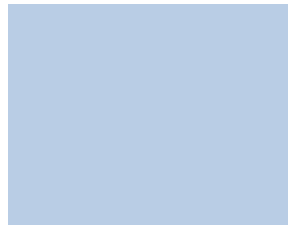


Sligo County Council

Traffic Modelling Report

N4 Collooney to Castlebaldwin



PKS Reference:	<i>SO/01/150</i>
Phase	<i>Preliminary Design</i>
Issue Date:	<i>11-02-2013</i>

N4 Collooney to Castlebaldwin Traffic Modelling Report

TABLE OF CONTENTS

1	Introduction.....	2
1.1	The Project Appraisal Guidelines	2
1.2	Project Description.....	2
2	Data Collection.....	5
2.1	Introduction.....	5
2.2	Traffic Surveys.....	5
2.3	Journey Times	8
3	Model Development.....	11
3.1	Overview.....	11
3.2	Network Development.....	11
3.3	Matrix Development.....	13
3.4	Assignment Model	14
3.5	Model Calibration.....	14
3.6	Model Calibration.....	15
4	Future Year Model Development.....	18
4.1	Introduction.....	18
4.2	Future Year Matrix Development	18
4.3	Future Year Network Development.....	20
4.4	Estimation of Annual Average Daily Traffic (AADT).....	20
4.5	Incremental Analysis.....	21
4.6	Results.....	22
4.7	Network Statistics	25

Appendix A – Incremental Analysis

Appendix B – Calibration

Appendix C - Validation

Chapter 1
Introduction



1 Introduction

1.1 The Project Appraisal Guidelines

The NRA Project Appraisal Guidelines (PAG) (2011) set out the following deliverables required as part of the appraisal process for major schemes:

- Project Brief;
- Traffic Modelling Report;
- Cost Benefit Analysis;
- Business Case; and
- Post Project Review.

1.2 Project Description

As part of Transport 21 the N4 National Primary Route from Dublin to Sligo was identified as a strategic radial corridor, which should provide a high quality link between Dublin and Sligo. As part of the N4 upgrade it is proposed to construct 11.2km of offline realignment from Doorly to Cloghoge Lower, 2.6km of online overlay improvement from the N4/N17 Toberbride roundabout to Doorly and numerous side road and existing road improvements. Overall the proposed scheme length is 14.7km along the mainline and a further 9km of links roads and 5km of local access roads. The scheme also includes an at-grade roundabout junction at Castlebaldwin and a grade separated interchange at the Ballymote Road. In order to provide access/egress from the local roads/dwellings along the online upgrade section a single carriageway parallel access road is proposed to the east of the existing N4 between Toberbride and Doorly. The access road connects to the eastern arm of the Toberbride Roundabout and the existing N4 at Doorly. Dwellings on the western side of the N4 can access the parallel road via an underpass. The scheme is referred to as the N4 Collooney to Castlebaldwin realignment and is shown in Fig 1.1 below.

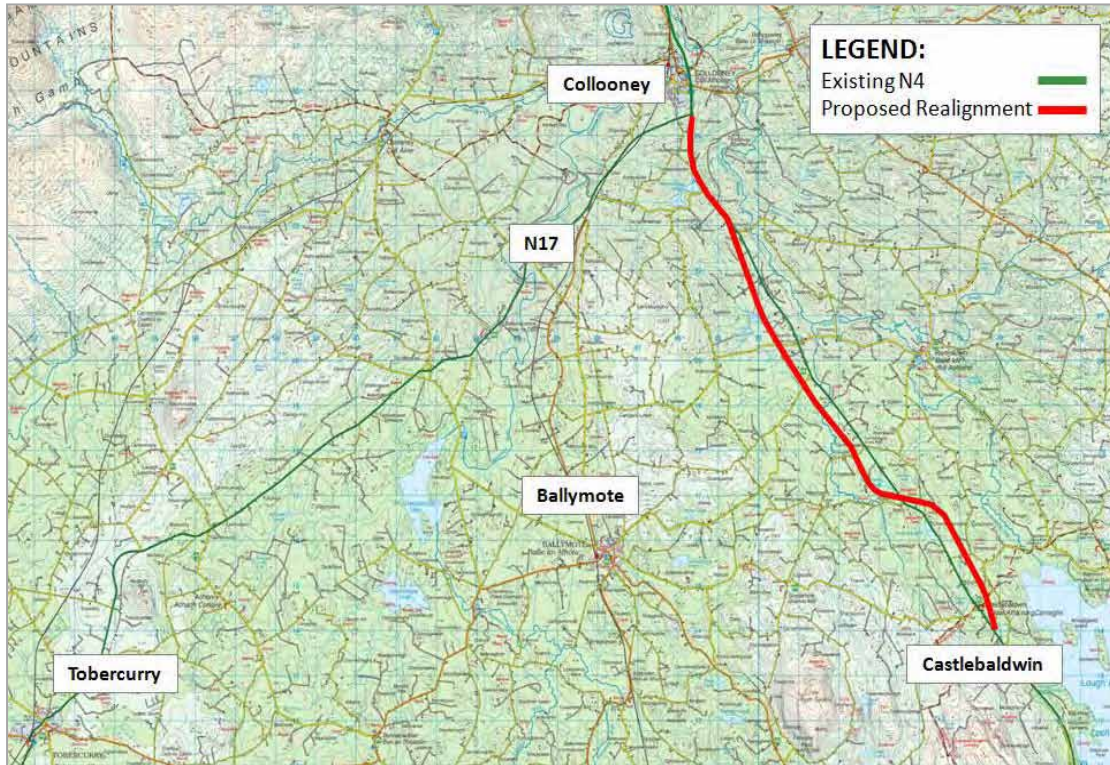
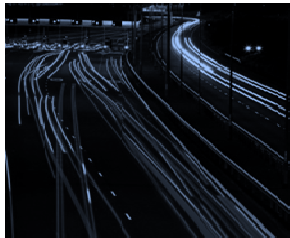
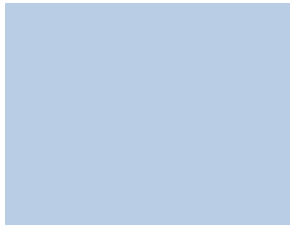


Figure 1.1 – N4 Collooney to Castlebaldwin

Chapter 2
Data Collection



2 Data Collection

2.1 Introduction

In order to develop a Traffic Model, a significant level of traffic data is required to ensure that the model can replicate existing traffic patterns and volumes. This section of the Traffic Modelling Report describes the collation of traffic data for the construction of the Base Year Traffic Model.

2.2 Traffic Surveys

A series of traffic surveys were carried out to ensure that a full understanding of the current traffic situation could be established. A summary of the traffic survey data that was collated to develop the Base Year Traffic Model is outlined in Table 2.1 below:

Table 2.1 - Summary of Survey Data

Ref.	Location	Junction Type	Survey Type	Date
J1	N17/R293	3-arm junction	MCC	25/11/08
J2	R294/N17 (Circular Rd)	3-arm junction	MCC	25/11/08
J3	N17/R294 (Teeling Street)	3-arm junction	MCC	25/11/08
J4a	Wolf Tone Square/Ballymote Road	3-arm junction	MCC	25/11/08
J4b	Teeling St./Mountain Road	3-arm junction	MCC	25/11/08
J5	R294/Wolf Tone Square	3-arm junction	MCC	25/11/08
J6	N17/Cloonacool Road	3-arm junction	MCC	25/11/08
J7	N4/Clunlurg	3-arm junction	MCC	25/11/08
J8	N4/Drumderry	3-arm junction	MCC	25/11/08
J9	R293/R296/R295	3-arm junction	MCC	25/11/08
J10	N4/Murillyroe	3-arm junction	MCC	25/11/08
ATC 1	N17 (North of Tobercurry)	2-way Link	ATC	22-29/11/08
ATC 2	N17 (Sligo)	2-way Link	ATC	22-29/11/08
ATC 3	N4 (South of Collooney)	2-way Link	ATC	22-29/11/08

Note: All MCC surveys were carried out for the AM Peak (07:00 – 10:00), Inter Peak (12:00 – 2:00) and PM Peak (16:00 – 19:00) periods.

Figures 2.1 to 2.4 below show the locations of the Manual Classified Counts (MCC) and Automatic Traffic Counts (ATC) were undertaken.

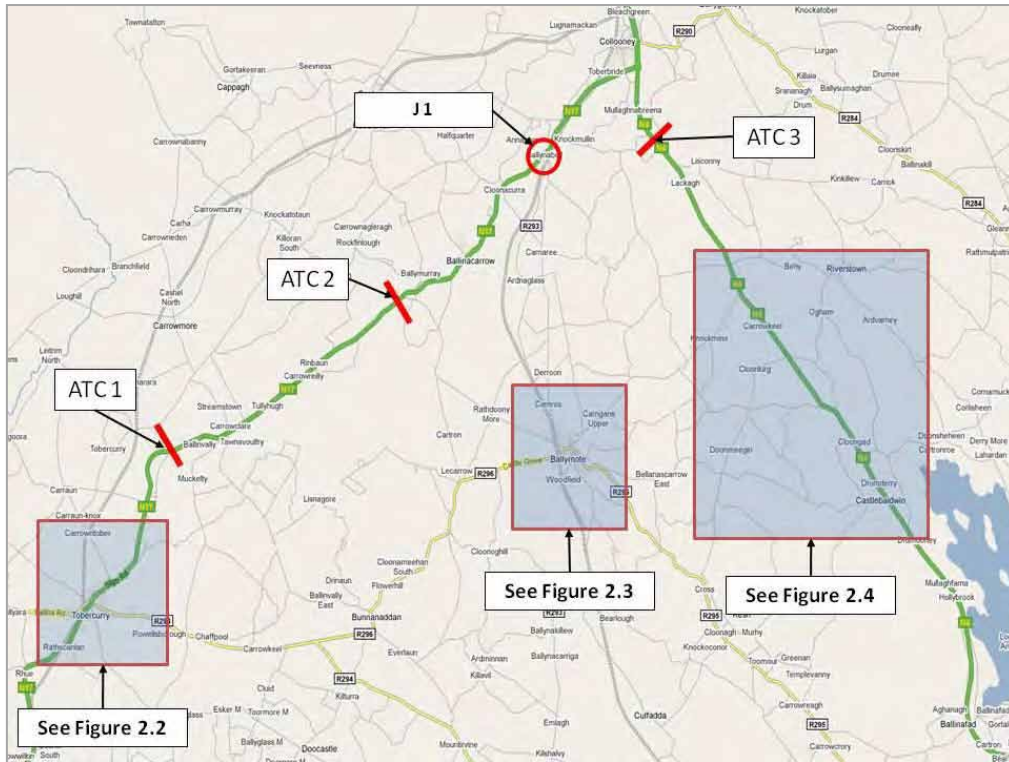


Figure 2.1 – Traffic Survey Locations

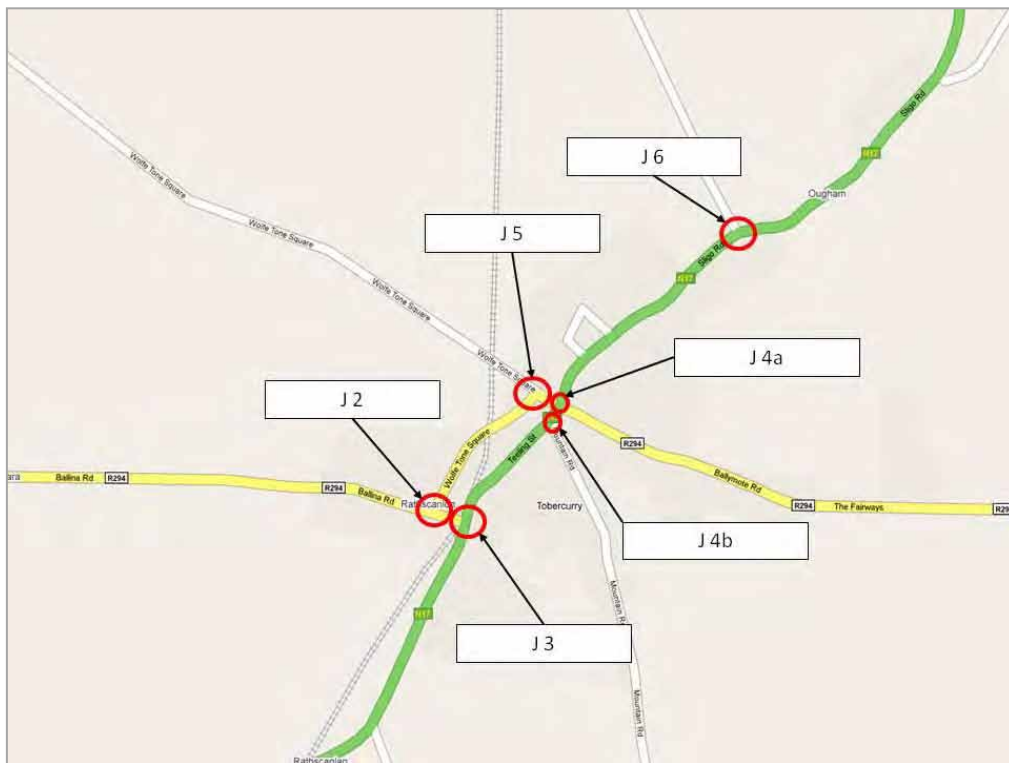


Figure 2.2 – Traffic Surveys (Tobercurry)

of a comparison undertaken to assess the changes in N4 flows between 2008 and 2012 is set out in Table 2.2 below.

Table 2.2 – Comparison of traffic flows on N4 between 2008 and 2012

Date	Location	AADT	% Diff
2008	N4 - South of Castlebaldwin	6,900	-
May 2012	Sligo County Council - Between Castlebaldwin and Boyle adjacent to NRA Site	7,108	+3%

Following on from the above assessment it was decided that the data used in the development of the 2008 models was reasonably reflective of current traffic conditions and fit for use in assessing the impact and benefits associated with the proposed scheme.

2.3 Journey Times

Journey time information is required in order to ensure that the travel time on existing roads is properly reflected within the base models, thereby ensuring that a robust assignment can be undertaken.

A number of journey time surveys were undertaken on Friday 13th February 2009. The two routes A and B are outlined below:

- Route A Northbound – N17/Ballymote Road (R294) Junction to N4/N17 Roundabout;
- Route A Southbound – N4/N17 Roundabout to N17/Ballymote Road (R294) Junction;
- Route B Northbound – N4 (Castlebaldwin) to N4/N17 Roundabout;
- Route B Southbound – N4/N17 Roundabout to N4 (Castlebaldwin);

During the project further data collection was undertaken in 2012 to ensure traffic had not altered significantly since 2008. An additional journey time route was included as part of this data collection;

- Route C Southbound – Doorly to N4 (Castlebaldwin);

Fig 2.5 below shows the journey time routes and journey time recording points. The results are outlined in Table 2.3.

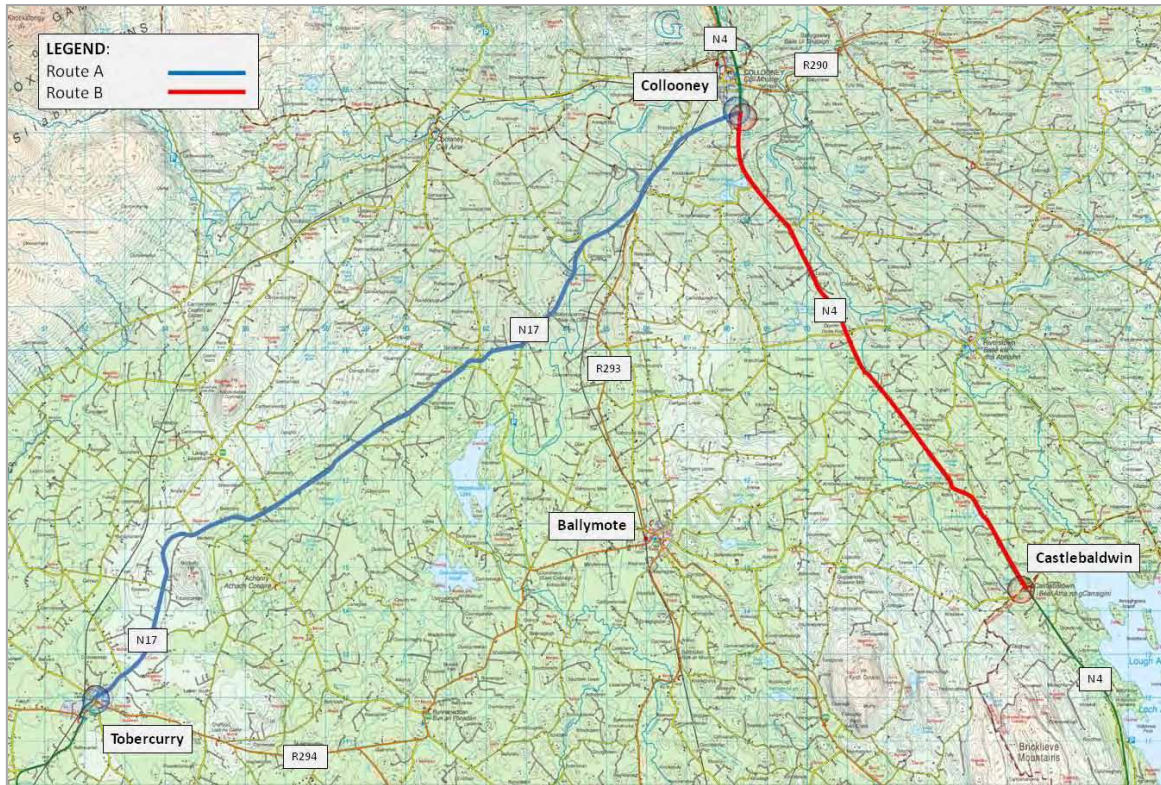


Figure 2.5 - Journey Time Routes

Table 2.3 - Journey Time Survey Results

Route	Route Description	Period	Run 1	Run 2	Run 3	Run 4	Average
			(sec)	(sec)	(sec)	(sec)	(sec)
A	Northbound	PM	1492	1577	1542	-	1537
A	Southbound	PM	1497	1621	1612	-	1577
B	Northbound	PM	937	1021	984	-	981
B	Southbound	PM	983	997	942	-	974
C	Southbound	AM	572	565	557	613	577
C	Southbound	IP	605	570	560	663	600

Chapter 3
Model Development



3 Model Development

3.1 Overview

In order to develop forecast traffic levels it is first necessary to develop a robust representation of current traffic patterns. This section of the report describes the development, calibration and validation of the 2008 Base Year Local Area Model (LAM).

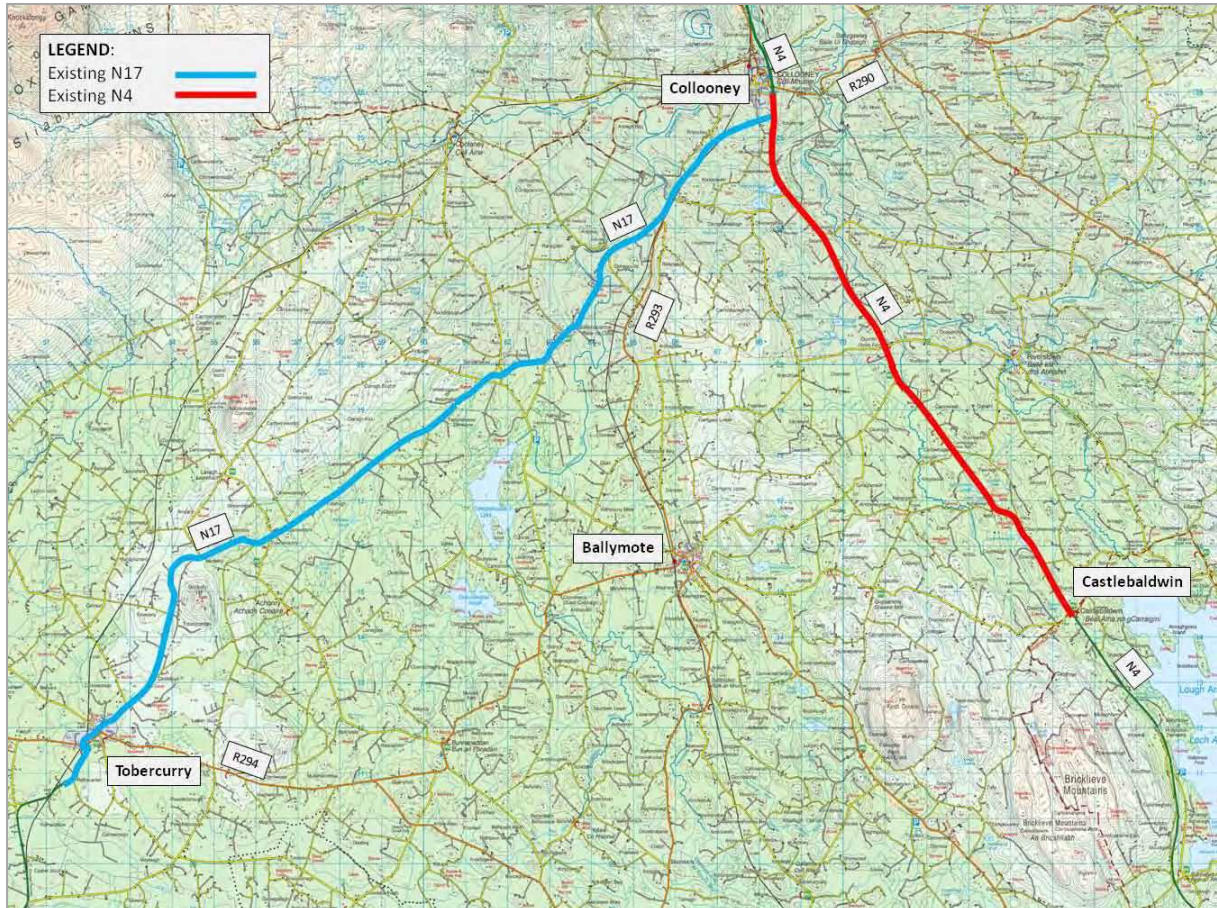


Figure 3.1 – Study Area for Traffic Model

3.2 Network Development

The 2006 NRA National Traffic Model (NTM) was used as a starting point for developing the LAM. Once the study area was identified and agreed with SCC it was 'cordoned' out of the NTM. The cordon included all roads on which traffic flows are influenced by any of the proposed N4 Collooney to Castlebaldwin road scheme. Fig 3.2 illustrates the LAM that was cordoned from the NTM.

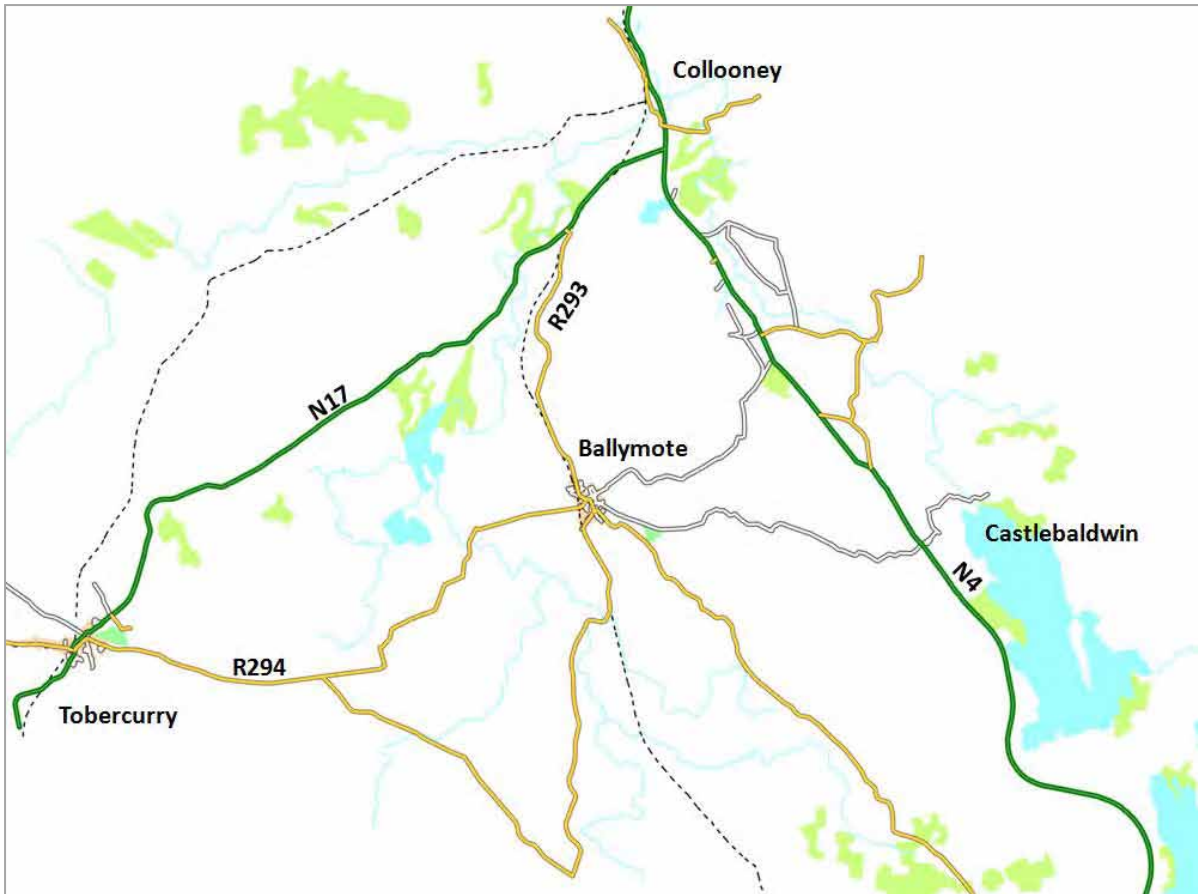


Figure 3.2 - Cordoned N4 Collooney to Castlebaldwin LAM

3.2.1 Refinement of LAM Road Network

Once the study area had been cordoned from the NTM, the road network was further refined to reflect local conditions. A number of additional links were added to the model, as follows:

- Local road (L-1502-32) connecting Ballymote to the N4 (via Carrigans Upper, Ardrea, Cloonagashel and Knockmina);
- Local road (L-1404-0) connecting Ballymote to the N4 at Castlebaldwin (via Ballinvoher and Cleavry);
- Local road (L-1404-0) connecting Drumderry at the N4 to Annaghor;
- Local road (L-1401-0) connecting Drumfin at the N4 to Riverstown;
- Local road (L-4703) connecting Cloonacool and the N17 (via Doomore, Carraun and Carrowntober); and
- Local roads in the Doorly area East of the N4.

3.2.2 Refinement of LAM Zoning System

In order to obtain suitable detail within the N4 LAM, a more detailed zoning system than used in the NTM was required. The zoning system in NTM is based on the aggregation of District of Electoral Divisions (DED's), which is suitable for most zones in the LAM apart from Collooney and Tobercurry. Fig 3.3 below shows the final zoning system for the cordoned study area.

The towns of Collooney and Tobercurry were each represented by single zones in the original NTM zone system. In order to reflect existing traffic flows and traffic patterns in these two key areas, these two zones were disaggregated as part of the model development. Collooney (zone

2000) was split into nine smaller zones and Tobercurry (zone 1000) was split into a total of twelve zones.

The zone splitting process was undertaken based on An Post geocoding information supplied by Sligo County Council. This data shows the location of postal address points and formed the basis for allocation of trip ends for larger zones into relevant subzones.

The original model cordoned from the NTM contained 18 zones, which included 8 external zones. The disaggregation of the Collooney and Tobercurry zones produces a model containing a total of 37 zones as shown below.

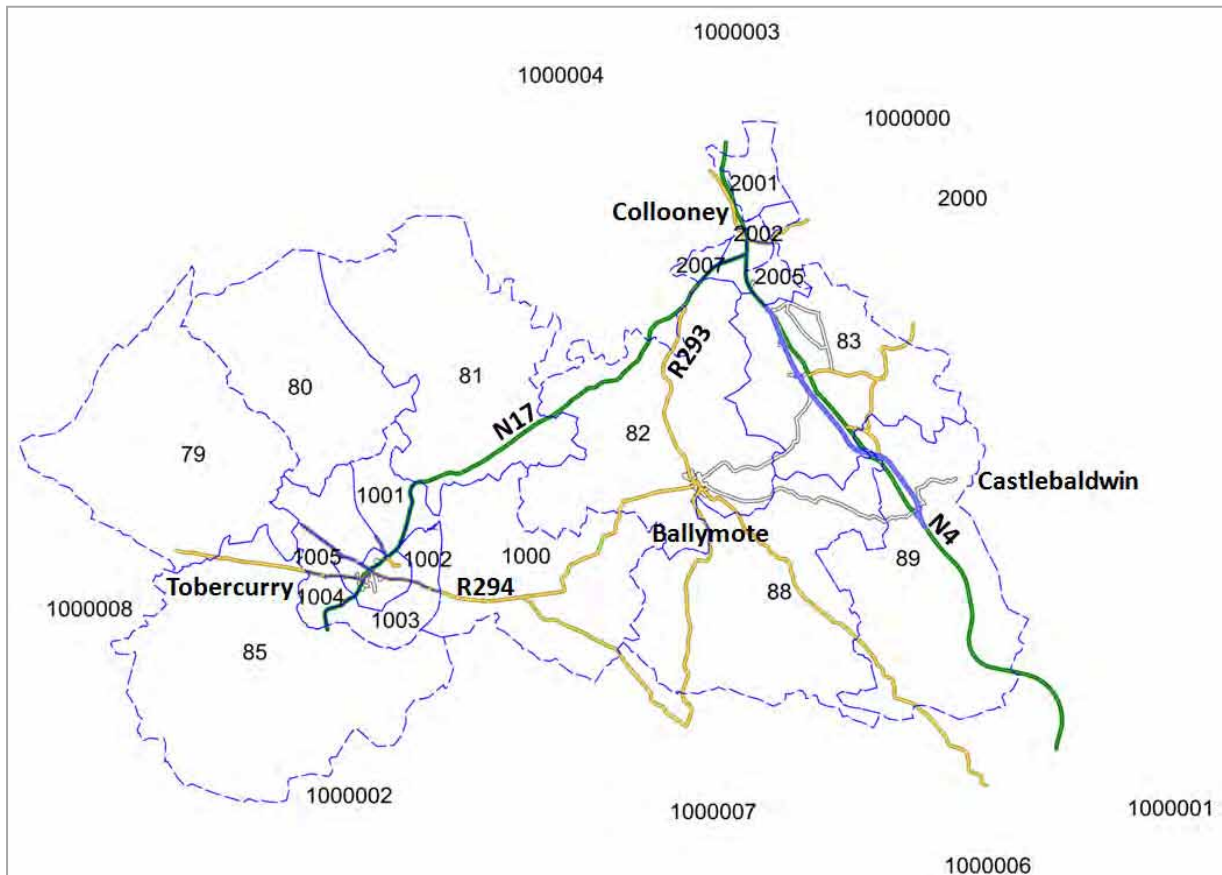


Fig 3.3 – N4 Zoning System

3.3 Matrix Development

The following time periods were required for the N4 LAM:

- Average hour in the morning peak from 07:00 – 09:00 (AM Peak Period);
- Average hour in the inter peak period from 12:00 - 14:00 (Inter Peak Period); and
- Evening Peak from 17:00 – 18:00 (PM Peak Hour)

The process of zone splitting was undertaken using VISUM, whereby origin and destination trip ends were allocated to the sub-zones whilst maintaining the equivalent distribution of the larger zones.

The AM and Inter Peak matrices were then “furnished” against the trip ends to produce the 2008 Base Year LAM AM and Inter Peak prior matrices.

As there is no PM Peak period NTM available to create a PM Peak period LAM, the PM Peak prior matrices were created by transposing the calibrated AM Peak period matrices.

3.4 Assignment Model

The assignment model applies the demand for travel, represented by the trip matrices, to the supply, in the form of the road network. The 'generalised cost' of the journey, represented by a combination of time and distance, is compared in a route choice algorithm, and a stable output produced, where, ideally, all possible routes between an origin and destination have the same 'cost'.

The 'generalised cost' is calculated using the following parameters, which reflect those in the National Traffic Model:

- *Car Generalised Cost = 0.869 * time (in seconds) + 0.0073 * length (in metres); and*
- *HGV Generalised Cost = 1 * time (in seconds)*

The Route Choice Algorithm selected is based on Equilibrium Lohse. This starts with an 'all or nothing' assignment, and assigns in an iterative fashion, with drivers consecutively including information gained during their last journey for the next route choice. The assignment terminates when a stable solution is calculated.

3.5 Model Calibration

The purpose of model calibration is to ensure that the model reflects the existing conditions on site. Calibration is an iterative process, whereby the model is continually revised to ensure that the most accurate replications of the base year conditions are represented.

Further model refinement was undertaken based on knowledge of the local area, site visits, mapping etc. The following parameters were refined as part of the calibration process to ensure the model best reflected existing conditions; junction type, no. arms at junction, no. lanes on each arm, link travel speed, link capacity, turn capacity etc. The model calibration process is outlined in Fig 3.4 below.

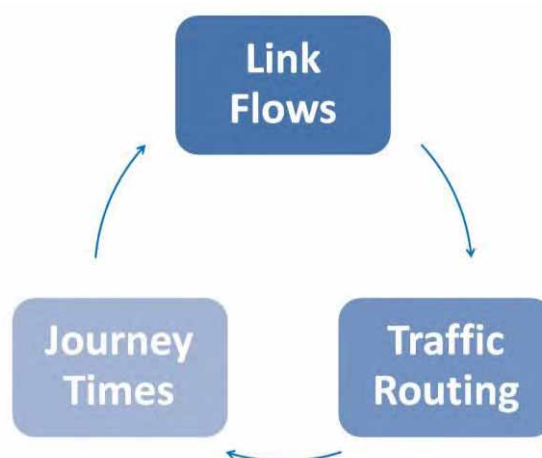


Figure 3.4 - Model Calibration Process

3.5.1 Calibration Results

The results of the calibration exercise are outlined below in Tables 3.1 and 3.2. The detailed summary tables are included in Appendix B.

Table 3.1 - Calibration Results: Individual Flows

Time Periods	% of Calibration Sites Meeting the flow criteria that: Individual Flows within 15% for flows 700 – 2700 vph Individual flows within 100 vph for flows < 700 vph Individual flows within 400 vph for flows > 2700 vph			
	Total Traffic	Lights	Heavies	Required
AM Peak	100%	100%	100%	>85%
Inter Peak	100%	100%	100%	>85%
PM Peak	100%	100%	100%	>85%

Table 3.2 - Calibration Results: GEH Values

Time Periods	% of Calibration Sites with GEH < 5			
	Total Traffic	Lights	Heavies	Required
AM peak	97%	97%	100%	>85%
Inter Peak	93%	93%	97%	>85%
PM Peak	100%	100%	96%	>85%

The comparison of modelled and observed flows has identified that the AM, Inter and PM Peak period models match the flow criteria for all user classes. Likewise, the GEH results show that the AM, Inter and PM Peak periods models also match the criteria for all user classes. The results therefore confirm that the models have been calibrated to a standard compliant with the PAG criteria for all user classes and all time periods.

3.6 Model Calibration

Model validation comprises the comparison of calibrated flows against an independent data set which was not used as part of the calibration process. Validation checks included:

- Matrix validation checks;
- Link flow validation and statistical criteria; and
- Overall model validation (e.g. journey times)

3.6.1 Validation of Traffic Flows

The observed and modelled flows were compared at each of the validation sites in accordance with the criteria above. The permissible difference was calculated for each value (based on the observed figure) and compared with that which had been modelled. Validation results are included in Appendix C and are summarised in Tables 3.3 and 3.4 below:

Table 3.3 - Validation Results: Individual Flows

Time Periods	% of Calibration Sites Meeting the flow criteria that: Individual Flows within 15% for flows 700 – 2700 vph Individual flows within 100 vph for flows < 700 vph Individual flows within 400 vph for flows > 2700 vph			
	Total Traffic	Lights	Heavies	Required
AM Peak	100%	100%	100%	>85%
Inter Peak	100%	97%	100%	>85%
PM Peak	100%	100%	100%	>85%

Table 3.4 - Validation Results: GEH Values

Time Periods	% of Calibration Sites with GEH < 5			
	Total Traffic	Lights	Heavies	Required
AM peak	94%	91%	100%	>85%
Inter Peak	91%	91%	97%	>85%
PM Peak	88%	94%	97%	>85%

The comparison against the validation counts shows that AM, Inter and PM Peak period models meet the PAG requirements for traffic flow on links. Likewise, all models meet the GEH criteria of 85%. The results therefore demonstrate that the validation criteria are successfully met.

3.6.2 Validation of Journey Times

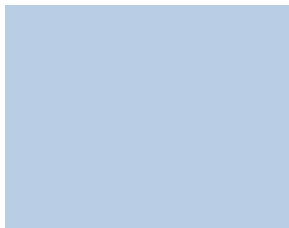
The journey time comparison is required to show that the model is reflecting base year network conditions, in terms of network speed and delay. The model is a time based assignment only; therefore the delay is generated by the speed flow relationship assumed in the model. Journey Time results are outlined in Table 3.5 below:

Table 3.5 - Modelled/Observed Journey Times

Route	Modelled Journey Time	Observed Journey Time	Ave Observed Journey	Diff	Diff	Required
	(sec)	(sec)	Time (sec)	(sec)	(%)	
A N-bound PM	1613	1492	1537	-76	-5%	±15%
		1577				
		1542				
A S-bound PM	1613	1497	1577	-36	-2%	±15%
		1621				
		1612				
B N-bound PM	961	937	981	20	2%	±15%
		1021				
		984				
B S-bound PM	962	983	974	12	1%	±15%
		997				
		942				
C S-bound AM	580	572	577	-3	-1%	±15%
		565				
		557				
		613				
C S-bound IP	584	605	600	16	3%	±15%
		570				
		560				
		663				

The results show only minimal differences between modelled and observed journey times, with no difference greater than 5%. As such the base year model is validated to the requirements of the PAG.

Chapter 4
Future Year Model Development



4 Future Year Model Development

4.1 Introduction

This section of the report sets out the development of the future year traffic models for the opening year (2017) and design year (2032).

4.2 Future Year Matrix Development

4.2.1 Overview

The development of traffic growth forecasts for the future year 2017 and 2032 Local Area Models (LAM) is based on the methodology set out in Unit 5.3 Traffic Forecasting of the National Roads Authorities' Project Appraisal Guidelines (PAG). The PAG sets out the criteria for using the Zonal Growth Rates forecasting methodology which is used for forecasting traffic growth when using Assignment Models. The forecasting process is summarised in Figure 4.1 below.

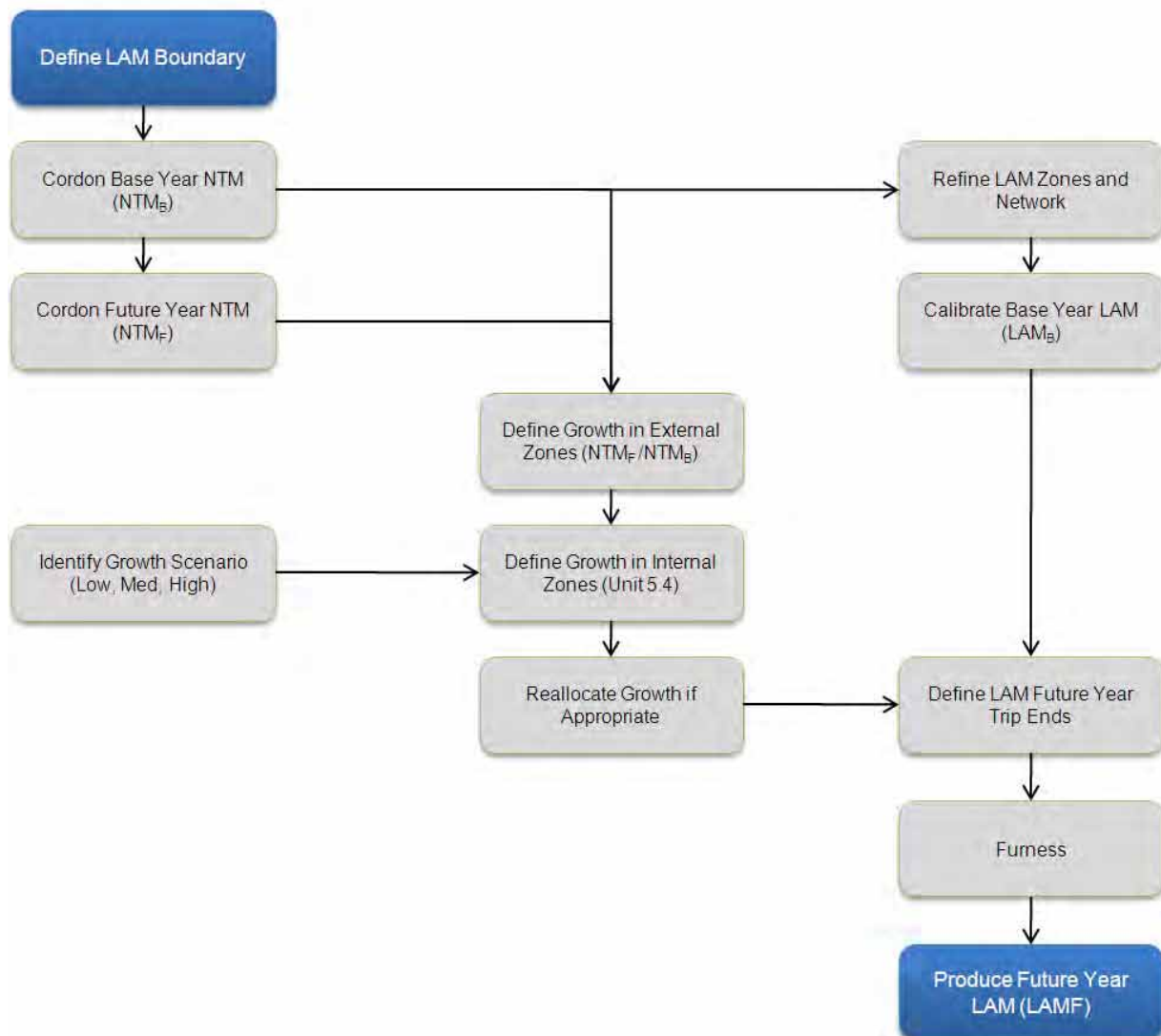


Figure 4.1 - Zonal Growth Rates Methodology

4.2.2 Internal Zone Trip End Growth

The relationship between the N4 LAM zones and the NTM zones was established, then annualised origin and destination Trip End Growth (TEG) factors for the zones in the N4 LAM were extracted from Unit 5.4 of the PAG for the AM, IP and PM Peak Periods.

TEG factors were then identified for each zone in the N4 LAM for both the scheme Opening Year (2017) and Design Year (2032). The TEG factors were then applied to the base year origin and destination trip ends for all internal zones in the LAM.

4.2.3 External Zone Trip End Growth

The LAM boundary was cordoned from the Future Year (2025) NTM and compared against the Base Year (2006) NTM which was cordoned as part of the development of the 2008 Base Year N4 LAM. The resulting growth factor for each external zone trip end was identified and annualised.

The resulting TEG factors were then applied to the base external origin and destinations trip ends in the LAM for both the scheme Opening and Design Year.

4.2.4 Future Year Trip Distribution

Future year trip distribution was undertaken utilising the furnishing distribution method. In order to carry out the trip distribution process it was first necessary to 'seed' the cells with no trips in the base year matrices with very small numbers (0.01 vehicles) to allow for future year trips between those specific cells. Otherwise any cell with a zero will remain zero irrespective of the factor applied. As part of the trip distribution process the matrix totals were doubly constrained to the mean of the forecast trip ends totals.

4.2.5 Future Demand Forecast Totals

The growth rates for the various scenarios are outlined in Table 4.1 below.

Table 4.1 – Growth Rate used for Future Model Development

Year		Low Growth		Medium Growth		High Growth	
		HGV	Cars	HGV	Cars	HGV	Cars
2008 – 2017	AM	107%	113%	109%	116%	117%	126%
	IP	102%	108%	103%	110%	106%	119%
	PM	107%	110%	108%	112%	115%	119%
2008 – 2032	AM	114%	136%	118%	142%	139%	167%
	IP	105%	119%	106%	123%	115%	148%
	PM	114%	131%	118%	136%	138%	156%

The resulting 2017 and 2032 matrices are based on National Road Authority (NRA) growth rates as outlined above. Table 4.2 below outlines the matrix totals.

Table 4.2 - Trip Matrix Total Comparison

Matrix	2008	2017			2032		
		Low Growth	Medium Growth	High Growth	Low Growth	Medium Growth	High Growth
AM Peak Car	2883	3270	3340	3619	3917	4087	4802
AM Peak HGV	236	252	257	275	270	279	328
Inter Peak Car	2504	2715	2762	2987	2975	3083	3698
Inter Peak HGV	170	174	175	180	178	181	196
PM Peak Car	4217	4653	4732	5023	5529	5738	6578
PM Peak HGV	165	176	178	190	188	194	227

4.3 Future Year Network Development

4.3.1 Do Minimum Road Network

The future year 'Do-Minimum' network includes the 2008 existing road network with no further road infrastructure improvements.

4.3.2 Do Something Road Network

The future year 'Do-Something' network includes all the assumptions of the 'Do-Minimum' network plus the N4 Collooney to Castlebaldwin realignment. The N4 Collooney to Castlebaldwin realignment major scheme alternative was developed as an offline Type 2 Dual Carriageway from Collooney to Castlebaldwin. The proposed scheme comprises 11.2km of offline realignment from Doorly to Cloghoge Lower, 2.6km of online overlay improvement from the N4/N17 Toberbride roundabout to Doorly and numerous side road and existing road improvements resulting in a total scheme length of 14.7km along the mainline and a further 9km of links roads and 5km of local access roads. The scheme also includes an at-grade roundabout junction at Castlebaldwin and a grade separated interchange at the Ballymote Road.

4.4 Estimation of Annual Average Daily Traffic (AADT)

As part of the development of the traffic models an exercise was undertaken to develop conversion rates which would allow extrapolation of modelled flows to Annual Average Daily Traffic (AADT) values. A relationship was developed based on regression analysis of local traffic data as set out below and based on the methodology outlined in PAG Unit 16.1.

- ATC Counter - N17 (North of Tobercurry) – Undertaken over 8 days in November 2008
- ATC Counter - N17 (Sligo) – Undertaken over 8 days in December 2008
- ATC Counter - N4 (South of Collooney) – Undertaken over 8 days in November 2008

The regression analysis was based on weekday data and resulted in the following peak hour to average 5-day daily traffic (weekday) formula. The analysis showed that the most accurate method of converting modelled flows to AADT was to use the AM and IP peak flows only.

$$(8.6965 * x) + (7.2372 * y) = \text{Ave 5-Day Daily Traffic}$$

Where,

x = AM Peak Period Flow

y = Inter Peak Period Flow

Table 4.3 below shows a comparison between actual and predicted AADT which shows the “fit” of the formula against surveyed AADT.

Table 4.3 – Regression Analysis Check

Location	AM Peak	Inter peak	Ave 5-day from Surveys	Ave 5-day using formula	% Difference
	2-Way Flow				
N17 (North of Tobercurry)	471	402	6966	6997	0.5%
N17 (Sligo)	510	495	7993	8010	0.2%
N4 (South of Collooney)	647	580	9852	9816	-0.4%

In order to convert the above average 5-day daily traffic formula (weekday only) into a 7-day AADT formula a factor was calculated based on the ATC counters as outlined below.

Table 4.4 – Average 5-day daily traffic to AADT factor

Location	Ave 5-Day Daily Flow Average	AADT Average	Factor
N17 (North of Tobercurry)	6966	6624	
N17 (Sligo)	7993	7443	
N4 (South of Collooney)	9852	9236	
TOTAL	8270	7768	

In addition to this a seasonality factor was calculated to ensure that ATC’s undertaken in Nov/Dec were reflective of average yearly conditions. The NRA Fixed traffic counter on the N4 at Dromod was utilised to calculate a factor to convert Nov/Dec traffic flows into average annual flows. In order to ensure consistency with previous calculations and remove any bias a factor was calculated based on the three ATC locations.

Table 4.5 – Annual Seasonality Factor

Time of Year	NRA Counter Average Monthly AADT	NRA Counter Average Yearly AADT	Factor
November	6559	6957	
December	4757	6957	
November	6559	6957	
TOTAL	17875	20870	

As outlined above these factors were calculated to be 0.94 and 1.17 respectively. When these factors are taken into account the final AADT formula is as follows.

$(9.536 * x) + (7.936 * y) = AADT$ <p>Where,</p> <p>$x = AM\ Peak\ Period\ Flow$</p> <p>$y = Inter\ Peak\ Period\ Flow$</p>

4.5 Incremental Analysis

An incremental assessment of the junction and carriageway type was undertaken as part of the scheme development. This assessment is set out in detail in Appendix A.

4.6 Results

Figure 4.2 highlights the local road network and locations where AADT is reported for each scenario. Results for each of the scenarios as set out below, for low, medium and high growth, are outlined in Tables 4.6 – 4.8.

- 2017 Do-Minimum Type 2 Dual Carriageway;
- 2017 Do-Something Type 2 Dual Carriageway;
- 2032 Do- Minimum Type 2 Dual Carriageway;
- 2032 Do-Something Type 2 Dual Carriageway.

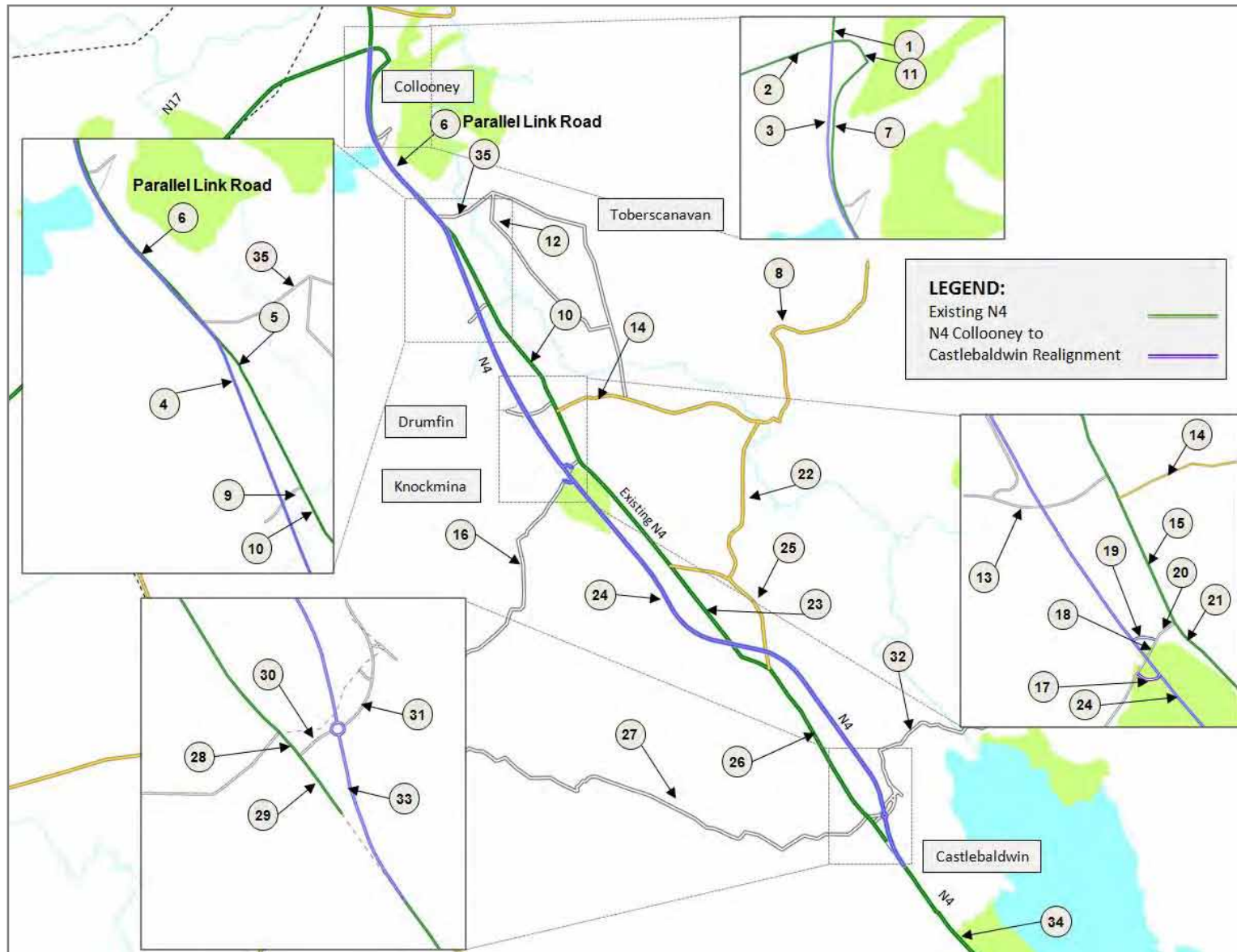


Figure 4.2 - N4 Collooney to Castlebaldwin Road Network and AADT Locations

Table 4.6 – Forecast AADT Values – Dual c/w - Low Growth

Link No.	2008 Base	AADT 2017		AADT 2032	
		Do-Min	Do-Smth Dual	Do-Min	Do-Smth Dual
1	24,000	25,900	25,900	29,100	29,100
2	14,200	15,500	15,500	17,400	17,400
3	10,400	11,200	8,200	12,600	9,100
4	-	-	8,200	-	9,100
5	9,600	10,200	2,100	11,500	2,400
6	-	-	2,600	-	2,900
7	-	-	3,100	-	3,500
8	1,600	1,900	1,900	2,300	2,300
9	500	500	500	600	600
10	9,300	10,000	1,900	11,300	2,200
11	-	-	3,100	-	3,500
12	200	200	200	300	300
13	400	500	500	600	600
14	1,600	1,800	1,800	2,100	2,200
15	8,600	9,300	1,100	10,500	1,400
16	1,200	1,300	1,600	1,600	2,000
17	-	-	700	-	800
18	1,300	1,500	1,400	1,900	1,700
19	-	-	400	-	500
20	1,300	1,500	1,500	1,900	1,800
21	7,600	8,100	400	9,100	500
22	200	200	200	200	200
23	7,300	7,800	100	8,700	100
24	-	-	8,100	-	9,100
25	200	200	200	200	200
26	7,500	8,000	200	8,900	200
27	700	800	500	1,000	700
28	7,600	8,200	900	9,200	1,100
29	7,600	8,200	200	9,200	200
30	-	-	1,000	-	1,200
31	-	-	600	-	700
32*	800	800	600	1,000	700
33	-	-	8,100	-	9,100
34	6,900	7,300	7,300	8,100	8,100
35	600	700	700	800	800

Table 4.7 – Forecast AADT Values – Dual c/w - Medium Growth

Link No.	2008 Base	AADT 2017		AADT 2032	
		Do-Min	Do-Smth Dual	Do-Min	Do-Smth Dual
1	24,000	26,300	26,300	30,100	30,100
2	14,200	15,800	15,800	18,000	18,100
3	10,400	11,400	8,300	13,000	9,400
4	-	-	8,300	-	9,400
5	9,600	10,400	2,200	11,800	2,500
6	-	-	2,600	-	3,100
7	-	-	3,100	-	3,700
8	1,600	2,000	2,000	2,400	2,400
9	500	500	500	600	600
10	9,300	10,200	2,000	11,600	2,300
11	-	-	3,100	-	3,700
12	200	200	200	300	300
13	400	500	500	600	600
14	1,600	1,900	1,900	2,200	2,300
15	8,600	9,500	1,100	10,900	1,400
16	1,200	1,300	1,600	1,700	2,100
17	-	-	700	-	800
18	1,300	1,600	1,400	2,000	1,800
19	-	-	400	-	500
20	1,300	1,600	1,500	2,000	1,900
21	7,600	8,300	400	9,400	500
22	200	200	200	300	200
23	7,300	7,900	100	9,000	100
24	-	-	8,200	-	9,300
25	200	200	200	300	200
26	7,500	8,100	200	9,200	200
27	700	800	500	1,100	700
28	7,600	8,300	900	9,500	1,200
29	7,600	8,300	200	9,500	200
30	-	-	1,000	-	1,200
31	-	-	600	-	800
32*	800	800	600	1,000	800
33	-	-	8,200	-	9,400
34	6,900	7,400	7,400	8,400	8,400
35	600	700	700	800	800

Table 4.8 – Forecast AADT Values – Dual c/w - High Growth

Link No.	2008 Base	AADT 2017		AADT 2032	
		Do-Min	Do-Smth Dual	Do-Min	Do-Smth Dual
1	24,000	28,300	28,300	35,300	35,300
2	14,200	17,000	17,100	21,300	21,400
3	10,400	12,200	8,900	15,100	10,800
4	-	-	8,900	-	10,800
5	9,600	11,100	2,400	13,700	3,000
6	-	-	2,800	-	3,600
7	-	-	3,400	-	4,300
8	1,600	2,100	2,100	2,800	2,800
9	500	600	600	700	700
10	9,300	10,900	2,100	13,400	2,700
11	-	-	3,400	-	4,300
12	200	200	200	300	300
13	400	500	500	700	700
14	1,600	2,000	2,000	2,600	2,700
15	8,600	10,100	1,200	12,600	1,700
16	1,200	1,500	1,800	2,100	2,400
17	-	-	700	-	900
18	1,300	1,700	1,600	2,300	2,100
19	-	-	500	-	600
20	1,300	1,700	1,600	2,300	2,200
21	7,600	8,800	500	10,800	600
22	200	200	200	300	300
23	7,300	8,400	100	10,300	100
24	-	-	8,800	-	10,700
25	200	200	200	300	300
26	7,500	8,600	200	10,600	300
27	700	900	600	1,300	900
28	7,600	8,800	1,000	10,900	1,400
29	7,600	8,800	200	10,900	300
30	-	-	1,100	-	1,500
31	-	-	700	-	900
32*	800	900	700	1,200	900
33	-	-	8,800	-	10,900
34	6,900	7,900	7,900	9,700	9,700
35	600	800	800	1,000	1,000

4.7 Network Statistics

Network statistics were extracted from the traffic models for each of the growth scenarios and a comparison was made against the Do-Minimum Option. The key network statistics comprise the following:

- Total Network Travel Time (hrs) for all vehicles;
- Total Network Delay (hrs) for all vehicles; and
- Average Vehicle Speed (km/hr).

Table 4.9 outlines the key network statistics for High Growth for the All Day Period:

Table 4.9 - Network Statistics – Daily – High Growth – Dual c/w

VISUM Modelling Network Statistic	Total Network Trips (veh/hr)	Total Vehicle km	Total Network Travel Time (hrs)	Average Vehicle Speed (km/hr)
2017 Do-Minimum	62,271	1,277,316	23,334	54.7
2017 Do-Something	62,271	1,282,798	23,001	55.8
2032 Do- Minimum	79,831	1,609,137	29,834	53.9
2032 Do-Something	79,831	1,616,121	29,398	55.0

Table 4.10 outlines the key network statistics for Medium Growth for the All Day Period:

Table 4.10 - Network Statistics – Daily – Medium Growth – Dual c/w

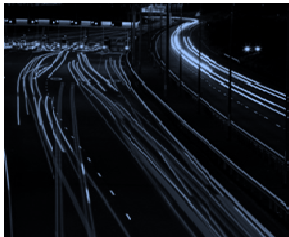
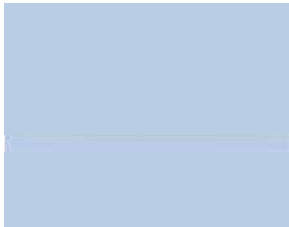
VISUM Modelling Network Statistic	Total Network Trips (veh)	Total Vehicle km	Total Network Travel Time (hrs)	Average Vehicle Speed (km/hr)
2017 Do-Minimum	57,611	1,184,017	21,538	55.0
2017 Do-Something	57,611	1,189,130	21,231	56.0
2032 Do- Minimum	67,537	1,365,765	25,007	54.6
2032 Do-Something	67,537	1,371,767	24,646	55.7

Table 4.11 outlines the key network statistics for Low Growth for the All Day Period:

Table 4.11 - Network Statistics – Daily – Low Growth – Dual c/w

VISUM Modelling Network Statistic	Total Network Trips (veh/hr)	Total Vehicle km	Total Network Travel Time (hrs)	Average Vehicle Speed (km/hr)
2017 Do-Minimum	56,514	1,162,513	21,140	55.0
2017 Do-Something	56,514	1,167,533	20,838	56.0
2032 Do- Minimum	64,954	1,315,341	24,057	54.7
2032 Do-Something	64,954	1,321,149	23,711	55.7

Appendices



Traffic Modelling Report

Appendix A
Incremental Analysis



Incremental Analysis – Junction at Ballymote

A.1.1 Traffic Impact

This section sets out the findings of an impact assessment of the inclusion of the Ballymote Junction on the proposed N4 upgrade between Collooney and Castlebaldwin. Testing has been undertaken using Medium Growth forecasts for the opening year and utilising the previous scheme design which included a roundabout on the N4 at Doorly and with local access allowed along the online retrofit section. Figure A.1 and Table A.1 present the impact on local traffic flows.

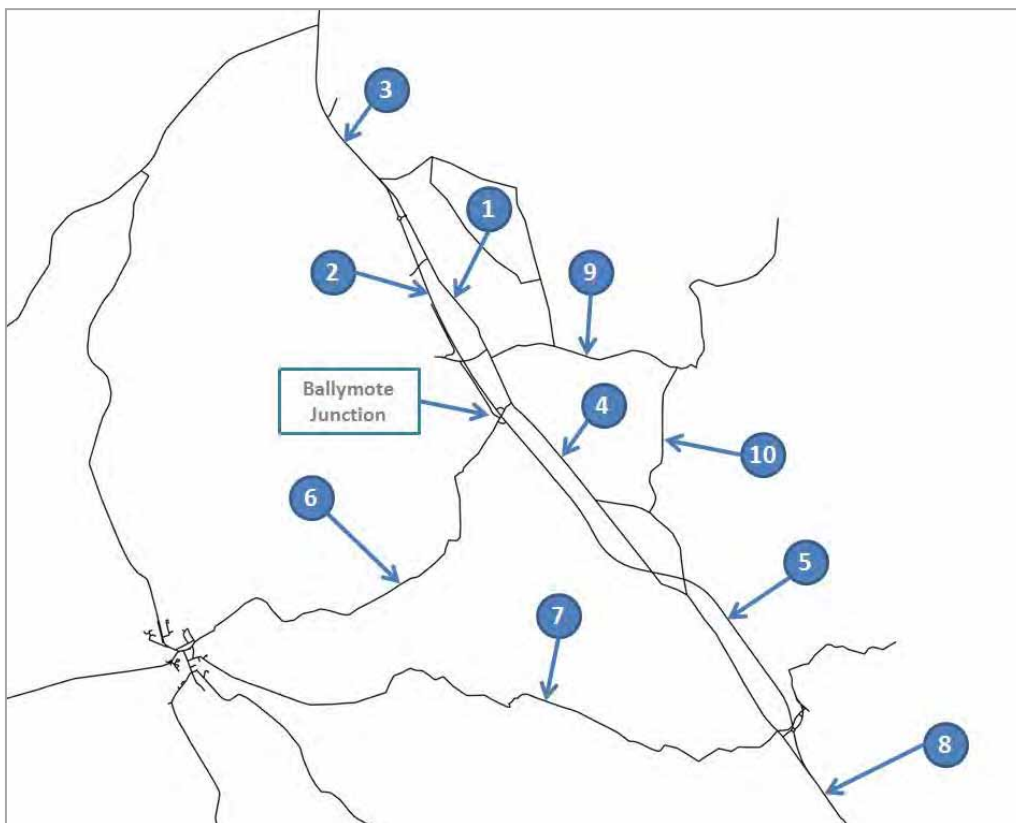


Figure A.1 – Link No's adjacent to Ballymote Junction

As presented in Table A.1 below the introduction of a junction at Ballymote leads to a decrease on the existing N4 as traffic from the Riverstown/Drumfin/Ballymote areas are provided with a more direct access to the proposed N4. The proposed scheme experiences a significant increase in traffic with traffic volumes on the northern and southern sections of the proposed scheme increasing by 6% and 4% respectively. Traffic also transfers from Link 7 to Link 6 when accessing the proposed scheme.

Table A.1 – Impact of Ballymote Junction on flows for Opening Year Medium Growth

Link No.	Dual Carriageway without interchange			AADT	Dual Carriageway with interchange			AADT	AADT Difference	AADT % Difference
	AM Peak	Inter Peak	PM Peak		AM Peak	Inter Peak	PM Peak			
1	135	126	105	2,289	116	100	90	1,900	-390	-17%
2	481	390	665	7,684	502	420	684	8,120	+436	6%
3	664	536	800	10,581	661	532	795	10,525	-56	-1%
4	9	2	10	100	1	0	1	10	-91	-90%
5	481	390	665	7,684	493	418	706	8,018	+334	4%
6	39	116	47	1,291	46	147	82	1,605	+314	24%
7	26	59	47	713	21	33	15	462	-251	-35%
8	441	383	593	7,245	441	383	593	7,245	0	0%
9	94	112	79	1,785	96	112	81	1,804	+19	1%
10	13	3	14	148	12	3	14	138	-10	-6%

Figure A.2 graphically presents the impact of the Ballymote junction as per Table A.1. The impact is presented for the AM, IP and PM peak periods. The green bands represent an increase in traffic as a result of the Ballymote junction whilst red represents a decrease.

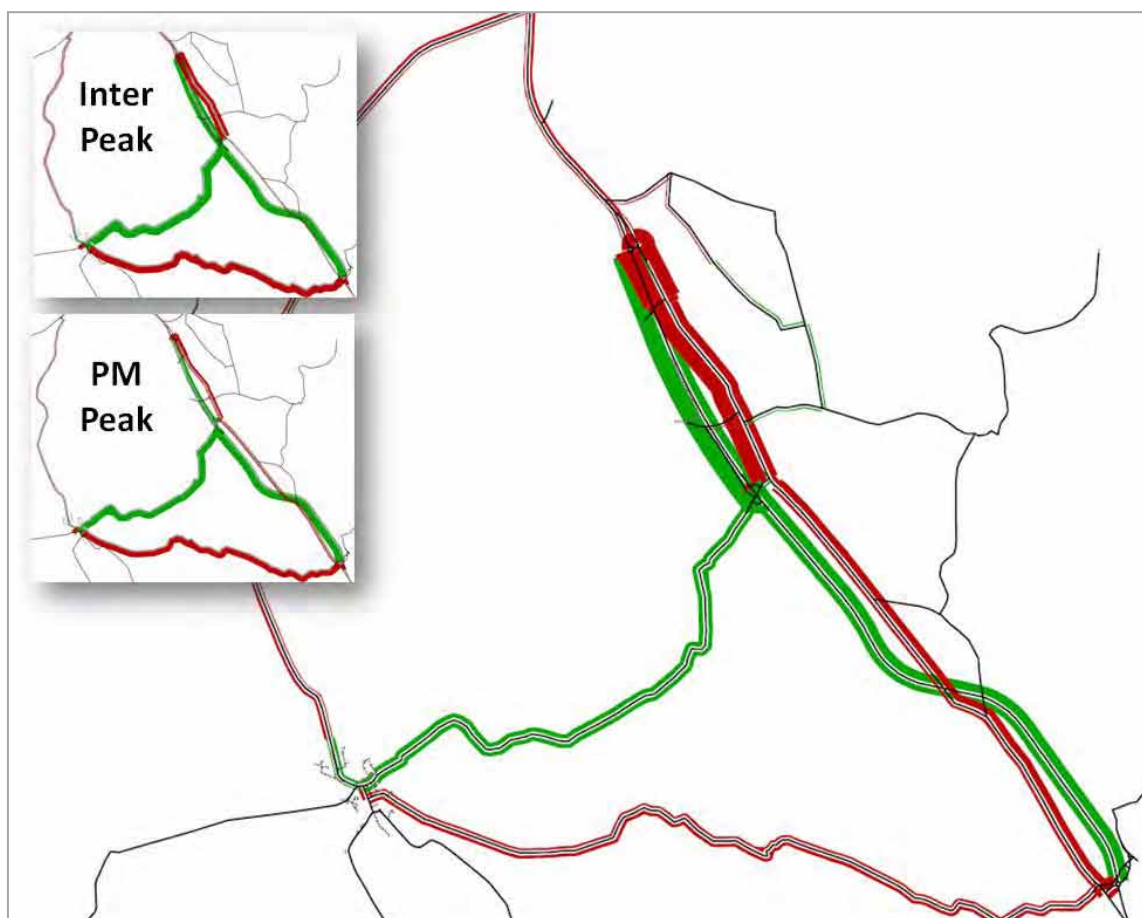


Figure A.2 – Impact of Ballymote Junction (AM)

A.1.2 Scheme Benefits

The impact of the junction on overall travel time and distance travelling is outlined in Table A.2.

Table A.2 – Network Performance Indicators (Ave Day)

Scenario	Total Travel Time (hrs)	Total Travel Distance (km)
Without interchange	20,761	1,159,107
With interchange	20,748	1,159,429
Impact	-13	+322

The results suggest that whilst the distance travelled may increase slightly as a result of the Ballymote junction the total travel time will also reduce slightly suggesting users are availing of higher speed routes. The impact of the inclusion of the junction in terms of travel time savings is outlined below based on an average Value of Time of €19.25 based on the NRA PAG.

Table A.3 – Impact of Ballymote Junction on travel time savings (Ave Day)

Performance Indicator	Difference in daily travel time savings (hrs)	Difference in annual travel time savings (hrs)	Difference in annual travel time savings (€)	Discounted 30 year travel time savings (€)
Travel Time Benefits	13	3,250	€62,563	€1,801,262

A.1.3 Scheme Costs

The cost of the Ballymote Grade Separated junction is estimated to be in the region of €300,000 which accounts for providing links from the N4 mainline to local road.

A.1.4 Scheme Appraisal

An initial appraisal was undertaken based on the above outputs as presented below.

Table A.4 - Cost Benefit Assessment

Parameter	Value
Present Value of Benefits (PVB)	€1,801,262
Present Value of Costs (PVC)	€300,000
Net Present Value (NPV)	€1,501,262
Benefit to Cost Ratio (BCR)	6.0

Whilst it is envisaged there will be disbenefits due to increased accidents and fuel usage, based on the initial calculations above the data suggests that the inclusion of the junction will not have a negative impact on the scheme in terms of cost benefit analysis.

In terms of junction type, a further scenario was tested to assess the impact of constructing a roundabout in place of the grade separated junction. The analysis found that the impact on traffic flows would be minimal. There would however be some safety impacts, as a grade separated junction with left in/left out accesses would provide a safer layout than a roundabout. In addition, journey times for mainline N4 traffic would increase.

Incremental Analysis - Road Type

B.2.1 Overview

This section of the report sets out the incremental analysis undertaken to assess the most suitable road type for the proposed N4 Collooney to Castlebaldwin scheme in particular the Castlebaldwin and Doorly section and the Doorly to Toberbride section. This analysis was supported by the traffic models developed as part of this project.

The National Roads Authority (NRA) TD9 states that a Type 3 Single Carriageway road (as per existing N4) will operate at LOS D up to an AADT of 5,000. The NRA Project Appraisal Guidelines (PAG Unit 4: Definition of Alternatives) suggests that the AADT flow outlined in NRA TD9 should only be treated as a guideline and not as a definitive means in the selection of carriageway type. During the course of the planning of the N4 scheme two road types were considered, Type 1 Single Carriageway and Type 2 Dual Carriageway the characteristics of which are outlined in Table B.1.

Table B.1 – Road Type Characteristics from NRA TD9

Type of Road	Capacity (AADT) for Level of Service D	Edge Treatment	Access Treatment	Junction Treatment at Minor Road	Junction Treatment at Major Road
Type 1 Single Carriageway (S2) (7.3m)	11,600	2.5m hard shoulders Footways/Cycle Tracks where required	Minimise number of accesses to avoid standing vehicles and concentrate turning movements.	Priority junctions, with ghost islands where necessary.	Ghost islands or roundabouts
Type 2 Dual 4. Divided 2 +2 Lanes (2x7.0m) Carriageways.	20,000	0.5m hard strips	No gaps in the central reserve. Left in / Left out	No gaps in the central reserve. Left in / Left out	At-grade roundabouts and compact grade separation

B.2.2 Safety Impact

The accident rates associated with both carriageway types was formulated by calculating the million vehicle kilometres (mvkm) on the carriageway based on the traffic flow and length of the road as set out in Unit 6.11 of the PAG. The accident rate was then proportioned into fatal, serious and minor rates for both accidents and casualties per accident. These rates were applied to the costs associated with accident and casualties to find the total cost.

The road type will have a significant impact on safety for road users. The below tables have been extracted from the NRA Project Appraisal Guidelines Unit 6.11. Historical data has shown that Dual Carriageways result in accident rates 50% lower than for Single Carriageways, in addition

the average number of casualties per accident are significant lower for Dual Carriageways than for Single Carriageways

Table B.2 - Accident Rates by Road Type

Road Type	Accident rate PIA/mvkm
Speed Limit	> 60 kph
	PIA/mvkm
2 Lane Single Carriageway	0.111
Dual Carriageway	0.056

**Extracted from Unit 6.11 of NRA's PAG*

Table B.3 – PAG Unit 6.11 - Average Number of Casualties per Accident

Road type	Casualties per PIA		
	> 60 kph		
Speed Limit	Fatal	Serious	Minor
2 Lane single carriageway	0.106	0.219	1.295
Dual Carriageway	0.075	0.104	1.202

The number of accidents and accident types were calculated based on a 2017 Medium Growth AADT flow on the online section of 11,300 veh's. Costs of accidents and casualties were extracted from Unit 6.11 of NRA's PAG and we used to calculate the accident costs associated with the Single Carriageway option for 2017.

Table B.4 - Two Lane Single Carriageway Costs

Accident Type	Fatal	Serious	Minor	Total
Cost per Accident	€469	€234	€847	€1,550
Cost per Casualty	€190,107	€44,132	€20,124	€254,363

The accident rate associated with the Dual Carriageway option were formulated using the same methodology as set out above. The results obtained are outlined in Table B.5 below.

Table B.5 - Dual Carriageway Accident Costs

Accident Type	Fatal	Serious	Minor	Total
Cost per Accident	€173	€74	€470	€717
Cost per Casualty	€67,861	€10,573	€9,424	€87,858

Overall the analysis shows that the inclusion of a Dual Carriageway in place of a Single Carriageway together with the inclusion of a parallel link road and access closures on the N4, would result in significant accident benefits. In addition, users would experience significant travel time savings as a result of increased capacity and reduced travel times.

The main objective of this project is to *“to improve safety along this section of the N4 and reduce the number of fatalities on both the N4 and the existing road network”*, therefore the potential safety of the road type is an important factor in the selection of the road type.

B.2.3 Traffic Impact

The road types were assessed for the current, opening and design years assuming high growth forecasts using the model described in Section A.1.1 above. Figure B.1 highlights the local road network and locations where AADT is reported for each scenario. Results for each of the road types as set out in Table B.1 are presented in Tables B.6 – B.7.

Figure B.1 - N4 Collooney to Castlebaldwin Road Network and AADT Locations

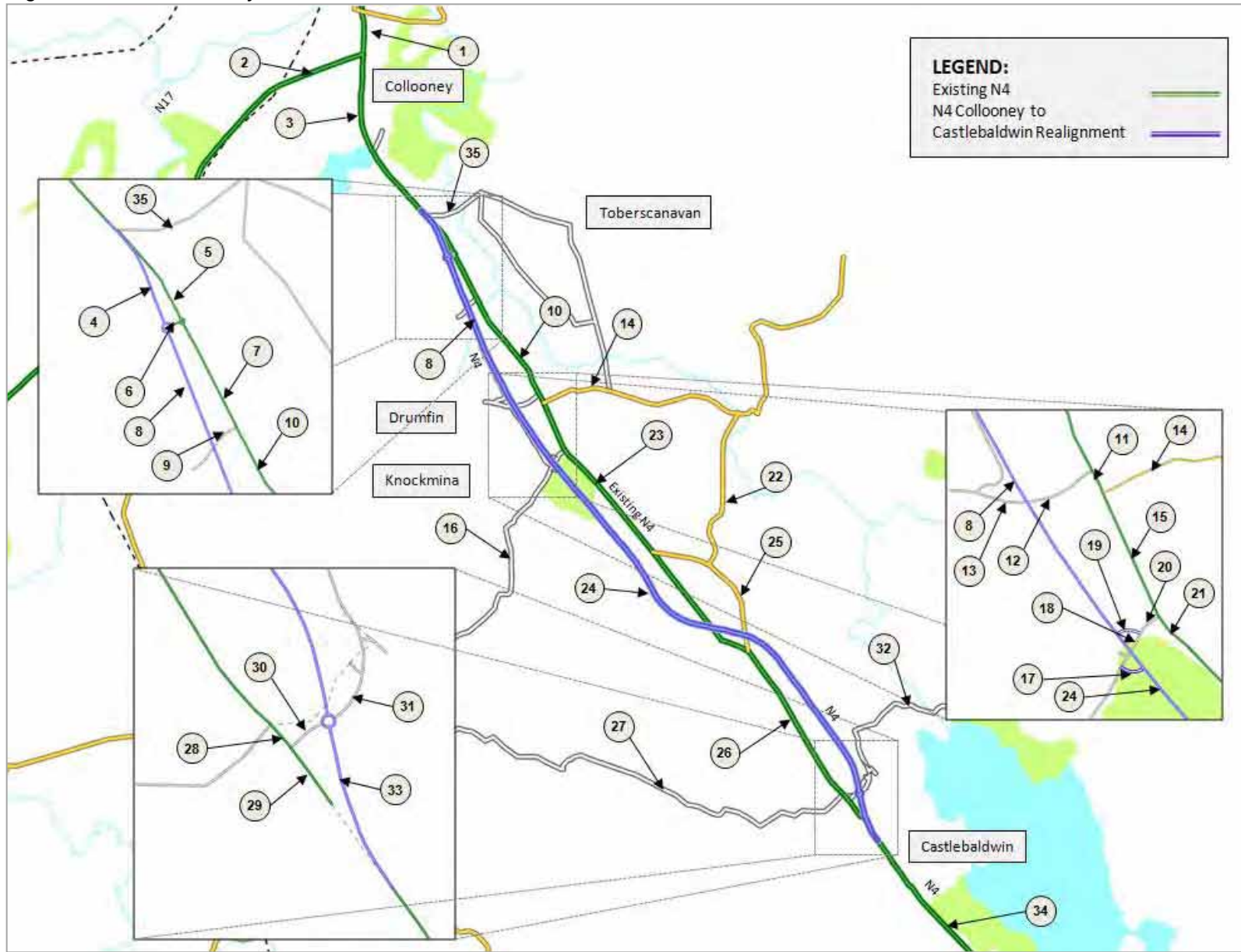


Table B.6 – AADT – Single c/w - High Growth

Link No.	2008 Base	AADT 2017		AADT 2032	
		Do-Min	Do-Smth Dual	Do-Min	Do-Smth Dual
1	24,000	28,300	28,300	35,300	35,300
2	14,200	17,000	17,000	21,300	21,300
3	10,400	12,200	12,100	15,100	15,000
4	-	-	11,500	-	14,200
5	9,600	11,100	700	13,700	900
6	-	-	3,100	-	3,900
7	9,600	11,100	2,400	13,700	3,000
8	-	-	8,900	-	10,900
9	500	600	600	700	700
10	9,300	10,900	2,200	13,400	2,800
11	9,200	10,800	1,900	13,300	2,400
12	400	500	400	700	500
13	400	500	500	700	700
14	1,600	2,000	2,100	2,600	2,700
15	8,600	10,100	1,300	12,600	1,800
16	1,200	1,500	1,900	2,100	2,600
17	-	-	700	-	900
18	1,300	1,700	1,400	2,300	1,900
19	-	-	400	-	600
20	1,300	1,700	1,400	2,300	1,900
21	7,600	8,800	500	10,800	600
22	200	200	200	300	300
23	7,300	8,400	100	10,300	100
24	-	-	8,800	-	10,700
25	200	200	200	300	300
26	7,500	8,600	200	10,600	300
27	700	900	600	1,300	900
28	7,600	8,800	1,000	10,900	1,400
29	7,600	8,800	200	10,900	300
30	-	-	1,100	-	1,500
31	-	-	700	-	900
32	800	900	900	1,200	1,200
33	-	-	8,800	-	10,900
34	6,900	7,900	7,900	9,700	9,700
35	600	800	700	1,000	900

Table B.7 – AADT – Dual c/w - High Growth

Link No.	2008 Base	AADT 2017		AADT 2032	
		Do-Min	Do-Smth Single	Do-Min	Do-Smth Single
1	24,000	28,300	28,300	35,300	35,300
2	14,200	17,000	17,000	21,300	21,300
3	10,400	12,200	12,100	15,100	15,000
4	-	-	11,500	-	14,200
5	9,600	11,100	700	13,700	900
6	-	-	3,100	-	3,900
7	9,600	11,100	2,400	13,700	3,000
8	-	-	8,900	-	10,900
9	500	600	600	700	700
10	9,300	10,900	2,200	13,400	2,800
11	9,200	10,800	1,900	13,300	2,400
12	400	500	400	700	500
13	400	500	500	700	700
14	1,600	2,000	2,100	2,600	2,700
15	8,600	10,100	1,300	12,600	1,800
16	1,200	1,500	1,900	2,100	2,600
17	-	-	700	-	900
18	1,300	1,700	1,400	2,300	1,900
19	-	-	400	-	600
20	1,300	1,700	1,400	2,300	1,900
21	7,600	8,800	500	10,800	600
22	200	200	200	300	300
23	7,300	8,400	100	10,300	100
24	-	-	8,800	-	10,700
25	200	200	200	300	300
26	7,500	8,600	200	10,600	300
27	700	900	600	1,300	900
28	7,600	8,800	1,000	10,900	1,400
29	7,600	8,800	200	10,900	300
30	-	-	1,100	-	1,500
31	-	-	700	-	900
32	800	900	900	1,200	1,200
33	-	-	8,800	-	10,900
34	6,900	7,900	7,900	9,700	9,700
35	600	800	700	1,000	900

As can be seen from above the predicted flows on the single and dual c/w are identical as the capacity of both carriageway types is sufficient to cater for future traffic demand.

B.2.4 Network Indicator Impact

In order to assess the overall performance of each road type a number of key performance indicators were extracted from the models.

Table B.8 - Network Statistics – Daily – High Growth – Single c/w

VISUM Modelling Network Statistic	Total Network Trips (veh/hr)	Total Vehicle km	Total Network Travel Time (hrs)	Total Network Delay (hrs)	Average Vehicle Speed (km/hr)
2017 Do-Minimum	62,271	1,277,316	23,334	389.56	54.74
2017 Do-Something	62,271	1,282,747	23,091	378.65	55.55
2032 Do- Minimum	79,831	1,609,137	29,834	874.23	53.94
2032 Do-Something	79,831	1,616,075	29,530	852.21	54.73

Table B.9 - Network Statistics – Daily – High Growth – Dual c/w

VISUM Modelling Network Statistic	Total Network Trips (veh/hr)	Total Vehicle km	Total Network Travel Time (hrs)	Total Network Delay (hrs)	Average Vehicle Speed (km/hr)
2017 Do-Minimum	62,271	1,277,316	23,334	389.56	54.74
2017 Do-Something	62,271	1,282,752	23,077	364.56	55.59
2032 Do- Minimum	79,831	1,609,137	29,834	874.23	53.94
2032 Do-Something	79,831	1,616,091	29,501	823.76	54.78

The above statistics suggest that the Dual Carriageway option will result in daily journey time savings of over 28 hours in 2032 when compared to the Single Carriageway option. This equates to a daily journey time saving of approx 3-4%. In addition, travel distance and average speed remain reasonably constant.

B.2.5 Impact of Future Growth on Capacity

The National Roads Authority (NRA) TD9 states that a Type 1 Single Carriageway road will operate at LOS D up to an AADT of 11,600. The NRA Project Appraisal Guidelines (PAG Unit 4: Definition of Alternatives) suggests that the AADT flow outlined in NRA TD9 should only be treated as a guideline and not as a definitive means in the selection of carriageway type. During the course of the planning of the N4 scheme two road types were considered, Type 1 Single Carriageway and Type 2 Dual Carriageway.

With regard to ascertaining when a flow of 11,600 AADT is reached along the proposed scheme the below table was prepared based on VISUM transport model outputs. The assessment assumes linear growth for flows after 2042. The assessment found that the northern section of the proposed scheme, north of the tie in point with the existing N4, will reach AADT flows of 11,600 between 2018 and 2029 depending on future growth rates. The more southerly links on the proposed scheme take longer to reach 11,600 as they are less impacted upon by the Riverstown/Ballymote traffic.

Table B.10 – Forecast Timescales when max flows reach 11,600 AADT criteria

Growth Rate	North of northern tie in		South of northern tie in		North of southern tie in	
	Single c/w	Dual c/w	Single c/w	Dual c/w	Single c/w	Dual c/w
Low	2029	2029	2074	2068	2075	2070
Medium	2025	2025	2062	2058	2063	2063
High	2018	2018	2037	2037	2039	2039

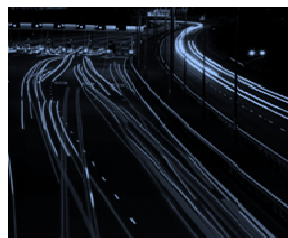
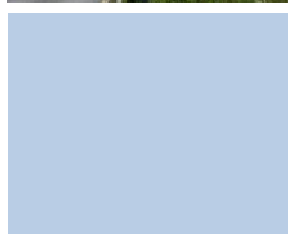
B.2.6 Road Type Costing

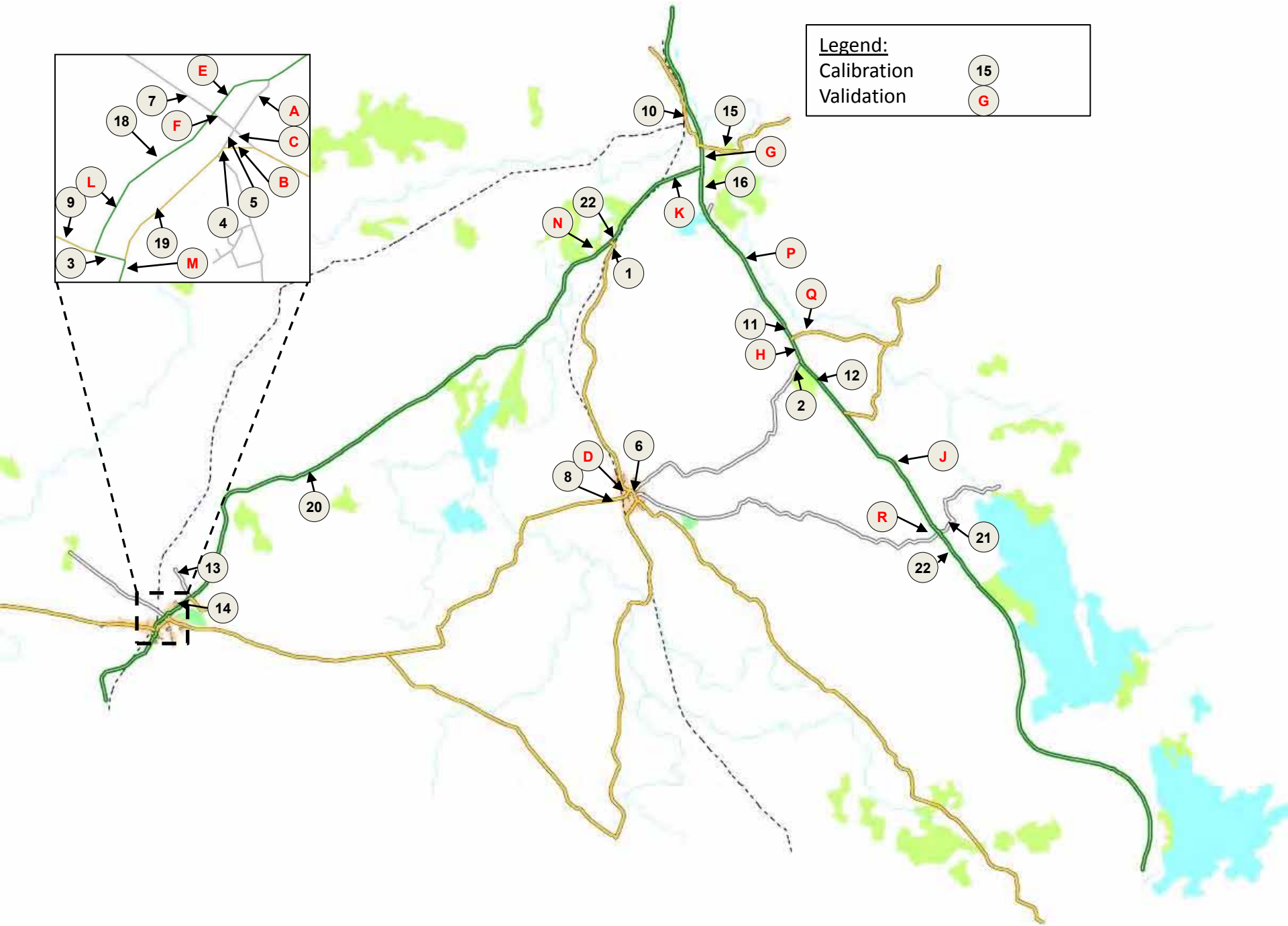
A costing exercise was undertaken by Sligo County Council to ascertain the approximate difference in cost for providing a single or dual carriageway. It was found that the Dual Carriageway option for the Castlebaldwin to Doorly section would be approx €2.5 – 3 million ex VAT more expensive. Based on a Total Budget Cost of €80.67 million for the Single Carriageway Option this equates to an increase in costs of approximately 3-4%.

When the above factors were taken into account it was decided by Sligo County Council to progress with a Type 2 Dual Carriageway.

Traffic Modelling Report

Appendix B
Calibration





AM Peak - All Traffic - Calibration

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Total Traffic	Total Traffic	Total Traffic
1 NB	1045	1031	1032	242.00	224.00	-18.00
1 SB	1045	1032	1031	98.00	89.00	-9.00
2 NB	3000	2009	121900628	23.00	25.00	2.00
2 SB	3000	121900628	2009	16.00	12.00	-4.00
3 EB	554442354	121837423	121838660	86.00	87.00	1.00
3 WB	554442354	121838660	121837423	236.00	232.00	-4.00
4 SB	559757333	121836043	121837747	207.00	218.00	11.00
4 NB	559757333	121837747	121836043	179.00	200.00	21.00
5 SB	559757334	121835738	121836043	147.00	87.00	-60.00
5 NB	559757334	121836043	121835738	152.00	102.00	-50.00
6 WB	559757800	121838987	121841906	238.00	242.00	4.00
6 EB	559757800	121841906	121838987	102.00	98.00	-4.00
7 NB	587825597	121837424	121839174	9.00	8.00	-1.00
7 SB	587825597	121839174	121837424	17.00	16.00	-1.00
8 NB	587834083	121841338	121841906	47.00	48.00	1.00
8 SB	587834083	121841906	121841338	69.00	71.00	2.00
9 EB	1917637667	121837069	121837423	125.00	115.00	-10.00
9 WB	1917637667	121837423	121837069	128.00	122.00	-6.00
10 NB	1927150830	121837702	121838459	159.00	149.00	-10.00
10 SB	1927150830	121838459	121837702	282.00	342.00	60.00
11 SB	2147476955	121899589	121900629	226.00	191.00	-35.00
11 NB	2147476955	121900629	121899589	388.00	417.00	29.00
12 SB	2147477002	121900628	121900630	212.00	166.00	-46.00
12 NB	2147477002	121900630	121900628	312.00	304.00	-8.00
13 SB	2147477035	121900643	121900644	34.00	23.00	-11.00
13 NB	2147477035	121900644	121900643	16.00	8.00	-8.00
14 EB	2147477037	121840034	121900644	328.00	327.00	-1.00
14 WB	2147477037	121900644	121840034	209.00	171.00	-38.00
15 EB	2147477038	121837672	121900645	180.00	181.00	1.00
15 WB	2147477038	121900645	121837672	154.00	188.00	34.00
16 SB	2147477045	121835544	121900648	252.00	195.00	-57.00
16 NB	2147477045	121900648	121835544	417.00	420.00	3.00
17 SB	2147477047	121900649	121841953	414.00	353.00	-61.00
17 NB	2147477048	121836854	121900650	1055.00	1134.00	79.00
18 SB	2147477057	121837424	121900654	84.00	73.00	-11.00
18 NB	2147477057	121900654	121837424	208.00	211.00	3.00
19 NB	2147477060	121838660	121900656	187.00	169.00	-18.00
19 SB	2147477060	121900656	121838660	214.00	170.00	-44.00
20 EB	2147477144	1025	121899590	316.00	315.00	-1.00
20 WB	2147477144	121899590	1025	155.00	127.00	-28.00
21 WB	2147477155	2015	121900627	24.00	23.00	-1.00
21 EB	2147477155	121900627	2015	17.00	8.00	-9.00
22 NB	2147477168	1032	1034	664.00	614.00	-50.00
22SB	2147477168	1034	1032	332.00	261.00	-71.00
23 SB	2147477211	121900627	221900688	226.00	181.00	-45.00
23 NB	2147477211	221900688	121900627	303.00	290.00	-13.00
				9489.00	9007.00	-482

RESULT = 97.83%		RESULT = 100.00%		CLASS TEST	ACT DIFF	FACTOR	
REQD = 85.00%	REQD = 85.00%	Target Difference	Flow Test				
GEH	COUNT	GEH TEST	Flow Test	ACT DIFF	FACTOR		
1.179	1	1	1	100	1	-18	0.9256
0.931	1	1	1	100	1	-9	0.9082
0.408	1	1	1	100	1	2	1.0870
1.069	1	1	1	100	1	-4	0.7500
0.108	1	1	1	100	1	1	1.0116
0.261	1	1	1	100	1	-4	0.9831
0.755	1	1	1	100	1	11	1.0531
1.526	1	1	1	100	1	21	1.1173
5.547	1	0	1	100	1	-60	0.5918
4.437	1	1	1	100	1	-50	0.6711
0.258	1	1	1	100	1	4	1.0168
0.400	1	1	1	100	1	-4	0.9608
0.343	1	1	1	100	1	-1	0.8889
0.246	1	1	1	100	1	-1	0.9412
0.145	1	1	1	100	1	1	1.0213
0.239	1	1	1	100	1	2	1.0290
0.913	1	1	1	100	1	-10	0.9200
0.537	1	1	1	100	1	-6	0.9531
0.806	1	1	1	100	1	-10	0.9371
3.397	1	1	1	100	1	60	1.2128
2.424	1	1	1	100	1	-35	0.8451
1.445	1	1	1	100	1	29	1.0747
3.346	1	1	1	100	1	-46	0.7830
0.456	1	1	1	100	1	-8	0.9744
2.060	1	1	1	100	1	-11	0.6765
2.309	1	1	1	100	1	-8	0.5000
0.055	1	1	1	100	1	-1	0.9970
2.757	1	1	1	100	1	-38	0.8182
0.074	1	1	1	100	1	1	1.0056
2.600	1	1	1	100	1	34	1.2208
3.813	1	1	1	100	1	-57	0.7738
0.147	1	1	1	100	1	3	1.0072
3.115	1	1	1	100	1	-61	0.8527
2.388	1	1	2	158	1	79	1.0749
1.242	1	1	1	100	1	-11	0.8690
0.207	1	1	1	100	1	3	1.0144
1.349	1	1	1	100	1	-18	0.9037
3.175	1	1	1	100	1	-44	0.7944
0.056	1	1	1	100	1	-1	0.9968
2.358	1	1	1	100	1	-28	0.8194
0.206	1	1	1	100	1	-1	0.9583
2.546	1	1	1	100	1	-9	0.4706
1.978	1	1	1	100	1	-50	0.9247
4.123	1	1	1	100	1	-71	0.7861
3.154	1	1	1	100	1	-45	0.8009
0.755	1	1	1	100	1	-13	0.9571
	46	45			46		

Average GEH 1.557

AM Peak - Lights - Calibration

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference	
				Lights Traffic	Lights Traffic	Lights	Traffic
1 NB	1045	1031	1032	232.00	213.00	-19.00	
1 SB	1045	1032	1031	90.00	81.00	-9.00	
2 NB	3000	2009	121900628	22.00	23.00	1.00	
2 SB	3000	121900628	2009	11.00	11.00	0.00	
3 EB	554442354	121837423	121838660	69.00	81.00	12.00	
3 WB	554442354	121838660	121837423	218.00	215.00	-3.00	
4 SB	559757333	121836043	121837747	192.00	197.00	5.00	
4 NB	559757333	121837747	121836043	176.00	186.00	10.00	
5 SB	559757334	121835738	121836043	135.00	79.00	-56.00	
5 NB	559757334	121836043	121835738	149.00	95.00	-54.00	
6 WB	559757800	121838987	121841906	226.00	224.00	-2.00	
6 EB	559757800	121841906	121838987	94.00	88.00	-6.00	
7 NB	587825597	121837424	121839174	8.00	8.00	0.00	
7 SB	587825597	121839174	121837424	16.00	15.00	-1.00	
8 NB	587834083	121841338	121841906	46.00	44.00	-2.00	
8 SB	587834083	121841906	121841338	66.00	64.00	-2.00	
9 EB	1917637667	121837069	121837423	114.00	106.00	-8.00	
9 WB	1917637667	121837423	121837069	119.00	111.00	-8.00	
10 NB	1927150830	121837702	121838459	143.00	137.00	-6.00	
10 SB	1927150830	121838459	121837702	261.00	321.00	60.00	
11 SB	2147476995	121899589	121900629	201.00	172.00	-29.00	
11 NB	2147476995	121900629	121899589	358.00	390.00	32.00	
12 SB	2147477002	121900628	121900630	192.00	149.00	-43.00	
12 NB	2147477002	121900630	121900628	285.00	283.00	-2.00	
13 SB	2147477035	121900643	121900644	32.00	21.00	-11.00	
13 NB	2147477035	121900644	121900643	14.00	7.00	-7.00	
14 EB	2147477037	121840034	121900644	309.00	305.00	-4.00	
14 WB	2147477037	121900644	121840034	182.00	157.00	-25.00	
15 EB	2147477038	121837672	121900645	165.00	167.00	2.00	
15 WB	2147477038	121900645	121837672	140.00	173.00	33.00	
16 SB	2147477045	121835544	121900648	226.00	176.00	-50.00	
16 NB	2147477045	121900648	121835544	386.00	393.00	7.00	
17 SB	2147477047	121900649	121841953	374.00	317.00	-57.00	
17 NB	2147477048	121836854	121900650	1007.00	1072.00	65.00	
18 SB	2147477057	121837424	121900654	68.00	68.00	0.00	
18 NB	2147477057	121900654	121837424	189.00	197.00	8.00	
19 NB	2147477060	121838660	121900656	183.00	158.00	-25.00	
19 SB	2147477060	121900656	121838660	198.00	154.00	-44.00	
20 EB	2147477144	1025	121899590	305.00	298.00	-7.00	
20 WB	2147477144	121899590	1025	141.00	117.00	-24.00	
21 WB	2147477155	2015	121900627	22.00	22.00	0.00	
21 EB	2147477155	121900627	2015	15.00	8.00	-7.00	
22 NB	2147477168	1032	1034	630.00	583.00	-47.00	
22SB	2147477168	1034	1032	294.00	238.00	-56.00	
23 SB	2147477211	121900627	221900688	203.00	162.00	-41.00	
23 NB	2147477211	221900688	121900627	272.00	271.00	-1.00	
				8778.00	8357.00	-421	

Average GEH

RESULT = 97.83%		RESULT = 100.00%					
REQD = 85.00%		REQD = 85.00%					
GEH	COUNT	GEH TEST	CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR
1.274	1	1	1	100	1	-19	0.9181
0.973	1	1	1	100	1	-9	0.9000
0.211	1	1	1	100	1	1	1.0455
0.000	1	1	1	100	1	0	1.0000
1.386	1	1	1	100	1	12	1.1739
0.204	1	1	1	100	1	-3	0.9862
0.359	1	1	1	100	1	5	1.0260
0.743	1	1	1	100	1	10	1.0568
5.414	1	0	1	100	1	-56	0.5852
4.889	1	1	1	100	1	-54	0.6376
0.133	1	1	1	100	1	-2	0.9912
0.629	1	1	1	100	1	-6	0.9362
0.000	1	1	1	100	1	0	1.0000
0.254	1	1	1	100	1	-1	0.9375
0.298	1	1	1	100	1	-2	0.9565
0.248	1	1	1	100	1	-2	0.9697
0.763	1	1	1	100	1	-8	0.9298
0.746	1	1	1	100	1	-8	0.9328
0.507	1	1	1	100	1	-6	0.9580
3.517	1	1	1	100	1	60	1.2299
2.124	1	1	1	100	1	-29	0.8557
1.655	1	1	1	100	1	32	1.0894
3.293	1	1	1	100	1	-43	0.7760
0.119	1	1	1	100	1	-2	0.9930
2.137	1	1	1	100	1	-11	0.6563
2.160	1	1	1	100	1	-7	0.5000
0.228	1	1	1	100	1	-4	0.9871
1.920	1	1	1	100	1	-25	0.8626
0.155	1	1	1	100	1	2	1.0121
2.638	1	1	1	100	1	33	1.2357
3.527	1	1	1	100	1	-50	0.7788
0.355	1	1	1	100	1	7	1.0181
3.067	1	1	1	100	1	-57	0.8476
2.016	1	1	2	151	1	65	1.0645
0.000	1	1	1	100	1	0	1.0000
0.576	1	1	1	100	1	8	1.0423
1.915	1	1	1	100	1	-25	0.8634
3.317	1	1	1	100	1	-44	0.7778
0.403	1	1	1	100	1	-7	0.9770
2.113	1	1	1	100	1	-24	0.8298
0.000	1	1	1	100	1	0	1.0000
2.064	1	1	1	100	1	-7	0.5333
1.908	1	1	1	100	1	-47	0.9254
3.434	1	1	1	100	1	-56	0.8095
3.035	1	1	1	100	1	-41	0.7980
0.061	1	1	1	100	1	-1	0.9963
	46	45			46		

1.451

AM Peak - Heavies - Calibration

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Heavies Traffic	Heavies Traffic	Heavies Traffic
1 NB	1045	1031	1032	10.00	11.00	1.00
1 SB	1045	1032	1031	8.00	8.00	0.00
2 NB	3000	2009	121900628	1.00	2.00	1.00
2 SB	3000	121900628	2009	5.00	1.00	-4.00
3 EB	554442354	121837423	121838660	17.00	6.00	-11.00
3 WB	554442354	121838660	121837423	18.00	17.00	-1.00
4 SB	559757333	121836043	121837747	15.00	21.00	6.00
4 NB	559757333	121837747	121836043	3.00	14.00	11.00
5 SB	559757334	121835738	121836043	12.00	9.00	-3.00
5 NB	559757334	121836043	121835738	3.00	7.00	4.00
6 WB	559757800	121838987	121841906	12.00	18.00	6.00
6 EB	559757800	121841906	121838987	8.00	10.00	2.00
7 NB	587825597	121837424	121839174	1.00	1.00	0.00
7 SB	587825597	121839174	121837424	1.00	1.00	0.00
8 NB	587834083	121841338	121841906	1.00	4.00	3.00
8 SB	587834083	121841906	121841338	3.00	7.00	4.00
9 EB	1917637667	121837069	121837423	11.00	10.00	-1.00
9 WB	1917637667	121837423	121837069	9.00	11.00	2.00
10 NB	1927150830	121837702	121838459	16.00	12.00	-4.00
10 SB	1927150830	121838459	121837702	21.00	21.00	0.00
11 SB	2147476995	121899589	121900629	25.00	19.00	-6.00
11 NB	2147476995	121900629	121899589	30.00	27.00	-3.00
12 SB	2147477002	121900628	121900630	20.00	17.00	-3.00
12 NB	2147477002	121900630	121900628	27.00	21.00	-6.00
13 SB	2147477035	121900643	121900644	2.00	2.00	0.00
13 NB	2147477035	121900644	121900643	2.00	1.00	-1.00
14 EB	2147477037	121840034	121900644	19.00	21.00	2.00
14 WB	2147477037	121900644	121840034	27.00	14.00	-13.00
15 EB	2147477038	121837672	121900645	15.00	14.00	-1.00
15 WB	2147477038	121900645	121837672	14.00	15.00	1.00
16 SB	2147477045	121835544	121900648	26.00	19.00	-7.00
16 NB	2147477045	121900648	121835544	31.00	27.00	-4.00
17 SB	2147477047	121900649	121841953	40.00	36.00	-4.00
17 NB	2147477048	121836854	121900650	48.00	62.00	14.00
18 SB	2147477057	121837424	121900654	16.00	5.00	-11.00
18 NB	2147477057	121900654	121837424	19.00	14.00	-5.00
19 NB	2147477060	121838660	121900656	4.00	11.00	7.00
19 SB	2147477060	121900656	121838660	16.00	17.00	1.00
20 EB	2147477144	1025	121899590	11.00	17.00	6.00
20 WB	2147477144	121899590	1025	14.00	10.00	-4.00
21 WB	2147477155	2015	121900627	2.00	2.00	0.00
21 EB	2147477155	121900627	2015	2.00	1.00	-1.00
22 NB	2147477168	1032	1034	34.00	31.00	-3.00
22SB	2147477168	1034	1032	38.00	23.00	-15.00
23 SB	2147477211	121900627	221900688	23.00	19.00	-4.00
23 NB	2147477211	221900688	121900627	31.00	19.00	-12.00
				711.00	655.00	-56

Average GEH

GEH	RESULT = 100.00%		CLASS TEST	RESULT = 100.00%		ACT DIFF	FACTOR
	REQD = 85.00%	GEH TEST		REQD = 85.00%	Flow Test		
0.309	1	1	1	100	1	1	1.1000
0.000	1	1	1	100	1	0	1.0000
0.816	1	1	1	100	1	1	2.0000
2.309	1	1	1	100	1	-4	0.2000
3.244	1	1	1	100	1	-11	0.3529
0.239	1	1	1	100	1	-1	0.9444
1.414	1	1	1	100	1	6	1.4000
3.773	1	1	1	100	1	11	4.6667
0.926	1	1	1	100	1	-3	0.7500
1.789	1	1	1	100	1	4	2.3333
1.549	1	1	1	100	1	6	1.5000
0.667	1	1	1	100	1	2	1.2500
0.000	1	1	1	100	1	0	1.0000
0.000	1	1	1	100	1	0	1.0000
1.897	1	1	1	100	1	3	4.0000
1.789	1	1	1	100	1	4	2.3333
0.309	1	1	1	100	1	-1	0.9091
0.632	1	1	1	100	1	2	1.2222
1.069	1	1	1	100	1	-4	0.7500
0.000	1	1	1	100	1	0	1.0000
1.279	1	1	1	100	1	-6	0.7600
0.562	1	1	1	100	1	-3	0.9000
0.697	1	1	1	100	1	-3	0.8500
1.225	1	1	1	100	1	-6	0.7778
0.000	1	1	1	100	1	0	1.0000
0.816	1	1	1	100	1	-1	0.5000
0.447	1	1	1	100	1	2	1.1053
2.871	1	1	1	100	1	-13	0.5185
0.263	1	1	1	100	1	-1	0.9333
0.263	1	1	1	100	1	1	1.0714
1.476	1	1	1	100	1	-7	0.7308
0.743	1	1	1	100	1	-4	0.8710
0.649	1	1	1	100	1	-4	0.9000
1.888	1	1	1	100	1	14	1.2917
3.395	1	1	1	100	1	-11	0.3125
1.231	1	1	1	100	1	-5	0.7368
2.556	1	1	1	100	1	7	2.7500
0.246	1	1	1	100	1	1	1.0625
1.604	1	1	1	100	1	6	1.5455
1.155	1	1	1	100	1	-4	0.7143
0.000	1	1	1	100	1	0	1.0000
0.816	1	1	1	100	1	-1	0.5000
0.526	1	1	1	100	1	-3	0.9118
2.716	1	1	1	100	1	-15	0.6053
0.873	1	1	1	100	1	-4	0.8261
2.400	1	1	1	100	1	-12	0.6129
	46	46			46		

1.161

Inter Peak - All Traffic - Calibration

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Total Traffic	Total Traffic	Total Traffic
1 NB	1045	1031	1032	96.00	88.00	-8.00
1 SB	1045	1032	1031	100.00	103.00	3.00
2 NB	3000	2009	121900628	23.00	85.00	62.00
2 SB	3000	121900628	2009	20.00	18.00	-2.00
3 EB	554442354	121837423	121838660	156.00	182.00	26.00
3 WB	554442354	121838660	121837423	197.00	194.00	-3.00
4 SB	559757333	121836043	121837747	238.00	201.00	-37.00
4 NB	559757333	121837747	121836043	192.00	191.00	-1.00
5 SB	559757334	121835738	121836043	157.00	92.00	-65.00
5 NB	559757334	121836043	121835738	136.00	86.00	-50.00
6 WB	559757800	121838987	121841906	235.00	183.00	-52.00
6 EB	559757800	121841906	121838987	256.00	223.00	-33.00
7 NB	587825597	121837424	121839174	23.00	19.00	-4.00
7 SB	587825597	121839174	121837424	19.00	14.00	-5.00
8 NB	587834083	121841338	121841906	107.00	86.00	-21.00
8 SB	587834083	121841906	121841338	104.00	59.00	-45.00
9 EB	1917637667	121837069	121837423	140.00	141.00	1.00
9 WB	1917637667	121837423	121837069	136.00	133.00	-3.00
10 NB	1927150830	121837702	121838459	199.00	170.00	-29.00
10 SB	1927150830	121838459	121837702	206.00	232.00	26.00
11 SB	2147476995	121899589	121900629	247.00	282.00	35.00
11 NB	2147476995	121900629	121899589	210.00	227.00	17.00
12 SB	2147477002	121900628	121900630	224.00	264.00	40.00
12 NB	2147477002	121900630	121900628	183.00	172.00	-11.00
13 SB	2147477035	121900643	121900644	29.00	22.00	-7.00
13 NB	2147477035	121900644	121900643	33.00	39.00	6.00
14 EB	2147477037	121840034	121900644	216.00	235.00	19.00
14 WB	2147477037	121900644	121840034	220.00	255.00	35.00
15 EB	2147477038	121837672	121900645	199.00	201.00	2.00
15 WB	2147477038	121900645	121837672	186.00	174.00	-12.00
16 SB	2147477045	121835544	121900648	286.00	311.00	25.00
16 NB	2147477045	121900648	121835544	274.00	248.00	-26.00
17 SB	2147477047	121900649	121841953	554.00	620.00	66.00
17 NB	2147477048	121836854	121900650	522.00	574.00	52.00
18 SB	2147477057	121837424	121900654	166.00	172.00	6.00
18 NB	2147477057	121900654	121837424	201.00	193.00	-8.00
19 NB	2147477060	121838660	121900656	166.00	162.00	-4.00
19 SB	2147477060	121900656	121838660	233.00	150.00	-83.00
20 EB	2147477144	1025	121899590	199.00	211.00	12.00
20 WB	2147477144	121899590	1025	203.00	252.00	49.00
21 WB	2147477155	2015	121900627	25.00	16.00	-9.00
21 EB	2147477155	121900627	2015	20.00	10.00	-10.00
22 NB	2147477168	1032	1034	295.00	301.00	6.00
22SB	2147477168	1034	1032	293.00	355.00	62.00
23 SB	2147477211	121900627	221900688	221.00	234.00	13.00
23 NB	2147477211	221900688	121900627	185.00	184.00	-1.00
				8330.00	8364.00	34

GEH	COUNT	RESULT =	CLASS TEST	RESULT =	ACT DIFF	FACTOR	
		93.48%		100.00%			
		REQD =	REQD =				
		85.00%	85.00%	85.00%			
		GEH TEST	Target Difference	Flow Test			
0.834	1	1	1	100	1	-8	0.9167
0.298	1	1	1	100	1	3	1.0300
8.437	1	0	1	100	1	62	3.6957
0.459	1	1	1	100	1	-2	0.9000
2.000	1	1	1	100	1	26	1.1667
0.215	1	1	1	100	1	-3	0.9848
2.497	1	1	1	100	1	-37	0.8445
0.072	1	1	1	100	1	-1	0.9948
5.825	1	0	1	100	1	-65	0.5860
4.746	1	1	1	100	1	-50	0.6324
3.597	1	1	1	100	1	-52	0.7787
2.132	1	1	1	100	1	-33	0.8711
0.873	1	1	1	100	1	-4	0.8261
1.231	1	1	1	100	1	-5	0.7368
2.138	1	1	1	100	1	-21	0.8037
4.985	1	1	1	100	1	-45	0.5673
0.084	1	1	1	100	1	1	1.0071
0.259	1	1	1	100	1	-3	0.9779
2.135	1	1	1	100	1	-29	0.8543
1.757	1	1	1	100	1	26	1.1262
2.152	1	1	1	100	1	35	1.1417
1.150	1	1	1	100	1	17	1.0810
2.561	1	1	1	100	1	40	1.1786
0.826	1	1	1	100	1	-11	0.9399
1.386	1	1	1	100	1	-7	0.7586
1.000	1	1	1	100	1	6	1.1818
1.265	1	1	1	100	1	19	1.0880
2.271	1	1	1	100	1	35	1.1591
0.141	1	1	1	100	1	2	1.0101
0.894	1	1	1	100	1	-12	0.9355
1.447	1	1	1	100	1	25	1.0874
1.609	1	1	1	100	1	-26	0.9051
2.724	1	1	1	100	1	66	1.1191
2.221	1	1	1	100	1	52	1.0996
0.462	1	1	1	100	1	6	1.0361
0.570	1	1	1	100	1	-8	0.9602
0.312	1	1	1	100	1	-4	0.9759
5.998	1	0	1	100	1	-83	0.6438
0.838	1	1	1	100	1	12	1.0603
3.249	1	1	1	100	1	49	1.2414
1.988	1	1	1	100	1	-9	0.6400
2.582	1	1	1	100	1	-10	0.5000
0.348	1	1	1	100	1	6	1.0203
3.444	1	1	1	100	1	62	1.2116
0.862	1	1	1	100	1	13	1.0588
0.074	1	1	1	100	1	-1	0.9946
	46	43			46		

Average GEH

1.890

Inter Peak - Lights - Calibration

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Lights Traffic	Lights Traffic	Lights Traffic
1 NB	1045	1031	1032	90.00	88.00	-2.00
1 SB	1045	1032	1031	93.00	96.00	3.00
2 NB	3000	2009	121900628	22.00	85.00	63.00
2 SB	3000	121900628	2009	19.00	18.00	-1.00
3 EB	554442354	121837423	121838660	149.00	156.00	7.00
3 WB	554442354	121838660	121837423	185.00	155.00	-30.00
4 SB	559757333	121836043	121837747	232.00	200.00	-32.00
4 NB	559757333	121837747	121836043	184.00	191.00	7.00
5 SB	559757334	121835738	121836043	153.00	91.00	-62.00
5 NB	559757334	121836043	121835738	128.00	85.00	-43.00
6 WB	559757800	121838987	121841906	225.00	183.00	-42.00
6 EB	559757800	121841906	121838987	241.00	216.00	-25.00
7 NB	587825597	121837424	121839174	22.00	19.00	-3.00
7 SB	587825597	121839174	121837424	18.00	14.00	-4.00
8 NB	587834083	121841338	121841906	100.00	86.00	-14.00
8 SB	587834083	121841906	121841338	100.00	59.00	-41.00
9 EB	1917637667	121837069	121837423	140.00	134.00	-6.00
9 WB	1917637667	121837423	121837069	135.00	133.00	-2.00
10 NB	1927150830	121837702	121838459	177.00	166.00	-11.00
10 SB	1927150830	121838459	121837702	186.00	204.00	18.00
11 SB	2147476995	121899589	121900629	214.00	255.00	41.00
11 NB	2147476995	121900629	121899589	188.00	213.00	25.00
12 SB	2147477002	121900628	121900630	192.00	238.00	46.00
12 NB	2147477002	121900630	121900628	164.00	160.00	-4.00
13 SB	2147477035	121900643	121900644	28.00	22.00	-6.00
13 NB	2147477035	121900644	121900643	31.00	39.00	8.00
14 EB	2147477037	121840034	121900644	189.00	196.00	7.00
14 WB	2147477037	121900644	121840034	201.00	229.00	28.00
15 EB	2147477038	121837672	121900645	181.00	181.00	0.00
15 WB	2147477038	121900645	121837672	165.00	164.00	-1.00
16 SB	2147477045	121835544	121900648	246.00	282.00	36.00
16 NB	2147477045	121900648	121835544	239.00	231.00	-8.00
17 SB	2147477047	121900649	121841953	498.00	566.00	68.00
17 NB	2147477048	121836854	121900650	464.00	512.00	48.00
18 SB	2147477057	121837424	121900654	150.00	146.00	-4.00
18 NB	2147477057	121900654	121837424	176.00	147.00	-29.00
19 NB	2147477060	121838660	121900656	158.00	162.00	4.00
19 SB	2147477060	121900656	121838660	226.00	150.00	-76.00
20 EB	2147477144	1025	121899590	179.00	172.00	-7.00
20 WB	2147477144	121899590	1025	186.00	226.00	40.00
21 WB	2147477155	2015	121900627	23.00	13.00	-10.00
21 EB	2147477155	121900627	2015	19.00	9.00	-10.00
22 NB	2147477168	1032	1034	256.00	262.00	6.00
22 SB	2147477168	1034	1032	267.00	322.00	55.00
23 SB	2147477211	121900627	221900688	191.00	207.00	16.00
23 NB	2147477211	221900688	121900627	164.00	173.00	9.00
				7594.00	7656.00	62

Average GEH

GEH	COUNT	RESULT = 93.48%		RESULT = 100.00%		ACT DIFF	FACTOR
		REQD = 85.00%	GEH TEST	REQD = 85.00%	Flow Test		
CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR	ACT DIFF	FACTOR	
0.212	1	1	1	100	1	-2	0.9778
0.309	1	1	1	100	1	3	1.0323
8.613	1	0	1	100	1	63	3.8636
0.232	1	1	1	100	1	-1	0.9474
0.567	1	1	1	100	1	7	1.0470
2.301	1	1	1	100	1	-30	0.8378
2.177	1	1	1	100	1	-32	0.8621
0.511	1	1	1	100	1	7	1.0380
5.613	1	0	1	100	1	-62	0.5948
4.167	1	1	1	100	1	-43	0.6641
2.941	1	1	1	100	1	-42	0.8133
1.654	1	1	1	100	1	-25	0.8963
0.663	1	1	1	100	1	-3	0.8636
1.000	1	1	1	100	1	-4	0.7778
1.452	1	1	1	100	1	-14	0.8600
4.598	1	1	1	100	1	-41	0.5900
0.513	1	1	1	100	1	-6	0.9571
0.173	1	1	1	100	1	-2	0.9852
0.840	1	1	1	100	1	-11	0.9379
1.289	1	1	1	100	1	18	1.0968
2.677	1	1	1	100	1	41	1.1916
1.766	1	1	1	100	1	25	1.1330
3.137	1	1	1	100	1	46	1.2396
0.314	1	1	1	100	1	-4	0.9756
1.200	1	1	1	100	1	-6	0.7857
1.352	1	1	1	100	1	8	1.2581
0.505	1	1	1	100	1	7	1.0370
1.910	1	1	1	100	1	28	1.1393
0.000	1	1	1	100	1	0	1.0000
0.078	1	1	1	100	1	-1	0.9939
2.216	1	1	1	100	1	36	1.1463
0.522	1	1	1	100	1	-8	0.9665
2.948	1	1	1	100	1	68	1.1365
2.173	1	1	1	100	1	48	1.1034
0.329	1	1	1	100	1	-4	0.9733
2.282	1	1	1	100	1	-29	0.8352
0.316	1	1	1	100	1	4	1.0233
5.543	1	0	1	100	1	-76	0.6637
0.528	1	1	1	100	1	-7	0.9609
2.787	1	1	1	100	1	40	1.2151
2.357	1	1	1	100	1	-10	0.5652
2.673	1	1	1	100	1	-10	0.4737
0.373	1	1	1	100	1	6	1.0234
3.205	1	1	1	100	1	55	1.2060
1.134	1	1	1	100	1	16	1.0838
0.693	1	1	1	100	1	9	1.0549
		46	43			46	

1.801

Inter Peak- Heavies - Calibration

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Heavies Traffic	Heavies Traffic	Heavies Traffic
1 NB	1045	1031	1032	6.00	0.00	-6.00
1 SB	1045	1032	1031	7.00	7.00	0.00
2 NB	3000	2009	121900628	1.00	0.00	-1.00
2 SB	3000	121900628	2009	1.00	0.00	-1.00
3 EB	554442354	121837423	121838660	7.00	26.00	19.00
3 WB	554442354	121838660	121837423	12.00	39.00	27.00
4 SB	559757333	121836043	121837747	6.00	1.00	-5.00
4 NB	559757333	121837747	121836043	8.00	1.00	-7.00
5 SB	559757334	121835738	121836043	4.00	1.00	-3.00
5 NB	559757334	121836043	121835738	8.00	1.00	-7.00
6 WB	559757800	121838987	121841906	10.00	0.00	-10.00
6 EB	559757800	121841906	121838987	15.00	7.00	-8.00
7 NB	587825597	121837424	121839174	1.00	0.00	-1.00
7 SB	587825597	121839174	121837424	1.00	0.00	-1.00
8 NB	587834083	121841338	121841906	7.00	0.00	-7.00
8 SB	587834083	121841906	121841338	4.00	0.00	-4.00
9 EB	1917637667	121837069	121837423	0.00	7.00	7.00
9 WB	1917637667	121837423	121837069	1.00	0.00	-1.00
10 NB	1927150830	121837702	121838459	22.00	4.00	-18.00
10 SB	1927150830	121838459	121837702	20.00	28.00	8.00
11 SB	2147476995	121899589	121900629	33.00	27.00	-6.00
11 NB	2147476995	121900629	121899589	22.00	14.00	-8.00
12 SB	2147477002	121900628	121900630	32.00	26.00	-6.00
12 NB	2147477002	121900630	121900628	19.00	12.00	-7.00
13 SB	2147477035	121900643	121900644	1.00	0.00	-1.00
13 NB	2147477035	121900644	121900643	2.00	0.00	-2.00
14 EB	2147477037	121840034	121900644	27.00	39.00	12.00
14 WB	2147477037	121900644	121840034	19.00	26.00	7.00
15 EB	2147477038	121837672	121900645	18.00	20.00	2.00
15 WB	2147477038	121900645	121837672	21.00	10.00	-11.00
16 SB	2147477045	121835544	121900648	40.00	29.00	-11.00
16 NB	2147477045	121900648	121835544	35.00	17.00	-18.00
17 SB	2147477047	121900649	121841953	56.00	54.00	-2.00
17 NB	2147477048	121836854	121900650	58.00	62.00	4.00
18 SB	2147477057	121837424	121900654	16.00	26.00	10.00
18 NB	2147477057	121900654	121837424	25.00	46.00	21.00
19 NB	2147477060	121838660	121900656	8.00	0.00	-8.00
19 SB	2147477060	121900656	121838660	7.00	0.00	-7.00
20 EB	2147477144	1025	121899590	20.00	39.00	19.00
20 WB	2147477144	121899590	1025	17.00	26.00	9.00
21 WB	2147477155	2015	121900627	2.00	4.00	2.00
21 EB	2147477155	121900627	2015	1.00	1.00	0.00
22 NB	2147477168	1032	1034	39.00	39.00	0.00
22 SB	2147477168	1034	1032	26.00	33.00	7.00
23 SB	2147477211	121900627	221900688	30.00	28.00	-2.00
23 NB	2147477211	221900688	121900627	21.00	11.00	-10.00
				736.00	711.00	-25

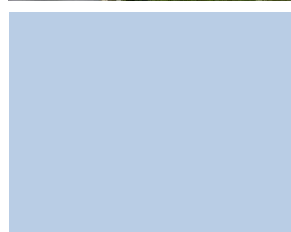
Average GEH

GEH	COUNT	RESULT = 97.83%		RESULT = 100.00%		ACT DIFF	FACTOR
		REQD = 85.00%	GEH TEST	REQD = 85.00%	Flow Test		
CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR			
3.464	1	1	1	100	1	-6	0.0000
0.000	1	1	1	100	1	0	1.0000
1.414	1	1	1	100	1	-1	0.0000
1.414	1	1	1	100	1	-1	0.0000
4.677	1	1	1	100	1	19	3.7143
5.347	1	0	1	100	1	27	3.2500
2.673	1	1	1	100	1	-5	0.1667
3.300	1	1	1	100	1	-7	0.1250
1.897	1	1	1	100	1	-3	0.2500
3.300	1	1	1	100	1	-7	0.1250
4.472	1	1	1	100	1	-10	0.0000
2.412	1	1	1	100	1	-8	0.4667
1.414	1	1	1	100	1	-1	0.0000
1.414	1	1	1	100	1	-1	0.0000
3.742	1	1	1	100	1	-7	0.0000
2.828	1	1	1	100	1	-4	0.0000
3.742	1	1	1	100	1	7	#DIV/0!
1.414	1	1	1	100	1	-1	0.0000
2.000	1	1	1	100	1	-2	0.0000
2.089	1	1	1	100	1	12	1.4444
1.476	1	1	1	100	1	7	1.3684
0.459	1	1	1	100	1	2	1.1111
2.794	1	1	1	100	1	-11	0.4762
1.873	1	1	1	100	1	-11	0.7250
3.530	1	1	1	100	1	-18	0.4857
0.270	1	1	1	100	1	-2	0.9643
0.516	1	1	1	100	1	4	1.0690
2.182	1	1	1	100	1	10	1.6250
3.525	1	1	1	100	1	21	1.8400
4.000	1	1	1	100	1	-8	0.0000
3.742	1	1	1	100	1	-7	0.0000
3.498	1	1	1	100	1	19	1.9500
1.941	1	1	1	100	1	9	1.5294
1.155	1	1	1	100	1	2	2.0000
0.000	1	1	1	100	1	0	1.0000
0.000	1	1	1	100	1	0	1.0000
1.289	1	1	1	100	1	7	1.2692
0.371	1	1	1	100	1	-2	0.9333
2.500	1	1	1	100	1	-10	0.5238
		46	45			46	

2.218

Traffic Modelling Report

Appendix C
Validation



AM Peak - All Traffic - Validation

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Total Traffic	Total Traffic	Total Traffic
A NB	559757332	121835738	121835739	156.00	131.00	-25.00
A SB	559757332	121835739	121835738	158.00	115.00	-43.00
B EB	559757335	121836043	121840797	60.00	98.00	38.00
B WB	559757335	121840797	121836043	92.00	131.00	39.00
C EB	559757336	121835738	121840797	25.00	57.00	32.00
C WB	559757336	121840797	121835738	20.00	46.00	26.00
D EB	559757773	121837934	121841906	106.00	127.00	21.00
D WB	559757773	121841906	121837934	220.00	248.00	28.00
E SB	587825600	121835739	121837424	74.00	61.00	-13.00
E NB	587825600	121837424	121835739	205.00	193.00	-12.00
F NB	587825619	121835738	121837424	14.00	16.00	2.00
F SB	587825619	121837424	121835738	15.00	30.00	15.00
G NB	1879715405	121838425	121837323	1015.00	1044.00	29.00
G SB	1905076643	121836921	121837541	470.00	463.00	-7.00
H NB	2147476994	121900628	121900629	354.00	307.00	-47.00
H SB	2147476994	121900629	121900628	220.00	156.00	-64.00
J NB	2147477003	121900627	121900630	319.00	301.00	-18.00
J SB	2147477003	121900630	121900627	219.00	163.00	-56.00
KWB	2147477042	121838293	121900647	231.00	278.00	47.00
K EB	2147477042	121900647	121838293	612.00	634.00	22.00
L NB	2147477056	121837423	121900654	211.00	211.00	0.00
LSB	2147477056	121900654	121837423	63.00	73.00	10.00
M SB	2147477059	121838660	121900655	154.00	210.00	56.00
M NB	2147477059	121900655	121838660	275.00	354.00	79.00
N WB	2147477166	1032	121900677	196.00	177.00	-19.00
N EB	2147477166	121900677	1032	393.00	396.00	3.00
P SB	2147477175	2005	2036	222.00	191.00	-31.00
P NB	2147477175	2036	2005	426.00	417.00	-9.00
Q EB	2147477178	121900629	121900681	17.00	61.00	44.00
Q WB	2147477178	121900681	121900629	55.00	136.00	81.00
R WB	2147477201	121900627	221900686	15.00	4.00	-11.00
R EB	2147477201	221900686	121900627	30.00	18.00	-12.00
				6642.00	6847.00	205

Average GEH

RESULT = 93.75%		RESULT = 100.00%					
REQD = 85.00%		REQD = 85.00%					
GEH	COUNT	GEH TEST	CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR
2.087	1	1	1	100	1	-25	0.8397
3.680	1	1	1	100	1	-43	0.7278
4.275	1	1	1	100	1	38	1.6333
3.693	1	1	1	100	1	39	1.4239
4.998	1	1	1	100	1	32	2.2800
4.526	1	1	1	100	1	26	2.3000
1.946	1	1	1	100	1	21	1.1981
1.830	1	1	1	100	1	28	1.1273
1.582	1	1	1	100	1	-13	0.8243
0.851	1	1	1	100	1	-12	0.9415
0.516	1	1	1	100	1	2	1.1429
3.162	1	1	1	100	1	15	2.0000
0.904	1	1	2	152	1	29	1.0286
0.324	1	1	1	100	1	-7	0.9851
2.585	1	1	1	100	1	-47	0.8672
4.668	1	1	1	100	1	-64	0.7091
1.022	1	1	1	100	1	-18	0.9436
4.052	1	1	1	100	1	-56	0.7443
2.946	1	1	1	100	1	47	1.2035
0.881	1	1	1	100	1	22	1.0359
0.000	1	1	1	100	1	0	1.0000
1.213	1	1	1	100	1	10	1.1587
4.151	1	1	1	100	1	56	1.3636
4.455	1	1	1	100	1	79	1.2873
1.391	1	1	1	100	1	-19	0.9031
0.151	1	1	1	100	1	3	1.0076
2.157	1	1	1	100	1	-31	0.8604
0.438	1	1	1	100	1	-9	0.9789
7.046	1	0	1	100	1	44	3.5882
8.289	1	0	1	100	1	81	2.4727
3.569	1	1	1	100	1	-11	0.2667
2.449	1	1	1	100	1	-12	0.6000
32		30		32			

2.682

AM Peak - Lights - Validation

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Lights Traffic	Lights Traffic	Lights Traffic
A NB	559757332	121835738	121835739	153.00	123.00	-30.00
A SB	559757332	121835739	121835738	146.00	104.00	-42.00
B EB	559757335	121836043	121840797	58.00	91.00	33.00
B WB	559757335	121840797	121836043	88.00	119.00	31.00
C EB	559757336	121835738	121840797	23.00	52.00	29.00
C WB	559757336	121840797	121835738	19.00	43.00	24.00
D EB	559757773	121837934	121841906	98.00	114.00	16.00
D WB	559757773	121841906	121837934	210.00	230.00	20.00
E SB	587825600	121835739	121837424	58.00	56.00	-2.00
E NB	587825600	121837424	121835739	186.00	180.00	-6.00
F NB	587825619	121835738	121837424	14.00	15.00	1.00
F SB	587825619	121837424	121835738	14.00	27.00	13.00
G NB	1879715405	121838425	121837323	958.00	985.00	27.00
G SB	1905076643	121836921	121837541	417.00	420.00	3.00
H NB	2147476994	121900628	121900629	325.00	286.00	-39.00
H SB	2147476994	121900629	121900628	196.00	140.00	-56.00
J NB	2147477003	121900627	121900630	287.00	281.00	-6.00
J SB	2147477003	121900630	121900627	196.00	146.00	-50.00
KWB	2147477042	121838293	121900647	196.00	254.00	58.00
K EB	2147477042	121900647	121838293	578.00	602.00	24.00
L NB	2147477056	121837423	121900654	190.00	197.00	7.00
LSB	2147477056	121900654	121837423	46.00	68.00	22.00
M SB	2147477059	121838660	121900655	127.00	191.00	64.00
M NB	2147477059	121900655	121838660	260.00	330.00	70.00
N WB	2147477166	1032	121900677	176.00	162.00	-14.00
N EB	2147477166	121900677	1032	372.00	376.00	4.00
P SB	2147477175	2005	2036	190.00	172.00	-18.00
P NB	2147477175	2036	2005	405.00	390.00	-15.00
Q EB	2147477178	121900629	121900681	12.00	56.00	44.00
Q WB	2147477178	121900681	121900629	50.00	128.00	78.00
R WB	2147477201	121900627	221900686	14.00	4.00	-10.00
R EB	2147477201	221900686	121900627	29.00	16.00	-13.00
				6091.00	6358.00	267

RESULT = 90.63%		RESULT = 100.00%					
REQD = 85.00%		REQD = 85.00%					
GEH	COUNT	GEH TEST	CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR
2.554	1	1	1	100	1	-30	0.8039
3.757	1	1	1	100	1	-42	0.7123
3.823	1	1	1	100	1	33	1.5690
3.047	1	1	1	100	1	31	1.3523
4.736	1	1	1	100	1	29	2.2609
4.311	1	1	1	100	1	24	2.2632
1.554	1	1	1	100	1	16	1.1633
1.348	1	1	1	100	1	20	1.0952
0.265	1	1	1	100	1	-2	0.9655
0.444	1	1	1	100	1	-6	0.9677
0.263	1	1	1	100	1	1	1.0714
2.871	1	1	1	100	1	13	1.9286
0.866	1	1	2	144	1	27	1.0282
0.147	1	1	1	100	1	3	1.0072
2.231	1	1	1	100	1	-39	0.8800
4.320	1	1	1	100	1	-56	0.7143
0.356	1	1	1	100	1	-6	0.9791
3.824	1	1	1	100	1	-50	0.7449
3.867	1	1	1	100	1	58	1.2959
0.988	1	1	1	100	1	24	1.0415
0.503	1	1	1	100	1	7	1.0368
2.914	1	1	1	100	1	22	1.4783
5.076	1	0	1	100	1	64	1.5039
4.076	1	1	1	100	1	70	1.2692
1.077	1	1	1	100	1	-14	0.9205
0.207	1	1	1	100	1	4	1.0108
1.338	1	1	1	100	1	-18	0.9053
0.752	1	1	1	100	1	-15	0.9630
7.546	1	0	1	100	1	44	4.6667
8.268	1	0	1	100	1	78	2.5600
3.333	1	1	1	100	1	-10	0.2857
2.741	1	1	1	100	1	-13	0.5517
	32	29			32		

Average GEH

2.606

AM Peak - Heavies - Validation

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Heavies Traffic	Heavies Traffic	Heavies Traffic
A NB	559757332	121835738	121835739	3.00	9.00	6.00
A SB	559757332	121835739	121835738	12.00	11.00	-1.00
B EB	559757335	121836043	121840797	2.00	8.00	6.00
B WB	559757335	121840797	121836043	4.00	12.00	8.00
C EB	559757336	121835738	121840797	2.00	5.00	3.00
C WB	559757336	121840797	121835738	1.00	3.00	2.00
D EB	559757773	121837934	121841906	8.00	13.00	5.00
D WB	559757773	121841906	121837934	10.00	18.00	8.00
E SB	587825600	121835739	121837424	16.00	4.00	-12.00
E NB	587825600	121837424	121835739	19.00	12.00	-7.00
F NB	587825619	121835738	121837424	0.00	1.00	1.00
F SB	587825619	121837424	121835738	1.00	3.00	2.00
G NB	1879715405	121838425	121837323	57.00	59.00	2.00
G SB	1905076643	121836921	121837541	53.00	43.00	-10.00
H NB	2147476994	121900628	121900629	29.00	21.00	-8.00
H SB	2147476994	121900629	121900628	24.00	16.00	-8.00
J NB	2147477003	121900627	121900630	32.00	20.00	-12.00
J SB	2147477003	121900630	121900627	23.00	17.00	-6.00
KWB	2147477042	121838293	121900647	35.00	24.00	-11.00
K EB	2147477042	121900647	121838293	34.00	32.00	-2.00
L NB	2147477056	121837423	121900654	21.00	14.00	-7.00
LSB	2147477056	121900654	121837423	17.00	5.00	-12.00
M SB	2147477059	121838660	121900655	27.00	18.00	-9.00
M NB	2147477059	121900655	121838660	15.00	24.00	9.00
N WB	2147477166	1032	121900677	20.00	15.00	-5.00
N EB	2147477166	121900677	1032	21.00	20.00	-1.00
P SB	2147477175	2005	2036	32.00	19.00	-13.00
P NB	2147477175	2036	2005	21.00	27.00	6.00
Q EB	2147477178	121900629	121900681	5.00	5.00	0.00
Q WB	2147477178	121900681	121900629	5.00	8.00	3.00
R WB	2147477201	121900627	221900686	1.00	0.00	-1.00
R EB	2147477201	221900686	121900627	1.00	2.00	1.00
				551.00	488.00	-63

GEH	COUNT	GEH TEST	CLASS TEST	RESULT =	100.00%	Target Difference	Flow Test	ACT DIFF	FACTOR
				REQD =	85.00%				
2.449	1	1	1	100	1	6	3.0000		
0.295	1	1	1	100	1	-1	0.9167		
2.683	1	1	1	100	1	6	4.0000		
2.828	1	1	1	100	1	8	3.0000		
1.604	1	1	1	100	1	3	2.5000		
1.414	1	1	1	100	1	2	3.0000		
1.543	1	1	1	100	1	5	1.6250		
2.138	1	1	1	100	1	8	1.8000		
3.795	1	1	1	100	1	-12	0.2500		
1.778	1	1	1	100	1	-7	0.6316		
1.414	1	1	1	100	1	1	#DIV/0!		
1.414	1	1	1	100	1	2	3.0000		
0.263	1	1	1	100	1	2	1.0351		
1.443	1	1	1	100	1	-10	0.8113		
1.600	1	1	1	100	1	-8	0.7241		
1.789	1	1	1	100	1	-8	0.6667		
2.353	1	1	1	100	1	-12	0.6250		
1.342	1	1	1	100	1	-6	0.7391		
2.025	1	1	1	100	1	-11	0.6857		
0.348	1	1	1	100	1	-2	0.9412		
1.673	1	1	1	100	1	-7	0.6667		
3.618	1	1	1	100	1	-12	0.2941		
1.897	1	1	1	100	1	-9	0.6667		
2.038	1	1	1	100	1	9	1.6000		
1.195	1	1	1	100	1	-5	0.7500		
0.221	1	1	1	100	1	-1	0.9524		
2.574	1	1	1	100	1	-13	0.5938		
1.225	1	1	1	100	1	6	1.2857		
0.000	1	1	1	100	1	0	1.0000		
1.177	1	1	1	100	1	3	1.6000		
1.414	1	1	1	100	1	-1	0.0000		
0.816	1	1	1	100	1	1	2.0000		
	32	32				32			

Average GEH

1.637

Inter Peak - All Traffic - Validation

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Total Traffic	Total Traffic	Total Traffic
A NB	559757332	121835738	121835739	118.00	97.00	-21.00
A SB	559757332	121835739	121835738	169.00	123.00	-46.00
B EB	559757335	121836043	121840797	97.00	106.00	9.00
B WB	559757335	121840797	121836043	123.00	109.00	-14.00
C EB	559757336	121835738	121840797	74.00	90.00	16.00
C WB	559757336	121840797	121835738	33.00	61.00	28.00
D EB	559757773	121837934	121841906	216.00	279.00	63.00
D WB	559757773	121841906	121837934	198.00	265.00	67.00
E SB	587825600	121835739	121837424	152.00	134.00	-18.00
E NB	587825600	121837424	121835739	172.00	140.00	-32.00
F NB	587825619	121835738	121837424	36.00	49.00	13.00
F SB	587825619	121837424	121835738	47.00	58.00	11.00
G NB	1879715405	121838425	121837323	526.00	561.00	35.00
G SB	1905076643	121836921	121837541	549.00	641.00	92.00
H NB	2147476994	121900628	121900629	195.00	195.00	0.00
H SB	2147476994	121900629	121900628	233.00	220.00	-13.00
J NB	2147477003	121900627	121900630	189.00	162.00	-27.00
J SB	2147477003	121900630	121900627	226.00	215.00	-11.00
KWB	2147477042	121838293	121900647	281.00	349.00	68.00
K EB	2147477042	121900647	121838293	269.00	332.00	63.00
L NB	2147477056	121837423	121900654	185.00	193.00	8.00
LSB	2147477056	121900654	121837423	139.00	172.00	33.00
M SB	2147477059	121838660	121900655	191.00	233.00	42.00
M NB	2147477059	121900655	121838660	165.00	257.00	92.00
N WB	2147477166	1032	121900677	218.00	252.00	34.00
N EB	2147477166	121900677	1032	223.00	212.00	-11.00
P SB	2147477175	2005	2036	298.00	282.00	-16.00
P NB	2147477175	2036	2005	282.00	227.00	-55.00
Q EB	2147477178	121900629	121900681	42.00	105.00	63.00
Q WB	2147477178	121900681	121900629	33.00	76.00	43.00
R WB	2147477201	121900627	221900686	35.00	31.00	-4.00
R EB	2147477201	221900686	121900627	29.00	22.00	-7.00
				5743.00	6248.00	505

GEH	COUNT	RESULT =	CLASS TEST	RESULT =	Target Difference	Flow Test	ACT DIFF	FACTOR
		90.63%		100.00%				
		REQD =			REQD =			
		85.00%			85.00%			
2.025	1	1	1	100	1	-21	0.8220	
3.807	1	1	1	100	1	-46	0.7278	
0.893	1	1	1	100	1	9	1.0928	
1.300	1	1	1	100	1	-14	0.8862	
1.767	1	1	1	100	1	16	1.2162	
4.084	1	1	1	100	1	28	1.8485	
4.005	1	1	1	100	1	63	1.2917	
4.404	1	1	1	100	1	67	1.3384	
1.505	1	1	1	100	1	-18	0.8816	
2.562	1	1	1	100	1	-32	0.8140	
1.994	1	1	1	100	1	13	1.3611	
1.518	1	1	1	100	1	11	1.2340	
1.501	1	1	1	100	1	35	1.0665	
3.772	1	1	1	100	1	92	1.1676	
0.000	1	1	1	100	1	0	1.0000	
0.864	1	1	1	100	1	-13	0.9442	
2.038	1	1	1	100	1	-27	0.8571	
0.741	1	1	1	100	1	-11	0.9513	
3.831	1	1	1	100	1	68	1.2420	
3.634	1	1	1	100	1	63	1.2342	
0.582	1	1	1	100	1	8	1.0432	
2.646	1	1	1	100	1	33	1.2374	
2.885	1	1	1	100	1	42	1.2199	
6.334	1	0	1	100	1	92	1.5576	
2.218	1	1	1	100	1	34	1.1560	
0.746	1	1	1	100	1	-11	0.9507	
0.940	1	1	1	100	1	-16	0.9463	
3.448	1	1	1	100	1	-55	0.8050	
7.348	1	0	1	100	1	63	2.5000	
5.825	1	0	1	100	1	43	2.3030	
0.696	1	1	1	100	1	-4	0.8857	
1.386	1	1	1	100	1	-7	0.7586	
	32	29			32			

Average GEH

2.541

Inter Peak - Lights - Validation

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Lights Traffic	Lights Traffic	Lights Traffic
A NB	559757332	121835738	121835739	114.00	96.00	-18.00
A SB	559757332	121835739	121835738	165.00	123.00	-42.00
B EB	559757335	121836043	121840797	93.00	106.00	13.00
B WB	559757335	121840797	121836043	116.00	109.00	-7.00
C EB	559757336	121835738	121840797	70.00	82.00	12.00
C WB	559757336	121840797	121835738	33.00	60.00	27.00
D EB	559757773	121837934	121841906	205.00	272.00	67.00
D WB	559757773	121841906	121837934	190.00	265.00	75.00
E SB	587825600	121835739	121837424	137.00	108.00	-29.00
E NB	587825600	121837424	121835739	146.00	101.00	-45.00
F NB	587825619	121835738	121837424	33.00	49.00	16.00
F SB	587825619	121837424	121835738	45.00	51.00	6.00
G NB	1879715405	121838425	121837323	457.00	505.00	48.00
G SB	1905076643	121836921	121837541	479.00	579.00	100.00
H NB	2147476994	121900628	121900629	176.00	183.00	7.00
H SB	2147476994	121900629	121900628	201.00	194.00	-7.00
J NB	2147477003	121900627	121900630	169.00	150.00	-19.00
J SB	2147477003	121900630	121900627	196.00	189.00	-7.00
KWB	2147477042	121838293	121900647	246.00	316.00	70.00
K EB	2147477042	121900647	121838293	230.00	293.00	63.00
L NB	2147477056	121837423	121900654	174.00	146.00	-28.00
LSB	2147477056	121900654	121837423	132.00	146.00	14.00
M SB	2147477059	121838660	121900655	171.00	207.00	36.00
M NB	2147477059	121900655	121838660	137.00	217.00	80.00
N WB	2147477166	1032	121900677	204.00	226.00	22.00
N EB	2147477166	121900677	1032	207.00	173.00	-34.00
P SB	2147477175	2005	2036	254.00	255.00	1.00
P NB	2147477175	2036	2005	262.00	213.00	-49.00
Q EB	2147477178	121900629	121900681	39.00	104.00	65.00
Q WB	2147477178	121900681	121900629	30.00	74.00	44.00
R WB	2147477201	121900627	221900686	33.00	31.00	-2.00
R EB	2147477201	221900686	121900627	28.00	22.00	-6.00
				5172.00	5645.00	473

RESULT = 90.63%		RESULT = 96.88%					
REQD = 85.00%		REQD = 85.00%					
GEH	COUNT	GEH TEST	CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR
1.757	1	1	1	100	1	-18	0.8421
3.500	1	1	1	100	1	-42	0.7455
1.303	1	1	1	100	1	13	1.1398
0.660	1	1	1	100	1	-7	0.9397
1.376	1	1	1	100	1	12	1.1714
3.959	1	1	1	100	1	27	1.8182
4.338	1	1	1	100	1	67	1.3268
4.972	1	1	1	100	1	75	1.3947
2.620	1	1	1	100	1	-29	0.7883
4.049	1	1	1	100	1	-45	0.6918
2.499	1	1	1	100	1	16	1.4848
0.866	1	1	1	100	1	6	1.1333
2.189	1	1	1	100	1	48	1.1050
4.348	1	1	1	100	0	100	1.2088
0.522	1	1	1	100	1	7	1.0398
0.498	1	1	1	100	1	-7	0.9652
1.504	1	1	1	100	1	-19	0.8876
0.505	1	1	1	100	1	-7	0.9643
4.176	1	1	1	100	1	70	1.2846
3.896	1	1	1	100	1	63	1.2739
2.214	1	1	1	100	1	-28	0.8391
1.187	1	1	1	100	1	14	1.1061
2.619	1	1	1	100	1	36	1.2105
6.013	1	0	1	100	1	80	1.5839
1.500	1	1	1	100	1	22	1.1078
2.467	1	1	1	100	1	-34	0.8357
0.063	1	1	1	100	1	1	1.0039
3.180	1	1	1	100	1	-49	0.8130
7.687	1	0	1	100	1	65	2.6667
6.102	1	0	1	100	1	44	2.4667
0.354	1	1	1	100	1	-2	0.9394
1.200	1	1	1	100	1	-6	0.7857
	32	29			31		

Average GEH

2.629

Inter Peak - Heavies - Validation

Notation	Link Number	From Node	To Node	Observed	Modelled	Difference
				Heavies Traffic	Heavies Traffic	Heavies Traffic
A NB	559757332	121835738	121835739	4.00	1.00	-3.00
A SB	559757332	121835739	121835738	4.00	1.00	-3.00
B EB	559757335	121836043	121840797	4.00	0.00	-4.00
B WB	559757335	121840797	121836043	7.00	0.00	-7.00
C EB	559757336	121835738	121840797	4.00	7.00	3.00
C WB	559757336	121840797	121835738	0.00	0.00	0.00
D EB	559757773	121837934	121841906	11.00	7.00	-4.00
D WB	559757773	121841906	121837934	8.00	0.00	-8.00
E SB	587825600	121835739	121837424	15.00	26.00	11.00
E NB	587825600	121837424	121835739	26.00	39.00	13.00
F NB	587825619	121835738	121837424	3.00	0.00	-3.00
F SB	587825619	121837424	121835738	2.00	7.00	5.00
G NB	1879715405	121838425	121837323	69.00	56.00	-13.00
G SB	1905076643	121836921	121837541	70.00	62.00	-8.00
H NB	2147476994	121900628	121900629	19.00	12.00	-7.00
H SB	2147476994	121900629	121900628	32.00	26.00	-6.00
J NB	2147477003	121900627	121900630	20.00	12.00	-8.00
J SB	2147477003	121900630	121900627	30.00	26.00	-4.00
KWB	2147477042	121838293	121900647	35.00	33.00	-2.00
K EB	2147477042	121900647	121838293	39.00	39.00	0.00
L NB	2147477056	121837423	121900654	11.00	46.00	35.00
LSB	2147477056	121900654	121837423	7.00	26.00	19.00
M SB	2147477059	121838660	121900655	20.00	26.00	6.00
M NB	2147477059	121900655	121838660	28.00	39.00	11.00
N WB	2147477166	1032	121900677	14.00	26.00	12.00
N EB	2147477166	121900677	1032	16.00	39.00	23.00
P SB	2147477175	2005	2036	44.00	27.00	-17.00
P NB	2147477175	2036	2005	20.00	14.00	-6.00
Q EB	2147477178	121900629	121900681	3.00	1.00	-2.00
Q WB	2147477178	121900681	121900629	3.00	2.00	-1.00
R WB	2147477201	121900627	221900686	2.00	0.00	-2.00
R EB	2147477201	221900686	121900627	1.00	0.00	-1.00
				571.00	600.00	29

Average GEH

RESULT = 96.88%		RESULT = 100.00%					
REQD = 85.00%		REQD = 85.00%					
GEH	COUNT	GEH TEST	CLASS TEST	Target Difference	Flow Test	ACT DIFF	FACTOR
1.897	1	1	1	100	1	-3	0.2500
1.897	1	1	1	100	1	-3	0.2500
2.828	1	1	1	100	1	-4	0.0000
3.742	1	1	1	100	1	-7	0.0000
1.279	1	1	1	100	1	3	1.7500
0.000	1	1	1	100	1	0	#DIV/0!
1.333	1	1	1	100	1	-4	0.6364
4.000	1	1	1	100	1	-8	0.0000
2.429	1	1	1	100	1	11	1.7333
2.280	1	1	1	100	1	13	1.5000
2.449	1	1	1	100	1	-3	0.0000
2.357	1	1	1	100	1	5	3.5000
1.644	1	1	1	100	1	-13	0.8116
0.985	1	1	1	100	1	-8	0.8857
1.778	1	1	1	100	1	-7	0.6316
1.114	1	1	1	100	1	-6	0.8125
2.000	1	1	1	100	1	-8	0.6000
0.756	1	1	1	100	1	-4	0.8667
0.343	1	1	1	100	1	-2	0.9429
0.000	1	1	1	100	1	0	1.0000
6.556	1	0	1	100	1	35	4.1818
4.677	1	1	1	100	1	19	3.7143
1.251	1	1	1	100	1	6	1.3000
1.901	1	1	1	100	1	11	1.3929
2.683	1	1	1	100	1	12	1.8571
4.386	1	1	1	100	1	23	2.4375
2.853	1	1	1	100	1	-17	0.6136
1.455	1	1	1	100	1	-6	0.7000
1.414	1	1	1	100	1	-2	0.3333
0.632	1	1	1	100	1	-1	0.6667
2.000	1	1	1	100	1	-2	0.0000
1.414	1	1	1	100	1	-1	0.0000
	32	31			32		

2.073