Chapter 6 Traffic Analysis

6.1 Introduction

This chapter of the EIS assesses the potential traffic impacts of the proposed M7 Naas to Newbridge By-Pass Upgrade Project (the proposed scheme). The traffic models, used to analyse the scheme, and future year traffic growth factors, used to generate Annual Average Daily Traffic for all key roads in the study area, are presented in this chapter.

6.2 Data Collection

6.2.1 Traffic Surveys

A series of traffic surveys were undertaken as part of the development of the 2012 Base Year M7 Local Area Model (LAM). The following traffic surveys were undertaken:

- Origin-Destination Surveys (O-D) April 2012;
- Automatic Traffic Counts (ATC) February 2012;
- Manual Classified Counts (MCC) February 2012; and
- Journey Time Surveys April 2012.

A number of permanent NRA ATC counters are located in the study area. Traffic data from these counters was also used as part of the development of the base year traffic models. The location of all traffic surveys are illustrated in **Plates 6.1 to 6.3**, below.

6.2.2 Journey Time Surveys

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

Journey time surveys were carried out in Naas between the Bundle of Sticks Roundabout and the Maudlins Roundabout using a GPS data logger. Three runs were carried out in each direction during the AM Peak, Inter Peak and PM Peak periods.

Additionally, journey time data was collected as part of the O-D surveys undertaken along the M7. The journey time data was recorded using Bluetooth devices mounted on overbridges along the M7; this data provided a comprehensive dataset of observed journey times between the overbridges at Johnstown and Lewistown. Journey time data between Lewistown and the end of the proposed scheme at Greatconnell was based on live data from independent route planning software.

The location of the journey time survey routes are shown in **Plate 6.4** and **Plate 6.5**. The journey time surveys measured journey time and delay. Journey time is defined as the point to point time taken for undertaking a journey, while delay is defined as the time spent stationary while undertaking that journey as a result of traffic congestion or traffic signals.

6.2.3 Existing Modelling Tools

The National Traffic Model (NTM) was developed by the National Roads Authority in 2008 and is currently maintained as a central analysis tool for the assessment of the future needs of the network at a strategic level. The modelled network includes all National Primary, Secondary and Regional Roads, plus other local roads of significance. The model is constructed to represent a 2006 Base Year and Future Years of 2025 and 2040. Network information is thus available on existing and proposed road links throughout the country.

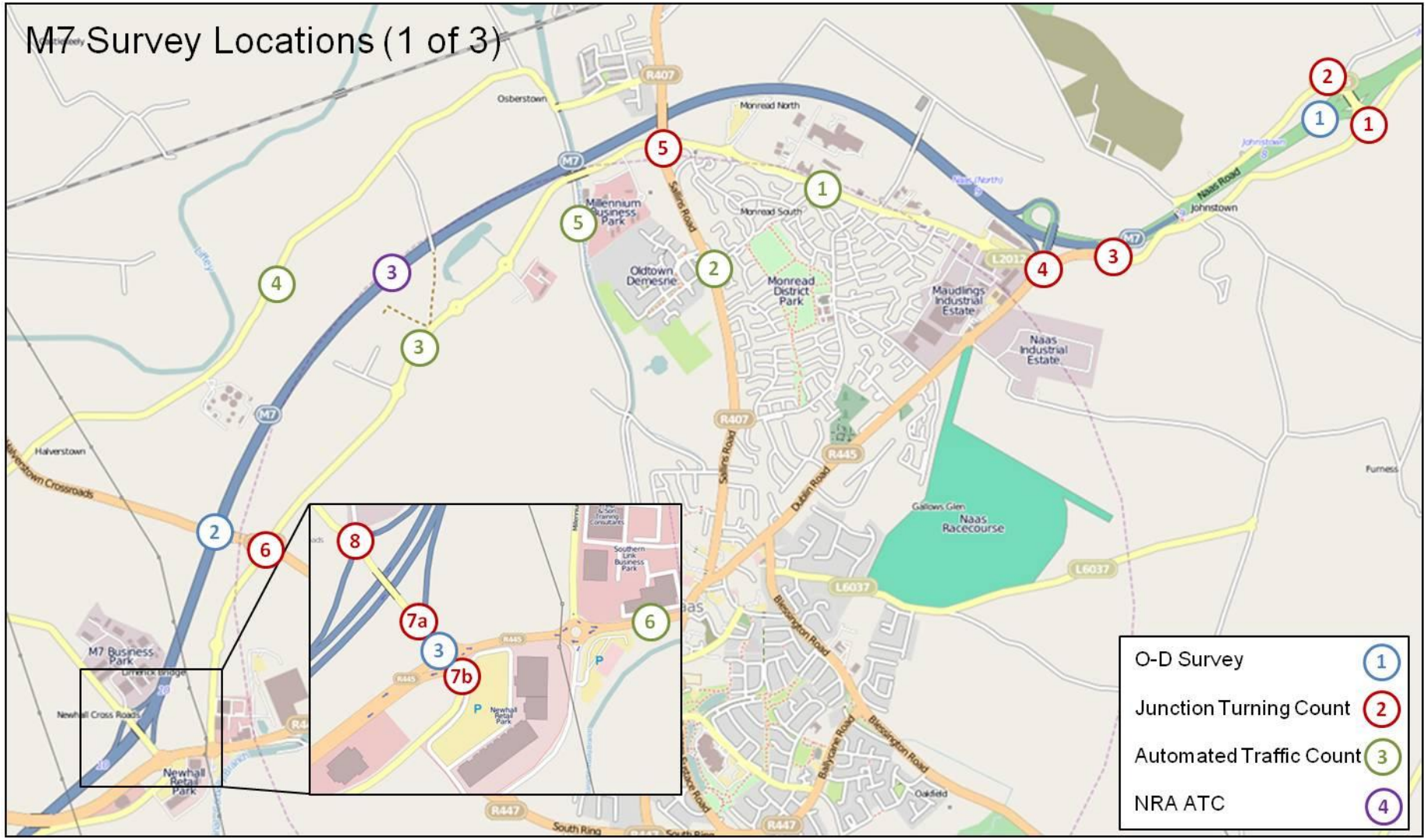

Plate 6.1: Traffic Survey Locations

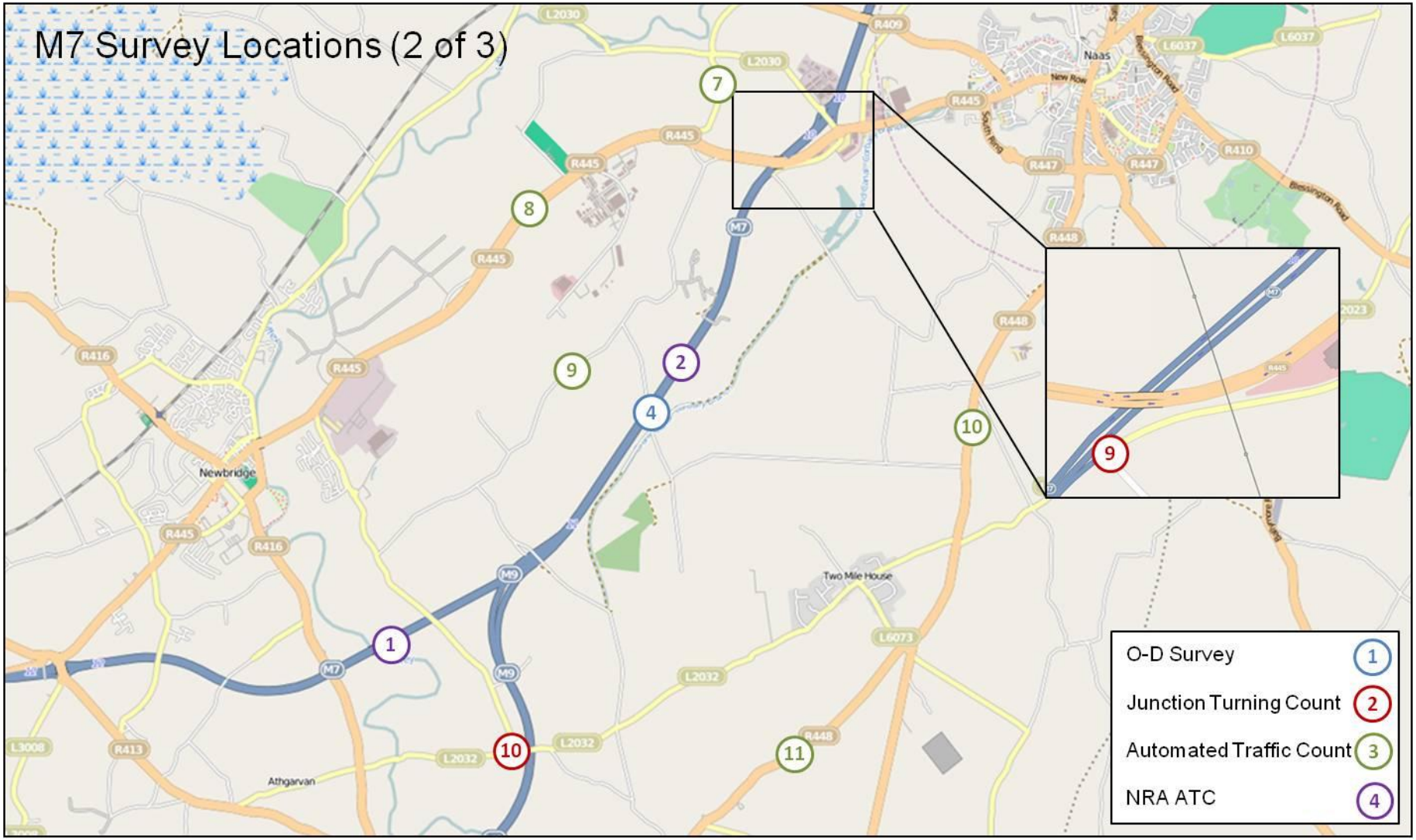

Plate 6.2: Traffic Survey Locations

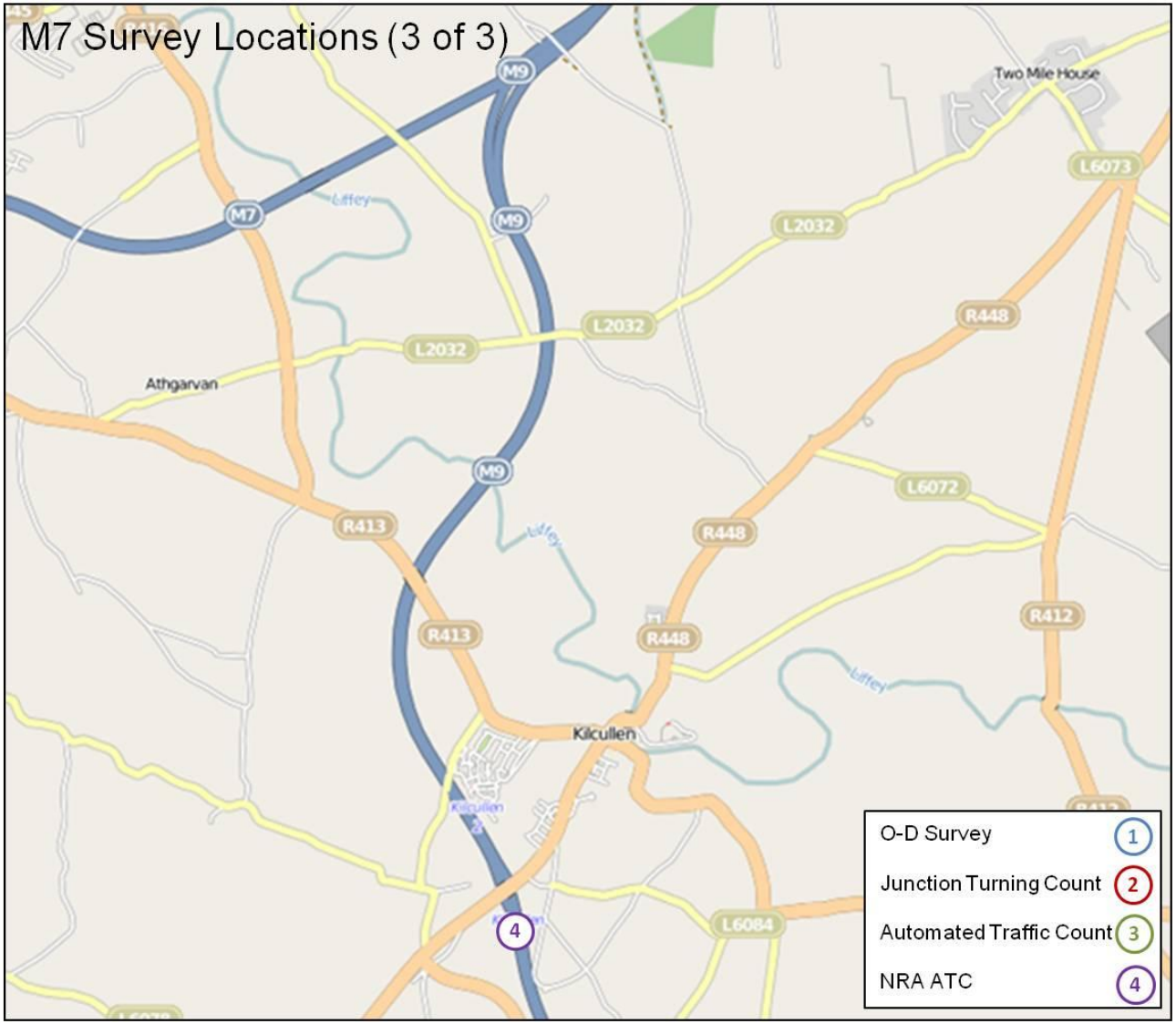

Plate 6.3: Traffic Survey Locations

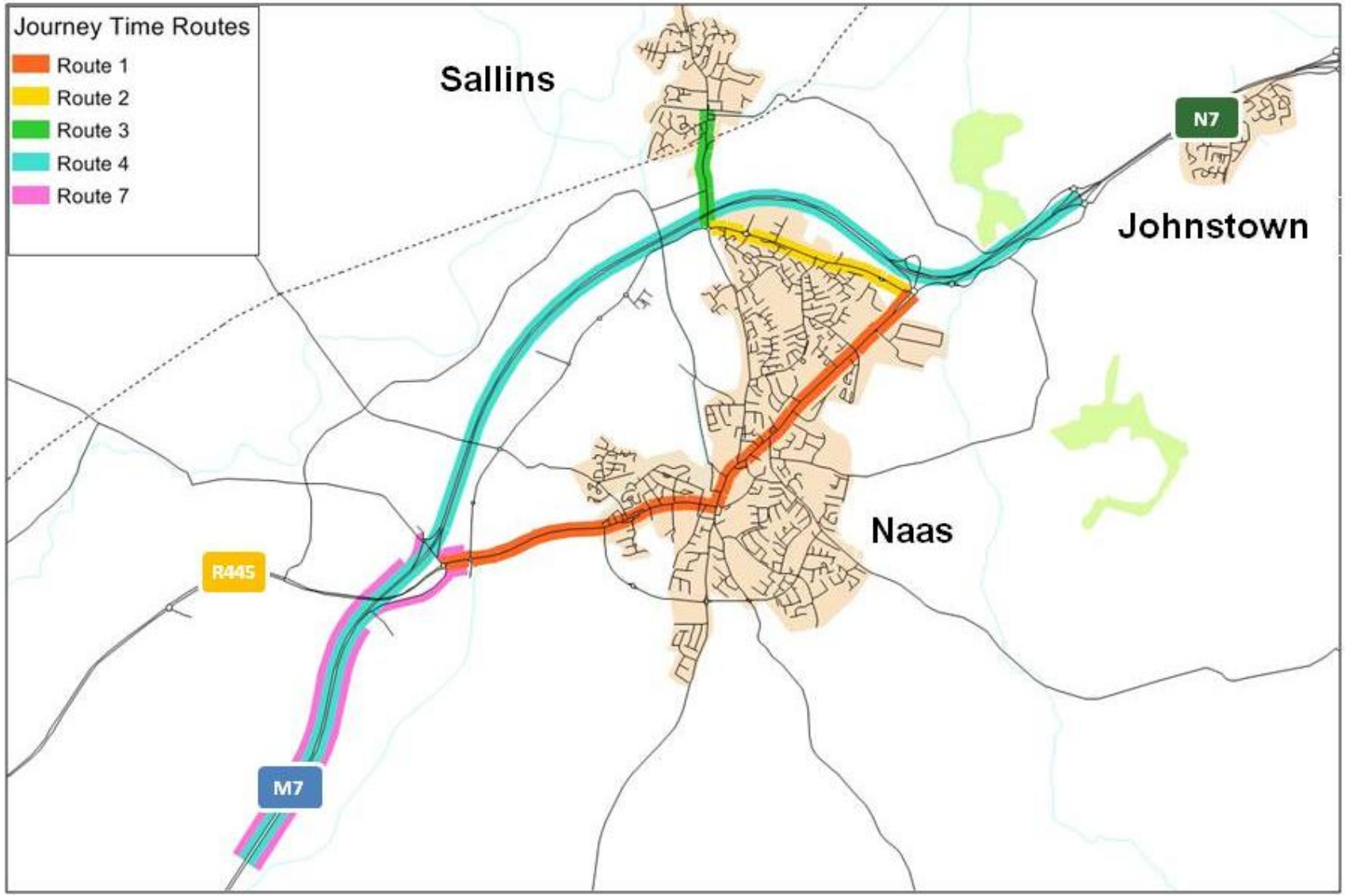

Plate 6.4: Journey Time Surveys

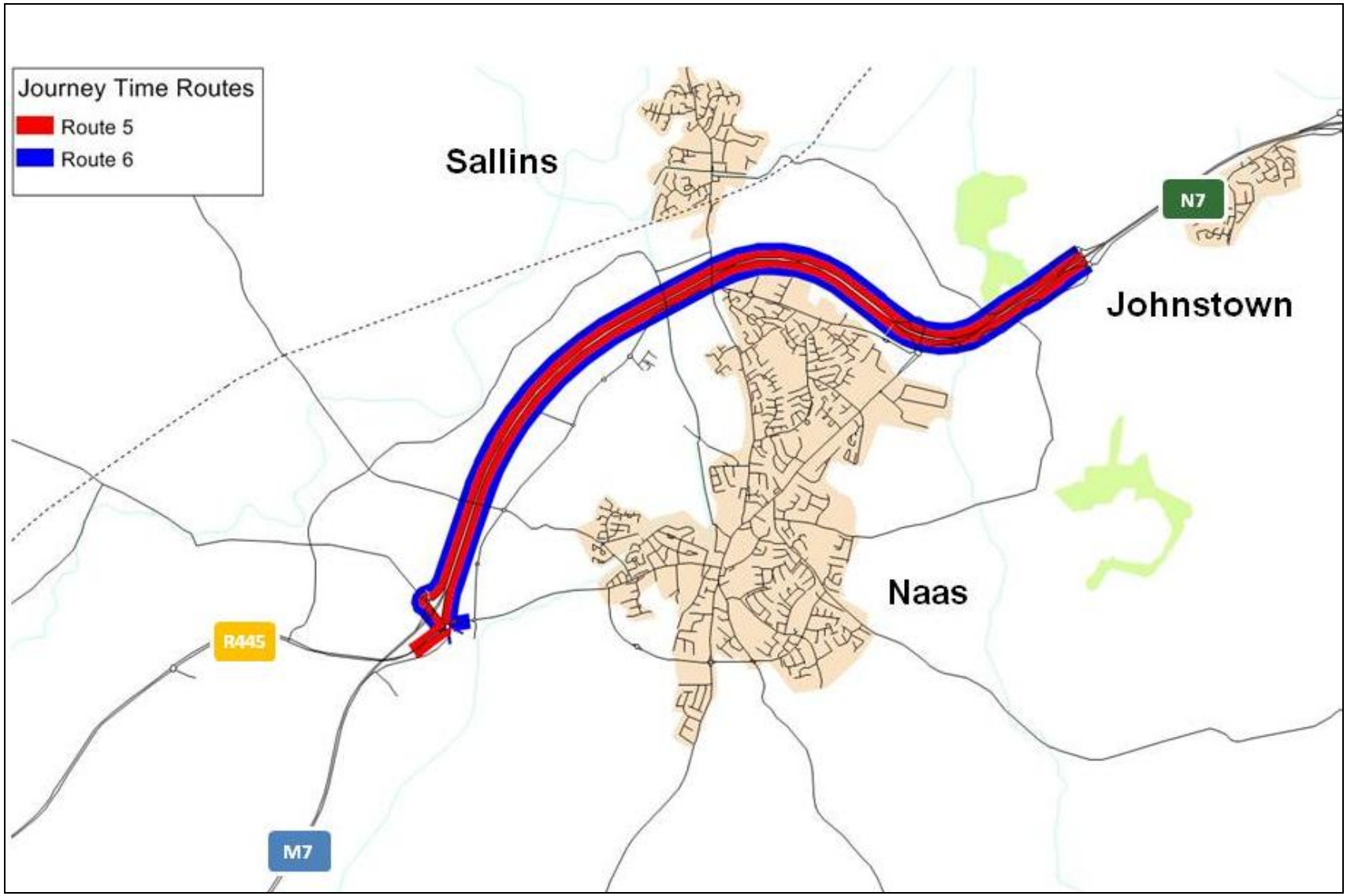

Plate 6.5: Journey Time Surveys

6.3 Base Year Traffic Models (2012)

6.3.1 Network Development

The study area for the traffic model is shown below in **Plate 6.6**. This area was cordoned from the NTM and further refined to ensure that all network characteristics were reflective of the 2012 road network.

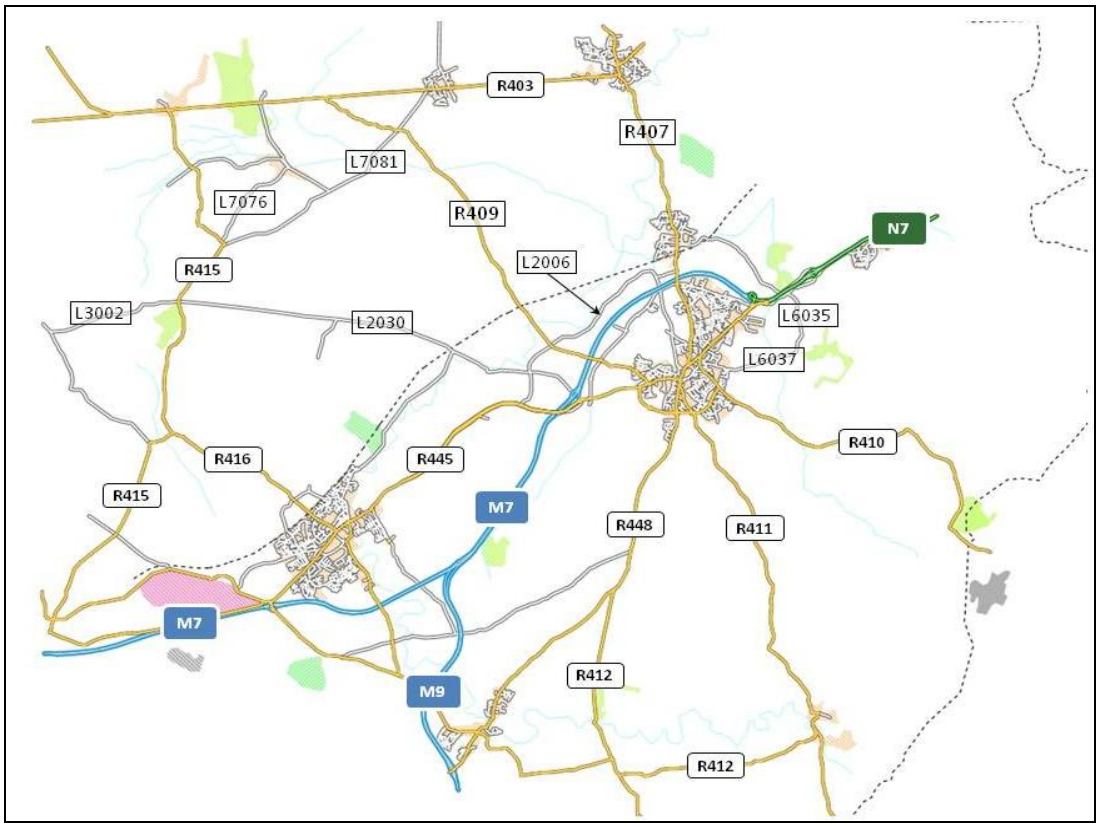

Plate 6.6 Modelled Network

6.3.2 Matrix Development

As part of the model development, the zones used in the NTM for the urban areas of Naas and Newbridge were disaggregated to allow more precise movements in and out of the town centres to be modelled. Larger zones are used in the rural areas.

The M7 LAM consists of 49 zones, with 34 zones representing demand within the study area (internal zones) and 15 zones feeding demand into the study area (external zones).

Un-calibrated trip matrices were firstly constructed for the AM Peak Hour (08:00 – 09:00) and the average Inter Peak Hour (12:00 – 14:00). These trip matrices were then calibrated to reflect link flow data and junction turning movements. These models were then validated using a set of independent count data not used during the calibration process. The calibration and validation process was undertaken in accordance with the criteria as set out in the NRA Project Appraisal Guidelines (PAG) 2011.

The PM Peak Hour matrices were generated by transposing the calibrated AM Peak Hour matrices. The PM models were calibrated and validated in accordance with the PAG.

6.3.3 Model Category

Traffic modelling for the proposed scheme is undertaken using an 'Assignment Model' and constructed in accordance with NRA *PAG Unit 5.2: Construction of Transport Models*. The model therefore assigns a fixed demand matrix based on the lowest generalised cost route between defined origin and destination zones. Demand is assigned on an iterative basis to account for changes in generalised cost as a result of increased traffic volumes.

6.4 Future Year Traffic Models (2015 & 2030)

6.4.1 Network Development

The future year 'Do-Minimum' network includes the 2012 existing network with only committed infrastructure improvements. For the current model, no committed or planned schemes are relevant, and it is therefore assumed that the existing network, properly maintained will form the Do-Minimum network for the future year. As such no changes to the base year network have been incorporated as part of the Do-Minimum scenario.

The future year 'Do-Something' network includes all the assumptions of the Do-Minimum network plus the proposed scheme. The Do-Something network is shown in **Plate 6.7**.

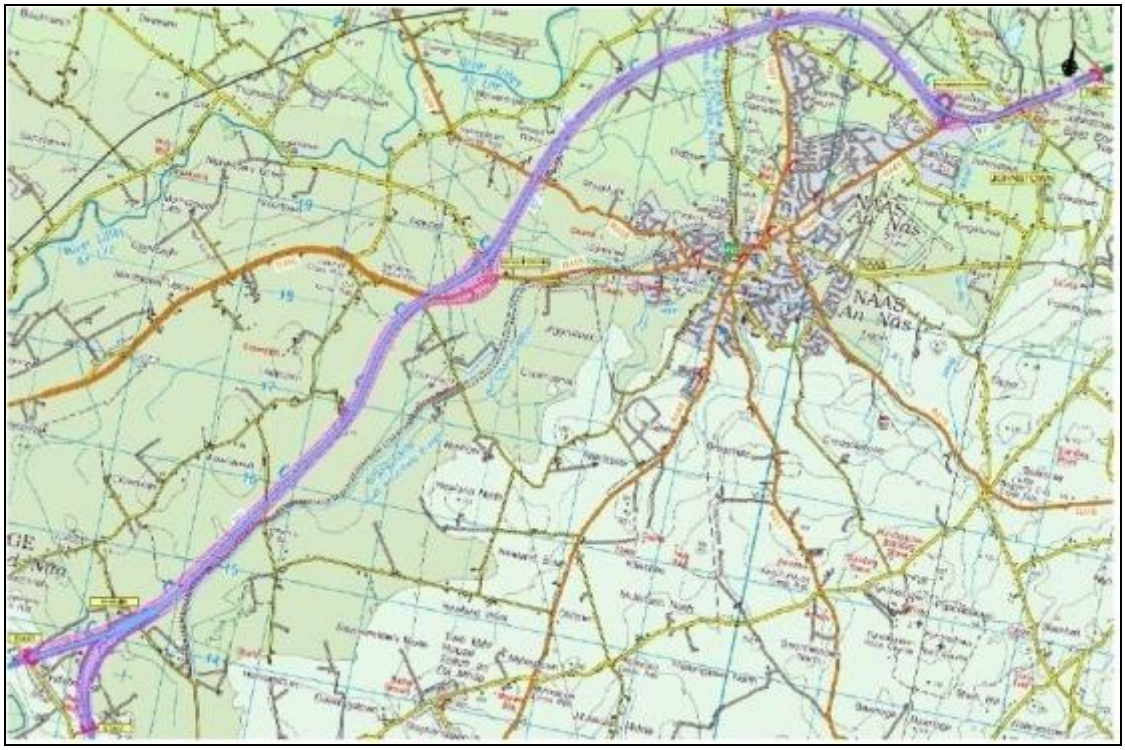

Plate 6.7: Do-Something Network

6.4.2 Traffic Growth

The development of the traffic growth forecasts for the future year M7 LAM has been based on the requirements as set out in NRA *PAG Unit 5.4: Zone-Based Traffic Forecasting*. The guidance sets out separate methodologies for establishing trip end growth for internal and external zones in the LAM.

Traffic models have been developed for the following years:

- Base Year - 2012;
- Scheme Opening Year - 2015; and
- Scheme Design Year – 2030.

The PAG specifies that the proposed scheme should be assessed using three future traffic growth scenarios, namely NRA low, medium and high growth. The overall growth in vehicular trips between the Base and the Opening Year and the Base and Design Year is outlined in Tables 6.1 and 6.2 respectively.

Table 6.1 Overall Trip End Growth in LAM (2012 – 2015)

NRA Growth Scenario	Light Vehicles (LV)			Heavy Vehicles (HV)		
	AM Peak (08:00-09:00)	Inter Peak (12:00-02:00)	PM Peak (17:00-18:00)	AM Peak (08:00-09:00)	Inter Peak (12:00-02:00)	PM Peak (17:00-18:00)
Low	3.5%	3.0%	3.5%	2.1%	2.6%	1.7%
Medium	4.2%	3.7%	4.2%	2.7%	3.5%	2.7%
High	7.0%	6.5%	6.9%	5.4%	6.6%	5.8%

Table 6.2 Overall Trip End Growth in LAM (2012 – 2030)

NRA Growth Scenario	Light Vehicles (LV)			Heavy Vehicles (HV)		
	AM Peak (08:00-09:00)	Inter Peak (12:00-02:00)	PM Peak (17:00-18:00)	AM Peak (08:00-09:00)	Inter Peak (12:00-02:00)	PM Peak (17:00-18:00)
Low	21.8%	18.3%	21.9%	7.3%	8.3%	7.6%
Medium	25.7%	22.4%	25.8%	11.7%	12.5%	11.6%
High	43.0%	40.7%	43.1%	28.7%	29.2%	28.3%

Future year models have been developed for all three growth scenarios. As the medium growth rate represents a central forecast of future growth, only the NRA medium growth results are presented throughout the remainder of this chapter of the EIS.

6.4.3 Estimation of Annual Average Daily Traffic (AADT)

The Annual Average Daily Traffic (AADT) on the proposed scheme and parallel routes was estimated by applying conversion rates to modelled AM peak, Inter peak and PM peak hour traffic flows. A relationship was developed based on regression analysis of 2 permanent NRA counters and a number of short term ATC counters in the study area. The formula developed is as follows:

AADT = (3.2 * AM Flow) + (6.5 * IP Flow) + (3.2 * PM Flow)

6.5 Scheme Impacts

The additional capacity of the proposed scheme reduces delay on the M7 during the AM and PM Peak Hours. Time savings are gained during the AM Peak Hour in the eastbound direction and in the westbound direction during the PM Peak Hour.

6.5.1 Opening Year (2015)

Forecast traffic volumes for the NRA medium growth scenario in the Opening Year (2015) are shown in Table 6.3. The locations for traffic flow data are presented graphically in **Plate 6.8** and **Plates 6.9 and 6.10.**

Table 6.3 Link Flow Summary for 2015 Opening Year (Medium Growth)

No.	Link	2012*	2015	2015
		Base	Do-Min	Do-Some
1	M7 Mainline West of M7/M9 Junction	34,000	34,550	33,900
2	M9 Mainline South of M7/M9 Junction	20,950	21,700	21,900
3	M7 Mainline East of M7/M9 Junction	54,950	56,250	55,800
4	M7 Mainline at Naas Newhall Interchange	43,400	44,200	58,250
5	R445 West of Newhall Interchange (Newbridge Road)	17,050	17,550	21,800
6	L2030 North of the Newhall Interchange	6,650	6,400	5,000
7	M7 Mainline East of Newhall Interchange	56,400	56,850	58,250
8	R409 - Caragh Road	6,450	6,800	7,200
9	L2006 - Osberstown Road	1,100	2,150	2,450
10	R407 - Sallins Road	18,050	17,850	16,700
11	N7 Mainline East of Maudlins Interchange	59,350	60,800	60,900
12	N7 Mainline West of Johnstown Interchange	68,600	71,000	70,750
13	L2014 - West of Johnstown	3,750	4,000	3,950
14	L2005 - Kerdiffstown Road	2,350	2,400	2,650
15	N7 Mainline at Johnstown Interchange	65,850	68,050	68,000
16	N7 Mainline East of Johnstown Interchange	69,600	72,000	72,000
17	L2014 - East of Johnstown	3,350	3,500	3,450
18	R416 - Athgarvan Road	5,550	6,050	6,050
19	Great Connell Road	2,100	2,300	2,600
20	M7 Eastbound Off-Slip (Newhall Interchange)	5,650	5,800	-
21	M7 Eastbound On-Slip (Newhall Interchange)	6,300	6,150	-
22	M7 Westbound Off-Slip (Newhall Interchange)	6,750	6,500	-
23	L2030 at Newhall Interchange	14,250	14,550	7,850
24	L2030 between M7 Off-Slip and R445	17,400	17,800	7,850
25	M7 Westbound On-Slip (Newhall Interchange)	6,400	6,750	750
26	R445 Newbridge Road	20,850	21,450	20,500
27	M7 Eastbound Off-Slip (Maudlins Interchange)	3,100	3,200	3,650
28	On/Off Slip (Maudlins Interchange)	12,500	13,350	13,800
29	N7 Eastbound On-Slip (Maudlins Interchange)	9,400	10,150	10,150
30	M7 Westbound On-Slip (Maudlins Interchange)	3,400	3,050	3,850
31	N7 Westbound Off-Slip (Maudlins Interchange)	9,300	10,250	9,900
32	R445 (Maudlins Interchange)	13,050	14,250	13,850
33	L2012 - Monread Road	15,550	17,750	18,050
34	R445 - Dublin Road	15,650	14,050	14,650
35	R445 - Dublin Road (East of Newhall Interchange)	-	-	18,850
36	R445 - Dublin Road (West of Newhall Interchange)	-	-	20,550

No.	Link	2012*	2015	2015
		Base	Do-Min	Do-Some
37	M7 Eastbound Off-Slip (Newhall Interchange)	-	-	7,600
38	M7 Eastbound On-Slip (Newhall Interchange)	-	-	6,350
39	M7 Westbound Off-Slip (Newhall Interchange)	-	-	6,000
40	M7 Westbound On-Slip (Newhall Interchange)	-	-	7,150

**AADT values are rounded up to the nearest 50.*

In summary, AADT on the M7 mainline increases by approximately 2% between the Base Year (2012) and scheme Opening Year (2015). Traffic flows on the M9 mainline increase by approximately 4% over this period.

In the Do-Minimum scenario a small amount (~1%) of traffic avoids the M7 and reroutes to avoid the increased congestion along the M7 corridor. This traffic transfers back to the M7 with the opening of the proposed scheme as a result of the additional capacity it provides.

In the Do-Something scenario (2015) the total traffic using the four slips roads of the Newhall Interchange increases by approximately 7%. This is due to traffic transferring from alternative routes as a result of the increased capacity of the Newhall Interchange and M7 mainline. At the Maudlins Interchange the total increase in traffic on the four slips roads in 2015 is approximately 3% between the Do-Minimum and Do-Something scenarios.

Although it has been highlighted previously that there is congestion at the Maudlins Interchange at present, this congestion occurs on the westbound M7 mainline carriageway as a result of the lane drop from three lanes on the N7 to two lanes on the M7. The proposed continuation of the third lane as far as the M7/M9 split at Greatconnell will address this issue. Therefore the 3% increase in traffic through the interchange in the Do-Something (2015) will be catered within the existing capacity of the interchange.

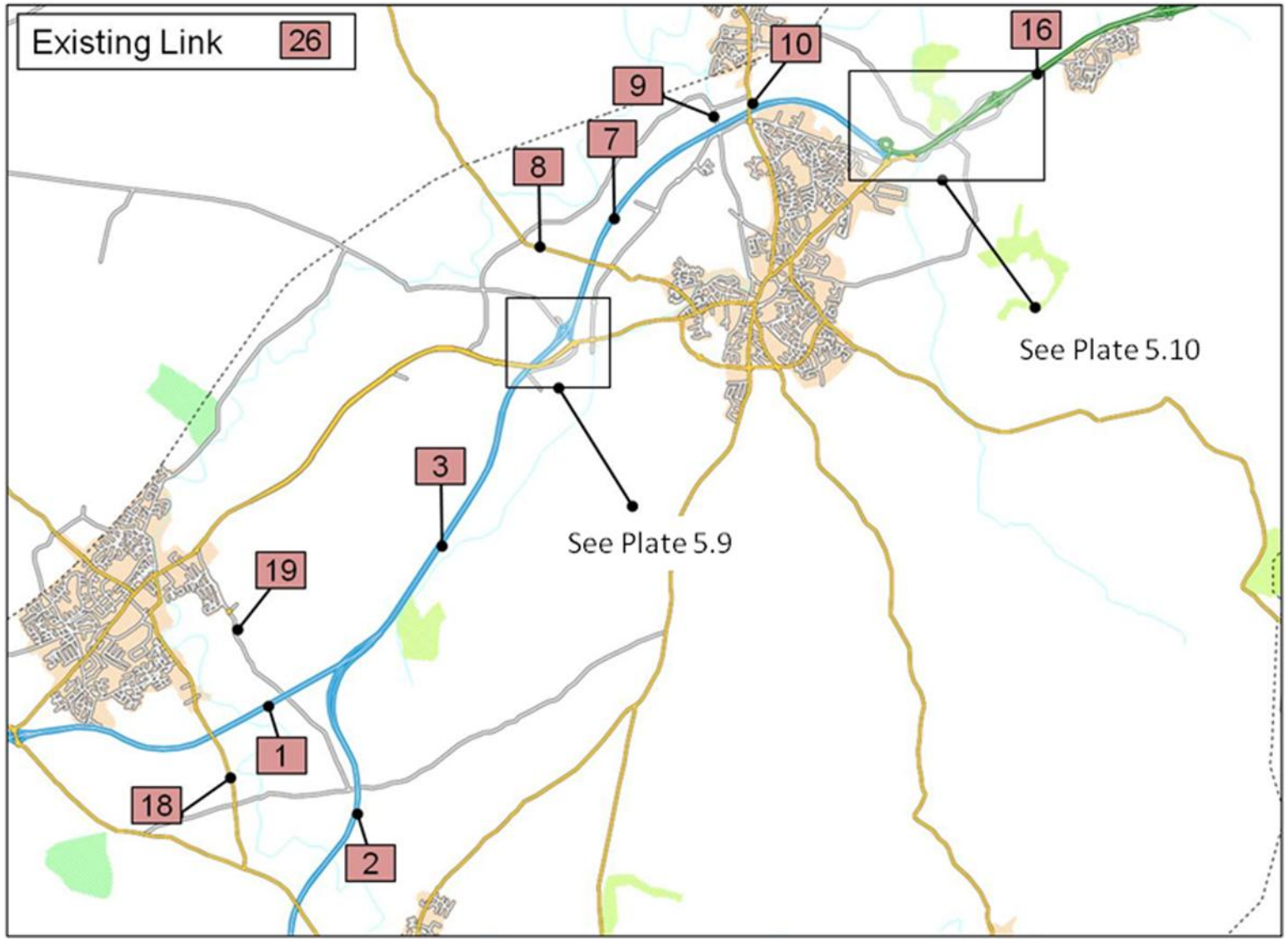

Plate 6.8: AADT Locations

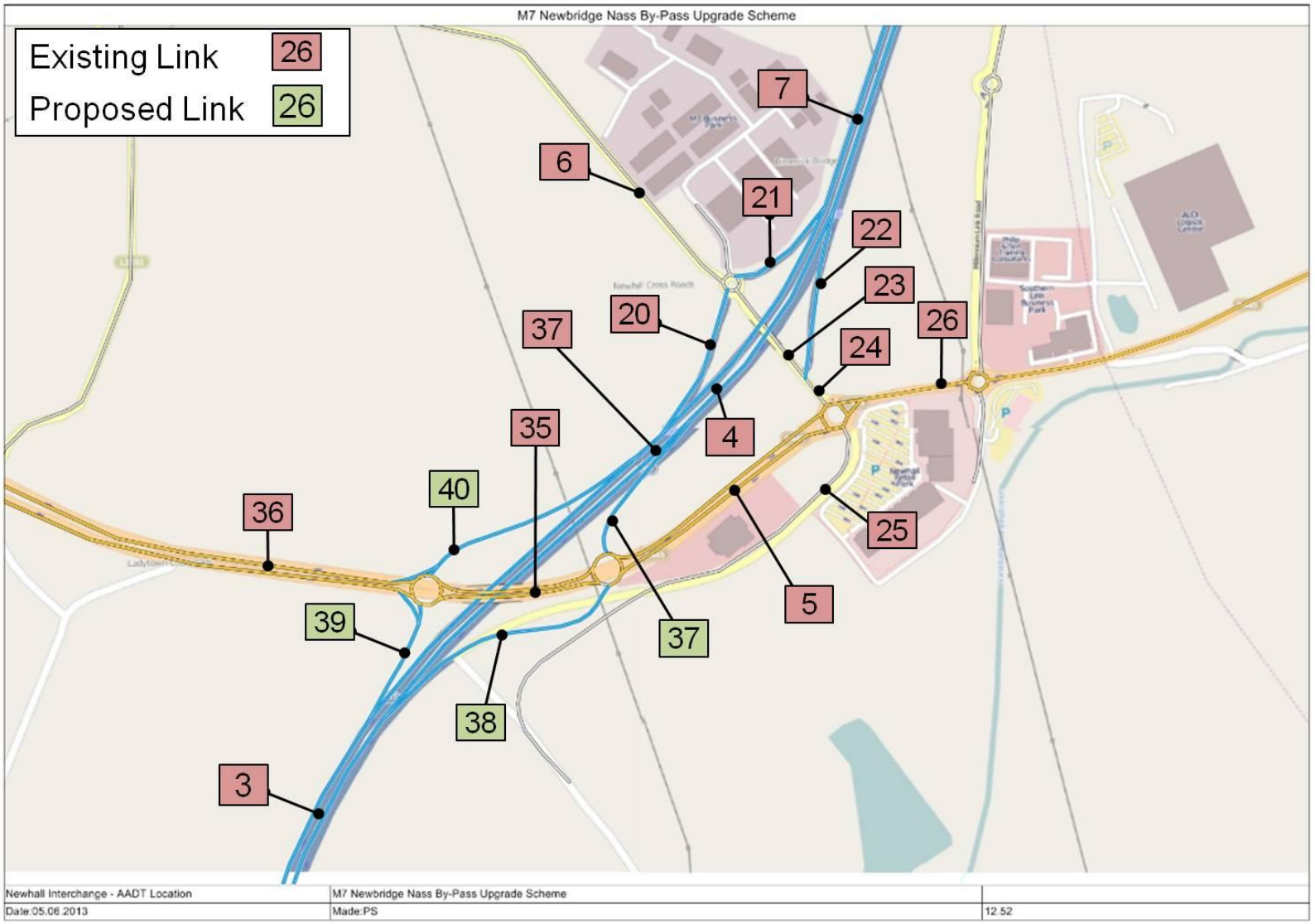

Plate 6.9: AADT Locations (Newhall Interchange)

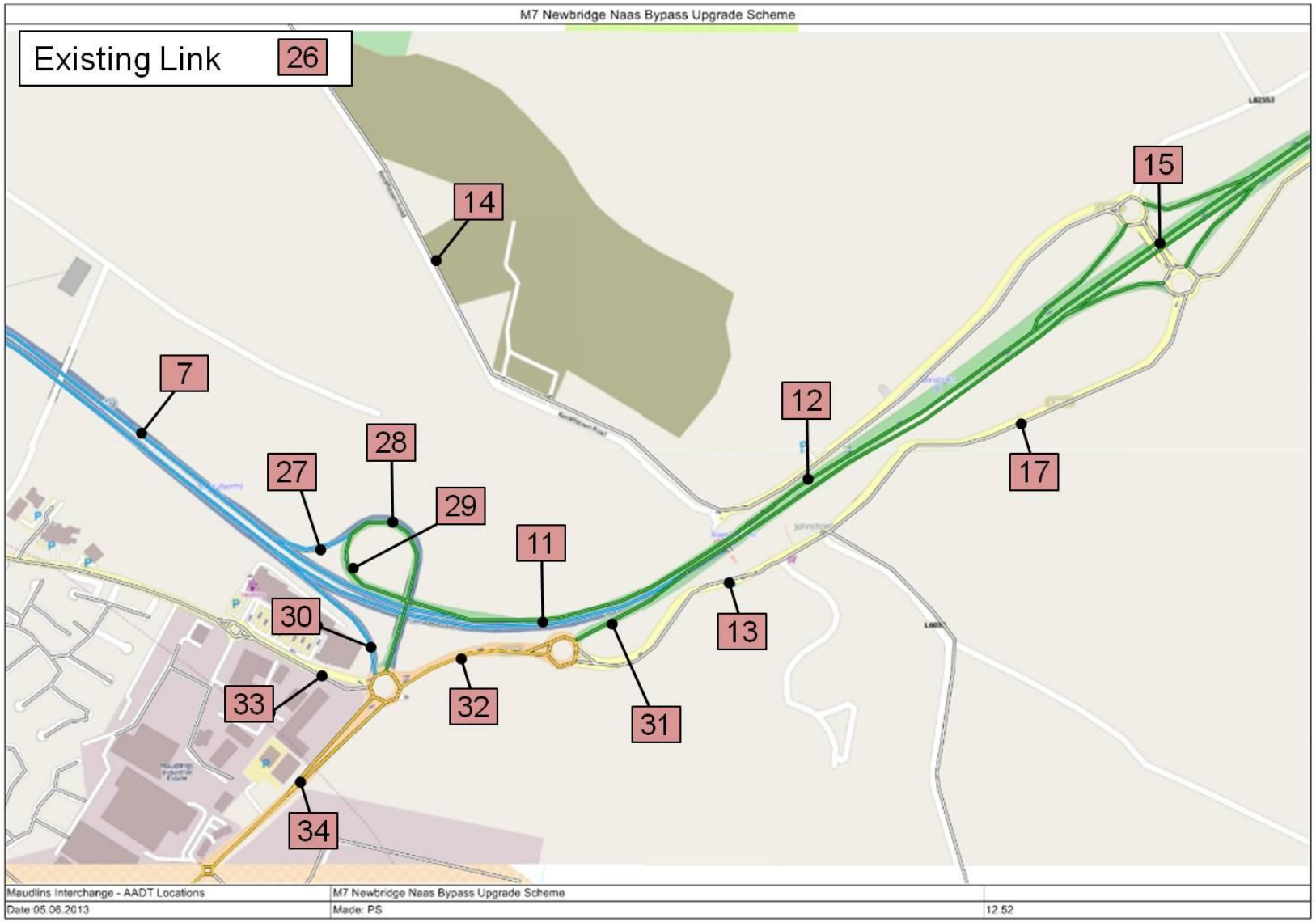

Plate 6.10: AADT Locations (Maudlins Interchange)

6.5.2 Design Year (2030)

Forecast traffic flows for the 2030 Design Year are set out in Table 6.4, again for the medium growth scenario.

Table 6.4 Link Flow Summary for 2030 Design Year (Medium Growth)

No.	Link	2012	2030	2030
		Base	Do-Min	Do-Some
1	M7 Mainline West of M7/M9 Junction	34,000	38,300	38,300
2	M9 Mainline South of M7/M9 Junction	20,950	24,900	25,200
3	M7 Mainline East of M7/M9 Junction	54,950	63,200	63,500
4	M7 Mainline at Newhall Interchange	43,400	49,600	68,100
5	R445 West of Newhall Interchange (Newbridge Road)	17,050	19,650	25,000
6	L2030 North of the Newhall Interchange	6,650	7,700	5,950
7	M7 Mainline East of Newhall Interchange	56,400	64,950	68,100
8	R409 - Caragh Road	6,450	9,100	9,150
9	L2006 - Osberstown Road	1,100	3,400	3,650
10	R407 - Sallins Road	18,050	19,500	17,150
11	N7 Mainline East of Maudlins Interchange	59,350	69,650	70,200
12	N7 Mainline West of Johnstown Interchange	68,600	81,450	81,300
13	L2014 - West of Johnstown	3,750	5,700	5,250
14	L2005 - Kerdiffstown Road	2,350	3,550	4,250
15	N7 Mainline at Johnstown Interchange	65,850	78,950	78,700
16	N7 Mainline East of Johnstown Interchange	69,600	84,500	84,550
17	L2014 - East of Johnstown	3,350	5,150	4,700
18	R416 - Athgarvan Road	5,550	7,800	8,000
19	Great Connell Road	2,100	3,400	3,850
20	M7 Eastbound Off-Slip (Newhall Interchange)	5,650	6,700	-
21	M7 Eastbound On-Slip (Newhall Interchange)	6,300	7,500	-
22	M7 Westbound Off-Slip (Newhall Interchange)	6,750	7,850	-
23	L2030 at Newhall Interchange	14,250	16,650	9,250
24	L2030 between M7 Off-Slip and R445	17,400	20,750	9,250
25	M7 Westbound On-Slip (Newhall Interchange)	6,400	7,500	900
26	R445 Newbridge Road	20,850	24,000	23,050
27	M7 Eastbound Off-Slip (Maudlins Interchange)	3,100	3,500	4,600
28	On/Off Slip (Maudlins Interchange)	12,500	15,000	15,850
29	N7 Eastbound On-Slip (Maudlins Interchange)	9,400	11,500	11,300
30	M7 Westbound On-Slip (Maudlins Interchange)	3,400	3,250	4,600
31	N7 Westbound Off-Slip (Maudlins Interchange)	9,300	11,800	11,150
32	R445 (Maudlins Interchange)	13,050	17,500	16,350
33	L2012 - Monread Road	15,550	20,650	20,700
34	R445 - Dublin Road	15,650	16,050	16,850
35	R445 - Dublin Road (East of Newhall Interchange)	-	-	20,600
36	R445 - Dublin Road (West of Newhall Interchange)	-	-	22,700

No.	Link	2012	2030	2030
		Base	Do-Min	Do-Some
37	M7 Eastbound Off-Slip (Newhall Interchange)	-	-	9,000
38	M7 Eastbound On-Slip (Newhall Interchange)	-	-	7,000
39	M7 Westbound Off-Slip (Newhall Interchange)	-	-	6,700
40	M7 Westbound On-Slip (Newhall Interchange)	-	-	9,250

**AADT values are rounded up to the nearest 50.*

In the Design Year (2030) traffic on the M7 increases by approximately 15-21% over the base year flows. There is an increase of approximately 17% over this period on the M9. As per the 2015 Do-Minimum scenario, a small amount (~4%) of traffic reroutes to avoid the increased congestion along the M7 corridor but transfers back to the M7 with the scheme in place.

In the Do-Something (2030) scenario the total traffic using the four slips roads of the Newhall Interchange is approximately 8% than in the Do-Minimum scenario. At the Maudlins Interchange the total increase in traffic on the four slips roads is approximately 5% between the Do-Minimum and Do-Something scenarios.

As previously highlighted, the existing congestion issue at the Maudlins Interchange will be address by the proposed continuation of the third lane as far as the M7/M9 split at Greatconnell. Therefore the 5% increase in traffic through the interchange in the Do-Something (2030) scenario will be catered within the existing capacity of the interchange.

6.6 Conclusions

In order to assess the impact of the scheme in terms of traffic, a series of traffic models were developed and assessed. Firstly, base year traffic models (2012) were created based on observed traffic data collected throughout the study area. These models were developed to provide a representation of existing traffic flows and traffic patterns and were calibrated and validated in line with NRA guidance.

Following on from this, traffic growth for the proposed scheme Opening (2015) and Design (2030) years was forecast based on the NRA growth factors outlined in the NRA Project Appraisal Guidelines. Once future growth was estimated, scheme impacts were assessed by comparing the Do-Minimum scenario (i.e. existing road network) with the Do-Something scenario (proposed scheme in place).

The impact of the proposed scheme in terms of the change in Annual Average Daily Traffic (AADT) on key links on the road network was produce for key links throughout the study area. In summary the proposed scheme leads to a reduction in congestion on the M7 and reduction in travel times between the Johnstown Interchange and M7/M9 Interchanges. The relocation of the Newhall Interchange also reduces congestion and significant improves the existing safety issues with traffic queuing on the off-ramps of the Interchange.