26.	11	-15.	42.3	3.5	49.	21	-28.	42.9	*Reaby Rd (365)	
7868	8450	82.	158	76.	192.7	6.9	96.	116	20.	120.8	1.9	178.	274	96.	153.9	*SH94 Gore 09400001	Gore boundary
4467	4976	15.	11	-4.	73.3	1.1	9.	8	-1.	88.9	0.3	24.	19	-5.	79.2	*Knapdale Rd (384)	
3849	5697	23.	41	18.	178.3	3.2	17.	30	13.	176.5	2.7	41.	71	30.	173.2	*Whiteering Rd (437)	
7890	4027	179.	150	-29.	83.8	2.3	223.	212	-11.	95.1	0.7	402.	362	-40.	90.0	*SH1 North of Gore 001S0854	Telemetry Site 45
6784	5652	25.	43	18.	172.0	3.1	37.	40	3.	108.1	0.5	63.	83	20.	131.7	*Ontario St (143	
4413	4408	204.	179	-25.	87.7	1.8	166.	114	-52.	68.7	4.4	370.	293	-77.	79.2	*SH1 Dacre 001S0899	East of Old Dunedin R
4926	4915	34.	14	-20.	41.2	4.1	30.	17	-13.	56.7	2.7	64.	31	-33.	48.4	*SH96 Glencoe 09600009	Near Hedgehope Stream
5675	5926	39.	45	6.	115.4	0.9	47.	52	5.	110.6	0.7	86.	97	11.	112.8	*SH94 09400059	
6340	6339	36.	62	26.	172.2	3.7	65.	82	17.	126.2	2.0	101.	144	43.	142.6	*SH90 Tapanui 9000032 Nov 2006	South of Tapanui
6300	4250	58.	47	-11.	81.0	1.5	79.	50	-29.	63.3	3.6	137.	97	-40.	70.8	*SH1 Clinton 01S00818	West of Clinton (sout
4025	4498	50.	33	-17.	66.0	2.6	59.	51	-8.	86.4	1.1	109.	84	-25.	77.1	*SH93 Clinton 9300001	South of Clinton
5214	2748	24.	15	-9.	62.5	2.0	46.	23	-23.	50.0	3.9	70.	38	-32.	54.3	*SH97 Lowther 9700004	Between Irthing Rd to
7025	4064	39.	63	24.	161.5	3.4	31.	24	-7.	77.4	1.3	70.	87	17.	124.3	*SH94 Lumsden 9400064	Lumsden - past SH6
7621	5918	22.	11	-11.	50.0	2.7	11.	16	5.	145.5	1.4	32.	27	-5.	84.4	*Dipton Casebrook Rd (3007)	
4576	8109	3.	1	-2.	33.3	1.4	4.	2	-2.	50.0	1.2	7.	3	-4.	42.9	*Dipton Mossburn Rd (3015)	
4338	5429	66.	57	-9.	86.4	1.1	99.	89	-10.	89.9	1.0	165.	146	-19.	88.5	*SH96 Oreti 9600056 Nov 2006	Oreti Hotel
4212	5980	59.	71	12.	120.3	1.5	124.	147	23.	118.5	2.0	183.	218	35.	119.1	*SH99 Riverton 9900027	Riverton - near racec
5907	4566	104.	123	19.	118.3	1.8	99.	28	-71.	28.3	8.9	203.	151	-52.	74.4	*SH94 Te Anau 9400136	East of Te Anau
5455	8243	25.	35	10.	140.0	1.8	25.	44	19.	176.0	3.2	50.	79	29.	158.0	*SH96 Ohai 9600089	Crawfords Tunnel
6498	5264	35.	18	-17.	51.4	3.3	21.	21	0.	100.0	0.0	56.	39	-17.	69.6	*SH99 Colac 9900039	East of Colac Bay Rd
2709	7614	63.	63	0.	100.0	0.0	11.	11	0.	100.0	0.0	74.	74	0.	100.0	*SH94 Te Anau 9400172	Retford Stream
5948	4186	70.	74	4.	105.7	0.5	104.	109	5.	104.8	0.5	174.	183	9.	105.2	*SH6 Lowther 00601082	Five Rivers Telemetry
8196	4034	67.	67	0.	100.0	0.0	90.	90	0.	100.0	0.0	157.	157	0.	100.0	*SH8 Alexandra 800394	Raes Junction - befor
7586	5884	244.	250	6.	102.5	0.4	310.	301	-9.	97.1	0.5	554.	551	-3.	99.5	*SH1 Milburn 01S00755	North of Milburn - be
4061	3862	256.	199	-57.	77.7	3.8	283.	254	-29.	89.8	1.8	539.	453	-86.	84.0	*SH1 Milton 01S00765	Milton - Telemetry Si
8240	4061	59.	70	11.	118.6	1.4	86.	66	-20.	76.7	2.3	145.	136	-9.	93.8	*SH8 Milton 800459	Junction with SH1
5795	4035	37.	61	24.	164.9	3.4	53.	80	27.	150.9	3.3	90.	141	51.	156.7	*SH90 Tapanui 9000026 Nov 2006	North of Tapanui
4508	5052	119.	127	8.	106.7	0.7	149.	124	-25.	83.2	2.1	268.	251	-17.	93.7	*SH1 Balclutha 01S00791	West of Balclutha (Te
4306	4209	16.	13	-3.	81.2	0.8	14.	9	-5.	64.3	1.5	30.	22	-8.	73.3	*SH99 Clifden 9900089	Clifden - near school
4195	6099	35.	23	-12.	65.7	2.2	46.	34	-12.	73.9	1.9	81.	57	-24.	70.4	*SH96 Wreys Bush 9600075	Wreys Bush
4004	4200	76.	60	-16.	78.9	1.9	89.	75	-14.	84.3	1.5	165.	135	-30.	81.8	*SH6 Dipton 601117	Dipton
5926	5675	47.	52	5.	110.6	0.7	39.	45	6.	115.4	0.9	86.	97	11.	112.8	*SH94 Lumsden 09400059	East of SH6
7709	6066	197.	183	-14.	92.9	1.0	266.	229	-37.	86.1	2.4	463.	412	-51.	89.0	*SH6 Winton 601147	Winton - Telemetry Si
3942	4126	178.	143	-35.	80.3	2.8	203.	207	4.	102.0	0.3	381.	350	-31.	91.9	*SH1 Mataura 01S00875	Mataura south of SH96
2760	2774	90.	122	32.	135.6	3.1	127.	135	8.	106.3	0.7	217.	257	40.	118.4	*SH1 Awarua 01S00935 Nov 2006	North of Awarua radio
1419	1530	317.	288	-29.	90.9	1.7	348.	385	37.	110.6	1.9	665.	673	8.	101.2	*SH1 (01S00919) from Invercargill	model
1031	1019	721.	638	-83.	88.5	3.2	362.	338	-24.	93.4	1.3	1083.	976	-107.	90.1	*SH6 Lorneville 601168	Lorneville - south of

```
Number of links =    51 Number of forward links =    51 Number of back links =    51

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     5118.     5440.    10558.
 VOLUME    5115.     5225.    10340.
 CHANGE      -3.     -215.     -218.
   %        100.       96.       98.
CORREL.
 COEFF.    0.976     0.974     0.983
 %RMS      27.12     22.34     19.96
  r^2      0.952     0.948     0.965
  GEH        0.0       2.9       2.1

  GEH  <5    <7   <10   <12   >12
  #    98   100   102   102     0
  %  96.1  98.0 100.0 100.0   0.0


 CORDON terminated successfully
```

PM Peak Period Heavy Vehicles

```
                              +--------------------------------------------+
                              | TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
                              |  TRACKS +-------------------------+ TRACKS  |
                              | S TRACKS|                         |S TRACKS |
                              | KS TRACK|   Program  :     CORDON  |KS TRACK |
                              | CKS TRAC|   Version  :      V7.08  |CKS TRAC |
                              | ACKS TRA|                         |ACKS TRA |
                              | RACKS TR|   Date run :  22-JUN-11  |RACKS TR |
                              | TRACKS T|   Time run :   16:39:01  |TRACKS T |
                              |  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
                              | S TRACKS+-------------------------+S TRACKS |
                              | KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
                              +--------------------------------------------+
                              +--------------------------------------------+
                              |            TRACKS Licenced to              |
                              |  Gabites Porter                            |
                              |         at :   Christchurch, N.Z.          |
                              +--------------------------------------------+
                                         Build Date : 18/05/11 07:32
                                         Parameter version : V5.20


 Network Period Factor :  1.000


  Cordon Period Factor :  1.000


     GEH Period Factor :  1.000
```

CSV Output File : GP06CH.CSV

Cordon Data File : GP06pm.HGVINVERCARGILL MODEL
Loaded Network : GP06NL.HGV *GGS PM - 2006 HEAVY VEHICLES
**** Links in network

Cordon Number : 1
Description : 1 SH Spot Counts

		FORWARD					BACK					TOTAL				
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	GEH	COUNT	VOLUME	CHANGE	%	
1419	1530	17.	23	6.	135.3	1.3	19.	23	4.	121.1	0.9	36.	46	10.	127.8	01S00919Invercargill Nth of Rockdale Rd
2760	2774	6.	12	6.	200.0	2.0	8.	12	4.	150.0	1.3	14.	24	10.	171.4	01S00935Invercargill Nth of Awarua Radio Station
4508	5052	6.	8	2.	133.3	0.8	7.	8	1.	114.3	0.4	13.	16	3.	123.1	01S00791Balclutha Te Houka
7890	4027	17.	12	-5.	70.6	1.3	15.	12	-3.	80.0	0.8	32.	24	-8.	75.0	01S00854GORE - Telemetry Site 45
2707	5637	26.	20	-6.	76.9	1.3	10.	20	10.	200.0	2.6	36.	40	4.	111.1	01S00863Past Saleyards Rd
5795	4035	4.	1	-3.	25.0	1.9	6.	2	-4.	33.3	2.0	10.	3	-7.	30.0	09000026Nth Tapanui-past Heriot Rd
4413	4408	8.	7	-1.	87.5	0.4	10.	7	-3.	70.0	1.0	18.	14	-4.	77.8	01S00899Dacre near transmitting station
7709	6066	21.	12	-9.	57.1	2.2	16.	12	-4.	75.0	1.1	37.	24	-13.	64.9	00601147WINTON - Telemetry Site 46
5948	4186	6.	4	-2.	66.7	0.9	5.	5	0.	100.0	0.0	11.	9	-2.	81.8	006010806Mid Dome
7586	5884	26.	22	-4.	84.6	0.8	20.	25	5.	125.0	1.1	46.	47	1.	102.2	01S00755Nth Milburn-before Lime Works Rd
4078	4004	9.	3	-6.	33.3	2.4	11.	4	-7.	36.4	2.6	20.	7	-13.	35.0	00601117 (Dipton)

Number of links = 11 Number of forward links = 11 Number of back links = 11

TOTALS	FORWARD	BACK	TOTALS
COUNT	146.	127.	273.
VOLUME	124.	130.	254.
CHANGE	-22.	3.	-19.
%	85.	102.	93.
CORREL.			
COEFF.	0.817	0.767	0.849
%RMS	40.15	43.91	33.64
r^2	0.668	0.588	0.721
GEH	1.9	0.3	1.2

GEH	<5	<7	<10	<12	>12
#	22	22	22	22	0
%	100.0	100.0	100.0	100.0	0.0

CORDON terminated successfully

APPENDIX FIVE
LOS CRITERIA

TRAFFIC EFFICIENCY (LEVEL OF SERVICE)

Within a road network it is desirable to have sufficient capacity to minimise congestion. The capacity depends upon the road width, the environment, the side friction and the form of the road. To assess what volume of traffic and delays are being experienced on roads of various types a 'level of service' analysis is used. Level of Service (LOS) is a subjective measure of the way in which a network is operating, given the traffic demands that are placed on it.

Higher levels of service result in traffic 'freedom' enabling ease of traffic movement with minimal delays while low levels of service are characterized by congestion, delays and slower overall travel speeds. With low levels of service there are consequent adverse economic and social effects suffered by the whole community. A level of service analysis sets volume boundaries indicated by a grading of A to F for different types of roads and intersections. Level of service A indicates free flow while level of service E is where volumes are close to capacity and F is in the zone of forced flow.

Because it is subjective, individual regions have a local perception of how individual roads and intersections are operating and that affects the local interpretation of the LOS values. In this study the boundaries were adopted from those used in several studies, and are based on guidelines from the U.S. Transportation Research Board Highway Capacity Manual. It was agreed with that these successfully reflect local perceptions of network operation.

This study focuses on LOS F, E, D and C with particular attention paid to LOS F and E. The final LOS boundaries used in the Study are described in Table 1, which provides a description of:

- LOS definitions describing the type of conditions a driver faces under each level
- Link LOS boundaries that describe the performance of traffic moving along a section of road and a function of traffic volume and link free flow speed.
- Intersection LOS boundaries are based on two different criteria: Worst Approach based delay for priority control intersections; and weighted average delay for roundabouts and signalised intersections.

It is important to note that level of service tends to be much worse during the morning and evening peaks. The interval between these periods usually generates fewer trips and the trips tend to be shorter resulting in a much better LOS.

Figure 1 shows how Link LOS varies depending on link type. It shows that the higher the vehicle volume and the lower the free speed the worse the LOS becomes. Link types are defined as follows:

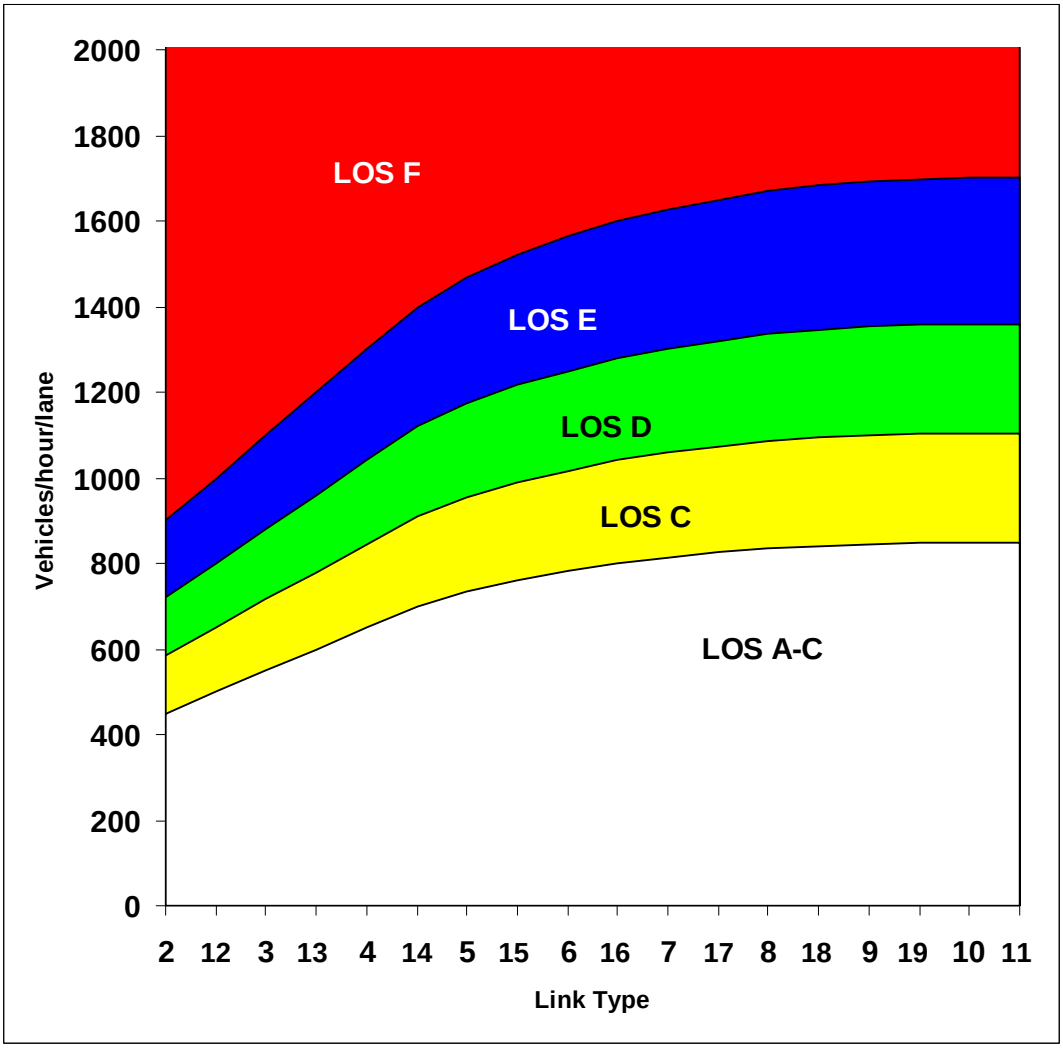
- Link type 1 equates to road speeds of 10km/hr
- Link type 2 and 12 equate to road speeds of 20km/hr and 25km/hr
- Link type 3 and 13 equate to road speeds of 30km/hr and 35km/hr
- Link type 4 and 14 equate to road speeds of 40km/hr and 45km/hr
- Link type 5 and 15 equate to road speeds of 50km/hr and 55km/hr
- Link type 6 and 16 equate to road speeds of 60km/hr and 65km/hr
- Link type 7 and 17 equate to road speeds of 70km/hr and 75km/hr
- Link type 8 and 18 equate to road speeds of 80km/hr and 85km/hr

- Link type 9 and 19 equate to road speeds of 90km/hr and 95km/hr
- Link type 10 and 11 equate to road speeds of 100km/hr and 110km/hr
- Link type 20 equates to road speeds of 105km/hr

Within an urban area it is generally the intersections that are of particular concern. At intersections the road user may experience delays because of congestion. The LOS is based on the delay values as given in Table 1**.**

Definitions Of LOS				Table 1
LOS	**Description**	**LOS criteria**		
		Link (vehicles per hour)	**Intersection (average delay/veh)**	
			Priority	**Signal/Rotary**
LOS F	Forced flow. The amount of traffic approaching a point exceeds that which can pass it. Flow break-downs occur, and queuing and delays occur.	In excess of **900-1700** depending on link type	50 sec	80 sec
LOS E	Traffic volumes are at or close to *capacity and there is virtually no freedom* to select desired speed and to manoeuvre within the traffic stream. Flow is unstable and *minor disturbances within the traffic stream will cause break-downs in operation*.	Between **810-1530** depending on link type	35 sec	55 sec
LOS D	Approaching unstable flow where *all drivers are severely restricted* in their freedom to select desired speed and to manoeuvre within the traffic stream. The general level of *comfort and convenience is poor* and small increases in traffic flow will cause operational problems.	Between **675-1275** depending on link type	25 sec	35 sec
LOS C	Stable flow but most drivers *are restricted to some extent* in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of *comfort and convenience has declined noticeably*.	Between **450-850** depending on link type	15 sec	20 sec
LOS B	Stable flow where drivers still *have reasonable freedom* to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is less than LOS A.	Not Applicable	Not Applicable	
LOS A	Free flow in which drivers are *virtually unaffected* by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of *comfort and convenience is excellent*.			

NB The LOS for priority intersections is dictated by the delay on the worst approach and the LOS for roundabouts and signalised intersections is calculated based on the weighted average delay across all approaches.



GGS Transportation Model	**Link LOS Criteria (Vehicles per Lane per Hour)**	**Figure 1**
Gabites Porter		