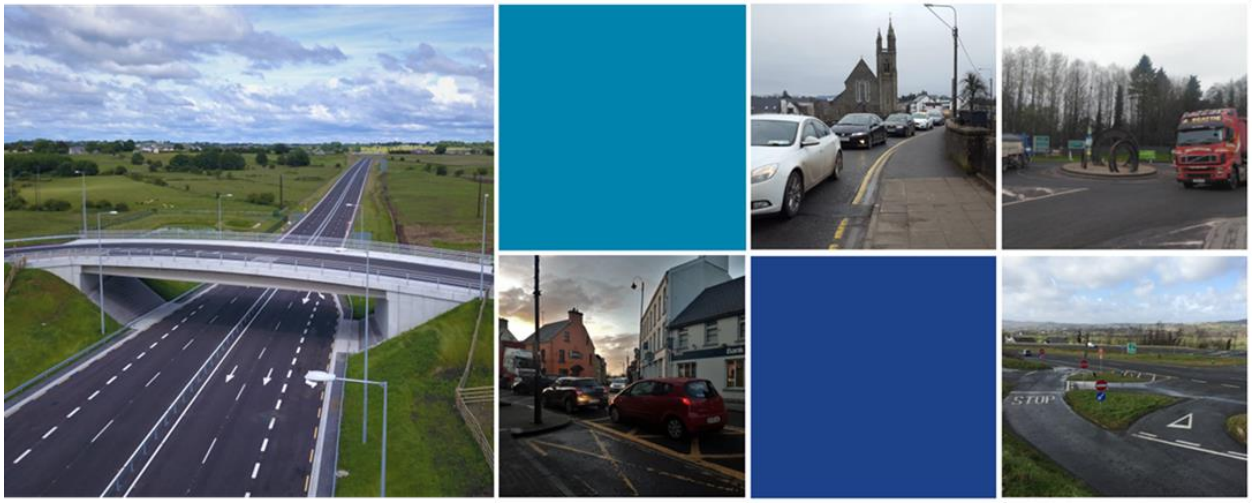
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Comhairle Conta Dhún na nGall
Donegal County Coun

TEN-T Priority Route Improvement Project, Donegal

Phase 2, Option Selection Report
Volume F – Transport Modelling Report



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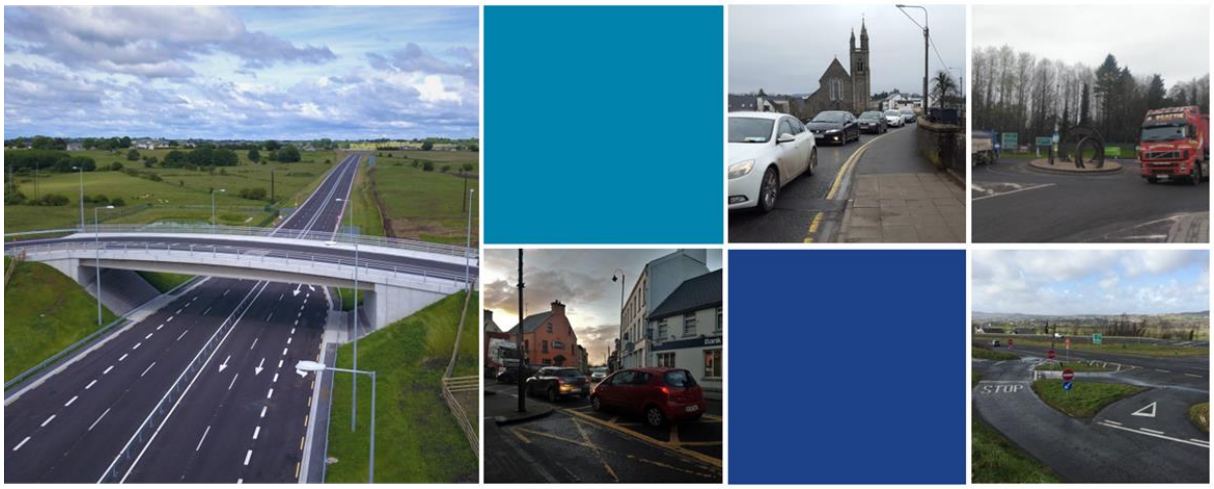

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TEN-T Priority Route Improvement Project, Donegal

Transport Modelling Report

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Chapter 1
Introduction

1 Introduction

1.1 Overview

In January 2017, Donegal County Council appointed joint venture RPS Barry Transportation as design consultants for the Trans-European Transport Network (TEN-T) Priority Route Improvement Project, Donegal. The project is divided into three sections as illustrated in Figure 1.1.

- Section 1 – N15/N13 Ballybofey / Stranorlar Urban Region
- Section 2 – N56/N13 Letterkenny to Manorcunningham
- Section 3 – N14 Manorcunningham to Lifford / Strabane / A5 Link.

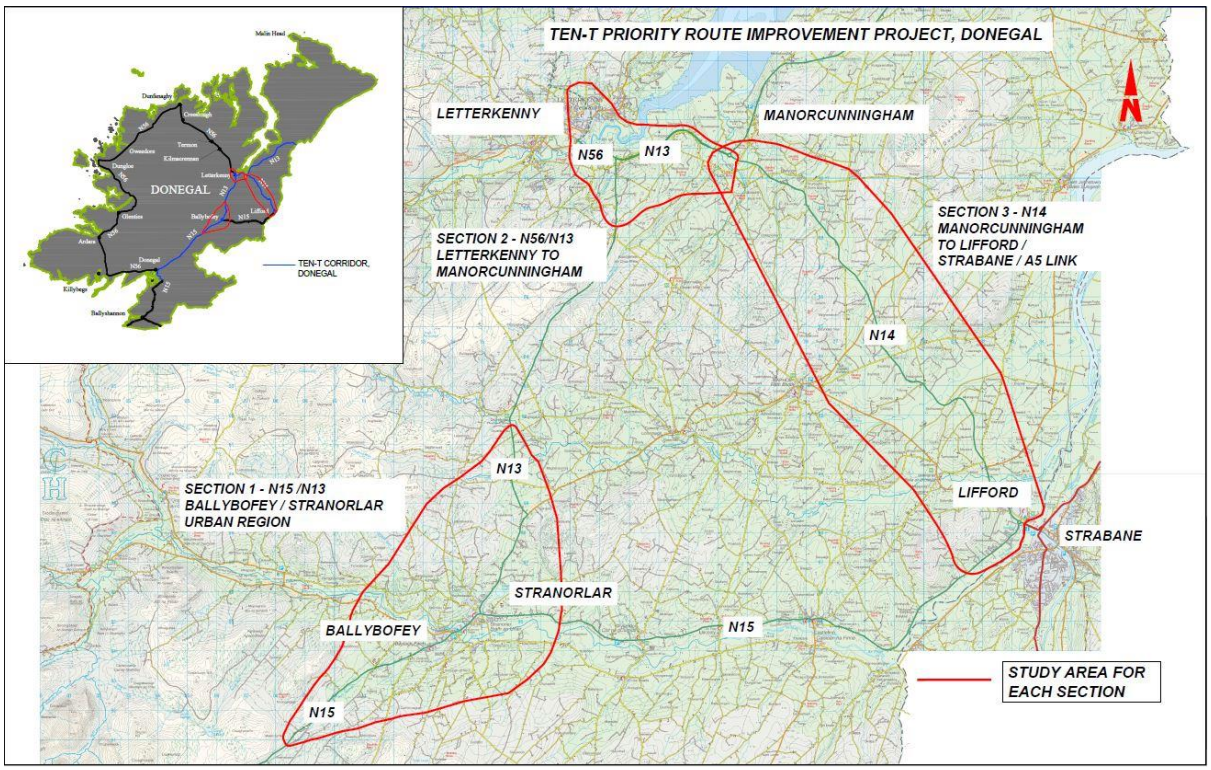


Figure 1.1 TEN-T Priority Route Improvement Project, Study Area for each section

The three sections of the TEN-T Priority Route Improvement Project, Donegal are being considered as three components of one project with the aim of addressing existing safety and operational issues on each section of the Trans-European Transport (TEN-T) network in County Donegal.

The objective of the TEN-T is to strengthen the social, economic and territorial cohesion of the union, and contribute to a single European transport area. It shall demonstrate European added value by contributing to objectives set out in 4 categories (Regulation 1315/2013), including:

- Cohesion – accessibility to remote, outermost and peripheral regions and a reduction of infrastructure quality gaps between member states;
- Efficiency – removal of bottlenecks and bridging missing links;
- Sustainability – developing transport solutions that will ensure future transport that is sustainable and economically efficient; and
- Increasing benefits for users – meeting transport needs of users within the Union and in relations with third countries.

This Transport Modelling Report (TMR) outlines the development of the calibrated and validated base model of the study area as well as the future year forecast scenarios. This TMR forms one of the required deliverables at the Phase 2 Stage 2 Route Selection stage of the Transport Infrastructure Ireland (TII) Project Appraisal Guidelines (PAG). The full set of Phase 2 Route Selection deliverables includes:

- Project Brief
- Traffic Modelling Report
- Cost Benefit Analysis
- Project Appraisal Balance Sheet
- Preliminary Business Case

1.2 Project Phase and Overview of the Project being Assessed

The TEN-T routes in Donegal connect to the rest of the TEN-T network in Northern Ireland and the Republic of Ireland and are supplemented by the National Secondary and Regional routes. In Donegal, the N56 is the only National Secondary road which provides a vital link connecting the south, west, northwest and north of Donegal to the national primary road network (Figure 1.2). The N56 Connects to the TEN-T network at the south of the county close to Donegal Town and at the north of the county at Letterkenny. The N56 is a coastal route circulating west Donegal. Due to the Derryveagh Mountain range running north–south through the centre of Donegal, other east–west connections across Donegal are limited.

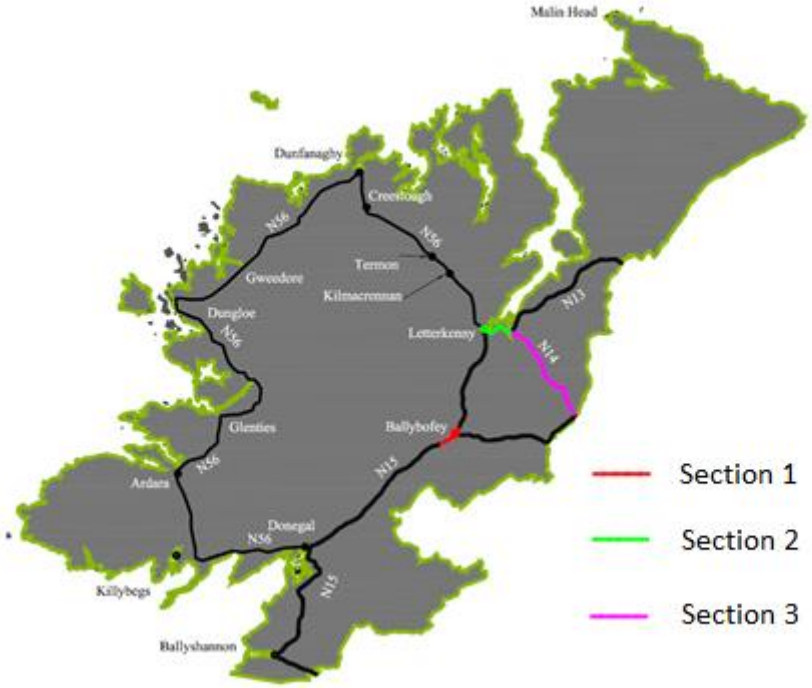


Figure 1.2 National Road Network in Donegal

The TEN-T routes are particularly important for both tourism and industry, in particular Killybegs harbour, Ireland's largest fishing port. The routes provide connectivity between County Donegal and the rest of the island of Ireland.

Transport Infrastructure Ireland (TII) are the Sanctioning Authority for the project. The Sponsoring Agency is Donegal County Council with Donegal National Roads Design Office (NRDO) performing the role of Project Manager.

Section 1

The N15 in the vicinity of Ballybofey/Stranorlar (approximately 9km) has been prioritised for improvement as part of this TEN-T Priority Route Improvement Project, Donegal. Ballybofey/Stranorlar are two towns connected over the River Finn by a multi-span arch bridge carrying the N15.

Currently the N15 that links Donegal to the rest of the Republic of Ireland via Leitrim and Sligo bisects the town centres of Ballybofey/Stranorlar and is the key link on the Atlantic Corridor in Donegal. The current condition of the N15 at this location is inadequate and inappropriate for strategic traffic, having a varying cross-section width of 6-7m, numerous retail frontages, on-street car parking, junctions with side-roads, a bus stop and traffic lights all adding to congestion, and reducing the average speed, as commercial and private vehicles drive through the Ballybofey/Stranorlar in both directions.

Section 2

This section of the TEN-T network is approximately 6.5km in length and incudes the road network between the Polestar Roundabout in Letterkenny and the N13/N14 Pluck Roundabout at Manorcunningham.

The N56, a coastal route that connects south, west, northwest and north Donegal, enters Letterkenny as a single carriageway route that traverses around the outskirts of the town and widens to a two-lane carriageway on approach to the Polestar roundabout. From the Polestar roundabout, traffic travels eastwards over a bridge on the River Swilly using a four-lane road (N56) as far as the Dry Arch Roundabout where it meets the N13 from Stranorlar and the N13 from Manorcunningham. The River Swilly bridge crossing is one of two crossings of the River Swilly in Letterkenny but is the only crossing that provides for a national route and forms the only national road link from Letterkenny to the rest of the primary road network. A 4.3km section of dual-carriageway (N13) connects the Dry Arch Roundabout with the Pluck Roundabout. The section also includes the section of the N13 from the Dry Arch Roundabout, south to the top of the hill at Lurgybrack.

Section 3

This section of road which is approximately 17km in length commences at the Pluck Roundabout, the junction between the N13 and N14 near Manorcunningham, and continues as a single carriageway in a south easterly direction to Lifford. There is a border crossing at Lifford into Strabane, County Tyrone, Northern Ireland, across the River Foyle. The N14 is the key route for both commercial and private vehicles travelling to Belfast and Dublin, in addition to buses travelling to Dublin via the A5 in Northern Ireland and the N2 in County Monaghan. Construction of the A5 Western Transport Corridor (WTC), from Derry to Strabane in Northern Ireland, was due to commence in 2018. However, the decision to proceed is currently subject of a legal challenge (as of November 2018). Additionally, a cross-border link connecting the new A5 WTC to the N15 south of Lifford has been designed and approved by An Bord Pleanála. The route for this link has been decided and where it crosses the River Finn into the Republic of Ireland will determine the connecting point between the TEN-T in Lifford and the A5 WTC in Strabane.

The network coverage of the Donegal TEN-T transport model is shown in Figure 1.

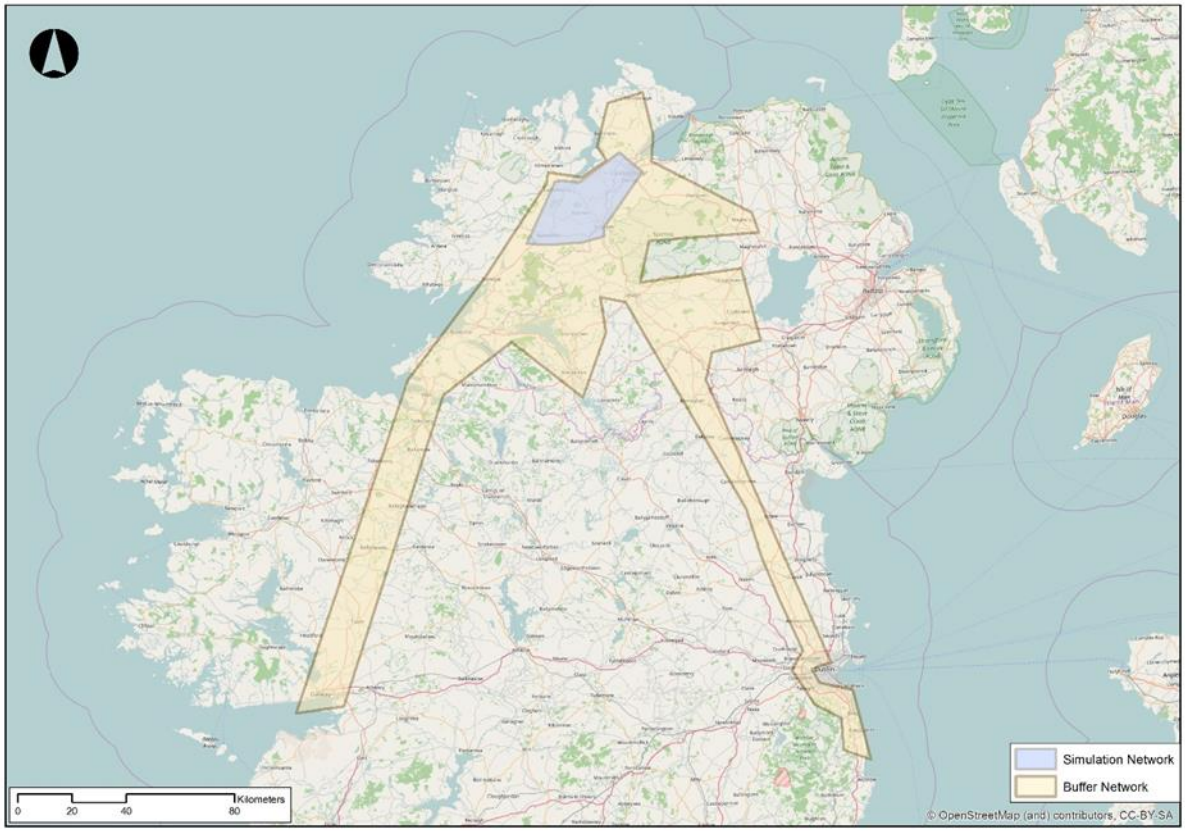


Figure 1.3 Transport Model Network Coverage

Data from the Donegal TEN-T SATURN model has been used as an input to several elements of the appraisal, these are:

- Option Selection
- Operational Assessment (Preferred design)
- Economic Assessment: Input to the Transport User Benefit Analysis (TUBA) software
- Safety Assessment: Input to Cost and Benefit to Accidents – Light Touch (COBALT) software
- Environmental Assessment

1.3 Report Structure

Chapter 2 details the data collection undertaken and a review of the existing transport models for the area. The coding of the Donegal TEN-T model network is detailed in Chapter 3, with the development of the demand matrices covered in Chapter 4. The model calibration and validation is summarised in Chapter 5. Development of the future year scenarios and the operation of the route options considered is covered in Chapter 6.

Chapter 2
Data Collection

2 Data Collection

2.1 Introduction

This chapter of the report outlines the data used to develop a traffic model to support an assessment of the TEN-T Priority Route Improvement Project, Donegal TEN-T. This includes details of the existing transport models that were used as a basis to develop the new Donegal TEN-T model.

This chapter describes the rationale for selection of the transport modelling platform and details the data collection exercise undertaken as part of the model development process. Analysis of the surveyed traffic data is provided to demonstrate that the December survey month it is suitable for use as an input to the development of a transport model.

2.2 Review of Existing Transport Models

The improvements to be assessed within the Phase 2 Route Selection were located on, or in the vicinity of, the following national routes within the Donegal area:

- N13/N56 between Letterkenny and Manorcunningham
- N14 between Manorcunningham and Lifford/Strabane
- N15 at Ballybofey/Stranorlar

Due to the scale of the options and the potential for impact on traffic routing, it was considered that an assignment model was required to facilitate an appropriate assessment of the improvements.

A review of existing transport models of the area was undertaken to identify if a suitable basis already existed for the assessment of the improvements. One of the criteria with regard to the modelling platform was that it had to have sufficient network coverage to accommodate all of the improvements being considered. This was required to provide a consistent basis for assessing the range of options being considered as part of the Phase 2 Route Selection process.

It was considered that the National Transport Model (NTM) did not currently provide sufficient network or zoning detail in the area of influence to be used as the basis for assessment. As the NTM would have required updating, a review of alternative modelling platforms was also considered.

The existing N13/N14/N15 SATURN (Simulation and Assignment of Traffic to Urban Road Networks) model, validated for a base year of 2013, covered the majority of the required study area. However, it contained a low level of detail at Letterkenny, which had been modelled as part of the buffer network only. A standalone model of Letterkenny had also been prepared in the SATURN software and was validated for a base year of 2009.

Following a review of the existing models available, it was considered that the best approach to providing a study model of the area would be to amalgamate the N13/N14/N15 SATURN model with the Letterkenny SATURN model. This approach would provide a detailed simulation model of the full study area.

Due to the age of the existing models, it was necessary to update the traffic demands contained within them. The new amalgamated model, referred to as the ‘Donegal TEN-T Model’, has been validated for a base year of 2017.

SATURN was retained as the software platform for the new Donegal TEN-T model. SATURN is a macro assignment simulation software package that enables the modelling of detailed network operation, including effects such as flow constraint, blocking back and the modelling of different junction types. Together with the assignment capability of the software, it was considered to provide an appropriate basis on which to simulate the operation of the base network and to assess the impact of the proposed Donegal TEN-T options.

2.3 Traffic Survey Data

As an input to the traffic model, a programme of traffic surveys was undertaken in December 2017. The traffic surveys included Junction Turning Counts (JTC), Automatic Traffic Counts (ATC), Automatic Number Plate Recognition (ANPR) and Moving Car Observer (MCO) journey time data. A summary of the traffic survey data used within the development to the Donegal TEN-T model is shown in Table 2-1.

Table 2-1 – Traffic Survey Data Collection

Survey Type	Number of Locations	Date of Survey
ATCs	26	ATCs carried out between the 29th November and the 12th December 2017. One site was resurveyed between the 7th and the 20th December.
MCC Junction Turning Counts (JTC)	28	07:00-19:00 on 5th December 2017.
ANPR	12	07:00-19:00 on 5th December 2017
MCO Journey Times	3	07:00-10:00, 12:00-14:00 and 16:00-19:00 on 5th December 2017.

Data from the Transport Infrastructure Ireland (TII) Traffic Monitoring Unit (TMU) database was also collated for use. The TMU data provided information on the longer-term trends within the study area. The December 2017 traffic survey data was compared to longer term averages from the TMU database in order to confirm that it was suitable for use in the development of a traffic model of the study area.

2.3.1 Automatic Traffic Counts (ATCs)

Twenty-six ATCs were conducted from Wednesday the 29th November to Tuesday 12th December 2017, obtaining 14 days' worth of data. The location of the ATCs is shown in Figure 2-1.

- ATC 1: R236 between N13 and Convoy
- ATC 2: N14 Mullanagung
- ATC 3: A38 Lifford Road
- ATC 4: R252 Glenfin Road
- ATC 5: N13 South of Killygordon
- ATC 6: R235 Castlefinn
- ATC 7: R236 Urney Road west of Clady
- ATC 8: R236 East of Raphoe
- ATC 9: N13 Moneyhaughly
- ATC 10: R236 Magheracloy
- ATC 11: R265 Clonleigh
- ATC 12: N14 Tircallen
- ATC 13: South of Stranorlar (Near to Navenny Street)
- ATC 14: N56 to the south of L1352
- ATC 15: R245 Ballymaleel

- ATC 16: R250 at River Swilly
- ATC 17: R250 West of Letterkenny
- ATC 18: Unnamed Road to north of Cluain Ard/Killylastin Heights
- ATC 19: L1114 Leck Road
- ATC 20: N15 Southwest of Ballybofey
- ATC 21: N15 East of Stranorlar
- ATC 22: N14 East of Letterkenny
- ATC 23: N14 North of Lifford
- ATC 24: N13 Northeast of Newton Cunningham
- ATC 25: R236 Northeast of St Johnston
- ATC 26: A5 North of Strabane

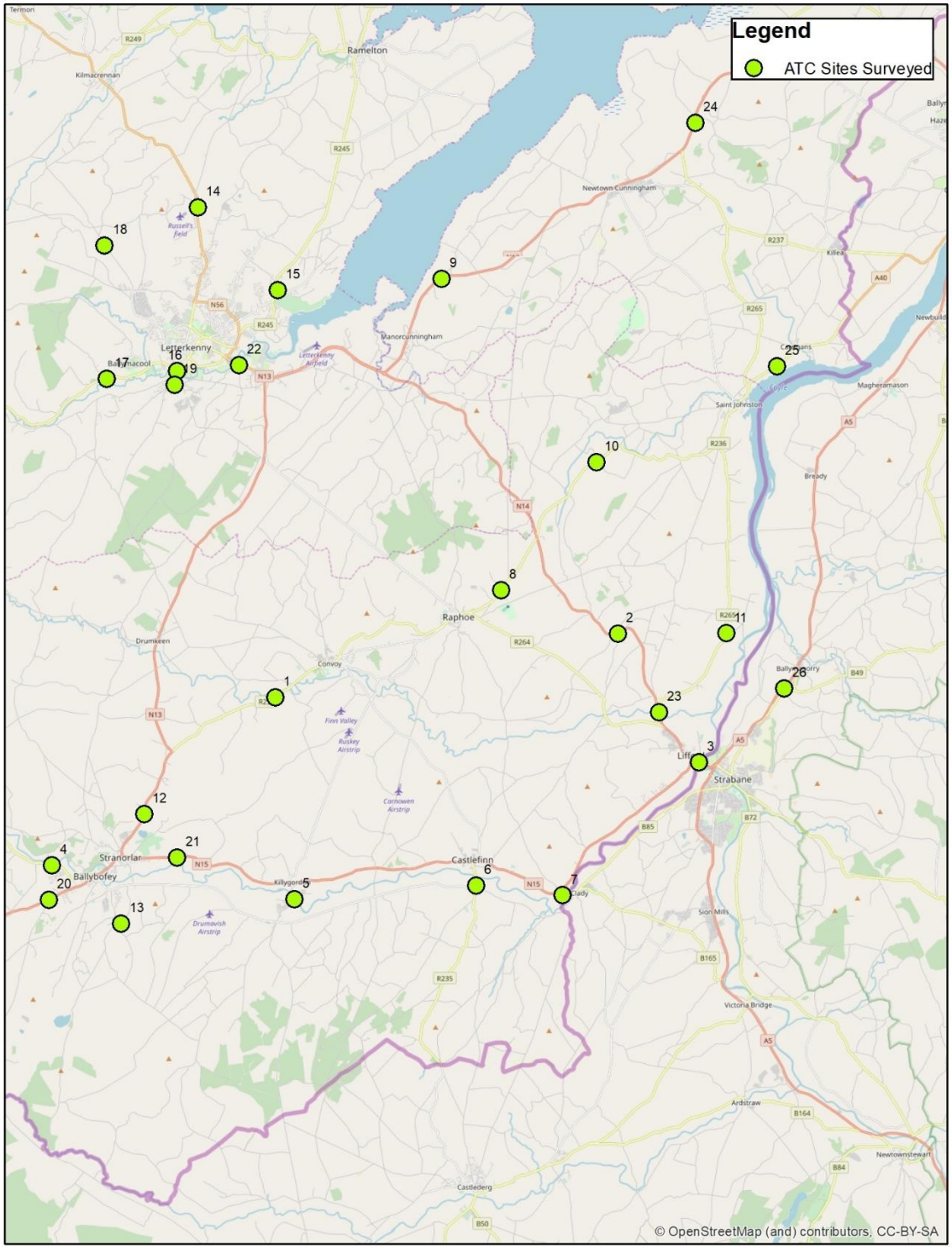


Figure 2.1 – Automatic Traffic Count Locations

2.3.2 Junction Turning Counts (JTCs)

Thirty MCC JTCs were recorded in 15-minute intervals for all traffic movements at each junction, disaggregated by vehicle class. The junction turning counts were collected on the 5th December 2017 for the period 07:00 to 19:00.

- JTC 1: N15/R252
- JTC 2: N15/Navenny Street
- JTC 3: N15/N13
- JTC 4: N15/Mala an Mhuilinn
- JTC 5: Navenny Street/Mala an Mhuilinn
- JTC 6: Navenny Street/Unnamed Road
- JTC 7: N14/N56 roundabout
- JTC 8: Port Road/Ramelton Road
- JTC 9: High Road/Circular Road
- JTC 10: N56 Roundabout
- JTC 11: N56/R245
- JTC 12: N56/Unnamed Road
- JTC 13: N56 Ramelton Road/R245
- JTC 14: R245/Unnamed Road
- JTC 15: Dry Arc Roundabout
- JTC 16: N14/N15 Roundabout
- JTC 17: A5/Derry Road
- JTC 18: A5/A38 Roundabout
- JTC 19: A5/Bradley Way Roundabout
- JTC 20: A5/Urney Road
- JTC 21: A5 Melmount Road Roundabout
- JTC 22: N13/R236
- JTC 23: N14/N13
- JTC 24: N14/R236 North
- JTC 25: N14/R236 South
- JTC 26: N14/Rossgier Close
- JTC 27: N14/R264
- JTC 28: R250 Pearse Road/L1114
- JTC 29: R250 Roundabout
- JTC 30: N56 Roundabout

The location of the JTCs are shown in Figure 2-2.

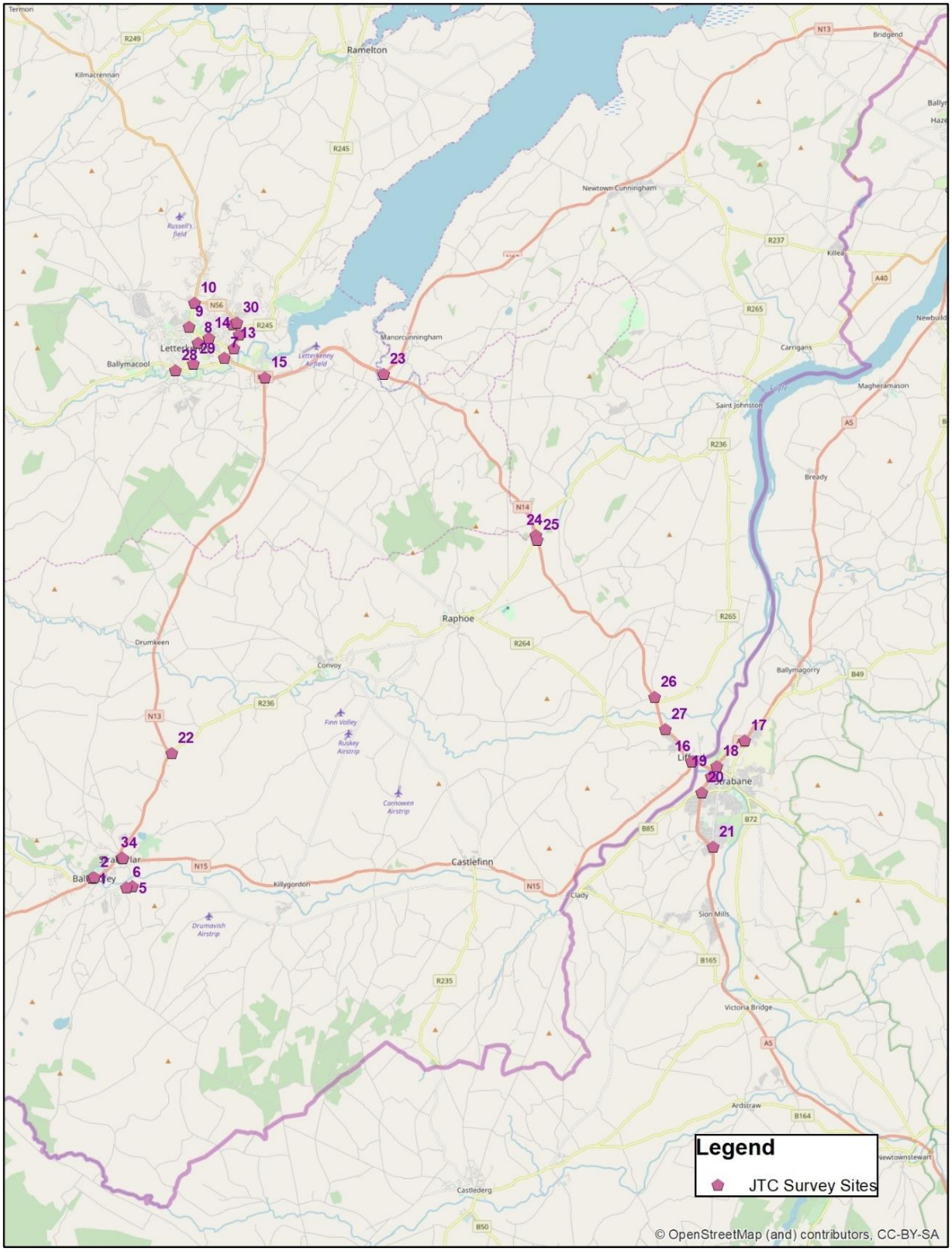


Figure 2.2 Junction Turning Count Locations

2.3.3 Moving Car Observer Journey Time Surveys

MCO journey times were collected on the two routes shown in Figure 2-3.

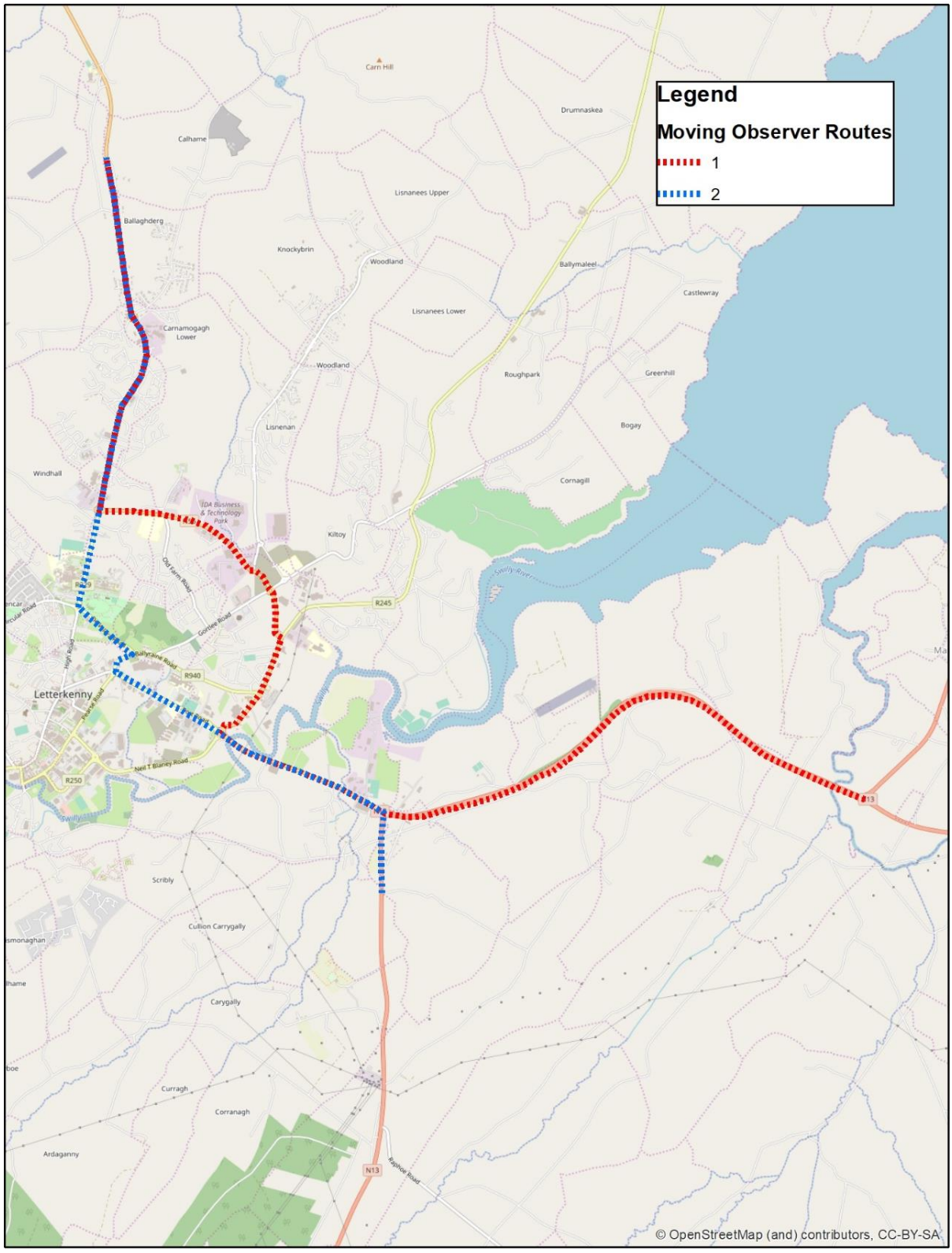


Figure 2.3 MCO Journey Time Routes

2.3.4 Automatic Number Plate Recognition

ANPR surveys were undertaken at the locations shown with Figure 2-4. These surveys provided information on the trip numbers and journey times between each of the surveyed locations.

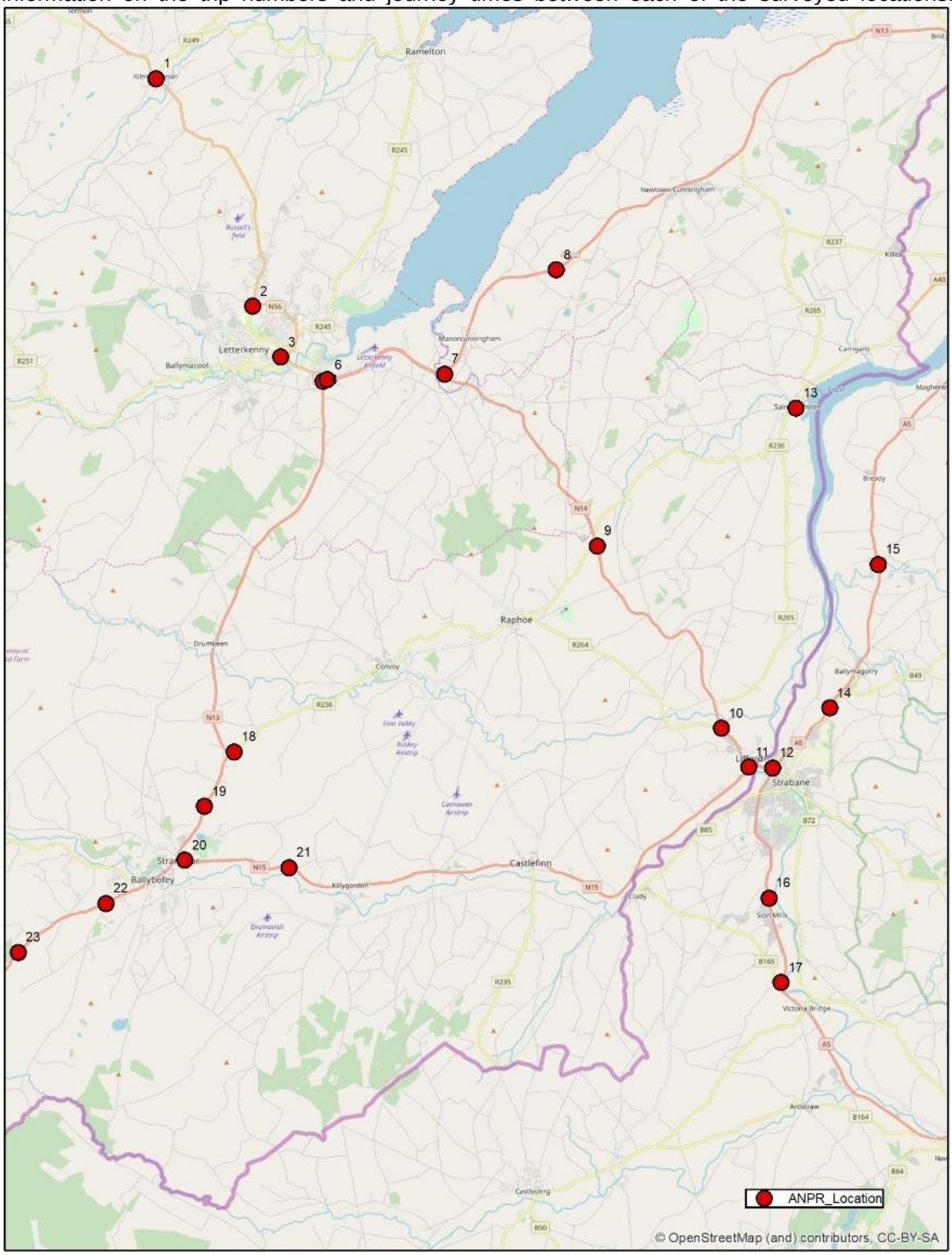


Figure 2.4 ANPR Locations

However, it is not always certain with ANPR data that the vehicle has been direct in its journey, e.g. if a traveller intentionally stops for some purpose for twenty minutes between two ANPR locations, the data produced would suggest that the vehicle journey time was twenty minutes

longer than it actually was. Therefore, journeys over a threshold of 30 minutes for longer distance trips and 20 minutes for shorter distances were filtered out of the ANPR dataset prior to its use in development of the transport model.

2.4 Suitability of December Survey Data

The traffic survey data was collected in December 2017. As this is not a 'neutral month' as defined within the PAG documentation, an analysis of the December survey day has been undertaken against data for the full year, derived from the TMU sites in the study area. Table 2-2 shows a comparison of TMU data for the day of survey in December against average data for neutral months and the AADT for 2017.

Table 2-2 – Comparison of Survey Period

TMU Location	Day of MCC/ANPR/MCO Survey 5th Dec 2017	AADT 2017	Neutral Month Average Daily Traffic 2017
1133 N13 (between Stranorlar and Ballybofey)	11,480	10,671	10,713
1132 N13 (between Letterkenny and Lifford)	21,383	21,527	21,602
1141 N14 (Between Lifford and Letterkenny)	12,049	12,447	12,405
1151 N15 (between Lifford to Castlefinn)	5,267	5,036	5,031
20561 N56 (between Letterkenny and Ellistrin)	11,900	11,951	11,999
20151 N15 (between Ballybofey and Donegal Town)	7,634	7,341	7,315

The data in Table 2-3 indicates that traffic volumes across the study area on the 5th December 2017 were similar to the AADT and average neutral period flows recorded for the year. This indicates that the surveyed data is suitable for use in the development of the Donegal TEN-T model.

2.5 Estimation of AADT Flows

The two week data recorded by the ATCs (See Figure 2.1) has been expanded to derive AADT flows, based on information for the Traffic Measurement Unit (TMU) sites within the study area. These factors were produced using the existing TMU flow data available from Transport Infrastructure Ireland (TII). The TMU sites used within the calculation of the AADT flow are shown in Figure 2-5.

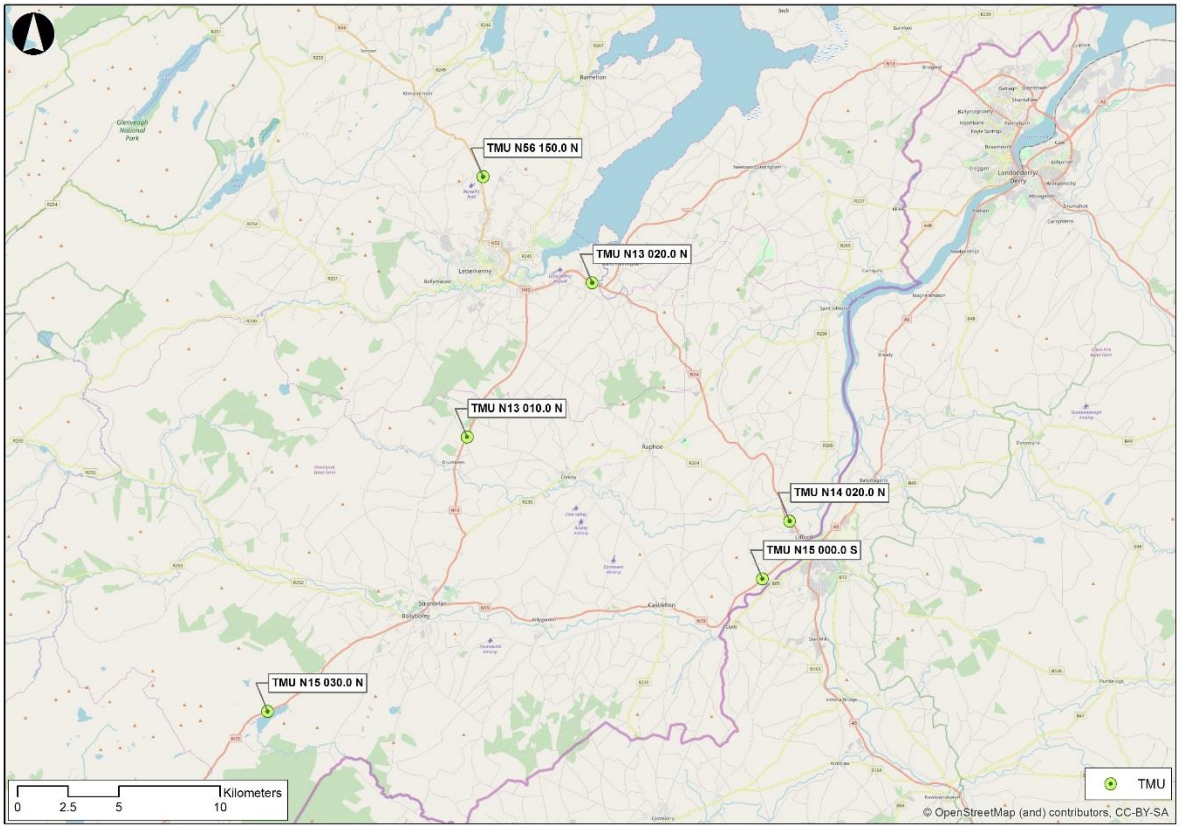


Figure 2.5 – TMU Locations

The Donegal TEN-T model has three modelled hours:

- Weekday AM Peak Hour: 08:15-09:15
- Weekday Average Hour in the Inter Peak between 10:00 and 16:00
- Weekday PM Peak Hour: 16:45-17:45

To produce modelled AADT flows it was necessary to:

- Factor flows in each of the three modelled hours to flows in their corresponding periods as follows:
    - AM Peak Period: 07:00-10:00
    - Inter Peak Period: 10:00-16:00
    - PM Peak Period 16:00-19:00
- Sum flows from all three periods to produce the estimated modelled 12-hour (07:00-19:00) weekday average flows
- Factor the 12-hour (07:00-19:00) weekday average flows to produce the estimated modelled AADT flows

Average flows from the TMU sites were derived and are as shown in Table 2-3.

Table 2-3 – Average Traffic Flows from TMU Sites

Period	Average TMU flows
AM peak Hour weekday Average (0800-0900)	914
Inter Peak Hour Weekday Average (1000-1600)	770
PM peak Hour Weekday Average (1700-1800)	1,006
AM Peak Period (07:00-10:00 Weekday)	2,213
Inter Peak (10:00-16:00 Weekday)	4,618
PM Peak (16:00-19:00 Weekday)	2,735
12-hour (7am-7pm Weekday)	53,141
24-hour 7-day AADT	62,676

Factors were calculated from the TMU data with which to factor the ATC and modelled peak flows to AADT flows. The AM, PM peak factors above were all created by dividing their respective periods flows by their respective peak flow. The 12-hour (07:00-19:00) weekday to AADT (24-hour average 7-day) factor was created by dividing the 24-hour 7-day Average AADT by the 12-hour (07:00-19:00) weekday flows. The Inter Peak factor is six as this modelled hour's flows are considered to represent the hourly average across the six-hour period from 10:00 to 16:00. These expansion factors are shown in Table 2-4.

Table 2-4 –TMU Expansion Factors

Description	Factor
AM Peak Hour to AM Peak Period (08:15-09:15 to 07:00-10:00)	2.42
Inter Peak Hour to Inter Peak Period (average hour 10:00-16:00 to 10:00-16:00)	6.00
PM Peak Hour to PM Peak Period (from 17:00-18:00 to 16:00-19:00 PM)	2.72
12-hour (07:00-19:00 Weekday) to AADT (24-hour average 7-day)	1.18

The above factors were compared with the results obtained via regression analysis, using the method specified in chapter 5.2.1 of PAG Unit 16.0 Estimating AADT on National Roads.

Table 2-6 presents these results compared to the factors produced via the average flows method.

Table 2-6 – Regression Factors Calculated

Factor	Figure Calculated Via Average Flows	Regression Factor Calculated		
		Lower	Central	Upper
AM Peak Hour to AM Peak Period factor (from 08:15-09:15 to 07:00-10:00)	2.42	2.19	2.37	2.55
PM Peak Hour to PM Peak Period factor (from 17:00-18:00 to 16:00-19:00)	2.72	2.62	2.70	2.78
12-hour (07:00-19:00 Weekday) to AADT (24-hour average 7-day) factor	1.18	1.14	1.17	1.19

The results in Table 2-6 indicate that the results produced via the average flows method fall within the 95% confidence interval and are similar to those derived from the regression analysis.

The averages flow method is thus considered to have produced results that correspond closely to those derived from the regression methodology. It is therefore considered that the AADT factors produced through application of the TMU average growth analysis are suitable for use in the study.

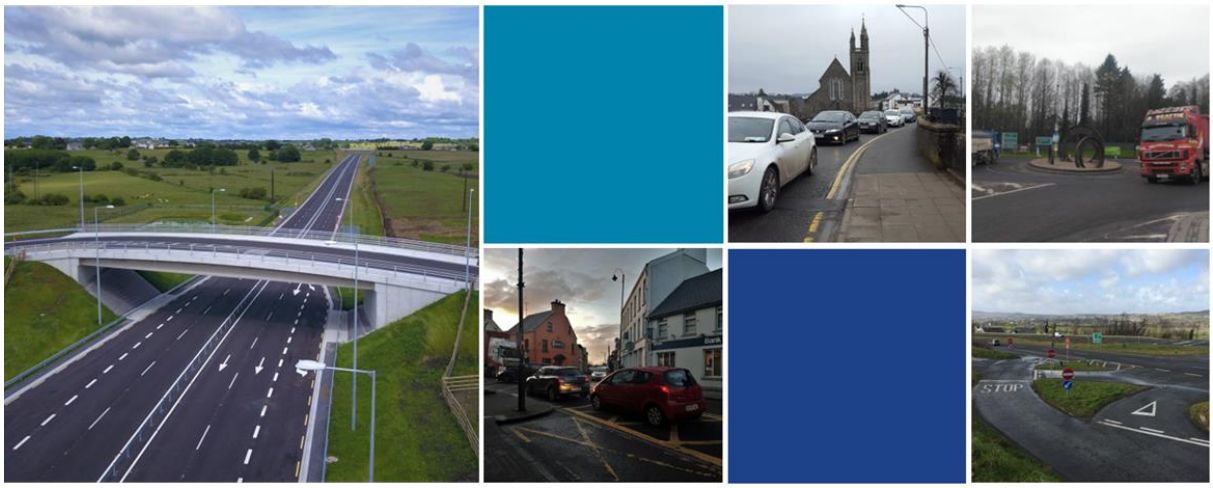
Table 2-5 presents the two-way traffic flows recorded at the ATC sites. The AAWT and AADT figures have been estimated by applying factors derived from the TMU average growth analysis.

Table 2-5 – Automatic Traffic Counter Data 2 Way Flow (2017)

Site No.	Location	Vehicles Per Hour			Vehicles Per Day	
		AM	IP	PM	AAWT	AADT
1	R236 West of Convoy	200	200	200	2,200	2,600
2	N14 Mullanagung	500	400	500	5,000	5,900
3	Lifford Bridge	1,100	1,300	1,400	14,300	16,900
4	R252 East of Ballybofey	300	300	300	3,300	3,900
5	Dromore Rd Bridge	200	200	200	2,200	2,600
6	R235 South of Castlefinn	200	200	200	2,200	2,600
7	Urney Rd Bridge	200	200	300	2,500	3,000
8	R236 East of Raphoe	500	300	400	4,100	4,800
9	N13 North of Manorcunningham	1,100	900	1,200	11,300	13,300
10	R236 Through Momeen Lower	200	100	100	1,400	1,700
11	R265 Through Clonleigh	300	200	300	2,700	3,200
12	N13 North of Stranorlar	1,000	800	900	9,700	11,400
13	Unamed Road South of Navenny Street	100	0	100	500	600
14	N56 Through Ellistrin	1,000	700	1,100	9,600	11,300
15	R245 North of Kiltoy Rd Junction	1,100	700	900	9,300	11,000
16	L1114 Bridge Over River Swilly	800	600	1,100	8,500	10,000

Site No.	Location	Vehicles Per Hour			Vehicles Per Day	
		AM	IP	PM	AAWT	AADT
17	R250 West of Letterkenny	600	400	500	5,200	6,100
18	Local Road Through Killanoir	200	100	200	1,600	1,900
19	L1114 Through Leck	300	100	300	2,100	2,500
20	N15 South of Ballybofey	700	600	700	7,200	8,500
21	N15 East of Stranorlar	300	400	500	4,500	5,300
22	N14 Dry Arch to Polestar	2,600	2,300	2,800	27,700	32,700
23	N14 North of Murlog	700	600	800	7,500	8,900
24	N13 through Castlecooley	1,100	800	1,100	10,500	12,400
25	R236 South of Carrigans	300	200	300	2,700	3,200
26	A5 Through Ballymagorry	1,300	1,000	1,400	13,000	15,300

Chapter 3
Network Development



3 Network Development

3.1 Overview

This chapter describes the process by which the coding of the SATURN model's network was developed. As discussed in Section 2.3, two main source models were identified as the starting point for the development of one overall strategic model to assess the 3 key improvement options. These were:

- The N13/N14/N15 strategic traffic model with a base year of 2013
- The Letterkenny Model with a 2009 base year

The following methodology was adopted with regard to the development of the highway network coding in the Donegal TEN-T model:

- Both network models were reviewed to identify coding inconsistencies and identify areas where highway networks had changed since the respective development periods;
- The existing N13/N14/N15 SATURN model was identified as the optimum source model for the main strategic elements of the proposed TENT-T model and was updated accordingly;
- The Atkins Letterkenny model had a far denser network and zone system within the main urban area which was deemed more suitable for the assessment of the strategic improvements around Letterkenny. The Atkins model network was, therefore, incorporated into the TEN-T model with both the highway network and internal traffic demands developed for Letterkenny sourced from the 2009 Atkins Letterkenny Transport Model;
- The external to internal (Letterkenny zones) and internal to external movements were derived from the N13/N14/N15 model;
- The area to the north including Derry was not be updated or removed from the model to avoid any structural change having an adverse impact on vehicle routing elsewhere. It should be noted, however, that no additional calibration of the model in this area was undertaken;
- Following network development, the consideration of assignment method was confirmed and the generalised costs for the assignment process calculated.

3.2 Software

The traffic model was constructed using version 11.3.12U of the SATURN (Simulation and Assignment of Traffic in Urban Road Networks) software suite (released November 2015).

3.3 Coding Audit and Corrections

A review was conducted of the coding used in both of the received models, which was to be incorporated into the revised model. Specific attention was given to:

- Types of junction used (signalized, roundabouts, etc.)
- Lane provision and allocation
- Saturation flows at junctions
- Speed/flow characteristics used on long rural links

Some of the network changes undertaken on the main strategic network are listed in Table 3. These mainly relate to network changes which have occurred since the development of the individual models.

Table 3-1 – Network Coding Changes

Area	Node	Description	Changes
Letterkenny	5049, 5849	Dromore N14-L1114 "left-in, left-out" priority junctions	Coded to accurately reflect its layout, using standard saturation flows specified in RM Spec2 Road Model Specification Report. This junction was not included in the previous models.
Letterkenny	8100-8105	New N56-Kiltoy Roundabout	Coded this roundabout using standard saturation flows specified in RM Spec2 Road Model Specification Report. It was not included in the previous models due to the it only being completed in 2017
Strabane	1801	Urney Rd-Castletown Rd Junction	Corrected to be mini-roundabout based on observations, using standard saturation flows specified in RM Spec2 Road Model Specification Report. It was previously coded as a priority junction
Letterkenny	9055-5051	L1114	Freeflow speed reduction from 60 to 48, reflecting signage and road quality
Letterkenny	5061	Crieve Rd-L1114 Roundabout	Saturation flow reduced from 1447 to 600 for southbound movement due to junction being narrow with poor visibility and constraints of adjacent bridge
Letterkenny	5062	Pearse Road – R250 Roundabout	Saturation flow reduced from 1555 to 600 for southbound movement due to junction being narrow with poor visibility and constraints of adjacent bridge
Ballybofey and Stranorlar	2058	Navenny St at Dreenan	New zone 804 added with access, for traffic to/from Carn View
Ballybofey	2057, 1139, 3107	Navenny St-Chestnut Rd-N15	Links connecting to N15 coded as two-way rather than one-way, to be consistent with observations.
Stranorlar	1859-1149	N15 through Stranorlar, east of junction with N13	Length corrected based on mapping to 830m from 1030m

3.4 Letterkenny Network Coding

The coding from the 2009 Atkins model was adopted as a starting point for the coding of Letterkenny in the model. It was audited and updated, as discussed in section 3.3.

The model coding for the main urban area of Letterkenny was duplicated in the Donegal Ten-T Model, with the links connected at the appropriate nodes.

The construction of a new roundabout at the Kiltoy Road/N56 junction, which was completed in 2017 was added to the model.

In initial testing of the model structure excessive delays were experienced at some of the zone loading points where spigot connectors had been used. To keep consistency with the rest of the Letterkenny network these spigot connectors were retained but the junction type was changed to a dummy node to enable traffic to both access the network and not develop unreasonable levels of delay in the network. This would also remove the possibility of forecast future network improvements having an unrealistically significant benefit to network conditions. The locations where the nodes were changed are shown in Table 3-2.

Table 3-2 – Zone Accesses Converted to Dummy Nodes in Letterkenny

Node	Zone	Junction Location
9013	783	Windy Heights – N56 Junction
9012	762	Thornbury – N56 Junction
9011	783	Ceanann View - N56 Junction
9280	783	Gleann Tain Close – N56 Junction
9242	762	Hazelwood Drive – N56 Junction
9180	564	Hospital Access – Kilmacrenan Road Junction
9983	564	Hospital Access –Circular Road Junction
9179	587	St Conals – Kilmacrenan Road Junction
9221	563	Errigal College Access – Kilmacrenan Road Junction
9226	602	High Rd – Fortwell Court
9256	622	R250-Shop Access
9326	544	Pearse Road-Courtyard Shopping Centre Car Park
9278	782	Letterkenny Office Park Access – Kilmacrenan Road Junction
5031	746,745	Kiltoy Rd – R245 Junction
9020	585	Business Park Rd – N56
9005	521	Iona Road – High Road
9168	621	Isle Lane-Port Road
9067	626,629	Neil T Blaney Road Southern Access Junction
9068	628	Letterkenny Public Services Centre
9368	643	N14 – Car Park Junction
9352	628	N14-Joe Bonnar Link Road Junction
9030	N/A	Kiltoy Rd – R245
9037	683	Ramelton Rd – Ballyraine Park
9366	644,724,725	R245 - Ballyraine Park
9027	744,743	Kiltoy Rd – Meadow Hill
9029	744,750	Kiltoy Rd – Carolina Park

3.5 Derry

The area of the model covering the town of Derry was not considered relevant to the TEN-T Priority Route Improvement Project being assessed. As a result, traffic data was not collected to update the calibration or validation of this part of the model.

All nodes for this part of the network were converted to “dummy nodes” in order to minimise the impact of this part of the model on assignment, convergence and delay propagation.

3.6 Strabane Access

It was noted in future years when stress testing the network, that with increased demands, excessive delays occurred on certain over capacity zone accesses within Strabane. When various options were being tested, this lead to “noise” impacts in the model, as small increases in major arm flows lead to large changes in minor arm delay.

In order to prevent this, the base model was adjusted to adopt a simplified modelling of these zone connectors as “link connectors” rather than “spigot connectors”. The junction was removed from the model and the demand from the zone was now directed on the mainline link.

A list of the locations where this was done is found in Table 3-3.

Table 3-3 – Zone Spigots Converted to Link Zones in Lifford and Strabane

Zone	Location
4	A5-Town Parks
7	Derry Road
8	Church Street-Market Street Junction
18	Eden Terrace- Railway St Junction

3.7 General Network Coding

In the general review of the traffic model structures the use of speed flow curves across both model areas was updated to a consistent set. These are as shown in Table 3-4 with representative saturation flows by junction type shown in Table 3-5.

Table 3-4 – Speed Flow Curves Used in Donegal Model

Speed-Flow Curve Number	Road Type	Freeflow Speed (kph)	Speed at Capacity (kph)	Capacity (PCUs)	Coefficient / Power	Notes
4	High Quality Single Carriageway	98	45	2000	3.2	
5	Dual N13, N14 and N15	86	45	4000	3	Lower freeflow speed than speed limit guidance for dual, due to observed speeds, capturing geometric delay
6	Good Quality Single Carriageway	87	45	1860	2.2	
7	Poor Quality Single Carriageway	77	45	1660	2.1	Applied to certain single carriageway National Road, the N13 between Listillion and Dry Arch and the N14 between Murlog and Mannorcunningh am, due to observed speeds,

Speed-Flow Curve Number	Road Type	Freeflow Speed (kph)	Speed at Capacity (kph)	Capacity (PCUs)	Coefficient / Power	Notes
						capturing geometric delay
12	Regional Road	67	33	1400	2	
13	Local Road	48	25	900	1.4	Used for small local rural roads
16	Suburban	61	45	1700	2	
17	Suburban dual	61	45	3400	2	Used for N56 through Letterkenny
41	Wider urban road	48	25	1400	1.27	Used for wider roads/regional roads in Letterkenny
44	Narrow urban road	28	15	650	2.14	Used for narrow urban roads in Letterkenny

Table 3-5 – Junction Saturation Flows

Junction Type	Movement Type	Saturation Flow (PCUs/Lane available)
Priority Junction	Minor Arm - Left	1300
Priority Junction	Minor Arm - Straight	1900
Priority Junction	Minor Arm - Right	1200
Priority Junction	Major Arm - Left	750
Priority Junction	Major Arm - Straight	650
Priority Junction	Major Arm - Right	650
Roundabout	Approach	1100
Roundabout	Approach with flare	1800
Roundabout (“exploded coding”) ICD>30m	Approach	1100
Roundabout (“exploded coding”) ICD>30m	Circulatory (remaining on roundabout)	1600
Roundabout (“exploded coding”) ICD>30m	Circulatory (exiting roundabout)	1800
Signalised Junctions	Left	1300
Signalised Junctions	Straight	1900
Signalised Junctions	Right	1600

The final network from the combined and updated source models has the following simulation network components:

- 180 external nodes (type 0)
- 519 priority junctions (type 1)
- 2 roundabouts (type 2)
- 13 traffic signals (type 3)
- 52 dummy nodes (type 4)
- 10 roundabouts with U-turns (type 5)

The overall classification of roundabouts is misleading as a number of key roundabout locations had their coding revised to an “exploded roundabout” thus the entries would have been treated as priority junctions.

Appendix A provides details of variations to default settings applied within the Donegal TEN-T SATURN model.

3.8 Assignment Approach

For this model the traffic is assigned to the network based on achieving as close as possible to “Wardrop User Equilibrium” through an iterative process. Wardrop User Equilibrium is defined as a state in which no user can reduce the generalised cost of their journey by changing route.

3.9 Derivation of Generalised Cost Equations

This section sets out the methodology used to derive the values of the time and distance coefficients of the generalised cost equations for each of the modelled user classes. The generalised cost equations comprise time, distance and toll cost coefficients, the derivation of which is discussed in more detail below.

3.9.1 Derivation of Time Coefficients

Time coefficients are defined in SATURN by a PPM (pence per minute) parameter, entered in the units of Euro cents per minute. Table 3 within Transport Infrastructure Ireland’s Project Appraisal Guidelines for National Roads Unit 6.11 - National Parameters Values Sheet sets values of time in 2011 prices for three journey purposes: working time, commuting and other non-working time. Values do not vary by type of vehicle or occupant (driver or passenger). These rates were combined with the occupancy rates for different time periods provided in Table 21 of Unit 6.11, in order to convert these values of time per occupant, into values of time per vehicle, for each time period.

For example, a working time car has an average occupancy of 1.26 in the AM peak, indicating one driver and an average of 0.26 passengers (the majority of working time car’s being single occupancy). Thus, to calculate the AM peak value of time for working time car, the value of time for one working time driver (29.02 €/Hour) is added to the value of time for one working time passenger (also 29.02 €/Hour) multiplied by 0.26.

For OGVs (user class 5 and 6), it was assumed that all vehicles were working time. For LGVs, the split for LGVs by purpose provided in Table 22 of Unit 6.11 was used to create an average for all LGVs irrespective of purpose.

Finally, the data was converted from €/Hour to Euro cents per minute and factored from 2011 to 2017 using the growth rates provided in Table 4 of Unit 6.11.

3.9.2 Derivation of Distance Coefficients

Distance coefficients are defined in SATURN by a PPK (pence per kilometre) parameter, entered in the units of Euro cents per kilometre. Vehicle operating costs comprise both fuel and other costs.

Fuel costs and consumption estimates in litres per 100km are given in PAG Unit 6.11 for both diesel and petrol cars, LGVs and OGVs. These values were used to calculate the fuel element of the PPK. For the non-fuel PPK, 2011 Euro cents per km prices are given in Table 10 of Unit 6.11.

3.9.3 Derivation of Toll Coefficients

Tolls are not modelled in the base model or any of the future year models, so it was not necessary to calculate monetary coefficients.

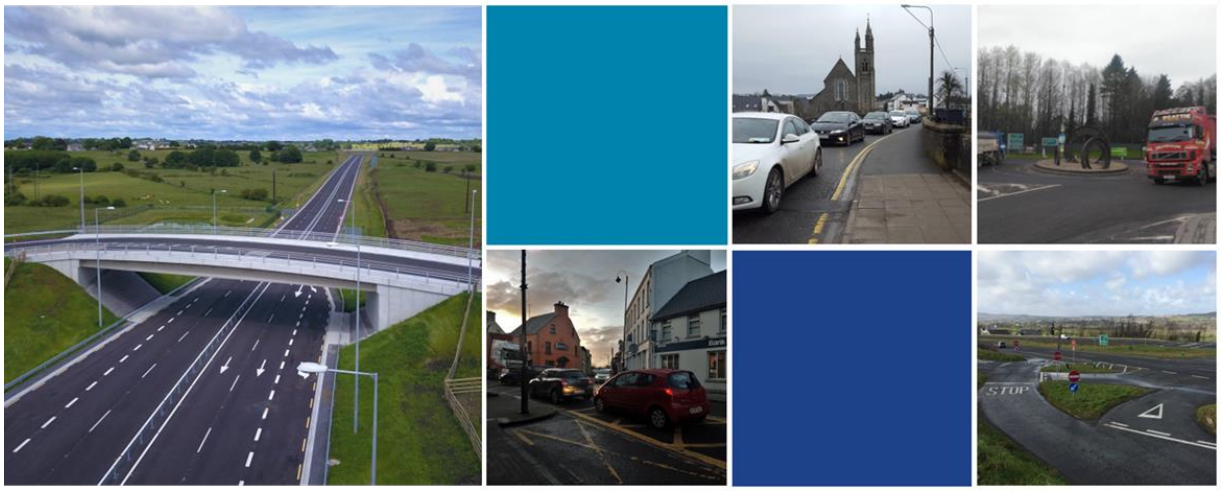
3.9.4 Summary of Generalised Cost Coefficients

A summary of the generalised cost coefficients used within the Donegal TEN-T model is shown in Table 3-6.

Table 3-6: Generalised Cost Coefficients

Purpose	Vehicle	Value of Time		Vehicle Operating Costs	
		Cents/sec	€/hr	Cents/metre	€/km
Work	Car	1.315	47.348	0.0111	0.111
Commute	Car	0.503	18.098	0.0102	0.102
Other	Car	0.618	22.248	0.0102	0.102
Work	LGV	0.974	35.047	0.0161	0.161
Work	MGV	1.134	40.833	0.0215	0.215
Work	HGV	1.251	45.041	0.0324	0.324

Chapter 4
Matrix Development



4 Matrix Development

4.1 Overview

This chapter describes the development of the demand matrices for the Donegal TEN-T model. The demand matrices from the existing Letterkenny (2009 base) and N13/N14/N15 model (2013 base) were used as an input to the development of the Donegal TEN-T traffic demands.

The matrix development process initially involves the identification of the peak hours of traffic demand for which matrices will be developed and then also confirms the trip purposes by vehicle type (user classes) within the matrix which will be assigned to the previously described highway network. The main approach to matrix development is then described.

4.2 Modelled Time Periods

TII TMU data has been analysed in order to identify the peaks in traffic demand within the study area. The 2017 weekday (Monday-Friday) daily traffic profile, based on an average of the data collected at the TMU sites is shown in Figure 4-1. The AM and PM peak hours are highlighted in red.

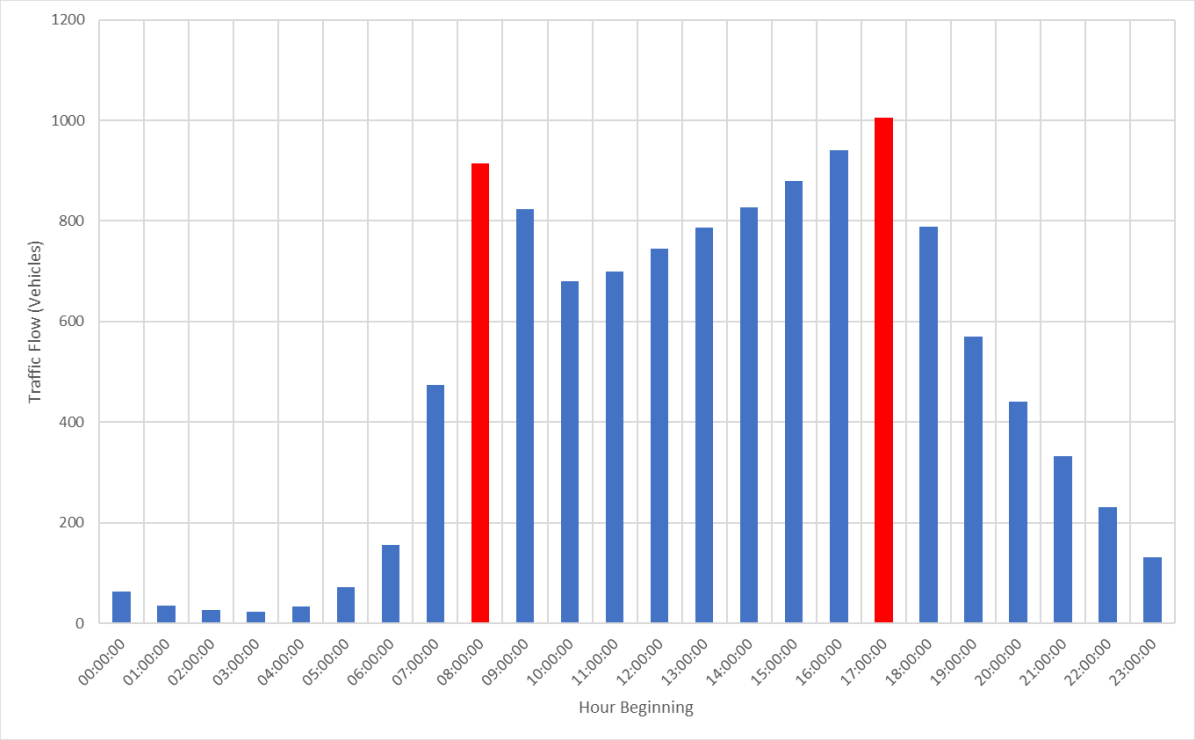


Figure 4-1 2017 Weekday Daily Traffic Profile

The modelled periods are therefore:

- Weekday AM Peak Hour: 08:15-09:15
- Weekday Average hour in the inter peak between 10:00 and 16:00
- Weekday PM Peak Hour: 16:45-17:45

4.3 Matrix Levels

The Donegal TEN-T model has been developed with six user classes, these being retained from the existing models. Traffic demand matrices within the Donegal TEN-T model have been prepared for each of the following trip purposes/user classes:

- User Class 1: Car (Employers Business)
- User Class 2: Car (Commuting)
- User Class 3: Car (Other non-work)
- User Class 4: Light Goods Vehicles
- User Class 5: Medium Goods Vehicles
- User Class 6: Heavy Goods Vehicles

The overall process used to prepare the prior matrix for the Donegal TEN-T model is shown in Figure 4-1. The individual steps of the process are described in more detail within subsequent sub-sections.

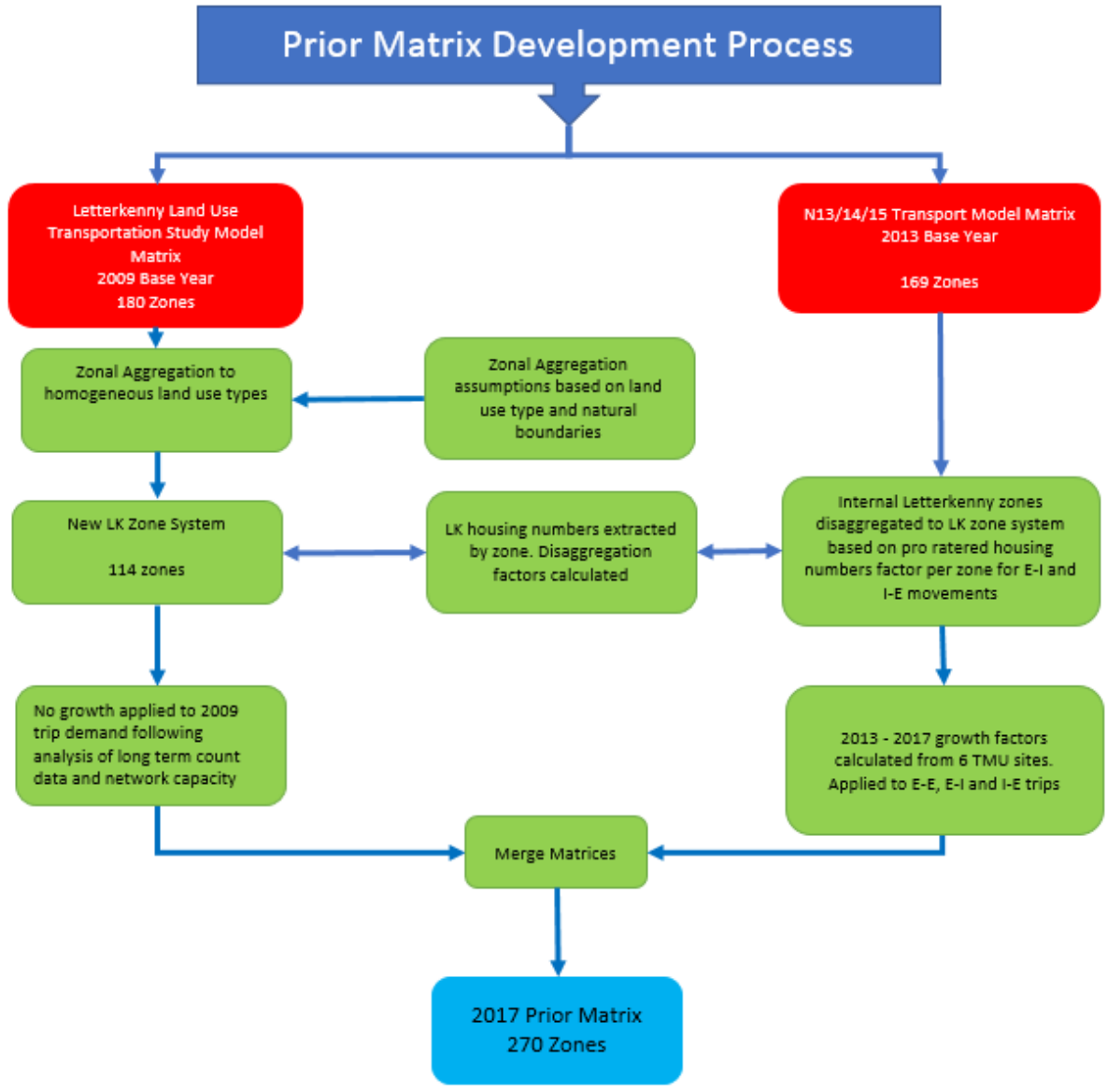


Figure 4-1 Matrix Development Process

In the Letterkenny area, it was necessary to merge the matrices from the Letterkenny Land Use Transportation Study model (2009 base) and the N13/N14/N15 model (2013 base). The N13/N14/N15 covers a wider geographical area and is underpinned by more recent origin-destination (Roadside Interview) survey data than the 2009 Letterkenny model. Therefore, the N13/N14/N15 demands were given precedence with regard to populating the strategic trips in the merged model. Due to its increased level of granularity, the existing Letterkenny model was used to seed the local trips in the merged model. This approach ensured that the strategic trip distribution from the N13/N14/N15 model was maintained in the merged model.

Table 4.1 shows the derivation of trips in the merged model. Trips within a cordon around Letterkenny are described as internal trips. The cells in Table 4.1 shaded in light blue show the trips derived from the existing Letterkenny model. Trips derived from the N13/N14/N15 model are shaded in light green.

Table 4-1 – Derivation of Trips in Merged Model Demand Matrices (Letterkenny Cordon)

Internal - Internal	Internal - External
External - Internal	External - External

In the previous N13/N14/N15 model, Letterkenny was represented by two zones. The Internal-External (I-E) and External-Internal (E-I) trips crossing the Letterkenny cordon in the prior matrix for the new model therefore had to be disaggregated to match the zoning system within the new model. The trips were disaggregated on a pro-rata basis based upon the distribution of demands in the existing Letterkenny model.

4.4 Zone Structure

The zone system for the Donegal TEN-T model is based on an amalgamation of the zoning from the existing N13/N14/N15 SATURN model and the Letterkenny model. The N13/N14/N15 zone structure is a disaggregation of the Electoral Divisions administrative areas.

Due to its wider network coverage, the N13/N14/N15 model was used to provide the basis for the zoning, however, this model contained a limited level of detail in Letterkenny. In order that the new Donegal TEN-T model would be suitable in assessing the Section 2 options, the level of detail at Letterkenny needed to be increased.

Within Letterkenny, the zoning system in the Donegal TEN-T model is based on that from the 2009 existing Letterkenny model.

These zones were allocated to a variety of land-uses based on observations of mapping. This is shown in Figure 4-2, with the zones numbered by their zone number in the 2009 Atkins Letterkenny Transport Model. This clearly identifies the retail town centre, the main residential areas to the west, east and north of the centre and the main employent clusters in the eastern areas of the city.

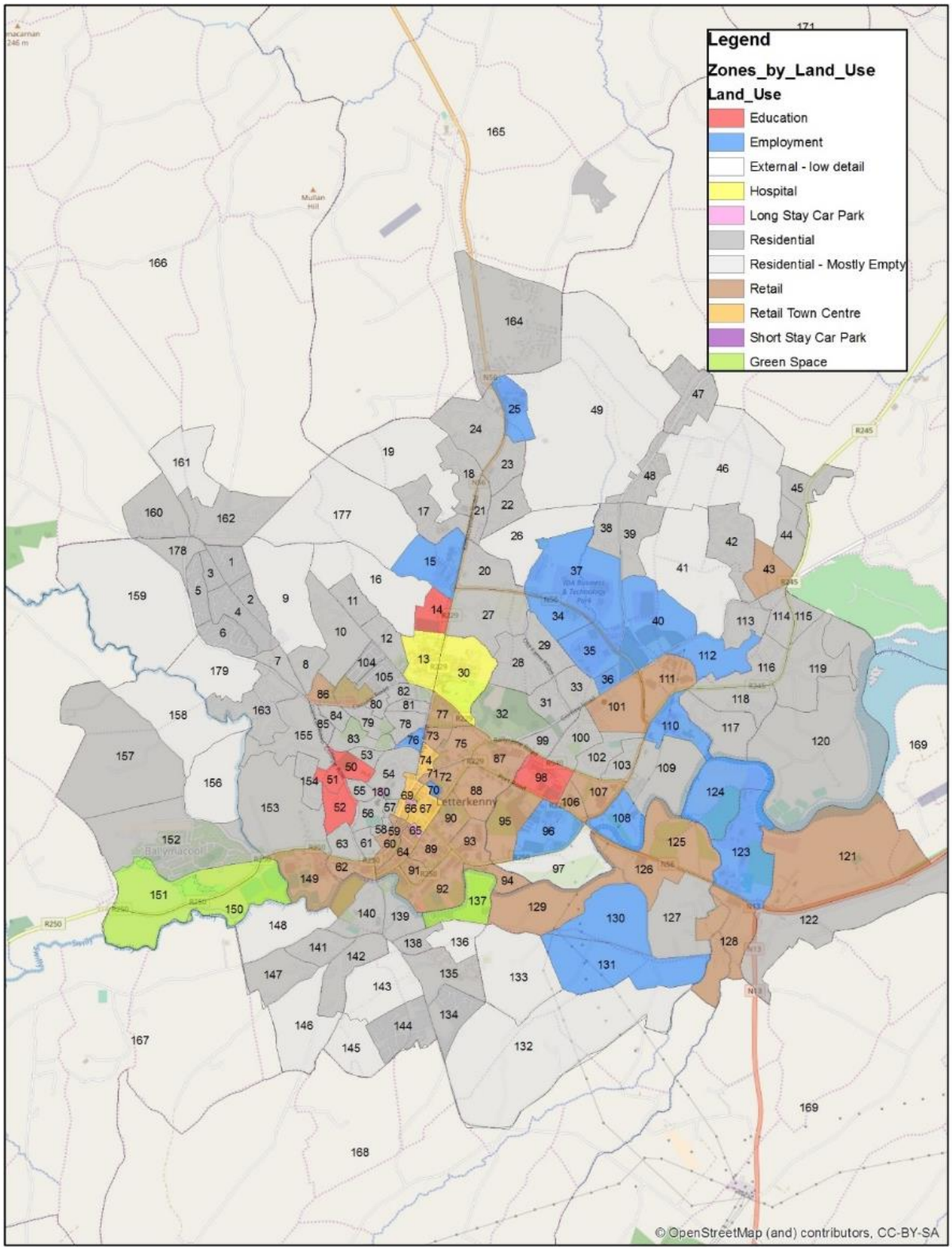


Figure 4-2 Letterkenny Zones: Land Use

In addition, to assist in the development of the model and for future forecasting purposes, the zones were allocated into a series of sectors based on physical barriers like major roads and rail lines and also natural boundaries such as the Swilly River. These sectors are shown in Figure 4-3.

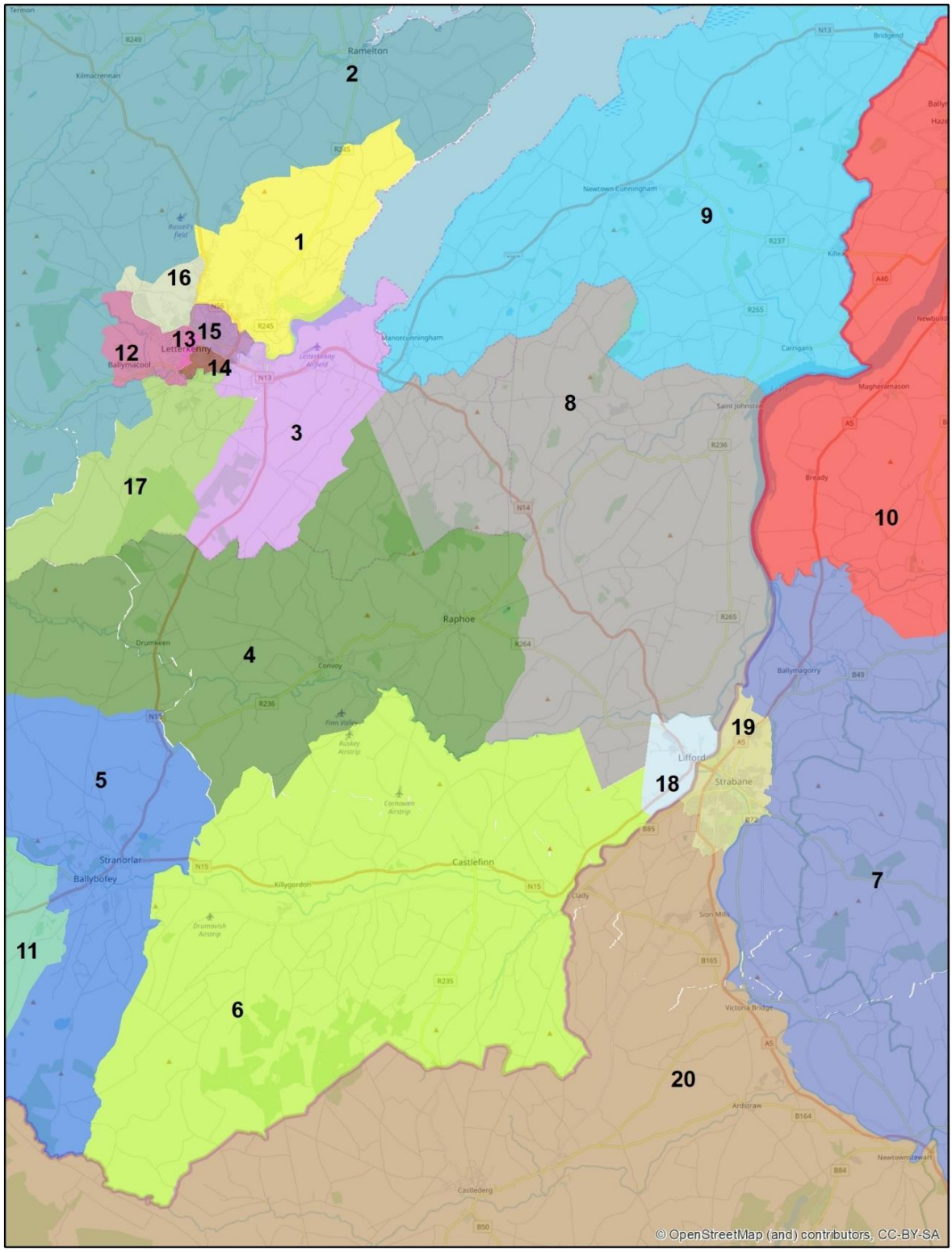


Figure 4-3 Letterkenny Zones: Sectoring

The Letterkenny zone system from the existing model was a very finely defined system with many discrete zones. The level of detail therein was excessive for the strategic modelling purposes of the TEN-T model being developed and as a result zones were amalgamated based on the following assumptions :

- Different land-uses (as shown in Figure 4-2) were kept separate such that only homogeneous land use types were combined;

- Zones in different sectors were not amalgamated which assisted in not combining zones with physical barriers between them.

Thus for example residential zones (1 to 8) in the north west of Letterkenny were grouped into one larger zone 421 in the revised model. This reduced the number of zones within the Letterkenny area by 66. The revised zone structure is shown in Figure 4-4.

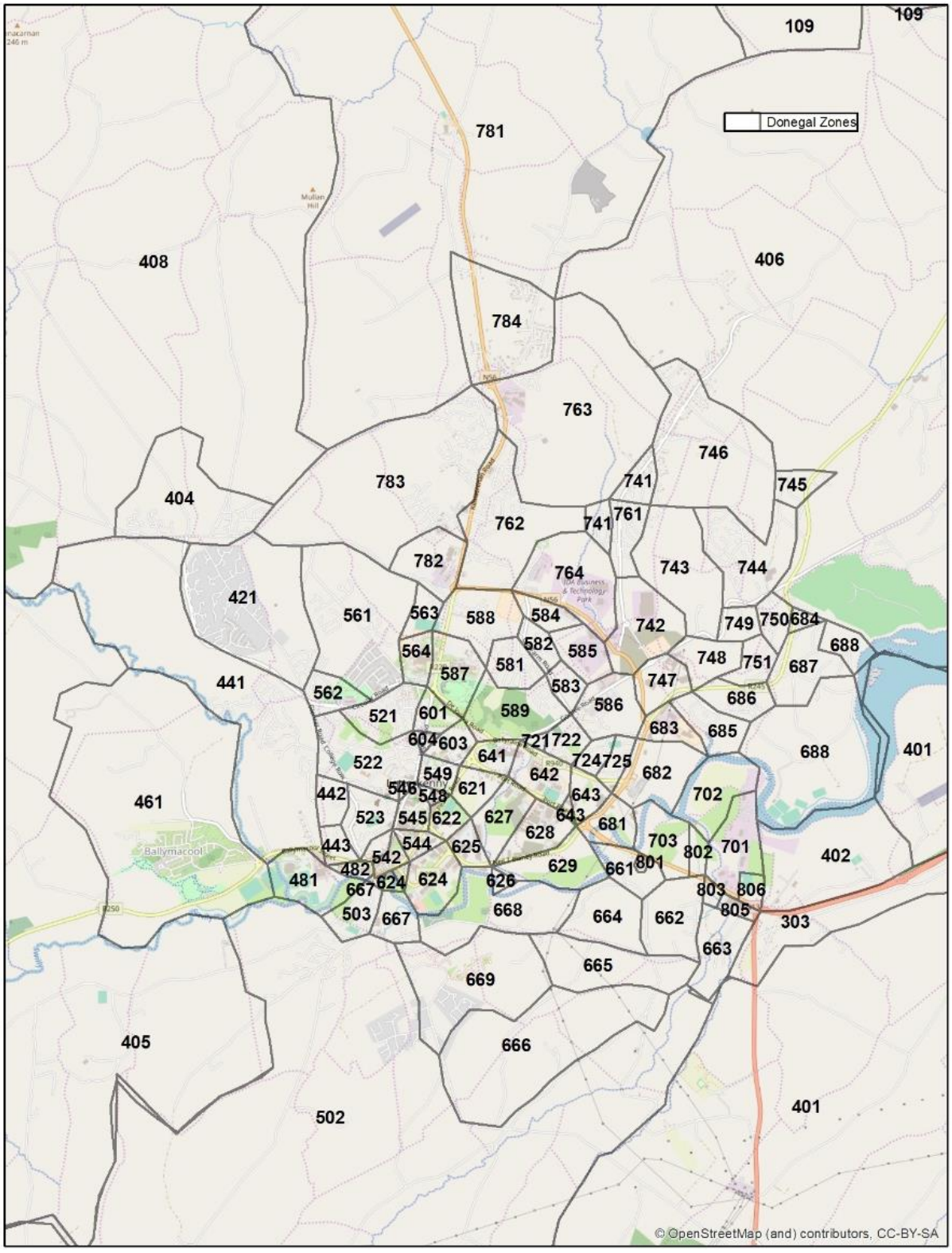


Figure 4-4 Donegal TEN-T Model Letterkenny Zone Structure

The revised zone structure for the main urban area of Letterkenny was then combined with the N13/N14/N15 SATURN model for zones outside of Letterkenny. The overall zone structure for the wider modelled area is shown in Figure 4-5.

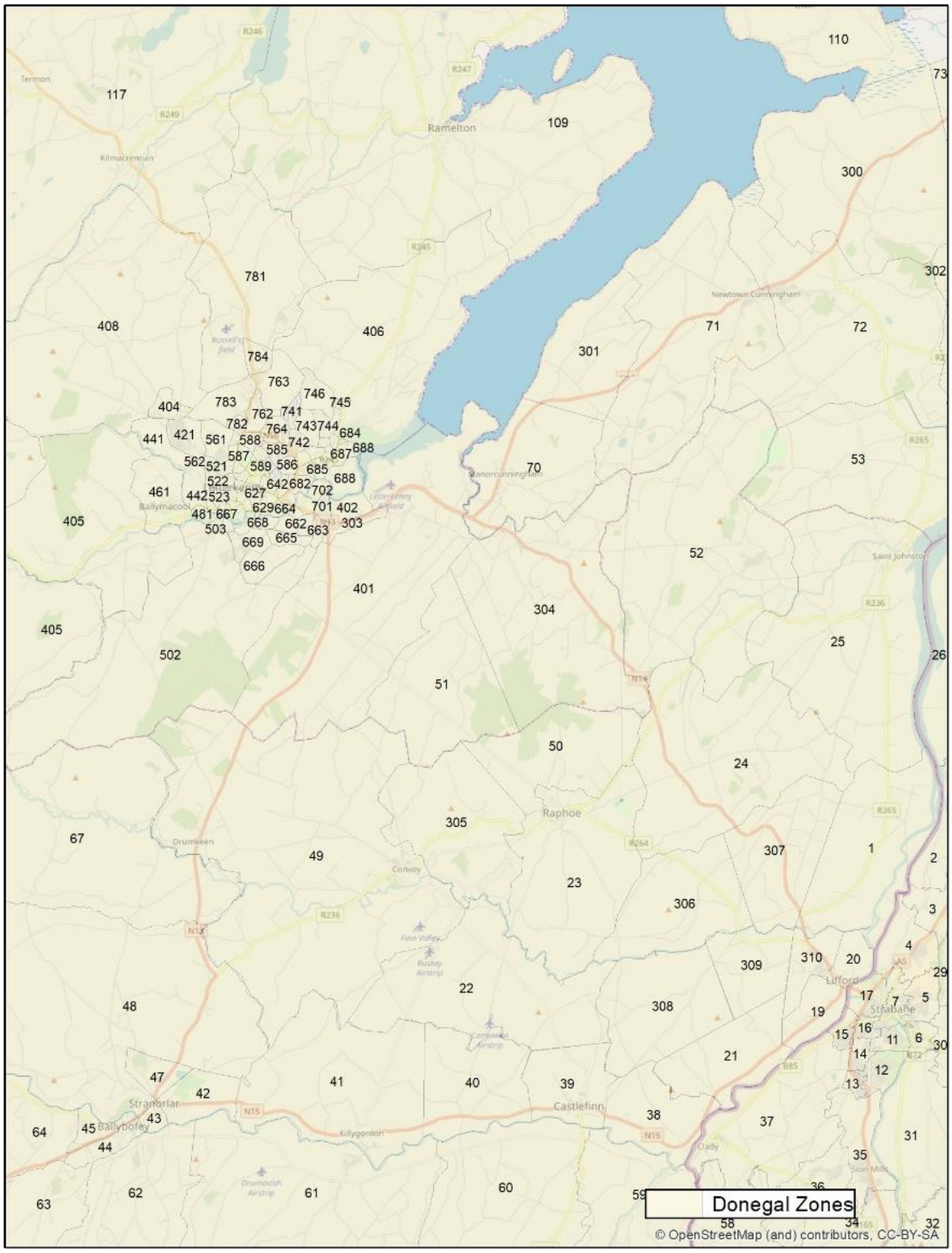


Figure 4-5 Final Overall Zone Structure

4.5 Initial Matrix Calculation

Having revised the overall zone structure of the TEN-T model a series of additional steps were then undertaken to combine the travel demand between the source models to develop the initial prior matrix. The following steps and assumptions were followed in the creation of the prior matrix for the new model:

- For trips between non-Letterkenny zones, the N13 model zones and trip demands were used;
- For internal trips between Letterkenny zones, the 2009 Atkins Letterkenny Transport Model demands were used. There was negligible growth for these zones between 2009 and 2013, based on survey data;
- For trips between Letterkenny and non-Letterkenny zones, the N13 model demands were used., These were disaggregated to the revised TEN-T model zone system using trip generation rates varying by land use type and peak period under consideration. These were used to weight disaggregation factors for N13 to Lettterkenny model trip demands;
- The outcome of the above steps was a highway trip demand matrix assumed to be at 2013 levels. This 2013 matrix was then factored from 2013 to 2017, using the growth rates derived from analysis of the TMU sites, applied on a sector basis and as shown in more detail in section 4.6.

4.6 Factoring to Modelled Base Year

Based on the trip matrix developed from the steps indicated above adjustment to account for growth from the indicative base year of travel demand (2013) to that of the required base year of the new Ten-T model (2017) was required. This adjustment from 2013 to 2017 was based on long term counts from the Traffic Measurement Units (TMUs) and applied at a sector level. The modelled area was split into 9 sectors, these are listed in Table 4-1 and shown geographically in Figure 4-6.

Table 4-1 – Sectors

Sector No.	Coverage
1	Letterkenny and surrounding area
2	Northwest of Letterkenny
3	N14 and surrounding area
4	Lifford, Strabane and Northern Ireland
5	Ballybofey, Stranorlar and surrounding area
6	N13 and surrounding area
7	Derry
8	Donegal
9	Letterkenny North East

These sectors are chosen such that the TMU counts could be used to estimate the growth in traffic between and within these sectors.

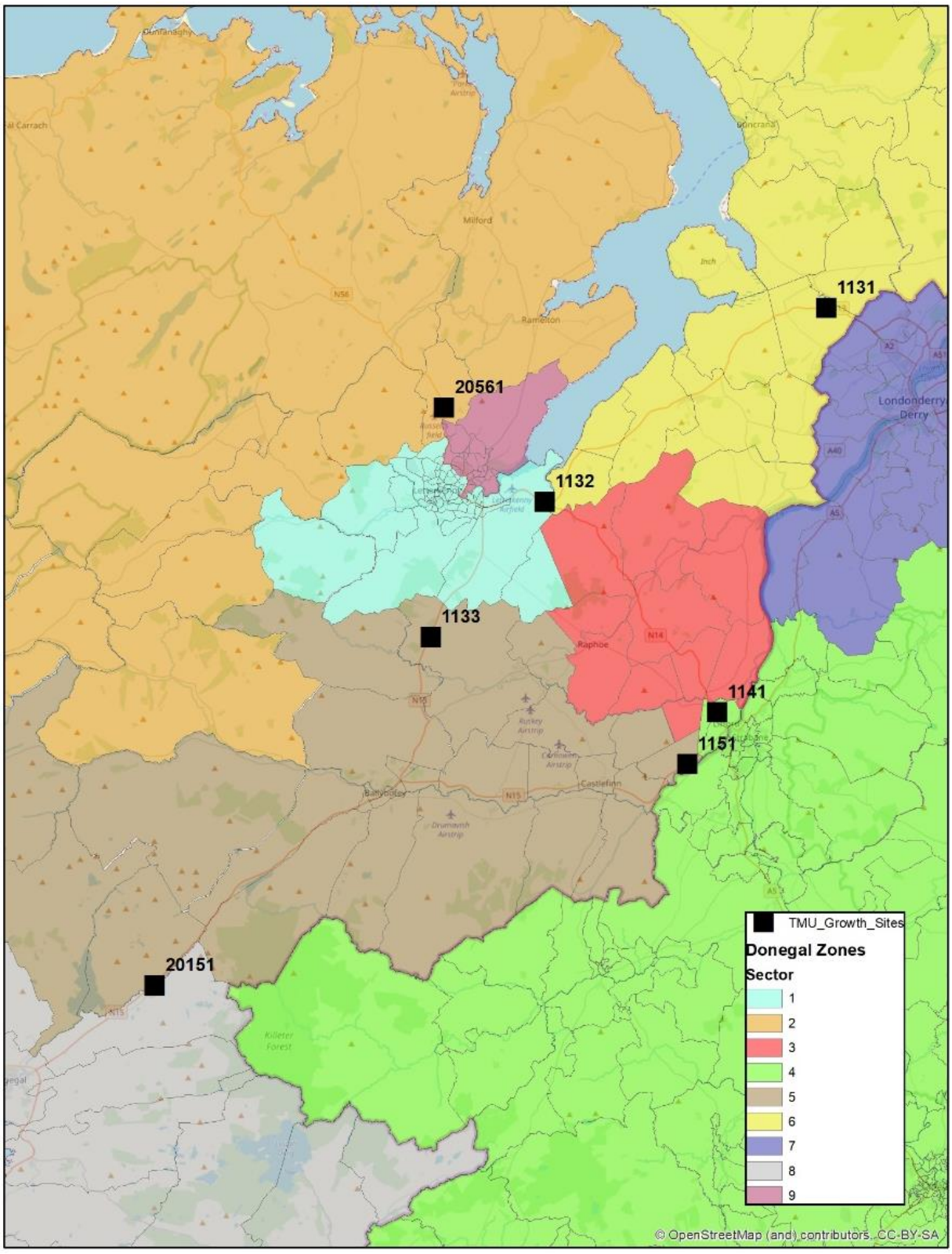


Figure 4-6 Final Zone Sectors and TMU Locations

The growth in traffic at each TMU site is shown in Table 4-2.

Table 4-2 – TMU Growth Rates

TMU Site	Location	AADT Growth 2013 - 2017
1131	N13 Between Bridgend and Burnfoot, Co. Donegal	8%
1132	N14 Between Letterkenny and Lifford, Rossbracken, Co. Donegal	12%
1133	N13 Between Stranorlar and Letterkenny, Treantaboy, Co. Donegal	12%
1141	N14 Between Lifford and Letterkenny, Drumbuoy, Co. Donegal	0%
1151	N15 Lifford to Castlefinn, Inchenagh, Co. Donegal	0%
20151	N15 Between Ballybofey and Donegal Town, North of Baresmore, Co. Donegal	10%
20561	N56 Between Letterkenny and Ellistrin, Mountaintop, Co. Donegal	14%

The approach followed was that the growth rate between two sectors would be the average of the growth rate for every TMU site this movement would be expected to go through.

For trips to and from Letterkenny, levels of growth implied within the TMU sites was not thought appropriate due to the levels of congestion already present within the urban area and the lack of growth experienced in the preceding period (2009 – 2013).

As a result, data for peak flows from survey data within Letterkenny, collected in 2008 and 2017 was used as it was considered to be more representative of available network capacity to accommodate actual growth experienced. This growth rate of 1% was applied uniformly to all Internal, Internal-External and External-Internal demands at Letterkenny. The growth rates used are shown in Table 4-3.

Table 4-3 – 2013 to 2017 Growth Rates Applied by Sector

From/To Sector	1	2	3	4	5	6	7	8	9
1	101.0%	101.0%	101.0%	101.0%	101.0%	101.0%	101.0%	101.0%	101.0%
2	101.0%	109.3%	112.9%	112.9%	113.3%	112.9%	111.4%	112.2%	114.3%
3	101.0%	112.9%	107.3%	109.4%	106.4%	111.5%	105.5%	109.8%	111.5%
4	101.0%	112.9%	109.4%	109.4%	109.4%	109.4%	109.4%	105.1%	111.5%
5	101.0%	113.3%	106.4%	109.4%	107.4%	111.9%	110.7%	109.8%	112.3%
6	101.0%	112.9%	111.5%	109.4%	111.9%	109.5%	108.2%	111.2%	111.5%
7	100.0%	100.0%	100.0%	100.0%	100.0%	108.2%	108.1%	100.0%	100.0%
8	101.0%	112.2%	109.8%	105.1%	109.8%	111.2%	110.5%	107.0%	111.1%
9	101.0%	114.3%	111.5%	111.5%	112.3%	111.5%	109.9%	111.1%	121.1%

Chapter 5
Model Calibration and Validation

5 Model Calibration and Validation

5.1 Overview

This chapter describes how the process of calibrating and validating the models was undertaken. The model was calibrated to ATC and JTC data. The model was validated to ANPR and moving observer journey times.

5.2 Calibration

Calibration is an iterative process, the purpose of which is to ensure that the base model and outputs reflect operation of the network, as indicated by the survey data.

5.3 Calibration Criteria

Data from the Donegal TEN-T model has been compared against PAG flow calibration criteria:

- 85% of flows have a GEH of lower than 5
- It meets the “flow difference criteria”

Where GEH Statistic is defined as:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where C is the surveyed flow and M is the modelled flow, both in PCUs.

Where the “flow difference criteria” is:

- For count flows under 700 PCU, a difference of less than 100 PCU between surveyed and modelled flows
- For flows between 700 and 2700 a difference of less than 15% between surveyed and modelled flows
- For flows over 2700 a difference of less than 400 between surveyed and modelled flows

The target was to have at least 85% of all movements meet either the “flow difference criteria” or have a GEH under 5.

5.4 Screenlines and Cordons

A set of screenlines and cordons were prepared for use in the calibration of the model. The location of the screenlines and cordons is shown in Figure 5-1.

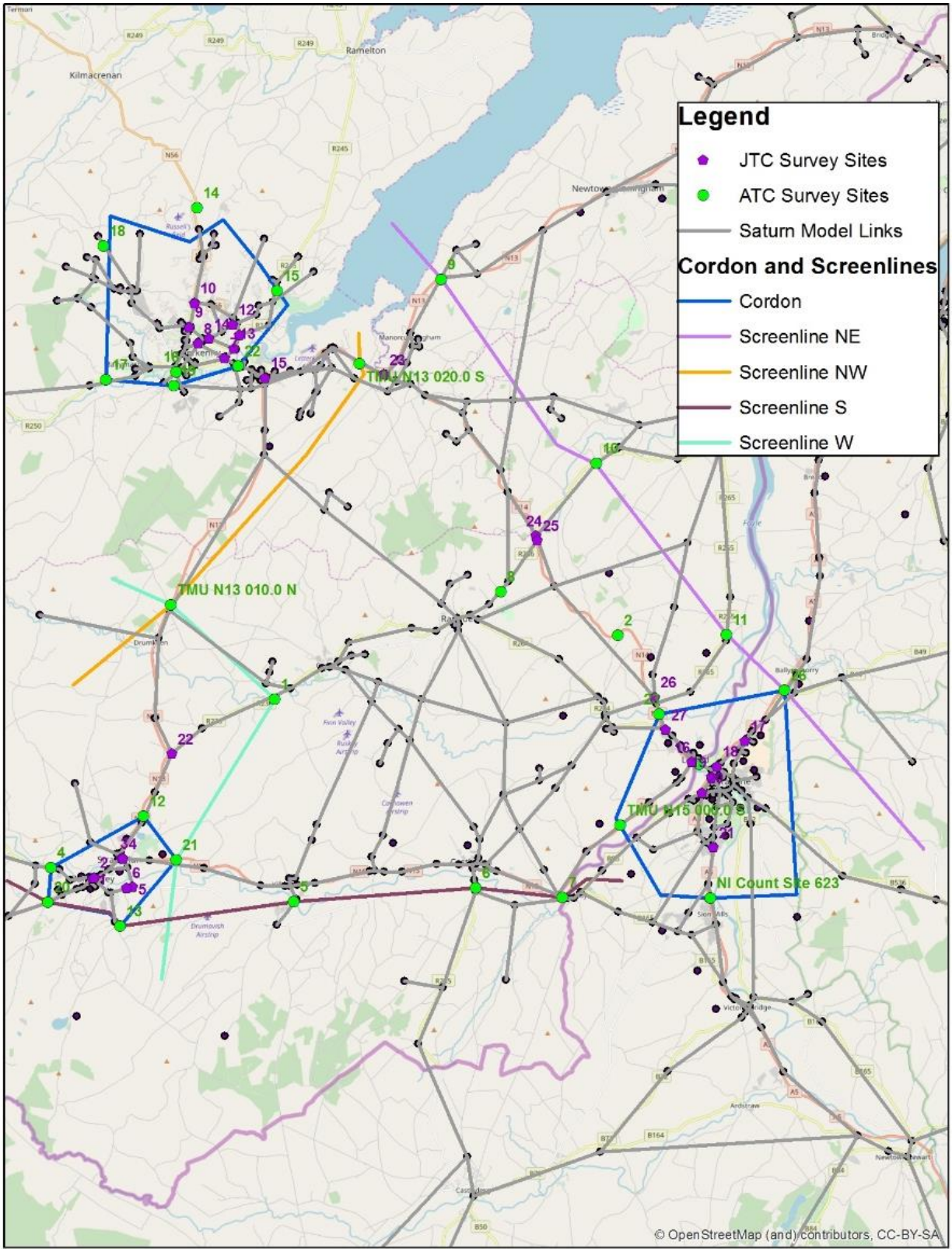


Figure 5-1 Cordon and Screenline Locations

5.5 Network Calibration

A summary of the changes made to the network calibration to better reflect survey data is provided in Table 5-1.

Table 5-1 – Network Coding Changes

Area	Node	Description	Changes
Letterkenny	5501	Dry Arch Roundabout (East)	Saturation flow increased from 1100 to 2200 PCU/hr and lane allocation increased from 1 to 2 for straight on movement increased, corresponding to observations and enabling surveyed flows to pass through with the surveyed levels of delay
Letterkenny	5002	Dry Arch Roundabout (South)	Saturation flow increased from 2200 to 2800 PCU/hr for left turning movement enabling surveyed flows to pass through with the surveyed levels of delay
Letterkenny	5509	Ballyraine School/campus roundabout (South)	Saturation flows on approach increased from 750 to 1100 PCU/hr per lane, enabling surveyed flows to pass through with the surveyed levels of delay and corresponding to observations of roundabout geometry
Letterkenny	5507	Ballyraine School/campus roundabout (North)	Saturation flows on approach increased from 750 to 900 PCU/hr per lane, enabling surveyed flows to pass through with the surveyed levels of delay and corresponding to observations of roundabout geometry
Letterkenny	9278-9282	N56 from Mountain Top - Nas Mór	Southbound mid link capacity reduced from 1600 to 1400 PCU/hr., in line with observations of road size/quality and to improve journey time validation
Ballybofey and Stranorlar	2046-1150	N15 through Ballybofey-Stranorlar	Mid link capacity reduced to 900 PCU/hr. This was to bring the journey times and journey time variability through this route in to line with those surveyed, as well as been consistent with the constraints on traffic through Ballybofey-Stranorlar
Ballybofey and Stranorlar	1140-1685	R252	Freeflow speed reduced from 60 to 35 kph on R245 through Ballybofey (west of its junction with the N15) and mid link capacity reduced from 900 to 500 PCU/hr, based on observed very narrow road layout

5.6 Matrix Estimation

Matrix Estimation (ME) is an iterative process whereby the demand matrices are adjusted based on surveyed traffic flow data collected for the modelled network. For the Donegal TEN-T model, ME was undertaken using the SATURN programs SATPIJA_MC and SATME2, to amend the demands to meet the 2017 calibration targets. For this process both the ATC and JTC data from the surveys was used.

The ME process was undertaken according to the method in Figure 5-2.

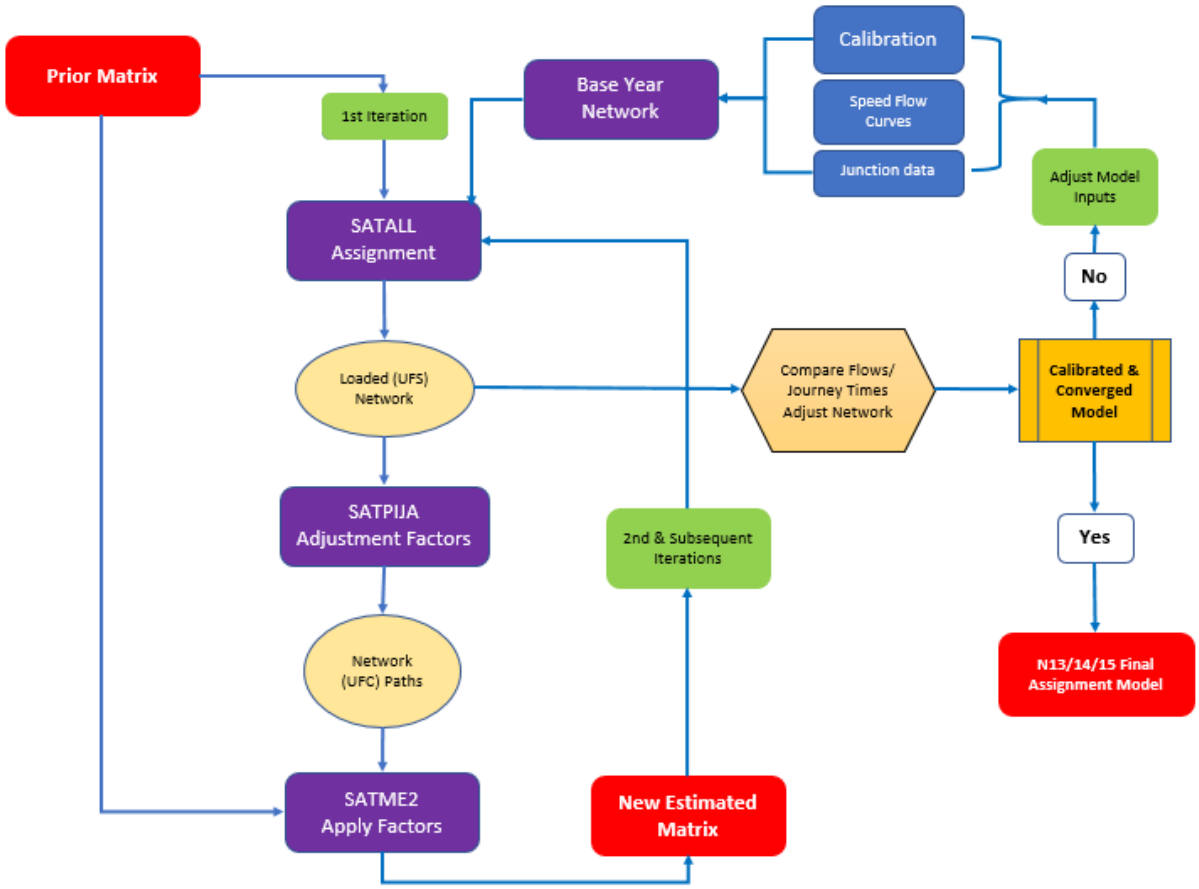


Figure 5-2 – Matrix Estimation Procedure

The ME process illustrated in the flow chart can be summarised as follows:

1. The prior matrix demand is assigned in the model
2. PIJA data, showing the proportion of vehicles using each route between every zone pairing is collected from the SATURN model
3. SATME2 uses the PIJA files to adjust the matrices, in order to provide a better fit between the traffic demands and the surveyed traffic flow data
4. The adjusted demand matrix is then assigned to the model,
5. If the model calibrates and converges then the process halts and the calibrated demands are retained for use in the model, otherwise the process returns to step 1.

Table 5-2 shows the pre and post matrix totals for each user class in the AM period.

Table 5-2 – AM Prior and Post Matrix Estimation Demand Totals

User Class	Description	Prior Matrix	Post ME	% Change
1	Car (Employers Business)	3,504	3,650	4%
2	Car (Commuting)	17,230	17,778	3%
3	Car (Other non-work)	10,809	11,398	5%
4	Light Goods Vehicle	5,652	5,511	-3%
5	Medium Goods Vehicle	2,220	2,061	-7%
6	Heavy Goods Vehicle	2,717	2,604	-4%
	Total	42,133	43,001	2%

Table 5-3 shows the pre and post matrix totals for each user class in the IP period.

Table 5-3 – IP Prior and Post Matrix Estimation Demand Totals

User Class	Description	Prior Matrix	Post ME	% Change
1	Car (Employers Business)	3,411	3,501	3%
2	Car (Commuting)	5,526	5,700	3%
3	Car (Other non-work)	18,153	18,949	4%
4	Light Goods Vehicle	4,169	3,834	-8%
5	Medium Goods Vehicle	2,386	1,905	-20%
6	Heavy Goods Vehicle	2,427	2,495	3%
	Total	36,072	36,385	1%

Table 5-4 shows the pre and post matrix totals for each user class in the PM period.

Table 5-4 – PM Prior and Post Matrix Estimation Demand Totals

User Class	Description	Prior Matrix	Post ME	% Change
1	Car (Employers Business)	3,567	3,628	2%
2	Car (Commuting)	16,667	16,680	0%
3	Car (Other non-work)	17,673	18,099	2%
4	Light Goods Vehicle	6,401	5,941	-7%
5	Medium Goods Vehicle	1,717	1,638	-5%
6	Heavy Goods Vehicle	2,296	2,262	-1%
	Total	48,322	48,248	0%

Analysis was also conducted regarding the change in number of trips by distance, user class and a sector. Figures 5-2 to 5-4 illustrate the trip length distribution is presented for the AM peak, Inter peak and PM peak.

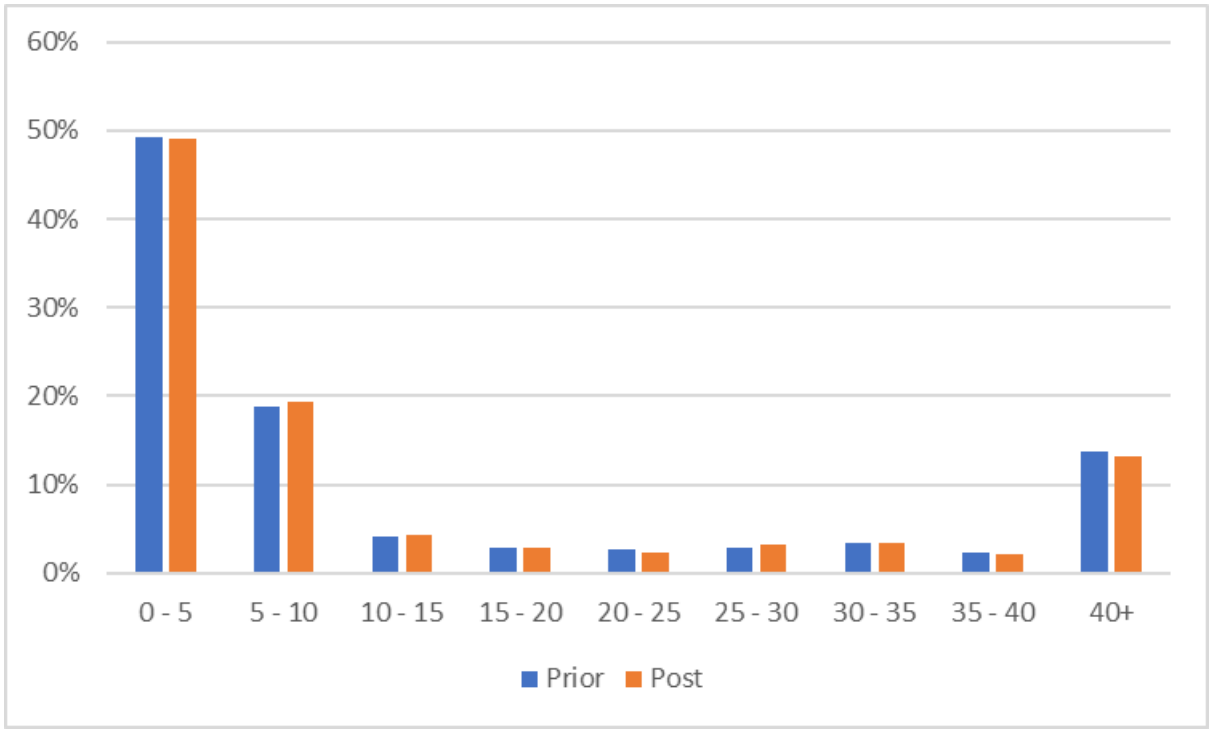


Figure 5-2 Prior and Post Matrix Trip Length Distribution – AM Peak

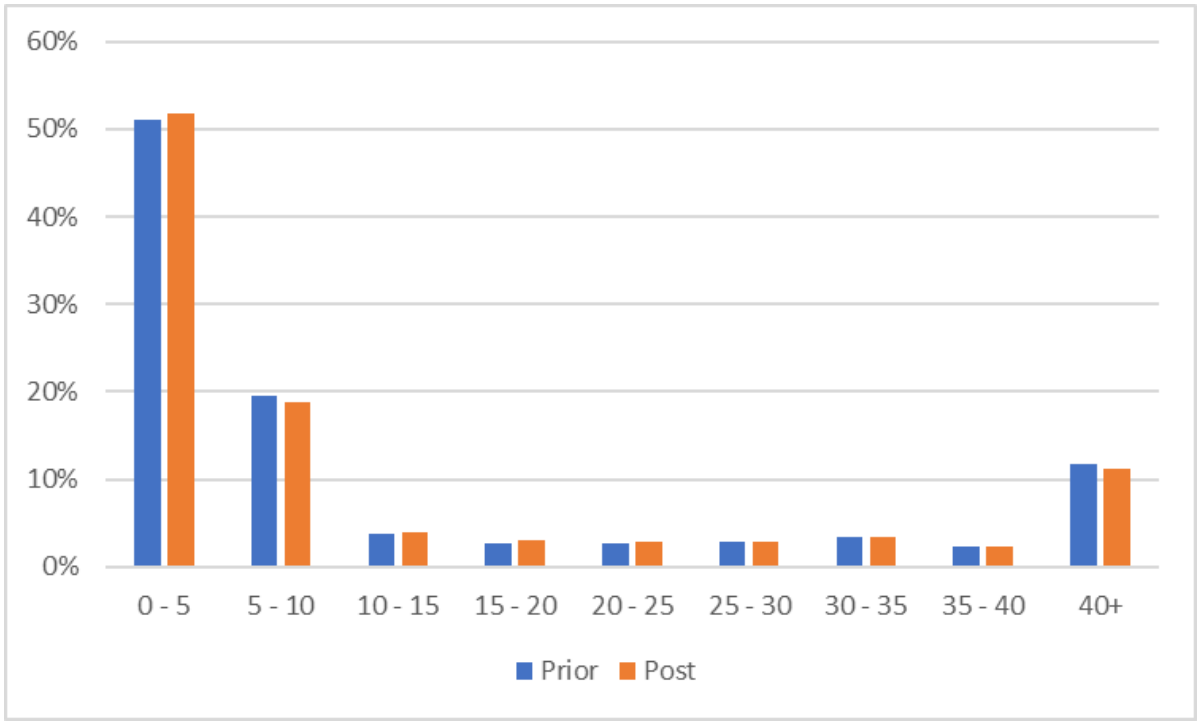


Figure 5-3 Prior and Post Matrix Trip Length Distribution – Inter Peak

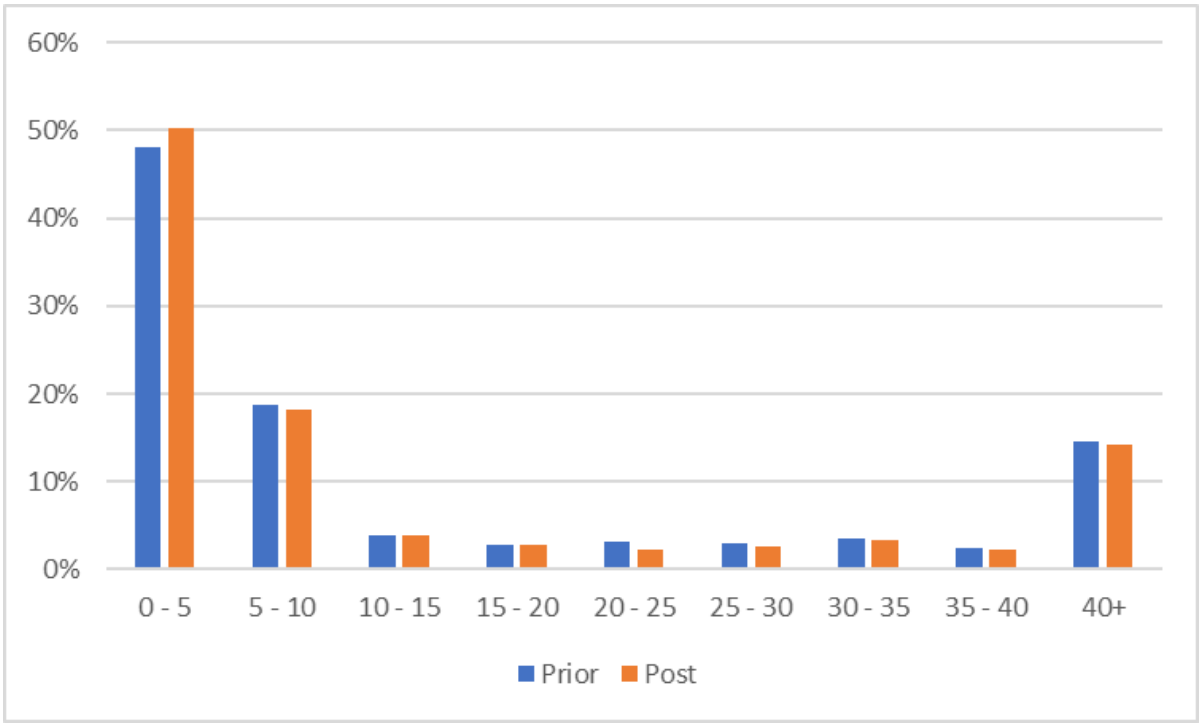


Figure 5-4 Prior and Post Matrix Trip Length Distribution – PM Peak

These indicate that the ME process has a proportionally small impact on the trip length distribution. In the PM peak and interpeak there is an increase in shorter trips, under 5km in length.

The results of the analysis of the impact of matrix estimation on trip numbers by user class is presented in Figures 5-5 to 5-7.

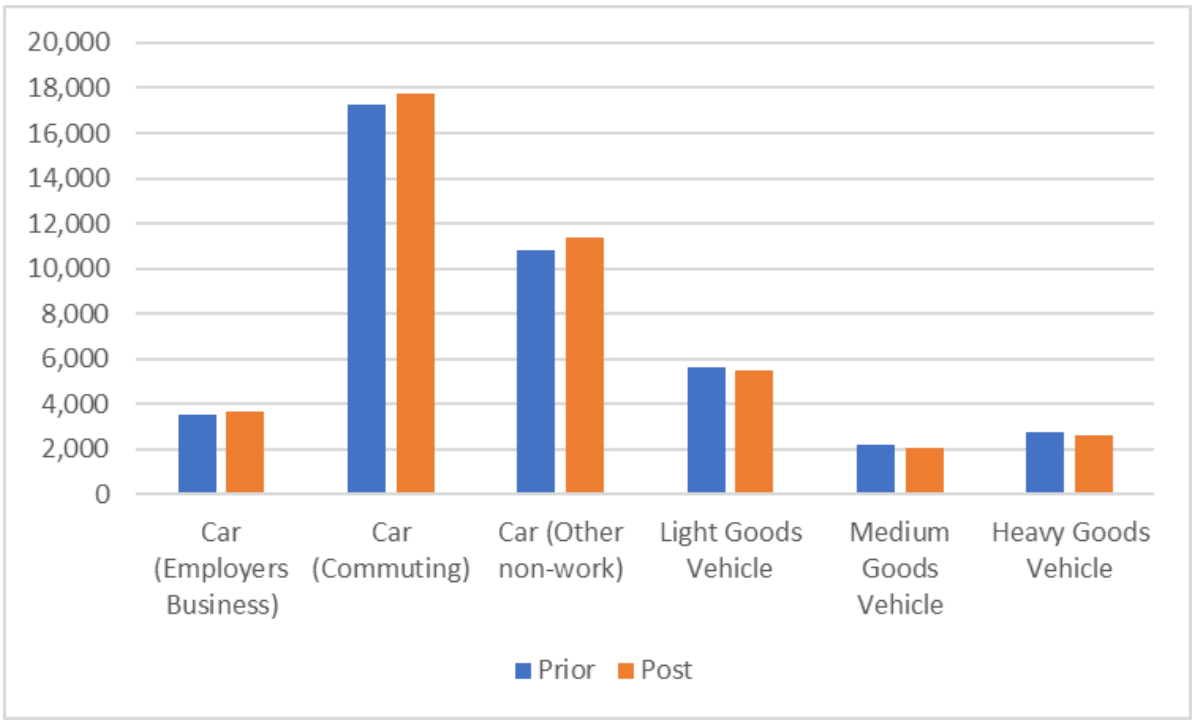


Figure 5-5 Prior and Post Matrix User Class Trips – AM Peak

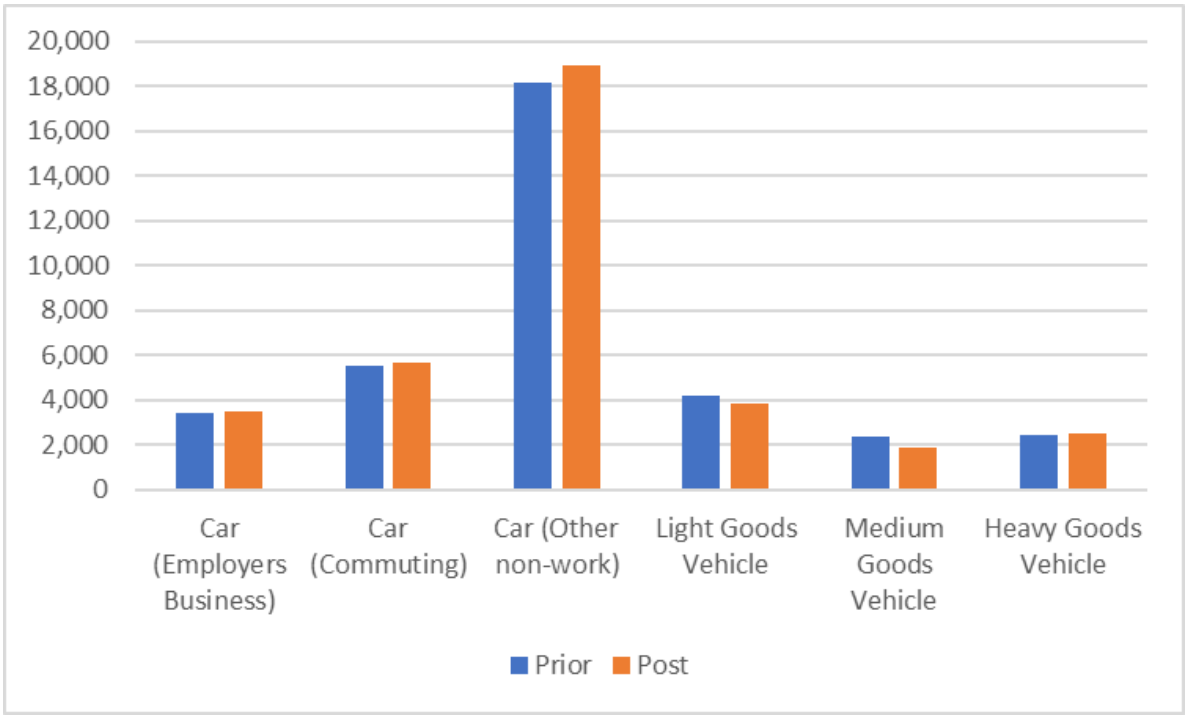


Figure 5-6 Prior and Post Matrix User Class Trips – Inter Peak

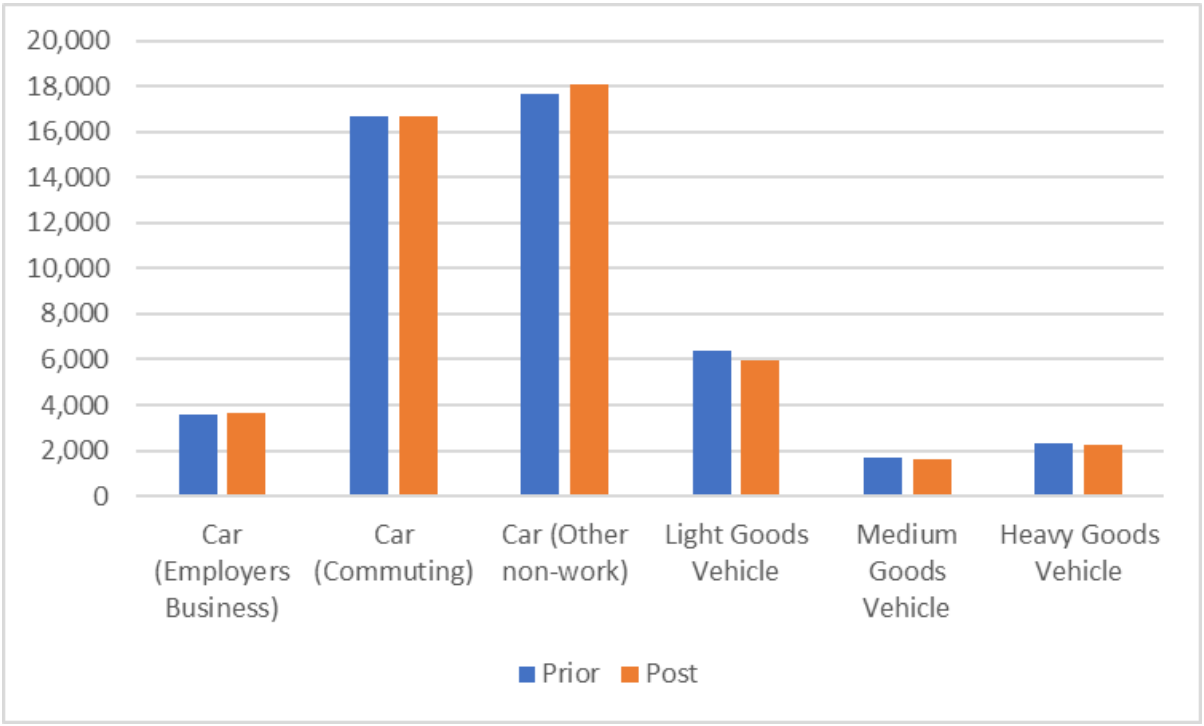


Figure 5-7 Prior and Post Matrix User Class Trips – PM Peak

These figures indicate that the ME process has a proportionally small impact on the user class proportions of the overall model demand. Generally, the ME does tend to reduce the goods vehicles and increase the number of cars in the model. This impact is greater in the interpeak than in the AM and PM peak periods.

A comparison of the estimated matrices and POWSCAR data has been undertaken. However, the comparison has been obscured, as due to data protection regulations, POWSCAR data has only been available on an all day, all mode basis. This does not correspond with the demand matrices in the

model. Therefore, the demand matrices in the TEN-T model have been compared with available O-D data for the national routes within the modelled area.

Trip numbers within the model have been compared to those on site by the ANPR surveys in order to confirm that the model adequately reflects observed patterns. The location of the ANPR surveys is shown in Figure 2.4. The comparison between trips from the ANPR survey and in the model is shown in Table 5.7 to 5.9 for the modelled periods. The data in Tables 5.7 to 5.9 shows that the observed and modelled trips match closely for the ANPR locations. This indicates that the strategic trip numbers in the model correspond with observations.

Table 5-7 – Comparison between ANPR and Modelled Trips – AM Peak

From ANPR	To ANPR	Observed	Modelled	Difference	% Difference	GEH
6 (N13 east of Letterkenny)	10 (N14 north of Lifford)	138	126	-12	-9%	1.0
10 (N14 north of Lifford)	6 (N13 east of Letterkenny)	161	180	19	12%	1.5
19 (N13 north of Stranorlar)	4 (N13 south of Lettekenny)	341	396	55	16%	2.8
4 (N13 south of Lettekenny)	19 (N13 north of Stranorlar)	273	324	51	19%	2.9
21 (N15 east of Stranorlar)	11 (N15 west of Lifford)	49	14	-34	-71%	6.1
11 (N15 west of Lifford)	21 (N15 east of Stranorlar)	48	39	-8	-18%	1.3
19 (N13 north of Stranorlar)	23 (N15 south of Ballybofey)	212	243	31	15%	2.0
23 (N15 south of Ballybofey)	19 (N13 north of Stranorlar)	186	255	69	37%	4.7

Table 5.8 shows the comparison between observed ANPR trips against modelled trips for the IP period.

Table 5-8 – Comparison between ANPR and Modelled Trips – IP

From ANPR	To ANPR	Observed	Modelled	Difference	% Difference	GEH
6 (N13 east of Letterkenny)	10 (N14 north of Lifford)	127	110	-17	-13%	1.5
10 (N14 north of Lifford)	6 (N13 east of Letterkenny)	171	159	-12	-7%	0.9

From ANPR	To ANPR	Observed	Modelled	Difference	% Difference	GEH
19 (N13 north of Stranorlar)	4 (N13 south of Lettekenny)	316	317	1	0%	0.0
4 (N13 south of Lettekenny)	19 (N13 north of Stranorlar)	304	334	30	10%	1.7
21 (N15 east of Stranorlar)	11 (N15 west of Lifford)	70	66	-4	-6%	0.5
11 (N15 west of Lifford)	21 (N15 east of Stranorlar)	71	77	6	8%	0.7
19 (N13 north of Stranorlar)	23 (N15 south of Ballybofey)	153	162	8	5%	0.7
23 (N15 south of Ballybofey)	19 (N13 north of Stranorlar)	162	117	-46	-28%	3.9

The comparison between observed trips from the ANPR and modelled data is shown in Table 5-9.

Table 5-9 – Comparison between ANPR and Modelled Trips – PM Peak

From ANPR	To ANPR	Observed	Modelled	Difference	% Difference	GEH
6 (N13 east of Letterkenny)	10 (N14 north of Lifford)	158	195	37	24%	2.8
10 (N14 north of Lifford)	6 (N13 east of Letterkenny)	145	171	26	18%	2.1
19 (N13 north of Stranorlar)	4 (N13 south of Lettekenny)	379	366	-13	-3%	0.7
4 (N13 south of Lettekenny)	19 (N13 north of Stranorlar)	295	377	82	28%	4.5
21 (N15 east of Stranorlar)	11 (N15 west of Lifford)	69	44	-26	-37%	3.4
11 (N15 west of Lifford)	21 (N15 east of Stranorlar)	62	47	-15	-24%	2.0
19 (N13 north of Stranorlar)	23 (N15 south of Ballybofey)	158	192	33	21%	2.5

From ANPR	To ANPR	Observed	Modelled	Difference	% Difference	GEH
23 (N15 south of Ballybofey)	19 (N13 north of Stranorlar)	223	216	-6	-3%	0.4

5.7 Calibration Results

A total of 196 MCC links flows and 58 ATC link flows were used for the calibration process. The MCC links flows were either the approach or exit flows on the arms of junctions. Table 5.10 shows the link calibration for all vehicle types.

Table 5-10 – Link Calibration Results (GEH) – All Vehicles

	AM			IP			PM		
	Total Counts	Counts with GEH < 5 or Flow Pass	% with GEH < 5	Total Counts	Counts with GEH < 5 or Flow Pass	% with GEH < 5	Total Counts	Counts with GEH < 5 or Flow Pass	% with GEH < 5
MCC Links	196	175	89%	194	162	84%	195	171	88%
ATCs	58	53	91%	58	50	86%	58	44	76%
All Count Totals	254	228	90%	252	212	84%	253	215	85%

This demonstrates that the model satisfies PAG criteria in the AM and PM peak period. The overall link flow calibration is 84% in the interpeak, which is 1% below the PAG criteria.

A comparison between the model data and PAG flow criteria is shown in Table 5.11.

Table 5-11 – Link Calibration Results (Flow Criteria) – All Vehicles

	AM			IP			PM		
	Total Counts	Counts with Flow Pass	% with Flow Pass	Total Counts	Counts with Flow Pass	% with Flow Pass	Total Counts	Counts with Flow Pass	% with Flow Pass
MCC Links	196	172	88%	194	174	90%	195	163	84%
ATCs	58	53	91%	58	48	83%	58	45	78%
All Count Totals	254	225	89%	252	222	88%	253	208	82%

The data in Table 5.11 indicates that the model meets PAG flow criteria in the AM and IP periods. In the PM period 82% of counts are within observed flow limits, this is 3% below PAG criteria.

Calibration data for HGVs only is shown in Table 5.12. The data in Table 5.12 shows that the model calibrates well to observed HGV flow data.

Table 5-12 – Link Calibration Results (GEH) – HGV Only

	AM			IP			PM		
	Total Counts	Counts with GEH < 5 or Flow Pass	% with GEH < 5	Total Counts	Counts with GEH < 5 or Flow Pass	% with GEH < 5	Total Counts	Counts with GEH < 5 or Flow Pass	% with GEH < 5
MCC Links	196	192	98%	194	193	99%	195	188	96%
ATCs	58	56	97%	58	57	98%	58	57	98%
All Count Totals	254	248	98%	252	250	99%	253	245	97%

Table 5.13 shows that the model meets PAG criteria with regard to HGV flows in each time period.

Table 5-13 – Link Calibration Results (Flow Criteria) – HGV Only

	AM			IP			PM		
	Total Counts	Counts with Flow Pass	% with Flow Pass	Total Counts	Counts with Flow Pass	% with Flow Pass	Total Counts	Counts with Flow Pass	% with Flow Pass
MCC Links	196	193	98%	194	194	100%	195	189	97%
ATCs	58	53	91%	58	48	83%	58	45	78%
All Count Totals	254	246	97%	252	242	96%	253	234	92%

Tables 5-14 to 5-19 show the AM, Interpeak and PM screenline calibration results for all vehicles and for HGVs only.

Table 5-14 – AM Screenline Calibration Results – All Vehicles

Screenline	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
West	Eastbound	731	720	-12	0.4	PASS
West	Westbound	612	663	51	2.0	PASS
North East	Eastbound	656	645	-11	0.4	PASS
North East	Westbound	950	961	11	0.4	PASS
North West	Eastbound	324	348	23	1.3	PASS
North West	Westbound	467	468	1	0.0	PASS

Table 5-15 – AM Screenline Calibration Results –HGV Only

Screenline	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
West	Eastbound	47	72	26	3.3	PASS
West	Westbound	59	64	5	0.7	PASS
North East	Eastbound	45	72	27	3.5	PASS
North East	Westbound	62	76	14	1.6	PASS
North West	Eastbound	27	45	19	3.1	PASS
North West	Westbound	30	42	12	2.0	PASS

Table 5-16 – IP Screenline Calibration Results – All Vehicles

Screenline	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
West	Eastbound	682	811	129	4.7	PASS
West	Westbound	689	852	163	5.9	FAIL
North East	Eastbound	604	521	-83	3.5	PASS
North East	Westbound	578	495	-83	3.6	PASS
North West	Eastbound	373	554	182	8.4	FAIL
North West	Westbound	388	509	121	5.7	FAIL

Table 5-17 – IP Screenline Calibration Results – HGV Only

Screenline	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
West	Eastbound	57	91	34	4.0	PASS
West	Westbound	71	97	26	2.8	PASS
North East	Eastbound	54	66	12	1.6	PASS
North East	Westbound	50	70	20	2.6	PASS
North West	Eastbound	39	49	10	1.5	PASS
North West	Westbound	34	53	19	2.9	PASS

Table 5-18 – PM Screenline Calibration Results – All Vehicles

Screenline	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
West	Eastbound	744	753	8	0.3	PASS
West	Westbound	889	893	3	0.1	PASS
North East	Eastbound	1185	1135	-50	1.5	PASS
North East	Westbound	988	993	5	0.2	PASS
North West	Eastbound	543	547	3	0.1	PASS
North West	Westbound	412	411	-0	0.0	PASS

Table 5-19 – PM Screenline Calibration Results – HGV Only

Screenline	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
West	Eastbound	48	83	35	4.4	PASS
West	Westbound	49	61	13	1.7	PASS
North East	Eastbound	68	97	29	3.2	PASS
North East	Westbound	72	59	-13	1.7	PASS
North West	Eastbound	29	34	6	1.0	PASS
North West	Westbound	27	50	23	3.8	PASS

The data in Tables 5-8 to 5-19 demonstrate that there is a close match between the surveyed and modelled screenline flows in the AM and PM peaks. There is also a good match in the Inter peak and PM peak, although modelled flows crossing the west and north west screenlines are higher than surveyed for all vehicles. The number of HGVs shows a close match between the modelled and observed data in all time periods.

Table 5-20 to Table 5-25 shows the results of the cordon calibration. When considering the results, it should be noted that the ATC at the Strabane outbound cordon appears to be overcounting the number of HGVs (based on a comparison with adjacent counts). The largest discrepancy occurs in the IP and PM periods, where the proportion of HGVs is higher than expected. This could be due to a fault with the installation of the detection equipment in the outbound direction.

The overall traffic volumes recorded by the ATCs at the Strabane cordon are considered to be appropriate and therefore the cordon has been included within the calibration. This is in order that the overall traffic volumes crossing the Strabane cordon can be assessed.

Table 5-20 – AM Cordon Calibration Results – All Vehicles

Cordon	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
Letterkenny	Inbound	2128	2042	-86	1.9	PASS
Letterkenny	Outbound	1094	1235	141	4.1	PASS
Strabane	Inbound	537	436	-102	4.6	PASS
Strabane	Outbound	450	472	21	1.0	PASS
Ballybofey	Inbound	1235	1332	97	2.7	PASS
Ballybofey	Outbound	1082	1111	29	0.9	PASS

Table 5-21– AM Cordon Calibration Results – HGV Only

Cordon	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
Letterkenny	Inbound	96	74	-22	2.4	PASS
Letterkenny	Outbound	49	163	114	11.0	FAIL
Strabane	Inbound	49	74	25	3.2	PASS
Strabane	Outbound	185	54	-131	12.0	FAIL
Ballybofey	Inbound	105	133	28	2.5	PASS
Ballybofey	Outbound	86	114	28	2.8	PASS

Table 5-22 – IP Cordon Calibration Results – All Vehicles

Cordon	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
Letterkenny	Inbound	2094	1908	-186	4.2	PASS
Letterkenny	Outbound	2139	2161	22	0.5	PASS
Strabane	Inbound	545	445	-100	4.5	PASS
Strabane	Outbound	423	498	75	3.5	PASS
Ballybofey	Inbound	1066	962	-105	3.3	PASS
Ballybofey	Outbound	985	909	-76	2.5	PASS

Table 5-23 – IP Cordon Calibration Results – HGV Only

Cordon	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
Letterkenny	Inbound	127	145	18	1.6	PASS
Letterkenny	Outbound	113	156	43	3.7	PASS
Strabane	Inbound	64	44	-20	2.7	PASS
Strabane	Outbound	175	53	-121	11.3	FAIL
Ballybofey	Inbound	108	120	12	1.1	PASS
Ballybofey	Outbound	87	125	38	3.7	PASS

Table 5-24 – PM Cordon Calibration Results – All Vehicles

Cordon	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
Letterkenny	Inbound	2124	2118	-7	0.1	PASS
Letterkenny	Outbound	3618	3632	15	0.2	PASS
Strabane	Inbound	894	809	-84	2.9	PASS
Strabane	Outbound	869	790	-79	2.7	PASS
Ballybofey	Inbound	1253	1273	20	0.6	PASS
Ballybofey	Outbound	1202	1270	68	1.9	PASS

Table 5-25 – PM Cordon Calibration Results – HGV Only

Cordon	Direction	Surveyed Flow	Modelled Flow	Difference	GEH	Flow Criteria
Letterkenny	Inbound	121	97	-24	2.3	PASS
Letterkenny	Outbound	118	132	14	1.3	PASS
Strabane	Inbound	79	62	-18	2.1	PASS
Strabane	Outbound	254	88	-166	12.7	FAIL
Ballybofey	Inbound	89	111	22	2.2	PASS
Ballybofey	Outbound	68	121	53	5.4	PASS

The data in Tables 5-20 to 5-25 demonstrates that for most cordon counts, the overall modelled traffic flows compare well to the surveyed data. In general, the HGV flows in the model also compare well to observed data. The exception to this is in the outbound direction at the Strabane cordon, however, the HGV traffic volumes at this location are considered unreliable.

In summary, it is considered that the Donegal TEN-T model compares well to observed traffic flow data and provides a suitable basis for forecasting future year demand and network operation.

5.8 Validation

Model validation consists of a comparison between modelled data outputs and an independent dataset which was not used in the process of calibration.

MCO journey time survey data was collected in Letterkenny, for the routes shown in Figure 2-3. Journey times from the model have been compared to this survey data to ensure that the model reasonably represents journey times and delay in, and around, Letterkenny.

A comparison between modelled and observed journey times for the AM period is shown in Table 5-26.

Table 5-26 – AM Journey Time Comparison – Letterkenny

Route	Direction	AM Peak (08:15-09:15) Journey Time (Seconds)			
		Surveyed	Modelled	Difference	% Difference
Route 1	NB	16:00	16:23	00:00:22	2%
Route 1	SB	15:36	13:43	-00:01:52	-12%
Route 2	NB	14:09	14:18	00:00:09	1%
Route 2	SB	11:49	13:14	00:01:25	12%

Table 5-27 shows the comparison between observed and modelled journey times in Letterkenny for the interpeak period.

Table 5-27 – Interpeak Journey Time Comparison – Letterkenny

Route	Direction	Inter Peak Average Hour (12:00-14:00) Journey Time (Seconds)			
		Surveyed	Modelled	Difference	% Difference
Route 1	NB	13:00	14:20	00:01:20	10%
Route 1	SB	12:56	12:31	-00:00:25	-3%
Route 2	NB	10:52	11:06	00:00:15	0%
Route 2	SB	10:37	01:20	00:01:20	13%

Table 5-28 shows the comparison between observed and modelled journey times in Letterkenny for the PM period.

Table 5-28– PM Journey Time Comparison – Letterkenny

Route	Direction	PM Peak (16:45-17:45) Journey Time (Seconds)			
		Surveyed	Modelled	Difference	% Difference
Route 1	NB	15:02	15:12	00:00:10	1%
Route 1	SB	14:53	16:04	00:01:11	8%
Route 2	NB	14:15	12:30	-00:01:45	-12%
Route 2	SB	17:53	14:09	-00:03:44	-21%

The comparison presented in Tables 5-26 and 5-28 show that the model meets PAG validation criteria in the AM and Inter Peak periods. Table 5-28 demonstrates that the modelled and surveyed journey

times are similar for Route 1 through Letterkenny. For Route 2, the modelled journey times are a few minutes faster than surveyed in both directions.

Overall, it is considered that the model provides a reasonable representation of modelled journey times in, and around, Letterkenny and forms a suitable basis on which to carry out a comparative assessment of route options in the locality.

Journey times from the Donegal TEN-T model have also been compared against data from the ANPR surveys. This is in order to understand how the model compares to journey times on the wider network. The ANPR journey time routes are shown in Figure 5-8.

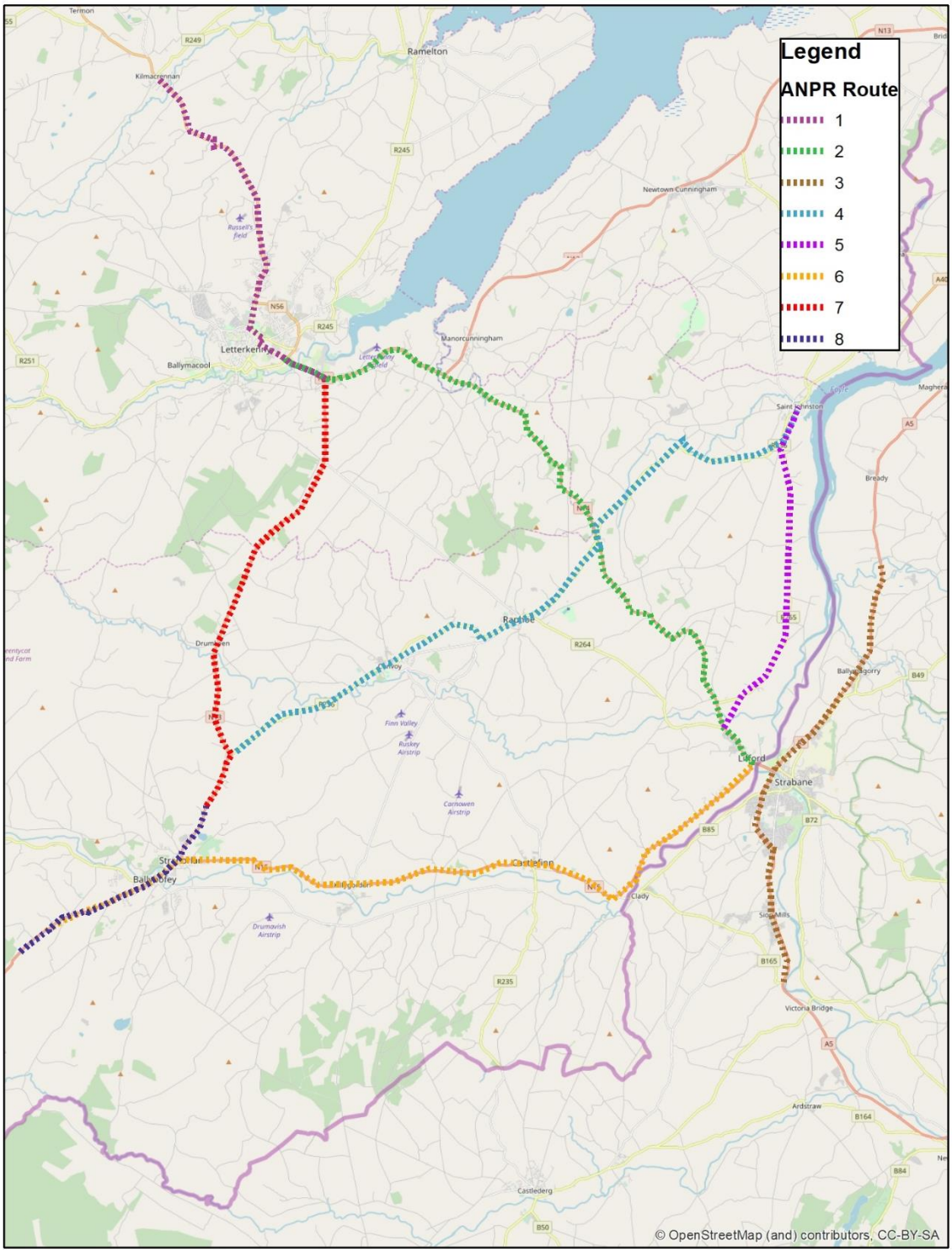


Figure 5-8 – Location of ANPR Journey Routes

Several of the journey time routes run parallel to the proposed Donegal TEN-T options:

- Section 1 = Journey Time Route 8
- Section 2 = Journey Time Route 1
- Section 3 = Journey Time Route 2

The comparison of surveyed and modelled journey times along routes 1, 2 and 8 will be important with regards to the suitability of the model to inform the economic assessment of the TEN-T Priority Route Improvement Project.

The comparison of surveyed and modelled journey time data for the AM peak period is shown in Table 5-29 and indicates that modelled journey times are generally within 15% of the surveyed times.

Table 5-29: Journey Time Validation Results – AM Peak

Route	Direction	AM Peak (08:15-09:15)			
		Surveyed Time	Modelled Time	Difference	% Difference
1 – Letterkenny Through Town Centre	NB	21:41	22:59	01:18	6%
	SB	23:54	22:58	-00:56	-4%
2 – N14	NB	23:52	22:10	-01:42	-7%
	SB	21:33	19:00	-02:34	-12%
3 – A5	NB	17:26	19:43	02:17	13%
	SB	17:54	18:09	00:15	1%
4 – R236	NB	28:09	29:51	01:42	6%
	SB	26:39	29:52	03:13	12%
5 –R265 Ross Downs to St Johnston	NB	09:40	11:05	01:25	15%
	SB	10:05	11:02	00:58	10%
6 – N15 Stranorlar to Lifford	NB	29:18	26:47	-02:32	-9%
	SB	28:19	30:22	02:03	7%
7 – N13 Stranorlar to Dry Arch	NB	14:22	12:23	-01:58	-14%
	SB	14:20	12:08	-02:13	-15%
8 – N13 Ballybofey/ Stranorlar	NB	09:40	12:26	02:45	29%
	SB	09:34	12:39	03:05	32%

The comparison of surveyed and modelled journey time data for the IP peak period is shown in Table 5-30 and indicates that modelled journey times are generally within 15% of the surveyed times. The modelled journey times through Letterkenny in the northbound direction of travel are 19% faster than surveyed and it is judged that this will contribute to a conservative estimate of the potential benefits that may be generated by the proposed Section 2 route options.

Table 5-30: Journey Time Validation Results – Inter Peak

Route	Direction	Inter Peak Average Hour (12:00-14:00)			
		Survey Time	Modelled Time	Difference	% Difference
1 – Letterkenny Through Town Centre	NB	25:34	20:41	-04:52	-19%
	SB	23:01	19:51	-03:10	-14%
2 – N14	NB	21:37	20:06	-01:31	-7%
	SB	21:48	18:54	-02:54	-13%
3 – A5	NB	17:56	17:16	-00:41	-4%
	SB	17:59	16:29	-01:30	-8%
4 – R236	NB	27:28	29:43	02:15	8%
	SB	26:37	29:51	03:14	12%
5 –R265 Ross Downs to St Johnston	NB	09:56	11:03	01:08	11%
	SB	10:34	10:59	00:25	4%
6 – N15 Stranorlar to Lifford	NB	33:10	26:36	-06:34	-20%
	SB	32:37	30:21	-02:16	-7%
7 – N13 Stranorlar to Dry Arch	NB	14:01	12:14	-01:47	-13%
	SB	14:31	12:23	-02:08	-15%
8 – N13 Ballybofey/ Stranorlar	NB	12:54	12:03	-00:50	-7%
	SB	12:23	12:33	00:10	1%

The comparison of surveyed and modelled journey time data for the PM peak period is shown in Table 5-31 and indicates that modelled journey times are generally within 15% of the surveyed times on the key routes.

Table 5-31: Journey Time Validation Results – PM Peak

Route	Direction	PM Peak (16:45-17:45)			
		Survey Time	Modelled Time	Difference	% Difference
1 – Letterkenny Through Town Centre	NB	26:55	23:39	-03:16	-12%
	SB	22:24	21:44	-00:40	-3%
2 – N14	NB	21:43	20:20	-01:23	-6%
	SB	23:43	21:10	-02:33	-11%
3 – A5	NB	17:31	17:02	-00:29	-3%
	SB	19:47	21:00	01:13	6%
4 – R236	NB	35:53	29:48	-06:04	-17%
	SB	32:27	29:55	-02:32	-8%

Route	Direction	PM Peak (16:45-17:45)			
		Survey Time	Modelled Time	Difference	% Difference
5 –R265 Ross Downs to St Johnston	NB	10:08	11:06	00:58	9%
	SB	10:38	11:13	00:36	6%
6 – N15 Stranorlar to Lifford	NB	35:26	26:54	-08:32	-24%
	SB	33:00	30:38	-02:22	-7%
7 – N13 Stranorlar to Dry Arch	NB	18:30	12:13	-06:17	-34%
	SB	19:13	12:30	-06:43	-35%
8 – N13 Ballybofey/ Stranorlar	NB	15:37	12:30	-03:07	-20%
	SB	14:27	12:44	-01:43	-12%

The modelled journey times generally meet PAG criteria for routes 1 (Section 2) and route 2 (Section 3). Whilst modelled journey times are slower than observed for route 8 (Section 1) in the AM peak, the effect of this will be offset to some degree by the faster journey times in the PM Peak. On the whole, it is considered that the model provides a reasonable estimate of journey times along the key routes and is suitable for the purpose of carrying out a comparative assessment of route options on the TEN-T network.

5.9 Base Model Convergence

PAG Unit 5.1: Construction of Transport Models gives the recommended values for convergence, shown in Table 5-32.

Table 5-32 – PAG Convergence Measures and Base Model Acceptability Guideline Values

Measure of Convergence	Base Model Acceptability Guideline Values
Delta and %GAP	< 0.1% or at least stable with convergence fully documented and all other criteria met
% of links with flow change (P)<1%	Four consecutive iterations > 98%
% of links with cost change (P2)<1%	Four consecutive iterations > 98%

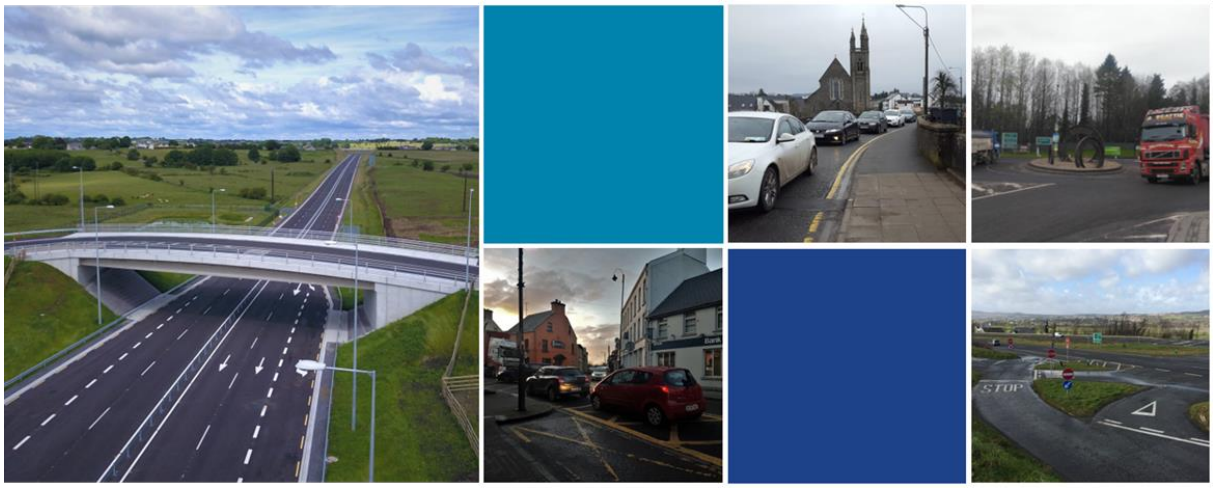
The model was set so that the assignment would finish when the latter two of these criteria were met, or when the number of assignment loops exceeded 200. The base model converged to these criteria in all time periods, the overall convergence results are shown in Table 5-33.

Table 5-33 – Base Model Convergence

Time Period	Iterations	%GAP	P (%)	P2 (%)
AM	25	0.013	98.9	99.4
IP	32	0.0062	99.5	99.6
PM	37	0.022	98.2	98.3

The results in Table 5-33 demonstrate that the base model meets the convergence criteria stated within PAG.

Chapter 6
Travel Demand Projections



6 Travel Demand Projections

This chapter describes the process for developing the future year do-minimum models. The development of the do-minimum models includes the preparation of forecast demands and the inclusion of committed schemes with the modelled network.

The following future year scenarios have been prepared:

- Opening Year: 2028
- Design Year: 2043 (opening year + 15 years)
- Forecast Year: 2058 (opening year + 30 years)

The traffic demands within the do-minimum and do-something scenarios have been forecast based on a fixed trip assumption.

6.1 Demand Growth

The demands within the future year models are based on the traffic growth factors included with PAG Unit 5.3: Travel Demand Projections. The base demands were factored according to the 'Annual Growth Factors' in Table 5.3.2 of PAG Unit 5.3, for the Border Region Central Growth Scenario. The growth rate has been applied as a global factor to the matrices. Linear interpolation of the growth rates was applied to produce the demands for the modelled years used within the Donegal TEN-T assessment.

The annual growth rates for the Border Region applicable to the TEN-T Priority Route Improvement Project, Donegal are shown in Table 6-1.

Table 6-1 – Annual Growth Rates for Border Region, (PAG Unit 5.3)

Years	Low Growth		Central Growth		High Growth	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
2013-2030	1.0082	1.0221	1.0114	1.0237	1.0124	1.0242
2030-2050	0.9998	1.0135	1.0030	1.0176	1.0044	1.0195

The growth factors applied to the 2017 base year traffic matrices to derive demands for 2028, 2043 and 2058 are shown in Table 6.2. Traffic growth has been capped at 2050 levels, the latest forecast growth horizon for which data is provided in PAG Unit 5.3.

Table 6-2 – Applied Growth Factors

Years	Low Growth		Central Growth		High Growth	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
2017-2028	1.0940	1.2718	1.1328	1.2939	1.1452	1.3009
2017-2043	1.1091	1.5817	1.2048	1.7012	1.2427	1.7540
2017-2058	1.1076	1.7374	1.2303	1.9221	1.2815	2.0079

Table 6-3 shows the forecast demand totals for 2028 that were prepared through application of the PAG Unit 5.3 growth rates. In line with the PAG factors in Unit 5.3, the growth in HGVs is higher than for light vehicles.

Table 6-3 – 2017 Baseline and 2028 Demands (Vehicles)

Matrix	2017	2028					
		Low		Central		High	
AM Peak Car	32,826	35,911	9.4%	37,185	13.3%	37,592	14.5%
AM Peak LGV	5,511	6,029	9.4%	6,242	13.3%	6,311	14.5%
AM Peak HGV	4,665	5,933	27.2%	6,036	29.4%	6,068	30.1%
Inter Peak Car	28,150	30,796	9.4%	31,889	13.3%	32,238	14.5%
Inter Peak LGV	3,834	4,195	9.4%	4,344	13.3%	4,391	14.5%
Inter Peak HGV	4,400	5,596	27.2%	5,693	29.4%	5,724	30.1%
PM Peak Car	38,406	42,017	9.4%	43,507	13.3%	43,983	14.5%
PM Peak LGV	5,941	6,500	9.4%	6,730	13.3%	6,804	14.5%
PM Peak HGV	3,900	4,960	27.2%	5,047	29.4%	5,074	30.1%

The forecast demands within the 2043 scenario are shown in Table 6-4.

Table 6-4 – 2017 Baseline and 2043 Demands (Vehicles)

Matrix	2017	2043					
		Low		Central		High	
AM Peak Car	32,826	36,407	10.9%	39,548	20.5%	40,792	24.3%
AM Peak LGV	5,511	6,112	10.9%	6,639	20.5%	6,848	24.3%
AM Peak HGV	4,665	7,378	58.2%	7,936	70.1%	8,182	75.4%
Inter Peak Car	28,150	31,222	10.9%	33,916	20.5%	34,982	24.3%
Inter Peak LGV	3,834	4,253	10.9%	4,620	20.5%	4,765	24.3%
Inter Peak HGV	4,400	6,959	58.2%	7,485	70.1%	7,717	75.4%
PM Peak Car	38,406	42,597	10.9%	46,272	20.5%	47,728	24.3%
PM Peak LGV	5,941	6,590	10.9%	7,158	20.5%	7,383	24.3%
PM Peak HGV	3,900	6,169	58.2%	6,635	70.1%	6,841	75.4%

The forecast demands within the 2058 scenario are shown in Table 6-5.

Table 6-5 – 2017 Baseline and 2058 Demands (Vehicles)

Matrix	2017	2058					
		Low		Central		High	
AM Peak Car	32,826	36,358	10.8%	40,386	23.0%	42,066	28.1%
AM Peak LGV	5,511	6,103	10.8%	6,780	23.0%	7,062	28.1%
AM Peak HGV	4,665	8,105	73.7%	8,966	92.2%	9,367	100.8%
Inter Peak Car	28,150	31,179	10.8%	34,633	23.0%	36,075	28.1%
Inter Peak LGV	3,834	4,247	10.8%	4,717	23.0%	4,914	28.1%

Matrix	2017	2058					
		Low		Central		High	
Inter Peak HGV	4,400	7,644	73.7%	8,457	92.2%	8,834	100.8%
PM Peak Car	38,406	42,539	10.8%	47,251	23.0%	49,218	28.1%
PM Peak LGV	5,941	6,581	10.8%	7,310	23.0%	7,614	28.2%
PM Peak HGV	3,900	6,776	73.7%	7,497	92.2%	7,831	100.8%

Zone based growth rates have been developed by TII for use with assignment models. The zone based growth rates provide an increased level of geographical detail than link based rates. A comparison between the forecast growth matrices generated by the two approaches has been undertaken and this analysis is summarised within Appendix C.

Trip totals for 2043 have been assessed on a sector by sector basis. The totals have been compared in the link based and zone based growth scenarios in order to determine if significant differences occur. The GEH statistic has been utilised in order to make the comparison as it can account for changes across small and large numbers of trips. When considering the AM, IP and PM forecast difference matrices, it can be seen that the GEH value for all individual sectors is less than 5. This indicates that the matrices derived from the link based and zone based growth rates are similar. The reason for the similarity in the trip totals could be due to the rural nature of the study area and the relatively low level of demand when compared to a large urban area such as Dublin.

In this instance, the link based growth rates produce similar levels of demand to the zone based rates. As such, the use of link based growth rates is considered reasonable as they would not lead to relative differences between the options that would affect the comparative nature of the assessment at this stage.

6.2 Future Year Network Development

6.2.1 Do-Minimum Network

A future year do-minimum network should include the existing road network plus any committed infrastructure. A series of committed infrastructure schemes have been added to the do-minimum modelled network in the future year scenarios, based on consultation with Donegal County Council. The committed infrastructure schemes included in the future year models are shown in Table 6-6.

Table 6-6 – Committed Schemes Included in Future Year Model

Name of Scheme	Completion Date	Description	Funding	Status
Port-Blaney Link	Prior to 2028	Link Road going from Southern Relief Road to Neil T Blaney Rd and the N14 Port Road, connecting with signalised junctions.		
Joe Bonnar Link Road	2019	Small Link Road, also connecting Port Road to Neil T Blaney Rd, with priority junctions.		
Swilly Access Road and R250 Road Improvements	2026	New link roads modelled as a high-quality single carriageway connecting (via signalised junctions) the new Southern Relief at Leck to the R250 at		

Name of Scheme	Completion Date	Description	Funding	Status
		the Aurora Leisure Centre and the R250 at Dunnes Stores.		
Southern Relief Road	2023	Upgrade to a high-quality single carriageway with an 80kph speed limit, of the L1114 between Leck and Strahirley.		
Northern Relief Road	Prior to 2028	The provision of high-quality single carriageway with an 80kph speed limit along the route of the existing Windy Hall (the existing Windy Hall is not in the base model).		
Port Bridge Roundabout	2019	Junction Signalisation.		
Polestar Junction	Prior to 2028	Junction Signalisation		
Oldtown Junction	2019	Junction signalisation.		
Justice Walsh Junction	2019	Junction signalisation.		
Town Centre Circulation - One Way System	Prior to 2028	Two-way roads become one-way circulatory as part of public realm improvement.		
N56 Four Lane Road – Safety Improvement Scheme	2020	Introduction of 60kph speed limit, central median and on demand pedestrian crossings between Pole Star and Dry Arch roundabouts.		

6.2.2 Do-Something Network

For the purpose of the Phase 2 Route Selection process, the options listed within Table 6-7 have been assessed.

Table 6-7 – Donegal TEN-T Individual Options

Section	Option
1	1A1 - Orange
	1B2 - Pink
	1C1 – Purple
	1D2 - Red
	1E2 - Green
	1F2 - Blue
	1G2 - Brown
2	2A - Orange
	2B - Pink
	2C - Purple
	2D - Red
	2E - Green
	2F – Blue
3	3A1 - Blue
	3A2 - Blue
	3B1 - Red
	3B2 - Red
	3C1 - Orange
	3C2 - Orange
	3D - Purple
	3E - Cyan
	3F - Pink

Traffic flow diagrams for each of these options, showing modelled Annual Average Daily Traffic (AADT) flows are presented in Appendix D.

The TEN-T Priority Route Improvement Project comprises the preferred options emerging from the Option Selection process, details of which can be found in the 'TEN-T Priority Route Improvement Project, Donegal: Option Selection Report'.

The do-something network includes proposed upgrades to the highway network for Sections 1, 2 and 3. The proposed network interventions included within the TEN-T Priority Route Improvement Project are:

- Section 1: Option 1G Brown: An offline bypass aligning to the west of Ballybofey/Stranorlar from south of Cappry on the N15 to north of Kilross on the N13. Link roads will connect the new route via grade separated junctions, to the N15 at the southern side of Ballybofey and to the N13/N15 at near Stranorlar.

- Section 2: Option 2D Red: Offline realignment of the N13 from Lurgybrack (south of Letterkenny) to form a new roundabout with the existing N13 dual carriageway to the east of the Letterkenny. The existing N13 will receive online upgrades, including a grade separated junction. A link road will connect from the proposed N13 roundabout to the N56 in Letterkenny, creating a new crossing of the River Swilly.
- Section 3: Option 3B2 Red: An offline realignment between the N13/N14 roundabout at Manorcunningham (Pluck roundabout) and the N15 south of Lifford. Grade separated junctions are proposed along the mainline at Drumoghill and at the R236 interface, while roundabouts will tie the route into the existing road network at each termination.

The TEN-T Priority Route Improvement Project has been coded into the do-something model in order to enable a comparison with the operation of the do-minimum network.

6.3 Future Year Model Operation

6.3.1 Model Convergence

The converge of the future year models has been assessed. This is to ensure that the model converges under the higher flows in the future year scenarios. This is a necessary step in ensuring that the future year models are able to assess the impact of the proposed TEN-T Priority Route Improvement Project and are not unduly affected by modelled impacts that are considered unlikely to be as a result of the proposed improvements.

Table 6-8 shows the convergence statistics for the do-minimum modelled scenarios. The statistics demonstrate that the do-minimum models meet PAG convergence criteria in all scenarios.

Table 6-8 – Do-Minimum Model Convergence Statistics

Year	Time Period	Iterations	%GAP	P (%)	P2 (%)
2028	AM	15	0.0085	99.2	99.3
	IP	7	0.01	99.1	99.8
	PM	16	0.0079	98.5	98.9
2043	AM	19	0.026	98.5	98.8
	IP	7	0.013	98.8	99.2
	PM	17	0.016	98.7	98.7
2058	AM	18	0.02	98.7	98.6
	IP	7	0.022	98.8	99.3
	PM	14	0.012	98.7	98.4

Table 6-9 shows the convergence statistics for the do-minimum modelled scenarios and demonstrated that the model meets PAG convergence criteria in all scenarios.

Table 6-9 – Do-Something Model Convergence Statistics

Year	Time Period	Iterations	%GAP	P (%)	P2 (%)
2028	AM	7	0.012	99.3	99.2
	IP	6	0.0052	99.4	99.9
	PM	21	0.0057	99.4	99.2
2043	AM	14	0.017	99.0	99.0
	IP	7	0.0093	99.4	99.7
	PM	10	0.0076	99	98.9
2058	AM	15	0.017	98.7	98.5
	IP	6	0.016	98.8	99.3
	PM	47	0.011	99.3	99

6.3.2 Traffic Flows

Figures 6-1 to 6-4 show AADTs and % HGVs for the do-minimum network in the Design year of 2043.

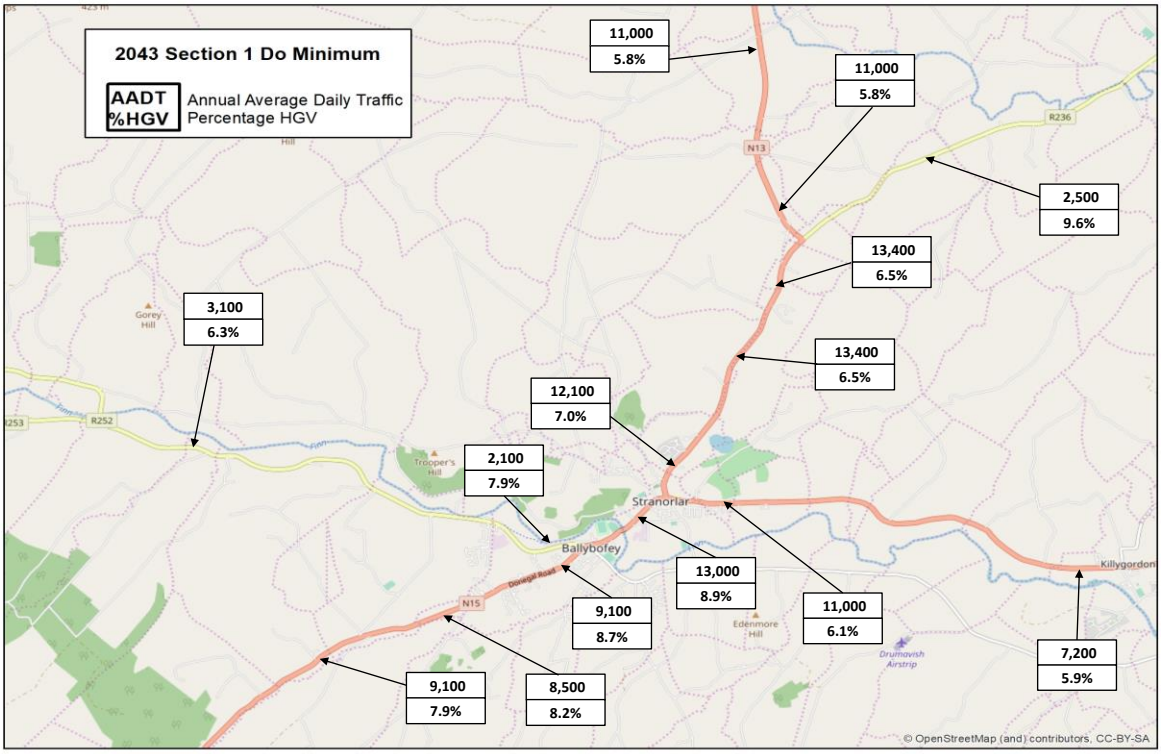


Figure 6-1 – Ballybofey/Stranorlar Do-minimum 2043 Traffic Flows

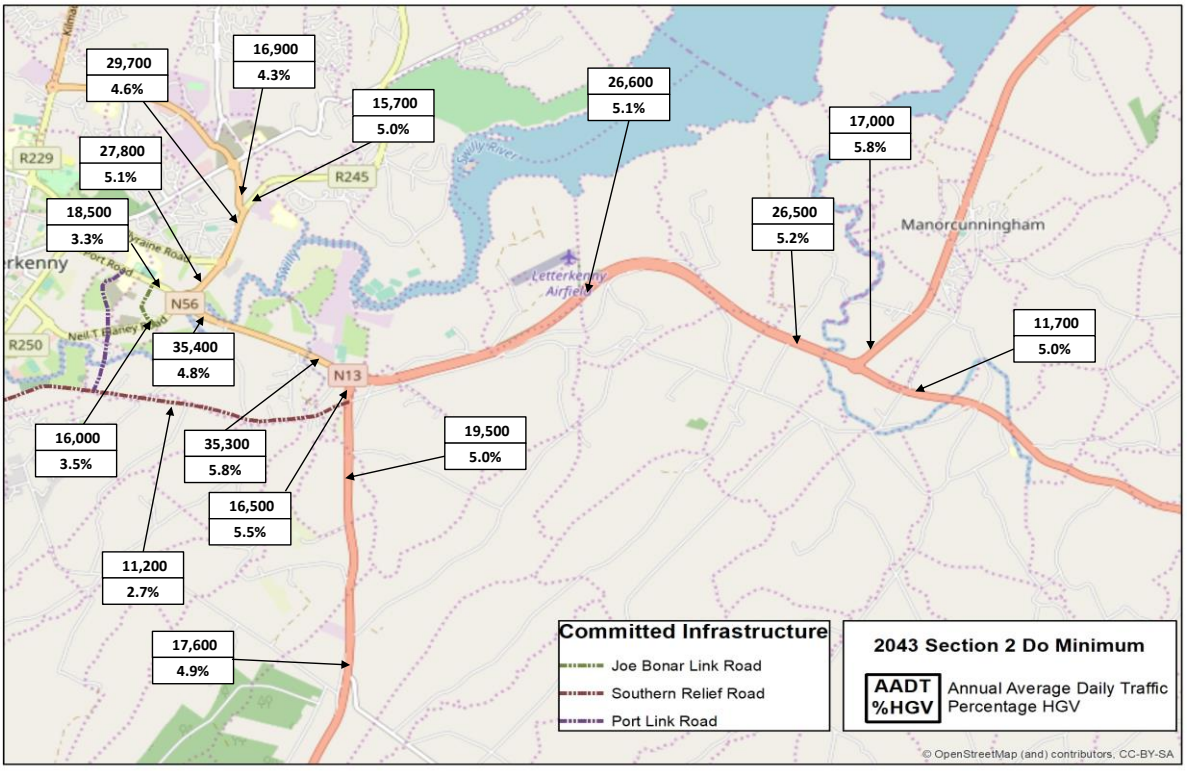


Figure 6-2 – Letterkenny Do-minimum 2043 Traffic Flows

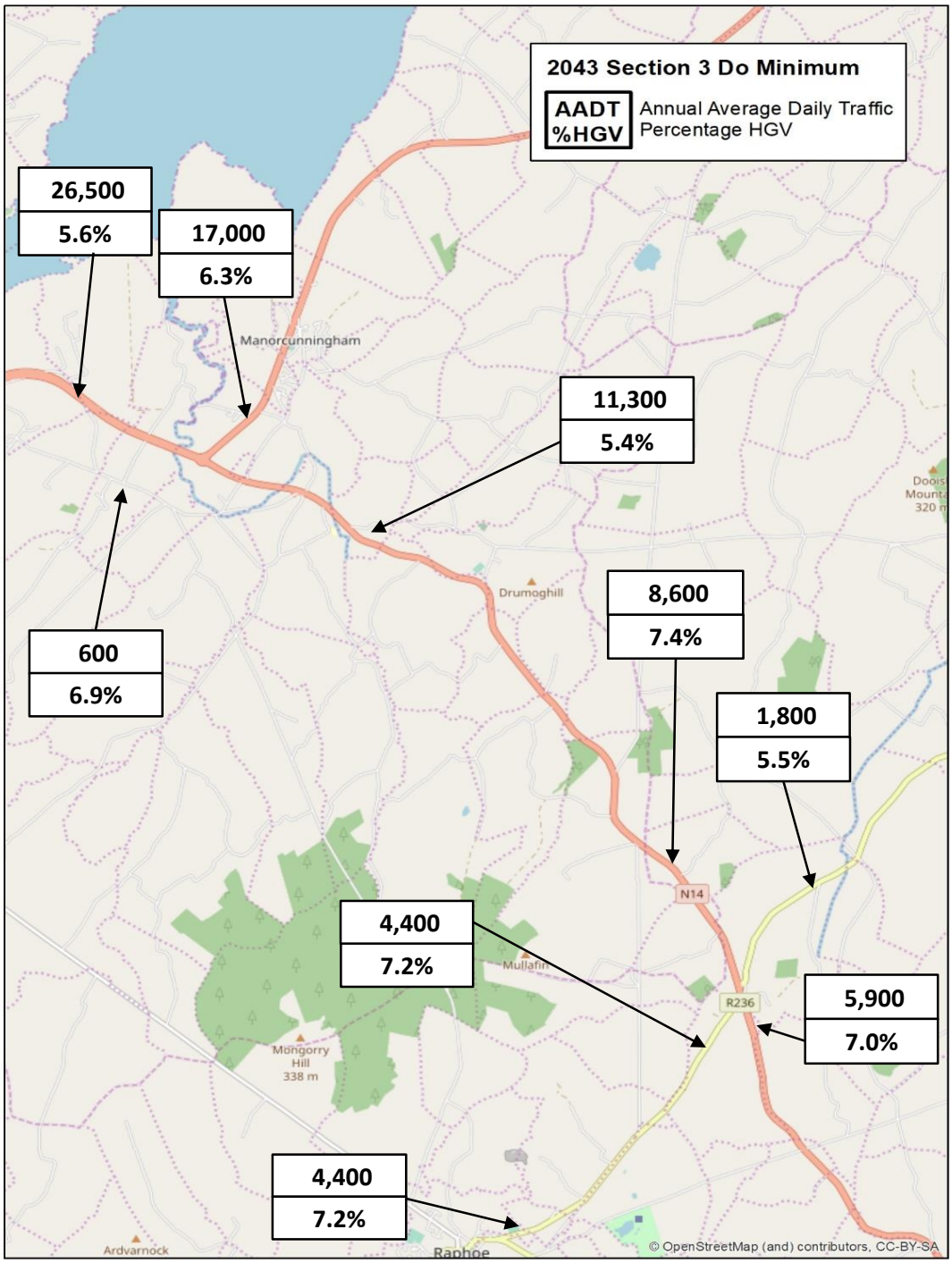


Figure 6-3 – N14 (North) Do-minimum 2043 Traffic Flows

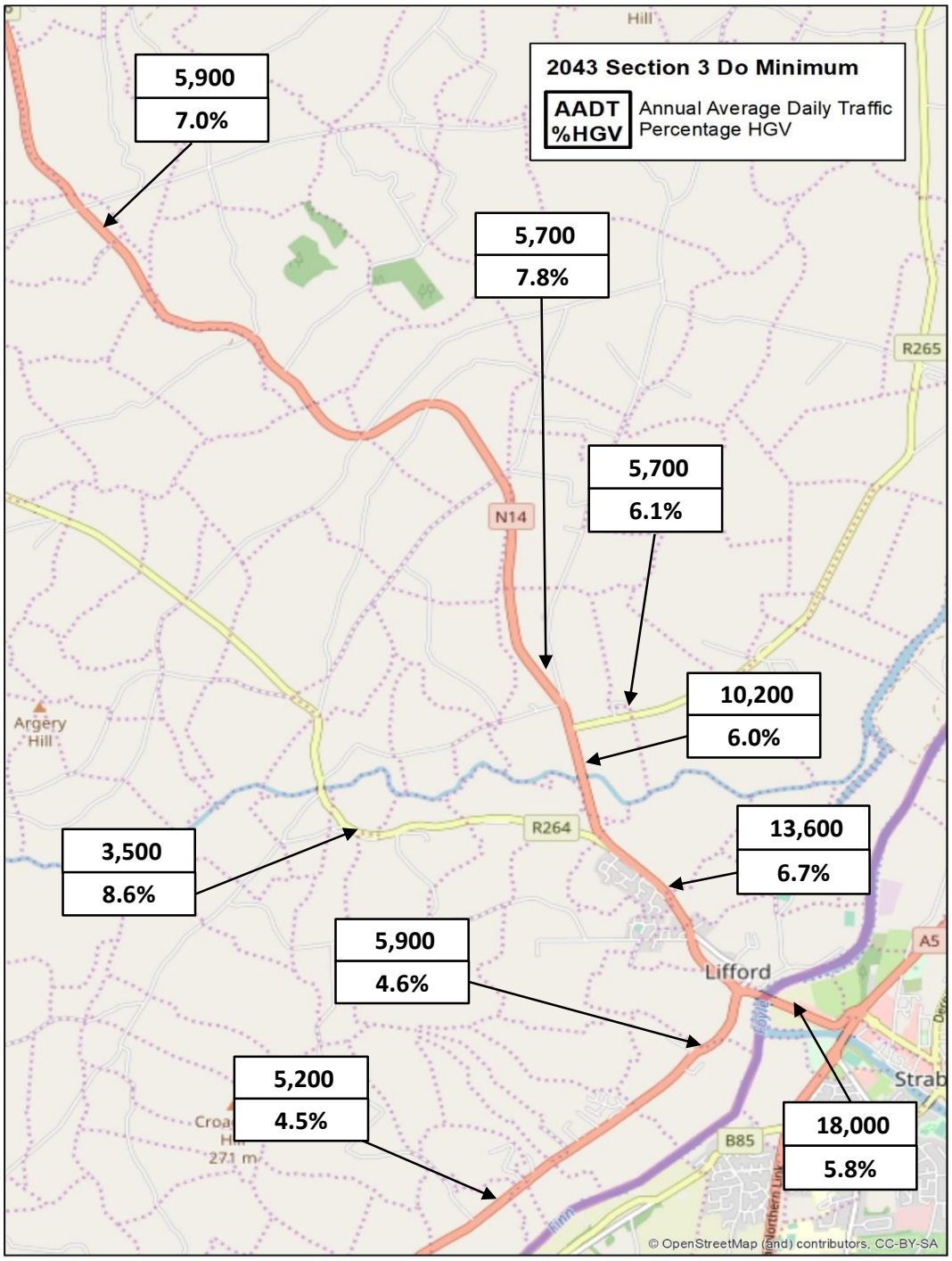


Figure 6-4 – N14 (South) Do-minimum 2043 Traffic Flows

Traffic flows and % HGVs for the do-something networks are shown in Figures 6-5 to 6-8. The network changes included within the do-something network are shown as blue links.

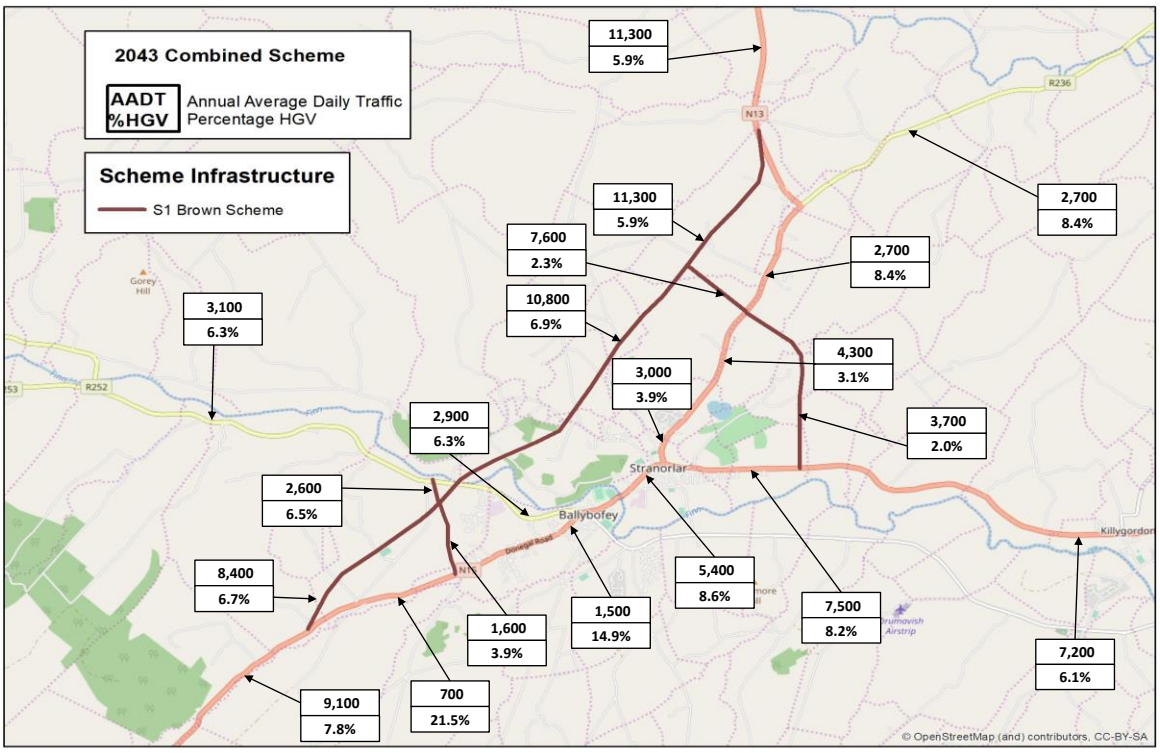


Figure 6-5 – Ballybofey/Stranorlar Do-something 2043 Traffic Flows

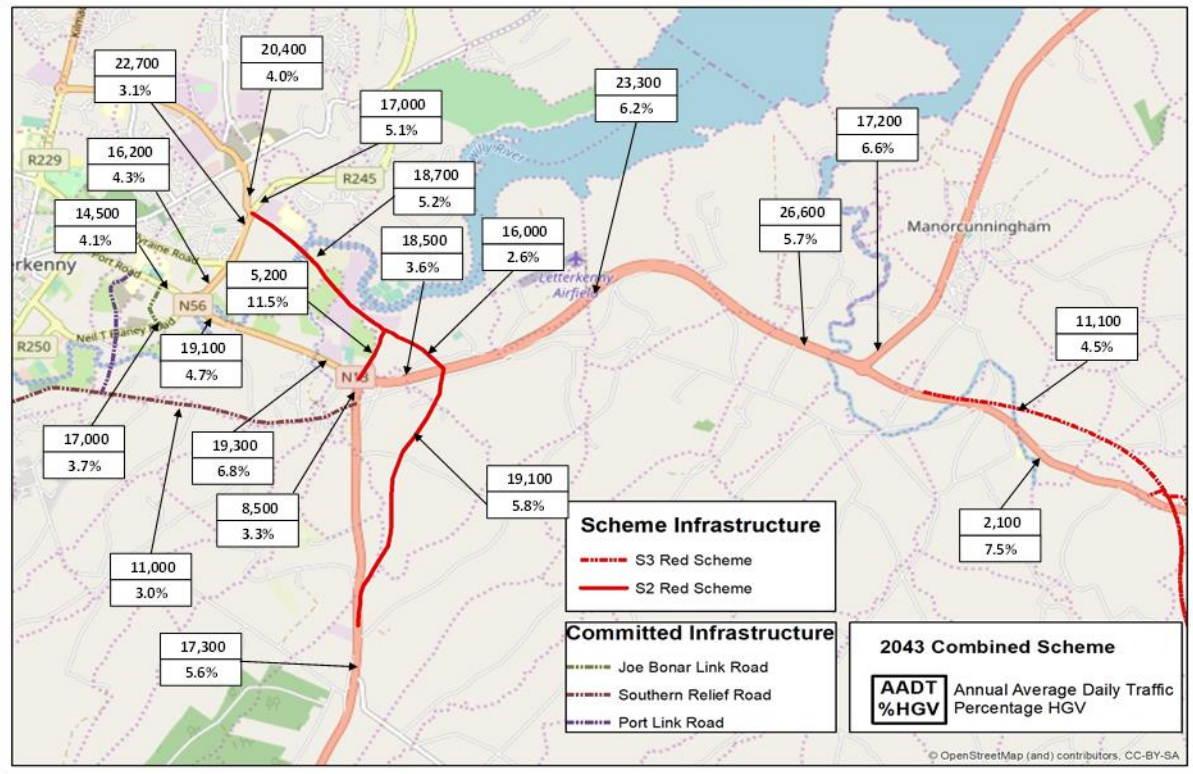


Figure 6-6 – Letterkenny Do-something 2043 Traffic Flows

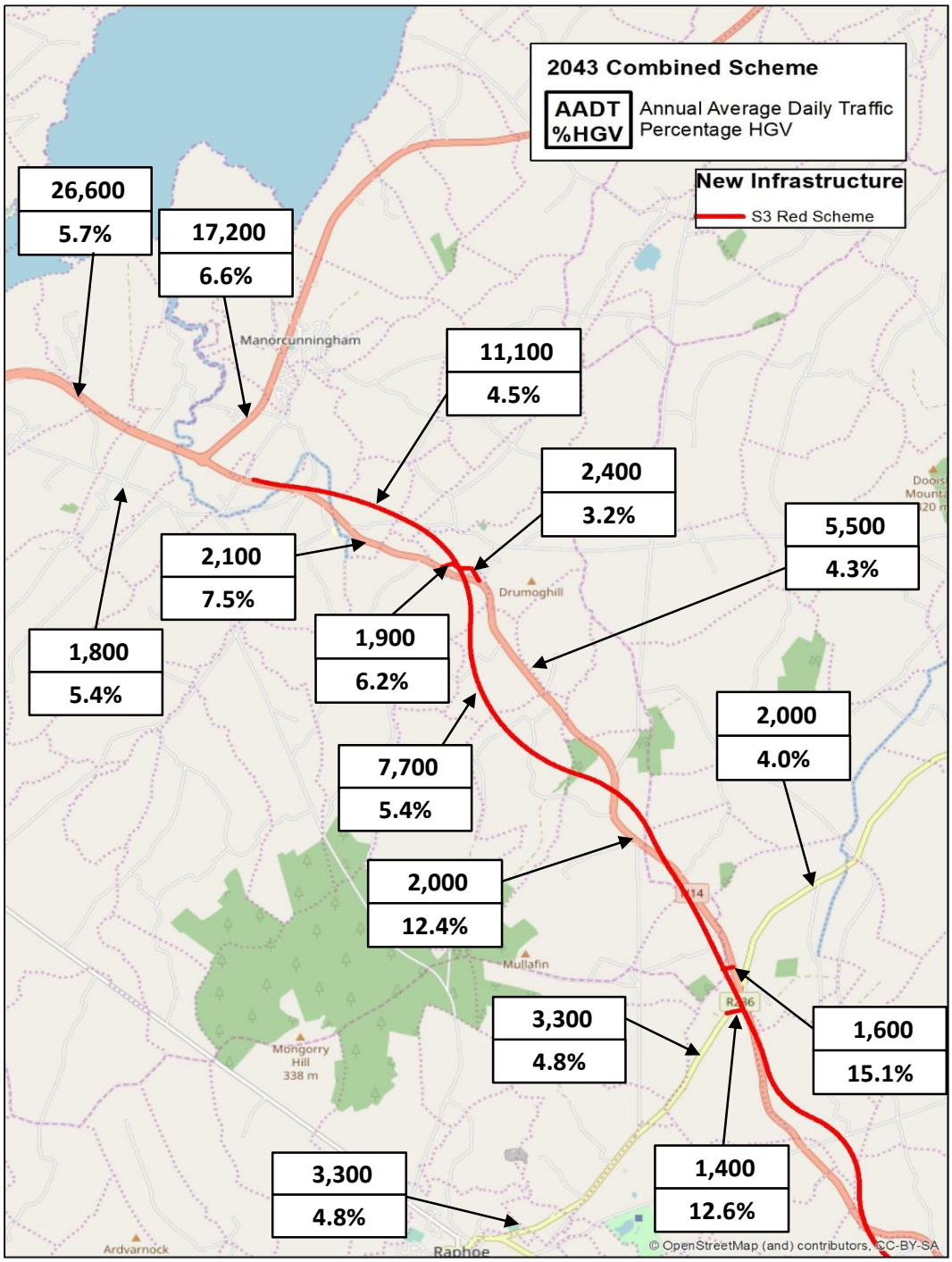


Figure 6-7 – N14 (North) Do-something 2043 Traffic Flows

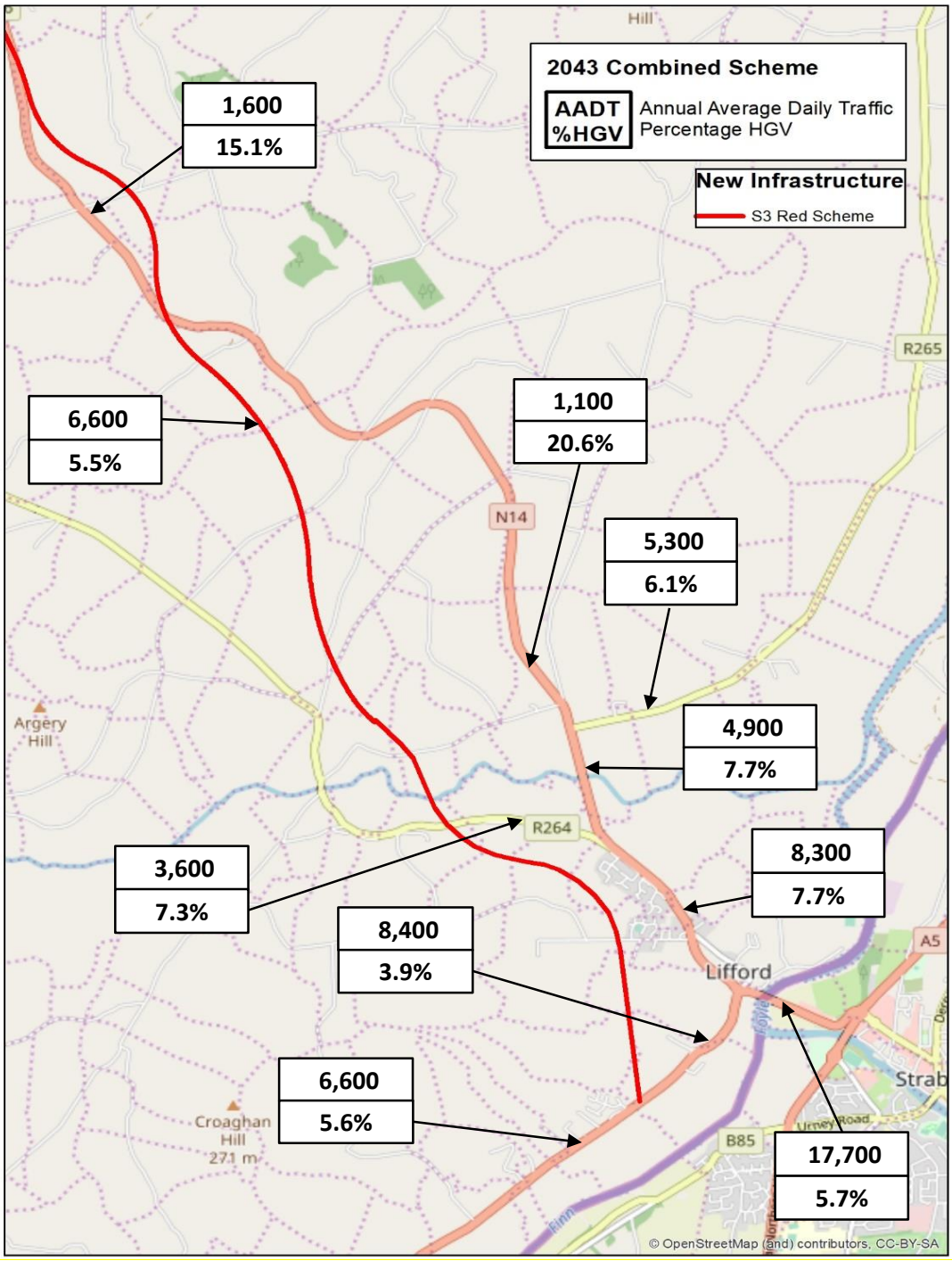


Figure 6-8 – N14 (North) Do-something 2043 Traffic Flows

The data in Figures 6-1 to 6-8 show that traffic reassigns from existing routes to use the new infrastructure. In particular, the following reassignment has been identified in the do-something network:

- Section 1: From the existing N15 and N13 at Ballybofey to the new bypass. At 2043, the AADT on the new bypass is approximately 10,100 vehicles.
- Section 2: At the Four lane road between Pole Star and Dry Arch, the forecast AADT in 2043 drops from 33,100 in the do-minimum to 17,900 in the do-something.
- Section 3: The proposed new dual carriageway attracts traffic from the existing N14. At the northern end of the new route, this is forecast to be around 7,000 vehicles AADT at 2043.

A full set of traffic flow diagrams, for each forecast year, is provided in Appendix C for the TEN-T Priority Route Improvement Project. These diagrams provide full details of the traffic flows in the do-minimum and the do-something networks.

6.3.3 Total 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 scenario. The key network statistics comprise the following:

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

Statistics showing the overall network performance in the AM period are shown in Table 6-10. The data in this table indicates that the do-something scenario has lower travel times and faster average speeds in all scenarios. Journey times increase in the later year scenarios due to the higher levels of demand present in these models.

Table 6-10 – Total Network Statistics

Statistic	Time Period	Do-Minimum			Do-Something		
		2028	2043	2058	2028	2043	2058
Total Travel Time (PCU Hrs)	AM	6,964	8,340	8,965	6,688	7,926	8,491
	IP	5,146	5,950	6,341	5,004	5,791	6,133
	PM	7,920	9,448	10,094	7,670	9,087	9,689
Total Travel Distance (PCU KMs)	AM	304,502	335,054	348,256	307,039	337,694	350,992
	IP	242,356	268,485	279,658	244,802	270,793	282,157
	PM	329,695	360,133	372,578	332,232	362,882	375,950
Average Speed (KPH)	AM	43.7	40.2	38.8	45.9	42.6	41.3
	IP	47.1	45.1	44.1	48.9	46.8	46.0
	PM	41.6	38.1	36.9	43.3	39.9	38.8
Total Trips Loaded	AM	49,463	54,123	56,131	49,463	54,123	56,131
	IP	41,925	46,020	47,808	41,925	46,020	47,808
	PM	55,284	60,065	62,058	55,284	60,065	62,058

6.3.4 Journey Times

The operation of the Do-minimum and Do-something networks have been assessed for the journey time routes shown in Figure 6-9.

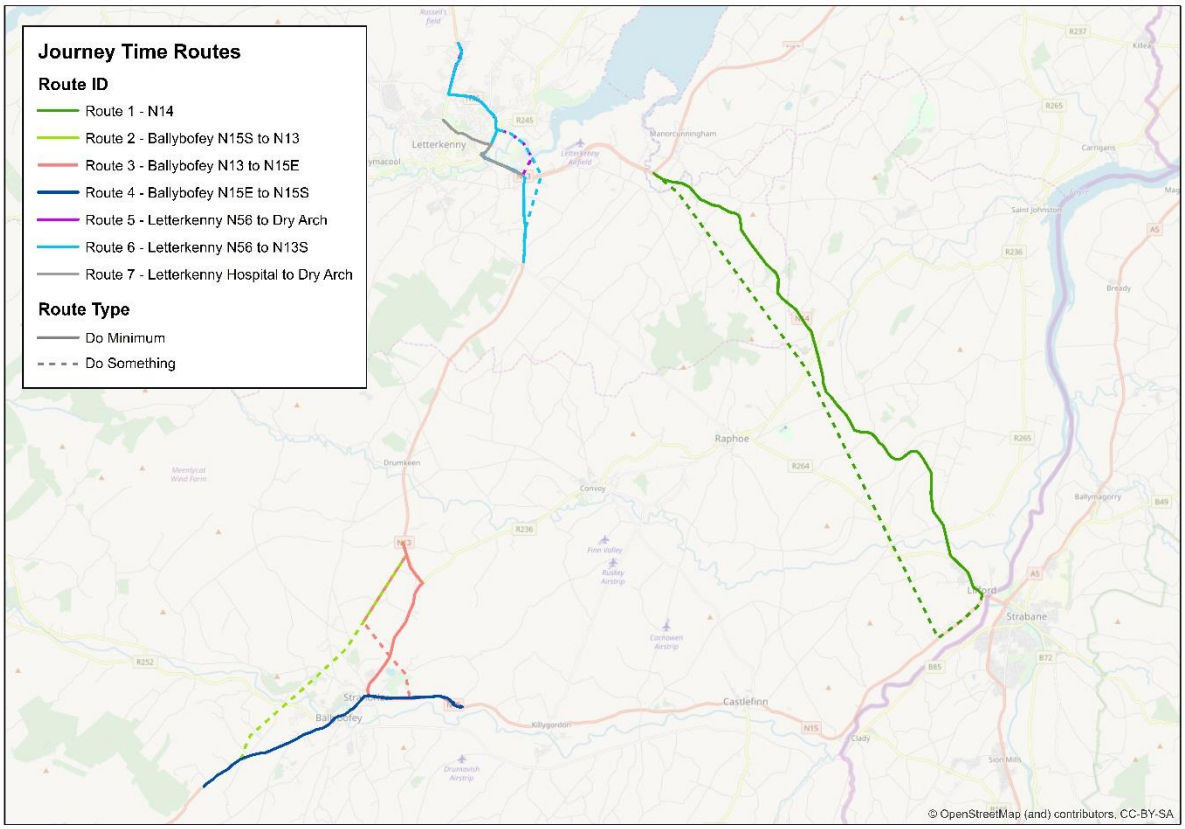


Figure 6-9 – Journey Time Routes

The data in Table 6-11 indicates that modelled journey times are improved on all routes in all scenarios in the do-something model within the AM peak.

Table 6-11 – AM Peak (08:15-09:15) Journey Times (Seconds)

Route		Do-Minimum			Do-Something			Difference		
		2028	2043	2058	2028	2043	2058	2028	2043	2058
N14	NB	883	888	891	788	790	790	-95	-99	-102
	SB	857	857	859	734	734	735	-123	-123	-124
Ballybofey N15S-N13	NB	983	1007	1018	507	509	510	-477	-498	-509
	SB	991	1020	1035	506	507	508	-486	-513	-527
Ballybofey N13-N15E	NB	487	497	502	364	365	365	-123	-132	-136
	SB	492	510	519	364	364	365	-129	-145	-154
Ballybofey N15E-N15S	NB	857	879	890	774	779	781	-83	-100	-109
	SB	819	828	832	775	779	781	-44	-49	-51
Letterkenny N56-Dry Arch	NB	868	1052	1154	786	886	930	-82	-165	-225
	SB	761	1006	1069	656	768	827	-105	-238	-242

Route		Do-Minimum			Do-Something			Difference		
		2028	2043	2058	2028	2043	2058	2028	2043	2058
Letterkenny N56-N13S	NB	1122	1429	1579	1022	1146	1171	-101	-283	-409
	SB	914	1161	1225	760	878	942	-153	-282	-282
Letterkenny Hospital-Dry Arch	NB	541	634	694	524	636	729	-17	2	35
	SB	444	561	637	326	332	339	-119	-229	-299

Journey times for the interpeak modelled period are shown in Table 6-12. The data in Table 6-12 demonstrates that the TEN-T Priority Route Improvement Project provides journey time benefits across all routes.

Table 6-12 – Interpeak (Average 12:00-14:00) Journey Times (Seconds)

Route		Do-Minimum			Do-Something			Difference		
		2028	2043	2058	2028	2043	2058	2028	2043	2058
N14	NB	868	871	873	790	793	794	-78	-78	-79
	SB	845	847	848	737	738	739	-108	-108	-109
Ballybofey N15S-N13	NB	948	967	976	502	502	503	-446	-465	-473
	SB	986	1020	1076	504	505	505	-482	-515	-571
Ballybofey N13-N15E	NB	478	485	489	363	364	364	-114	-121	-125
	SB	496	523	576	365	365	366	-131	-158	-210
Ballybofey N15E-N15S	NB	831	850	858	782	788	791	-48	-61	-67
	SB	813	821	825	781	787	790	-31	-34	-35
Letterkenny N56-Dry Arch	NB	599	628	653	452	476	502	-148	-152	-151
	SB	512	534	555	431	460	470	-81	-74	-85
Letterkenny N56-N13S	NB	759	792	818	570	594	619	-189	-198	-199
	SB	670	695	717	535	567	577	-136	-129	-140
Letterkenny Hospital-Dry Arch	NB	386	407	425	382	395	409	-4	-12	-15
	SB	406	492	523	325	338	351	-81	-154	-172

Table 6-13 shows the modelled journey time for the PM peak. As with the other time periods, the TEN-T Priority Route Improvement Project provides a journey time benefit across all routes.

Table 6-13 – PM Peak (16:45-17:45) Journey Times (Seconds)

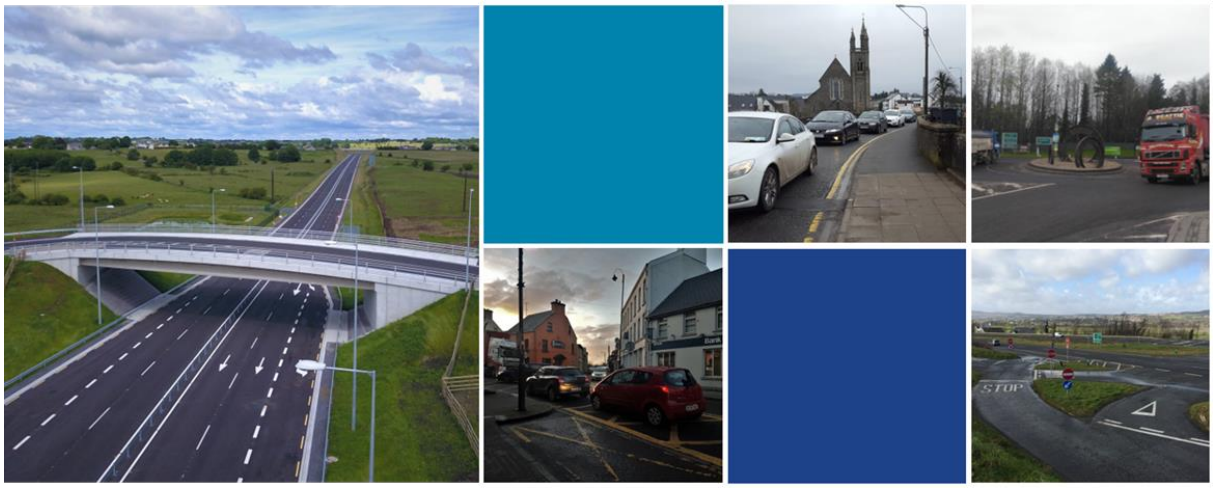
Route		Do-Minimum			Do-Something			Difference		
		2028	2043	2058	2028	2043	2058	2028	2043	2058
N14	NB	879	883	885	792	795	796	-87	-88	-90
	SB	865	871	873	737	739	739	-128	-132	-134
Ballybofey N15S-N13	NB	985	1012	1025	508	511	512	-476	-501	-513
	SB	1016	1078	1107	507	509	509	-509	-569	-597
Ballybofey N13-N15E	NB	490	500	504	365	366	367	-124	-133	-138
	SB	513	568	594	366	367	367	-148	-202	-228
Ballybofey N15E-N15S	NB	861	887	899	780	786	789	-82	-101	-110
	SB	832	839	843	776	780	782	-56	-60	-61
Letterkenny N56-Dry Arch	NB	923	1143	1224	690	745	755	-234	-398	-469
	SB	549	624	678	444	468	501	-105	-156	-178
Letterkenny N56-N13S	NB	1085	1309	1397	805	856	851	-281	-453	-546
	SB	720	836	899	616	651	678	-104	-186	-221
Letterkenny Hospital-Dry Arch	NB	537	702	769	450	472	448	-88	-230	-321
	SB	605	731	801	568	595	697	-38	-136	-104

Each of the three improvements considered contribute to the journey time benefits delivered by the TEN-T Priority Route Improvement Project. The largest journey time improvements arising from the Project occur through Ballybofey and Stranorlar. These benefits occur as the twin towns are bypassed in the do-something scenario.

The other main location of journey time benefits are the routes that pass through or near to the Dry Arch roundabout. The Section 2 improvement provides a bypass of Dry Arch roundabout, these leads to a reduction in delay at Dry Arch. This reduction in delay causes traffic to reassign from the surrounding local routes, such as the L1114, back onto the strategic routes through Dry Arch and onto the new Letterkenny link road. This reassignment of traffic leads to further decongestion benefits for the local road network in the vicinity of the Section 2 improvement.

Appendices

Appendix A
Coding Settings



Variations from Default Parameters

Logic Parameters

Parameter	Default Value	Selected Value	Reasons for Change
ATLAS	False	True	Prevention of nodes outside of network being included, as they
CROWCC	False	True	Set to true to approximate impact of non-modelled road network on assignment of zones with multiple accesses.
DUTCH	False	True	Enables longer node numbers
EZBUS	False	True	Enable easier coding of bus routes
FIFO	True	False	To ensure that first entry would be used
FOZZY	False	True	Enable easier coding of bus routes
FREEXY	False	True	Enable easier coding of supplementary node data
TOPUP	False	True	This enabled the addition of new input files for coding changes, without changing the pre-existing input files and main data file (except for adding the “include” order to the main data file for these new input files) thus assisting version control.
UPBUS	False	True	This parameter has been changed such that journey time routes start and end and the top and bottom of simulation links.
SPEEDS	False	True	This parameter has been changed to allow travel speeds to be coded on simulation links in preference to travel times. This makes it easier to check and amend the simulation coding.

Appendix B
Traffic Full Calibration Data

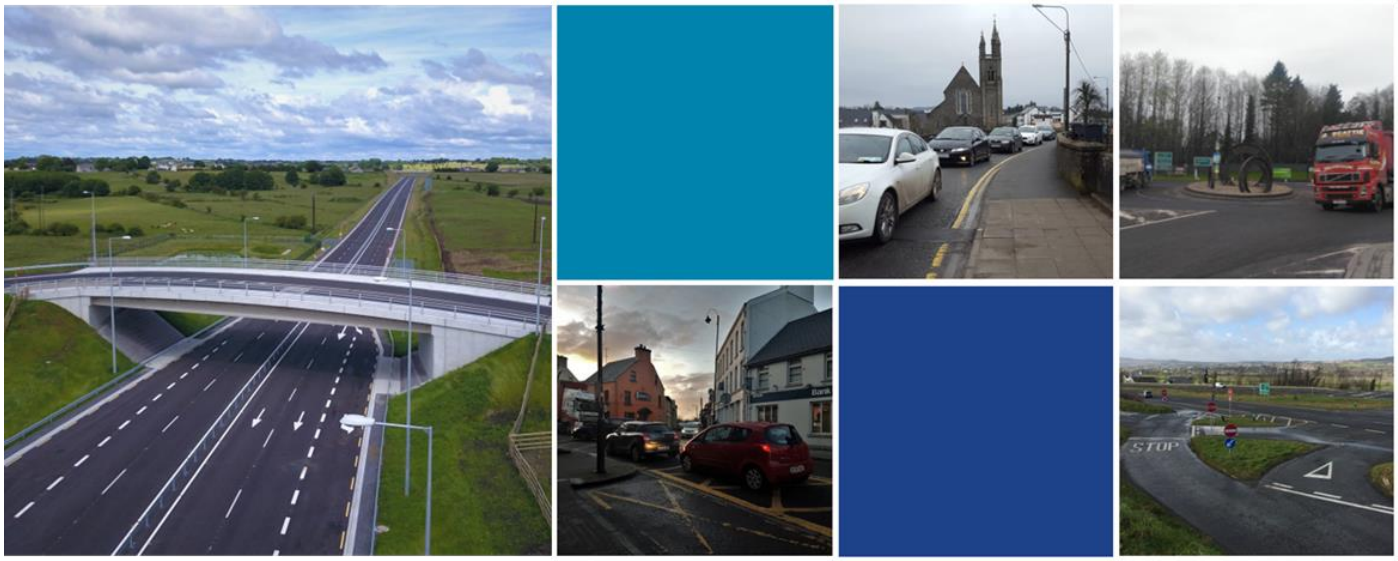


Table B-1 –AM ATC Flow Calibration

Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Eastbound	130	92	-38	3.6	PASS
ATC 1 Westbound	109	90	-19	1.9	PASS
ATC 2 Northbound	267	257	-10	0.6	PASS
ATC 2 Southbound	235	236	1	0.1	PASS
ATC 3 Eastbound	529	587	58	2.4	PASS
ATC 3 Westbound	608	604	-4	0.2	PASS
ATC 4 Eastbound	181	156	-25	1.9	PASS
ATC 4 Westbound	137	100	-37	3.4	PASS
ATC 5 Northbound	115	115	1	0.1	PASS
ATC 5 Southbound	90	92	2	0.2	PASS
ATC 6 Eastbound	66	69	3	0.3	PASS
ATC 6 Westbound	127	131	4	0.4	PASS
ATC 7 Eastbound	109	117	8	0.8	PASS
ATC 7 Westbound	124	127	3	0.3	PASS
ATC 8 Northbound	227	164	-63	4.5	PASS
ATC 8 Southbound	280	152	-129	8.8	FAIL
ATC 9 Eastbound	441	489	47	2.2	PASS
ATC 9 Westbound	688	774	86	3.2	PASS
ATC 10 Northbound	78	70	-8	1.0	PASS
ATC 10 Southbound	76	68	-8	0.9	PASS
ATC 11 Northbound	137	87	-50	4.8	PASS
ATC 11 Southbound	186	119	-67	5.4	PASS
ATC 12 Northbound	458	489	31	1.4	PASS
ATC 12 Southbound	518	438	-80	3.7	PASS
ATC 13 Northbound	25	53	29	4.6	PASS
ATC 13 Southbound	31	129	97	10.9	PASS
ATC 14 Northbound	378	187	-191	11.4	FAIL
ATC 14 Southbound	636	236	-400	19.2	FAIL
ATC 15 Northbound	348	418	71	3.6	PASS
ATC 15 Southbound	739	813	74	2.6	PASS
ATC 16 Northbound	552	564	12	0.5	PASS
ATC 16 Southbound	273	252	-21	1.3	PASS
ATC 17 Eastbound	425	477	52	2.4	PASS

Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 17 Westbound	146	145	-1	0.1	PASS
ATC 18 Northbound	38	130	76	10.0	PASS
ATC 18 Southbound	195	289	94	6.1	PASS
ATC 19 Eastbound	184	355	171	10.4	FAIL
ATC 19 Westbound	134	228	94	7.0	PASS
ATC 20 Northbound	327	385	58	3.1	PASS
ATC 20 Southbound	329	309	-19	1.1	PASS
ATC 21 Eastbound	134	160	26	2.1	PASS
ATC 21 Westbound	178	224	47	3.3	PASS
ATC 22 Eastbound	1,082	1173	91	2.7	PASS
ATC 22 Westbound	1,483	1907	424	10.3	FAIL
ATC 23 Northbound	253	339	86	5.0	PASS
ATC 23 Southbound	413	357	-56	2.9	PASS
ATC 24 Northbound	470	518	49	2.2	PASS
ATC 24 Southbound	619	606	-13	0.5	PASS
ATC 25 Northbound	228	230	2	0.1	PASS
ATC 25 Southbound	84	132	48	4.6	PASS
ATC 26 Northbound	267	257	-10	0.6	PASS
ATC 26 Southbound	235	236	1	0.1	PASS
ATC TMU N13 010.0 N Northbound	467	468	1	0.0	PASS
ATC TMU N13 010.0 N Southbound	324	348	23	1.3	PASS
ATC TMU N15 000.0 S Northbound	124	79	-46	4.5	PASS
ATC TMU N15 000.0 S Southbound	197	133	-64	5.0	PASS

Table B-2 –IP ATC Flow Calibration

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Eastbound	95	73	-22	2.4	PASS

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Westbound	91	67	-24	2.7	PASS
ATC 2 Northbound	205	187	-18	1.3	PASS
ATC 2 Southbound	203	147	-56	4.2	PASS
ATC 3 Eastbound	635	697	62	2.4	PASS
ATC 3 Westbound	652	624	-27	1.1	PASS
ATC 4 Eastbound	137	43	-94	9.9	PASS
ATC 4 Westbound	129	39	-90	9.8	PASS
ATC 5 Northbound	79	80	1	0.1	PASS
ATC 5 Southbound	87	87	0	0.1	PASS
ATC 6 Eastbound	89	85	-4	0.4	PASS
ATC 6 Westbound	94	97	3	0.3	PASS
ATC 7 Eastbound	106	110	5	0.5	PASS
ATC 7 Westbound	104	107	4	0.3	PASS
ATC 8 Northbound	153	80	-72	6.7	PASS
ATC 8 Southbound	155	120	-35	3.0	PASS
ATC 9 Eastbound	450	417	-33	1.6	PASS
ATC 9 Westbound	425	379	-46	2.3	PASS
ATC 10 Northbound	57	30	-27	4.1	PASS
ATC 10 Southbound	58	42	-16	2.2	PASS
ATC 11 Northbound	97	74	-23	2.4	PASS
ATC 11 Southbound	95	74	-21	2.3	PASS
ATC 12 Northbound	358	388	30	1.5	PASS
ATC 12 Southbound	403	465	61	2.9	PASS
ATC 13 Northbound	21	15	-6	1.5	PASS
ATC 13 Southbound	18	16	-2	0.5	PASS
ATC 14 Northbound	367	107	-260	16.9	FAIL
ATC 14 Southbound	371	108	-264	17.0	FAIL
ATC 15 Northbound	317	445	129	6.6	FAIL
ATC 15 Southbound	336	217	-119	7.1	FAIL
ATC 16 Northbound	261	450	188	10.0	FAIL
ATC 16 Southbound	323	271	-52	3.0	PASS
ATC 17 Eastbound	195	181	-14	1.0	PASS
ATC 17 Westbound	177	107	-70	5.9	PASS
ATC 18 Northbound	41	130	76	9.6	PASS
ATC 18 Southbound	40	23	-18	3.1	PASS
ATC 19 Eastbound	79	160	81	7.4	PASS
ATC 19 Westbound	46	214	168	14.7	FAIL
ATC 20 Northbound	283	208	-76	4.8	PASS
ATC 20 Southbound	278	238	-40	2.5	PASS
ATC 21 Eastbound	199	229	30	2.0	PASS
ATC 21 Westbound	225	231	6	0.4	PASS
ATC 22 Eastbound	1,158	1212	54	1.6	PASS

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 22 Westbound	1,106	1166	60	1.8	PASS
ATC 23 Northbound	218	311	93	5.7	PASS
ATC 23 Southbound	345	266	-79	4.5	PASS
ATC 24 Northbound	387	385	-1	0.1	PASS
ATC 24 Southbound	381	292	-89	4.8	PASS
ATC 25 Northbound	95	97	2	0.2	PASS
ATC 25 Southbound	98	99	1	0.1	PASS
ATC 26 Northbound	205	187	-18	1.3	PASS
ATC 26 Southbound	203	147	-56	4.2	PASS
ATC TMU N13 010.0 N Northbound	388	509	121	5.7	FAIL
ATC TMU N13 010.0 N Southbound	373	554	182	8.4	FAIL
ATC TMU N15 000.0 S Northbound	201	179	-21	1.5	PASS
ATC TMU N15 000.0 S Southbound	205	187	-18	1.3	PASS

Table B-3 –PM ATC Flow Calibration

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Eastbound	102	87	-15	1.6	PASS
ATC 1 Westbound	113	88	-25	2.5	PASS
ATC 2 Northbound	250	248	-2	0.2	PASS
ATC 2 Southbound	230	235	5	0.3	PASS

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 3 Eastbound	721	738	17	0.6	PASS
ATC 3 Westbound	694	738	44	1.6	PASS
ATC 4 Eastbound	145	93	-53	4.8	PASS
ATC 4 Westbound	194	90	-104	8.7	FAIL
ATC 5 Northbound	88	89	1	0.1	PASS
ATC 5 Southbound	87	88	1	0.1	PASS
ATC 6 Eastbound	136	147	11	0.9	PASS
ATC 6 Westbound	99	108	10	1.0	PASS
ATC 7 Eastbound	164	166	2	0.1	PASS
ATC 7 Westbound	158	160	2	0.2	PASS
ATC 8 Northbound	161	150	-11	0.9	PASS
ATC 8 Southbound	207	143	-64	4.8	PASS
ATC 9 Eastbound	680	735	55	2.1	PASS
ATC 9 Westbound	541	547	6	0.3	PASS
ATC 10 Northbound	70	47	-23	3.0	PASS
ATC 10 Southbound	77	52	-25	3.1	PASS
ATC 11 Northbound	185	106	-79	6.6	PASS
ATC 11 Southbound	140	158	19	1.5	PASS
ATC 12 Northbound	414	454	40	1.9	PASS
ATC 12 Southbound	462	478	16	0.7	PASS
ATC 13 Northbound	36	120	84	9.5	PASS
ATC 13 Southbound	25	73	48	6.9	PASS
ATC 14 Northbound	704	210	-494	23.1	FAIL
ATC 14 Southbound	348	90	-259	17.5	FAIL
ATC 15 Northbound	560	997	436	15.6	FAIL
ATC 15 Southbound	295	136	-159	10.8	FAIL
ATC 16 Northbound	321	478	157	7.8	FAIL
ATC 16 Southbound	767	585	-183	7.0	FAIL
ATC 17 Eastbound	194	186	-9	0.6	PASS
ATC 17 Westbound	343	151	-192	12.2	FAIL
ATC 18 Northbound	106	227	121	9.4	FAIL
ATC 18 Southbound	49	95	46	5.5	PASS
ATC 19 Eastbound	249	402	153	8.5	FAIL
ATC 19 Westbound	92	246	153	11.8	FAIL
ATC 20 Northbound	388	371	-17	0.9	PASS
ATC 20 Southbound	328	351	24	1.3	PASS
ATC 21 Eastbound	230	254	24	1.5	PASS
ATC 21 Westbound	233	258	25	1.6	PASS
ATC 22 Eastbound	1,656	1646	-10	0.2	PASS
ATC 22 Westbound	1,146	1365	220	6.2	FAIL
ATC 23 Northbound	345	396	51	2.6	PASS
ATC 23 Southbound	463	437	-27	1.3	PASS

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 24 Northbound	610	624	14	0.6	PASS
ATC 24 Southbound	535	533	-2	0.1	PASS
ATC 25 Northbound	109	119	10	0.9	PASS
ATC 25 Southbound	226	232	7	0.4	PASS
ATC 26 Northbound	250	248	-2	0.2	PASS
ATC 26 Southbound	230	235	5	0.3	PASS
ATC TMU N13 010.0 N Northbound	412	411	-0	0.0	PASS
ATC TMU N13 010.0 N Southbound	543	547	3	0.1	PASS
ATC TMU N15 000.0 S Northbound	200	137	-63	4.8	PASS
ATC TMU N15 000.0 S Southbound	274	146	-128	8.8	FAIL

Table B-4 –AM ATC Flow Calibration
- *Heavy Vehicles*

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Eastbound	4	9	5	2.0	PASS
ATC 1 Westbound	5	8	3	1.2	PASS
ATC 2 Northbound	40	42	2	0.3	PASS
ATC 2 Southbound	26	37	11	2.0	PASS
ATC 3 Eastbound	46	86	40	4.9	PASS
ATC 3 Westbound	57	84	27	3.2	PASS
ATC 4 Eastbound	11	18	7	1.7	PASS
ATC 4 Westbound	8	3	-5	1.9	PASS
ATC 5 Northbound	8	8	0	0.0	PASS
ATC 5 Southbound	5	7	2	0.7	PASS
ATC 6 Eastbound	3	5	2	1.0	PASS
ATC 6 Westbound	5	7	2	1.0	PASS
ATC 7 Eastbound	7	12	5	1.7	PASS
ATC 7 Westbound	12	14	2	0.7	PASS
ATC 8 Northbound	23	8	-15	3.7	PASS
ATC 8 Southbound	8	19	11	3.0	PASS
ATC 9 Eastbound	30	56	26	4.0	PASS
ATC 9 Westbound	44	51	7	1.0	PASS
ATC 10 Northbound	5	2	-3	1.6	PASS
ATC 10 Southbound	4	3	-1	0.3	PASS
ATC 11 Northbound	10	14	4	1.0	PASS
ATC 11 Southbound	14	21	7	1.7	PASS
ATC 12 Northbound	27	44	17	2.8	PASS
ATC 12 Southbound	33	53	20	3.0	PASS
ATC 13 Northbound	1	5	4	2.5	PASS
ATC 13 Southbound	1	11	10	4.2	PASS
ATC 14 Northbound	17	2	-15	4.7	PASS
ATC 14 Southbound	67	3	-64	10.8	PASS
ATC 15 Northbound	16	126	110	13.0	FAIL
ATC 15 Southbound	9	30	21	4.8	PASS
ATC 16 Northbound	57	3	-54	9.97	PASS
ATC 16 Southbound	3	5	2	1.1	PASS
ATC 17 Eastbound	13	29	16	3.4	PASS
ATC 17 Westbound	9	23	14	3.6	PASS
ATC 18 Northbound	-	6	6	3.3	PASS
ATC 18 Southbound	2	11	9	3.5	PASS
ATC 19 Eastbound	7	6	-1	0.6	PASS
ATC 19 Westbound	5	1	-4	2.3	PASS

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 20 Northbound	33	41	8	1.2	PASS
ATC 20 Southbound	37	40	3	0.5	PASS
ATC 21 Eastbound	13	22	9	2.1	PASS
ATC 21 Westbound	27	11	-16	3.8	PASS
ATC 22 Eastbound	39	63	24	3.4	PASS
ATC 22 Westbound	131	143	12	1.0	PASS
ATC 23 Northbound	166	51	-115	11.1	FAIL
ATC 23 Southbound	30	64	34	5.0	PASS
ATC 24 Northbound	36	64	28	4.0	PASS
ATC 24 Southbound	34	69	35	4.9	PASS
ATC 25 Northbound	14	14	0	0.1	PASS
ATC 25 Southbound	13	17	4	1.1	PASS
ATC 26 Northbound	40	42	2	0.3	PASS
ATC 26 Southbound	26	37	11	2.0	PASS
ATC TMU N13 010.0 N Northbound	30	42	12	2.0	PASS
ATC TMU N13 010.0 N Southbound	27	45	19	3.1	PASS
ATC TMU N15 000.0 S Northbound	19	10	-9	2.3	PASS
ATC TMU N15 000.0 S Southbound	19	4	-15	4.5	PASS

Table B-5 –IP ATC Flow Calibration
- *Heavy Vehicles*

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Eastbound	7	14	7	2.1	PASS
ATC 1 Westbound	9	18	9	2.6	PASS
ATC 2 Northbound	34	23	-11	2.1	PASS
ATC 2 Southbound	33	25	-8	1.5	PASS
ATC 3 Eastbound	60	77	17	2.0	PASS
ATC 3 Westbound	57	56	-1	0.1	PASS
ATC 4 Eastbound	10	10	0	0.1	PASS
ATC 4 Westbound	7	9	2	0.7	PASS
ATC 5 Northbound	10	11	1	0.3	PASS
ATC 5 Southbound	9	9	0	0.1	PASS
ATC 6 Eastbound	9	7	-2	0.8	PASS
ATC 6 Westbound	9	12	3	1.0	PASS
ATC 7 Eastbound	10	13	3	1.0	PASS
ATC 7 Westbound	10	13	3	0.9	PASS
ATC 8 Northbound	19	7	-12	3.3	PASS
ATC 8 Southbound	9	17	8	2.2	PASS
ATC 9 Eastbound	36	60	24	3.5	PASS
ATC 9 Westbound	36	59	23	3.4	PASS
ATC 10 Northbound	7	0	-7	3.4	PASS
ATC 10 Southbound	5	2	-3	1.8	PASS
ATC 11 Northbound	11	6	-5	1.8	PASS
ATC 11 Southbound	9	9	-0	0.1	PASS
ATC 12 Northbound	23	36	13	2.4	PASS
ATC 12 Southbound	38	60	22	3.2	PASS
ATC 13 Northbound	1	2	1	0.6	PASS
ATC 13 Southbound	1	1	0	0.4	PASS
ATC 14 Northbound	19	5	-14	3.9	PASS
ATC 14 Southbound	32	3	-29	7.1	PASS
ATC 15 Northbound	13	56	43	7.4	PASS
ATC 15 Southbound	15	21	6	1.4	PASS
ATC 16 Northbound	33	6	-27	6.2	PASS
ATC 16 Southbound	7	7	0	0.0	PASS
ATC 17 Eastbound	14	25	11	2.4	PASS
ATC 17 Westbound	10	6	-4	1.6	PASS
ATC 18 Northbound	1	1	-0	0.2	PASS
ATC 18 Southbound	2	1	-1	0.8	PASS
ATC 19 Eastbound	5	4	-1	0.6	PASS
ATC 19 Westbound	3	0	-3	2.1	PASS

ATC 20 Northbound	36	18	-18	3.4	PASS
ATC 20 Southbound	40	53	13	2.0	PASS
ATC 21 Eastbound	16	25	9	1.9	PASS
ATC 21 Westbound	23	29	6	1.2	PASS
ATC 22 Eastbound	65	84	19	2.3	PASS
ATC 22 Westbound	61	96	35	4.0	PASS
ATC 23 Northbound	152	30	-122	12.9	FAIL
ATC 23 Southbound	39	35	-4	0.7	PASS
ATC 24 Northbound	46	69	23	3.0	PASS
ATC 24 Southbound	44	40	-4	0.6	PASS
ATC 25 Northbound	13	15	2	0.6	PASS
ATC 25 Southbound	13	14	1	0.3	PASS
ATC 26 Northbound	34	23	-11	2.1	PASS
ATC 26 Southbound	33	25	-8	1.5	PASS
ATC TMU N13 010.0 N Northbound	34	53	19	2.9	PASS
ATC TMU N13 010.0 N Southbound	39	49	10	1.5	PASS
ATC TMU N15 000.0 S Northbound	25	9	-15	3.7	PASS
ATC TMU N15 000.0 S Southbound	23	24	1	0.3	PASS

Table B-6 –PM ATC Flow Calibration
- *Heavy Vehicles*

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 1 Eastbound	3	11	8	3.0	PASS
ATC 1 Westbound	5	9	4	1.4	PASS
ATC 2 Northbound	21	39	18	3.3	PASS
ATC 2 Southbound	28	22	-6	1.1	PASS
ATC 3 Eastbound	43	50	7	1.0	PASS
ATC 3 Westbound	38	70	32	4.4	PASS
ATC 4 Eastbound	11	10	-1	0.4	PASS
ATC 4 Westbound	7	4	-4	1.5	PASS
ATC 5 Northbound	6	6	-0	0.0	PASS
ATC 5 Southbound	8	8	-0	0.0	PASS
ATC 6 Eastbound	11	12	1	0.3	PASS
ATC 6 Westbound	8	8	-0	0.1	PASS
ATC 7 Eastbound	9	12	3	1.0	PASS
ATC 7 Westbound	13	15	2	0.6	PASS
ATC 8 Northbound	20	7	-13	3.6	PASS
ATC 8 Southbound	10	11	1	0.3	PASS
ATC 9 Eastbound	32	42	10	1.7	PASS
ATC 9 Westbound	30	29	-1	0.2	PASS
ATC 10 Northbound	5	1	-4	2.0	PASS
ATC 10 Southbound	6	3	-3	1.4	PASS
ATC 11 Northbound	10	14	4	1.2	PASS
ATC 11 Southbound	8	4	-4	1.5	PASS
ATC 12 Northbound	19	51	32	5.3	PASS
ATC 12 Southbound	25	28	3	0.6	PASS
ATC 13 Northbound	1	11	10	4.0	PASS
ATC 13 Southbound	-	4	4	2.8	PASS
ATC 14 Northbound	22	9	-13	3.5	PASS
ATC 14 Southbound	40	8	-32	6.5	PASS
ATC 15 Northbound	11	15	4	1.2	PASS
ATC 15 Southbound	15	4	-11	3.4	PASS
ATC 16 Northbound	20	2	-18	5.5	PASS
ATC 16 Southbound	7	10	3	1.0	PASS
ATC 17 Eastbound	4	7	3	1.3	PASS
ATC 17 Westbound	8	5	-3	1.1	PASS
ATC 18 Northbound	2	9	7	3.0	PASS
ATC 18 Southbound	2	4	2	1.1	PASS
ATC 19 Eastbound	12	10	-2	0.6	PASS
ATC 19 Westbound	3	2	-1	0.6	PASS

ATC Movement	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
ATC 20 Northbound	38	50	12	1.9	PASS
ATC 20 Southbound	23	33	10	2.0	PASS
ATC 21 Eastbound	18	22	4	1.0	PASS
ATC 21 Westbound	15	18	3	0.9	PASS
ATC 22 Eastbound	63	84	21	2.5	PASS
ATC 22 Westbound	57	71	14	1.7	PASS
ATC 23 Northbound	211	37	-174	15.6	FAIL
ATC 23 Southbound	28	25	-3	0.6	PASS
ATC 24 Northbound	40	47	7	1.1	PASS
ATC 24 Southbound	38	44	6	0.9	PASS
ATC 25 Northbound	5	9	4	1.5	PASS
ATC 25 Southbound	4	9	5	2.0	PASS
ATC 26 Northbound	21	39	18	3.3	PASS
ATC 26 Southbound	28	22	-6	1.1	PASS
ATC TMU N13 010.0 N Northbound	27	50	23	3.8	PASS
ATC TMU N13 010.0 N Southbound	29	34	6	1.0	PASS
ATC TMU N15 000.0 S Northbound	23	14	-9	2.0	PASS
ATC TMU N15 000.0 S Southbound	22	12	-10	2.4	PASS

C-7 AM JTC Approach Calibration

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	211	217	6	0.4	PASS
1	N15 (E)	548	551	3	0.1	PASS
1	N15 (W)	501	494	-7	0.3	PASS
2	N15 (W)	688	638	-50	2.0	PASS
2	N15 (E)	500	452	-49	2.2	PASS
3	N13	548	485	-63	2.8	PASS
3	N15 (E)	425	438	13	0.6	PASS
3	N15 (W)	504	570	66	2.9	PASS
4	N15 (W)	499	467	-32	1.5	PASS
4	N15 (E)	374	358	-16	0.9	PASS
4	Mala an Mhuilinn	238	227	-10	0.7	PASS
5	Mala an Mhuilinn	199	188	-11	0.8	PASS
5	N15 (E)	181	146	-35	2.7	PASS
5	N15 (W)	320	124	-196	13.2	FAIL
7	N14 (NW)	451	407	-44	2.1	PASS
7	N56 (NE)	935	991	56	1.8	PASS
7	N14 (SE)	2007	2054	47	1.0	PASS
7	Port Road	434	456	22	1.0	PASS
8	Ramelton Road (N)	1003	943	-59	1.9	PASS
8	Ramelton Road (E)	161	153	-9	0.7	PASS
8	Port Road (S)	663	737	74	2.8	PASS
8	Pearse Road	595	500	-94	4.0	PASS
9	Circular Road (N)	866	872	6	0.2	PASS
9	High Road (E)	888	857	-31	1.0	PASS
9	High Road (S)	528	477	-50	2.2	PASS
9	Circular Road (W)	756	856	99	3.5	PASS
10	N56 (N)	1198	1173	-26	0.7	PASS
10	N56 (E)	643	764	122	4.6	FAIL
10	Windy Hall	817	783	-34	1.2	PASS
10	N56 (W)	8	0	-8	4.0	PASS
11	N56 (N)	585	595	10	0.4	PASS
11	R245	674	754	80	3.0	PASS
11	N56 (S)	965	986	21	0.7	PASS
13	R245	311	182	-129	8.2	FAIL
13	N56 (N)	1084	1264	180	5.3	FAIL

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
13	Ballyraine Park	4	16	12	3.9	PASS
13	N56 (S)	1115	1134	19	0.6	PASS
14	Unnamed Road	456	270	-186	9.8	FAIL
14	N56 Ramelton Road (E)	551	800	249	9.6	FAIL
14	N56 Ramelton Road (W)	597	660	63	2.5	PASS
15	Dry Arc Roundabout (W)	1245	1318	74	2.1	PASS
15	Dry Arc Roundabout (N)	59	62	3	0.4	PASS
15	N13 (E)	1396	1321	-75	2.0	PASS
15	N13 (S)	858	859	1	0.0	PASS
16	N14 Letterkenny Road	662	477	-185	7.7	FAIL
16	Butcher Street	59	57	-2	0.2	PASS
16	N14	558	604	46	1.9	PASS
16	N15	372	291	-82	4.5	PASS
17	A5 (W)	880	866	-13	0.5	PASS
17	A5 (E)	1079	1183	104	3.1	PASS
17	Derry Road (W)	216	73	-142	11.8	FAIL
18	A38 Lifford Road	657	587	-70	2.8	PASS
18	Barnhill Road	739	651	-88	3.4	PASS
18	Railway Street	431	554	123	5.6	FAIL
18	A5 Bradley Way	1201	1132	-69	2.0	PASS
19	A5 Bradley Way (N)	1045	899	-146	4.7	PASS
19	Bradley Way (E)	403	428	24	1.2	PASS
19	A5 Bradley Way (S)	864	784	-80	2.8	PASS
20	Great Northern Link (N)	659	666	8	0.3	PASS
20	Urney Road (E)	313	311	-1	0.1	PASS
20	Great Northern Link (S)	836	781	-55	2.0	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
20	Urney Road (W)	408	327	-81	4.2	PASS
21	Great Northern Link	547	549	2	0.1	PASS
21	A5 Melmount Road (N)	250	288	38	2.3	PASS
21	Dublin Road Industrial Estate	48	0	-48	9.8	PASS
21	A5 Melmount Road (S)	931	866	-65	2.2	PASS
22	N13 (N)	451	348	-104	5.2	FAIL
22	R236	157	90	-66	6.0	PASS
22	N13 (S)	620	489	-131	5.6	FAIL
23	N14 (N)	892	898	6	0.2	PASS
23	N13	858	836	-22	0.7	PASS
23	N14 (S)	546	512	-34	1.5	PASS
24	N14 (N)	372	346	-26	1.4	PASS
24	R236 North	93	68	-24	2.7	PASS
24	N14 (S)	381	427	46	2.3	PASS
25	N14 (N)	422	414	-8	0.4	PASS
25	N14 (S)	275	263	-12	0.7	PASS
25	R236 South	153	164	11	0.9	PASS
26	N14 (N)	281	236	-45	2.8	PASS
26	Rossgier Close (E)	49	56	7	0.9	PASS
26	N14 (S)	270	284	13	0.8	PASS
26	Rossgier Close (W)	53	35	-18	2.7	PASS
27	N14 (N)	478	357	-120	5.9	FAIL
27	N14 (S)	513	483	-31	1.4	PASS
27	R264	160	161	1	0.1	PASS
34	Car Park (NE)	64	63	-1	0.1	PASS
34	SE Link Route	513	542	29	1.3	PASS
34	R250 NW	721	752	31	1.1	PASS
35	R250 North	759	770	11	0.4	PASS
35	R250 East	359	367	8	0.4	PASS
35	L1114 Bridge	629	564	-65	2.7	PASS
35	Dunnes Stores	41	43	2	0.3	PASS
36	N56 North	474	498	24	1.1	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
36	Kiltoy Road East	824	654	-170	6.3	FAIL
36	N56 South	594	596	2	0.1	PASS
36	Gortlee Road West	254	347	93	5.4	PASS

C-8 AM JTC Exit Calibration

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	189	193	4	0.3	PASS
1	N15 (E)	643	638	-5	0.2	PASS
1	N15 (W)	428	432	4	0.2	PASS
2	N15 (W)	483	551	67	3.0	PASS
2	N15 (E)	648	537	-111	4.5	FAIL
2	Navenny St	57	100	43	4.9	PASS
3	N13	494	542	48	2.1	PASS
3	N15 (E)	431	467	36	1.7	PASS
3	N15 (W)	552	484	-68	3.0	PASS
4	N15 (W)	465	438	-27	1.3	PASS
4	N15 (E)	373	361	-11	0.6	PASS
4	Mala an Mhuilinn	273	253	-20	1.2	PASS
5	Mala an Mhuilinn	337	161	-175	11.1	FAIL
5	N15 (E)	142	98	-44	4.0	PASS
5	N15 (W)	222	198	-24	1.6	PASS
7	N14 (NW)	924	907	-16	0.5	PASS
7	N56 (NE)	1124	1141	17	0.5	PASS
7	N14 (SE)	1212	1247	35	1.0	PASS
7	Port Road	568	585	18	0.7	PASS
8	Ramelton Road (N)	707	600	-106	4.2	FAIL
8	Ramelton Road (E)	289	283	-6	0.3	PASS
8	Port Road (S)	497	459	-39	1.8	PASS
8	Pearse Road	404	419	15	0.7	PASS
8	Port Road (N)	525	540	15	0.7	PASS
9	Circular Road (N)	935	910	-25	0.8	PASS
9	High Road (E)	902	919	17	0.6	PASS
9	High Road (S)	570	554	-16	0.7	PASS
9	Circular Road (W)	631	651	20	0.8	PASS
10	N56 (N)	724	807	82	3.0	PASS
10	N56 (E)	858	831	-27	0.9	PASS
10	Windy Hall	1072	1083	11	0.3	PASS
10	N56 (W)	12	0	-12	4.9	PASS
11	N56 (N)	634	596	-38	1.5	PASS
11	R245	479	475	-4	0.2	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
11	N56 (S)	1111	1264	154	4.5	PASS
13	R245	537	608	71	3.0	PASS
13	N56 (N)	1018	986	-32	1.0	PASS
13	Ballyraine Park	5	18	13	3.9	PASS
13	N56 (S)	955	985	30	1.0	PASS
14	Unnamed Road	278	410	132	7.1	FAIL
14	N56 Ramelton Road (E)	419	410	-9	0.4	PASS
14	N56 Ramelton Road (W)	908	368	-540	21.4	FAIL
15	Dry Arc Roundabout (W)	1903	1926	23	0.5	PASS
15	Dry Arc Roundabout (N)	72	72	0	0.0	PASS
15	N13 (E)	875	865	-10	0.3	PASS
15	N13 (S)	708	697	-11	0.4	PASS
16	N14 Letterkenny Road	576	506	-70	3.0	PASS
16	Butcher Street	53	89	36	4.2	PASS
16	N14	786	560	-227	8.7	FAIL
16	N15	235	274	39	2.4	PASS
17	A5 (W)	733	651	-82	3.1	PASS
17	A5 (E)	891	937	45	1.5	PASS
17	Derry Road (W)	121	532	411	22.8	FAIL
18	A38 Lifford Road	607	604	-3	0.1	PASS
18	Barnhill Road	871	866	-5	0.2	PASS
18	Railway Street	515	502	-13	0.6	PASS
18	A5 Bradley Way	1037	899	-138	4.4	PASS
19	A5 Bradley Way (N)	1210	1132	-78	2.3	PASS
19	Bradley Way (E)	439	312	-127	6.5	FAIL
19	A5 Bradley Way (S)	664	666	3	0.1	PASS
20	Great Northern Link (N)	866	784	-82	2.9	PASS
20	Urney Road (E)	361	325	-36	1.9	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
20	Great Northern Link (S)	806	735	-71	2.6	PASS
20	Urney Road (W)	183	207	24	1.7	PASS
21	Great Northern Link	763	737	-26	0.9	PASS
21	A5 Melmount Road (N)	295	308	13	0.7	PASS
21	Dublin Road Industrial Estate	53	0	-53	10.2	PASS
21	A5 Melmount Road (S)	665	658	-7	0.3	PASS
22	N13 (N)	561	397	-163	7.5	FAIL
22	R236	108	92	-16	1.6	PASS
22	N13 (S)	559	438	-121	5.4	FAIL
23	N14 (N)	1338	1348	10	0.3	PASS
23	N13	578	525	-53	2.2	PASS
23	N14 (S)	380	372	-8	0.4	PASS
24	N14 (N)	351	357	6	0.3	PASS
24	R236 North	80	70	-10	1.2	PASS
24	N14 (S)	415	414	-0	0.0	PASS
25	N14 (N)	392	427	35	1.7	PASS
25	N14 (S)	271	263	-8	0.5	PASS
25	R236 South	187	152	-35	2.7	PASS
26	N14 (N)	249	257	8	0.5	PASS
26	Rossgier Close (E)	33	41	9	1.4	PASS
26	N14 (S)	351	271	-80	4.5	PASS
26	Rossgier Close (W)	20	40	20	3.7	PASS
27	N14 (N)	428	339	-89	4.5	PASS
27	N14 (S)	601	512	-88	3.7	PASS
27	R264	123	150	27	2.3	PASS
34	Car Park (NE)	164	152	-12	1.0	PASS
34	SE Link Route	432	485	53	2.5	PASS
34	R250 SW	702	720	18	0.7	PASS
35	R250 North	538	496	-42	1.8	PASS
35	R250 East	887	855	-32	1.1	PASS
35	L1114 Bridge	281	252	-29	1.8	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
35	Dunnes Stores	82	72	-10	1.1	PASS
36	N56 North	862	854	-8	0.3	PASS
36	Kiltoy Road East	373	433	60	3.0	PASS
36	N56 South	577	595	18	0.8	PASS
36	Gortlee Road West	334	213	-121	7.3	FAIL

Table C–9 IP JTC Approach Calibration

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	225	211	-14	0.9	PASS
1	N15 (E)	623	571	-52	2.1	PASS
1	N15 (W)	461	411	-50	2.4	PASS
2	N15 (W)	638	526	-113	4.7	FAIL
2	N15 (E)	586	456	-130	5.7	FAIL
3	N13	462	395	-67	3.3	PASS
3	N15 (E)	398	431	33	1.6	PASS
3	N15 (W)	464	510	47	2.1	PASS
4	N15 (W)	412	393	-19	0.9	PASS
4	N15 (E)	378	362	-15	0.8	PASS
4	Mala an Mhuilinn	235	244	9	0.6	PASS
5	Mala an Mhuilinn	242	181	-61	4.2	PASS
5	N15 (E)	97	191	95	7.9	PASS
5	N15 (W)	259	48	-211	17.1	FAIL
7	N14 (NW)	688	715	27	1.0	PASS
7	N56 (NE)	852	808	-44	1.5	PASS
7	N14 (SE)	1262	1254	-8	0.2	PASS
7	Port Road	824	850	26	0.9	PASS
8	Ramelton Road (N)	881	879	-2	0.1	PASS
8	Ramelton Road (E)	442	447	5	0.2	PASS
8	Port Road (S)	683	693	10	0.4	PASS
8	Pearse Road	722	587	-134	5.3	FAIL
9	Circular Road (N)	788	785	-2	0.1	PASS
9	High Road (E)	736	748	12	0.4	PASS
9	High Road (S)	451	444	-7	0.3	PASS
9	Circular Road (W)	706	713	7	0.3	PASS
10	N56 (N)	755	760	5	0.2	PASS
10	N56 (E)	517	524	7	0.3	PASS
10	Windy Hall	690	676	-14	0.5	PASS
10	N56 (W)	17	0	-17	5.9	PASS
11	N56 (N)	438	387	-51	2.5	PASS
11	R245	480	547	67	3.0	PASS
11	N56 (S)	914	965	51	1.7	PASS
13	R245	357	315	-42	2.3	PASS
13	N56 (N)	869	865	-4	0.1	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
13	Ballyraine Park	9	38	29	6.0	PASS
13	N56 (S)	986	975	-11	0.3	PASS
14	Unnamed Road	176	294	117	7.6	FAIL
14	N56 Ramelton Road (E)	415	446	31	1.5	PASS
14	N56 Ramelton Road (W)	549	360	-189	8.9	FAIL
15	Dry Arc Roundabout (W)	1297	1185	-112	3.2	PASS
15	Dry Arc Roundabout (N)	74	63	-11	1.4	PASS
15	N13 (E)	772	697	-74	2.7	PASS
15	N13 (S)	586	600	14	0.6	PASS
16	N14 Letterkenny Road	574	493	-81	3.5	PASS
16	Butcher Street	112	82	-30	3.1	PASS
16	N14	698	624	-73	2.8	PASS
16	N15	290	303	13	0.8	PASS
17	A5 (W)	684	634	-50	1.9	PASS
17	A5 (E)	804	816	12	0.4	PASS
17	Derry Road (W)	189	165	-24	1.8	PASS
18	A38 Lifford Road	761	697	-64	2.4	PASS
18	Barnhill Road	616	344	-272	12.4	FAIL
18	Railway Street	827	867	40	1.4	PASS
18	A5 Bradley Way	951	889	-62	2.0	PASS
19	A5 Bradley Way (N)	946	943	-3	0.1	PASS
19	Bradley Way (E)	347	346	-2	0.1	PASS
19	A5 Bradley Way (S)	597	576	-21	0.9	PASS
20	Great Northern Link (N)	644	646	3	0.1	PASS
20	Urney Road (E)	200	189	-11	0.8	PASS
20	Great Northern Link (S)	585	565	-21	0.9	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
20	Urney Road (W)	172	179	8	0.6	PASS
21	Great Northern Link	465	462	-3	0.2	PASS
21	A5 Melmount Road (N)	244	234	-10	0.7	PASS
21	Dublin Road Industrial Estate	43	0	-43	9.3	PASS
21	A5 Melmount Road (S)	615	593	-23	0.9	PASS
22	N13 (N)	376	404	28	1.4	PASS
22	R236	99	67	-32	3.6	PASS
22	N13 (S)	443	388	-55	2.7	PASS
23	N14 (N)	734	736	2	0.1	PASS
23	N13	439	441	2	0.1	PASS
23	N14 (S)	287	268	-19	1.1	PASS
24	N14 (N)	236	225	-11	0.7	PASS
24	R236 North	59	42	-16	2.3	PASS
24	N14 (S)	261	268	6	0.4	PASS
25	N14 (N)	251	266	14	0.9	PASS
25	N14 (S)	195	187	-7	0.5	PASS
25	R236 South	88	80	-7	0.8	PASS
26	N14 (N)	185	147	-38	2.9	PASS
26	Rossgier Close (E)	32	30	-3	0.5	PASS
26	N14 (S)	236	210	-25	1.7	PASS
26	Rossgier Close (W)	21	37	16	3.0	PASS
27	N14 (N)	316	266	-50	2.9	PASS
27	N14 (S)	413	409	-4	0.2	PASS
27	R264	84	141	57	5.4	PASS
34	Car Park (NE)	392	379	-12	0.6	PASS
34	SE Link Route	546	570	24	1.0	PASS
34	R250 NW	1370	1398	28	0.8	PASS
35	R250 North	573	813	240	9.1	FAIL
35	R250 East	589	367	-222	10.2	FAIL
35	L1114 Bridge	295	450	155	8.0	FAIL
35	Dunnes Stores	126	106	-20	1.8	PASS
36	N56 North	364	342	-22	1.2	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
36	Kiltoy Road East	259	370	111	6.3	FAIL
36	N56 South	398	496	98	4.6	PASS
36	Gortlee Road West	166	196	30	2.2	PASS

Table C–10 IP JTC Exit Calibration

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	219	272	-14	0.8	PASS
1	N15 (E)	598	526	-73	3.1	PASS
1	N15 (W)	507	395	-64	3.1	PASS
2	N15 (W)	688	571	16	0.7	PASS
2	N15 (E)	532	491	-112	4.8	FAIL
2	Navenny St	451	35	-51	6.6	PASS
3	N13	438	449	-10	0.4	PASS
3	N15 (E)	474	393	48	2.5	PASS
3	N15 (W)	432	493	-78	3.4	PASS
4	N15 (W)	428	431	-55	2.6	PASS
4	N15 (E)	259	353	-15	0.8	PASS
4	Mala an Mhuilinn	295	217	-13	0.8	PASS
5	Mala an Mhuilinn	118	203	8	0.6	PASS
5	N15 (E)	372	88	-74	6.6	PASS
5	N15 (W)	510	129	-126	9.1	FAIL
7	N14 (NW)	1144	749	-20	0.7	PASS
7	N56 (NE)	1371	976	39	1.3	PASS
7	N14 (SE)	755	1262	20	0.6	PASS
7	Port Road	896	642	-8	0.3	PASS
8	Ramelton Road (N)	481	470	-183	7.7	FAIL
8	Ramelton Road (E)	599	622	3	0.1	PASS
8	Port Road (S)	625	447	-20	1.0	PASS
8	Pearse Road	984	567	-13	0.5	PASS
8	Port Road (N)	799	464	3	0.2	PASS
9	Circular Road (N)	599	753	6	0.2	PASS
9	High Road (E)	744	844	-16	0.6	PASS
9	High Road (S)	763	466	30	1.4	PASS
9	Circular Road (W)	714	627	1	0.1	PASS
10	N56 (N)	918	833	37	1.3	PASS
10	N56 (E)	25	464	34	1.6	PASS
10	Windy Hall	582	662	3	0.1	PASS
10	N56 (W)	439	0	-11	4.7	PASS
11	N56 (N)	1065	496	14	0.6	PASS
11	R245	523	538	21	0.9	PASS
11	N56 (S)	954	865	70	2.4	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
13	R245	15	412	-1	0.1	PASS
13	N56 (N)	1154	965	2	0.1	PASS
13	Ballyraine Park	326	13	7	2.1	PASS
13	N56 (S)	480	803	29	1.0	PASS
14	Unnamed Road	861	245	16	1.0	PASS
14	N56 Ramelton Road (E)	1706	245	-114	6.6	FAIL
14	N56 Ramelton Road (W)	101	182	-359	18.9	FAIL
15	Dry Arc Roundabout (W)	876	1141	-39	1.1	PASS
15	Dry Arc Roundabout (N)	696	58	2	0.3	PASS
15	N13 (E)	644	730	-41	1.5	PASS
15	N13 (S)	144	617	23	0.9	PASS
16	N14 Letterkenny Road	752	516	-33	1.4	PASS
16	Butcher Street	285	90	18	1.9	PASS
16	N14	834	587	-91	3.6	PASS
16	N15	1033	310	10	0.6	PASS
17	A5 (W)	220	344	-206	9.8	FAIL
17	A5 (E)	766	774	43	1.6	PASS
17	Derry Road (W)	857	497	442	26.6	FAIL
18	A38 Lifford Road	824	624	-87	3.4	PASS
18	Barnhill Road	975	634	15	0.6	PASS
18	Railway Street	1240	581	-143	5.6	FAIL
18	A5 Bradley Way	348	943	-1	0.0	PASS
19	A5 Bradley Way (N)	701	889	-10	0.3	PASS
19	Bradley Way (E)	903	329	-6	0.3	PASS
19	A5 Bradley Way (S)	265	646	-9	0.4	PASS
20	Great Northern Link (N)	710	576	-26	1.1	PASS
20	Urney Road (E)	198	162	-38	2.8	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
20	Great Northern Link (S)	655	619	-12	0.5	PASS
20	Urney Road (W)	328	159	-9	0.7	PASS
21	Great Northern Link	59	476	-30	1.4	PASS
21	A5 Melmount Road (N)	748	148	-64	4.7	PASS
21	Dublin Road Industrial Estate	441	0	-26	7.3	PASS
21	A5 Melmount Road (S)	114	665	40	1.6	PASS
22	N13 (N)	491	322	-57	3.0	PASS
22	R236	1182	73	-17	1.9	PASS
22	N13 (S)	589	465	16	0.7	PASS
23	N14 (N)	382	709	14	0.5	PASS
23	N13	351	483	0	0.0	PASS
23	N14 (S)	77	253	-29	1.8	PASS
24	N14 (N)	374	240	-4	0.2	PASS
24	R236 North	385	30	-30	4.5	PASS
24	N14 (S)	265	266	14	0.9	PASS
25	N14 (N)	119	268	7	0.5	PASS
25	N14 (S)	216	146	-40	3.1	PASS
25	R236 South	49	120	33	3.2	PASS
26	N14 (N)	307	187	-11	0.8	PASS
26	Rossgier Close (E)	32	25	-12	2.2	PASS
26	N14 (S)	458	192	-25	1.8	PASS
26	Rossgier Close (W)	568	21	-1	0.2	PASS
27	N14 (N)	88	311	-5	0.3	PASS
27	N14 (S)	388	402	10	0.5	PASS
27	R264	634	103	-2	0.2	PASS
34	Car Park (NE)	1597	386	5	0.3	PASS
34	SE Link Route	768	828	38	1.3	PASS
34	R250 SW	864	1133	-5	0.1	PASS
35	R250 North	312	469	-47	2.1	PASS
35	R250 East	142	906	316	11.6	FAIL
35	L1114 Bridge	717	271	-81	4.6	PASS
35	Dunnes Stores	325	88	-36	3.5	PASS
36	N56 North	532	475	17	0.8	PASS
36	Kiltoy Road East	277	297	-20	1.1	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
36	N56 South	219	387	-4	0.2	PASS
36	Gortlee Road West	598	244	71	4.9	PASS

C-11 PM JTC Approach Calibration

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	219	205	-14	1.0	PASS
1	N15 (E)	598	580	-19	0.8	PASS
1	N15 (W)	507	496	-11	0.5	PASS
2	N15 (W)	688	610	-78	3.1	PASS
2	N15 (E)	532	462	-70	3.1	PASS
3	N13	451	390	-61	3.0	PASS
3	N15 (E)	438	453	15	0.7	PASS
3	N15 (W)	474	589	115	5.0	FAIL
4	N15 (W)	432	444	12	0.6	PASS
4	N15 (E)	428	415	-13	0.6	PASS
4	Mala an Mhuilinn	259	235	-25	1.6	PASS
5	Mala an Mhuilinn	295	211	-84	5.3	PASS
5	N15 (E)	118	94	-24	2.3	PASS
5	N15 (W)	372	130	-242	15.3	FAIL
7	N14 (NW)	510	760	250	9.9	FAIL
7	N56 (NE)	1144	750	-394	12.8	FAIL
7	N14 (SE)	1371	1617	246	6.4	FAIL
7	Port Road	755	455	-300	12.2	FAIL
8	Ramelton Road (N)	896	989	93	3.0	PASS
8	Ramelton Road (E)	481	474	-7	0.3	PASS
8	Port Road (S)	599	534	-65	2.7	PASS
8	Pearse Road	625	576	-49	2.0	PASS
9	Circular Road (N)	984	1004	19	0.6	PASS
9	High Road (E)	799	712	-87	3.2	PASS
9	High Road (S)	599	542	-56	2.4	PASS
9	Circular Road (W)	744	787	43	1.5	PASS
10	N56 (N)	763	764	1	0.0	PASS
10	N56 (E)	714	752	37	1.4	PASS
10	Windy Hall	918	896	-22	0.7	PASS
10	N56 (W)	25	0	-25	7.1	PASS
11	N56 (N)	582	486	-95	4.1	PASS
11	R245	439	480	41	1.9	PASS
11	N56 (S)	1065	1021	-43	1.3	PASS
13	R245	523	258	-264	13.4	FAIL
13	N56 (N)	954	852	-102	3.4	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
13	Ballyraine Park	15	14	-1	0.3	PASS
13	N56 (S)	1154	1083	-71	2.1	PASS
14	Unnamed Road	326	318	-8	0.4	PASS
14	N56 Ramelton Road (E)	480	554	74	3.3	PASS
14	N56 Ramelton Road (W)	861	869	8	0.3	PASS
15	Dry Arc Roundabout (W)	1706	1692	-14	0.3	PASS
15	Dry Arc Roundabout (N)	101	99	-2	0.2	PASS
15	N13 (E)	876	869	-7	0.2	PASS
15	N13 (S)	696	701	6	0.2	PASS
16	N14 Letterkenny Road	644	605	-40	1.6	PASS
16	Butcher Street	144	86	-58	5.4	PASS
16	N14	752	738	-14	0.5	PASS
16	N15	285	250	-35	2.1	PASS
17	A5 (W)	834	761	-72	2.6	PASS
17	A5 (E)	1033	1318	285	8.3	FAIL
17	Derry Road (W)	220	109	-111	8.7	FAIL
18	A38 Lifford Road	766	738	-28	1.0	PASS
18	Barnhill Road	857	788	-69	2.4	PASS
18	Railway Street	824	866	42	1.4	PASS
18	A5 Bradley Way	975	982	7	0.2	PASS
19	A5 Bradley Way (N)	1240	1226	-14	0.4	PASS
19	Bradley Way (E)	348	312	-37	2.0	PASS
19	A5 Bradley Way (S)	701	740	39	1.4	PASS
20	Great Northern Link (N)	903	930	27	0.9	PASS
20	Urney Road (E)	265	223	-42	2.7	PASS
20	Great Northern Link (S)	710	683	-27	1.0	PASS
20	Urney Road (W)	198	211	13	0.9	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
21	Great Northern Link	655	616	-39	1.5	PASS
21	A5 Melmount Road (N)	328	289	-39	2.2	PASS
21	Dublin Road Industrial Estate	59	0	-59	10.9	PASS
21	A5 Melmount Road (S)	748	822	74	2.6	PASS
22	N13 (N)	441	392	-49	2.4	PASS
22	R236	114	88	-27	2.6	PASS
22	N13 (S)	491	454	-37	1.7	PASS
23	N14 (N)	1182	1212	30	0.9	PASS
23	N13	589	574	-15	0.6	PASS
23	N14 (S)	382	339	-43	2.3	PASS
24	N14 (N)	351	343	-9	0.5	PASS
24	R236 North	77	52	-24	3.0	PASS
24	N14 (S)	374	393	19	1.0	PASS
25	N14 (N)	385	395	10	0.5	PASS
25	N14 (S)	265	244	-21	1.3	PASS
25	R236 South	119	150	31	2.7	PASS
26	N14 (N)	216	235	20	1.3	PASS
26	Rossgier Close (E)	49	53	4	0.6	PASS
26	N14 (S)	307	309	2	0.1	PASS
26	Rossgier Close (W)	32	53	21	3.3	PASS
27	N14 (N)	458	437	-21	1.0	PASS
27	N14 (S)	568	552	-17	0.7	PASS
27	R264	88	118	30	3.0	PASS
34	Car Park (NE)	388	398	10	0.5	PASS
34	SE Link Route	634	677	43	1.7	PASS
34	R250 NW	1597	1444	-153	3.9	PASS
35	R250 North	768	627	-141	5.3	FAIL
35	R250 East	864	717	-147	5.2	FAIL
35	L1114 Bridge	312	478	166	8.3	FAIL
35	Dunnes Stores	142	75	-67	6.5	PASS
36	N56 North	717	485	-232	9.5	FAIL
36	Kiltoy Road East	325	349	24	1.3	PASS
36	N56 South	532	534	2	0.1	PASS
36	Gortlee Road West	277	481	204	10.5	FAIL

C-8 PM JTC Exit Calibration

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	265	258	-7	0.4	PASS
1	N15 (E)	630	610	-20	0.8	PASS
1	N15 (W)	429	412	-17	0.8	PASS
2	N15 (W)	488	580	91	4.0	PASS
2	N15 (E)	644	564	-80	3.3	PASS
2	Navenny St	88	46	-42	5.1	PASS
3	N13	441	500	59	2.7	PASS
3	N15 (E)	366	444	78	3.9	PASS
3	N15 (W)	556	488	-68	3.0	PASS
4	N15 (W)	485	453	-32	1.5	PASS
4	N15 (E)	354	352	-2	0.1	PASS
4	Mala an Mhuilinn	281	289	9	0.5	PASS
5	Mala an Mhuilinn	258	217	-41	2.6	PASS
5	N15 (E)	225	63	-162	13.5	FAIL
5	N15 (W)	301	154	-147	9.8	FAIL
7	N14 (NW)	498	158	-340	18.8	FAIL
7	N56 (NE)	1143	1083	-60	1.8	PASS
7	N14 (SE)	1631	1647	16	0.4	PASS
7	Port Road	508	526	18	0.8	PASS
8	Ramelton Road (N)	717	783	66	2.4	PASS
8	Ramelton Road (E)	469	223	-246	13.2	FAIL
8	Port Road (S)	317	407	90	4.7	PASS
8	Pearse Road	639	658	19	0.7	PASS
8	Port Road (N)	458	361	-97	4.8	PASS
9	Circular Road (N)	836	816	-20	0.7	PASS
9	High Road (E)	1046	1041	-5	0.2	PASS
9	High Road (S)	417	343	-73	3.8	PASS
9	Circular Road (W)	827	792	-35	1.2	PASS
10	N56 (N)	1190	1193	4	0.1	PASS
10	N56 (E)	476	397	-79	3.8	PASS
10	Windy Hall	751	822	71	2.5	PASS
10	N56 (W)	4	0	-4	2.8	PASS
11	N56 (N)	495	534	39	1.7	PASS
11	R245	684	601	-83	3.3	PASS
11	N56 (S)	906	852	-54	1.8	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
13	R245	375	392	17	0.9	PASS
13	N56 (N)	1121	1021	-100	3.1	PASS
13	Ballyraine Park	14	6	-8	2.6	PASS
13	N56 (S)	1136	788	-348	11.2	FAIL
14	Unnamed Road	425	497	73	3.4	PASS
14	N56 Ramelton Road (E)	548	497	-50	2.2	PASS
14	N56 Ramelton Road (W)	695	482	-212	8.7	FAIL
15	Dry Arc Roundabout (W)	1246	1229	-17	0.5	PASS
15	Dry Arc Roundabout (N)	69	71	2	0.2	PASS
15	N13 (E)	1219	1204	-14	0.4	PASS
15	N13 (S)	845	852	6	0.2	PASS
16	N14 Letterkenny Road	674	628	-45	1.8	PASS
16	Butcher Street	74	62	-12	1.5	PASS
16	N14	707	621	-85	3.3	PASS
16	N15	371	368	-4	0.2	PASS
17	A5 (W)	835	788	-46	1.6	PASS
17	A5 (E)	939	832	-106	3.6	PASS
17	Derry Road (W)	50	563	513	29.3	FAIL
18	A38 Lifford Road	801	738	-63	2.3	PASS
18	Barnhill Road	792	761	-30	1.1	PASS
18	Railway Street	602	623	22	0.9	PASS
18	A5 Bradley Way	1227	1226	-1	0.0	PASS
19	A5 Bradley Way (N)	977	982	4	0.1	PASS
19	Bradley Way (E)	418	366	-52	2.6	PASS
19	A5 Bradley Way (S)	894	930	35	1.2	PASS
20	Great Northern Link (N)	711	740	28	1.1	PASS
20	Urney Road (E)	245	148	-97	6.9	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
20	Great Northern Link (S)	814	804	-10	0.4	PASS
20	Urney Road (W)	306	280	-26	1.5	PASS
21	Great Northern Link	620	646	26	1.1	PASS
21	A5 Melmount Road (N)	263	176	-86	5.8	PASS
21	Dublin Road Industrial Estate	32	0	-32	8.0	PASS
21	A5 Melmount Road (S)	876	896	20	0.7	PASS
22	N13 (N)	412	369	-43	2.2	PASS
22	R236	122	87	-35	3.4	PASS
22	N13 (S)	511	478	-34	1.5	PASS
23	N14 (N)	880	880	-0	0.0	PASS
23	N13	792	778	-14	0.5	PASS
23	N14 (S)	482	467	-14	0.7	PASS
24	N14 (N)	342	346	4	0.2	PASS
24	R236 North	76	47	-29	3.7	PASS
24	N14 (S)	384	395	11	0.6	PASS
25	N14 (N)	371	393	22	1.1	PASS
25	N14 (S)	261	252	-9	0.6	PASS
25	R236 South	136	143	7	0.6	PASS
26	N14 (N)	249	248	-2	0.1	PASS
26	Rossgier Close (E)	60	75	15	1.8	PASS
26	N14 (S)	265	287	22	1.4	PASS
26	Rossgier Close (W)	29	40	12	2.0	PASS
27	N14 (N)	446	396	-50	2.4	PASS
27	N14 (S)	543	553	10	0.4	PASS
27	R264	126	158	32	2.7	PASS
34	Car Park (NE)	313	280	-33	1.9	PASS
34	SE Link Route	858	656	-202	7.3	FAIL
34	R250 SW	1448	1583	135	3.5	PASS
35	R250 North	601	629	28	1.1	PASS
35	R250 East	523	501	-22	1.0	PASS
35	L1114 Bridge	850	585	-265	9.9	FAIL
35	Dunnes Stores	112	132	20	1.8	PASS
36	N56 North	498	534	36	1.6	PASS
36	Kiltoy Road East	545	698	152	6.1	FAIL

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
36	N56 South	493	486	-7	0.3	PASS
36	Gortlee Road West	315	130	-184	12.4	FAIL

C-13 AM JTC Approach Calibration – Heavy Vehicles

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	23	27	4	0.8	PASS
1	N15 (E)	64	72	7	0.9	PASS
1	N15 (W)	50	51	1	0.1	PASS
2	N15 (W)	70	75	5	0.6	PASS
2	N15 (E)	70	70	0	0.0	PASS
3	N13	21	59	38	6.0	PASS
3	N15 (E)	18	31	13	2.6	PASS
3	N15 (W)	29	62	33	4.9	PASS
4	N15 (W)	32	33	1	0.2	PASS
4	N15 (E)	37	31	-6	1.1	PASS
4	Mala an Mhuilinn	10	15	6	1.6	PASS
5	Mala an Mhuilinn	0	9	9	4.2	PASS
5	N15 (E)	6	6	0	0.1	PASS
5	N15 (W)	13	9	-4	1.3	PASS
7	N14 (NW)	35	29	-6	1.1	PASS
7	N56 (NE)	48	48	0	0.1	PASS
7	N14 (SE)	86	143	57	5.3	PASS
7	Port Road	47	32	-15	2.5	PASS
8	Ramelton Road (N)	24	25	1	0.2	PASS
8	Ramelton Road (E)	12	14	1	0.4	PASS
8	Port Road (S)	19	27	8	1.6	PASS
8	Pearse Road	24	25	1	0.3	PASS
9	Circular Road (N)	22	23	1	0.3	PASS
9	High Road (E)	32	32	0	0.0	PASS
9	High Road (S)	8	9	2	0.5	PASS
9	Circular Road (W)	13	29	15	3.4	PASS
10	N56 (N)	40	40	-0	0.0	PASS
10	N56 (E)	29	34	6	1.0	PASS
10	Windy Hall	18	17	-1	0.3	PASS
11	N56 (N)	36	20	-16	3.1	PASS
11	R245	29	34	5	0.9	PASS
11	N56 (S)	78	96	19	2.0	PASS
13	R245	13	8	-5	1.5	PASS
13	N56 (N)	49	51	2	0.3	PASS
13	N56 (S)	84	103	19	1.9	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
14	Unnamed Road	2	1	-1	0.5	PASS
14	N56 Ramelton Road (E)	16	27	11	2.3	PASS
14	N56 Ramelton Road (W)	15	23	8	1.9	PASS
15	Dry Arc Roundabout (W)	102	159	57	5.0	PASS
15	Dry Arc Roundabout (N)	3	6	3	1.4	PASS
15	N13 (E)	78	80	3	0.3	PASS
15	N13 (S)	48	47	-1	0.1	PASS
16	N14 Letterkenny Road	86	69	-17	1.9	PASS
16	Butcher Street	0	1	1	1.4	PASS
16	N14	82	84	2	0.2	PASS
16	N15	26	37	11	2.0	PASS
17	A5 (W)	133	134	2	0.1	PASS
17	A5 (E)	115	134	19	1.7	PASS
17	Derry Road (W)	10	3	-7	2.6	PASS
18	A38 Lifford Road	94	86	-8	0.9	PASS
18	Barnhill Road	96	98	2	0.2	PASS
18	Railway Street	29	49	20	3.3	PASS
18	A5 Bradley Way	169	172	2	0.2	PASS
19	A5 Bradley Way (N)	165	164	-1	0.1	PASS
19	Bradley Way (E)	16	27	11	2.3	PASS
19	A5 Bradley Way (S)	168	146	-23	1.8	PASS
20	Great Northern Link (N)	158	155	-3	0.2	PASS
20	Urney Road (E)	7	13	7	2.1	PASS
20	Great Northern Link (S)	151	142	-9	0.8	PASS
20	Urney Road (W)	25	10	-15	3.7	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
21	Great Northern Link	154	152	-1	0.1	PASS
21	A5 Melmount Road (N)	4	45	42	8.4	PASS
21	A5 Melmount Road (S)	154	104	-49	4.4	PASS
22	N13 (N)	46	45	-1	0.2	PASS
22	R236	8	8	0	0.1	PASS
22	N13 (S)	62	44	-18	2.5	PASS
23	N14 (N)	82	83	1	0.1	PASS
23	N13	64	62	-3	0.3	PASS
23	N14 (S)	45	28	-17	2.8	PASS
24	N14 (N)	28	53	25	3.9	PASS
24	R236 North	14	3	-10	3.5	PASS
24	N14 (S)	43	47	4	0.6	PASS
25	N14 (N)	45	56	11	1.6	PASS
25	N14 (S)	44	39	-5	0.8	PASS
25	R236 South	14	8	-5	1.5	PASS
26	N14 (N)	43	37	-6	1.0	PASS
26	Rossgier Close (E)	0	3	3	2.2	PASS
26	N14 (S)	43	41	-2	0.3	PASS
26	Rossgier Close (W)	13	5	-8	2.6	PASS
27	N14 (N)	64	64	1	0.1	PASS
27	N14 (S)	64	56	-8	1.0	PASS
27	R264	0	8	8	4.0	PASS
34	Car Park (NE)	5	5	0	0.0	PASS
34	SE Link Route	10	28	18	4.2	PASS
34	R250 NW	21	37	16	2.9	PASS
35	R250 North	19	31	12	2.4	PASS
35	R250 East	10	28	18	4.1	PASS
35	L1114 Bridge	4	3	-1	0.8	PASS
35	Dunnes Stores	2	3	1	0.7	PASS
36	N56 North	15	36	21	4.1	PASS
36	Kiltoy Road East	5	29	24	5.9	PASS
36	N56 South	17	7	-10	3.0	PASS
36	Gortlee Road West	1	16	15	5.2	PASS

C-14 AM JTC Exit Calibration – Heavy Vehicles

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	9	16	7	2.1	PASS
1	N15 (E)	73	75	2	0.3	PASS
1	N15 (W)	56	58	2	0.3	PASS
2	N15 (W)	70	72	2	0.2	PASS
2	N15 (E)	70	65	-5	0.6	PASS
2	Navenny St	0	10	10	4.4	PASS
3	N13	27	48	21	3.4	PASS
3	N15 (E)	14	33	19	3.9	PASS
3	N15 (W)	27	71	44	6.3	PASS
4	N15 (W)	39	31	-9	1.4	PASS
4	N15 (E)	34	37	4	0.6	PASS
4	Mala an Mhuilinn	6	11	5	1.9	PASS
5	Mala an Mhuilinn	11	10	-1	0.2	PASS
5	N15 (E)	3	7	4	2.0	PASS
5	N15 (W)	6	7	1	0.3	PASS
7	N14 (NW)	27	42	15	2.6	PASS
7	N56 (NE)	94	103	9	1.0	PASS
7	N14 (SE)	66	68	2	0.2	PASS
7	Port Road	30	36	7	1.1	PASS
8	Ramelton Road (N)	21	24	3	0.6	PASS
8	Ramelton Road (E)	6	8	3	1.0	PASS
8	Port Road (S)	26	27	1	0.3	PASS
8	Pearse Road	6	9	4	1.3	PASS
8	Port Road (N)	21	21	-0	0.0	PASS
9	Circular Road (N)	15	18	2	0.6	PASS
9	High Road (E)	23	33	10	1.9	PASS
9	High Road (S)	19	21	2	0.3	PASS
9	Circular Road (W)	18	22	4	0.8	PASS
10	N56 (N)	36	41	4	0.7	PASS
10	N56 (E)	31	28	-3	0.5	PASS
10	Windy Hall	20	22	2	0.4	PASS
11	N56 (N)	31	7	-24	5.5	PASS
11	R245	60	93	32	3.7	PASS
11	N56 (S)	52	51	-1	0.1	PASS
13	R245	16	18	2	0.5	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
13	N56 (N)	78	96	19	2.0	PASS
13	N56 (S)	53	48	-5	0.7	PASS
14	Unnamed Road	8	17	10	2.8	PASS
14	N56 Ramelton Road (E)	8	17	10	2.8	PASS
14	N56 Ramelton Road (W)	18	9	-9	2.4	PASS
15	Dry Arc Roundabout (W)	96	142	47	4.3	PASS
15	Dry Arc Roundabout (N)	0	2	2	2.1	PASS
15	N13 (E)	83	78	-4	0.5	PASS
15	N13 (S)	52	69	18	2.3	PASS
16	N14 Letterkenny Road	78	56	-21	2.6	PASS
16	Butcher Street	2	17	15	4.9	PASS
16	N14	100	81	-19	2.0	PASS
16	N15	13	36	22	4.5	PASS
17	A5 (W)	103	98	-5	0.5	PASS
17	A5 (E)	138	137	-1	0.1	PASS
17	Derry Road (W)	0	37	37	8.6	PASS
18	A38 Lifford Road	83	84	1	0.1	PASS
18	Barnhill Road	124	134	10	0.9	PASS
18	Railway Street	20	14	-6	1.6	PASS
18	A5 Bradley Way	162	164	3	0.2	PASS
19	A5 Bradley Way (N)	171	172	1	0.0	PASS
19	Bradley Way (E)	20	10	-10	2.5	PASS
19	A5 Bradley Way (S)	159	155	-4	0.3	PASS
20	Great Northern Link (N)	162	146	-17	1.4	PASS
20	Urney Road (E)	12	6	-5	1.8	PASS
20	Great Northern Link (S)	155	155	0	0.0	PASS
20	Urney Road (W)	12	10	-1	0.4	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
21	Great Northern Link	141	121	-20	1.7	PASS
21	A5 Melmount Road (N)	12	13	1	0.3	PASS
21	A5 Melmount Road (S)	169	168	-1	0.1	PASS
22	N13 (N)	49	35	-14	2.2	PASS
22	R236	15	9	-6	1.8	PASS
22	N13 (S)	52	53	1	0.1	PASS
23	N14 (N)	90	90	-0	0.0	PASS
23	N13	76	60	-16	1.9	PASS
23	N14 (S)	25	22	-3	0.6	PASS
24	N14 (N)	40	45	5	0.7	PASS
24	R236 North	6	2	-4	1.9	PASS
24	N14 (S)	39	56	18	2.6	PASS
25	N14 (N)	43	47	4	0.6	PASS
25	N14 (S)	38	37	-0	0.0	PASS
25	R236 South	22	19	-3	0.7	PASS
26	N14 (N)	46	42	-4	0.7	PASS
26	Rossgier Close (E)	2	1	-0	0.4	PASS
26	N14 (S)	51	41	-10	1.5	PASS
26	Rossgier Close (W)	0	2	2	1.8	PASS
27	N14 (N)	57	51	-6	0.8	PASS
27	N14 (S)	64	72	9	1.1	PASS
27	R264	8	6	-2	0.8	PASS
34	Car Park (NE)	4	6	2	0.8	PASS
34	SE Link Route	19	30	11	2.3	PASS
34	R250 SW	13	34	21	4.3	PASS
35	R250 North	8	23	15	3.8	PASS
35	R250 East	22	30	8	1.6	PASS
35	L1114 Bridge	2	5	3	1.7	PASS
35	Dunnes Stores	3	3	0	0.1	PASS
36	N56 North	17	30	13	2.7	PASS
36	Kiltoy Road East	3	37	34	7.5	PASS
36	N56 South	17	20	3	0.7	PASS
36	Gortlee Road West	1	1	0	0.2	PASS

C-15 IP JTC Approach Calibration – Heavy Vehicles

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	28	21	-7	1.4	PASS
1	N15 (E)	129	84	-45	4.3	PASS
1	N15 (W)	83	48	-35	4.3	PASS
2	N15 (W)	106	66	-40	4.3	PASS
2	N15 (E)	126	81	-45	4.4	PASS
3	N13	40	62	22	3.1	PASS
3	N15 (E)	27	38	11	2.0	PASS
3	N15 (W)	40	66	26	3.6	PASS
4	N15 (W)	63	45	-18	2.5	PASS
4	N15 (E)	56	39	-17	2.5	PASS
4	Mala an Mhuilinn	23	15	-8	1.9	PASS
5	Mala an Mhuilinn	19	13	-7	1.7	PASS
5	N15 (E)	11	14	3	0.9	PASS
5	N15 (W)	25	3	-22	6.0	PASS
7	N14 (NW)	31	31	0	0.0	PASS
7	N56 (NE)	98	103	5	0.5	PASS
7	N14 (SE)	106	103	-4	0.4	PASS
7	Port Road	47	44	-3	0.5	PASS
8	Ramelton Road (N)	22	21	-1	0.2	PASS
8	Ramelton Road (E)	6	10	4	1.4	PASS
8	Port Road (S)	27	30	3	0.6	PASS
8	Pearse Road	15	11	-3	0.9	PASS
9	Circular Road (N)	19	19	0	0.1	PASS
9	High Road (E)	26	26	1	0.1	PASS
9	High Road (S)	7	8	1	0.2	PASS
9	Circular Road (W)	16	20	4	0.9	PASS
10	N56 (N)	46	51	5	0.7	PASS
10	N56 (E)	46	47	1	0.1	PASS
10	Windy Hall	22	20	-2	0.4	PASS
11	N56 (N)	49	49	0	0.1	PASS
11	R245	56	58	2	0.3	PASS
11	N56 (S)	81	88	7	0.8	PASS
13	R245	13	17	4	1.1	PASS
13	N56 (N)	97	98	1	0.1	PASS
13	N56 (S)	86	91	5	0.5	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
14	Unnamed Road	2	7	5	2.3	PASS
14	N56 Ramelton Road (E)	10	12	2	0.5	PASS
14	N56 Ramelton Road (W)	14	13	-1	0.2	PASS
15	Dry Arc Roundabout (W)	126	78	-48	4.7	PASS
15	Dry Arc Roundabout (N)	4	5	1	0.5	PASS
15	N13 (E)	105	96	-9	0.9	PASS
15	N13 (S)	45	68	23	3.1	PASS
16	N14 Letterkenny Road	88	76	-12	1.3	PASS
16	Butcher Street	1	4	3	1.9	PASS
16	N14	91	56	-34	4.0	PASS
16	N15	22	21	-1	0.2	PASS
17	A5 (W)	106	113	7	0.7	PASS
17	A5 (E)	140	130	-10	0.8	PASS
17	Derry Road (W)	7	24	17	4.3	PASS
18	A38 Lifford Road	84	77	-7	0.8	PASS
18	Barnhill Road	125	84	-41	4.0	PASS
18	Railway Street	26	65	40	5.9	PASS
18	A5 Bradley Way	127	123	-4	0.3	PASS
19	A5 Bradley Way (N)	160	154	-6	0.5	PASS
19	Bradley Way (E)	16	17	1	0.2	PASS
19	A5 Bradley Way (S)	114	107	-7	0.6	PASS
20	Great Northern Link (N)	145	145	0	0.0	PASS
20	Urney Road (E)	7	5	-2	0.7	PASS
20	Great Northern Link (S)	114	109	-4	0.4	PASS
20	Urney Road (W)	9	9	-0	0.2	PASS
21	Great Northern Link	131	132	0	0.0	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
21	A5 Melmount Road (N)	14	14	-0	0.0	PASS
21	A5 Melmount Road (S)	116	93	-24	2.3	PASS
22	N13 (N)	55	47	-8	1.1	PASS
22	R236	13	18	6	1.4	PASS
22	N13 (S)	57	36	-21	3.0	PASS
23	N14 (N)	98	86	-12	1.2	PASS
23	N13	66	67	1	0.1	PASS
23	N14 (S)	44	33	-12	1.9	PASS
24	N14 (N)	39	35	-4	0.7	PASS
24	R236 North	13	2	-11	4.1	PASS
24	N14 (S)	49	30	-19	3.1	PASS
25	N14 (N)	41	37	-5	0.8	PASS
25	N14 (S)	37	23	-14	2.6	PASS
25	R236 South	16	7	-9	2.7	PASS
26	N14 (N)	38	25	-13	2.4	PASS
26	Rossgier Close (E)	1	1	-0	0.3	PASS
26	N14 (S)	40	25	-15	2.6	PASS
26	Rossgier Close (W)	4	5	0	0.2	PASS
27	N14 (N)	54	35	-20	3.0	PASS
27	N14 (S)	54	34	-20	3.1	PASS
27	R264	11	40	29	5.8	PASS
34	Car Park (NE)	5	6	1	0.3	PASS
34	SE Link Route	9	16	7	1.9	PASS
34	R250 NW	12	27	15	3.4	PASS
35	R250 North	12	30	19	4.1	PASS
35	R250 East	9	11	2	0.7	PASS
35	L1114 Bridge	7	6	-1	0.6	PASS
35	Dunnes Stores	0	3	3	2.3	PASS
36	N56 North	14	44	31	5.7	PASS
36	Kiltoy Road East	6	37	32	6.9	PASS
36	N56 South	12	58	46	7.7	PASS
36	Gortlee Road West	2	7	5	2.5	PASS

C-16 IP JTC Exit Calibration – Heavy Vehicles

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	30	24	-6	1.2	PASS
1	N15 (E)	106	66	-40	4.3	PASS
1	N15 (W)	104	63	-40	4.4	PASS
2	N15 (W)	126	84	-42	4.1	PASS
2	N15 (E)	106	65	-41	4.5	PASS
2	Navenny St	0	1	1	1.6	PASS
3	N13	33	41	9	1.5	PASS
3	N15 (E)	27	45	19	3.1	PASS
3	N15 (W)	48	80	32	4.0	PASS
4	N15 (W)	62	38	-25	3.5	PASS
4	N15 (E)	60	42	-18	2.5	PASS
4	Mala an Mhuilinn	20	19	-1	0.3	PASS
5	Mala an Mhuilinn	15	12	-3	0.9	PASS
5	N15 (E)	21	13	-8	2.1	PASS
5	N15 (W)	18	4	-14	4.3	PASS
7	N14 (NW)	40	47	7	1.1	PASS
7	N56 (NE)	85	91	6	0.6	PASS
7	N14 (SE)	115	97	-18	1.8	PASS
7	Port Road	43	45	2	0.3	PASS
8	Ramelton Road (N)	22	22	-1	0.2	PASS
8	Ramelton Road (E)	7	8	1	0.4	PASS
8	Port Road (S)	20	18	-2	0.4	PASS
8	Pearse Road	11	11	0	0.1	PASS
8	Port Road (N)	10	12	2	0.7	PASS
9	Circular Road (N)	16	20	4	1.0	PASS
9	High Road (E)	26	26	-0	0.0	PASS
9	High Road (S)	7	9	2	0.8	PASS
9	Circular Road (W)	19	18	-1	0.1	PASS
10	N56 (N)	56	57	1	0.2	PASS
10	N56 (E)	40	40	1	0.1	PASS
10	Windy Hall	22	21	-1	0.3	PASS
11	N56 (N)	54	58	4	0.5	PASS
11	R245	33	40	7	1.1	PASS
11	N56 (S)	99	98	-1	0.1	PASS
13	R245	12	15	3	0.9	PASS
13	N56 (N)	84	88	4	0.4	PASS
13	N56 (S)	100	103	3	0.3	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
14	Unnamed Road	4	10	6	2.4	PASS
14	N56 Ramelton Road (E)	13	10	-3	0.8	PASS
14	N56 Ramelton Road (W)	9	8	-1	0.4	PASS
15	Dry Arc Roundabout (W)	109	88	-22	2.2	PASS
15	Dry Arc Roundabout (N)	2	3	1	0.7	PASS
15	N13 (E)	100	85	-15	1.6	PASS
15	N13 (S)	68	70	2	0.3	PASS
16	N14 Letterkenny Road	75	38	-36	4.9	PASS
16	Butcher Street	1	8	7	3.4	PASS
16	N14	85	75	-9	1.0	PASS
16	N15	42	36	-6	0.9	PASS
17	A5 (W)	126	84	-42	4.1	PASS
17	A5 (E)	109	137	28	2.5	PASS
17	Derry Road (W)	1	47	46	9.4	PASS
18	A38 Lifford Road	84	56	-27	3.3	PASS
18	Barnhill Road	102	113	11	1.1	PASS
18	Railway Street	19	23	4	0.9	PASS
18	A5 Bradley Way	156	154	-2	0.2	PASS
19	A5 Bradley Way (N)	127	123	-4	0.3	PASS
19	Bradley Way (E)	14	9	-5	1.6	PASS
19	A5 Bradley Way (S)	148	145	-3	0.2	PASS
20	Great Northern Link (N)	114	107	-7	0.7	PASS
20	Urney Road (E)	10	9	-1	0.4	PASS
20	Great Northern Link (S)	146	140	-5	0.4	PASS
20	Urney Road (W)	5	8	3	1.2	PASS
21	Great Northern Link	114	86	-28	2.8	PASS
21	A5 Melmount Road (N)	12	8	-4	1.2	PASS
21	A5 Melmount Road (S)	144	144	-0	0.0	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
22	N13 (N)	46	28	-18	3.0	PASS
22	R236	13	14	0	0.1	PASS
22	N13 (S)	65	60	-5	0.6	PASS
23	N14 (N)	100	100	-0	0.0	PASS
23	N13	71	69	-2	0.3	PASS
23	N14 (S)	37	17	-20	3.9	PASS
24	N14 (N)	47	30	-17	2.8	PASS
24	R236 North	13	0	-12	4.7	PASS
24	N14 (S)	41	37	-5	0.8	PASS
25	N14 (N)	49	30	-19	3.1	PASS
25	N14 (S)	31	20	-11	2.3	PASS
25	R236 South	14	17	3	0.7	PASS
26	N14 (N)	41	23	-19	3.3	PASS
26	Rossgier Close (E)	2	2	-0	0.3	PASS
26	N14 (S)	38	28	-9	1.6	PASS
26	Rossgier Close (W)	1	2	0	0.2	PASS
27	N14 (N)	45	30	-15	2.5	PASS
27	N14 (S)	65	74	9	1.1	PASS
27	R264	9	4	-5	1.9	PASS
34	Car Park (NE)	1	4	3	2.2	PASS
34	SE Link Route	8	24	16	3.9	PASS
34	R250 SW	13	21	8	2.0	PASS
35	R250 North	11	7	-3	1.1	PASS
35	R250 East	12	33	21	4.3	PASS
35	L1114 Bridge	5	7	2	0.9	PASS
35	Dunnes Stores	0	3	3	2.4	PASS
36	N56 North	11	45	35	6.6	PASS
36	Kiltoy Road East	6	44	38	7.7	PASS
36	N56 South	15	49	35	6.2	PASS
36	Gortlee Road West	3	8	6	2.4	PASS

C-17 PM JTC Approach Calibration – Heavy Vehicles

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
1	R252	21	17	-4	1.0	PASS
1	N15 (E)	41	43	2	0.3	PASS
1	N15 (W)	71	65	-6	0.8	PASS
2	N15 (W)	85	78	-7	0.8	PASS
2	N15 (E)	44	42	-2	0.4	PASS
3	N13	12	29	17	3.7	PASS
3	N15 (E)	10	20	10	2.6	PASS
3	N15 (W)	28	73	45	6.3	PASS
4	N15 (W)	26	28	2	0.3	PASS
4	N15 (E)	26	24	-2	0.4	PASS
4	Mala an Mhuilinn	11	11	-0	0.1	PASS
5	Mala an Mhuilinn	6	4	-2	0.8	PASS
5	N15 (E)	11	0	-10	4.4	PASS
5	N15 (W)	22	10	-13	3.2	PASS
7	N14 (NW)	13	31	18	3.8	PASS
7	N56 (NE)	70	44	-26	3.4	PASS
7	N14 (SE)	81	80	-2	0.2	PASS
7	Port Road	15	17	2	0.5	PASS
8	Ramelton Road (N)	15	19	4	0.8	PASS
8	Ramelton Road (E)	0	4	4	2.7	PASS
8	Port Road (S)	11	13	3	0.8	PASS
8	Pearse Road	8	7	-1	0.2	PASS
9	Circular Road (N)	18	22	4	0.9	PASS
9	High Road (E)	22	20	-2	0.3	PASS
9	High Road (S)	4	7	4	1.6	PASS
9	Circular Road (W)	20	19	-1	0.3	PASS
10	N56 (N)	38	38	-0	0.1	PASS
10	N56 (E)	23	23	0	0.0	PASS
10	Windy Hall	15	18	3	0.6	PASS
11	N56 (N)	36	36	0	0.1	PASS
11	R245	24	10	-14	3.5	PASS
11	N56 (S)	38	38	0	0.0	PASS
13	R245	12	5	-6	2.1	PASS
13	N56 (N)	61	44	-18	2.4	PASS
13	N56 (S)	53	49	-4	0.6	PASS
14	Unnamed Road	2	4	2	1.1	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
14	N56 Ramelton Road (E)	8	17	10	2.7	PASS
14	N56 Ramelton Road (W)	22	18	-4	0.8	PASS
15	Dry Arc Roundabout (W)	92	86	-6	0.6	PASS
15	Dry Arc Roundabout (N)	4	6	2	1.1	PASS
15	N13 (E)	42	43	1	0.2	PASS
15	N13 (S)	59	60	1	0.2	PASS
16	N14 Letterkenny Road	41	32	-9	1.5	PASS
16	Butcher Street	0	4	4	2.8	PASS
16	N14	67	70	3	0.3	PASS
16	N15	31	30	-1	0.2	PASS
17	A5 (W)	79	53	-26	3.1	PASS
17	A5 (E)	91	113	21	2.1	PASS
17	Derry Road (W)	0	1	1	1.4	PASS
18	A38 Lifford Road	52	50	-2	0.3	PASS
18	Barnhill Road	85	54	-31	3.7	PASS
18	Railway Street	11	25	14	3.2	PASS
18	A5 Bradley Way	96	99	3	0.3	PASS
19	A5 Bradley Way (N)	98	88	-10	1.0	PASS
19	Bradley Way (E)	12	12	-0	0.0	PASS
19	A5 Bradley Way (S)	89	87	-2	0.2	PASS
20	Great Northern Link (N)	98	85	-13	1.3	PASS
20	Urney Road (E)	4	3	-0	0.2	PASS
20	Great Northern Link (S)	82	92	11	1.1	PASS
20	Urney Road (W)	2	2	0	0.2	PASS
21	Great Northern Link	98	68	-30	3.3	PASS
21	A5 Melmount Road (N)	9	41	33	6.5	PASS
21	A5 Melmount Road (S)	91	100	9	0.9	PASS
22	N13 (N)	27	20	-7	1.5	PASS
22	R236	13	9	-5	1.5	PASS
22	N13 (S)	59	51	-8	1.1	PASS
23	N14 (N)	65	65	-1	0.1	PASS

JTC	From Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow Criteria
23	N13	28	24	-4	0.7	PASS
23	N14 (S)	44	26	-18	3.0	PASS
24	N14 (N)	21	28	7	1.4	PASS
24	R236 North	8	3	-5	2.0	PASS
24	N14 (S)	52	46	-6	0.9	PASS
25	N14 (N)	30	31	2	0.3	PASS
25	N14 (S)	49	39	-10	1.5	PASS
25	R236 South	6	7	1	0.5	PASS
26	N14 (N)	15	22	8	1.8	PASS
26	Rossgier Close (E)	2	3	1	0.7	PASS
26	N14 (S)	40	39	-2	0.3	PASS
26	Rossgier Close (W)	6	4	-2	0.8	PASS
27	N14 (N)	24	25	1	0.2	PASS
27	N14 (S)	50	78	28	3.4	PASS
27	R264	4	3	-1	0.7	PASS
34	Car Park (NE)	0	11	11	4.6	PASS
34	SE Link Route	10	18	8	2.2	PASS
34	R250 NW	5	12	7	2.4	PASS
35	R250 North	10	9	-1	0.2	PASS
35	R250 East	11	12	2	0.5	PASS
35	L1114 Bridge	3	2	-1	0.8	PASS
35	Dunnes Stores	0	2	2	2.0	PASS
36	N56 North	12	17	5	1.3	PASS
36	Kiltoy Road East	6	32	26	6.0	PASS
36	N56 South	15	33	18	3.6	PASS
36	Gortlee Road West	1	6	5	2.8	PASS

C-18 PM JTC Exit Calibration – Heavy Vehicles

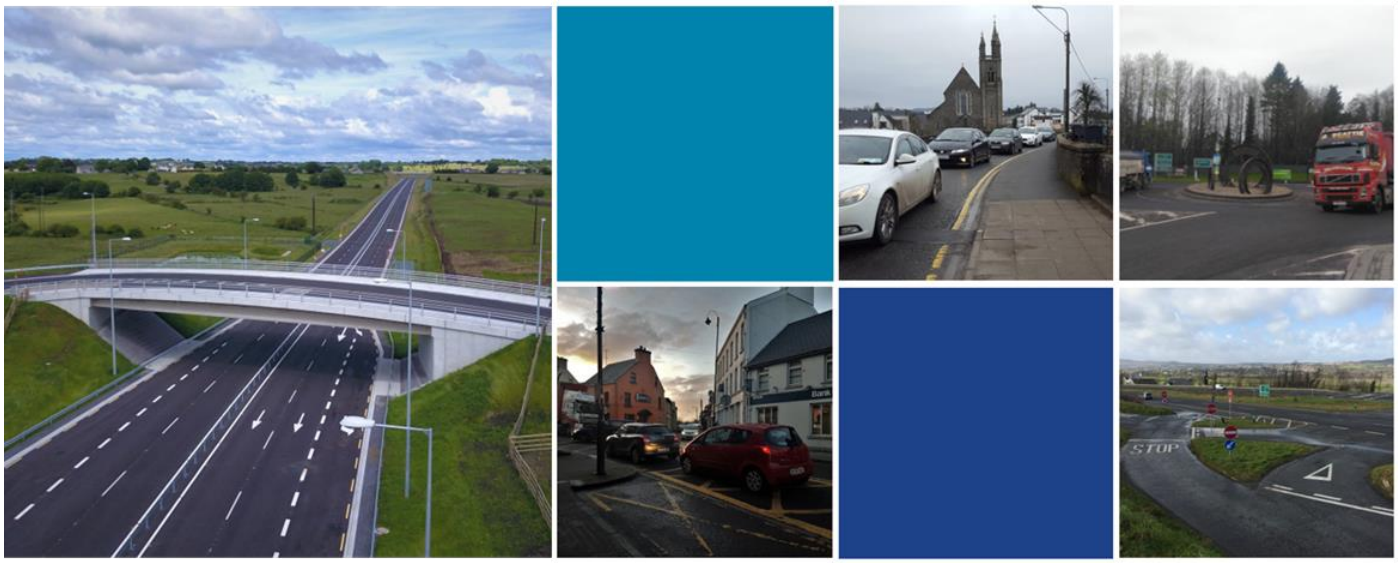
JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow
1	R252	265	258	-7	0.4	PASS
1	N15 (E)	630	610	-20	0.8	PASS
1	N15 (W)	429	412	-17	0.8	PASS
2	N15 (W)	488	580	91	4.0	PASS
2	N15 (E)	644	564	-80	3.3	PASS
2	Navenny St	88	46	-42	5.1	PASS
3	N13	441	500	59	2.7	PASS
3	N15 (E)	366	444	78	3.9	PASS
3	N15 (W)	556	488	-68	3.0	PASS
4	N15 (W)	485	453	-32	1.5	PASS
4	N15 (E)	354	352	-2	0.1	PASS
4	Mala an Mhuilinn	281	289	9	0.5	PASS
5	Mala an Mhuilinn	258	217	-41	2.6	PASS
5	N15 (E)	225	63	-162	13.5	FAIL
5	N15 (W)	301	154	-147	9.8	FAIL
7	N14 (NW)	498	158	-340	18.8	FAIL
7	N56 (NE)	1143	1083	-60	1.8	PASS
7	N14 (SE)	1631	1647	16	0.4	PASS
7	Port Road	508	526	18	0.8	PASS
8	Ramelton Road (N)	717	783	66	2.4	PASS
8	Ramelton Road (E)	469	223	-246	13.2	FAIL
8	Port Road (S)	317	407	90	4.7	PASS
8	Pearse Road	639	658	19	0.7	PASS
8	Port Road (N)	458	361	-97	4.8	PASS
9	Circular Road (N)	836	816	-20	0.7	PASS
9	High Road (E)	1046	1041	-5	0.2	PASS
9	High Road (S)	417	343	-73	3.8	PASS
9	Circular Road (W)	827	792	-35	1.2	PASS
10	N56 (N)	1190	1193	4	0.1	PASS
10	N56 (E)	476	397	-79	3.8	PASS
10	Windy Hall	751	822	71	2.5	PASS
10	N56 (W)	4	0	-4	2.8	PASS
11	N56 (N)	495	534	39	1.7	PASS
11	R245	684	601	-83	3.3	PASS
11	N56 (S)	906	852	-54	1.8	PASS
13	R245	375	392	17	0.9	PASS
13	N56 (N)	1121	1021	-100	3.1	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow
13	Ballyraine Park	14	6	-8	2.6	PASS
13	N56 (S)	1136	788	-348	11.2	FAIL
14	Unnamed Road	425	497	73	3.4	PASS
14	N56 Ramelton Road (E)	548	497	-50	2.2	PASS
14	N56 Ramelton Road (W)	695	482	-212	8.7	FAIL
15	Dry Arc Roundabout (W)	1246	1229	-17	0.5	PASS
15	Dry Arc Roundabout (N)	69	71	2	0.2	PASS
15	N13 (E)	1219	1204	-14	0.4	PASS
15	N13 (S)	845	852	6	0.2	PASS
16	N14 Letterkenny Road	674	628	-45	1.8	PASS
16	Butcher Street	74	62	-12	1.5	PASS
16	N14	707	621	-85	3.3	PASS
16	N15	371	368	-4	0.2	PASS
17	A5 (W)	835	788	-46	1.6	PASS
17	A5 (E)	939	832	-106	3.6	PASS
17	Derry Road (W)	50	563	513	29.3	FAIL
18	A38 Lifford Road	801	738	-63	2.3	PASS
18	Barnhill Road	792	761	-30	1.1	PASS
18	Railway Street	602	623	22	0.9	PASS
18	A5 Bradley Way	1227	1226	-1	0.0	PASS
19	A5 Bradley Way (N)	977	982	4	0.1	PASS
19	Bradley Way (E)	418	366	-52	2.6	PASS
19	A5 Bradley Way (S)	894	930	35	1.2	PASS
20	Great Northern Link (N)	711	740	28	1.1	PASS
20	Urney Road (E)	245	148	-97	6.9	PASS
20	Great Northern Link (S)	814	804	-10	0.4	PASS
20	Urney Road (W)	306	280	-26	1.5	PASS
21	Great Northern Link	620	646	26	1.1	PASS
21	A5 Melmount Road (N)	263	176	-86	5.8	PASS

JTC	To Arm	Observed Flows	Modelled Flows	Difference (Modelled - Count)	GEH	Flow
21	Dublin Road Industrial Estate	32	0	-32	8.0	PASS
21	A5 Melmount Road (S)	876	896	20	0.7	PASS
22	N13 (N)	412	369	-43	2.2	PASS
22	R236	122	87	-35	3.4	PASS
22	N13 (S)	511	478	-34	1.5	PASS
23	N14 (N)	880	880	-0	0.0	PASS
23	N13	792	778	-14	0.5	PASS
23	N14 (S)	482	467	-14	0.7	PASS
24	N14 (N)	342	346	4	0.2	PASS
24	R236 North	76	47	-29	3.7	PASS
24	N14 (S)	384	395	11	0.6	PASS
25	N14 (N)	371	393	22	1.1	PASS
25	N14 (S)	261	252	-9	0.6	PASS
25	R236 South	136	143	7	0.6	PASS
26	N14 (N)	249	248	-2	0.1	PASS
26	Rossgier Close (E)	60	75	15	1.8	PASS
26	N14 (S)	265	287	22	1.4	PASS
26	Rossgier Close (W)	29	40	12	2.0	PASS
27	N14 (N)	446	396	-50	2.4	PASS
27	N14 (S)	543	553	10	0.4	PASS
27	R264	126	158	32	2.7	PASS
34	Car Park (NE)	313	280	-33	1.9	PASS
34	SE Link Route	858	656	-202	7.3	FAIL
34	R250 SW	1448	1583	135	3.5	PASS
35	R250 North	601	629	28	1.1	PASS
35	R250 East	523	501	-22	1.0	PASS
35	L1114 Bridge	850	585	-265	9.9	FAIL
35	Dunnes Stores	112	132	20	1.8	PASS
36	N56 North	498	534	36	1.6	PASS
36	Kiltoy Road East	545	698	152	6.1	FAIL
36	N56 South	493	486	-7	0.3	PASS
36	Gortlee Road West	315	130	-184	12.4	FAIL

Appendix C

Future Year Traffic Growth Analysis



A comparison has been undertaken of the forecast demands derived from application of the link based and zone-based growth rates produced by the National Transport Model (NTpM). The comparison has been presented for light vehicle demands in 2043 in order to illustrate the difference between the two approaches.

The link-based rates from PAG Unit 5.3 for the Border area were applied to the Donegal TEN-T model base matrices in order to produce forecast demands.

Zone correspondence between the TEN-T model and the NTpM was analysed on a geographical basis so that the zone-based rates could be applied. The NTpM zone-based growth factors were applied to the base light vehicles origin and destination demands to create target origin and destination demands. The Furness Method was used to factor the base matrices to the zone-based origin and destination growth factors. These demands were then compared to the forecast trip matrices that had been produced through application of the link-based growth rate.

The comparison of the future year matrices has been undertaken based on the sector system shown in Figure B1:

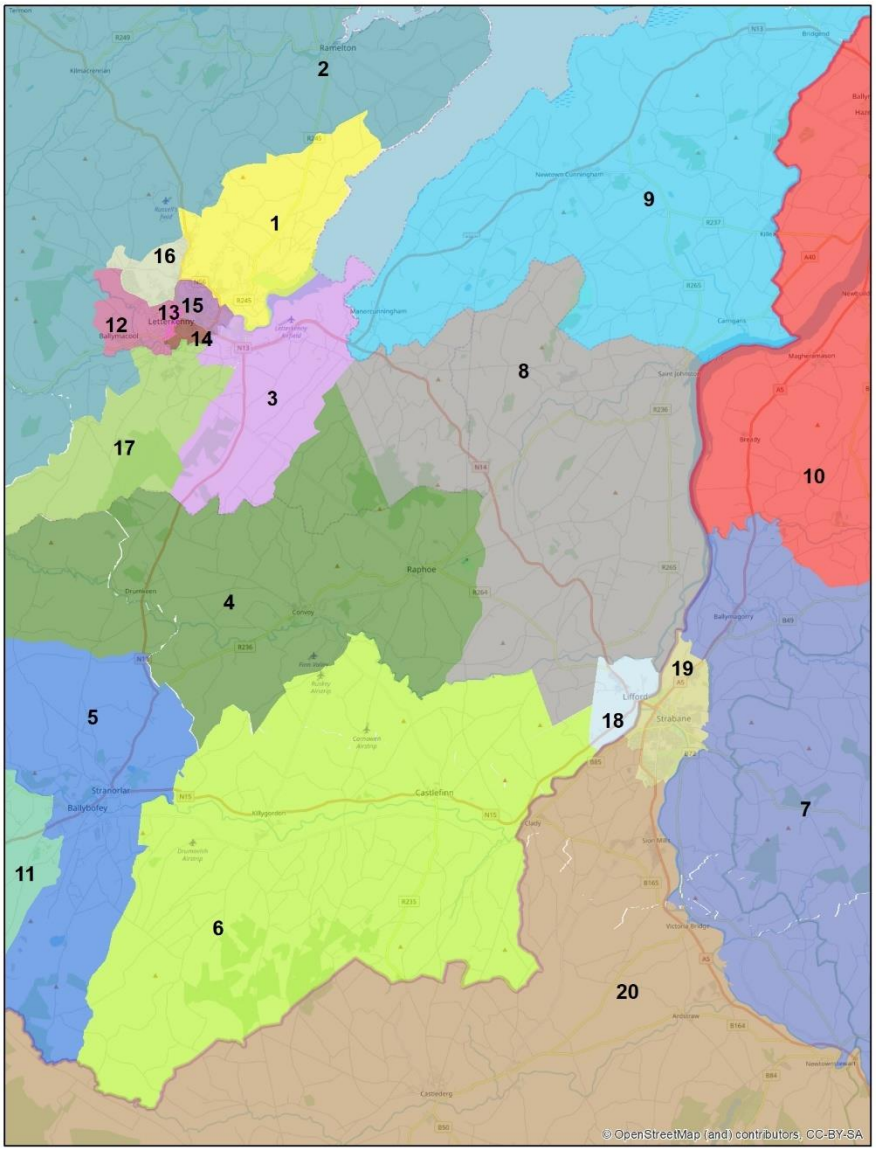


Figure B1 - Sectors Used for Future Year Traffic Growth Analysis

Demands that are internal to sector's 10 and 7 as well as demands between 7 and 10 are masked out of the analysis. Benefits from these movements are masked out of the scheme benefits.

The forecast demands produced by application of the zone-based growth rates to the Donegal TEN-T based matrices are shown in tables C-1 to C-3. The demands are presented for the sector system shown in Figure B1.

Table C-1 –2043 AM Light Vehicles - Forecast Demands Derived from Zone Based Growth

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	187	90	106	17	0	3	-	64	22	18	-	326	78	49	230	194	14	2	-	1	**1,399**
2	316	116	145	55	148	51	15	150	48	88	109	250	262	235	484	330	21	9	10	9	**2,852**
3	64	133	53	18	4	6	1	43	37	13	4	93	20	15	124	55	33	5	0	2	**724**
4	34	48	21	178	74	53	21	64	71	35	19	16	7	7	14	6	5	12	40	13	**738**
5	8	22	5	41	1,040	32	1	4	50	27	26	29	12	10	14	2	0	4	7	4	**1,340**
6	11	41	7	52	60	186	11	63	20	14	62	10	5	5	13	3	1	33	67	74	**735**
7	-	3	0	10	3	31	-	4	13	-	261	7	4	6	1	-	-	14	391	254	**1,002**
8	81	131	36	52	11	128	17	40	69	158	46	28	13	14	22	9	11	52	37	41	**997**
9	82	189	46	46	35	21	21	66	417	1,008	130	98	50	58	31	9	12	17	9	19	**2,364**
10	13	101	5	26	21	16	-	23	614	-	122	43	29	42	16	2	2	7	189	93	**1,365**
11	14	39	6	12	98	107	111	22	98	60	221	28	13	16	27	13	0	7	20	216	**1,129**
12	198	88	74	6	25	4	7	10	12	30	49	354	198	147	332	310	31	4	2	1	**1,882**
13	122	65	30	2	7	1	7	4	7	11	18	95	46	12	128	104	18	2	2	0	**682**
14	73	34	14	2	4	1	10	4	13	8	18	47	32	36	91	71	9	2	4	0	**473**
15	170	189	98	4	3	2	3	9	22	22	6	277	211	48	176	137	46	3	1	3	**1,429**
16	113	60	30	2	0	0	-	5	5	5	2	313	259	138	147	139	23	0	-	1	**1,243**
17	81	24	42	5	0	1	-	34	9	13	-	141	33	71	182	84	5	1	-	0	**728**
18	2	5	5	14	21	29	22	24	8	15	20	2	1	1	2	1	0	34	181	11	**398**
19	-	32	1	111	22	50	307	57	40	412	17	44	20	18	4	-	-	154	5,126	291	**6,705**
20	13	23	2	9	11	80	294	16	10	288	242	5	2	1	21	1	0	28	693	328	**2,069**
Total	**1,583**	**1,432**	**726**	**660**	**1,588**	**804**	**848**	**706**	**1,584**	**2,225**	**1,376**	**2,208**	**1,294**	**928**	**2,058**	**1,470**	**232**	**390**	**6,779**	**1,361**	**30,252**

Table C-2 – 2043 IP Light Vehicles - Forecast Demands – Zone Based Growth

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	172	119	57	23	0	1	1	26	19	6	0	185	129	77	218	158	6	0	-	0	**1,198**
2	97	98	31	52	36	13	10	41	34	62	33	82	135	108	169	92	8	1	9	8	**1,120**
3	30	69	34	29	1	2	5	22	23	8	0	22	43	13	62	21	14	1	-	1	**397**
4	11	36	20	139	29	38	36	29	57	14	23	12	26	21	11	11	14	8	29	14	**578**
5	3	15	5	37	805	51	2	15	18	31	14	23	50	37	20	6	0	16	35	8	**1,191**
6	2	13	4	45	43	119	17	73	15	13	59	4	8	6	5	6	1	44	72	66	**613**
7	0	23	0	13	8	27	-	5	10	-	167	5	11	12	4	1	0	36	268	256	**845**
8	10	33	9	33	8	44	10	21	48	55	44	7	14	10	5	7	3	17	37	49	**465**
9	13	55	13	21	16	17	15	43	280	688	58	18	39	28	13	11	5	3	6	16	**1,358**
10	2	41	1	13	30	27	-	46	673	-	90	20	48	35	13	2	0	11	211	146	**1,407**
11	2	21	2	10	16	69	84	19	38	39	136	12	24	20	11	5	1	12	33	204	**760**
12	96	41	35	26	54	6	3	10	13	21	27	295	295	164	259	318	19	1	3	1	**1,688**
13	66	54	45	24	58	8	7	15	20	34	33	159	209	254	446	116	46	2	6	1	**1,603**
14	102	302	28	26	63	10	10	18	25	42	36	131	129	408	176	92	13	2	8	1	**1,622**
15	337	226	84	13	19	3	6	11	16	18	11	297	145	209	237	317	49	1	2	1	**2,001**
16	79	70	28	11	1	1	0	11	10	7	2	244	180	109	164	122	2	0	-	0	**1,042**
17	11	50	6	7	0	0	0	2	1	0	0	121	38	56	47	26	3	0	-	0	**369**
18	0	4	1	8	36	49	36	17	6	14	22	1	3	2	1	0	0	30	238	13	**483**
19	0	15	0	54	27	38	268	51	9	246	15	8	19	16	7	2	0	166	4,978	348	**6,268**
20	0	6	0	13	9	67	243	44	9	150	206	3	8	10	3	0	0	21	481	327	**1,599**
Total	**1,032**	**1,291**	**405**	**595**	**1,260**	**591**	**752**	**518**	**1,324**	**1,449**	**976**	**1,647**	**1,554**	**1,595**	**1,872**	**1,313**	**185**	**374**	**6,415**	**1,460**	**26,609**

Table C-3 – 2043 PM Light Vehicles - Forecast Demands Derived from Zone Based Growth

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	139	156	142	78	5	11	-	119	94	55	-	85	40	102	149	141	3	4	-	0	**1,323**
2	69	47	73	32	38	27	3	39	50	60	57	53	97	77	168	83	6	3	18	9	**1,011**
3	107	174	69	39	9	6	-	48	53	26	-	89	32	23	98	10	46	4	-	1	**833**
4	18	56	13	211	33	52	33	46	55	14	27	7	4	6	2	3	5	10	32	25	**654**
5	8	52	4	28	942	47	3	22	37	41	60	24	12	16	8	45	1	10	26	9	**1,396**
6	4	38	4	58	37	184	14	111	16	23	111	5	3	3	2	1	1	24	75	94	**808**
7	-	31	-	31	5	66	-	23	15	-	233	3	5	10	2	-	-	65	371	436	**1,296**
8	21	66	16	48	5	71	8	41	88	35	47	7	4	7	3	3	10	36	97	59	**671**
9	24	95	20	50	67	35	20	86	551	965	103	28	18	27	7	4	16	10	15	32	**2,174**
10	4	108	2	22	19	27	-	158	1,228	-	109	62	38	51	12	5	1	55	352	288	**2,541**
11	0	110	0	57	50	156	157	74	121	95	288	27	19	28	6	0	0	20	60	328	**1,596**
12	126	102	34	24	36	7	9	14	30	25	25	375	125	271	249	335	32	2	7	2	**1,831**
13	66	150	30	25	36	6	14	14	35	27	32	323	94	219	223	370	77	2	9	2	**1,755**
14	79	806	29	65	71	12	42	34	87	55	82	162	38	25	102	170	41	6	22	5	**1,935**
15	203	572	117	23	21	5	2	29	73	55	5	327	240	175	228	581	73	4	1	1	**2,736**
16	123	241	9	1	5	0	-	2	3	2	-	242	167	158	170	161	19	0	-	0	**1,304**
17	15	44	8	3	4	0	-	6	4	1	0	149	24	78	25	45	3	0	-	0	**411**
18	1	12	4	8	18	37	56	22	12	20	20	3	2	2	1	0	0	33	212	26	**490**
19	-	12	-	22	11	33	235	41	7	151	35	6	6	10	2	-	-	180	5,440	475	**6,664**
20	0	15	1	11	7	100	380	53	10	107	284	1	3	5	2	0	0	12	389	386	**1,764**
Total	**1,009**	**2,887**	**575**	**838**	**1,420**	**881**	**977**	**980**	**2,569**	**1,756**	**1,518**	**1,977**	**972**	**1,295**	**1,460**	**1,958**	**335**	**481**	**7,125**	**2,180**	**33,193**

The forecasts 2043 light vehicle demands produced by application of the link-based growth rates to the TEN-T model, are presented in tables C-4 to C-6, with the same sector system applied:

Table C-4 –2043 AM Light Vehicles - Forecast Demands Derived from Link Based Growth

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	185	99	112	16	0	3	-	59	20	18	-	320	78	49	219	191	13	2	-	1	**1,386**
2	309	76	152	52	138	46	17	139	43	90	112	245	261	239	488	332	21	8	10	10	**2,788**
3	70	93	52	17	4	5	1	42	32	14	4	107	24	16	132	59	35	7	0	3	**717**
4	35	43	22	164	64	49	25	58	66	37	21	17	7	8	15	7	5	14	46	14	**717**
5	9	22	7	42	982	31	1	5	49	30	29	34	14	11	17	2	0	4	9	5	**1,303**
6	12	38	6	47	53	171	12	58	18	12	62	11	5	5	14	3	1	31	78	77	**713**
7	-	1	0	10	2	28	-	3	10	-	265	6	2	1	0	-	-	15	425	261	**1,030**
8	82	117	38	48	10	127	16	32	62	158	30	29	13	15	24	10	12	57	42	48	**970**
9	89	182	43	40	29	14	21	55	404	951	117	109	57	66	36	10	13	18	12	24	**2,289**
10	14	96	5	24	22	17	-	16	548	-	119	46	32	46	17	2	2	9	232	116	**1,363**
11	15	35	6	11	90	99	109	20	88	54	215	30	14	17	29	14	0	6	24	240	**1,117**
12	193	102	76	5	21	3	7	9	11	30	49	348	197	143	327	306	30	4	2	1	**1,865**
13	126	67	27	1	6	1	6	4	6	10	18	98	38	11	128	108	18	2	1	0	**678**
14	80	30	12	2	3	1	8	4	11	8	17	48	29	37	92	72	9	3	1	0	**469**
15	169	199	98	4	3	2	3	9	21	21	6	276	208	44	174	130	46	3	0	3	**1,419**
16	110	60	30	2	0	0	-	5	5	5	2	309	258	136	143	137	23	1	-	1	**1,227**
17	80	23	41	4	0	1	-	32	9	13	-	140	35	71	182	84	5	1	-	0	**721**
18	2	4	2	13	20	27	21	21	5	12	19	2	1	1	2	1	0	30	194	11	**386**
19	-	23	1	94	17	42	311	53	32	393	15	41	18	15	4	-	-	132	5,195	267	**6,652**
20	13	21	2	7	8	69	289	14	7	243	238	5	2	1	21	2	0	13	772	351	**2,080**
Total	**1,592**	**1,332**	**731**	**602**	**1,472**	**739**	**848**	**641**	**1,446**	**2,102**	**1,336**	**2,221**	**1,294**	**932**	**2,064**	**1,470**	**233**	**359**	**7,045**	**1,430**	**29,891**

Table C-5 – 2043 IP Light Vehicles - Forecast Demands Derived from Link Based Growth

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	190	116	61	26	0	2	1	27	22	7	0	210	140	80	241	178	7	0	-	0	**1,308**
2	95	85	34	51	38	14	11	40	35	64	36	90	147	117	173	96	9	1	9	8	**1,153**
3	35	54	44	31	1	2	6	22	24	9	0	26	56	12	71	24	16	1	-	1	**434**
4	13	37	25	150	24	42	32	32	48	11	11	14	32	27	13	12	18	11	34	14	**602**
5	3	15	6	33	835	49	1	16	15	37	15	25	55	43	21	6	0	14	35	8	**1,232**
6	2	12	4	45	43	129	16	74	17	14	58	4	9	7	5	6	1	49	75	67	**638**
7	0	22	0	14	8	21	-	4	8	-	168	4	9	5	2	1	0	39	277	238	**821**
8	10	34	8	35	9	47	10	22	48	56	45	8	16	12	6	8	4	19	39	50	**484**
9	14	58	14	22	13	15	11	45	327	703	41	21	45	33	15	13	6	2	6	16	**1,418**
10	1	43	1	15	35	29	-	47	693	-	92	22	55	39	15	2	0	10	224	139	**1,462**
11	2	22	3	10	18	72	77	20	26	43	147	13	27	23	13	6	1	12	34	209	**779**
12	109	45	42	28	60	7	4	11	15	24	31	323	308	181	280	350	21	1	3	1	**1,844**
13	73	60	48	25	63	9	8	16	23	40	37	169	206	266	473	125	51	2	6	1	**1,702**
14	113	335	19	28	70	12	11	19	28	49	42	142	135	433	195	96	14	2	8	1	**1,753**
15	367	234	90	13	21	4	6	12	18	20	13	316	153	229	260	338	48	1	2	1	**2,145**
16	88	74	35	12	1	1	0	11	12	8	2	267	187	117	176	135	2	0	-	0	**1,129**
17	13	52	7	7	0	1	0	2	2	0	0	133	42	63	50	28	3	0	-	0	**403**
18	0	4	1	8	36	54	38	18	7	16	25	2	3	3	1	1	0	32	241	13	**503**
19	0	15	0	56	28	42	270	54	10	269	16	8	20	18	7	2	0	174	4,826	352	**6,166**
20	0	6	0	13	9	69	231	47	10	148	214	3	9	12	3	0	0	21	464	302	**1,563**
Total	**1,128**	**1,323**	**443**	**621**	**1,310**	**620**	**732**	**541**	**1,388**	**1,518**	**995**	**1,802**	**1,652**	**1,720**	**2,022**	**1,425**	**202**	**393**	**6,285**	**1,420**	**27,539**

Table C-6 – 2043 PM Light Vehicles - Forecast Demands Derived from Link Based Growth

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	142	148	141	82	5	11	-	122	105	59	-	89	42	106	153	148	3	3	-	0	**1,357**
2	63	39	77	31	38	26	3	37	44	60	56	51	91	75	165	76	6	3	15	9	**963**
3	115	176	54	41	10	6	-	52	63	29	-	95	33	23	95	10	47	3	-	1	**854**
4	17	51	12	204	34	48	31	42	48	13	23	6	4	5	2	3	5	8	28	24	**607**
5	8	49	4	25	902	40	3	20	39	38	51	22	11	14	8	44	1	9	20	8	**1,316**
6	4	35	3	58	35	175	12	107	15	15	109	5	2	3	2	1	1	22	65	86	**756**
7	-	33	-	40	6	66	-	23	11	-	248	3	5	11	2	-	-	70	374	443	**1,334**
8	19	60	12	49	5	70	7	36	74	35	46	6	4	6	3	3	10	32	87	58	**621**
9	22	90	16	42	70	30	18	68	527	890	100	26	17	26	7	4	15	8	13	28	**2,017**
10	4	108	2	25	21	24	-	159	1,200	-	110	60	38	52	12	5	1	52	316	244	**2,434**
11	0	120	0	29	54	160	152	74	120	106	284	28	17	25	6	0	0	19	53	332	**1,579**
12	130	101	40	27	39	8	8	14	34	28	26	377	130	277	257	337	33	2	6	2	**1,877**
13	68	150	34	29	38	7	12	15	39	30	31	326	94	218	229	379	78	2	8	3	**1,790**
14	82	826	31	75	73	13	35	37	98	62	76	162	39	24	101	173	43	5	21	5	**1,982**
15	202	578	130	26	22	5	2	30	82	59	4	334	249	178	236	583	72	4	1	1	**2,799**
16	125	242	11	1	5	0	-	2	4	3	-	244	170	164	175	161	19	0	-	0	**1,326**
17	16	46	10	3	5	1	-	6	5	1	0	151	26	80	22	46	3	0	-	0	**421**
18	1	7	2	10	20	38	57	22	8	22	21	3	2	2	1	0	0	31	191	24	**460**
19	-	14	-	24	13	40	270	48	10	197	42	6	6	11	2	-	-	193	5,646	550	**7,072**
20	0	16	0	10	9	106	409	58	8	123	313	1	4	6	2	0	0	10	395	420	**1,891**
Total	**1,018**	**2,888**	**581**	**830**	**1,403**	**873**	**1,020**	**972**	**2,532**	**1,772**	**1,539**	**1,995**	**984**	**1,308**	**1,478**	**1,974**	**338**	**477**	**7,237**	**2,238**	**33,457**

The sector-based demand matrices produced by link-based growth were compared to those produced using zone based growth. The absolute difference, percentage difference and the GEH statistics were calculated for the same sector system (see section 5.2 for the calculation of GEH statistics.) These are presented in tables C-7 to C-15:

Table C-7 –2043 AM Light Vehicles – Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth– Absolute Difference

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	-2	9	6	-1	-0	-0	-	-4	-1	1	-	-6	0	-0	-11	-3	-1	0	-	0	**-13**
2	-8	-40	7	-3	-10	-5	2	-11	-4	2	3	-5	-1	4	5	1	-0	-1	0	1	**-64**
3	6	-40	-1	-1	0	-0	0	-1	-5	2	-1	14	4	0	7	5	2	1	-0	1	**-7**
4	1	-5	1	-14	-10	-4	4	-6	-5	3	2	1	1	1	1	1	0	1	6	1	**-21**
5	1	-0	1	1	-58	-1	0	1	-0	3	2	5	2	1	3	0	0	-0	2	1	**-37**
6	0	-2	-1	-4	-8	-14	1	-5	-1	-1	0	1	0	0	1	0	0	-1	11	3	**-21**
7	-	-2	-0	-0	-1	-3	-	-0	-3	-	3	-1	-2	-4	-0	-	-	1	34	8	**28**
8	2	-13	1	-4	-1	-1	-1	-7	-8	-0	-16	1	1	1	1	1	1	5	5	7	**-27**
9	7	-7	-3	-6	-6	-7	-1	-11	-13	-56	-13	12	7	7	4	1	1	1	3	4	**-74**
10	0	-5	0	-2	1	0	-	-6	-66	-	-4	3	3	4	1	0	0	2	43	22	**-2**
11	1	-4	-0	-1	-7	-8	-3	-2	-10	-6	-7	2	1	1	3	2	0	-1	5	24	**-11**
12	-5	14	3	-0	-4	-0	0	-1	-1	-1	-1	-7	-1	-4	-4	-5	-1	0	-0	0	**-17**
13	4	2	-3	-0	-1	-0	-0	-0	-1	-0	-1	3	-7	-1	-0	4	-0	0	-1	0	**-4**
14	7	-4	-2	-0	-0	0	-2	0	-2	0	-1	1	-2	1	1	1	0	1	-2	0	**-4**
15	-1	10	0	-0	-0	-0	-0	-0	-1	-1	-0	-2	-3	-3	-1	-7	-0	1	-0	0	**-11**
16	-3	1	-0	-0	-0	-0	-	-0	-0	-0	0	-5	-0	-2	-3	-2	-1	0	-	0	**-15**
17	-2	-1	-1	-0	-0	-0	-	-3	-1	0	-	-1	1	1	-1	0	-0	-0	-	0	**-7**
18	-0	-1	-4	-1	-2	-2	-1	-3	-3	-4	-1	-0	-0	-0	-0	0	-0	-3	13	-1	**-12**
19	-	-9	-0	-17	-5	-8	5	-3	-8	-19	-3	-3	-2	-2	-0	-	-	-21	69	-25	**-53**
20	-0	-2	0	-2	-3	-11	-4	-2	-3	-45	-4	0	0	0	0	0	-0	-15	78	23	**11**
Total	**10**	**-100**	**5**	**-58**	**-116**	**-65**	**-1**	**-65**	**-138**	**-123**	**-40**	**14**	**0**	**4**	**6**	**-0**	**1**	**-31**	**266**	**70**	**-361**

Table C-8 –2043 IP Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – Absolute Difference

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	18	-3	4	2	0	0	0	1	3	1	0	25	12	2	23	21	1	0	-	0	**110**
2	-2	-12	3	-1	2	1	1	-1	1	2	3	8	11	9	5	4	1	-0	-0	-0	**33**
3	5	-15	10	2	0	0	1	0	1	0	0	5	13	-1	9	3	2	-1	-	0	**37**
4	3	2	5	11	-5	4	-4	3	-9	-3	-12	3	5	6	2	1	3	3	5	-0	**24**
5	0	0	1	-4	30	-3	-1	1	-3	6	1	2	5	7	2	1	0	-3	0	-0	**41**
6	0	-1	0	1	-0	10	-1	1	2	2	-2	0	1	1	0	0	0	5	3	1	**25**
7	0	-1	0	1	-0	-6	-	-1	-2	-	1	-1	-2	-6	-1	0	0	3	10	-18	**-24**
8	-0	1	-1	1	0	3	0	1	0	0	1	1	2	1	0	1	1	2	1	2	**19**
9	1	3	0	1	-3	-3	-4	3	46	15	-17	3	6	5	2	2	2	-1	0	0	**60**
10	-1	2	-0	2	5	2	-	1	21	-	3	3	6	4	1	0	0	-0	13	-7	**55**
11	0	0	1	-1	1	3	-7	0	-12	4	12	1	3	4	1	0	0	1	2	5	**18**
12	13	4	7	2	5	1	0	1	2	3	4	28	12	16	22	31	2	0	0	0	**156**
13	8	6	3	2	5	2	1	1	3	5	5	10	-3	12	27	9	5	0	0	0	**99**
14	11	33	-8	2	7	2	1	1	3	7	6	11	6	24	19	4	1	0	0	0	**131**
15	31	8	6	1	2	1	1	1	2	2	2	19	8	20	23	20	-1	0	0	0	**144**
16	9	4	7	0	0	0	0	1	1	1	0	23	7	8	12	13	-0	0	-	0	**87**
17	2	2	1	1	0	0	-0	0	0	0	0	12	3	7	3	2	0	0	-	-0	**34**
18	-0	0	-1	-0	0	5	2	1	1	2	3	0	0	0	-0	0	0	2	4	-0	**20**
19	0	-0	0	2	1	3	2	3	1	23	1	1	1	2	0	0	0	7	-152	3	**-102**
20	0	-0	-0	-0	0	3	-12	3	1	-2	8	0	1	2	0	0	0	-0	-17	-24	**-36**
Total	**97**	**32**	**38**	**26**	**51**	**29**	**-20**	**23**	**63**	**69**	**18**	**154**	**98**	**125**	**150**	**113**	**17**	**18**	**-129**	**-40**	**931**

Table C-9 – 2043 PM Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – Absolute Difference

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**Total**
1	3	-8	-1	4	0	0	-	3	11	4	-	4	2	3	3	7	-0	-0	-	0	**34**
2	-6	-9	4	-2	0	-2	-0	-2	-6	1	-1	-3	-6	-2	-3	-7	-0	-0	-3	-1	**-48**
3	8	2	-15	2	0	0	-	5	10	3	-	6	1	-0	-3	0	1	-0	-	-0	**21**
4	-2	-5	-2	-7	1	-3	-3	-4	-7	-0	-4	-1	-0	-1	-0	-0	-0	-2	-4	-1	**-46**
5	-0	-3	1	-4	-40	-6	-0	-2	2	-3	-9	-2	-1	-2	-0	-1	-0	-2	-6	-1	**-79**
6	-0	-3	-0	-1	-2	-10	-2	-4	-0	-7	-2	-0	-0	-0	-0	-0	-0	-2	-11	-7	**-52**
7	-	2	-	9	1	0	-	0	-4	-	15	0	0	1	0	-	-	4	2	7	**38**
8	-2	-7	-4	1	0	-1	-1	-5	-14	-0	-0	-1	-1	-1	-0	-0	-0	-4	-10	-1	**-51**
9	-2	-5	-4	-8	3	-5	-2	-17	-24	-75	-4	-1	-1	-1	-0	-0	-1	-2	-2	-5	**-157**
10	0	0	0	3	2	-2	-	1	-28	-	1	-2	-0	1	-0	0	0	-4	-36	-44	**-107**
11	0	10	0	-28	3	4	-4	-0	-1	12	-4	1	-2	-3	-0	0	0	-1	-7	4	**-17**
12	4	-1	6	4	3	1	-1	1	4	3	0	2	4	6	7	2	1	-0	-0	0	**47**
13	2	-0	4	4	2	1	-2	1	5	3	-1	3	0	-1	6	9	1	-0	-1	0	**35**
14	3	19	2	9	2	1	-7	2	11	7	-6	0	1	-1	-1	3	2	-0	-2	0	**47**
15	-1	6	13	2	1	0	-0	1	8	4	-0	7	8	3	8	2	-1	-0	-0	0	**63**
16	2	1	2	0	0	0	-	0	1	0	-	2	4	6	4	-0	1	-0	-	0	**22**
17	1	2	1	1	0	0	-	0	1	0	0	2	1	3	-3	1	0	-0	-	-0	**10**
18	-1	-5	-2	1	1	2	0	-0	-4	2	1	-0	-0	-0	-0	-0	0	-2	-21	-2	**-31**
19	-	2	-	3	2	7	35	7	3	47	7	0	-0	0	0	-	-	13	206	75	**408**
20	0	1	-0	-0	1	6	29	5	-2	16	29	0	1	1	0	-0	-0	-2	6	34	**127**
Total	**10**	**1**	**6**	**-8**	**-17**	**-8**	**43**	**-8**	**-36**	**16**	**20**	**19**	**12**	**13**	**17**	**15**	**3**	**-4**	**112**	**58**	**264**

Table C-10 – 2043 AM Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – Percentage Difference

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	-1%	10%	6%	-7%	-9%	-8%	0%	-7%	-6%	3%	0%	-2%	0%	0%	-5%	-1%	-4%	0%	0%	12%	**-1%**
2	-2%	-35%	5%	-5%	-7%	-11%	12%	-7%	-9%	2%	3%	-2%	0%	2%	1%	0%	-1%	-8%	3%	8%	**-2%**
3	10%	-30%	-1%	-7%	12%	-3%	11%	-2%	-14%	14%	-13%	15%	17%	3%	6%	8%	5%	24%	-14%	26%	**-1%**
4	3%	-10%	4%	-8%	-14%	-8%	17%	-9%	-7%	8%	9%	7%	8%	8%	8%	11%	5%	9%	15%	8%	**-3%**
5	14%	-1%	21%	3%	-6%	-4%	15%	19%	-1%	11%	9%	16%	15%	11%	18%	19%	13%	-6%	24%	16%	**-3%**
6	2%	-6%	-15%	-8%	-13%	-8%	9%	-8%	-7%	-9%	0%	6%	8%	6%	6%	9%	3%	-5%	17%	4%	**-3%**
7	0%	-58%	-41%	-5%	-41%	-9%	0%	-10%	-24%	0%	1%	-19%	-48%	-77%	-54%	0%	0%	7%	9%	3%	**3%**
8	2%	-10%	4%	-8%	-11%	-1%	-8%	-19%	-11%	0%	-35%	5%	6%	5%	6%	8%	5%	9%	14%	17%	**-3%**
9	8%	-4%	-7%	-13%	-17%	-33%	-3%	-16%	-3%	-6%	-10%	12%	13%	12%	14%	15%	11%	7%	32%	22%	**-3%**
10	4%	-5%	10%	-7%	4%	2%	0%	-28%	-11%	0%	-3%	7%	10%	9%	9%	9%	7%	22%	23%	24%	**0%**
11	9%	-10%	-1%	-7%	-8%	-8%	-3%	-9%	-11%	-11%	-3%	8%	8%	7%	10%	15%	8%	-20%	24%	11%	**-1%**
12	-3%	16%	4%	-8%	-16%	-9%	3%	-9%	-5%	-2%	-1%	-2%	-1%	-3%	-1%	-2%	-3%	5%	-3%	11%	**-1%**
13	3%	3%	-11%	-20%	-17%	-8%	-7%	-7%	-15%	-4%	-5%	3%	-16%	-9%	0%	3%	0%	8%	-28%	13%	**-1%**
14	9%	-11%	-15%	-19%	-12%	2%	-17%	1%	-15%	5%	-6%	2%	-8%	1%	1%	2%	4%	23%	-63%	23%	**-1%**
15	0%	5%	0%	-10%	-15%	-4%	-7%	-4%	-5%	-2%	-6%	-1%	-1%	-7%	-1%	-5%	-1%	20%	-40%	15%	**-1%**
16	-2%	1%	0%	-5%	-9%	-6%	0%	-7%	-4%	-2%	13%	-1%	0%	-1%	-2%	-2%	-3%	15%	0%	13%	**-1%**
17	-2%	-5%	-2%	-5%	-9%	-6%	0%	-8%	-6%	1%	0%	-1%	4%	1%	0%	0%	-2%	-2%	0%	10%	**-1%**
18	-3%	-12%	-70%	-8%	-8%	-7%	-3%	-11%	-41%	-24%	-4%	-1%	-3%	-11%	-5%	1%	-31%	-10%	7%	-7%	**-3%**
19	0%	-28%	-7%	-16%	-23%	-16%	2%	-6%	-21%	-5%	-16%	-8%	-10%	-14%	-6%	0%	0%	-14%	1%	-9%	**-1%**
20	-2%	-8%	1%	-20%	-23%	-13%	-1%	-12%	-33%	-16%	-2%	1%	3%	7%	2%	9%	-2%	-53%	11%	7%	**1%**
Total	**1%**	**-7%**	**1%**	**-9%**	**-7%**	**-8%**	**0%**	**-9%**	**-9%**	**-6%**	**-3%**	**1%**	**0%**	**0%**	**0%**	**0%**	**1%**	**-8%**	**4%**	**5%**	**-1%**

Table C-11 – 2043 IP Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – Percentage Difference

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	10%	-2%	8%	9%	11%	12%	2%	6%	16%	17%	16%	14%	9%	3%	10%	13%	16%	7%	0%	9%	**9%**
2	-2%	-13%	9%	-1%	5%	6%	6%	-2%	2%	3%	9%	10%	8%	8%	3%	4%	11%	-4%	-1%	-1%	**3%**
3	18%	-22%	31%	8%	21%	3%	19%	1%	4%	6%	39%	22%	29%	-4%	15%	16%	18%	-48%	0%	12%	**9%**
4	23%	5%	24%	8%	-17%	10%	-11%	12%	-15%	-22%	-51%	22%	21%	31%	21%	14%	24%	30%	16%	-2%	**4%**
5	6%	1%	19%	-11%	4%	-5%	-50%	10%	-18%	18%	5%	11%	10%	18%	9%	11%	16%	-16%	0%	-5%	**3%**
6	12%	-7%	10%	1%	-1%	9%	-3%	2%	11%	13%	-3%	12%	11%	19%	10%	8%	22%	11%	5%	1%	**4%**
7	15%	-5%	42%	9%	-5%	-22%	0%	-24%	-16%	0%	1%	-16%	-19%	-55%	-35%	11%	30%	9%	4%	-7%	**-3%**
8	-2%	2%	-10%	4%	6%	7%	0%	7%	0%	1%	3%	14%	12%	15%	8%	9%	20%	9%	3%	4%	**4%**
9	4%	6%	1%	6%	-21%	-16%	-28%	6%	17%	2%	-29%	16%	14%	18%	13%	17%	31%	-30%	7%	1%	**4%**
10	-37%	5%	-30%	14%	16%	9%	0%	2%	3%	0%	3%	15%	13%	12%	11%	9%	17%	-3%	6%	-5%	**4%**
11	22%	0%	38%	-8%	8%	4%	-8%	0%	-32%	11%	8%	11%	10%	19%	11%	8%	23%	6%	5%	2%	**2%**
12	14%	9%	20%	8%	10%	21%	13%	9%	19%	16%	15%	9%	4%	10%	8%	10%	13%	13%	3%	14%	**9%**
13	12%	11%	6%	7%	9%	21%	11%	6%	15%	15%	14%	6%	-2%	5%	6%	8%	10%	11%	1%	14%	**6%**
14	10%	11%	-30%	9%	11%	25%	12%	7%	13%	17%	16%	8%	5%	6%	11%	4%	6%	13%	2%	12%	**8%**
15	9%	4%	7%	7%	9%	20%	9%	6%	13%	13%	14%	6%	6%	9%	10%	6%	-3%	10%	2%	6%	**7%**
16	11%	6%	25%	3%	9%	6%	1%	5%	15%	14%	7%	10%	4%	7%	7%	11%	-1%	9%	0%	5%	**8%**
17	16%	5%	8%	12%	9%	15%	-7%	13%	19%	14%	12%	10%	9%	13%	6%	8%	15%	1%	0%	-10%	**9%**
18	-29%	4%	-43%	-3%	0%	10%	6%	8%	11%	13%	15%	10%	9%	13%	-2%	8%	6%	8%	2%	-2%	**4%**
19	15%	-2%	41%	4%	4%	9%	1%	6%	14%	9%	4%	7%	6%	9%	6%	0%	29%	4%	-3%	1%	**-2%**
20	1%	-1%	-38%	-1%	1%	4%	-5%	7%	11%	-1%	4%	17%	16%	24%	13%	5%	9%	0%	-3%	-7%	**-2%**
Total	**9%**	**3%**	**9%**	**4%**	**4%**	**5%**	**-3%**	**4%**	**5%**	**5%**	**2%**	**9%**	**6%**	**8%**	**8%**	**9%**	**9%**	**5%**	**-2%**	**-3%**	**3%**

Table C-12 – 2043 PM Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – Percentage Difference

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	2%	-5%	-1%	5%	7%	0%	0%	2%	11%	7%	0%	4%	4%	3%	2%	5%	-4%	-9%	0%	0%	**3%**
2	-9%	-18%	5%	-5%	0%	-6%	-5%	-5%	-12%	1%	-2%	-5%	-6%	-2%	-2%	-9%	-3%	-14%	-19%	-6%	**-5%**
3	8%	1%	-21%	4%	5%	0%	0%	9%	18%	13%	0%	7%	4%	0%	-3%	4%	3%	-10%	0%	-2%	**3%**
4	-9%	-10%	-11%	-3%	3%	-7%	-8%	-8%	-13%	-1%	-15%	-10%	-10%	-10%	-9%	-8%	-7%	-19%	-14%	-5%	**-7%**
5	-2%	-6%	17%	-13%	-4%	-14%	-12%	-7%	4%	-7%	-16%	-7%	-11%	-10%	-1%	-2%	-2%	-15%	-23%	-12%	**-6%**
6	-6%	-7%	-12%	-1%	-5%	-5%	-11%	-4%	-2%	-32%	-2%	-4%	-8%	-7%	-4%	-4%	-3%	-8%	-14%	-8%	**-6%**
7	0%	7%	0%	28%	20%	0%	0%	1%	-28%	0%	6%	3%	6%	9%	4%	0%	0%	7%	1%	2%	**3%**
8	-10%	-10%	-23%	1%	0%	-1%	-8%	-11%	-16%	0%	-1%	-10%	-13%	-17%	-12%	-6%	-4%	-12%	-10%	-2%	**-8%**
9	-8%	-5%	-19%	-16%	4%	-14%	-11%	-20%	-4%	-8%	-4%	-4%	-4%	-3%	-6%	-6%	-5%	-19%	-14%	-14%	**-7%**
10	4%	0%	13%	16%	12%	-9%	0%	0%	-2%	0%	1%	-3%	-1%	2%	-2%	0%	3%	-6%	-10%	-15%	**-4%**
11	12%	9%	32%	-49%	7%	3%	-3%	0%	-1%	12%	-1%	4%	-9%	-12%	0%	5%	0%	-5%	-12%	1%	**-1%**
12	3%	-1%	18%	15%	8%	11%	-7%	7%	14%	12%	2%	0%	4%	2%	3%	1%	2%	-6%	-7%	4%	**3%**
13	3%	0%	14%	14%	6%	12%	-15%	7%	14%	13%	-4%	1%	0%	-1%	3%	2%	2%	-5%	-6%	6%	**2%**
14	4%	2%	8%	14%	3%	11%	-17%	7%	13%	12%	-8%	0%	3%	-3%	-1%	2%	5%	-5%	-7%	5%	**2%**
15	0%	1%	11%	9%	5%	4%	-16%	4%	11%	8%	-6%	2%	3%	2%	4%	0%	-1%	-11%	-5%	1%	**2%**
16	2%	0%	17%	16%	3%	10%	0%	10%	18%	14%	0%	1%	2%	4%	3%	0%	3%	-6%	0%	4%	**2%**
17	5%	5%	16%	18%	5%	12%	0%	9%	20%	12%	24%	1%	5%	3%	-11%	2%	2%	-4%	0%	-1%	**3%**
18	-47%	-43%	-55%	15%	7%	4%	0%	-2%	-32%	8%	3%	-3%	-9%	-17%	-16%	-7%	10%	-5%	-10%	-7%	**-6%**
19	0%	16%	0%	12%	22%	21%	15%	18%	38%	31%	19%	8%	-1%	4%	5%	0%	0%	7%	4%	16%	**6%**
20	0%	9%	-50%	-4%	16%	6%	8%	9%	-20%	15%	10%	18%	23%	30%	20%	0%	-6%	-15%	2%	9%	**7%**
Total	**1%**	**0%**	**1%**	**-1%**	**-1%**	**-1%**	**4%**	**-1%**	**-1%**	**1%**	**1%**	**1%**	**1%**	**1%**	**1%**	**1%**	**1%**	**-1%**	**2%**	**3%**	**1%**

Table C-10 – 2043 AM Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth –GEH Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	0.1	0.9	0.6	0.3	0.1	0.1	0.0	0.6	0.3	0.1	0.0	0.3	0.0	0.0	0.7	0.2	0.1	0.0	0.0	0.1	**0.3**
2	0.4	4.1	0.6	0.4	0.8	0.8	0.4	0.9	0.7	0.2	0.3	0.3	0.1	0.3	0.2	0.1	0.1	0.2	0.1	0.2	**1.2**
3	0.8	3.8	0.1	0.3	0.2	0.1	0.1	0.1	0.9	0.5	0.3	1.4	0.7	0.1	0.6	0.6	0.3	0.5	0.1	0.4	**0.2**
4	0.2	0.7	0.2	1.1	1.3	0.6	0.7	0.7	0.6	0.5	0.4	0.3	0.2	0.2	0.3	0.3	0.1	0.3	0.9	0.3	**0.8**
5	0.4	0.0	0.5	0.2	1.8	0.2	0.2	0.4	0.0	0.6	0.4	0.8	0.5	0.3	0.7	0.3	0.0	0.1	0.6	0.3	**1.0**
6	0.1	0.4	0.4	0.6	1.0	1.1	0.3	0.7	0.3	0.3	0.0	0.2	0.2	0.1	0.2	0.2	0.0	0.3	1.3	0.4	**0.8**
7	0.0	1.3	0.3	0.2	0.8	0.5	0.0	0.2	0.9	0.0	0.2	0.5	1.2	2.3	0.5	0.0	0.0	0.3	1.7	0.5	**0.9**
8	0.2	1.2	0.2	0.6	0.4	0.1	0.3	1.2	0.9	0.0	2.6	0.3	0.2	0.2	0.3	0.2	0.2	0.7	0.8	1.1	**0.9**
9	0.7	0.5	0.5	0.9	1.0	1.6	0.1	1.4	0.6	1.8	1.1	1.1	0.9	0.9	0.8	0.4	0.4	0.3	0.9	0.9	**1.5**
10	0.1	0.5	0.2	0.4	0.2	0.1	0.0	1.4	2.7	0.0	0.3	0.5	0.5	0.6	0.3	0.1	0.1	0.6	3.0	2.2	**0.1**
11	0.3	0.7	0.0	0.3	0.8	0.8	0.3	0.4	1.1	0.9	0.4	0.4	0.3	0.3	0.5	0.5	0.0	0.6	1.0	1.6	**0.3**
12	0.4	1.5	0.3	0.2	0.8	0.2	0.1	0.3	0.2	0.1	0.1	0.3	0.1	0.3	0.2	0.3	0.1	0.1	0.0	0.1	**0.4**
13	0.4	0.3	0.6	0.3	0.5	0.1	0.2	0.2	0.4	0.1	0.2	0.3	1.2	0.3	0.0	0.3	0.0	0.1	0.4	0.0	**0.2**
14	0.8	0.6	0.6	0.3	0.2	0.0	0.6	0.0	0.6	0.1	0.3	0.2	0.4	0.1	0.1	0.1	0.1	0.3	1.4	0.1	**0.2**
15	0.0	0.7	0.0	0.2	0.3	0.1	0.1	0.1	0.3	0.1	0.2	0.1	0.2	0.5	0.1	0.6	0.1	0.3	0.4	0.2	**0.3**
16	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.2	0.3	0.0	0.1	0.3	0.2	0.1	0.1	0.0	0.1	**0.4**
17	0.2	0.2	0.2	0.1	0.0	0.1	0.0	0.5	0.2	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	**0.2**
18	0.0	0.3	2.0	0.3	0.4	0.4	0.2	0.6	1.3	1.0	0.2	0.0	0.0	0.1	0.1	0.0	0.1	0.6	1.0	0.2	**0.6**
19	0.0	1.7	0.1	1.7	1.1	1.2	0.3	0.5	1.4	0.9	0.7	0.5	0.4	0.6	0.1	0.0	0.0	1.8	1.0	1.5	**0.6**
20	0.1	0.4	0.0	0.6	0.8	1.2	0.2	0.5	1.2	2.8	0.3	0.0	0.0	0.1	0.1	0.1	0.0	3.3	2.9	1.2	**0.2**
Total	**0.2**	**2.7**	**0.2**	**2.3**	**3.0**	**2.3**	**0.0**	**2.5**	**3.5**	**2.6**	**1.1**	**0.3**	**0.0**	**0.1**	**0.1**	**0.0**	**0.1**	**1.6**	**3.2**	**1.9**	**2.1**

Table C-11 – 2043 IP Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – GEH Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	1.3	0.3	0.6	0.4	0.1	0.1	0.0	0.3	0.7	0.4	0.1	1.8	1.0	0.3	1.5	1.6	0.4	0.0	0.0	0.0	**3.1**
2	0.2	1.3	0.5	0.1	0.3	0.2	0.2	0.1	0.1	0.2	0.5	0.9	1.0	0.9	0.4	0.4	0.3	0.0	0.0	0.0	**1.0**
3	1.0	2.0	1.7	0.4	0.2	0.0	0.4	0.0	0.2	0.2	0.2	1.0	1.8	0.2	1.1	0.7	0.6	0.6	0.0	0.1	**1.8**
4	0.7	0.3	1.0	0.9	0.9	0.6	0.7	0.6	1.2	0.8	2.9	0.7	1.0	1.3	0.7	0.4	0.8	0.8	0.8	0.1	**1.0**
5	0.1	0.0	0.4	0.7	1.1	0.4	0.9	0.4	0.8	1.0	0.2	0.5	0.7	1.1	0.4	0.3	0.1	0.7	0.0	0.1	**1.2**
6	0.1	0.3	0.2	0.1	0.1	0.9	0.1	0.2	0.4	0.5	0.2	0.2	0.3	0.5	0.2	0.2	0.2	0.7	0.4	0.1	**1.0**
7	0.1	0.2	0.2	0.3	0.1	1.2	0.0	0.6	0.5	0.0	0.1	0.4	0.7	2.2	0.7	0.1	0.0	0.5	0.6	1.2	**0.8**
8	0.1	0.1	0.3	0.2	0.2	0.5	0.0	0.3	0.0	0.1	0.2	0.4	0.4	0.5	0.2	0.2	0.4	0.4	0.2	0.3	**0.9**
9	0.2	0.4	0.0	0.3	0.9	0.7	1.1	0.4	2.7	0.6	2.4	0.7	0.9	0.9	0.5	0.5	0.6	0.6	0.2	0.0	**1.6**
10	0.5	0.3	0.3	0.5	0.9	0.4	0.0	0.1	0.8	0.0	0.3	0.6	0.9	0.7	0.4	0.1	0.1	0.1	0.9	0.6	**1.4**
11	0.3	0.0	0.5	0.2	0.3	0.3	0.8	0.0	2.1	0.6	1.0	0.4	0.5	0.8	0.4	0.2	0.2	0.2	0.3	0.3	**0.7**
12	1.3	0.6	1.2	0.4	0.7	0.5	0.2	0.3	0.7	0.7	0.8	1.6	0.7	1.3	1.3	1.7	0.5	0.1	0.1	0.1	**3.7**
13	0.9	0.8	0.4	0.3	0.7	0.6	0.3	0.2	0.6	0.9	0.8	0.8	0.2	0.8	1.3	0.8	0.7	0.1	0.0	0.1	**2.4**
14	1.0	1.8	1.7	0.5	0.9	0.7	0.4	0.3	0.6	1.1	0.9	0.9	0.5	1.2	1.4	0.4	0.2	0.2	0.1	0.1	**3.2**
15	1.6	0.5	0.7	0.2	0.4	0.3	0.2	0.2	0.5	0.5	0.5	1.1	0.7	1.3	1.5	1.1	0.2	0.1	0.0	0.1	**3.2**
16	1.0	0.5	1.2	0.1	0.1	0.1	0.0	0.2	0.5	0.4	0.1	1.5	0.6	0.8	0.9	1.2	0.0	0.1	0.0	0.0	**2.6**
17	0.5	0.3	0.2	0.3	0.0	0.1	0.0	0.2	0.2	0.1	0.0	1.1	0.5	0.9	0.4	0.4	0.2	0.0	0.0	0.0	**1.7**
18	0.2	0.1	0.6	0.1	0.0	0.7	0.3	0.3	0.3	0.5	0.7	0.1	0.1	0.2	0.0	0.1	0.0	0.4	0.3	0.1	**0.9**
19	0.0	0.1	0.1	0.3	0.2	0.5	0.1	0.4	0.4	1.4	0.1	0.2	0.3	0.4	0.2	0.0	0.0	0.6	2.2	0.2	**1.3**
20	0.0	0.0	0.3	0.0	0.0	0.3	0.8	0.5	0.3	0.2	0.6	0.3	0.4	0.7	0.2	0.0	0.0	0.0	0.8	1.4	**0.9**
Total	**2.9**	**0.9**	**1.8**	**1.0**	**1.4**	**1.2**	**0.7**	**1.0**	**1.7**	**1.8**	**0.6**	**3.7**	**2.4**	**3.1**	**3.4**	**3.0**	**1.2**	**0.9**	**1.6**	**1.0**	**5.7**

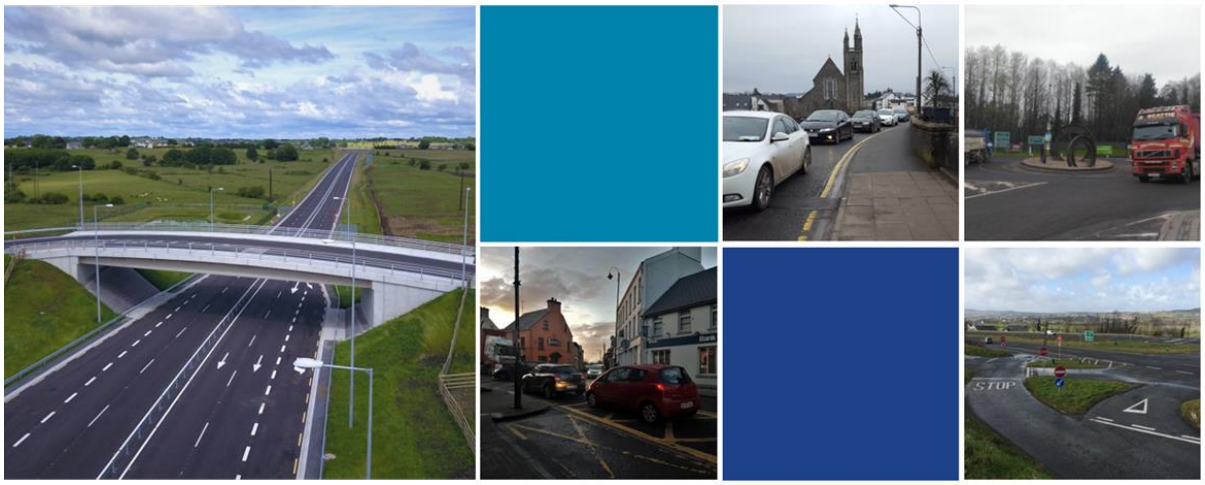
Table C-12 – 2043 PM Light Vehicles - Forecast Demands Produced by Link Based Growth Minus Demands Produced by Zone Based Growth – GEH Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	0.2	0.6	0.1	0.4	0.1	0.0	0.0	0.3	1.1	0.5	0.0	0.4	0.2	0.3	0.3	0.6	0.1	0.2	0.0	0.0	**0.9**
2	0.7	1.3	0.4	0.3	0.0	0.3	0.1	0.3	0.8	0.1	0.2	0.4	0.6	0.2	0.2	0.8	0.1	0.3	0.9	0.2	**1.5**
3	0.8	0.2	1.9	0.3	0.2	0.0	0.0	0.6	1.3	0.6	0.0	0.7	0.2	0.0	0.3	0.1	0.2	0.2	0.0	0.0	**0.7**
4	0.4	0.7	0.4	0.5	0.2	0.5	0.5	0.6	1.0	0.1	0.8	0.3	0.2	0.3	0.1	0.1	0.2	0.6	0.8	0.3	**1.9**
5	0.0	0.4	0.3	0.7	1.3	1.0	0.2	0.3	0.3	0.5	1.3	0.3	0.4	0.4	0.0	0.2	0.0	0.5	1.3	0.4	**2.1**
6	0.1	0.5	0.3	0.1	0.3	0.7	0.4	0.4	0.1	1.7	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.4	1.3	0.8	**1.9**
7	0.0	0.4	0.0	1.5	0.4	0.0	0.0	0.0	1.1	0.0	1.0	0.1	0.1	0.3	0.1	0.0	0.0	0.5	0.1	0.3	**1.1**
8	0.5	0.8	1.0	0.1	0.0	0.1	0.2	0.7	1.5	0.0	0.1	0.3	0.3	0.5	0.2	0.1	0.1	0.7	1.0	0.2	**2.0**
9	0.4	0.5	0.9	1.2	0.3	0.9	0.5	2.0	1.1	2.5	0.4	0.2	0.2	0.1	0.2	0.1	0.2	0.7	0.6	0.8	**3.4**
10	0.1	0.0	0.2	0.7	0.5	0.5	0.0	0.0	0.8	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.5	2.0	2.7	**2.2**
11	0.1	0.9	0.2	4.3	0.5	0.3	0.3	0.0	0.1	1.2	0.2	0.2	0.4	0.7	0.0	0.0	0.0	0.2	0.9	0.2	**0.4**
12	0.4	0.1	1.0	0.7	0.5	0.3	0.2	0.3	0.7	0.6	0.1	0.1	0.4	0.4	0.4	0.1	0.1	0.1	0.2	0.1	**1.1**
13	0.2	0.0	0.7	0.7	0.3	0.3	0.6	0.3	0.8	0.6	0.2	0.2	0.0	0.1	0.4	0.5	0.1	0.1	0.2	0.1	**0.8**
14	0.3	0.7	0.4	1.1	0.2	0.4	1.1	0.4	1.1	0.9	0.7	0.0	0.2	0.1	0.1	0.2	0.3	0.1	0.3	0.1	**1.1**
15	0.1	0.3	1.1	0.4	0.2	0.1	0.2	0.2	1.0	0.6	0.1	0.4	0.5	0.2	0.5	0.1	0.1	0.2	0.1	0.0	**1.2**
16	0.2	0.0	0.5	0.2	0.1	0.0	0.0	0.1	0.3	0.2	0.0	0.1	0.3	0.5	0.3	0.0	0.1	0.0	0.0	0.0	**0.6**
17	0.2	0.3	0.5	0.3	0.1	0.1	0.0	0.2	0.4	0.1	0.1	0.1	0.3	0.3	0.6	0.2	0.0	0.0	0.0	0.0	**0.5**
18	0.6	1.7	1.3	0.4	0.3	0.3	0.0	0.1	1.2	0.3	0.1	0.1	0.1	0.3	0.2	0.0	0.1	0.3	1.5	0.4	**1.4**
19	0.0	0.5	0.0	0.6	0.7	1.1	2.2	1.1	0.9	3.5	1.1	0.2	0.0	0.1	0.1	0.0	0.0	1.0	2.8	3.3	**4.9**
20	0.0	0.3	0.4	0.1	0.4	0.6	1.5	0.7	0.7	1.5	1.7	0.2	0.4	0.6	0.3	0.0	0.0	0.5	0.3	1.7	**3.0**
Total	**0.3**	**0.0**	**0.2**	**0.3**	**0.5**	**0.3**	**1.4**	**0.2**	**0.7**	**0.4**	**0.5**	**0.4**	**0.4**	**0.4**	**0.5**	**0.3**	**0.2**	**0.2**	**1.3**	**1.2**	**1.4**

For the comparison of individual sector to sector movements, the GEH value is generally under 3. Tables C10 to C12 demonstrate that the demands used in the model, based on link-based growth, are very similar to those that would be produced via the application of NTpM zone-based growth rates.

Appendix D

Traffic Flow Figures for Donegal Ten-T Project



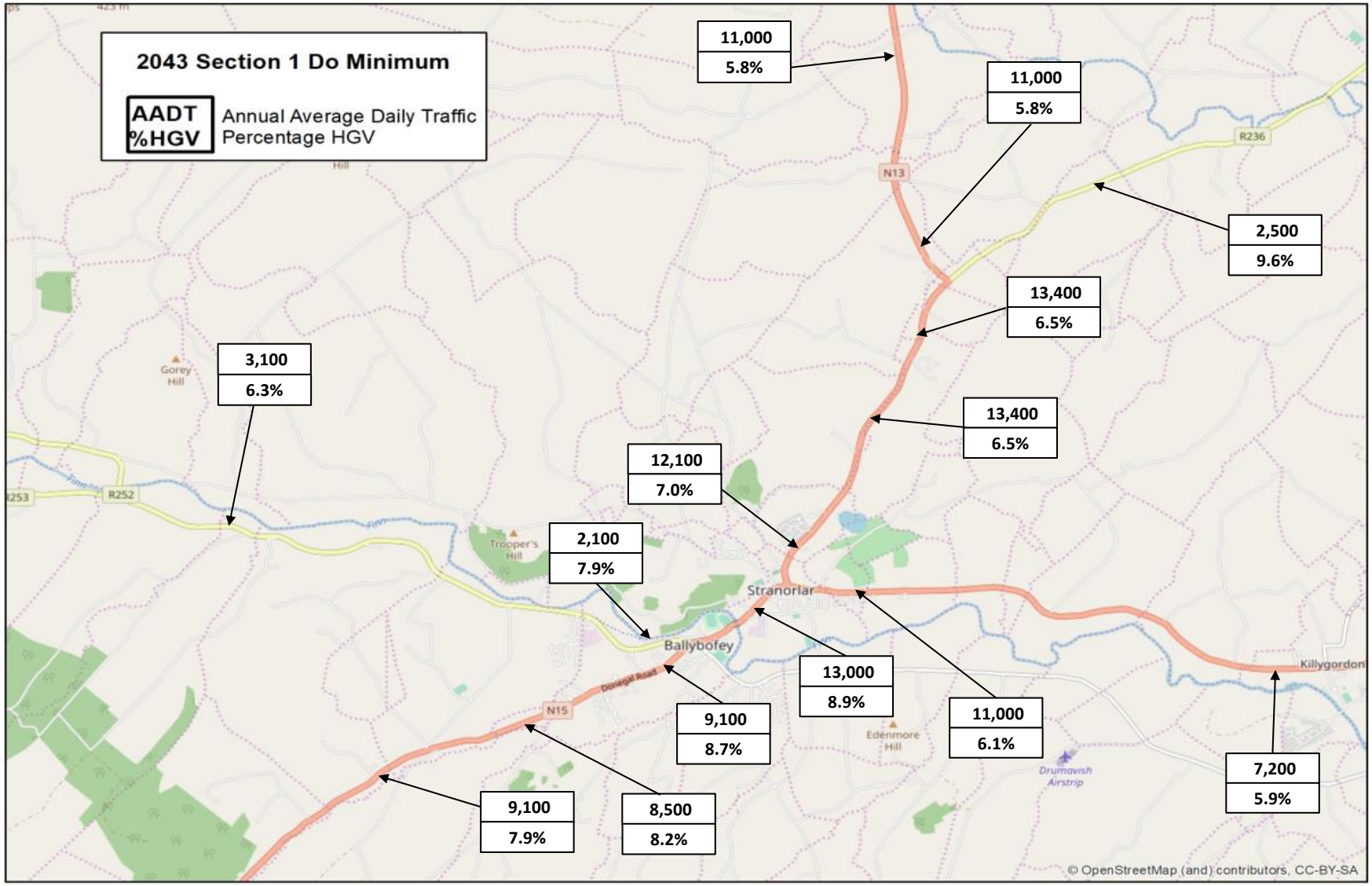


Figure D1 – Section 1 – Do-Minimum 2043 Traffic Flows

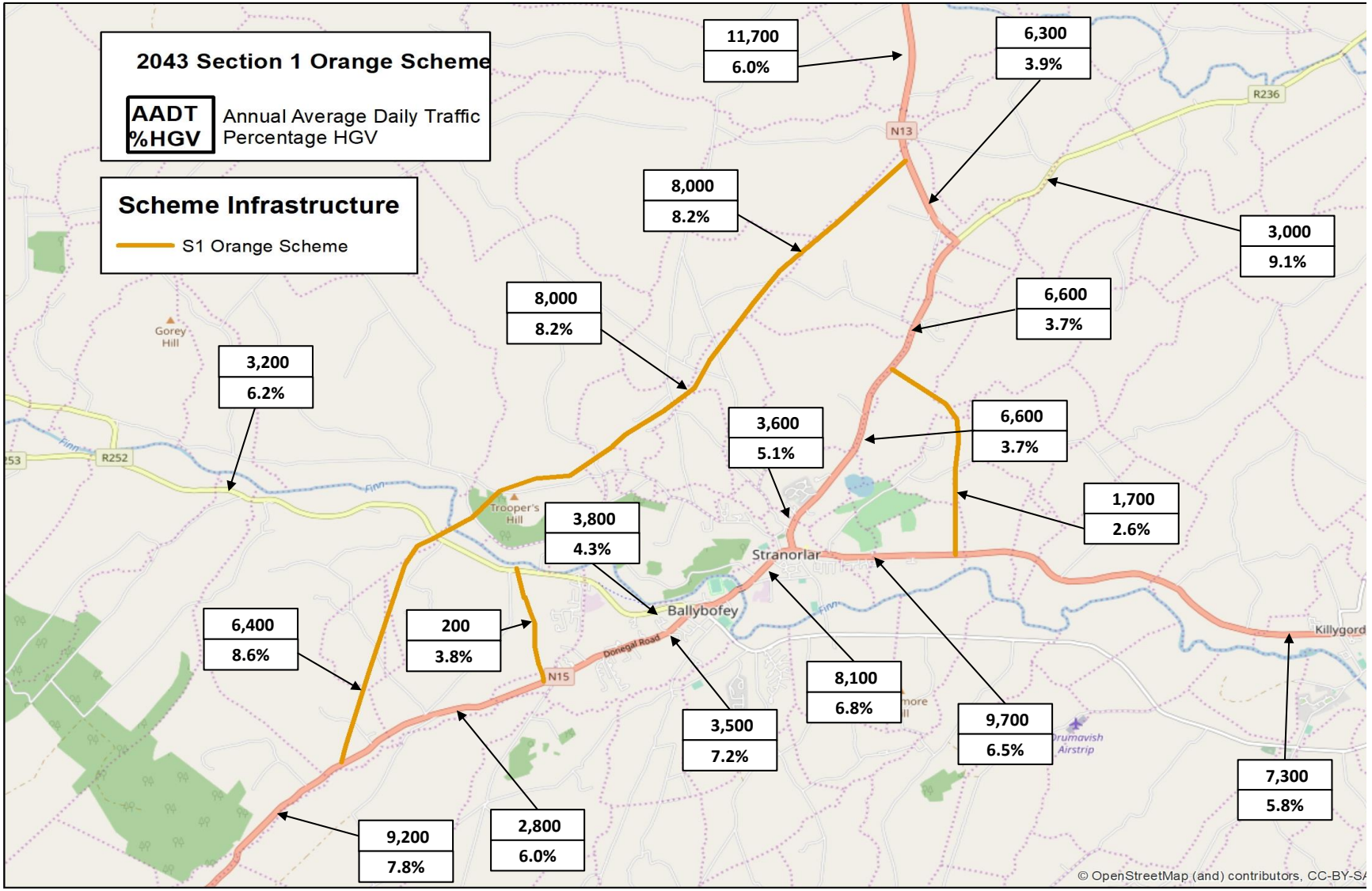


Figure D2 – Section 1 – 1A1 Orange 2043 Traffic Flows

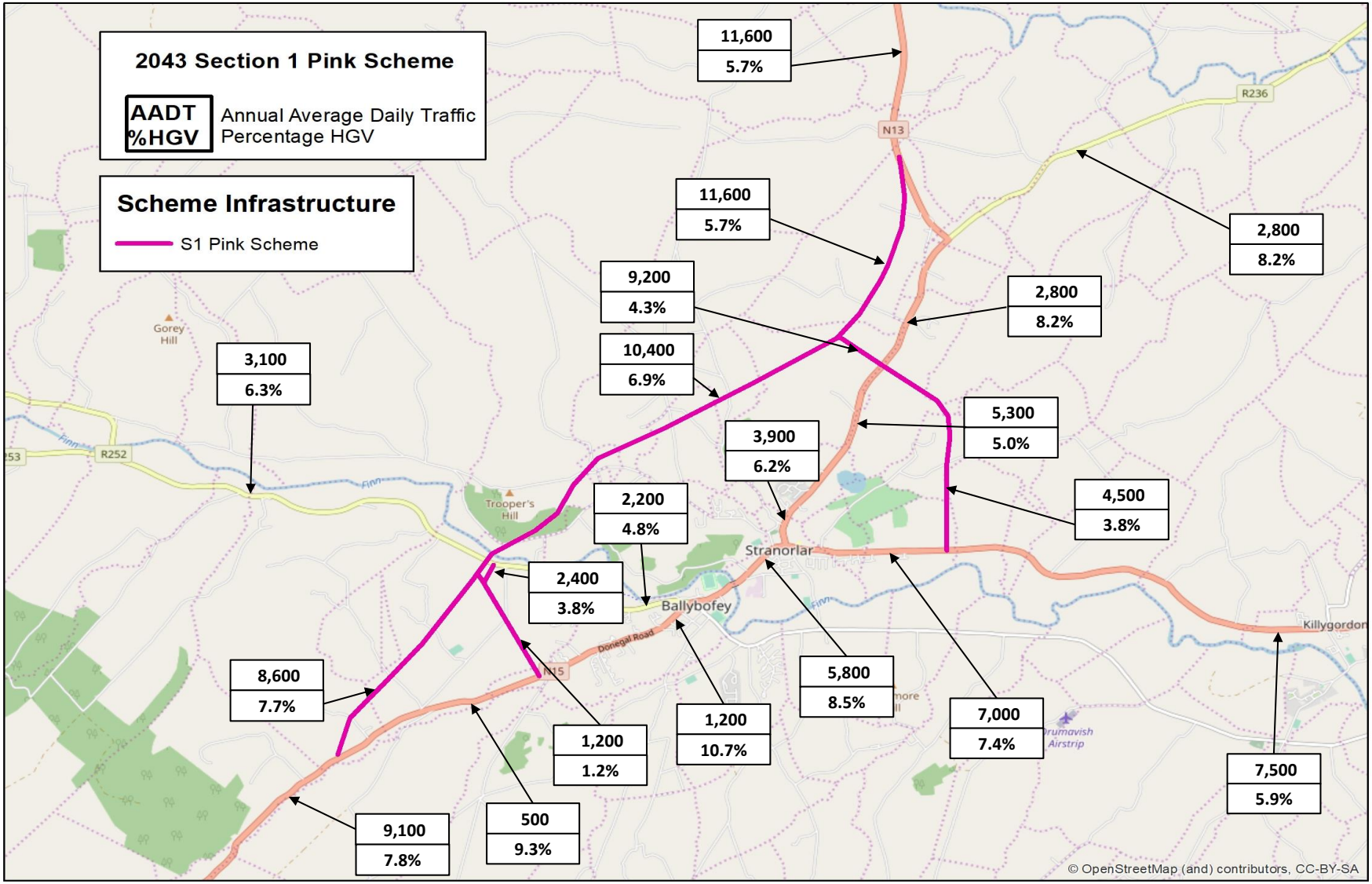


Figure D3– Section 1 – 1B1 Pink 2043 Traffic Flows

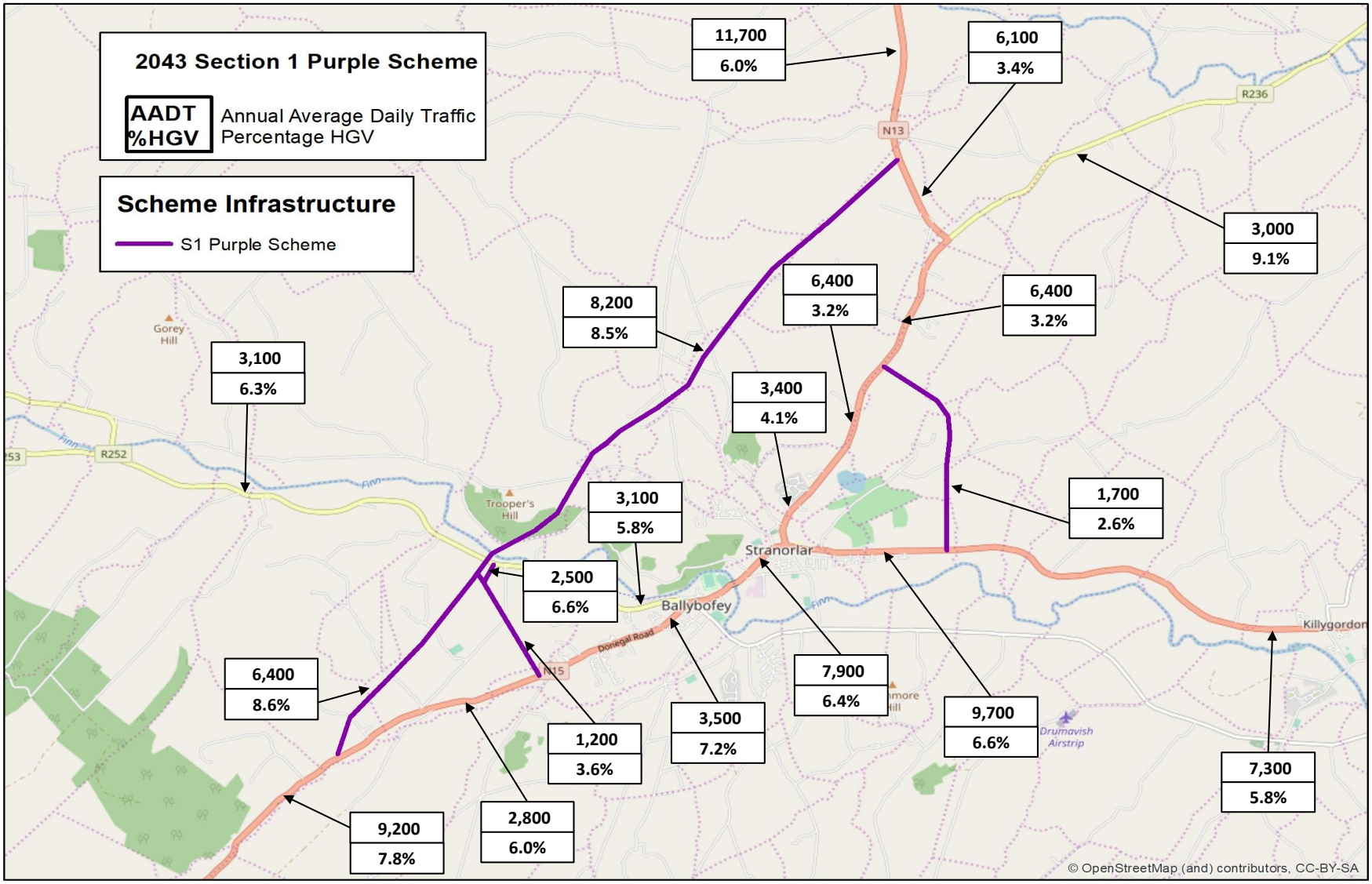


Figure D4 – Section 1 – 1C1 Purple 2043 Traffic Flows

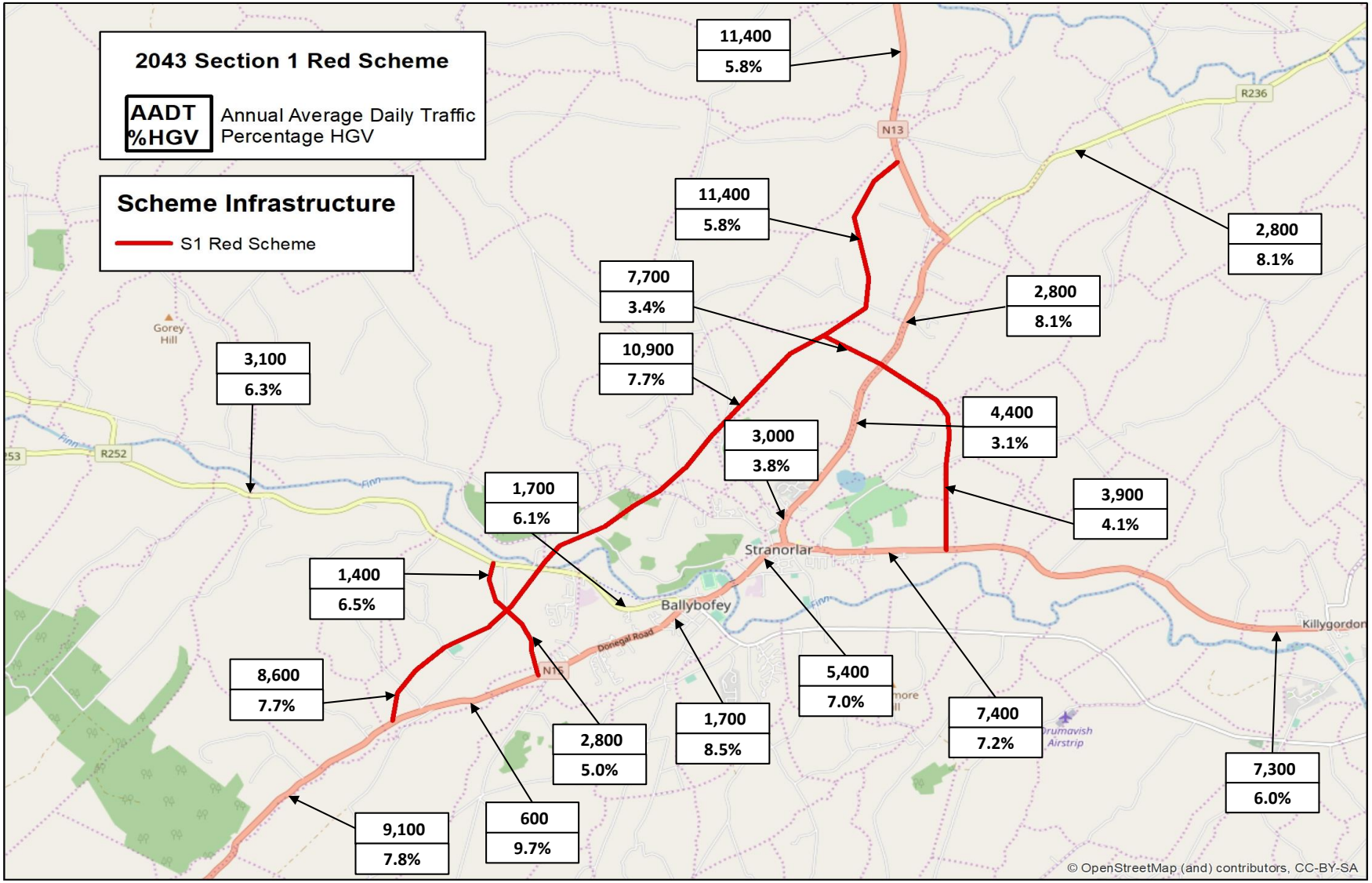


Figure D5 – Section 1 – 1D2 Red 2043 Traffic Flows

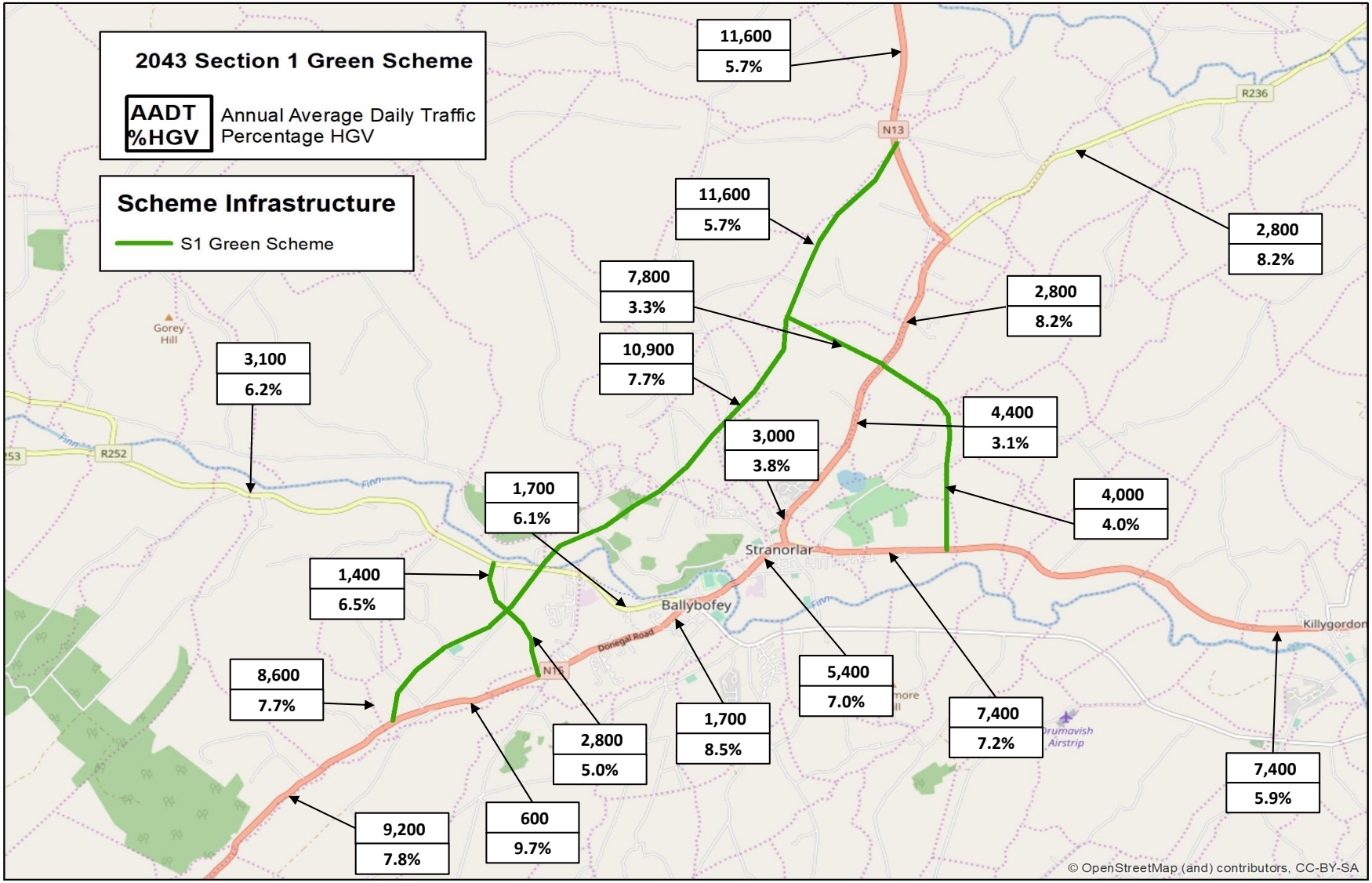


Figure D6 – Section 1 – 1E2 Green 2043 Traffic Flows

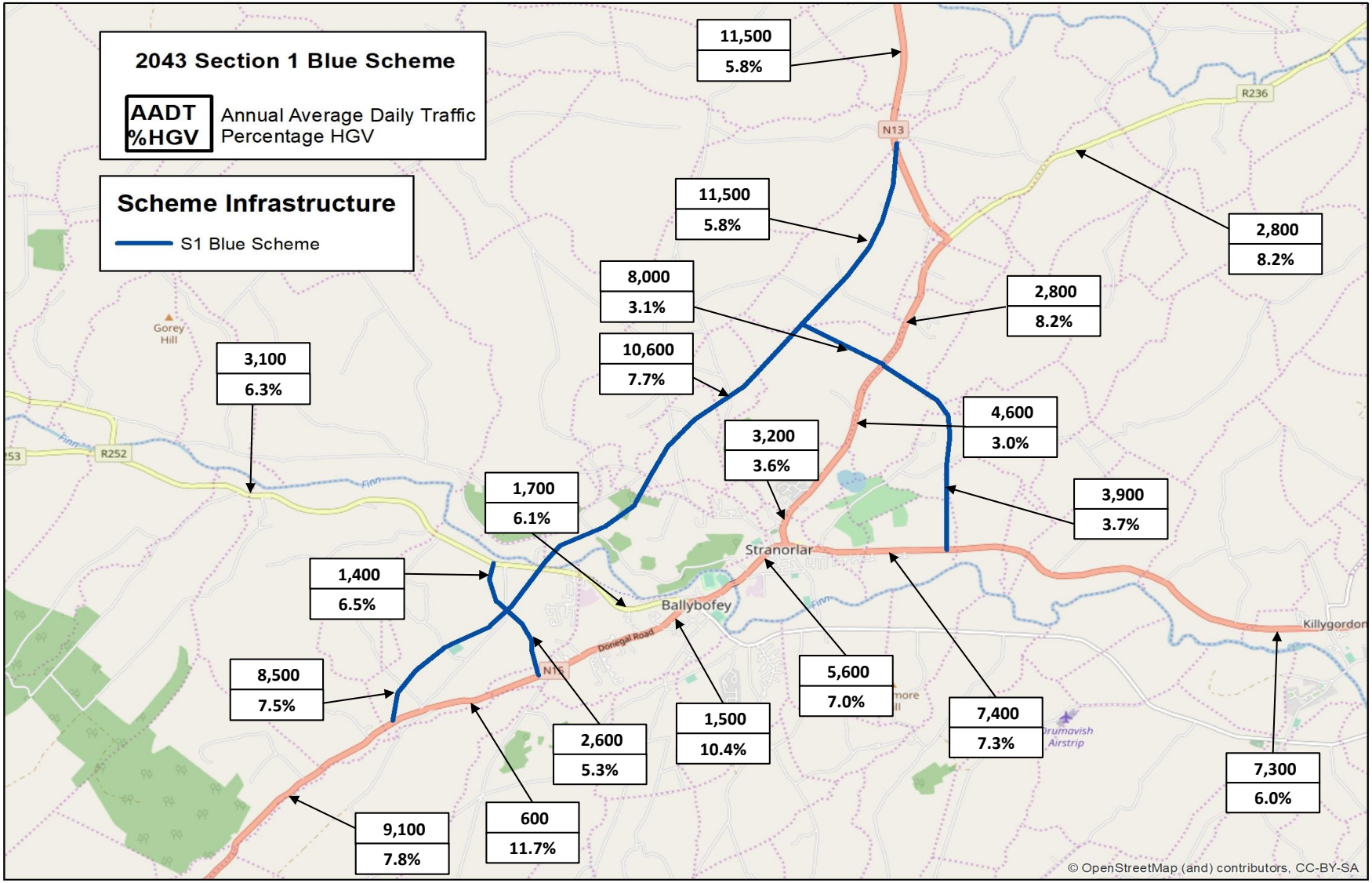


Figure D7– Section 1 – 1F2 Blue 2043 Traffic Flows

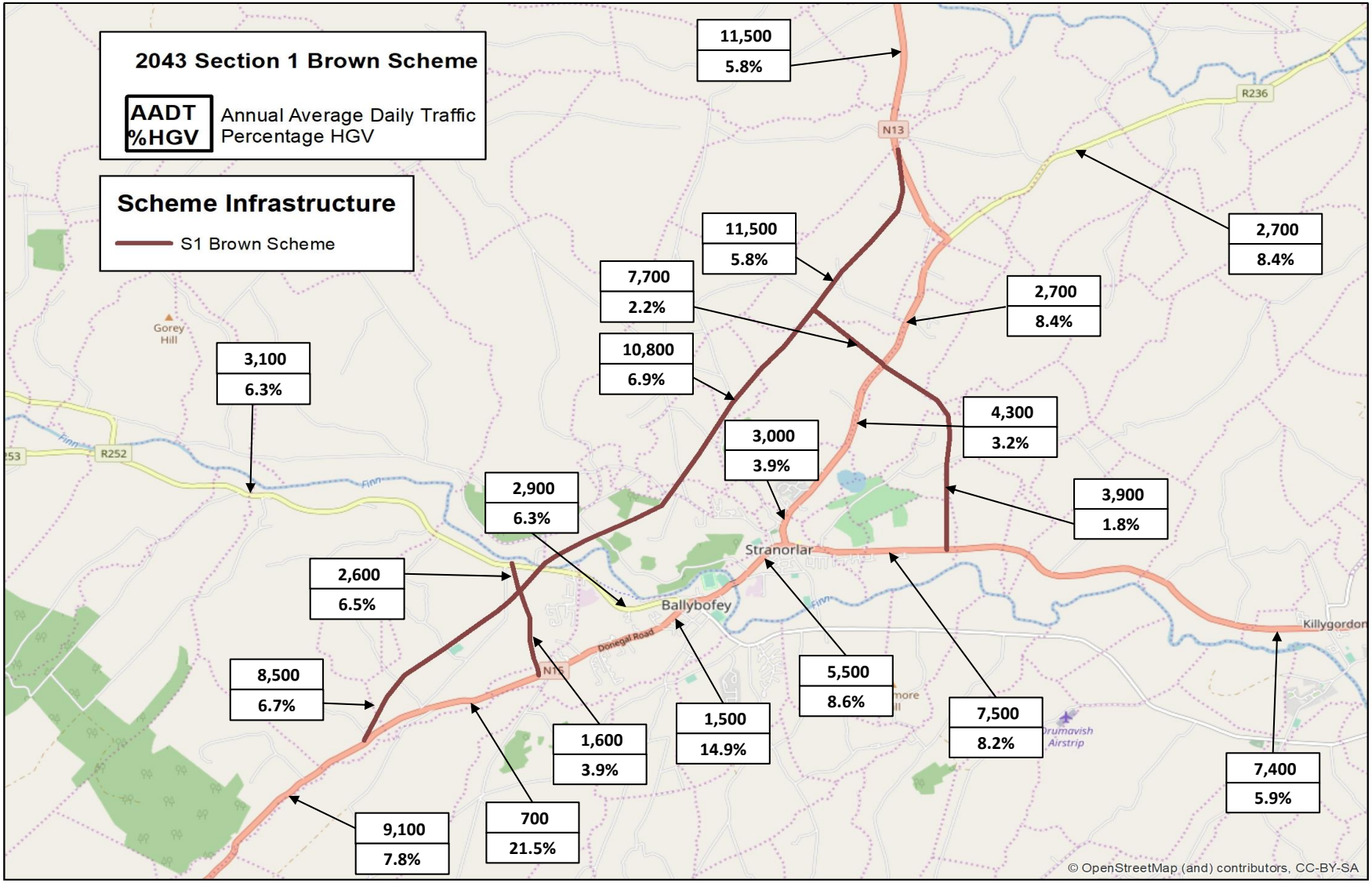


Figure D8 – Section 1 – 1G2 Brown 2043 Traffic Flows

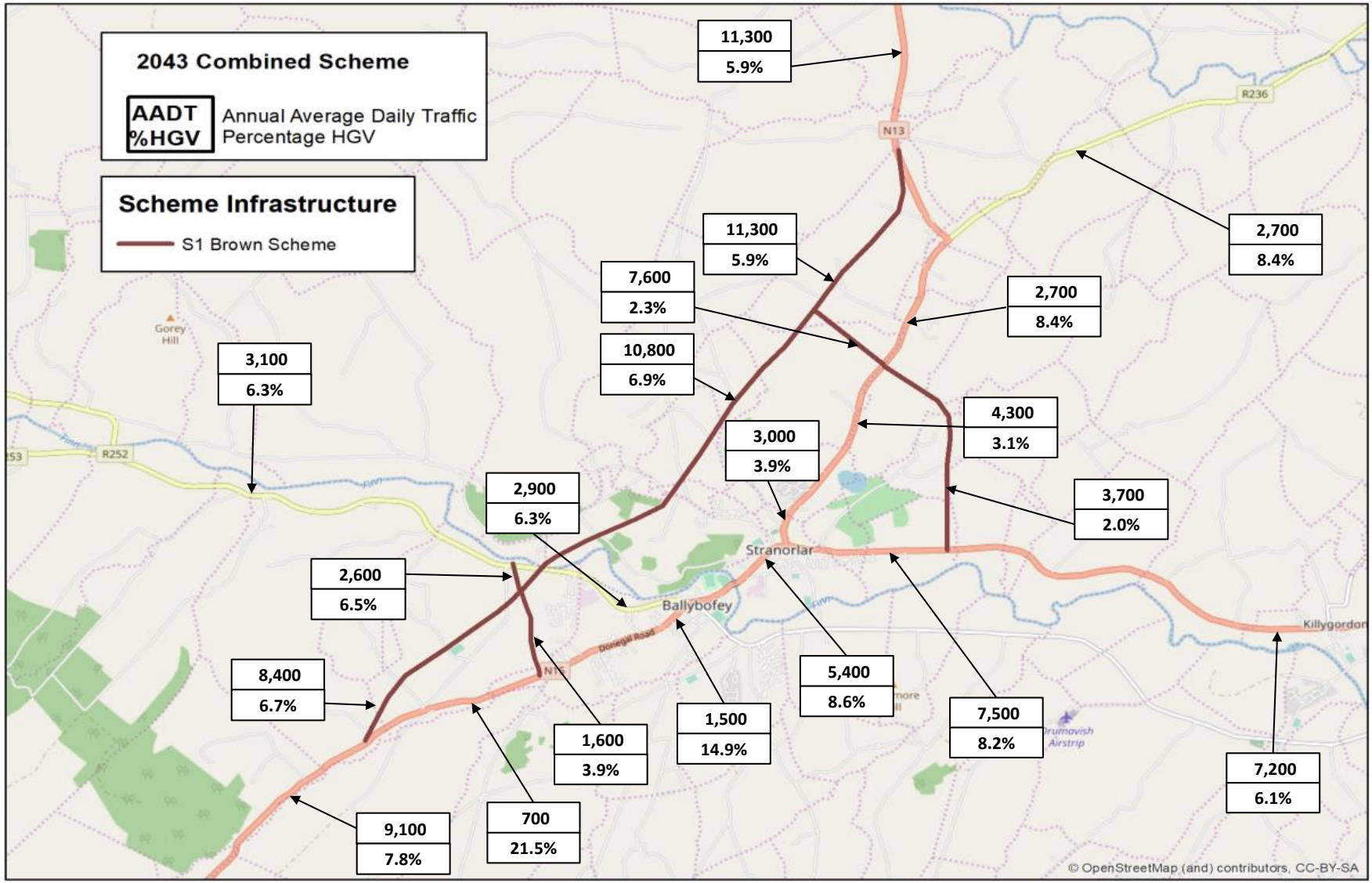


Figure D9 – Section 1 – 1G2 2D 3B2 Combined Scheme 2043 Traffic Flows

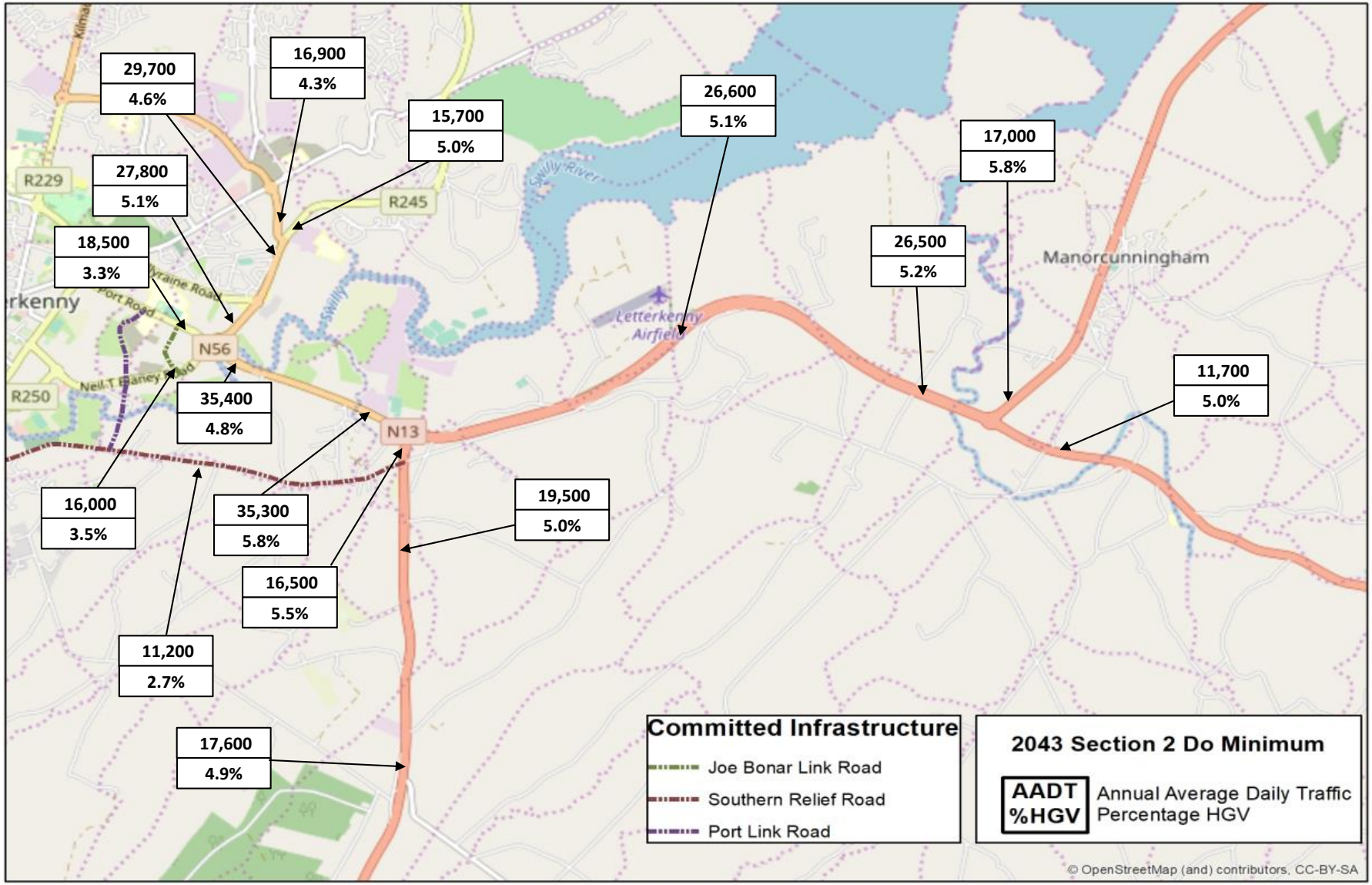


Figure D10 – Section 2 – Do Minimum 2043 Traffic Flows

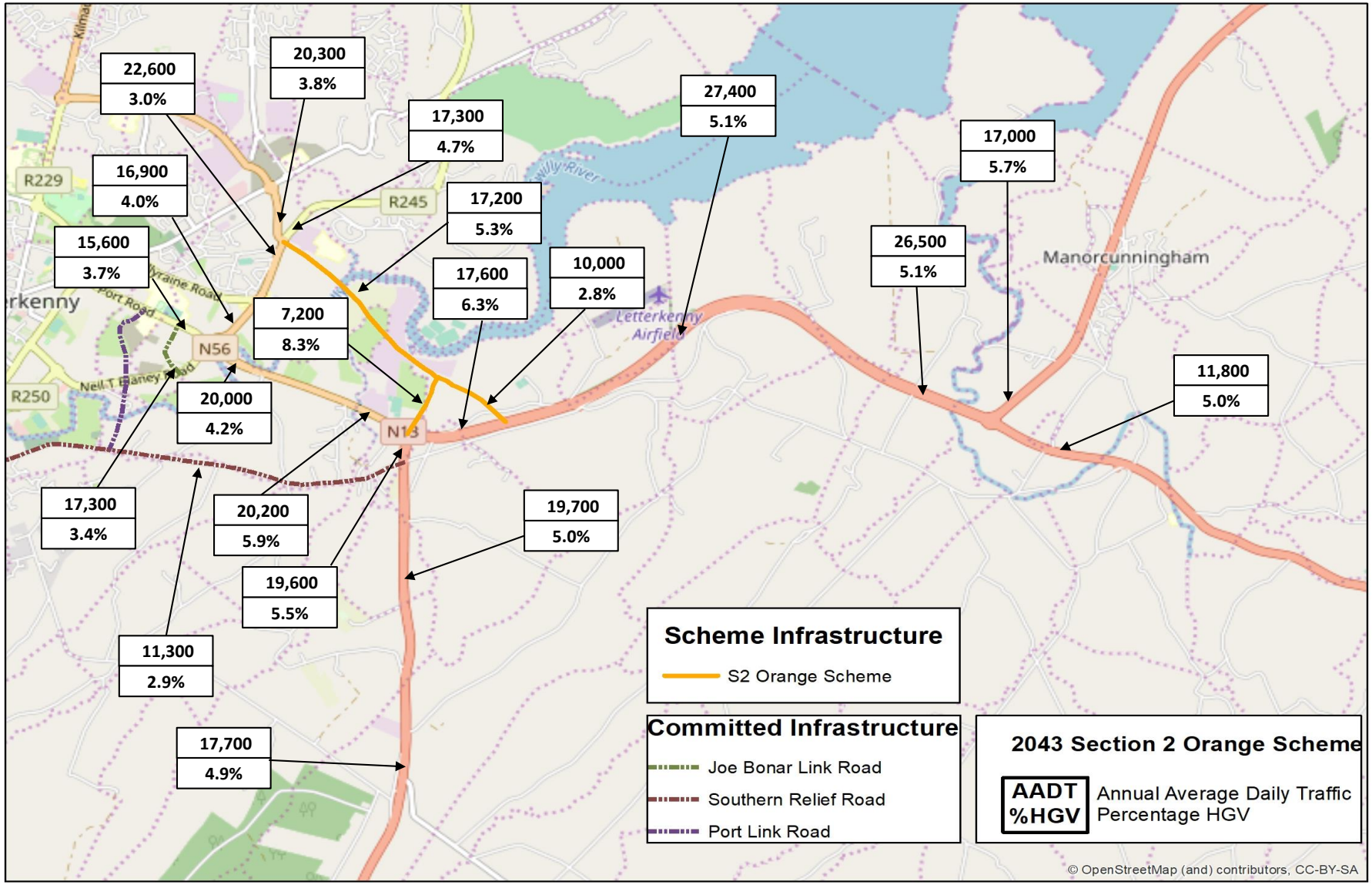


Figure D11 – Section 2 – 2A Orange 2043 Traffic Flows

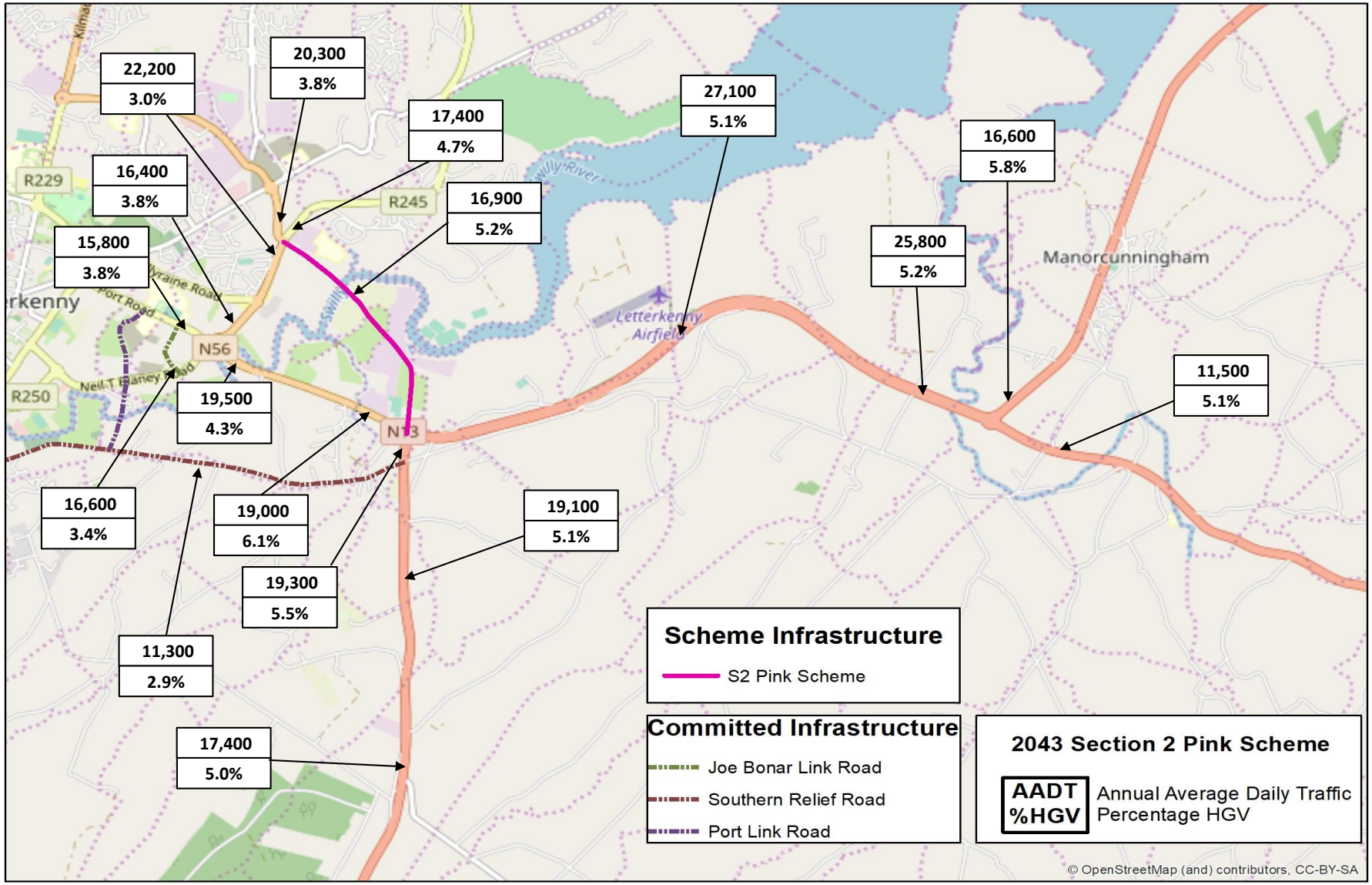


Figure D12 – Section 2 – 2B Pink 2043 Traffic Flows

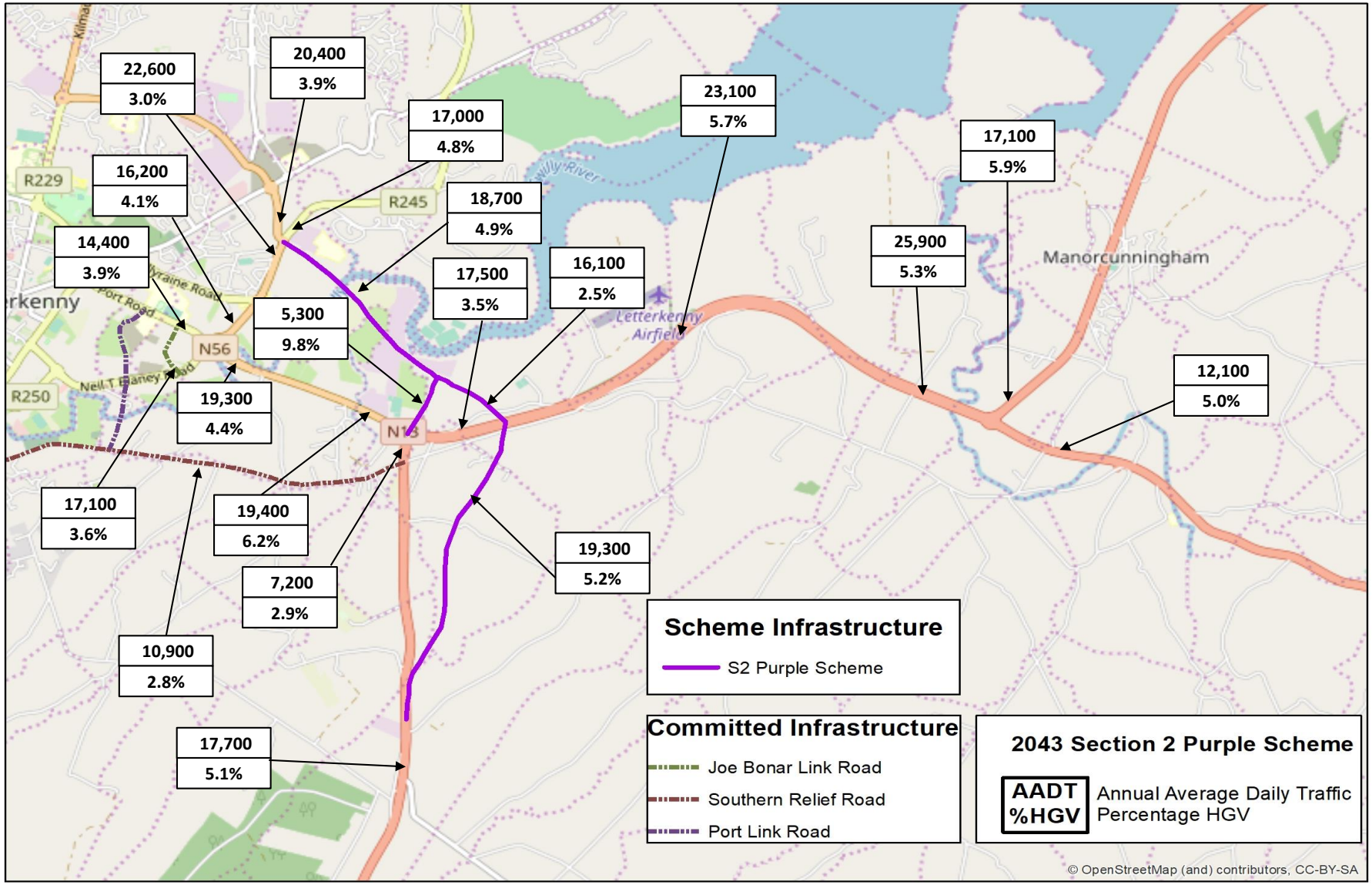


Figure D13 – Section 2 – 2C Purple 2043 Traffic Flows

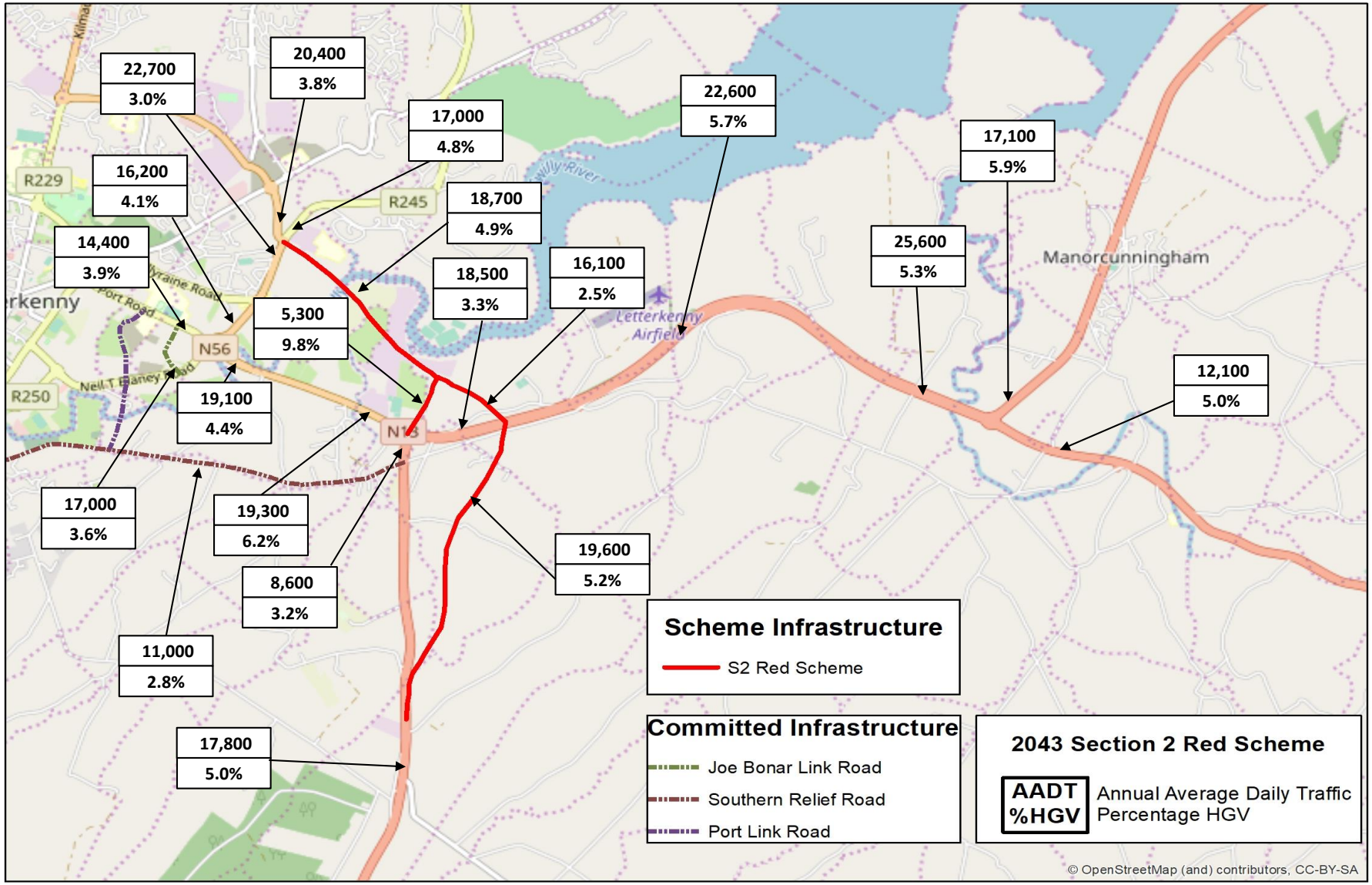


Figure D14 – Section 2 – 2D Red 2043 Traffic Flows

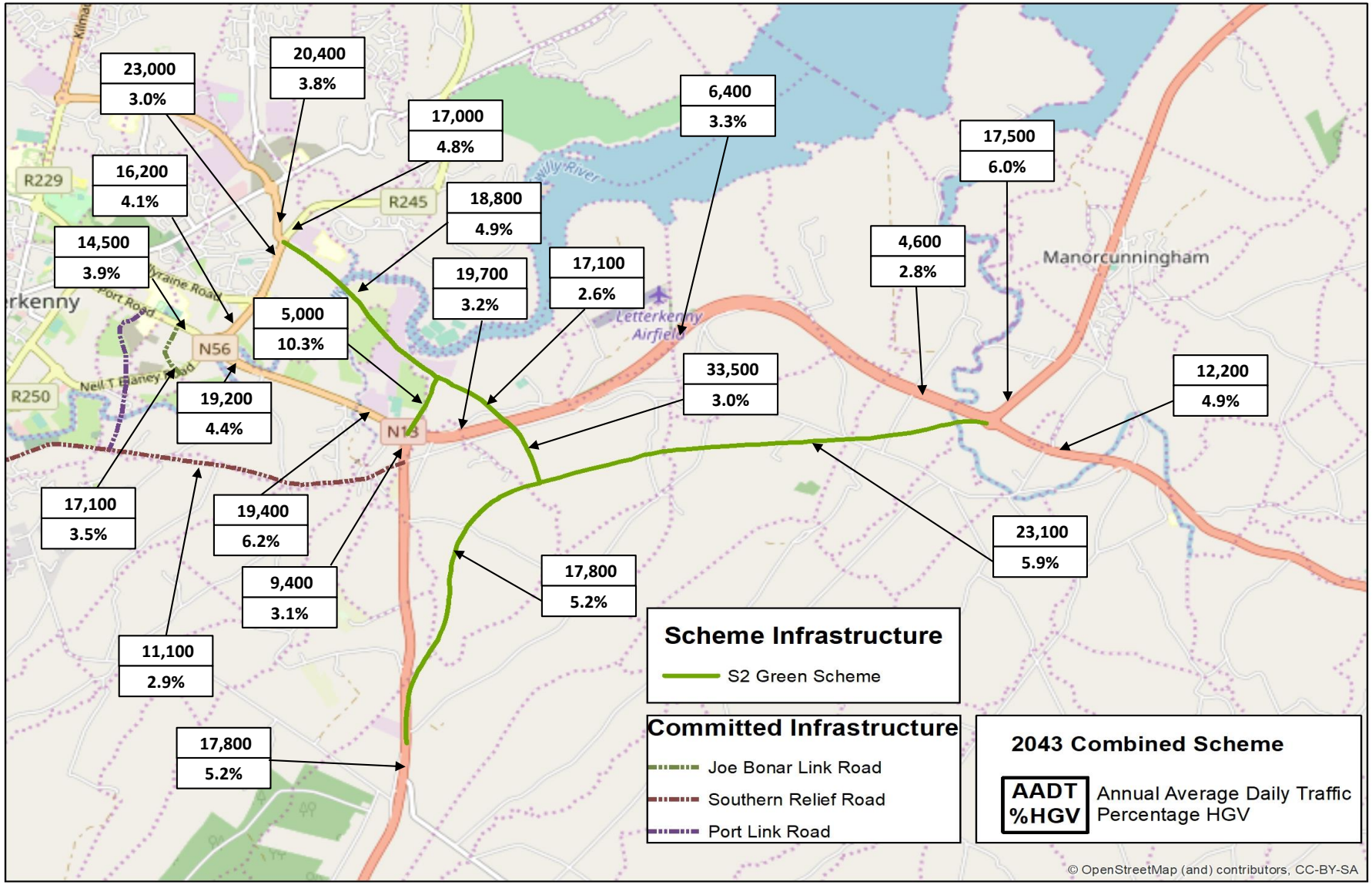


Figure D15 – Section 2 – 2E Green 2043 Traffic Flows

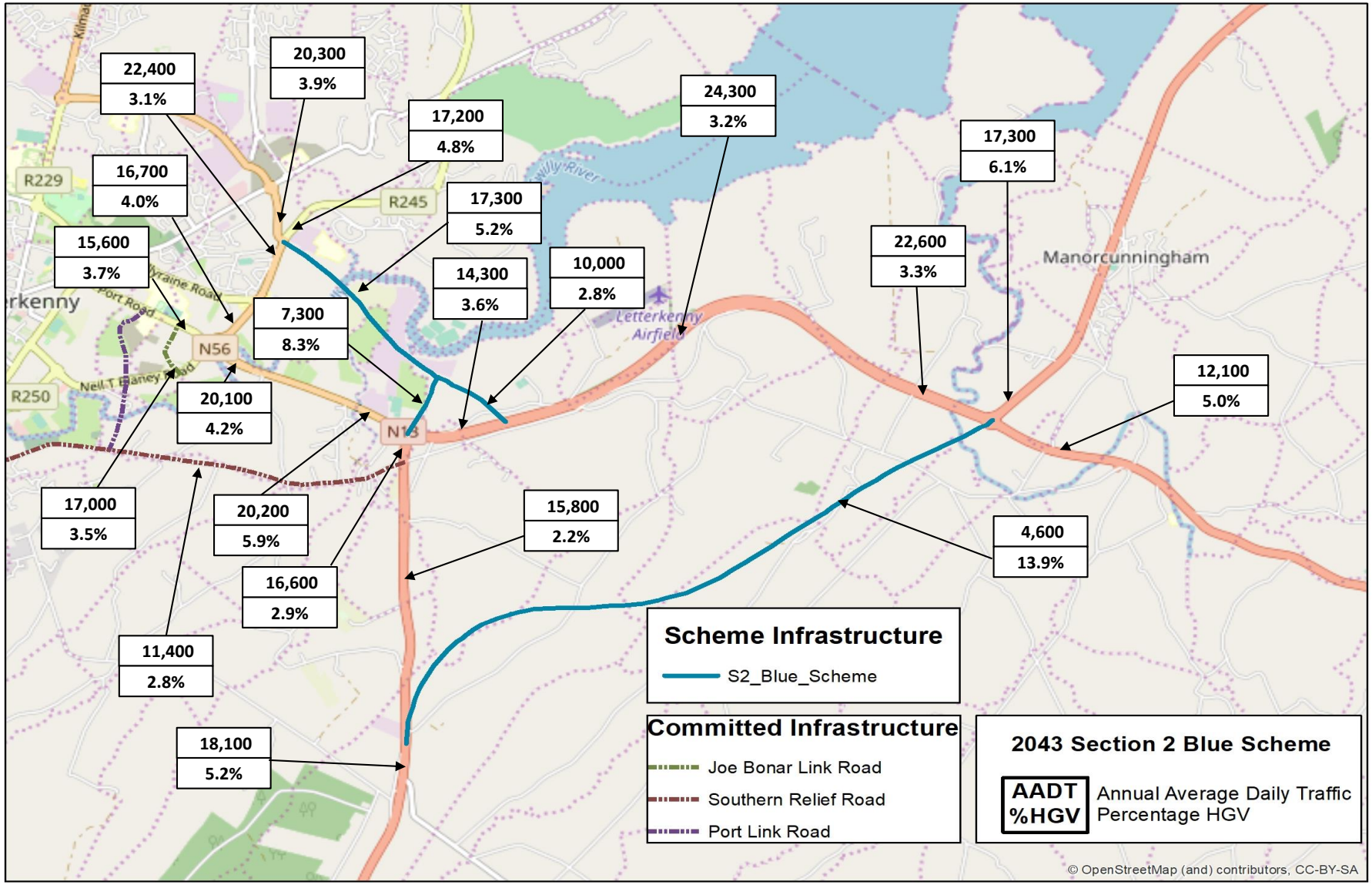


Figure D16 – Section 2 – 2F Blue 2043 Traffic Flows

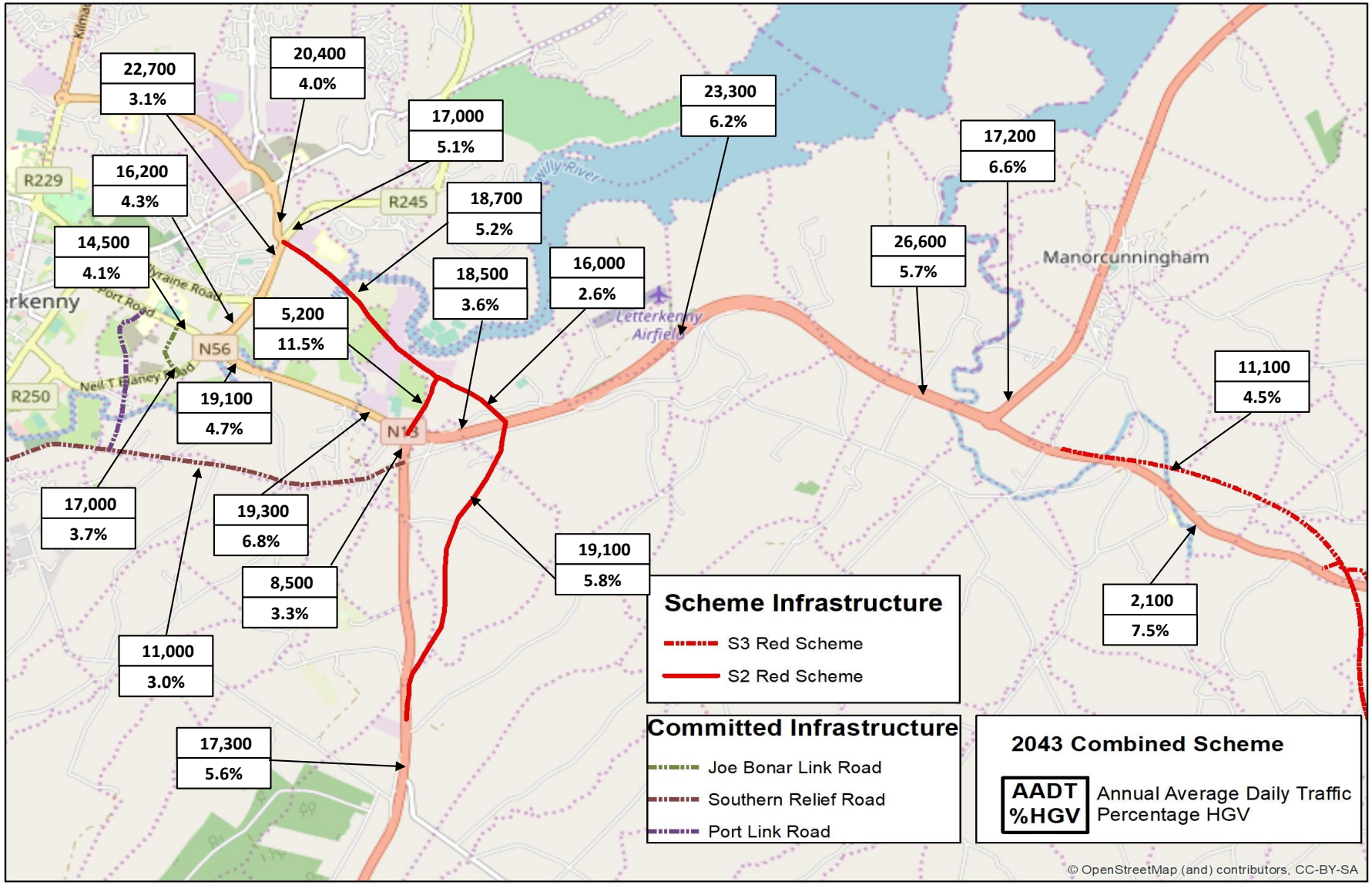


Figure D17 – Section 2 – 1G2 2D 3B2 Combined Scheme 2043 Traffic Flows

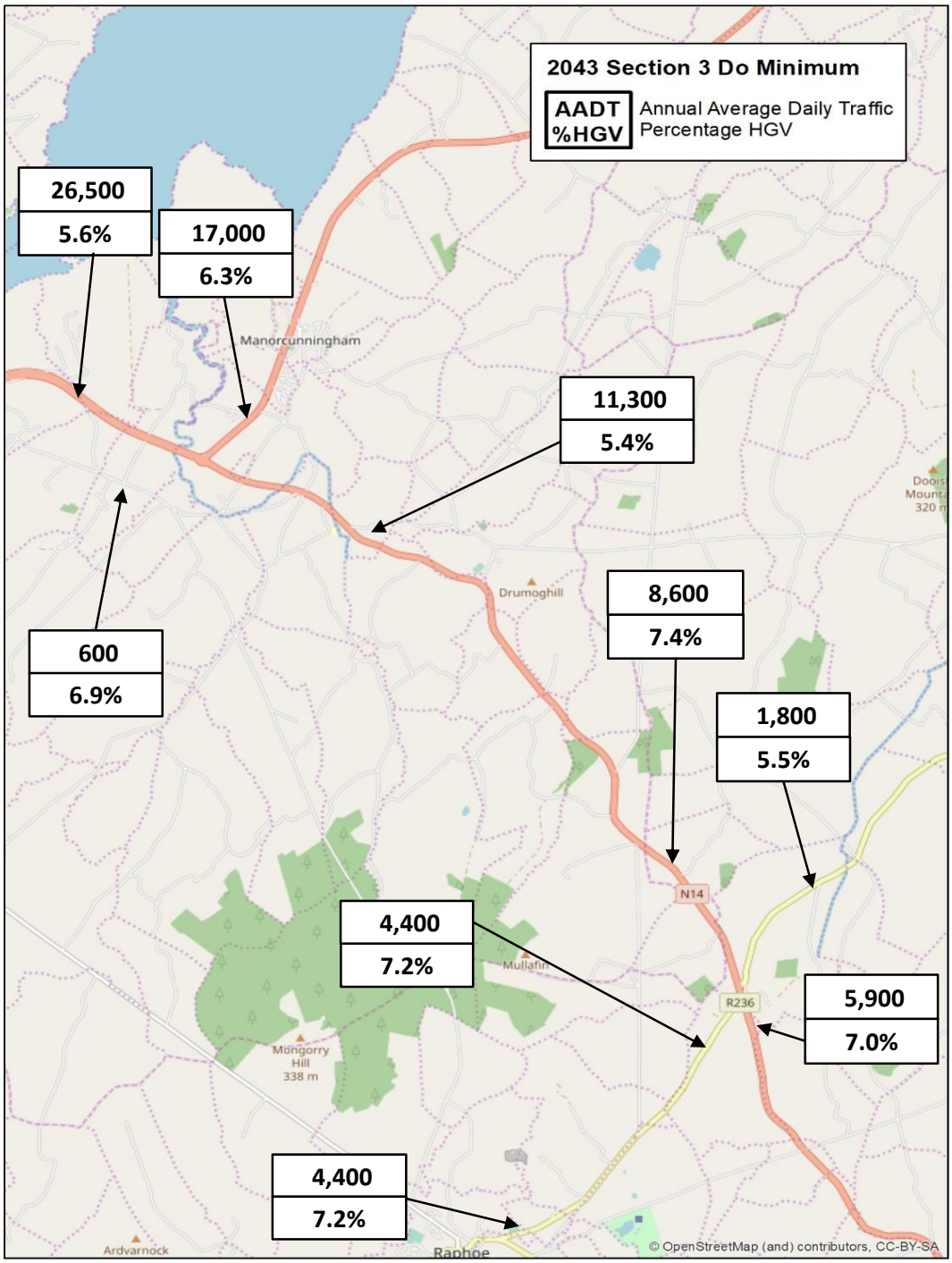


Figure D18 – Section 3 – Do Minimum 2043 Traffic Flows (North)

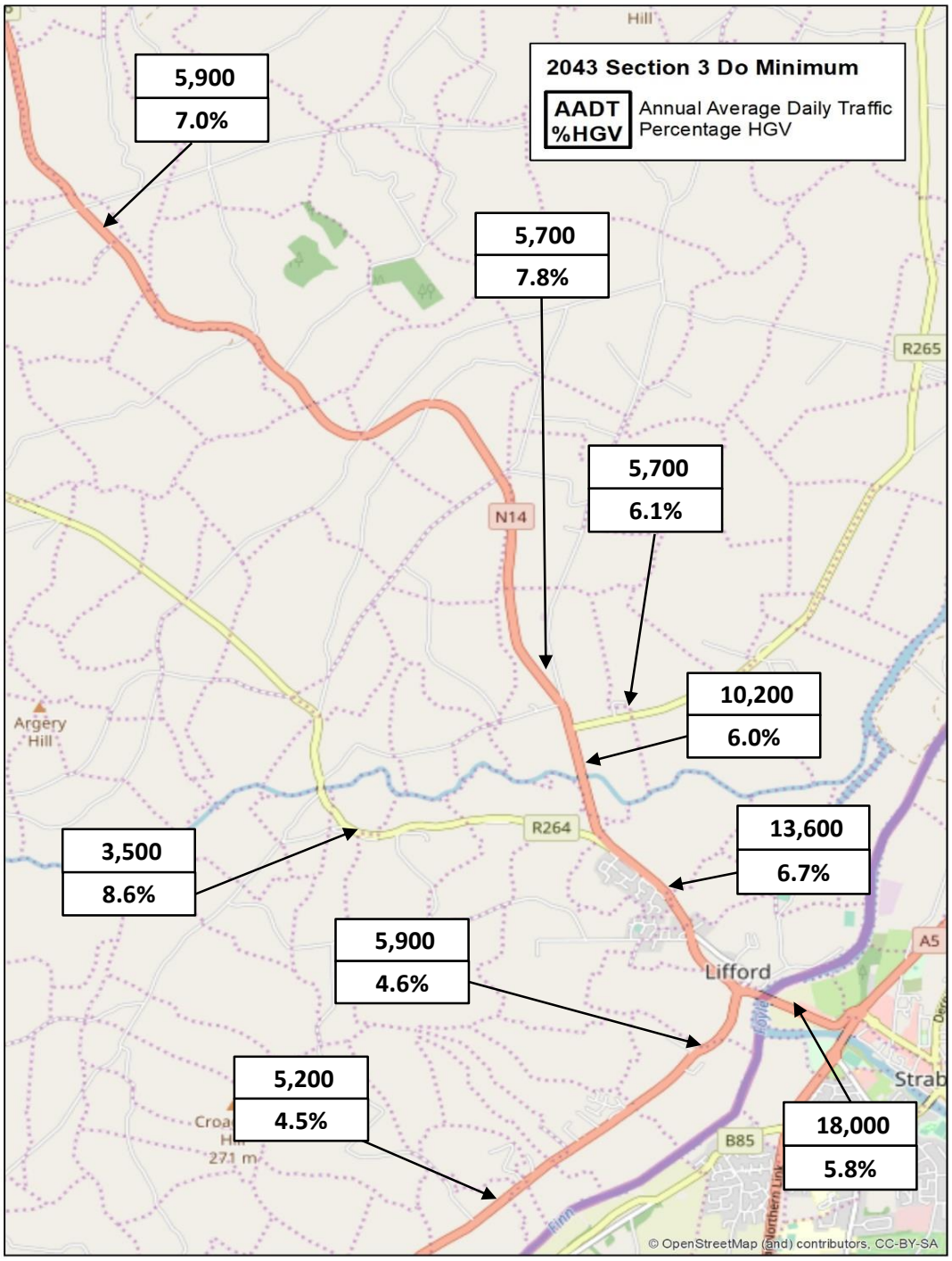


Figure D19 – Section 3 – Do Minimum 2043 Traffic Flows (South)

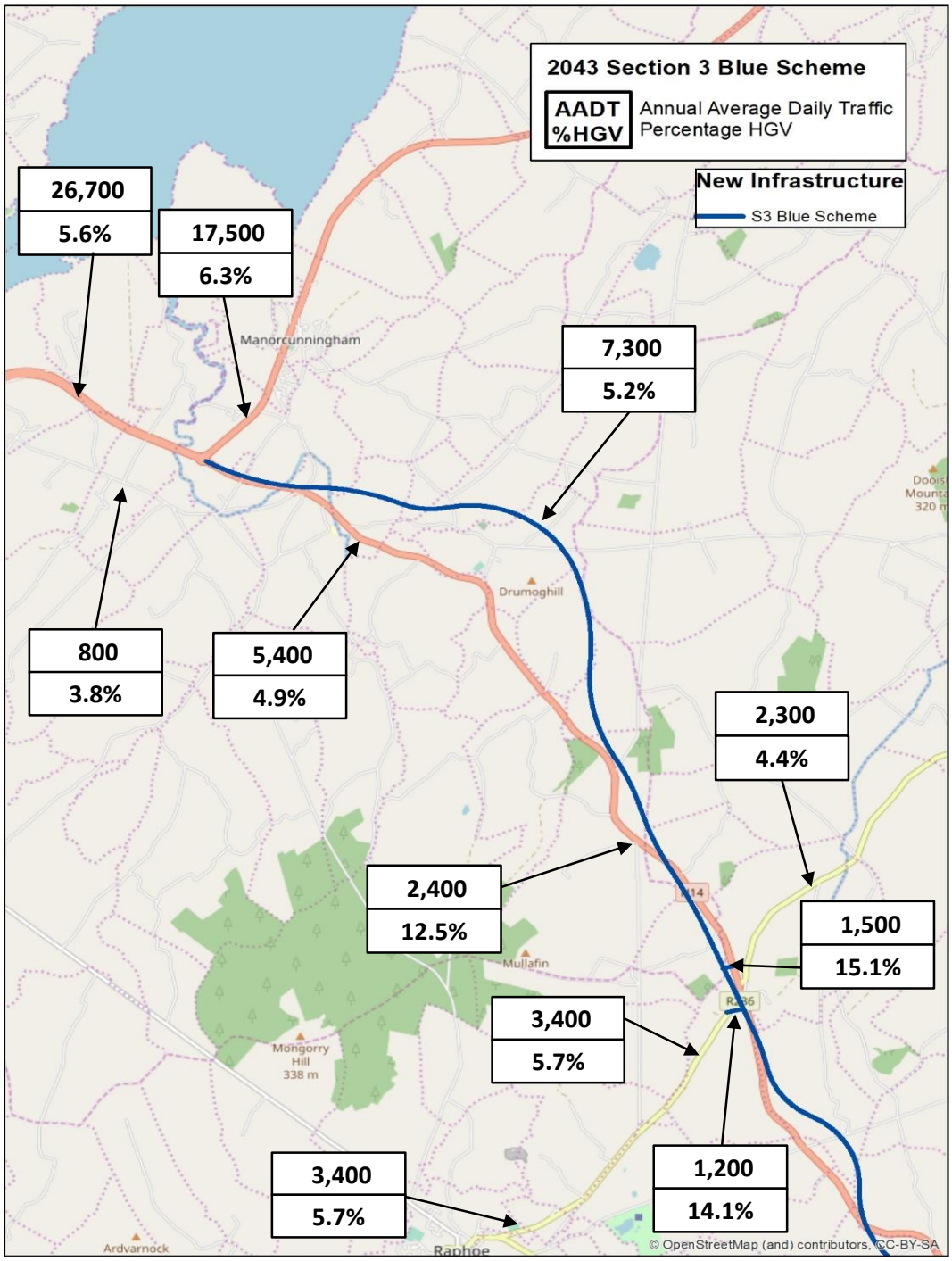


Figure D20 – Section 3 – 3A1 Blue 2043 Traffic Flows (North)

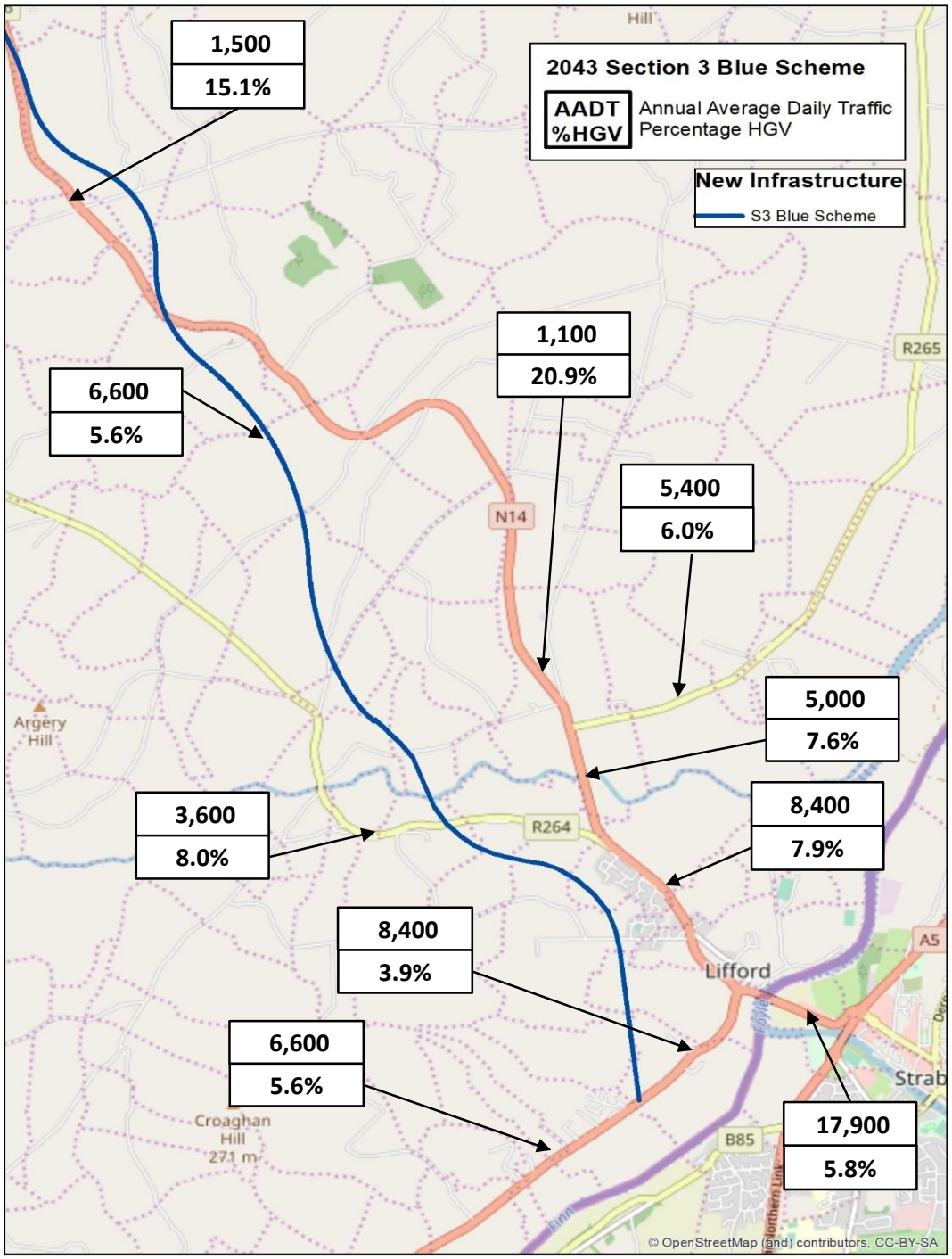


Figure D21 – Section 3 – 3A1 Blue 2043 Traffic Flows (South)

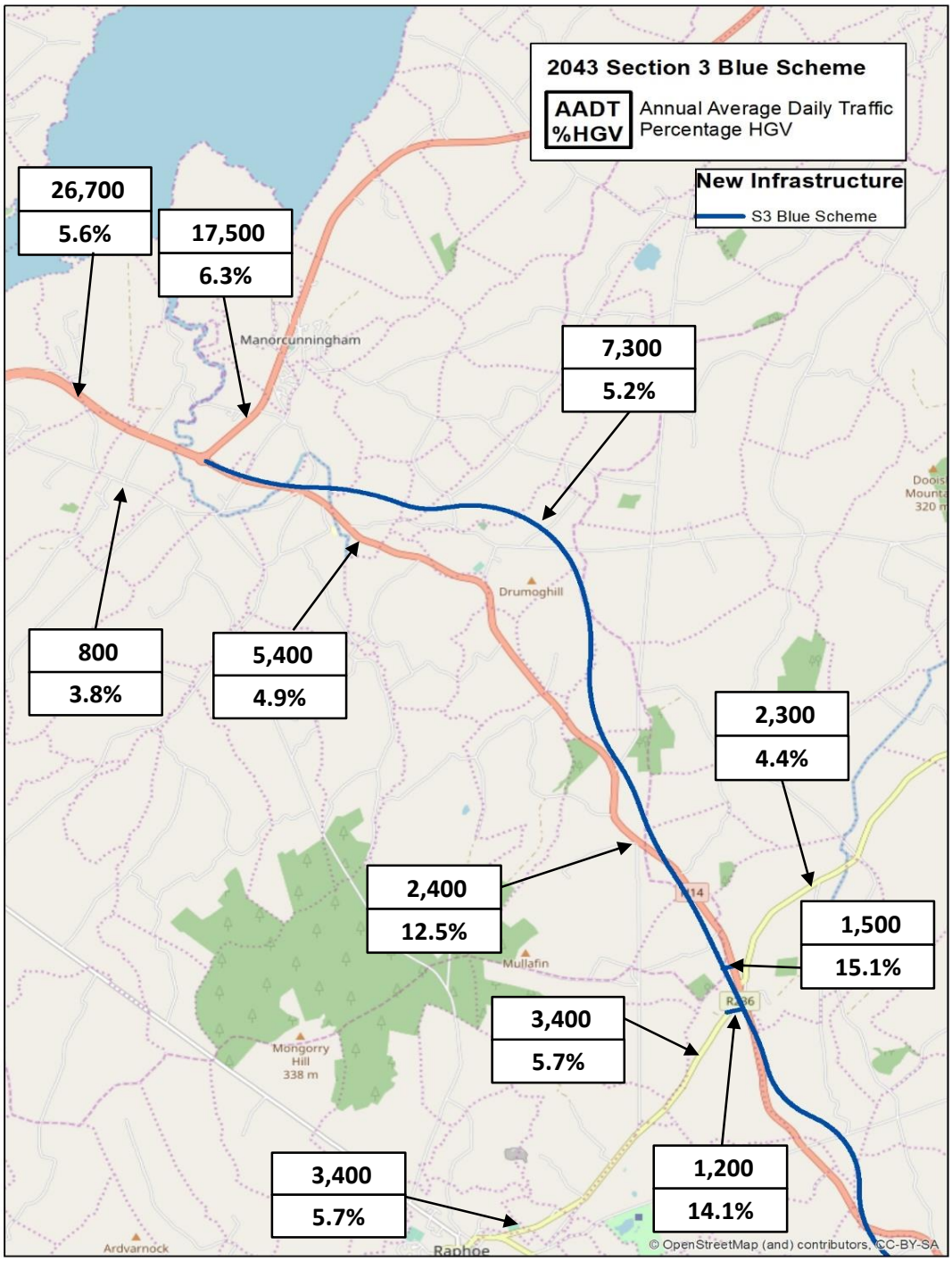


Figure D22 – Section 3 – 3A2 Blue 2043 Traffic Flows (North)

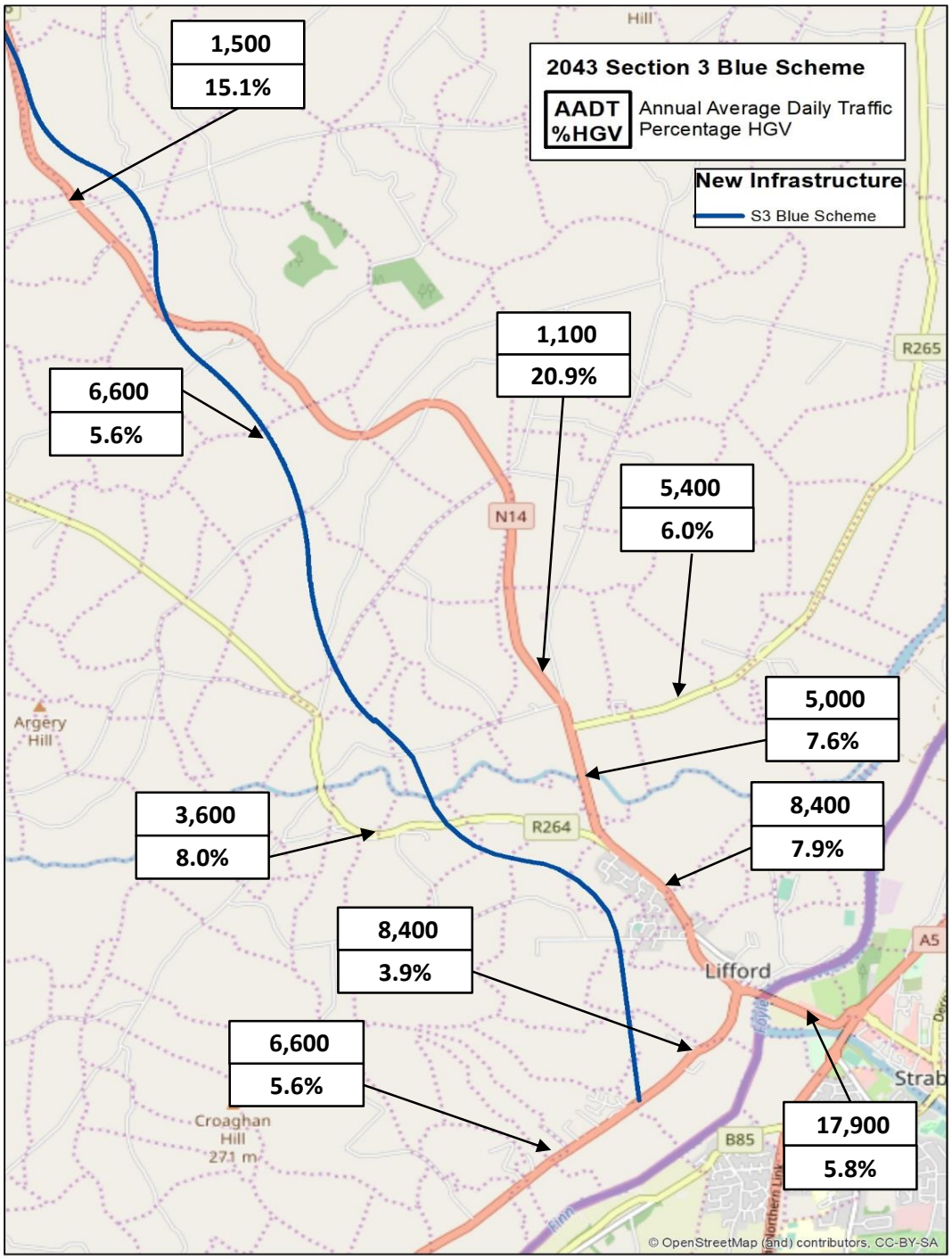


Figure D23 – Section 3 – 3A2 Blue 2043 Traffic Flows (South)

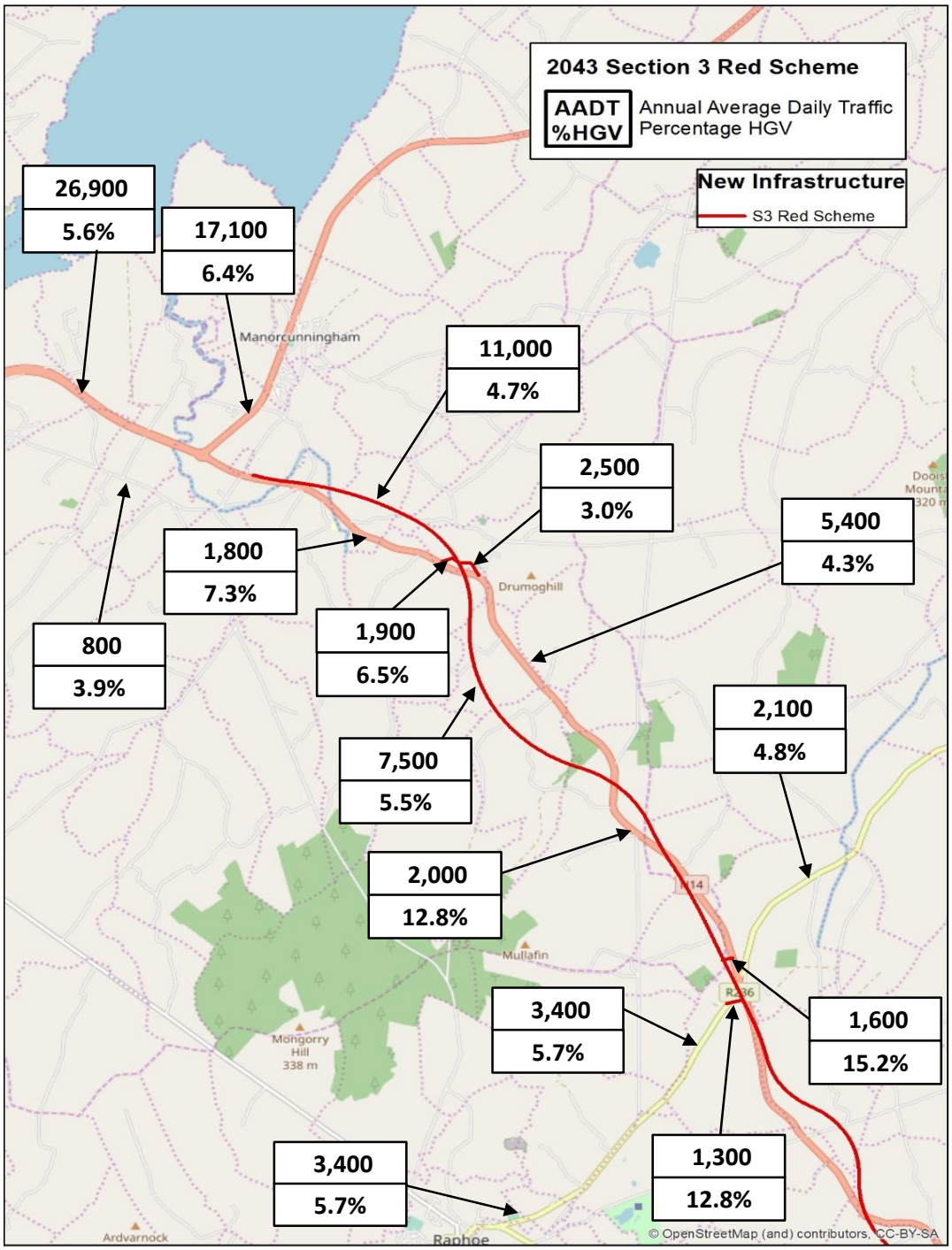


Figure D24 – Section 3 – 3B1 Red 2043 Traffic Flows (North)

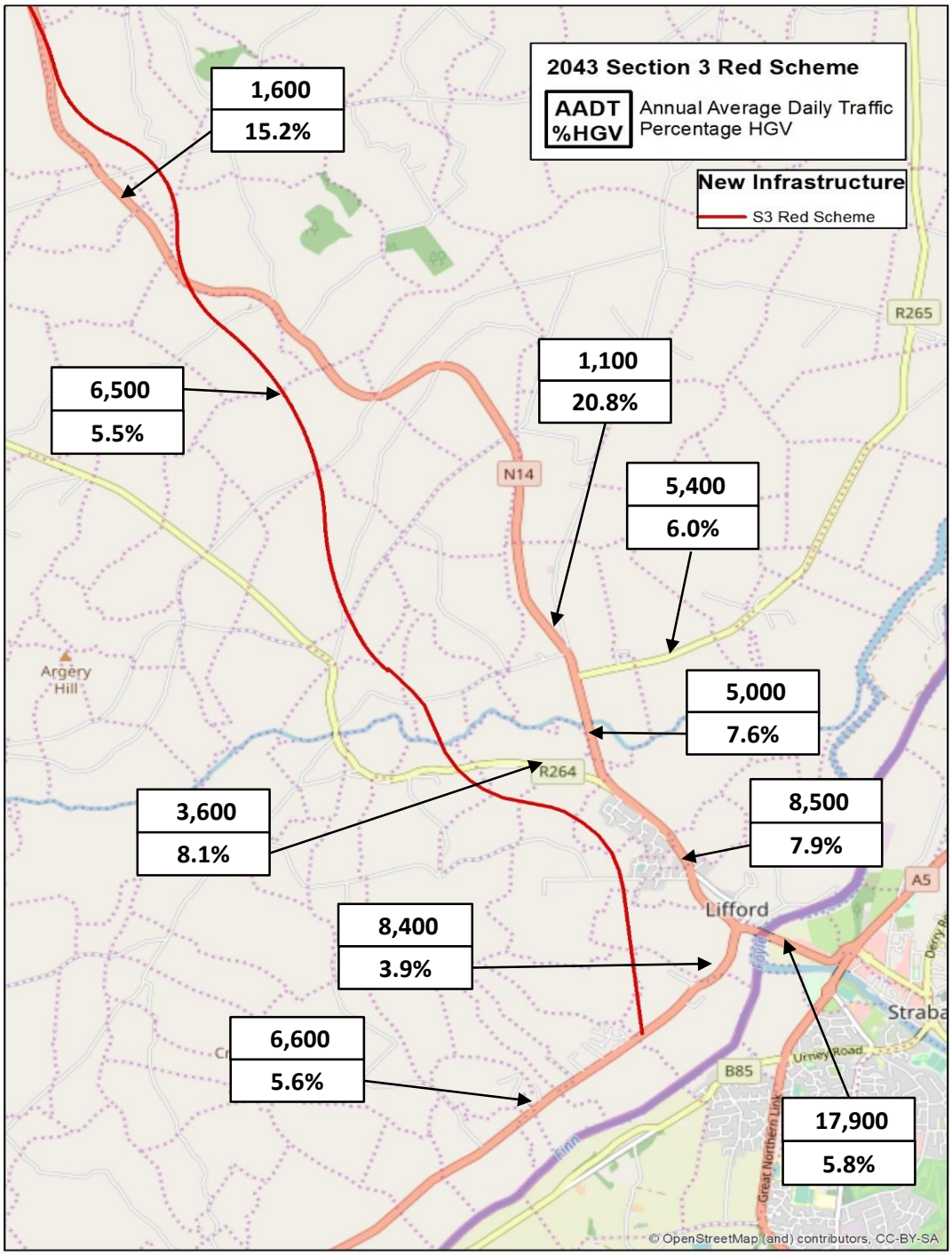


Figure D25 – Section 3 – 3B1 Red 2043 Traffic Flows (South)

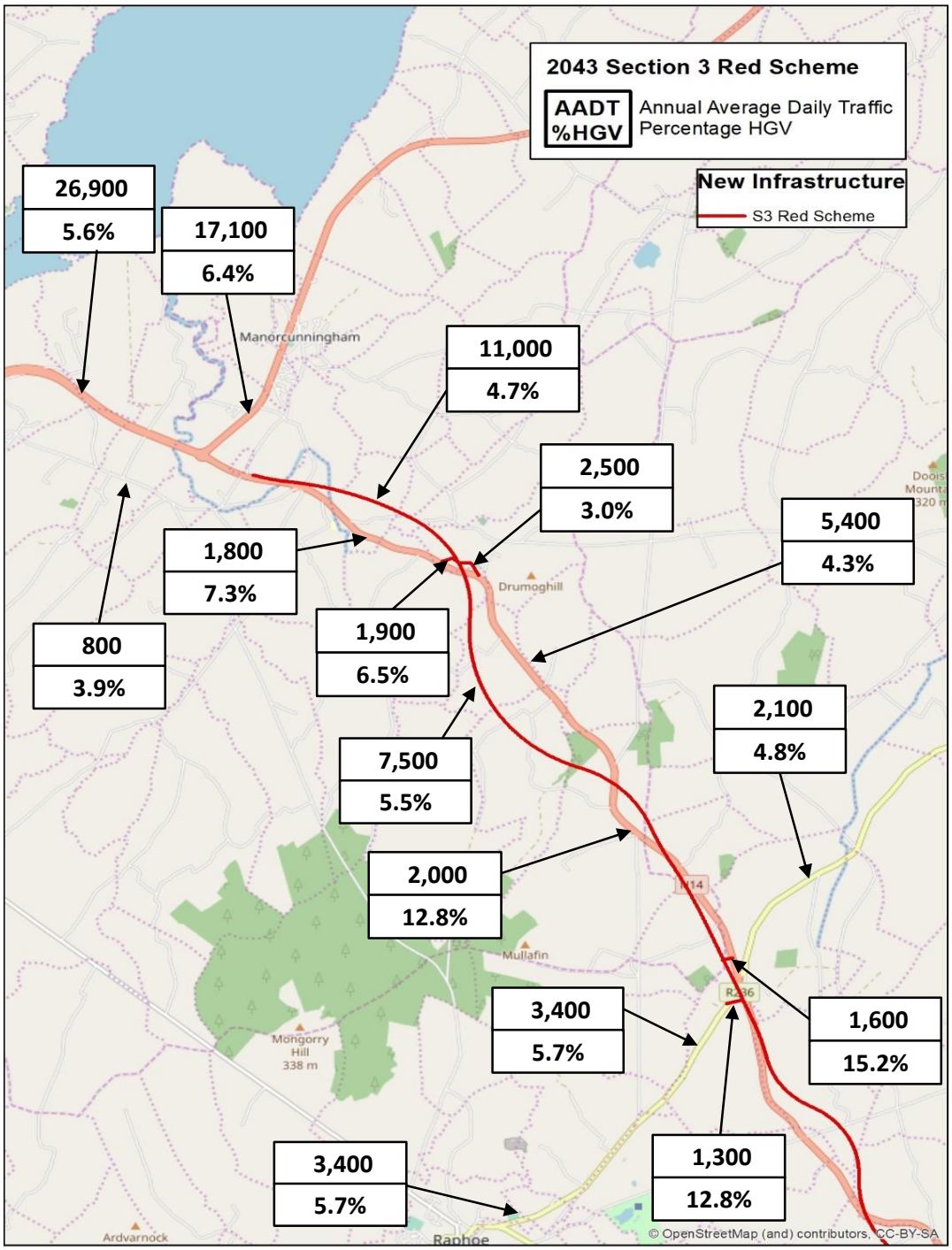


Figure D26 – Section 3 – 3B2 Red 2043 Traffic Flows (North)

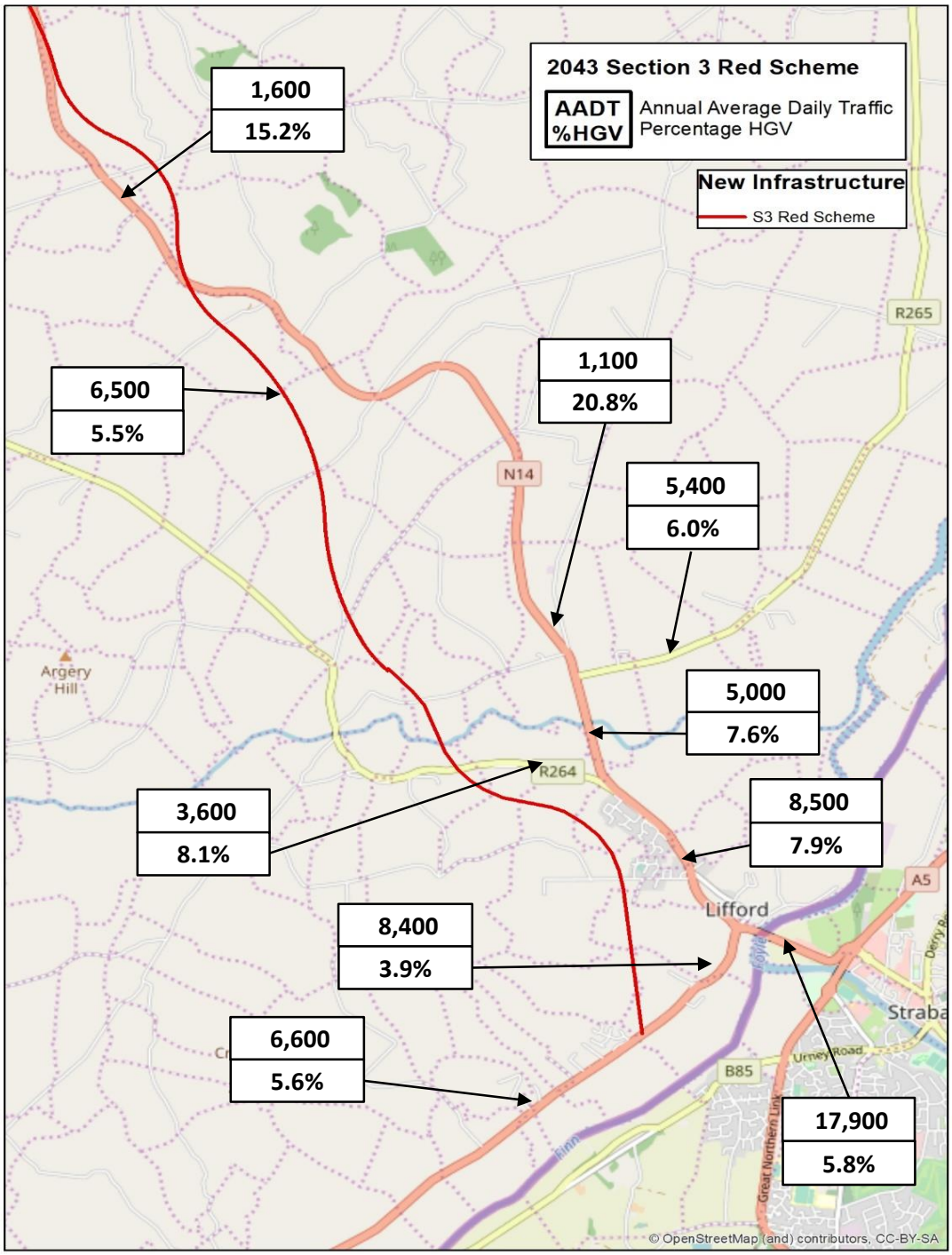


Figure D27 – Section 3 – 3B2 Red 2043 Traffic Flows (South)

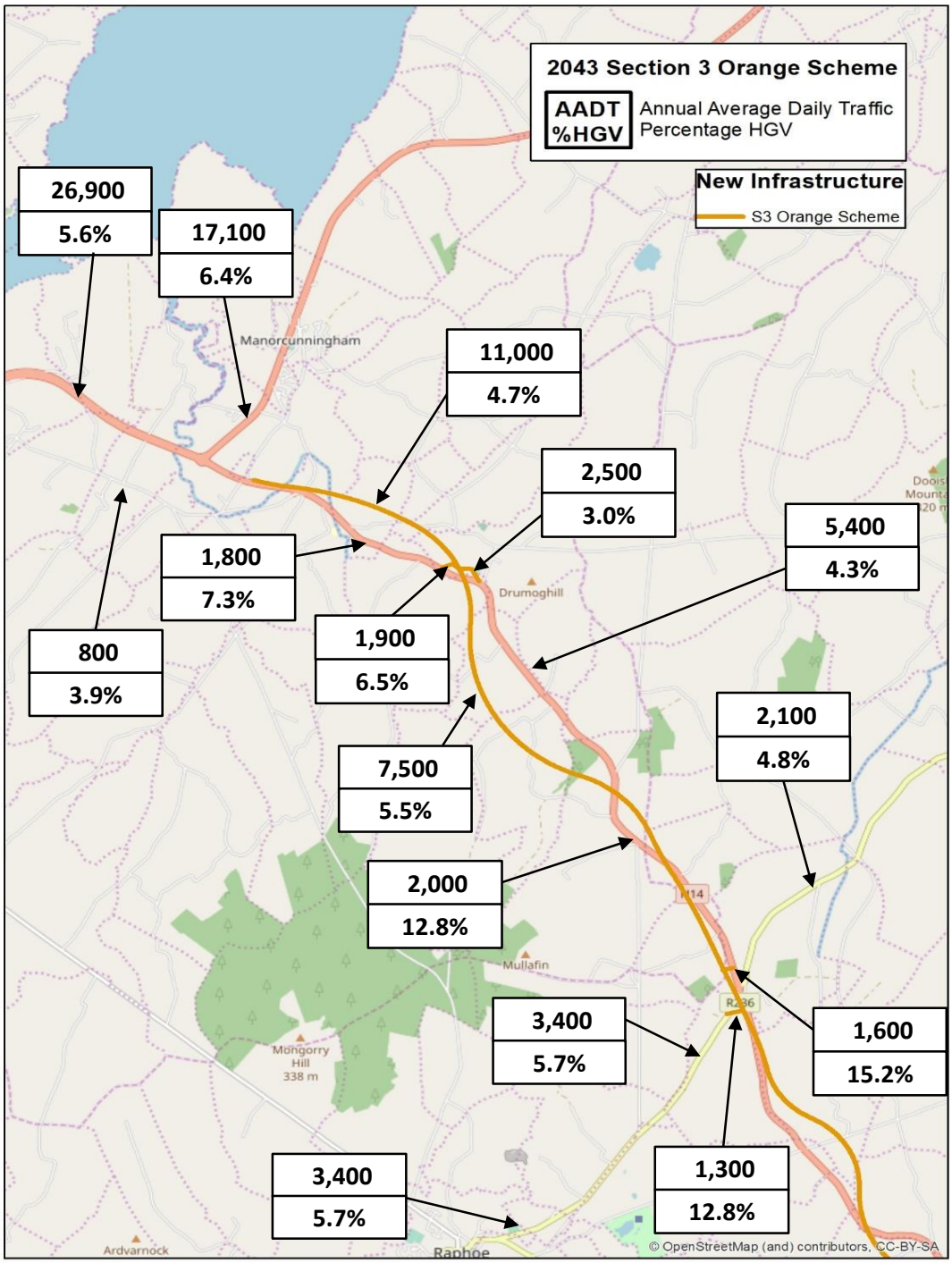


Figure D28 – Section 3 – 3C1 Orange 2043 Traffic Flows (North)

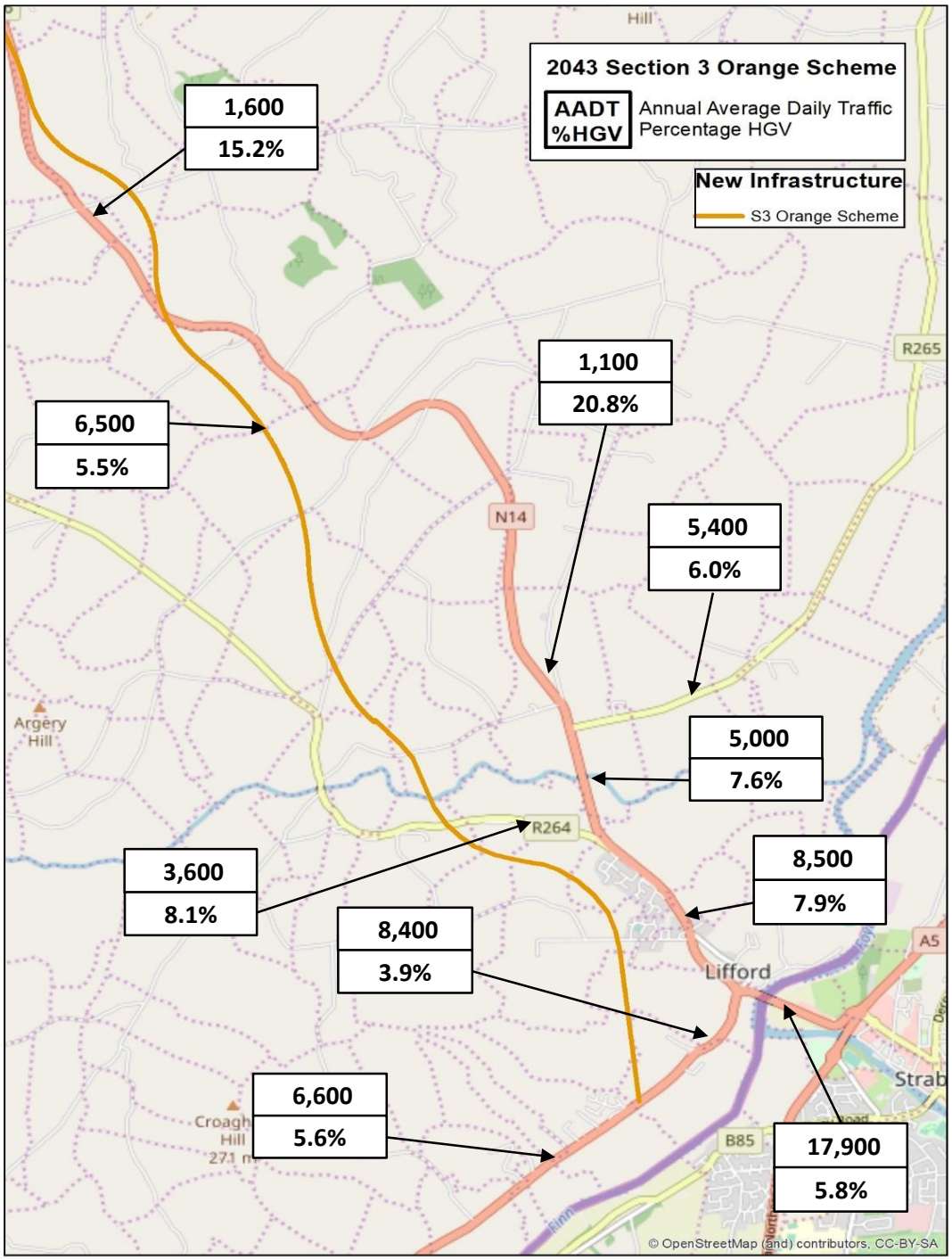


Figure D29 – Section 3 – 3C1 Orange 2043 Traffic Flows (South)

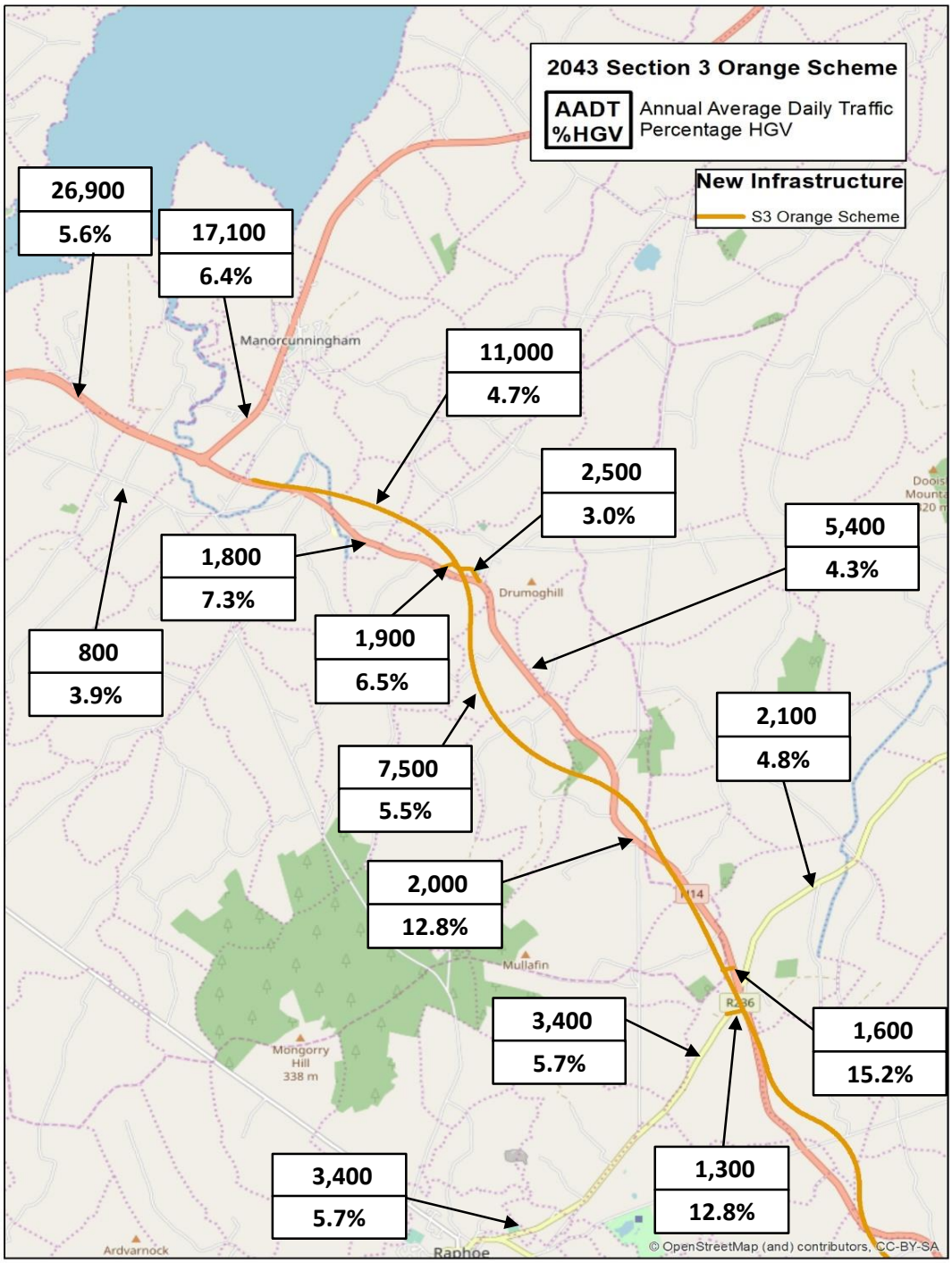


Figure D30 – Section 3 – 3C2 Orange 2043 Traffic Flows (North)

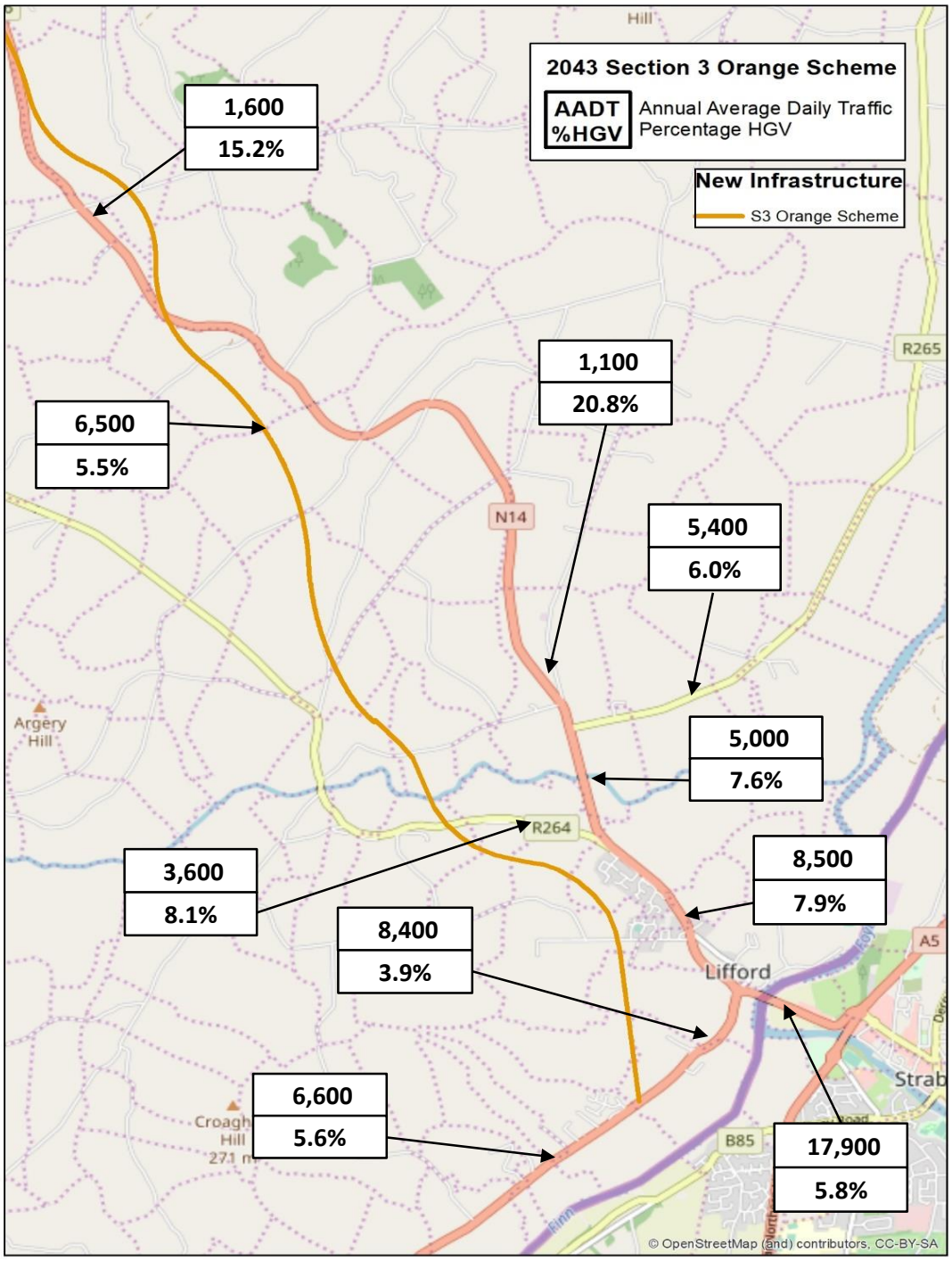


Figure D31 – Section 3 – 3C2 Orange 2043 Traffic Flows (South)

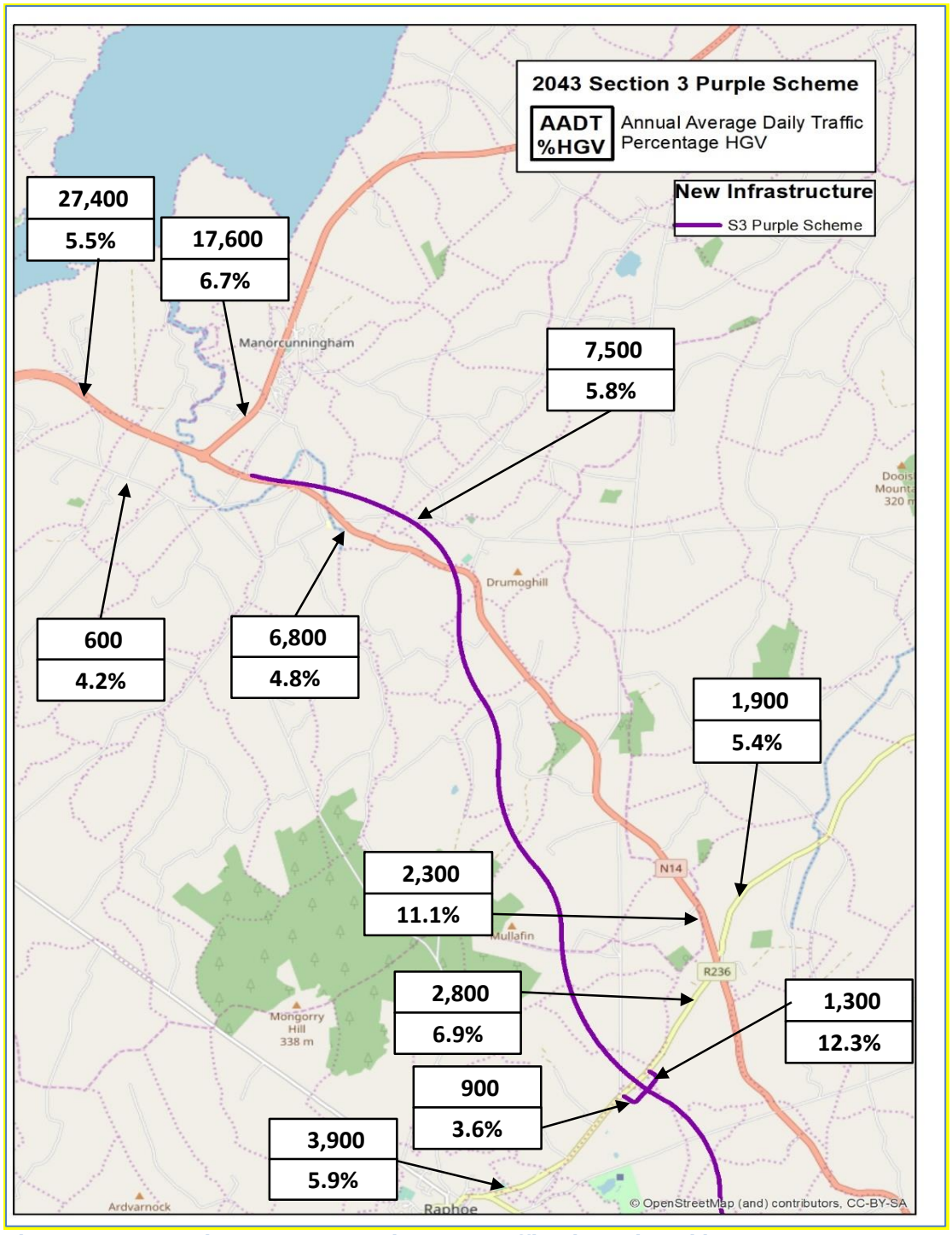


Figure D32 – Section 3 – 3D2 Purple 2043 Traffic Flows (North)

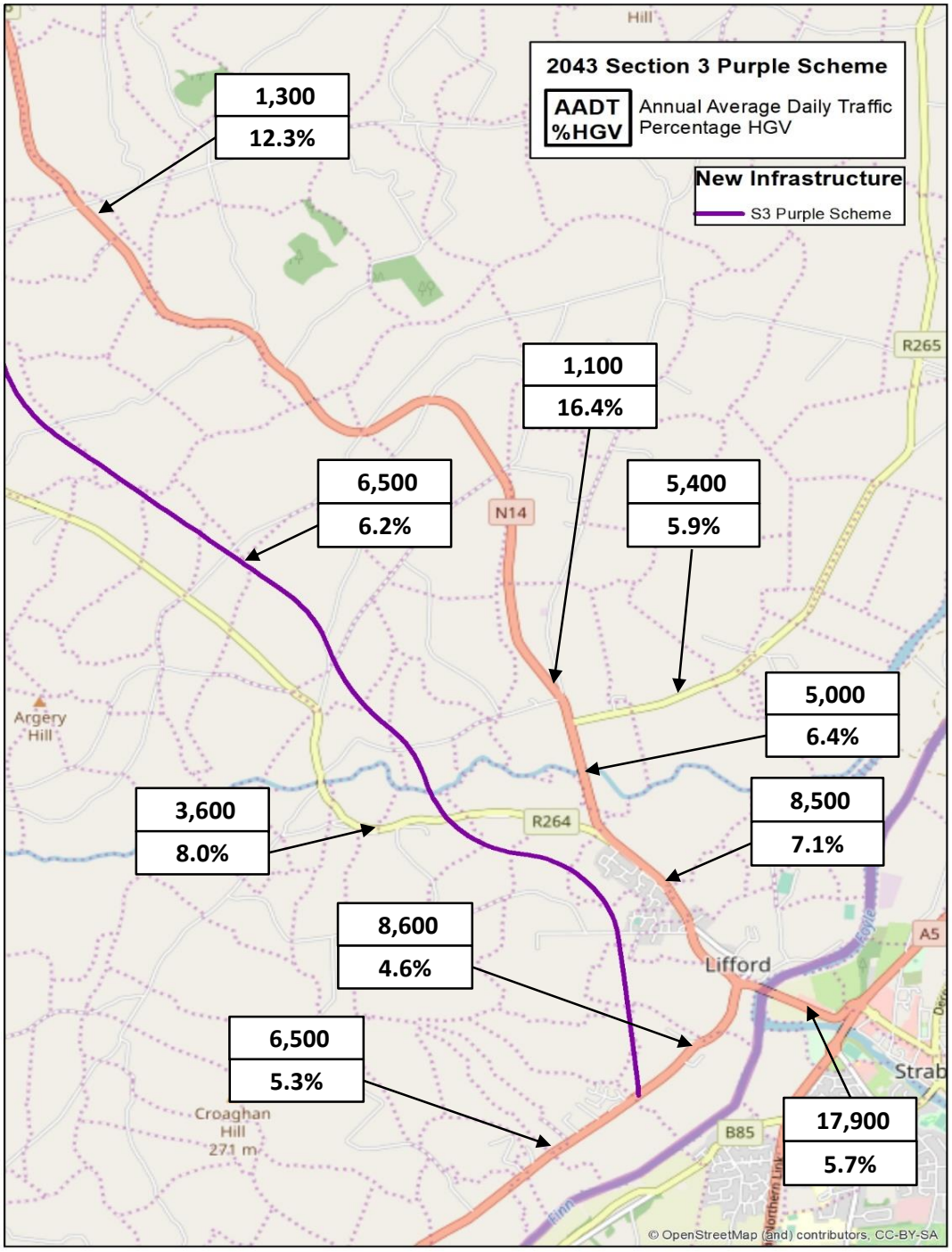


Figure D33 – Section 3 – 3D2 Purple 2043 Traffic Flows (South)

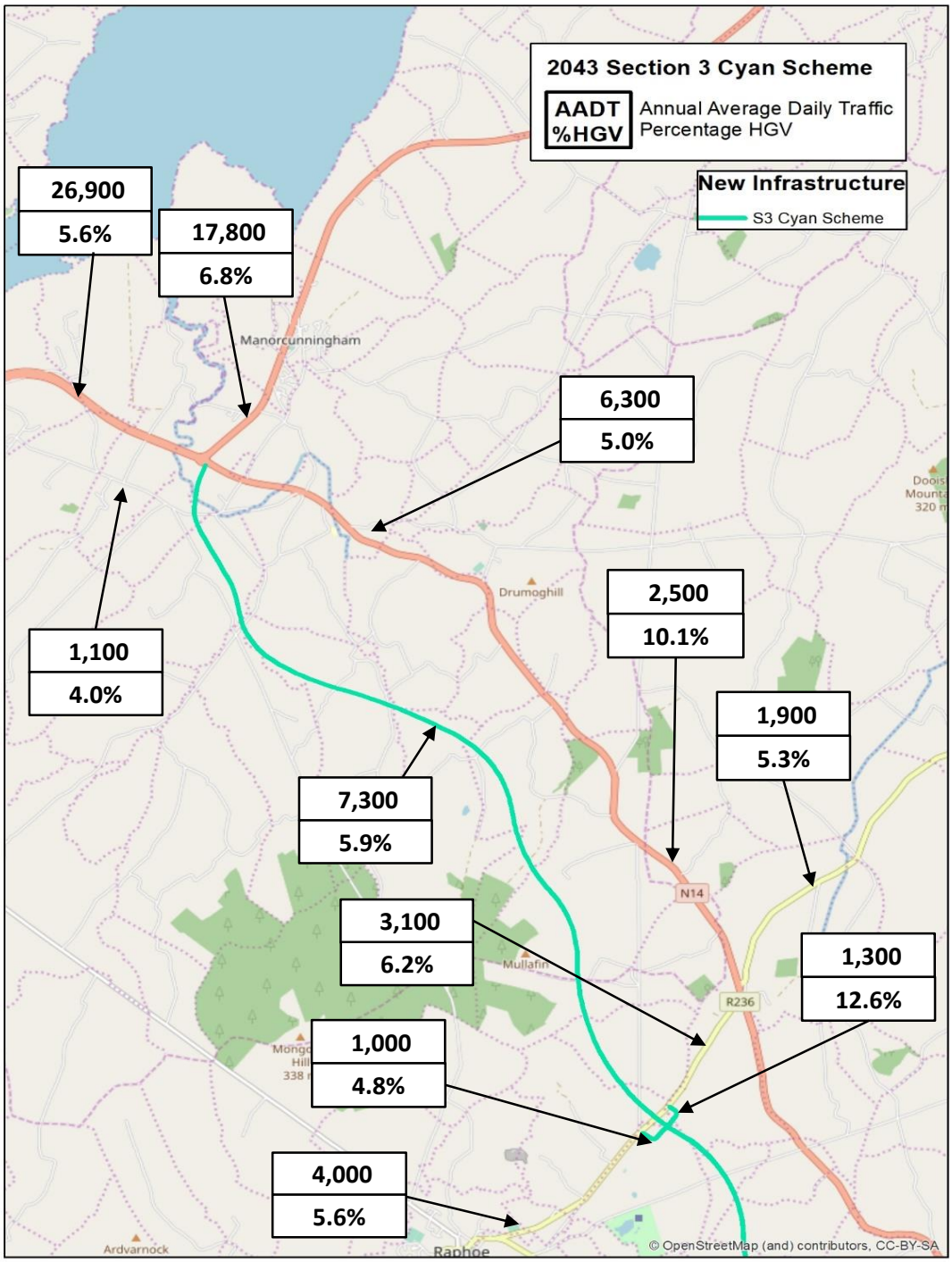


Figure D34 – Section 3 – 3E Cyan 2043 Traffic Flows (North)

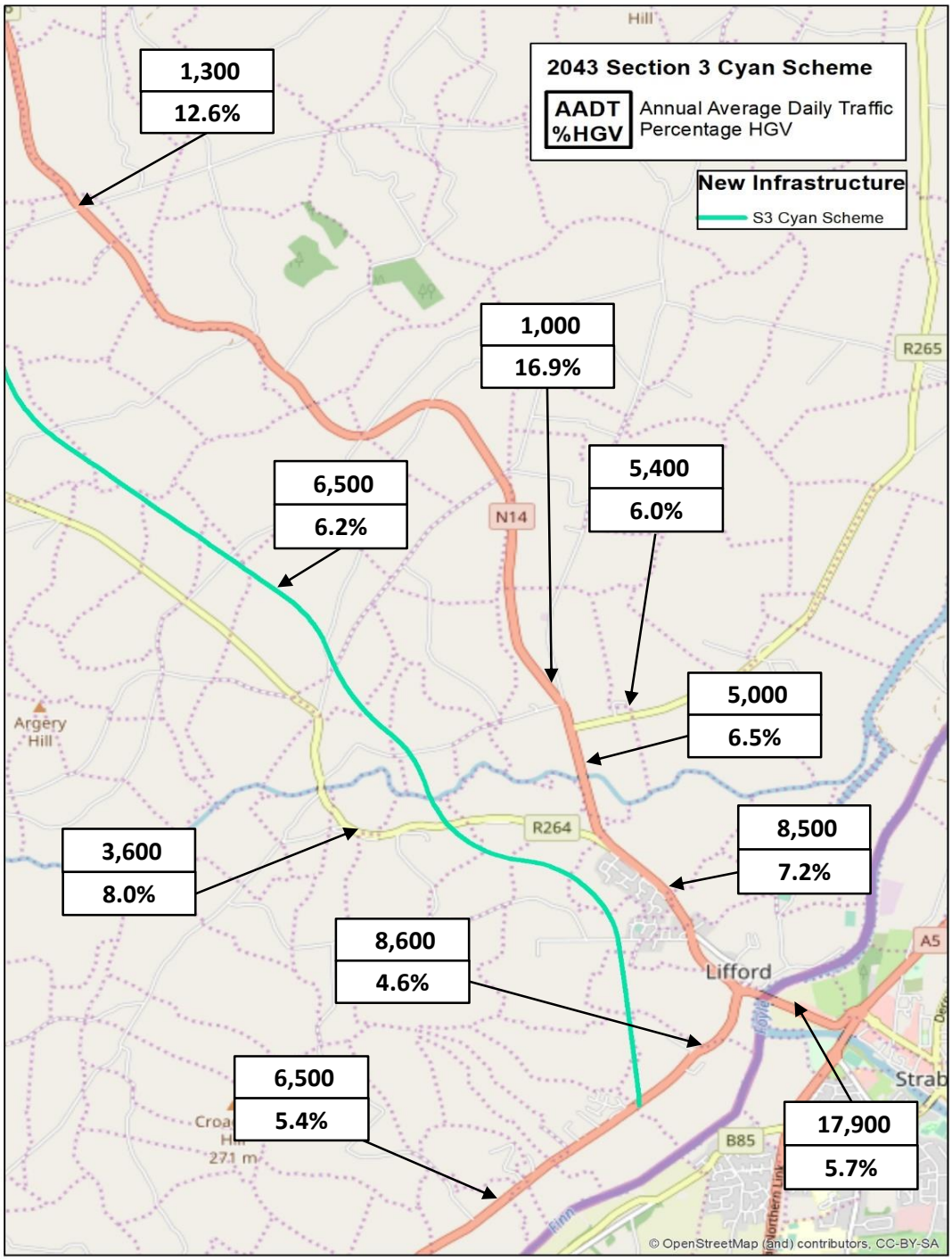


Figure D35 – Section 3 – 3E Cyan 2043 Traffic Flows (South)

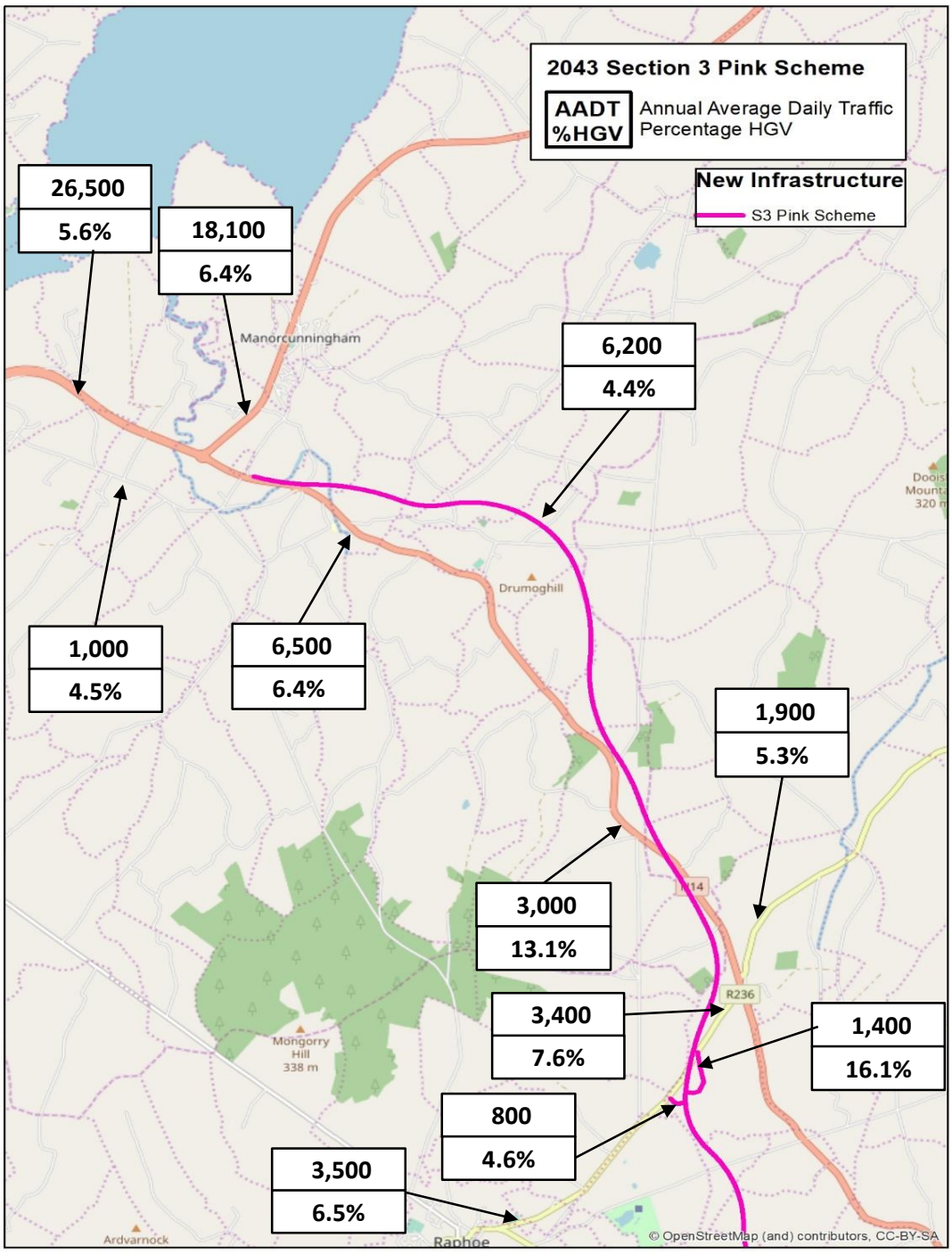


Figure D36 – Section 3 – 3F Pink 2043 Traffic Flows (North)

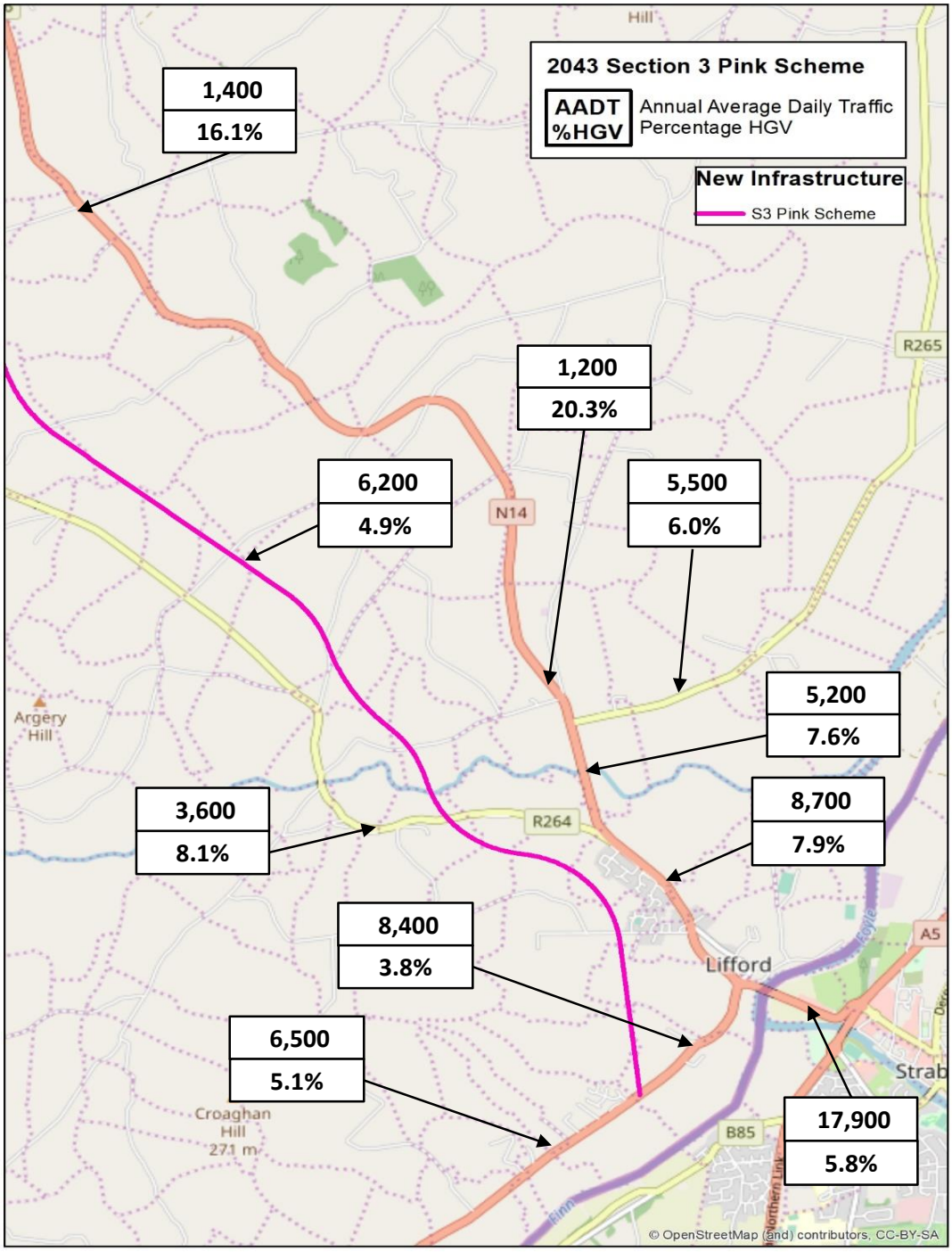


Figure D37 – Section 3 – 3F Pink 2043 Traffic Flows (South)

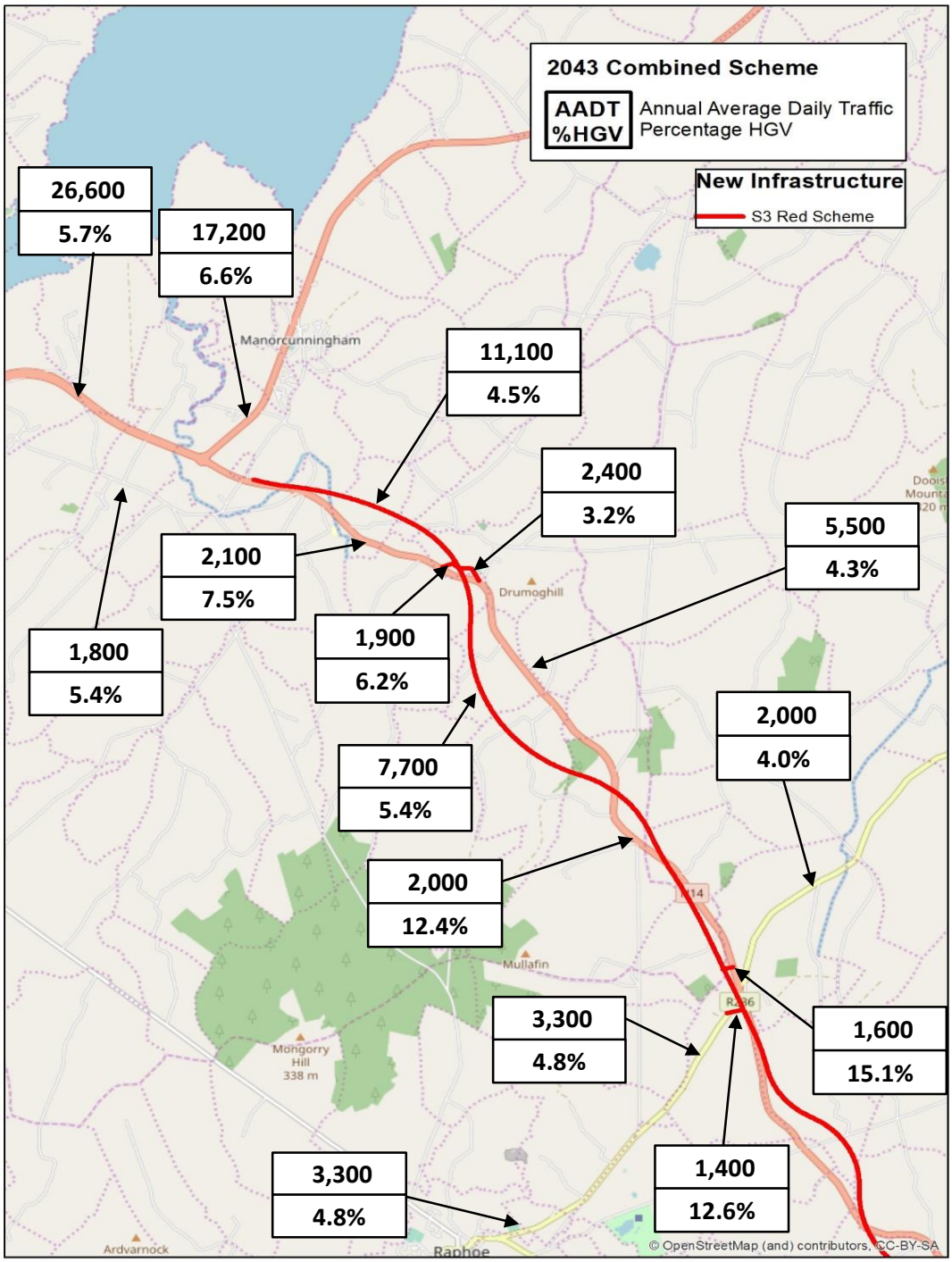


Figure D38 – Section 3 – 1G2 2D 3B2 Combined Scheme 2043 Traffic Flows (North)

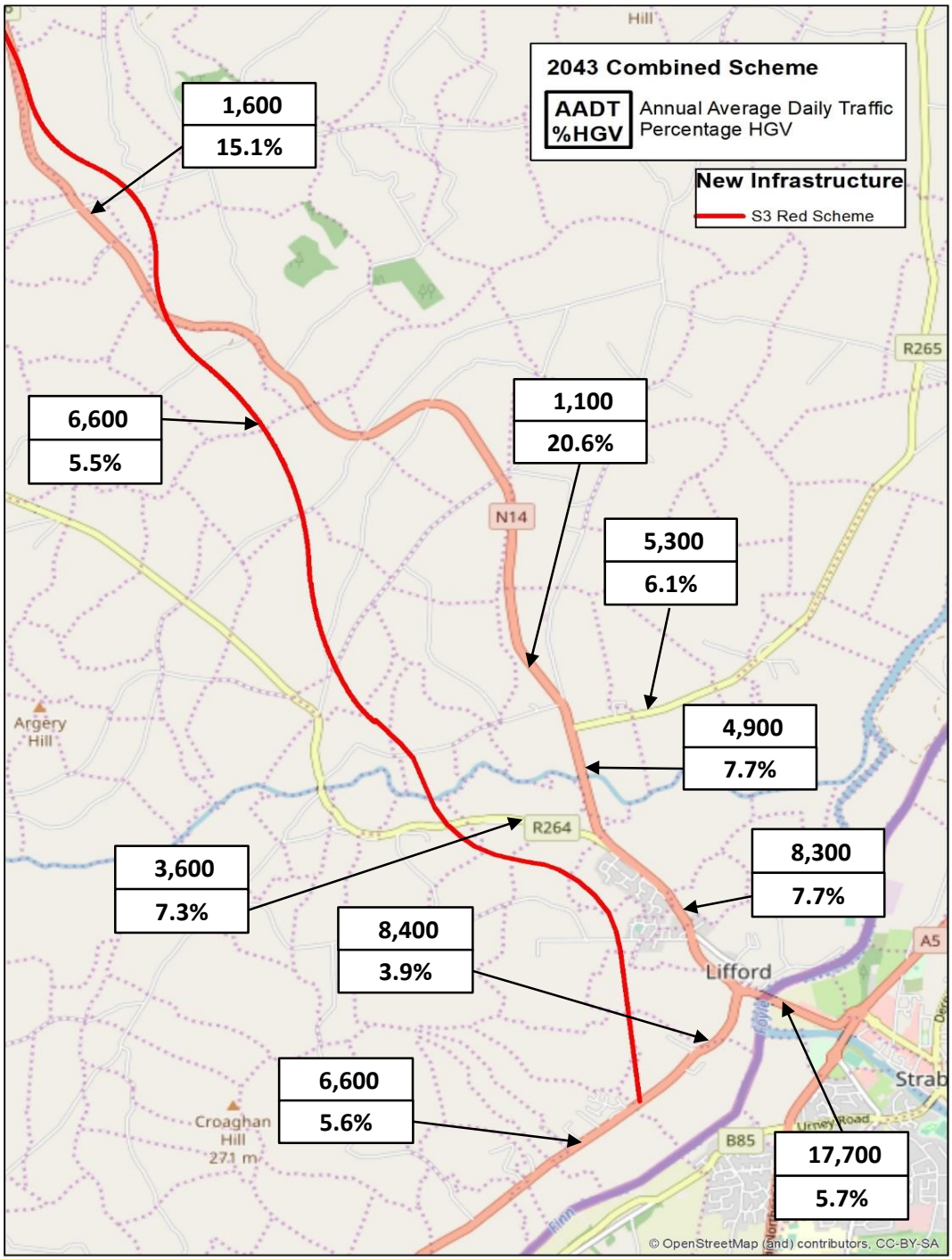


Figure D39 – Section 3 – 1G2 2D 3B2 Combined Scheme 2043 Traffic Flows (South)