Chapter 5

Traffic Analysis

Rialtas na hÉireann Government of Ireland
Tionscadal Éireann Project Ireland 2040
An Roinn Iompair Turasóireachta agus Spóirt Department of Transport, Tourism and Sport
Comhairle Cathrach & Contae Luimnigh Limerick City & County Council
ROD AECOM

Chapter 5 Traffic Analysis

5.1 Introduction

This chapter of the EIAR assesses the potential traffic impacts of the proposed Foynes to Limerick Road (including Adare Bypass). It provides an overview of the traffic modelling processes used to inform the traffic analysis assessment and the data and assumptions which underpin the analysis. The outputs of the traffic analysis assessment are also presented alongside the findings of the assessment.

5.1.1 Existing & Future Traffic Issues

From a capacity perspective, the existing (2017) Annual Average Daily Traffic (AADT) volumes on the N21 between Rathkeale (12,950 AADT) and Attyflin (16,900 AADT) are already in excess of the operating capacity (11,600 AADT) of a single carriageway road operating at a Level of Service D. Major traffic delays are currently experienced through Adare Village (18,300 AADT) and these existing delays will be exacerbated over time as traffic levels increase in line with the projected growth in population and employment in the wider region.

Existing AADT volumes on the N69 between Foynes (6,350) and Mungret (11,750) are lower than the N21, however the N69 has a lower operating capacity due to its varying road cross section, poor road alignment and lack of overtaking opportunities. Existing average speeds along the N69 between Foynes Port and the N18 Dock Road Interchange are approximately 63kph and are projected to reduce to 52kph by 2039 as traffic congestion increases.

From a safety perspective both the N21 and N69 corridors already have existing collision rates in excess of the national average. The overall percentage of Heavy Goods Vehicles (HGV) along the N69 currently passing through the various urban settlements will effectively double over time with the growth and expansion of Foynes Port. Clearly such a very high increase in HGV traffic on the N69 would have significant negative impacts for the local communities along the route in terms of safety, security, amenity, noise and air quality, and particularly so in the case of vulnerable road users. Road safety on the N21 route will diminish due to growing traffic flows on the rural sections which already exceed the capacity of a single carriageway road.

5.1.2 Key Summary Findings

Based on the findings of the traffic assessment the proposed road development will have the following benefits in comparison to the 2039 Do-Minimum (i.e. not to proceed with the proposed road development) Scenario:

Safety – Potential reduction of 659 causalities, including 11 fatalities and 36 serious injuries.

Traffic Reduction in Urban Settlements – 77% reduction in traffic levels along N21 through Adare Village in 2039 and up to a 40% reduction through settlements along the N69.

Journey Time Savings – Reduced journey times between Foynes, Rathkeale, Adare and Limerick. Average time savings will range from 9 to 15 minutes depending on the time of day.

Journey Time Reliability – Consistent journey times throughout the day.

Noise & Air Quality – Reduction in noise and improvements in air quality as traffic levels are reduced through populated areas

In summary, the proposed road development will substantially reduce the level of traffic on the existing N69 and N21 corridors, as traffic transfers to the proposed road due to

the journey time saving and reliability benefits it provides. This generates safety benefits for all road users as traffic is reduced through existing settlements. In addition the reduction in traffic through these existing settlements will have positive impacts from an noise and air quality perspective.

5.2 Traffic Modelling Overview

A traffic model, which is referred to as the Foynes to Limerick Local Area Model (LAM) was developed to inform the identification of the preferred route option for the proposed road development, its design and its environmental impacts. In addition, the Foynes to Limerick LAM was used to provide outputs to inform the justification of the proposed road development as part of both the Preliminary and Detailed Business Cases.

The Foynes to Limerick LAM provides outputs such as Annual Average Daily Traffic (AADT) volumes and the percentage of Heavy Goods Vehicles (HGV) on each section of the modelled road network, in addition to the average journey time and speed on each section. It also provides information on the routes that vehicles choose to travel between their origin and destination.

At the Route Selection phase the Foynes to Limerick LAM was used to assess all route options and to inform the selection of the preferred route option. It was then used at the Design phase to inform the design of the preferred option (cross section and junction strategy) and to provide outputs to inform the assessment of the potential environmental impacts.

The Base Year Foynes to Limerick LAM was developed, calibrated and validated in accordance with the Transport Infrastructure Ireland (TII) Project Appraisal Guidelines (PAG) Unit 5.1 - Construction of Transport Models (Oct 2016). The Base Year Foynes to Limerick LAM was initially developed to reflect road conditions, traffic patterns and traffic levels in 2014 as part of the Route Selection phase and was subsequently updated to reflect conditions in 2017 as part of the Design phase. Traffic surveys were undertaken to inform the development of the Base Year Foynes to Limerick LAM and to validate its outputs.

Future Year Foynes to Limerick LAMs were developed for the proposed road development Opening Year (2024) and Design Year (2039). Both Future Year Foynes to Limerick LAMs were developed in accordance with TII PAG Unit 5.3 - Travel Demand Projections (May 2019). This TII PAG Unit provides traffic growth projections up to the year 2050 for defined geographically areas throughout the country. These traffic growth projections take into account the objectives of the National Planning Framework in terms of the quantum and distribution of population and employment growth.

Both the Base and Future Year Foynes to Limerick LAMs were audited by the TII Strategic & Transport Planning Unit as part of an independent assessment of the traffic model. The audit confirmed that the Base Year models were in compliance with the TII PAG and had been developed, calibrated and validated accordingly. It also confirmed that the future year models have been developed in accordance with the TII PAG.

5.2.1 Existing Modelling Tools

The National Transport Model (NTpM) was initially developed by TII in 2008 and is currently maintained as a central analysis tool for the assessment of the future needs of the national road network at a strategic level.

The NTpM modelled road network includes all National Primary, Secondary and Regional Roads in Ireland, plus other local roads of significance. At the time of developing the Base Year Foynes to Limerick LAM, the NTpM represented a Base Year of 2013 and Future Years of 2030 and 2050. Network information was thus available on existing and proposed road links throughout the country. The 2013 NTpM was used as the initial starting point in the development of the Base Year Foynes to Limerick LAM.

Using the NTpM as a starting point, the study area for the Foynes to Limerick LAM was identified and extracted from the NTpM. As the NTpM is a strategic model, the modelled area and road network extracted which represented the Foynes to Limerick LAM had to be enhanced and refined to reflect local conditions in accordance with the TII PAG.

The NTpM is updated every 5 years by TII following the release of the Central Statistics Office (CSO) Census results. As part of the most recent update in 2018, the NTpM base year was updated to 2016 to take into account the 2016 census results and also to take account of the increase in traffic levels throughout the country between 2013 and 2016, as a result of improved economic conditions and the recovery from the major economic crisis in the period 2008 to 2013.

As part of the most recent update of the NTpM, updated future year traffic growth projections were developed for 2030, 2040 and 2050 to take into account the objectives of the National Planning Framework in terms of the quantum and distribution of future population and employment growth throughout Ireland.

Accordingly, the traffic projections for the proposed road development reflect the latest NTpM projections, which are provided in TII PAG Unit 5.3 - Travel Demand Projections (May 2019).

5.3 Data Collection

Traffic survey data was required to develop and validate the Base Year Foynes to Limerick LAM, this traffic survey data is presented and discussed in the following sections.

5.3.1 Traffic Surveys

A first series of traffic surveys were undertaken in 2014 as part of the development of the Base Year Foynes to Limerick LAM, for the Route Selection phase of the project. Further traffic surveys took place in 2017 and early 2018 from which the base model was updated for the Design phase of the project. The following traffic surveys were undertaken:

- Origin-Destination Surveys (O-D);
- Automatic Traffic Counts (ATC);
- Junction Turning Counts (JTC); and
- Journey Time Surveys.

A number of permanent TII Traffic Monitoring Units (Automatic Traffic Counters) are located in the traffic model study area. Traffic data from these counters was also used in the development of the Base Year Foynes to Limerick LAM. The location of all traffic surveys are illustrated in Plates 5.1 to 5.4.

5.3.2 Journey Time Surveys

Journey time information was collected in order to ensure that the observed travel time on the existing roads was properly reflected in the corresponding journey times within the Base Year Foynes to Limerick LAM, thereby ensuring that a robust assignment of traffic onto the modelled road network would be produced.

Journey time surveys were carried out using Automatic Number Plate Recognition (ANPR) cameras, which track the registration of a vehicle at various locations throughout the road network and record the time at which the vehicle passed the camera. The location of the ANPR journey time survey data collection points are shown in Plate 5.2. The ANPR journey time data was supplemented with additional journey time data collected using Bluetooth tracking devices through Adare Village. Bluetooth devices track the anonymous Bluetooth signal from car kits and GPS devices within the vehicle or from mobile phones carried in the vehicles.

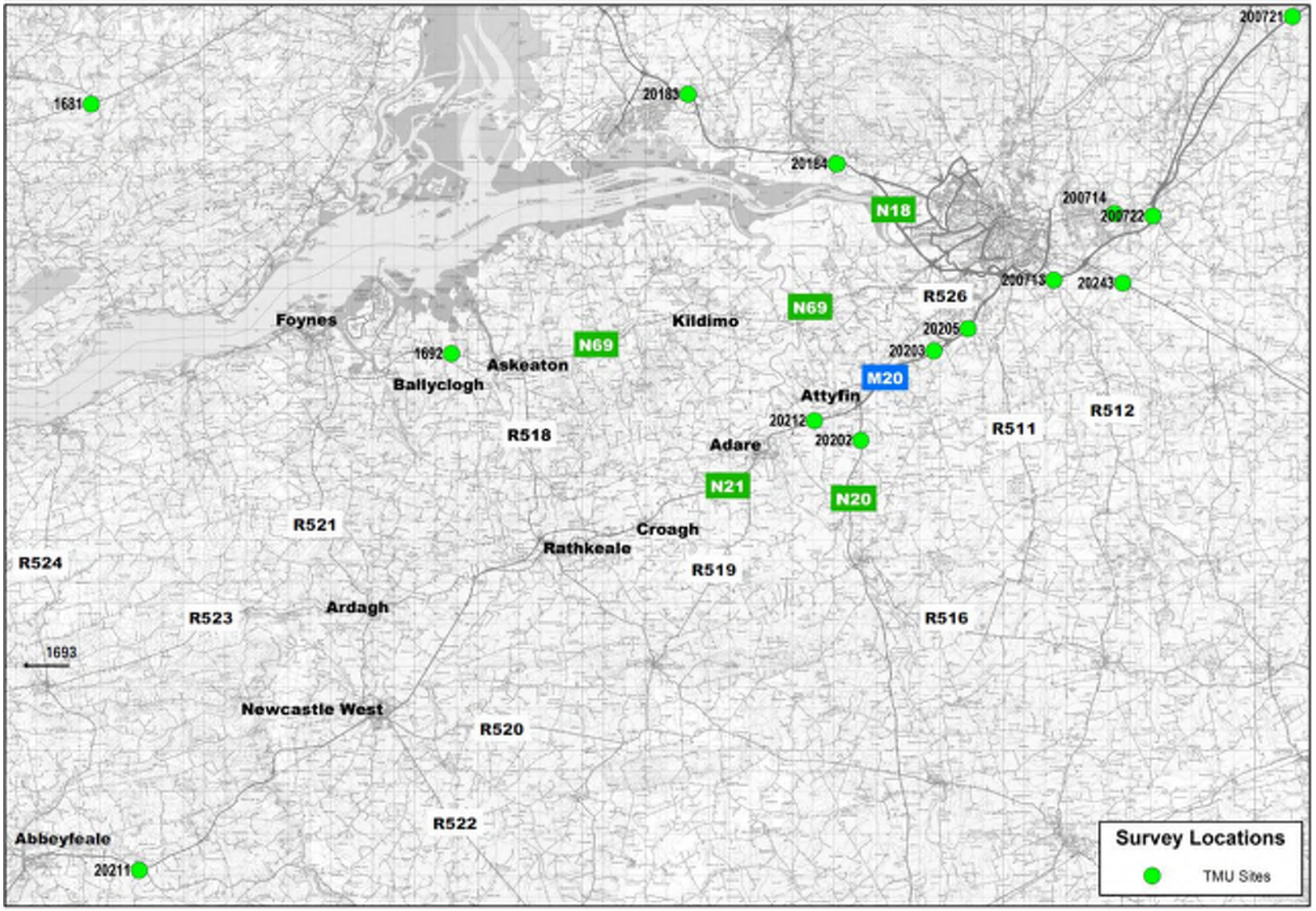

Plate 5.1 TII Traffic Monitoring Units (TMU) within the Traffic Model Study Area

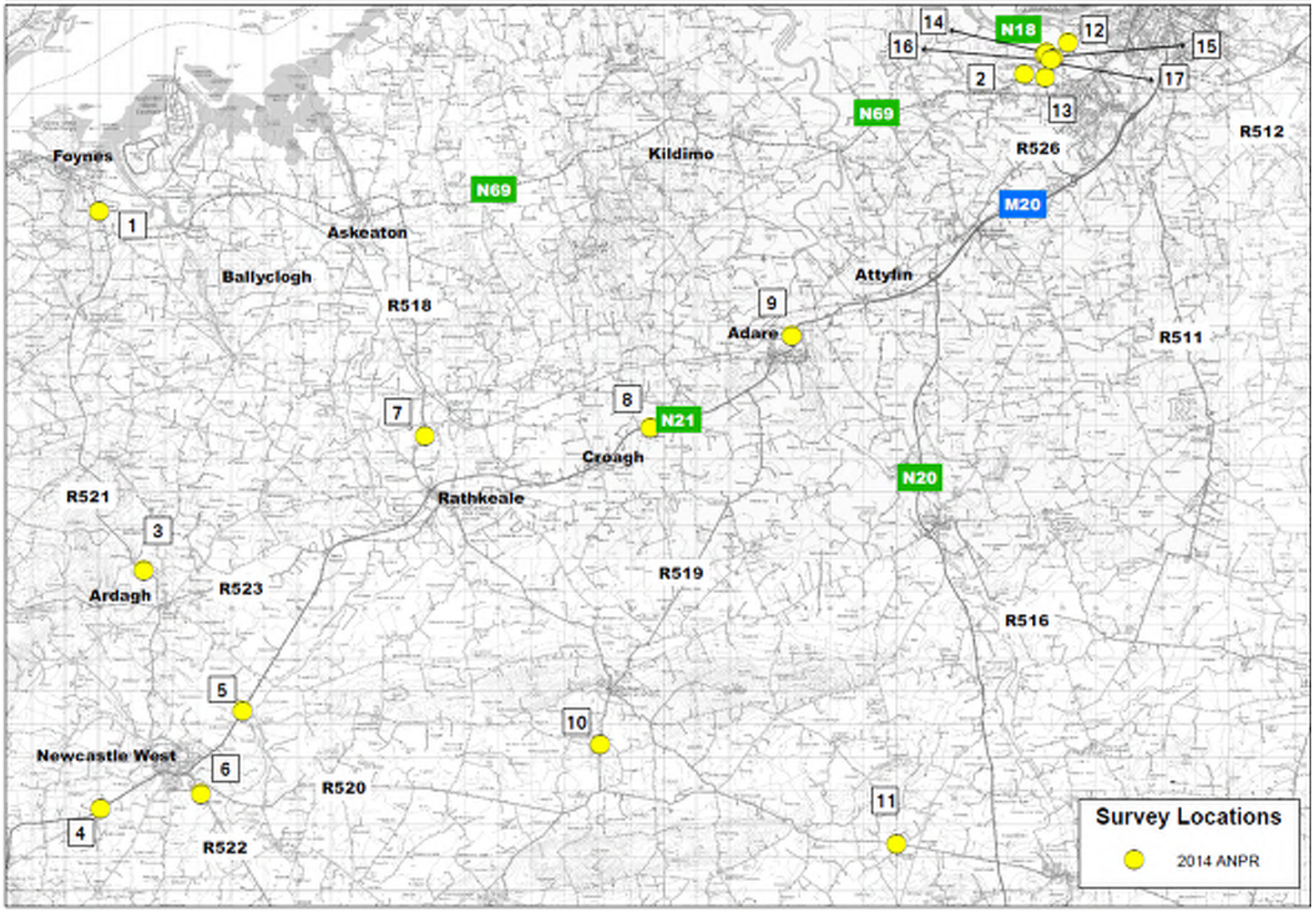

Plate 5.2 Automatic Number Plate Recognition (ANPR) Survey Locations

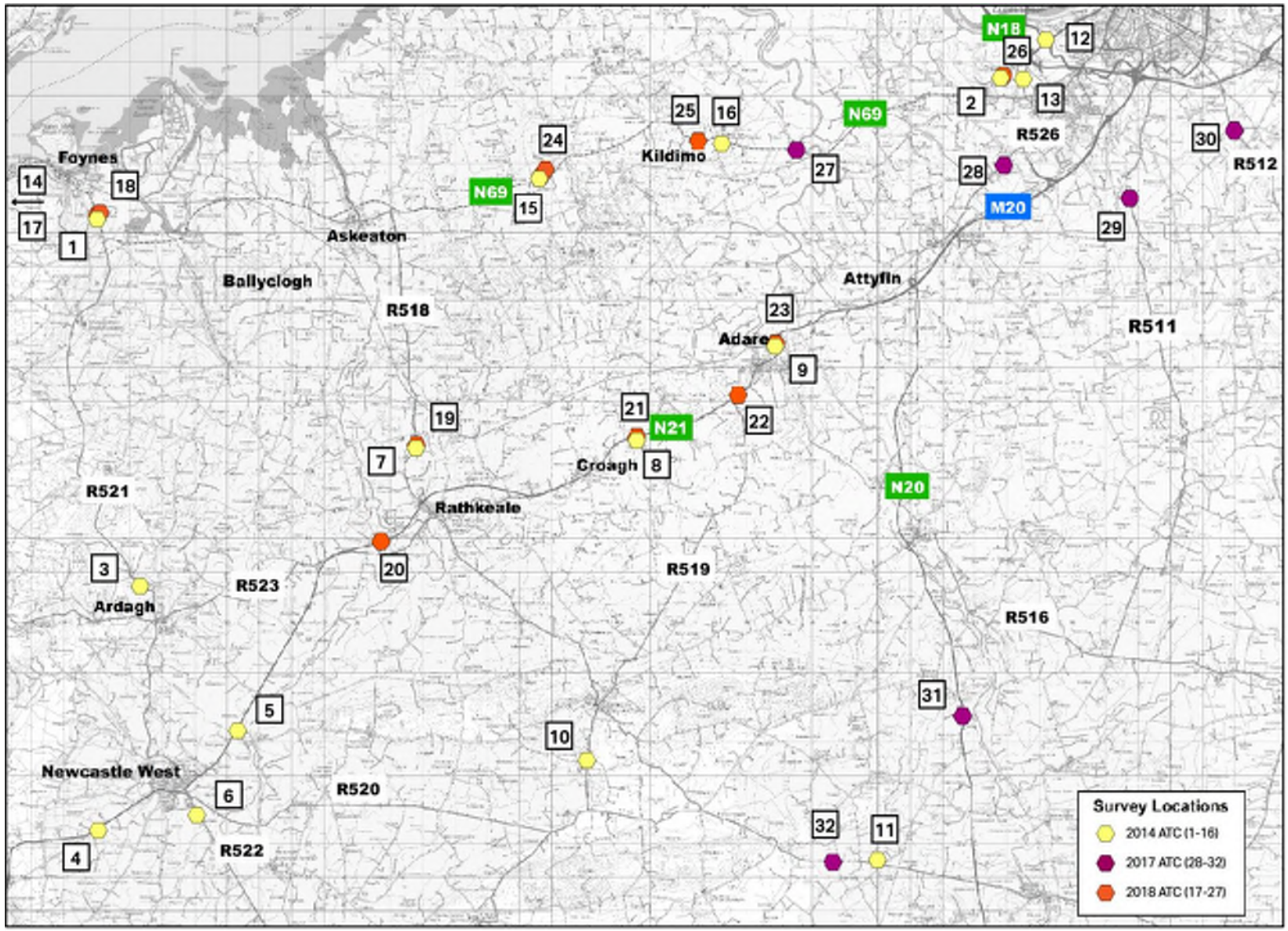

Plate 5.3 Automatic Traffic Count (ATC) Survey Locations

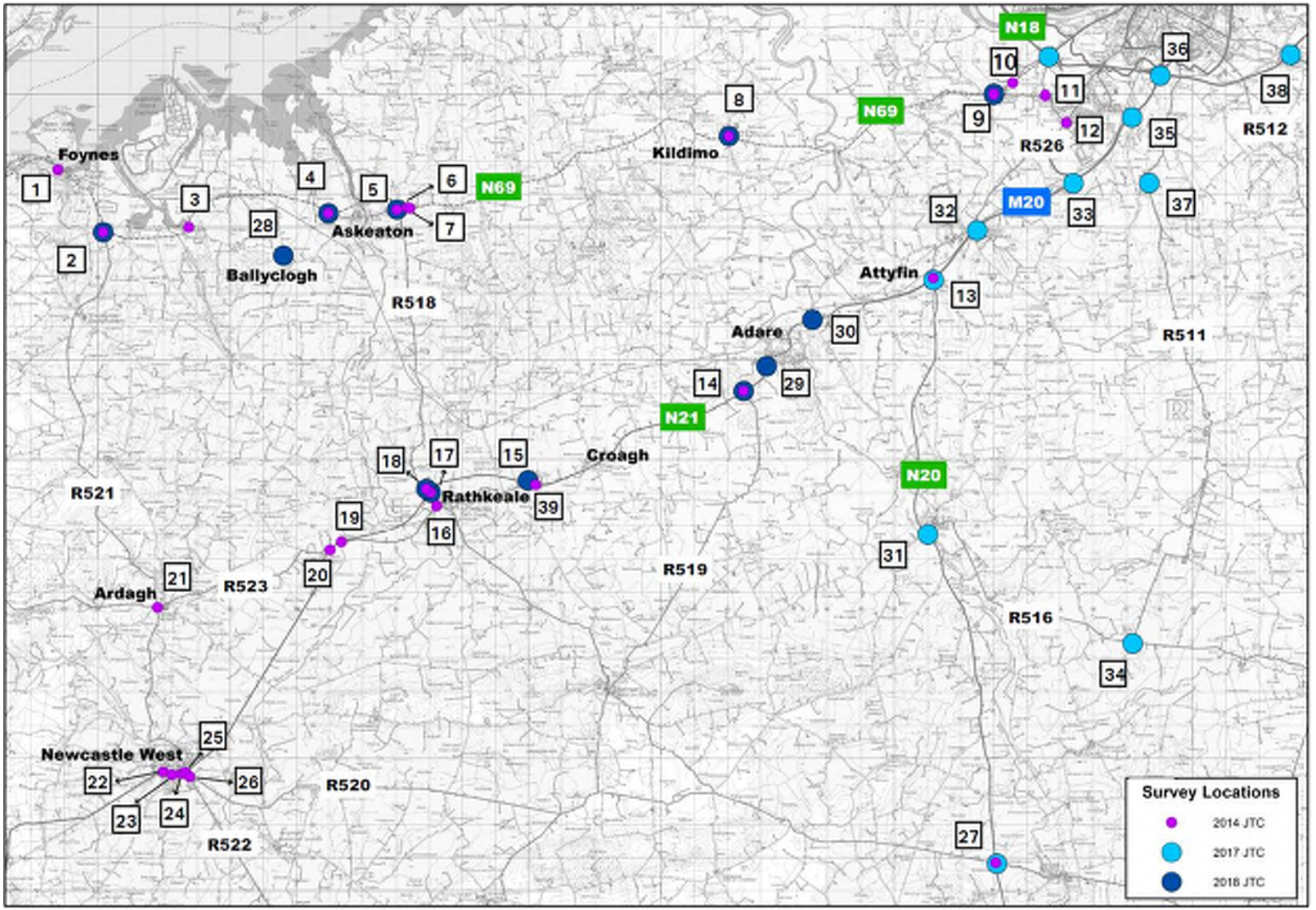

Plate 5.4 Junction Turning Count (JTC) Survey Locations

5.4 Base Year Traffic Modelling (2017)

5.4.1 Network Development

The study area for the traffic model which was initially identified using the TII National Transport Model is shown in Plate 5.5. The basic road network and zone structure was obtained from the NTpM and further refined to ensure that all network characteristics of the traffic model were reflective of the base year (2017) road network conditions.

Plate 5.5 Traffic Model Study Area

5.4.2 Trip Matrix Development

As part of the development of the Foynes to Limerick LAM, the zones (which represent the origin and destination of trips) used in the NTpM were refined to allow more precise movements in and out of the urban settlements to be modelled. Larger zones were used in the rural areas.

The Foynes to Limerick LAM consists of 110 zones, of these zones 88 represent trips within the study area (internal zones) with a further 22 zones representing trips feeding into the study area (external zones).

Un-calibrated trip matrices were firstly extracted from the TII NTpM 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 (observed) road traffic volumes and (observed) 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 TII PAG Unit 5.1 – Construction of Transport Models (Oct 2016).

There is no representation of the PM Peak Hour (17:00 – 18:00) in the TII NTpM. The un-calibrated PM Peak Hour matrices were therefore generated by reversing the calibrated AM Peak Hour matrices. The PM models were then calibrated and validated using observed traffic count data in accordance with the PAG.

5.4.3 Model Category

Traffic modelling for the proposed road was undertaken using an 'Assignment Model' and constructed in accordance with TII PAG Unit 5.1 - Construction of Transport Models. Assignment models allocate demand (trips) through a road network, taking into account the journey time, distance and tolls that vehicles would experience on the various route choices between their origin and destination.

5.5 Future Year Traffic Models (2024 & 2039)

5.5.1 Network Development

The future year 'Do-Minimum' road network which forms the basis of the future traffic models, should include the existing road network plus any committed infrastructure improvements in the study area. As there are no significant road improvements committed currently within the study area, the 'Do-Minimum' future road network for the proposed road development consists of only the existing road network, which is assumed to be maintained over time. Plate 5.6 illustrates the Do-Minimum road network.

The future year 'Do-Something' road network includes all the assumptions of the Do-Minimum network plus the proposed road development. The Do-Something network is shown in Plate 5.7.

Plate 5.6 Do-Minimum Road Network

Plate 5.7 Do-Something Road Network

5.5.2 Future Traffic Growth

The development of the traffic growth forecasts for the future year Foynes to Limerick LAM has been based on the requirements as set out in TII PAG Unit 5.3 - Travel Demand Projections (May 2019).

Future Year Foynes to Limerick LAMs have been developed for the following years in accordance with TII PAG Unit 5.1 – Construction of Transport Models:

- Proposed road development Opening Year - 2024; and
- Proposed road development Design Year - 2039 (Opening Year + 15 years).

The TII PAG specifies that the proposed road development should be assessed using three future traffic growth scenarios, namely the TII central growth scenario and two sensitivity scenarios (low and high). The TII central traffic growth scenario is based on the population and employment projections from the National Planning Framework. The TII low and high traffic growth projections assume the same distribution of population and employment as the National Planning Framework but with lower and higher total growth projections.

The TII PAG provides traffic growth projections for all general traffic zones in the NTpM but does not provide projections for Special Zones (i.e. airports and ports in Ireland). As Shannon-Foynes Port is classed as a Special Zone in the NTpM a separate process was required to project future traffic growth for the port and this is described in the following sections.

5.5.3 General Zones Traffic Growth

Traffic growth projections were developed for each of the three TII growth scenarios in line with methodology set out in TII PAG Unit 5.3 - Travel Demand Projections (May 2019).

5.5.4 Special Zone Traffic Growth: Shannon - Foynes Port

The growth in traffic for Shannon - Foynes Port was projected using estimated future tonnage provided by Shannon - Foynes Port Company (SFPC) from their Vision 2041 masterplan document. In addition, tonnages from new expanding markets, biomass and containers, was also provided by SFPC. These new markets are in addition to the increase in tonnage already forecast as part of the port's strategic masterplan.

Projected tonnages for the Port were converted to HGV movements based on estimates in relation to average HGV load size and number of movements per load. Table 5.1 outlines the projected increase in HGV Annual Average Daily Traffic (AADT) movements for three SFPC scenarios, Baseline, Midline & Highline in 2039. The 2041 SFPC projections have been adjusted to 2039 for the purposes of the traffic modelling assessment.

Table 5.1 HGV AADT Projections – Shannon - Foynes Port (2039 Design Year)

	Baseline	Midline	Highline
Vision 2041	641	858	1,168
Biomass	63	208	270
Containers	90	143	265
Total	**734**	**1,209**	**1,703**

For the purpose of the EIAR it has been assumed that the SFPC Baseline, Midline and Highline HGV projections for the Port correspond with the TII Low, Central and High growth scenarios. The growth projections outlined in Table 5.1 equate to a 1.7 to 4.0 increase on current (2017) daily HGV movements through Shannon - Foynes Port.

For Light Vehicle (LV) growth from the port, it was assumed that Light Goods Vehicles (LGV) which account for approximately 34% of all LVs, would grow at the same rate as HGVs. For private cars, it was assumed they would grow in proportion to the employment growth outlined in the SFPC Vision 2041 document, a total of 25% up to 2041. It was assumed this figure relates to the 2041 Midline scenario and growth for other years as well as the baseline and highline scenarios was calculated proportionally to the change in tonnage.

Additional growth in employment at Shannon - Foynes Port was estimated based on the extra tonnage forecast for Biomass and Containers. The 25% increase in employment discussed above is related solely to the additional tonnage through the port as part of Vision 2041 and does not take into account the potential employment required by the Biomass & Containers new markets in the region.

In these cases, the increase in employment has been increased in line with the increased tonnage associated with the new markets. This results in a total increase in employment growth of 41% by 2041 (or 1.5% per annum) in the Midline scenario. Table 5.2 outlines the forecast LV AADT for Shannon - Foynes Port based on these figures.

Table 5.2 Light Vehicle AADT Projections – Shannon - Foynes Port (2039 Design Year)

	Baseline	Midline	Highline
LGV	538	820	1,155
Car	662	789	967
Total	**1,200**	**1,609**	**2,122**

The Shannon - Foynes Port Masterplan provides insight into the existing distribution of HGV traffic leaving Shannon - Foynes Port. Currently 95% of the 100,000 HGV loads that leave the port and head east on the N69. Of this traffic, 65% travels to Limerick city and onward and 30% uses the R521 to connect southward to the N21 at Newcastle West. The remaining 5% head west along the N69 towards Listowel, County Kerry.

The planned major growth of Shannon - Foynes Port is focussed on serving the wider region which will account for the bulk of future traffic, and for which the proposed road development will provide the most direct and efficient access route to the national motorway network.

For the small proportion of HGV traffic that travels directly from Shannon - Foynes Port to the Dock Road area of Limerick City or north towards Clare, the existing N69 route will remain a little more direct than the proposed road development. This traffic accounts for approximately 20% of the existing overall port traffic and will reduce to approximately 5% of overall HGV demand as the port traffic grows in future. However, HGV drivers on this route may choose to use the proposed road instead, despite the slightly longer trip as it will guarantee a smoother, safer and more reliable journey than the existing road where there will be potential for unpredictable delays and congestion.

5.5.5 Traffic Growth Summary

The overall growth in traffic in the Foynes to Limerick LAM between the Base and the Opening Year (2024) and the Base and Design Year (2039) is outlined in Tables 5.3 and 5.4 respectively.

Table 5.3 Overall Trip End Growth in Foynes LAM (2017 – 2024)

TII Growth Scenario	Light Vehicles (LV)			Heavy Vehicles (HV)		
	AM	Inter	PM	AM	Inter	PM
Central	12%	13%	13%	29%	28%	26%
Low Sensitivity	11%	11%	11%	27%	26%	25%
High Sensitivity	15%	16%	15%	32%	30%	27%

Table 5.4 Overall Trip End Growth in Foynes LAM (2017 – 2039)

TII Growth Scenario	Light Vehicles (LV)			Heavy Vehicles (HV)		
	AM	Inter	PM	AM	Inter	PM
Central	33%	35%	34%	83%	81%	77%
Low Sensitivity	28%	30%	29%	76%	75%	72%
High Sensitivity	42%	45%	42%	94%	91%	86%

Future year models have been developed for all three TII growth scenarios. However, only the TII high growth results are presented throughout the remainder of this EIAR as they represent the worst-case scenario from an environmental perspective.

5.5.6 Estimation of Annual Average Daily Traffic (AADT)

Conversion factors were applied to derive the Annual Average Daily Traffic (AADT) flow from the AM, Inter and PM peak hour traffic flows. These conversion factors were derived in accordance with TII Project Appraisal Guidance (PAG) Unit 16.1 – Estimating AADT on National Roads (Oct 2016).

5.6 Predicted Impacts

5.6.1 Opening Year AADT (2024)

Traffic volumes are shown in Table 5.5 for the 2017 Base Year and the forecast Do-Minimum and Do-Something Opening Year (2024) scenarios. The traffic flows in each of these scenarios are illustrated graphically in Plate 5.8 and Plate 5.9 respectively.

Table 5.5 AADT Summary for 2024 Opening Year (TII High Growth) *

No.	Link	2017 Base	2024 Do-Minimum	2024 Do-Something
1	N69 West of Foynes	3,600	4,300	4,050
2	N69 Ballyculhane between Foynes & Askeaton	6,350	8,500	1,900
3	N69 Ballyvogue East of R518 Junction at Askeaton	8,250	10,600	6,350
4	N69 West of River Maigue Bridge	9,600	12,150	7,800
5	N69 West of R859 Junction	10,200	12,850	8,400
6	N69 Southwest of N18 Junction	11,750	13,650	11,200
7	R510 South of N18 Junction	13,000	14,450	14,650
8	N18 between Junctions 1 and 2	32,700	39,350	37,900
9	R518 North of Rathkeale	2,100	2,700	1,700
10	R521 North of Ardagh	3,300	3,900	3,950
11	N21 West of N21/R521 Junction	14,650	16,650	16,800
12	R523 West of Reens Junction	2,100	2,500	2,950
13	N21 Amogan Beg	12,950	14,050	450

No.	Link	2017 Base	2024 Do-Minimum	2024 Do-Something
14	N21 East of Croagh	13,900	15,450	1,500
15	N21 East of R519	15,700	17,650	3,750
16	N21 West of Attyflin Junction No.5	16,900	19,000	23,750
17	N20 South of Attyflin Junction No.5	14,850	17,750	17,900
18	M20 West of Raheen Junction No.3	29,200	33,950	37,400
19	M20 between Junction 3 Raheen & 2 Dooradoyle	31,800	36,950	40,350
20	M7 between Junction 29 Ballysimon and 30 Cork	42,300	51,350	51,400
21	**Foynes to Ballyclogh**	**-**	**-**	6,250
22	**Ballyclogh to Askeaton**	**-**	**-**	3,850
23	**Ballyclogh to Rathkeale**	**-**	**-**	4,350
24	**Rathkeale to Croagh**	**-**	**-**	18,550
25	**Croagh to Adare**	**-**	**-**	18,950
26	**Rathkeale Junction**	**-**	**-**	1,600
27	**Croagh Junction**	**-**	**-**	2,350
28	**Adare Junction**	**-**	**-**	7,350

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

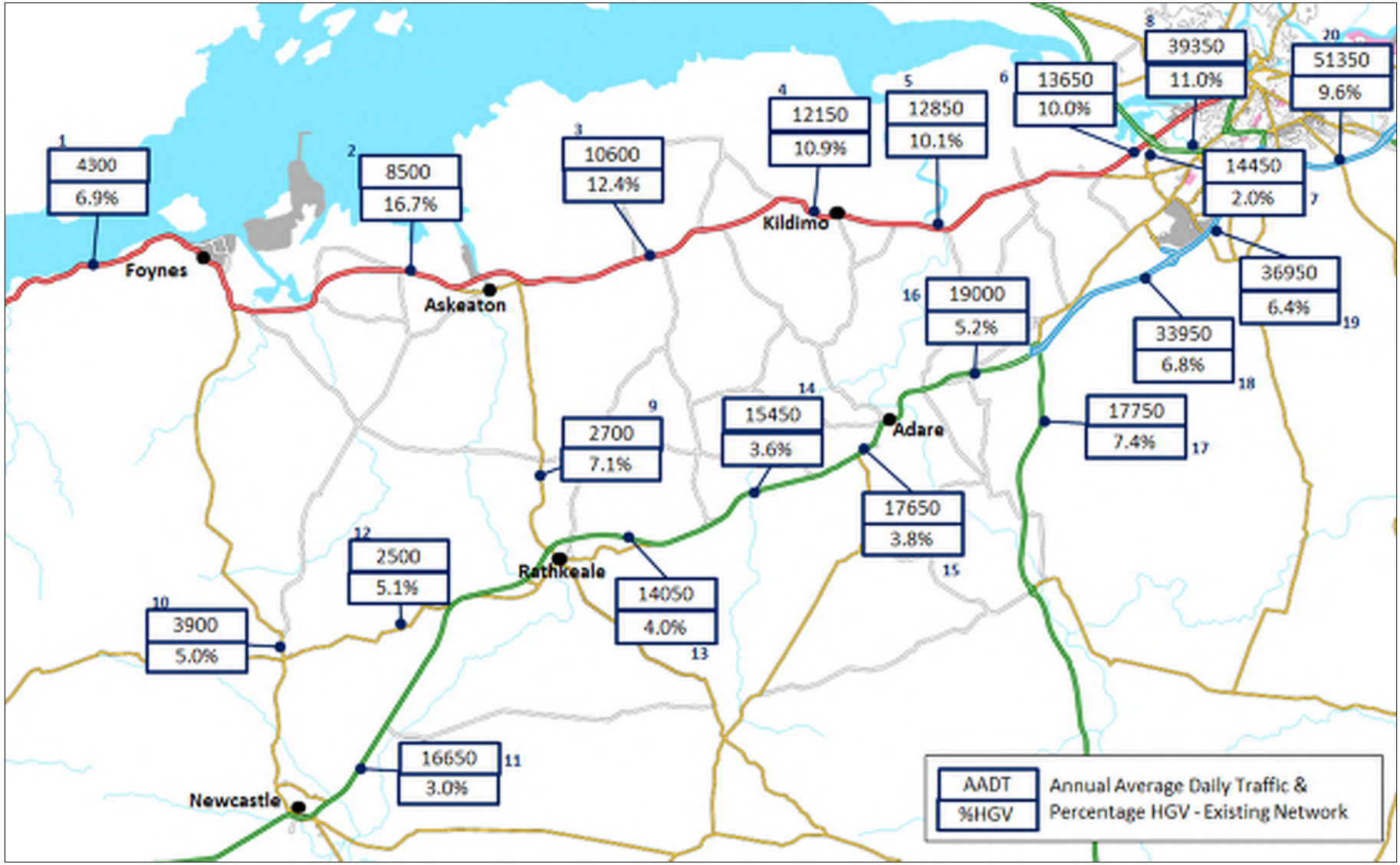

Plate 5.8 2024 Do-Minimum AADT (High Growth Sensitivity Scenario)

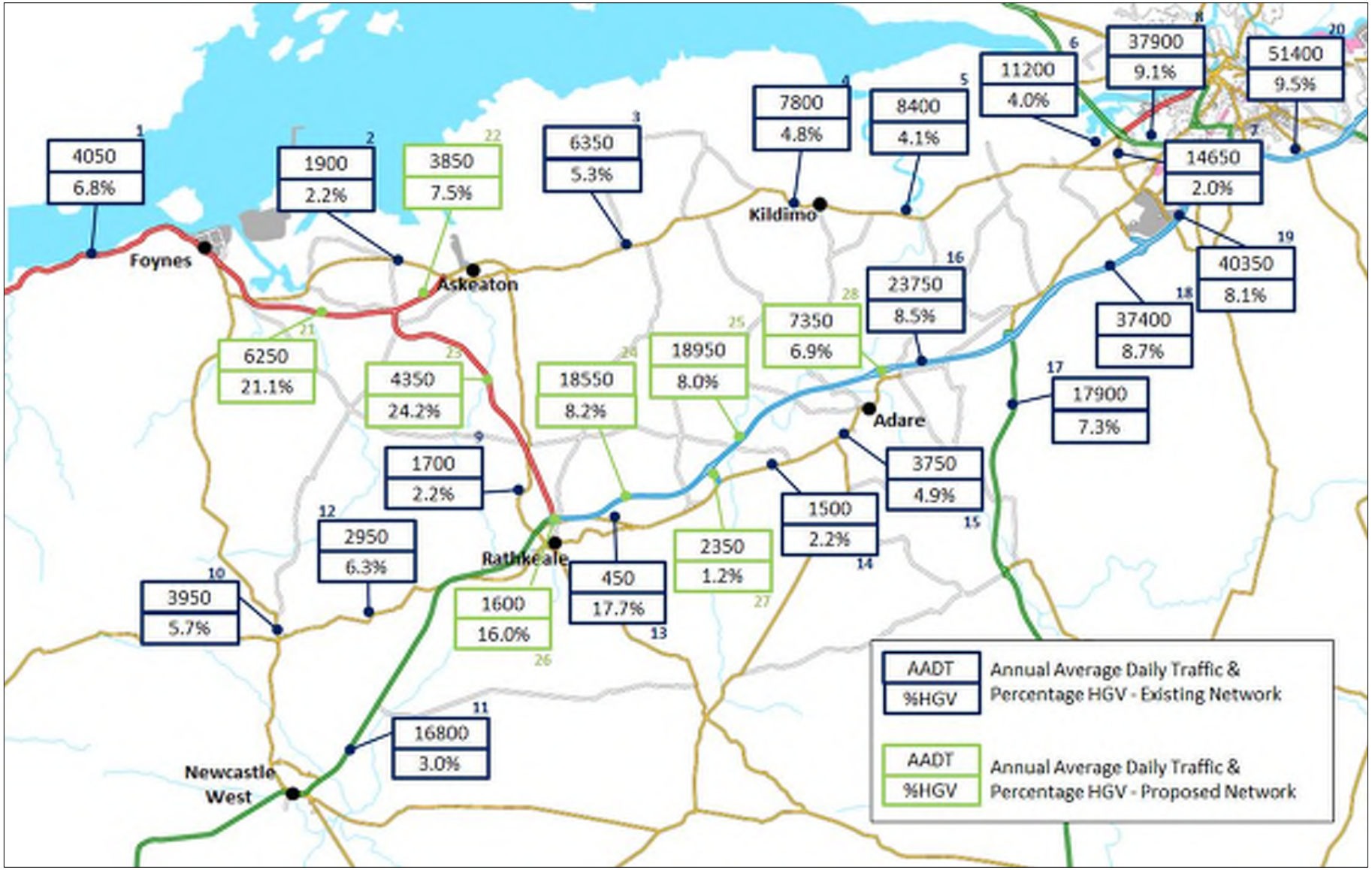

Plate 5.9 2024 Do-Something AADT (High Growth Sensitivity Scenario)

In the 2024 Do-Something scenario the proposed road development is projected to carry up to 18,950 AADT between Rathkeale and Adare. The traffic flows presented in Table 5.5 highlight a number of impacts as a direct result of the proposed road development. These impacts for the Opening Year include:

- A reduction in traffic along the existing N69 between Foynes and Askeaton of 78% due to the proposed road development;
- A reduction in traffic along the existing N69 between Askeaton and the N18 Dock Road of between 18% and 40% as a result of traffic transferring onto the proposed Foynes to Rathkeale section of the proposed road development;
- A large reduction in traffic through Adare (79%) due to traffic using the M21 bypass of Adare; and
- An increase of approximately 3,450 AADT (10%) in traffic on the M20 corridor west of Raheen (Junction No. 3) as a result of traffic transferring from the N69 corridor to the proposed road development.

In summary, the proposed road development substantially reduces the level of traffic on the existing N69 and N21 corridors, as traffic transfers to the proposed new road due to the time saving and journey time benefits it provides. There are also more modest reductions in traffic volumes on sections of the regional road network such as the R518 between Rathkeale and Askeaton.

5.6.2 Design Year (2039)

Forecast traffic flows in the Do-Minimum and Do-Something 2039 Design Year scenarios are outlined in Table 5.6 alongside the 2017 base year flows and are illustrated in Plate 5.10 and Plate 5.11 respectively.

Table 5.6 AADT Summary for 2039 Design Year (High Growth)*

No.	Link	2017 Base	2039 Do-Minimum	2039 Do-Something
1	N69 West of Foynes	3,600	5,450	5,100
2	N69 Ballyculhane between Foynes & Askeaton	6,350	11,050	2,400
3	N69 Ballyvogue East of R518 Junction at Askeaton	8,250	13,700	8,000
4	N69 West of River Maigue Bridge	9,600	15,750	9,800
5	N69 West of R859 Junction	10,200	16,700	10,500
6	N69 Southwest of N18 Junction	11,750	17,800	14,250
7	R510 South of N18 Junction	13,000	18,250	18,650
8	N18 between Junctions 1 and 2	32,700	50,300	48,450
9	R518 North of Rathkeale	2,100	3,500	2,200
10	R521 North of Ardagh	3,300	5,000	5,100
11	N21 West of N21/R521 Junction	14,650	20,850	21,150
12	R523 West of Reens Junction	2,100	3,100	3,650
13	N21 Amogan Beg	12,950	17,350	550
14	N21 East of Croagh	13,900	19,000	1,850

No.	Link	2017 Base	2039 Do-Minimum	2039 Do-Something
15	N21 East of R519	15,700	20,800	4,750
16	N21 West of Attyflin Junction No.5	16,900	22,700	30,450
17	N20 South of Attyflin Junction No.5	14,850	23,250	22,800
18	M20 West of Raheen Junction No.3	29,200	43,250	47,800
19	M20 between Junction 3 Raheen & 2 Dooradoyle	31,800	48,100	52,600
20	M7 between Junction 29 Ballysimon and 30 Cork	42,300	66,100	65,750
21	**Foynes to Ballyclogh**	**-**	-	8,350
22	**Ballyclogh to Askeaton**	**-**	-	4,950
23	**Ballyclogh to Rathkeale**	**-**	-	5,950
24	**Rathkeale to Croagh**	**-**	-	23,650
25	**Croagh to Adare**	**-**	-	24,250
26	**Rathkeale Junction**	**-**	-	2,000
27	**Croagh Junction**	**-**	-	2,900
28	**Adare Junction**	**-**	-	9,400

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

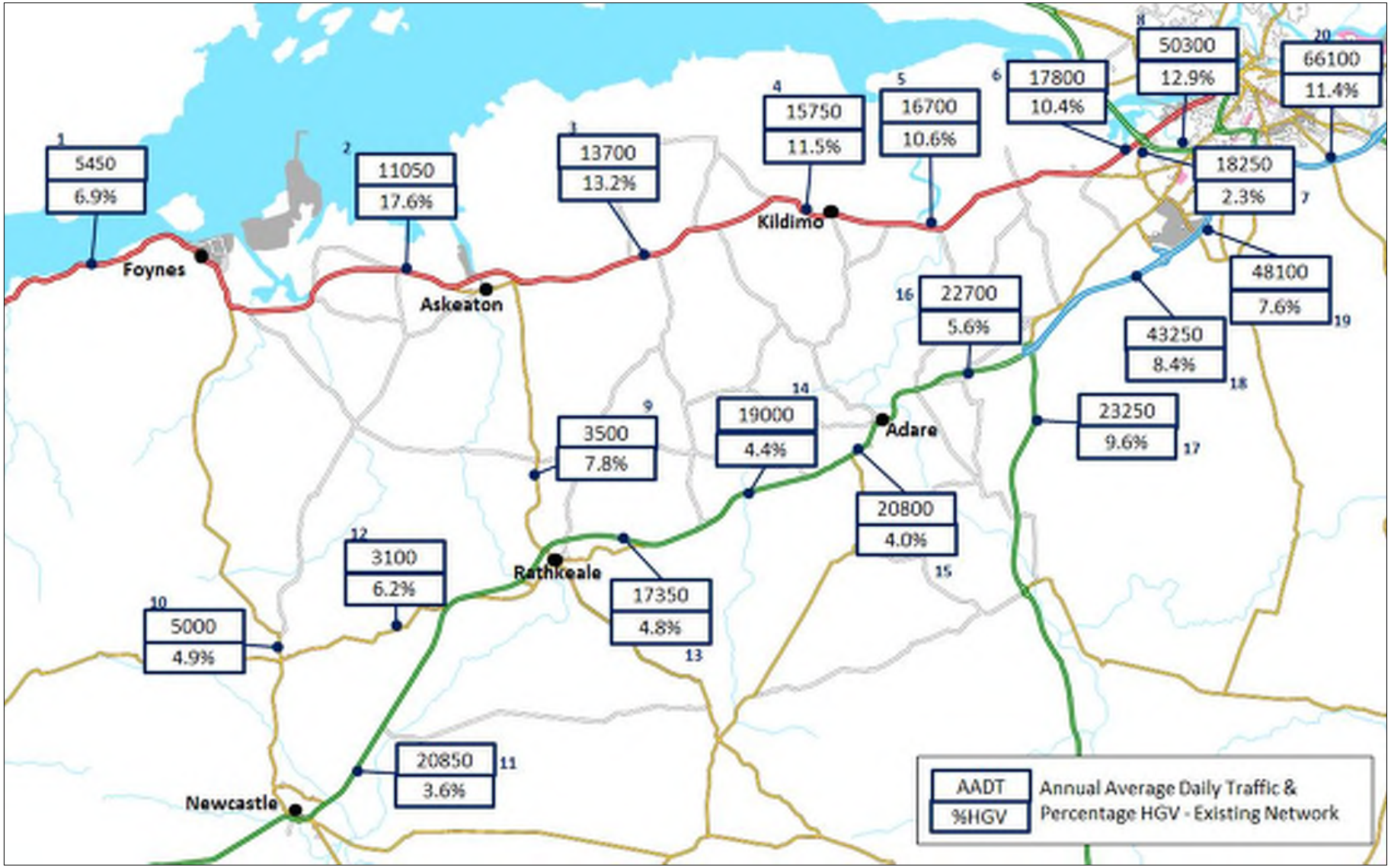

Plate 5.10 2039 Modelled Future AADT & Percentage HGV (Do-Minimum Network)

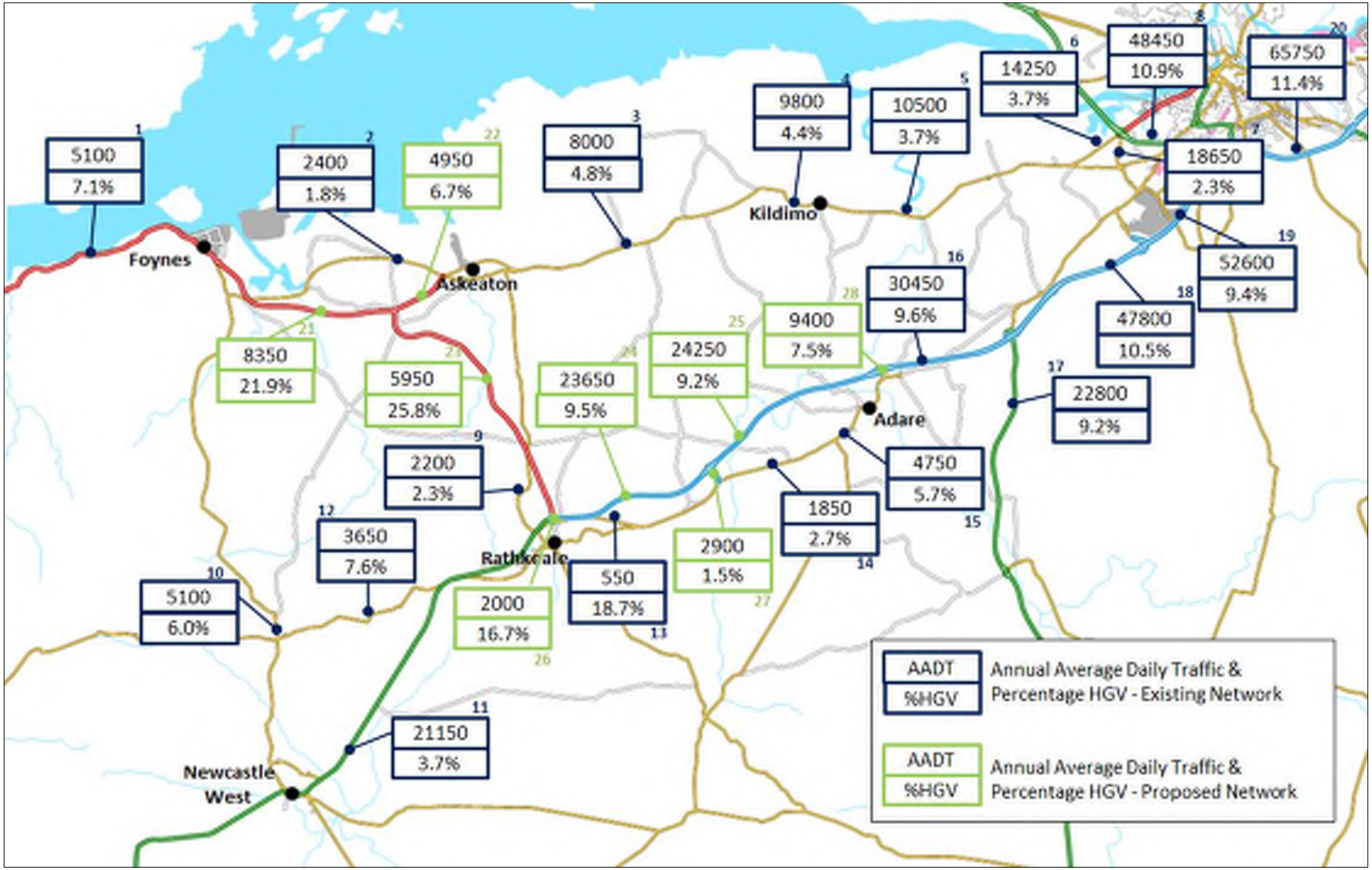

Plate 5.11 2039 Modelled Future AADT & Percentage HGV (Do-Something Network)

In the 2039 Do-Something scenario the proposed road development is forecast to carry up to 24,250 AADT between Rathkeale and Adare, and up to 8,350 AADT between Rathkeale and Foynes. The traffic flows in the Do-Something scenario show a similar pattern of impacts as reported for the Opening Year (2024), with a 77% reduction in traffic levels along N21 through Adare Village in 2039 and up to a 40% reduction through settlements along the N69.

5.6.3 Selection of Preferred Cross Section - Foynes to Rathkeale Section

As required under the TII Project Management Guidelines an incremental analysis of the carriageway type was undertaken to inform the selection of the cross-section for the proposed road development. As part of the incremental analysis an assessment of the operating capacity of the Foynes to Rathkeale section of the proposed road development was undertaken. The Foynes to Rathkeale section of the proposed road development is illustrated in Plate 5.12 and consists of the following 3 key sections:

- Section A (Foynes to Ballyclogh);
- Section B (Ballyclogh to Askeaton); and
- Section C (Ballyclogh to Rathkeale).

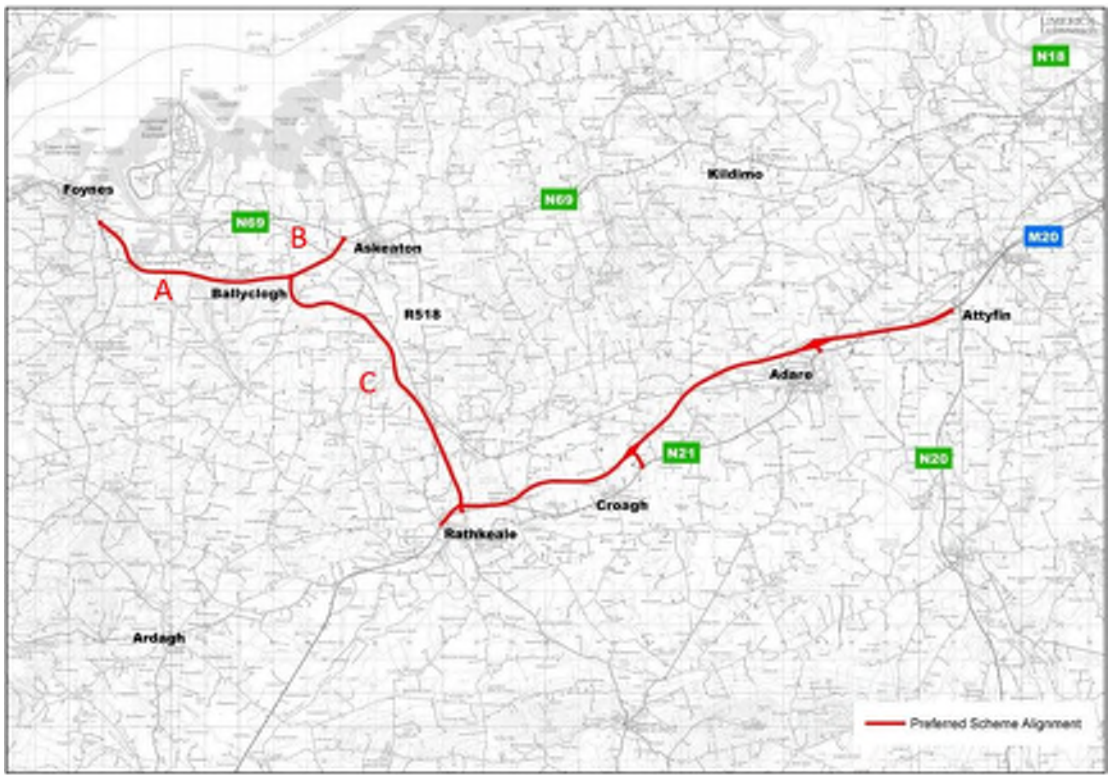

Plate 5.12 Proposed Road Development

Under the TEN-T Regulations only a Motorway or an Express Road may be considered as a road option type on the Core TEN-T road network. In Table 6.1 of TII Standard DN-GEO-03031, the minimum road type cross section of an Express Road is a Type 1 Single Carriageway. A Type 1 Single Carriageway is appropriate for flows of up to 11,600 AADT, above which a dual carriageway should be considered.

Table 5.7 presents the AADT projections for the 3 sections of the proposed road development between Foynes and Rathkeale for each of the TII traffic growth scenarios. Of particular significance on Sections A & C is the very high volume of Heavy Goods Vehicles, which will be up to 26% of the total traffic in the high growth

scenario. This compares with a typical HGV proportion of 5-7%% on most national routes.

The notional traffic capacity of the various road cross-sections defined in TII Standard DN-GEO-03031 does not account for the effect of such unusually high volumes of HGVs. To assess the Volume/Capacity (V/C) Ratio based on Passenger Car Units PCU) instead of vehicles an assumption was made to use a PCU factor of 3 to convert HGVs to PCU (i.e. 1 HGV = 3 PCUs). A factor of 3 was used to reflect the larger HGVs that will use Shannon - Foynes Port.

The impact of these higher traffic volumes in terms of PCUs is presented in Table 5.7. The capacity of a single carriageway road operating at Level of Service D is 11,600 AADT. The calculation of this AADT capacity is based on an assumption of a 12% HGV content (Section 4.8 of the NRA National Roads Needs Study). On the basis of 1 HGV = 3 PCU, the capacity of a single carriageway link in PCUs would be 14,384 PCUs.

Table 5.7 Annual Average Daily Traffic (AADT) 2039 Design Year

Section	AADT	%HGV	HGVs	PCU	V/C Ratio
A	8,350	21.9%	1,829	12,007	83%
B	4,950	6.7%	333	5,614	39%
C	5,950	25.8%	1,535	9,020	63%

PCU: Passenger Car Unit. 1 HGV = 3 PCU. Capacity of a Single Carriageway in PCU = 14,384

Due to activity at Shannon - Foynes Port between Monday and Friday, weekday traffic volumes are notably higher than the 7-day average between Monday and Sunday. This is reflected in the TII TMU located on the N69 West of Askeaton, which shows that Annual Average Weekday Traffic (AAWT) flows are approximately 10% higher than AADT. In addition the proportion of HGVs is also higher (9.5% versus 7.9%). To assess the impact of these higher weekday volumes, the AADT and %HGV volumes presented in Table 5.7 were increased by 10% and converted to PCUs. The results of which are presented in Table 5.8.

Table 5.8 Annual Average Weekday Traffic (AAWT) 2039 Design Year

Section	PCU	V/C Ratio
A	13,610	95%
B	6,248	43%
C	10,260	71%

PCU: Passenger Car Unit. 1 HGV = 3 PCU. Capacity of a Single Carriageway in PCU = 14,384

The V/C Ratio assessment based on AAWT volumes presented in Table 5.8 shows that Section A (Foynes to Ballyclogh) of the proposed road could potentially be operating at up to 95% of its capacity as a Type 1 Single Carriageway between Monday and Friday in the high growth scenario. Providing a new road that may be operating close to its capacity after only 15 years of its operational life would not be best practice and therefore the case for a Type 2 Dual Carriageway cross section for Section A can be made on capacity grounds.

The V/C Ratio assessment shows that a Type 1 Single Carriageway would have ample capacity to cater for the projected demand on Section B (Ballyclogh to Askeaton) of

the proposed road development. Table 5.7 also indicates that projected HGV levels on Section B are significantly lower (at approximately 6%) than on Sections A and C. As such no further consideration was required in relation to the preferred cross section (i.e. Type 1 Single) for Section B.

From a V/C Ratio perspective, Section C if delivered as a Type 1 Single Carriageway would have the capacity to cater for the projected demand. However, the unusually high proportion of HGV traffic on this section (>25%) raises concerns over the operating capacity, safety and reliability if delivered as a Type 1 Single Carriageway.

5.6.4 Need for A Type 2 Dual Cross Section – Section C (Ballyclogh to Rathkeale)

The marginal additional cost of providing a Type 2 Dual Carriageway above that of a Type 1 Single Carriageway between Foynes and Rathkeale is only 6% of the total cost. There are a number of non-quantifiable or qualitative factors that need to be taken into consideration in relation to the selection of a Type 2 Dual Carriageway for Section C, that would offset the marginal additional cost of the Type 2 Dual Carriageway, including:

- Additional Safety Benefits;
- Journey Time Reliability and Quality Benefits;
- Future Proofing Access to a Tier 1 Port;
- Continuity of Cross Section between Shannon - Foynes Port and the M21 at Rathkeale; and
- Wider Government Policy.

Additional Safety Benefits

The collision model (COBALT-Ireland) used to inform the Business Case is based on AADT and local/default collision rates by road type. The model does not take into account the high volumes of HGVs that will be experienced on the N69 in the Do-Minimum scenario or the potential impact of the high proportion of HGVs (up to 26%) on Section C of the Foynes to Rathkeale link in the Do-Something scenario. Therefore the benefit of providing a Type 2 Dual over a Type 1 Single from a safety perceptive is considered to be underestimated.

Journey Time Reliability and Quality Benefits

Either a Type 2 Dual Carriageway or Type 1 Single Carriageway will provide an improved road network in terms of efficiency and effectiveness at the year of opening. However due to the additional residual capacity offered by the Type 2 Dual Carriageway over a Single Carriageway, the road network would continue to provide a high level of service even if traffic growth was greater than projected.

Although not currently monetised under the TII PAG, the journey time reliability and quality benefits of the Type 2 Dual over a Type 1 Single would further increase the economic case for a Type 2 Dual above that of a Type 1 Single.

Future Proofing Access to a Tier 1 Port

The Tier 1 Port status of Shannon - Foynes indicates the national and regional importance of the port as a major factor in the economic life of the Mid-West Region and the national economy. Growth of the port is currently constrained by the poor-quality road access that discourages industrial and commercial development relative to the opportunities associated with the port.

As a Type 1 Single or Type 2 Dual, the Foynes to Rathkeale section will provide a vastly improved connection at year of opening. However, as traffic levels rise over the time and Shannon - Foynes Port expands, the provision of a Type 1 Single if operating at a reduced level of service may potentially discourage or limit investment in Shannon - Foynes Port or the surrounding area. While it is acknowledged that the road could be upgraded at a point in the future, this will further increase the capital cost, lead to delays during construction and also risk reputational damage.

Continuity of Cross Section between Shannon - Foynes Port and the M21 at Rathkeale

The need for a Type 2 Dual cross section on Section A of the Foynes to Rathkeale link (Foynes to Ballyclogh) can be made on capacity grounds as demonstrated in Table 5.8. If a Type 1 Single cross section is provided on Section C (Ballyclogh to Rathkeale), then vehicles travelling between Shannon - Foynes Port and the M21, will travel along three different road cross sections (Type 2 Dual, Type 1 Single and Type 1 Dual/Motorway).

There should be a consistent cross section between Shannon - Foynes Port and the M21 at Rathkeale in order to provide a safe and reliable route for traffic on the TEN-T Core road network, to reflect its strategic importance for major National, European and Global transport.

Wider Government Policy

There are numerous policy documents at European, National, Regional and Local level summarised previously in the EIAR that support the need for a high quality road connection between Shannon - Foynes Port and the motorway road network. However these policy document and their objectives do not specifically dictate the cross section of the road connection.

Under the Department of Transport, Tourism and Sport (DTTAS) National Ports Policy (2013), Shannon-Foynes Port is classified as a Tier 1 Port. The National Ports Policy has as a key strategic objective, the continued commercial development of Shannon - Foynes Port Company, and clearly identifies as a matter of reasonable priority, the improvement of the road and rail freight connections. Therefore, in order to maximise the potential of Shannon - Foynes Port, the road connection should be of a standard capable of maintaining a safe and reliable connection.

On the basis of the above points, a Type 2 Dual Carriageway cross section was selected as the preferred cross section between Foynes and Rathkeale.

5.7 Safety Benefits

The proposed road development will be of a higher safety standard than the existing road network and will therefore contribute to a network wide reduction in collisions. This is reflected in the COBALT model which forecasts a reduction of 427 collisions over the 30-year development appraisal period. This equates to a reduction of 659 casualties categorised as follows:

- 11 Fatalities;
- 36 Serious Injuries; and
- 612 Slight Injuries.

5.8 Journey Time Benefits

The proposed road development will significantly reduce journey times between Foynes, Rathkeale, Adare and Limerick. An overview of the AM peak journey time savings for four key journeys is shown in Table 5.9.

- For all 4 typical journeys the proposed road development will provide faster trips at higher average speeds on the better quality road;
- Time savings will range from 9 to 15 minutes;
- Average speeds will increase by up to 52 km/h mainly due to avoidance of delays in Adare; and,
- For some journeys the travel distance will actually be longer via the new route by up to 13km for a trip from Shannon - Foynes Port to the N18 Junction 2 at Dock Road in Limerick City. However, this trip will still be 9 minutes quicker due to the faster road with the average speed increased from 52 km/h to 92 km/h (77%).

Table 5.9 Journey Time Benefits 2039 Design Year (AM Peak Period)

Journey	Journey Time (minutes)				Average Speed (km/h)				Distance (km)			
	DM	DS	Diff	% Diff	DM	DS	Diff	% Diff	DM	DS	Diff	% Diff
Foynes to Rathkeale (centre)	22	11	- 11	- 50%	56	88	+ 32	+ 57%	21	17	- 4	- 19%
Rathkeale to Attyflin	26	11	- 15	- 58%	40	92	+ 52	+ 130%	17	17	0	0%
Foynes to M7 J 30	41	27	- 14	- 34%	53	95	+ 42	+ 79%	36	42	+ 6	+ 17%
Foynes to N18 Dock Rd.	38	29	- 9	- 24%	52	92	+ 40	+ 77%	32	45	+ 13	+ 41%

Note: DM = Do-Minimum / DS = Do-Something

5.9 Economic Assessment

A Cost Benefit Analysis (CBA) assessment of the proposed road development was undertaken in line with the Department of Public Expenditure and Reform (DPER) 'Public Spending Code' guidelines and the Department of Transport, Tourism and Sport (DTTaS) 'Common Appraisal Framework' (2016) guidelines. The CBA assessment monetises the journey time, vehicle operating cost, emissions and safety benefits of the proposed road development and compares these against the cost of delivering the proposed road development to produce a Benefit to Cost Ratio (BCR).

A BCR of less than 1 indicates that the monetised benefits do not outweigh the cost of delivering the proposed road development. A BCR greater than 1 indicates that that monetised benefits outweigh the costs and that there is a positive return on the investment. The BCR for the proposed road development is 1.63 which indicates that the proposed road development will generate significant economic benefits. It should be noted that the economic assessment is considered conservative as it is based on lower traffic growth projections than used in the assessment of the potential environmental impacts.

Standard Cost Benefit Analysis based on journey time savings does not take into account the potential wider economic benefits that improved transport infrastructure may bring to the wider region through better journey time reliability and travel quality. In this respect the potential of the proposed road development to support the development of Shannon - Foynes Port will be significant at local, regional and national level and is not properly reflected in the standard BCR assessment which is therefore conservative. In addition the potential socio-economic and tourism benefits of removing 77% of the traffic from Adare in 2039, which currently clogs up the village are not captured in the standard CBA.

5.10 Impact of Not Progressing with the Proposed Road Development

Without the proposed bypass of Adare, major traffic delays would continue through Adare village during peak times with average speeds as low as 14kph in the Design Year (2039).

Without the proposed road development there will continue to be negative environmental impacts due to high traffic volumes through the villages along the existing N21 corridor at Adare and Croagh, and on the N69 at Kilcornan, Kildimo, Clarina and Mungret.

In the Do-Minimum Scenario, with no new access route to Shannon - Foynes Port, the number of HGV's passing through the village of Kildimo daily would increase from approximately 500 at present (2017) to approximately 1,800 (2039), which is an increase of 360%. This equate to approximately 2.5 HGVs per minute passing through the village on the basis of the Shannon-Foynes Port operating hours.

Clearly such a very high increase in HGV traffic would have significant negative impacts for the local communities along the route in terms of safety, security, amenity, noise and air quality, and particularly so in the case of vulnerable road users.

Road safety on the N21 route will diminish due to growing traffic flows on the rural sections which already exceed the capacity of a single carriageway road. Likewise the already very poor road safety rating on the N69 will worsen due a very large increase in port related HGV traffic.

Without the proposed road development, there will be worsening journey time reliability between Foynes and the existing TEN-T core road network which will undermine the economic development of the Mid-West region and contravene the TEN-T requirement for core network access by 2030.

5.10.1 Summary Findings

Based on the findings of the traffic assessment, the proposed road development will have the following benefits:

- Safety – Potential reduction of 659 causalities, including 11 fatalities and 36 serious injuries.
- Traffic Reduction in Urban Settlements – 77% reduction in traffic levels along N21 through Adare Village in 2039 and up to a 40% reduction through settlements along the N69.
- Journey Time Savings – Reduced journey times between Foynes, Rathkeale, Adare and Limerick. Average time savings will range from 9 to 15 minutes depending on the time of day.
- Journey Time Reliability – Consistent journey times throughout the day.
- Noise & Air Quality – Reduction in noise and improvements in air quality as traffic levels are reduced through populated areas

In summary, the proposed road development will substantially reduce the level of traffic on the existing N69 and N21 corridors, as traffic transfers to the proposed road development due to the journey time saving and reliability benefits it provides. This generates safety benefits for all road users as traffic is reduced through existing settlements. In addition the reduction in traffic through these existing settlements will have positive impacts from an noise and air quality perspective.