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1 Introduction

1.1 Our Involvement in Metro North

- 1.1.1 In March 2006, MVA Consultancy were appointed as sub-consultant by ERM to undertake the traffic assessment element of the Environmental Impact Statement for Metro North. In undertaking this work, we are required to advise the RPA on traffic related impacts associated with the single preferred route and associated construction methodology. This assessment is on-going, and when complete will provide a picture of the impact of the scheme in 2011 (assumed indicative construction year), 2014 (assumed year of opening) and 2029 (assumed horizon year).
- 1.1.2 MVA have been requested to advise the RPA and Jacobs Engineering on detailed multi-modal traffic related impacts associated with the construction of the project. In particular, we are now required to assess:
- the comparative impact of phasing options for construction works along sections of the alignment in outer urban areas;
 - the comparative impact of various construction methods and phasing scenarios at individual city centre stations; and
 - mitigating traffic management measures for various construction methodologies and phasing options.
- 1.1.3 To undertake an assessment of this level of complexity, it was deemed necessary to develop a micro-simulation model of Dublin city centre. This report outlines the development of the Dublin City Centre Traffic Model, a critical element of this study, and summarises the calibration and validation processes.

1.2 Background to Model Development

- 1.2.1 One of the key elements of the project to-date was to develop the Metro North SATURN Traffic Model (MNTM) to assess the impact of the Metro North alignment. We have therefore utilised this model to supplement available survey data in the production of our Dublin City Centre 2007 Base VISSIM Model. We have developed this model using the VISSIM micro-simulation software, release 5.00.08.
- 1.2.2 The model covers an area of the city centre from Dorset Street in the north, to St. Stephens Green in the south and includes the O'Connell Bridge and Butt Bridge crossings over the River Liffey. The development of the model made use of all available survey data. Where no count data was available we have utilised the MNTM traffic model to inform our decisions.
- 1.2.3 The VISSIM micro-simulation package offers two mechanisms of modelling routing choice:
- Static Routing - where the simulated vehicles follow routes through the network that are manually defined (vehicles in the simulation have no choice on which way to go from their origin to destination); or

2 Network Development

2.1 Overview

2.1.1 During the scoping stage of the study, it was identified that the model must be capable of:

- assessing the construction impacts of the proposed stations at Parnell Square, O'Connell Bridge and St Stephens Green;
- assessing the impact of traffic management proposals on general traffic, taxis and buses; and
- assessing the detailed operation of town centre junctions during the construction phasing.

2.1.2 Therefore, the preparation of the modelled network is a critical stage in the development of a robust, reliable traffic model suitable for the above purposes. An extensive data collection exercise has been undertaken in order to produce a detailed and accurate representation of the Dublin City Centre road network. This includes:

- junction inventories of all modelled intersections;
- review of all signal controlled junctions including pedestrian demands;
- comprehensive review of taxi operations; and
- comprehensive review of all bus services.

2.1.3 We have adopted standard VISSIM model coding procedures, in accordance with guidance available, when developing the models.

2.2 Network Coverage

2.2.1 The modelled network represents present traffic conditions and covers the area shown in Figure 2.1.

2.2.2 We are confident that the model area is sufficiently detailed in terms of network representation to provide a robust base model to undertake scheme assessments to satisfy the objectives of this study.

2.3 Modelled Time Periods

2.3.1 We have developed a VISSIM traffic model for the AM peak period (0800-0900), in line with our MNTM SATURN Model. The model incorporates a preload period of 1 hour (0700-0800) which facilitates the accurate representation of traffic conditions at the beginning of the peak period.

1 Introduction

- Dynamic Assignment – used where the road network provides several route options from one point to another (the assignment requires Origin-Destination matrices and distributes vehicles over these alternative routes based on generalised costs).
- 1.2.4 In this situation, both approaches are equally viable, however it is essential we consider the approach in conjunction with other applicable factors, ie the availability of a strategic model covering the network area.
- 1.2.5 The ‘Dynamic’ approach is generally adopted for larger networks where route choice will be an important factor when assessing future proposals similar to this study; however, we adopted the ‘Static’ routing option as this could easily be used in conjunction with the detailed larger strategic MNTM SATURN model.
- 1.2.6 The main reasons why we have adopted this approach include:
- the development of the model and associated run times are substantially less than the ‘Dynamic’ assignment approach;
 - the MNTM SATURN model was sufficiently detailed in the city centre area to inform routing patterns through the VISSIM model area; and
 - the MNTM SATURN model would also consider the wider area routing impacts of the whole scheme alignment.
- 1.2.7 Using the ‘Static’ routing approach we have developed, calibrated and validated models for the morning peak period. Separate user classes were input for cars, goods vehicles and taxis utilising all of the available count data and the MNTM SATURN model actual traffic flows. In addition, all bus services have been coded as fixed routes in the model.

1.3 Structure of Report

- 1.3.1 Following this introductory chapter, the Model Development Report consists of six further chapters:
- Chapter 2 details the model coverage area and network building procedures;
 - Chapter 3 discusses the traffic data collected during this study and utilised in the model development;
 - Chapter 4 presents the calibration and validation to observed traffic flows and journey time data, respectively, and also presents information on queue lengths; and
 - Chapter 5 provides our conclusions on the model development and its suitability for future use.

2.4 Model Data

2.4.1 We have utilised the following data in the production of the models:

- AutoCAD mapping (in electronic format);
- junction inventories, including photographic records; and
- existing signal data.

2.5 Signal Controlled Junctions

2.5.1 Timings for the signal controlled junctions within the network area were extracted from MNTM SATURN Model and supplemented by site visits.

2.5.2 We have assumed that the pedestrian stage is called every cycle at signal controlled junctions as pedestrian activity is high within the city centre area. Pedestrian flows are not modelled within this model.

2.5.3 During the Model Validation and Calibration process we have re-optimised the signals as required to reflect the optimisation of the signal times and co-ordination that would occur on-street with Dublin City SCATS Urban Traffic Control system.

2.5.4 Information on pedestrian crossings within the network area was extracted from the MNTM SATURN Model.

2.6 Speed Restrictions

2.6.1 Information on speed limits in the network area was taken from site observations. Using this data, speed distributions were defined in the model for each speed restriction and vehicle type. The speed distributions used in the models are shown below in Table 2.1.

Table 2.1 Speed Distributions by Vehicle Type

Speed Limit	Speed Distributions	
	Cars & Taxis	Heavies & Buses
30 kph	25-35 kph	20-30 kph
50 kph	40-45 kph	25-35 kph

Values are kilometres per hour

2.7 Bus Services

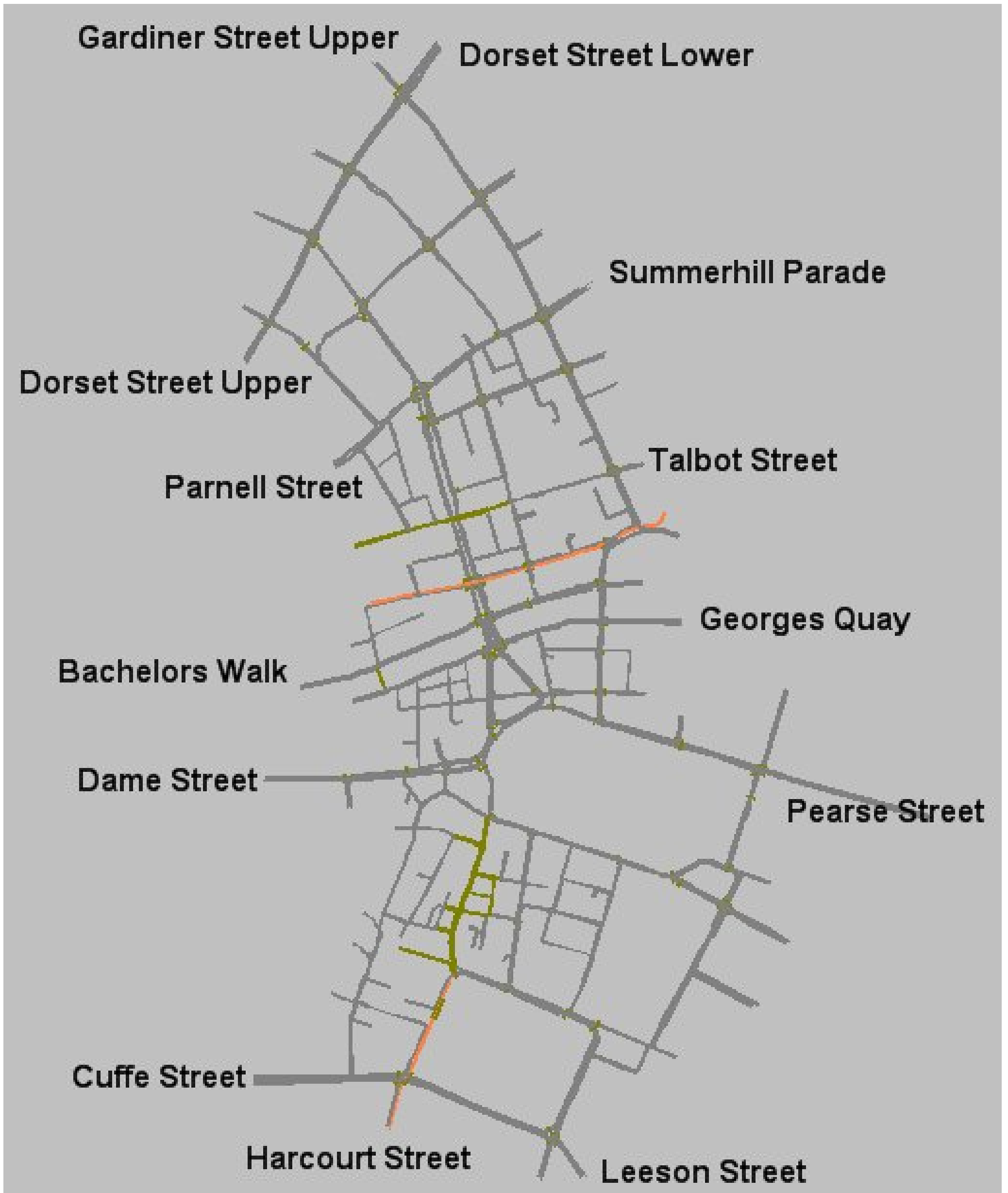
2.7.1 Bus services in the modelled network are coded as fixed route services with designated start times and a frequency. A comprehensive review of all public bus services in the Dublin City Centre area has been undertaken and collated for input into the model. It is considered that every public bus service in the City Centre as at June 2007 has been included in the model.

2 Network Development

- 2.7.2 Using the collated data, bus routes were coded in VISSIM with start times based on timetable information. Appendix A includes details on all the bus services coded within the model.
- 2.7.3 The stopping characteristics at individual bus stops are determined by bus stop dwell time distributions. We have included all bus stops in the modelled area.
- 2.7.4 Bus stops in the network were categorised by location and a standard dwell time distribution assigned as follows:
- High Use – mean time 101 seconds, standard deviation 57 seconds;
 - Medium Use – mean time 36 seconds, standard deviation 15 seconds; and
 - Low Use – mean time 20 seconds, standard deviation 11 seconds.
- 2.7.5 The above dwell times are based on site observations where we undertook surveys of passengers boarding and alighting at a selection of bus stops within the modelled area. We then categorised each bus stop into the above usage levels to reflect the demand for boarding and alighting at each location.
- 2.7.6 It should be noted that the bus stop 'skipping' function has been enabled at all bus stops in the network. Therefore, if the returned random dwell time for a vehicle approaching a stop is less than 0.1 seconds then the bus will not slow down at the stop. The returned random dwell time is dependent on the distribution and hence the low use stops are most likely to return a value of zero. This replicates the true behaviour of buses at stops, where buses only stop when passengers are boarding or alighting.
- 2.7.7 In addition to the timetabled bus services, additional bus routes and stopping locations have been coded into the network to account for private coach tours.

2.8 Other Model Assumptions

- 2.8.1 Parking restrictions have been modelled as they were observed to operate rather than assuming complete adherence to regulations by the public. This is to ensure the model reflects the true operational characteristics of the local area.
- 2.8.2 Taxi ranks have not been included in the area. Taxi movements are replicated throughout the modelled area.
- 2.8.3 Motor and pedal cycles have not been included in the modelling.



Extent of Dublin City Centre VISSIM Model

Figure 2.1

3 Survey Data and Other Data Sources

3.1 Introduction

3.1.1 In order to develop a robust and reliable Dublin City Centre Traffic Model it was necessary to utilise various data resources, including:

- Manual Classified Count Data;
- MNTM SATURN model;
- Dublin Bus website; and
- Site visits.

3.2 Count Data

3.2.1 Manual Classified Junction turning counts were provided for the City Centre area covering for the 0700 – 0900 period at 40 junction locations. The data was collected in February 2005 but is considered appropriate for present conditions as no major traffic management plans have been implemented since the data collection exercise was undertaken. In addition, it is recognised that the road network generally operates at/or close to capacity in the AM peak period, so traffic flows are not likely to differ considerably between the years.

3.2.2 Where no junction turning count data was available we utilised 'Actual Flow' data from the MNTM SATURN model. The MNTM SATURN model was specifically developed for evaluating the impact of the Metro North alignment options and is considered 'fit-for-use' for this purpose.

3.2.3 To supplement the traffic flow data mentioned above, we have undertaken a 'Select Link Analysis' (SLA) procedure to extract origin-destination flow data to identify traffic flow patterns through the network area. This task will inform the 'Static Routing' inputs to realistically replicate drivers' lane choice behaviour, ie mirror the 'local knowledge' city centre drivers possess.

3.2.4 Traffic flows used in the VISSIM model development are contained in Appendix B.

3.3 Journey Time Survey Data

3.3.1 Car based journey times were undertaken on Tuesday 3 and Wednesday 4 July 2007. The journey time survey was conducted between the following junctions:

- Northbound - Leeson Street / Pembroke Street and Dorset Street / Gardiner Street; and
- Southbound – Dorset Street / Gardiner Street and Merrion Street Upper / Merrion Row.

3.3.2 Journey times were recorded at each of the following timing points within the modelled area:

Northbound (via O'Connell Bridge)

- Node 102 – Leeson Street / St. Stephen's Green;
- Node 103 - Merrion Row/ St. Stephen's Green North;
- Node 104 - St. Stephen's Green / Kildare Street;
- Node 105 - Dawson Street / Nassau Street;
- Node 106 - Leinster Street / Kildare Street;
- Node 107 - Leinster Street / Lincoln Place;
- Node 108 - Lincoln Place / Westland Row;
- Node 109 - Westland Row / Pearse Street;
- Node 110 - Pearse Street / Tara Street;
- Node 111 - Tara Street / Townsend Street;
- Node 112 - Tara Street / Burgh Quay;
- Node 113 - Burgh Quay / Hawkins Street;
- Node 114 - Burgh Quay / O'Connell Bridge South;
- Node 115 - O'Connell Bridge / O'Connell Street;
- Node 116 - O'Connell Street / Abbey Street;
- Node 117 - O'Connell Street / Henry Street;
- Node 118 - O'Connell Street / Parnell Street;
- Node 119 - Parnell Street / Parnell Square West;
- Node 120 - Parnell Square West / Parnell Square North;
- Node 121 - Granby Row / Dorset Street;
- Node 122 - Dorset Street / Fredrick Street; and
- Node 122 - Dorset Street / Gardiner Street.

Southbound

- Node 201 - Dorset Street Lower / Gardiner Street Upper;
- Node 202 - Gardiner Street Upper / Gardiner Place;
- Node 203 - Gardiner Street Middle / Parnell Street;
- Node 204 - Parnell Street / Marlborough Street;
- Node 205 - Brugha Street / Marlborough Street;
- Node 206 - Brugha Street / O'Connell Street;
- Node 207 - O'Connell Street / Earl Street North;
- Node 208 - O'Connell Street / Abbey Street
- Node 209 - O'Connell Street / Eden Quay

- Node 210 - O’Connell Bridge South / D’Olier Street;
- Node 211 - D’Olier Street / Fleet Street;
- Node 212 - College Street / College Green;
- Node 213 - College Green / Grafton Street;
- Node 214 - Grafton Street / Nassau Street;
- Node 215 - Nassau Street / Dawson Street;
- Node 216 - Nassau Street / Kildare Street;
- Node 217 - Kildare Street / Molesworth Street;
- Node 218 - Kildare Street / St. Stephen’s Green North;
- Node 219 - St. Stephen’s Green North / Merrion Row; and
- Node 220 - Merrion Row / Merrion Street Upper.

3.3.3 The journey time survey runs utilised a standard method as outlined in the DMRB Traffic Appraisal Manual. The runs were spread throughout each survey period to avoid a cluster at any particular time. It is normal practice to have a minimum of 6 runs per direction per time period, although, due to lengths of these runs we were unable to complete a sixth run in the southbound direction. However, we consider the sample sufficient for the validation of the model. Table 3.1 indicates the actual number of runs undertaken.

Table 3.1 Number of Journey Time Survey Runs

Time Period	Number of Journey Time Survey Runs	
	Northbound	Southbound
0700-0900	6	5

3.3.4 Details of the average journey time survey results and the modelled results are discussed later in Chapter 4.

4 Model Validation and Calibration

4.1 Introduction

- 4.1.1 This chapter details the steps taken to produce and validate the Dublin City Centre VISSIM model using the data outlined in the previous chapters.
- 4.1.2 The surveyed traffic data has been directly input into VISSIM as entry flows at the network edges and turning proportions at each modelled junction. This is to ensure modelled flows are directly equivalent to the observed traffic flows. Where gaps were identified in the survey data we have utilised the MNTM SATURN model to infill the traffic flow data.
- 4.1.3 Validation is the process of comparing observed data against corresponding modelled data. Validation has been undertaken using the journey times for the routes detailed in Chapter 3.

4.2 Calibration and Validation Measures

- 4.2.1 The following measures were applied to achieve a good level of validation in the models:
- Within VISSIM it is normal modelling practise to route traffic through one junction at a time. In congested situations, however, this can lead to unrealistic lane changing too close to the downstream junction, particularly where junction spacing is relatively short. Therefore, in order to replicate observed vehicle behaviour, ie drivers' local knowledge of the road network, we have utilised origin-destination information from the MNTM SATURN model to inform the routing decisions on the main routes through the modelled area;
 - Within VISSIM there is a parameter 'Waiting Time Before Diffusion', which determines the maximum time a vehicle can remain stationary within the network, eg waiting to changing lane. When this time is reached the vehicle is taken out of the network and a warning message is written to the error file. We have maintained the default value of 60 seconds for the purposes of this model;
 - New link types have been defined within VISSIM for congested links within the modelled network. This effectively increases the saturation flow and reduces the headway on the links thus providing a more accurate representation of driver behaviour in congested conditions; and
 - Reduced speed areas have been defined and placed on turning sections to realistically model vehicles slowing down on the approach to each turn.

4.3 Calibration Statistics

- 4.3.1 The criteria set out in the Design Manual for Roads and Bridges (DMRB) Volume 12, Section 2, Part 1 Chapter 4 were referenced when evaluating the model. The DMRB criterion makes use of the GEH summary statistic, which is defined as:

$$GEH = \sqrt{\frac{(observed - modelled)^2}{0.5 * (observed + modelled)}}$$

4.3.2 Table 4.1 summarises the flow comparisons for all traffic flows and compares them against the DMRB criteria. Appendix C contains full details of the traffic flow comparisons.

Table 4.1 Link Calibration Summary – Actual Traffic Flows (Using Survey data only for 2006 base model)

	GEH <5	GEH <7	GEH <10	Flows within 100 for links with flows of less than 700vph	Flows within 15% for links with flows 700 – 2700vph
DMRB Criteria	>85%	n/a	n/a	>85%	>85%
Lights	87	94	96	-	-
Heavies	79	94	100	-	-
Taxis	79	96	99	-	-
Buses	95	98	100	-	-
TOTAL	92	97	99	-	-

vph = vehicles per hour

4.3.3 Table 4.1 indicates that that the DMRB criteria for all vehicle classes have been fully satisfied which indicates that the calibration of the model is excellent.

4.3.4 Closer inspection of the link flow comparisons shows that the modelled flows are well matched to observed data throughout the modelled area.

4.4 Validation Statistics

4.4.1 The Design Manual for Roads and Bridges (DMRB) Volume 12, Section 2, Chapter 6 recommends that data should be plotted on graph where the observed mean journey time are showing the 95% confidence range for each section with the modelled journey time. This allows for comparison of the modelled with the observed journey time as detailed in Chapter 3.

4.4.2 The graphs in Appendix D compare the average modelled journey times (shown as the red line on the graphs) to three values:

- the average observed journey times (shown as a blue cross);
- 95% confidence levels about the mean journey time (shown as a blue bar); and
- 95% confidence levels about the population (shown as the green bar).

4.4.3 The 95% confidence interval about the mean is the most exacting validation criteria. The 95% confidence level about the population is a less exacting validation criterion.

4 Model Validation and Calibration

4.4.4 Appendix D contains the complete journey time comparisons, including journey time graphs. Tables 4.2 to 4.3 summarise the validation results. The notation used in the tables is as follows:

- X – Satisfies 95% confidence level about the mean criteria;
- O – Satisfies 95% confidence level about the population criteria; and
- Neither – fails to meet either validation criteria.

Table 4.2 Northbound Journey Time Validation Summary

Section	Section Description	Level of Validation
102	Leeson Street / St. Stephen's Green – Merrion Row/Stephen's Green North	X
103	Merrion Row / St. Stephens Green North –St. Stephen's Green / Kildare Street	X
104	St. Stephen's Green / Kildare Street - Dawson Street / Nassau Street	X
105	Dawson Street / Nassau Street - Leinster Street / Kildare Street	-
106	Leinster Street / Kildare Street - Leinster Street / Lincoln Place	X
107	Leinster Street / Lincoln Place - Lincoln Place / Westland Row	X
108	Lincoln Place / Westland Row - Westland Row / Pearse Street	X
109	Westland Row / Pearse Street - Pearse Street / Tara Street	X
110	Pearse Street / Tara Street - Tara Street / Townsend Street	X
111	Tara Street / Townsend Street - Tara Street / Burgh Quay	X
112	Tara Street / Burgh Quay - Burgh Quay / Hawkins Street	X
113	Burgh Quay / Hawkins Street - Burgh Quay / O'Connell Bridge South	X
114	Burgh Quay / O'Connell Bridge South - O'Connell Bridge / O'Connell Street	X
115	O'Connell Bridge / O'Connell Street - O'Connell Street / Abbey Street	O
116	O'Connell Street / Abbey Street - O'Connell Street / Henry Street	-
117	O'Connell Street / Henry Street - O'Connell Street / Parnell Street	X
118	O'Connell Street / Parnell Street - Parnell Street / Parnell Square West	X
119	Parnell Street / Parnell Square West - Parnell Square West / Parnell Square North	O
120	Parnell Square West / Parnell Square North - Granby Row / Dorset Street	X
121	Granby Row / Dorset Street - Dorset / Frederick Street	O
Total	Northbound	X

Table 4.3 Journey Time Validation Summary - Southbound

Section	Section Description	Level of Validation
201	Dorset Street Lower / Gardiner Street Upper - Gardiner Street Upper / Gardiner Place	X
202	Gardiner Street Upper / Gardiner Place - Gardiner Street Middle / Parnell Street	X
203	Gardiner Street Middle / Parnell Street - Parnell Street / Marlborough Street	X
204	Parnell Street / Marlborough Street - Brugha Street / Marlborough Street	X
205	Brugha Street / Marlborough Street - Brugha Street / O'Connell Street	X
206	Brugha Street / O'Connell Street - O'Connell Street / Earl Street North	X
207	O'Connell Street / Earl Street North - O'Connell Street / Abbey Street	X
208	O'Connell Street / Abbey Street - O'Connell Street / Eden Quay	X
209	O'Connell Street / Eden Quay - O'Connell Bridge South / D'Olier Street	X
210	O'Connell Bridge South / D'Olier Street - D'Olier Street / Fleet St	X
211	D'Olier Street / Fleet Street - College Street / College Green	X
212	College Street / College Green - College Green / Grafton Street	X
213	College Green / Grafton Street - Grafton Street / Nassau Street	X
214	Grafton Street / Nassau Street - Nassau Street / Dawson Street	X
215	Nassau Street / Dawson Street - Nassau Street / Kildare Street	X
216	Nassau Street / Kildare Street - Kildare Street / Molesworth Street	X
217	Kildare Street / Molesworth Street - Kildare Street / St. Stephen's Green North	X
218	Kildare Street / St. Stephen's Green North - Merrion Row / St. Stephen's Green North	X
219	Merrion Row / St. Stephen's Green North - Merrion Row / Merrion Street	X
Total	Southbound	X

4.4.5 Table 4.2 above indicates that 75% (15 out of 20) of the journey time sections in the northbound direction fall within the 95% confidence limits. Similarly, Table 4.3 indicates that 100% (19 out of 19) fall within the 95% confidence limits in the southbound direction.

4 Model Validation and Calibration

- 4.4.6 Overall 87% (34 out of 39) of the journey time sections fall within the 95% confidence limits. This level of validation against independent data is very good and highlights that the model provides a robust basis on which the Metro North construction impacts can be evaluated.

5 Conclusions and Future Model Application

5.1 Conclusions

- 5.1.1 The development of the Dublin City Centre Traffic Model has been presented in this report. The model development has made use of an extensive data, which has allowed for a detailed representation of the modelled network.
- 5.1.2 The calibration of the model to link flows has been presented and has been shown to be excellent for model time period. The validation of the model to independent journey time data is also very good and this adds confidence to the future use of the model.
- 5.1.3 We consider that the Dublin City Centre Traffic Model will provide a reliable and robust base against which to test construction impacts of the Metro North Stations and mitigating traffic management proposals.

Appendix A – Bus Service Details

Dublin City Centre VISSIM Model - Coded Bus Services

VISSIM Line No	Ser. No.	Direction	Terminus	AM Preload				AM Peak Hour				Notes
				0700 - 0800				0800 - 0900				
				Initial Service Time	VISSIM Start Time (secs)	No of Services in Period	VISSIM Service Rate (secs)	Initial Service Time	VISSIM Start Time	No of Services in Period	VISSIM Service Rate (secs)	
Dublin Bus												
1	1	SB	Parnell Sq East, O'Connell St, D'Olier St, Townsend St, Lombard St, Pearse St	Parnell Square	0730	1800	1	Single Service	-	-	-	-
2	1	NB	Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell Sq West, Parnell Sq North	Parnell Square	-	-	-	-	0825	1500	1	Single Service
3	2	SB	Parnell Sq East, O'Connell St, D'Olier St, Townsend St, Lombard St, Pearse St	Parnell Square	0715	900	1	Single Service	0805	300	2	1650
4	2	NB	Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell Sq West	Parnell Square	-	-	-	-	0810	600	3	1000
5	3	SB	Parnell Sq East, O'Connell St, D'Olier St, Townsend St, Lombard St, Pearse St	Parnell Square	0735	2100	3	500	0815	900	3	900
6	3	NB	Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell Sq West, Parnell Sq North	Parnell Square	0740	2400	2	600	0810	600	2	1500
7	4	SB	Blessington St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Clare St, Merrion Sq North		0705	300	5	660	0805	300	3	1100
8	4	NB	Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell Sq West, Western Way		0715	900	3	900	0810	600	4	750
9	5	SB	Parnell Square East, O'Connell St, D'Olier St, College St, Nassau St, Clare St, Merrion Sq North, Mount St	Parnell Square	-	-	-	-	0805	300	1	Single Service
10	7/A/B/D	SB	Parnell Square East, O'Connell St, D'Olier St, College St, Nassau St, Clare St, Merrion Sq North, Mount St	Parnell Square	0700	0	7	520	0810	600	5	600
11	7/A/B/D	NB	Mount St, Clare St, Lincoln Pl, Westland Row, Pearse St, College St, West Morland St, O'Connell St, Parnell Square West	Parnell Square	0725	1500	3	700	0800	0	7	520
12	8	SB	Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Clare St, Merrion Sq North, Mount St	Parnell Square	-	-	-	-	0815	900	1	Single Service
13	8	NB	Mount St, Clare St, Lincoln Pl, Westland Row, Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell Sq West	Parnell Square	-	-	-	-	0800	0	1	Single Service
14	10/A	SB	Blessington St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, Merrion Row, Baggot St		0705	300	6	550	0800	0	11	330
15	10/A	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Western Way		0725	1500	5	420	0800	0	9	400
16	11/A/B	SB	Dorset St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, St Stephens Green East, Leeson St		0710	600	4	750	0800	0	7	520
17	11/A/B	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Dorset St		0740	2400	3	400	0800	0	7	520
18	13/A	SB	Dorset St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Clare St, Merrion Sq South		0700	0	6	600	0805	300	7	480
19	13/A	NB	Merrion Sq South, Clare St, Lincoln Pl, Westland Row, Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell St West, Dorset St		0700	0	6	600	0800	0	6	600
20	14/A	SB	Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, St Stephens Green East, Earlsfort Tce	Parnell Square	0720	1200	4	600	0810	600	4	750
21	14/A	NB	Earlsfort Tce, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West	Parnell Square	0730	1800	4	450	0810	600	4	750
22	15/A/B/C/E/F	SB	Eden Quay, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green East, Earlsfort Tce	Eden Quay Contra Flow	0705	300	10	330	0800	0	10	360
23	15/A/B/C/E/F	NB	Earlsfort Tce, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, Fleet St, Tara St, Eden Quay	Eden Quay Contra Flow	0710	600	10	300	0800	0	18	200
24	15X		Earlsfort Tce, St Stephens Green East, St Stephens Green North, Dawson Street, Suffolk St, Fleet St, Townsend St, Lombard St, Westland Row, Merrion Square		-	-	-	-	0805	300	1	Single Service
25	16/A	SB	Dorset St, Parnell Sq East, O'Connell St, D'Olier St, College St, College Green, Dame St, South Great Georges St		0700	0	8	450	805	300	5	660
26	16/A	NB	South Great Georges St, Dame St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Dorset St		0720	1200	3	800	800	0	9	400
27	19/A	SB	Blessington St, Parnell Sq East, O'Connell St, D'Olier St, College St, College Green, Dame St, South Great Georges St		0710	600	9	340	806	360	10	330
28	19/A	NB	South Great Georges St, Dame St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Western Way		0715	900	8	340	800	0	11	330
29	20B		Talbot St, Marlborough St, Eden Quay, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St. Stephens Green		0700	0	2	1800	800	0	6	600
30	20B		St. Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, Eden Quay Beresford Pl		-	-	-	-	800	0	4	900
31	25/A	WB	Pearse St, Westmoreland St, Aston Quay, Wellington Quay	Pearse St (opposite G	0708	480	4	780	815	900	3	900
32	25/A	EB	Ormonds Quay, Bachelors Walk, D'Olier St, Townsend St	Pearse St (opposite G	0705	300	6	550	803	180	5	690
33	25X	EB	Ormonds Quay, Bachelors Walk, D'Olier St, College St, Grafton St, Nassau St, Kildare St, Merrion Row, Baggot St		-	-	-	-	0805	300	12	280
34	26	WB	Pearse St, Westmoreland St, Aston Quay, Wellington Quay	Pearse St (opposite G	0715	900	1	Single Service	835	2100	2	750
35	26	EB	Ormonds Quay, Bachelors Walk, D'Olier St, Townsend St	Pearse St (opposite G	0745	2700	1	Single Service	835	2100	2	750
36	27C	SB	Beresford Pl, Burgh Quay, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green East, Leeson St		-	-	-	-	800	0	-	-
37	27X	SB	Georges Quay, Burgh Quay, Hawkins St, College St, Grafton St, Nassau St, Clare St, Merrion Square		-	-	-	-	0815	900	3	900
38	29A	SB	Talbot St, Marlborough St	Marlborough St	0720	1200	3	800	810	600	5	600
39	29A	NB	Marlborough St, Eden Quay, Beresford Pl	Eden Quay	710	600	4	750	810	600	5	600
40	31	SB	Talbot St, Marlborough St	Marlborough St	0730	1800	2	900	810	600	4	750
41	31	NB	Marlborough St, Eden Quay, Beresford Pl	Eden Quay	0750	3000	1	Single Service	810	600	4	750
42	32/A/B	SB	Talbot St, Marlborough St	Marlborough St	-	-	-	-	800	0	3	1200
43	32/A/B	NB	Marlborough St, Eden Quay, Beresford Pl	Eden Quay	0700	0	2	1800	800	0	3	1200
44	32X	SB	Talbot St, Marlborough St, Eden Quay, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St. Stephens Green		-	-	-	-	0805	300	3	1100
45	33	SB	Dorset St, Frederick St, Parnell Square East, O'Connell St, Cathal Brugha St, Marlborough St	Marlborough St	0725	1500	2	1050	825	1500	3	700
46	33	NB	Lower Abbey St, Gardiner St, Dorset St	Lower Abbey St	0705	300	3	1100	805	300	2	1650
47	37	WB	Hawkins St, College St, College Green, Dame St	Hawkins St	0700	0	5	720	810	600	4	750
48	37	EB	Dame St, College Green, Westmorland St, D'Olier St, Townsend St, Tara St, Burgh Quay, Hawkins St	Hawkins St	0730	1800	2	900	800	0	7	520
49	37X	EB	Ormonds Quay, Bachelors Walk, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green, Leeson St		-	-	-	-	0820	1200	3	800
50	38/A/B/C	SB	Blessington St, Parnell Sq East, O'Connell St, D'Olier St, Townsend St, Tara St, Burgh Quay, Hawkins St	Hawkins St	0710	600	5	600	800	0	8	450
51	38/A/B/C	NB	Hawkins St, College St, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Western Way	Hawkins St	0700	0	8	450	800	0	7	520
52	39/A/C	WB	Hawkins St, College St, College Green, Dame St	Hawkins St	705	300	8	420	805	300	6	550
53	39/A/C	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Tara St, Burgh Quay, Hawkins St	Hawkins St	0700	0	8	450	806	360	8	410
54	39B	WB	Ormonds Quay, Bachelors Walk, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green, Leeson St		-	-	-	-	805	300	4	830
55	39X	WB	Blessington St, Parnell Sq East, O'Connell St, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephen's Green, Leeson St		-	-	-	-	0800	0	5	720
56	40/A/B/C/D	SB	Dorset St, Frederick St, Parnell Sq East, Parnell St	Parnell Street	0700	0	13	280	800	0	14	260
57	40/A/B/C/D	NB	Parnell St, Gardiner St, Dorset St	Parnell Street	700	0	16	230	800	0	16	230
58	40A	SB	Dorset St, Frederick St, Parnell Sq East, O'Connell St, D'Olier St, College St, Grafton St, Nassau St, Dawson St, St Stephen's Green	St Stephen's Green	-	-	-	-	800	0	2	1800
59	41/A/B/C	SB	Dorset St, Frederick St, Parnell Square East, O'Connell St, Abbey St Lower	Lower Abbey St	700	0	9	400	800	0	11	330
60	41/A/B/C	NB	Lower Abbey St, Gardiner St, Dorset St	Lower Abbey St	705	300	8	420	800	0	6	600
61	41X	SB	Dorset St, Parnell Sq East, O'Connell St, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephen's Green, Leeson St		-	-	-	-	0825	1500	5	420
62	42/A/B	SB	Talbot St, Marlborough St	Marlborough St	705	300	6	550	805	300	9	370
63	42/A/B	NB	Lower Abbey St, Beresford Pl	Lower Abbey St	700	0	7	520	805	300	8	420
64	43	SB	Talbot St, Marlborough St	Marlborough St	745	2700	1	Single Service	800	0	4	900
65	43	NB	Lower Abbey St, Beresford Pl	Lower Abbey St	700	0	3	1200	815	900	2	1350
66	44/B/C	SB	Townsend St, Lombard St, Westland Row, Merrion Square, Ely Place, Hume St, St Stephen's Green East, Earlsfort Tce	Townsend St	715	900	1	Single Service	810	600	2	1500
67	44/B/C	NB	Earlsfort Tce, St Stephen's Green East, Dawson St, Nassau St, Lincoln Place, Westland Row, Pearse St, Tara St, Poolbeg St, Hawkins St, Townsend St	Townsend St	730	1800	1	Single Service	800	0	3	1200
68	45	SB	Eden Quay Contra Flow, D'Olier St, College St, Grafton St, Nassau St, Clare St, Merrion Square North	Eden Quay Contra Flow	702	120	3	1160	800	0	3	1200
69	45	NB	Merrion Square North, Clare St, Lincoln Place, Westland Row, Pearse St, Tara St, Eden Quay	Eden Quay Contra Flow	740	2400	2	600	810	600	4	750
70	46/A/B/C/D/E	SB	Mountjoy Sq North, Denmark St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, St Stephens Green, Leeson St	Mountjoy Square	700	0	10	360	804	240	15	230
71	46/A/B/C/D/E	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West	Mountjoy Square	725	1500	5	420	800	0	20	180

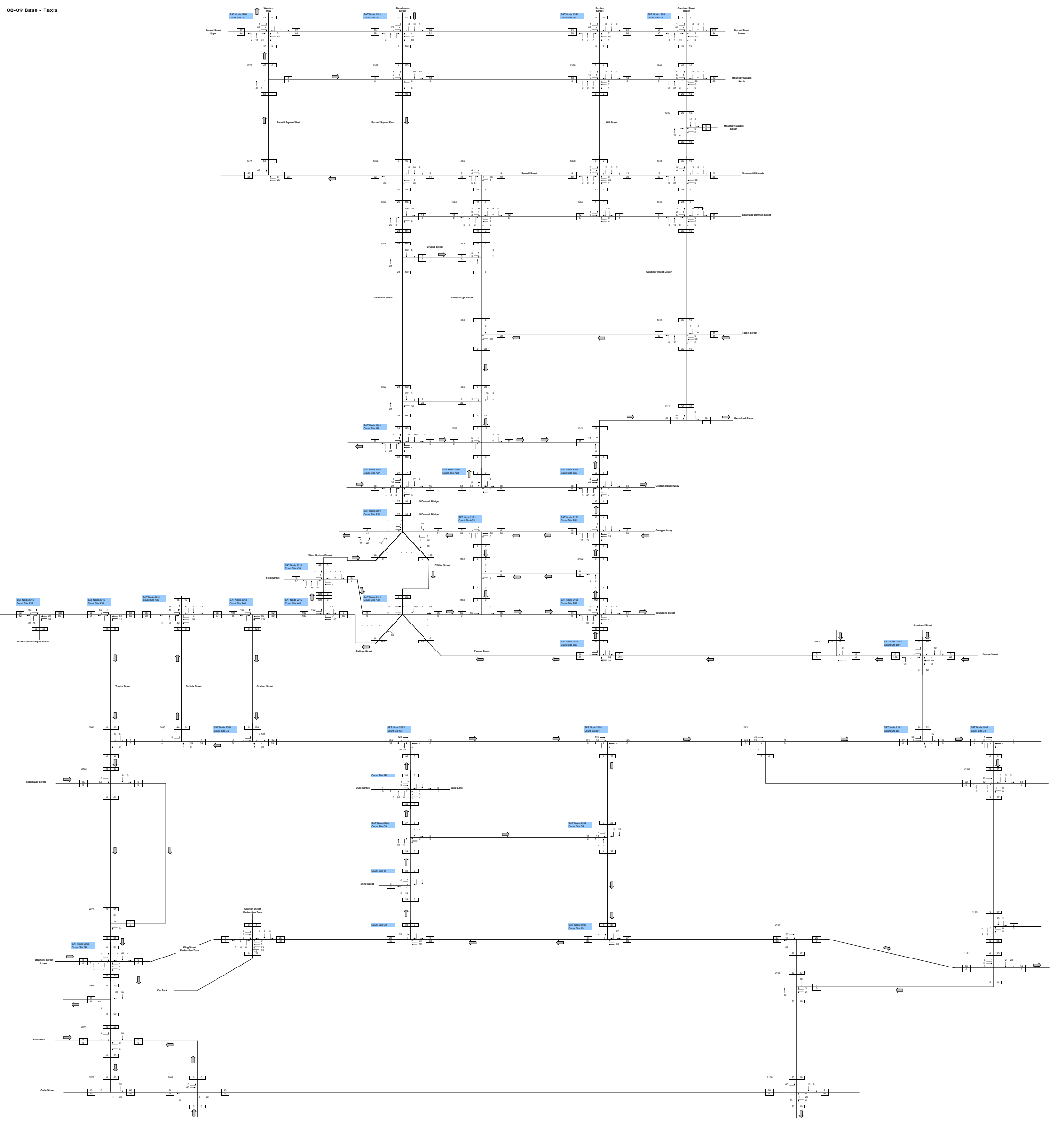
Dublin City Centre VISSIM Model - Coded Bus Services

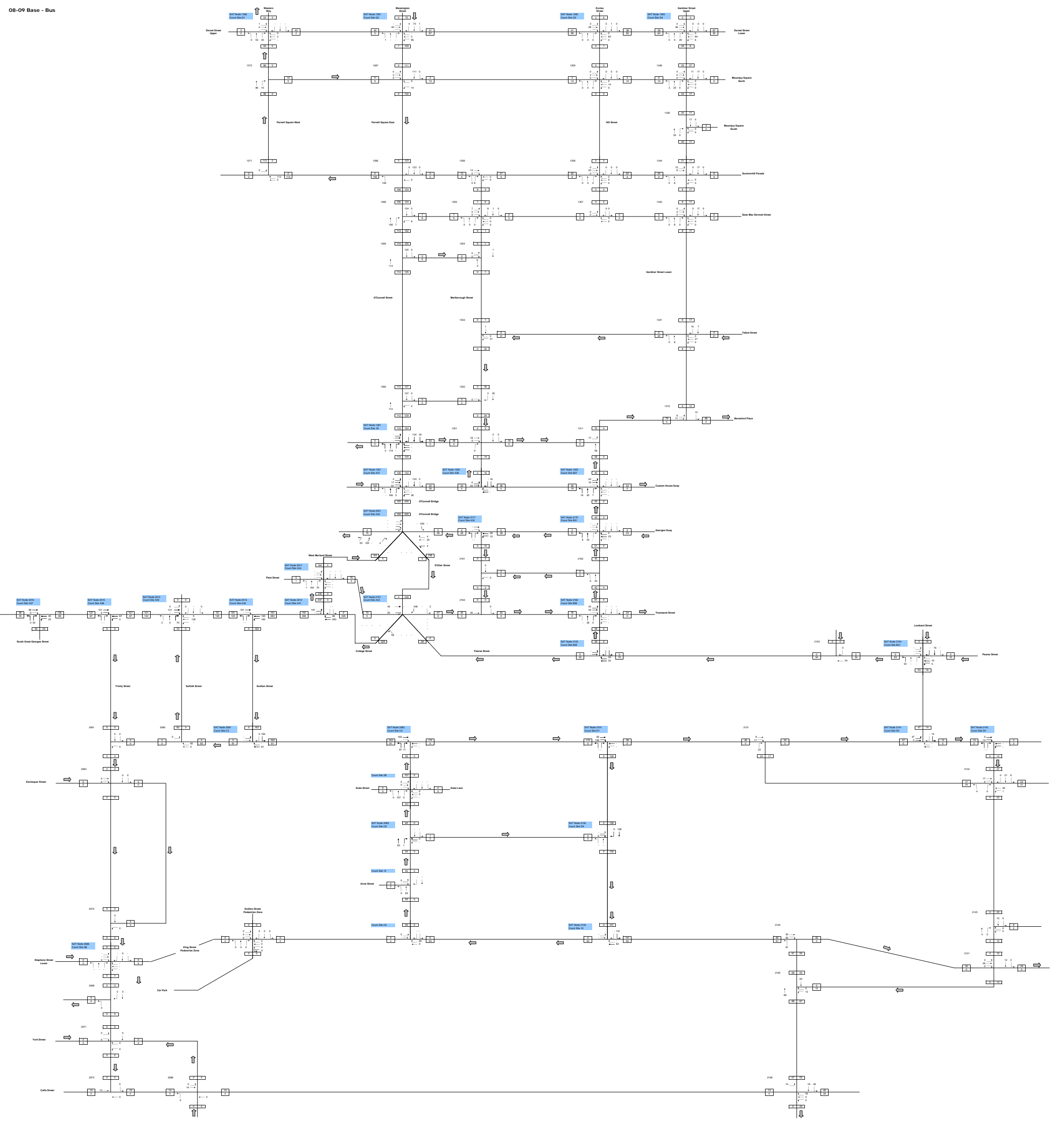
VISSIM Line No	Ser. No.	Direction	Terminus	AM Preload 0700 - 0800				AM Peak Hour 0800 - 0900				Notes	
				Initial Service Time	VISSIM Start Time (secs)	No of Services in Period	VISSIM Service Rate (secs)	Initial Service Time	VISSIM Start Time	No of Services in Period	VISSIM Service Rate (secs)		
72	46X	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Dorset St		-	-	-	0830	1800	1	Single Service		
73	46X	SB	No service										
74	48A	SB	Parnell Sq East, O'Connell St, D'Olier St, Townsend St, Lombard St, Westland Row, Merrion Square West, Ely Place, Hume St, St Stephen's Green East, Earlsfort Terrace	Parnell Square	710	600	2	1500	800	0	3	1200	
75	48A	NB	Earlsfort Terrace, St Stephen's Green East, St Stephen's Green North, Dawson St, Nassau St, Lincoln Place, Westland Row, Pearse St, College St, Westmoreland St, O'Connell St, Parnell Square West	Parnell Square	745	2700	1	Single Service	820	1200	2	1200	
76	49/A	WB	Eden Quay, D'Olier St, College St, College Green, Dame St	Eden Quay Contra Fl	710	600	3	1000	810	600	3	1000	
77	49/A	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Tara St, Eden Quay	Eden Quay Contra Fl	725	1500	3	700	810	600	4	750	
78	49X	WB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Lombard St, Westland Row, Merrion Square West		-	-	-	0805	300	1	Single Service		
79	49X	EB	No Service in time period										
80	50	WB	Pearse St, College St, Dame St, Lord Edward St		715	900	1	Single Service	800	0	1	Single Service	
81	50	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Pearse St		715	900	2	1350	820	1200	1	Single Service	
82	50X		Dame St, Fleet St, Townsend St, Lombard St, Westland Row, Merrion Square West		-	-	-	0820	1200	1	Single Service		
83	50X		No Service in time period										
84	51/B/C	EB	High St, Lord Edward St, Dame St, College Green, Westmoreland St, Aston Quay	Aston Quay	715	900	7	390	800	0	8	450	
85	51/B/C	WB	Aston Quay, Wellington Quay, Essex Quay, Wood Quay	Aston Quay	700	0	5	720	810	600	5	600	
86	51A	NB	Lower Abbey St, Beresford Pl	Lower Abbey St	700	0	1	Single Service	815	900	1	Single Service	
87	51A	SB	Talbot St, Marlborough St, Lower Abbey St	Lower Abbey St	-	-	-	-	815	900	1	Single Service	
88	51d	EB	Bachelors Walk, o'Connell Bridge, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green North, Merrion Row, Baggot St		-	-	-	-	820	1200	3	800	
89	51d	WB	No Service in time period										
90	51X	EB	Bachelors Walk, O'Connell Bridge, D'Olier St, College St, Nassau St, Kildare St, St Stephen's Green North, Merrion Row, Baggot St		-	-	-	-	0815	900	2	1350	
91	51X	WB	No Service in time period										
92	53/A	SB	Talbot St, Marlborough St, Eden Quay,	Marlborough St	730	1800	2	900	810	600	3	1000	
93	53/A	NB	Marlborough St, Eden Quay, Beresford Pl	Eden Quay	720	1200	2	1200	800	0	3	1200	
94	54A	WB	Eden Quay, D'Olier St, College St, College Green, Dame St	Eden Quay Contra Fl	700	0	2	1800	800	0	3	1200	
95	54A	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Tara St, Eden Quay	Eden Quay Contra Fl	-	-	-	-	800	0	3	1200	
96	56A	WB	Pearse St, College St, Dame St, Lord Edward St		730	1800	2	900	822	1320	2	1140	
97	56A	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Pearse St		700	0	2	1800	805	300	2	1650	
98	58C	SB	No Service in time period										
99	58C	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West	Parnell Square	-	-	-	-	840	2400	1	Single Service	
100	58X	SB	No Service in time period										
101	58X	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Dorset St		-	-	-	-	0820	1200	1	Single Service	
102	59		Outwith network extent										
103	59		Outwith network extent										
104	63	SB	Mountjoy Sq North, Denmark St, Parnell Sq East, O'Connell St, D'Olier St, Grafton St, Nassau St, Clare St, Merrion Sq North, Mount St	Mountjoy Square	-	-	-	-	810	600	1	Single Service	
105	63	NB	Merrion Sq South, Clare St, Lincoln Pl, Westland Row, Pearse St, College St, West Morland St, O'Connell St, Parnell St, Parnell St West, Parnell Sq North, Denmark St, Gardiner St, Mountjoy Sq South	Mountjoy Square	-	-	-	-	800	0	2	1800	
106	65/B	WB	Eden Quay, D'Olier St, College St, College Green, Dame St, South Great Georges St	Eden Quay Contra Fl	705	300	3	1100	810	600	2	1500	
107	65/B	EB	South Great Georges St, Dame St, College Green, Westmorland St, Fleet St, Townsend St, Tara St, Eden Quay	Eden Quay Contra Fl	750	3000	1	Single Service	815	900	3	900	
108	65X	EB	Georges St, Dame St, College Green, Westmoreland St, Fleet St, Townsend St, Lombard St, Westland Row, Merrion Square West, Baggot St		-	-	-	-	0840	2400	1	Single Service	
109	65X	WB	no service										
110	66/A/B	WB	Pearse St, College St, Westmoreland Street, Aston Quay, Wellington Quay	Pearse St (opposite G	710	600	4	750	800	0	3	1200	
111	66/A/B	EB	Ormond Quay, Bachelors Walk, D'Olier St, Townsend St, Lombard St, Pease St	Pearse St (opposite G	715	900	4	680	815	900	5	540	
112	66X	EB	Ormond Quay, Bachelors Walk, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephen's Green North, Merrion Row, Baggot S		-	-	-	-	0815	900	7	390	
113	66X	WB	No Service in time period										
114	67/A	WB	Pearse St, College St, Westmoreland Street, Aston Quay, Wellington Quay	Pearse St (opposite G	700	0	3	1200	830	1800	1	Single Service	
115	67/A	EB	Ormond Quay, Bachelors Walk, D'Olier St, Townsend St, Lombard St, Pease St	Pearse St (opposite G	750	3000	1	Single Service	815	900	2	1350	
116	67X	EB	Ormond Quay, Bachelors Walk, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephen's Green North, Merrion Row, Baggot St		-	-	-	-	0810	600	4	750	
117	67X	WB	No Service in time period										
118	68	EB	Dame St, College Grn, Westmoreland St, Aston Quay	Aston Quay	-	-	-	-	800	0	1	Single Service	
119	68	WB	Aston Quay, Wellington Quay, Essex Quay, Wood Quay	Aston Quay	750	3000	1	Single Service	-	-	-	-	
120	69	EB	Dame St, College Grn, Westmoreland St, Aston Quay	Aston Quay	740	2400	1	Single Service	815	900	2	1350	
121	69	WB	Aston Quay, Wellington Quay, Essex Quay, Wood Quay	Aston Quay	715	900	1	Single Service	855	3300	1	Single Service	
122	69X	WB	Ormond Quay, Grattan Bridge, Parliament St, Dame St, College Green, Westmoreland St, Aston Quay	Aston Quay	-	-	-	-	0820	1200	1	Single Service	
123	69X	EB	No Service										
124	70/A	WB	Hawkins St, College St, College Green, Dame St	Hawkins St	700	0	1	Single Service	835	2100	1	Single Service	
125	70/A	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Tara St, Burgh Quay, Hawkins St	Hawkins St	740	2400	1	Single Service	800	0	3	1200	
126	70X		Blessington St, Parnell Sq East, O'Connell St, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephen's Green, Leeson St		-	-	-	-	0810	600	2	1500	
127	70X		No Service in time period										
128	74/A	SB	Eden Quay, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green East, Earlsfort Tce	Eden Quay Contra Fl	-	-	-	-	0820	1200	5	480	
129	74/A	NB	Earlsfort Tce, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, Fleet St, Tara St, Eden Quay	Eden Quay Contra Fl	-	-	-	-	0820	1200	5	480	
134	77/A	WB	Pearse St, College St, College Grn, Dame St	Ringsend	700	0	10	360	800	0	7	520	
135	77/A	EB	Dame St, College Green, Westmorland St, Fleet St, Townsend St, Sandwith St, Pearse St	Ringsend	710	600	8	380	800	0	10	360	
136	77X	EB	Dame St, College Grn, Westmoreland St, Fleet St, Townsend St, Lombard St, Westland Row, Merrions Sq, Baggot St		-	-	-	-	0820	1200	2	1200	
137	77X	WB	No Service in time period										
138	78/A	WB	Aston Quay, Wellington Quay	Aston Quay	710	600	8	380	800	0	9	400	
139	78/A	EB	Dame St, College Grn, Westmoreland St, Aston Quay	Aston Quay	720	1200	4	600	800	0	10	360	
140	79/A	WB	Aston Quay, Wellington Quay	Aston Quay	705	300	3	1100	800	0	4	900	
141	79/A	EB	Dame St, College Grn, Westmoreland St, Aston Quay	Aston Quay	750	3000	1	Single Service	805	300	6	550	
142	83	SB	Bachelors Walk, O'Connell Bridge, D'Olier St, College St, College Green, Dame St, South Great Georges St		700	0	8	450	805	300	4	830	
143	83	NB	South Great Georges St, Dame St, College Green, Westmorland St, Aston Quay		700	0	4	900	800	0	5	720	
144	84	SB	Eden Quay Contra Flow, D'Olier St, College St, Grafton St, Nassau St, Clare St, Merrion Square North	Eden Quay Contra Fl	745	2700	1	Single Service	-	-	-	-	
145	84	NB	Merrion Square North, Clare St, Lincoln Place, Westland Row, Pearse St, Tara St, Eden Quay	Eden Quay Contra Fl	745	2700	1	Single Service	855	3300	1	Single Service	
146	84X	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmoreland St, Fleet St, Townsend St, Tara St, Eden Quay	Eden Quay Contra Fl	-	-	-	-	0800	0	6	600	

Dublin City Centre VISSIM Model - Coded Bus Services

VISSIM Line No	Ser. No.	Direction	Terminus	AM Preload 0700 - 0800				AM Peak Hour 0800 - 0900				Notes	
				Initial Service Time	VISSIM Start Time (secs)	No of Services in Period	VISSIM Service Rate (secs)	Initial Service Time	VISSIM Start Time	No of Services in Period	VISSIM Service Rate (secs)		
147	84X	SB	No Service in time period										
150	90	WB	Georges Quay, Aston Quay		710	600	4	750	810	600	4	750	
151	90	EB	Bachelors Walk, Custom House Quay		700	0	4	900	800	0	4	900	
152	92	SB	Bachelors Walk, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green East, Leeson St		710	600	3	1000	810	600	3	1000	
153	92	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, Aston Quay		740	2400	1	Single Service	800	0	3	1200	
168	116	SB	Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, St Stephens Green East, Leeson St	Parnell Square	735	2100	1	Single Service	-	-	-	-	
169	116	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West	Parnell Square	-	-	-	-	840	2400	2	600	
170	117	NB	Leeson St, St Stephen's Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmoreland St, D'Olier St	D'Olier Street	-	-	-	-	850	3000	1	Single Service	
171	117	SB	No services in period										
172	118	NB	Leeson St, St Stephen's Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmoreland St, D'Olier St	D'Olier Street	-	-	-	-	850	3000	2	300	
173	118	SB	No services in period										
174	120	WB	Parnell St, Gardiner St, Dorset St	Parnell Street	705	300	6	550	805	300	6	550	
175	120	EB	Blessington St, Parnell Sq East, Parnell St	Parnell Street	725	1500	4		800	0	6	600	
176	121	SB	Eccles St, Dorset St, Parnell St East, O'Connell St, D'Olier St, College St, College Green, Dame St, South Great Georges St		710	600	4	750	800	0	4	900	
177	121	NB	Dame St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West Granby Row, Dorset St, Eccles St		715	900	3	900	800	0	4	900	
178	122	SB	Dorset St, Parnell St East, O'Connell St, D'Olier St, College St, College Green, Dame St, South Great Georges St		700	0	4	900	800	0	6	600	
179	122	NB	South Great Georges St, Dame St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West Granby Row, Dorset St		745	2700	2	450	805	300	6	550	
180	123	SB	Summerhill Parade, Parnell St, O'Connell St, D'Olier St, College St, College Green, Dame St		705	300	8	420	805	300	8	420	
181	123	NB	Dame St, College Green, Westmorland St, O'Connell St, Parnell St, Summerhill Parade		710	600	8	380	805	300	8	420	
182	127	SB	Amiens St, memorial Rd, Georges Quay, Burgh Quay, Hawkins St, College St, Grafton St, Nassau St, Kildare St, St Stephen's Green East, Leeson St	Leeson St	-	-	-	-	850	3000	1	Single Service	
183	127	NB	No services in period										
184	129	SB	Burgh Quay, D'Olier St, College St, Grafton St, Nassau St, Kildare St, St Stephens Green East, Leeson St	Leeson St					845	2700	1	Single Service	
185	129	NB	No services in period										
186	130	SB	Talbot St, Marlborough St, Lower Abbey St	Marlborough St	740	2400	3	400	805	300	8	420	
187	130	NB	Marlborough St, Lower Abbey St, Beresford Pl	Lower Abbey St	700	0	7	520	803	180	7	490	
188	145	SB	Mountjoy Sq North, Denmark St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, St Stephens Green, Leeson St	Mountjoy Square	710	600	3	1000	800	0	6	600	
189	145	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Denmark St, Gardiner St, Mountjoy Sq South	Mountjoy Square	750	3000	1	Single Service	805	300	5	660	
190	150	WB	Fleet St, College St, College Green, Dame St	Fleet St	700	0	6	600	800	0	6	600	
191	150	EB	Dame St, College Green, Westmorland St, Fleet St	Fleet St	700	0	5	720	800	0	9	400	
192	151	EB	Ormond Quay, Bachelors Walk, Eden Quay, Custom House Quay		730	1800	3	600	800	0	7	520	
193	151	WB	Georges Quay, Birgh Quay, D'Olier St, College St, Dame St, Lord Edward St		705	300	6	550	805	300	6	550	
222	746	SB	Dorset St, Parnell Sq East, O'Connell St, D'Olier St, College St, Nassau St, Kildare St, St Stephens Green East, Leeson St		-	-	-	-	-	-	-	-	
223	746	NB	Leeson St, St Stephens Green East, St Stephens Green North, Dawson St, Nassau St, Suffolk St, College Green, Westmorland St, O'Connell St, Parnell St, Parnell Sq West, Dorset St		-	-	-	-	850	3000	1	Single Service	
224	747	NB	Georges Quay, Burgh Quay, O'Connell St, Parnell Street, Gardiner St, Dorset St	Store St	700	0	5	720	800	0	6	600	
225	747	SB	Sean Mac Dermot St, Cathal Brugha St, O'Connell St, Abbey St Lower, Beresford Place, Store St	Store St	705	300	4	830	805	300	6	550	
226	748	Circular	Georges Quay, Burgh Quay, Aston Quay, Wellington Quay, Wood Quay, Ushers Quay, Heuston, Wolfe Tone Quay, Ellis Quay, Ormond Quay, Bachelors Walk, Eden Quay, Beresford Place, Store St	Heuston	730	1800	2	900	820	1200	2	1200	
227	City Tour	Circular	Bachelors Walk, O'Connell St, Parnell St, Parnell St West, Parnell St North, Parnell St East, O'Connell St, D'Olier St, College St, Grafton St, Nassau St, Leinster St South, Clare St, Merrion Sq West, Ely Place, Hume St, St Stephens St North, Dawson St, Nassau St, Suffolk St, Dame St		-	-	-	-	-	-	-	-	First Service is at 09:30

Appendix B – Traffic Flow Diagrams





Appendix C – Traffic Flow Comparisons

Dublin City Centre VISSIM Model

AM Peak - Comparison of Observed and Modelled Flows

ID	Road	Dir.	Location	Count Data (and SATURN Actual Flows)					Modelled					Difference					% Difference					GEH					GEH Category				
				Lights	Heavies	Taxis	PSVs	Vehs	Lights	Heavies	Taxis	PSVs	Vehs	Lights	Heavies	Taxis	PSVs	Vehs	Lights	Heavies	Taxis	PSVs	Vehs	Lights	Heavies	Taxis	PSVs	Vehs	Lights	Heavies	Taxis	PSVs	Vehs
01	Dorset Street Upper	NE	Approach to Granby Row	449	31	37	3	520	448	31	37	0	516	-10	0	-3	-4	0%	0%	-100%	-1%	0.0	0.0	0.0	2.4	0.2	<5	<5	<5	<5	<5		
02	Dorset Street Upper	SW	Away from Granby Row	787	23	44	2	856	727	44	30	2	803	-60	21	-14	0	-8%	91%	-32%	0%	-6%	2.2	3.6	2.3	0.0	1.8	<5	<5	<5	<5		
03	Western Way	NW	Away from Dorset Street Upper	100	8	17	54	179	63	20	7	41	131	-37	12	-10	-13	-37%	150%	-59%	-24%	-27%	4.1	3.2	2.9	1.9	3.9	<5	<5	<5	<5		
04	Dorset Street Upper	NE	Between Granby Row and Blessington Street	511	34	69	41	654	466	48	44	43	601	-45	15	-25	2	-9%	43%	-36%	5%	-8%	2.0	2.3	3.3	0.3	2.1	<5	<5	<5	<5		
05	Dorset Street Upper	SW	Between Blessington Street and Granby Row	792	25	41	3	860	739	35	33	6	813	-53	11	-8	4	-7%	43%	-20%	140%	-5%	1.9	1.9	1.3	1.7	1.6	<5	<5	<5	<5		
06	Blessington Street	SE	Approach to Dorset Street Upper	140	7	51	75	273	141	7	51	46	245	1	0	0	-29	0%	0%	0%	-39%	-10%	0.1	0.0	0.0	3.7	1.7	<5	<5	<5	<5		
07	Dorset Street Lower	NE	Between Blessington Street and Eccles Street	601	39	74	41	754	549	53	48	43	693	-52	14	-26	2	-9%	36%	-35%	5%	-8%	2.1	2.1	3.3	0.3	2.3	<5	<5	<5	<5		
08	Dorset Street Lower	SW	Between Eccles Street and Blessington Street	734	28	90	88	939	676	35	90	89	890	-58	8	0	2	-8%	27%	0%	2%	-5%	2.2	1.3	0.0	0.2	1.6	<5	<5	<5	<5		
09	Eccles Street	NW	Away from Dorset Street Lower	175	1	18	3	197	158	1	1	3	163	-17	0	-17	0	-10%	0%	-94%	0%	-17%	1.3	0.0	5.5	0.0	2.5	<5	<5	<5	<5		
10	Eccles Street	SE	Approach to Dorset Street Lower	312	2	21	6	341	312	2	21	4	339	0	0	-2	-2	0%	0%	0%	-33%	-1%	0.0	0.0	0.0	0.9	0.1	<5	<5	<5	<5		
11	Dorset Street Lower	NE	Between Eccles Street and Gardiner Street Upper	650	44	84	38	816	603	56	54	37	750	-47	12	-30	-1	-6%	27%	-36%	-3%	-8%	1.9	1.7	3.6	0.2	2.4	<5	<5	<5	<5		
12	Dorset Street Lower	SW	Between Gardiner Street Upper and Eccles Street	868	32	89	84	1073	844	42	83	86	1055	-24	10	-6	3	-3%	31%	-7%	3%	-2%	0.8	1.6	0.6	0.3	0.5	<5	<5	<5	<5		
13	Gardiner Street Upper	NW	Away from Dorset Street Lower	136	1	5	0	142	142	1	7	0	150	6	0	2	0	4%	0%	40%	0%	6%	0.5	0.0	0.8	-	0.7	<5	<5	<5	<5		
14	Gardiner Street Upper	SE	Approach to Dorset Street Lower	216	0	6	0	222	215	0	6	0	221	-1	0	0	0	0%	0%	0%	-	0%	0.1	-	0.0	-	0.1	<5	<5	<5	<5		
15	Dorset Street Lower	NE	Away from Gardiner Street Upper	870	70	127	67	1134	834	91	62	62	1049	-36	21	-65	-5	-4%	30%	-51%	-7%	-7%	1.2	2.3	6.7	0.6	2.6	<5	<5	<5	<5		
16	Dorset Street Lower	SW	Approach to Gardiner Street Upper	1321	49	94	90	1554	1320	49	95	86	1550	-1	0	1	-4	0%	0%	1%	-4%	0%	0.0	0.0	0.1	0.4	0.1	<5	<5	<5	<5		
17	Granby Row	NW	Between Parnell Square North and Dorset Street Upper	107	35	26	89	257	79	48	13	80	220	-28	13	-13	-9	-26%	36%	-49%	-10%	-14%	2.9	2.0	2.8	1.0	2.4	<5	<5	<5	<5		
83	Abbey Street Mid	W	Away from O'Connell Street	67	1	0	0	68	33	2	10	0	45	-34	1	10	0	-51%	100%	-	-	-34%	4.8	0.8	-	-	3.1	<5	<5	<5	<5		
89	O'Connell Street	N	Between Bachelors Walk and Abbey Street Mid	464	38	29	114	644	262	76	33	129	500	-202	39	4	16	-44%	103%	14%	14%	-22%	10.6	5.1	0.7	1.4	6.0	>10	<7	<7	<5	<7	
90	O'Connell Street	S	Between Abbey Street Mid and Bachelors Walk	415	15	77	134	640	331	64	136	105	636	-84	50	59	-29	-4	-20%	341%	77%	-21%	-1%	4.3	7.9	5.7	2.6	0.1	<5	<5	<5	<5	
91	Eden Quay	E	Between O'Connell Street and Marlborough Street	822	104	50	20	996	975	63	55	17	1110	-153	-41	6	-3	11%	19%	-39%	11%	-15%	12%	5.1	4.5	0.8	0.7	3.5	<7	<5	<5	<5	
92	Eden Quay	W	Between Marlborough Street and O'Connell Street	0	0	0	13	13	0	0	0	28	0	0	0	0	15	15	0%	0%	40%	0%	0	-	0	-	3.3	3.3	<5	<5	<5	<5	
95	Eden Quay	E	Between Marlborough Street and Beresford Place	906	107	29	36	1078	980	63	58	33	1134	-74	-44	29	-3	8%	-41%	100%	-8%	5%	2.4	4.8	4.4	0.5	1.7	<5	<5	<5	<5		
96	Eden Quay	W	Between Beresford Place and Marlborough Street	0	0	0	8	8	0	0	0	23	23	0	0	15	15	0%	0%	-	188%	188%	-	-	-	-	3.8	3.8	<5	<5	<5	<5	
98	Custom House Quay	E	Away from Beresford Place	1022	103	84	23	1232	1159	45	90	11	1305	-137	-58	6	-12	7%	-56%	7%	-52%	6%	4.1	6.7	0.6	2.9	2.0	<5	<7	<5	<5	<5	
99	O'Connell Bridge	N	Between Aston Quay and Eden Quay	641	43	25	109	817	579	56	44	133	812	-62	13	20	24	-10%	30%	80%	22%	-1%	2.5	1.8	3.3	2.2	0.2	<5	<5	<5	<5		
100	O'Connell Bridge	S	Between Eden Quay and Aston Quay	818	28	98	240	1184	613	90	156	225	1084	-205	62	58	-15	-100	-25%	221%	59%	-6%	-8%	7.7	8.1	5.1	1.0	3.0	<10	<10	<5	<5	
101	Tara Street Bridge	N	Between Georges Quay and Custom House Quay	1261	36	80	43	1420	1263	64	97	65	1489	2	28	17	22	69	0%	78%	21%	51%	5%	0.1	4.0	1.8	3.0	1.8	<5	<5	<5	<5	
102	Bachelors Walk	E	Approach to O'Connell Street	1048	113	66	100	1327	975	108	65	11	1259	-28	37	22	41	2%	45%	22%	62%	6%	0.7	3.7	2.0	4.4	2.8	<5	<5	<5	<5		
103	Aston Quay	W	Away from O'Connell Bridge	550	173	44	75	842	556	182	42	49	829	-6	9	-2	-26	-1%	5%	-5%	-35%	-2%	0.3	0.7	0.3	3.3	0.4	<5	<5	<5	<5		
104	Burgh Quay	W	Between Hawkins Street and O'Connell Bridge	937	193	54	28	1212	780	227	48	32	1087	-157	34	-6	4	-17%	18%	-10%	14%	-10%	5.4	2.3	0.8	0.7	3.7	<7	<5	<5	<5		
105	Burgh Quay	W	Between Tara Street and Hawkins Street	897	209	48	35	1188	779	231	48	61	1119	-118	23	0	27	-13%	11%	0%	77%	-6%	4.1	1.5	0.0	3.8	2.0	<5	<5	<5	<5		
106	Georges Quay	W	Approach to Tara Street	403	190	33	23	649	400	191	33	24	648	-3	1	0	-1	-1%	1%	0%	4%	0%	0.1	0.1	0.0	0.2	0.0	<5	<5	<5	<5		
107	Fleet Street	W	Away from Westmorland Street	62	8	17	1	88	87	6	26	0	119	25	-2	9	-1	40%	-25%	53%	-100%	35%	2.9	0.8	1.9	1.4	3.0	<5	<5	<5	<5		
108	Westmorland Street	N	Between Fleet Street and Aston Quay	726	48	46	164	984	605	48	87	160	900	-121	0	41	-4	-17%	0%	89%	-2%	-9%	4.7	0.0	5.0	0.3	2.7	<5	<5	<5	<5		
109	Fleet Street	E	Between Westmorland Street and D'Olier Street	120	6	28	70	224	160	1	70	84	315	40	-5	43	14	92	33%	-83%	155%	20%	41%	3.4	2.7	6.1	1.6	5.6	<5	<5	<7	<5	
110	D'Olier Street	SE	Between Burgh Quay and College Street	1288	53	120	248	1709	845	119	202	224	1390	-443	66	83	-24	-319	-34%	125%	69%	-10%	-19%	13.6	7.1	6.5	1.6	8.1	>10	<10	<10	<5	<7
113	Tara Street	N	Between Townsend Street and Georges Quay	1770	83	100	66	2019	1798	120	121	107	2146	28	37	22	41	128	2%	45%	22%	62%	6%	0.7	3.7	2.0	4.4	2.8	<5	<5	<5	<5	
114	Townsend Street	E	Away from Tara Street	474	19	51	34	578	335	66	88	72	561	-139	47	37	38	-29%	247%	73%	112%	-3%	6.9	7.2	4.4	5.2	0.7	<7	<10	<5	<7		
115	Westmorland Street	N	Between College Street and Fleet Street	906	59	109	236	1309	866	55	183	244	1348	-40	-4	74	8	-9	-4%	-6%	3%	-3%	-4%	1.3	0.5	6.1	0.5	1.1	<5	<5	<5	<5	
116	College Street	SW	Between Hawkins Street and Westmorland Street	1172	41	187	329	1729	965	89	234	278	1566	-207	48	47	-51	-163	-18%	117%	25%	-16%	-9%	6.3	6.0	3.2	1.9	4.0	<7	<7	<5	<5	
117	Pearse Street	W	Between Tara Street and Hawkins Street	105	4	61	46	214	147	4	40	44	235	43	1	-21	-2	41%	14%	-34%	-3%	10%	3.8	0.3	2.9	0.2	1.4	<5	<5	<5	<5		
118	Tara Street	N	Between Pearse Street and Townsend Street	1878	100	99	39	2116	1926	130	121	74	2251	48																			

Appendix D – Journey Time Comparisons



Figure D.1 : AM Peak Car Journey Time Validation


Appendix E – Network Diagrams

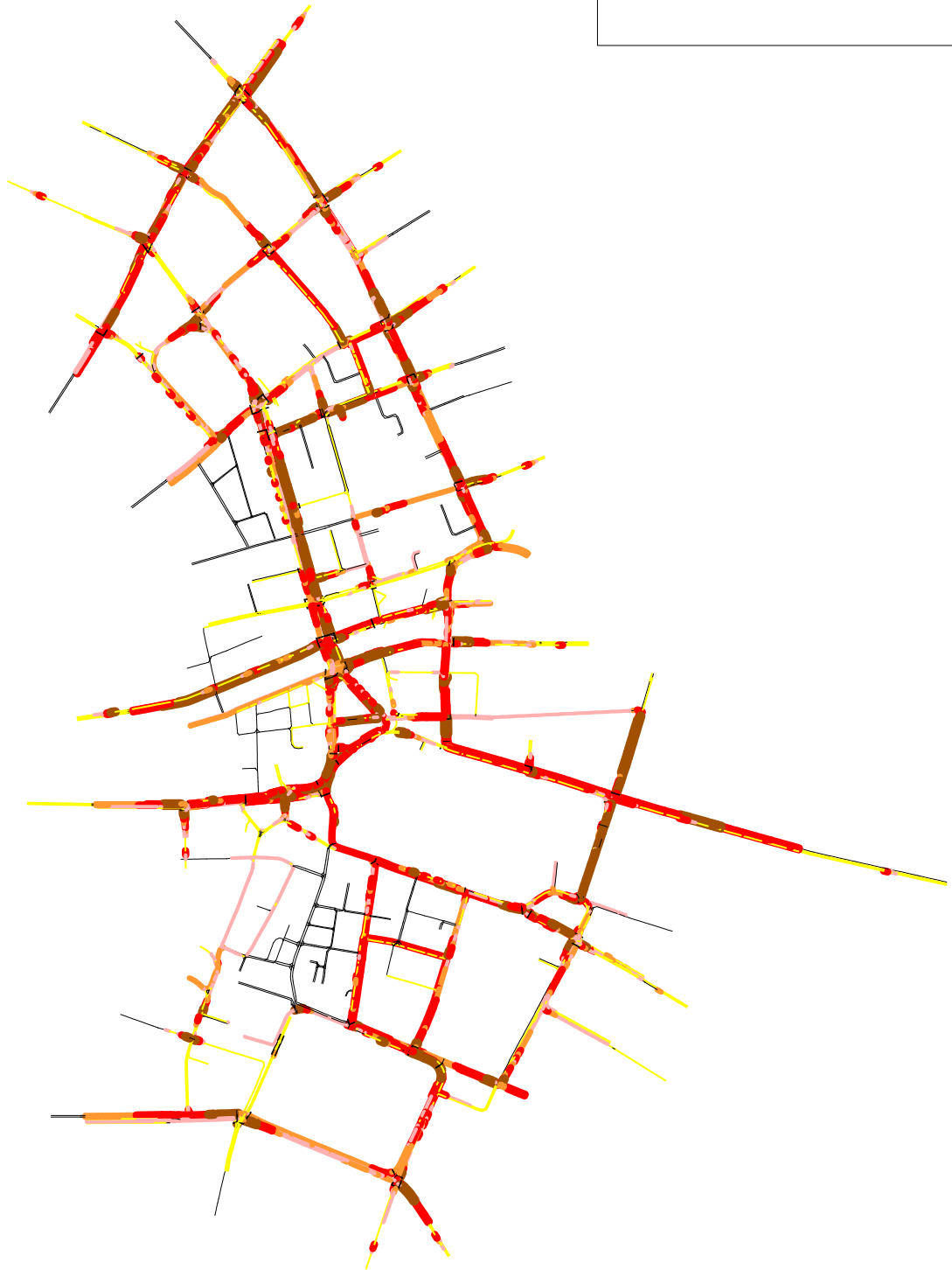
2006 Base Year Average Speed (veh/km)
All Vehicles

40 to 44.3	(1371)
30 to 40	(2741)
20 to 30	(1709)
10 to 20	(1039)
0.1 to 10	(1265)






2006 Base Year Density (veh/km)
All Vehicles

-  > 50 (694)
-  15 to 50 (1726)
-  10 to 15 (985)
-  5 to 10 (1640)
-  0 to 5 (3080)



2006 Base Year Lost Time (s/s)
All Vehicles

	0.8 to 1	(870)
	0.6 to 0.8	(830)
	0.4 to 0.6	(840)
	0.2 to 0.4	(1230)
	0.01 to 0.2	(3578)
	all others	(17)



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