

Letterkenny ILUTS Addendum

Final Modelling Report

Donegal County Council

September 2022



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1. Introduction

1.1. Background

Atkins previously provided consultancy services support to Donegal County Council (DCC) in the development of their Integrated Land Use and Transportation Study (ILUTS) for Letterkenny in 2009. As part of this project a strategic traffic model, known as the Letterkenny Traffic Model (LTM) was prepared. This model was then used as a basis upon which to test future transport proposals for the town.

DCC has since commissioned Atkins to update the model with the latest land use area plan for Letterkenny and review the modelling outputs for the town.

1.2. 2017 Base Model

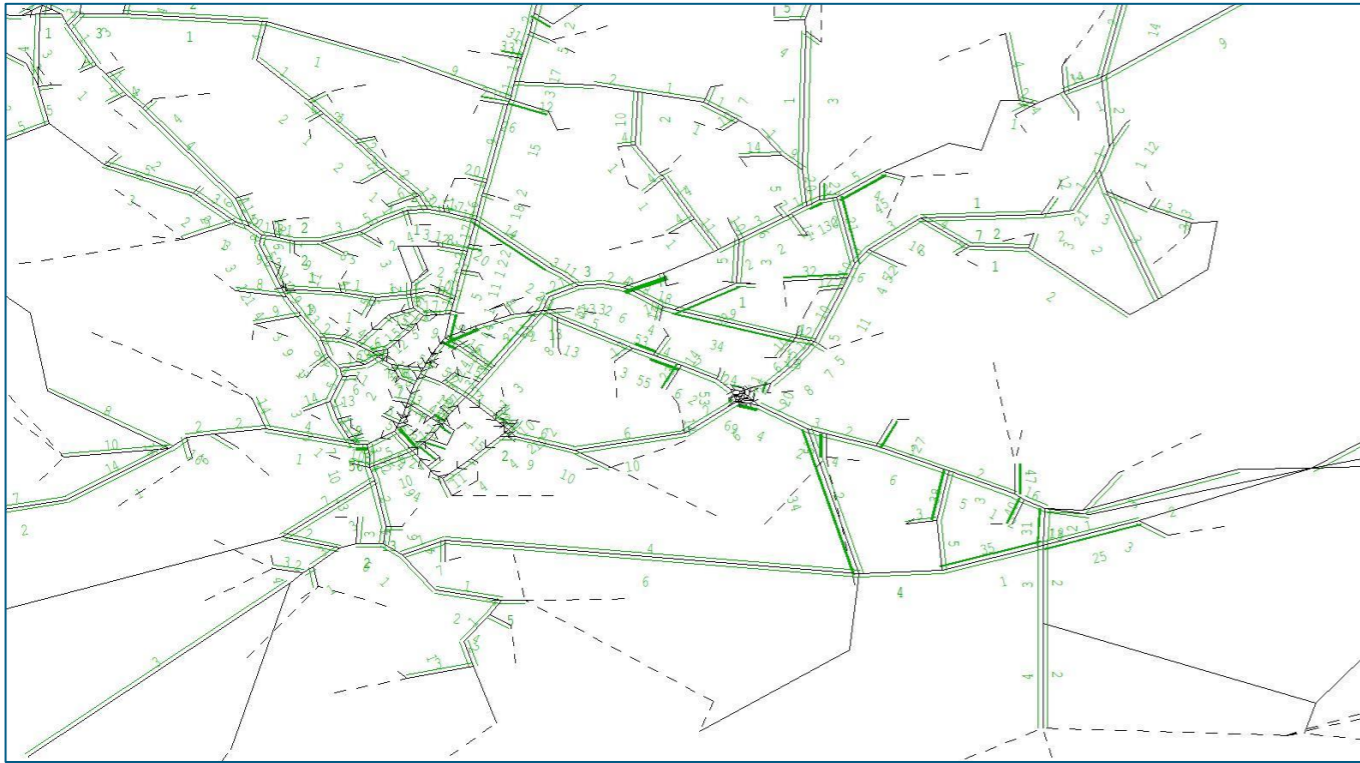
As detailed in TN01 Model Validation Report, the 2009 model was updated to a Present Year Validation (PYV) for 2017 using data collected by the DCC and TomTom Journey Time data. The report concluded that the 2017 base year model yielded a good representation of 2017 traffic patterns in Letterkenny and formed a sound basis upon which future travel demands for the town can be assessed.

The current baseline scenario for 2017 is shown in the delay and VoC plots on the following pages:

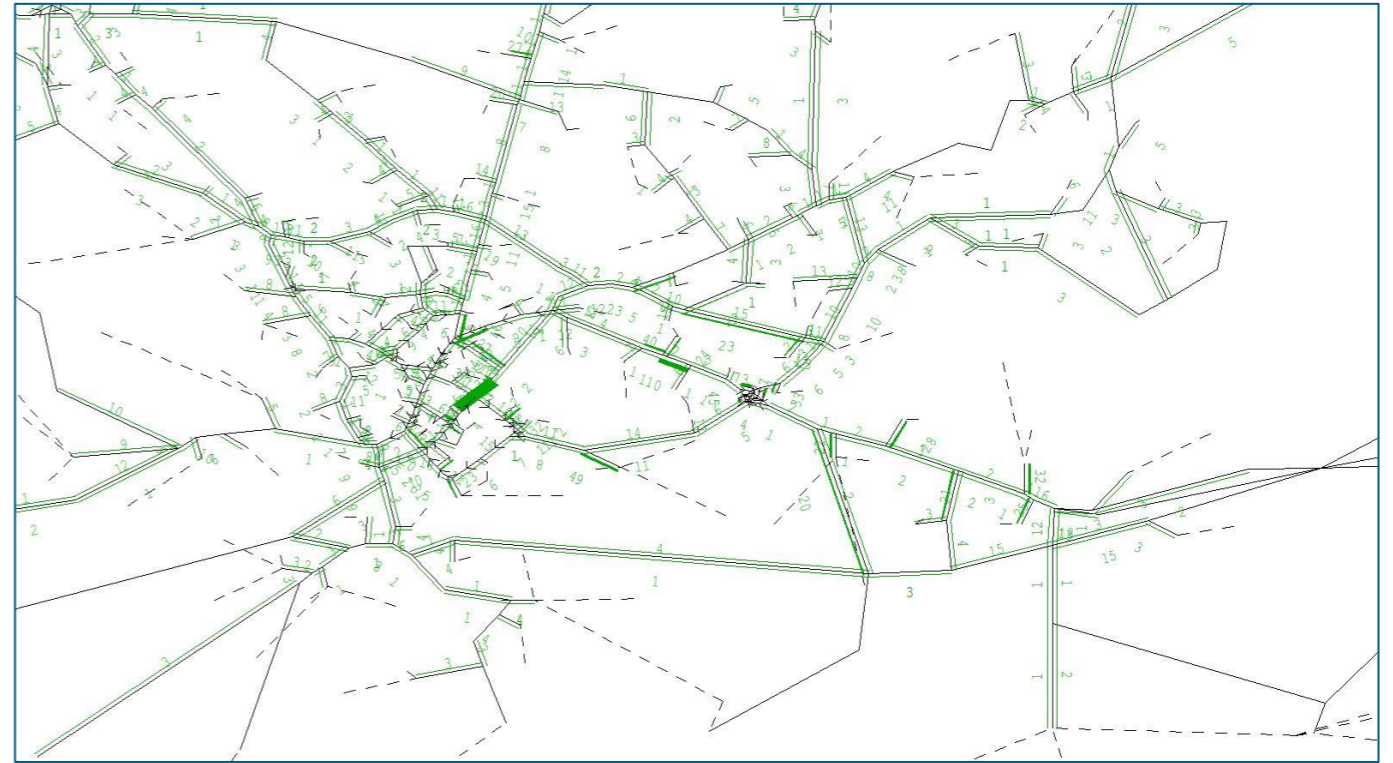
- The delay plots show the total delay in seconds along the link;
- The VoC (Volume over Capacity) shown as a percentage, is the ratio of hourly traffic to the capacity of a link i.e. the closer the VoC is to 100% the more congested the road is.

The VoC on specific links is also shown. The key links where the VoC have been extracted are shown in Figure 4-1.

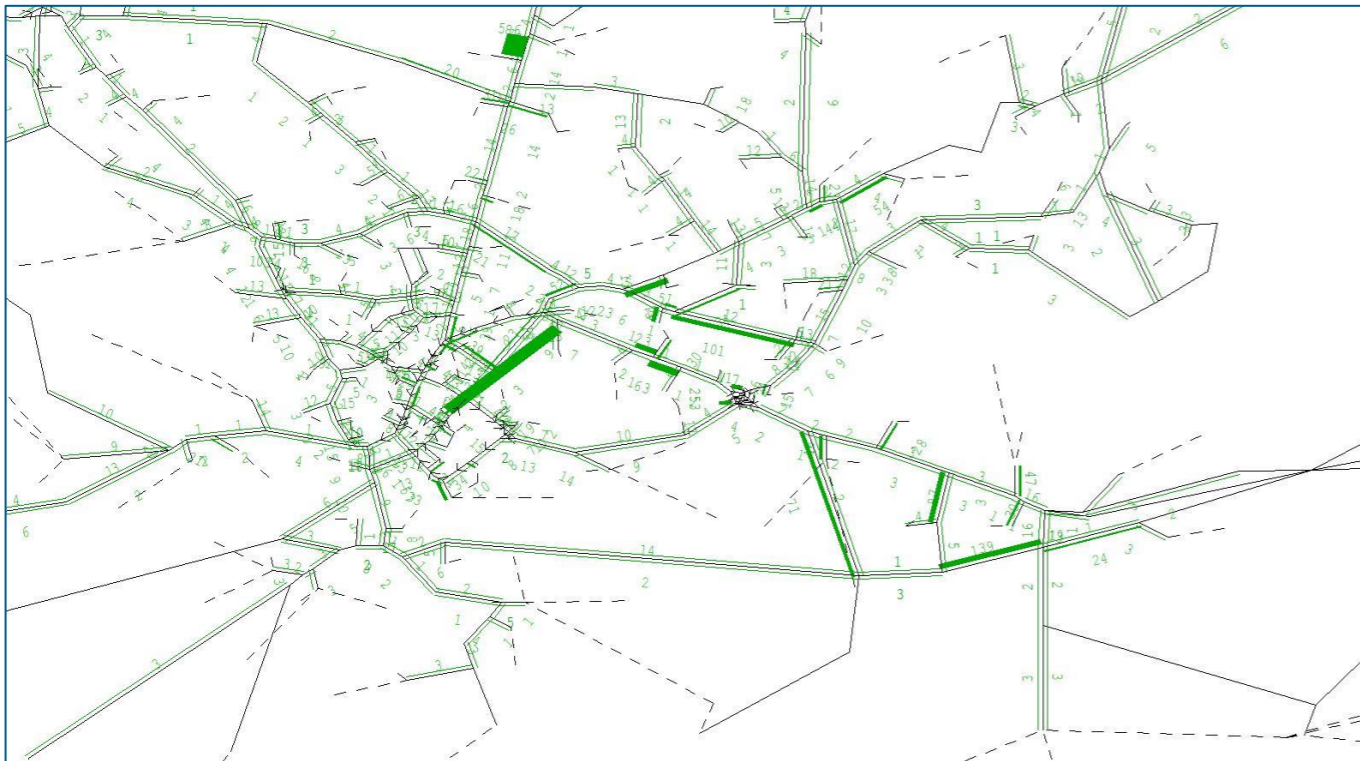
AM Delay: 2017 Base



IP Delay: 2017 Base



PM Delay: 2017 Base



The delay plots show the total delay along the link in seconds. This includes the total delay per turn including both transient and over capacity queuing effects.

The model delay plots show:

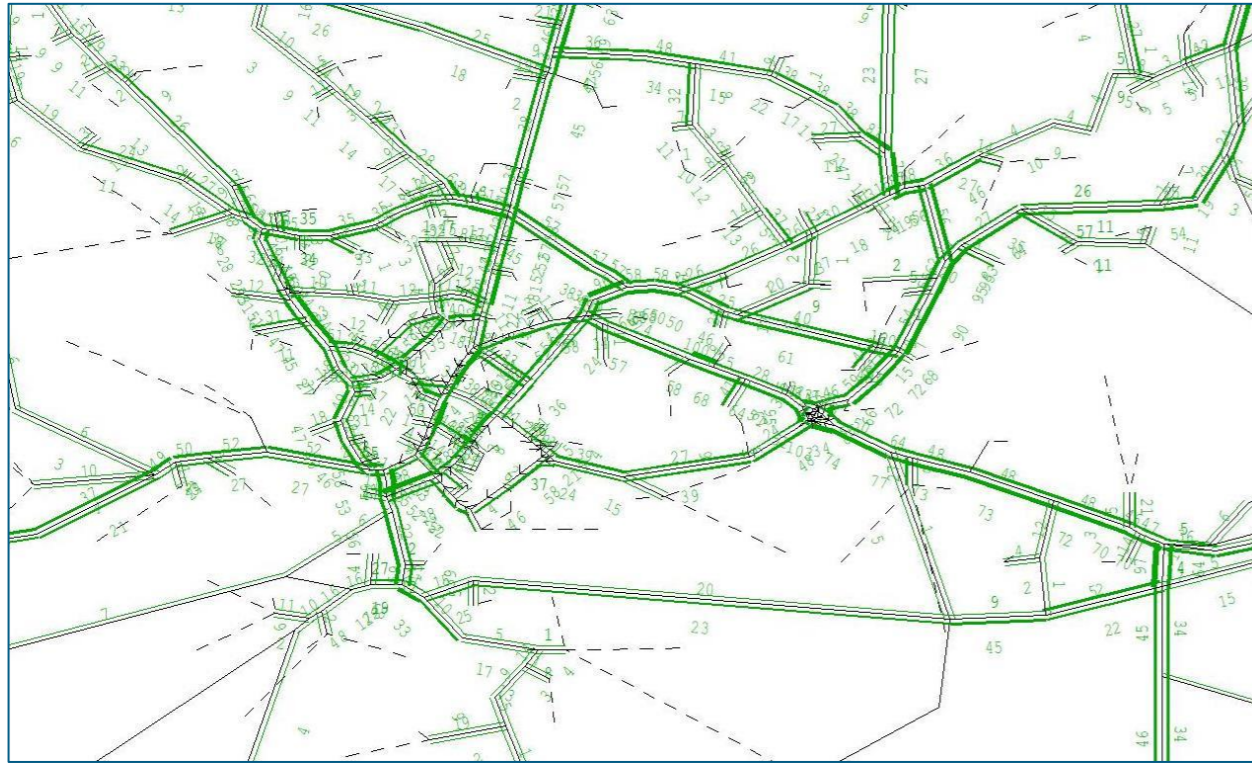
- There is some level of delay on almost all links throughout Letterkenny;
- There are significant levels of delay at the:
 - Links leading to the junction of the High Road and Port Road;
 - Pearse Road;
 - Along the Port Road at LYIT;
 - The Ballyraine Road;
 - At the Polestar Roundabout; and
 - Lower Main Street

These plots demonstrate that with the current levels of demand there is already a significant amount of delay and congestion in Letterkenny.

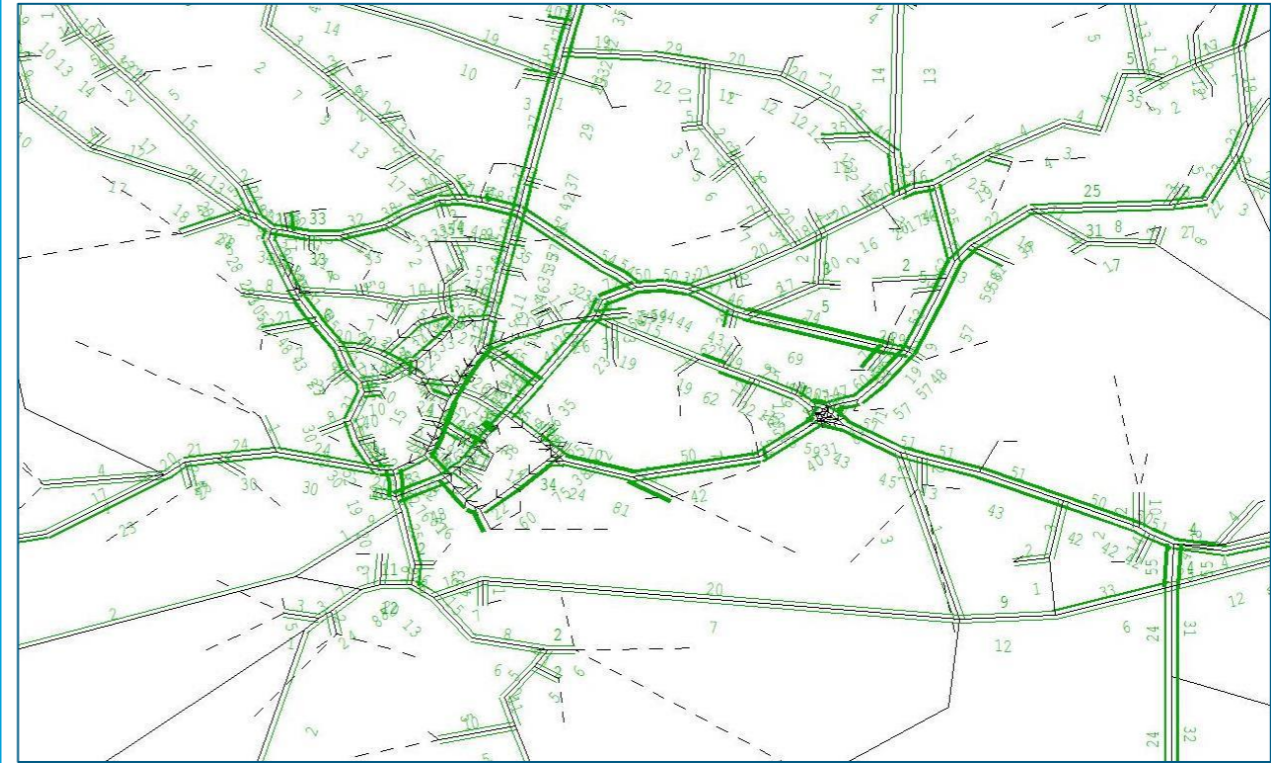
Table 1-1 – 2017 Base VoC on Key Links

ID	Location	Direction	2017 Base		
			AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	50.40	51.36	49.60
		WB	74.27	43.28	59.50
2	Four Lane Road at Dry Arch Roundabout	EB	47.24	50.68	56.49
		WB	70.11	41.59	54.80
3	Neil T Blaney Road	EB	27.08	49.90	38.05
		WB	38.79	41.52	35.96
4	Port Road	EB	100.38	61.53	103.91
		WB	57.60	19.31	36.19
5	Ballyraine Road	EB	40.13	73.66	60.30
		WB	60.75	68.62	104.01
6	N56	NB	54.00	53.44	72.38
		SB	89.97	57.20	58.67
7	South West of Kilty Roundabout	NB	29.86	20.09	51.16
		SB	17.65	15.52	26.21
8	Kilmacrennan Road	NB	38.16	37.13	54.60
		SB	45.05	29.12	46.51
9	Port Road	SB	52.18	40.84	58.36
10	High Road	NB	41.36	33.51	49.48
		SB	81.38	46.12	59.83
11	Main Street	SB	91.10	91.72	95.94
12	Paddy Harte Road	SB	58.30	75.50	81.85
13	Pearse Road	NB	53.78	48.82	52.34
		SB	36.43	34.63	47.73
14	Convent Road	NB	48.79	31.23	47.86
		SB	22.36	15.41	33.85
15	R250	EB	51.77	23.96	35.35
		WB	26.53	30.36	51.28
16	Leck Road	EB	19.77	19.84	73.66
		WB	22.77	6.81	13.97
17	R229	EB	56.70	53.83	65.22
		WB	44.60	34.52	41.71
18	N56	EB	47.78	29.13	47.75
		WB	33.73	22.16	45.41
19	N56	NB	30.40	36.66	65.68
		SB	56.71	33.19	36.51

AM VoC: 2017 Base



IP VoC: 2017 Base



PM VoC: 2017 Base



The VoC plots and link table show the percentage Volume over Capacity. These plots show:

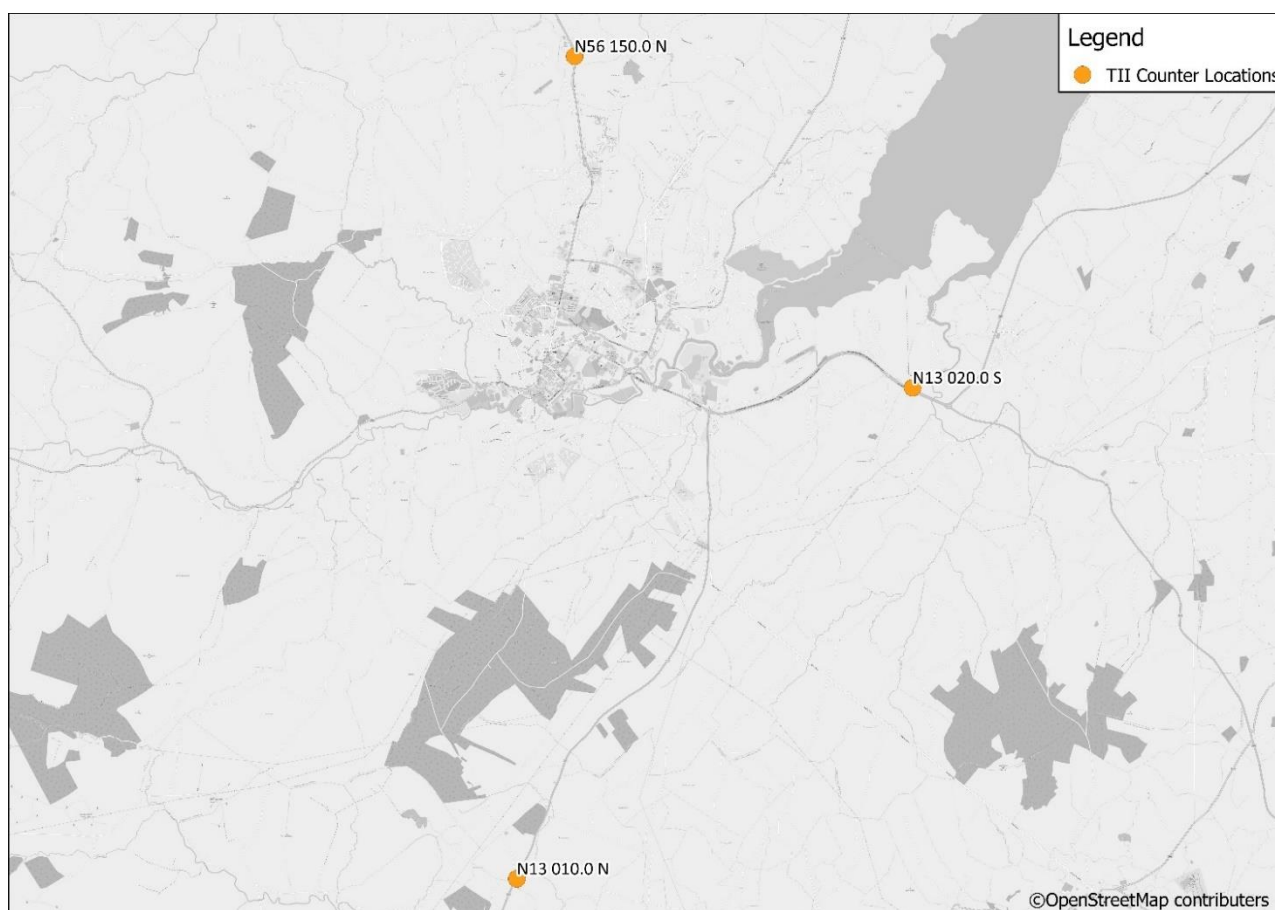
- There is a high VoC percentage on:
 - Main Street;
 - Ballyraine Road (particularly in the IP and PM);
 - The Leck Road in the PM peak;
 - Port Road at the LYIT Campus;
 - N56.
- There is generally a higher VoC percentage across Letterkenny in the PM peak compared with the AM and IP.

1.3. 2022 Traffic Levels

1.3.1. TII Traffic Count Data

Given that the base year model was updated to reflect a pre Covid-19 scenario a review was undertaken of existing available Traffic Count Data¹ collected by Traffic Infrastructure Ireland (TII) in order to understand the impact of the pandemic on the traffic levels on the main routes into/out of Letterkenny. There are three counters located close to Letterkenny, these are shown in Figure 1-1.

Figure 1-1 - TII Traffic Counters



A comparison of the traffic counts from June 2019 to June 2022 is shown in Table 1-2.

Table 1-2 - Overall Traffic Levels 2019 v 2022

Location	2019 Daily Traffic	2022 Daily Traffic	Difference	% Difference
N13 020	21730	21669	-61	0%
N56 150	12221	13238	+1017	8%
N13 010	10545	10405	-140	-1%

Table 1-2 illustrates that the total daily traffic in the area has recovered from the reduced flows during the height of the pandemic and moreover in the case of the N56 counter, traffic levels are higher in 2022 compared to 2019.

The traffic levels across a 24hr period are shown in Figure 1-2 to Figure 1-4.

¹ [Traffic Count Data - \(tii.ie\)](https://www.tii.ie/)

Figure 1-2 – N13 020 Daily Traffic Trend

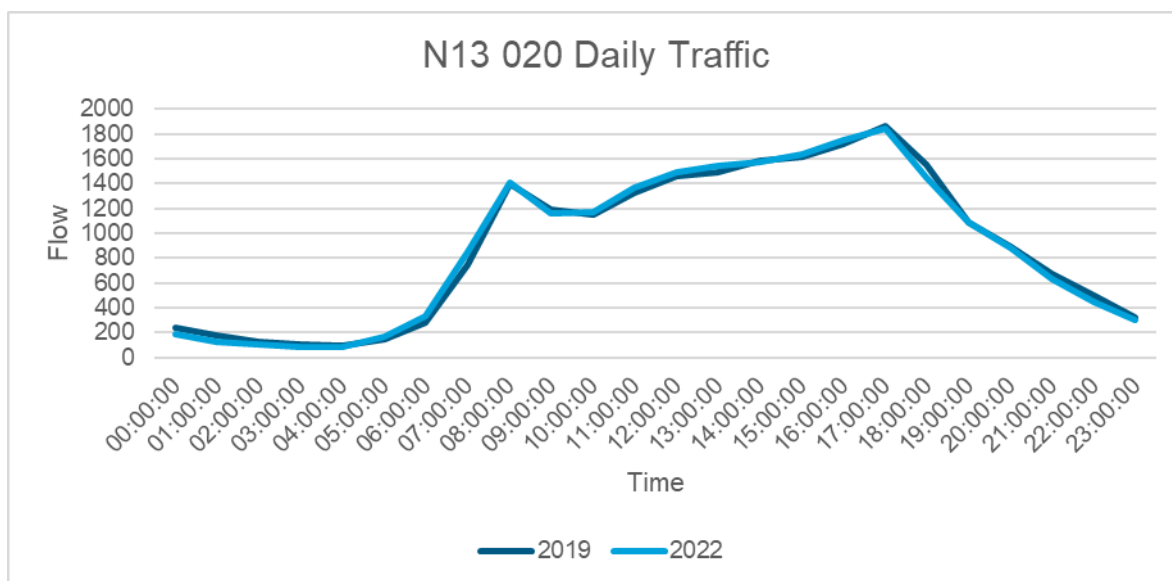


Figure 1-3 – N56 Daily Traffic Trend

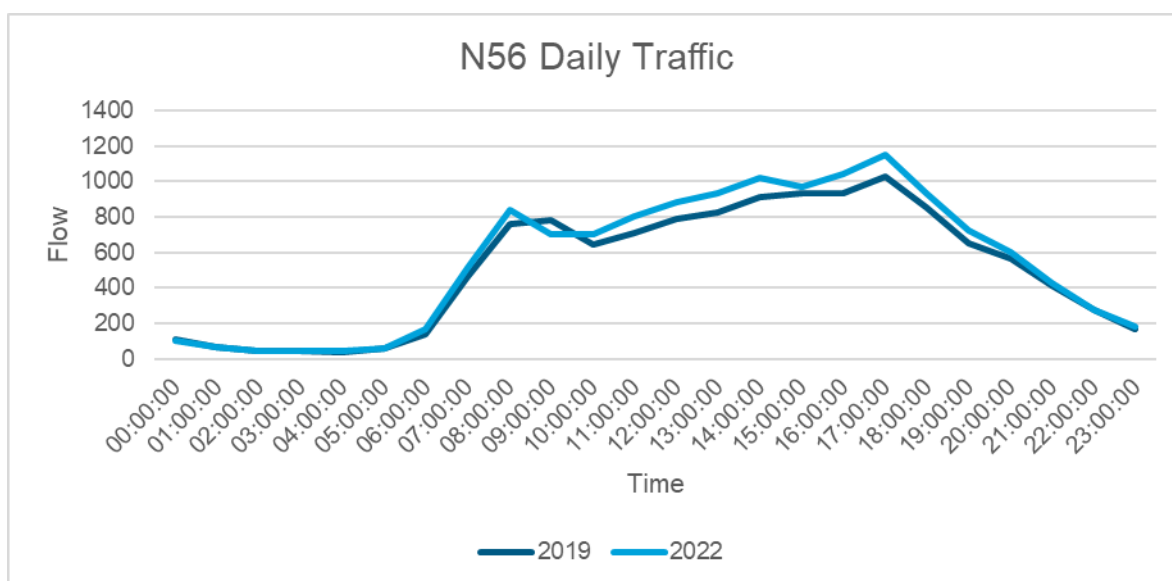


Figure 1-4 - N13 010 Daily Traffic Trend

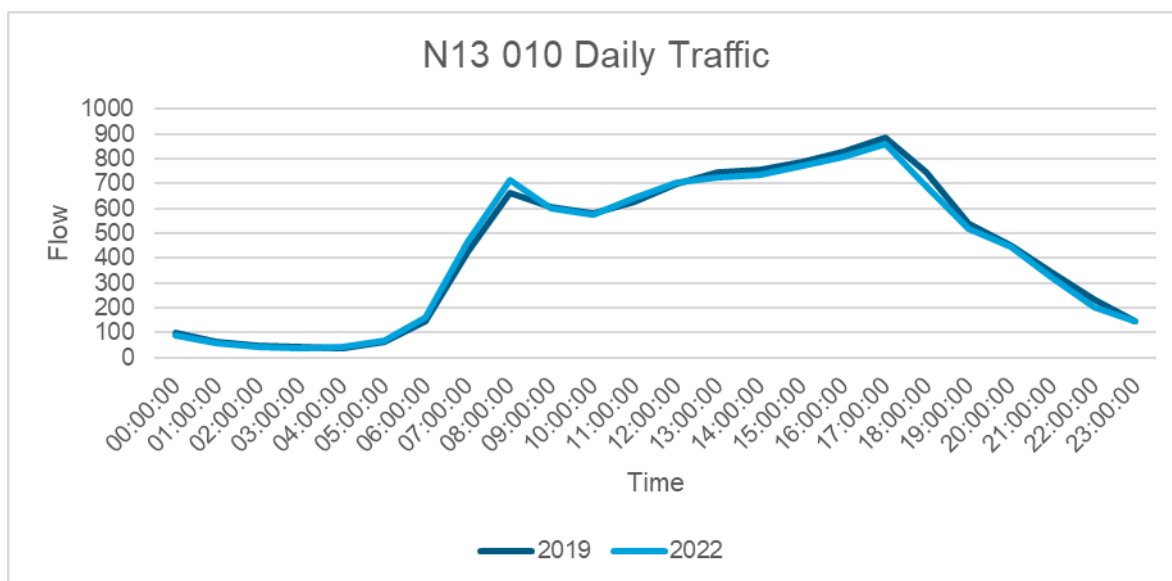
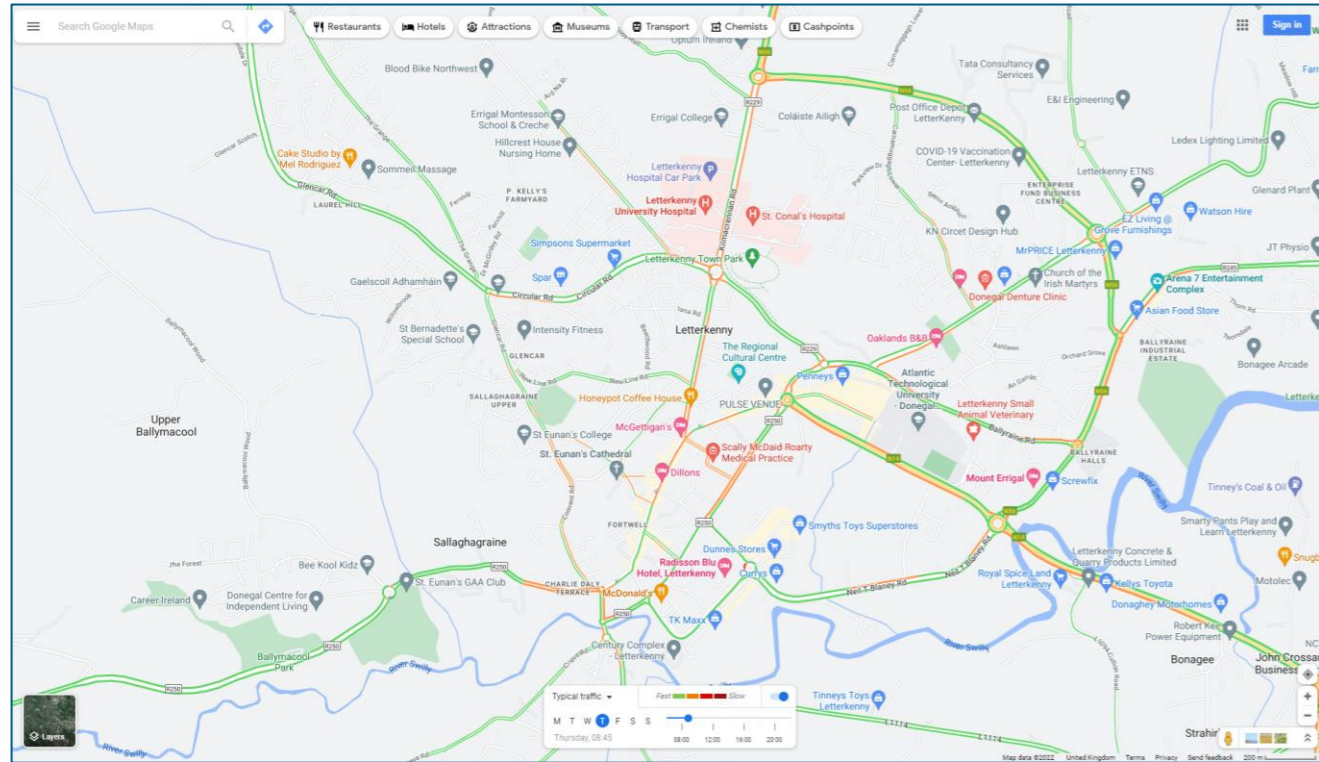


Figure 1-2 to Figure 1-4 show that across the 24 hour period, the temporal traffic in 2022 is consistent with that experienced in 2019. Whilst care is needed in generalising from a small sample of counts and without details about trip purpose, the data suggests that traffic patterns have not altered fundamentally due to COVID.

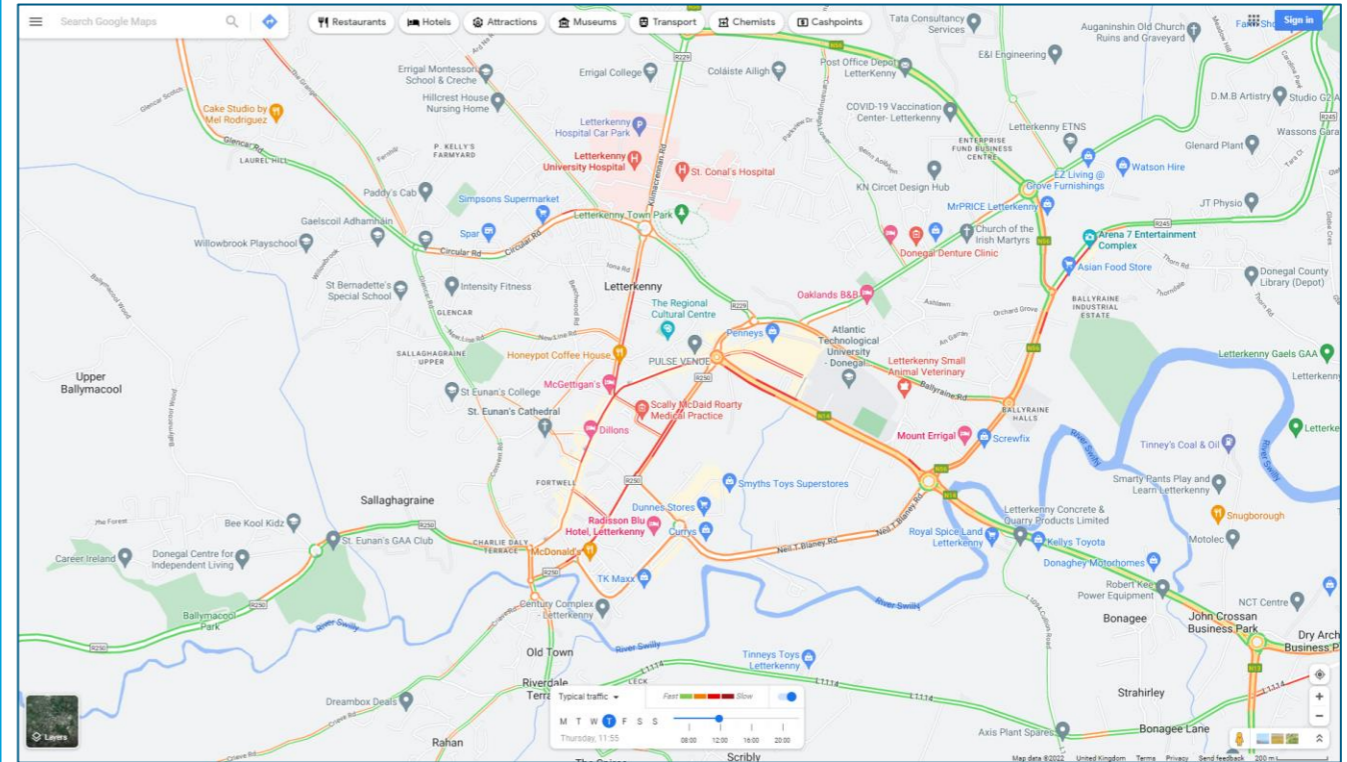
1.3.2. Typical Traffic

The current 2022 'typical traffic levels' in Letterkenny are on the next page.

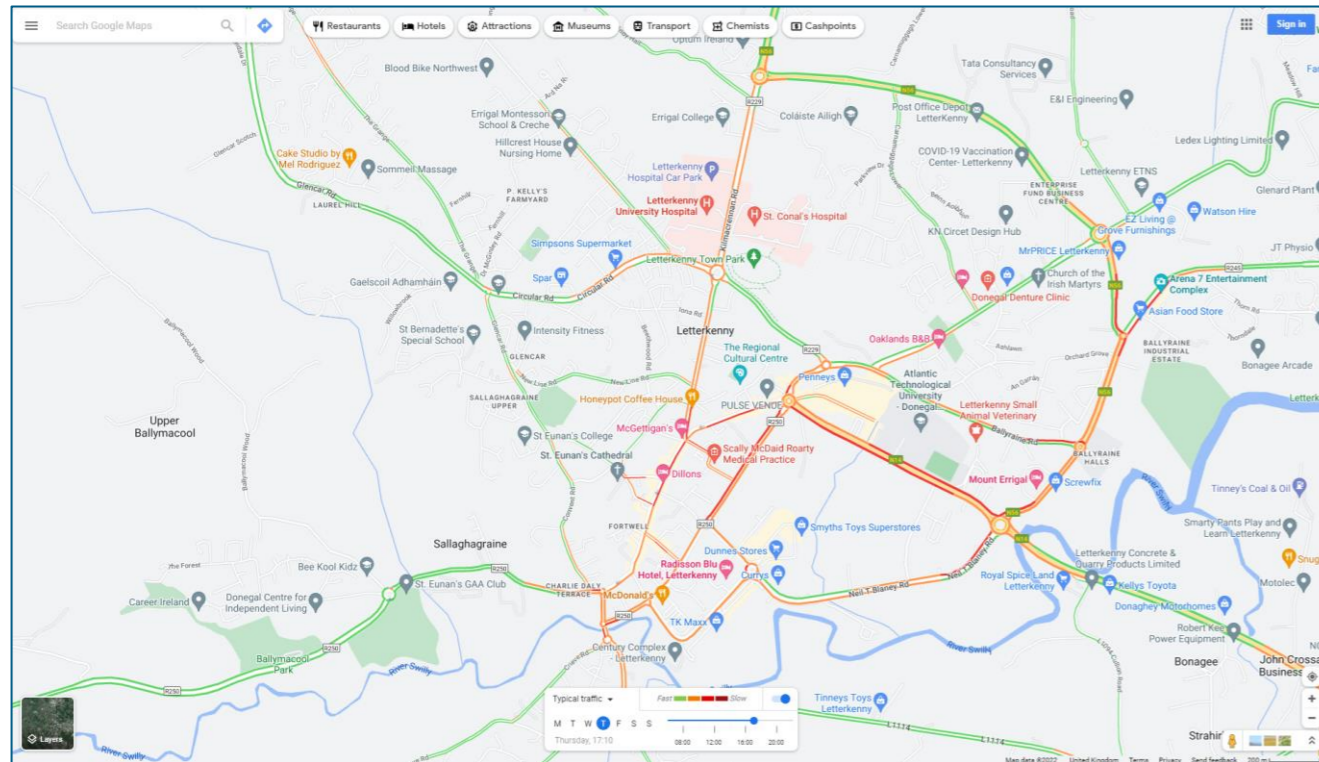
Google Typical Traffic – AM Peak



Google Typical Traffic – Inter Peak



Google Typical Traffic – PM Peak



Google traffic levels are defined² as:

- Green: No traffic delays.
- Orange: Medium amount of traffic.
- Red: Traffic delays. The darker the red, the slower the speed of traffic on the road.

The plots demonstrate that there is already a high level of delay in Letterkenny town centre, in particular at:

- Polestar Roundabout and Port Road;
- Pearse Road;
- Main Street;
- Ballyraine Road; and
- High Road.

² Use layers to find places, traffic, terrain, biking & public transport - Computer - Google Maps Help 12/09/2022

1.4. Purpose of Report

The purpose of this report is to summarise the results of the modelling undertaken to assess the Letterkenny Land Use Plan. The remainder of this report is as follows:

- Chapter 2 sets out the model forecasting approach;
- Chapter 3 sets out the forecast scenarios;
- Chapter 4 summarises the model outputs;
- Chapter 5 presents further model interrogation;
- Chapter 6 sets out the summary and conclusions.

2. Model Forecasting Approach

2.1. Introduction

This section sets out an overview of the forecasting approach for both the supply and demand sides of the model. The forecast years for this scheme are:

- 2024;
- 2029; and
- 2033.

The forecast assignments were created for the same three time periods in line with the base model:

- AM Peak: 08:15 – 09:15;
- Inter Peak: 12:00 – 13:00; and
- PM Peak: 17:00 – 18:00.

2.2. The Uncertainty Log

In order to develop forecast networks and demand, it is necessary to create an uncertainty log to ascertain which schemes are likely to be implemented during the forecast years. This has been developed for Letterkenny following consultation with the council. The classifications for this uncertainty log are shown in Table 2-1.

Table 2-1 - Uncertainty Log Classifications

Probability of the Input	Status
Near Certain: The outcome will happen or there is a high probability that it will happen.	<ul style="list-style-type: none"> • Intent announced by proponent to regulatory agencies; or • Approved development proposals; or • Projects under construction.
More than likely: The outcome is likely to happen but there is some uncertainty.	<ul style="list-style-type: none"> • Submission of planning or consent application imminent; or • Development application within the consent process.
Reasonably Foreseeable: The outcome may happen, but there is significant uncertainty.	<ul style="list-style-type: none"> • Identified within a development plan; or • Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented; or • Development conditional upon the transport strategy/scheme proceeding; or • A committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty.
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	<ul style="list-style-type: none"> • Conjecture based upon currently available information; or • Discussed on a conceptual basis; or • One of a number of possible inputs in an initial consultation process; or • Or a policy aspiration.

2.3. Supply: Forecast Network Development

2.3.1. Do Minimum

The forecast Do Minimum networks have been developed by taking the base year model networks and including any schemes identified in the uncertainty log as Near Certain or More Than Likely. The network uncertainty log is set out in Table 2-2.

Table 2-2 - Network Uncertainty Log

Ref	Scheme	Classification	Opening Year	2024	2029	2033
DM1	Kiltoy Roundabout	Completed	2017	Yes	Yes	Yes
DM2	Joe Bonnar (priority junction on the Port Road and signals at Neil T Blaney Road)	Completed	2022	Yes	Yes	Yes
DM3	Four Lane Improvements	Under Construction	2022/23	Yes	Yes	Yes
DM4 &5	Justice Walsh Road / Justice Walsh Traffic Signals*	Reasonably Foreseeable	2022	Yes	Yes	Yes
DM6	Polestar Roundabout - Signalised Junction Option 4 Ballyraine Rdbt Ramelton Road/ Middle Road Rdbt	More than Likely	2023/24	Yes	Yes	Yes
DM7	Signalised junction along the Four Lane Road*	Under Construction	2022/23	Yes	Yes	Yes
DM8	Cathedral One Way	Under Construction	2022	Yes	Yes	Yes
DM9	Church Lane One Way	Reasonably Foreseeable	2022	No	No	No
DM10	Station Roundabout	Reasonably Foreseeable	None	No	No	No
DM11	Western Relief Road	Hypothetical	None	No	No	No
DM 12	Northern Relief Road	Hypothetical	None	No	No	No

The forecast schemes included in the Do Minimum networks for all three forecast years are:

- DM1 - Kiltoy Roundabout;
- DM2 - Joe Bonnar (priority junction on the Port Road and signals at Neil T Blaney Road);
- DM3 - Four Lane Improvements;
- DM4 &5 - Justice Walsh Road / Justice Walsh Traffic Signals;
- DM6 - Polestar Roundabout - Signalised Junction Option 4, Ballyraine Roundabout and Ramelton Road/ Middle Road Roundabout;
- DM7 - Signalised junction along the Four Lane Road; and
- DM8 - Cathedral One Way.

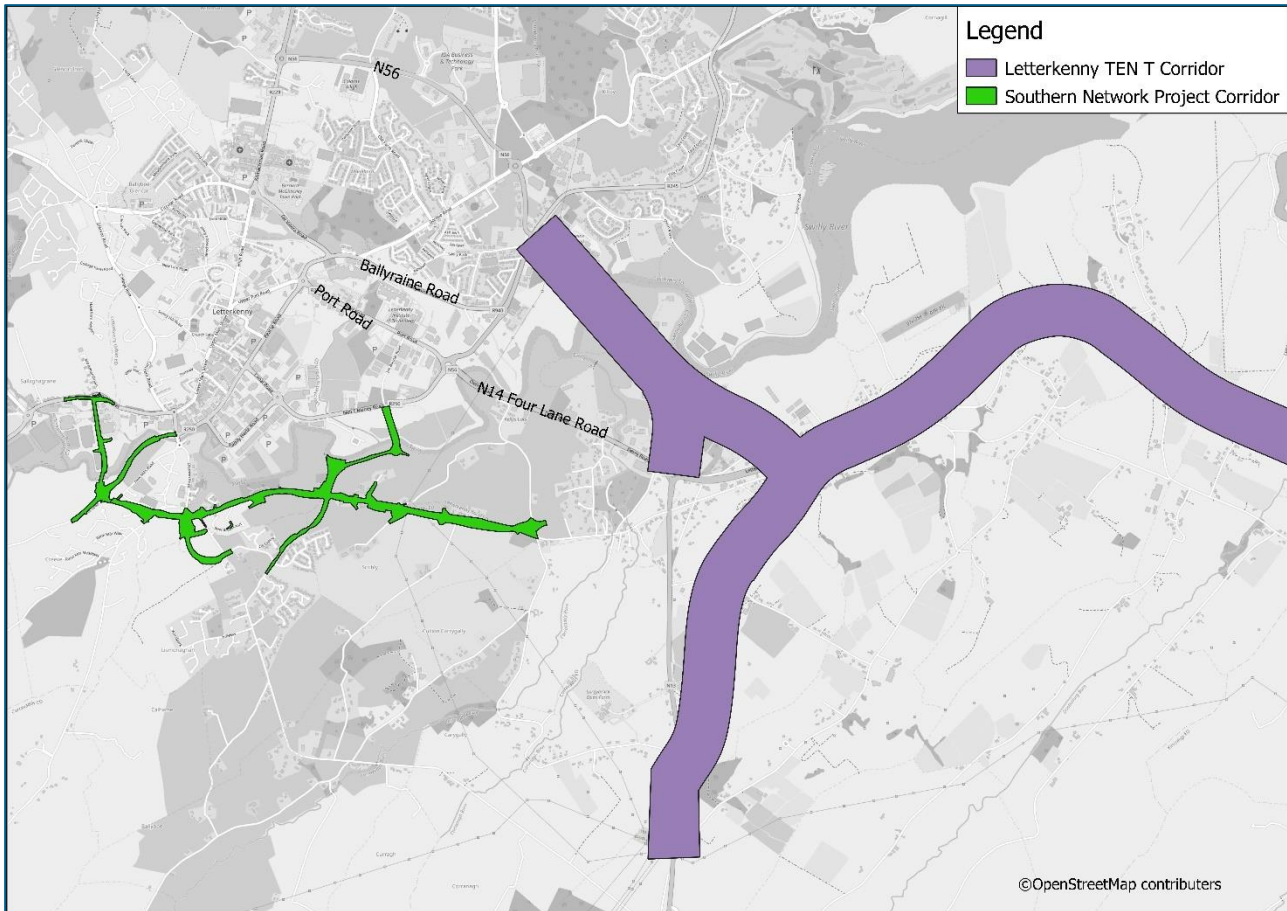
2.3.2. Do Something

The forecast Do Something networks include the following two schemes:

- The **TEN-T** scheme links from the R940 to the Dry Arch Roundabout providing a new crossing over the River Swilly. The mainline of this scheme is a dual carriageway with a speed limit of 100kph. There are also associated upgrades to the N13.; and
- The **Southern Network Plan (SNP)** is coded in the model along the L1114 between the L1094 and the Crieve Road at a speed limit of 80kph. There are also new links to the R250 (Swilly Access Road) and the Joe Bonnar Link Road.

These schemes are shown in Figure 2-1.

Figure 2-1 – Do Something Scheme Locations



2.4. Demand: Forecast Matrices

The council has provided details of the new planned development in the format of the latest shapefiles of the current Plan working draft. These land uses form the basis of the forecast demand within Letterkenny. The demand for the external zones (outside of Letterkenny) in the model will be forecast using the Project Appraisal Guidance.

2.4.1. Trip Rates

Each Land Use has been assigned an appropriate trip rate (generated by the latest version of the TRICS database in line with industry best practice guidelines). These trip rates are shown in Table 2-3 and Table 2-4.

Table 2-3 - Land Use Trip Rates (Private and Light Vehicle)

Letterkenny Land Use	TRICS Land Use	AM		IP		PM	
		Arr	Dep	Arr	Dep	Arr	Dep
Commercial	DIY and Retail Park	0.576	0.299	1.918	1.851	1.004	1.432
Residential	*DCC Rates	0.260	0.64	0.210	0.160	0.590	0.340
General Employment	Industrial Estate and Business Park	0.715	0.104	0.177	0.217	0.072	0.582
Opportunity Sites - Hotel	Hotel	0.313	0.405	0.220	0.152	0.232	0.227
Opportunity Sites - Commercial	DIY and Retail Park	0.576	0.299	1.918	1.851	1.004	1.432
Leisure Centre	Leisure Centre	12.815	7.615	12.848	15.934	25.082	24.609
5 Aside	5 Aside	0.643	0.250	0.321	0.714	2.786	0.715

Table 2-4 - Land Use Trip Rates (HGV)

Letterkenny Land Use	TRICS Land Use	AM		IP		PM	
		Arr	Dep	Arr	Dep	Arr	Dep
Commercial	DIY and Retail Park	0.006	0.006	0.006	0.010	0.003	0.001
Residential	*DCC Rates	0.000	0.000	0.000	0.000	0.000	0.000
General Employment	Industrial Estate and Business Park	0.006	0.006	0.007	0.006	0.003	0.003
Opportunity Sites - Hotel	Hotel	0.009	0.006	0.004	0.007	0.000	0.004
Opportunity Sites - Commercial	DIY and Retail Park	0.006	0.006	0.006	0.010	0.003	0.001
Leisure Centre	Leisure Centre	0.033	0.033	0.034	0.000	0.000	0.000
5 Aside	5 Aside	0.036	0.036	0.000	0.000	0.000	0.000

*Atkins undertook a cross check of trip rates derived from the latest TRICS database for residential developments. This established that the DCC residential trip rates previously used for the original ILUTS study are higher than those associated with the latest TRICS database. As agreed with DCC, for robustness the DCC trip rates have been applied.

2.4.2. Land Use Plan

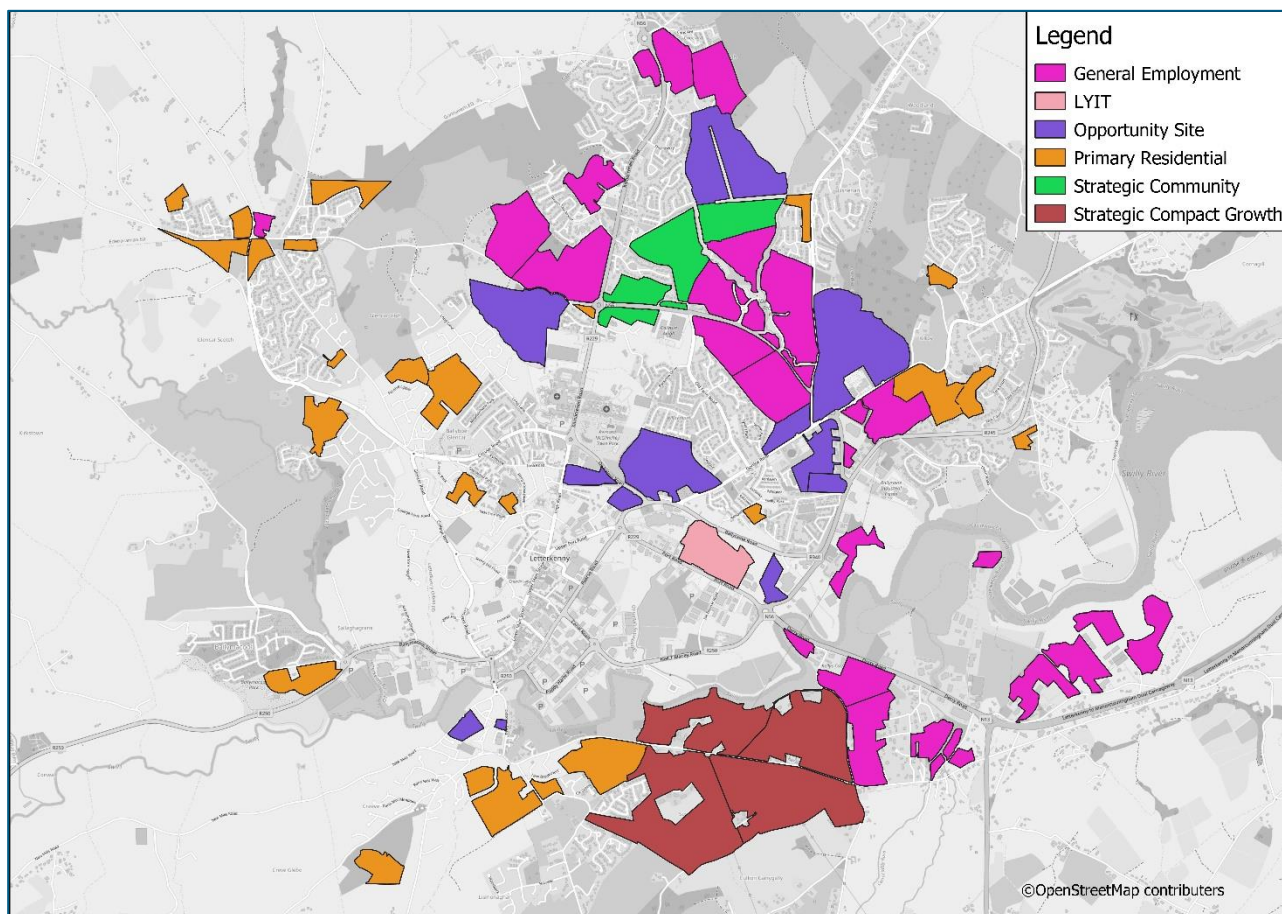
Table 2-5 sets out the land use assumptions for each relevant layer of the proposed plan.

Table 2-5 - Changes to Land Use Assumptions

Layer	Trip Rates	Scenario
Primarily Residential_working draft_reion	Residential	Core
LYIT_Campus_working draft_region	27% increase in Base Trips by 2033	Core
Opportunity Site_working draft_region	<ul style="list-style-type: none"> • Opp Site 1 – 50% associated with planning application 09/80091 & 50% Opp – Commercial; • Opp Site 2 – 50% Commercial & 50% Residential; • Opp Site 3 – 70% Commercial & 30% Residential; • Opp Site 4 – 50% Commercial & 50% Residential; • Opp Site 5 – 33% Commercial & 33% Residential & 33% Opp - Hotel; • Opp Site 6 – 50% Commercial & 50% (Residential); • Opp Site 7 – 84% Commercial & 16% Residential; • Opp Site 8 – 50% Commercial & 50% Residential; • Opp Site 9 – 50% Commercial & 50% Residential; • Opp Site 10 - 50% Commercial & 50% (Residential); • Opp Site 11 – 50% Commercial & 50% Retail; • Opp Site 12 - 50% Commercial & 50% (Residential). 	Core
Strategic_Community_Opp_working draft	Mixture of Leisure Centre and Pitches	Core
General_Employment_working draft_region	General Employment	Core
Strategic Compact Growth Area	Residential	Core

The locations of these land use areas are shown in Figure 2-2.

Figure 2-2 – Land Use Zoning



In summary the following land uses are included in the core modelling scenario:

- Primarily Residential
- LYIT Campus
- Opportunity Sites
- Strategic Community Opportunity
- General Employment
- Strategic Compact Growth Area

The following phasing of all development land uses was assumed for each forecast year based on the 2009 ILUTS modelling:

- 2024 – 26%
- 2029 – 58%
- 2033 – 100%

These are consistent with the assumptions applied in the original ILUTS assessment which was calculated by KSA Planning based on the forecast population growth in Letterkenny.

2.4.3. External Zones

The zones outside of Letterkenny are forecast using the National Project Appraisal Guidance. These are supplied by county and so the forecast growth from 2017 to each of the forecast years is set out in Table 2-6.

Table 2-6 - PAG Forecast Growth Rates from 2017

Vehicle Type	2024	2029	2033
Light Vehicles	1.0803	1.1416	1.1679
Heavy Vehicles	1.2182	1.4027	1.5047

2.4.4. Proxy Test

A modal shift scenario will be tested by reducing private car trips in the model by 10% (assuming these trips will be reallocated to sustainable modes i.e. public transport and active travel). This proxy test is similar to that of the DoT's new Sustainable Mobility Policy³ which aims to reduce the number of kilometres driven by fossil fuelled cars by 10% by 2030.

³ [gov.ie - Ireland's new Sustainable Mobility Policy is a Priority in our Climate and Energy Use Plans For the Future \(www.gov.ie\)](https://www.gov.ie/en/publications-and-resources/articles/2022-09-ireland-s-new-sustainable-mobility-policy-is-a-priority-in-our-climate-and-energy-use-plans-for-the-future/)

3. Forecast Scenarios

3.1. Overview

The Do Minimum scenario will be assessed in 2024, 2029 and 2033.

The following Do Something Scenarios will be assessed in 2029 and 2033:

- Scenario 1 – Development proceeds on core zoned sites and TEN-T (only) is constructed and operational.
- Scenario 2 – Development proceeds on core zoned sites and SNP (only) is constructed and operational.
- Scenario 3 – Development proceeds on core zoned sites and TEN-T and SNP are constructed and operational.

The following Do Something Scenario will be assessed in 2033:

- Scenario 4 – Development proceeds on core zoned sites including a 10% reduction from private car trips and TEN-T and SNP are constructed and operational plus proxy test for a modal shift to sustainable modes

A summary of the forecast scenarios is set out in Table 3-1.

Table 3-1 - Forecast Model Runs

Scenario	Network	Matrix	2024	2029	2033
DM	DM	Core	✓	✓	✓
DS1	DM + TEN-T	Core		✓	✓
DS2	DM + SNP	Core		✓	✓
DS3	DM + TEN-T & SNP	Core		✓	✓
DS4	DM + TEN-T & SNP	Core with 10% reduction			✓

4. Model Outputs

4.1. Introduction

This section sets out the model outputs from the core scenarios to provide an overview of the performance of the road network overall and on a link by link basis. The model outputs show:

- Forecast traffic flows
- Changes in journey times
- Changes in delays.

Network-wide summary totals are also presented to provide an indicator of the overall change in traffic demand and the network performance.

4.2. Forecast Model Assumptions

While the SATURN modelling results set out in the remainder of this report provide an overview of traffic levels and locations where there may be delay issues in the future, it should be noted that:

- The forecast Land Use plan has been implemented in the model with general assumptions regarding land-use types. Therefore, individual Transport Assessments should be undertaken when greater detail regarding individual zones or developments is known. More precise trip levels could then be coded in the SATURN model
- The SATURN model provides a good estimate of strategic traffic movements however some care should be taken regarding individual junction analysis. The SATURN model should be enhanced to add some detailed junction modelling within the urban area to assess the heavily trafficked and strategically important junctions.

4.3. Matrix Totals

The matrix totals for each forecast year are set out in Table 4-1.

Table 4-1 - Forecast Matrix Totals

Time Period	2017 Base	2024		2029		2033	
		Demand	% Inc from 2017 Base	Demand	% Inc from 2017 Base	Demand	% Inc from 2017 Base
AM	11255	13888	23%	16027	42%	18637	66%
IP	10162	12755	26%	14974	47%	17744	75%
PM	12417	15604	26%	18238	47%	21499	73%

It is notable that the 2033 demand in particular, represents a very substantial increase (66% - 75%) over base 2017 levels.

The assumptions regarding the phasing of the development for 2024 and 2029 (26% and 58% respectively) results in growths over the base of 23%-26% and 42%-47% respectively.

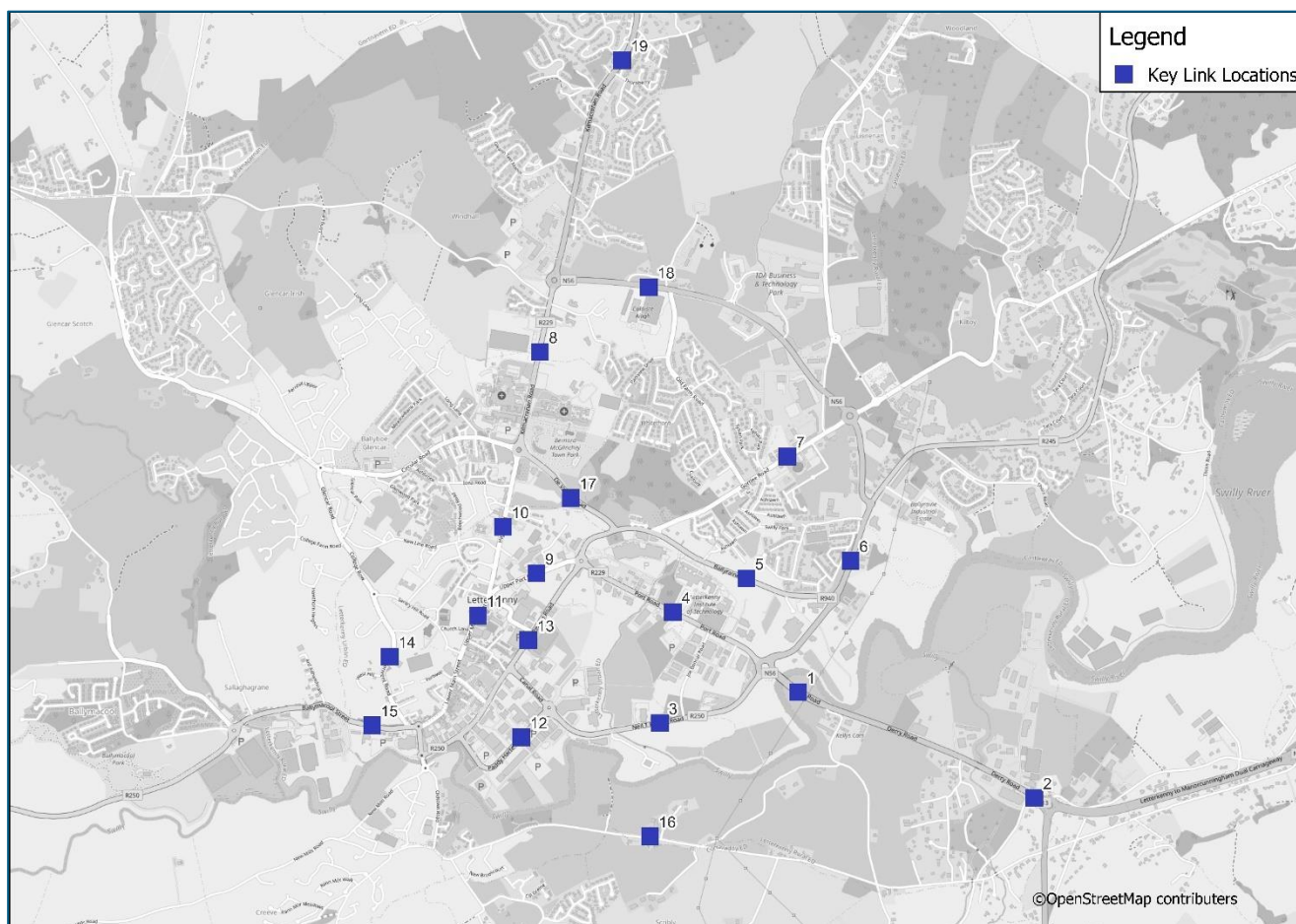
4.4. Modelling Outputs

This section sets out the model outputs from the core scenarios These model outputs include:

- Flows on key links in the town, shown in PCUs;
- Journey time comparisons over two routes, displayed in seconds; and
- P1X flow difference plots where the increase in flow (in PCUs) or delay (in seconds) is shown in green and a decrease in blue;
- Qualitative commentary drawing out key points; and
- SATURN Simulation Summary Results to include:
 - Over Capacity Queues - the extra time spent in queues at over-capacity junctions waiting for the cycle in which the vehicle exits
 - Total Travel Time - the sum of both link and junction times
 - Travel Distance - Vehicle or pcu-kms on simulation links
 - Overall Average Speed - defined by (total distance) / (total time)

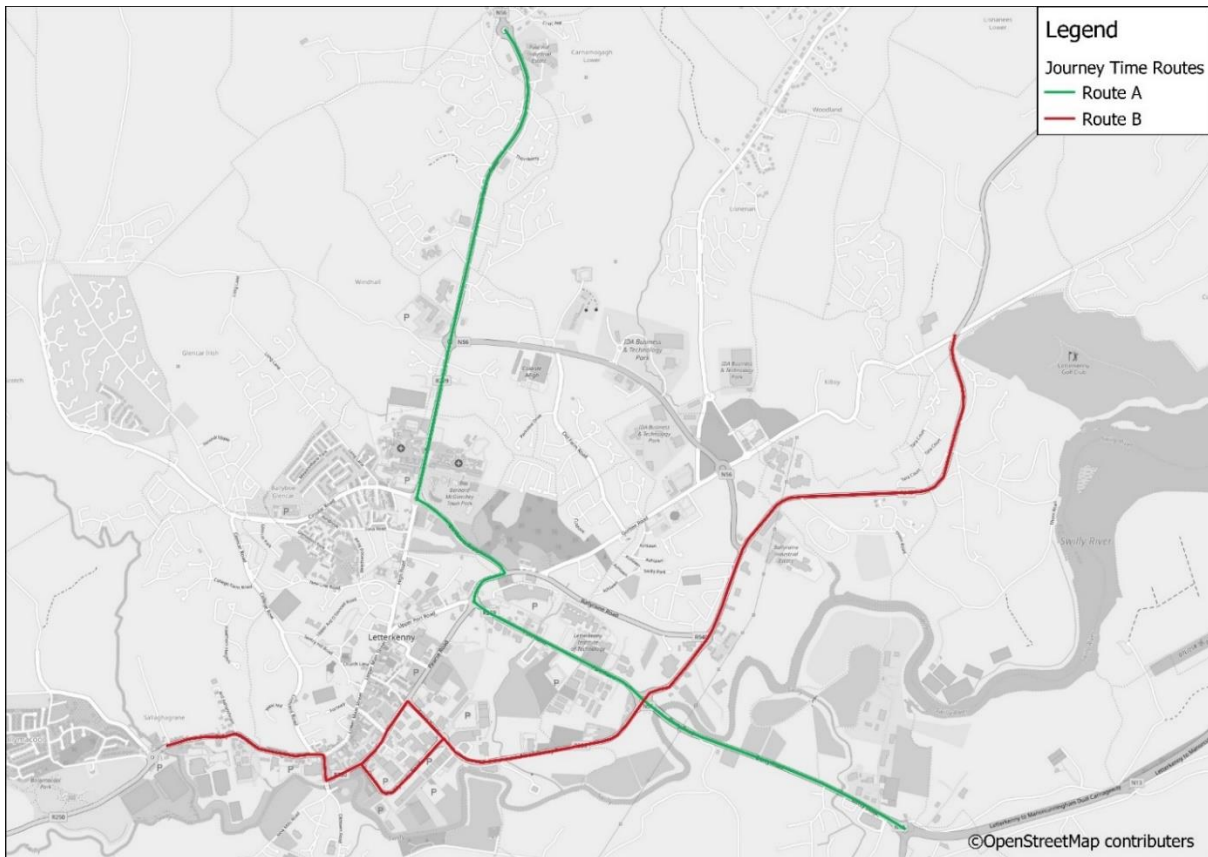
The key links where the flows have been extracted are shown in Figure 4-1.

Figure 4-1 – Key Links (ID 1 – ID19)



The journey time routes are shown in Figure 4-2.

Figure 4-2 – Journey Time Routes



4.5. Do Minimum Case

This scenario represents the case where the forecast land use plan goes ahead without any further highway scheme interventions.

4.5.1. SATURN Simulation Summary Results

4.5.1.1. 2024

Summary Result	Units	2017 Base			2024 DM			2024 Change from Base		
		AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	590.3	133.1	1079.3	1458%	112%	317%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	2164.3	1379.3	2749.6	80%	49%	83%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	48704.5	39209.6	49596.1	18%	25%	18%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	22.5	28.4	18	-34%	-16%	-36%

4.5.1.2. 2029

Summary Result	Units	2017 Base			2029 DM			2029 Change from Base		
		AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	1199	381.8	1797.3	3064%	507%	595%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	3083.1	1972.9	3745.8	156%	113%	150%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	55338.4	45887.2	55015.6	34%	46%	31%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	17.9	23.3	14.7	-48%	-31%	-48%

4.5.1.3. 2033

Summary Result	Units	2017 Base			2033 DM			2033 Change from Base		
		AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	2196	1871.2	3276	5694%	2875%	1167%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	4401.8	3748.7	5458.5	265%	305%	264%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	61636.8	51049	59427.8	50%	63%	41%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	14	13.6	10.9	-59%	-60%	-61%

The above summary results show that with the additional demand on the network:

- There is a significant increase in over capacity queues, meaning there is a large volume of time spent waiting at queues at over capacity junctions;
- Total travel time is more than triple that of the base by 2033 which far exceeds the 66-75% growth in the matrix;
- There is a large increase in travel distance across the network;
- Average speed nearly halves by 2033.

The results of the forecast modelling show that the high levels of trip growth associated with the Land Use Plan, indicate that there is likely to be significant issues in the network which will require urgent attention if the planned demand is to be realised.

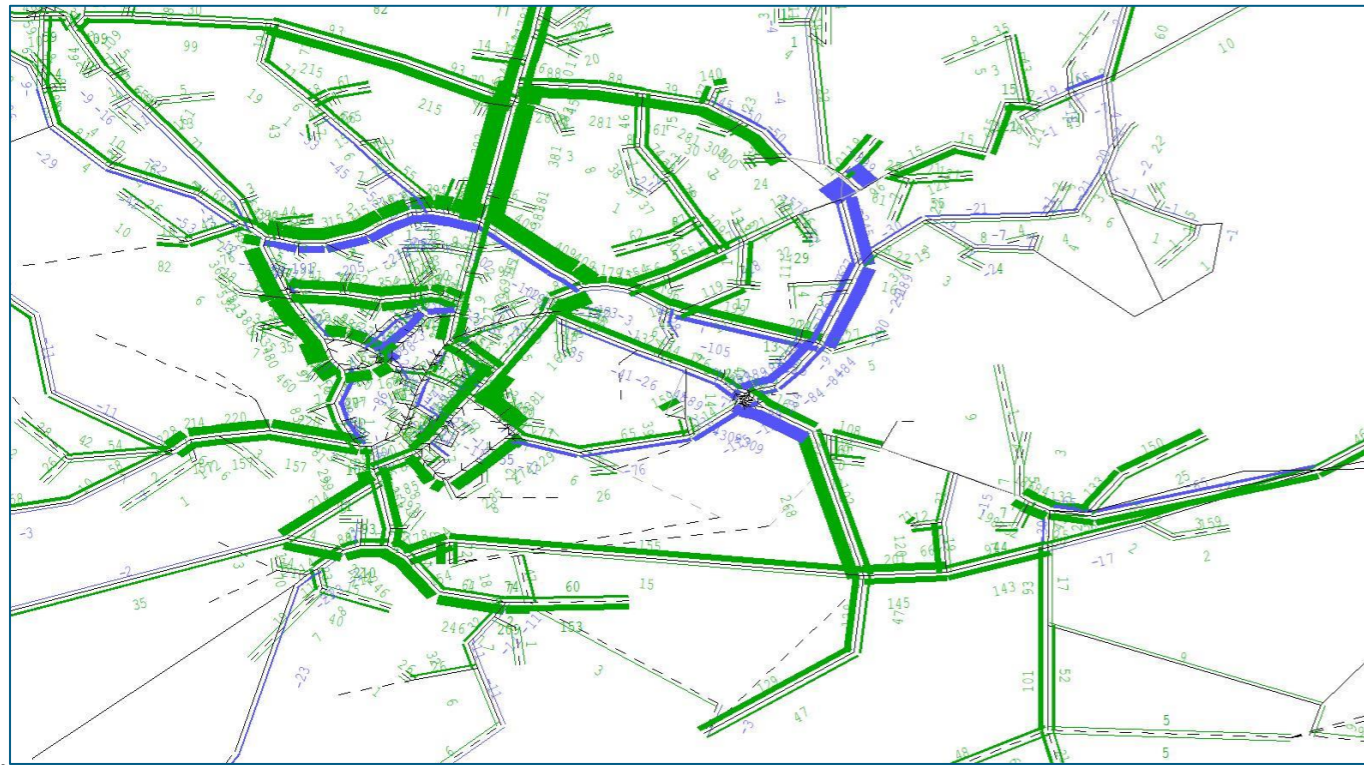
Further details on these results including link flows and delay plots are shown the rest of the section.

4.5.2. 2024

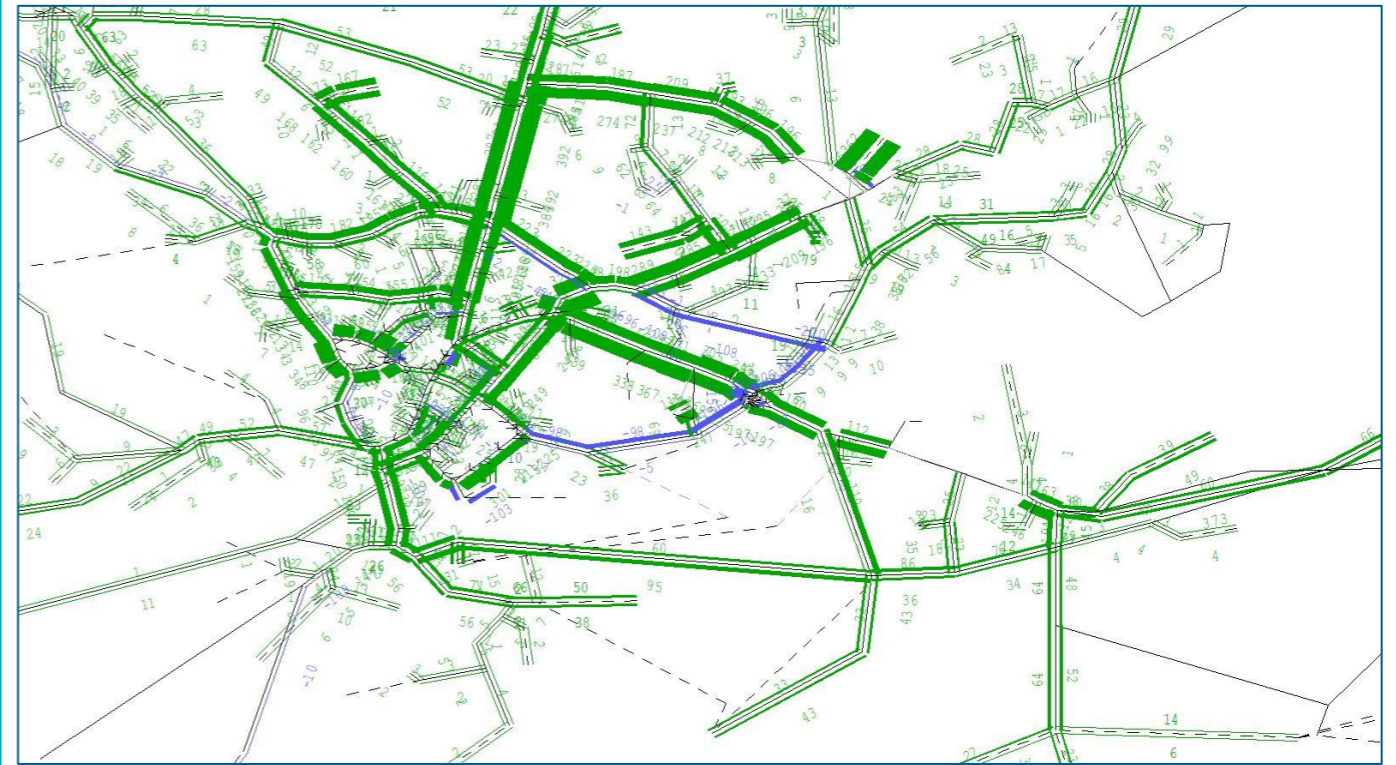
Table 4-2 - 2024 Do Minimum Key Link Flows

ID	Location	Direction	2017 Base			DM			Difference from 2017 Base			Percentage Difference from 2017 Base		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1290	1310	1270	1450	1510	1670	160	200	400	12%	15%	31%
		WB	1900	1110	1520	1590	1300	1650	-310	190	130	-16%	17%	9%
2	Four Lane Road at Dry Arch Roundabout	EB	1170	1250	1380	1350	1420	1550	180	170	170	15%	14%	12%
		WB	1790	1060	1400	2030	1310	1500	240	250	100	13%	24%	7%
3	Neil T Blaney Road	EB	380	700	530	440	600	640	60	-100	110	16%	-14%	21%
		WB	540	580	500	470	580	560	-70	0	60	-13%	0%	12%
4	Port Road	EB	360	270	180	490	490	240	130	220	60	36%	81%	33%
		WB	720	240	450	680	580	580	-40	340	130	-6%	142%	29%
5	Ballyraine Road	EB	250	420	490	450	420	640	200	0	150	80%	0%	31%
		WB	530	550	460	430	450	370	-100	-100	-90	-19%	-18%	-20%
6	N56	NB	760	750	1010	630	760	740	-130	10	-270	-17%	1%	-27%
		SB	1320	820	800	1030	850	810	-290	30	10	-22%	4%	1%
7	South West of Kilty Roundabout	NB	370	250	640	390	490	610	20	240	-30	5%	96%	-5%
		SB	190	220	340	230	430	250	40	210	-90	21%	95%	-26%
8	Kilmacrennan Road	NB	610	590	870	1000	880	1160	390	290	290	64%	49%	33%
		SB	910	590	880	1290	980	1260	380	390	380	42%	66%	43%
9	Port Road	SB	450	380	480	480	440	680	30	60	200	7%	16%	42%
10	High Road	NB	520	420	620	520	690	790	0	270	170	0%	64%	27%
		SB	640	430	470	740	610	570	100	180	100	16%	42%	21%
11	Main Street	SB	440	450	430	420	310	320	-20	-140	-110	-5%	-31%	-26%
12	Paddy Harte Road	SB	820	1060	1150	1090	1270	1350	270	210	200	33%	20%	17%
13	Pearse Road	NB	750	680	730	1030	890	980	280	210	250	37%	31%	34%
		SB	340	480	630	720	730	790	380	250	160	112%	52%	25%
14	Convent Road	NB	660	430	670	750	530	710	90	100	40	14%	23%	6%
		SB	300	220	470	210	210	630	-90	-10	160	-30%	-5%	34%
15	R250	EB	720	340	490	950	390	580	230	50	90	32%	15%	18%
		WB	370	430	720	530	470	770	160	40	50	43%	9%	7%
16	Leck Road	EB	90	90	360	250	150	220	160	60	-140	178%	67%	-39%
		WB	200	60	130	220	160	410	20	100	280	10%	167%	215%
17	R229	EB	910	860	1040	1320	1080	1280	410	220	240	45%	26%	23%
		WB	870	750	830	770	700	690	-100	-50	-140	-11%	-7%	-17%
18	N56	EB	640	340	430	730	520	730	90	180	300	14%	53%	70%
		WB	610	400	820	890	670	1070	280	270	250	46%	68%	30%
19	N56	NB	490	590	1050	550	640	1060	60	50	10	12%	8%	1%
		SB	910	530	580	1020	590	680	110	60	100	12%	11%	17%

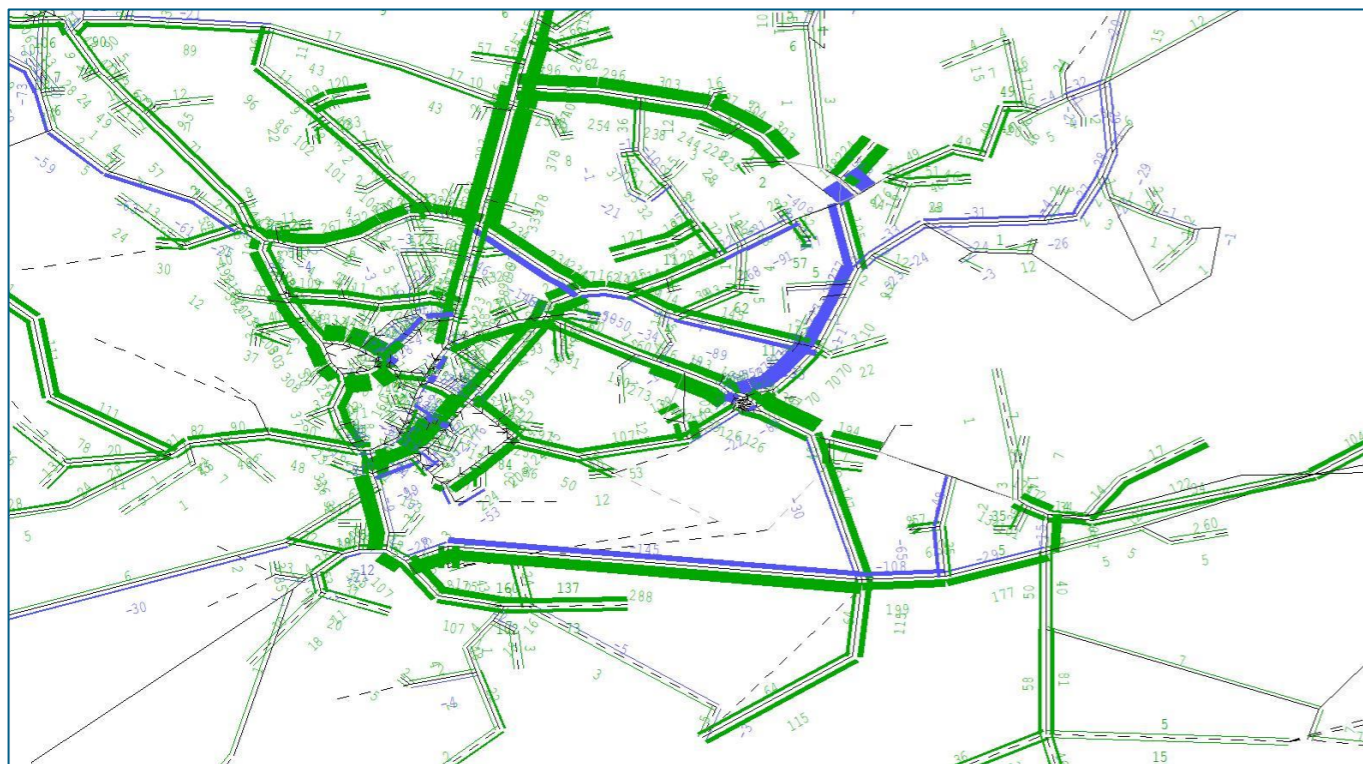
AM Modelled Flow (Vehicles): 2024 DM – 2017 Base



IP Actual Flow: 2024 DM – 2017 Base



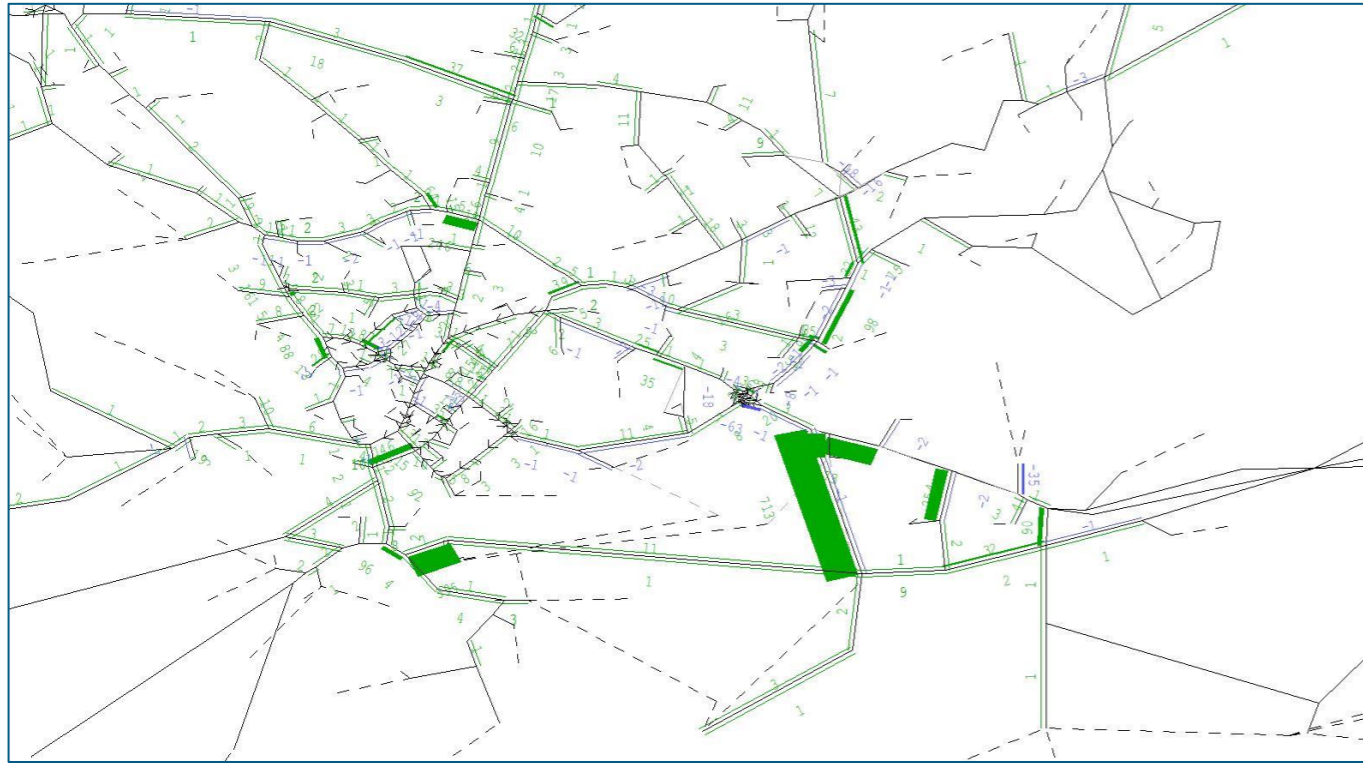
PM Actual Flow: 2024 DM – 2017 Base



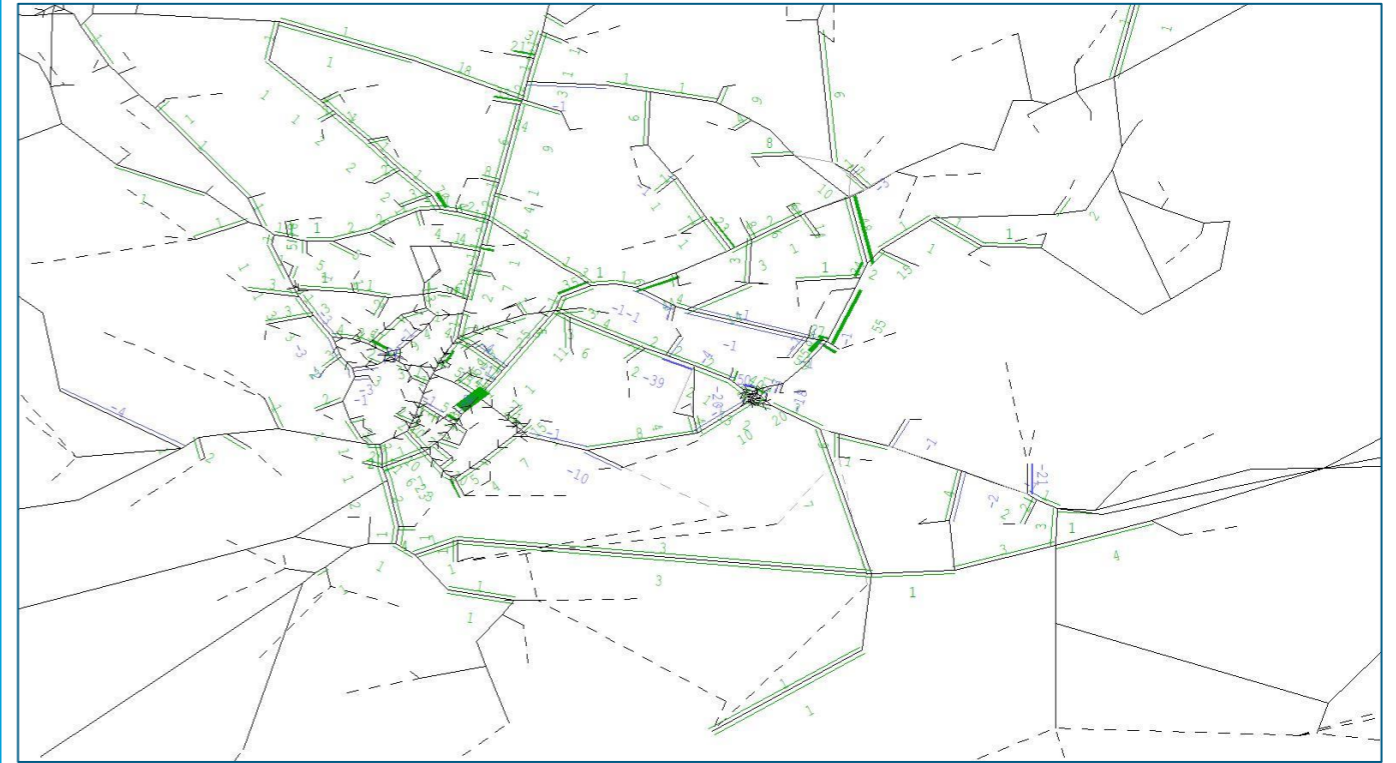
The above flows at select links and flow difference plots show:

- The flow increases on the majority of links between the 2017 Base and 2024 forecast Do Minimum Scenario. This is as expected due to the increased forecast demand associated with the Land Use Plan;
- There is up to a 27% reduction in flow along the N56 and a 14% reduction in flow along the Neil T Blaney Road likely due to the signalisation of the roundabouts in this area. This has caused traffic to reroute to other locations and utilising the N56 and the Kilmacrennan Road;
- There is generally an increase in flow along the N14 Four Lane Road in some peak hours, again due to the additional demand in the model;
- The flow along the Circular Road and De Valera Road shows decreases in flow WB, these are likely due to the impact of the One Way Scheme at the Cathedral Road;
- The Leck Road generally experiences a large increase (EB in the AM peak and WB in the PM peak) in demand (up to 215%), due to the development in the Strategic Growth Area.

AM Delay: 2024 DM – 2017 Base



IP Delay: 2024 DM – 2017 Base



PM Delay: 2024 DM – 2017 Base

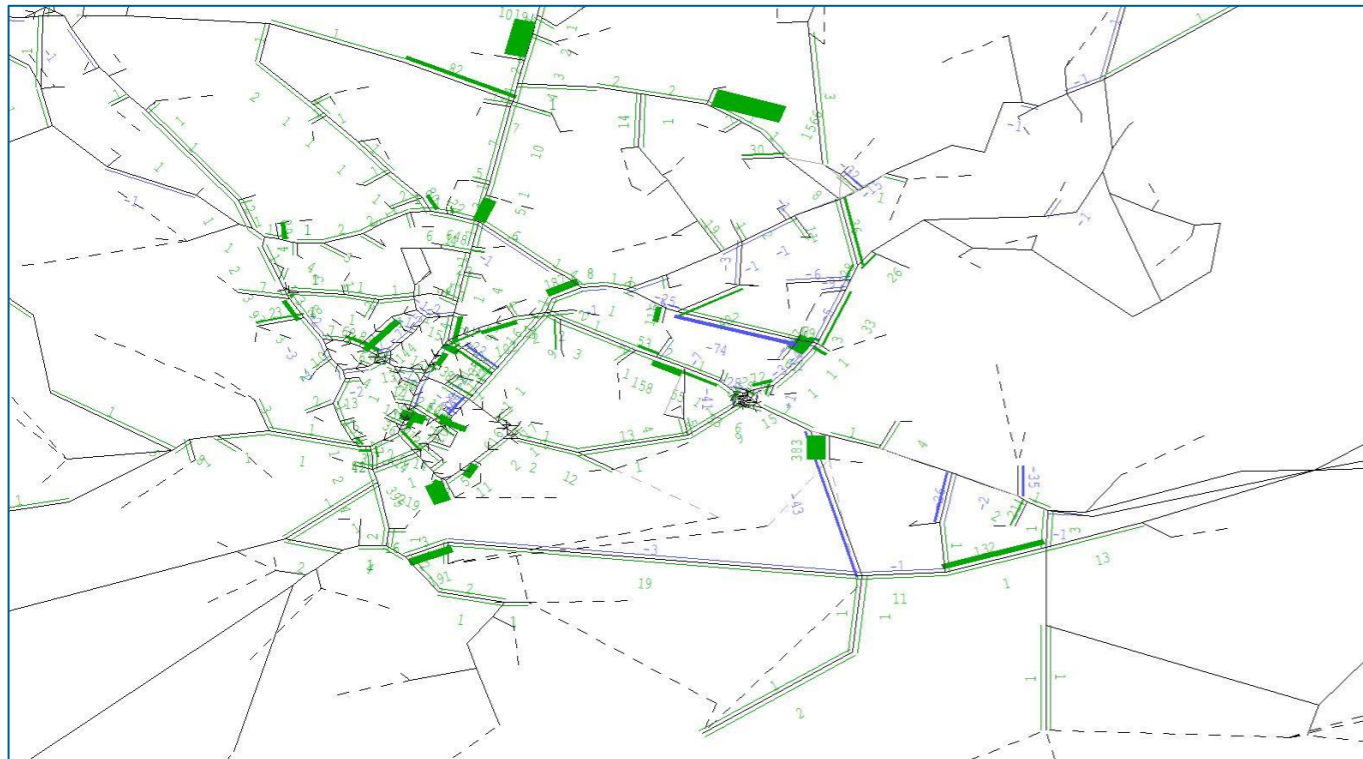


Table 4-3 - 2024 Do Minimum Journey Times (Seconds)

Route	Base			DM			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	720	670	840	1480	730	1350	760	60	510	105%	8%	61%
Route A SB	690	670	810	840	730	940	150	60	130	22%	9%	16%
Route B EB	590	580	820	890	720	1420	300	140	600	51%	25%	73%
Route B WB	600	570	630	800	720	970	200	150	340	33%	26%	54%

The Journey times results show that in general terms the AM and PM show increases greater than the total matrix growth (23% and 26% respectively). This is consistent with a network already nearing capacity in the Base. By 2024, if the planned development is implemented, some journeys across Letterkenny could take twice as long due to the increased pressures on the network.

By contrast the IP journey times are less or approximately equivalent to the matrix growth suggesting spare capacity at this time.

The journey time for Route A NB shows a particularly large increase in the AM (105%).

The delay plots provide an indication of where there may be particular congestion issues arising from the development. These are highlighted as:

- There are large increases in delay along the Leck Road and at the junctions along the Four Lane Road likely due to the increased demand associated with the Strategic Growth Area;
- In the AM and PM peaks there are increased delays at the Cathedral One Way Scheme;
- There are increases in delay where the demand loads onto the network, this is due to the increases in flow along the main links;

The large increase on Route A NB is explained to some degree by the large increases in delay along the Port road at LYIT and along the Kilmacrennan Road.

Table 4-4 - 2024 Do Minimum Key Link VoC

ID	Location	Direction	Base			DM			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	50.40	51.36	49.60	63.77	73.78	91.15	13.37	22.42	41.55	27%	44%	84%
		WB	74.27	43.28	59.50	62.18	50.97	64.41	-12.09	7.69	4.91	-16%	18%	8%
2	Four Lane Road at Dry Arch Roundabout	EB	47.24	50.68	56.49	54.90	57.99	63.76	7.66	7.31	7.27	16%	14%	13%
		WB	70.11	41.59	54.80	79.16	51.18	58.74	9.05	9.59	3.94	13%	23%	7%
3	Neil T Blaney Road	EB	27.08	49.90	38.05	41.64	56.03	60.45	14.56	6.13	22.40	54%	12%	59%
		WB	38.79	41.52	35.96	33.39	41.18	39.77	-5.40	-0.34	3.81	-14%	-1%	11%
4	Port Road	EB	100.38	61.53	103.91	101.93	94.14	106.92	1.55	32.61	3.01	2%	53%	3%
		WB	57.60	19.31	36.19	54.29	46.37	46.61	-3.31	27.06	10.42	-6%	140%	29%
5	Ballyraine Road	EB	40.13	73.66	60.30	50.83	67.33	64.37	10.70	-6.33	4.07	27%	-9%	7%
		WB	60.75	68.62	104.01	58.97	48.61	62.87	-1.78	-20.01	-41.14	-3%	-29%	-40%
6	N56	NB	54.00	53.44	72.38	44.98	54.56	52.62	-9.02	1.12	-19.76	-17%	2%	-27%
		SB	89.97	57.20	58.67	71.94	67.29	56.70	-18.03	10.09	-1.97	-20%	18%	-3%
7	South West of Kilty Roundabout	NB	29.86	20.09	51.16	31.54	38.91	48.67	1.68	18.82	-2.49	6%	94%	-5%
		SB	17.65	15.52	26.21	16.09	30.46	18.36	-1.56	14.94	-7.85	-9%	96%	-30%
8	Kilmacrennan Road	NB	38.16	37.13	54.60	62.67	55.04	72.26	24.51	17.91	17.66	64%	48%	32%
		SB	45.05	29.12	46.51	70.59	52.21	70.99	25.54	23.09	24.48	57%	79%	53%
9	Port Road	SB	52.18	40.84	58.36	58.66	51.02	105.23	6.48	10.18	46.87	12%	25%	80%
10	High Road	NB	41.36	33.51	49.48	41.44	55.28	63.48	0.08	21.77	14.00	0%	65%	28%
		SB	81.38	46.12	59.83	89.58	83.54	77.48	8.20	37.42	17.65	10%	81%	30%
11	Main Street	SB	91.10	91.72	95.94	100.88	103.33	107.61	9.78	11.61	11.67	11%	13%	12%
12	Paddy Harte Road	SB	58.30	75.50	81.85	77.90	90.86	96.76	19.60	15.36	14.91	34%	20%	18%
13	Pearse Road	NB	53.78	48.82	52.34	97.94	80.60	91.51	44.16	31.78	39.17	82%	65%	75%
		SB	36.43	34.63	47.73	51.39	52.38	58.75	14.96	17.75	11.02	41%	51%	23%
14	Convent Road	NB	48.79	31.23	47.86	53.58	37.63	50.49	4.79	6.40	2.63	10%	20%	5%
		SB	22.36	15.41	33.85	19.09	14.66	45.29	-3.27	-0.75	11.44	-15%	-5%	34%
15	R250	EB	51.77	23.96	35.35	67.51	28.03	41.77	15.74	4.07	6.42	30%	17%	18%
		WB	26.53	30.36	51.28	37.73	33.69	54.73	11.20	3.33	3.45	42%	11%	7%
16	Leck Road	EB	19.77	19.84	73.66	68.47	37.55	55.21	48.70	17.71	-18.45	246%	89%	-25%
		WB	22.77	6.81	13.97	24.48	17.33	45.94	1.71	10.52	31.97	8%	154%	229%
17	R229	EB	56.70	53.83	65.22	82.28	67.78	79.81	25.58	13.95	14.59	45%	26%	22%
		WB	44.60	34.52	41.71	42.12	36.77	37.16	-2.48	2.25	-4.55	-6%	7%	-11%
18	N56	EB	47.78	29.13	47.75	77.34	44.10	70.85	29.56	14.97	23.10	62%	51%	48%
		WB	33.73	22.16	45.41	49.34	37.36	59.51	15.61	15.20	14.10	46%	69%	31%
19	N56	NB	30.40	36.66	65.68	34.51	40.29	66.20	4.11	3.63	0.52	14%	10%	1%
		SB	56.71	33.19	36.51	63.59	36.77	42.54	6.88	3.58	6.03	12%	11%	17%

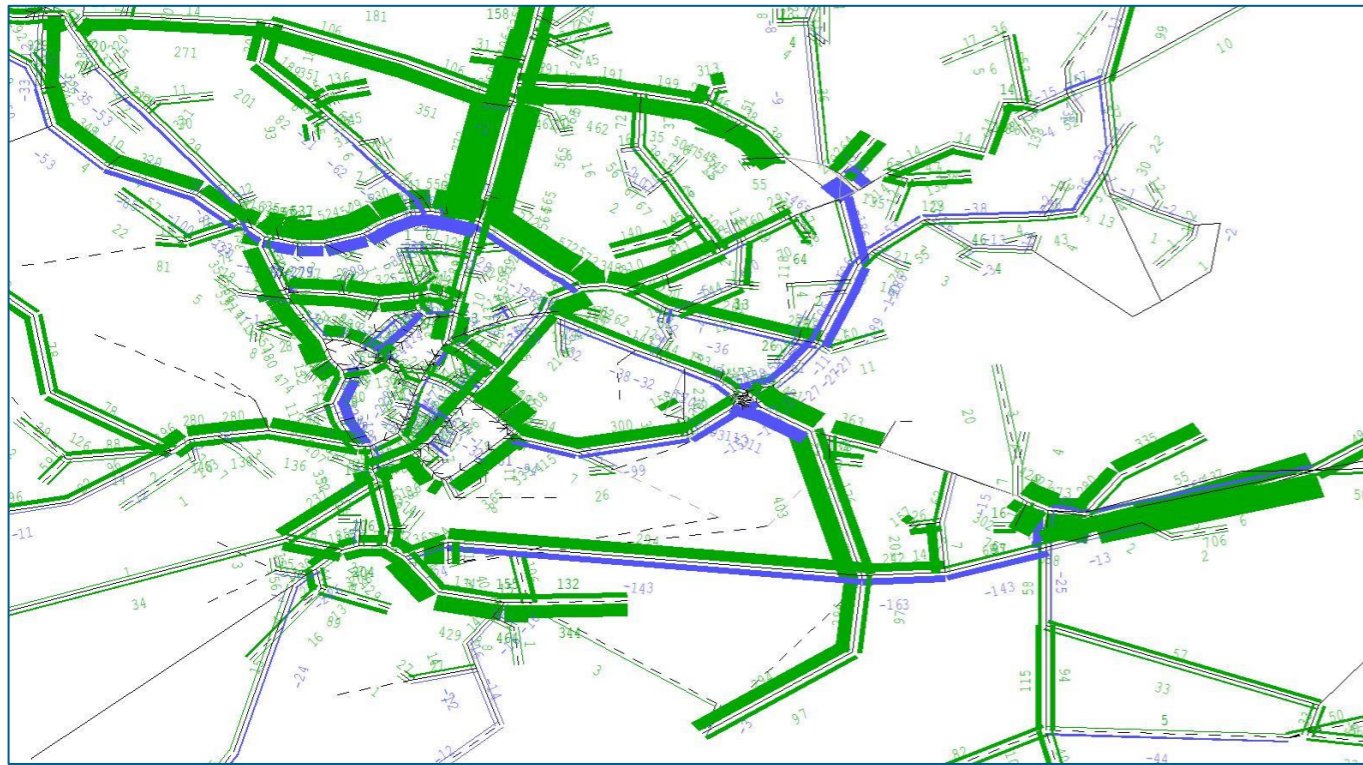
The VoC percentages show that in the DM, the Port Road and Main Street are over capacity.

4.5.3. 2029

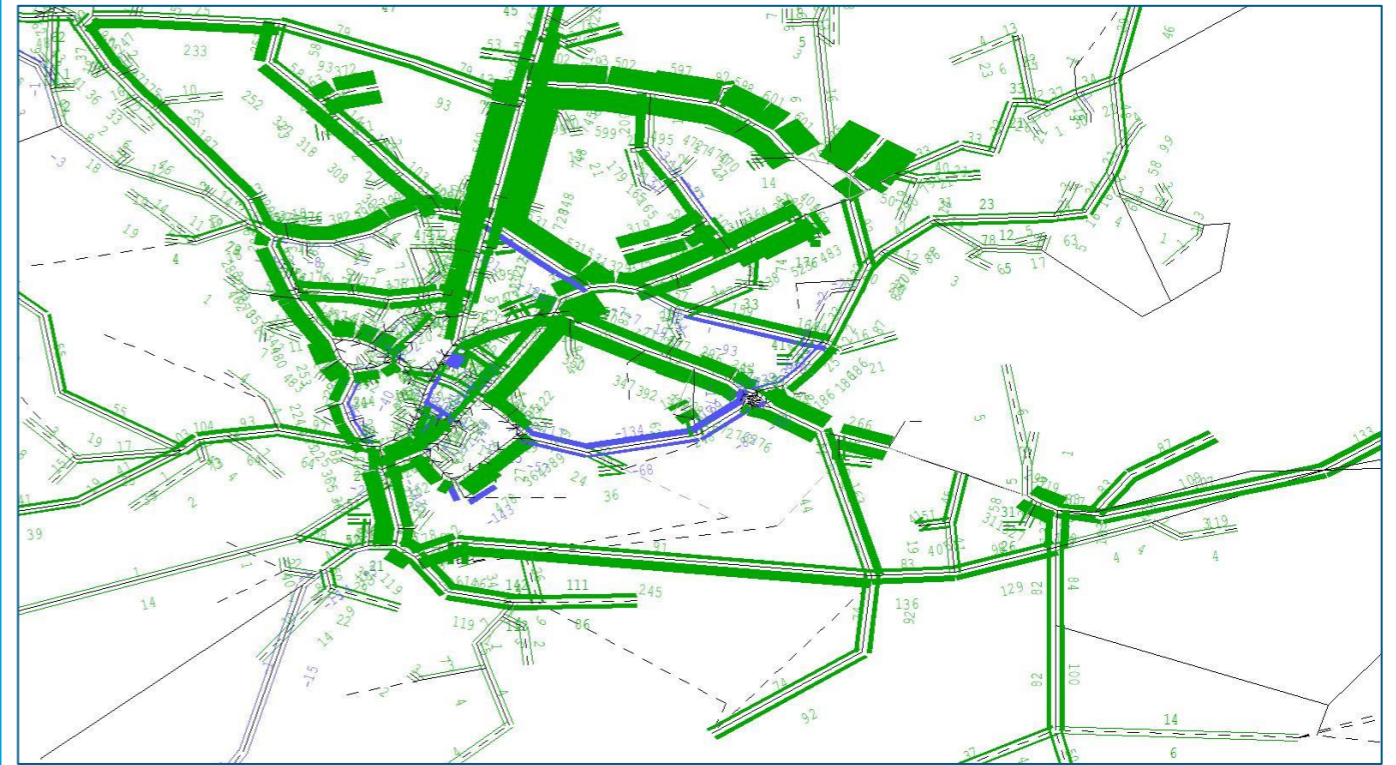
Table 4-5 - 2029 Do Minimum Key Link Flows

ID	Location	Direction	Base			DM			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1290	1310	1270	1780	1700	1650	490	390	380	38%	30%	30%
		WB	1900	1110	1520	1590	1380	1720	-310	270	200	-16%	24%	13%
2	Four Lane Road at Dry Arch Roundabout	EB	1170	1250	1380	1590	1570	1530	420	320	150	36%	26%	11%
		WB	1790	1060	1400	2550	1390	1780	760	330	380	42%	31%	27%
3	Neil T Blaney Road	EB	380	700	530	680	560	790	300	-140	260	79%	-20%	49%
		WB	540	580	500	440	510	750	-100	-70	250	-19%	-12%	50%
4	Port Road	EB	360	270	180	500	480	250	140	210	70	39%	78%	39%
		WB	720	240	450	680	590	620	-40	350	170	-6%	146%	38%
5	Ballyraine Road	EB	250	420	490	510	580	680	260	160	190	104%	38%	39%
		WB	530	550	460	500	460	540	-30	-90	80	-6%	-16%	17%
6	N56	NB	760	750	1010	650	780	710	-110	30	-300	-14%	4%	-30%
		SB	1320	820	800	1130	900	1100	-190	80	300	-14%	10%	38%
7	South West of Kilty Roundabout	NB	370	250	640	530	610	650	160	360	10	43%	144%	2%
		SB	190	220	340	260	740	350	70	520	10	37%	236%	3%
8	Kilmacrennan Road	NB	610	590	870	1380	1140	1220	770	550	350	126%	93%	40%
		SB	910	590	880	1480	1340	1390	570	750	510	63%	127%	58%
9	Port Road	SB	450	380	480	480	630	730	30	250	250	7%	66%	52%
10	High Road	NB	520	420	620	610	870	770	90	450	150	17%	107%	24%
		SB	640	430	470	700	560	510	60	130	40	9%	30%	9%
11	Main Street	SB	440	450	430	340	110	170	-100	-340	-260	-23%	-76%	-60%
12	Paddy Harte Road	SB	820	1060	1150	1150	1420	1440	330	360	290	40%	34%	25%
13	Pearse Road	NB	750	680	730	990	980	890	240	300	160	32%	44%	22%
		SB	340	480	630	850	910	940	510	430	310	150%	90%	49%
14	Convent Road	NB	660	430	670	790	650	750	130	220	80	20%	51%	12%
		SB	300	220	470	80	180	670	-220	-40	200	-73%	-18%	43%
15	R250	EB	720	340	490	1000	430	710	280	90	220	39%	26%	45%
		WB	370	430	720	510	490	860	140	60	140	38%	14%	19%
16	Leck Road	EB	90	90	360	380	180	200	290	90	-160	322%	100%	-44%
		WB	200	60	130	60	310	420	-140	250	290	-70%	417%	223%
17	R229	EB	910	860	1040	1480	1390	1490	570	530	450	63%	62%	43%
		WB	870	750	830	740	620	720	-130	-130	-110	-15%	-17%	-13%
18	N56	EB	640	340	430	830	840	950	190	500	520	30%	147%	121%
		WB	610	400	820	1070	1000	1280	460	600	460	75%	150%	56%
19	N56	NB	490	590	1050	600	670	1010	110	80	-40	22%	14%	-4%
		SB	910	530	580	1080	660	750	170	130	170	19%	25%	29%

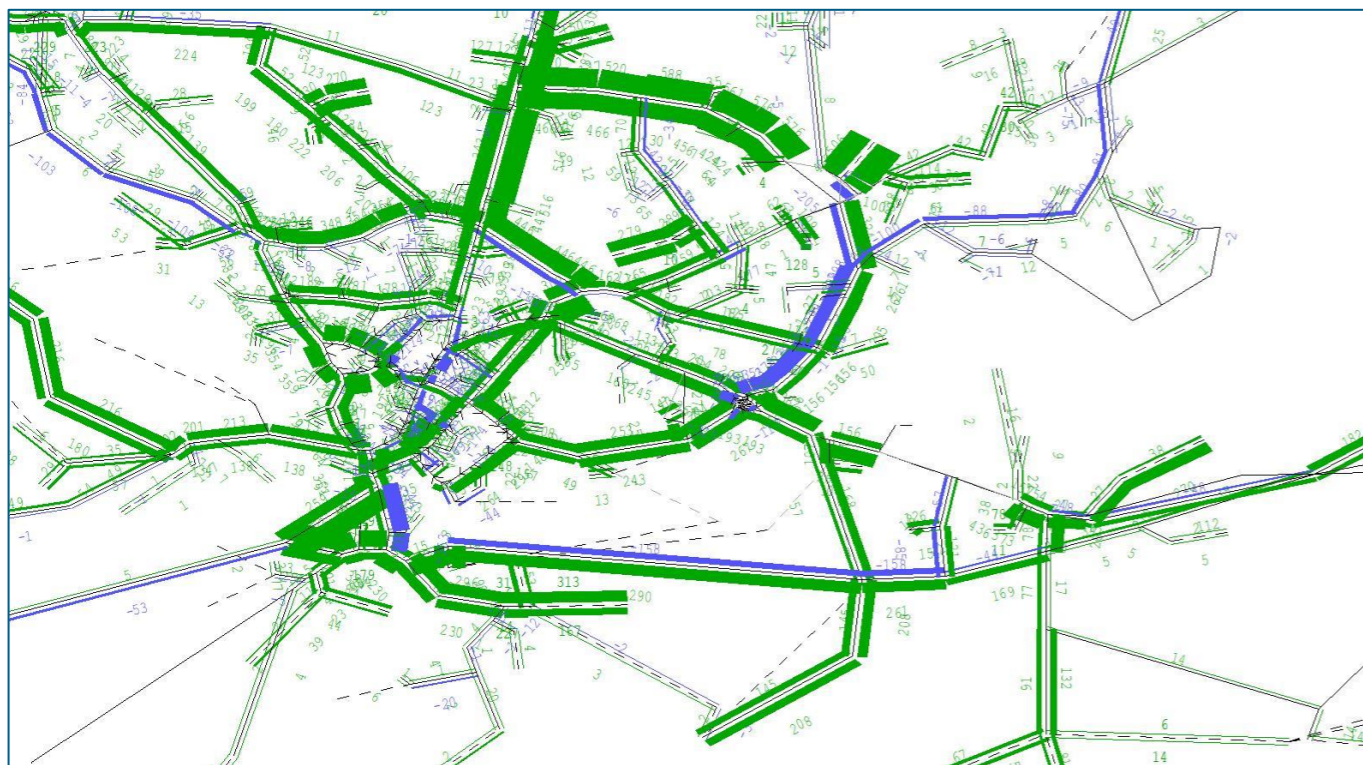
AM Actual Flow: 2029 DM – 2017 Base



IP Actual Flow: 2029 DM – 2017 Base



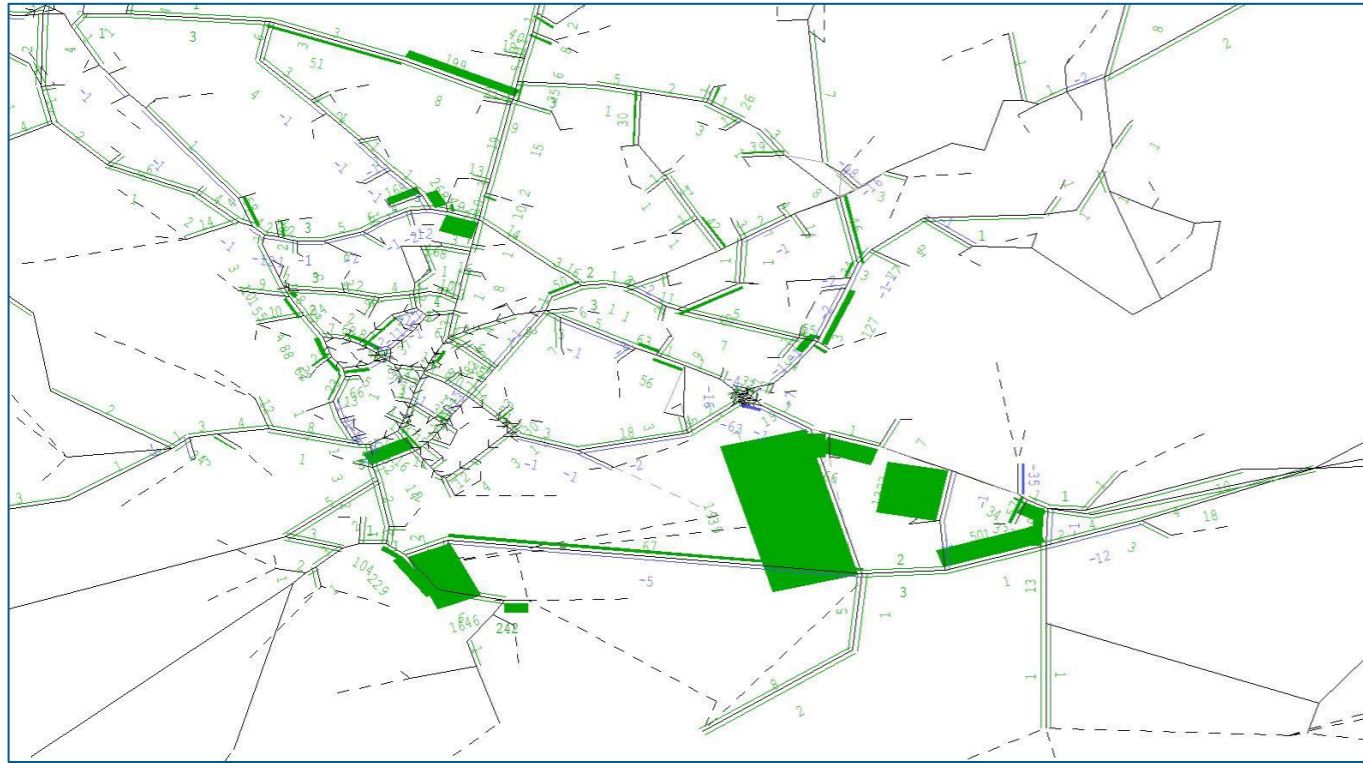
PM Actual Flow: 2029 DM – 2017 Base



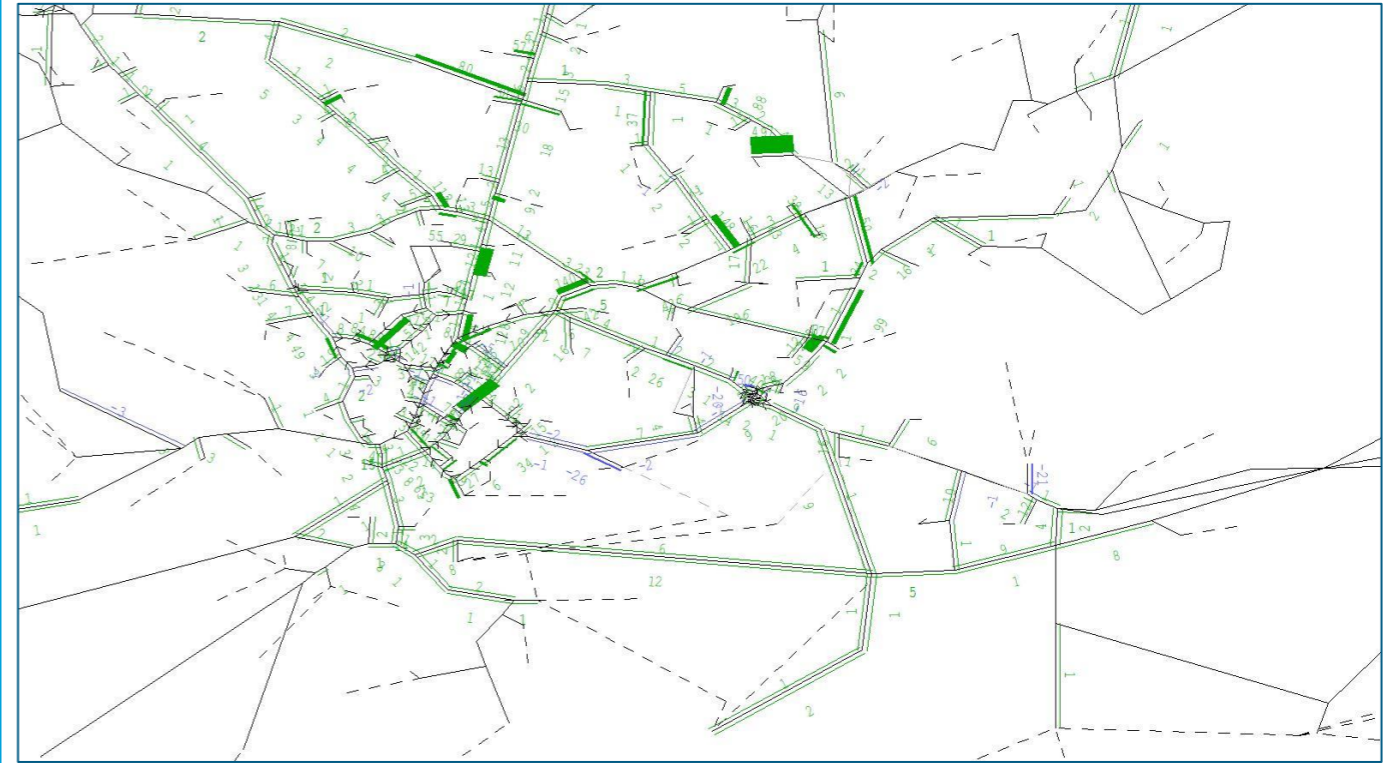
The above flows at select links and flow difference plots show:

- The flow increases on the majority of links between the 2017 Base and 2024 forecast Do Minimum Scenario. This is as expected due to the increased forecast demand associated with the Land Use Plan;
- There is up to a 30% reduction in flow along the N56 and a 20% reduction in flow along the Neil T Blaney Road likely due to the signalisation of the roundabouts in this area (and traffic re-routing);
- There is generally an increase in flow along the N14 Four Lane Road in some peak hours, again likely due to the additional demand in the model;
- The flow along the Circular Road and De Valera Road shows decreases in flow WB, these are likely due to the impact of the One Way Scheme at the Cathedral Road;
- The Leck Road generally experiences a large increase (EB in the AM peak and WB in the PM peak) in demand (up to 417%), due to the development in the Strategic Growth Area.

AM Delay: 2029 DM – 2017 Base



IP Delay: 2029 DM – 2017 Base



PM Delay: 2029 DM – 2017 Base

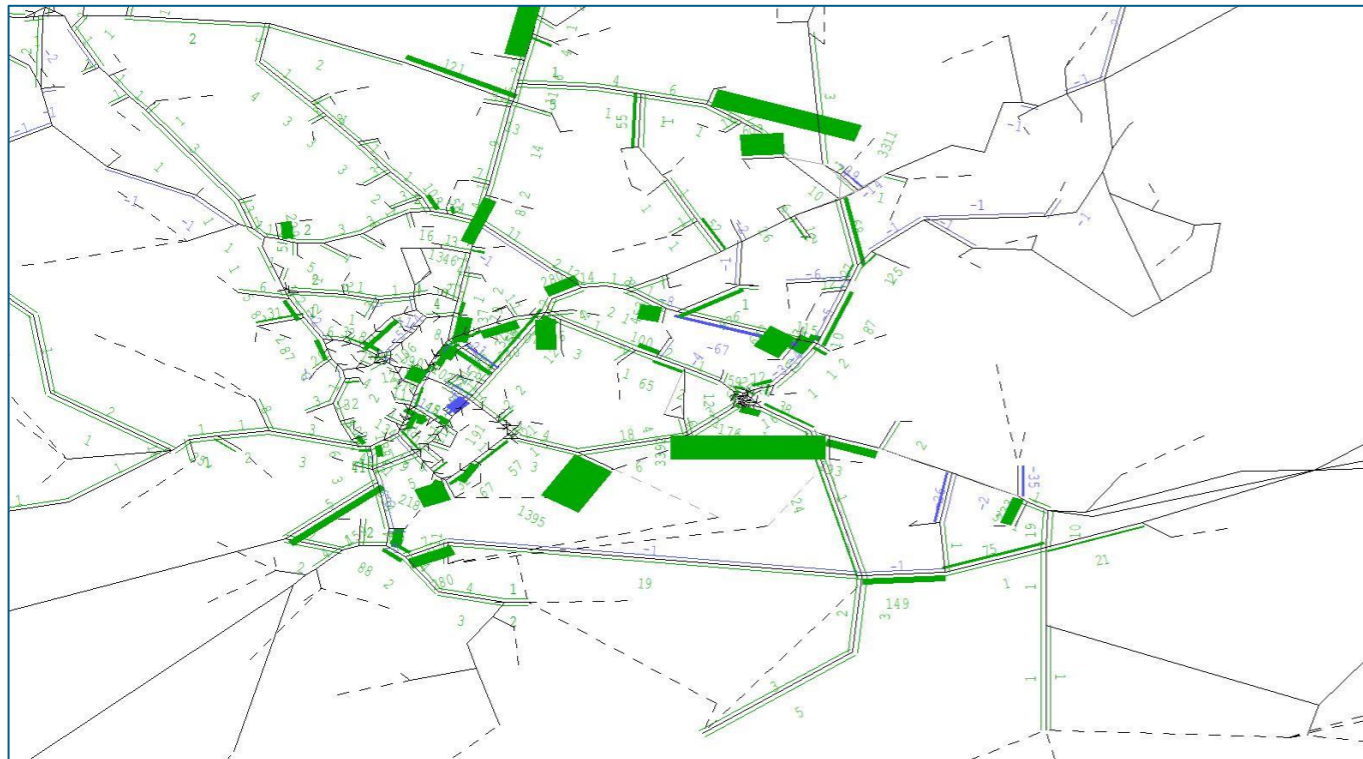


Table 4-6 - 2029 Do Minimum Journey Times (Seconds)

Route	Base			DM			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	720	670	840	1960	920	1910	1240	250	1070	172%	38%	128%
Route A SB	690	670	810	930	830	1110	240	160	300	36%	24%	37%
Route B EB	590	580	820	1200	900	1720	610	320	900	104%	55%	109%
Route B WB	600	570	630	870	830	1200	260	260	570	44%	46%	91%

The Journey times results show that in general terms the AM and PM show increases greater than the total matrix growth (42% and 47% respectively). This is consistent with a network already nearing capacity in the Base. By 2029, if the planned development is implemented, some journeys across Letterkenny could take almost three times as long due to the increased pressures on the network.

By contrast the IP journey times are slightly less or approximately equivalent to the matrix growth suggesting a small amount of spare capacity at this time.

The journey time for Route A NB shows a particularly large increase in the AM (172%).

The delay plots provide an indication of where there may be particular congestion issues arising from the development. These are highlighted as:

- There are large increases in delay along the Leck Road and at the junctions along the Four Lane Road likely due to the increased demand associated with the Strategic Growth Area;
- In the AM and PM peaks there are increased delays at the Cathedral One Way Scheme;
- The Ballyraine signalisation, along with the increases in demand are causing increases in delay in the area;
- There are increases in delay where the demand loads onto the network, this is due to the increases in flow along the main links;

The large increase on Route A NB is explained to some degree by the large increases in delay along the Port road at LYIT, the Ramelton Road and along the Kilmacrennan Road.

Table 4-7 - 2029 Do Minimum Key Link VoC

ID	Location	Direction	Base			DM			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	50.40	51.36	49.60	95.38	93.08	92.04	44.98	41.72	42.44	89%	81%	86%
		WB	74.27	43.28	59.50	62.11	54.05	67.05	-12.16	10.77	7.55	-16%	25%	13%
2	Four Lane Road at Dry Arch Roundabout	EB	47.24	50.68	56.49	65.15	64.72	62.74	17.91	14.04	6.25	38%	28%	11%
		WB	70.11	41.59	54.80	118.40	54.37	69.36	48.29	12.78	14.56	69%	31%	27%
3	Neil T Blaney Road	EB	27.08	49.90	38.05	63.27	52.60	74.12	36.19	2.70	36.07	134%	5%	95%
		WB	38.79	41.52	35.96	31.73	36.69	53.29	-7.06	-4.83	17.33	-18%	-12%	48%
4	Port Road	EB	100.38	61.53	103.91	104.01	91.90	109.53	3.63	30.37	5.62	4%	49%	5%
		WB	57.60	19.31	36.19	54.56	47.08	49.40	-3.04	27.77	13.21	-5%	144%	37%
5	Ballyraine Road	EB	40.13	73.66	60.30	56.53	79.11	87.24	16.40	5.45	26.94	41%	7%	45%
		WB	60.75	68.62	104.01	68.38	50.20	87.87	7.63	-18.42	-16.14	13%	-27%	-16%
6	N56	NB	54.00	53.44	72.38	46.44	55.81	51.05	-7.56	2.37	-21.33	-14%	4%	-29%
		SB	89.97	57.20	58.67	79.10	71.18	76.70	-10.87	13.98	18.03	-12%	24%	31%
7	South West of Kilty Roundabout	NB	29.86	20.09	51.16	42.68	49.17	51.80	12.82	29.08	0.64	43%	145%	1%
		SB	17.65	15.52	26.21	18.75	52.91	26.53	1.10	37.39	0.32	6%	241%	1%
8	Kilmacrennan Road	NB	38.16	37.13	54.60	86.39	71.42	76.05	48.23	34.29	21.45	126%	92%	39%
		SB	45.05	29.12	46.51	86.79	75.52	79.79	41.74	46.40	33.28	93%	159%	72%
9	Port Road	SB	52.18	40.84	58.36	57.58	93.66	112.89	5.40	52.82	54.53	10%	129%	93%
10	High Road	NB	41.36	33.51	49.48	48.69	69.80	61.91	7.33	36.29	12.43	18%	108%	25%
		SB	81.38	46.12	59.83	93.97	87.34	68.29	12.59	41.22	8.46	15%	89%	14%
11	Main Street	SB	91.10	91.72	95.94	104.63	106.45	108.51	13.53	14.73	12.57	15%	16%	13%
12	Paddy Harte Road	SB	58.30	75.50	81.85	82.11	101.49	102.99	23.81	25.99	21.14	41%	34%	26%
13	Pearse Road	NB	53.78	48.82	52.34	94.36	87.96	82.29	40.58	39.14	29.95	75%	80%	57%
		SB	36.43	34.63	47.73	60.44	64.77	70.74	24.01	30.14	23.01	66%	87%	48%
14	Convent Road	NB	48.79	31.23	47.86	101.22	46.77	53.55	52.43	15.54	5.69	107%	50%	12%
		SB	22.36	15.41	33.85	11.55	12.52	47.95	-10.81	-2.89	14.10	-48%	-19%	42%
15	R250	EB	51.77	23.96	35.35	71.78	30.91	50.57	20.01	6.95	15.22	39%	29%	43%
		WB	26.53	30.36	51.28	36.23	34.95	61.17	9.70	4.59	9.89	37%	15%	19%
16	Leck Road	EB	19.77	19.84	73.66	100.64	48.64	55.17	80.87	28.80	-18.49	409%	145%	-25%
		WB	22.77	6.81	13.97	6.88	34.06	46.16	-15.89	27.25	32.19	-70%	400%	230%
17	R229	EB	56.70	53.83	65.22	92.47	87.04	93.11	35.77	33.21	27.89	63%	62%	43%
		WB	44.60	34.52	41.71	42.27	33.71	39.16	-2.33	-0.81	-2.55	-5%	-2%	-6%
18	N56	EB	47.78	29.13	47.75	80.22	61.83	76.52	32.44	32.70	28.77	68%	112%	60%
		WB	33.73	22.16	45.41	59.40	55.46	71.31	25.67	33.30	25.90	76%	150%	57%
19	N56	NB	30.40	36.66	65.68	37.40	41.62	63.31	7.00	4.96	-2.37	23%	14%	-4%
		SB	56.71	33.19	36.51	67.44	41.00	46.98	10.73	7.81	10.47	19%	24%	29%

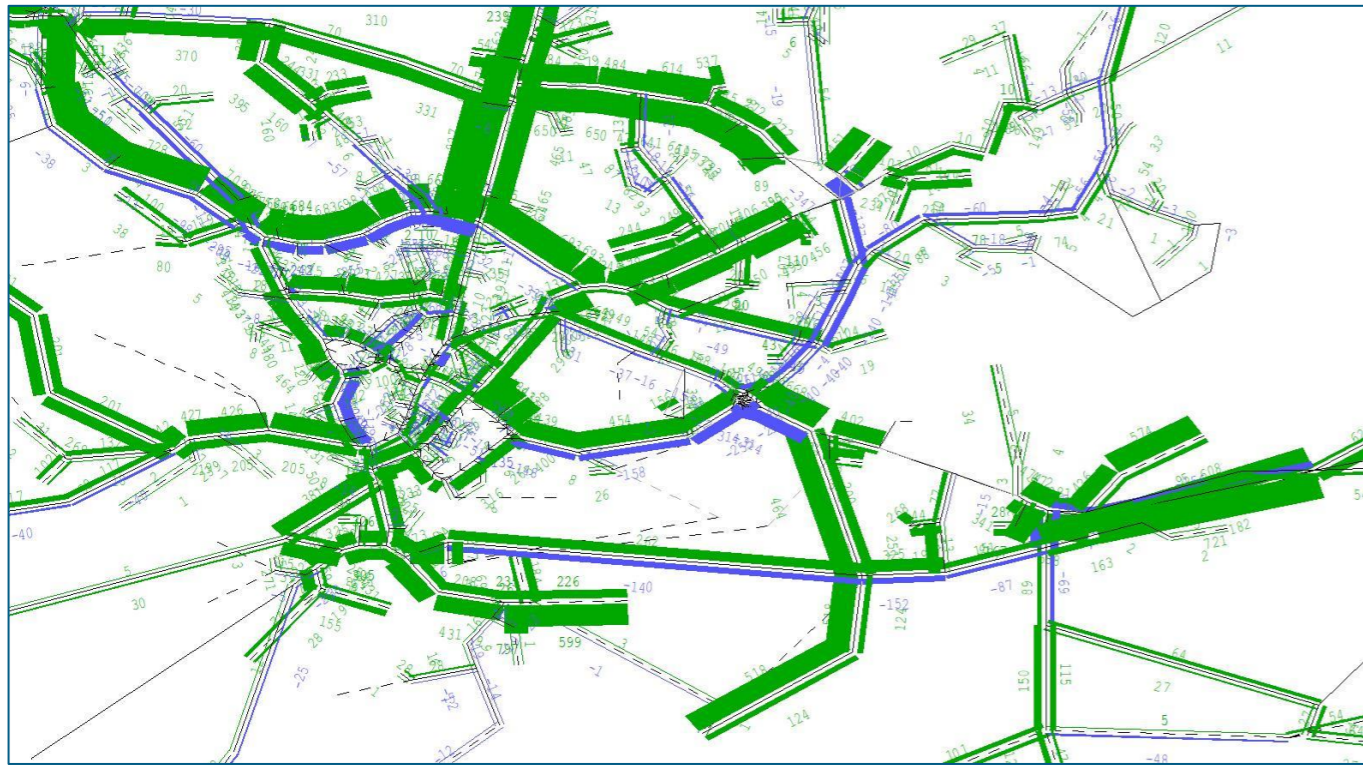
The VoC percentages show that in the DM, the Four Lane Road, Port Road, Main Street, Paddy Harte Road, Convent Road and the Leck Road are all over capacity.

4.5.4. 2033

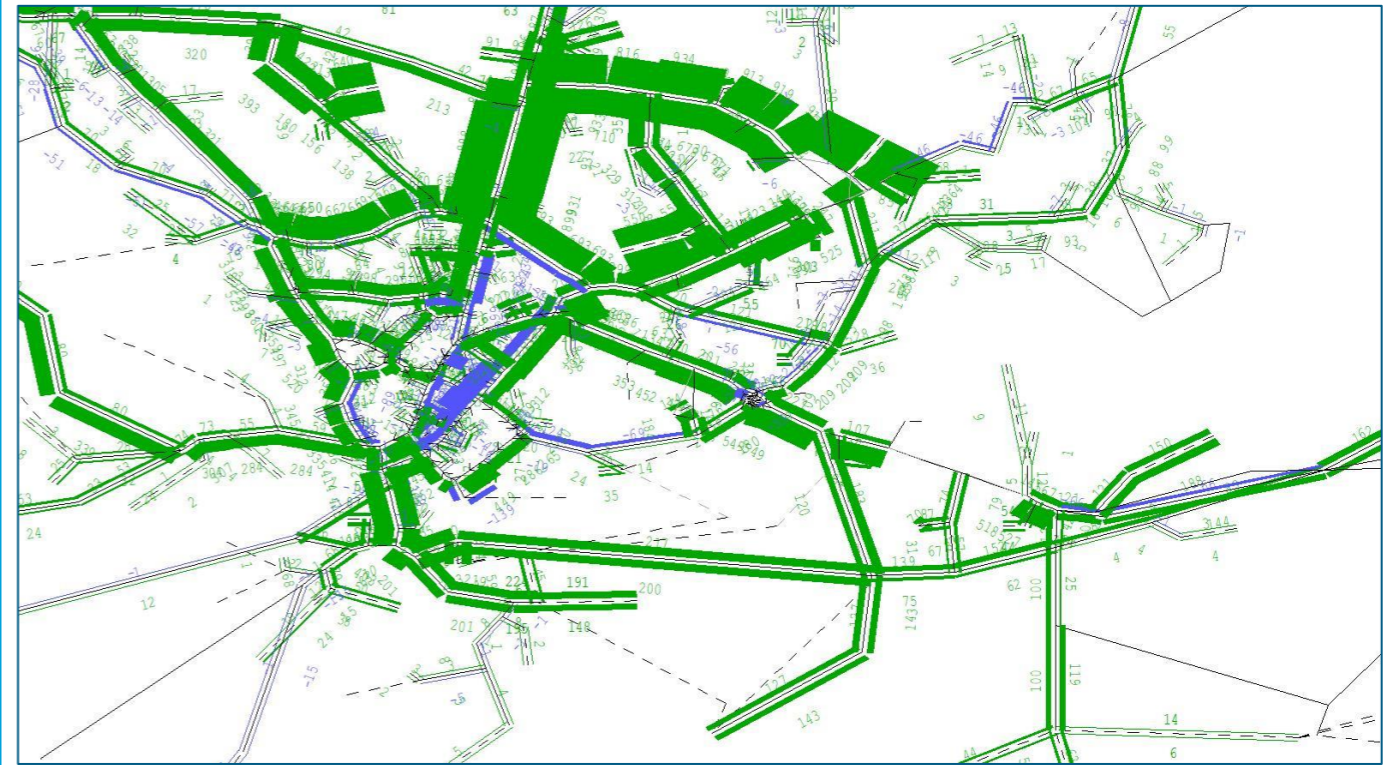
Table 4-8 - 2033 Do Minimum Key Link Flows

ID	Location	Direction	Base			DM			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1290	1310	1270	1960	1540	1690	670	230	420	52%	18%	33%
		WB	1900	1110	1520	1590	1660	1700	-310	550	180	-16%	50%	12%
2	Four Lane Road at Dry Arch Roundabout	EB	1170	1250	1380	1640	1420	1540	470	170	160	40%	14%	12%
		WB	1790	1060	1400	2790	1590	2120	1000	530	720	56%	50%	51%
3	Neil T Blaney Road	EB	380	700	530	830	630	840	450	-70	310	118%	-10%	58%
		WB	540	580	500	390	600	770	-150	20	270	-28%	3%	54%
4	Port Road	EB	360	270	180	510	400	250	150	130	70	42%	48%	39%
		WB	720	240	450	680	590	580	-40	350	130	-6%	146%	29%
5	Ballyraine Road	EB	250	420	490	540	540	590	290	120	100	116%	29%	20%
		WB	530	550	460	480	500	560	-50	-50	100	-9%	-9%	22%
6	N56	NB	760	750	1010	650	730	590	-110	-20	-420	-14%	-3%	-42%
		SB	1320	820	800	1180	1010	1160	-140	190	360	-11%	23%	45%
7	South West of Kilty Roundabout	NB	370	250	640	780	670	730	410	420	90	111%	168%	14%
		SB	190	220	340	690	810	430	500	590	90	263%	268%	26%
8	Kilmacrennan Road	NB	610	590	870	1540	1480	1290	930	890	420	152%	151%	48%
		SB	910	590	880	1380	1520	1470	470	930	590	52%	158%	67%
9	Port Road	SB	450	380	480	560	620	720	110	240	240	24%	63%	50%
10	High Road	NB	520	420	620	750	790	720	230	370	100	44%	88%	16%
		SB	640	430	470	660	190	210	20	-240	-260	3%	-56%	-55%
11	Main Street	SB	440	450	430	240	40	30	-200	-410	-400	-45%	-91%	-93%
12	Paddy Harte Road	SB	820	1060	1150	1080	1340	1500	260	280	350	32%	26%	30%
13	Pearse Road	NB	750	680	730	930	210	840	180	-470	110	24%	-69%	15%
		SB	340	480	630	890	800	1020	550	320	390	162%	67%	62%
14	Convent Road	NB	660	430	670	810	790	770	150	360	100	23%	84%	15%
		SB	300	220	470	40	130	670	-260	-90	200	-87%	-41%	43%
15	R250	EB	720	340	490	1150	390	820	430	50	330	60%	15%	67%
		WB	370	430	720	580	710	890	210	280	170	57%	65%	24%
16	Leck Road	EB	90	90	360	350	310	190	260	220	-170	289%	244%	-47%
		WB	200	60	130	60	260	400	-140	200	270	-70%	333%	208%
17	R229	EB	910	860	1040	1630	1550	1560	720	690	520	79%	80%	50%
		WB	870	750	830	840	610	750	-30	-140	-80	-3%	-19%	-10%
18	N56	EB	640	340	430	1130	1150	1120	490	810	690	77%	238%	160%
		WB	610	400	820	1260	1110	1450	650	710	630	107%	178%	77%
19	N56	NB	490	590	1050	650	600	930	160	10	-120	33%	2%	-11%
		SB	910	530	580	1140	700	860	230	170	280	25%	32%	48%

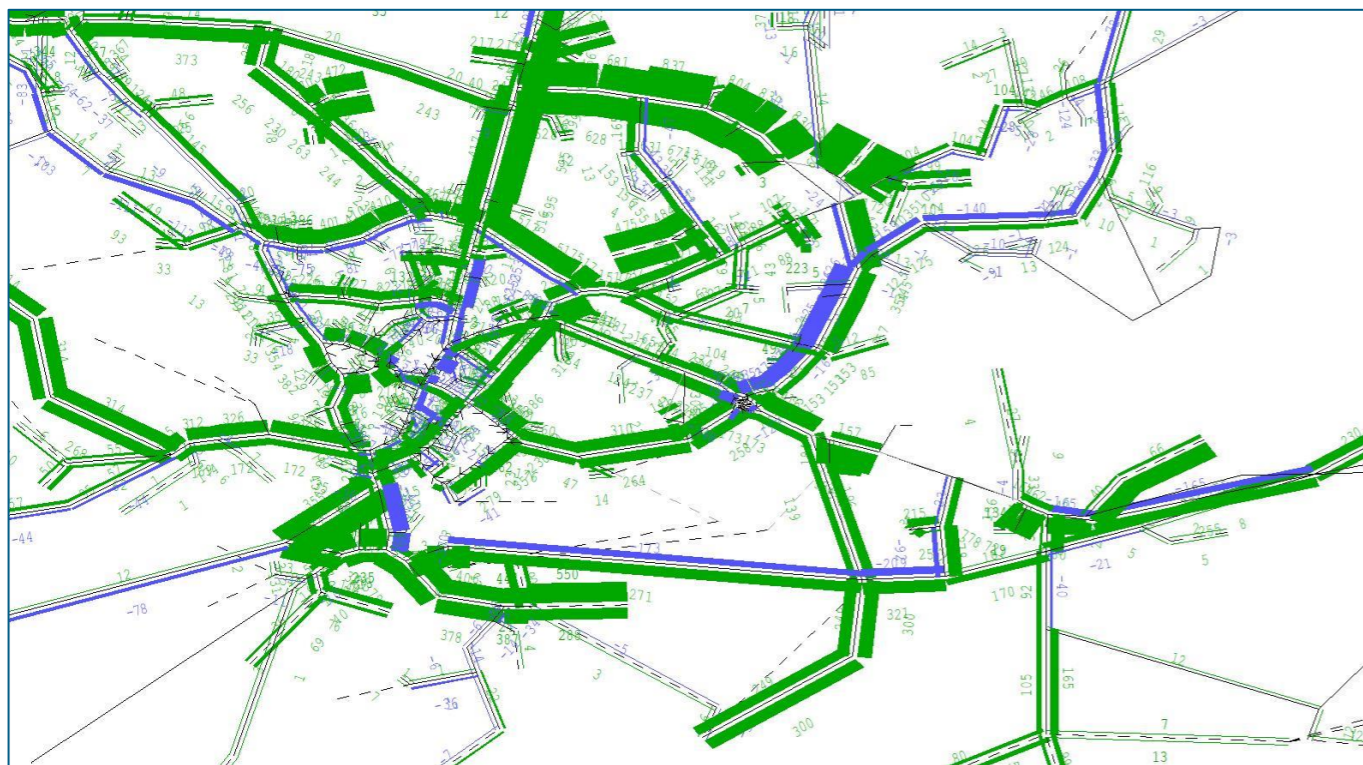
AM Actual Flow: 2033 DM – 2017 Base



IP Actual Flow: 2033 DM – 2017 Base



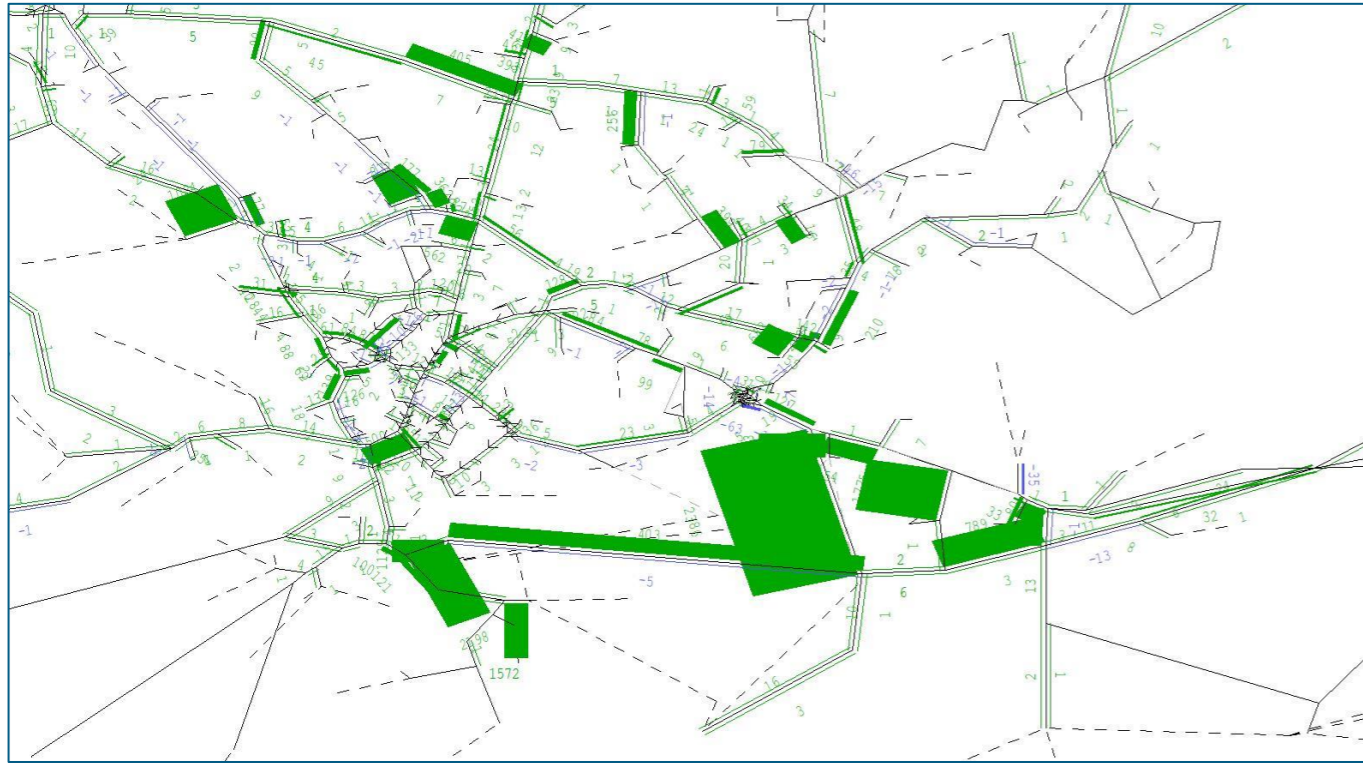
PM Actual Flow: 2033 DM – 2017 Base



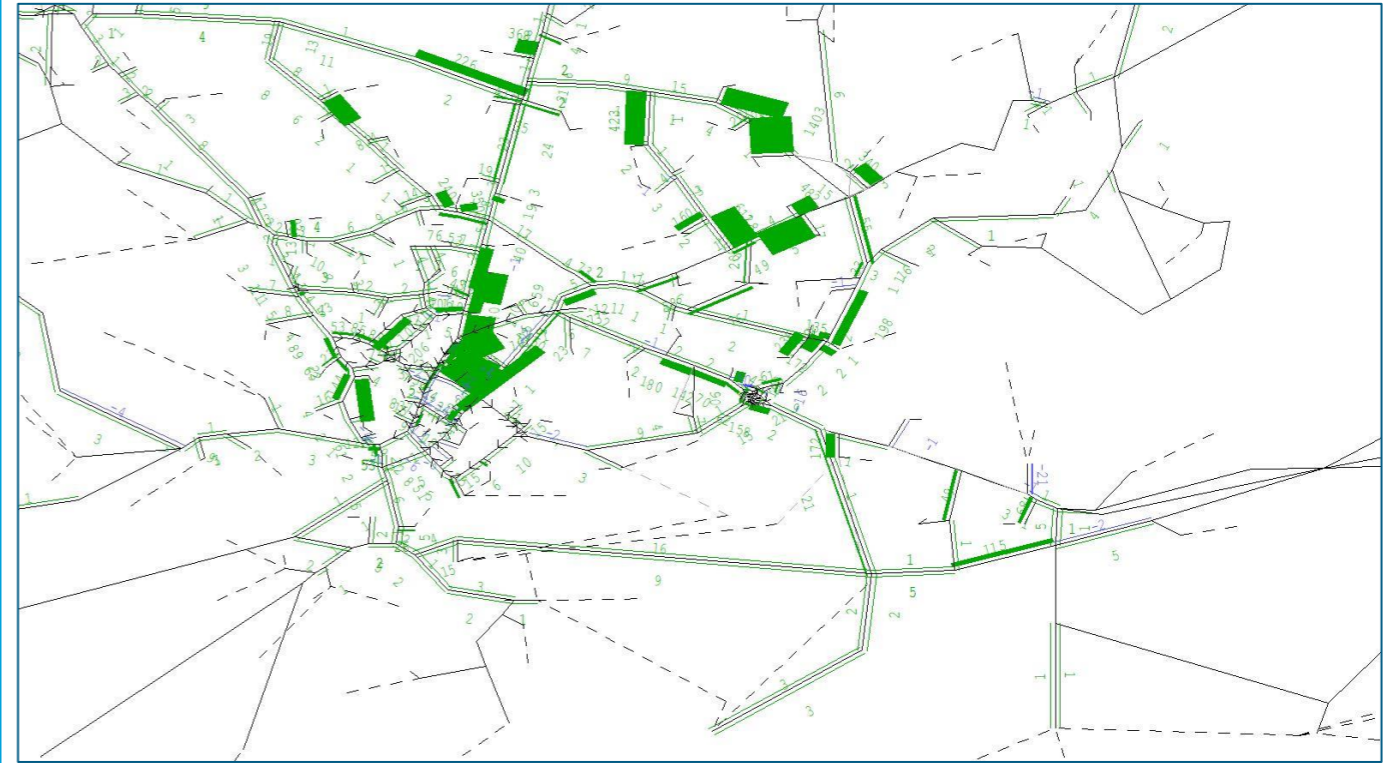
The above flows at select links and flow difference plots show:

- The flow increases on the majority of links between the 2017 Base and 2024 forecast Do Minimum Scenario. This is as expected due to the increased forecast demand associated with the Land Use Plan;
- There is up to a 42% reduction in flow along the N56 and a 28% reduction in flow along the Neil T Blaney Road likely due to the signalisation of the roundabouts in this area;
- There is generally an increase in flow along the N14 Four Lane Road in some peak hours, again likely due to the additional demand in the model;
- The flow along the Circular Road and De Valera Road shows decreases in flow WB, these are likely due to the impact of the One Way Scheme at the Cathedral Road;
- The Leck Road generally experiences a large increase (EB in the AM peak and WB in the PM peak) in demand (up to 417%), due to the development in the Strategic Growth Area.

AM Delay: 2033 DM – 2017 Base



IP Delay: 2033 DM – 2017 Base



PM Delay: 2033 DM – 2017 Base

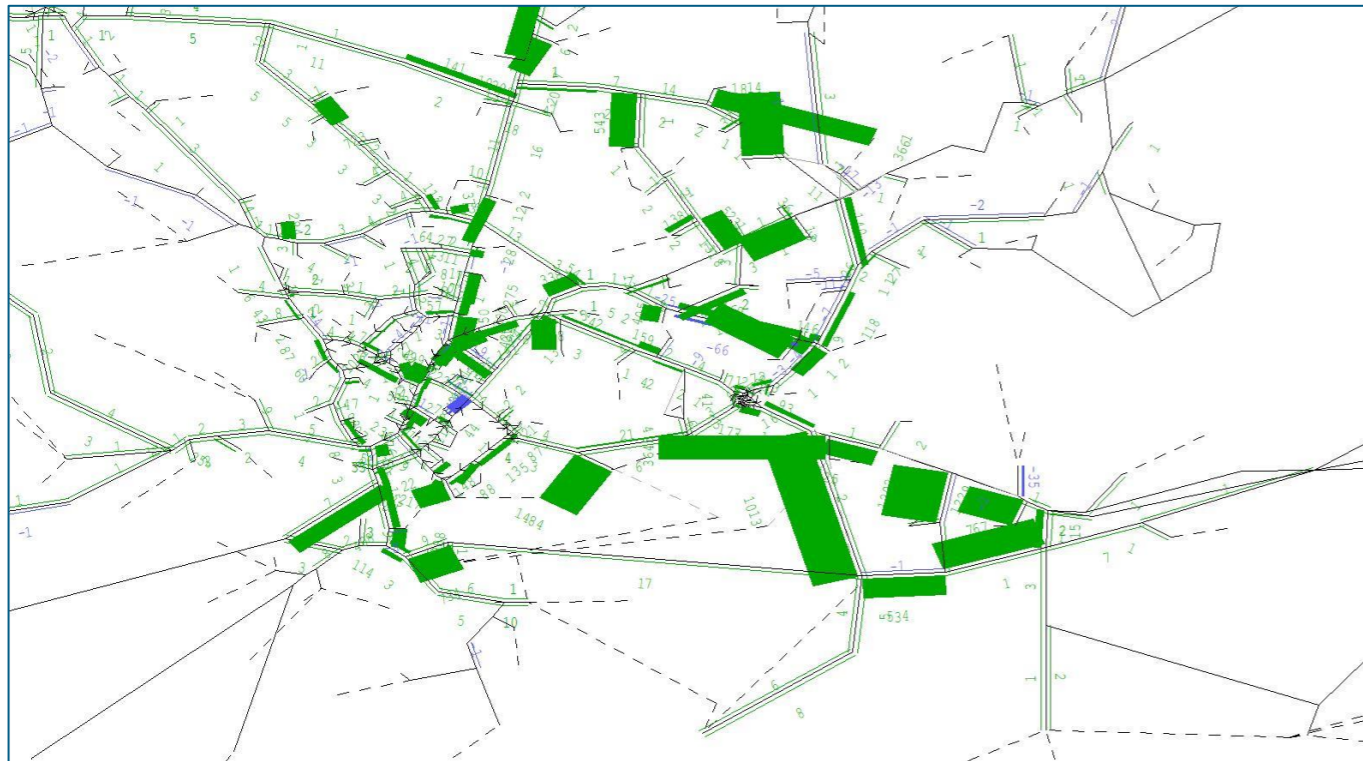


Table 4-9 - 2033 Do Minimum Journey Times (Seconds)

Route	Base			DM			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	720	670	840	2260	1420	2190	1540	750	1350	214%	111%	162%
Route A SB	690	670	810	1210	1030	1290	530	370	480	76%	55%	59%
Route B EB	590	580	820	1580	1330	1920	1000	750	1090	169%	129%	133%
Route B WB	600	570	630	990	1040	1380	390	470	750	65%	82%	120%

The Journey times results show that in general terms the AM, IP and PM show increases greater than the total matrix growth (66%, 75% and 73% respectively). This is consistent with a network already nearing capacity in the Base. By 2033, if the planned development is implemented, some journeys across Letterkenny could take over three times as long due to the increased pressures on the network.

The journey time for Route A NB shows a particularly large increase in the AM (214%).

The delay plots provide an indication of where there may be particular congestion issues arising from the development. These are highlighted as:

- There are large increases in delay along the Leck Road and at the junctions along the Four Lane Road likely due to the increased demand associated with the Strategic Growth Area;
- In the AM and PM peaks there are increased delays at the Cathedral One Way Scheme;
- The Ballyraine signalisation, along with the increases in demand are causing increases in delay in the area;
- There are increases in delay where the demand loads onto the network, this is due to the increases in flow along the main links;

The large increase on Route A NB is explained to some degree by the large increases in delay along the Port road at LYIT, the Ramelton Road and along the Kilmacrennan Road.

Table 4-10 - 2033 Do Minimum Key Link VoC

ID	Location	Direction	Base			DM			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	50.40	51.36	49.60	106.49	84.59	94.18	56.09	33.23	44.58	111%	65%	90%
		WB	74.27	43.28	59.50	62.01	64.72	66.26	-12.26	21.44	6.76	-17%	50%	11%
2	Four Lane Road at Dry Arch Roundabout	EB	47.24	50.68	56.49	66.14	57.95	62.24	18.90	7.27	5.75	40%	14%	10%
		WB	70.11	41.59	54.80	125.65	62.19	82.98	55.54	20.60	28.18	79%	50%	51%
3	Neil T Blaney Road	EB	27.08	49.90	38.05	77.26	58.16	87.24	50.18	8.26	49.19	185%	17%	129%
		WB	38.79	41.52	35.96	27.51	42.53	54.81	-11.28	1.01	18.85	-29%	2%	52%
4	Port Road	EB	100.38	61.53	103.91	104.87	75.60	112.82	4.49	14.07	8.91	4%	23%	9%
		WB	57.60	19.31	36.19	54.61	47.57	46.07	-2.99	28.26	9.88	-5%	146%	27%
5	Ballyraine Road	EB	40.13	73.66	60.30	90.09	69.54	108.93	49.96	-4.12	48.63	124%	-6%	81%
		WB	60.75	68.62	104.01	66.58	53.06	91.27	5.83	-15.56	-12.74	10%	-23%	-12%
6	N56	NB	54.00	53.44	72.38	46.17	52.41	42.04	-7.83	-1.03	-30.34	-15%	-2%	-42%
		SB	89.97	57.20	58.67	82.69	79.95	81.01	-7.28	22.75	22.34	-8%	40%	38%
7	South West of Kilty Roundabout	NB	29.86	20.09	51.16	62.31	53.90	58.20	32.45	33.81	7.04	109%	168%	14%
		SB	17.65	15.52	26.21	48.98	57.80	32.45	31.33	42.28	6.24	178%	272%	24%
8	Kilmacrennan Road	NB	38.16	37.13	54.60	96.11	92.63	80.67	57.95	55.50	26.07	152%	149%	48%
		SB	45.05	29.12	46.51	80.89	90.69	85.50	35.84	61.57	38.99	80%	211%	84%
9	Port Road	SB	52.18	40.84	58.36	76.86	90.21	110.13	24.68	49.37	51.77	47%	121%	89%
10	High Road	NB	41.36	33.51	49.48	59.69	63.34	57.37	18.33	29.83	7.89	44%	89%	16%
		SB	81.38	46.12	59.83	92.82	136.83	115.66	11.44	90.71	55.83	14%	197%	93%
11	Main Street	SB	91.10	91.72	95.94	108.14	108.28	108.54	17.04	16.56	12.60	19%	18%	13%
12	Paddy Harte Road	SB	58.30	75.50	81.85	77.23	95.94	107.35	18.93	20.44	25.50	32%	27%	31%
13	Pearse Road	NB	53.78	48.82	52.34	87.11	117.68	78.35	33.33	68.86	26.01	62%	141%	50%
		SB	36.43	34.63	47.73	63.31	56.94	72.59	26.88	22.31	24.86	74%	64%	52%
14	Convent Road	NB	48.79	31.23	47.86	107.61	107.88	54.73	58.82	76.65	6.87	121%	245%	14%
		SB	22.36	15.41	33.85	7.95	9.07	47.56	-14.41	-6.34	13.71	-64%	-41%	41%
15	R250	EB	51.77	23.96	35.35	82.21	28.18	58.65	30.44	4.22	23.30	59%	18%	66%
		WB	26.53	30.36	51.28	41.19	50.62	63.55	14.66	20.26	12.27	55%	67%	24%
16	Leck Road	EB	19.77	19.84	73.66	118.25	81.22	54.17	98.48	61.38	-19.49	498%	309%	-26%
		WB	22.77	6.81	13.97	7.19	29.07	44.07	-15.58	22.26	30.10	-68%	327%	215%
17	R229	EB	56.70	53.83	65.22	102.12	97.14	97.51	45.42	43.31	32.29	80%	80%	50%
		WB	44.60	34.52	41.71	47.51	33.87	41.11	2.91	-0.65	-0.60	7%	-2%	-1%
18	N56	EB	47.78	29.13	47.75	80.40	82.30	82.49	32.62	53.17	34.74	68%	183%	73%
		WB	33.73	22.16	45.41	69.82	61.61	80.33	36.09	39.45	34.92	107%	178%	77%
19	N56	NB	30.40	36.66	65.68	40.41	37.42	58.20	10.01	0.76	-7.48	33%	2%	-11%
		SB	56.71	33.19	36.51	71.09	43.87	53.57	14.38	10.68	17.06	25%	32%	47%

The VoC percentages show that in the DM, the Four Lane Road, Port Road, Ballyraine Road, High Road, Main Street, Paddy Harte Road, Pearse Road, Convent Road, Leck Road and the R229 are all over capacity.

4.6. Do Something - Scenario 1

This scenario assesses the TEN-T scheme with the 2029 and 2033 core demand.

4.6.1. SATURN Simulation Summary Results

4.6.1.1. 2029

Summary Result	Units	2017 Base			2029 DM			2029 DS1			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	1199	381.8	1797.3	497.7	239.8	1224.2	-58%	-37%	-32%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	3083.1	1972.9	3745.8	2452.9	1750.7	3226.6	-20%	-11%	-14%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	55338.4	45887.2	55015.6	64037.8	49413.8	62588	16%	8%	14%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	17.9	23.3	14.7	26.1	28.2	19.4	46%	21%	32%

4.6.1.2. 2033

Summary Result	Units	2017 Base			2033 DM			2033 DS1			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	2196	1871.2	3276	1507.5	1489.7	2532.8	-31%	-20%	-23%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	4401.8	3748.7	5458.5	3831.4	3292.7	4842.3	-13%	-12%	-11%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	61636.8	51049	59427.8	71349.5	54713.5	68505.1	16%	7%	15%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	14	13.6	10.9	18.6	16.6	14.1	33%	22%	29%

The above summary results show that with the implementation of the TEN-T scheme:

- There is a decrease in over capacity queues from the DM model showing some improvement however these are still significantly higher than in the base;
- Total travel time decreases compared to the DM model but again is still significantly higher than in the base;
- There is a large increase in travel distance across the network likely due to traffic rerouting and travelling further to make use of the TEN-T scheme;
- Average speed increases compared to the DM but is still slower than in the base.

The results of the DS1 forecast modelling show that while there is improvement in the network performance compared to the Do Minimum scenario, it still performs worse than the already struggling base network and further improvements will be needed if the planned demand is to be realised.

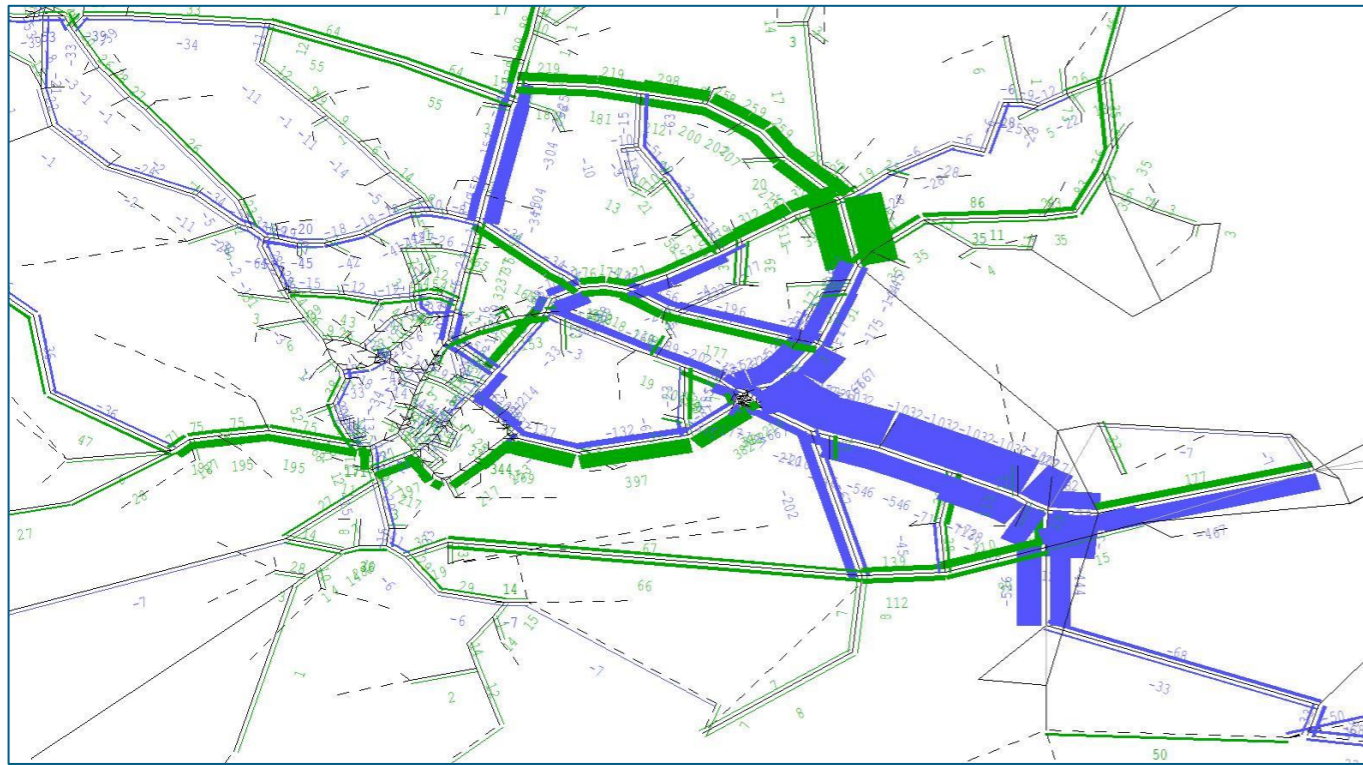
Further details on these results including link flows and delay plots are shown the rest of the section.

4.6.2. 2029

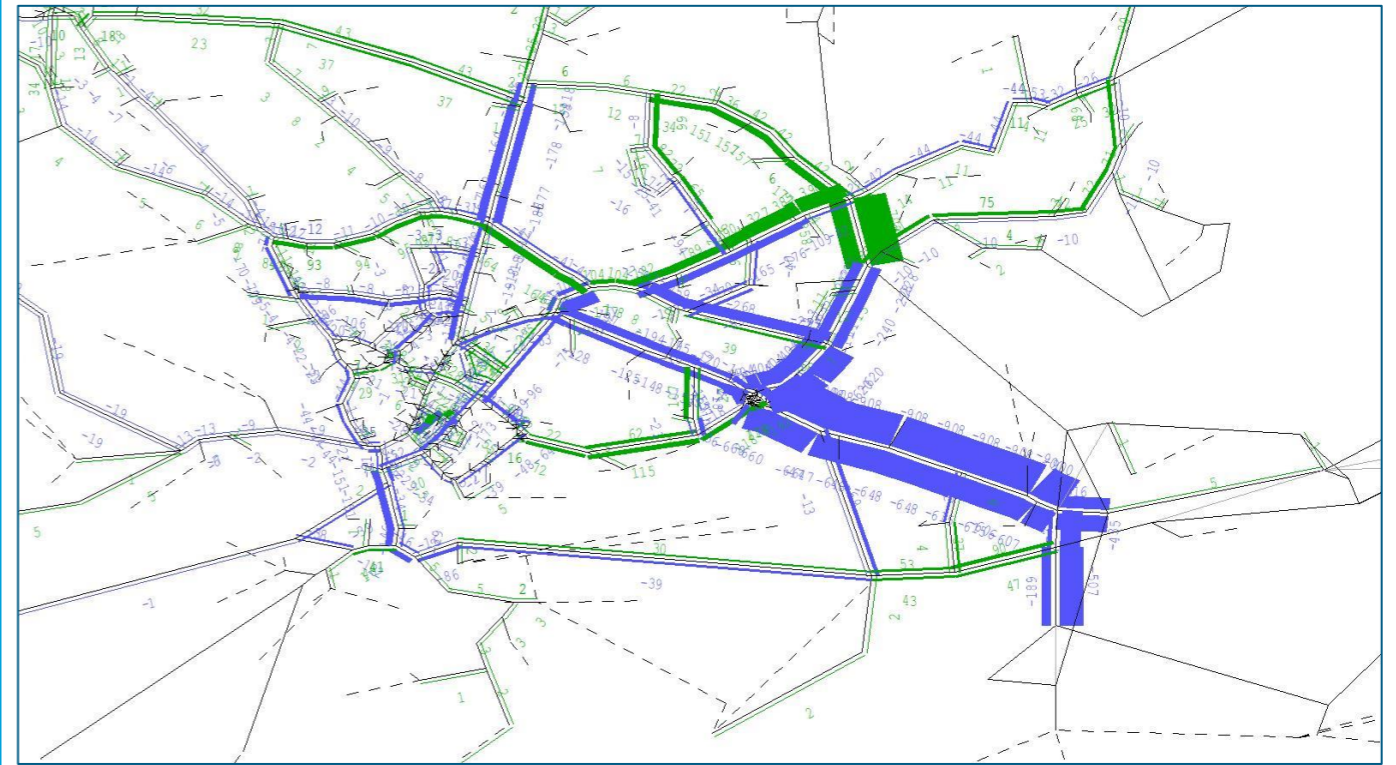
Table 4-11 - 2029 Do Something 1 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1780	1700	1650	670	720	920	-1110	-980	-730	-62%	-58%	-44%
		WB	1590	1380	1720	1410	720	870	-180	-660	-850	-11%	-48%	-49%
2	Four Lane Road at Dry Arch Roundabout	EB	1590	1570	1530	570	670	820	-1020	-900	-710	-64%	-57%	-46%
		WB	2550	1390	1780	1440	790	800	-1110	-600	-980	-44%	-43%	-55%
3	Neil T Blaney Road	EB	680	560	790	550	630	980	-130	70	190	-19%	13%	24%
		WB	440	510	750	840	630	730	400	120	-20	91%	24%	-3%
4	Port Road	EB	500	480	250	340	290	240	-160	-190	-10	-32%	-40%	-4%
		WB	680	590	620	680	460	520	0	-130	-100	0%	-22%	-16%
5	Ballyraine Road	EB	510	580	680	310	310	360	-200	-270	-320	-39%	-47%	-47%
		WB	500	460	540	670	500	690	170	40	150	34%	9%	28%
6	N56	NB	650	780	710	320	550	690	-330	-230	-20	-51%	-29%	-3%
		SB	1130	900	1100	950	660	820	-180	-240	-280	-16%	-27%	-25%
7	South West of Kilty Roundabout	NB	530	610	650	850	940	890	320	330	240	60%	54%	37%
		SB	260	740	350	270	570	460	10	-170	110	4%	-23%	31%
8	Kilmacrennan Road	NB	1380	1140	1220	1230	980	1170	-150	-160	-50	-11%	-14%	-4%
		SB	1480	1340	1390	1170	1160	1340	-310	-180	-50	-21%	-13%	-4%
9	Port Road	SB	480	630	730	590	560	690	110	-70	-40	23%	-11%	-5%
10	High Road	NB	610	870	770	600	750	770	-10	-120	0	-2%	-14%	0%
		SB	700	560	510	740	540	630	40	-20	120	6%	-4%	24%
11	Main Street	SB	340	110	170	320	90	140	-20	-20	-30	-6%	-18%	-18%
12	Paddy Harte Road	SB	1150	1420	1440	1400	1370	1300	250	-50	-140	22%	-4%	-10%
13	Pearse Road	NB	990	980	890	980	990	780	-10	10	-110	-1%	1%	-12%
		SB	850	910	940	630	810	860	-220	-100	-80	-26%	-11%	-9%
14	Convent Road	NB	790	650	750	830	610	670	40	-40	-80	5%	-6%	-11%
		SB	80	180	670	40	170	570	-40	-10	-100	-50%	-6%	-15%
15	R250	EB	1000	430	710	1080	420	630	80	-10	-80	8%	-2%	-11%
		WB	510	490	860	700	490	730	190	0	-130	37%	0%	-15%
16	Leck Road	EB	380	180	200	450	210	230	70	30	30	18%	17%	15%
		WB	60	310	420	130	270	460	70	-40	40	117%	-13%	10%
17	R229	EB	1480	1390	1490	1450	1350	1480	-30	-40	-10	-2%	-3%	-1%
		WB	740	620	720	900	790	1010	160	170	290	22%	27%	40%
18	N56	EB	830	840	950	1050	840	920	220	0	-30	27%	0%	-3%
		WB	1070	1000	1280	1250	1010	1470	180	10	190	17%	1%	15%
19	N56	NB	600	670	1010	650	680	1070	50	10	60	8%	1%	6%
		SB	1080	660	750	1080	660	750	0	0	0	0%	0%	0%

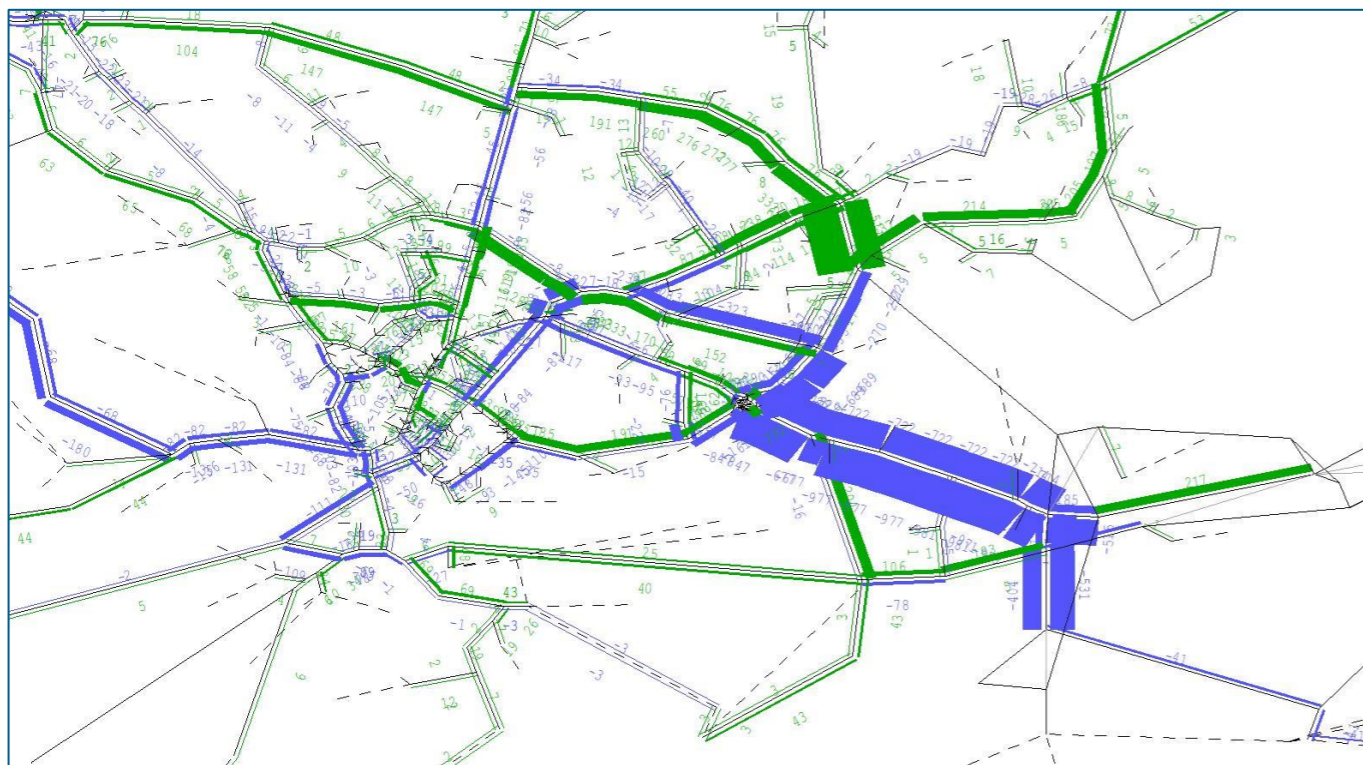
AM Actual Flow: 2029 DS – DM



IP Actual Flow: 2029 DS – DM



PM Actual Flow: 2029 DS – DM



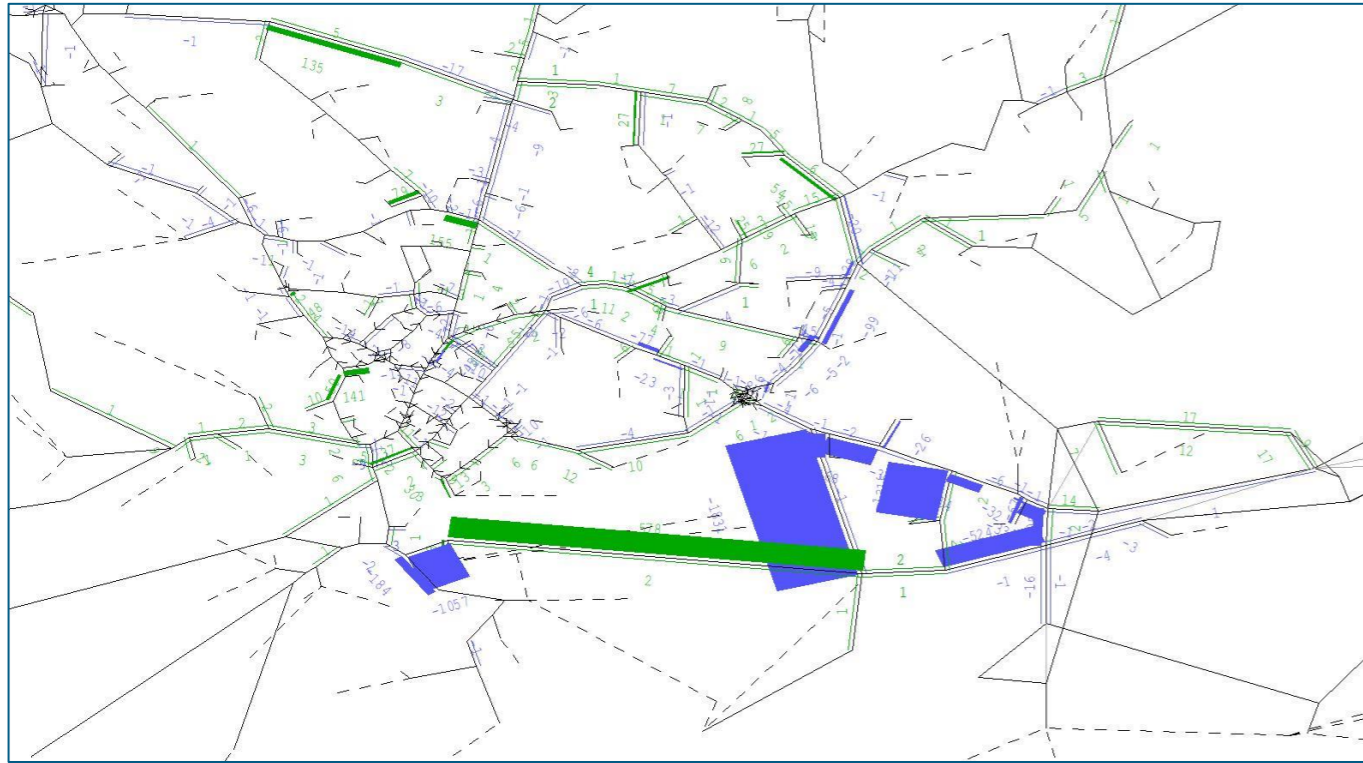
The above flows at select links and flow difference plots show:

- There is a large decrease in traffic along the Four Lane Road (up to 64%). This is due to traffic reassigning onto the proposed TEN-T corridor;
- The reassigned traffic causes an increase in flow along the N56 at the Kiltroy Roundabout and on the approach to the Ramelton Road;
- The TEN-T experiences traffic flows of up to 1470 PCUs NB and 1410 PCUs SB;
- There is traffic rerouting in the town centre meaning the Neil T Blaney Road and the Ballyraine Road experience an uplift in traffic;
- The AM and PM models experience an increase in traffic along the Leck Road of up to 8%.

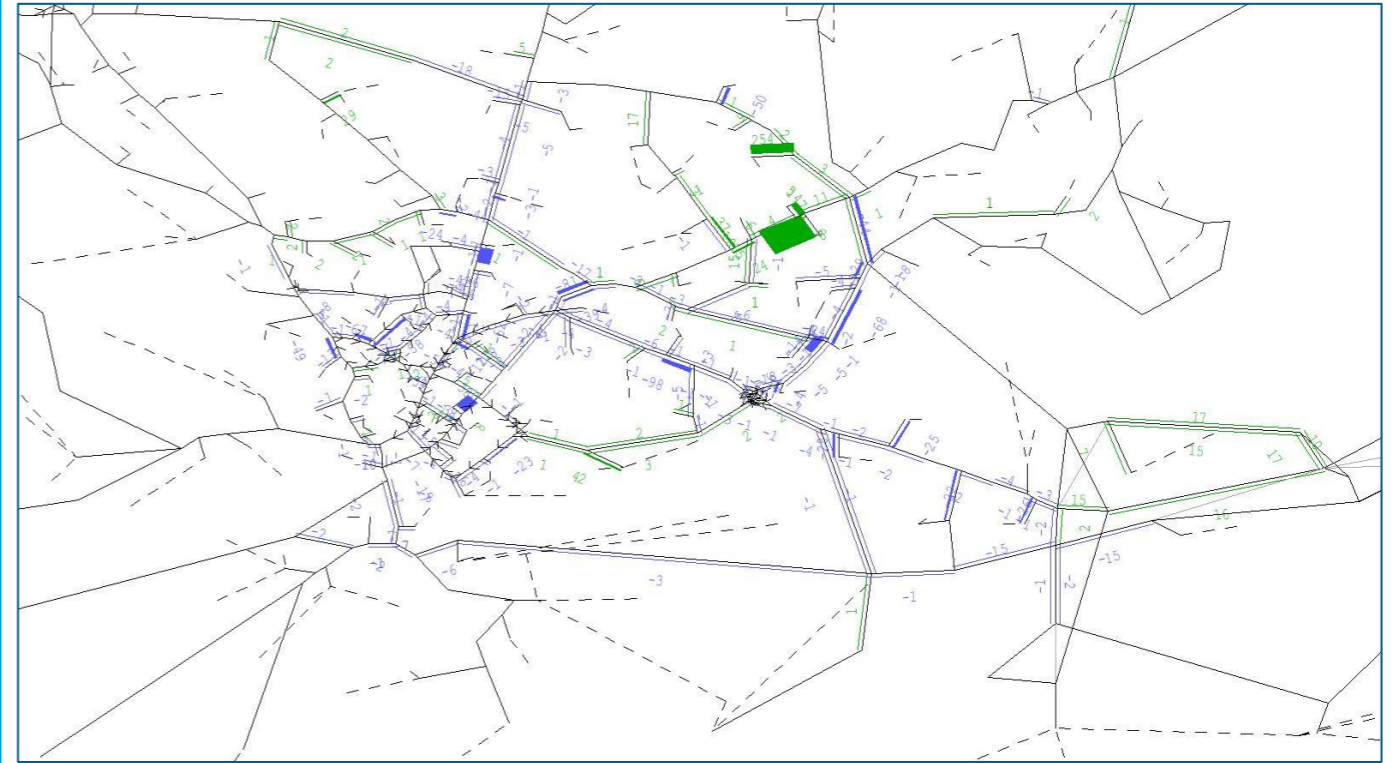
Table 4-12 - TEN-T Flow South of the Ballyraine Rd

	AM	IP	PM
NB	1470	810	1370
SB	1410	1070	1100

AM Delay: 2029 DS – DM



IP Delay: 2029 DS – DM



PM Delay: 2029 DS – DM

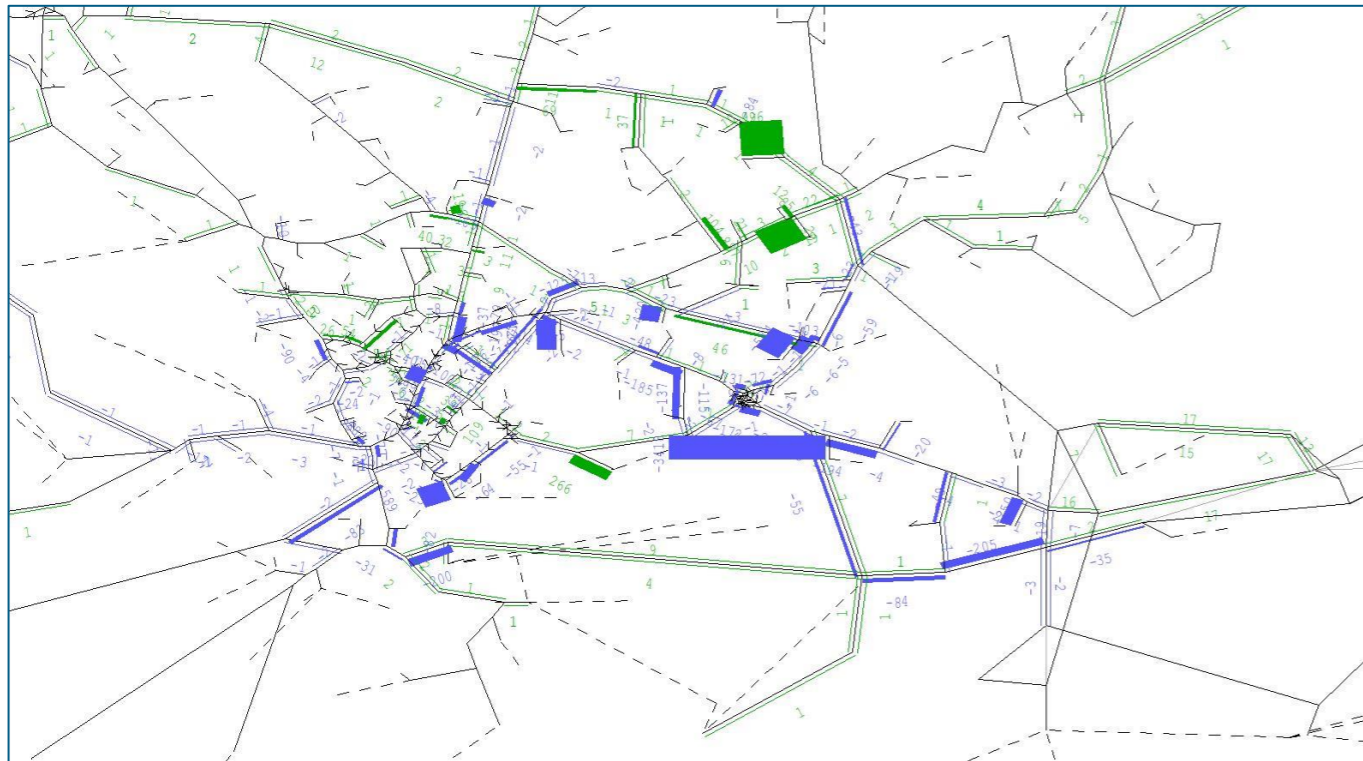


Table 4-13 - 2029 Do Something 1 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	1960	920	1910	800	710	930	-1160	-210	-980	-59%	-23%	-51%
Route A SB	930	830	1110	800	750	930	-130	-80	-180	-14%	-10%	-17%
Route B EB	1200	900	1720	1070	630	900	-130	-270	-820	-11%	-30%	-48%
Route B WB	870	830	1200	740	690	910	-120	-150	-290	-14%	-18%	-24%

There are significant decreases in journey times across the town, up to a 59% decrease on Route A and up to a 48% decrease on Route B. These decreases in journey time are associated with the traffic rerouting to the TEN-T, away from the Town Centre;

While there are journey time savings compared to the Do Minimum, in the majority of cases the forecast DS journey times are still higher than in the 2017 Base Model.

The delay plots show:

- There are large increases in delay along the Leck Road likely due to the increased demand rerouting to the area, however there are delay savings where the Leck Road connects to the Four Lane Road;
- In PM peak in particular there are significant delay savings across Letterkenny;
- There are some increases in delay at the junctions along the N56 and close to Kiltroy Roundabout. The increases in delay are due to the increased traffic volumes at these locations;

It should be noted that while there are large delay savings close to the scheme, in the AM peak there are not many delay savings in the town centre area (i.e. Main Street, Pearse Road area)

Table 4-14 - 2029 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	95.38	93.08	92.04	31.60	31.37	51.00	-63.78	-61.71	-41.04	-67%	-66%	-45%
		WB	62.11	54.05	67.05	55.22	28.27	33.97	-6.89	-25.78	-33.08	-11%	-48%	-49%
2	Four Lane Road at Dry Arch Roundabout	EB	65.15	64.72	62.74	24.82	28.62	35.95	-40.33	-36.10	-26.79	-62%	-56%	-43%
		WB	118.40	54.37	69.36	56.44	30.67	31.13	-61.96	-23.70	-38.23	-52%	-44%	-55%
3	Neil T Blaney Road	EB	63.27	52.60	74.12	50.56	58.24	90.74	-12.71	5.64	16.62	-20%	11%	22%
		WB	31.73	36.69	53.29	60.07	44.89	52.19	28.34	8.20	-1.10	89%	22%	-2%
4	Port Road	EB	104.01	91.90	109.53	70.75	55.21	106.85	-33.26	-36.69	-2.68	-32%	-40%	-2%
		WB	54.56	47.08	49.40	54.59	37.05	41.96	0.03	-10.03	-7.44	0%	-21%	-15%
5	Ballyraine Road	EB	56.53	79.11	87.24	55.43	64.72	68.04	-1.10	-14.39	-19.20	-2%	-18%	-22%
		WB	68.38	50.20	87.87	89.63	47.79	102.25	21.25	-2.41	14.38	31%	-5%	16%
6	N56	NB	46.44	55.81	51.05	23.20	39.21	49.31	-23.24	-16.60	-1.74	-50%	-30%	-3%
		SB	79.10	71.18	76.70	67.59	52.65	57.89	-11.51	-18.53	-18.81	-15%	-26%	-25%
7	South West of Kiltroy Roundabout	NB	42.68	49.17	51.80	67.61	75.34	70.82	24.93	26.17	19.02	58%	53%	37%
		SB	18.75	52.91	26.53	29.90	49.69	41.06	11.15	-3.22	14.53	59%	-6%	55%
8	Kilmacrennan Road	NB	86.39	71.42	76.05	76.84	61.40	73.21	-9.55	-10.02	-2.84	-11%	-14%	-4%
		SB	86.79	75.52	79.79	67.23	63.21	75.87	-19.56	-12.31	-3.92	-23%	-16%	-5%
9	Port Road	SB	57.58	93.66	112.89	81.98	75.84	106.69	24.40	-17.82	-6.20	42%	-19%	-5%
10	High Road	NB	48.69	69.80	61.91	48.20	59.81	61.40	-0.49	-9.99	-0.51	-1%	-14%	-1%
		SB	93.97	87.34	68.29	96.47	72.97	90.83	2.50	-14.37	22.54	3%	-16%	33%
11	Main Street	SB	104.63	106.45	108.51	102.16	105.80	108.45	-2.47	-0.65	-0.06	-2%	-1%	0%
12	Paddy Harte Road	SB	82.11	101.49	102.99	100.16	98.09	92.66	18.05	-3.40	-10.33	22%	-3%	-10%
13	Pearse Road	NB	94.36	87.96	82.29	91.51	88.00	72.91	-2.85	0.04	-9.38	-3%	0%	-11%
		SB	60.44	64.77	70.74	45.17	57.89	67.19	-15.27	-6.88	-3.55	-25%	-11%	-5%
14	Convent Road	NB	101.22	46.77	53.55	103.96	43.59	48.00	2.74	-3.18	-5.55	3%	-7%	-10%
		SB	11.55	12.52	47.95	6.79	12.45	40.42	-4.76	-0.07	-7.53	-41%	-1%	-16%
15	R250	EB	71.78	30.91	50.57	77.11	30.29	44.71	5.33	-0.62	-5.86	7%	-2%	-12%
		WB	36.23	34.95	61.17	50.15	34.83	51.79	13.92	-0.12	-9.38	38%	0%	-15%
16	Leck Road	EB	100.64	48.64	55.17	132.39	52.72	76.14	31.75	4.08	20.97	32%	8%	38%
		WB	6.88	34.06	46.16	14.24	29.72	50.63	7.36	-4.34	4.47	107%	-13%	10%
17	R229	EB	92.47	87.04	93.11	90.38	84.46	92.60	-2.09	-2.58	-0.51	-2%	-3%	-1%
		WB	42.27	33.71	39.16	48.67	41.48	56.33	6.40	7.77	17.17	15%	23%	44%
18	N56	EB	80.22	61.83	76.52	75.71	64.35	65.74	-4.51	2.52	-10.78	-6%	4%	-14%
		WB	59.40	55.46	71.31	69.47	56.10	81.92	10.07	0.64	10.61	17%	1%	15%
19	N56	NB	37.40	41.62	63.31	40.79	42.68	66.84	3.39	1.06	3.53	9%	3%	6%
		SB	67.44	41.00	46.98	67.50	41.00	46.98	0.06	0.00	0.00	0%	0%	0%

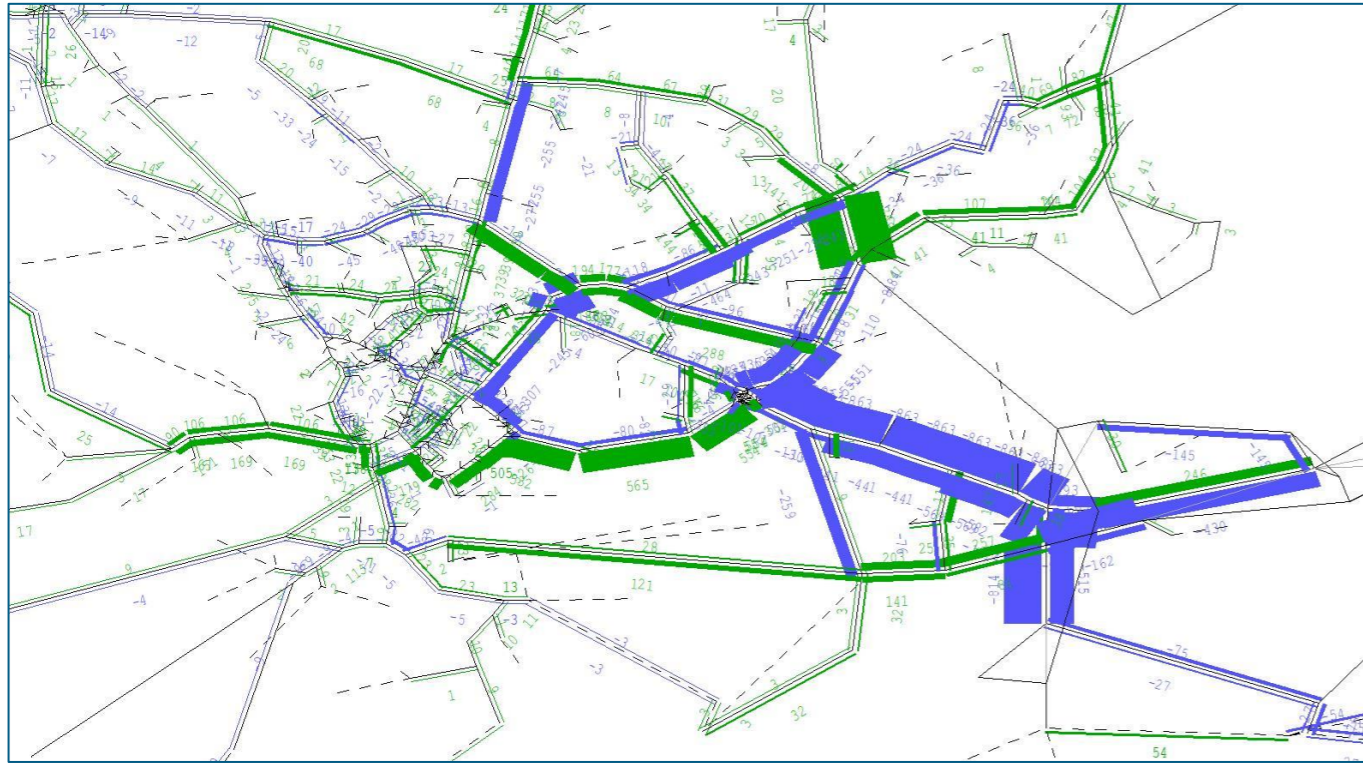
The VoC percentages show that in the DS, the Port Road, Ballyraine Road and Main Street are all over capacity.

4.6.3. 2033

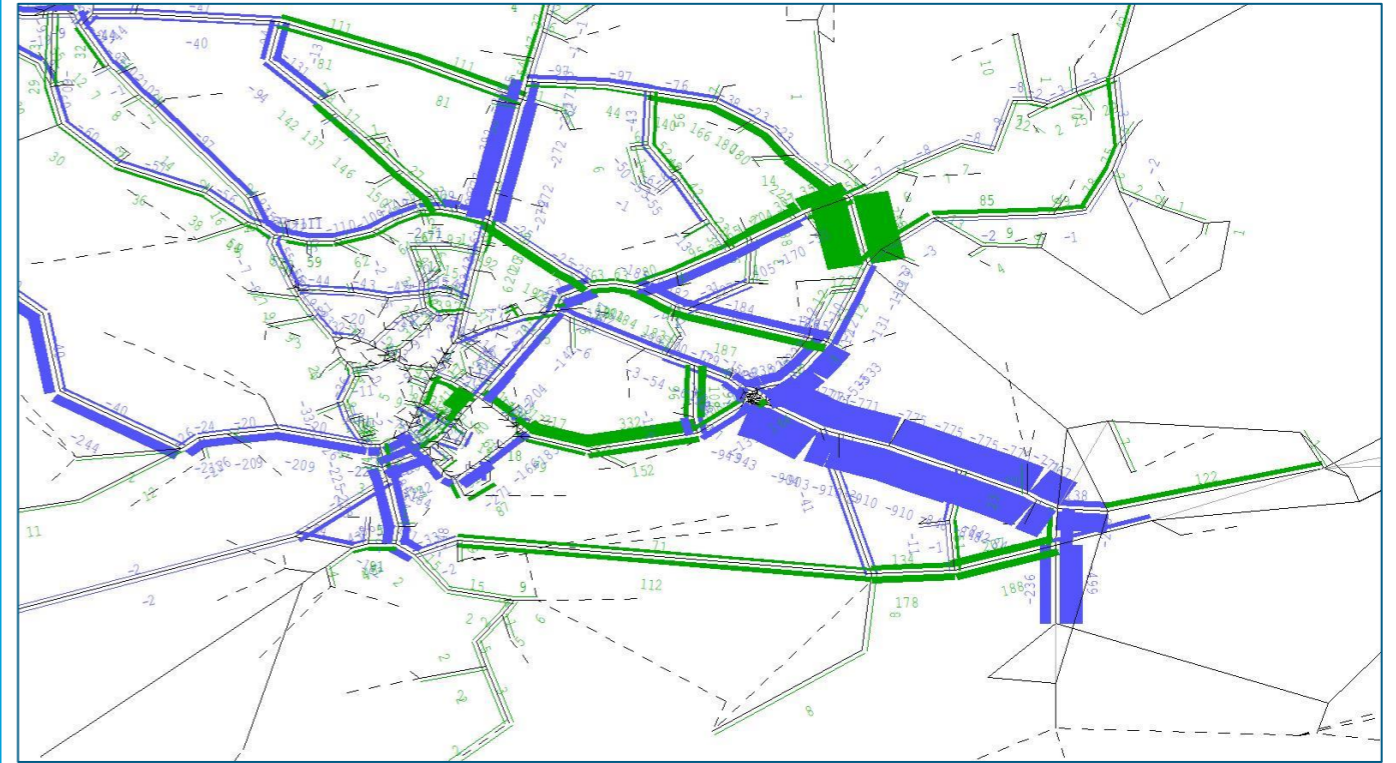
Table 4-15 - 2033 Do Something 1 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1960	1540	1690	970	750	900	-990	-790	-790	-51%	-51%	-47%
		WB	1590	1660	1700	1490	710	900	-100	-950	-800	-6%	-57%	-47%
2	Four Lane Road at Dry Arch Roundabout	EB	1640	1420	1540	780	650	810	-860	-770	-730	-52%	-54%	-47%
		WB	2790	1590	2120	1680	750	1250	-1110	-840	-870	-40%	-53%	-41%
3	Neil T Blaney Road	EB	830	630	840	750	960	970	-80	330	130	-10%	52%	15%
		WB	390	600	770	950	750	890	560	150	120	144%	25%	16%
4	Port Road	EB	510	400	250	480	300	240	-30	-100	-10	-6%	-25%	-4%
		WB	680	590	580	680	590	570	0	0	-10	0%	0%	-2%
5	Ballyraine Road	EB	540	540	590	450	360	590	-90	-180	0	-17%	-33%	0%
		WB	480	500	560	770	690	720	290	190	160	60%	38%	29%
6	N56	NB	650	730	590	490	720	860	-160	-10	270	-25%	-1%	46%
		SB	1180	1010	1160	1070	880	1030	-110	-130	-130	-9%	-13%	-11%
7	South West of Kilty Roundabout	NB	780	670	730	850	880	770	70	210	40	9%	31%	5%
		SB	690	810	430	430	640	560	-260	-170	130	-38%	-21%	30%
8	Kilmacrennan Road	NB	1540	1480	1290	1550	1090	1360	10	-390	70	1%	-26%	5%
		SB	1380	1520	1470	1120	1250	1340	-260	-270	-130	-19%	-18%	-9%
9	Port Road	SB	560	620	720	570	560	740	10	-60	20	2%	-10%	3%
10	High Road	NB	750	790	720	750	750	720	0	-40	0	0%	-5%	0%
		SB	660	190	210	700	200	220	40	10	10	6%	5%	5%
11	Main Street	SB	240	40	30	220	40	20	-20	0	-10	-8%	0%	-33%
12	Paddy Harte Road	SB	1080	1340	1500	1410	1180	1430	330	-160	-70	31%	-12%	-5%
13	Pearse Road	NB	930	210	840	930	150	690	0	-60	-150	0%	-29%	-18%
		SB	890	800	1020	580	590	810	-310	-210	-210	-35%	-26%	-21%
14	Convent Road	NB	810	790	770	820	750	730	10	-40	-40	1%	-5%	-5%
		SB	40	130	670	20	130	610	-20	0	-60	-50%	0%	-9%
15	R250	EB	1150	390	820	1260	370	670	110	-20	-150	10%	-5%	-18%
		WB	580	710	890	750	500	820	170	-210	-70	29%	-30%	-8%
16	Leck Road	EB	350	310	190	380	380	200	30	70	10	9%	23%	5%
		WB	60	260	400	190	370	550	130	110	150	217%	42%	38%
17	R229	EB	1630	1550	1560	1620	1530	1590	-10	-20	30	-1%	-1%	2%
		WB	840	610	750	1160	810	1100	320	200	350	38%	33%	47%
18	N56	EB	1130	1150	1120	1190	1060	1110	60	-90	-10	5%	-8%	-1%
		WB	1260	1110	1450	1260	1150	1520	0	40	70	0%	4%	5%
19	N56	NB	650	600	930	720	630	980	70	30	50	11%	5%	5%
		SB	1140	700	860	1160	700	870	20	0	10	2%	0%	1%

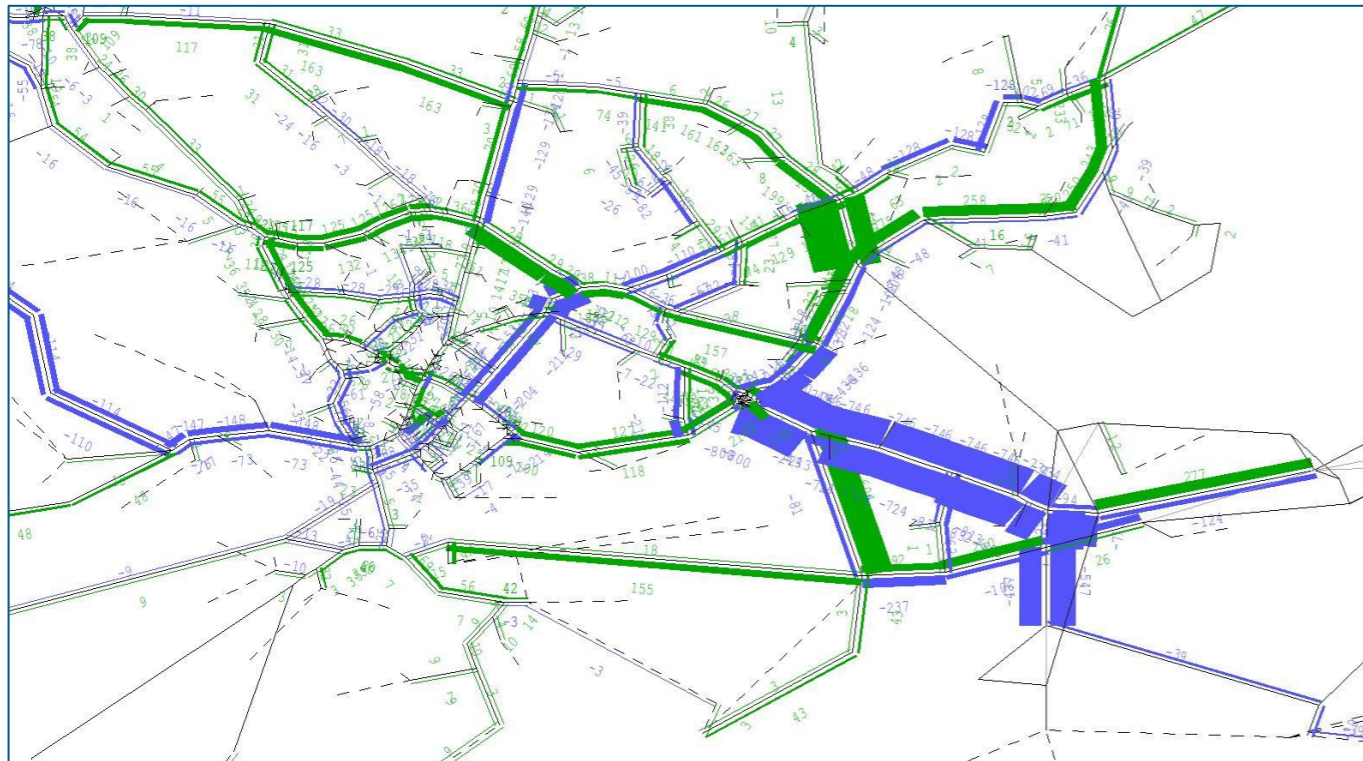
AM Actual Flow: 2033 DS – DM



IP Actual Flow: 2033 DS – DM



PM Actual Flow: 2033 DS – DM



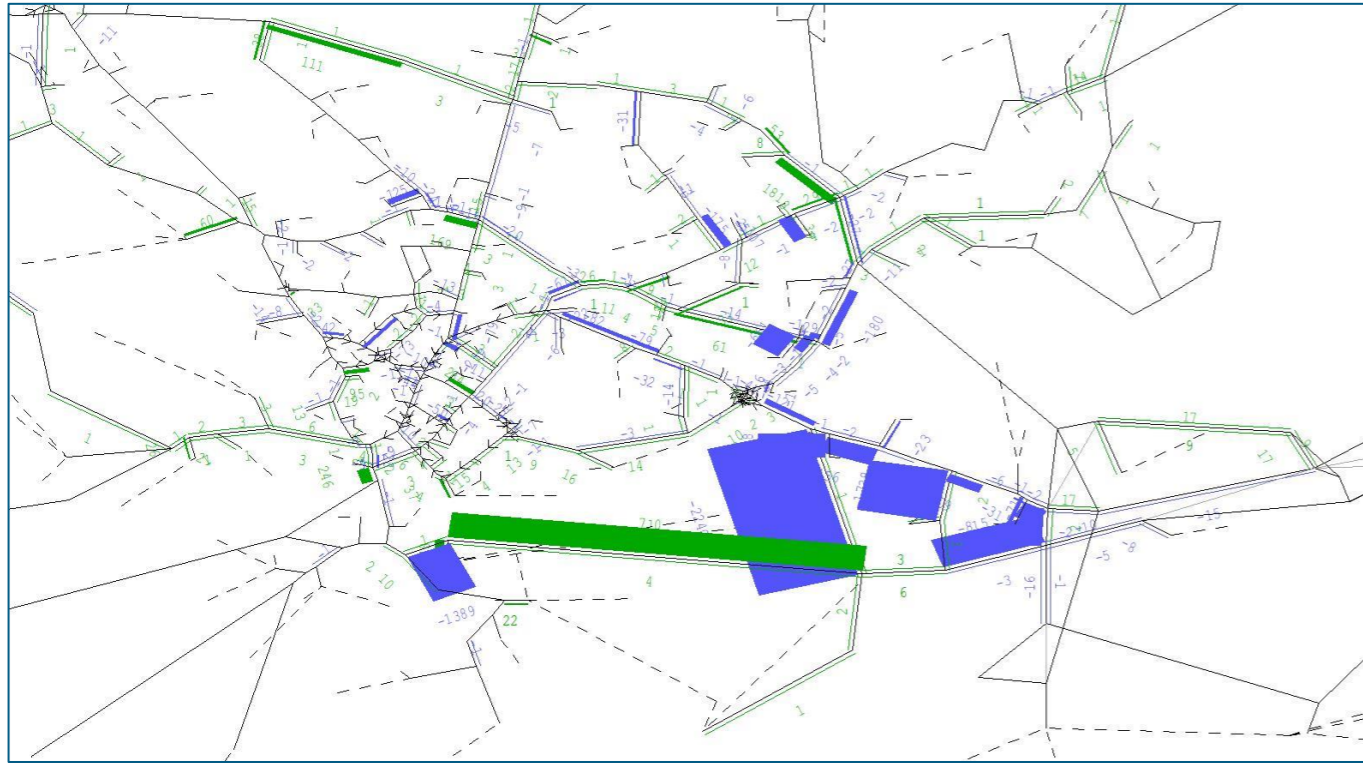
The above flows at select links and flow difference plots show:

- There is a large decrease in traffic along the Four Lane Road (up to 57%). This is due to traffic reassigning onto the proposed TEN-T corridor;
- The reassigned traffic causes an increase in flow along the N56 at the Kiltroy Roundabout and on the approach to the Ramelton Road;
- The TEN-T experiences traffic flows of up to 1670 PCUs NB and 1520 PCUs SB;
- There is traffic rerouting in the town centre meaning the Neil T Blaney Road and the Ballyrairie Road experience an uplift in traffic.

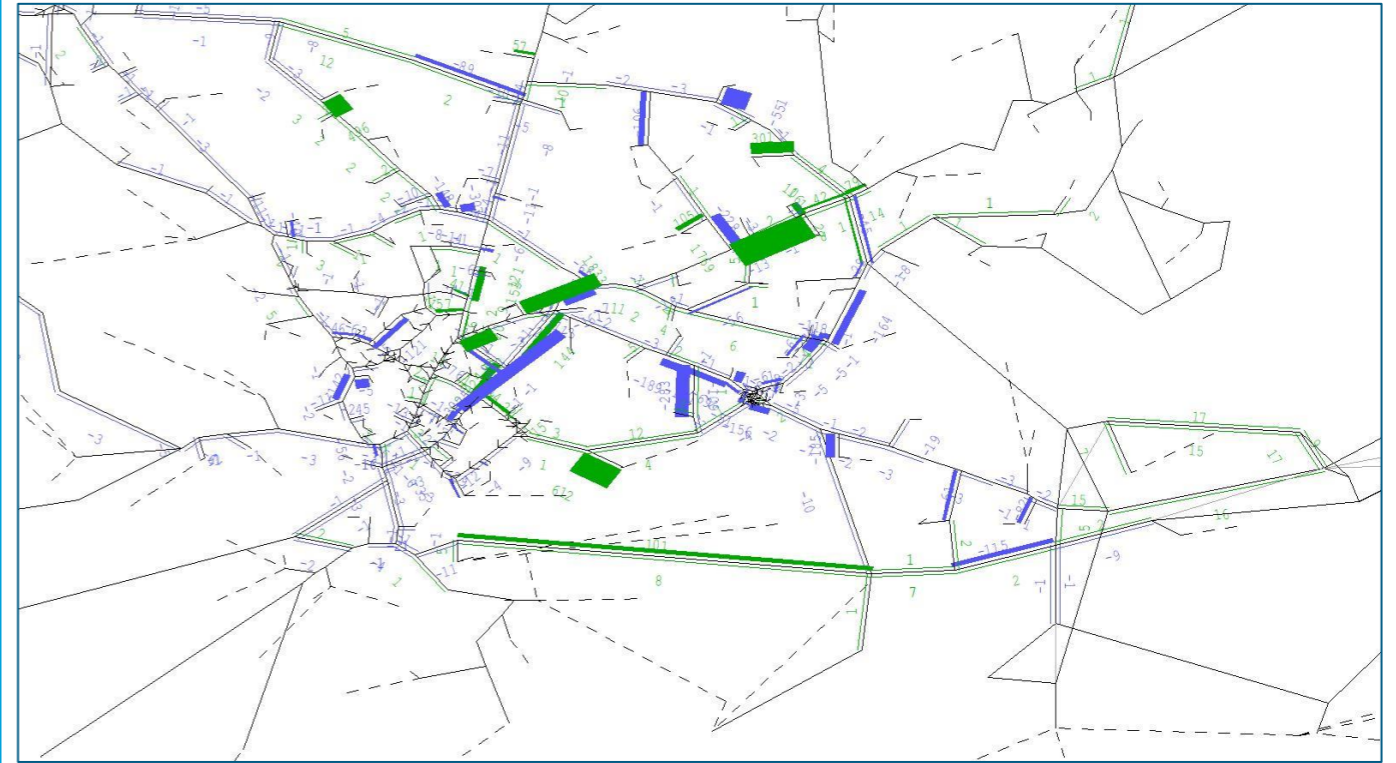
Table 4-16 - TEN-T Flow South of the Ballyrairie Rd

	AM	IP	PM
NB	1670	1180	1590
SB	1520	1150	1230

AM Delay: 2033 DS – DM



IP Delay: 2033 DS – DM



PM Delay: 2033 DS – DM

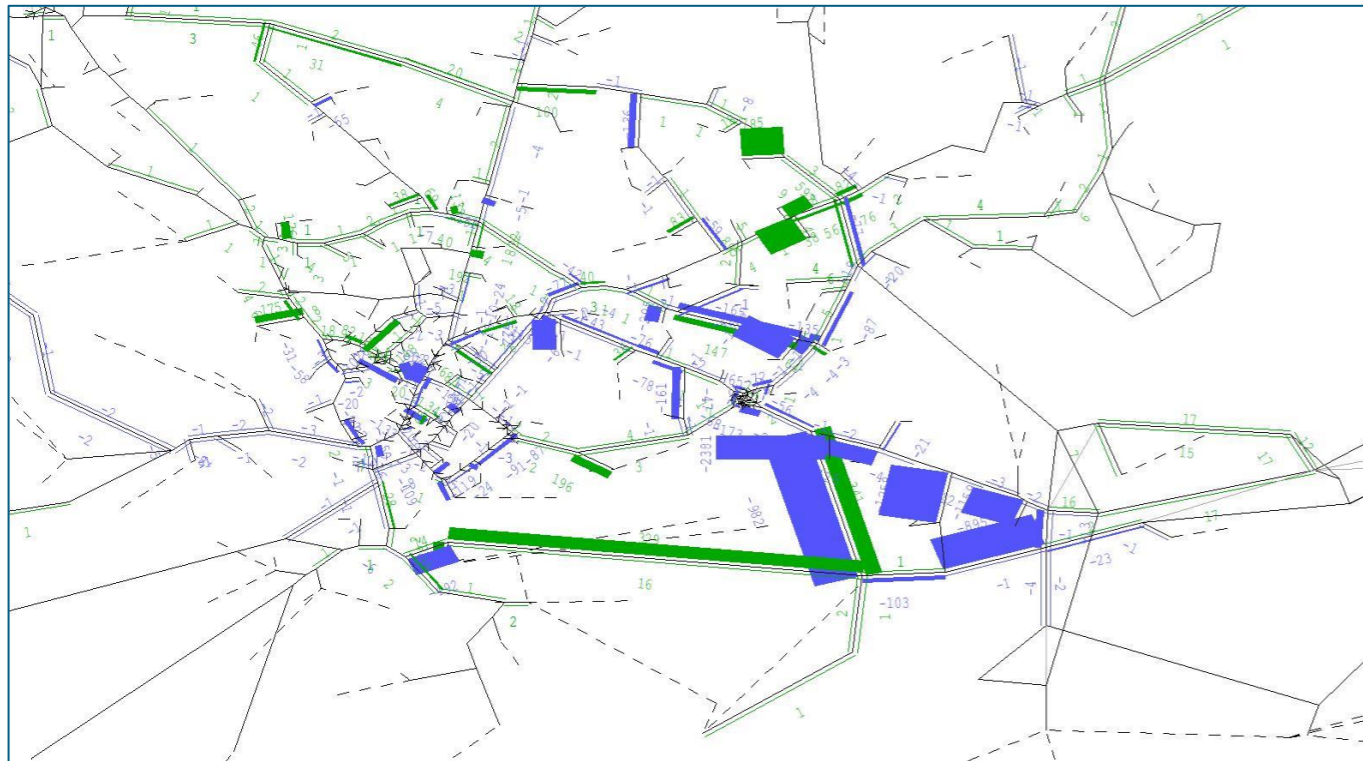


Table 4-17 - 2033 Do Something 1 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	2260	1420	2190	990	740	1130	-1270	-680	-1060	-56%	-48%	-49%
Route A SB	1210	1030	1290	870	770	1060	-340	-270	-240	-28%	-26%	-18%
Route B EB	1580	1330	1920	1250	780	1080	-330	-550	-840	-21%	-41%	-44%
Route B WB	990	1040	1380	770	680	1090	-220	-360	-290	-22%	-34%	-21%

There are significant decreases in journey times across the town, up to a 56% decrease on Route A and up to a 44% decrease on Route B. These decreases in journey time are associated with the traffic rerouting to the TEN-T, away from the Town Centre and thus reducing the congestion;

While there are journey time savings compared to the Do Minimum, in the majority of cases the forecast DS journey times are still higher than in the 2017 Base Model.

The delay plots show:

- There are large increases in delay along the Leck Road likely due to the increased demand rerouting to the area, however there are delay savings where the Leck Road connects to the Four Lane Road;
- There are some increases in delay at the junctions along the N56 and close to Kiltroy Roundabout. The increases in delay are due to the increased traffic volumes at these locations;

It should be noted that while there are large delay savings close to the scheme, in the AM peak there are not many delay savings in the town centre area (i.e. Main Street, Pearse Road area)

Table 4-18 - 2033 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	106.49	84.59	94.18	52.10	37.78	49.85	-54.39	-46.81	-44.33	-51%	-55%	-47%
		WB	62.01	64.72	66.26	58.06	27.86	35.01	-3.95	-36.86	-31.25	-6%	-57%	-47%
2	Four Lane Road at Dry Arch Roundabout	EB	66.14	57.95	62.24	34.86	29.08	36.38	-31.28	-28.87	-25.86	-47%	-50%	-42%
		WB	125.65	62.19	82.98	65.54	29.20	48.70	-60.11	-32.99	-34.28	-48%	-53%	-41%
3	Neil T Blaney Road	EB	77.26	58.16	87.24	68.99	88.85	94.00	-8.27	30.69	6.76	-11%	53%	8%
		WB	27.51	42.53	54.81	67.84	53.40	63.23	40.33	10.87	8.42	147%	26%	15%
4	Port Road	EB	104.87	75.60	112.82	100.48	56.93	108.59	-4.39	-18.67	-4.23	-4%	-25%	-4%
		WB	54.61	47.57	46.07	54.59	47.34	45.50	-0.02	-0.23	-0.57	0%	0%	-1%
5	Ballyraine Road	EB	90.09	69.54	108.93	54.35	67.10	75.63	-35.74	-2.44	-33.30	-40%	-4%	-31%
		WB	66.58	53.06	91.27	102.75	65.38	107.84	36.17	12.32	16.57	54%	23%	18%
6	N56	NB	46.17	52.41	42.04	35.04	51.72	61.51	-11.13	-0.69	19.47	-24%	-1%	46%
		SB	82.69	79.95	81.01	75.72	70.17	72.41	-6.97	-9.78	-8.60	-8%	-12%	-11%
7	South West of Kilty Roundabout	NB	62.31	53.90	58.20	67.94	70.80	61.47	5.63	16.90	3.27	9%	31%	6%
		SB	48.98	57.80	32.45	39.52	49.90	42.18	-9.46	-7.90	9.73	-19%	-14%	30%
8	Kilmacrennan Road	NB	96.11	92.63	80.67	96.59	68.12	85.08	0.48	-24.51	4.41	0%	-26%	5%
		SB	80.89	90.69	85.50	65.87	69.68	78.93	-15.02	-21.01	-6.57	-19%	-23%	-8%
9	Port Road	SB	76.86	90.21	110.13	76.95	83.55	114.39	0.09	-6.66	4.26	0%	-7%	4%
10	High Road	NB	59.69	63.34	57.37	60.28	59.89	57.69	0.59	-3.45	0.32	1%	-5%	1%
		SB	92.82	136.83	115.66	95.66	145.36	114.29	2.84	8.53	-1.37	3%	6%	-1%
11	Main Street	SB	108.14	108.28	108.54	108.03	108.29	108.53	-0.11	0.01	-0.01	0%	0%	0%
12	Paddy Harte Road	SB	77.23	95.94	107.35	100.50	84.10	102.30	23.27	-11.84	-5.05	30%	-12%	-5%
13	Pearse Road	NB	87.11	117.68	78.35	86.66	128.24	63.82	-0.45	10.56	-14.53	-1%	9%	-19%
		SB	63.31	56.94	72.59	43.90	42.39	60.25	-19.41	-14.55	-12.34	-31%	-26%	-17%
14	Convent Road	NB	107.61	107.88	54.73	107.51	94.92	52.36	-0.10	-12.96	-2.37	0%	-12%	-4%
		SB	7.95	9.07	47.56	5.23	9.41	43.44	-2.72	0.34	-4.12	-34%	4%	-9%
15	R250	EB	82.21	28.18	58.65	89.77	26.72	48.06	7.56	-1.46	-10.59	9%	-5%	-18%
		WB	41.19	50.62	63.55	53.27	35.69	58.31	12.08	-14.93	-5.24	29%	-29%	-8%
16	Leck Road	EB	118.25	81.22	54.17	156.97	103.62	112.99	38.72	22.40	58.82	33%	28%	109%
		WB	7.19	29.07	44.07	20.67	41.42	61.32	13.48	12.35	17.25	187%	42%	39%
17	R229	EB	102.12	97.14	97.51	101.00	95.60	99.33	-1.12	-1.54	1.82	-1%	-2%	2%
		WB	47.51	33.87	41.11	60.25	43.02	59.65	12.74	9.15	18.54	27%	27%	45%
18	N56	EB	80.40	82.30	82.49	84.94	75.41	79.27	4.54	-6.89	-3.22	6%	-8%	-4%
		WB	69.82	61.61	80.33	70.24	64.07	84.41	0.42	2.46	4.08	1%	4%	5%
19	N56	NB	40.41	37.42	58.20	44.99	39.09	61.36	4.58	1.67	3.16	11%	4%	5%
		SB	71.09	43.87	53.57	72.52	43.87	54.40	1.43	0.00	0.83	2%	0%	2%

The VoC percentages show that in the DS, the Port Road, Ballyraine Road, High Road, Main Street, Paddy Harte Road, Pearse Road and the Leck Road are all over capacity.

4.7. Do Something - Scenario 2

This scenario assesses the Southern Network Plan scheme with the 2029 and 2033 core demand.

4.7.1. SATURN Simulation Summary Results

4.7.1.1. 2029

Summary Result	Units	2017 Base			2029 DM			2029 DS2			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	1199	381.8	1797.3	861.7	356.3	1510.4	-28%	-7%	-16%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	3083.1	1972.9	3745.8	2793.7	1925.1	3515.3	-9%	-2%	-6%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	55338.4	45887.2	55015.6	57198.7	45790.7	57224.6	3%	0%	4%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	17.9	23.3	14.7	20.5	23.8	16.3	15%	2%	11%

4.7.1.2. 2033

Summary Result	Units	2017 Base			2033 DM			2033 DS2			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	2196	1871.2	3276	1700.5	1726.5	2791.6	-23%	-8%	-15%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	4401.8	3748.7	5458.5	3976.9	3544.6	5022.7	-10%	-5%	-8%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	61636.8	51049	59427.8	63506.6	50733.6	61309.7	3%	-1%	3%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	14	13.6	10.9	16	14.3	12.2	14%	5%	12%

The above summary results show that with the implementation of the SNP scheme:

- There is a decrease in over capacity queues from the DM model showing some improvement however these are still significantly higher than in the base;
- Total travel time decreases compared to the DM model but again is still significantly higher than in the base;
- There is a small increase in travel distance across the network likely due to traffic rerouting and travelling further to make use of the SNP scheme;
- Average speed increases compared to the DM but is still significantly slower than in the base.

The results of the DS2 forecast modelling show that while there is improvement in the network performance compared to the Do Minimum scenario, it still performs worse than the already struggling base network and further improvements will be needed if the planned demand is to be realised.

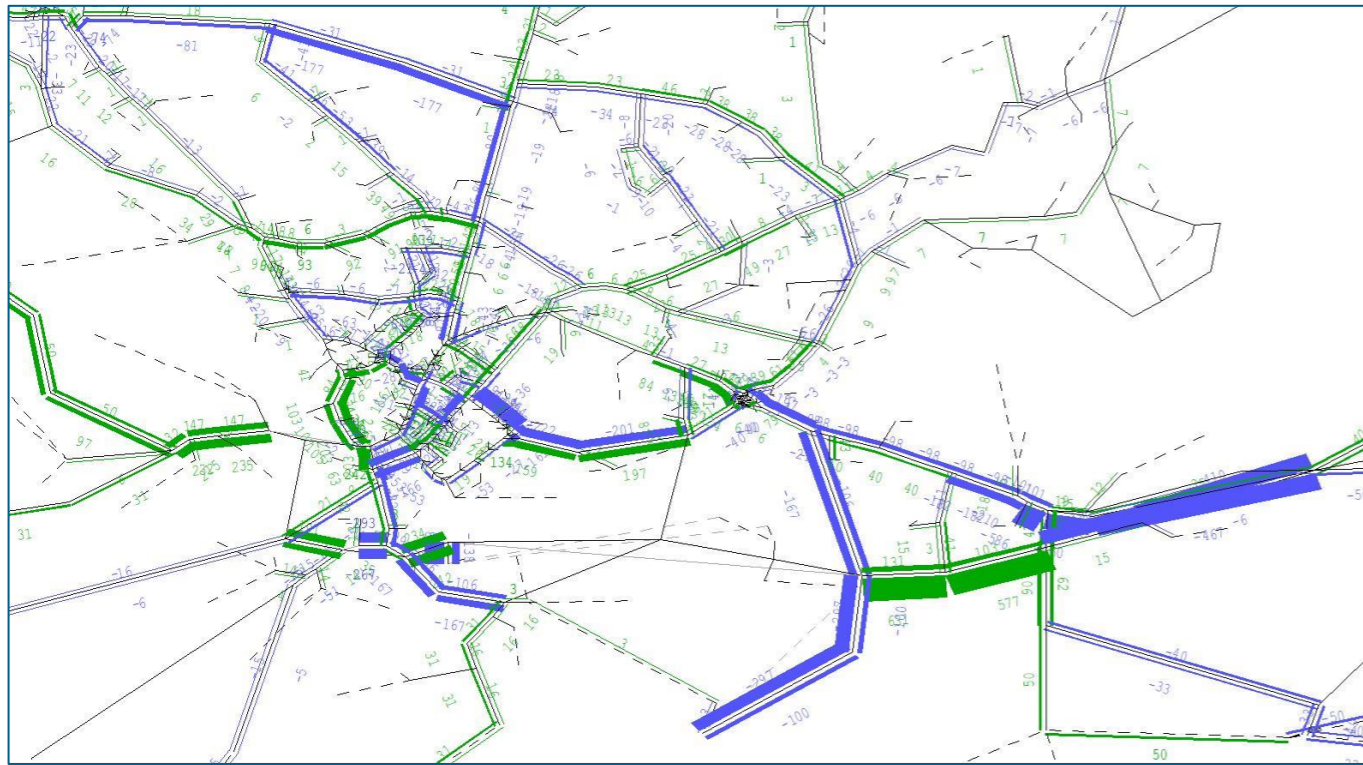
Further details on these results including link flows and delay plots are shown the rest of the section.

4.7.2. 2029

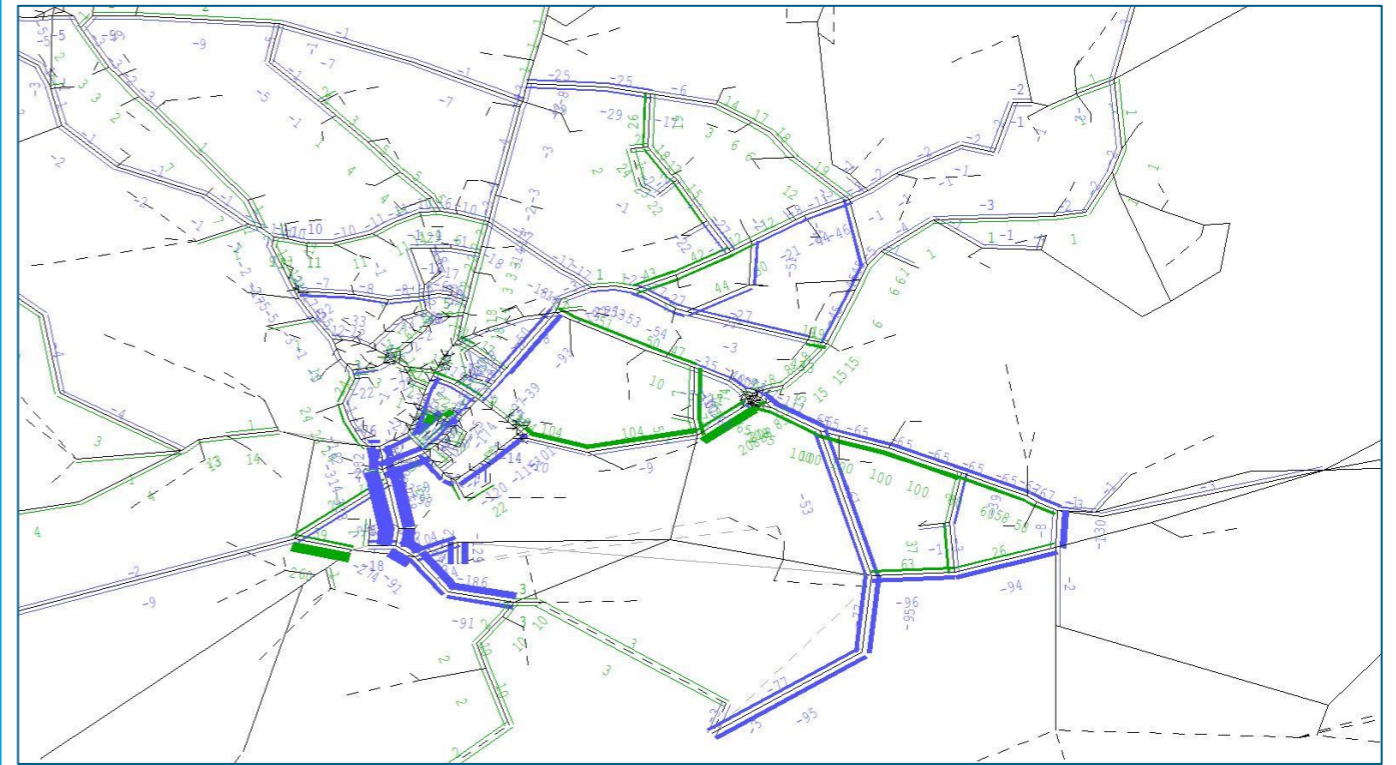
Table 4-19 - 2029 Do Something 2 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1780	1700	1650	1580	1590	1590	-200	-110	-60	-11%	-6%	-4%
		WB	1590	1380	1720	1600	1450	1630	10	70	-90	1%	5%	-5%
2	Four Lane Road at Dry Arch Roundabout	EB	1590	1570	1530	1490	1510	1550	-100	-60	20	-6%	-4%	1%
		WB	2550	1390	1780	1960	1450	1540	-590	60	-240	-23%	4%	-13%
3	Neil T Blaney Road	EB	680	560	790	480	670	570	-200	110	-220	-29%	20%	-28%
		WB	440	510	750	640	500	370	200	-10	-380	45%	-2%	-51%
4	Port Road	EB	500	480	250	510	530	250	10	50	0	2%	10%	0%
		WB	680	590	620	680	590	570	0	0	-50	0%	0%	-8%
5	Ballyraine Road	EB	510	580	680	520	550	640	10	-30	-40	2%	-5%	-6%
		WB	500	460	540	510	460	410	10	0	-130	2%	0%	-24%
6	N56	NB	650	780	710	620	740	740	-30	-40	30	-5%	-5%	4%
		SB	1130	900	1100	1140	910	1000	10	10	-100	1%	1%	-9%
7	South West of Kilty Roundabout	NB	530	610	650	540	630	620	10	20	-30	2%	3%	-5%
		SB	260	740	350	290	720	350	30	-20	0	12%	-3%	0%
8	Kilmacrennan Road	NB	1380	1140	1220	1300	1140	1390	-80	0	170	-6%	0%	14%
		SB	1480	1340	1390	1460	1340	1470	-20	0	80	-1%	0%	6%
9	Port Road	SB	480	630	730	450	620	700	-30	-10	-30	-6%	-2%	-4%
10	High Road	NB	610	870	770	670	870	910	60	0	140	10%	0%	18%
		SB	700	560	510	710	560	660	10	0	150	1%	0%	29%
11	Main Street	SB	340	110	170	340	100	140	0	-10	-30	0%	-9%	-18%
12	Paddy Harte Road	SB	1150	1420	1440	1120	1310	1260	-30	-110	-180	-3%	-8%	-13%
13	Pearse Road	NB	990	980	890	1070	950	1090	80	-30	200	8%	-3%	22%
		SB	850	910	940	810	870	960	-40	-40	20	-5%	-4%	2%
14	Convent Road	NB	790	650	750	870	680	780	80	30	30	10%	5%	4%
		SB	80	180	670	230	170	680	150	-10	10	188%	-6%	1%
15	R250	EB	1000	430	710	1070	490	510	70	60	-200	7%	14%	-28%
		WB	510	490	860	740	500	830	230	10	-30	45%	2%	-3%
16	Leck Road	EB	380	180	200	470	180	500	90	0	300	24%	0%	150%
		WB	60	310	420	430	330	760	370	20	340	617%	6%	81%
17	R229	EB	1480	1390	1490	1450	1380	1260	-30	-10	-230	-2%	-1%	-15%
		WB	740	620	720	720	610	610	-20	-10	-110	-3%	-2%	-15%
18	N56	EB	830	840	950	860	810	1040	30	-30	90	4%	-4%	9%
		WB	1070	1000	1280	1040	970	1340	-30	-30	60	-3%	-3%	5%
19	N56	NB	600	670	1010	610	670	1040	10	0	30	2%	0%	3%
		SB	1080	660	750	1080	660	750	0	0	0	0%	0%	0%

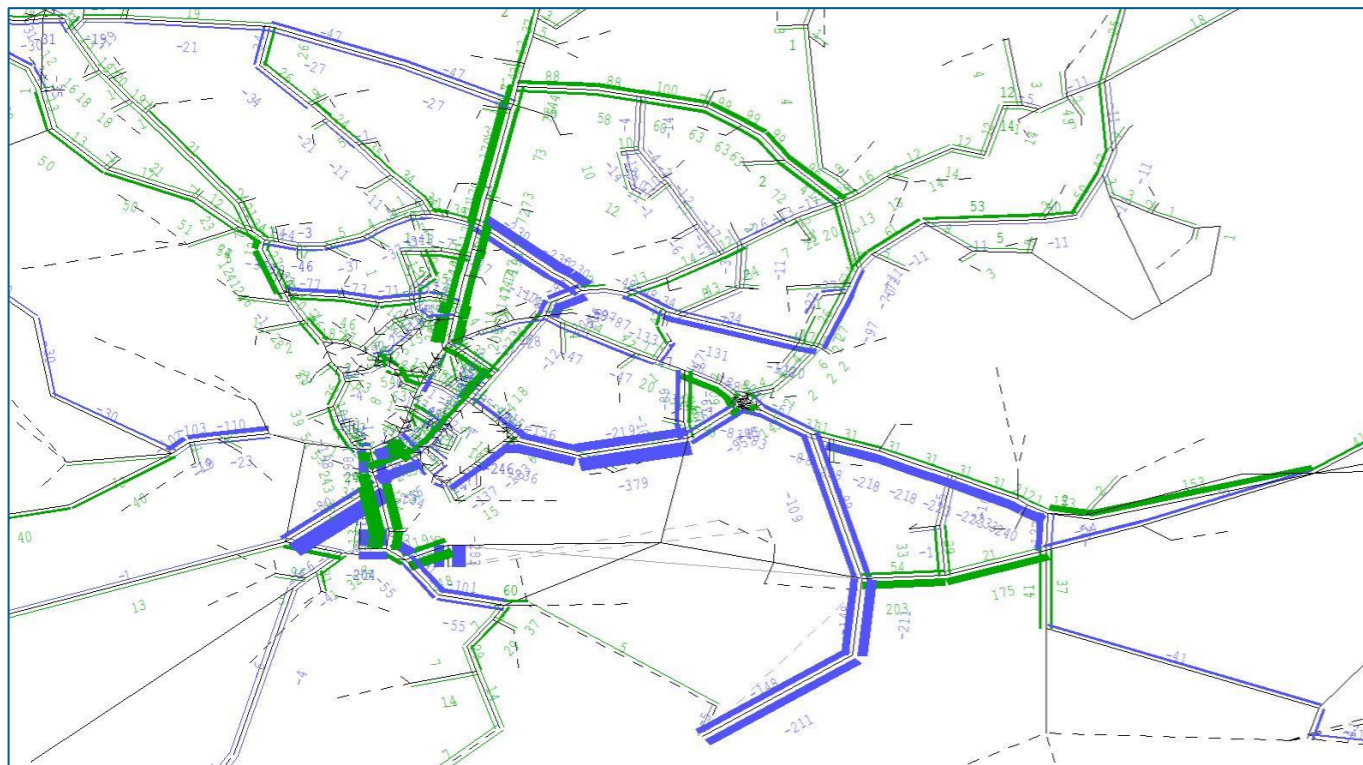
AM Actual Flow: 2029 DS – DM



IP Actual Flow: 2029 DS – DM



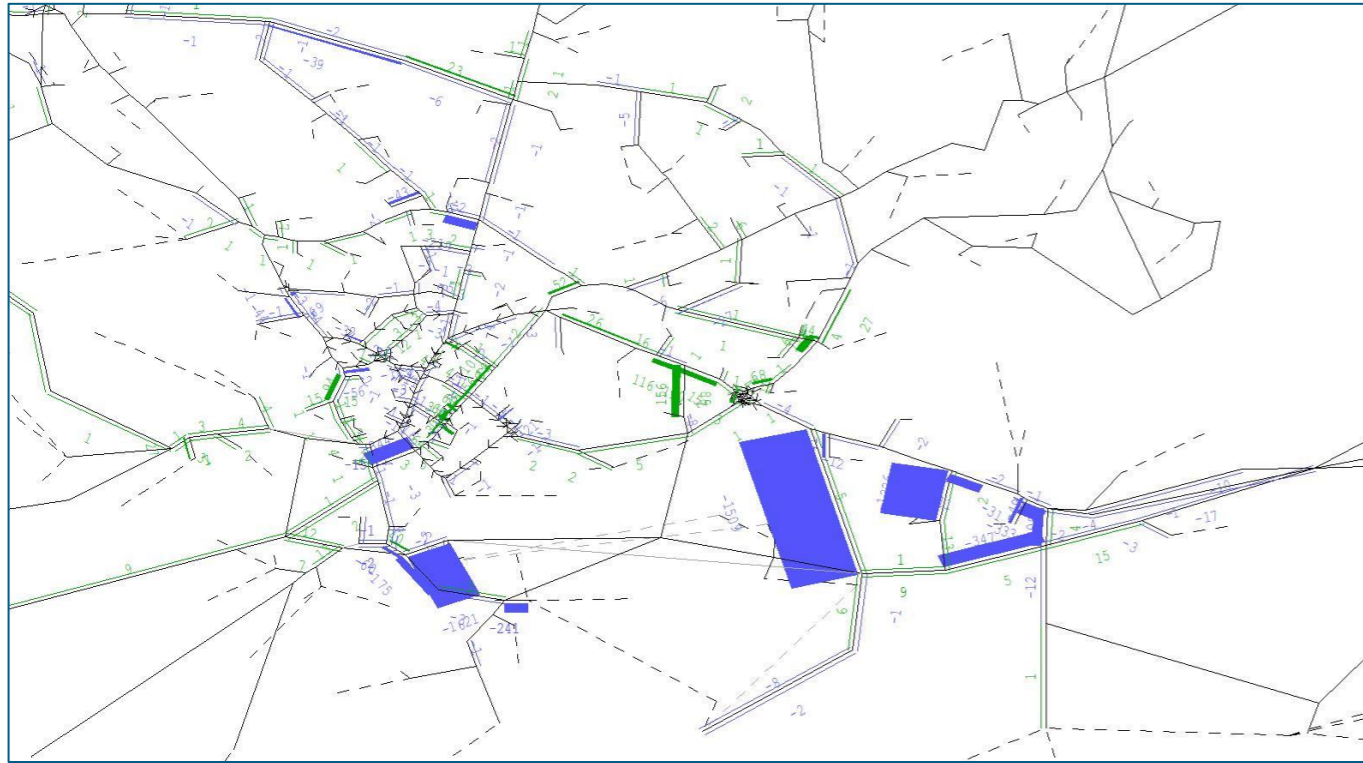
PM Actual Flow: 2029 DS – DM



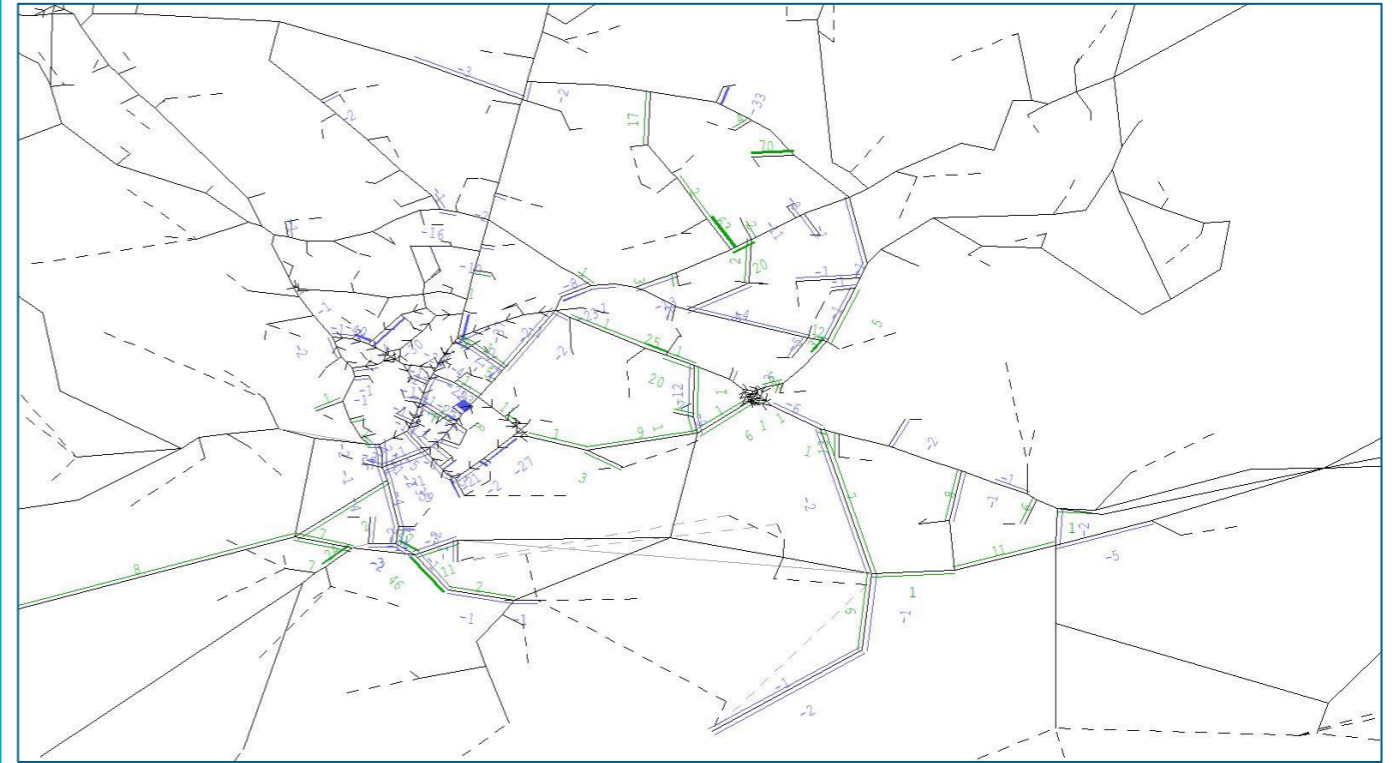
The above flows at select links and flow difference plots show:

- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road
- There is a decrease in traffic along the Neil T Blaney Road (up to 51%) in the PM peak where traffic reroutes to the new SNP.

AM Delay: 2029 DS – DM



IP Delay: 2029 DS – DM



PM Delay: 2029 DS – DM

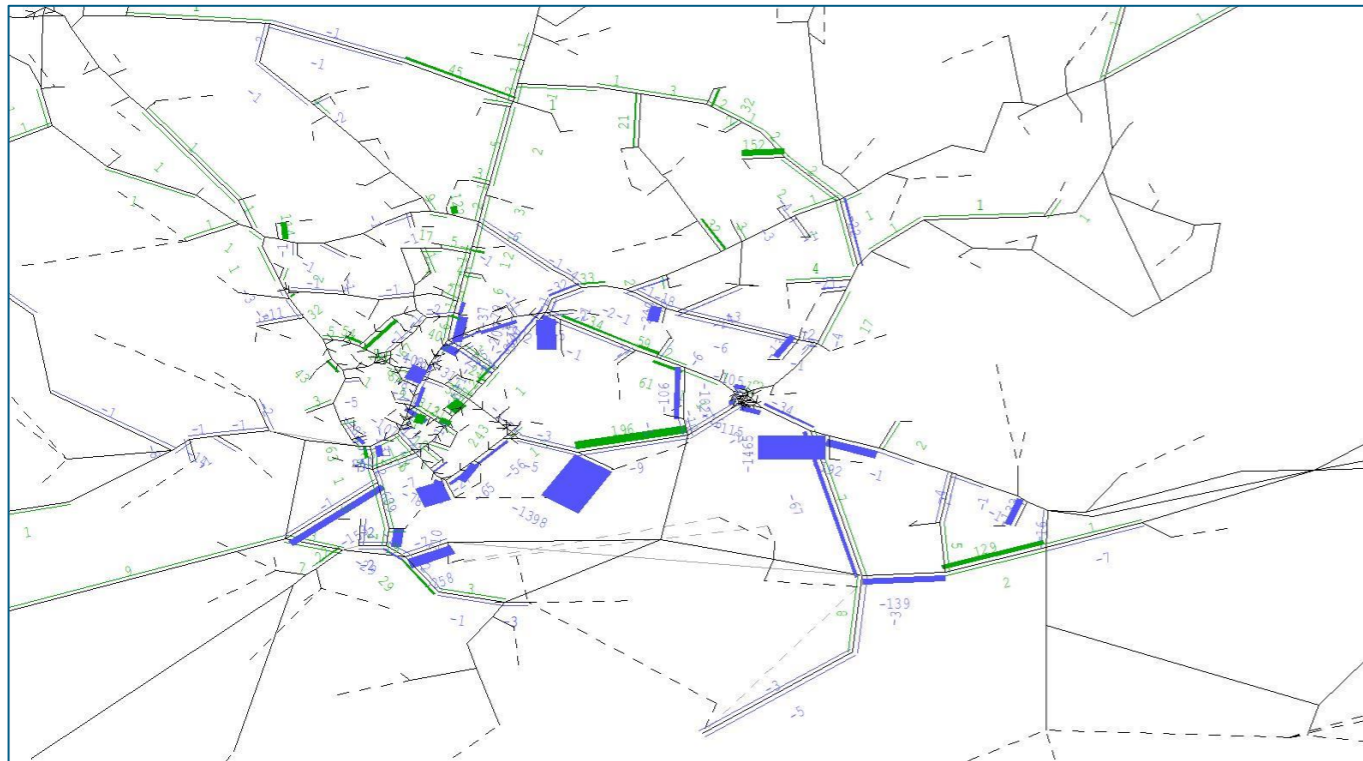


Table 4-20 - 2029 Do Something 2 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	1960	920	1910	1690	940	1430	-270	10	-480	-14%	2%	-25%
Route A SB	930	830	1110	970	830	1090	40	0	-20	4%	0%	-1%
Route B EB	1200	900	1720	1430	960	1570	230	60	-140	19%	7%	-8%
Route B WB	870	830	1200	930	800	1080	70	-30	-120	8%	-4%	-10%

Route A generally shows some journey time savings whereas Route B shows some increases (likely due to the increase in delay at the Joe Bonnar Road junction with the SNP).

While there are journey time savings compared to the Do Minimum, in the majority of cases the forecast DS journey times are still higher than in the 2017 Base Model

The delay plots and journey times show:

- There are large decreases in delay where the traffic from the Leck Road has reroutes away however this does cause some increases in delay along the Neil T Blaney Road at Joe Bonnar;
- This in turn causes some increases in delay at the Junction of the Joe Bonnar Road and the Port Road;

Table 4-21 - 2029 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	95.38	93.08	92.04	64.24	75.47	72.29	-31.14	-17.61	-19.75	-33%	-19%	-21%
		WB	62.11	54.05	67.05	62.33	56.59	63.80	0.22	2.54	-3.25	0%	5%	-5%
2	Four Lane Road at Dry Arch Roundabout	EB	65.15	64.72	62.74	61.96	61.69	64.74	-3.19	-3.03	2.00	-5%	-5%	3%
		WB	118.40	54.37	69.36	76.71	56.65	59.98	-41.69	2.28	-9.38	-35%	4%	-14%
3	Neil T Blaney Road	EB	63.27	52.60	74.12	68.97	97.68	110.82	5.70	45.08	36.70	9%	86%	50%
		WB	31.73	36.69	53.29	45.80	36.02	26.23	14.07	-0.67	-27.06	44%	-2%	-51%
4	Port Road	EB	104.01	91.90	109.53	104.87	101.34	112.83	0.86	9.44	3.30	1%	10%	3%
		WB	54.56	47.08	49.40	54.60	47.07	45.65	0.04	-0.01	-3.75	0%	0%	-8%
5	Ballyraine Road	EB	56.53	79.11	87.24	62.39	71.71	82.73	5.86	-7.40	-4.51	10%	-9%	-5%
		WB	68.38	50.20	87.87	70.13	49.88	68.65	1.75	-0.32	-19.22	3%	-1%	-22%
6	N56	NB	46.44	55.81	51.05	44.58	52.61	52.93	-1.86	-3.20	1.88	-4%	-6%	4%
		SB	79.10	71.18	76.70	79.78	71.66	69.92	0.68	0.48	-6.78	1%	1%	-9%
7	South West of Kilty Roundabout	NB	42.68	49.17	51.80	43.34	50.14	49.72	0.66	0.97	-2.08	2%	2%	-4%
		SB	18.75	52.91	26.53	20.68	51.39	25.95	1.93	-1.52	-0.58	10%	-3%	-2%
8	Kilmacrennan Road	NB	86.39	71.42	76.05	81.40	71.16	86.65	-4.99	-0.26	10.60	-6%	0%	14%
		SB	86.79	75.52	79.79	84.74	75.30	86.29	-2.05	-0.22	6.50	-2%	0%	8%
9	Port Road	SB	57.58	93.66	112.89	53.01	91.33	107.93	-4.57	-2.33	-4.96	-8%	-2%	-4%
10	High Road	NB	48.69	69.80	61.91	53.41	69.98	73.10	4.72	0.18	11.19	10%	0%	18%
		SB	93.97	87.34	68.29	92.66	87.54	87.83	-1.31	0.20	19.54	-1%	0%	29%
11	Main Street	SB	104.63	106.45	108.51	105.20	106.41	108.47	0.57	-0.04	-0.04	1%	0%	0%
12	Paddy Harte Road	SB	82.11	101.49	102.99	80.19	93.30	89.92	-1.92	-8.19	-13.07	-2%	-8%	-13%
13	Pearse Road	NB	94.36	87.96	82.29	102.66	85.26	102.58	8.30	-2.70	20.29	9%	-3%	25%
		SB	60.44	64.77	70.74	57.89	62.00	74.13	-2.55	-2.77	3.39	-4%	-4%	5%
14	Convent Road	NB	101.22	46.77	53.55	106.42	48.46	56.04	5.20	1.69	2.49	5%	4%	5%
		SB	11.55	12.52	47.95	21.88	12.43	48.51	10.33	-0.09	0.56	89%	-1%	1%
15	R250	EB	71.78	30.91	50.57	76.50	34.78	36.74	4.72	3.87	-13.83	7%	13%	-27%
		WB	36.23	34.95	61.17	53.02	35.95	59.53	16.79	1.00	-1.64	46%	3%	-3%
16	Leck Road	EB	100.64	48.64	55.17	100.93	40.30	102.25	0.29	-8.34	47.08	0%	-17%	85%
		WB	6.88	34.06	46.16	28.67	22.28	50.75	21.79	-11.78	4.59	317%	-35%	10%
17	R229	EB	92.47	87.04	93.11	90.83	86.00	78.75	-1.64	-1.04	-14.36	-2%	-1%	-15%
		WB	42.27	33.71	39.16	40.81	32.60	34.83	-1.46	-1.11	-4.33	-3%	-3%	-11%
18	N56	EB	80.22	61.83	76.52	74.01	60.03	79.15	-6.21	-1.80	2.63	-8%	-3%	3%
		WB	59.40	55.46	71.31	57.51	53.87	74.51	-1.89	-1.59	3.20	-3%	-3%	4%
19	N56	NB	37.40	41.62	63.31	38.20	41.68	65.14	0.80	0.06	1.83	2%	0%	3%
		SB	67.44	41.00	46.98	67.44	41.00	46.98	0.00	0.00	0.00	0%	0%	0%

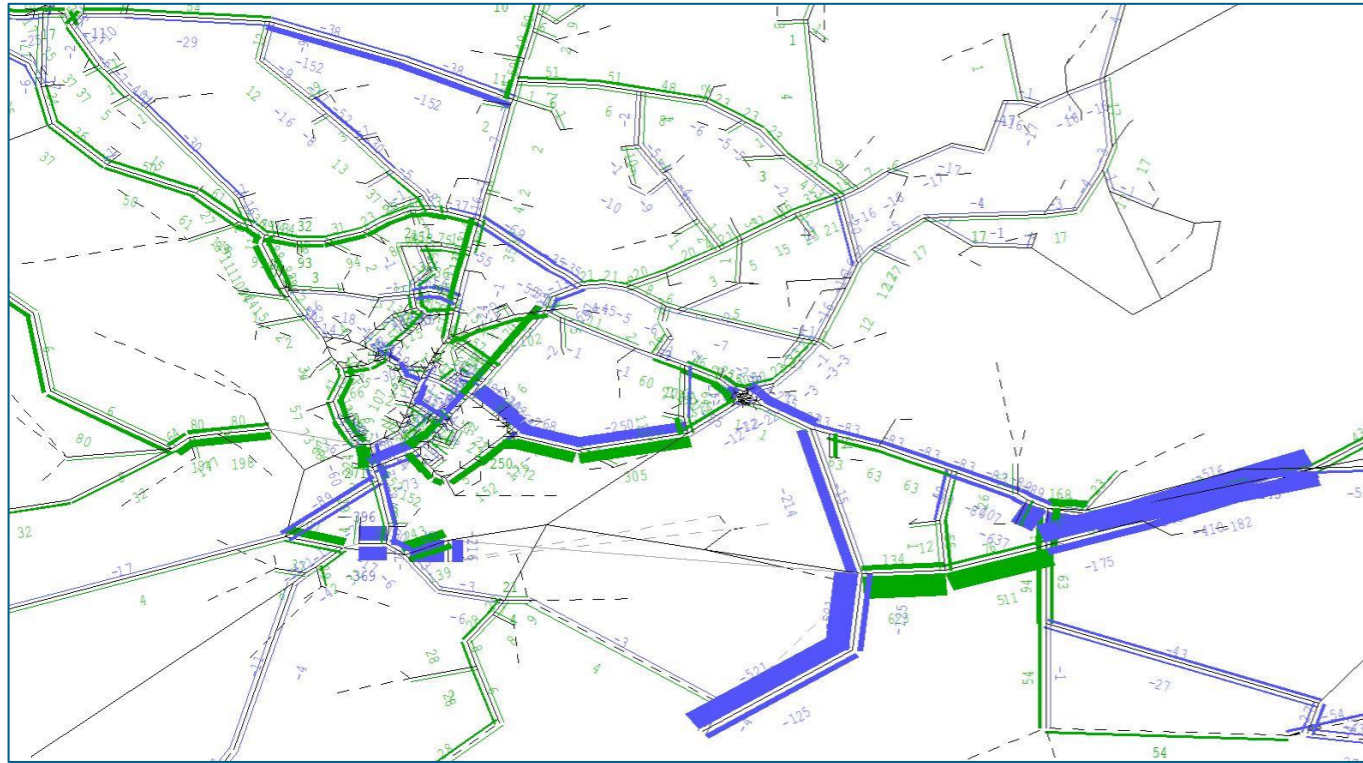
The VoC percentages show that in the DS, the Neil T Blaney Road, Port Road, Main Street, Pearse Road and the Leck Road are all over capacity.

4.7.3. 2033

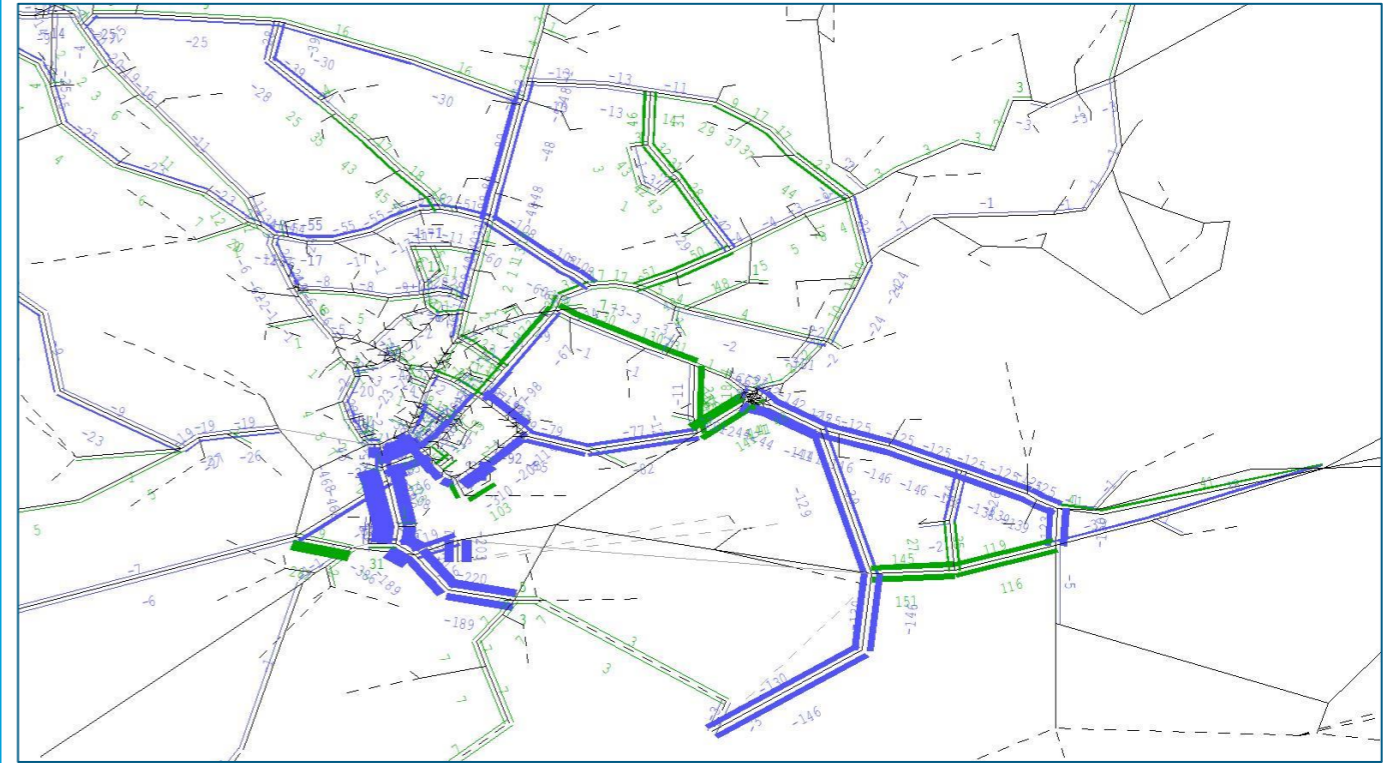
Table 4-22 - 2033 Do Something 2 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1960	1540	1690	1740	1400	1380	-220	-140	-310	-11%	-9%	-18%
		WB	1590	1660	1700	1590	1410	1640	0	-250	-60	0%	-15%	-4%
2	Four Lane Road at Dry Arch Roundabout	EB	1640	1420	1540	1550	1290	1340	-90	-130	-200	-5%	-9%	-13%
		WB	2790	1590	2120	2160	1450	1590	-630	-140	-530	-23%	-9%	-25%
3	Neil T Blaney Road	EB	830	630	840	580	550	460	-250	-80	-380	-30%	-13%	-45%
		WB	390	600	770	690	510	360	300	-90	-410	77%	-15%	-53%
4	Port Road	EB	510	400	250	510	530	250	0	130	0	0%	33%	0%
		WB	680	590	580	680	590	580	0	0	0	0%	0%	0%
5	Ballyraine Road	EB	540	540	590	550	550	590	10	10	0	2%	2%	0%
		WB	480	500	560	480	500	490	0	0	-70	0%	0%	-13%
6	N56	NB	650	730	590	630	740	610	-20	10	20	-3%	1%	3%
		SB	1180	1010	1160	1190	990	1130	10	-20	-30	1%	-2%	-3%
7	South West of Kilty Roundabout	NB	780	670	730	810	670	740	30	0	10	4%	0%	1%
		SB	690	810	430	700	810	470	10	0	40	1%	0%	9%
8	Kilmacrennan Road	NB	1540	1480	1290	1530	1390	1310	-10	-90	20	-1%	-6%	2%
		SB	1380	1520	1470	1380	1470	1470	0	-50	0	0%	-3%	0%
9	Port Road	SB	560	620	720	650	610	740	90	-10	20	16%	-2%	3%
10	High Road	NB	750	790	720	860	750	710	110	-40	-10	15%	-5%	-1%
		SB	660	190	210	660	190	220	0	0	10	0%	0%	5%
11	Main Street	SB	240	40	30	240	40	20	0	0	-10	0%	0%	-33%
12	Paddy Harte Road	SB	1080	1340	1500	1260	1140	1300	180	-200	-200	17%	-15%	-13%
13	Pearse Road	NB	930	210	840	1100	260	940	170	50	100	18%	24%	12%
		SB	890	800	1020	890	700	910	0	-100	-110	0%	-13%	-11%
14	Convent Road	NB	810	790	770	850	780	830	40	-10	60	5%	-1%	8%
		SB	40	130	670	150	100	670	110	-30	0	275%	-23%	0%
15	R250	EB	1150	390	820	1060	430	500	-90	40	-320	-8%	10%	-39%
		WB	580	710	890	770	680	880	190	-30	-10	33%	-4%	-1%
16	Leck Road	EB	350	310	190	510	320	520	160	10	330	46%	3%	174%
		WB	60	260	400	340	310	710	280	50	310	467%	19%	78%
17	R229	EB	1630	1550	1560	1570	1450	1430	-60	-100	-130	-4%	-6%	-8%
		WB	840	610	750	780	550	680	-60	-60	-70	-7%	-10%	-9%
18	N56	EB	1130	1150	1120	1180	1140	1160	50	-10	40	4%	-1%	4%
		WB	1260	1110	1450	1260	1100	1440	0	-10	-10	0%	-1%	-1%
19	N56	NB	650	600	930	680	600	950	30	0	20	5%	0%	2%
		SB	1140	700	860	1150	700	860	10	0	0	1%	0%	0%

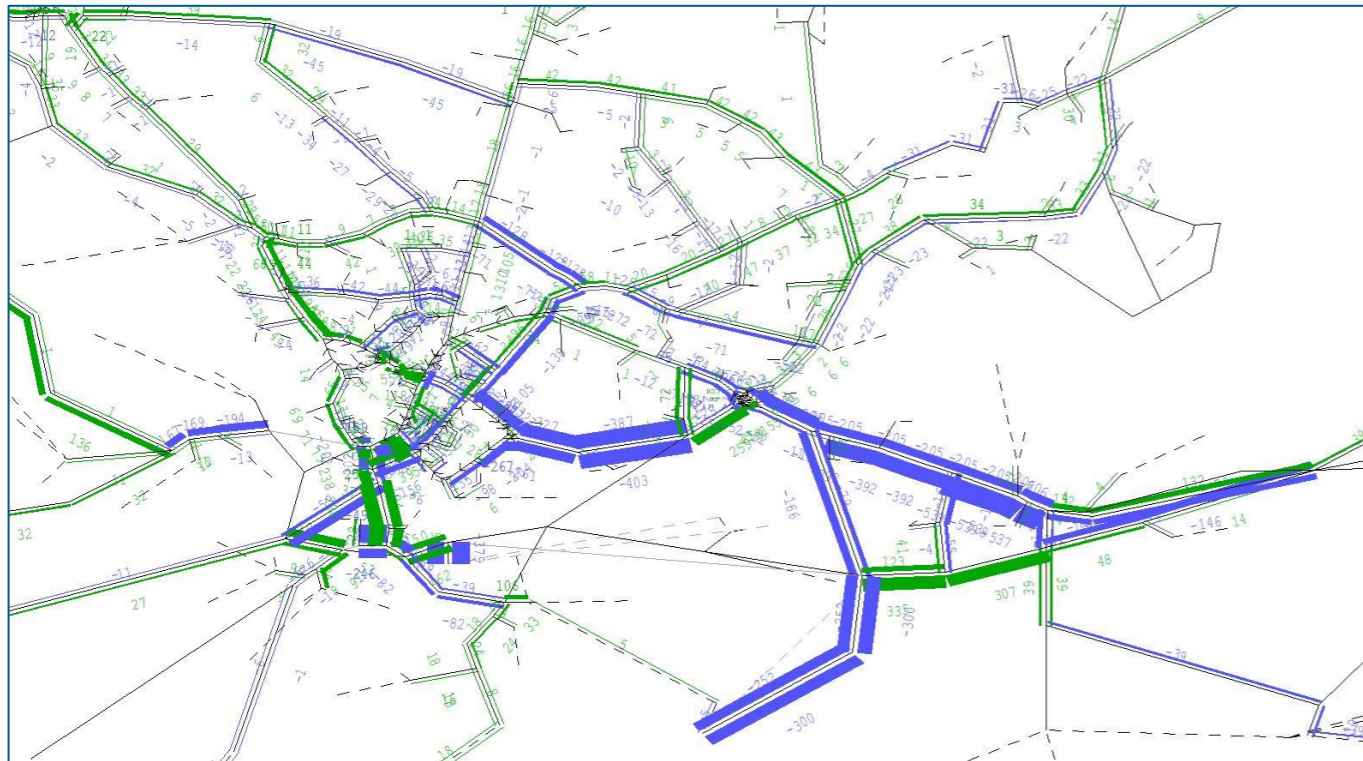
AM Actual Flow: 2033 DS – DM



IP Actual Flow: 2033 DS – DM



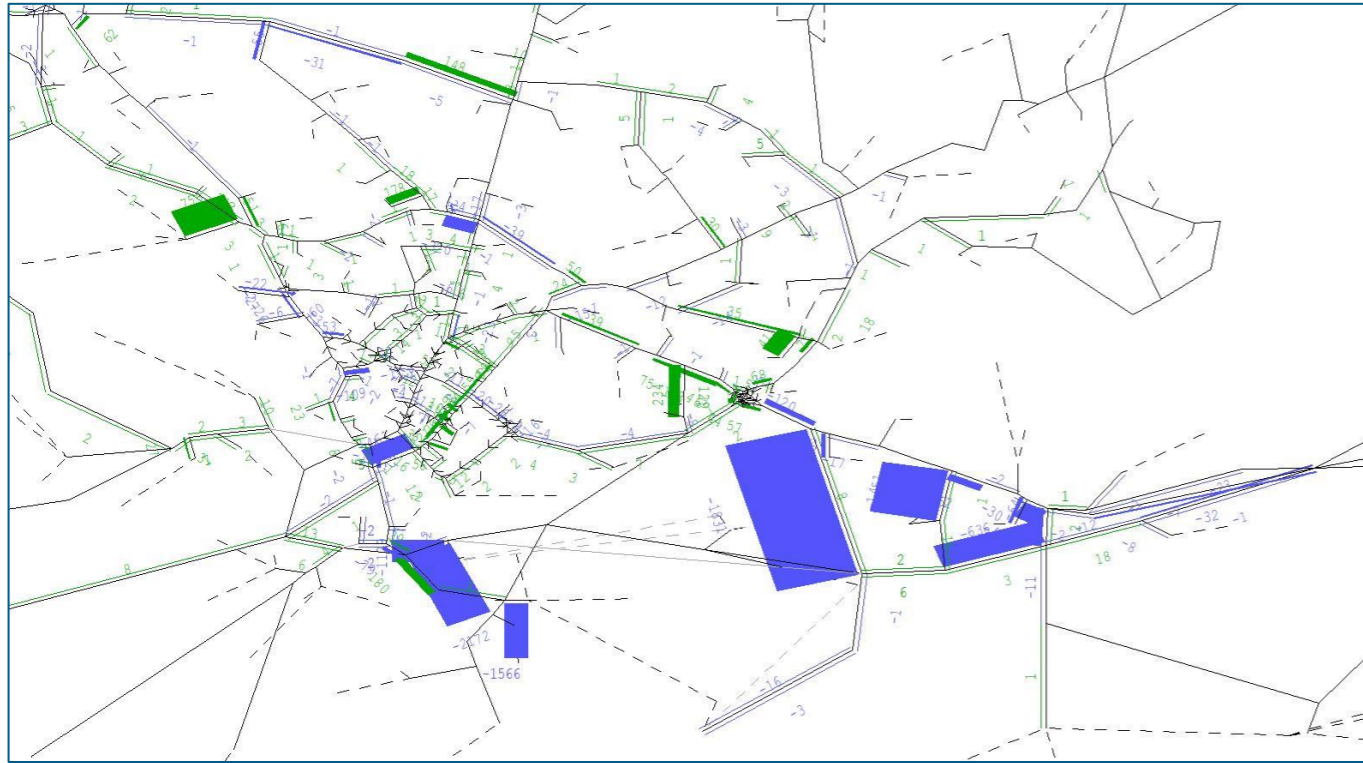
PM Actual Flow: 2033 DS – DM



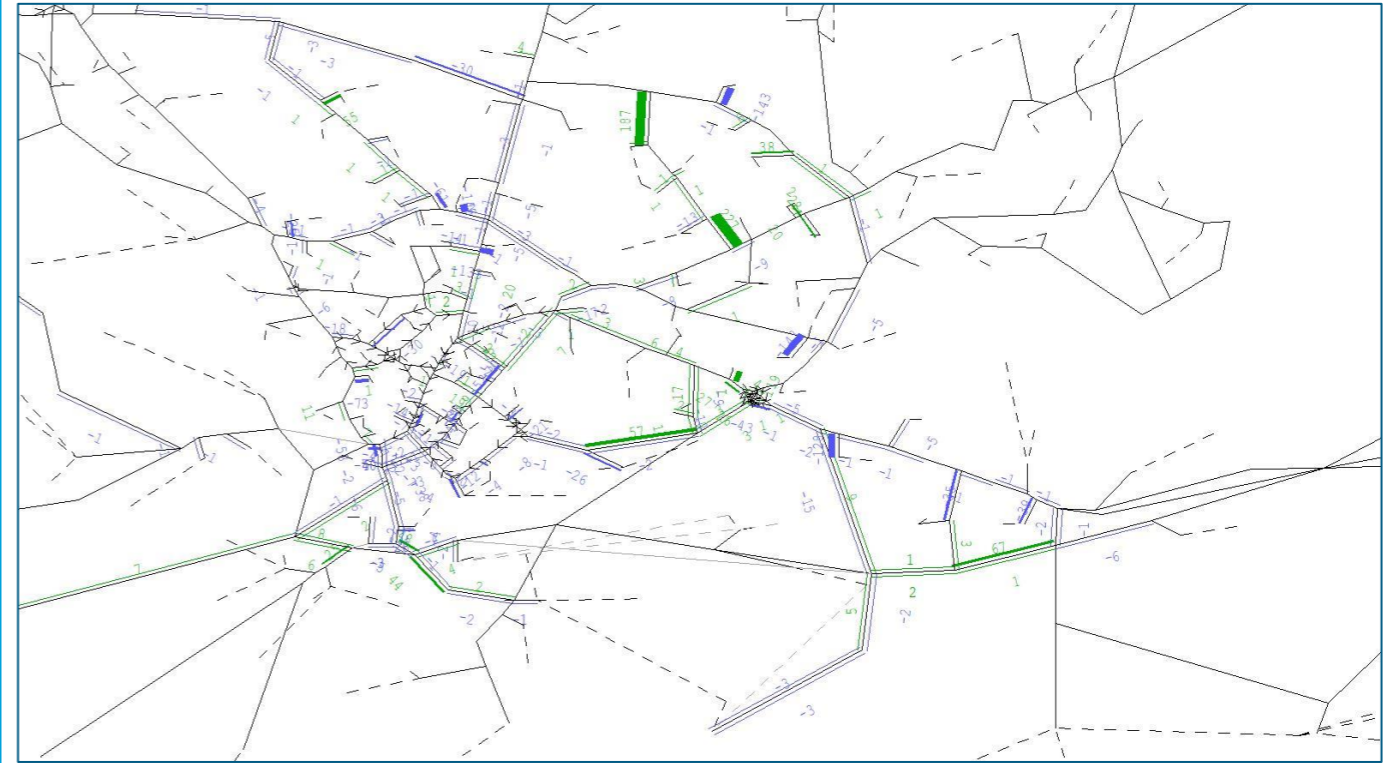
The above flows at select links and flow difference plots show:

- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road
- There is a decrease in traffic along the Neil T Blaney Road (up to 53%) in the PM peak where traffic reroutes to the new SNP.

AM Delay: 2033 DS – DM



IP Delay: 2033 DS – DM



PM Delay: 2033 DS – DM

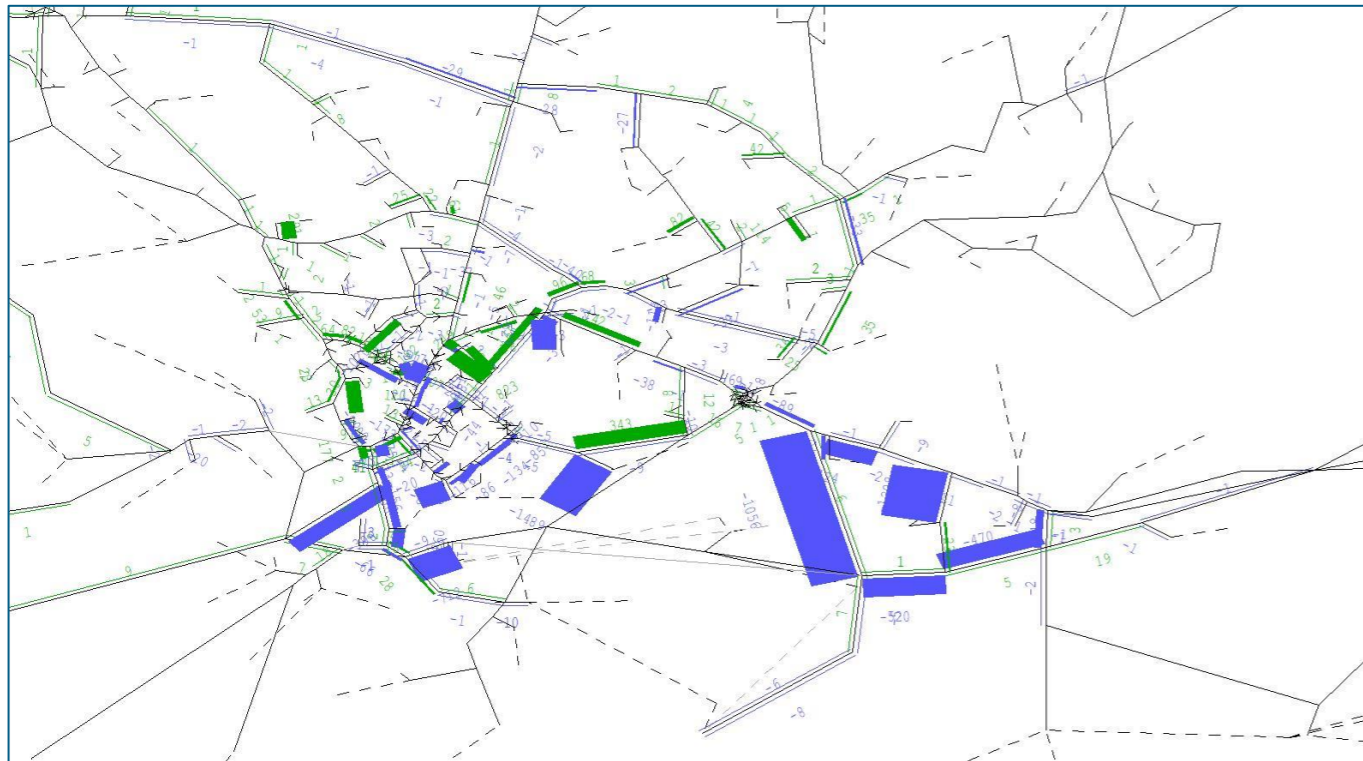


Table 4-23 - 2033 Do Something 2 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	2260	1420	2190	1920	1400	1790	-340	-10	-400	-15%	-1%	-18%
Route A SB	1210	1030	1290	1140	1020	1280	-80	-20	-10	-6%	-2%	-1%
Route B EB	1580	1330	1920	1680	1370	1900	100	50	-20	6%	3%	-1%
Route B WB	990	1040	1380	1060	940	1400	70	-100	20	7%	-9%	2%

Route A generally shows some journey time savings whereas Route B shows some increases (likely due to the increase in delay at the Joe Bonnar Road junction with the SNP).

While there are journey time savings compared to the Do Minimum, in the majority of cases the forecast DS journey times are still higher than in the 2017 Base Model.

The delay plots and journey times show:

- There are large decreases in delay where the traffic from the Leck Road has reroutes away however this does cause some increases in delay along the Neil T Blaney Road at Joe Bonnar;
- This in turn causes some increases in delay at the Junction of the Joe Bonnar Road and the Port Road in the AM peak.

Table 4-24 - 2033 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	106.49	84.59	94.18	93.59	72.40	67.35	-12.90	-12.19	-26.83	-12%	-14%	-28%
		WB	62.01	64.72	66.26	62.05	55.17	64.23	0.04	-9.55	-2.03	0%	-15%	-3%
2	Four Lane Road at Dry Arch Roundabout	EB	66.14	57.95	62.24	64.99	53.36	55.89	-1.15	-4.59	-6.35	-2%	-8%	-10%
		WB	125.65	62.19	82.98	84.19	56.76	62.00	-41.46	-5.43	-20.98	-33%	-9%	-25%
3	Neil T Blaney Road	EB	77.26	58.16	87.24	71.01	102.87	119.30	-6.25	44.71	32.06	-8%	77%	37%
		WB	27.51	42.53	54.81	49.29	36.68	25.99	21.78	-5.85	-28.82	79%	-14%	-53%
4	Port Road	EB	104.87	75.60	112.82	104.87	100.11	112.82	0.00	24.51	0.00	0%	32%	0%
		WB	54.61	47.57	46.07	54.53	47.53	46.16	-0.08	-0.04	0.09	0%	0%	0%
5	Ballyraine Road	EB	90.09	69.54	108.93	101.41	68.91	109.08	11.32	-0.63	0.15	13%	-1%	0%
		WB	66.58	53.06	91.27	65.57	52.94	80.93	-1.01	-0.12	-10.34	-2%	0%	-11%
6	N56	NB	46.17	52.41	42.04	45.04	53.14	43.79	-1.13	0.73	1.75	-2%	1%	4%
		SB	82.69	79.95	81.01	83.52	78.05	79.45	0.83	-1.90	-1.56	1%	-2%	-2%
7	South West of Kilty Roundabout	NB	62.31	53.90	58.20	64.76	53.58	58.83	2.45	-0.32	0.63	4%	-1%	1%
		SB	48.98	57.80	32.45	50.02	58.17	34.09	1.04	0.37	1.64	2%	1%	5%
8	Kilmacrennan Road	NB	96.11	92.63	80.67	95.68	87.08	81.81	-0.43	-5.55	1.14	0%	-6%	1%
		SB	80.89	90.69	85.50	81.01	86.66	85.74	0.12	-4.03	0.24	0%	-4%	0%
9	Port Road	SB	76.86	90.21	110.13	100.21	87.22	114.47	23.35	-2.99	4.34	30%	-3%	4%
10	High Road	NB	59.69	63.34	57.37	68.68	60.19	56.52	8.99	-3.15	-0.85	15%	-5%	-1%
		SB	92.82	136.83	115.66	95.54	137.94	118.22	2.72	1.11	2.56	3%	1%	2%
11	Main Street	SB	108.14	108.28	108.54	108.16	108.28	108.53	0.02	0.00	-0.01	0%	0%	0%
12	Paddy Harte Road	SB	77.23	95.94	107.35	89.70	81.27	92.79	12.47	-14.67	-14.56	16%	-15%	-14%
13	Pearse Road	NB	87.11	117.68	78.35	102.57	113.78	87.36	15.46	-3.90	9.01	18%	-3%	11%
		SB	63.31	56.94	72.59	63.75	49.90	69.77	0.44	-7.04	-2.82	1%	-12%	-4%
14	Convent Road	NB	107.61	107.88	54.73	107.21	107.90	101.62	-0.40	0.02	46.89	0%	0%	86%
		SB	7.95	9.07	47.56	16.00	7.42	48.03	8.05	-1.65	0.47	101%	-18%	1%
15	R250	EB	82.21	28.18	58.65	76.05	30.95	35.36	-6.16	2.77	-23.29	-7%	10%	-40%
		WB	41.19	50.62	63.55	55.32	48.76	62.64	14.13	-1.86	-0.91	34%	-4%	-1%
16	Leck Road	EB	118.25	81.22	54.17	108.80	100.41	103.50	-9.45	19.19	49.33	-8%	24%	91%
		WB	7.19	29.07	44.07	22.54	20.76	47.40	15.35	-8.31	3.33	213%	-29%	8%
17	R229	EB	102.12	97.14	97.51	97.82	90.39	89.51	-4.30	-6.75	-8.00	-4%	-7%	-8%
		WB	47.51	33.87	41.11	44.39	30.57	38.46	-3.12	-3.30	-2.65	-7%	-10%	-6%
18	N56	EB	80.40	82.30	82.49	84.08	81.39	85.41	3.68	-0.91	2.92	5%	-1%	4%
		WB	69.82	61.61	80.33	70.16	60.86	80.07	0.34	-0.75	-0.26	0%	-1%	0%
19	N56	NB	40.41	37.42	58.20	42.37	37.57	59.07	1.96	0.15	0.87	5%	0%	1%
		SB	71.09	43.87	53.57	71.66	43.87	53.75	0.57	0.00	0.18	1%	0%	0%

The VoC percentages show that in the DS, the Neil T Blaney Road, Port Road, Ballyraine Road, High Road, Main Street, Pearse Road, Convent Road and the Leck Road are all over capacity.

4.8. Do Something - Scenario 3

This scenario assesses both the TEN-T and Southern Network Plan schemes with the 2029 and 2033 core demand.

4.8.1. SATURN Simulation Summary Results

4.8.1.1. 2029

Summary Result	Units	2017 Base			2029 DM			2029 DS3			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	1199	381.8	1797.3	210.5	227.8	999.4	-82%	-40%	-44%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	3083.1	1972.9	3745.8	2120.8	1713.6	2979.4	-31%	-13%	-20%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	55338.4	45887.2	55015.6	63439.7	49033	62877.3	15%	7%	14%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	17.9	23.3	14.7	29.9	28.6	21.1	67%	23%	44%

4.8.1.2. 2033

Summary Result	Units	2017 Base			2033 DM			2033 DS3			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	2196	1871.2	3276	1063.5	1468.2	2288.7	-52%	-22%	-30%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	4401.8	3748.7	5458.5	3416.3	3255.4	4560.7	-22%	-13%	-16%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	61636.8	51049	59427.8	72124.8	54000.7	68109.8	17%	6%	15%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	14	13.6	10.9	21.1	16.6	14.9	51%	22%	37%

The above summary results show that with the implementation of the TEN-T and SNP schemes:

- There is a decrease in over capacity queues from the DM model showing some improvement however these are still significantly higher than in the base;
- Total travel time decreases compared to the DM model but again is still significantly higher than in the base;
- There is an increase in travel distance across the network likely due to traffic rerouting and travelling further to make use of the schemes;
- Average speed increases compared to the DM but is still significantly slower than in the base.

The results of the DS3 forecast modelling show that while there is improvement in the network performance compared to the Do Minimum scenario, it still performs worse than the already struggling base network and further improvements will be needed if the planned demand is to be realised.

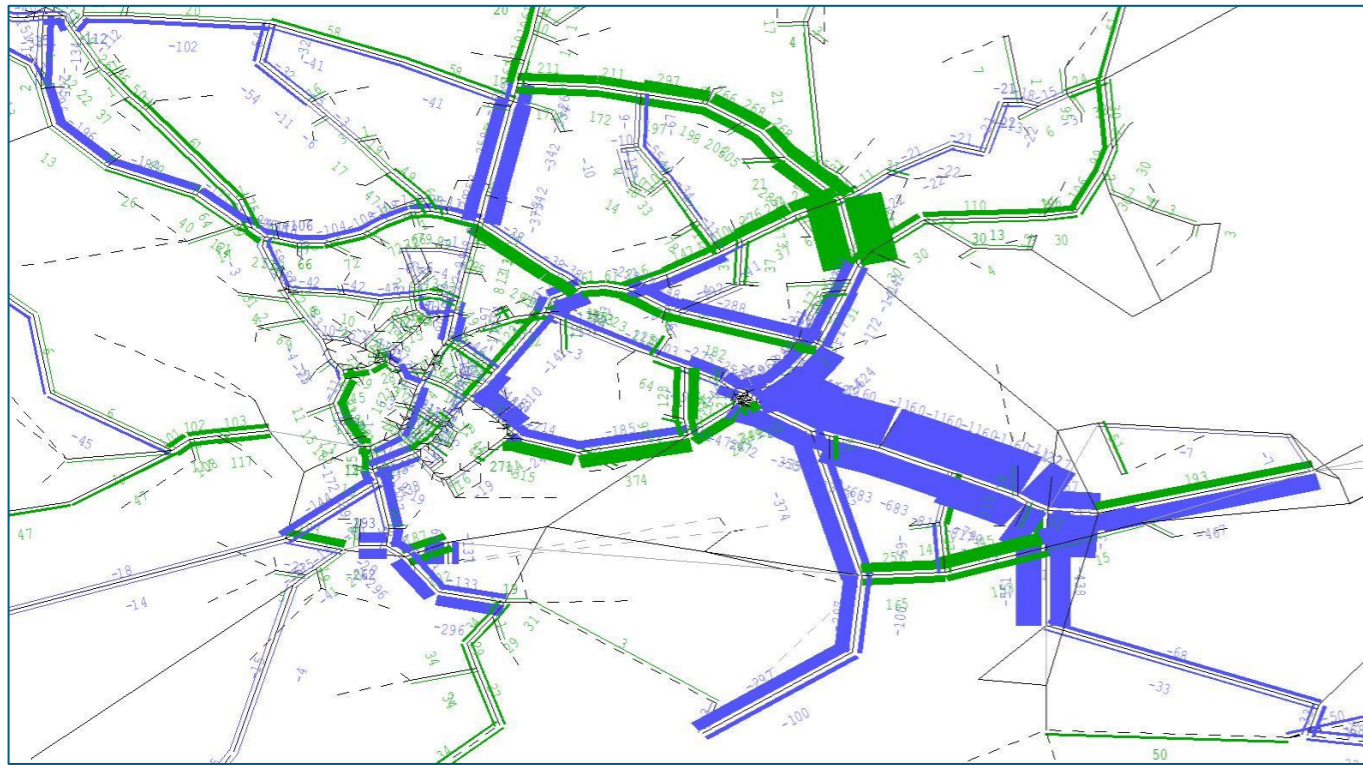
Further details on these results including link flows and delay plots are shown the rest of the section.

4.8.2. 2029

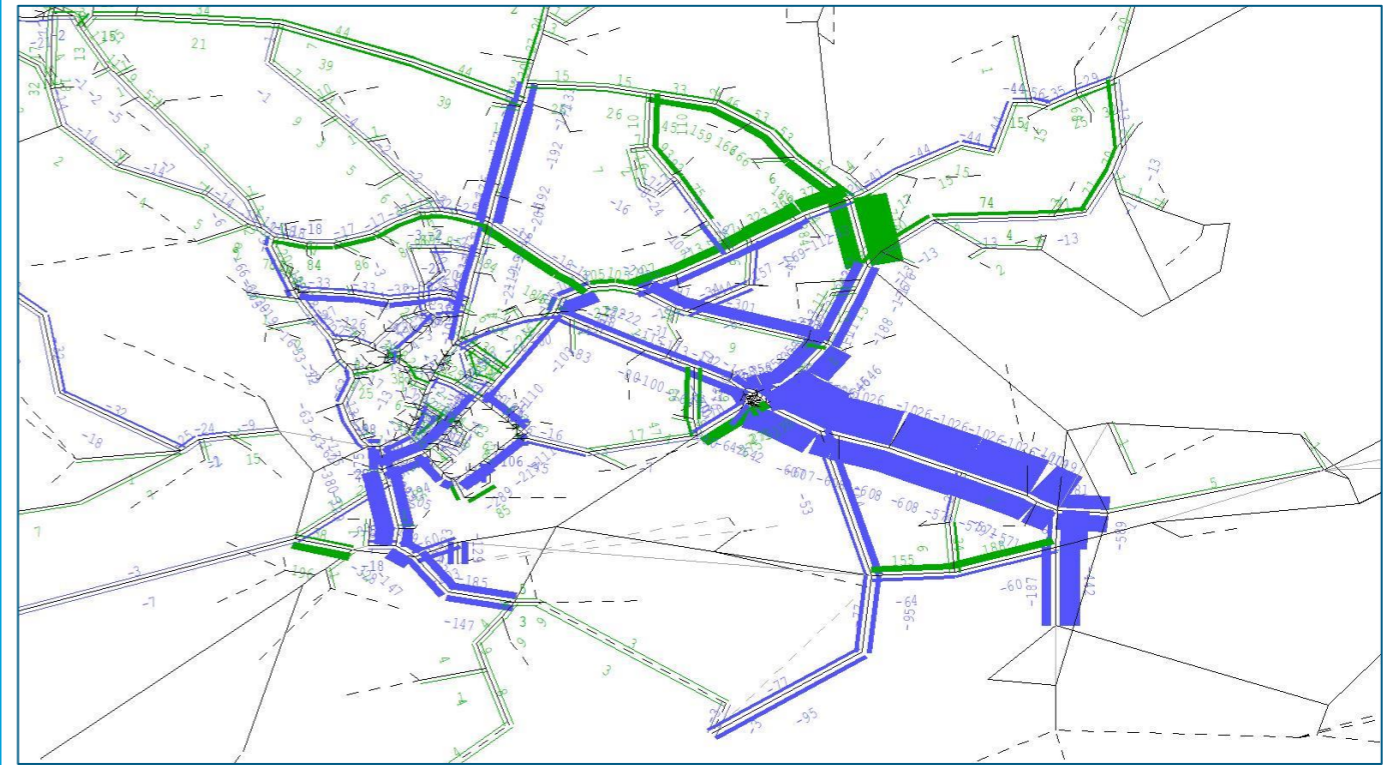
Table 4-25 - 2029 Do Something 3 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1780	1700	1650	470	540	700	-1310	-1160	-950	-74%	-68%	-58%
		WB	1590	1380	1720	1120	740	780	-470	-640	-940	-30%	-46%	-55%
2	Four Lane Road at Dry Arch Roundabout	EB	1590	1570	1530	470	550	670	-1120	-1020	-860	-70%	-65%	-56%
		WB	2550	1390	1780	1380	820	580	-1170	-570	-1200	-46%	-41%	-67%
3	Neil T Blaney Road	EB	680	560	790	490	580	630	-190	20	-160	-28%	4%	-20%
		WB	440	510	750	820	510	400	380	0	-350	86%	0%	-47%
4	Port Road	EB	500	480	250	390	370	250	-110	-110	0	-22%	-23%	0%
		WB	680	590	620	680	510	530	0	-80	-90	0%	-14%	-15%
5	Ballyraine Road	EB	510	580	680	220	280	420	-290	-300	-260	-57%	-52%	-38%
		WB	500	460	540	680	470	680	180	10	140	36%	2%	26%
6	N56	NB	650	780	710	430	570	700	-220	-210	-10	-34%	-27%	-1%
		SB	1130	900	1100	960	710	890	-170	-190	-210	-15%	-21%	-19%
7	South West of Kilty Roundabout	NB	530	610	650	810	940	820	280	330	170	53%	54%	26%
		SB	260	740	350	300	570	450	40	-170	100	15%	-23%	29%
8	Kilmacrennan Road	NB	1380	1140	1220	1120	970	1330	-260	-170	110	-19%	-15%	9%
		SB	1480	1340	1390	1130	1150	1370	-350	-190	-20	-24%	-14%	-1%
9	Port Road	SB	480	630	730	520	560	670	40	-70	-60	8%	-11%	-8%
10	High Road	NB	610	870	770	600	740	820	-10	-130	50	-2%	-15%	6%
		SB	700	560	510	710	540	620	10	-20	110	1%	-4%	22%
11	Main Street	SB	340	110	170	320	90	130	-20	-20	-40	-6%	-18%	-24%
12	Paddy Harte Road	SB	1150	1420	1440	1170	1200	1200	20	-220	-240	2%	-15%	-17%
13	Pearse Road	NB	990	980	890	1070	1000	860	80	20	-30	8%	2%	-3%
		SB	850	910	940	540	800	870	-310	-110	-70	-36%	-12%	-7%
14	Convent Road	NB	790	650	750	780	590	760	-10	-60	10	-1%	-9%	1%
		SB	80	180	670	240	160	540	160	-20	-130	200%	-11%	-19%
15	R250	EB	1000	430	710	1020	410	500	20	-20	-210	2%	-5%	-30%
		WB	510	490	860	620	500	790	110	10	-70	22%	2%	-8%
16	Leck Road	EB	380	180	200	430	220	520	50	40	320	13%	22%	160%
		WB	60	310	420	380	280	550	320	-30	130	533%	-10%	31%
17	R229	EB	1480	1390	1490	1440	1370	1380	-40	-20	-110	-3%	-1%	-7%
		WB	740	620	720	1030	810	900	290	190	180	39%	31%	25%
18	N56	EB	830	840	950	1040	850	1010	210	10	60	25%	1%	6%
		WB	1070	1000	1280	1240	1020	1470	170	20	190	16%	2%	15%
19	N56	NB	600	670	1010	660	680	1080	60	10	70	10%	1%	7%
		SB	1080	660	750	1080	660	750	0	0	0	0%	0%	0%

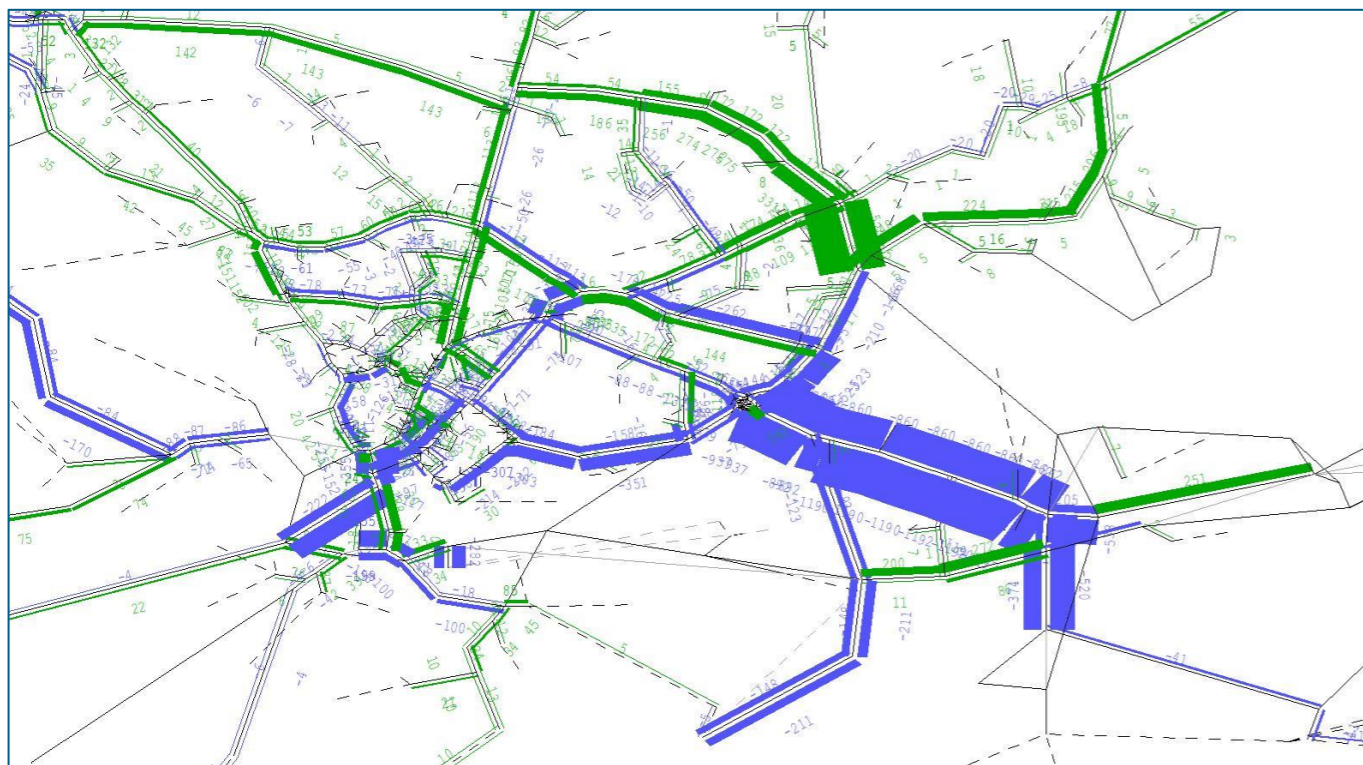
AM Actual Flow: 2029 DS – DM



IP Actual Flow: 2029 DS – DM



PM Actual Flow: 2029 DS – DM



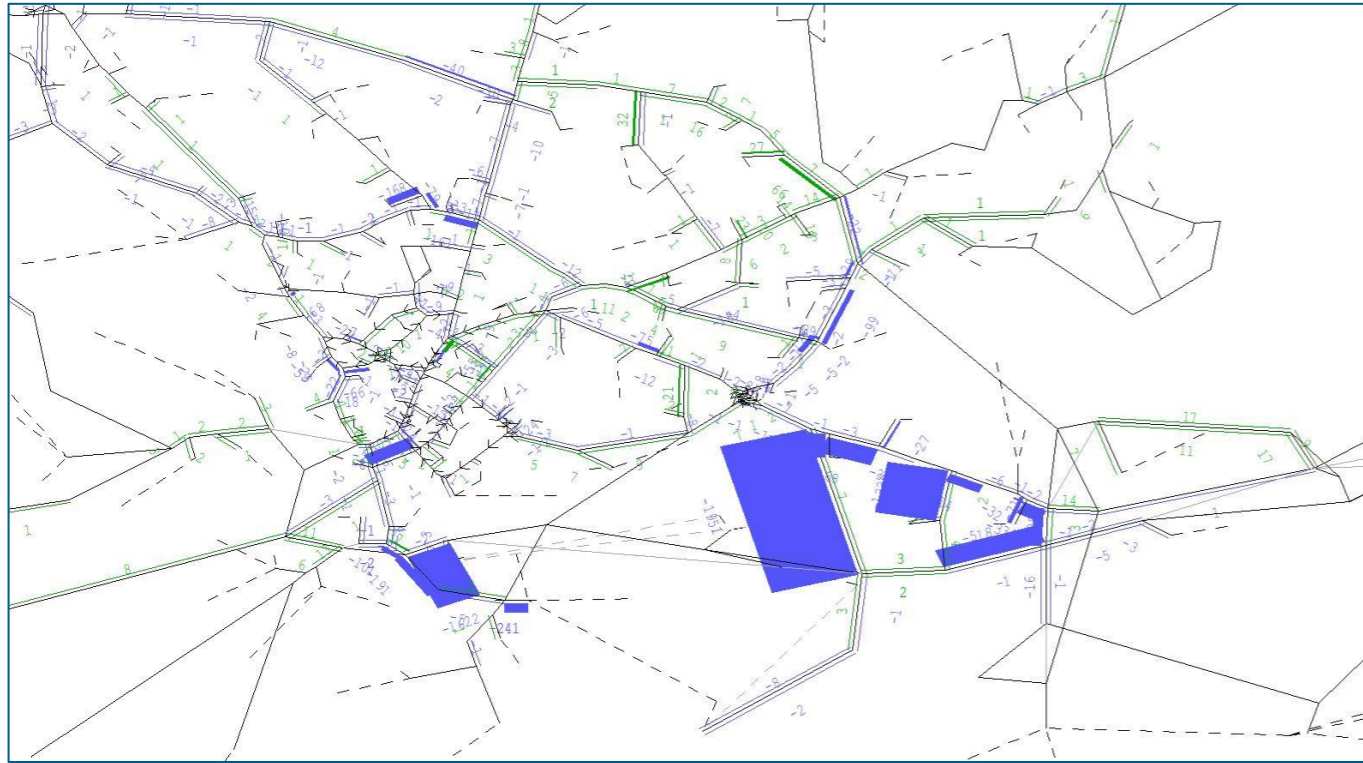
The above flows at select links and flow difference plots show:

- There is a large decrease in traffic along the Four Lane Road (up to 74%). This is due to traffic reassigning onto the proposed TEN-T corridor and the SNP;
- The reassigned traffic causes an increase in flow along the N56 at the Kilty Roundabout and on the approach to the Ramelton Road;
- The TEN-T experiences traffic flows of up to 1290 PCUs NB and 1020 PCUs SB;
- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road
- There is traffic rerouting in the town centre meaning the Circular Road and the De Valera Road experience an uplift in traffic;
- The Neil T Blaney Road experiences an increase in traffic in the AM peak WB.

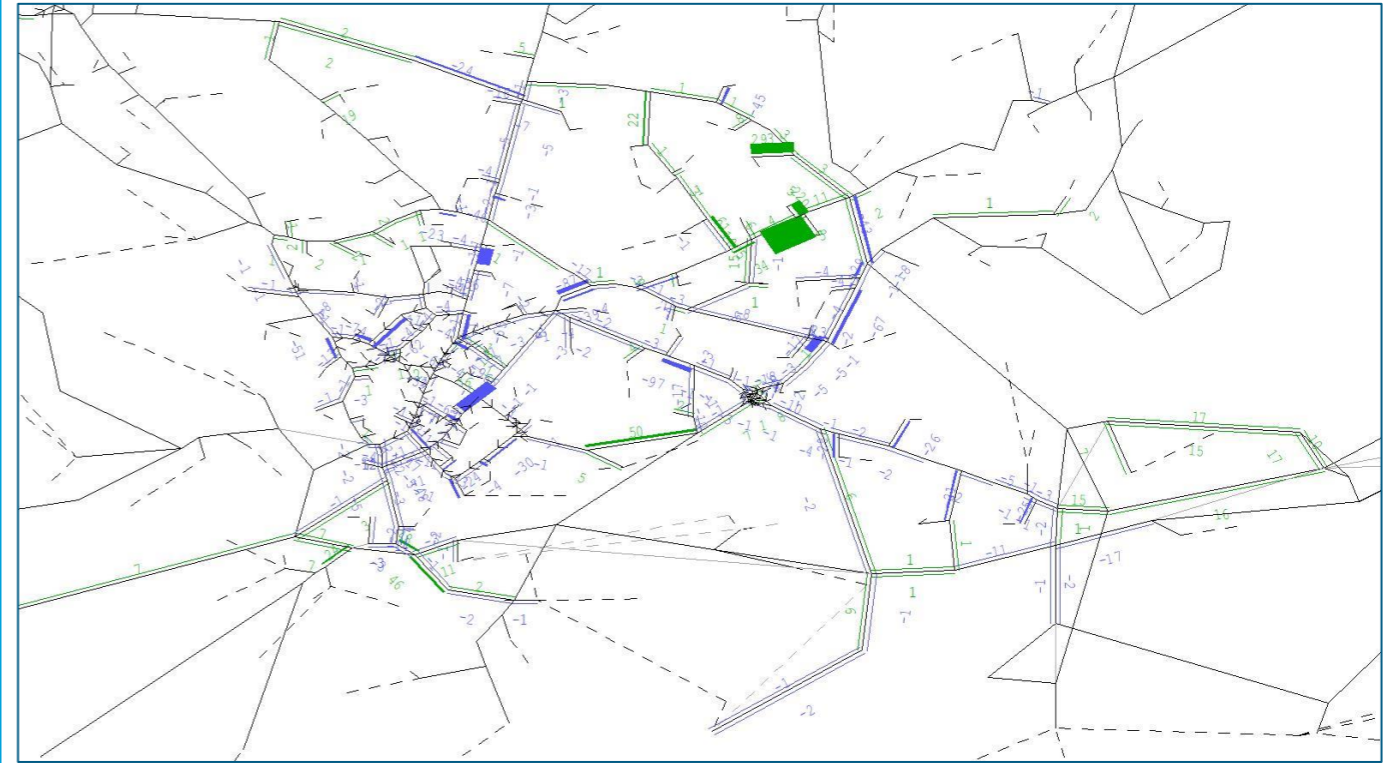
Table 4-26 - TEN-T Flow South of the Ballyraine Rd

	AM	IP	PM
NB	1290	810	1290
SB	990	1020	990

AM Delay: 2029 DS – DM



IP Delay: 2029 DS – DM



PM Delay: 2029 DS – DM

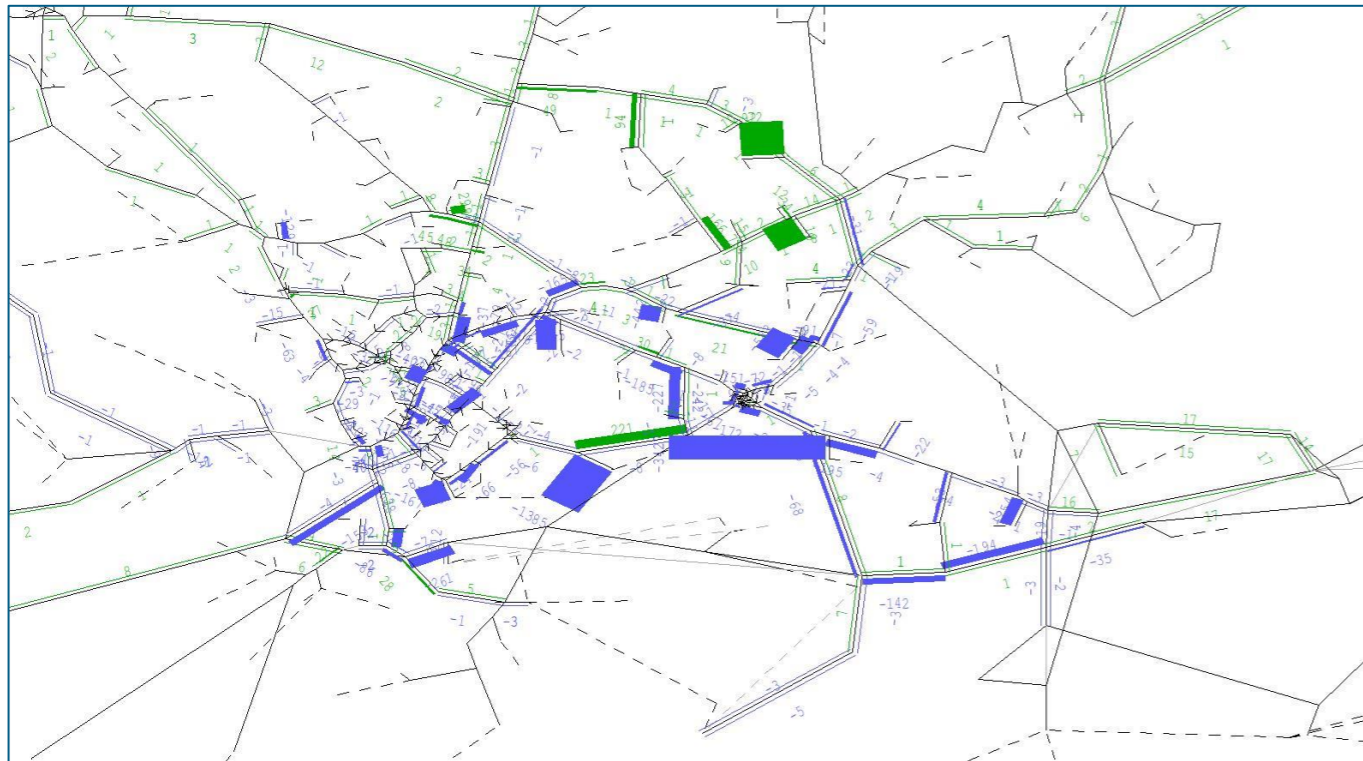


Table 4-27 - 2029 Do Something 3 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	1960	920	1910	820	710	890	-1140	-210	-1020	-58%	-23%	-53%
Route A SB	930	830	1110	800	760	980	-130	-70	-130	-14%	-9%	-12%
Route B EB	1200	900	1720	730	670	870	-470	-230	-850	-39%	-25%	-49%
Route B WB	870	830	1200	720	670	780	-150	-160	-420	-17%	-19%	-35%

The journey times decrease compared to the Do Minimum scenario however they are still higher than the base model.

The delay plots show:

- In general, there are decreases in delay across the network with the journey times decreasing by up to 58%;
- There are some increases in delay at the junctions along the N56 and close to Kilty Roundabout. The increases in delay are due to the increased traffic volumes at these locations accessing the TEN-T;
- There are also some increases in delay along the Neil T Blaney Road at Joe Bonnar where traffic from the SNP is accessing the town, however these are minor compared to the delay savings along the Leck Road/SNP.

Table 4-28 - 2029 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	95.38	93.08	92.04	18.50	21.05	32.78	-76.88	-72.03	-59.26	-81%	-77%	-64%
		WB	62.11	54.05	67.05	43.67	28.96	30.44	-18.44	-25.09	-36.61	-30%	-46%	-55%
2	Four Lane Road at Dry Arch Roundabout	EB	65.15	64.72	62.74	20.64	23.50	29.58	-44.51	-41.22	-33.16	-68%	-64%	-53%
		WB	118.40	54.37	69.36	53.79	32.05	22.60	-64.61	-22.32	-46.76	-55%	-41%	-67%
3	Neil T Blaney Road	EB	63.27	52.60	74.12	68.45	102.35	112.18	5.18	49.75	38.06	8%	95%	51%
		WB	31.73	36.69	53.29	58.45	36.22	28.22	26.72	-0.47	-25.07	84%	-1%	-47%
4	Port Road	EB	104.01	91.90	109.53	81.47	70.06	111.17	-22.54	-21.84	1.64	-22%	-24%	1%
		WB	54.56	47.08	49.40	54.60	40.69	42.34	0.04	-6.39	-7.06	0%	-14%	-14%
5	Ballyraine Road	EB	56.53	79.11	87.24	39.28	55.66	68.08	-17.25	-23.45	-19.16	-31%	-30%	-22%
		WB	68.38	50.20	87.87	90.30	44.90	100.85	21.92	-5.30	12.98	32%	-11%	15%
6	N56	NB	46.44	55.81	51.05	30.51	40.59	50.17	-15.93	-15.22	-0.88	-34%	-27%	-2%
		SB	79.10	71.18	76.70	67.77	56.67	62.10	-11.33	-14.51	-14.60	-14%	-20%	-19%
7	South West of Kilty Roundabout	NB	42.68	49.17	51.80	64.78	75.02	65.73	22.10	25.85	13.93	52%	53%	27%
		SB	18.75	52.91	26.53	31.02	49.82	39.03	12.27	-3.09	12.50	65%	-6%	47%
8	Kilmacrennan Road	NB	86.39	71.42	76.05	70.24	60.39	83.09	-16.15	-11.03	7.04	-19%	-15%	9%
		SB	86.79	75.52	79.79	63.67	62.20	80.00	-23.12	-13.32	0.21	-27%	-18%	0%
9	Port Road	SB	57.58	93.66	112.89	66.16	76.42	102.48	8.58	-17.24	-10.41	15%	-18%	-9%
10	High Road	NB	48.69	69.80	61.91	47.76	59.03	65.25	-0.93	-10.77	3.34	-2%	-15%	5%
		SB	93.97	87.34	68.29	94.54	72.18	83.07	0.57	-15.16	14.78	1%	-17%	22%
11	Main Street	SB	104.63	106.45	108.51	101.59	105.52	108.44	-3.04	-0.93	-0.07	-3%	-1%	0%
12	Paddy Harte Road	SB	82.11	101.49	102.99	83.81	85.99	85.71	1.70	-15.50	-17.28	2%	-15%	-17%
13	Pearse Road	NB	94.36	87.96	82.29	102.27	89.06	80.69	7.91	1.10	-1.60	8%	1%	-2%
		SB	60.44	64.77	70.74	38.33	56.93	62.18	-22.11	-7.84	-8.56	-37%	-12%	-12%
14	Convent Road	NB	101.22	46.77	53.55	56.59	42.27	54.34	-44.63	-4.50	0.79	-44%	-10%	1%
		SB	11.55	12.52	47.95	20.78	11.58	38.92	9.23	-0.94	-9.03	80%	-8%	-19%
15	R250	EB	71.78	30.91	50.57	72.87	29.34	35.96	1.09	-1.57	-14.61	2%	-5%	-29%
		WB	36.23	34.95	61.17	44.56	36.02	56.55	8.33	1.07	-4.62	23%	3%	-8%
16	Leck Road	EB	100.64	48.64	55.17	74.02	49.55	104.70	-26.62	0.91	49.53	-26%	2%	90%
		WB	6.88	34.06	46.16	25.53	18.41	36.94	18.65	-15.65	-9.22	271%	-46%	-20%
17	R229	EB	92.47	87.04	93.11	90.10	85.90	86.05	-2.37	-1.14	-7.06	-3%	-1%	-8%
		WB	42.27	33.71	39.16	55.31	42.41	50.37	13.04	8.70	11.21	31%	26%	29%
18	N56	EB	80.22	61.83	76.52	74.59	65.11	72.04	-5.63	3.28	-4.48	-7%	5%	-6%
		WB	59.40	55.46	71.31	68.97	56.89	81.62	9.57	1.43	10.31	16%	3%	14%
19	N56	NB	37.40	41.62	63.31	41.48	42.78	67.41	4.08	1.16	4.10	11%	3%	6%
		SB	67.44	41.00	46.98	67.53	41.00	46.98	0.09	0.00	0.00	0%	0%	0%

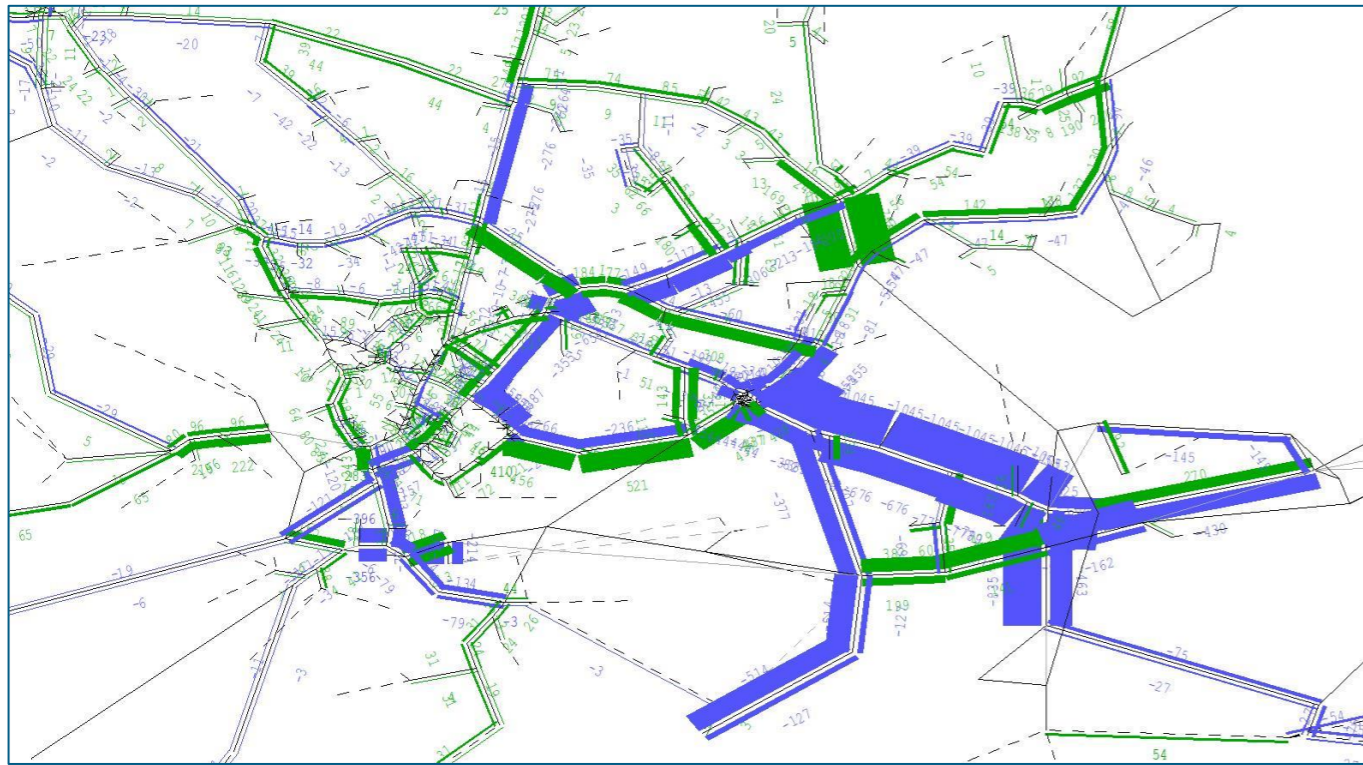
The VoC percentages show that in the DS, the Neil T Blaney Road, Port Road, Ballyraine Road, Main Street, Pearse Road and the Leck Road are all over capacity.

4.8.3. 2033

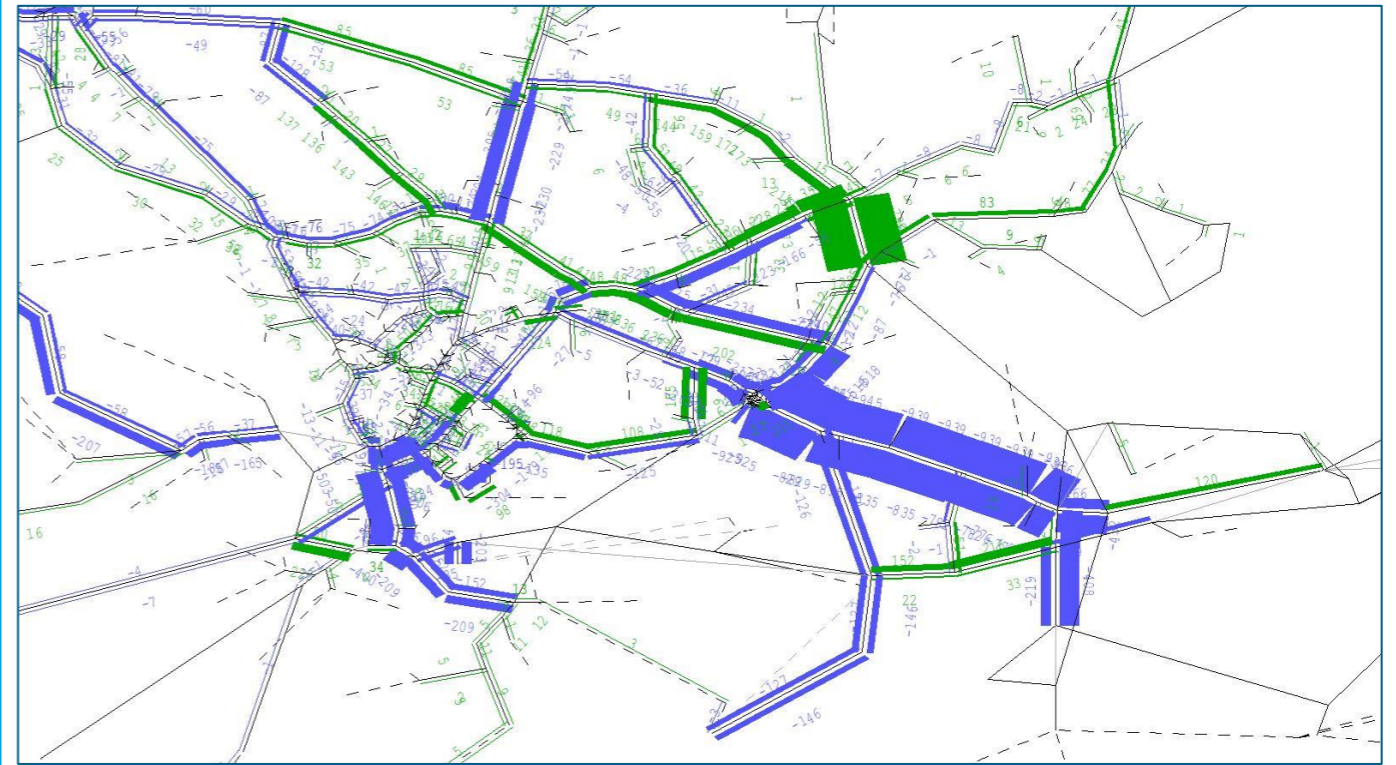
Table 4-29 - 2033 Do Something 3 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1960	1540	1690	680	490	930	-1280	-1050	-760	-65%	-68%	-45%
		WB	1590	1660	1700	1140	730	810	-450	-930	-890	-28%	-56%	-52%
2	Four Lane Road at Dry Arch Roundabout	EB	1640	1420	1540	590	480	850	-1050	-940	-690	-64%	-66%	-45%
		WB	2790	1590	2120	1480	810	500	-1310	-780	-1620	-47%	-49%	-76%
3	Neil T Blaney Road	EB	830	630	840	600	740	630	-230	110	-210	-28%	17%	-25%
		WB	390	600	770	910	470	510	520	-130	-260	133%	-22%	-34%
4	Port Road	EB	510	400	250	480	330	250	-30	-70	0	-6%	-18%	0%
		WB	680	590	580	680	590	560	0	0	-20	0%	0%	-3%
5	Ballyraine Road	EB	540	540	590	480	310	620	-60	-230	30	-11%	-43%	5%
		WB	480	500	560	790	700	720	310	200	160	65%	40%	29%
6	N56	NB	650	730	590	650	780	640	0	50	50	0%	7%	8%
		SB	1180	1010	1160	1100	930	1050	-80	-80	-110	-7%	-8%	-9%
7	South West of Kilty Roundabout	NB	780	670	730	810	900	750	30	230	20	4%	34%	3%
		SB	690	810	430	470	640	630	-220	-170	200	-32%	-21%	47%
8	Kilmacrennan Road	NB	1540	1480	1290	1520	1180	1400	-20	-300	110	-1%	-20%	9%
		SB	1380	1520	1470	1100	1290	1370	-280	-230	-100	-20%	-15%	-7%
9	Port Road	SB	560	620	720	640	610	750	80	-10	30	14%	-2%	4%
10	High Road	NB	750	790	720	760	800	740	10	10	20	1%	1%	3%
		SB	660	190	210	650	200	230	-10	10	20	-2%	5%	10%
11	Main Street	SB	240	40	30	220	40	20	-20	0	-10	-8%	0%	-33%
12	Paddy Harte Road	SB	1080	1340	1500	1200	1160	1230	120	-180	-270	11%	-13%	-18%
13	Pearse Road	NB	930	210	840	1090	140	820	160	-70	-20	17%	-33%	-2%
		SB	890	800	1020	500	700	810	-390	-100	-210	-44%	-13%	-21%
14	Convent Road	NB	810	790	770	850	770	780	40	-20	10	5%	-3%	1%
		SB	40	130	670	100	90	610	60	-40	-60	150%	-31%	-9%
15	R250	EB	1150	390	820	1120	320	470	-30	-70	-350	-3%	-18%	-43%
		WB	580	710	890	800	540	800	220	-170	-90	38%	-24%	-10%
16	Leck Road	EB	350	310	190	490	340	510	140	30	320	40%	10%	168%
		WB	60	260	400	420	280	630	360	20	230	600%	8%	58%
17	R229	EB	1630	1550	1560	1610	1590	1530	-20	40	-30	-1%	3%	-2%
		WB	840	610	750	1180	770	1040	340	160	290	40%	26%	39%
18	N56	EB	1130	1150	1120	1200	1100	1180	70	-50	60	6%	-4%	5%
		WB	1260	1110	1450	1270	1160	1520	10	50	70	1%	5%	5%
19	N56	NB	650	600	930	720	620	970	70	20	40	11%	3%	4%
		SB	1140	700	860	1160	700	870	20	0	10	2%	0%	1%

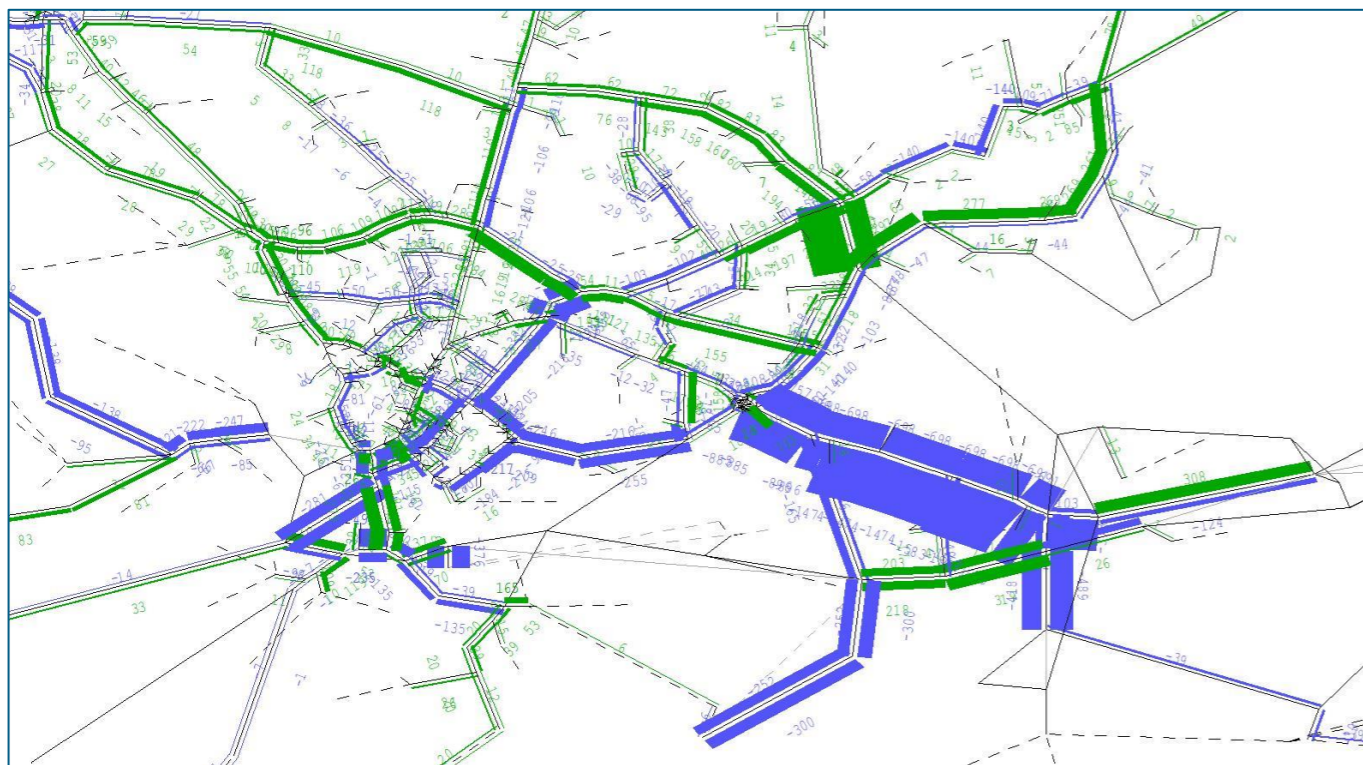
AM Actual Flow: 2033 DS – DM



IP Actual Flow: 2033 DS – DM



PM Actual Flow: 2033 DS – DM



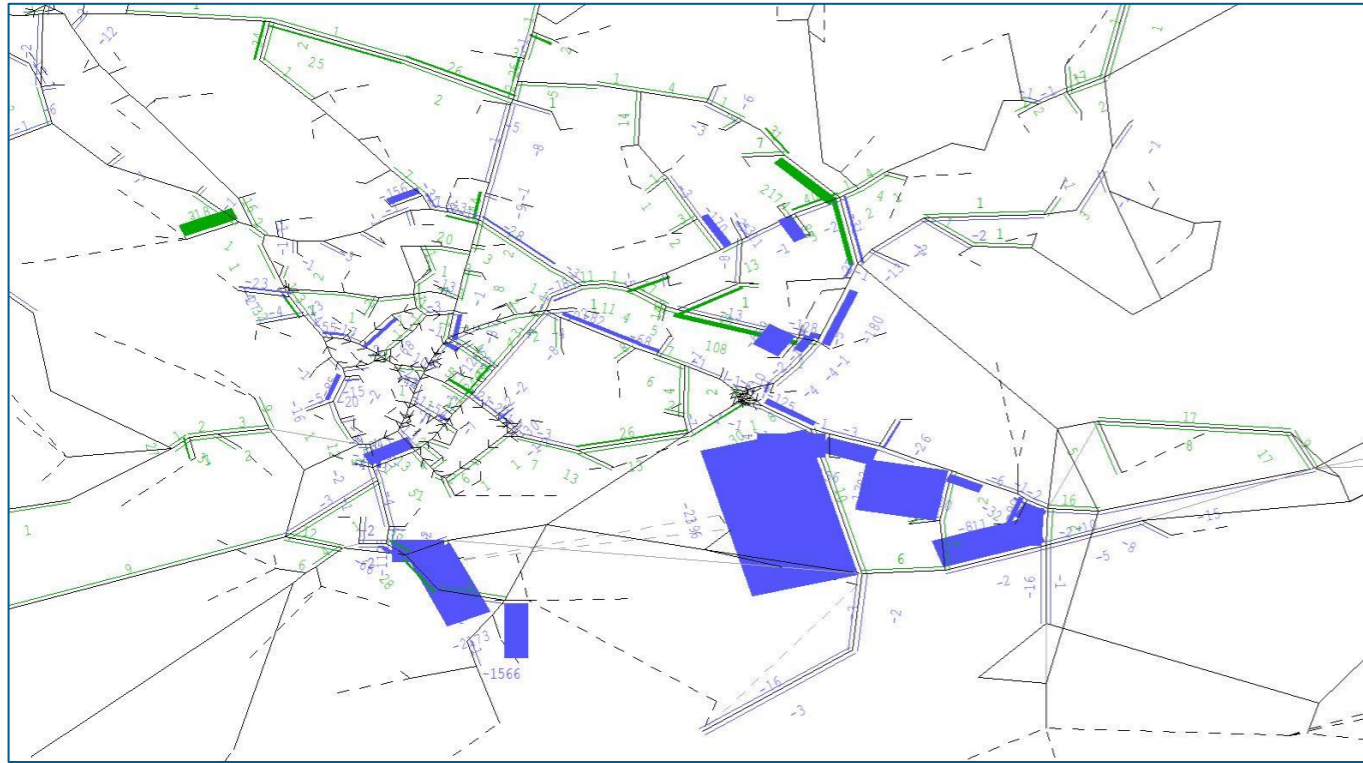
The above flows at select links and flow difference plots show:

- There is a large decrease in traffic along the Four Lane Road (up to 76%). This is due to traffic reassigning onto the proposed TEN-T corridor and the SNP;
- The reassigned traffic causes an increase in flow along the N56 at the Kiltroy Roundabout and on the approach to the Ramelton Road;
- The TEN-T experiences traffic flows of up to 1690 PCUs NB and 1530 PCUs SB;
- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road
- There is traffic rerouting in the town centre meaning the Circular Road and the De Valera Road experience an uplift in traffic;
- The Neil T Blaney Road experiences an increase in traffic in the AM peak WB due to the additional traffic from the SNP.

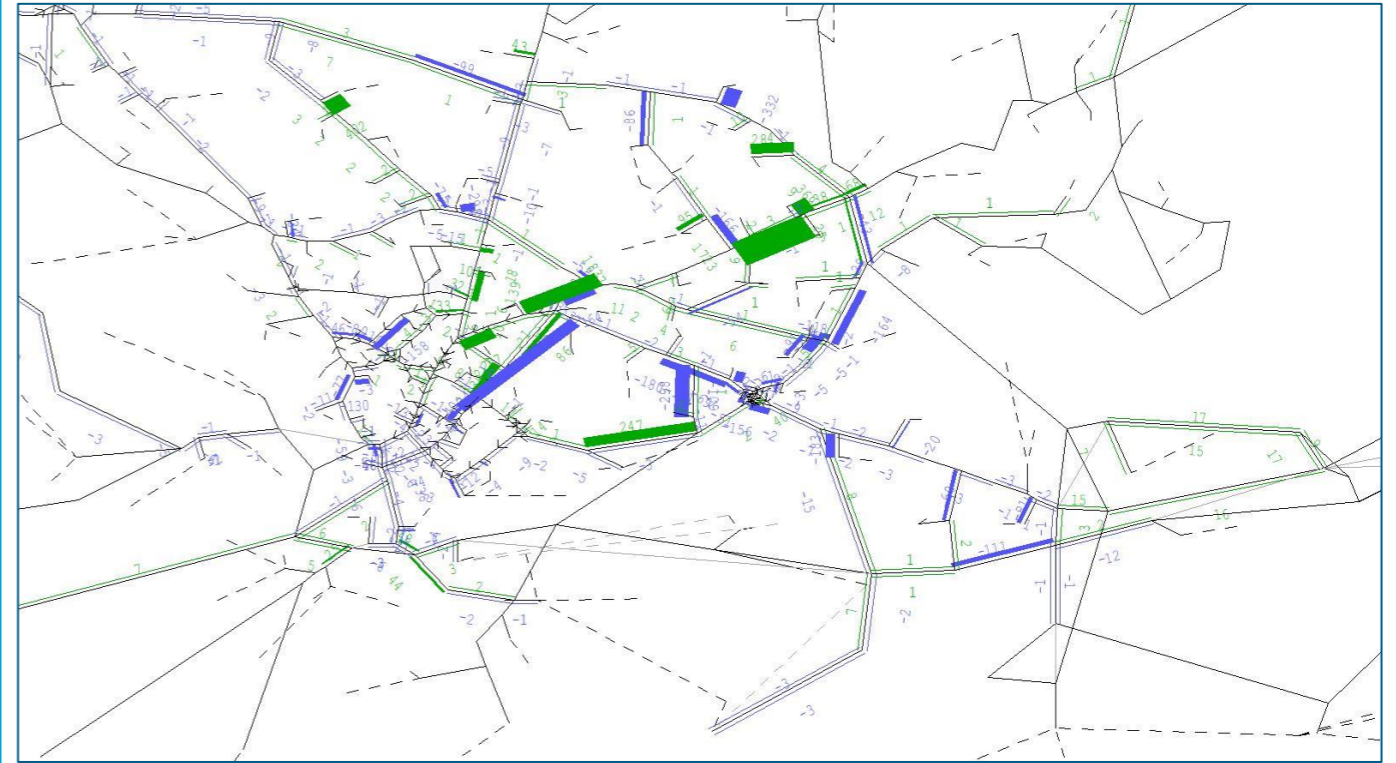
Table 4-30 - TEN-T Flow South of the Ballyraine Rd

	AM	IP	PM
NB	1690	1060	1620
SB	1530	1100	990

AM Delay: 2033 DS – DM



IP Delay: 2033 DS – DM



PM Delay: 2033 DS – DM

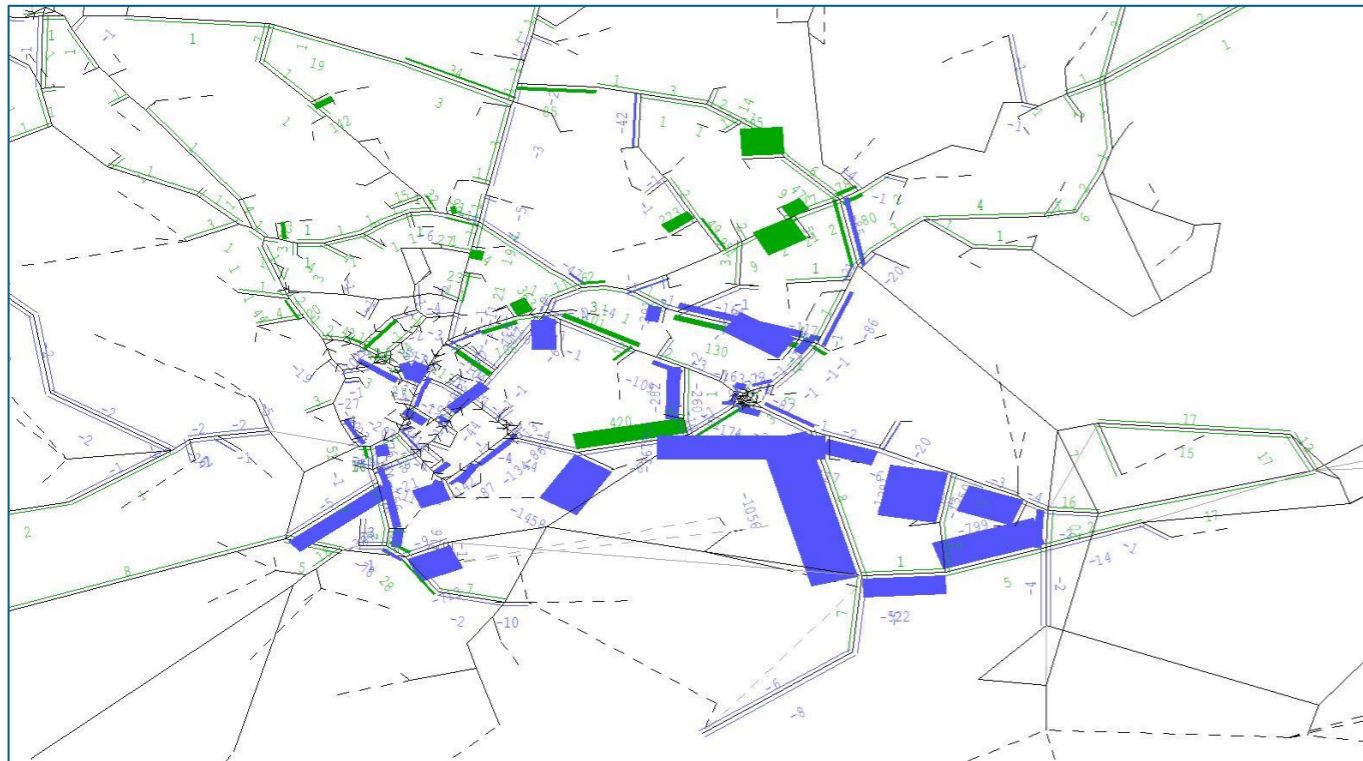


Table 4-31 - 2033 Do Something 3 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	2260	1420	2190	1110	750	1170	-1160	-670	-1020	-51%	-47%	-47%
Route A SB	1210	1030	1290	870	780	1170	-340	-250	-120	-28%	-24%	-9%
Route B EB	1580	1330	1920	930	910	1190	-650	-420	-720	-41%	-31%	-38%
Route B WB	990	1040	1380	780	710	990	-210	-330	-390	-21%	-31%	-28%

While there are journey time savings compared to the Do Minimum, in the majority of cases the forecast DS journey times are still higher than in the 2017 Base Model.

The delay plots and journey times show:

- In general, there are decreases in delay across the network with the journey times decreasing by up to 58%;
- There are some increases in delay at the junctions along the N56 and close to Kiltroy Roundabout. The increases in delay are due to the increased traffic volumes at these locations accessing the TEN-T;
- There are also some increases in delay along the Neil T Blaney Road at Joe Bonnar where traffic from the SNP is accessing the town, however these are minor compared to the delay savings along the Leck Road/SNP.

Table 4-32 - 2033 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	106.49	84.59	94.18	29.98	20.34	50.33	-76.51	-64.25	-43.85	-72%	-76%	-47%
		WB	62.01	64.72	66.26	44.66	28.60	31.68	-17.35	-36.12	-34.58	-28%	-56%	-52%
2	Four Lane Road at Dry Arch Roundabout	EB	66.14	57.95	62.24	27.54	21.12	37.78	-38.60	-36.83	-24.46	-58%	-64%	-39%
		WB	125.65	62.19	82.98	57.81	31.80	19.37	-67.84	-30.39	-63.61	-54%	-49%	-77%
3	Neil T Blaney Road	EB	77.26	58.16	87.24	101.55	113.27	123.46	24.29	55.11	36.22	31%	95%	42%
		WB	27.51	42.53	54.81	64.72	33.63	36.60	37.21	-8.90	-18.21	135%	-21%	-33%
4	Port Road	EB	104.87	75.60	112.82	101.08	62.87	112.83	-3.79	-12.73	0.01	-4%	-17%	0%
		WB	54.61	47.57	46.07	54.56	47.37	45.15	-0.05	-0.20	-0.92	0%	0%	-2%
5	Ballyraine Road	EB	90.09	69.54	108.93	56.61	66.23	75.41	-33.48	-3.31	-33.52	-37%	-5%	-31%
		WB	66.58	53.06	91.27	105.37	66.78	106.90	38.79	13.72	15.63	58%	26%	17%
6	N56	NB	46.17	52.41	42.04	46.52	55.76	45.71	0.35	3.35	3.67	1%	6%	9%
		SB	82.69	79.95	81.01	77.65	73.66	73.86	-5.04	-6.29	-7.15	-6%	-8%	-9%
7	South West of Kilty Roundabout	NB	62.31	53.90	58.20	65.19	71.57	59.75	2.88	17.67	1.55	5%	33%	3%
		SB	48.98	57.80	32.45	41.33	50.61	46.47	-7.65	-7.19	14.02	-16%	-12%	43%
8	Kilmacrennan Road	NB	96.11	92.63	80.67	95.17	73.57	87.54	-0.94	-19.06	6.87	-1%	-21%	9%
		SB	80.89	90.69	85.50	64.68	73.39	80.40	-16.21	-17.30	-5.10	-20%	-19%	-6%
9	Port Road	SB	76.86	90.21	110.13	96.72	89.25	116.01	19.86	-0.96	5.88	26%	-1%	5%
10	High Road	NB	59.69	63.34	57.37	60.92	64.07	59.23	1.23	0.73	1.86	2%	1%	3%
		SB	92.82	136.83	115.66	96.48	144.55	116.80	3.66	7.72	1.14	4%	6%	1%
11	Main Street	SB	108.14	108.28	108.54	107.45	108.28	108.53	-0.69	0.00	-0.01	-1%	0%	0%
12	Paddy Harte Road	SB	77.23	95.94	107.35	85.87	83.13	87.72	8.64	-12.81	-19.63	11%	-13%	-18%
13	Pearse Road	NB	87.11	117.68	78.35	102.60	129.45	76.40	15.49	11.77	-1.95	18%	10%	-2%
		SB	63.31	56.94	72.59	35.67	50.09	64.03	-27.64	-6.85	-8.56	-44%	-12%	-12%
14	Convent Road	NB	107.61	107.88	54.73	102.87	103.59	56.02	-4.74	-4.29	1.29	-4%	-4%	2%
		SB	7.95	9.07	47.56	11.22	6.62	43.21	3.27	-2.45	-4.35	41%	-27%	-9%
15	R250	EB	82.21	28.18	58.65	79.66	23.10	33.81	-2.55	-5.08	-24.84	-3%	-18%	-42%
		WB	41.19	50.62	63.55	57.08	38.85	57.49	15.89	-11.77	-6.06	39%	-23%	-10%
16	Leck Road	EB	118.25	81.22	54.17	107.09	111.16	105.75	-11.16	29.94	51.58	-9%	37%	95%
		WB	7.19	29.07	44.07	28.20	18.83	41.98	21.01	-10.24	-2.09	292%	-35%	-5%
17	R229	EB	102.12	97.14	97.51	100.59	99.69	95.94	-1.53	2.55	-1.57	-1%	3%	-2%
		WB	47.51	33.87	41.11	61.08	40.71	56.41	13.57	6.84	15.30	29%	20%	37%
18	N56	EB	80.40	82.30	82.49	85.70	78.48	84.05	5.30	-3.82	1.56	7%	-5%	2%
		WB	69.82	61.61	80.33	70.29	64.34	84.56	0.47	2.73	4.23	1%	4%	5%
19	N56	NB	40.41	37.42	58.20	45.12	38.94	60.66	4.71	1.52	2.46	12%	4%	4%
		SB	71.09	43.87	53.57	72.56	43.87	54.22	1.47	0.00	0.65	2%	0%	1%

The VoC percentages show that in the DS, the Neil T Blaney Road, Port Road, Ballyraine Road, High Road, Main Street, Pearse Road, Convent Road, Leck Road and the R229 are all over capacity.

4.9. Do Something - Scenario 4

This scenario assesses both the TEN-T and Southern Network Plan schemes with a 10% reduction in 2033 core demand to represent a shift to sustainable modes.

4.9.1. SATURN Simulation Summary Results

4.9.1.1. 2033

Summary Result	Units	2017 Base			2033 DM			2033 DS4			Change from DM		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
OVER-CAPACITY QUEUES	PCU. HRS./HR	37.9	62.9	258.6	2196	1871.2	3276	395.7	922.1	1530.3	-82%	-51%	-53%
TOTAL TRAVEL TIME	PCU. HRS./HR	1205.2	926.4	1498.5	4401.8	3748.7	5458.5	2495.7	2522.1	3624.7	-43%	-33%	-34%
TRAVEL DISTANCE	PCU. KMS./HR	41152.8	31350.4	42027.2	61636.8	51049	59427.8	66857.7	50090.8	64406	8%	-2%	8%
OVERALL AVERAGE SPEED	KPH	34.1	33.8	28	14	13.6	10.9	26.8	19.9	17.8	91%	46%	63%

The above summary results show that with the implementation of the TEN-T and SNP schemes and a 10% reduction in demand:

- There is a decrease in over capacity queues from the DM model showing some improvement however these are still higher than in the base;
- Total travel time decreases compared to the DM model but again is still significantly higher than in the base;
- There is a small increase in travel distance across the network in the AM and PM peaks likely due to traffic rerouting and travelling further to make use of the schemes;
- Average speed increases compared to the DM but is still slower than in the base.

The results of the DS4 forecast modelling show that while there is improvement in the network performance compared to the Do Minimum scenario, it still performs worse than the already struggling base network and further improvements will be needed if the planned demand is to be realised even with the 10% reduction.

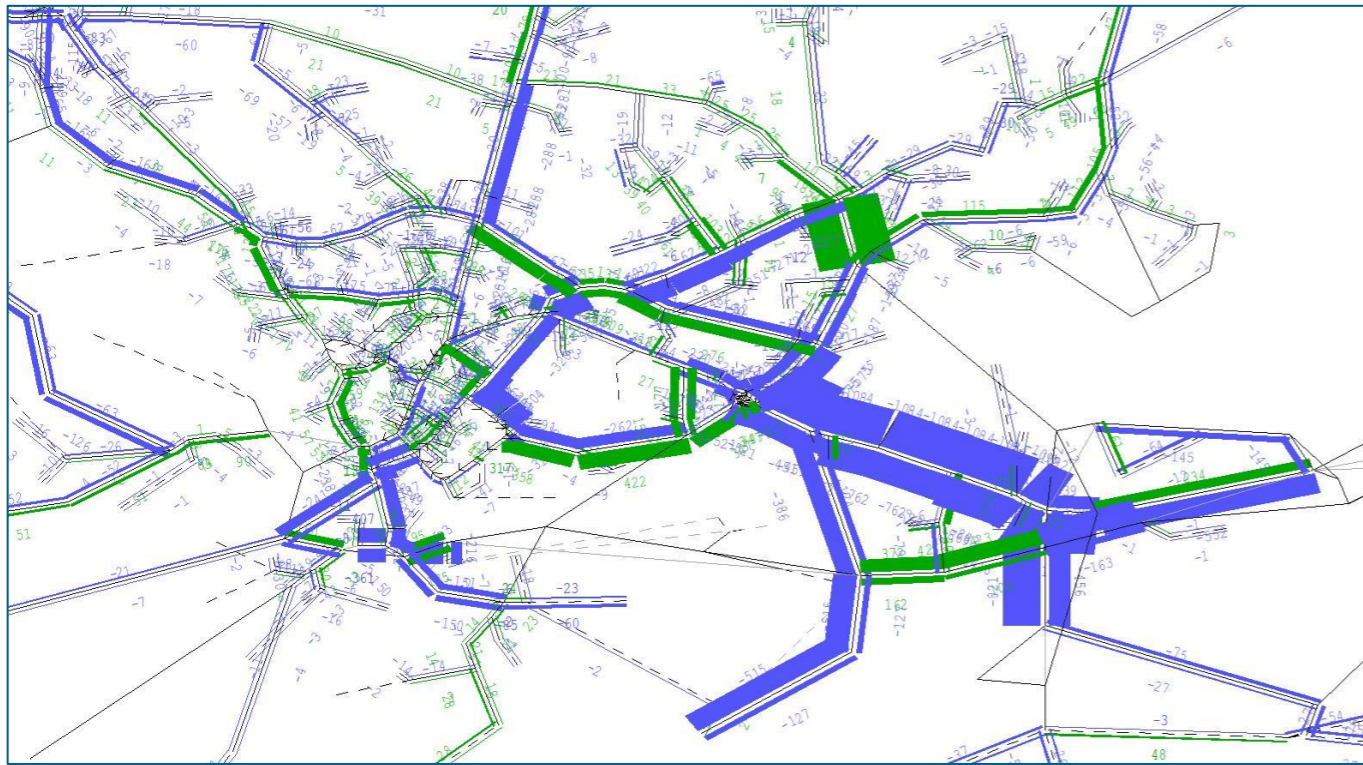
Further details on these results including link flows and delay plots are shown the rest of the section.

4.9.2. 2033

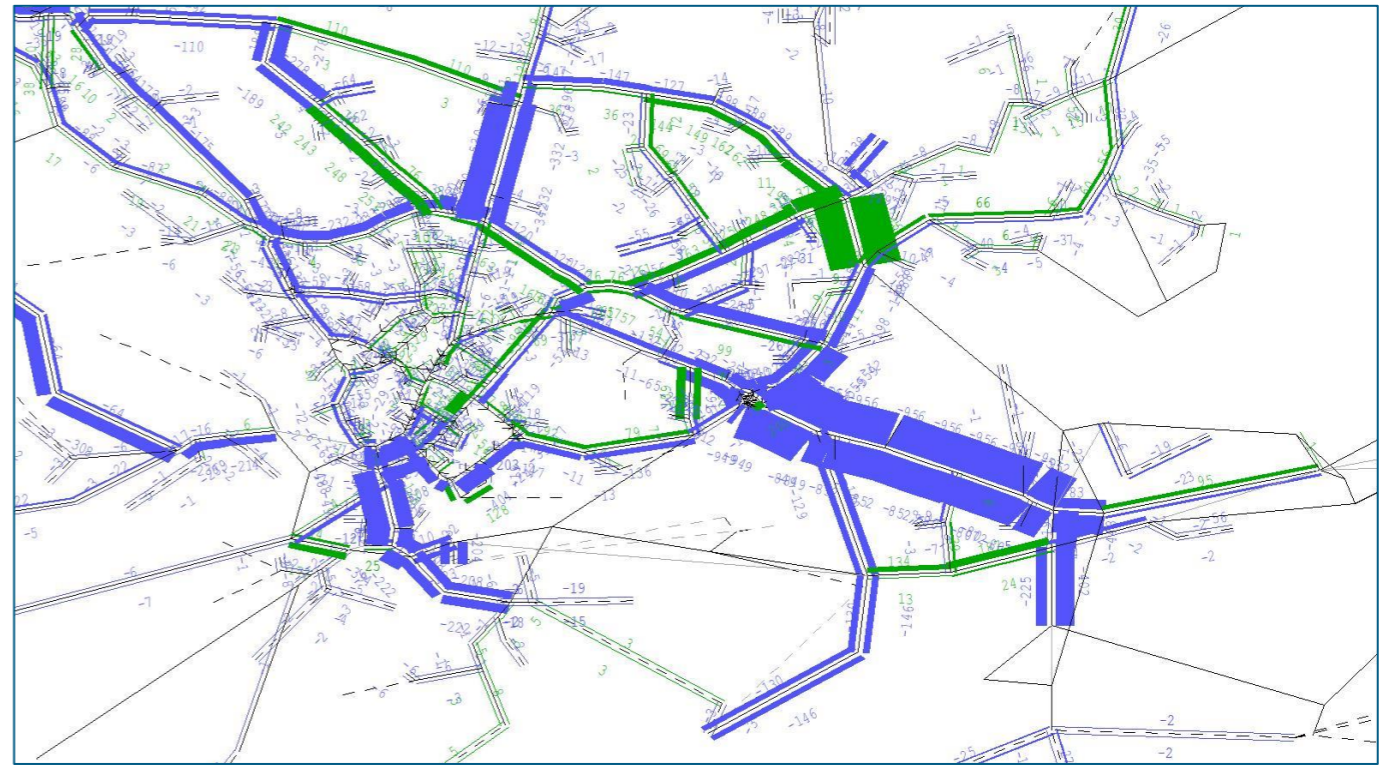
Table 4-33 - 2033 Do Something 4 Key Link Flows

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	1960	1540	1690	630	470	750	-1330	-1070	-940	-68%	-69%	-56%
		WB	1590	1660	1700	1070	710	780	-520	-950	-920	-33%	-57%	-54%
2	Four Lane Road at Dry Arch Roundabout	EB	1640	1420	1540	550	470	680	-1090	-950	-860	-66%	-67%	-56%
		WB	2790	1590	2120	1370	790	490	-1420	-800	-1630	-51%	-50%	-77%
3	Neil T Blaney Road	EB	830	630	840	570	710	470	-260	80	-370	-31%	13%	-44%
		WB	390	600	770	810	460	430	420	-140	-340	108%	-23%	-44%
4	Port Road	EB	510	400	250	460	270	250	-50	-130	0	-10%	-33%	0%
		WB	680	590	580	680	580	560	0	-10	-20	0%	-2%	-3%
5	Ballyraine Road	EB	540	540	590	350	260	570	-190	-280	-20	-35%	-52%	-3%
		WB	480	500	560	760	600	700	280	100	140	58%	20%	25%
6	N56	NB	650	730	590	520	670	670	-130	-60	80	-20%	-8%	14%
		SB	1180	1010	1160	990	820	990	-190	-190	-170	-16%	-19%	-15%
7	South West of Kiltroy Roundabout	NB	780	670	730	840	920	770	60	250	40	8%	37%	5%
		SB	690	810	430	410	590	600	-280	-220	170	-41%	-27%	40%
8	Kilmacrennan Road	NB	1540	1480	1290	1520	950	1280	-20	-530	-10	-1%	-36%	-1%
		SB	1380	1520	1470	1090	1190	1340	-290	-330	-130	-21%	-22%	-9%
9	Port Road	SB	560	620	720	530	650	740	-30	30	20	-5%	5%	3%
10	High Road	NB	750	790	720	710	720	720	-40	-70	0	-5%	-9%	0%
		SB	660	190	210	640	190	540	-20	0	330	-3%	0%	157%
11	Main Street	SB	240	40	30	250	50	30	10	10	0	4%	25%	0%
12	Paddy Harte Road	SB	1080	1340	1500	1080	1100	1210	0	-240	-290	0%	-18%	-19%
13	Pearse Road	NB	930	210	840	1070	290	850	140	80	10	15%	38%	1%
		SB	890	800	1020	480	680	770	-410	-120	-250	-46%	-15%	-25%
14	Convent Road	NB	810	790	770	840	710	790	30	-80	20	4%	-10%	3%
		SB	40	130	670	180	100	540	140	-30	-130	350%	-23%	-19%
15	R250	EB	1150	390	820	1040	350	500	-110	-40	-320	-10%	-10%	-39%
		WB	580	710	890	670	490	730	90	-220	-160	16%	-31%	-18%
16	Leck Road	EB	350	310	190	470	330	500	120	20	310	34%	6%	163%
		WB	60	260	400	390	250	580	330	-10	180	550%	-4%	45%
17	R229	EB	1630	1550	1560	1530	1430	1470	-100	-120	-90	-6%	-8%	-6%
		WB	840	610	750	1130	780	970	290	170	220	35%	28%	29%
18	N56	EB	1130	1150	1120	1150	1010	1160	20	-140	40	2%	-12%	4%
		WB	1260	1110	1450	1260	1140	1510	0	30	60	0%	3%	4%
19	N56	NB	650	600	930	680	600	990	30	0	60	5%	0%	6%
		SB	1140	700	860	1040	650	750	-100	-50	-110	-9%	-7%	-13%

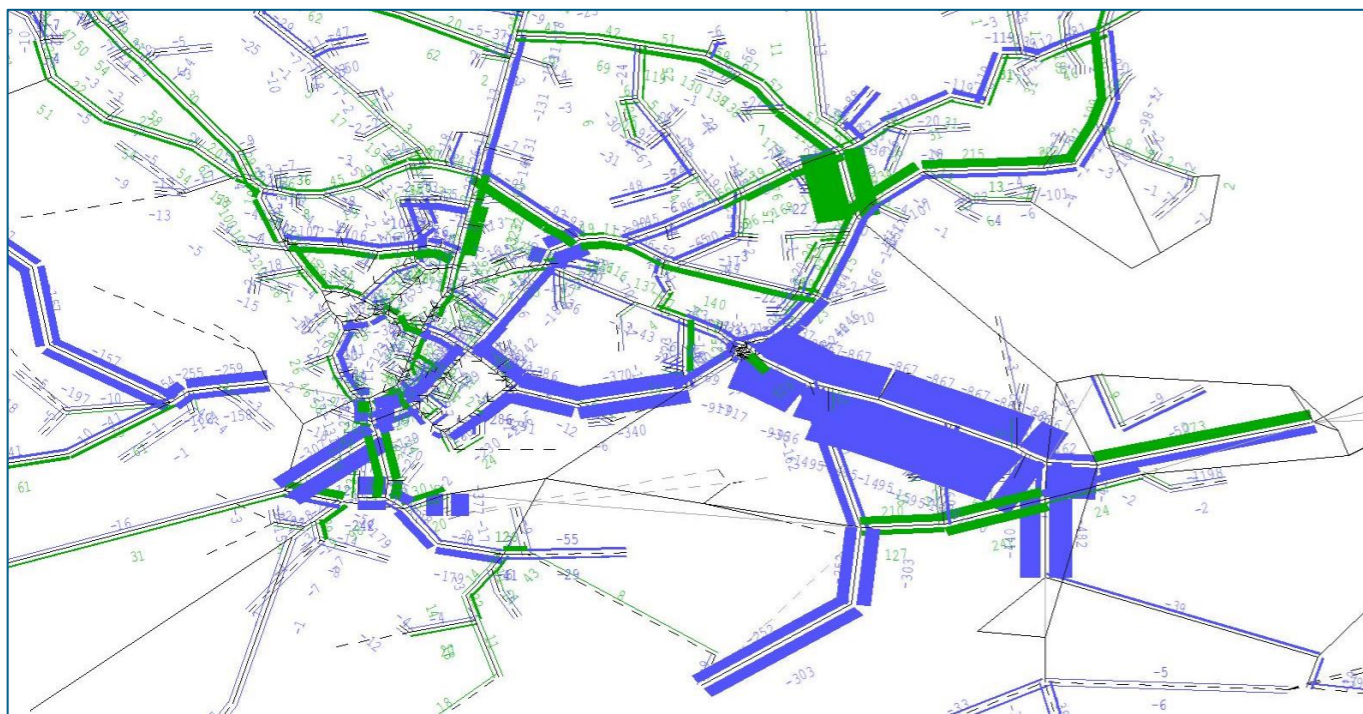
AM Actual Flow: 2033 DS – DM



IP Actual Flow: 2033 DS – DM



PM Actual Flow: 2033 DS – DM



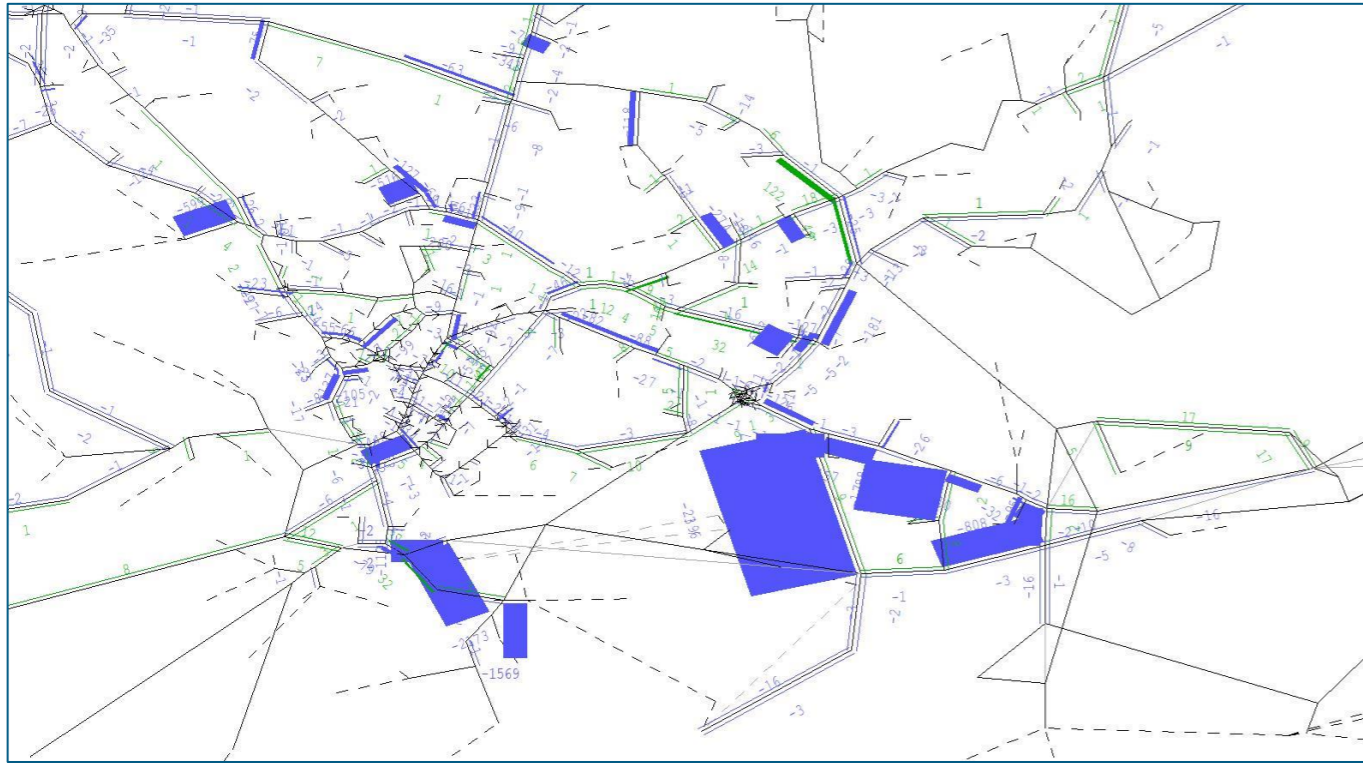
The above flows at select links and flow difference plots show:

- There is a large decrease in traffic along the Four Lane Road (up to 77%). This is due to traffic reassigning onto the proposed TEN-T corridor and the SNP;
- The reassigned traffic causes an increase in flow along the N56 at the Kilty Roundabout and on the approach to the Ramelton Road;
- The TEN-T experiences traffic flows of up to 1590 PCUs NB and 1450 PCUs SB;
- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road
- There is traffic rerouting in the town centre meaning the Circular Road and the De Valera Road experience an uplift in traffic;
- The Neil T Blaney Road experiences an increase in traffic in the AM peak WB due to the additional traffic from the SNP.

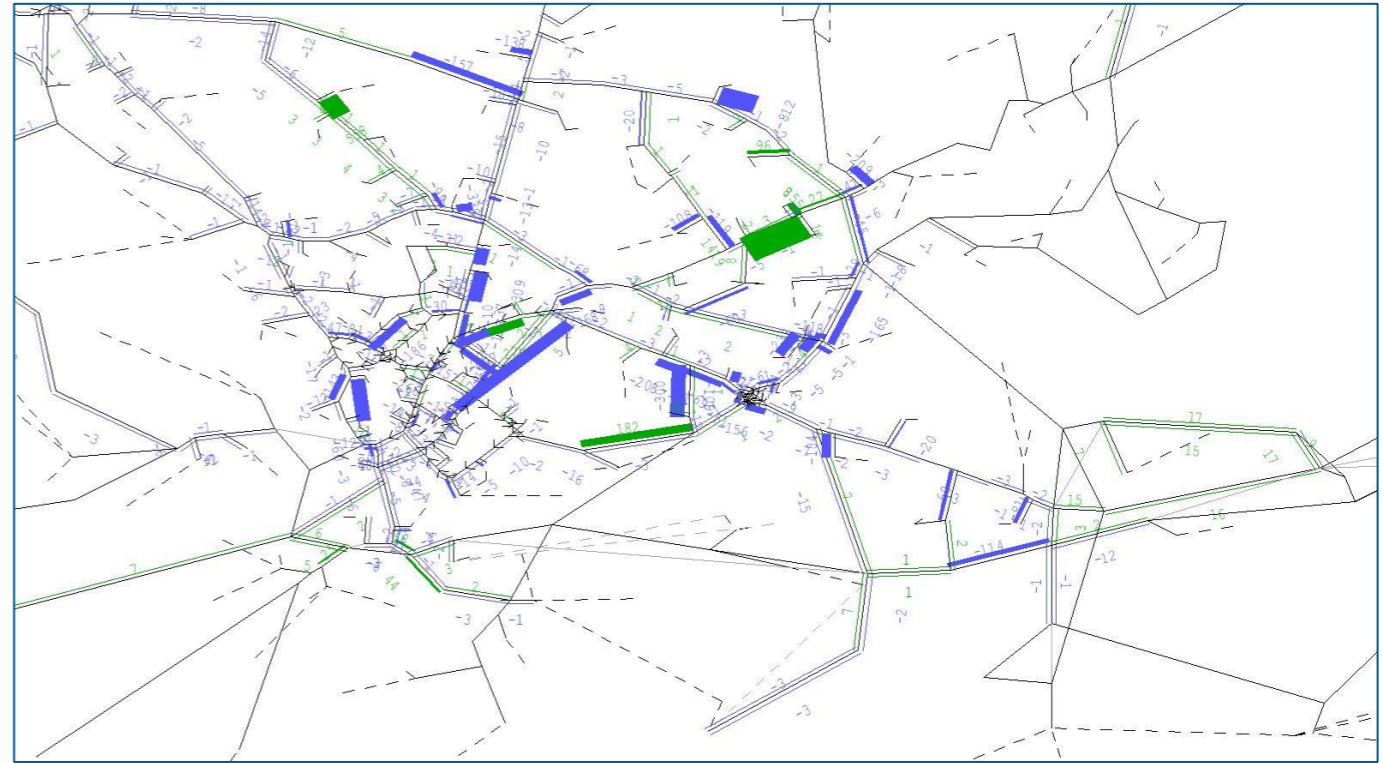
Table 4-34 - TEN-T Flow South of the Ballyraine Rd

	AM	IP	PM
NB	1590	930	1420
SB	1450	1040	980

AM Delay: 2033 DS – DM



IP Delay: 2033 DS – DM



PM Delay: 2033 DS – DM

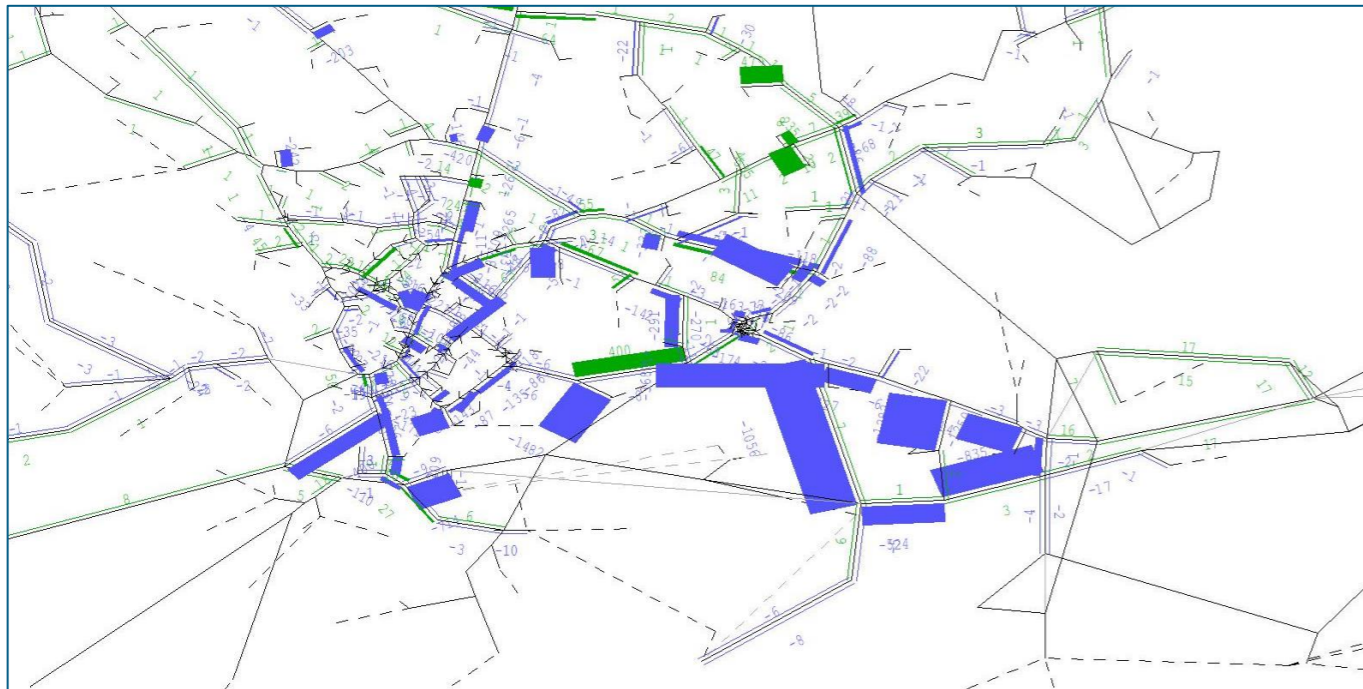


Table 4-35 - 2033 Do Something 4 Journey Times (Seconds)

Route	DM			DS			Difference			Percentage Difference		
	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
Route A NB	2260	1420	2190	930	700	1060	-1330	-710	-1130	-59%	-50%	-51%
Route A SB	1210	1030	1290	800	750	1120	-410	-290	-170	-34%	-28%	-13%
Route B EB	1580	1330	1920	750	820	1100	-830	-510	-820	-52%	-38%	-43%
Route B WB	990	1040	1380	710	660	870	-280	-380	-510	-28%	-36%	-37%

While there are journey time savings compared to the Do Minimum, in the majority of cases the forecast DS journey times are still higher than in the 2017 Base Model.

The delay plots show:

- In general, there are decreases in delay across the network with the journey times decreasing by up to 59%;
- There are some increases in delay at the junctions along the N56 and close to Kiltroy Roundabout. The increases in delay are due to the increased traffic volumes at these locations accessing the TEN-T;
- There are also some increases in delay along the Neil T Blaney Road at Joe Bonnar where traffic from the SNP is accessing the town, however these are minor compared to the delay savings along the Leck Road/SNP.

Table 4-36 - 2033 Do Something Key Link VoC

ID	Location	Direction	DM			DS			Difference			Percentage Difference		
			AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
1	Four Lane Road at Polestar Roundabout	EB	106.49	84.59	94.18	26.65	19.23	40.13	-79.84	-65.36	-54.05	-75%	-77%	-57%
		WB	62.01	64.72	66.26	41.67	27.64	30.43	-20.34	-37.08	-35.83	-33%	-57%	-54%
2	Four Lane Road at Dry Arch Roundabout	EB	66.14	57.95	62.24	25.64	20.23	30.01	-40.50	-37.72	-32.23	-61%	-65%	-52%
		WB	125.65	62.19	82.98	53.70	30.89	19.32	-71.95	-31.30	-63.66	-57%	-50%	-77%
3	Neil T Blaney Road	EB	77.26	58.16	87.24	85.11	109.68	122.48	7.85	51.52	35.24	10%	89%	40%
		WB	27.51	42.53	54.81	57.63	32.79	30.49	30.12	-9.74	-24.32	109%	-23%	-44%
4	Port Road	EB	104.87	75.60	112.82	95.77	50.70	112.82	-9.10	-24.90	0.00	-9%	-33%	0%
		WB	54.61	47.57	46.07	54.63	46.73	45.05	0.02	-0.84	-1.02	0%	-2%	-2%
5	Ballyraine Road	EB	90.09	69.54	108.93	45.39	52.95	70.50	-44.70	-16.59	-38.43	-50%	-24%	-35%
		WB	66.58	53.06	91.27	101.18	57.01	104.40	34.60	3.95	13.13	52%	7%	14%
6	N56	NB	46.17	52.41	42.04	37.10	48.08	47.94	-9.07	-4.33	5.90	-20%	-8%	14%
		SB	82.69	79.95	81.01	70.25	64.81	69.48	-12.44	-15.14	-11.53	-15%	-19%	-14%
7	South West of Kiltroy Roundabout	NB	62.31	53.90	58.20	66.80	73.71	61.28	4.49	19.81	3.08	7%	37%	5%
		SB	48.98	57.80	32.45	38.91	48.23	45.41	-10.07	-9.57	12.96	-21%	-17%	40%
8	Kilmacrennan Road	NB	96.11	92.63	80.67	94.84	59.49	79.86	-1.27	-33.14	-0.81	-1%	-36%	-1%
		SB	80.89	90.69	85.50	63.97	64.28	77.72	-16.92	-26.41	-7.78	-21%	-29%	-9%
9	Port Road	SB	76.86	90.21	110.13	68.41	112.36	113.78	-8.45	22.15	3.65	-11%	25%	3%
10	High Road	NB	59.69	63.34	57.37	56.44	57.77	57.75	-3.25	-5.57	0.38	-5%	-9%	1%
		SB	92.82	136.83	115.66	93.25	119.66	94.21	0.43	-17.17	-21.45	0%	-13%	-19%
11	Main Street	SB	108.14	108.28	108.54	104.88	108.17	108.44	-3.26	-0.11	-0.10	-3%	0%	0%
12	Paddy Harte Road	SB	77.23	95.94	107.35	77.26	78.62	86.21	0.03	-17.32	-21.14	0%	-18%	-20%
13	Pearse Road	NB	87.11	117.68	78.35	102.13	111.91	78.55	15.02	-5.77	0.20	17%	-5%	0%
		SB	63.31	56.94	72.59	39.87	48.43	58.18	-23.44	-8.51	-14.41	-37%	-15%	-20%
14	Convent Road	NB	107.61	107.88	54.73	59.65	50.69	56.09	-47.96	-57.19	1.36	-45%	-53%	2%
		SB	7.95	9.07	47.56	16.68	7.03	38.76	8.73	-2.04	-8.80	110%	-22%	-19%
15	R250	EB	82.21	28.18	58.65	74.39	25.35	35.64	-7.82	-2.83	-23.01	-10%	-10%	-39%
		WB	41.19	50.62	63.55	47.64	35.31	52.28	6.45	-15.31	-11.27	16%	-30%	-18%
16	Leck Road	EB	118.25	81.22	54.17	101.73	105.98	104.35	-16.52	24.76	50.18	-14%	30%	93%
		WB	7.19	29.07	44.07	25.84	16.39	38.70	18.65	-12.68	-5.37	259%	-44%	-12%
17	R229	EB	102.12	97.14	97.51	95.79	89.62	91.69	-6.33	-7.52	-5.82	-6%	-8%	-6%
		WB	47.51	33.87	41.11	59.27	40.39	53.68	11.76	6.52	12.57	25%	19%	31%
18	N56	EB	80.40	82.30	82.49	81.91	71.79	82.67	1.51	-10.51	0.18	2%	-13%	0%
		WB	69.82	61.61	80.33	69.80	63.61	84.13	-0.02	2.00	3.80	0%	3%	5%
19	N56	NB	40.41	37.42	58.20	42.76	37.80	61.95	2.35	0.38	3.75	6%	1%	6%
		SB	71.09	43.87	53.57	64.93	40.67	47.15	-6.16	-3.20	-6.42	-9%	-7%	-12%

The VoC percentages show that in the DS, the Neil T Blaney Road, Port Road, Ballyraine Road, High Road, Main Street, Pearse Road and the Leck Road are all over capacity.

5. 2033 Model Interrogation

5.1. Introduction

The previous section sets out a review of the model outputs for each forecast year. This has shown that when the forecast demand resulting from the Land Use plan is added into the model, the network performs worse than in the base. The journey times are still slower than in the base model and there are a number of links where the VoC is over 100%, i.e. the roads in these locations are over capacity.

When the Do Something schemes (TEN-T and SNP) are tested in the DS1-4 scenarios, there are some improvements in the network performance, however, the journey times are slower than in the base and there are still a number of links that are over capacity. This section sets out some further model interrogations to consider network Journey Times and to help understand the potential cause of these over-capacity links.

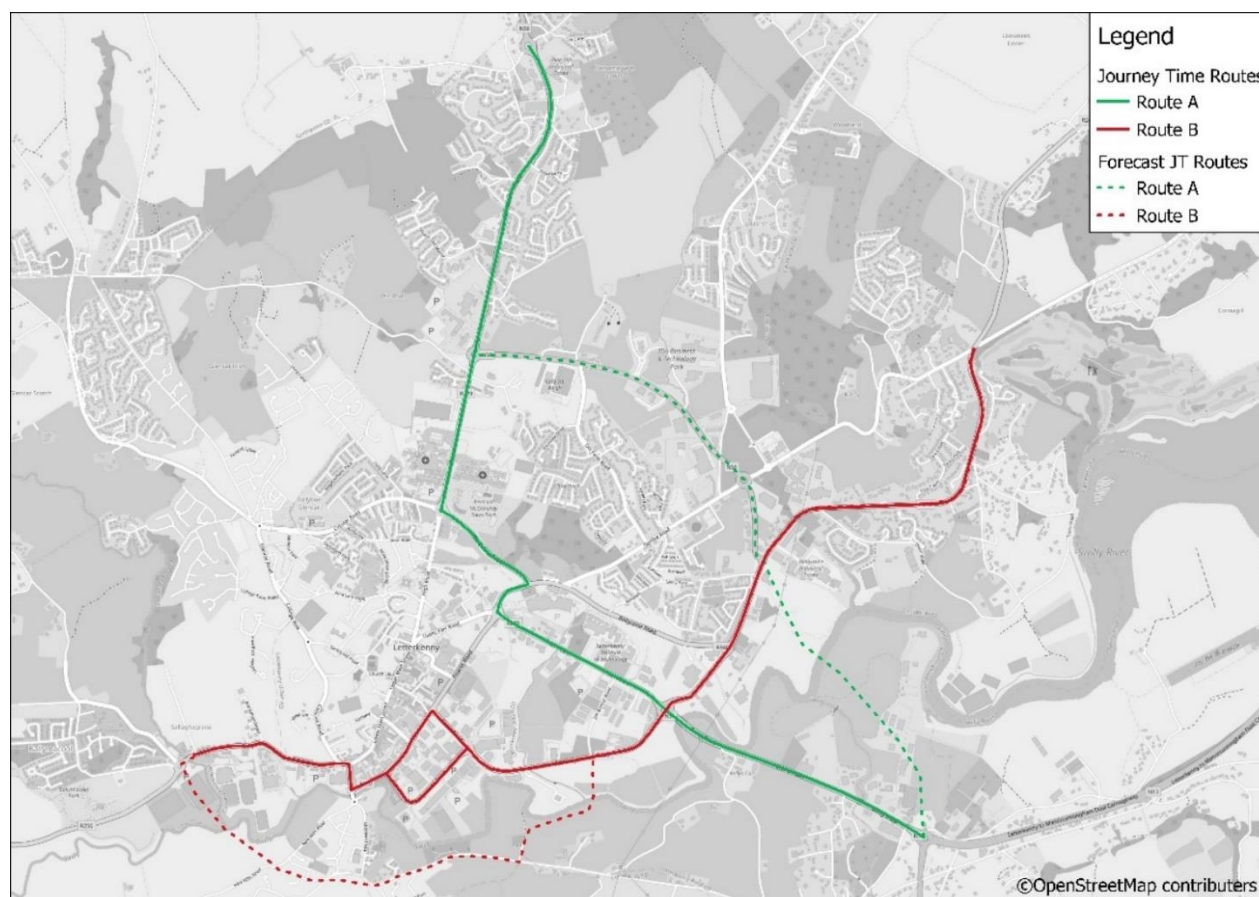
This analysis has been completed for the 2033 DS4 Scenario and compares:

- The 2017 base model;
- The 2033 DM model which includes all of the plan demand
- The 2033 DS4 model which includes both the TEN-T and SNP schemes and has a 10% reduction in car demand.

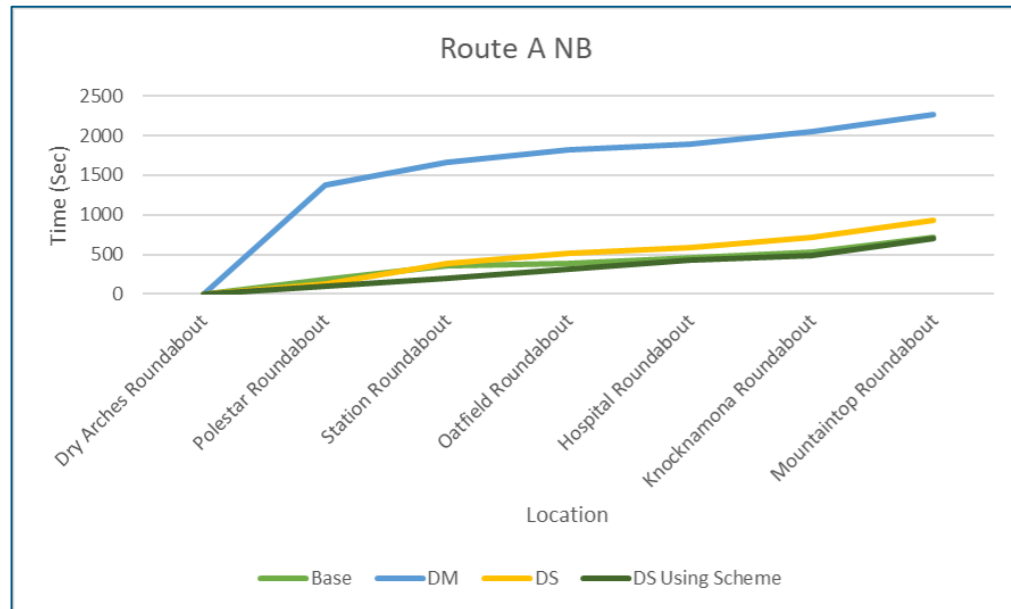
5.2. Journey Time Comparison

This section compares the journey time routes shown in Figure 4-2 in the Base, DM and 2033 DS4 scenarios. It also compares the journey times if the TEN-T and SNP schemes are used. These additional routes are shown in Figure 5-1.

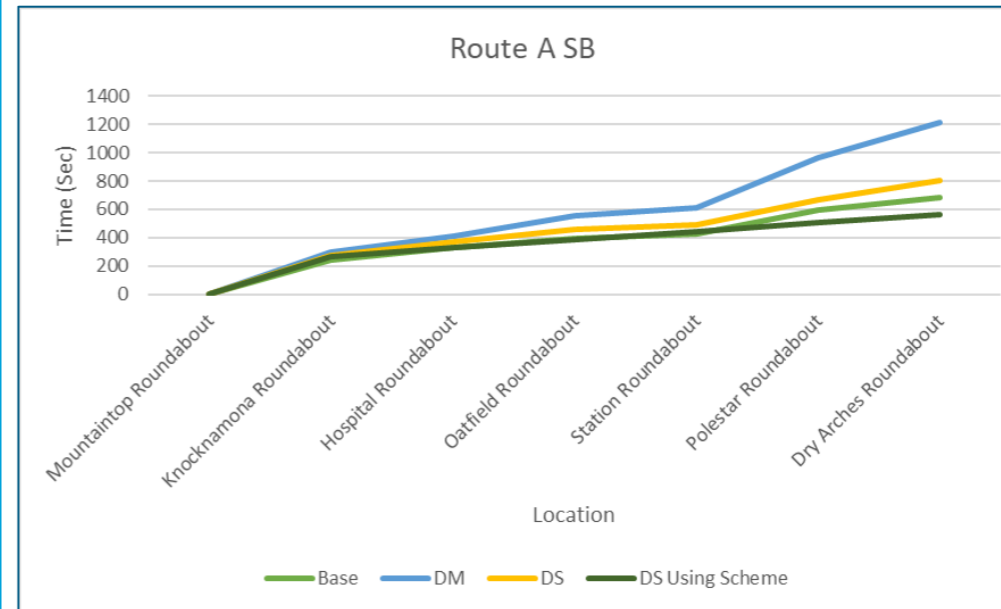
Figure 5-1 - Journey Tim Routes - Using TEN-T and SNP



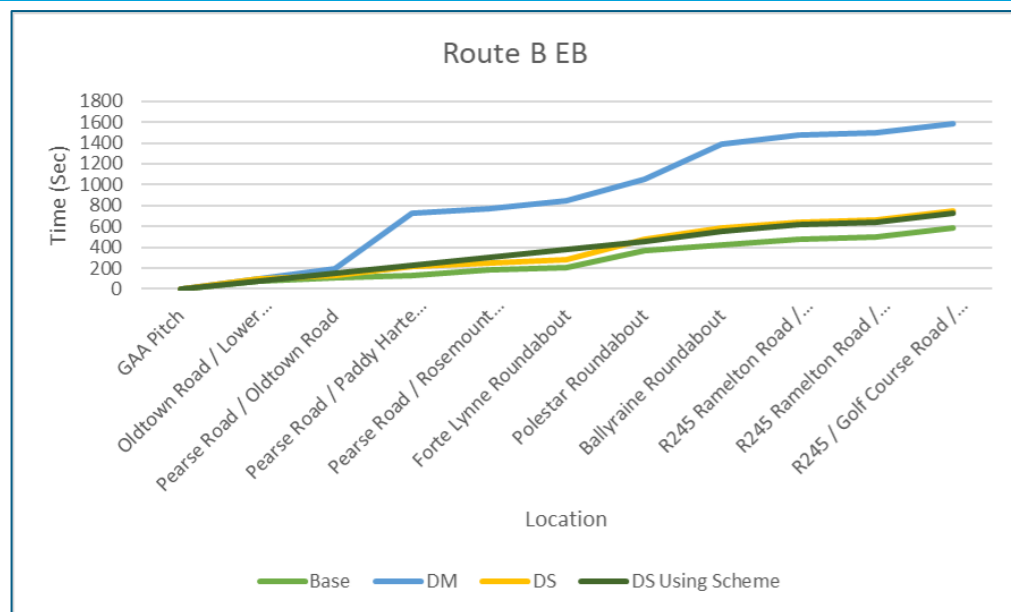
5.2.1. AM Peak



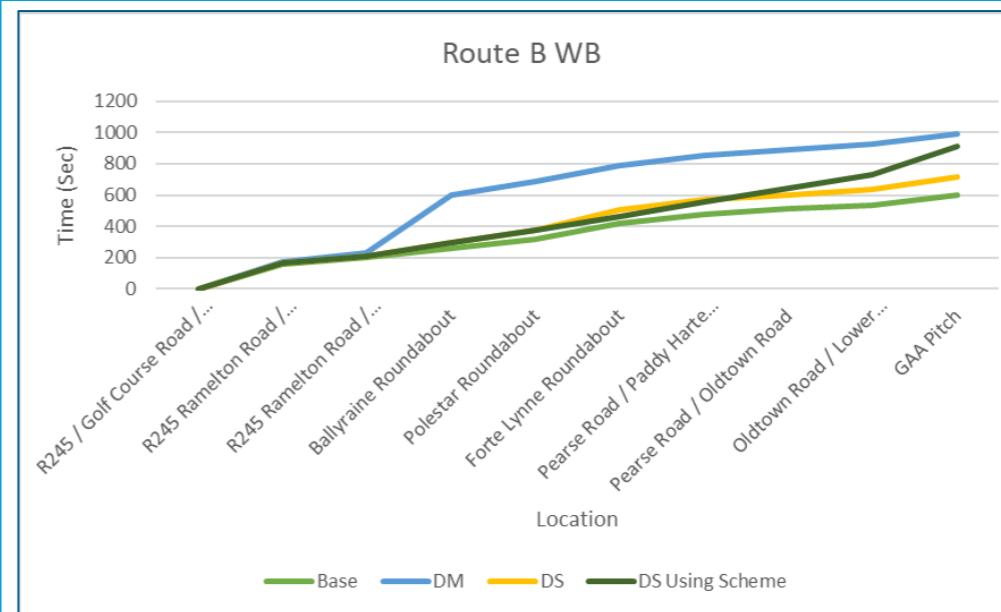
- Between the Base and the DM, the additional demand is causing significant increases to the journey time, particularly between the Dry Arches Roundabout and the Polestar Roundabout;
- In the Do Something, when using the TEN-T scheme, the journey time is comparable to the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area.



- Between the Base and the DM, the additional demand is causing significant increases to the journey time, particularly between the Station Roundabout and the Dry Arches Roundabout;
- In the Do Something, when using the TEN-T scheme, the journey time is quicker than the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area.



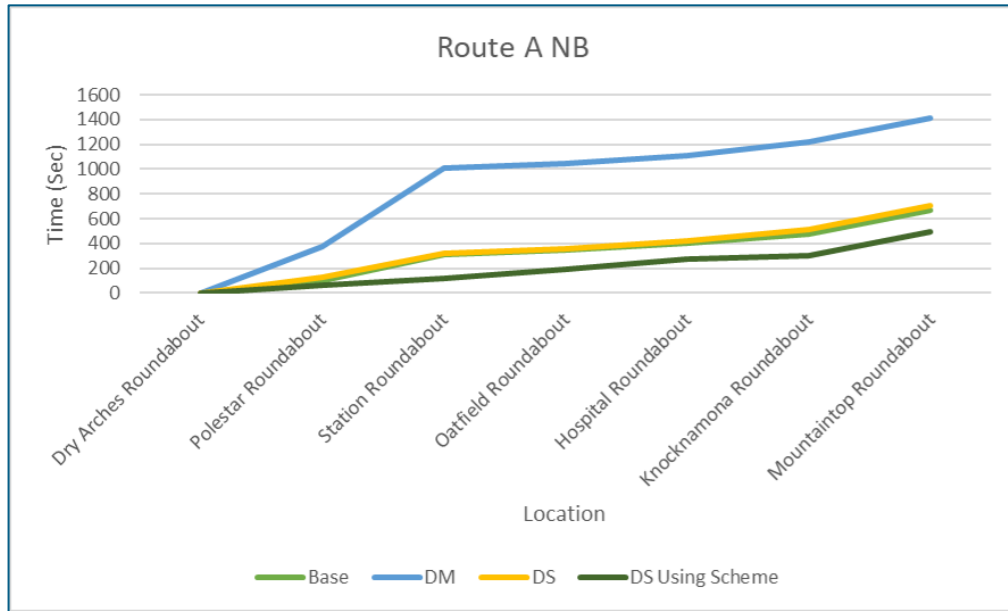
- Between the Base and the DM, the additional demand is causing significant increases to the journey time travelling eastbound across Letterkenny;
- In the Do Something, when using the SNP scheme, the journey time is much quicker compared with the DM but still slower than in the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area.



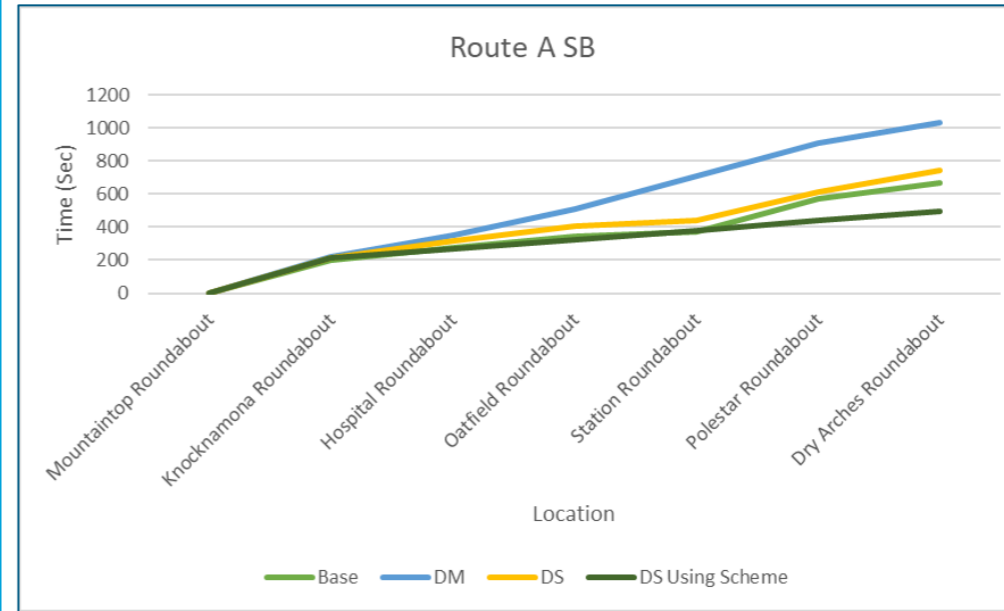
- Between the Base and the DM, the additional demand is causing significant increases to the journey time travelling westbound across Letterkenny;
- In the Do Something, when using the SNP scheme, the journey time is slightly quicker compared with the DM but still significantly slower than in the base;
- The DS also has the added benefit of reduced travel time along the existing route meaning it is actually quicker than using the SNP scheme due to the reduced traffic in the area.

These graphs show that the DS schemes are required to provide Letterkenny with efficient routes across the town to cater for the additional demand. In the case of the SNP, further refinement of the scheme is required to ensure it is effectively catering for the additional demand in the area.

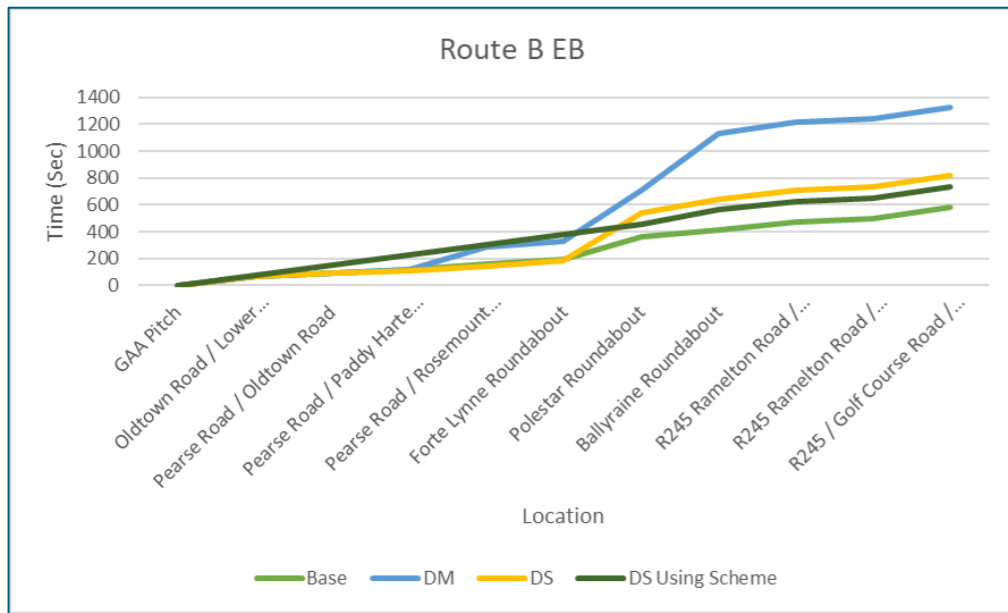
5.2.2. Inter Peak



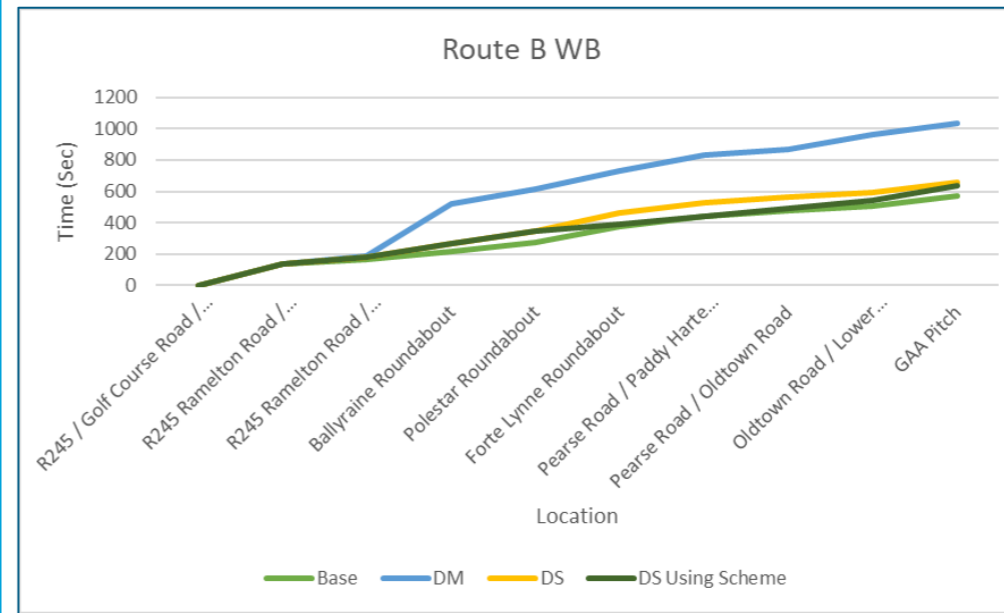
- Between the Base and the DM, the additional demand is causing significant increases to the journey time, particularly between the Dry Arches Roundabout and the Station Roundabout;
- In the Do Something, when using the TEN-T scheme, the journey time is quicker than in the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area making it comparable to the base travel time.



- Between the Base and the DM, the additional demand is causing significant increases to the journey time along the route;
- In the Do Something, when using the TEN-T scheme, the journey time is quicker than the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area.



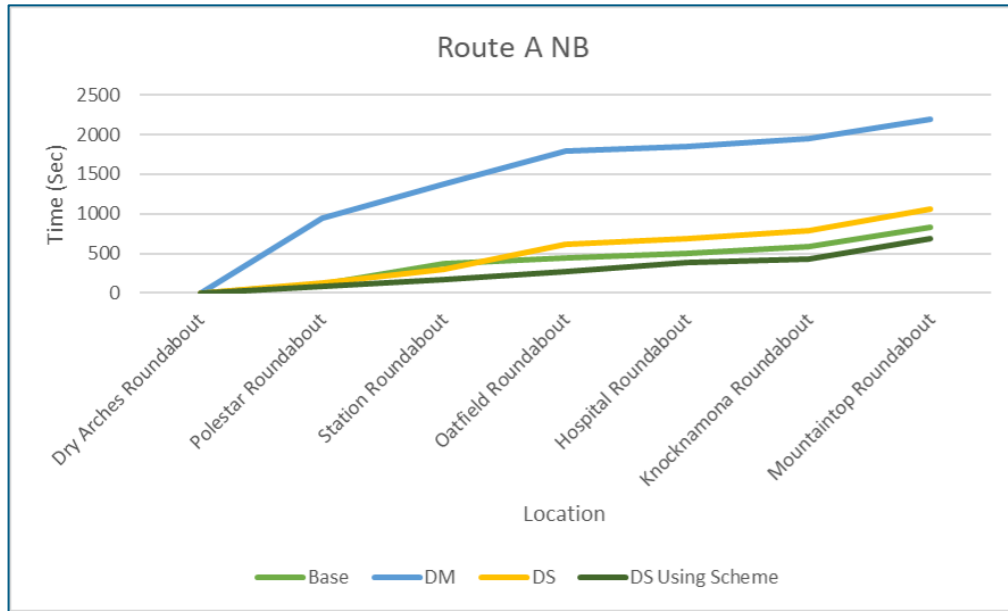
- Between the Base and the DM, the additional demand is causing significant increases to the journey time travelling eastbound across Letterkenny particularly noticeable at the Polestar and Ballyraine Roundabouts;
- In the Do Something, when using the SNP scheme, the journey time is much quicker compared with the DM but still slower than in the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area, however this is still slower than in the base.



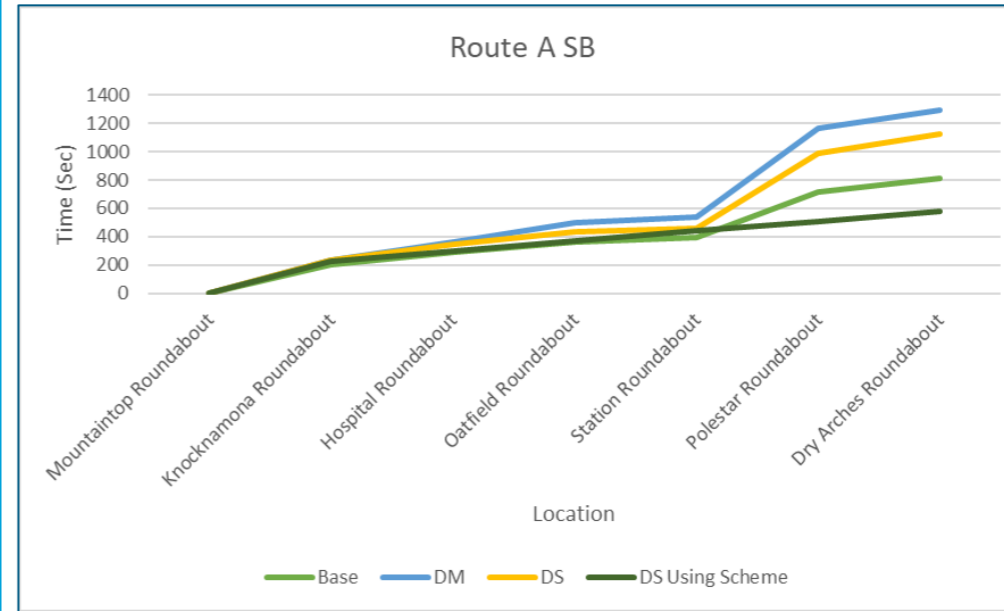
- Between the Base and the DM, the additional demand is causing significant increases to the journey time travelling westbound across Letterkenny;
- In the Do Something, when using the SNP scheme, the journey time is slightly quicker compared with the DM and only slightly slower than in the base;
- The DS also has the added benefit of reduced travel time along the existing route meaning it is comparable to using the SNP scheme due to the reduced traffic in the area.

Like in the AM peak, these graphs show that the DS schemes are required to provide Letterkenny with efficient routes across the town to cater for the additional demand. In the case of the SNP, further refinement of the scheme is required to ensure it is effectively catering for the additional demand in the area.

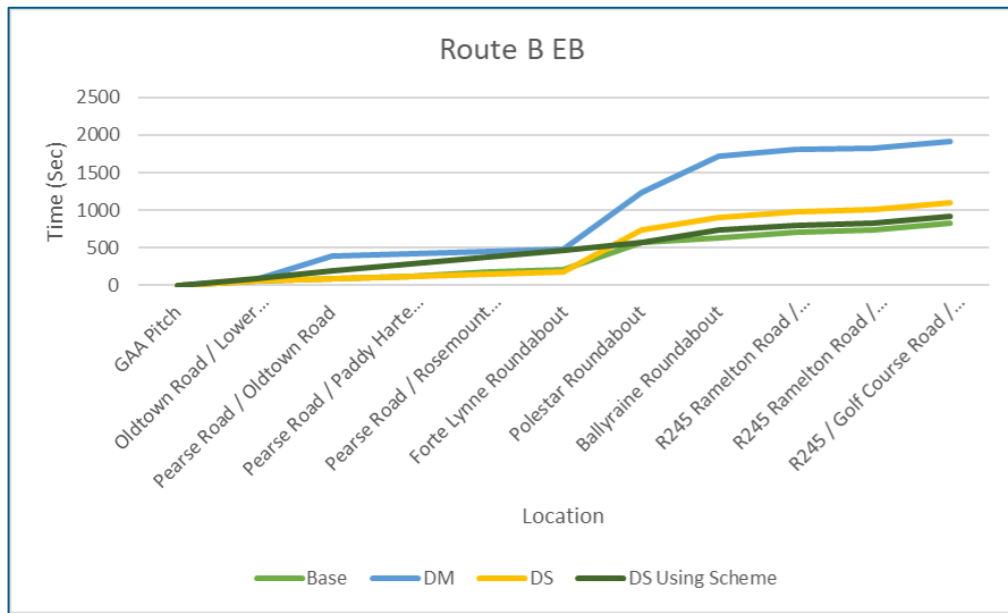
5.2.3. PM Peak



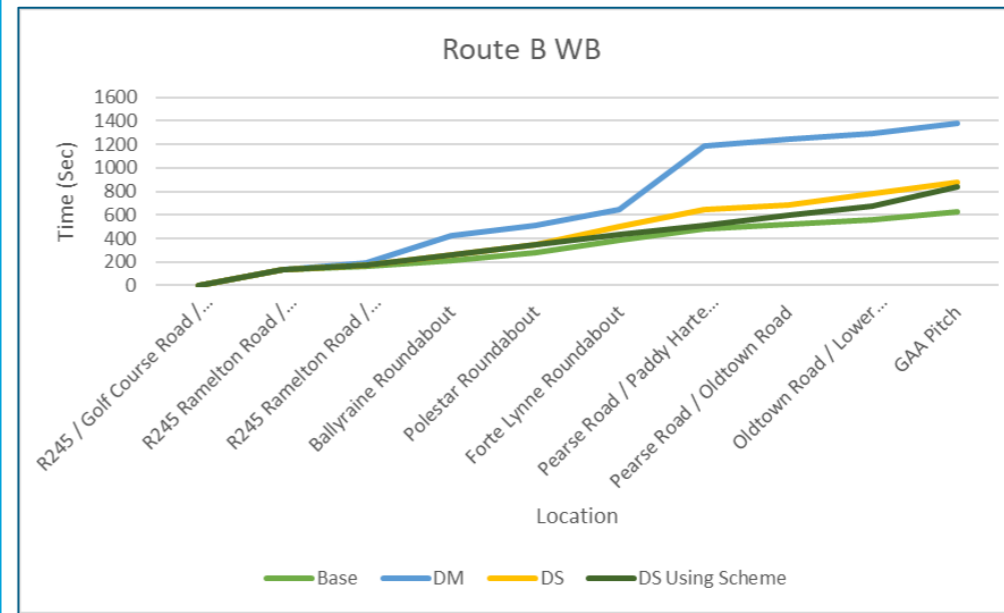
- Between the Base and the DM, the additional demand is causing significant increases to the journey time, particularly between the Dry Arches Roundabout and the Station Roundabout;
- In the Do Something, when using the TEN-T scheme, the journey time is quicker than in the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area making it comparable to the base travel time.



- Between the Base and the DM, the additional demand is causing significant increases to the journey time along the route;
- In the Do Something, when using the TEN-T scheme, the journey time is quicker than the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area however this journey time is still significantly higher than in the base.



- Between the Base and the DM, the additional demand is causing significant increases to the journey time travelling eastbound across Letterkenny particularly noticeable at the Polestar and Ballyraine Roundabouts;
- In the Do Something, when using the SNP scheme, the journey time is much quicker compared with the DM but still slightly slower than in the base;
- The DS also has the added benefit of reduced travel time along the existing route compared with the DM due to the reduced traffic in the area, however this is still slower than in the base.



- Between the Base and the DM, the additional demand is causing significant increases to the journey time travelling westbound across Letterkenny;
- In the Do Something, when using the SNP scheme, the journey time is quicker compared with the DM and only slightly slower than in the base;
- The DS also has the added benefit of reduced travel time along the existing route meaning it is comparable to using the SNP scheme due to the reduced traffic in the area.

Like in the AM and Interpeaks, these graphs show that the DS schemes are required to provide Letterkenny with efficient routes across the town to cater for the additional demand. In the case of the SNP, further refinement of the scheme is required to ensure it is effectively catering for the additional demand in the area.

5.3. 2033 VoC Summary

A summary of the VoC percentages along key links for 2033 is set out in Table 5-1.

Table 5-1 - 2033 Key Link VoC

ID	Location	Direction	AM Peak					Inter Peak					PM Peak							
			Base 17	DM	DS1	DS2	DS3	DS4	Base 17	DM	DS1	DS2	DS3	DS4	Base 17	DM	DS1	DS2	DS3	DS4
1	Four Lane Road at Polestar Roundabout	EB	50.40	106.49	52.10	93.59	29.98	26.65	51.36	84.59	37.78	72.40	20.34	19.23	49.60	94.18	49.85	67.35	50.33	40.13
		WB	74.27	62.01	58.06	62.05	44.66	41.67	43.28	64.72	27.86	55.17	28.60	27.64	59.50	66.26	35.01	64.23	31.68	30.43
2	Four Lane Road at Dry Arch Roundabout	EB	47.24	66.14	34.86	64.99	27.54	25.64	50.68	57.95	29.08	53.36	21.12	20.23	56.49	62.24	36.38	55.89	37.78	30.01
		WB	70.11	125.65	65.54	84.19	57.81	53.70	41.59	62.19	29.20	56.76	31.80	30.89	54.80	82.98	48.70	62.00	19.37	19.32
3	Neil T Blaney Road	EB	27.08	77.26	68.99	71.01	101.55	85.11	49.90	58.16	88.85	102.87	113.27	109.68	38.05	87.24	94.00	119.30	123.46	122.48
		WB	38.79	27.51	67.84	49.29	64.72	57.63	41.52	42.53	53.40	36.68	33.63	32.79	35.96	54.81	63.23	25.99	36.60	30.49
4	Port Road	EB	100.38	104.87	100.48	104.87	101.08	95.77	61.53	75.60	56.93	100.11	62.87	50.70	103.91	112.82	108.59	112.82	112.83	112.82
		WB	57.60	54.61	54.59	54.53	54.56	54.63	19.31	47.57	47.34	47.53	47.37	46.73	36.19	46.07	45.50	46.16	45.15	45.05
5	Ballyraine Road	EB	40.13	90.09	54.35	101.41	56.61	45.39	73.66	69.54	67.10	68.91	66.23	52.95	60.30	108.93	75.63	109.08	75.41	70.50
		WB	60.75	66.58	102.75	65.57	105.37	101.18	68.62	53.06	65.38	52.94	66.78	57.01	104.01	91.27	107.84	80.93	106.90	104.40
6	N56	NB	54.00	46.17	35.04	45.04	46.52	37.10	53.44	52.41	51.72	53.14	55.76	48.08	72.38	42.04	61.51	43.79	45.71	47.94
		SB	89.97	82.69	75.72	83.52	77.65	70.25	57.20	79.95	70.17	78.05	73.66	64.81	58.67	81.01	72.41	79.45	73.86	69.48
7	South West of Kilty Roundabout	NB	29.86	62.31	67.94	64.76	65.19	66.80	20.09	53.90	70.80	53.58	71.57	73.71	51.16	58.20	61.47	58.83	59.75	61.28
		SB	17.65	48.98	39.52	50.02	41.33	38.91	15.52	57.80	49.90	58.17	50.61	48.23	26.21	32.45	42.18	34.09	46.47	45.41
8	Kilmacrennan Road	NB	38.16	96.11	96.59	95.68	95.17	94.84	37.13	92.63	68.12	87.08	73.57	59.49	54.60	80.67	85.08	81.81	87.54	79.86
		SB	45.05	80.89	65.87	81.01	64.68	63.97	29.12	90.69	69.68	86.66	73.39	64.28	46.51	85.50	78.93	85.74	80.40	77.72
9	Port Road	SB	52.18	76.86	76.95	100.21	96.72	68.41	40.84	90.21	83.55	87.22	89.25	112.36	58.36	110.13	114.39	114.47	116.01	113.78
10	High Road	NB	41.36	59.69	60.28	68.68	60.92	56.44	33.51	63.34	59.89	60.19	64.07	57.77	49.48	57.37	57.69	56.52	59.23	57.75
		SB	81.38	92.82	95.66	95.54	96.48	93.25	46.12	136.83	145.36	137.94	144.55	119.66	59.83	115.66	114.29	118.22	116.80	94.21
11	Main Street	SB	91.10	108.14	108.03	108.16	107.45	104.88	91.72	108.28	108.29	108.28	108.28	108.17	95.94	108.54	108.53	108.53	108.53	108.44
12	Paddy Harte Road	SB	58.30	77.23	100.50	89.70	85.87	77.26	75.50	95.94	84.10	81.27	83.13	78.62	81.85	107.35	102.30	92.79	87.72	86.21
13	Pearse Road	NB	53.78	87.11	86.66	102.57	102.60	102.13	48.82	117.68	128.24	113.78	129.45	111.91	52.34	78.35	63.82	87.36	76.40	78.55
		SB	36.43	63.31	43.90	63.75	35.67	39.87	34.63	56.94	42.39	49.90	50.09	48.43	47.73	72.59	60.25	69.77	64.03	58.18
14	Convent Road	NB	48.79	107.61	107.51	107.21	102.87	59.65	31.23	107.88	94.92	107.90	103.59	50.69	47.86	54.73	52.36	101.62	56.02	56.09
		SB	22.36	7.95	5.23	16.00	11.22	16.68	15.41	9.07	9.41	7.42	6.62	7.03	33.85	47.56	43.44	48.03	43.21	38.76
15	R250	EB	51.77	82.21	89.77	76.05	79.66	74.39	23.96	28.18	26.72	30.95	23.10	25.35	35.35	58.65	48.06	35.36	33.81	35.64
		WB	26.53	41.19	53.27	55.32	57.08	47.64	30.36	50.62	35.69	48.76	38.85	35.31	51.28	63.55	58.31	62.64	57.49	52.28
16	Leck Road	EB	19.77	118.25	156.97	108.80	107.09	101.73	19.84	81.22	103.62	100.41	111.16	105.98	73.66	54.17	112.99	103.50	105.75	104.35
		WB	22.77	7.19	20.67	22.54	28.20	25.84	6.81	29.07	41.42	20.76	18.83	16.39	13.97	44.07	61.32	47.40	41.98	38.70
17	R229	EB	56.70	102.12	101.00	97.82	100.59	95.79	53.83	97.14	95.60	90.39	99.69	89.62	65.22	97.51	99.33	89.51	95.94	91.69
		WB	44.60	47.51	60.25	44.39	61.08	59.27	34.52	33.87	43.02	30.57	40.71	40.39	41.71	41.11	59.65	38.46	56.41	53.68
18	N56	EB	47.78	80.40	84.94	84.08	85.70	81.91	29.13	82.30	75.41	81.39	78.48	71.79	47.75	82.49	79.27	85.41	84.05	82.67
		WB	33.73	69.82	70.24	70.16	70.29	69.80	22.16	61.61	64.07	60.86	64.34	63.61	45.41	80.33	84.41	80.07	84.56	84.13
19	N56	NB	30.40	40.41	44.99	42.37	45.12	42.76	36.66	37.42	39.09	37.57	38.94	37.80	65.68	58.20	61.36	59.07	60.66	61.95
		SB	56.71	71.09	72.52	71.66	72.56	64.93	33.19	43.87	43.87	43.87	43.87	40.67	36.51	53.57	54.40	53.75	54.22	47.15

Table 5-1 shows that with the additional demand in the DM scenarios, a number of key links have a VoC of over 100%, these include:

- Four Lane Road;
- Neil T Blaney Road;
- Port Road;
- Ballyraine Road;
- High Road;
- Main Street;
- Paddy Harte Road;
- Pearse Road;
- Convent Road;
- R250;
- Leck Road; and
- R229.

With the addition of the Do Something schemes the Four Lane Road shows some improvement and is not over capacity.

To further understand where the trips along these over capacity links are travelling to and from, Atkins has undertaken some Select Link Analysis (SLA). These SLAs have been undertaken for the over capacity links in the AM and PM peak of Do Something Scenario 4 for 2033.

5.4. Select Link Analysis

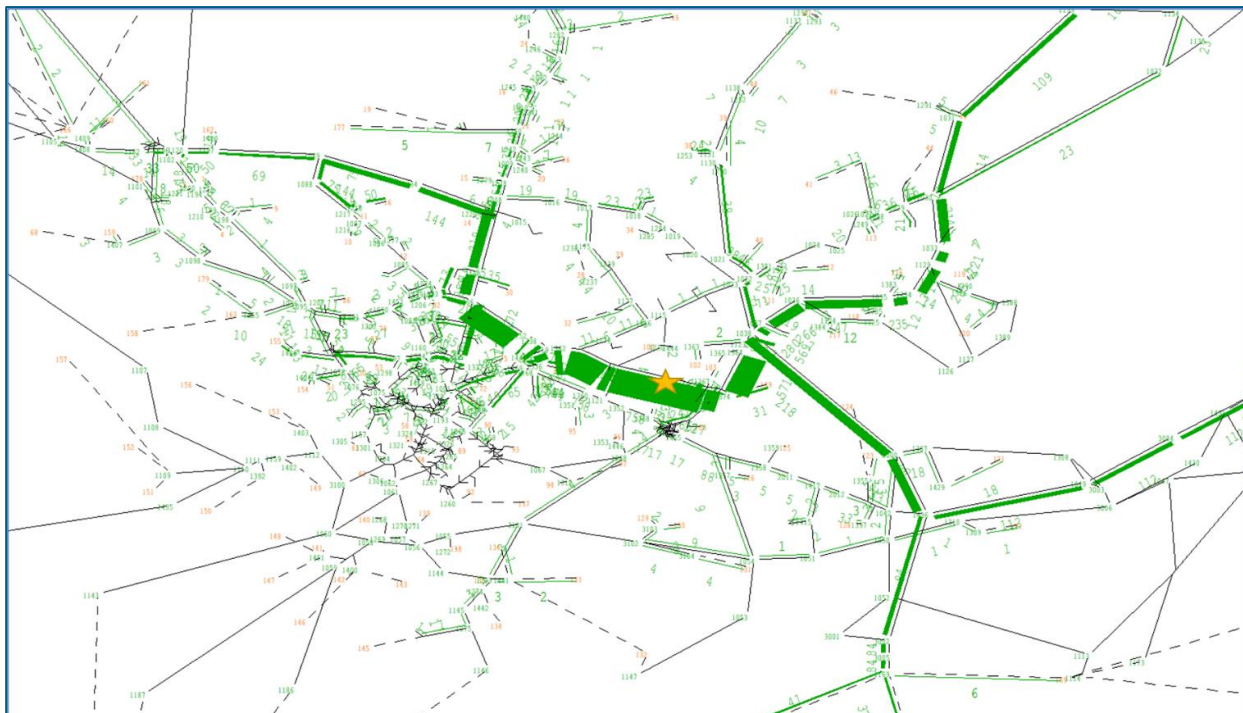
The Select Link Analysis images shown in this section show where the traffic at each link is travelling to and from as a green bandwidth plot with the key link location shown as a star. These SLA are shown in Figure 5-2 to Figure 5-14.

5.4.1. AM Peak

5.4.1.1. Ballyraine Road

The SLA of the Ballyraine Road is set out in Figure 5-2.

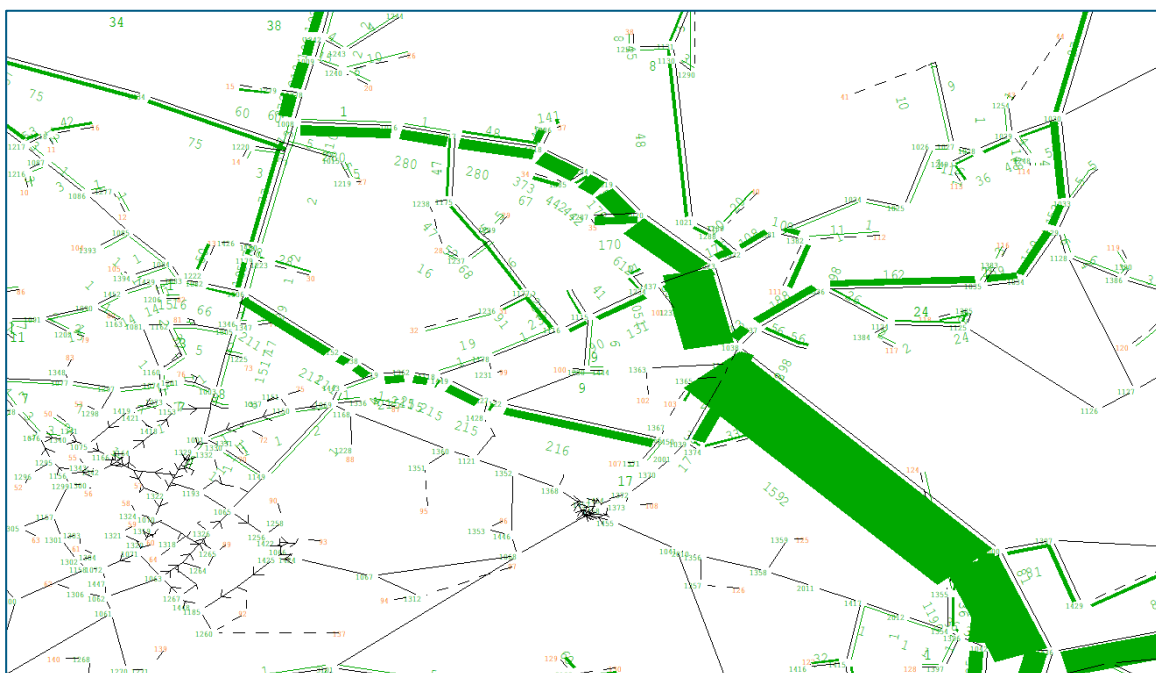
Figure 5-2 – Select Link Analysis - Ballyraine Road WB



The SLA shows that there is some strategic traffic travelling along the TEN-T and R245 however a significant amount of the traffic destines within Letterkenny.

To understand where the strategic traffic is routing from, a SLA of the TEN-T was undertaken, shown in Figure 5-3.

Figure 5-3 – Select Link Analysis – TEN-T NB



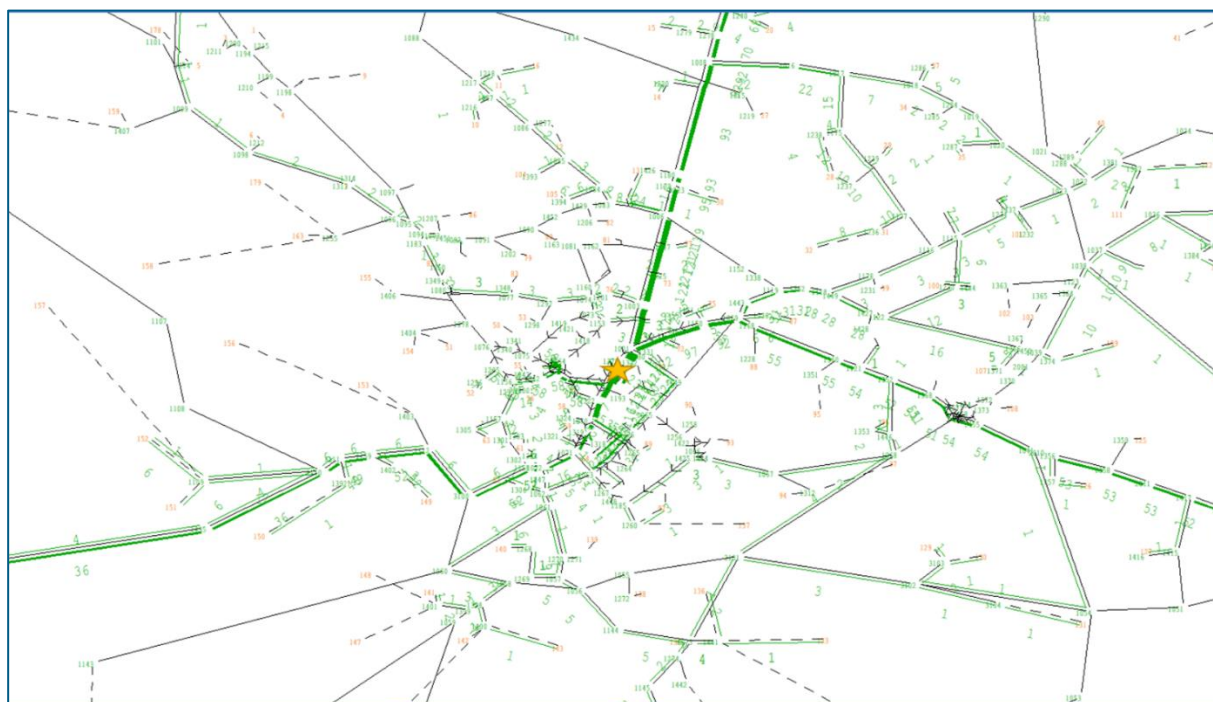
The SLA of the TEN-T shows that some of the strategic traffic using the Ballyraine Road turns left at the N56 and travels along the Ballyraine Road and towards the west suggesting that the trips are routing sensibly and haven't been displaced onto the Ballyraine Road as a result of delay elsewhere.

To enable the Ballyraine Road to cope with the additional traffic demand and improve the VoC and delay, local improvements to the road and junction capacity will be required. These could include signal/junction optimisation or adding an additional lane of traffic. These improvements would be subject to further assessment.

5.4.1.2. Main Street

The SLA of Main Street is shown in Figure 5-4.

Figure 5-4 – Select Link Analysis - Main Street SB



The SLA shows that there is some strategic traffic travelling along the N56 however the majority of the traffic originates and destinate across Letterkenny.

Half of the trips along this link are destinating within the Town Centre meaning they are likely parking on street or in a car park. To counteract the high level of traffic on this route, traffic management schemes should be considered, as identified in the 2009 ILUTS the following schemes could be considered:

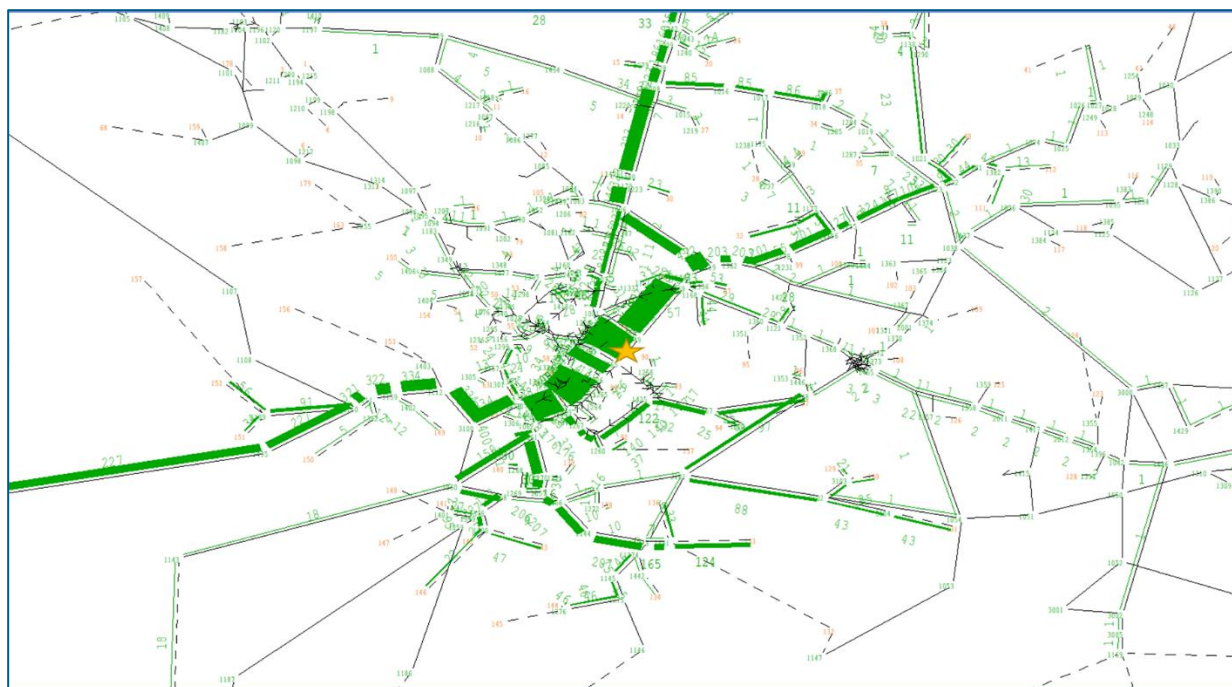
- Town Centre Pedestrianisation;
- 'People Friendly option with shared spaces'

The option of reducing the number of Town Centre car parking spaces could also be considered.

5.4.1.3. Pearse Road

The SLA for Pearse Road is shown in Figure 5-5.

Figure 5-5 – Select Link Analysis - Pearse Road NB



The Pearse Road SLA shows that there is a mixture of strategic and local traffic at this location. There is some strategic traffic at this location coming from the R250 and travelling towards the N56 however there is a good proportion of the traffic originating and destinating in the Strategic Growth area and other development locations in Letterkenny.

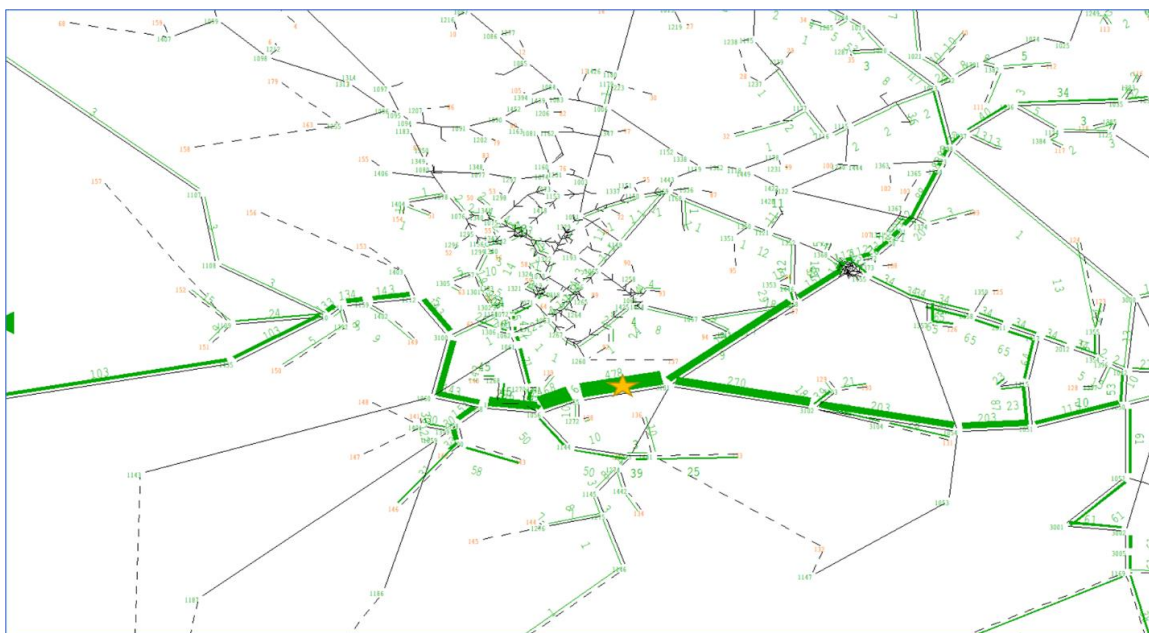
Approximately a quarter of the trips along Pearse Road destinate in the town centre suggesting again that the town centre parking is attracting traffic along this route.

To address the strategic traffic along this route, the Western Relief Road considered as part of the 2009 ILUTS could be used to relieve traffic in the area, however this would be subject to additional scheme testing and an economical appraisal.

5.4.1.4. Leck Road / SNP

The SLA for the Leck Road is set out in Figure 5-6.

Figure 5-6 – Select Link Analysis – Leck Road EB



There is a mixture of local traffic travelling to and from the strategic growth area in this location along with some strategic traffic using the upgraded SNP travelling from the R250.

A delay plot of the area is shown in Figure 5-7.

Figure 5-7 – Delay Plot – Leck Road EB

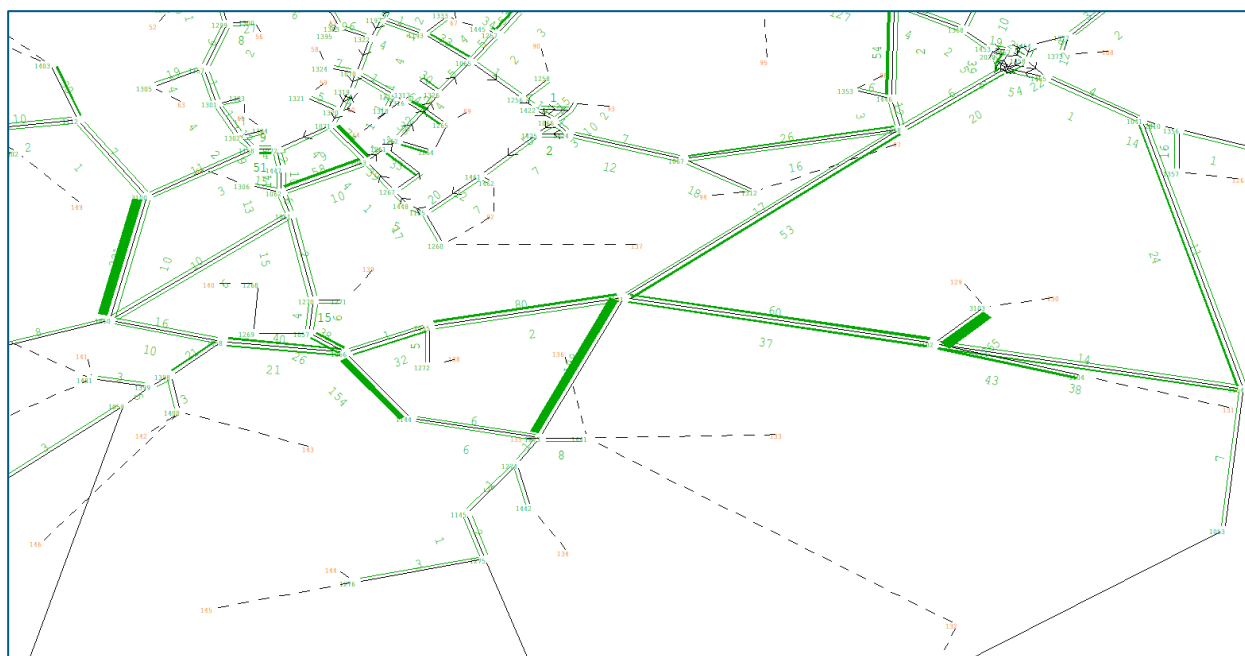


Figure 5-7 shows a large amount of delay along the SNP route. This suggests that there isn't enough capacity on this upgraded link road to cope with the traffic demand.

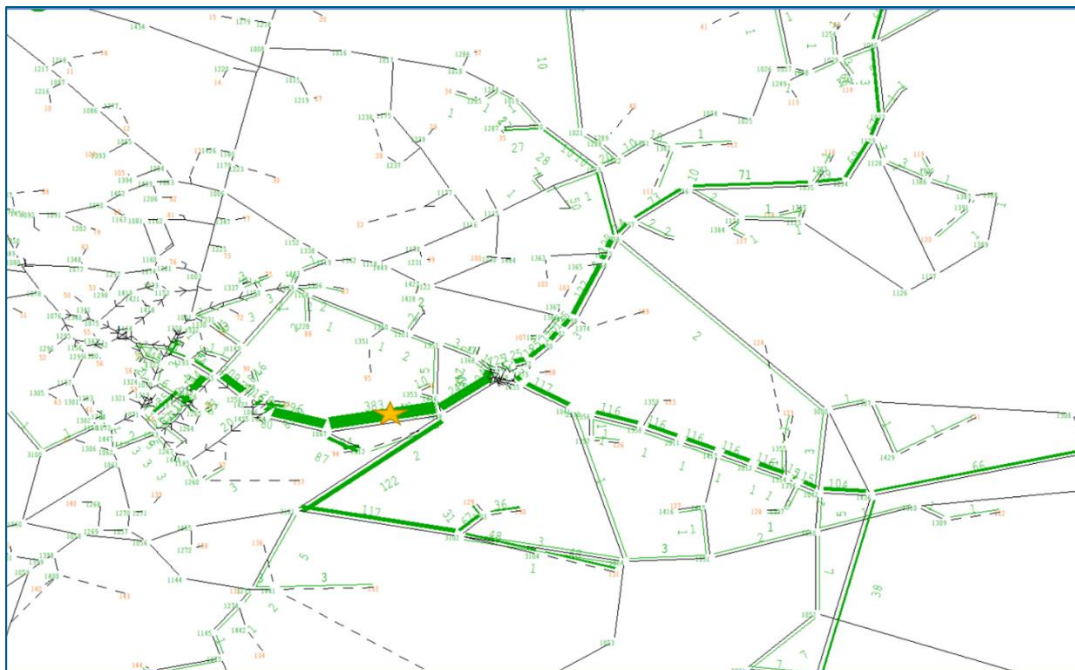
Further consideration to the design of the SNP is required to ensure it has the capacity to handle both the strategic traffic demand and the traffic generation from the Strategic Growth Area.

5.4.2. PM Peak

5.4.2.1. Neil T Blaney Road

The SLA for the Neil T Blaney Road is shown in Figure 5-8 and Figure 5-9.

Figure 5-8 – Select Link Analysis – Neil T Blaney Road EB



The majority of traffic using the Neil T Blaney Road originates within Letterkenny with a mixture of local destinations (including the Strategic Growth Area) and more strategic destinations using the Four Lane Road and R245.

Figure 5-9 – Select Link Analysis – Neil T Blaney Road EB (Zoom)

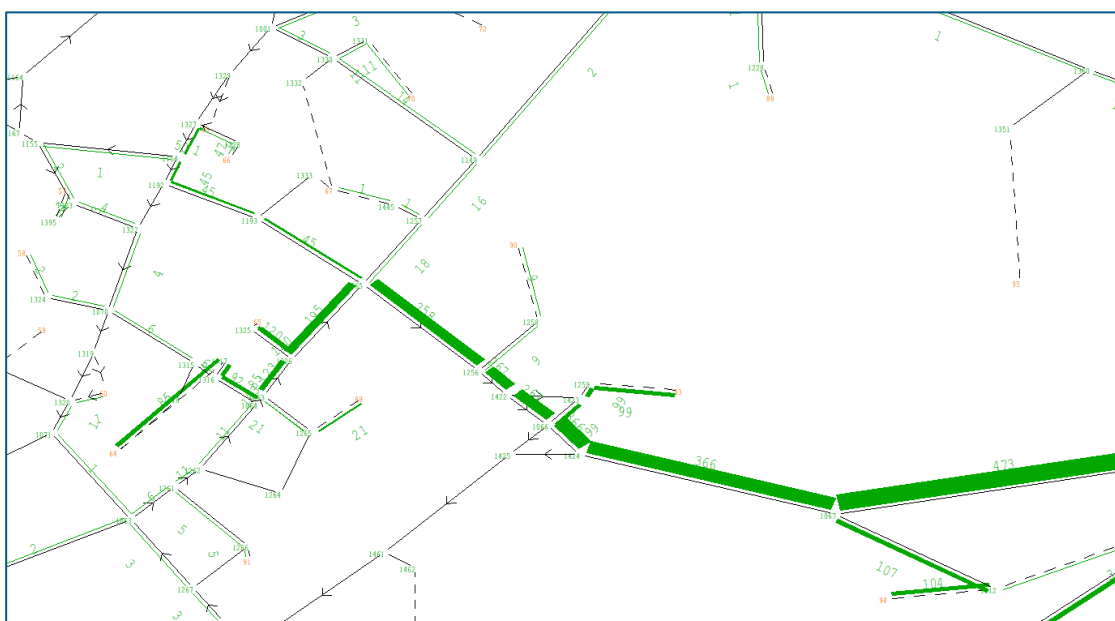


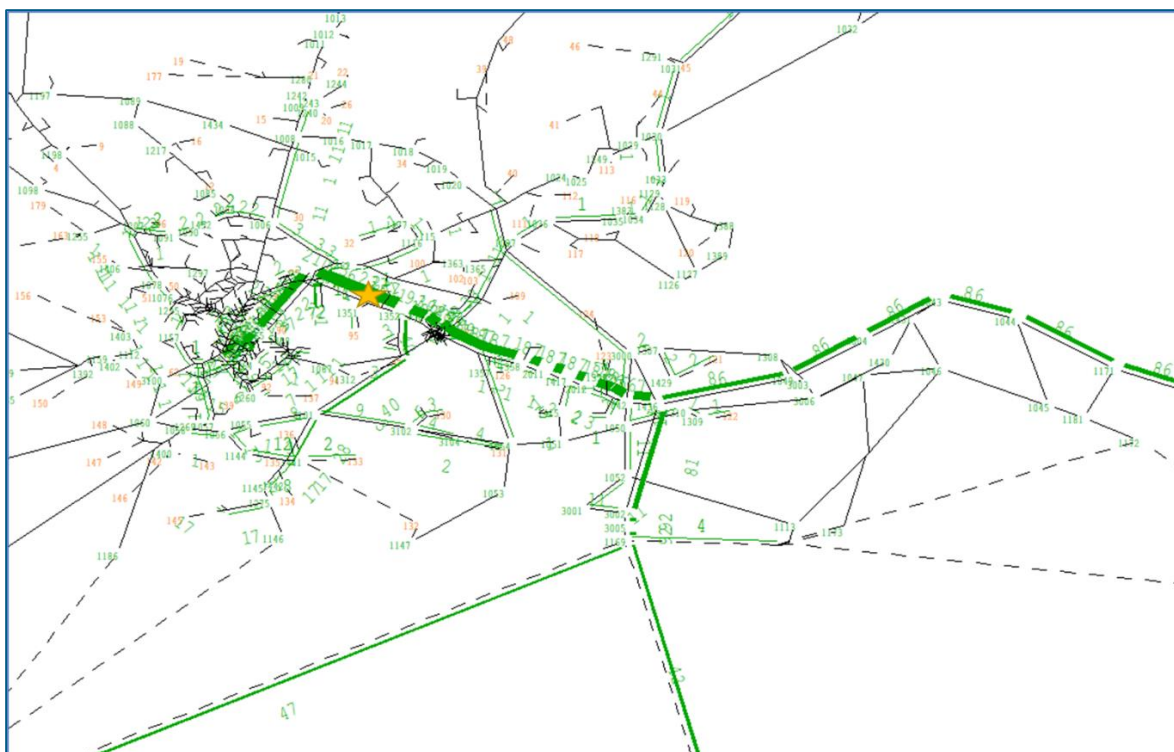
Figure 5-9 shows that the majority of the traffic using the Neil T Blaney Road in the PM peak originates in Letterkenny Town Centre suggesting that trips are coming from the town centre car parks.

To counteract the high level of traffic on this route, traffic management schemes should be considered which could include the option of reducing the number of Town Centre car parking spaces.

5.4.2.2. Port Road

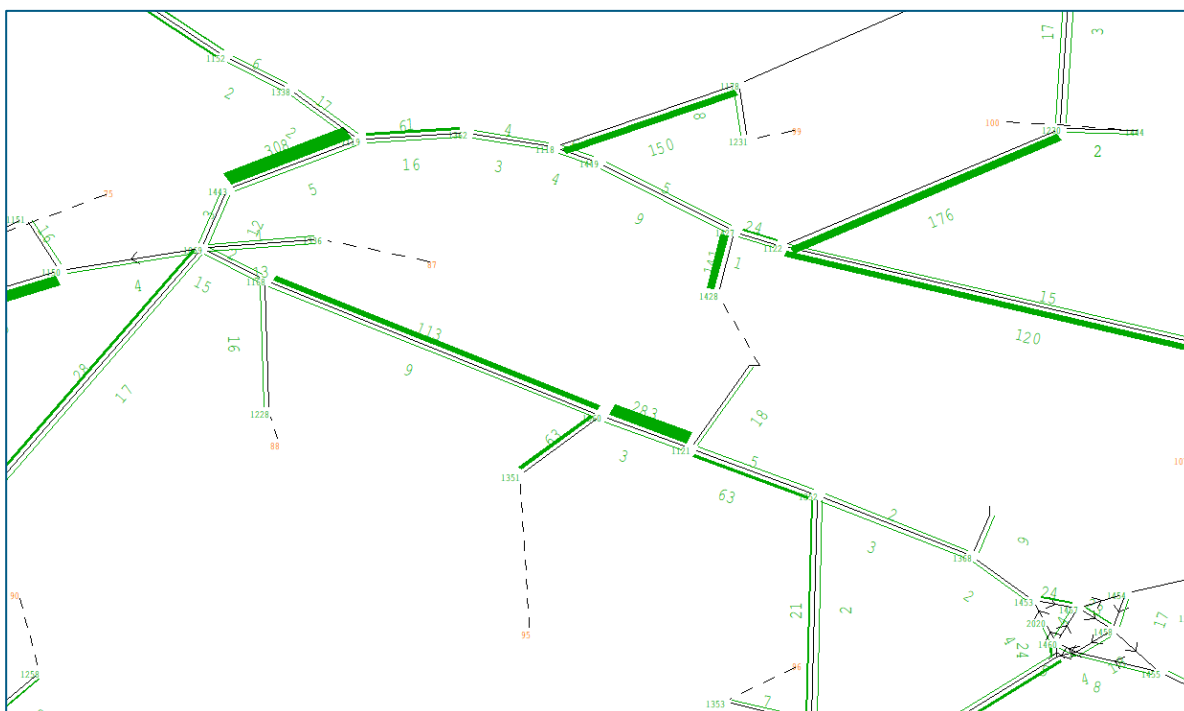
The SLA for the Port Road is set out in Figure 5-10.

Figure 5-10 – Select Link Analysis – Port Road EB



This SLA shows a mixture of both local and strategic origins and destinations. A delay plot of the Port Road is shown in Figure 5-11.

Figure 5-11 – Delay Plot – Port Road EB

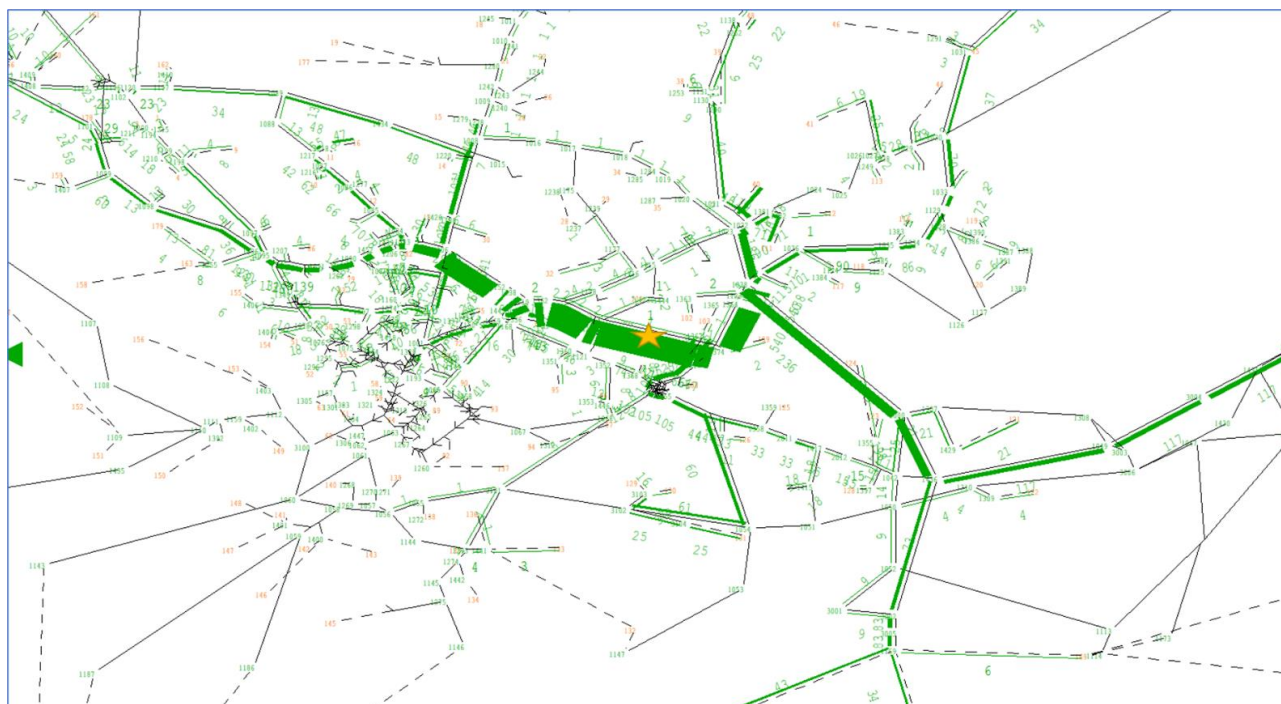


The delay plot suggests that some local junction upgrades are needed at the LYIT campus due to the additional demand in the area. This improvement would be subject to further assessment.

5.4.2.3. Ballyraine Road

The SLA for the Ballyraine Road is shown in Figure 5-12.

Figure 5-12 – Select Link Analysis – Ballyraine Road WB



The SLA shows that there is some strategic traffic travelling along the TEN-T and R245 however the majority of the traffic destines within Letterkenny. This includes the development lands near the IDA.

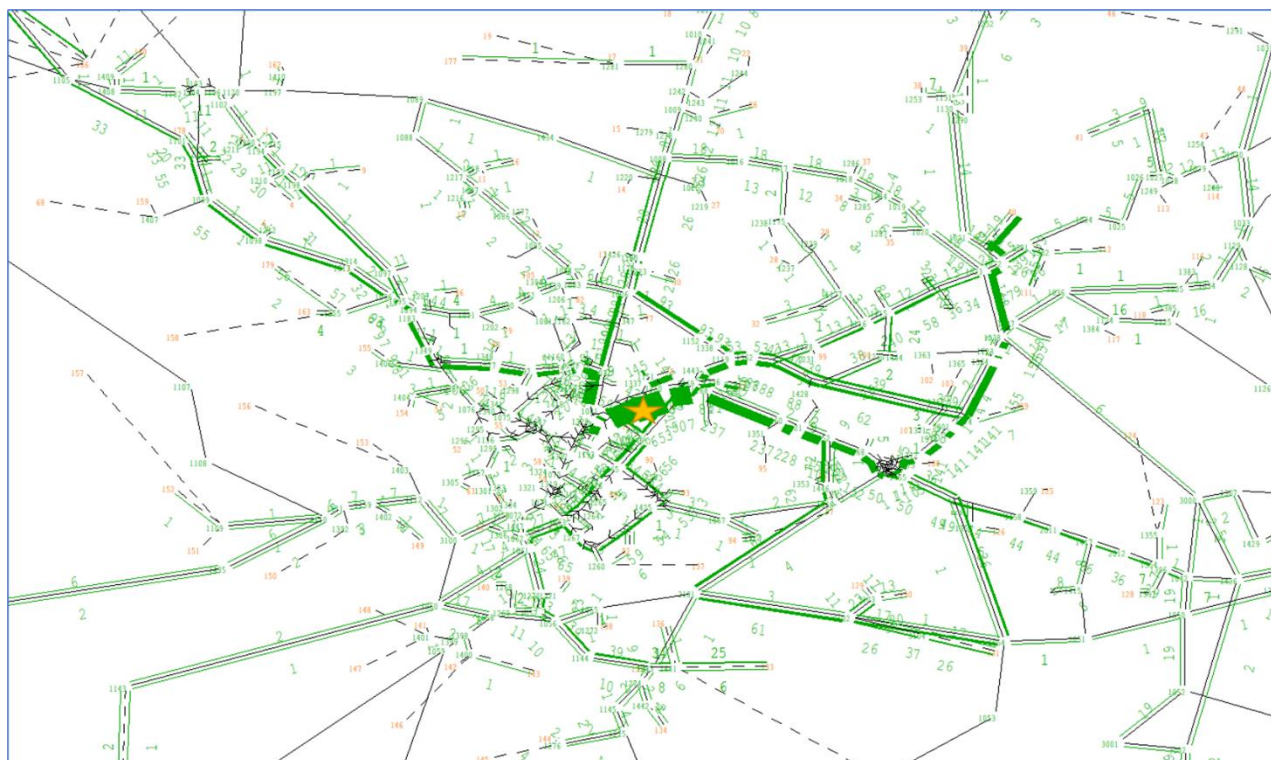
A significant proportion of the traffic along this link is travelling from the East of Letterkenny to either the town centre or the west suggesting that the trips are routing sensibly and haven't been displaced onto the Ballyraine Road as a result of delay elsewhere.

To enable the Ballyraine Road to cope with the additional traffic demand and improve the VoC and delay, local improvements to the road and junction capacity will be required. These could include signal/junction optimisation or adding an additional lane of traffic. These improvements would be subject to further assessment.

5.4.2.4. Port Road

The SLA of the Port Road is shown in Figure 5-13.

Figure 5-13 – Select Link Analysis – Port Road



The SLA shows a mixture of strategic and local traffic using this link with a significant amount of traffic travelling from the development lands near the IDA.

The routing in the area looks sensible which suggests that there is no additional traffic using the Port Road as a result of delays elsewhere in the model.

Over a third of traffic on this link is destined in the town centre suggesting that some of the demand is making use of Town Centre car parks.

To counteract the high level of traffic on this route, traffic management schemes should be considered, as identified in the 2009 ILUTS the following schemes could be considered:

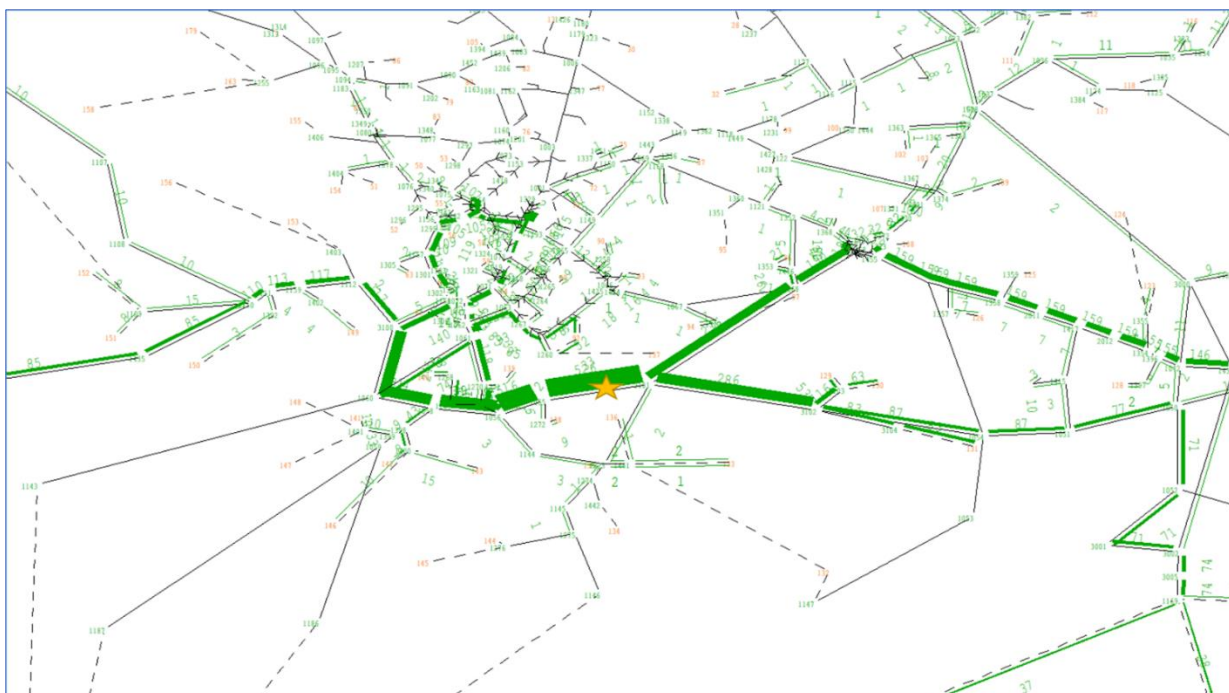
- Town Centre Pedestrianisation;
- ‘People Friendly option with shared spaces’

The option of reducing the number of Town Centre car parking spaces could also be considered.

5.4.2.5. Leck Road

The SLA of the Leck Road is shown in Figure 5-14.

Figure 5-14 – Select Link Analysis – Leck Road EB



There is a mixture of local traffic travelling to and from the strategic growth area in this location along with some strategic traffic using the upgraded SNP travelling from the R250. A delay plot of the Leck Road is shown in Figure 5-15.

Figure 5-15 – Delay Plot – Leck Road EB

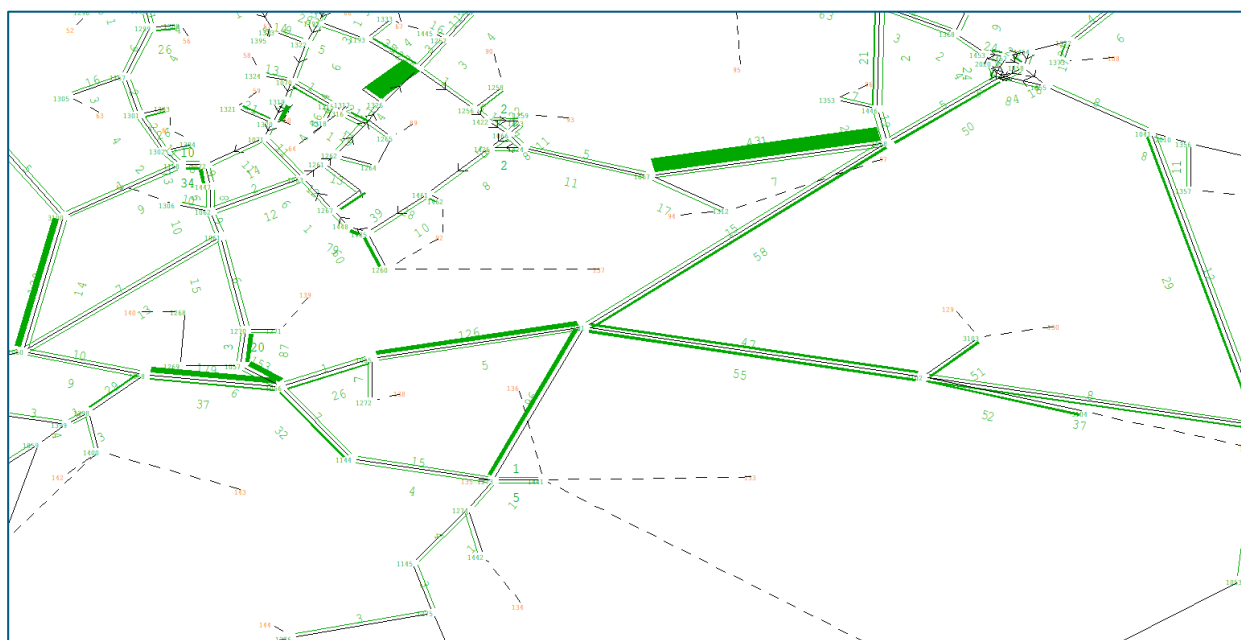


Figure 5-15 shows a large amount of delay along the SNP route. This suggests that there isn't enough capacity on this upgraded link road to cope with the traffic demand.

Further consideration to the design of the SNP is required to ensure it has the capacity to handle both the strategic traffic demand and the traffic generation from the Strategic Growth Area.

5.5. Summary

In Summary, Atkins has reviewed the journey times across the network to understand how the schemes impact on these. This analysis has shown that:

- The forecast increase in travel demand will have a significant impact on journey times across the network;
- The proposed TEN-T scheme will offset the proposed reductions in travel times and will indeed provide travel time reductions when compared with the Base tests;
- The TEN-T will provide journey time reductions on other parts of the road network as it draws traffic onto the new road link;
- The SNP offsets some of the impacts of the additional travel demand in this area but still results in travel times which are greater than those experienced in the Base;
- Further refinement of this SNP scheme may be worthwhile to assess whether further improvements in network performance can be delivered.

Atkins has also reviewed the links that have a VoC of over 100% in the 2033 DS4 scenario to understand where the additional trips at these links are travelling to/from. This has shown that there is a mixture of both strategic and local traffic using these over capacity links including traffic associated with the Land Use plan and the development zones in the North of Letterkenny at the IDA.

This suggests that in order to cope with the additional demand associated with the full realisation of the Land Use Plan, further localised improvements to the highway network or demand interventions will be required.

6. Summary

6.1. Summary

6.1.1. Scenario Summary

In the Do Minimum Scenario:

- The simulation summary results show that the high levels of trip growth associated with the Land Use Plan, indicate that there is likely to be significant issues in the network which will require urgent attention if the planned demand is to be realised;
- As expected the flow increases on the majority of links between the 2017 Base and forecast Do Minimum Scenarios. This is due to the increased forecast demand associated with the Land Use Plan;
- Some of the Do Minimum schemes result in a reduction in highway flow, in particular, there is a reduction in flow along the N56 and along the Neil T Blaney Road likely due to the signalisation of the roundabouts in this area;
- The Leck Road generally experiences a large increase in demand, due to the development in the Strategic Growth Area. This results in a large increase in delay in the area;
- There are also large increases in journey times across the town, partially due to the impact of some of the DM schemes but also due to the increased demand on the network.
- There are increases in delay where the demand loads onto the network, this is due to the increases in flow along the main links;
- The results of the forecast modelling show that the high levels of trip growth associated with the Land Use Plan, indicate that there is likely to be significant issues in the network which will require urgent attention if the planned demand is to be realised.

In Scenario 1 which includes the TEN-T scheme:

- There is a large decrease in traffic along the Four Lane Road, due to traffic reassigning onto the proposed TEN-T corridor;
- The reassigned traffic causes an increase in flow along the N56 at the Kilty Roundabout and on the approach to the Ramelton Road. This results in some increases in delay at the junctions in this area;
- There are large increases in delay along the Leck Road likely due to the increased demand rerouting to the area, however there are delay savings were the Leck Road connects to the Four Lane Road;
- There are significant decreases in journey times across the town. These decreases in journey time are associated with the traffic rerouting to the TEN-T, away from the Town Centre;
- The simulation summary results indicate that while the scheme improves on the DM scenario, the addition of the TEN-T will not be enough to relieve the pressures of the additional demand on the network.

In Scenario 2 which includes the SNP scheme:

- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road;
- There are large decreases in delay where the traffic from the Leck Road has reroutes away however this does cause some increases in delay along the Neil T Blaney Road at Joe Bonnar;
- Route A generally shows some journey time savings whereas Route B shows some increases (likely due to the impact at the Joe Bonnar Road);
- The simulation summary results indicate that while the scheme improves on the DM scenario, the addition of the SNP will not be enough to relieve the pressures of the additional demand on the network.

In Scenario 3 which includes both the TEN-T and SNP schemes:

- There is a large decrease in traffic along the Four Lane Road. This is due to traffic reassigning onto the proposed TEN-T corridor and the SNP;

- The reassigned traffic causes an increase in flow along the N56 at the Kilty Roundabout and on the approach to the Ramelton Road;
- There also is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road;
- There is traffic rerouting in the town centre meaning the Circular Road and the De Valera Road experience an uplift in traffic;
- In general, there are decreases in delay across the network and decreases in the journey times;
- There are some increases in delay at the junctions along the N56 and close to Kilty Roundabout. The increases in delay are due to the increased traffic volumes at these locations accessing the TEN-T;
- There are also some increases in delay along the Neil T Blaney Road at Joe Bonnar where traffic from the SNP is accessing the town, however these are minor compared to the delay savings along the Leck Road/SNP;
- The simulation summary results indicate that while the scheme improves on the DM scenario, the addition of both the TEN-T and SNP will not be enough to relieve the pressures of the additional demand on the network.

In Scenario 4 which includes both the TEN-T and SNP schemes and a 10% reduction in car demand shows:

- There is a large decrease in traffic along the Four Lane Road due to traffic reassigning onto the proposed TEN-T corridor and the SNP which causes an increase in flow along the N56 at the Kilty Roundabout and on the approach to the Ramelton Road;
- The TEN-T experiences high traffic flows;
- There is an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road
- In general, there are decreases in delay across the network with the journey times also decreasing;
- There are some increases in delay at the junctions along the N56 and close to Kilty Roundabout. The increases in delay are due to the increased traffic volumes at these locations accessing the TEN-T;
- The results of the DS4 forecast modelling show that while there is improvement in the network performance compared to the Do Minimum scenario, it still performs worse than the already struggling base network and further improvements will be needed if the planned demand is to be realised even with the 10% reduction.

6.1.2. Select Link Analysis

The scenario summary has shown that when the additional demand associated with the Land Use plan is added into the model, the network performs worse than in the base and there are a number of links where the VoC is over 100%, i.e. the roads in these locations are over capacity.

There is some improvement when the DS schemes are added, however, there are still a number of links that are over capacity which have been interrogated further using a Select Link Analysis in the 2033 DS4 scenario. This has shown that there is a mixture of both strategic and local traffic using these over capacity links including traffic from the Strategic Growth Area and the development zones in the North of Letterkenny at the IDA.

This suggests that further improvements to the highway network or demand interventions will be required. For example, these could include:

- Network improvements to increase the available capacity;
- Introducing additional PT services;
- Active Travel interventions at both new and existing developments.

6.1.3. Journey Time Analysis

The Journey Time analysis has shown that:

- The forecast increase in travel demand will have a significant impact on journey times across the network;
- The proposed TEN-T scheme will offset the proposed reductions in travel times and will indeed provide travel time reductions when compared with the Base tests. The TEN-T will provide journey time reductions on other parts of the road network as it draws traffic onto the new road link;

- The SNP offsets some of the impacts of the additional travel demand in this area but still results in travel times which are greater than those experienced in the Base. Further refinement of this SNP scheme may be worthwhile to assess whether further improvements in network performance can be delivered.

6.2. Conclusion

Based on the outputs of the modelling:

- In the Do Minimum scenario, with the additional demand associated with the Land Use plan there is a significant increase in demand on the network. This results in increased delays and journey times across the network. This is particularly significant on the Four Lane Road and along the Leck Road. The additional demand associated with the Strategic Growth Area adds increased traffic to the Leck Road which in turn causes large delays at the junctions along the Four Lane Road. The summary results indicate that there is likely to be significant issues as the network doesn't have the capacity for the additional planned demand. This will require urgent attention if the planned demand is to be realised.

When comparing the Do Something scenarios with the Do Minimum, the following is noted:

- With the addition of the TEN-T in Scenario 1 there is a significant demand reduction along the Four Lane Road. This results in a reduction in delay in this area and in journey times across the town. Traffic rerouting to the TEN-T scheme results in increased demand along the N56 at the Kilty Roundabout and on the approach to the Ramelton Road which causes some additional delays in the area;
- The Southern Network Project in Scenario 2 results in an increase in traffic along the Leck Road / SNP. This traffic accesses the town via the new links at Joe Bonnar and the Swilly Access Road rather than at the Four Lane Road. There are large delay savings along the Leck Road and close to the Four Lane Road however there is less of an impact across the town compared to the TEN-T scheme.
- In Scenario 3 where both the TEN-T and SNP schemes are implemented, there are still decreases in delay and traffic along the Four Lane Road with traffic reassigning to both of the new road schemes. There are significant journey time and delay savings across the network, with only some increases in delay where the new schemes tie into the existing network i.e at the Neil T Blaney Road and on the N56 near Kilty.
- In Scenario 4 the TEN-T and SNP still perform well, even with the decreased car demand. When reviewing the links that have a VoC of over 100% in the 2033 DS4 scenario to understand where the additional trips at these links are travelling to/from. This has shown that there is a mixture of both strategic and local traffic using these over-capacity links including traffic associated with the Land Use plan and the development zones in the North of Letterkenny at the IDA. This suggests that in order to cope with the additional demand associated with the full realisation of the Land Use Plan, further improvements to the highway network or demand interventions will be required.

Damian Murray
Atkins Limited
The Vantage
32-36 Great Victoria Street
Belfast
BT2 7BA

Damian.Murray@atkinsglobal.com

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