KILDARE TOWN TRANSPORT STRATEGY

Volume 2, Part 2 - Appendices

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Kildare Town Transport Strategy

Volume 2, Part 2 Appendices

Appendix C VISSIM Model Development Report

VISSIM Model Development Report

Kildare Town Transport Strategy

Kildare County Council

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1. Introduction

AECOM were commissioned by Kildare County Council (KCC) to develop a microsimulation, Kildare Town Model (KTM) in VISSIM. This report summarises the development, calibration and validation of the base year (2018) model.

1.1 Background

The model was created with a base year of 2018. The model was developed with peak periods in line with a previously developed strategic (VISUM) model, 08:00-09:00 and 17:00-18:00 for the AM and PM hours respectively.

1.2 Study Area

The extent of the study area is provided in Figure 1.1. The modelled area covers all the main junctions in Kildare Town and main roads running through the town. The study area extent includes the following key roads:

- R455 between the Curragh to the east and the railway line to the west;
- R401 Dunmurray Road and R415 Station Road;
- The R413 Melitta Road to northeast; and Green Road and Southgreen Road to northwest; and
- The R415 between the R445 and the M7, Tully Road / Bride St and Grey Abbey Road to the south.

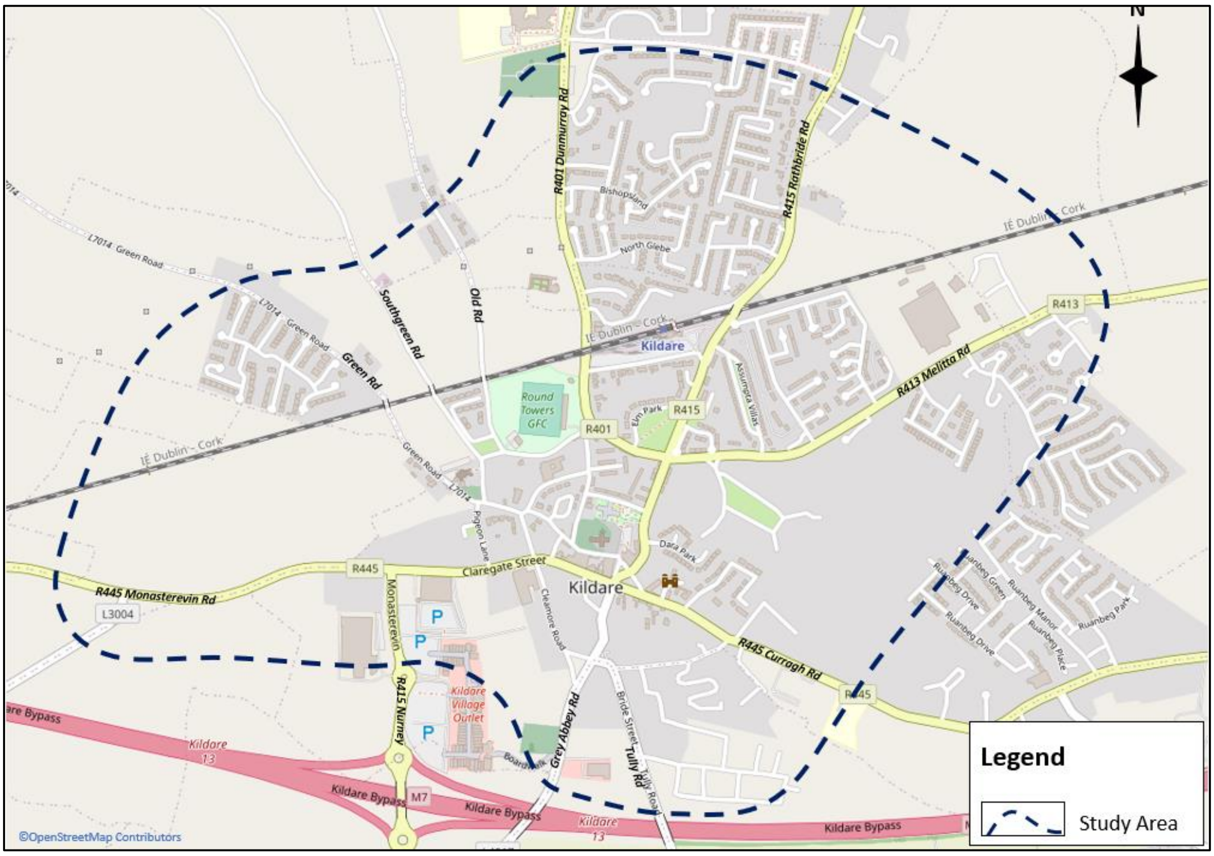


Figure 1.1: Kildare Town Model study area extents

1.3 Report Structure

The remainder of this report is structured as follows:

- Chapter 2 – Data Collection
- Chapter 3 – Network Development
- Chapter 4 – Matrix Development
- Chapter 5 – Model Convergence - Calibration - Validation
- Chapter 6 – Summary/Conclusion

2. Data Collection

2.1 Overview

This section of the report summarises the traffic survey data collected to develop the KTM. Data was collected on 18th October 2018 to create both the strategic model and microsimulation models for Kildare. Survey data was supplemented with additional data to improve the overall modelled representation of the town.

2.2 Survey Data

Data was collected by undertaking the following traffic surveys in October 2018:

- Junction Turning Counts (JTC);
- Automatic Traffic Counts (ATC); and
- Origin-Destination (O-D) matrices and Journey Times derived from an Automatic Number Plate Recognition (ANPR) survey.

Traffic surveys for this study were undertaken on 18th October 2018 based on the Traffic Survey Specification (TSS) titled "Kildare Town Traffic Survey Spec", provided in Appendix A. The list of sites and locations used in the modelling can be found in Appendix A.

Supplementary data captured in early 2020 included:

- Journey Time data using AECOM's Google data collection methodology[1];
- Bus information; and
- Signal Specifications.

The supplementary data was assessed as being suitable to include in preparation of the model, despite differing time periods. A validation of 2020 journey time data was undertaken ensure its compatibility with 2018 data prior to inclusion in the model. Core traffic data for the KTM remains that collected in 2018. The overall quality of the model (and its representation of traffic flows) were improved through use of the supplementary data.

2.2.1 Junction Turning Counts (JTC)

Classified Junction Turning Counts (JTC) give an indication of the turning movements observed at key junctions in the network. Data was recorded at 23 JTC as per the TSS. Of those, 14 sites are in the VISSIM model study area and are shown in Figure 2.1. The data was collected on Thursday 18th of October 2018 over a 12-hour period from 07:00-19:00 in 15-minute intervals.

2.2.2 Automatic Traffic Counts (ATC)

Automatic Traffic Count (ATC) data provides link count (screenline) data over a longer time period, smoothing any day-to day variations improving upon the quality of data from a single day count. Data was collected at 16 ATC Sites as per TSS. Of those, 10 ATC sites are located in the study area as shown in Figure 2.1. Data collection was carried out over a 1-week period in October 2018.

[1] Validation was undertaken between Google collected journey time data, ANPR collected data and the existing Visum model of Kildare – despite wider traffic impacts from Covid, the journey times in 2020 remained applicable for the model development.

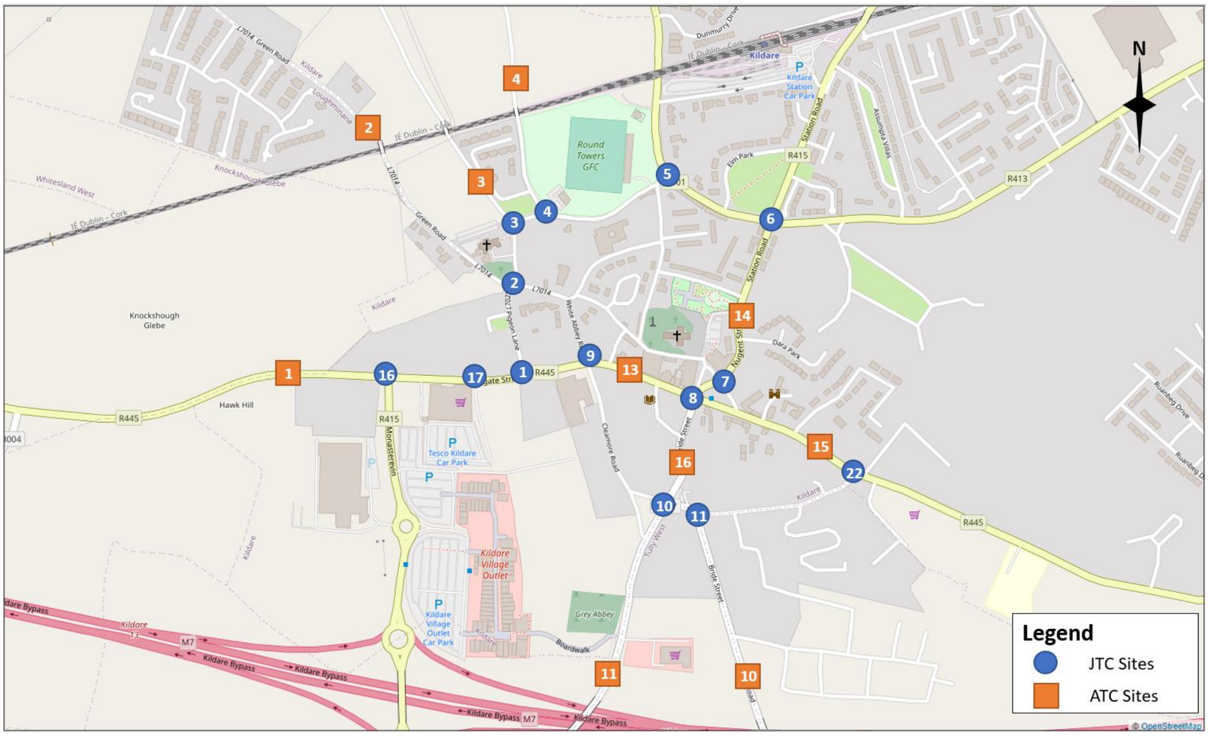


Figure 2.1: JTC and ATC survey locations

2.2.3 Origin - Destination (O-D) Surveys

O-D surveys were carried out on Thursday 18th October 2018 at 16 sites, between 07:00-19:00. Of these, 14 ANPR sites are in or near the VISSIM model study area boundaries. Figure 2.2 shows the location of the ANPR sites. As some sites are outside the study area boundaries, these cannot be directly used for calculating the journey time between two sites.

Figure 2.2: O-D Sites

The survey only captures movements that have passed through the cordon and does not include trips that have an origin or destination within the cordon. Appendix C provides the full matrix of O-D movements captured by the ANPR during the AM and PM peaks[2].

Journey times were additionally retrieved from ANPR data, which was analysed and checked for consistency using Tukey's test. This statistical 'filter' has only been applied to screen journey times in order to dismiss measurements which are statistical outliers. The outcome of the check indicated that additional journey time data may improve the accuracy of the model, hence supplementary journey time data was collected from other sources to represent the base conditions more accurately, this is outlined in the following section.

2.2.4 Journey Time Surveys (JTS)

Journey time data has been retrieved from Google using a bespoke tool. Data was collected along main routes within the study area. As the data collected was in the year 2020, a consistency check was carried out for the collected data with the journey times from the VISUM strategic model that was calibrated and validated for base conditions in 2018.

Based on statistical tests the most appropriate journey time data was selected from ANPR, Google or the existing validated Kildare strategic model. 56 journey time routes were identified for the KTM.

2.3 Bus Information

Public transport stops and routes were identified in order to include information regarding public transport lines in the model. Information regarding the bus routes, stops and frequency was retrieved from the Transport for Ireland (TFI) website.

The study area is serviced by the following bus routes during the peak periods: 126, 126a, 126b, 126e, 726, 826, 883, and 14. A map of the bus stop locations within the model can be seen in Figure 2.3 below.

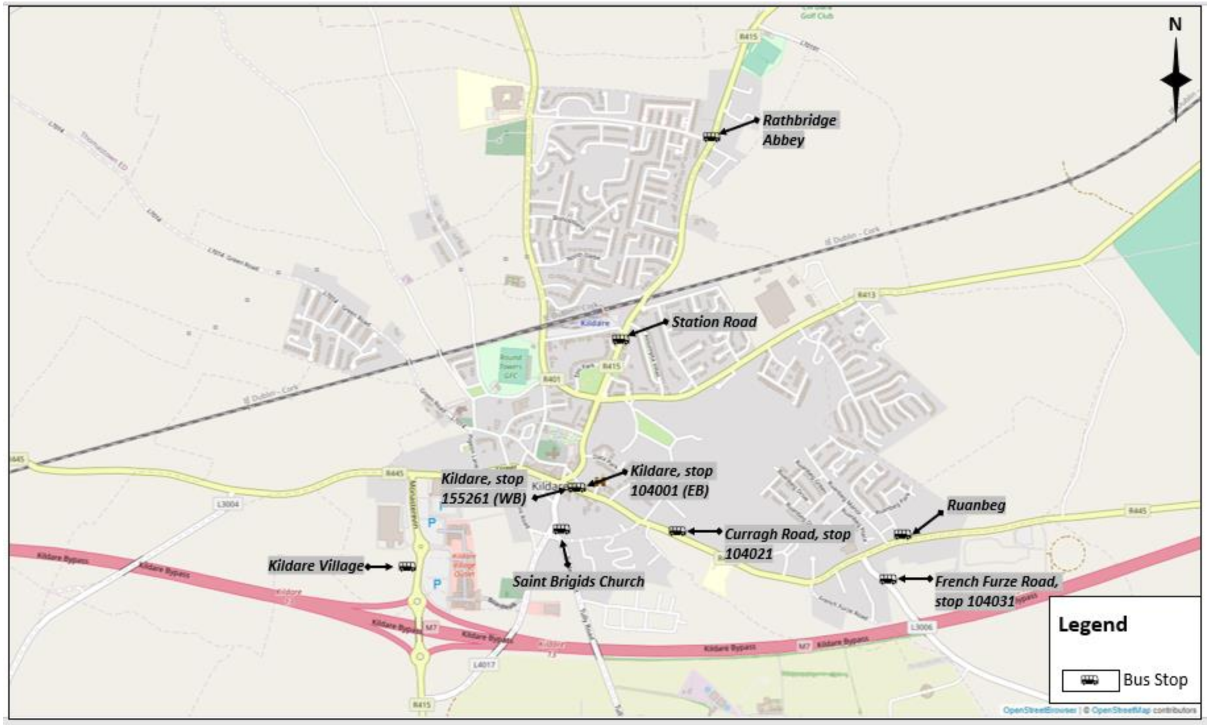


Figure 2.3: Bus Stop Locations

[2] Noting that the 14 ANPR sites provide data for 12 zones.

2.4 Signal Specifications

Traffic signal data was obtained from KCC and consisted of signal specifications (stages and phases) along with intergreens and minimum and maximum green times at the majority of signals. Eight signalised junctions and three pedestrian crossing signals have been identified in the study area; their locations can be seen in Figure 2.4. Traffic signals are vehicle actuated or MOVA controlled as shown in Table 2.1, these have been modelled using VisVAP (VISSIM Vehicle Actuated Programming).

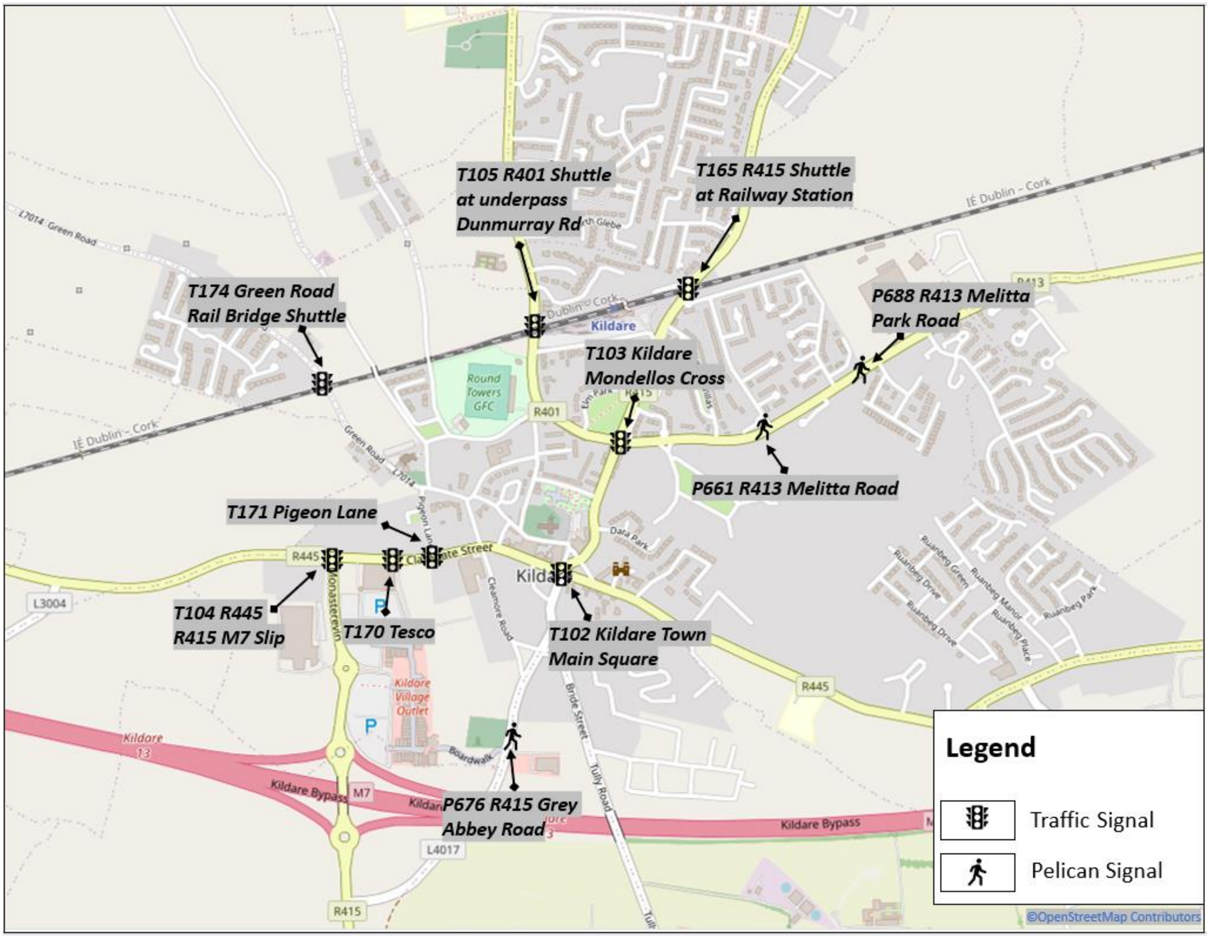


Figure 2.4 - Signalised Junction Locations

Table 2.1 Signals Method of Control

No.	Junction	Observed Method of Control
1	T102 R445-R415 Main Square	VA
2	T103 R415-R413 Mondello Cross	VA
3	T104 R445-R415 M7 Slip-Monasterevin Rd	MOVA
4	T170 R445 Pigeon Lane	MOVA
5	T171 R445 Tesco junction	MOVA
6	T105 R401 Dunmurray Rd Shuttle	VA
7	T165 R415 Shuttle at Railway Station	VA
8	T174 Green Road Shuttle	VA
9	P676 R415 Grey Abbey Rd	Push button
10	P661 R413 Melitta Rd	Push button
11	P688 R413 Melitta Rd	Push button

2.5 Peak Determination

To ensure a good correlation between the strategic model and micro simulation model, it was agreed with KCC to develop microsimulation models covering the same peak periods as the strategic model. The network peak hours are reiterated as follows:

- AM peak: 08:00-09:00
- PM peak: 17:00-18:00

To ensure that the peak in the town centre for microsimulation aligns with the strategic modelled peak, JTC and ATC traffic data for those sites in the town centre were analysed.

Accordingly, it was observed that the peak time starts 15-min later in the town centre (within the KTM scope), than the strategic model peak. Upon analysing the number of vehicles for both the peaks, the difference proved to be minor, and so it was agreed among the modelling team and client to use the same peak as the strategic model peak. This also improves the ability to build, compare and transfer matrices between microsimulation and strategic models for base and forecast scenarios, and for ensuring consistency between across the two model scales.

3. Network Development

3.1 Overview

This section describes how the model network has been developed and provides an overview of how the data was used and applied. The KTM has been constructed on VISSIM's built-in aerial imagery. This allows for the rapid development of various elements of the model including lane widths, lane markings, road curvature and stop lines.

The model covers all the main junctions in Kildare Town, including those at the junctions of the R445, R401, R415 and R413 – the model coverage can be viewed in Figure 3.1.[3] A list of junctions included in the model are listed in Table 3.1.

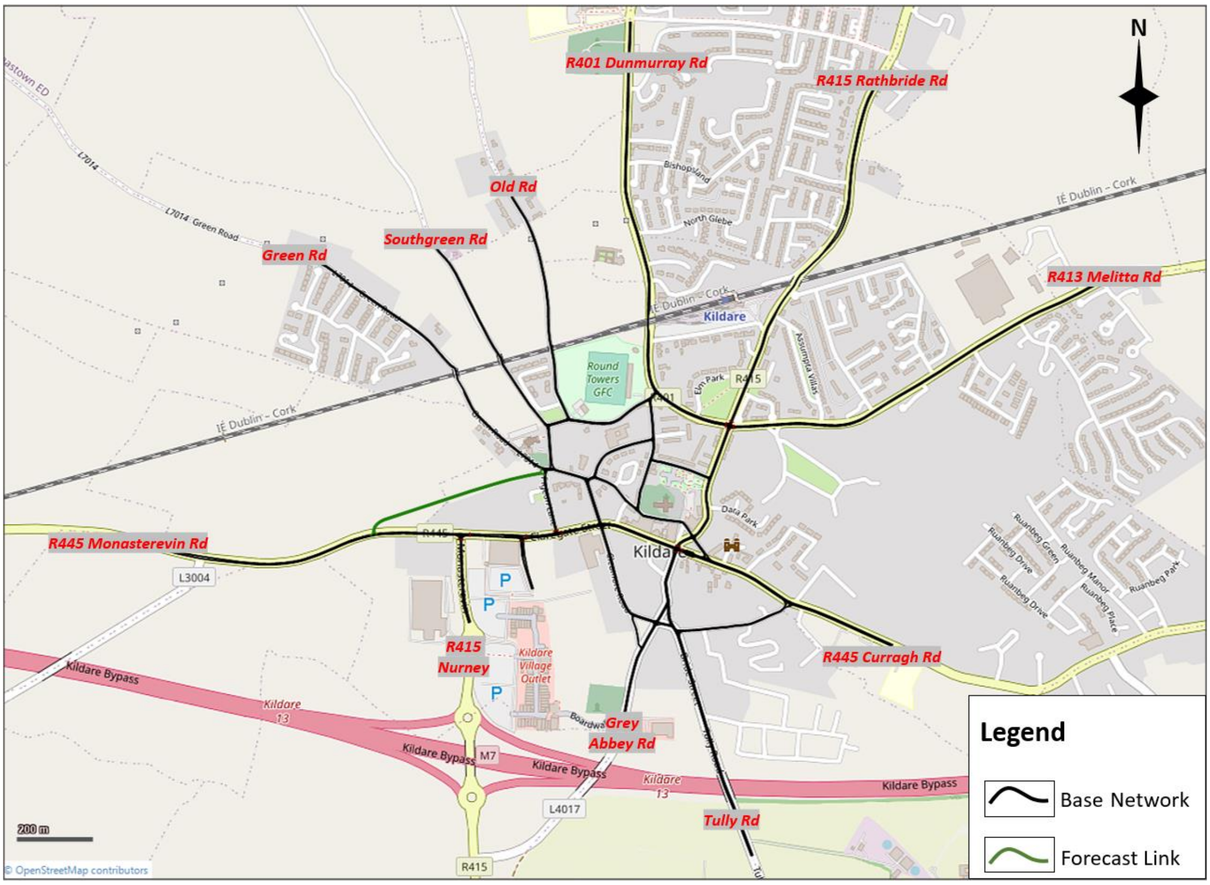


Figure 3.1 VISSIM Model Extents

[3] It was agreed to include a single link in the base model for future use between Green Road and Monasterevin Road (highlighted in green in Figure 3.1), though this is closed to traffic in the base.

Table 3.1 Junction covered in VISSIM modelling

JTC No.	Survey Node Ref.	Junction
1	1	Pigeon Lane / Monasterevin Road (R445) (E) / Monasterevin Road (R445) (W)
2	2	Southgreen Road / Friary Road / Pigeon Lane / Green Road
3	3	Southgreen Road / Bothairín na gCorp / Green Road
4	4	Old Road (NNW) / Old Road(E) / Bothairín na gCorp
5	5	Dunmurray Road (R401) (NNW) / Dunmurray Road (R401) (SE) / Old Road
6	6	Station Road (R415) (NNE) / Melitta Road / Station Road (R415) (SSW) / Dunmurray Road (R401)
7	7	Bride Street (NE) / Market Square (SSE) / Bride Street (WSW) / Market Square (NW)
8	8	Bride Street (NNE) / R445(ESE) / Bride Street (SSW) / R445 (WNW)
9	9	White Abbey Road / Claregate Street / Academy Street / Monasterevin Road (R445)
10	10	Bride Street (NNE) / Bride Street (SE) / Grey Abbey Road / Cleamore Road
11	11	Tully Road (NW) / Meadow Road / Tully Road (SSE)
12	16	Monasterevin Road (R445) (E) / R415 / Monasterevin Road (R445) (W)
13	17	R445 (E) / R445 (W)
14	22	R445(ESE) / Meadow Road / R445 (WNW)

3.2 Modelling Specifications

The VISSIM model for Kildare town has been prepared with the following parameters, in agreement with the client and acknowledging the benefit of maintaining the same peak periods as the strategic model of the town.

Table 3.2 Modelling Parameters

Modelling Parameters		
Modelled Year	2018	
Assessment Periods	AM Warm-up	0730-0800
	AM Peak (Evaluation Period)	**0800-0900**
	AM cool-down	0900-0945
	PM Warm-up	1630-1700
	PM Peak (Evaluation Period)	**1700-1800**
	PM Cool-Down Period	1800-1845
Vehicle Types	Light Vehicles	
	Heavy Vehicles	
	Public Service Vehicles (PSV, comprising of buses only with specific routing, timetables and bus stops for each bus service number)	
VISSIM Version	11.00-13 (64-bit)	

3.3 Signal Control

Signal data was obtained from KCC to inform the model. This information has been used to accurately model the operation of signal controlled junctions within the KTM VISSIM model. Table 3.3 provides an overview of the signal operation in the town with descriptive detail provided below.

Table 3.3 Modelled Signal Control Mode

No.	Ref.	Junction	Observed Method of Control	Modelled Method of Control
1	T102	R445-R415 Main Square	VA	Fixed Time
2	T103	R415-R413 Mondello Cross	VA	Fixed Time
3	T104	R445-R415 M7 Slip-Monasterevin Rd	MOVA	Fixed Time with VA
4	T170	R445 Pigeon Lane	MOVA	Fixed Time
5	T171	R445 Tesco junction	MOVA	Fixed Time
6	T105	R401 Dunmurray Rd Shuttle	VA	VA using Detectors
7	T165	R415 Shuttle at Railway Station	VA	VA using Detectors
8	T174	Green Road Shuttle	VA	VA using Detectors
9	P676	R415 Grey Abbey Rd	Push button	Demand based activation
10	P661	R413 Melitta Rd	Push button	Demand based activation
11	P688	R413 Melitta Rd	Push button	Demand based activation

Several of the road bridges over or beneath the railway line are single-lane and therefore operate shuttle signals (progressively alternating the approaching traffic streams). The shuttles operate on vehicle actuated (VA) control. Information about the maximum and minimum stage times for the shuttle signals were provided for development of the model. Shuttle signals in the model were coded as detector based with the minimum and maximum phase green time information provided. The signalised junctions of T102 (Kildare Town Main Square) and T103 (R415 & R413 Mondellos Cross) have been coded as fixed signals, with green times taken as reference from the strategic model.

Traffic signals T170 (R445 Pigeon Lane) and T171 (Tesco junction) are MOVA junctions that operate via same signal controller. The streams defined in the signal specifications have been incorporated in the signal coding for these junctions in the model, hence, the stages with east and west phases on R445 run with offset having green at the same time. T104 (R445-R415 M7 Slip-Monasterevin Rd) is a MOVA junction, which has been coded as a fixed signal in the model with vehicle actuation for vehicles turning right to the R415 from the R445 west. All the three signals - T104, T170 and T171, have been coded to run the east-west phases on the R445 with offset, to reduce delay for vehicles travelling east-west along the R445. Green times for these junctions were calculated based on data collected during the AM and PM peak times, including the number of stage activations in the peak hour and average green time during each stage.

Pedestrian calls at traffic signals were coded as demand based (excluding MOVA junctions that had information available for all the stage activations). Pedestrian calls are coded for every cycle for the peak periods, and for every two-to-three cycles during non-peak timings (warm up and cool down), though some minor changes are permitted to attain suitable calibration and validation.

3.4 Speed Decisions in the Model

Desired speed decisions, which determine the speed distribution of vehicles in the model, have been placed along links in the VISSIM model to ensure that vehicles adopt representative speeds. This allows on-site speed to be modelled.

The locations of desired speed decisions are based on observed posted speed limit locations from available online data. Default speed profiles defined in VISSIM were used in the KTM. The modelled speeds in VISSIM were also cross referenced with the strategic model.

Reduced speed areas (RSAs) have been added on approaches to junctions and applicable curved geometries throughout the town to slow vehicles at particular locations. The reduced speed areas used in the model are defined based on type of road, information provided by the client and in some cases the curvature or narrowness of a road. They have also been placed on the stretches of road that experience delay due to traffic accessing local roads, residences and facilities that have not been coded in the model – these account for parking, turning and manoeuvres on some of the less trafficked roads of the historic town.

3.5 Driving Behaviour Parameters

VISSIM has several sets of driving behaviours which can be tailored to the specific model to more accurately and reflect site specific conditions (e.g. for motorways, urban areas, cycling etc.) These parameters affect the car following and lane change models of vehicles, lateral behaviour and vehicular reaction to traffic signals. These sets of parameters are associated with link types so that all vehicles travelling along a specific link will display the same driving behaviour.

The driver behaviour profiles have been used on a variety of different links, depending on their location within the VISSIM model. The following driving behaviours have been included in the model:

- Urban (Motorised) (default);
- Footpath (no interaction) – used for pedestrian crossings and areas.

3.6 Priority Rules and Conflict Areas

Priority rules in the VISSIM model replicate give way behaviour at unsignalised junctions whereby a vehicle would wait until there is a suitable gap to manoeuvre safely and continue its journey. The priority rules have been placed in the vicinity of all unsignalised and some signalised junctions within the model where yielding behaviour was observed / expected. Conflict areas have been inserted on some of the merges, diverges and at junctions to prevent overlapping of vehicles in the model to improve the simulation of site conditions.

Priority rules also assist, and have been applied, where opposing traffic streams may be required to give-way in junctions (such as right-turns mid-junction). Priority rules and conflict areas remain unchanged between the AM and PM models.

3.7 Routing decisions

Routing decisions were checked for all the junctions, and also allowed the identification and removal of redundant or circular routes. These alterations were also applied to assist with the model convergence, reducing the level of fluctuation in the dynamic assignment process. Routes from each origin to destination have been retrieved from and checked against the strategic model. One of the examples of a route closure applied to the model is shown in Figure 3.2, which bans vehicles travelling in the east-west directions on the R445 from taking a detour through Market Square.

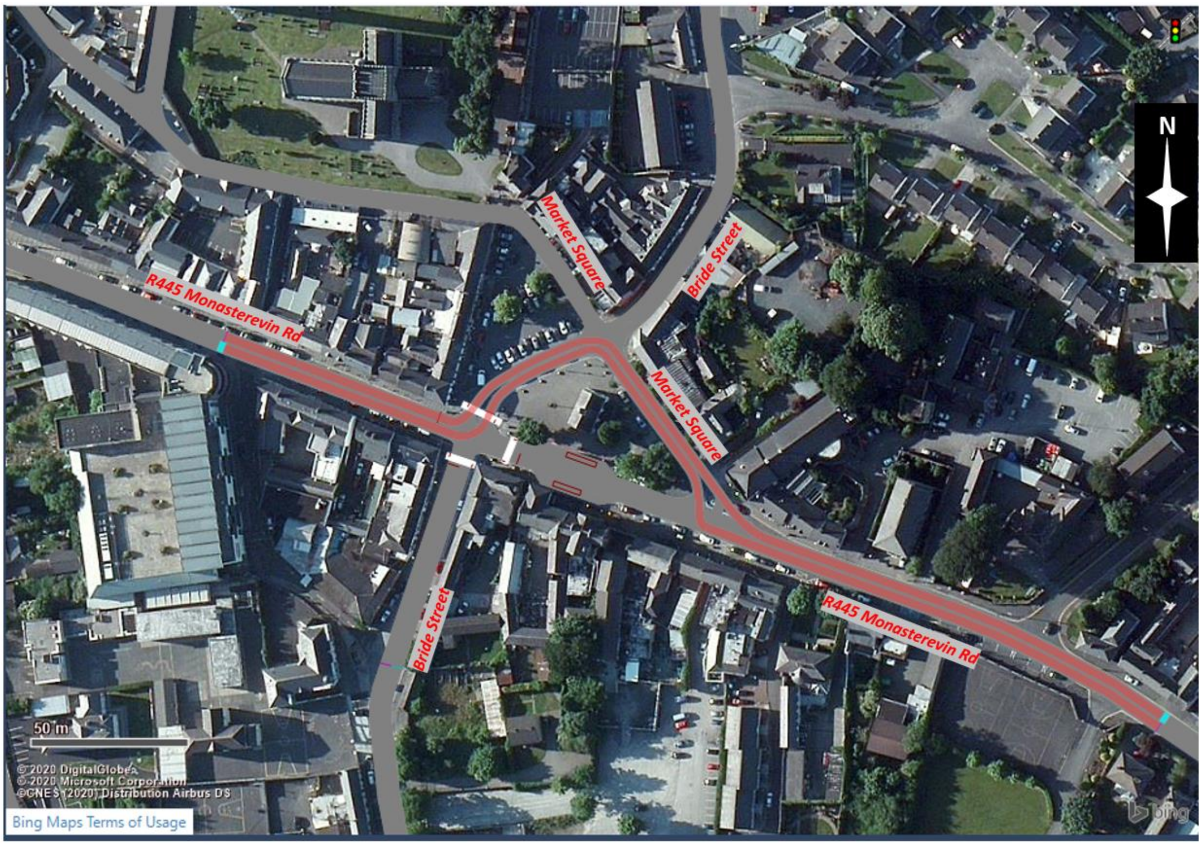


Figure 3.2 Example Vehicle Route closure at R445/ Bride Street Junction

3.8 Network Checks

A series of checks were made to ensure that the base models correlated with the physical characteristics observed on site. These checks are described as follows:

- Range checks – the characteristics of all links were checked to ensure that they were within appropriate ranges for the class of link. Characteristics include driver behaviour, speed and number of entry lanes;
- Link lengths – the lengths of all links in the network were checked against the corresponding distances measured from the base mapping and site observations;
- Route checking – the origin to destination routes for each vehicle type were checked for logical routing through the network. Any anomalies were corrected by the route closures;
- Vehicle travel checks – visual checking was carried out to ensure there was no irregular or unexpected vehicle stops occurring across the network (except for the locations with priority rules, conflict area or signal heads). Such stops can be caused due to vehicles being unable to find the path to the next link or connector. This issue might rise due to blocking of vehicles on the link or connector, closing the link or connector for dynamic assignment, closing the edge, or an error in the placement of particular connectors.

4. Matrix Development

4.1 Overview

The VISSIM models were built using dynamic assignment (matrix based) demand in which vehicles choose their route through the network based on lowest cost paths. Dynamic assignment was chosen because of data availability, the path-finding nature of vehicles and opportunity to quickly amend scenarios and network data during option testing. The nature of the network also lends itself well to dynamic assignment due to the many possible routes being available to vehicles through the network.

The zoning system, on which dynamic assignment is based, provides a series of vehicular entry and exit points on the network. The inter-zonal movements (which are generated by the assignment process), are a set of vehicle paths between the origins and destinations. Model zones are represented in VISSIM by parking lot pairs with separated lots acting as entry and exit points. The zoning system for the Kildare VISSIM network is shown in Figure 4.1 with the traffic entry and exit points at the town's approximate extents.

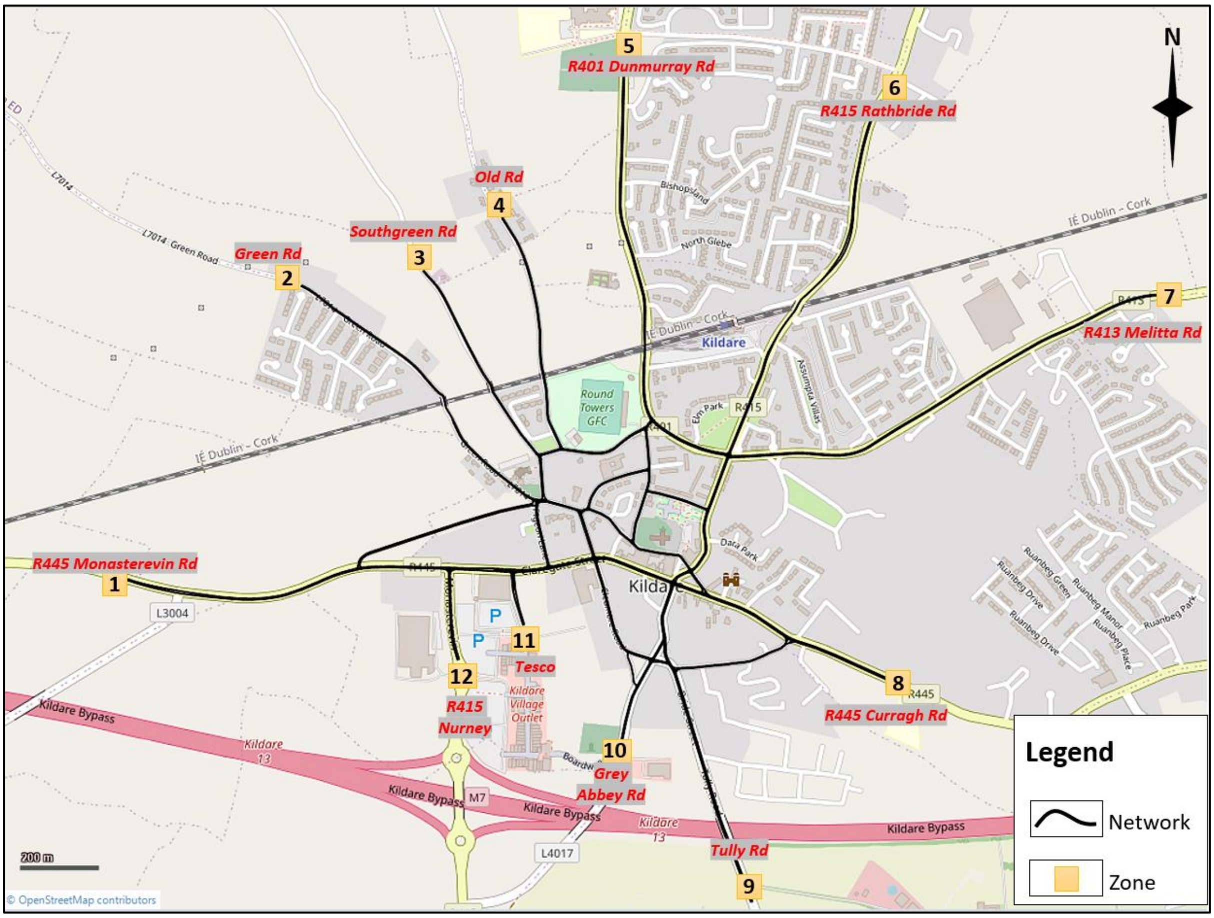


Figure 4.1 Kildare Town Modelled Zones Location

Table 4.1 VISSIM Model Zones

Zone Number	Entry/ Exit Point
1	R445 Monasterevin Rd
2	Green Rd
3	Southgreen Rd
4	Old Rd
5	R401 Dunmurray Rd
6	R415 Rathbride Rd
7	R413 Melitta Rd
8	R445 Curragh Rd
9	Tully Rd
10	Grey Abbey Rd
11	Tesco
12	R415 Nurney

4.2 Matrix Development

For the KTM, a set of O-D matrices were created to distribute traffic around the network. A combination of JTC, ANPR, and ATC survey data was used in coordination with VISUM cordoned matrices to produce the VISSIM matrices.

The matrix construction for the AM and PM VISSIM models was undertaken in five stages as part of a matrix Furness method. The stages are as follows:

4.2.1 Stage 1 - Derive ANPR Baseline

The first step was to carry out an analysis of the ANPR data provided by the traffic surveyor and create ANPR O-D matrices of the matched data for each of the modelling periods. The data provided is for all vehicles and not classified by the vehicle class, hence the same matrices were initially considered for both light vehicles (LV) and heavy vehicles (HV). This step sets the broad scale of travel patterns for the model, where the trip totals will be corrected during the Furness process.

4.2.2 Stage 2 - Derive cordoned matrices from VISUM strategic models

The Kildare VISUM strategic model was cordoned as per the requirement of the VISSIM Model to extract matrices for the study area, as seen in Figure 4.2. The VISUM cordoned matrices for AM and PM peak are provided in Appendix C. It is noted that the strategic model maintained some internal zones as traffic sources and sinks. A sense check was carried out to assess whether the VISUM cordoned matrices can be directly used to create VISSIM matrices. It was observed that differences were present between zone totals from VISUM and survey data in many cases (likely due to presence of internal zones), and so adjustments were necessary.

Hence, it was decided to use a combination of ANPR (which was unclassified) and VISUM cordoned matrices to create an improved set of VISSIM matrices suitable for microsimulation of Kildare Town and providing the necessary routing across the study area.

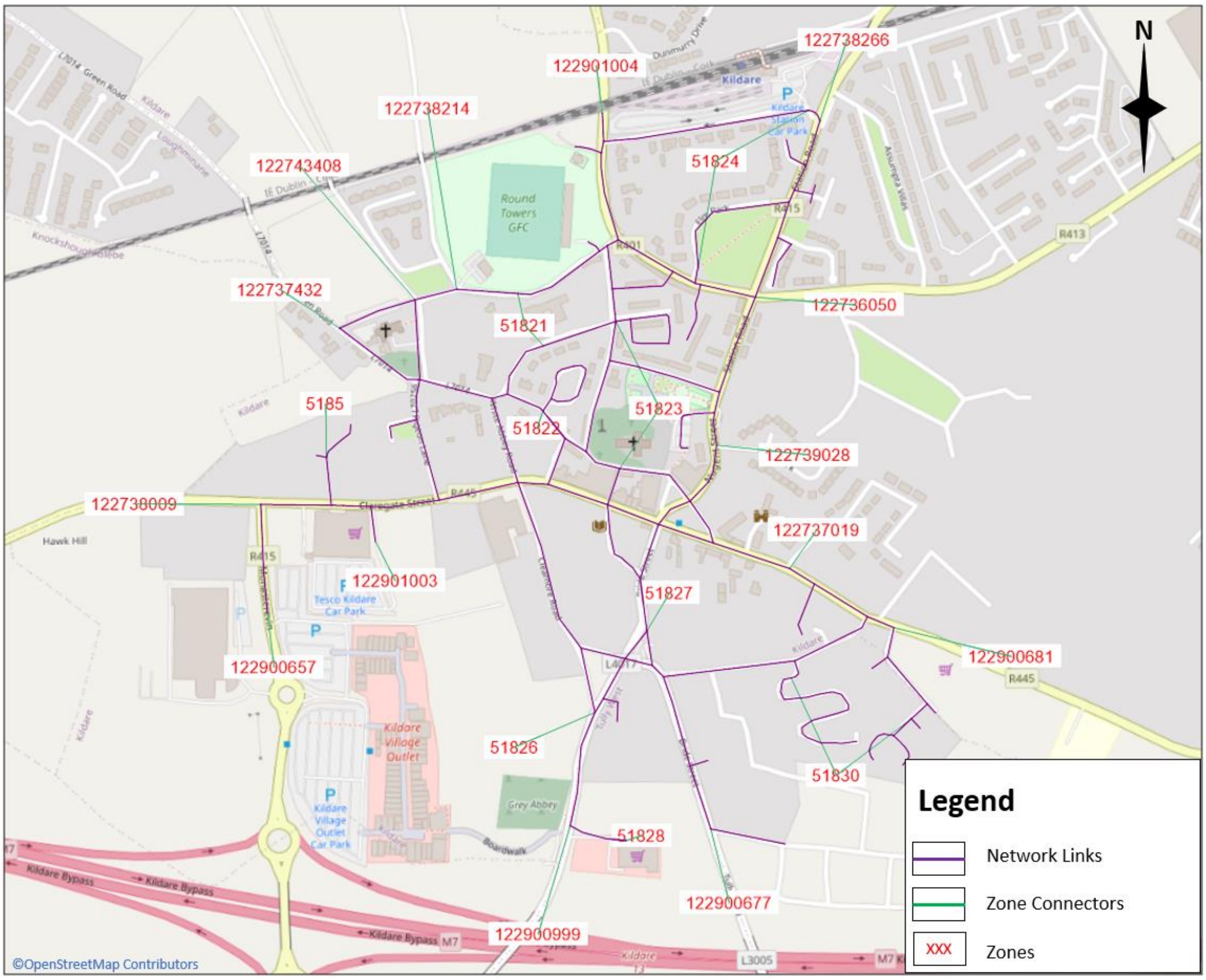


Figure 4.2 VISUM Cordoned Network, Zones and Connectors

4.2.3 Stage 3 - Derive Origin - Destination Zone Totals

Using JTC, ATC and O-D data a series of matrices were produced for each vehicle class (LVs and HVs) and by modelling periods (build-up, peak and cool-down).

Each zone's origin and destination totals were derived from JTC counts (except Zone 10 which is documented below), as JTC provides more accurate representation of the traffic entering the junctions and network.

Zone 10 origin and destination totals were calculated using a combination of ATC and JTC counts. The location of JTC 10 is at the junction of Grey Abbey Road and Clearmore Road and ATC 11 was located south of the ALDI supermarket, as shown in Figure 4.3. It was observed that some of the trips from Grey Abbey Road (northbound) access Academy Street, which provides access to St. Bridgit's primary school. Comparison of data showed that ATC 11 northbound trips were higher than JTC 10's Arm C northbound trips (towards the junction). Likewise, ATC 11 southbound trips were lower than JTC 10's Arm C southbound movement (trips originating from the junction) – this is suspected to be due to some trips accessing the supermarket and surrounding facilities and the complexity of the junctions and links. Hence, to attain better calibration at JTC 10 and maintain model robustness, the greater of the two observed survey counts were considered as zone totals for Zone 10.

Figure 4.3 Zone 10 related JTC and ATC locations

4.2.4 Stage 4 - Uplift Matrix

The matrices developed in Stage 3 (from ANPR and VISUM combined matrices) were uplifted to match O-D totals. This was carried out by applying a doubly constrained factor model using the Furness method. This was undertaken to ensure that all vehicles that travelled through the network are accounted for in the model and ensures that the volume of vehicles more accurately match captured O-D totals of the JTC survey.

Based on the above steps, the matrices for the AM and PM Peak, Warm Up and Cool Down periods were derived. Final AM and PM Peak hour matrices used in the models are shown in Appendix C as per Table 4.2. In total, for each of the AM and PM peak models, nine O-D matrices for each 15-minute period were constructed for AM peak and PM peak for each vehicle class (LV and HV).

Table 4.2 Matrices defined for Warm up - Peak - Cool down

Matrix Type	Simulation time	AM period	PM period
Warm Up (2 Matrices)	0-1800	0730-0800	1630-1700
Peak (4 Matrices)	1800-5400	0800-0900	1700-1800
Cool Down (3 Matrices)	5400-8100	0900-0945	1800-1845

An extended Cool Down period has been allowed for, allowing the opportunity for future scenarios to look at later time periods' activity.

5. Model Convergence - Calibration - Validation

5.1 Model Convergence

5.1.1 Overview

As the VISSIM model has been setup and operated using the Dynamic Assignment module, in which a series of iterated simulations are used to determine the route of a vehicle through the network based on cost, there is a need to assess the convergence of the model. This is required to establish a point where the travel times and volumes do not change significantly from one iteration to the next, enabling the model to be deemed stable and results to be analysed in confidence.

TII Guidelines have been used to ensure suitability. TII's Project Appraisal Guidelines for National Roads Unit 5.1 - Construction of Transport Models[4] provides a series of criteria that should be used to assess the convergence and stability of traffic models. The following convergence criteria can be assessed within the context of VISSIM:

- 'Delta' or '%GAP': The difference between the costs along the chosen routes and those along the minimum cost routes, summed across the whole network, and expressed as a percentage of the minimum costs. This indicator is the most appropriate (truest) measure of assignment convergence.
- 'P' or 'P2': The percentage of links on which flows (given by 'P') or costs (given by 'P2') change by less than a fixed percentage between successive iterations. The percentage of links with minor changes in flow or cost provides an insight into the stability of the assignment as opposed to the degree of convergence. In other words, these measures are not sufficient indicators of convergence in their own right.

Table 5.1 Summary of Convergence Measures

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

5.1.2 Model Convergence Results

The AM and PM models were initially run using VISSIM's default random seed and assigning travel demand matrices in batch mode. The simulation started with 85% of the total O-D demand which was gradually increased by 2.5% per run until 100% demand was reached. This was done to establish the initial costs (BEW files) and paths (WEG files) within the network.

Using the path and cost files from the first simulation run, the batch run of the models continued until the criteria stated above was fulfilled, using the same random seed in order to assess the convergence of the model. For each of the simulation runs, a cost file, a path file, Network Performance Evaluation (NPE file) and Convergence Evaluation file (CVA file) were output.

[4] PE-PAG-02015, 2016, PAG Unit 5.1, Chapter 4, Section 4.6

Table 5.2 Convergence Summary - AM Period

Run	Total Travel Time			Convergence Figures on Paths	
	Total Travel Time (h)	Difference from previous run (%)		Volume (%)	Travel Time (%)
17	191.82	-		100%	98%
18	190.79	-0.53%		100%	97%
19	191.37	0.31%		100%	99%
20	190.78	-0.31%		100%	99%
21	191.39	0.32%		100%	99%

Table 5.3 Convergence Summary - PM period

Run	Total Travel Time			Convergence Figures on Paths	
	Total Travel Time (h)	Difference from previous run (%)		Volume (%)	Travel Time (%)
14	170.47	-		100%	98%
15	170.21	-0.16%		100%	98%
16	170.15	-0.03%		100%	99%
17	169.76	-0.23%		100%	99%
18	170.13	0.22%		100%	100%

For the AM Peak model, the criteria a), b) and c) have been met, as in Table 5.2. For criteria a), percentage change in total user's costs for four consecutive iterations is less than 1% (user cost represented by total travel time). For criterion b), 100% of the paths were identified to have a change in all path traffic volumes less than five vehicles or less than 5%. For criterion c), around 98% of paths had a difference in travel time on paths within 0-15% for more than four consecutive iterations.

For the PM Peak model, the criteria a), b) and c) have been met, as in Table 5.3. For criteria a), percentage change in total user's costs for four consecutive iterations is less than 1%. For criterion b), 100% of the paths were identified to have a change in all path traffic volumes less than five vehicles or less than 5%. For criterion c), around 99% of paths had a difference in travel time on paths within 0-15% for more than four consecutive iterations.

As all the criteria a), b) and c) have been fulfilled for both AM and PM peak models, it has been deemed acceptable. Further to this, due to the number of runs undertaken (AM model – 21 runs & PM model – 18 runs), there is confidence in the convergence within the model.

5.2 Calibration - Validation

5.2.1 Overview

Following convergence, the VISSIM models were taken forward for calibration and validation. This process is done to ensure that the inputs into the model are representative of on-site conditions.

Model calibration involves the estimation and subsequent adjustment of parameters within a model to best fit observations. The process of model validation determines how well the model estimates compare with site and observations. To correctly model on-site behaviour, a number of factors are considered for the model, as listed below:

- Correct coding of link lengths and widths;
- Accurate representation of traffic patterns in the area;
- Key junction areas being modelled accurately;

- The correct level of traffic being able to traverse the network and equally the correct levels are being suppressed; and
- Refining and adjustment of the trip matrices;
- Optimising signal operation; and
- Checking VISSIM diagnostic outputs for warnings and errors.

TII (PE-PAG-02015, 2016, PAG Unit 5.1, Chapter 5) "Project Appraisal Guidelines for National Roads Unit 5.1 - Construction of Transport Models" provides criteria that should be followed to determine level of calibration or validation, summarised in Table 5.4.

Table 5.4 TII Criteria for Calibration and Validation

Criteria	Acceptability Guidelines
Assigned Hourly Flows* compared with observed flows. 1. Individual flows within 15% for flows 700-2700 vph 2. Individual flows within 100 vph for flows < 700 vph 3. Individual flows within 400 vph for flows < 2700 vph 4. Total screenline flows (normally >5 links) to be within 5% 5. GEH Statistic i. Individual flows: GEH < 5 ii. Screenline** totals: GEH < 4 Notes: * link flows or turning movements in vehicles per hour (vph) **Screenlines containing high flow routes such as motorways should be presented both including and excluding such routes.	All (or nearly all) screenlines Greater than 85% of all cases
Modelled journey times compared with observed times 6. Times within 15% (or 1 minute if higher)	> 85% of routes

5.2.2 Model Calibration

Model calibration assessed O-D matrix flows and junction turning flows. To test the robustness of the models, results were extracted for 10 different seeds, starting from random seed 42 with a random seed increment of 1 per run, and the corresponding average values were used.

Table 5.5 Entry Flow Calibration - All Vehicles - AM Peak

Zone	Location	Matrix	Modelled	Abs.	%	GEH	<5%?	<4 GEH?
1	R445 Monasterevin Rd	365	361	-4	-1%	0.20	Y	Y
2	Green Rd	83	78	-5	-6%	0.57	N	Y
3	Southgreen Rd	32	28	-4	-11%	0.64	N	Y
4	Old Rd	39	34	-5	-13%	0.85	N	Y
5	R401 Dunmurray Rd	469	466	-3	-1%	0.15	Y	Y
6	R415 Rathbride Rd	247	246	-1	0%	0.04	Y	Y
7	R413 Melitta Rd	310	306	-4	-1%	0.23	Y	Y
8	R445 Curragh Rd	390	388	-2	-1%	0.11	Y	Y
9	Tully Rd	98	96	-2	-2%	0.19	Y	Y
10	Grey Abbey Rd	207	203	-4	-2%	0.30	Y	Y
11	R415 Nurney	346	343	-3	-1%	0.17	Y	Y
12	R445 Monasterevin Rd	365	361	-4	-1%	0.20	Y	Y
LEVEL OF CALIBRATION ACHIEVED							73%	100%

Table 5.6 Entry Flow Calibration - All Vehicles - AM Peak

Zone	Location	Matrix	Modelled	Abs.	%	GEH	<5%?	<4 GEH?
1	R445 Monasterevin Rd	234	233	-1	-1%	0.08	Y	Y
2	Green Rd	58	58	0	0%	0.03	Y	Y
3	Southgreen Rd	32	33	1	3%	0.16	Y	Y
4	Old Rd	33	31	-2	-7%	0.43	N	Y
5	R401 Dunmurray Rd	276	275	-1	0%	0.07	Y	Y
6	R415 Rathbride Rd	262	258	-4	-2%	0.26	Y	Y
7	R413 Melitta Rd	307	302	-5	-2%	0.27	Y	Y
8	R445 Curragh Rd	536	533	-3	0%	0.11	Y	Y
9	Tully Rd	86	81	-5	-6%	0.53	N	Y
10	Grey Abbey Rd	166	164	-2	-1%	0.15	Y	Y
11	R415 Nurney	301	298	-3	-1%	0.18	Y	Y
12	R445 Monasterevin Rd	234	233	-1	-1%	0.08	Y	Y
LEVEL OF CALIBRATION ACHIEVED							82%	100%

To demonstrate that the correct flows enter the model, comparisons were made between the O-D flow matrix and VISSIM model entry flows, Table 5.5 and

Table 5.6 show these results for the AM and PM peaks respectively. Both the peaks satisfy GEH < 4 criteria, with very slight differences in absolute terms. Hence, entry flows O-D flows have good correlation with the matrices.

Calibration of the model was also checked based on the 116 junction turning counts from the survey data. Table 5.7 and Table 5.8 show that turning flows for AM and PM peak satisfy TII criteria for both GEH and individual flow. AM peak and PM peak attain 85% turning flows with GEH < 5. Turning counts satisfying individual flow criteria for AM and PM peaks are 99% and 100% respectively.

Table 5.7 Junction Turning Counts Calibration Summary - AM Peak

PAG Criteria	Within	Total	%
% Counts with GEH <5	99	116	85%
% Flows within Individual Flow	115	116	99%

Table 5.8 Junction Turning Counts Calibration Summary - PM Peak

PAG Criteria	Within	Total	%
% Counts with GEH <5	99	116	85%
% Flows within Individual Flow	116	116	100%

As demonstrated in previous tables the model has been correctly calibrated based on entry flows and turning flows. Hence, the model can be taken forward to assess validation. Appendix D shows detailed results of turning flows calibration.

5.2.3 Model validation

The model has been validated with ATC link flows and journey times. ATC data was tested against link flows at locations identified in section 2.2.2. Journey times from the model were tested across 56 routes based on the data extracted as per section 2.2.4.

Table 5.9 and Table 5.10 show ATC link flow validation results for AM peak and PM peak respectively. In both peaks there are some variations experienced at the ATC sites in relation to flows (seeking within

5%), however GEH are generally in the expected range (< 4 in the case of screenline comparison). The AM peak achieves 75% links with GEH < 4, slightly under the sought 85% from PAG guidelines and so a specific investigation was undertaken. The links failing this criterion were observed to be primarily in the south of the study area, in the vicinity of Bride Street and Grey Abbey Road. These areas have a high number of key trip attractors such as schools and supermarkets, additionally the pedestrian crossings on Cleamore Road make the area more complex and difficult to fully calibrate. However, JTCs in the area are well calibrated in AM peak, and are more accurate in relation to the turning movements on the specific survey day. Whilst the ATCs do not fully achieve the 85% target, the reasons are well understood and all other measures indicate that the model remains wholly representative.

The PM peak has good correlation with GEH, with 90% links achieving the criterion. As seen in the AM peak, links failing this criterion are similarly in the south of the study area. PM matrices needed no additional adjustments. Both the peaks have good calibration in turning movements for sites 10 and 11, with almost all the turns passing the GEH and individual flow criteria. The PM model therefore validates well, within the guideline criteria for screenlines.

Table 5.9 ATC Link Flow Validation - AM Peak

ATC	Location	ATC	Modelled	Abs.	%	GEH	<5%?	<4 GEH?
1E	R445 Monasterevin Rd	341	361	20	6%	1.06	N	Y
1W	R445 Monasterevin Rd	164	185	21	13%	1.59	N	Y
2E	Green Road	90	80	-10	-11%	1.06	N	Y
2W	Green Road	53	46	-7	-13%	0.94	N	Y
3S	South Green Road	30	28	-2	-7%	0.37	N	Y
3N	South Green Road	15	17	2	15%	0.55	N	Y
4S	Old Road	35	34	-1	-3%	0.20	Y	Y
4N	Old Road	15	15	0	1%	0.05	Y	Y
10N	Tully Road	102	96	-6	-6%	0.58	N	Y
10S	Tully Road	68	92	24	35%	2.68	N	Y
11S	Grey Abbey Road	91	213	122	135%	9.91	N	N
11N	Grey Abbey Road	193	203	10	5%	0.68	Y	Y
13E	Monasterevin Road (R445) – Town Centre	392	344	-48	-12%	2.48	N	Y
13W	Monasterevin Road (R445) – Town Centre	259	168	-91	-35%	6.22	N	N
14N	Bride Street	372	347	-25	-7%	1.31	N	Y
14S	Bride Street	381	408	27	7%	1.36	N	Y
15E	Dublin Road (R445)	371	379	8	2%	0.40	Y	Y
15W	Dublin Road (R445)	362	270	-92	-25%	5.15	N	N
16N	Bride Street (South of Town Centre)	218	140	-78	-36%	5.82	N	N
16S	Bride Street (South of Town Centre)	215	132	-83	-39%	6.29	N	N
LEVEL OF VALIDATION ACHIEVED							20%	75%

Table 5.10 ATC Link Flow Validation - PM Peak

ATC	Location	ATC	Modelled	Abs.	%	GEH	<5%?	<4 GEH?
1E	R445 Monasterevin Rd	216	233	17	8%	1.16	N	Y
1W	R445 Monasterevin Rd	348	355	7	2%	0.39	Y	Y
2E	Green Road	53	58	5	9%	0.67	N	Y
2W	Green Road	75	63	-12	-16%	1.49	N	Y
3S	South Green Road	24	33	9	40%	1.77	N	Y
3N	South Green Road	28	21	-7	-26%	1.49	N	Y
4S	Old Road	17	31	14	82%	2.86	N	Y
4N	Old Road	28	42	14	51%	2.40	N	Y

10N	Tully Road	91	81	-10	-11%	1.10	N	Y
10S	Tully Road	106	99	-7	-7%	0.69	N	Y
11S	Grey Abbey Road	242	272	30	12%	1.85	N	Y
11N	Grey Abbey Road	165	164	-1	0%	0.05	Y	Y
13E	Monasterevin Road (R445) – Town Centre	338	304	-34	-10%	1.89	N	Y
13W	Monasterevin Road (R445) – Town Centre	352	291	-61	-17%	3.42	N	Y
14N	Bride Street	412	329	-83	-20%	4.33	N	N
14S	Bride Street	414	363	-51	-12%	2.57	N	Y
15E	Dublin Road (R445)	331	327	-4	-1%	0.23	Y	Y
15W	Dublin Road (R445)	422	433	11	3%	0.52	Y	Y
16N	Bride Street (South of Town Centre)	179	124	-55	-31%	4.45	N	N
16S	Bride Street (South of Town Centre)	224	212	-12	-6%	0.84	N	Y
LEVEL OF VALIDATION ACHIEVED							20%	90%

Journey time validation results show good correlation with the observed data as can be viewed from the summary provided in Table 5.11 and Table 5.12 for the AM and PM peaks respectively. A detailed breakdown of results of validation is provided in Appendix E. Journey time results to the south of the study area attain high levels of consistency with observations. Though there is some discrepancy in the ATC validation in the south of the study area (discussed previously), journey times of modelled vehicles replicate site conditions well. Journey times were met in 88% and 91% of the cases (routes) in AM peak and PM peak respectively, and satisfy PAG criteria for journey time – seeking to be within 15% and absolute difference less than 60 sec. Hence, from above, the KTM is deemed validated to replicate site conditions in the base year.

Table 5.11 Journey Time Validation - AM peak

TII Criteria	Within	Total	%
a) Routes with JT difference less than 60 sec	54	56	96%
b) Routes with JT difference less than 15%	49	56	88%
c) Routes satisfying both the criteria a) & b)	49	56	88%

Table 5.12 Journey Time Validation - PM peak

TII Criteria	Within	Total	%
a) Routes with JT difference less than 60 sec	54	56	96%
b) Routes with JT difference less than 15%	51	56	91%
c) Routes satisfying both the criteria a) & b)	51	56	91%

6. Summary

The KTM incorporates many roads through the town centre and connections to major roads nearby. The model has been calibrated and validated successfully to October 2018 conditions, noting some recent comparable data was collected for quality improvement and validation. This model is suitable to develop forecast models and test for traffic growth, development schemes and new or amended roads infrastructure throughout the town.

Convergence – The models have been successfully converged for both AM and PM peak periods, meeting TII convergence criteria, demonstrating high levels of stability.

Calibration – The VISSIM models have been well calibrated with 100% zone entry flows meeting the necessary criteria for both the peaks. Modelled and observed junction turning counts show good correlation with 85% achieving GEHs less than 5 in the AM and PM peaks.

Validation – The models were validated against ATC link flows and journey times of 56 routes in the model. ATC comparison shows AM peak achieves 75% link counts and PM peak 90% link counts satisfying <4 GEH. Both the models show good journey time validation, with 88% AM and 91% PM, satisfying PAG criteria of observed and modelled difference less than 15% and 60 seconds. Some ATC sites, particularly in the south of the town, failed to meet the screenline criteria, but through further investigation the reasons are understood. Bearing in mind the calibration and validation used four unique data sets (O-D, JTC, ATC and journey times), and that applicable elements of the strategic VISUM model were included, both the peak models show good correlation to the base conditions and are considered to appropriately model the town.

Thus, the AM and PM peaks of the KTM have been well calibrated and validated and are suitable to test for future conditions, infrastructure changes, new schemes and developments.

Appendices

Appendix A Survey Specifications

PROJECT: Kildare

SURVEY TYPE: Junction Turning Counts, Automatic Traffic Counts, Origin-Destination Surveys, and Parking surveys

JTC SURVEYS: Vehicular junction turning count (JTC) surveys are required at the following sites in Kildare Town:

1. Monasterevin Road (R445) / Pigeon Lane
2. Pigeon Lane / Green Road / Friary Road / South Green Road
3. South Green Road / Bothairín na gCorp
4. Old Road / Bothairín na gCorp
5. Dunmurray Road (R401) / Bothairín na gCorp
6. Dunmurray Road (R401) / Station Road (R415) / Melitta Road (R413)
7. Bride Street / Market Square
8. Bride Street / R445
9. Monasterevin Road (R445) / White Abbey Road / Academy St.
10. Bride Street / Grey Abbey Road
11. Meadow Rd/Tully Road
12. Grey Abbey Link Rd/R415 Ghost island T-junction
13. M7 Southern Roundabout
14. M7 Northern Roundabout
15. Kildare Village Roundabout
16. R415 / Monasterevin Road (R445) Signals
17. Tesco Entrance/R445
18. Dunmurrary Road / Fair Green Road
19. Dunmurrary Road / Rathbride Demesne
20. Station Road / Rathbride Demesne
21. Station Road / Fair Green Road
22. R445/Meadow Road
23. R445/ French Furze Road

For each of these sites, queue lengths are also required on each junction arm in 15 minute intervals. The surveys are required for the 12 hour period 7am to 7pm. A site location map is indicated in Figures 1 and 2 below.

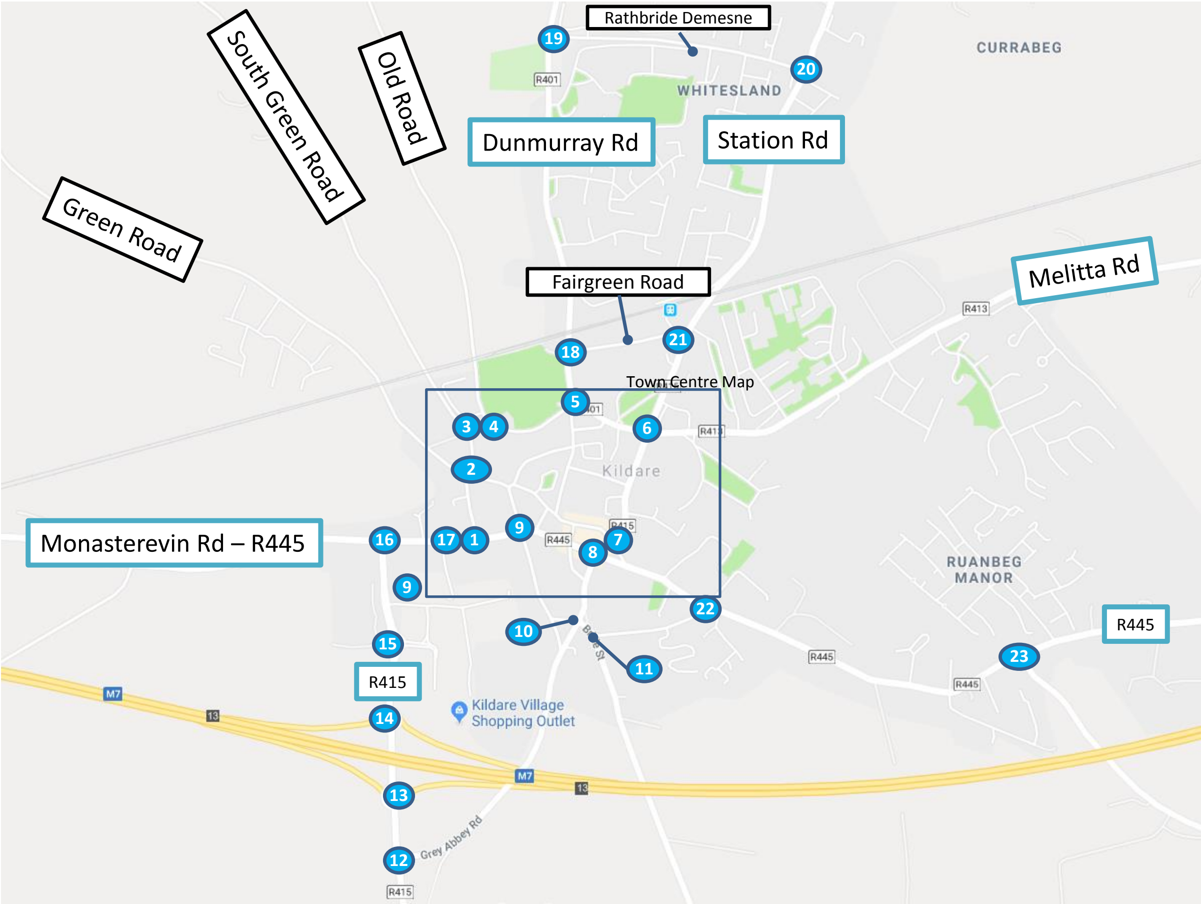


Figure 1: JTC survey sites

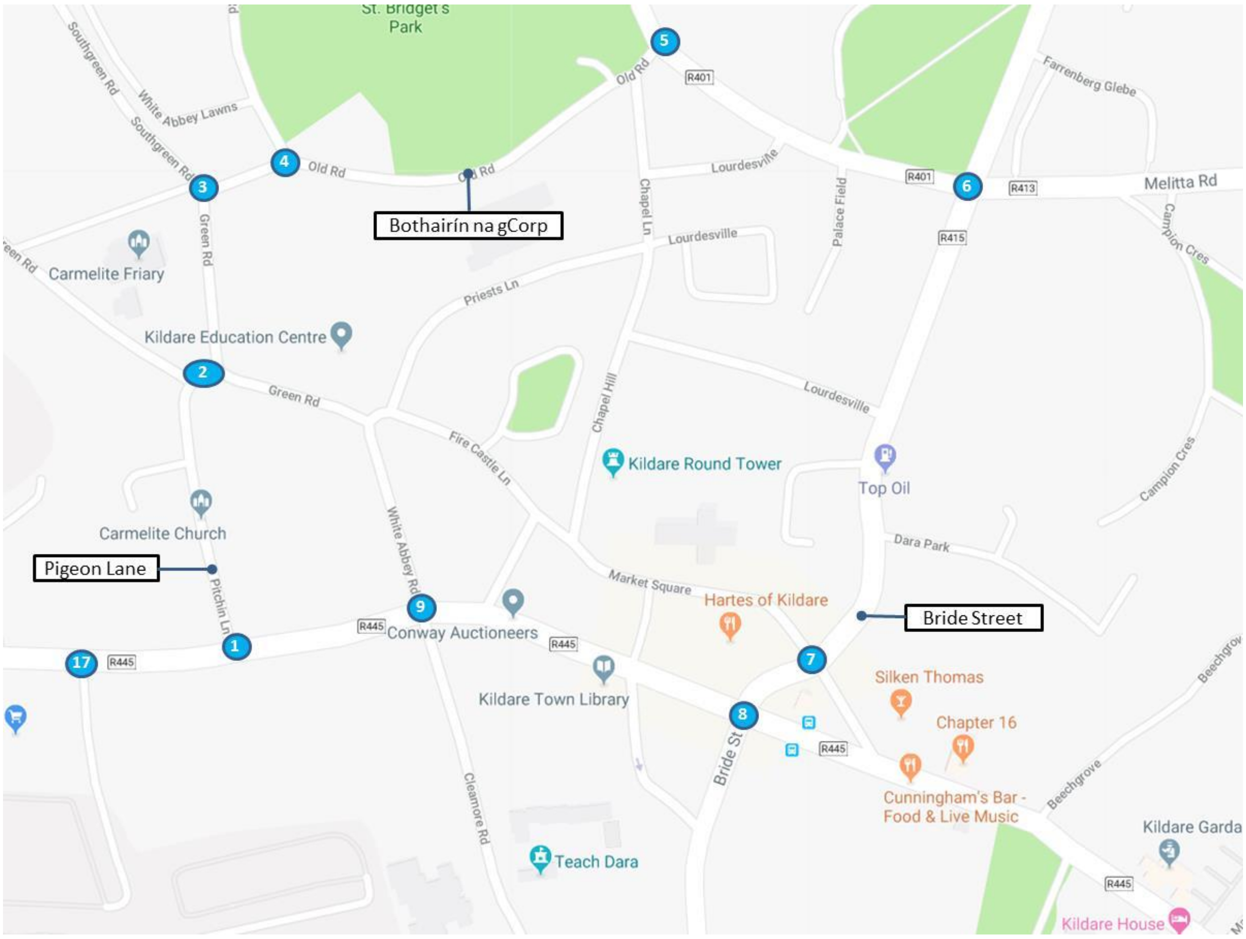


Figure 2: JTC survey sites (Town Centre)

ATC/O-D SURVEYS: Automatic traffic count (ATC) surveys and the associated Origin-Destination (O-D) surveys are required at the following 16 sites, as shown in **Figures 3 & 4**:

1. Monasterevin Road (R445)
2. Green Road
3. South Green Road
4. Old Road
5. Dunmurray Road (R401)
6. Station Road (R415)
7. Melitta Road (R413)
8. Dublin Road (R445)
9. French Furze Road
10. Tully Road
11. Grey Abbey Road
12. R415
13. Monasterevin Road (R445) – Town Centre
14. Bride Street (North of Town Centre)
15. Dublin Road (R445) – Town Centre
16. Bride Street (South of Town Centre)

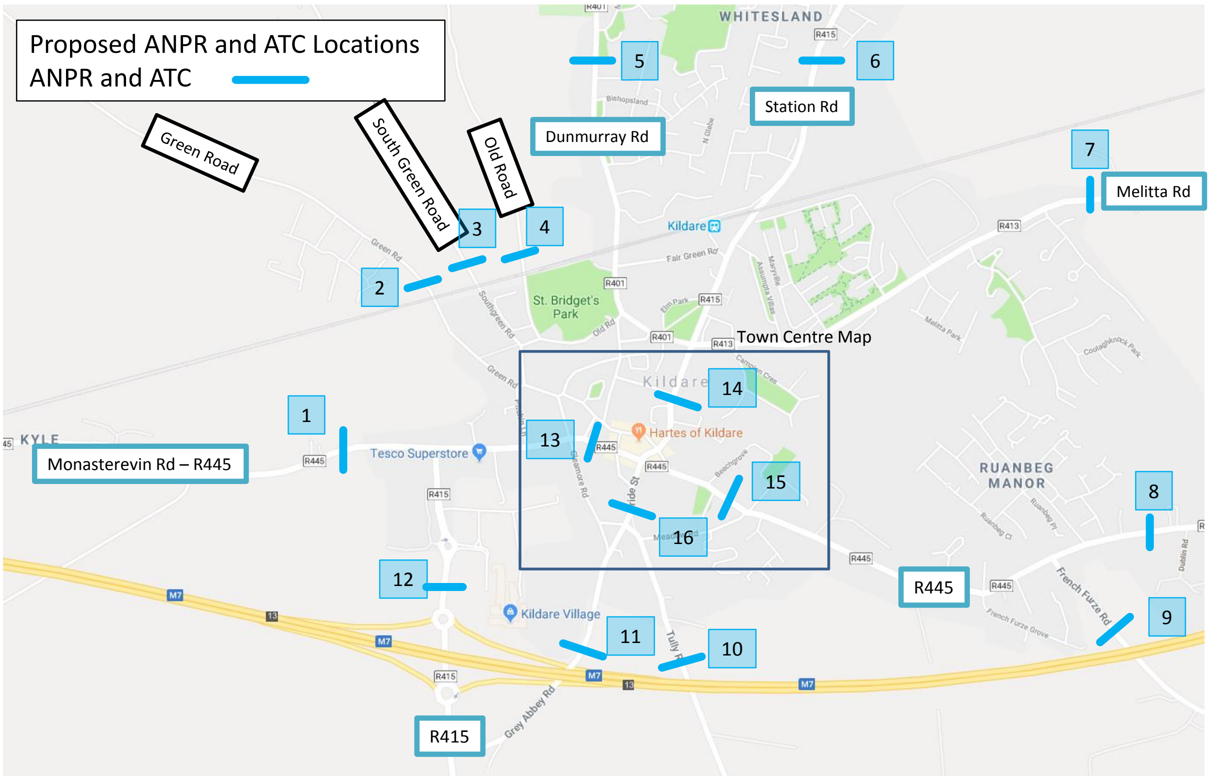


Figure 3: ATC and O-D survey sites

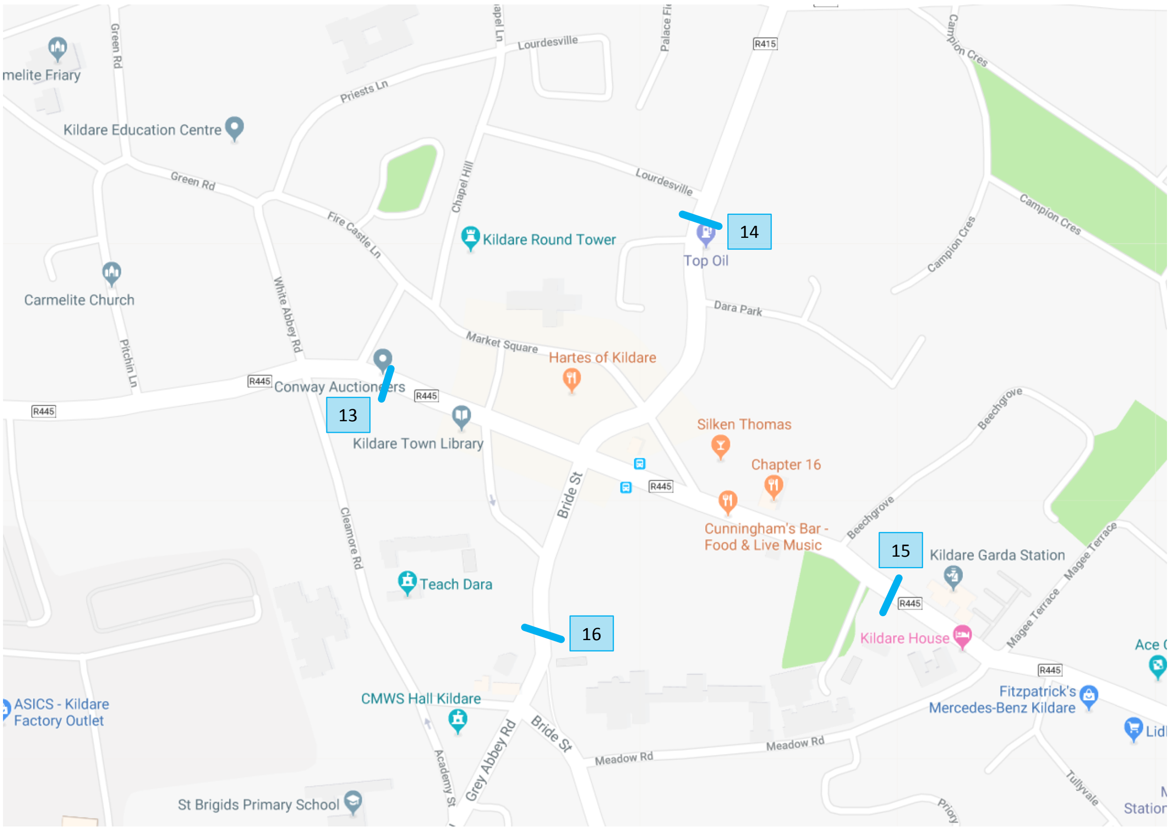


Figure 4: ATC and O-D survey sites (Town Centre)

Origin–Destination (O-D) surveys are to be carried out using the **ANPR method.** These O-D surveys are being undertaken in order to determine the various routes which vehicles may choose to travel throughout the study area.

The **ANPR surveys** are required for the 12 hour period 7am to 7pm. A vehicle will start to be recorded when it passes through its first cordon coming into the network and will stop being recorded when it passes through the last cordon that it is seen (NB appropriate filters should be applied to the data to ensure stops within the town are captured). Any other cordons that this vehicle has been seen to be travelling through will also be recorded as it is necessary to record each vehicles route through the network.

Average Journey Times between sites to also be produced from the ANPR Surveys for the 12 hour period. Appropriate filters should be applied to the ANPR and journey time data to ensure journeys with a stop between sites are identified.

<u>All **ATCs surveys** should be undertaken for a **period of 1 week.**</u>

Parking surveys: Car parking surveys are required on street at the locations highlighted in Figure 5. Parking surveys are required for the 12 hour period 7am to 7pm. Approximate numbers of car parking spaces are provided below;

- Bothairín na gCorp – 30 spaces
- Bride Street – No dedicated marked spaces on road.
- R445 – 30 spaces
- Pigeon Lane – No dedicated marked spaces on road.
- Green Road – No dedicated marked spaces on road.
- Old Road – No dedicated marked spaces on road.

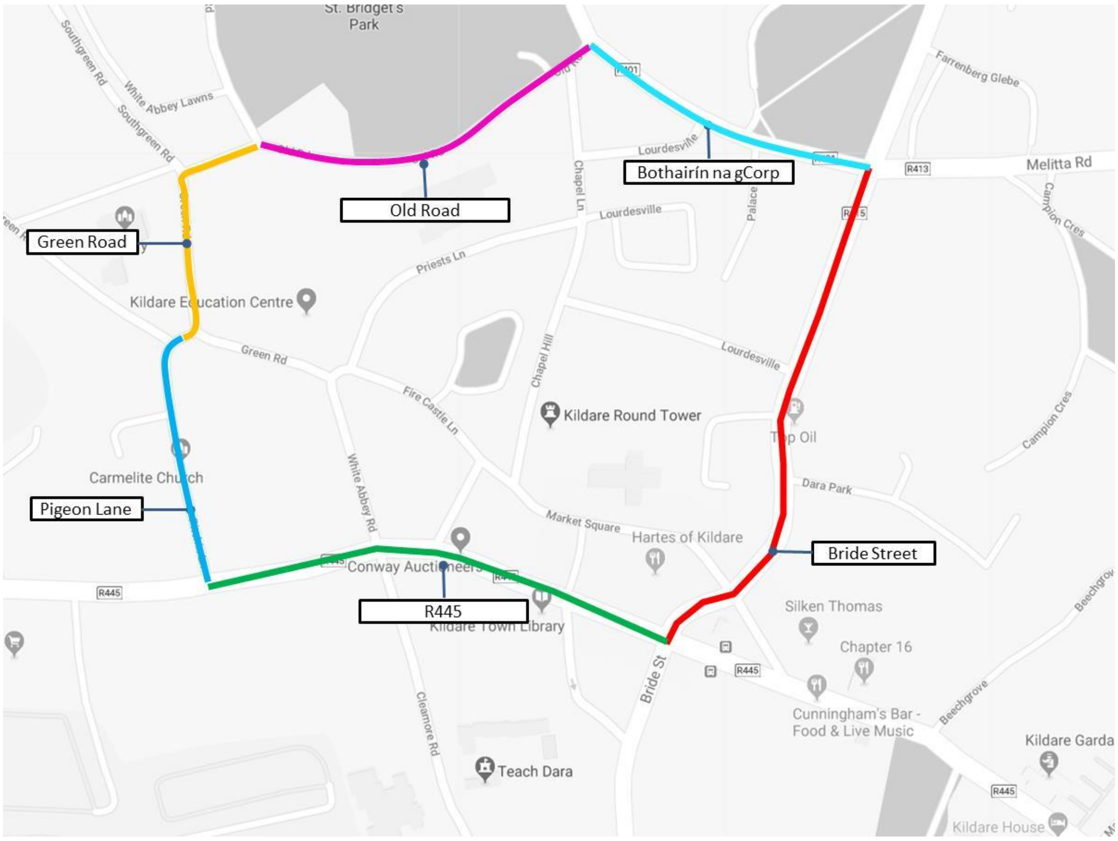


Figure 5: Parking Survey Locations

DAYS: The ANPR, JTC and Parking surveys are to be undertaken on a neutral weekday (Tuesday or Wednesday) within the school term**.** All ANPR, JTC and Parking surveys are required for the 12 hour period 7am to 7pm.

RETURN: Completed surveys should be returned to AECOM two weeks after the survey date.

FORMAT REQUIRED: All data is to be presented in MS Excel or compatible format, by day / weekly total. A copy of survey video footage must be supplied to AECOM on DVD, USB, or through a file sharing website. Vehicular JTC's are to also to be presented in a format that clearly identifies the origin and destination of each of the turning movements.

The results of the parking survey are to be provided as tabulated data on a location basis for each 15 mins (Excel), along with analysis reports on duration, occupancy, turnover and legality for the separate locations using number plate matching.

Data is to be made available within two weeks of the survey being carried out.

PRESENTATION: The traffic count data should record the following classification of vehicles / users at 15 minute intervals with hourly and 3-hourly totals highlighted in the table.

- Car
- Taxi
- LGV
- OGV1

- OGV2
- Bus
- Motorcycle (MC)
- Pedal cycle (PC)

Parking Survey Data is to be presented in tabular format. These surveys should include the following:

- Partial registration surveys in 15 minute beats for both sides of each street or car park;
- Survey data is to be presented graphically with occupancy levels plotted against available capacity at 15 minute intervals in each zone throughout the study area. (An example of the information required can be made available on request).
- Two classifications of vehicles: LV and HV
- If a vehicle is carrying out a violation (i.e. car parked on a Clearway / No Loading/Footpath restriction);
- Any observations / comments during the survey (i.e. double parking, parking on footway, etc.).

The results should include the following for each street/car park by classification for every survey period:

- Arrivals and departures;
- Total duration of stay;
- Parking accumulation;
- Observations and violations.

ADDITIONAL INFO

It is the supplier's responsibility to ensure continuous data collection in accordance with this specification and the NTA specification for traffic surveys. Any omission may require all the surveys to be undertaken again.

Should there be any item in this specification that is unclear, AECOM should be contacted as soon as possible to provide clarification. It is the responsibility of the survey contractor to ensure that the survey is undertaken to the requirements of this specification, and a discussion with the design team is strongly recommended.

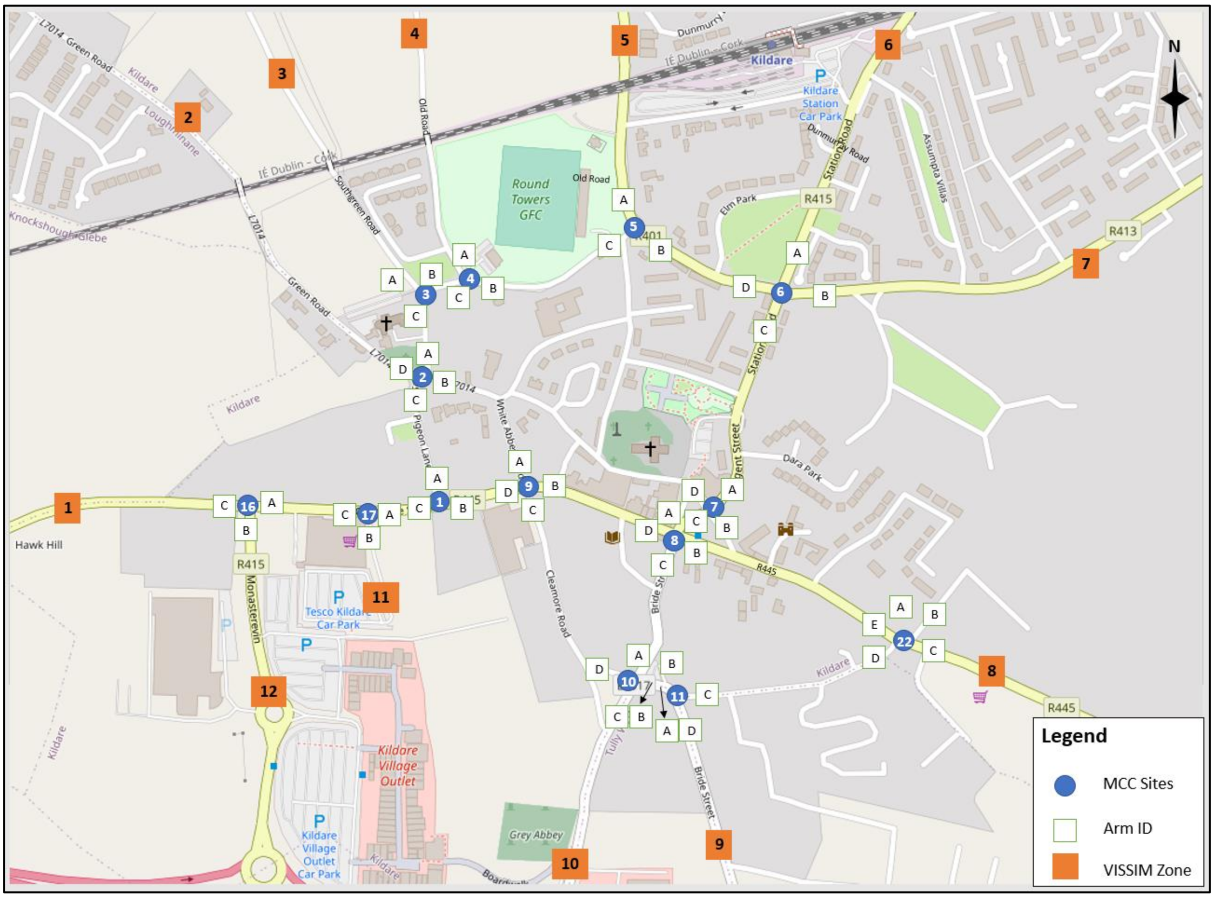
Any notable events or conditions during the survey period should be noted and reported.

The successful Traffic Counting Company shall comply with the Safety Health and Welfare at Work Act 2005 (Nr 10 of 2005) (hereinafter called "the Act") and the Regulations made thereafter.

PRECISE SITE LOCATIONS TO BE CLARIFIED WITH AECOM PRIOR TO COMMENCEMENT OF SURVEYS

Appendix B Survey Sites and Description

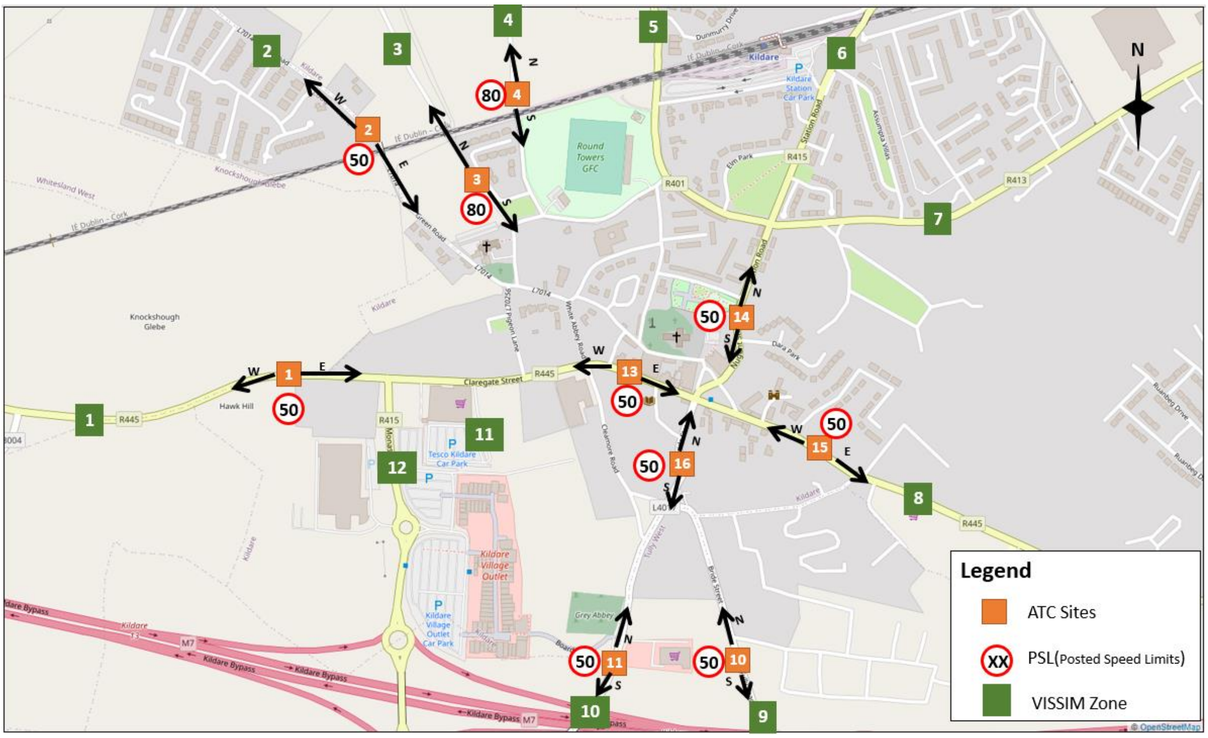
Junction Turning Counts location and arm IDs



Site No	Arm	ID	Site Name	Name
1	A	1A	Site 01 - Pigeon Lane / Monasterevin Road (R445) (E) / Monasterevin Road (R445) (W)	Pigeon Lane
1	B	1B		Monasterevin Road (R445) (E)
1	C	1C		Monasterevin Road (R445) (W)
2	A	2A	Site 02 - Southgreen Road / Friary Road / Pigeon Lane / Green Road	Southgreen Road
2	B	2B		Friary Road
2	C	2C		Pigeon Lane
2	D	2D		Green Road
3	A	3A	Site 03 - Southgreen Road / Bothairín na gCorp / Green Road / Car Park Access	Southgreen Road
3	B	3B		Bothairín na gCorp
3	C	3C		Green Road
3	D	3D		Car Park Access
4	A	4A	Site 04 - Old Road (NNW) / Old Road(E) / Bothairín na gCorp	Old Road (NNW)
4	B	4B		Old Road(E)
4	C	4C		Bothairín na gCorp
5	A	5A	Site 05 - Dunmurray Road (R401) (NNW) / Dunmurray Road (R401) (SE) / Old Road	Dunmurray Road (R401) (NNW)
5	B	5B		Dunmurray Road (R401) (SE)
5	C	5C		Old Road
6	A	6A		Station Road (R415)(NNE)

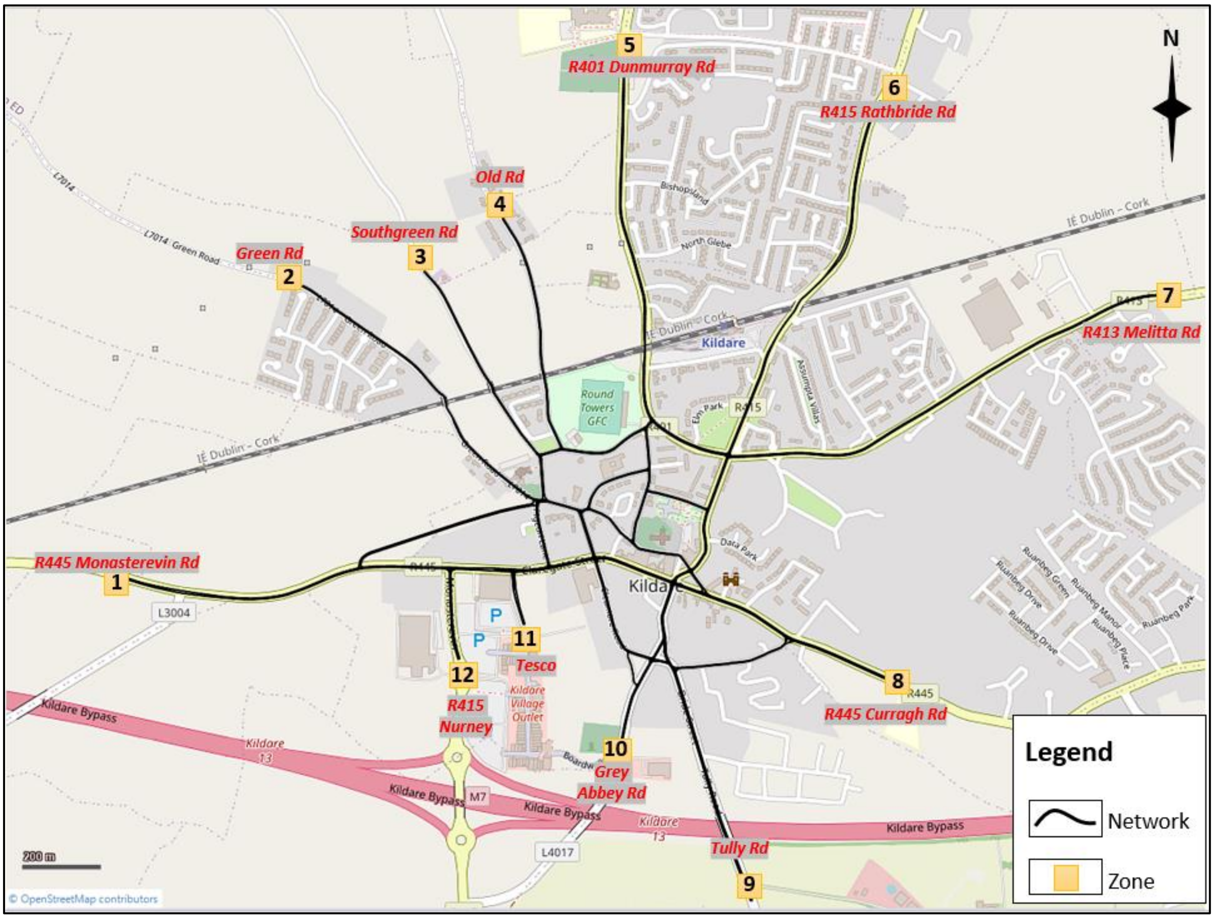
6	B	6B	Site 06 - Station Road (R415) (NNE) / Melitta Road / Station Road (R415) (SSW) / Dunmurray Road (R401)	Melitta Road
6	C	6C		Station Road (R415) (SSW)
6	D	6D		Dunmurray Road (R401)
7	A	7A	Site 07 - Bride Street (NE) / Market Square (SSE) / Bride Street (WSW) / Market Square (NW)	Bride Street (NE)
7	B	7B		Market Square (SSE)
7	C	7C		Bride Street (WSW)
7	D	7D		Market Square (NW)
8	A	8A	Site 08 - Bride Street (NNE) / R445 (ESE) / Bride Street (SSW) / R445(WNW)	Bride Street (NNE)
8	B	8B		R445(ESE)
8	C	8C		Bride Street (SSW)
8	D	8D		R445(WNW)
9	A	9A	Site 09 - White Abbey Road / Claregate Street / Academy Street / Monasterevin Road (R445)	White Abbey Road
9	B	9B		Claregate Street
9	C	9C		Academy Street
9	D	9D		Monasterevin Road (R445)
10	A	10A	Site 10 - Bride Street (NNE) / Bride Street (SE) / Grey Abbey Road / Cleamore Road	Bride Street (NNE)
10	B	10B		Bride Street (SE)
10	C	10C		Grey Abbey Road
10	D	10D		Cleamore Road
11	A	11A	Site 11 - Tully Road (NW) / Car Park Access / Meadow Road / Tully Road (SSE)	Tully Road (NW)
11	B	11B		Car Park Access
11	C	11C		Meadow Road
11	D	11D		Tully Road (SSE)
16	A	16A	Site 16 - Monasterevin Road (R445) (E) / R415 / Monasterevin Road (R445) (W)	Monasterevin Road (R445) (E)
16	B	16B		R415
16	C	16C		Monasterevin Road (R445) (W)
17	A	17A	Site 17 - R445 (E) / Tesco Entrance / R445(W)	R445(E)
17	B	17B		Tesco Entrance
17	C	17C		R445(W)
22	A	22A	Site 22 - Car Park Access / Magee Terrace R445(ESE) / Meadow Road / R445 (WNW)	Car Park Access
22	B	22B		Magee Terrace
22	C	22C		R445(ESE)
22	D	22D		Meadow Road
22	E	22E		R445(WNW)

ATC location and direction descriptions



ATC No.	Description	Direction 1	Direction 2
1	Monasterevin Road (R445)	Eastbound	Westbound
2	Green Road	Eastbound	Westbound
3	South Green Road	Northbound	Southbound
4	Old Road	Northbound	Southbound
10	Tully Road	Northbound	Southbound
11	Grey Abbey Road	Northbound	Southbound
13	Monasterevin Road (R445) – Town Centre	Eastbound	Westbound
14	Bride Street	Northbound	Southbound
15	Dublin Road (R445)	Eastbound	Westbound
16	Bride Street (South of Town Centre)	Northbound	Southbound

Journey Time location and reference points



Zone/ JT point	Coordinates	Description
1	53.157217, -6.932923	Knockshough Glebe, Co. Kildare, Ireland
2	53.163638, -6.924920	304-312 Green Rd, Co. Kildare, Ireland
5	53.169118, -6.912912	Dunmurray Rd, Bishopsland, Kildare, Ireland
6	53.167975, -6.903094	R415, Whitesland East, Kildare, Ireland
7	53.163479, -6.892090	Melitta Rd, Collaghknock Glebe, Co. Kildare, Ireland
8	53.154732, -6.902980	R445, Kildare, Ireland
9	53.149771, -6.908155	Tully Rd, Co. Kildare, Ireland
12	53.155102, -6.919154	R415, Greyabbey, Kildare, Ireland

Appendix C Matrices

ANPR O-D pairs AM Peak 08:00-09:00

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	3	2	31	19	17	50	0	2	0	46	236
2	0	0	0	1	13	3	7	13	0	1	0	12	69
3	0	0	0	0	2	1	3	2	1	0	0	3	17
4	0	1	0	0	0	0	2	3	2	0	0	0	4
5	18	6	2	1	0	6	20	16	11	3	0	17	159
6	16	2	0	1	12	0	20	14	3	8	0	18	164
7	7	1	0	1	6	4	0	1	1	0	0	1	53
8	15	1	0	0	8	5	6	0	13	4	0	6	166
9	3	1	0	0	16	5	3	9	0	1	0	0	63
10	6	2	1	0	8	14	4	23	9	0	0	7	122
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	28	5	7	3	50	32	8	21	2	3	0	0	233
TOTAL	132	36	14	12	218	140	133	310	63	54	0	150	

ANPR O-D pairs PM Peak 17:00-18:00

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	1	2	5	14	5	31	4	8	0	25	144
2	3	0	1	1	0	2	4	1	1	0	0	2	31
3	4	1	0	0	0	2	0	0	1	1	0	5	17
4	5	2	1	0	0	0	0	0	0	2	0	3	6
5	5	4	0	1	0	2	5	5	3	6	0	14	75
6	19	1	1	1	4	0	5	2	6	27	0	21	145
7	14	5	1	1	7	3	0	6	2	5	0	5	92
8	52	7	3	2	10	11	4	0	15	41	0	19	308
9	3	0	1	3	0	5	0	9	0	8	0	2	61
10	5	0	1	0	2	9	2	15	10	0	0	10	122
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	41	7	2	3	13	17	2	15	3	3	0	0	211
TOTAL	199	37	14	18	67	116	56	193	68	197	0	203	

VISUM Cordoned Matrices AM Peak 08:00-09:00

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	20	2	0	26	21	8	70	0	0	7	129	283
2	5	0	0	0	10	4	1	8	0	0	0	2	32
3	0	0	0	0	0	0	0	1	0	0	0	0	3
4	1	0	0	0	2	2	1	9	1	0	0	5	22
5	38	2	1	0	0	0	64	89	30	12	6	16	259
6	11	2	1	0	1	0	31	84	9	13	6	1	158
7	16	7	2	0	137	12	0	0	5	13	53	4	249
8	46	10	2	0	84	30	1	0	10	16	13	8	219
9	0	0	0	0	0	7	17	28	0	0	0	0	53
10	0	0	0	0	1	7	42	55	0	0	0	0	104
11	5	0	0	0	0	0	0	33	0	0	0	6	45
12	51	5	0	0	18	6	15	11	0	0	18	0	124
TOTAL	173	47	7	1	278	91	180	389	56	54	103	172	1551

VISUM Cordoned Matrices PM Peak 17:00-18:00

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	7	2	1	2	7	7	81	0	0	2	31	140
2	4	0	0	0	1	1	1	29	1	2	0	4	42
3	4	0	0	0	0	0	0	11	0	1	0	1	18
4	15	0	0	0	0	0	1	9	0	1	0	1	28
5	49	2	1	1	0	0	36	49	5	9	1	0	152
6	6	0	0	0	0	0	24	14	24	51	0	0	120
7	18	2	0	14	122	39	0	4	21	27	1	9	255
8	23	42	12	9	25	55	52	0	21	23	57	4	324
9	0	0	0	0	0	6	44	23	0	0	0	0	74
10	0	1	0	3	0	5	63	26	0	0	2	0	101
11	32	0	0	0	0	0	0	25	0	0	0	8	66
12	104	13	5	3	7	23	11	0	0	0	36	0	202
TOTAL	255	68	21	32	159	136	238	271	73	113	99	59	1522

Appendix C: VISSIM Matrices

Kildare - O-D Matrices - AM Peak (8:00-9:00)

AECOM

Project Name: Kildare Town VISSIM Modelling
Project Number: 60599248
Subject: Kildare - O-D Matrices - AM Peak (8:00-9:00)
Date: 5/19/2020

Link to ANPR data: https://www.google.com/maps/d/viewer?mid=1mMApsjUj wnCHNeWZyHaZf5ty4TQc 0F&ll=53.15941568077573%2C-6.905709999999985&z=14

Vehicle Compositions (Class Description)

LVs	LV
HVs	HV

AM Build-Up	7:30:00	7:45:00
	7:45:00	8:00:00
AM Peak	8:00:00	8:15:00
	8:15:00	8:30:00
	8:30:00	8:45:00
	8:45:00	9:00:00
AM Cool-Down	9:00:00	9:15:00
	9:15:00	9:30:00
	9:30:00	9:45:00

Consistency Checks Pre-Furness v Post-Furness?
Furness Totals

	LVs	HVs	Total
Pre-Furness	4734.40	121.20	4855.60
Post-Furness	4623.63	146.39	4770.02
Error (%)	2.34%	-20.79%	1.76%

Purpose
*Values in these matrices have been taken from post furnessed matrices. Some of the OD's had to be adjusted to display correct OD pattern to the south of the study area. Corrected values are highlighed in blue.

LVs

Pre Peak 1 7:30 AM 7:45 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	5	15	5	11	0	1	0	14	52
2	0	0	0	0	2	3	2	2	0	1	0	2	12
3	0	0	0	0	0	1	0	0	0	0	0	0	2
4	0	0	0	0	0	2	1	1	0	0	0	1	6
5	3	1	1	1	0	3	12	9	1	1	0	7	38
6	2	0	0	0	2	0	7	20	3	9	0	4	48
7	2	1	0	0	9	9	0	1	1	4	0	5	33
8	3	1	1	1	3	18	2	0	4	10	0	2	44
9	0	0	0	0	2	4	3	3	0	1	0	0	13
10	0	0	0	0	1	9	8	8	1	0	0	1	30
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	0	0	0	5	12	3	3	0	1	0	0	27
TOTAL	13	3	3	3	30	75	44	59	11	27	0	36	305

Pre Peak 2 7:45 AM 8:00 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	6	14	5	16	0	1	0	18	61
2	0	0	0	0	2	2	2	2	1	1	0	3	12
3	0	0	0	0	0	1	0	0	0	0	0	0	2
4	1	0	0	0	1	2	1	2	1	1	0	1	9
5	7	2	1	1	0	3	13	14	4	1	0	14	61
6	1	0	0	0	1	0	6	10	2	3	0	3	27
7	7	3	0	0	15	8	0	1	5	6	0	13	59
8	6	2	1	1	3	15	1	0	9	9	0	4	52
9	1	0	0	0	2	5	3	4	0	1	0	0	16
10	1	1	0	0	2	9	8	11	2	0	0	2	35
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	7	1	0	0	7	15	4	6	1	1	0	0	42
TOTAL	31	12	3	4	37	73	43	67	24	23	0	58	376

Peak 1 8:00 AM 8:15 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	11	13	7	16	0	1	0	14	63
2	1	0	0	0	2	2	2	2	0	0	0	2	11
3	0	0	0	0	1	2	1	1	0	0	0	1	7
4	1	0	0	0	1	2	1	2	0	0	0	1	10
5	9	2	2	1	0	4	24	20	2	1	0	15	80
6	2	0	0	0	2	0	6	15	1	4	0	4	34
7	6	2	0	0	27	6	0	1	2	5	0	11	60
8	6	2	2	1	7	17	2	0	3	9	0	4	54
9	0	0	0	0	3	3	3	3	0	0	0	2	16
10	1	0	0	0	3	7	9	20	0	0	0	1	42
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	6	1	0	0	15	16	6	6	5	1	0	0	56
TOTAL	31	9	7	3	72	72	62	87	14	21	0	54	433

Peak 2 8:15 AM 8:30 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	17	8	9	19	1	1	0	25	81
2	1	0	0	0	6	1	4	4	1	1	0	3	21
3	0	0	0	0	1	1	1	1	0	0	0	1	5
4	0	0	0	0	2	1	2	2	0	1	0	1	10
5	9	2	1	2	0	2	42	29	3	2	0	18	110
6	2	0	0	0	4	0	19	21	2	6	0	4	58
7	5	2	0	0	39	6	0	1	2	6	0	10	71
8	8	3	1	2	17	15	5	0	7	18	0	6	80
9	1	0	0	0	6	3	7	7	0	1	0	3	28
10	1	0	0	0	5	6	17	16	1	0	0	2	47
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	7	1	0	0	31	12	12	11	5	1	0	0	81
TOTAL	33	10	4	5	128	55	118	110	21	36	0	72	592

Peak 3 8:30 AM 8:45 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	31	10	8	29	1	3	0	14	98
2	2	0	0	0	8	1	3	4	1	2	0	3	25
3	1	0	0	0	2	1	1	1	0	2	0	2	11
4	1	0	0	0	2	1	1	2	0	1	0	1	10
5	19	3	2	2	0	3	31	38	4	7	0	27	137
6	4	0	0	0	6	0	16	24	2	15	0	5	72
7	7	2	0	0	47	7	0	1	2	14	0	11	92
8	16	3	2	2	25	17	3	0	9	51	0	8	135
9	1	0	0	0	7	2	4	6	0	2	0	3	24
10	1	0	0	0	9	7	14	22	1	0	0	3	58
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	7	1	0	0	44	13	8	12	1	3	0	0	89
TOTAL	58	12	6	6	182	63	88	139	21	99	0	77	751

Peak 4 8:45 AM 9:00 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	2	0	0	21	11	10	42	2	2	0	20	110
2	2	0	0	0	5	1	3	6	1	1	0	3	23
3	0	0	0	0	1	1	1	1	0	1	0	1	7
4	1	0	0	0	1	1	1	2	0	1	0	1	9
5	15	4	2	2	0	3	32	46	7	4	0	22	135
6	3	0	0	0	4	0	13	33	4	10	0	5	73
7	7	3	0	0	31	12	0	2	4	10	0	10	80
8	13	5	3	2	15	16	4	0	16	32	0	7	113
9	1	0	0	0	5	3	5	8	0	1	0	3	26
10	1	1	0	0	5	6	13	25	2	0	0	2	55
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	13	2	1	1	36	17	11	21	1	3	0	0	106
TOTAL	55	17	8	6	124	71	93	187	38	65	0	74	737

Post Peak 1 9:00 AM 9:15 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	2	0	0	7	6	8	35	0	1	0	11	69
2	0	0	0	0	1	0	2	3	0	0	0	2	9
3	1	0	0	0	1	1	1	2	0	0	0	1	8
4	0	0	0	0	0	1	1	2	0	0	0	1	7
5	9	3	2	1	0	1	22	33	2	1	0	15	88
6	1	0	0	0	1	0	7	16	1	2	0	2	30
7	10	5	1	0	21	11	0	3	2	6	0	16	75
8	16	7	4	2	9	14	5	0	7	18	0	9	91
9	1	0	0	0	2	2	4	9	0	0	0	0	19
10	1	0	0	0	1	3	9	18	0	0	0	1	35
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	4	2	1	0	15	10	11	22	0	1	0	0	67
TOTAL	43	20	9	4	59	48	70	143	13	31	0	59	498

Post Peak 2 9:15 AM 9:30 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	8	11	7	31	0	1	0	16	76
2	0	0	0	0	1	1	1	2	0	0	0	2	8
3	0	0	0	0	0	1	0	1	0	0	0	1	4
4	1	0	0	0	1	1	1	3	0	1	0	2	10
5	11	1	1	1	0	2	14	21	3	2	0	21	76
6	4	0	0	0	1	0	10	26	3	8	0	8	60
7	6	1	0	0	9	13	0	1	2	6	0	13	52
8	16	2	1	2	6	17	3	0	11	24	0	11	93
9	1	0	0	0	2	4	5	9	0	1	0	0	23
10	1	0	0	0	2	7	11	21	1	0	0	4	47
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	8	1	0	0	12	16	8	15	1	2	0	0	63
TOTAL	49	6	3	4	42	72	60	129	21	46	0	79	512

Post Peak 3 9:30 AM 9:45 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	2	0	0	6	10	8	27	0	1	0	19	75
2	1	0	0	0	1	1	2	3	0	1	0	2	11
3	0	0	0	0	0	0	0	0	0	0	0	0	3
4	0	0	0	0	0	1	1	1	0	0	0	1	5
5	8	2	1	1	0	1	12	13	2	1	0	9	50
6	3	0	0	0	1	0	11	19	3	7	0	4	49
7	7	3	0	0	8	5	0	1	2	6	0	8	40
8	12	4	2	1	4	11	2	0	9	17	0	5	67
9	1	1	0	0	2	4	5	8	0	1	0	0	23
10	1	1	0	0	1	5	9	13	1	0	0	2	33
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	5	2	1	0	11	16	10	14	1	2	0	0	63
TOTAL	38	16	6	3	35	55	60	100	19	37	0	50	419

HVs

Pre Peak 1 7:30 AM 7:45 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	2	0	0	0	0	1	0	0	0	0	0	0	3
8	0	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	1	0	0	0	0	0	0	0	0	1
TOTAL	2	0	0	1	1	1	1	1	0	0	0	1	8

Pre Peak 2 7:45 AM 8:00 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	2	0	1	0	0	0	2	6
2	0	0	0	0	0	0	0	0	0	0	0	1	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	1
6	1	0	0	0	0	0	0	0	1	0	0	0	2
7	0	0	0	0	1	0	0	0	0	0	0	0	1
8	1	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	2	0	0	0	1	2	1	2	1	1	0	4	14

Peak 1 8:00 AM 8:15 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	1	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	1	0	0	0	0	0	2
6	2	0	0	0	0	0	1	1	0	1	0	1	5
7	0	0	0	0	0	0	0	0	0	0	0	0	1
8	0	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	1	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	3	0	0	0	0	1	0	0	0	0	0	0	4
TOTAL	6	0	0	0	1	3	2	1	1	1	0	1	17

Peak 2 8:15 AM 8:30 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	1	1	0	0	0	2	0	0	0	0	5
2	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	1	0	0	0	0	1
6	0	0	0	0	0	0	1	0	0	0	0	0	2
7	0	0	0	0	2	0	0	0	0	0	0	0	2
8	1	0	0	0	1	0	0	0	1	0	0	0	3
9	0	0	0	0	0	0	0	1	0	0	0	0	2
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	0	1	0	0	0	0	1	0	0	0	0	5
TOTAL	4	0	2	1	4	1	3	6	1	0	0	1	23

Peak 3 8:30 AM 8:45 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	1	0	1	0	0	0	1	3
2	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	1	0	0	0	0	0	0	2
6	1	0	0	0	0	0	0	0	0	0	0	0	2
7	1	0	0	0	0	1	0	0	0	0	0	0	2
8	0	0	0	0	0	0	0	0	1	0	0	0	3
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	1	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	1	1	0	0	0	0	0	0	3
TOTAL	3	0	0	0	2	5	1	2	1	1	0	3	18

Peak 4 8:45 AM 9:00 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	1	3
2	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	1	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	2
6	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0	0	0	2
8	0	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	1	0	0	0	0	0	0	2
TOTAL	3	0	0	0	2	3	1	2	1	0	0	2	14

Post Peak 1 9:00 AM 9:15 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	0	2
2	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	2	1	0	0	0	0	4
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	1	0	0	0	1	1	0	0	0	0	0	0	3
8	0	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	1	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	1	0	1	0	0	0	0	2
TOTAL	2	0	0	0	1	4	3	3	0	1	0	1	17

Post Peak 2 9:15 AM 9:30 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	1	2	1	0	0	0	0	4
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	1	0	0	0	0	0	0	0	0	0	0	0	1
6	3	1	0	0	0	0	1	1	0	1	0	1	8
7	1	0	0	0	0	0	0	0	0	0	0	0	1
8	2	0	0	0	0	0	1	0	0	0	0	0	4
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	1	0	0	0	0	0	0	2
TOTAL	7	1	0	0	1	2	5	4	1	1	0	1	23

Post Peak 3 9:30 AM 9:45 AM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	1	3
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	1	0	0	0	0	0	2
7	1	0	0	0	1	0	0	0	0	0	0	0	2
8	1	0	0	0	0	0	0	0	0	1	0	0	2
9	0	0	0	0	0	0	0	1	0	0	0	0	1
10	0	0	0	0	0	1	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	2
TOTAL	2	0	0	0	2	2	2	3	0	1	0	2	13

Prepared By:	Nymisha Nandini	19-May-20
Checked By:	0	0-Jan-00
Approved By:		

Kildare - O-D Matrices - PM Peak (17:00-18:00)

AECOM

Project Name: Kildare Town VISSIM Modelling
Project Number: 60599248
Subject: Kildare - O-D Matrices - PM Peak (17:00-18:00)
Date: 5/19/2020

Link to ANPR data: https://www.google.com/maps/d/viewer?mid=1mMApsjUj_wnCHNeWZyHaZf5ty4TQc_0F&ll=53.15941568077573%2C-6.905709999999985&z=14

Vehicle Compositions (Class Description)

LVs	LV
HVs	HV

AM Build-Up	16:30:00	16:45:00
	16:45:00	17:00:00
AM Peak	17:00:00	17:15:00
	17:15:00	17:30:00
	17:30:00	17:45:00
	17:45:00	18:00:00
AM Cool-Down	18:00:00	18:15:00
	18:15:00	18:30:00
	18:30:00	18:45:00

Consistency Checks Pre-Furness v Post-Furness?
Furness Totals

	LVs	HVs	Total
Pre-Furness	4970.00	80.00	5050.00
Post-Furness	4971.98	103.10	5075.09
Error (%)	-0.04%	-28.88%	-0.50%

Purpose
*Values in these matrices have been taken from post furnessed matrices. Some of the OD's had to be adjusted to display correct OD pattern to the south of the study area. Corrected values are highlighed in blue.

LVs

Pre Peak 1 4:30 PM 4:45 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	1	1	3	3	25	1	1	0	8	43
2	1	0	0	0	1	0	1	4	0	1	0	2	10
3	1	0	0	0	0	0	1	2	0	1	0	1	7
4	1	0	0	0	0	0	0	1	0	0	0	1	3
5	12	0	1	1	0	1	10	14	1	3	0	7	50
6	7	0	1	1	1	0	13	6	4	15	0	11	59
7	14	1	1	2	35	12	0	8	5	12	0	14	104
8	28	5	2	2	8	14	18	0	7	19	0	17	119
9	2	0	0	0	1	2	9	7	0	1	0	3	26
10	2	0	1	1	1	2	15	13	2	0	0	7	43
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	15	4	2	2	10	15	10	12	3	5	0	0	76
TOTAL	82	12	7	9	58	49	79	92	23	58	0	71	540

Pre Peak 2 4:45 PM 5:00 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	1	1	1	5	3	33	1	2	0	11	58
2	1	0	0	0	1	1	1	5	0	1	0	1	12
3	0	0	0	0	0	0	0	1	0	0	0	0	2
4	2	0	0	0	0	0	0	1	0	1	0	1	6
5	15	1	1	1	0	2	8	18	1	5	0	5	56
6	7	1	1	1	1	0	9	6	3	19	0	6	52
7	11	1	1	2	23	7	0	7	4	12	0	7	74
8	31	7	2	2	8	23	15	0	7	29	0	11	135
9	2	1	1	1	1	3	7	8	0	2	0	2	25
10	3	1	1	1	1	4	15	18	2	0	0	6	52
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	13	5	2	2	7	19	6	11	2	5	0	0	73
TOTAL	84	16	10	11	42	64	64	108	20	76	0	50	546

Peak 1 5:00 PM 5:15 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	1	4	3	28	2	1	0	15	55
2	2	0	0	0	1	1	1	6	2	1	0	2	16
3	1	0	0	0	1	1	1	2	1	1	0	2	9
4	1	0	0	0	0	1	1	2	0	1	0	1	7
5	11	1	0	0	0	2	10	17	1	3	0	8	52
6	7	1	0	0	2	0	11	8	6	19	0	13	67
7	7	1	0	1	27	8	0	5	4	7	0	8	69
8	26	9	1	2	13	25	19	0	11	23	0	19	147
9	1	0	0	0	1	2	5	5	0	1	0	4	18
10	1	1	0	0	1	3	12	12	2	0	0	7	40
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	19	6	1	1	11	20	8	12	3	4	0	0	86
TOTAL	75	19	5	6	58	65	70	96	32	62	0	79	567

Peak 2 5:15 PM 5:30 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	1	2	2	5	4	32	3	2	0	8	59
2	2	0	0	1	1	1	1	4	1	1	0	2	12
3	1	0	0	1	1	1	1	2	1	1	0	2	10
4	2	0	0	0	1	0	1	1	0	1	0	1	8
5	18	1	1	2	0	2	15	18	1	5	0	9	71
6	8	0	1	2	2	0	9	6	5	22	0	11	65
7	8	0	1	3	32	11	0	4	3	8	0	7	79
8	29	5	1	4	14	18	19	0	8	24	0	16	138
9	1	0	0	1	1	2	6	4	0	1	0	4	21
10	2	1	1	2	2	3	20	14	3	0	0	8	54
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	11	3	1	3	12	16	8	9	2	5	0	0	71
TOTAL	82	11	6	20	68	58	84	94	27	70	0	68	588

Peak 3 5:30 PM 5:45 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	1	2	4	3	32	2	2	0	9	55
2	2	0	0	0	1	1	1	5	1	1	0	2	15
3	1	0	0	0	1	0	0	1	0	1	0	1	6
4	3	0	0	0	1	1	1	2	0	1	0	1	12
5	20	1	0	1	0	2	12	22	1	6	0	7	72
6	7	0	0	1	1	0	9	5	2	18	0	7	51
7	9	1	0	2	32	11	0	5	3	11	0	6	80
8	32	6	1	2	13	20	15	0	6	29	0	13	138
9	1	0	0	0	1	2	6	6	0	2	0	4	23
10	2	0	0	1	1	2	10	10	1	0	0	4	32
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	18	3	1	1	8	12	5	7	1	4	0	0	59
TOTAL	95	13	4	9	61	55	61	97	18	75	0	54	542

Peak 4 5:45 PM 6:00 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	1	1	2	6	5	32	3	3	0	4	58
2	2	0	0	0	1	1	1	4	1	1	0	2	13
3	1	0	0	0	1	1	1	1	0	1	0	1	7
4	2	0	0	0	1	0	1	1	0	1	0	1	7
5	21	2	1	1	0	2	15	18	2	6	0	9	77
6	9	1	1	1	2	0	16	6	5	23	0	10	74
7	8	1	1	1	31	12	0	3	3	8	0	6	75
8	22	8	2	2	10	14	13	0	6	18	0	9	103
9	1	1	1	0	1	2	6	4	0	1	0	3	21
10	2	1	1	1	2	2	13	9	2	0	0	5	37
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	22	6	2	1	11	15	7	7	2	4	0	0	77
TOTAL	89	22	10	9	60	55	77	85	25	66	0	49	547

Post Peak 1 6:00 PM 6:15 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	1	1	3	4	3	40	2	3	0	9	66
2	1	0	0	0	1	1	1	5	1	1	0	3	14
3	0	0	0	0	0	0	0	1	0	0	0	1	2
4	1	0	0	0	0	0	0	1	0	0	0	1	3
5	19	1	1	1	0	2	13	25	2	7	0	14	84
6	6	0	1	1	2	0	2	6	5	22	0	13	58
7	7	0	1	1	33	10	0	4	4	9	0	9	77
8	27	5	2	2	16	15	15	0	10	30	0	21	142
9	1	0	0	0	1	1	6	6	0	2	0	3	22
10	2	0	1	1	2	2	11	12	2	0	0	8	41
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	20	3	1	1	12	11	6	9	3	5	0	0	71
TOTAL	83	10	8	8	70	45	56	110	27	80	0	81	579

Post Peak 2 6:15 PM 6:30 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	1	2	2	21	1	1	0	10	39
2	1	0	0	0	1	1	1	7	1	1	0	2	16
3	0	0	0	0	0	0	0	1	0	1	0	1	6
4	2	0	0	0	1	1	1	2	1	1	0	2	10
5	18	2	1	1	0	2	16	33	3	8	0	13	97
6	5	1	0	1	2	0	8	7	5	21	0	10	60
7	6	1	0	2	32	6	0	6	5	10	0	8	74
8	21	8	1	2	12	17	15	0	10	26	0	15	128
9	1	0	0	0	1	2	5	6	0	1	0	2	19
10	2	1	0	1	2	3	15	17	3	0	0	8	51
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	12	6	1	2	13	17	7	13	3	6	0	0	79
TOTAL	68	20	4	10	65	51	70	112	32	76	0	70	577

Post Peak 2 6:30 PM 6:45 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	1	0	0	2	4	4	28	1	2	0	6	48
2	1	0	0	0	1	1	1	6	1	1	0	2	15
3	0	0	0	0	0	0	0	1	0	0	0	1	4
4	2	0	0	0	1	0	1	2	1	1	0	1	8
5	16	1	0	1	0	2	14	17	2	5	0	8	64
6	7	1	0	1	2	0	6	6	5	18	0	10	56
7	9	1	0	1	31	9	0	5	5	9	0	8	77
8	21	6	1	1	9	12	15	0	7	17	0	11	99
9	1	0	0	0	1	1	4	3	0	1	0	1	12
10	1	1	0	0	1	2	13	10	2	0	0	5	36
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	18	4	1	1	9	12	7	8	3	4	0	0	67
TOTAL	76	15	3	6	56	43	65	85	26	57	0	54	486

HVs

Pre Peak 1 4:30 PM 4:45 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	1	0	0	0	0	0	1	2
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	1
4	0	0	1	0	0	0	0	0	0	0	0	0	1
5	0	0	0	0	0	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	1
8	1	0	0	0	0	1	0	0	0	0	0	0	2
9	0	0	0	0	0	1	0	0	0	0	0	0	1
10	0	0	1	0	0	1	0	1	0	0	0	0	3
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	1	0	0	0	0	0	0	0	0	0	2
TOTAL	2	0	2	0	0	4	1	2	1	0	0	2	15

Pre Peak 2 4:45 PM 5:00 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	3	4
2	0	0	0	0	0	0	0	1	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	1	1
7	1	0	0	0	0	0	0	1	0	0	0	0	2
8	2	0	0	0	0	0	0	0	0	1	0	1	4
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	2
TOTAL	4	0	1	0	1	1	1	3	1	1	0	6	18

Peak 1 5:00 PM 5:15 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	2	3
2	0	0	0	0	0	0	1	0	0	0	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	1	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	2
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	1	0	1	0	0	1	2	1	0	1	0	3	12

Peak 2 5:15 PM 5:30 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	0	0	0	0	0	0	0	0	0	0	0	2
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	1	0	0	0	0	0	0	0	1
TOTAL	2	0	0	0	1	1	0	1	1	1	0	1	9

Peak 3 5:30 PM 5:45 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	0	2
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	1	0	0	0	0	0	2
7	1	0	0	0	1	0	0	0	0	0	0	0	2
8	1	0	0	0	1	0	1	0	0	1	0	0	4
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	1	0	0	0	0	2
TOTAL	3	0	0	0	2	0	2	3	1	1	0	1	14

Peak 4 5:45 PM 6:00 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	1	0	0	0	0	0	0	2
8	1	0	0	0	0	0	0	0	0	0	0	0	2
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	1	0	1	0	0	0	0	4
TOTAL	3	0	0	0	1	2	1	3	1	1	0	1	13

Post Peak 1 6:00 PM 6:15 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	1	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	1	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	1	0	0	0	1	1	0	2	1	1	0	1	8

Post Peak 2 6:15 PM 6:30 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	0	0	0	0	0	0	0	0	0	0	0	1
5	0	0	0	0	0	0	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	1
8	0	0	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	3	0	0	0	0	0	0	1	1	1	0	1	8

Post Peak 2 6:30 PM 6:45 PM

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	1	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	1	1
6	0	0	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	1
8	0	0	0	0	0	0	1	0	0	0	0	0	2
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	1
TOTAL	2	0	0	0	0	0	1	1	0	1	0	2	7

Prepared By:	Nymisha Nandini	19-May-20
Checked By:	0	0-Jan-00
Approved By:		

Appendix D VISSIM Calibration Results

Junction Turning Flow Calibration Results

Project Name: Kildare Town VISSIM Modelling
Project Number: 60629806
Subject: Kildare Turn Count Calibration AM Peak
Date: 27th May 2020

Peak Time	
8:00	9:00

VISSIM Node 100 **MCC ID** 1

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 01 - Pigeon Lane / Monasterevin Road (R445)(E) / Monasterevin Road (R445)(W)	A	28	Pigeon Lane	B	14	Monasterevin Road (R445)(E)	36	0	-36	-100%	8.5	N	OK
	A	28		C	16	Monasterevin Road (R445)(W)	192	210	18	9%	1.3	Y	OK
	B	13	Monasterevin Road (R445)(E)	A	27	Pigeon Lane	11	0	-11	-100%	4.7	Y	OK
	B	13		C	16	Monasterevin Road (R445)(W)	167	143	-24	-14%	1.9	Y	OK
	C	15	Monasterevin Road (R445)(W)	A	27	Pigeon Lane	200	248	48	24%	3.2	Y	OK
	C	15		B	14	Monasterevin Road (R445)(E)	356	327	-29	-8%	1.6	Y	OK
						Total Vehicles	962	928	-34	-4%			

VISSIM Node 101 **MCC ID** 2

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 02 - Southgreen Road / Friary Road / Pigeon Lane / Green Road	A	32	Southgreen Road	B	33	Friary Road	75	39	-36	-48%	4.8	Y	OK
	A	32		C	28	Pigeon Lane	178	195	17	10%	1.2	Y	OK
	A	32		D	30	Green Road	6	17	11	183%	3.2	Y	OK
	B	34	Friary Road	A	31	Southgreen Road	95	46	-49	-52%	5.8	N	OK
	B	34		C	28	Pigeon Lane	7	0	-7	-100%	3.7	Y	OK
	B	34		D	30	Green Road	20	20	0	0%	0.0	Y	OK
	C	27	Pigeon Lane	A	31	Southgreen Road	183	237	54	30%	3.7	Y	OK
	C	27		B	33	Friary Road	10	0	-10	-100%	4.5	Y	OK
	C	27		D	30	Green Road	16	10	-6	-38%	1.7	Y	OK
	D	29	Green Road	A	31	Southgreen Road	13	30	17	131%	3.7	Y	OK
	D	29		B	33	Friary Road	27	33	6	22%	1.1	Y	OK
	D	29		C	28	Pigeon Lane	41	17	-24	-59%	4.5	Y	OK
						Total Vehicles	671	644	-27	-4%			

VISSIM Node 102 **MCC ID** 3

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 03 - Southgreen Road / Bothairín na gCorp / Green Road / Car Park Access	A	35	Southgreen Road	B	37	Bothairín na gCorp	6	15	9	150%	2.8	Y	OK
	A	35		C	32	Green Road	25	13	-12	-48%	2.8	Y	OK
	B	38	Bothairín na gCorp	A	36	Southgreen Road	3	7	4	133%	1.8	Y	OK
	B	38		C	32	Green Road	249	240	-9	-4%	0.6	Y	OK
	C	31	Green Road	A	36	Southgreen Road	17	11	-6	-35%	1.6	Y	OK
	C	31		B	37	Bothairín na gCorp	267	301	34	13%	2.0	Y	OK
						Total Vehicles	567	587	20	4%			

VISSIM Node 103 **MCC ID** 4

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 04 - Old Road(NNW) / Old Road(E) / Bothairín na gCorp	A	39	Old Road(NNW)	B	41	Old Road(E)	10	16	6	60%	1.7	Y	OK
	A	39		C	38	Bothairín na gCorp	28	18	-10	-36%	2.1	Y	OK
	B	42	Old Road(E)	A	40	Old Road(NNW)	5	7	2	40%	0.8	Y	OK
	B	42		C	38	Bothairín na gCorp	230	230	0	0%	0.0	Y	OK
	C	37	Bothairín na gCorp	A	40	Old Road(NNW)	13	9	-4	-31%	1.2	Y	OK
	C	37		B	41	Old Road(E)	274	306	32	12%	1.9	Y	OK
						Total Vehicles	560	586	26	5%			

VISSIM Node 104 **MCC ID** 5

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 05 - Dunmurray Road (R401)(NNW) / Dunmurray Road (R401)(SE) / Old Road	A	57	Dunmurray Road (R401)(NNW)	B	51	Dunmurray Road (R401)(SE)	219	276	57	26%	3.6	Y	OK
	A	57		C	42	Old Road	248	178	-70	-28%	4.8	Y	OK
	B	52	Dunmurray Road (R401)(SE)	A	58	Dunmurray Road (R401)(NNW)	161	268	107	66%	7.3	N	Fail
	B	52		C	42	Old Road	71	58	-13	-18%	1.6	Y	OK
	C	41	Old Road	A	58	Dunmurray Road (R401)(NNW)	284	210	-74	-26%	4.7	Y	OK
	C	41		B	51	Dunmurray Road (R401)(SE)	74	98	24	32%	2.6	Y	OK
						Total Vehicles	1057	1088	31	3%			

VISSIM Node 105 **MCC ID** 6

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 06 - Station Road (R415)(NNE) / Melitta Road / Station Road (R415)(SSW) / Dunmurray Road (R401)	A	55	Station Road (R415)(NNE)	B	54	Melitta Road	56	52	-4	-7%	0.5	Y	OK
	A	55		C	6	Station Road (R415)(SSW)	171	138	-33	-19%	2.7	Y	OK
	A	55		D	52	Dunmurray Road (R401)	19	33	14	74%	2.7	Y	OK
	B	53	Melitta Road	A	56	Station Road (R415)(NNE)	32	30	-2	-6%	0.4	Y	OK
	B	53		C	6	Station Road (R415)(SSW)	120	83	-37	-31%	3.7	Y	OK
	B	53		D	52	Dunmurray Road (R401)	158	182	24	15%	1.8	Y	OK
	C	5	Station Road (R415)(SSW)	A	56	Station Road (R415)(NNE)	170	161	-9	-5%	0.7	Y	OK
	C	5		B	54	Melitta Road	121	122	1	1%	0.1	Y	OK
	C	5		D	52	Dunmurray Road (R401)	55	110	55	100%	6.1	N	OK
	D	51	Dunmurray Road (R401)	A	56	Station Road (R415)(NNE)	41	68	27	66%	3.7	Y	OK
	D	51		B	54	Melitta Road	152	164	12	8%	1.0	Y	OK
	D	51		C	6	Station Road (R415)(SSW)	91	128	37	41%	3.5	Y	OK
						Total Vehicles	1186	1271	85	7%			

VISSIM Node 106 **MCC ID** 7

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 07 - Bride Street(NE) / Market Square(SSE) / Bride Street(WSW) / Market Square(NW)	A	6	Bride Street(NE)	B	7	Market Square(SSE)	169	205	36	21%	2.6	Y	OK
	A	6		C	6	Bride Street(WSW)	227	142	-85	-37%	6.3	N	OK
	A	6		D	46	Market Square(NW)	0	0	0	-	0.0	Y	OK
	B	8	Market Square(SSE)	A	5	**Bride Street(NE)**	**116**	**143**	**27**	**23%**	**2.4**	Y	OK
	B	8		C	6	**Bride Street(WSW)**	**5**	**2**	**-3**	**-60%**	**1.6**	Y	OK
	B	8		D	46	**Market Square(NW)**	**1**	**0**	**-1**	**-100%**	**1.4**	Y	OK
	C	5	Bride Street(WSW)	A	5	**Bride Street(NE)**	**286**	**264**	**-22**	**-8%**	**1.3**	Y	OK
	C	5		B	7	**Market Square(SSE)**	**15**	**0**	**-15**	**-100%**	**5.5**	N	OK
	C	5		D	46	Market Square(NW)	2	0	-2	-100%	2.0	Y	OK
	D	45		A	5	Bride Street(NE)	2	0	-2	-100%	2.0	Y	OK

Junction	From (Link)			To (Link)			Observed	Modelled	Value	%	Value	<5	Individual Flows
	D	45	Market Square(NW)	B	7	Market Square(SSE)	1	0	-1	-100%	1.4	Y	OK
	D	45		C	6	Bride Street(WSW)	1	0	-1	-100%	1.4	Y	OK
						Total Vehicles	825	756	-69	-8%			

VISSIM Node 107 **MCC ID** 8

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 08 - Bride Street(NNE) / R445(ESE) / Bride Street(SSW) / R445(WNW)	A	6	Bride Street(NNE)	B	3	R445(ESE)	11	0	-11	-100%	4.7	Y	OK
	A	6		C	10	Bride Street(SSW)	136	90	-46	-34%	4.3	Y	OK
	A	6		D	2	R445(WNW)	80	54	-26	-33%	3.2	Y	OK
	B	4	R445(ESE)	A	5	Bride Street(NNE)	15	0	-15	-100%	5.5	N	OK
	B	4		C	10	Bride Street(SSW)	32	28	-4	-13%	0.7	Y	OK
	B	4		D	2	R445(WNW)	149	96	-53	-36%	4.8	Y	OK
	C	72	Bride Street(SSW)	A	5	Bride Street(NNE)	153	122	-31	-20%	2.6	Y	OK
	C	72		B	3	R445(ESE)	30	0	-30	-100%	7.7	N	OK
	C	72		D	2	R445(WNW)	43	18	-25	-58%	4.5	Y	OK
	D	1	R445(WNW)	A	5	Bride Street(NNE)	136	142	6	4%	0.5	Y	OK
	D	1		B	3	R445(ESE)	199	177	-22	-11%	1.6	Y	OK
	D	1		C	10	Bride Street(SSW)	11	13	2	18%	0.6	Y	OK
						Total Vehicles	995	740	-255	-26%			

VISSIM Node 108 **MCC ID** 9

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 09 - White Abbey Road / Claregate Street / Academy Street / Monasterevin Road (R445)	A	11	White Abbey Road	B	1	Claregate Street	85	51	-34	-40%	4.1	Y	OK
	A	11		C	60	Academy Street	76	21	-55	-72%	7.9	N	OK
	A	11		D	13	Monasterevin Road (R445)	7	0	-7	-100%	3.7	Y	OK
	B	2	Claregate Street	A	12	White Abbey Road	78	40	-38	-49%	4.9	Y	OK
	B	2		C	60	Academy Street	27	0	-27	-100%	7.3	N	OK
	B	2		D	13	Monasterevin Road (R445)	134	128	-6	-4%	0.5	Y	OK
	C	59	Academy Street	A	12	White Abbey Road	63	26	-37	-59%	5.5	N	OK
	C	59		B	1	Claregate Street	14	0	-14	-100%	5.3	N	OK
	C	59		D	13	Monasterevin Road (R445)	35	16	-19	-54%	3.8	Y	OK
	D	14	Monasterevin Road (R445)	A	12	White Abbey Road	40	0	-40	-100%	8.9	N	OK
	D	14		B	1	Claregate Street	306	297	-9	-3%	0.5	Y	OK
	D	14		C	60	Academy Street	51	30	-21	-41%	3.3	Y	OK
						Total Vehicles	916	609	-307	-34%			

VISSIM Node 109 **MCC ID** 10

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 10 - Bride Street(NNE) / Bride Street(SE) / Grey Abbey Road / Cleamore Road	A	67	Bride Street(NNE)	B	70	Bride Street(SE)	59	28	-31	-53%	4.7	Y	OK
	A	67		C	67	Grey Abbey Road	106	104	-2	-2%	0.2	Y	OK
	A	67		D	59	Cleamore Road	27	0	-27	-100%	7.3	N	OK
	B	71	Bride Street(SE)	A	68	Bride Street(NNE)	49	50	1	2%	0.1	Y	OK
	B	71		C	67	Grey Abbey Road	62	84	22	35%	2.6	Y	OK
	B	71		D	59	Cleamore Road	43	17	-26	-60%	4.7	Y	OK
	C	68	Grey Abbey Road	A	68	Bride Street(NNE)	90	91	1	1%	0.1	Y	OK
	C	68		B	70	Bride Street(SE)	52	87	35	67%	4.2	Y	OK
	C	68		D	59	Cleamore Road	3	12	9	300%	3.3	Y	OK
	D	60	Cleamore Road	A	68	Bride Street(NNE)	50	0	-50	-100%	10.0	N	OK
	D	60		B	70	Bride Street(SE)	51	24	-27	-53%	4.4	Y	OK
	D	60		C	67	Grey Abbey Road	27	26	-1	-4%	0.2	Y	OK
						Total Vehicles	619	523	-96	-16%			

VISSIM Node 110 **MCC ID** 11

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 11 - Tully Road(NW) / Car Park Access / Meadow Road / Tully Road(SSE)	A	70	Tully Road(NW)	C	65	Meadow Road	98	83	-15	-15%	1.6	Y	OK
	A	70		D	73	Tully Road(SSE)	52	56	4	8%	0.5	Y	OK
	C	66	Meadow Road	A	71	Tully Road(NW)	92	80	-12	-13%	1.3	Y	OK
	C	66		D	73	Tully Road(SSE)	22	37	15	68%	2.8	Y	OK
	D	9	Tully Road(SSE)	A	71	Tully Road(NW)	62	71	9	15%	1.1	Y	OK
	D	9		C	65	Meadow Road	32	24	-8	-25%	1.5	Y	OK
						Total Vehicles	358	351	-7	-2%			

VISSIM Node 111 **MCC ID** 16

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 16 - Monasterevin Road (R445)(E) / R415 / Monasterevin Road (R445)(W)	A	18	Monasterevin Road (R445)(E)	B	26	R415	174	203	29	17%	2.1	Y	OK
	A	18		C	24	Monasterevin Road (R445)(W)	133	150	17	13%	1.4	Y	OK
	B	25	R415	A	19	Monasterevin Road (R445)(E)	292	306	14	5%	0.8	Y	OK
	B	25		C	24	Monasterevin Road (R445)(W)	39	39	0	0%	0.0	Y	OK
	C	23	Monasterevin Road (R445)(W)	A	19	Monasterevin Road (R445)(E)	289	281	-8	-3%	0.5	Y	OK
	C	23		B	26	R415	75	75	0	0%	0.0	Y	OK
						Total Vehicles	1002	1054	52	5%			

VISSIM Node 112 **MCC ID** 17

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 17 - R445(E) / Tesco Entrance / R445(W)	A	16	R445(E)	C	18	R445(W)	299	353	54	18%	3.0	Y	OK
	C	17	R445(W)	A	15	R445(E)	534	581	47	9%	2.0	Y	OK
						Total Vehicles	833	934	101	12%			

VISSIM Node 113 **MCC ID** 22

Junction	From (Link)			To (Link)			Flow Peak Time		Difference		GEH		Individual Flows
							Observed	Modelled	Value	%	Value	<5	
MCC Site 22 - Car Park Access / Magee Terrace / R445(ESE) / Meadow Road / R445(WNW)	C	4	R445(ESE)	D	66	Meadow Road	129	118	-11	-9%	1.0	Y	OK
	C	4		E	4	R445(WNW)	257	270	13	5%	0.8	Y	OK
	D	65	Meadow Road	C	3	R445(ESE)	116	105	-11	-9%	1.0	Y	OK
	D	65		E	4	R445(WNW)	34	0	-34	-100%	8.2	N	OK
	E	3	R445(WNW)	C	3	R445(ESE)	344	379	35	10%	1.8	Y	OK
	E	3		D	66	Meadow Road	14	0	-14	-100%	5.3	N	OK
						Total Vehicles	894	872	-22	-2%			

	Percentage of Validation Counts with GEH < 5 =	99 17	85.34%
	Individual Flows meeting DMRB criteria =	115 1	99.14%

Kildare Turn Count Calibration PM Peak

AECOM

Project Name: Kildare Town VISSIM Modelling
Project Number: 60629806
Subject: Kildare Turn Count Calibration PM Peak
Date: 27th May 2020

Peak Time	
17:00	18:00

VISSIM Node 100 **MCC ID** 1

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 01 - Pigeon Lane / Monasterevin Road (R445)(E) / Monasterevin Road (R445)(W)	A	28	Pigeon Lane	B	14	Monasterevin Road (R445)(E)	11	0	-11	-100%	4.7	Y	OK
	A	28		C	16	Monasterevin Road (R445)(W)	173	209	36	21%	2.6	Y	OK
	B	13	Monasterevin Road (R445)(E)	A	27	Pigeon Lane	5	0	-5	-100%	3.2	Y	OK
	B	13		C	16	Monasterevin Road (R445)(W)	366	286	-80	-22%	4.4	Y	OK
	C	15	Monasterevin Road (R445)(W)	A	27	Pigeon Lane	143	150	7	5%	0.6	Y	OK
	C	15		B	14	Monasterevin Road (R445)(E)	303	274	-29	-10%	1.7	Y	OK
						Total Vehicles	1001	919	-82	-8%			

VISSIM Node 101 **MCC ID** 2

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 02 - Southgreen Road / Friary Road / Pigeon Lane / Green Road	A	32	Southgreen Road	B	33	Friary Road	51	42	-9	-18%	1.3	Y	OK
	A	32		C	28	Pigeon Lane	144	194	50	35%	3.8	Y	OK
	A	32		D	30	Green Road	14	8	-6	-43%	1.8	Y	OK
	B	34	Friary Road	A	31	Southgreen Road	63	31	-32	-51%	4.7	Y	OK
	B	34		C	28	Pigeon Lane	18	0	-18	-100%	6.0	N	OK
	B	34		D	30	Green Road	26	35	9	35%	1.6	Y	OK
	C	27	Pigeon Lane	A	31	Southgreen Road	118	128	10	8%	0.9	Y	OK
	C	27		B	33	Friary Road	5	0	-5	-100%	3.2	Y	OK
	C	27		D	30	Green Road	25	22	-3	-12%	0.6	Y	OK
	D	29	Green Road	A	31	Southgreen Road	13	12	-1	-8%	0.3	Y	OK
	D	29		B	33	Friary Road	22	31	9	41%	1.7	Y	OK
	D	29		C	28	Pigeon Lane	21	16	-5	-24%	1.2	Y	OK
						Total Vehicles	520	519	-1	0%			

VISSIM Node 102 **MCC ID** 3

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 03 - Southgreen Road / Bothairín na gCorp / Green Road / Car Park Access	A	35	Southgreen Road	B	37	Bothairín na gCorp	8	11	3	38%	1.0	Y	OK
	A	35		C	32	Green Road	23	22	-1	-4%	0.2	Y	OK
	B	38	Bothairín na gCorp	A	36	Southgreen Road	4	6	2	50%	0.9	Y	OK
	B	38		C	32	Green Road	186	222	36	19%	2.5	Y	OK
	C	31	Green Road	A	36	Southgreen Road	22	15	-7	-32%	1.6	Y	OK
	C	31		B	37	Bothairín na gCorp	171	155	-16	-9%	1.3	Y	OK
						Total Vehicles	414	431	17	4%			

VISSIM Node 103 **MCC ID** 4

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 04 - Old Road(NNW) / Old Road(E) / Bothairín na gCorp	A	39	Old Road(NNW)	B	41	Old Road(E)	8	9	1	13%	0.3	Y	OK
	A	39		C	38	Bothairín na gCorp	25	22	-3	-12%	0.6	Y	OK
	B	42	Old Road(E)	A	40	Old Road(NNW)	12	15	3	25%	0.8	Y	OK
	B	42		C	38	Bothairín na gCorp	183	206	23	13%	1.6	Y	OK
	C	37	Bothairín na gCorp	A	40	Old Road(NNW)	32	27	-5	-16%	0.9	Y	OK
	C	37		B	41	Old Road(E)	154	139	-15	-10%	1.2	Y	OK
						Total Vehicles	414	418	4	1%			

VISSIM Node 104 **MCC ID** 5

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 05 - Dunmurray Road (R401)(NNW) / Dunmurray Road (R401)(SE) / Old Road	A	57	Dunmurray Road (R401)(NNW)	B	51	Dunmurray Road (R401)(SE)	138	141	3	2%	0.3	Y	OK
	A	57		C	42	Old Road	136	132	-4	-3%	0.3	Y	OK
	B	52	Dunmurray Road (R401)(SE)	A	58	Dunmurray Road (R401)(NNW)	135	188	53	39%	4.2	Y	OK
	B	52		C	42	Old Road	88	88	0	0%	0.0	Y	OK
	C	41	Old Road	A	58	Dunmurray Road (R401)(NNW)	115	58	-57	-50%	6.1	N	OK
	C	41		B	51	Dunmurray Road (R401)(SE)	63	89	26	41%	3.0	Y	OK
						Total Vehicles	675	696	21	3%			

VISSIM Node 105 **MCC ID** 6

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 06 - Station Road (R415)(NNE) / Melitta Road / Station Road (R415)(SSW) / Dunmurray Road (R401)	A	55	Station Road (R415)(NNE)	B	54	Melitta Road	46	44	-2	-4%	0.3	Y	OK
	A	55		C	6	Station Road (R415)(SSW)	198	159	-39	-20%	2.9	Y	OK
	A	55		D	52	Dunmurray Road (R401)	16	48	32	200%	5.7	N	OK
	B	53	Melitta Road	A	56	Station Road (R415)(NNE)	43	41	-2	-5%	0.3	Y	OK
	B	53		C	6	Station Road (R415)(SSW)	126	91	-35	-28%	3.4	Y	OK
	B	53		D	52	Dunmurray Road (R401)	134	167	33	25%	2.7	Y	OK
	C	5	Station Road (R415)(SSW)	A	56	Station Road (R415)(NNE)	159	136	-23	-14%	1.9	Y	OK
	C	5		B	54	Melitta Road	162	163	1	1%	0.1	Y	OK
	C	5		D	52	Dunmurray Road (R401)	76	62	-14	-18%	1.7	Y	OK
	D	51	Dunmurray Road (R401)	A	56	Station Road (R415)(NNE)	35	63	28	80%	4.0	Y	OK
	D	51		B	54	Melitta Road	89	88	-1	-1%	0.1	Y	OK
	D	51		C	6	Station Road (R415)(SSW)	82	83	1	1%	0.1	Y	OK
						Total Vehicles	1166	1145	-21	-2%			

VISSIM Node 106 **MCC ID** 7

Junction	From (Link)			To (Link)			Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 07 - Bride Street(NE) / Market Square(SSE) / Bride Street(WSW) / Market Square(NW)	A	6	Bride Street(NE)	B	7	Market Square(SSE)	135	117	-18	-13%	1.6	Y	OK
	A	6		C	6	Bride Street(WSW)	248	212	-36	-15%	2.4	Y	OK
	A	6		D	46	Market Square(NW)	19	0	-19	-100%	6.2	N	OK
	B	8	Market Square(SSE)	A	5	Bride Street(NE)	153	197	44	29%	3.3	Y	OK
	B	8		C	6	Bride Street(WSW)	7	1	-6	-86%	3.0	Y	OK
	B	8		D	46	Market Square(NW)	13	0	-13	-100%	5.1	N	OK
	C	5	Bride Street(WSW)	A	5	Bride Street(NE)	251	166	-85	-34%	5.9	N	OK
	C	5		B	7	Market Square(SSE)	7	0	-7	-100%	3.7	Y	OK
	C	5		D	46	Market Square(NW)	3	0	-3	-100%	2.4	Y	OK
	D	45		A	5	Bride Street(NE)	25	0	-25	-100%	7.1	N	OK

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
	D	45	Market Square(NW)	B	7	Market Square(SSE)	10	0	-10	-100%	4.5	Y	OK
	D	45		C	6	Bride Street(WSW)	11	0	-11	-100%	4.7	Y	OK
						Total Vehicles	882	693	-189	-21%			

VISSIM Node 107 MCC ID 8

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 08 - Bride Street(NNE) / R445(ESE) / Bride Street(SSW) / R445(WNW)	A	6	Bride Street(NNE)	B	3	R445(ESE)	3	0	-3	-100%	2.4	Y	OK
	A	6		C	10	Bride Street(SSW)	128	151	23	18%	1.9	Y	OK
	A	6		D	2	R445(WNW)	133	63	-70	-53%	7.1	N	OK
	B	4	R445(ESE)	A	5	Bride Street(NNE)	15	0	-15	-100%	5.5	N	OK
	B	4		C	10	Bride Street(SSW)	34	21	-13	-38%	2.5	Y	OK
	B	4		D	2	R445(WNW)	250	215	-35	-14%	2.3	Y	OK
	C	72	Bride Street(SSW)	A	5	Bride Street(NNE)	126	98	-28	-22%	2.6	Y	OK
	C	72		B	3	R445(ESE)	22	14	-8	-36%	1.9	Y	OK
	C	72		D	2	R445(WNW)	51	11	-40	-78%	7.2	N	OK
	D	1	R445(WNW)	A	5	Bride Street(NNE)	136	67	-69	-51%	6.8	N	OK
	D	1		B	3	R445(ESE)	168	198	30	18%	2.2	Y	OK
	D	1		C	10	Bride Street(SSW)	4	38	34	850%	7.4	N	OK
						Total Vehicles	1070	876	-194	-18%			

VISSIM Node 108 MCC ID 9

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 09 - White Abbey Road / Claregate Street / Academy Street / Monasterevin Road (R445)	A	11	White Abbey Road	B	1	Claregate Street	55	54	-1	-2%	0.1	Y	OK
	A	11		C	60	Academy Street	28	18	-10	-36%	2.1	Y	OK
	A	11		D	13	Monasterevin Road (R445)	7	0	-7	-100%	3.7	Y	OK
	B	2	Claregate Street	A	12	White Abbey Road	57	48	-9	-16%	1.2	Y	OK
	B	2		C	60	Academy Street	12	0	-12	-100%	4.9	Y	OK
	B	2		D	13	Monasterevin Road (R445)	325	242	-83	-26%	4.9	Y	OK
	C	59	Academy Street	A	12	White Abbey Road	32	17	-15	-47%	3.0	Y	OK
	C	59		B	1	Claregate Street	15	0	-15	-100%	5.5	N	OK
	C	59		D	13	Monasterevin Road (R445)	45	42	-3	-7%	0.5	Y	OK
	D	14	Monasterevin Road (R445)	A	12	White Abbey Road	30	0	-30	-100%	7.7	N	OK
	D	14		B	1	Claregate Street	272	250	-22	-8%	1.4	Y	OK
	D	14		C	60	Academy Street	19	24	5	26%	1.1	Y	OK
						Total Vehicles	897	695	-202	-23%			

VISSIM Node 109 MCC ID 10

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 10 - Bride Street(NNE) / Bride Street(SE) / Grey Abbey Road / Cleamore Road	A	67	Bride Street(NNE)	B	70	Bride Street(SE)	55	44	-11	-20%	1.6	Y	OK
	A	67		C	67	Grey Abbey Road	149	168	19	13%	1.5	Y	OK
	A	67		D	59	Cleamore Road	10	0	-10	-100%	4.5	Y	OK
	B	71	Bride Street(SE)	A	68	Bride Street(NNE)	37	43	6	16%	0.9	Y	OK
	B	71		C	67	Grey Abbey Road	98	78	-20	-20%	2.1	Y	OK
	B	71		D	59	Cleamore Road	25	15	-10	-40%	2.2	Y	OK
	C	68	Grey Abbey Road	A	68	Bride Street(NNE)	95	81	-14	-15%	1.5	Y	OK
	C	68		B	70	Bride Street(SE)	60	39	-21	-35%	3.0	Y	OK
	C	68		D	59	Cleamore Road	5	1	-4	-80%	2.3	Y	OK
	D	60	Cleamore Road	A	68	Bride Street(NNE)	11	0	-11	-100%	4.7	Y	OK
	D	60		B	70	Bride Street(SE)	32	16	-16	-50%	3.3	Y	OK
	D	60		C	67	Grey Abbey Road	28	27	-1	-4%	0.2	Y	OK
						Total Vehicles	605	512	-93	-15%			

VISSIM Node 110 MCC ID 11

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 11 - Tully Road(NW) / Car Park Access / Meadow Road / Tully Road(SSE)	A	70	Tully Road(NW)	C	65	Meadow Road	79	31	-48	-61%	6.5	N	OK
	A	70		D	73	Tully Road(SSE)	64	68	4	6%	0.5	Y	OK
	C	66	Meadow Road	A	71	Tully Road(NW)	94	74	-20	-21%	2.2	Y	OK
	C	66		D	73	Tully Road(SSE)	37	31	-6	-16%	1.0	Y	OK
	D	9	Tully Road(SSE)	A	71	Tully Road(NW)	62	62	0	0%	0.0	Y	OK
	D	9		C	65	Meadow Road	21	19	-2	-10%	0.4	Y	OK
						Total Vehicles	357	285	-72	-20%			

VISSIM Node 111 MCC ID 16

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 16 - Monasterevin Road (R445)(E) / R415 / Monasterevin Road (R445)(W)	A	18	Monasterevin Road (R445)(E)	B	26	R415	215	212	-3	-1%	0.2	Y	OK
	A	18		C	24	Monasterevin Road (R445)(W)	277	284	7	3%	0.4	Y	OK
	B	25	R415	A	19	Monasterevin Road (R445)(E)	224	230	6	3%	0.4	Y	OK
	B	25		C	24	Monasterevin Road (R445)(W)	72	71	-1	-1%	0.1	Y	OK
	C	23	Monasterevin Road (R445)(W)	A	19	Monasterevin Road (R445)(E)	192	195	3	2%	0.2	Y	OK
	C	23		B	26	R415	38	39	1	3%	0.2	Y	OK
						Total Vehicles	1018	1031	13	1%			

VISSIM Node 112 MCC ID 17

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 17 - R445(E) / Tesco Entrance / R445(W)	A	16	R445(E)	C	18	R445(W)	408	494	86	21%	4.0	Y	OK
	C	17	R445(W)	A	15	R445(E)	349	424	75	21%	3.8	Y	OK
						Total Vehicles	757	918	161	21%			

VISSIM Node 113 MCC ID 22

Junction	From	Link	From (Link)	To	Link	To (Link)	Flow Peak Time Observed	Flow Peak Time Modelled	Difference Value	Difference %	GEH Value	GEH <5	Individual Flows
MCC Site 22 - Car Park Access / Magee Terrace / R445(ESE) / Meadow Road / R445(WNW)	C	4	R445(ESE)	D	66	Meadow Road	116	105	-11	-9%	1.0	Y	OK
	C	4		E	4	R445(WNW)	405	433	28	7%	1.4	Y	OK
	D	65	Meadow Road	C	3	R445(ESE)	87	51	-36	-41%	4.3	Y	OK
	D	65		E	4	R445(WNW)	16	0	-16	-100%	5.7	N	OK
	E	3	R445(WNW)	C	3	R445(ESE)	286	327	41	14%	2.3	Y	OK
	E	3		D	66	Meadow Road	15	0	-15	-100%	5.5	N	OK
						Total Vehicles	925	916	-9	-1%			

Percentage of Validation Counts with GEH < 5 =	99 17	85.34%
Individual Flows meeting DMRB criteria =	116 0	100.00%

Appendix E VISSIM Validation Results

Journey Time Validation Results

Appendix E - Kildare Journey Time Validation

AECOM

Project Name: Kildare Town VISSIM Modelling
Project Number: 60629806
Subject: Kildare Journey Time Validation
Date: 27th May 2020

AM Peak 0800-0900

	Total	56 Count	%
Routes with JT difference less than 60 sec		54	96%
Routes with JT difference less than 15%		49	88%
Routes satisfying both the criteria		49	88%
Routes satisfying GEH criteria		56	100%

From	To	ID	JT No.	Modelled Time	Observed Time	Mod-Obs Diff	%Diff	GEH	Check
1	2	1_2	1	232	209	24	11%	1.6	Y
1	5	1_5	2	357	341	16	5%	0.8	Y
1	6	1_6	3	389	372	17	4%	0.8	Y
1	7	1_7	4	400	348	53	15%	2.7	Y
1	8	1_8	5	244	224	20	9%	1.3	Y
1	9	1_9	6	257	232	25	11%	1.6	Y
1	12	1_12	7	100	90	10	11%	1.0	Y
2	1	2_1	8	237	208	29	14%	1.9	Y
2	5	2_5	9	271	304	-33	-11%	1.9	Y
2	6	2_6	10	361	351	10	3%	0.5	Y
2	7	2_7	11	376	318	58	18%	3.1	N
2	8	2_8	12	232	244	-11	-5%	0.7	Y
2	9	2_9	13	243	249	-6	-2%	0.4	Y
2	12	2_12	14	201	179	23	13%	1.6	Y
5	1	5_1	15	316	318	-3	-1%	0.2	Y
5	2	5_2	16	261	287	-26	-9%	1.6	Y
5	6	5_6	17	322	381	-59	-15%	3.1	Y
5	7	5_7	18	328	311	17	5%	0.9	Y
5	8	5_8	19	329	318	11	3%	0.6	Y
5	9	5_9	20	334	366	-32	-9%	1.7	Y
5	12	5_12	21	286	290	-3	-1%	0.2	Y
6	1	6_1	22	425	443	-18	-4%	0.9	Y
6	2	6_2	23	390	336	54	16%	2.9	N
6	5	6_5	24	372	414	-42	-10%	2.1	Y
6	7	6_7	25	319	271	48	18%	2.8	N
6	8	6_8	26	319	277	42	15%	2.4	Y
6	9	6_9	27	357	323	34	11%	1.8	Y
6	12	6_12	28	396	327	69	21%	3.6	N
7	1	7_1	29	378	368	11	3%	0.6	Y
7	2	7_2	30	343	341	1	0%	0.1	Y
7	5	7_5	31	299	354	-56	-16%	3.1	N
7	6	7_6	32	268	309	-41	-13%	2.4	Y
7	8	7_8	33	263	289	-26	-9%	1.6	Y
7	9	7_9	34	306	337	-31	-9%	1.7	Y
7	12	7_12	35	345	339	6	2%	0.3	Y
8	1	8_1	36	240	217	22	10%	1.5	Y
8	2	8_2	37	229	236	-7	-3%	0.5	Y
8	5	8_5	38	313	339	-26	-8%	1.5	Y
8	6	8_6	39	270	293	-23	-8%	1.4	Y
8	7	8_7	40	289	249	40	16%	2.4	N
8	9	8_9	41	118	119	-2	-2%	0.2	Y
8	12	8_12	42	206	188	18	9%	1.3	Y
9	1	9_1	43	263	242	21	9%	1.3	Y
9	2	9_2	44	241	257	-16	-6%	1.0	Y
9	5	9_5	45	341	384	-42	-11%	2.2	Y
9	6	9_6	46	301	335	-34	-10%	1.9	Y
9	7	9_7	47	321	311	10	3%	0.5	Y
9	8	9_8	48	123	131	-8	-6%	0.7	Y
9	12	9_12	49	232	213	19	9%	1.3	Y
12	1	12_1	50	99	89	10	11%	1.1	Y
12	2	12_2	51	208	182	26	15%	1.9	Y
12	5	12_5	52	324	308	17	5%	0.9	Y
12	6	12_6	53	375	339	36	11%	1.9	Y
12	7	12_7	54	375	314	61	19%	3.3	N
12	8	12_8	55	224	226	-2	-1%	0.2	Y
12	9	12_9	56	214	221	-6	-3%	0.4	Y

PM Peak 1700-1800

	Total	56 Count	%
Routes with JT difference less than 60 sec		54	96%
Routes with JT difference less than 15%		51	91%
Routes satisfying both the criteria		51	91%
Routes satisfying GEH criteria		56	100%

From	To	ID	JT No.	Modelled Time	Observed Time	Mod-Obs Diff	%Diff	GEH	Check
1	2	1_2	1	217	232	-14	-6%	1.0	Y
1	5	1_5	2	304	344	-40	-12%	2.2	Y
1	6	1_6	3	368	390	-22	-6%	1.1	Y
1	7	1_7	4	371	368	2	1%	0.1	Y
1	8	1_8	5	218	252	-34	-14%	2.2	Y
1	9	1_9	6	246	290	-44	-15%	2.7	Y
1	12	1_12	7	92	106	-14	-13%	1.4	Y
2	1	2_1	8	245	213	32	15%	2.1	Y
2	5	2_5	9	241	288	-47	-16%	2.9	N
2	6	2_6	10	327	349	-22	-6%	1.2	Y
2	7	2_7	11	334	318	15	5%	0.8	Y
2	8	2_8	12	220	244	-24	-10%	1.6	Y
2	9	2_9	13	240	278	-38	-14%	2.4	Y
2	12	2_12	14	209	191	18	9%	1.3	Y
5	1	5_1	15	319	322	-3	-1%	0.2	Y
5	2	5_2	16	243	290	-47	-16%	2.9	N
5	6	5_6	17	298	304	-6	-2%	0.4	Y
5	7	5_7	18	296	322	-26	-8%	1.5	Y
5	8	5_8	19	282	326	-45	-14%	2.6	Y
5	9	5_9	20	319	396	-77	-19%	4.1	N
5	12	5_12	21	294	302	-8	-3%	0.5	Y
6	1	6_1	22	439	391	48	12%	2.4	Y
6	2	6_2	23	369	359	10	3%	0.5	Y
6	5	6_5	24	343	339	4	1%	0.2	Y
6	7	6_7	25	311	300	11	4%	0.6	Y
6	8	6_8	26	305	300	5	2%	0.3	Y
6	9	6_9	27	377	372	5	1%	0.3	Y
6	12	6_12	28	417	381	36	9%	1.8	Y
7	1	7_1	29	405	381	24	6%	1.2	Y
7	2	7_2	30	337	335	3	1%	0.1	Y
7	5	7_5	31	302	339	-37	-11%	2.1	Y
7	6	7_6	32	281	304	-23	-8%	1.3	Y
7	8	7_8	33	268	289	-22	-7%	1.3	Y
7	9	7_9	34	325	354	-29	-8%	1.6	Y
7	12	7_12	35	369	362	7	2%	0.4	Y
8	1	8_1	36	241	251	-10	-4%	0.7	Y
8	2	8_2	37	223	261	-37	-14%	2.4	Y
8	5	8_5	38	308	329	-21	-6%	1.2	Y
8	6	8_6	39	280	299	-19	-6%	1.1	Y
8	7	8_7	40	291	254	37	15%	2.2	Y
8	9	8_9	41	117	155	-38	-24%	3.2	N
8	12	8_12	42	209	230	-21	-9%	1.4	Y
9	1	9_1	43	266	262	4	2%	0.3	Y
9	2	9_2	44	240	268	-28	-10%	1.8	Y
9	5	9_5	45	312	368	-56	-15%	3.0	Y
9	6	9_6	46	318	332	-14	-4%	0.8	Y
9	7	9_7	47	337	309	27	9%	1.5	Y
9	8	9_8	48	123	140	-17	-12%	1.5	Y
9	12	9_12	49	235	241	-6	-2%	0.4	Y
12	1	12_1	50	99	88	11	13%	1.2	Y
12	2	12_2	51	200	194	5	3%	0.4	Y
12	5	12_5	52	289	295	-6	-2%	0.3	Y
12	6	12_6	53	349	342	7	2%	0.4	Y
12	7	12_7	54	347	319	28	9%	1.5	Y
12	8	12_8	55	201	217	-16	-7%	1.1	Y
12	9	12_9	56	224	300	-76	-25%	4.7	N

Appendix D VISUM Future Year Traffic Modelling Report

Kildare Town Transport Strategy

Future Year VISUM Traffic Modelling Report

Kildare County Council

November 2021

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Kildare County Council

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1 Introduction

1.1 Introduction

AECOM was commissioned by Kildare County Council to provide assistance in the preparation of a Transport Strategy for Kildare Town. AECOM's role was to develop an understanding of the transport issues in Kildare Town and make recommendations on a strategic implementation plan of improvement measures and interventions in relation to walking, cycling, public transport, car parking and traffic movements.

To aid this cause, Kildare County Council have commissioned AECOM to develop a strategic model to inform the Council on the impact of their network improvements and planning proposals. This report outlines the methodology used to develop the future year traffic models, a description of the road options, the results of the option assessment and the impact of the combined roads strategy.

1.2 Base Year Traffic Modelling

A base VISUM model was created as part of the South Green and Northern Link Street project which was based on 2018 traffic conditions. The development of the model was informed by a series of surveys (JTCs, ATCs, O-D surveys and Journey Time surveys) and the process of the developing the base model is described in the the Kildare Town Northern Link and South Green Access – Traffic Modelling Report. The VISUM models are fixed demand models, which demonstrate the re-routing of traffic associated with changes to the network (e.g. increased capacity, greater congestion, etc). The Kildare Town Transport Strategy uses this 2018 base model due to the Covid-19 pandemic which meant that survey data could not be collected for 2020. The base model uses 2018 travel demand information to reflect pre-covid traffic conditions in the town, with the future year models assessing the post-covid pandemic situation when traffic levels have returned to normal and the town has grown.

1.3 Report Structure

The report takes the following structure:

- Chapter 2: Future Year Matrix Development;
- Chapter 3: Assessment of Road Options; and
- Chapter 4: Impact of Combined Roads Strategy

2 Future Year Matrix Development

This chapter details the development of the future year vehicular trip matrices used to inform the assessment of road options for the Kildare Town Transport Strategy. Matrices were developed for the years 2025 and 2035 using the demand matrices from the base year (2018) VISUM model.

The zone structure defined in the base year model, as shown in Figure 2.1, was retained in the future year demand matrices. As with the base year (2018) model development, separate demand matrices were created to represent the AM peak (08:00-09:00) and the PM peak (17:00-18:00) hours and these were further classified by Light and Heavy vehicle user classes.

Figure 2.1: VISUM Local Area Model – Zone Structure

2.1 Land-use & Population / Jobs Targets

The future year population and job projections were created by the All-Island Research Observatory (AIRO)[1], which is a spatial analysis and planning research unit operating in Maynooth University. Kildare County Council commissioned AIRO to complete this work to inform the development of the future year modelling scenarios. The original AIRO forecasts were examined by the KCC planning department and modified based on new information from planning applications, to create land-use scenarios 2 and 3.

Three future year land-use scenarios were considered for the development of future year matrices, in 2025; two scenarios were assessed to identify the most realistic approach to estimating growth in the town. The three scenarios were named as follows:

1. Scenario 1: Original AIRO 2025
2. Scenario 2: Modified AIRO 2025
3. Scenario 3: Modified AIRO 2035+

[1] AIRO Website: https://airo.maynoothuniversity.ie/about-airo

The population and jobs targets for each of these scenarios were provided by KCC in the form of a planning sheet, which projected the additional number of persons and jobs for each zone of the Local Area Model (LAM). In total, between 2016 and 2025, the town's population is projected to increase by 1,789, and 2,784 for Scenario 1 and Scenario 2 respectively, while for Scenario 3, the projected population growth was 4,620. In terms of jobs, 739 and 1,344 additional jobs were estimated to be generated by 2025 and 2035 respectively.

Scenario 2: Modified AIRO was ultimately selected as the preferred 2025 scenario because this scenario contained growth for the Phase 1 Magee Barracks development, which is likely to be completed by 2025, but was excluded from Scenario 1: Original AIRO 2025. As a result of this analysis, the Kildare future year VISUM models were created from Scenario: Modified AIRO for 2025 and Scenario 3: Modified AIRO for 2035.

2.2 Trip Forecasting

Population and jobs projections provided by KCC were used to forecast vehicular trips for zones within Kildare Town LAM. The origin and destination trip ends of the internal zones in the base year model were uplifted using the calculated population and job growth factors.

For the estimation of vehicular trips to/from external zones, link-based central growth rates provided in Table 5.3 of "*Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections"* were used to derive external traffic growth factors for the years 2025 and 2035. These growth factors as presented in Table 2.1, were multiplied with the base year trip ends of external zones to develop future year origin and destination trip ends for 2025 and 2035.

Table 2.1 2025 and 2035 External Zone Growth factors

Model Year	Light Vehicle	Heavy Vehicle
2025	1.102	1.178
2035	1.210	1.445

The final future year trip ends estimated after following the above process are presented in Table 2.2.

Table 2.2 Future year trip ends

Model Year	AM Peak		PM Peak	
	Light Vehicle	Heavy Vehicle	Light Vehicle	Heavy Vehicle
Scenario 1	8,213	288	8,599	361
Scenario 2	8,257	288	8,637	361
Scenario 3	9,376	351	9,346	439

2.3 Allocation & Distribution of Future Growth

With zone totals determined, the distribution of the origin and destination totals was carried out using the Furnessing distribution method, which is based on the reasonable assumption that in the forecast year, the pattern of trip making will remain substantially identical to those in the Base year, with the trip volumes increasing in line with the growth of both the origin and destination.

For proper distribution of trip ends, all the O-D cells with zero demand in the base year matrices were seeded with a very small number (0.01) so that they get populated with appropriate future year trips. Otherwise, the cells remain zero irrespective of the factor applied.

The final demand matrices were obtained by projecting the base year matrices using doubly-constrained projection in VISUM with the mean value of future year origin and destination trip ends used as matrix total for the iterative calculation.

3 Option Assessment

3.1 Overview

A key objective of the Kildare Town Transport Strategy is to reduce car dependency through improvements in public transport services and walking/cycling facilities throughout the town. The following five road objectives were defined at the outset of the transport strategy and have been used to guide the identification of roads options and their assessment:

1. Reduce unnecessary vehicular trips through Kildare town centre.
2. Mitigation measures to improve road safety and eliminate collision hotspots.
3. Reduce vehicular emissions in town centre by promoting mode transfer to sustainable travel modes.
4. Provide recommendations on the future road schemes required to meet capacity requirements and changing travel patterns.
5. Review existing road plans in the existing LAP to identify the most appropriate traffic solutions which will support the delivery of the multi-modal strategy.

Ten road options were proposed with the aim of meeting these objectives, and each of these options were tested using the 2025 and 2035 future year models.

3.2 Do Minimum Road Network

The roads strategy assumes that several committed roads schemes will be completed in the future and they form the Do-Minimum (DM) road network, which is described in Table 3.1. In the 2025 DM network, only Phase 1 of the Magee Barracks Roads is assumed to have been completed, while in the 2035 DM network; Phase 2 has been completed to link Melitta Road with the R445.

In some cases, elements of the DM network are already in place, such as the one-way system on Cleamore Road and the construction of the Dunmurray Link Road.

The Do-Minimum road network is assumed to be in place in every transport modelling scenario, with proposed road strategy options tested in addition to the DM network changes to assess their impact.

The Do-Minimum network is not assessed in the strategy because these interventions are regarded as a certainty. In combination, the DM network and the preferred road strategy measures, will form the future road network for Kildare Town.

Table 3.1 Do-Minimum Road Network in 2025 and 2035

Year	Do-Minimum Road Network
2025	• Phase 1 Magee Barracks Roads • Dunmurray Link Road/South Internal East-West Link • Modus link road • Hospital Street to Tully Road link road • One-way northbound system implemented on Cleamore Road • Traffic signals at Southgreen Bridge • Traffic signals at Pigeon Lane/Green Road junction
2035	• Phase 1 and 2 Magee Barracks Roads • Dunmurray Link Road/South Internal East-West Link • Modus link road • Hospital Street to Tully Road link road • One-way northbound system implemented on Cleamore Road • Traffic signals at Southgreen Bridge • Traffic signals at Pigeon Lane/Green Road junction

The different elements of the DM road network are shown spatially in Figure 3.1.

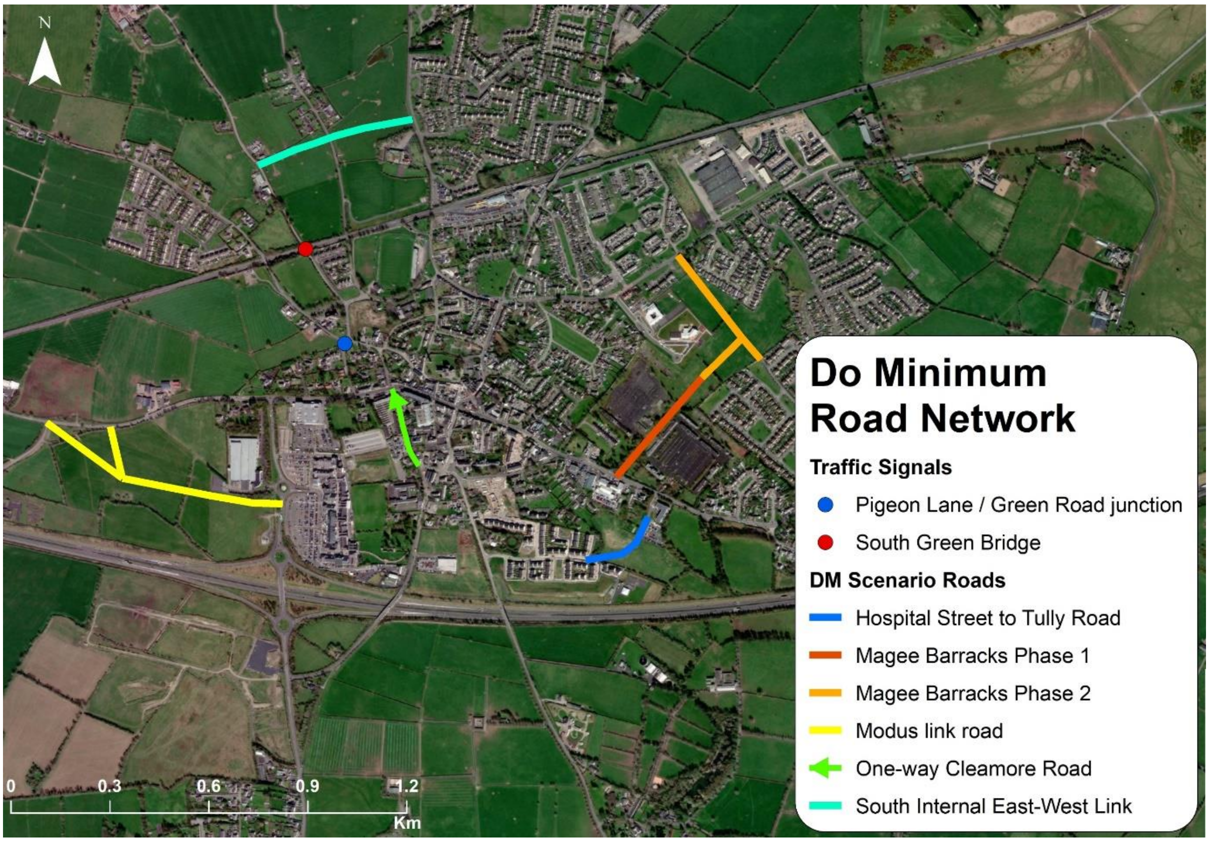

Figure 3.1 Do-Minimum Road Network in 2035

3.3 Market Square Analysis

The first stage in the development of the road strategy involved determining which section of Market Square should be pedestrianised and closed to vehicle traffic to support the public realm proposals for the town centre. This section describes the two options that were considered; closing Bride Street or closing the eastern section of Market Square, and the results of the VISUM and VISSIM transport modelling used to inform the preferred solution.

3.3.1 Market Square Pedestrianisation Options

3.3.1.1 Bride Street Road Closure in Market Square

This option proposes closing the section of Bride Street which runs through Market Square to vehicle traffic to improve the public realm and allow for pedestrianisation (Figure 3.2). The eastern section of Market Square remains open to vehicle traffic in this option.

Figure 3.2 Bride Street Road Closure in Market Square

3.3.1.2 Closure of Eastern Section of Market Square to Vehicle Traffic

In this option, the eastern section of Market Square has been closed to vehicle traffic to improve the public realm and allow for pedestrianisation (Figure 3.3). This option includes a new pedestrian crossing point at the north of the square to allow for easy access between the pedestrianised east and west sections of Market Square across the R415.

Figure 3.3 Closure of the Eastern Section of Market Square

3.3.2 Market Square Pedestrianisation Transport Modelling Results

This section provides the VISUM transport modelling results for the two Market Square pedestrianisation options in 2025 and 2035 to inform the selection of the preferred solution.

3.3.2.1 VISUM Results: Bride Street Road Closure in Market Square

2025 Results

The closure of the section of Bride Street through Market Square was tested in 2025 and compared against the Do-Minimum scenario for the AM and PM peaks in the network statistics shown in Table 3.2. The AM difference plot is provided in Figure 3.4, which shows the difference in traffic volumes between the tested scenario and the Do-Minimum Scenario. An increase in traffic is shown as red links while a decrease in traffic is shown as green links.

The network statistics show that the closure of the section of Bride Street in Market Square has resulted in a slight increase in trip distance and travel time delay and a minor reduction in average speed. In the difference plot, it can be observed that traffic volumes have reduced on Bride Street and traffic is rerouting onto the eastern section of Market Square and the R445. To a certain extent, the closure of Bride Street is causing vehicle rerouting across the wider town centre road network with increased traffic volumes on Pigeon Lane and Old Road.

Table 3.2 Network statistics (Bride Street Closure Vs DM) - 2025

Peak	Option	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
AM Peak	DM - 2025	8,545	77,024	1,394	55.26
	Bride St. Closure	8,545	77,035	1,406	54.80
PM Peak	DM - 2025	8,998	95,910	1,606	59.72
	Bride St. Closure	8,998	95,940	1,608	59.70

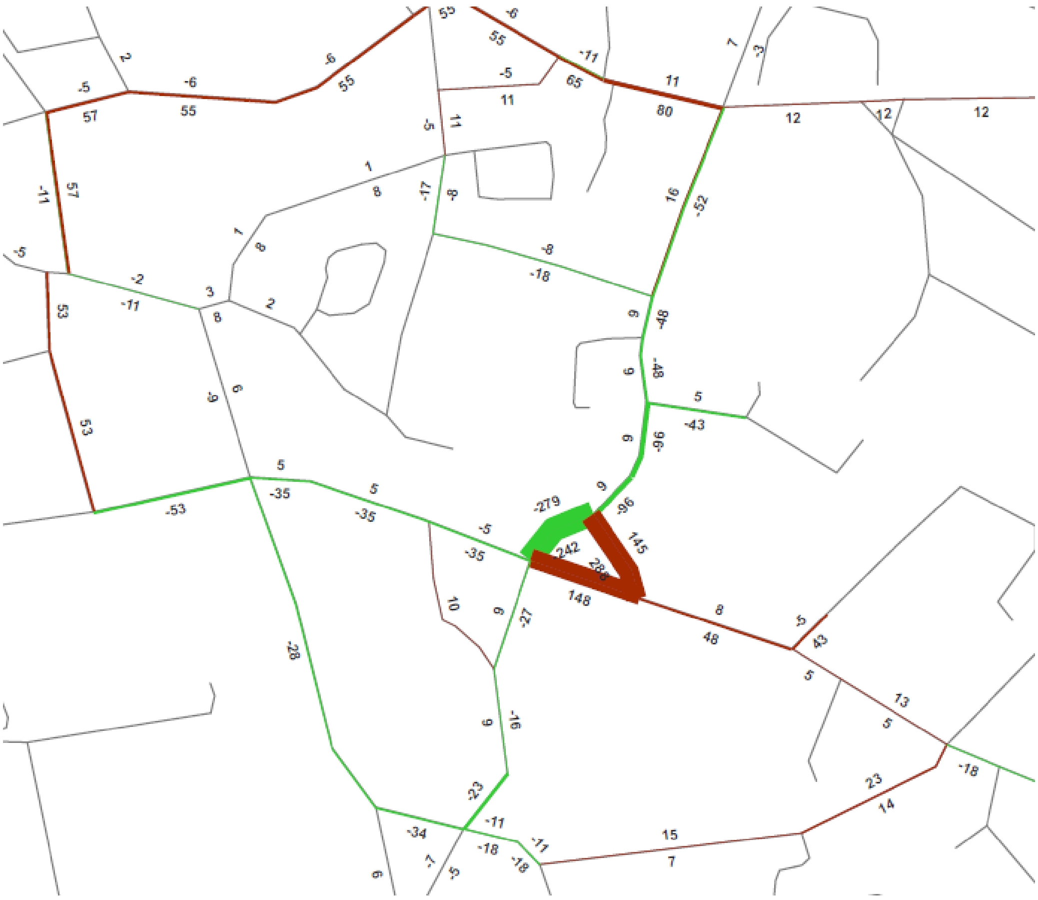

Figure 3.4 Flow comparison (Bride Street Closure Vs DM)– 2025 – AM Peak

2035 Results

The closure of the section of Bride Street through Market Square is tested in 2035 and compared against the Do-Minimum scenario for the AM and PM peaks in the network statistics shown in Table 3.3. The AM difference plot is provided in Figure 3.5, which shows the difference in traffic volumes between the tested scenario and the Do-Minimum Scenario.

The network statistics show that the closure of Bride Street in Market Square has resulted in a slight increase in trip distances and travel time delay. These negative impacts on traffic are marginal and they are not likely to have a significant impact on travel in the town centre in 2035 when the Magee Barracks Roads will provide an alternative north-south route. Compared to 2025, the 2035 difference plots show that there is less traffic and rerouting of traffic across the wider network, due to the additional road infrastructure in place in 2035 relative to 2025.

Table 3.3 Network statistics (Bride Street Closure Vs DM) - 2035

Peak	Option	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
AM Peak	DM- 2035	9,727	85,150	1,512	56.30
	Bride St. Closure	9,727	85,224	1,517	56.20
PM Peak	DM- 2035	9,785	104,939	1,734	60.50
	Bride St. Closure	9,785	105,054	1,733	60.60

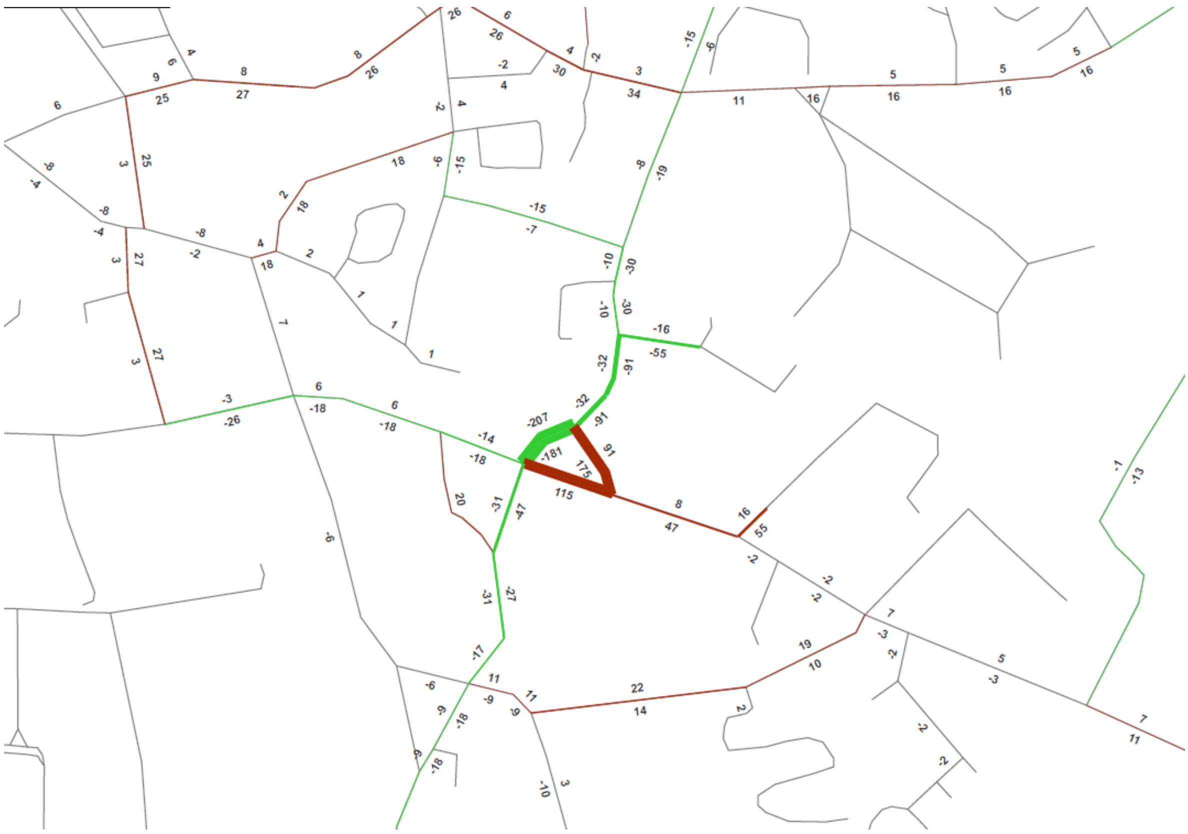

Figure 3.5 Flow comparison (Bride Street Closure Vs DM)– 2035 – AM Peak

3.3.2.2 VISUM Results: Closure of Eastern Section of Market Square

2025 Results

The closure of the eastern section of Market Square was tested in the 2025 traffic model and compared to the DM scenario in the AM and PM peaks in the network statistics shown in Table 3.4. A difference plot for the AM peak is shown in Figure 3.6. In respect to the network statistics, there is a marginal increase in total vehicle kilometres travelled, reflecting the slight rerouting caused by closing the eastern section of Market Square, this is also associated with a small increase in travel time delay. The difference plot shows that the impact on traffic routing is very localised, with most traffic switching from the eastern section of Market Square to Bride Street in Market Square.

Table 3.4 Network statistics (Closure of the Eastern Section of Market Square Vs DM) - 2025

Peak	Option	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
AM Peak	DM- 2025	8,545	77,024	1,394	55.26
	Eastern Market Sq. Closure	8,545	77,104	1,395	55.30
PM Peak	DM- 2025	8,998	95,910	1,606	59.72
	Eastern Market Sq. Closure	8,998	95,957	1,612	59.50

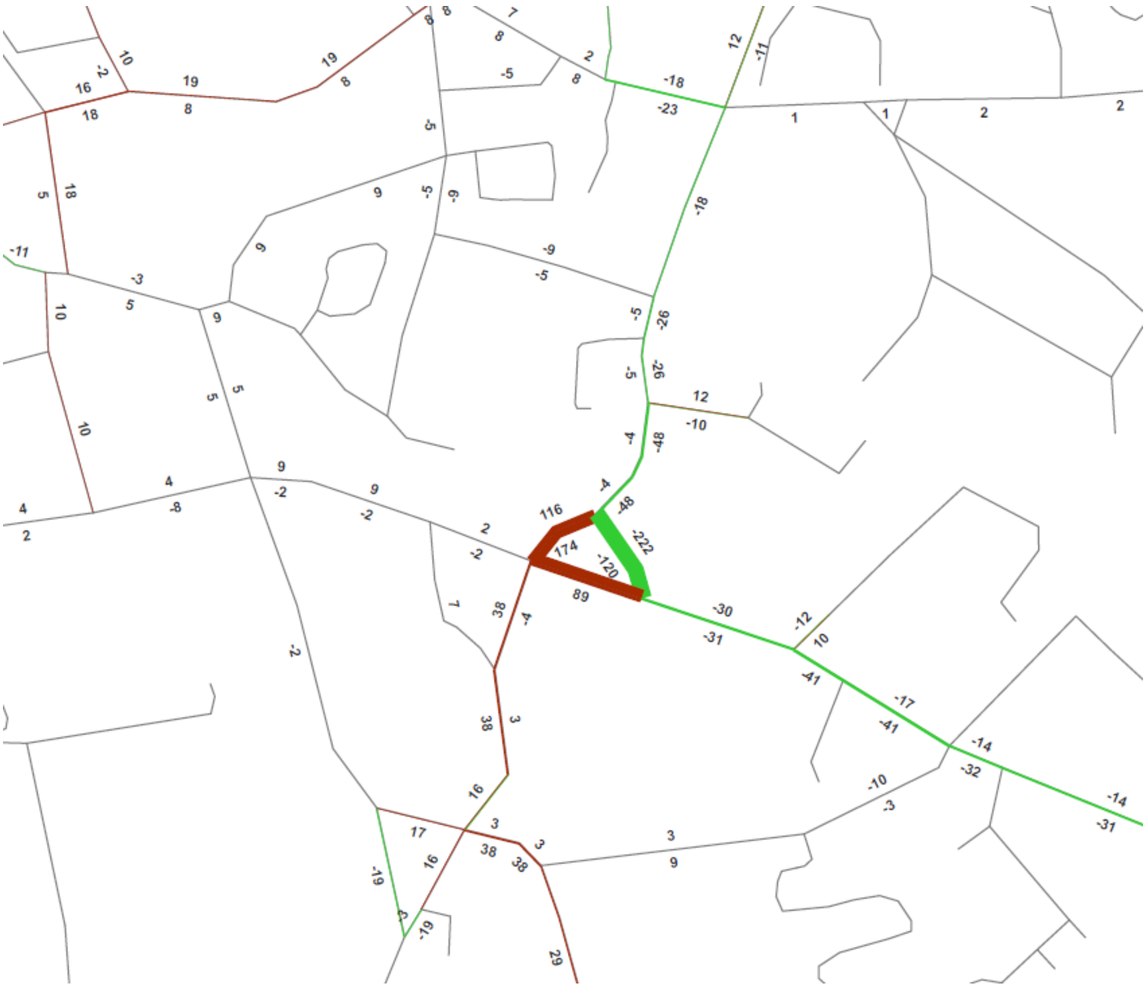

Figure 3.6 Flow comparison (Eastern Market Square Closure Vs DM)– 2025 – AM Peak

2035 Results

The closure of the eastern section of Market Square is tested in 2035 and compared to the DM scenario for the AM and PM peaks. The network statistics are shown in Table 3.5, with the flow difference plots shown in Figure 3.7 for the AM peak. This option results in a marginal reduction in average network speeds and a minor increase in travel time delay. In the AM peak, there is a slight increase in total vehicle km due to rerouting and a minor increase in delay in both time periods. The difference plots show that the impact is very localised, with traffic switching from the eastern section of Market Square to Bride Street.

Table 3.5 Network statistics (Eastern Market Square Closure Vs DM) - 2035

Peak	Option	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
AM Peak	DM- 2035	9,727	85,150	1,512	56.30

	Eastern Market Sq. Closure	9,727	85,196	1,516	56.20
PM Peak	DM- 2035	9,785	104,939	1,734	60.50
	Eastern Market Sq. Closure	9,785	104,921	1,736	60.40

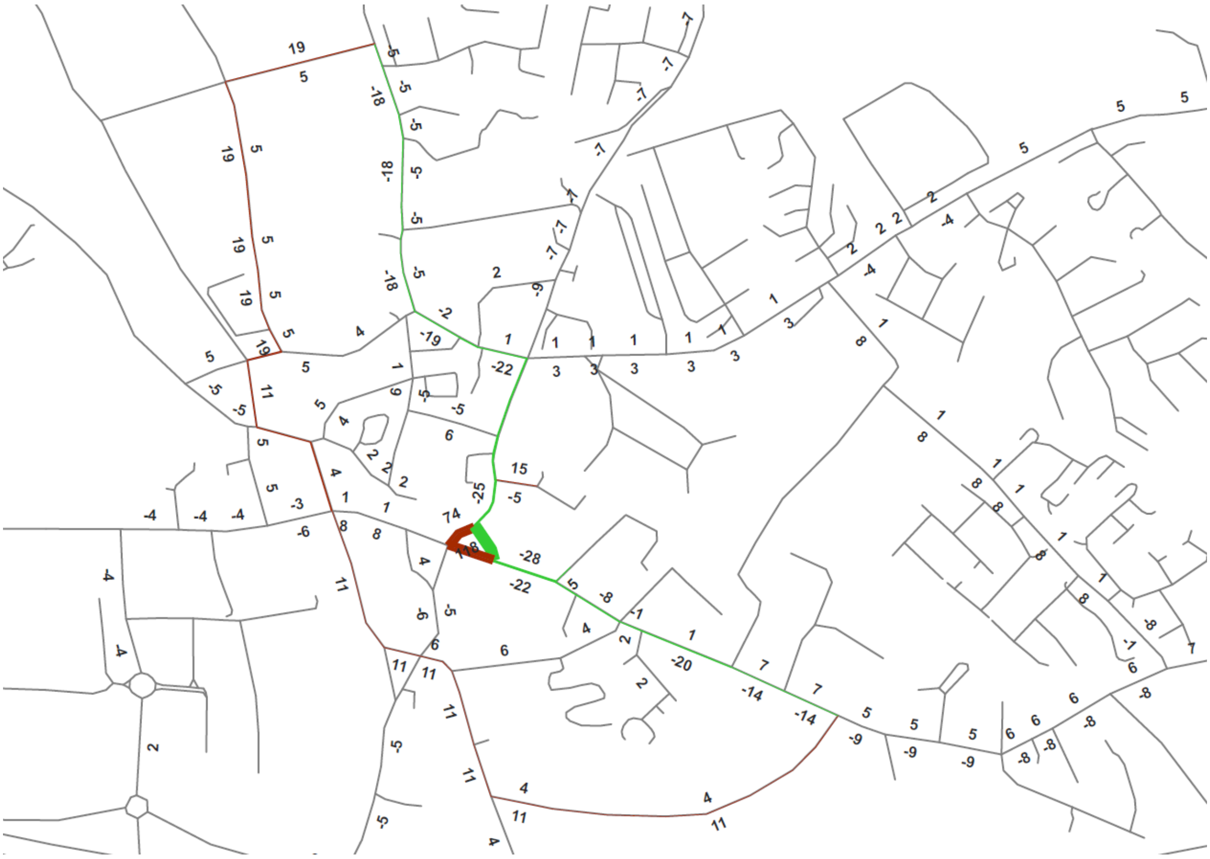

Figure 3.7 Flow comparison (Eastern Market Square Closure Vs DM)– 2035 – AM Peak

3.3.2.3 Comparison of VISSIM Microsimulation Results

2025 Results

The closure of the Bride Street section or eastern section of Market Square was tested in the VISSIM microsimulation model which allows traffic flows and queues to be shown visually. In the 2025 AM period, Figure 3.8 shows the queuing around Market Square when the eastern section is closed to traffic while Figure 3.9 shows the same when the Bride Street section is closed to traffic.

The VISSIM modelling indicates that in both scenarios, there will be greater queuing when compared to the Do-Minimum Scenario because total junction capacity has been reduced through a road closure. However, when the two Market Square road closures are compared, it can be observed that the closure of the eastern side of the square results in longer queuing along the R445. In this scenario, all traffic must travel through a single crossroads junction and longer queues develop as vehicles must wait behind right-turning vehicles. Whereas, when the Bride Street section of Market Square is closed to traffic, vehicle demand is split between a signalised T-junction (Bride Street/R445) and a priority T-junction (Market Square East/R445) and this operates more efficiently with shorter queues as illustrated in Figure 3.9.

Figure 3.8 VISSIM 2025 AM – Comparison of DM and Eastern Section of Market Sq. Closed to Traffic

Figure 3.9 VISSIM 2025 AM – Comparison of DM and Bride Street Section of Market Sq. Closed to Traffic

2035 Results

Figure 3.10 and Figure 3.11 show the same Market Square scenarios in the 2035 AM peak period in comparison to the Do-Minimum Scenario. These images show a similar theme to the results explained in 2025, with the Bride Street Road closure performing better with shorter queuing than the closure of the eastern side of the square. Due to growth in population and jobs, there are more trips occurring in 2035 than 2025 and this results in slightly longer queues in both scenarios.

Figure 3.10 VISSIM 2035 AM – Comparison of DM and Eastern Section of Market Sq. Closed to Traffic

Figure 3.11 VISSIM 2035 AM – Comparison of DM and Bride St. Section of Market Sq. Closed to Traffic

3.3.3 Conclusion of Market Square Assessment

3.3.3.1 Traffic Modelling and Policy Considerations

The VISUM results indicate that the negative impact on vehicular traffic from closing either side of Market Square is relatively modest in 2025 or 2035 with minor increases projected in trip distance and delay (due to vehicles rerouting). However, it is important to note that the VISUM network statistics cover the entire study area and the VISSIM results must be considered as well to understand the localised impact on the junctions in Market Square and the increase in queue lengths.

The VISSIM modelling considered the local impact of closing either side of Market Square on the R445/Bride Street junction in greater detail. It is important to acknowledge that a road closure in Market Square will reduce vehicle capacity and result in longer queuing than the existing situation. However, the VISSIM analysis highlighted that the closure of the eastern side of Market Square resulted in longer queuing of vehicles along the R445, Bride Street and through Market Square. Long queues of vehicles in Market Square will have a negative impact on the local area, as well as causing greater delays to residents and visitors to Kildare town centre. In comparison with this scenario, the closure of the Bride Street section of Market Square results in less queuing because vehicle demand is spread across two junctions which operate more efficiently.

The VISSIM modelling results clearly favour the closure of the Bride Street section of Market Square and this provides a strong justification for this side to be the preferred outcome of the assessment. However, wider policy priorities must also be considered as well as the implications for transport. In this regard, the recent pedestrianisation of the car park in the north-west of Market Square has been very successful, with this area now being used as a space where people can socialise, eat outside or attend the regular weekly market as shown in Figure 3.12. The closure of the Bride Street section of Market Square would allow for this pedestrianised space to be extended to Kildare Town Tourism Office, which would create a large pedestrian plaza in the centre of the town which could be used for a larger market, outdoor dining and cultural events. This plaza would enhance the public realm of the town centre and strengthen the appeal of visiting Kildare town for retail, social or tourism activities. In contrast with this, the closure of the eastern side of Market Square would create two small plazas, divided by traffic on Bride Street, which would be a less useful space for holding markets or cultural events and provide weaker public realm improvements.

Figure 3.12 Pedestrianised Space in North-West of Market Square

3.3.3.2 Preferred Road Closure in Market Square

On the basis of the transport and public rationale outlined in Section 3.3.3.1, it has been determined that Bride Street is the preferred road closure in Market Square in the long term. In the Kildare Town Transport Strategy, the closure of the Bride Street section is proposed as a medium-long term measure in the roads strategy (RD 3) which will require the completion of the Northern Link Street and Magee Barracks Roads prior to implementation. The provision of the Magee Barracks Roads and the Northern

Link Street will ensure that there is an alternative north-south route for traffic and HGVs once Bride Street has been closed in Market Square. Kildare County Council will take steps to ensure the safety of pedestrians and cyclists at the eastern section of Market Square once traffic is diverted from Bride Street. This will involve the redesign of the eastern side of Market Square junction to increase its capacity to cater for greater vehicle volumes and to ensure the safety of pedestrians and cyclists.

However, in the short to medium term until the Magee Barracks Roads and the Northern Link Street are in place, there is an opportunity to implement temporary road closures on the eastern side of Market Square to enhance the overall public realm offering of the square. These temporary road closures may be implemented at weekends or for longer periods. The temporary closure of the eastern side of the square to traffic, for instance at the weekends, will create a new space for outdoor seating, public events and socialising. This will provide a benefit to the town centre in the short term, prior to the implementation of the Bride Street road closure, in line with measure RD 3 of the transport strategy, and the permanent reopening of the east side of Market Square to traffic in the medium-long term.

3.4 Road Options Description

In Section 3.3, it was determined that the Bride Street section of Market Square should be closed to traffic to facilitate public realm improvements. Following this, a number of road options were created to improve traffic conditions across Kildare Town. The majority of these options are tested in the VISUM transport model to assess their impact on the road network in Kildare and inform the option assessment process.

3.4.1 Option 1: Closure of Old Road Bridge and Replace Southgreen Bridge

In this option, Old Road Bridge is closed to motor vehicle traffic to facilitate access for pedestrians and cyclists. In addition to this, the traffic signals are removed on Southgreen bridge and the bridge is replaced to accommodate two-way traffic as well as improvements to the approach roads.

The replacement of Southgreen bridge and the improvements to approach roads are required to provide additional capacity to facilitate access to the new housing areas zoned in the north-west of the town and to improve safety.

The replacement of Southgreen bridge will also increase capacity on this road to accommodate the vehicles rerouted from Old Road Bridge once it is closed. The closure of Old Road Bridge will provide for a high-quality walking and cycling link between the town and the main future development areas in the north-west. The closure of Old Road Bridge is integrated into the cycling and walking network strategies to deliver improvements for active modes along this corridor. The location of Old Road Bridge and Southgreen Bridge is shown in Figure 3.13.

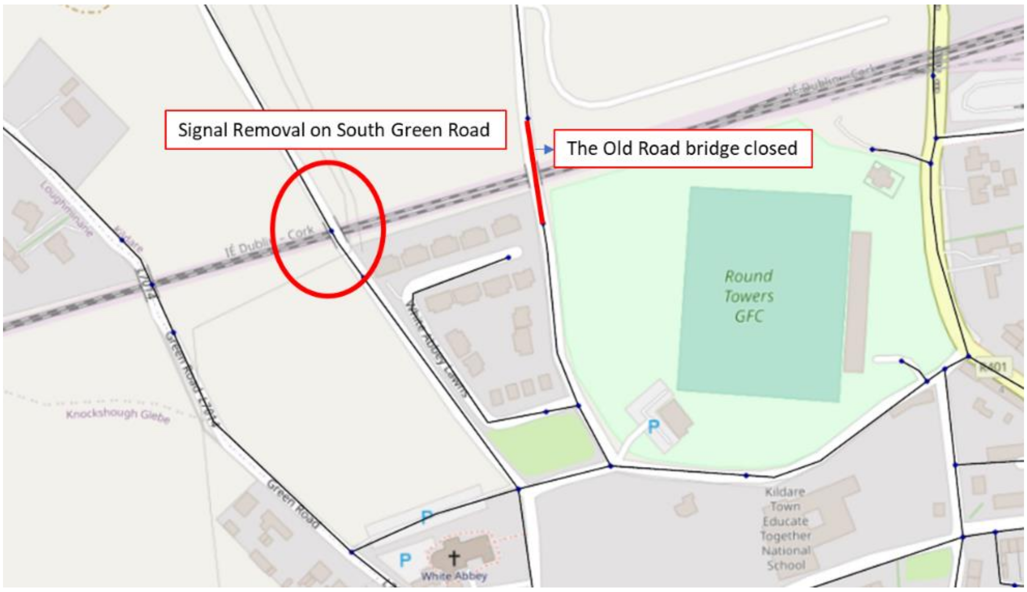

Figure 3.13 Option 1: Closure of Old Road Bridge and Replacement of Southgreen Bridge

3.4.2 Option 2: Northern Link Street

In this option, a new link road is proposed from the R445 to the junction of Green Road and Pigeon lane, with the local roads improved along the route until the junction with the R415 as shown in Figure 3.14. The existing junction between Green Road and Pigeon Lane will be redesigned to accommodate the new road. To complement the new road, a one-way system is proposed for Friary Road/White Abbey Road (southbound) and Pigeon Lane (northbound). Other improvements include a new access to the GAA pitches and the implementation of local access only arrangements on a number of roads.

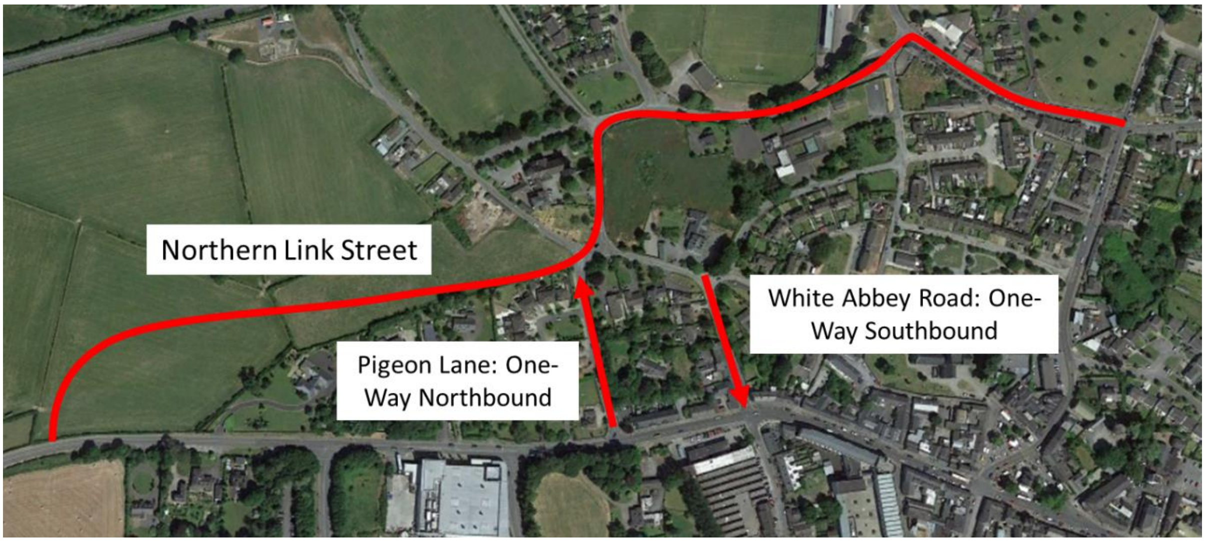

Figure 3.14 Option 2: Northern Link Street

3.4.3 Option 3: Bride Street Road Closure and One-Way System

In this option, Bride Street becomes a one-way road (southbound only) from the junction with Bang-Up Lane to the junction with Cleamore Road as shown in Figure 3.15. Furthermore, this option involves the closure of Bride Street to motorised traffic between the R445 and Bang Up Lane as well as the closure of the eastern section of Market Square to vehicles. The closure of the southern section of Bride Street and the eastern section of Market Square would facilitate public realm improvements and pedestrianisation.

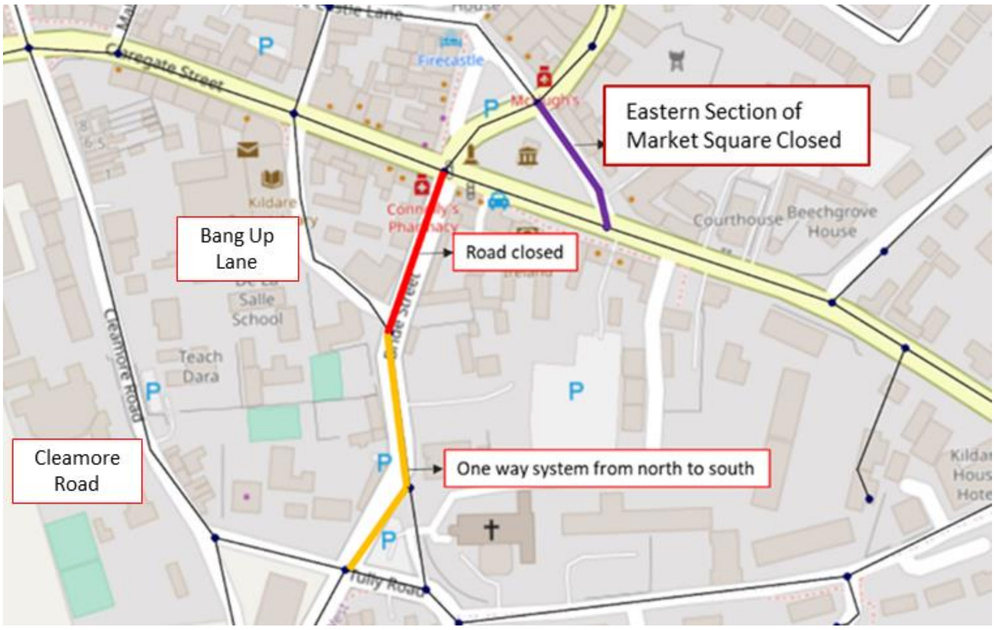

Figure 3.15 Option 3: Bride Street Road Closure and One-Way System

3.4.4 Option 4: Bride Street Southbound One-way System

In this option, Bride Street is made a one-way road (southbound only) from the junction with the R445 to the junction with Cleamore Road, as shown in Figure 3.16. Reducing vehicle traffic along this street would allow for measures to enhance the public realm and expand pedestrian facilities.

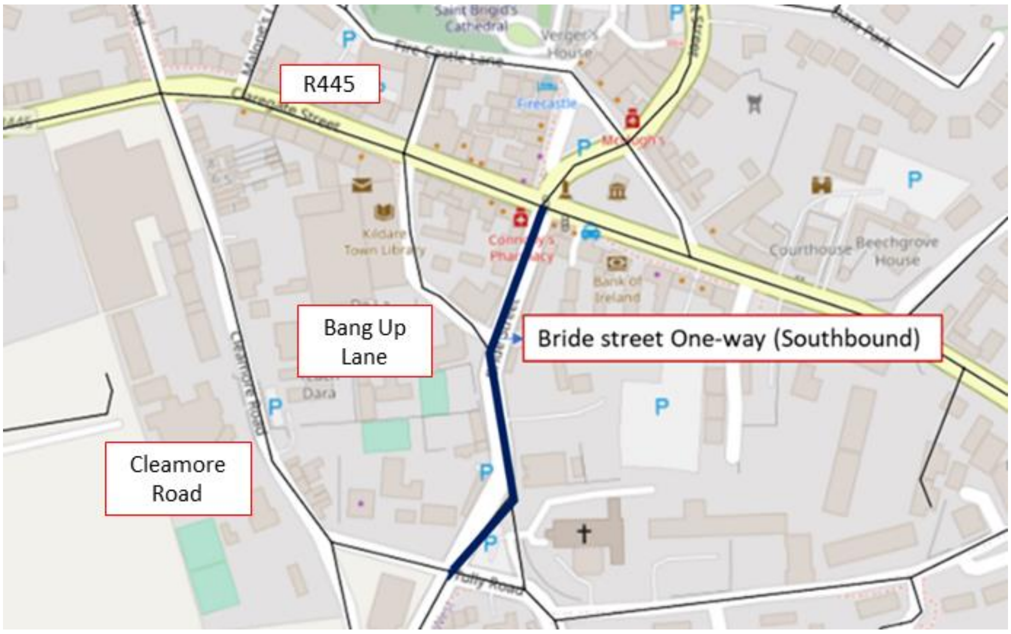

Figure 3.16 Option 4: Bride Street Southbound One-way System

3.4.5 Option 5: One-Way Northbound System on Bride Street

In this option, a northbound one-way system is implemented on Bride Street between the R445 and Bang Up Lane, as shown in Figure 3.17. The section of Bride Street to the south of Bang Up Lane remains two way to facilitate access to the Bride Street off-street car park which may be upgraded as part of the parking strategy.

Figure 3.17 Option 5: One-Way Northbound System on Bride Street

3.4.6 Option 6: One-Way Westbound System on Meadow Road

In this option, a one-way westbound system is implemented on Meadow Road to reduce traffic volumes and facilitate improvements to the infrastructure for active modes (Figure 3.18).

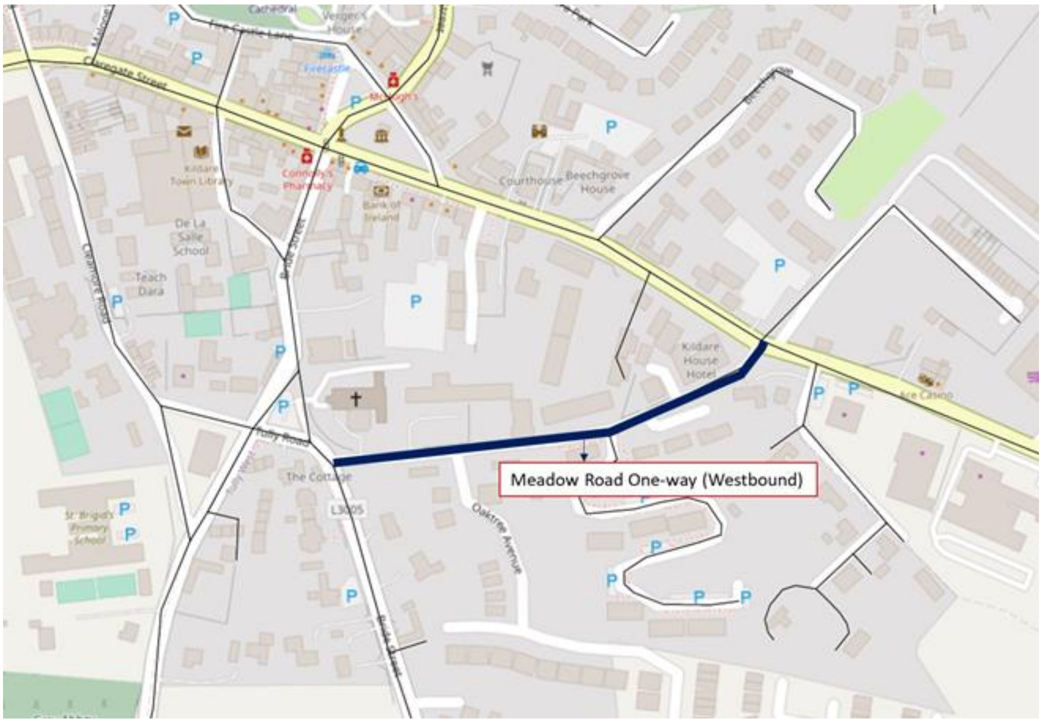

Figure 3.18 Option 6: One-Way Westbound System on Meadow Road

3.4.7 Option 7: Upgrade Signalised Junctions to MOVA or SCOOT as Appropriate

This option would upgrade signalised junctions to MOVA or SCOOT as appropriate to improve traffic flow and improve the safety of pedestrians, cyclists and vulnerable road users through the implementation of Intelligent Transport Solutions technology. This option has not been assessed in the transport model.

3.4.8 Option 8: Bride Street to Melitta Road One-Way Northbound System

In this option, a northbound one-way system is implemented from Bride Street to Melitta Road to reduce traffic volumes on the corridor and facilitate public realm improvements. The extent of the one-way system is shown in Figure 3.19.

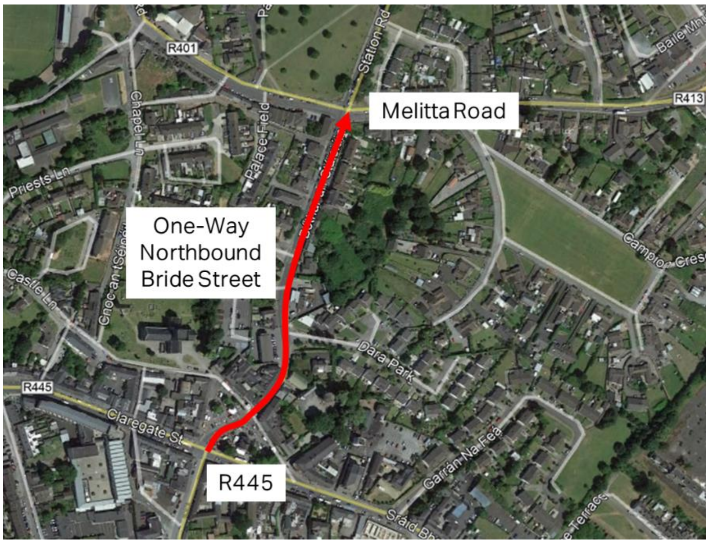

Figure 3.19 Option 8: Bride Street to Melitta Road One-Way Northbound System

3.4.9 Option 9: Northern Clockwise One-Way Loop System on R401 and R415

In this option, a clockwise one-way loop system is implemented on the R401 and R415 as shown in Figure 3.20. This option would allow for the signalised shuttle systems to be removed on the two bridges over the railway line.

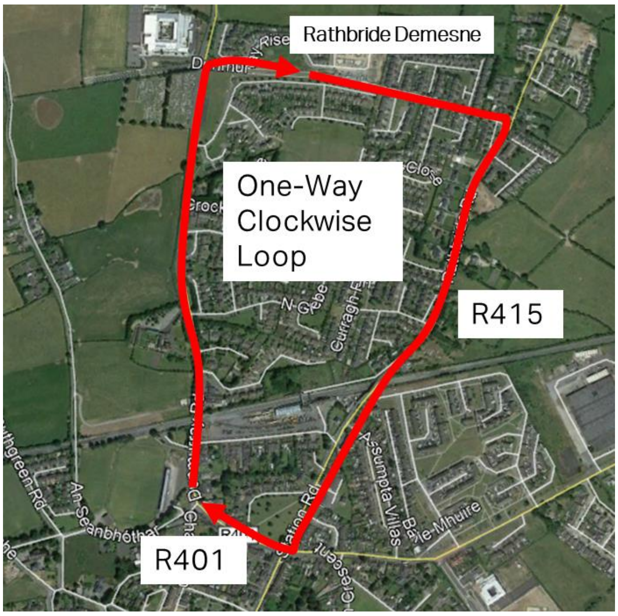

Figure 3.20 Option 9: Northern Clockwise One-Way Loop System on R401 and R415

3.4.10 Option 10: Town Centre Clockwise One-Way Loop System

In this option, a clockwise one-way loop system is implemented in the central areas of Kildare Town as shown in Figure 3.21. This one-way system would reduce traffic flows on Bride Street, Market Square, Meadow Road, Cleamore Road, Pigeon Lane and the R401; to facilitate public realm improvements.

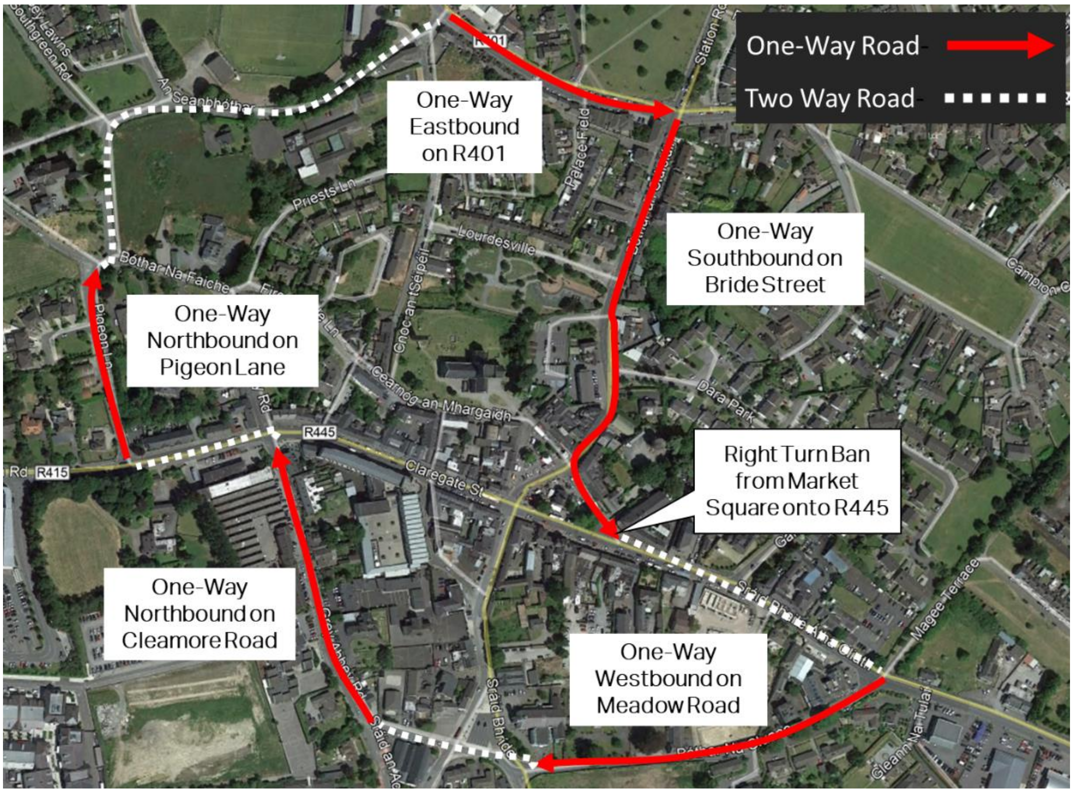

Figure 3.21 Option 10: Town Centre Clockwise One-Way Loop System

3.5 Roads Option Assessment

This section describes the results of the strategic transport modelling (VISUM) assessment of the potential options. In this section, difference plots from the VISUM modelling are presented for each Do-Something (DS) option and a summary of network statistics across all options is provided. A difference plot shows the change in traffic volumes when the option is implemented, in comparison with the Do-Minimum Scenario. In the difference plots, green indicates a reduction in traffic on the link as a result of implementing the option while red represents an increase in traffic on the link.

3.5.1 Option 1: Closure of Old Road Bridge and Replace Southgreen Bridge

Option 1 contains two elements, the closure of Old Road Bridge and the replacement of Southgreen Bridge to accommodate two-way traffic. To avoid the closure of Old Road Bridge having undue influence on the difference plot results, a variation of the DM scenario ('Alternative DM Scenario') is used which includes the closure of Old Road Bridge so that the comparison between the DS and DM scenarios focuses on the impact of upgrading Southgreen Bridge.

Option 1 was compared against this Alternative DM Scenario in 2025 for the AM peak and the flow difference plot is shown in Figure 3.22. This difference plot shows that some traffic has transferred onto Southgreen Road from the Dunmurray Road since the bridge has been made two-way.

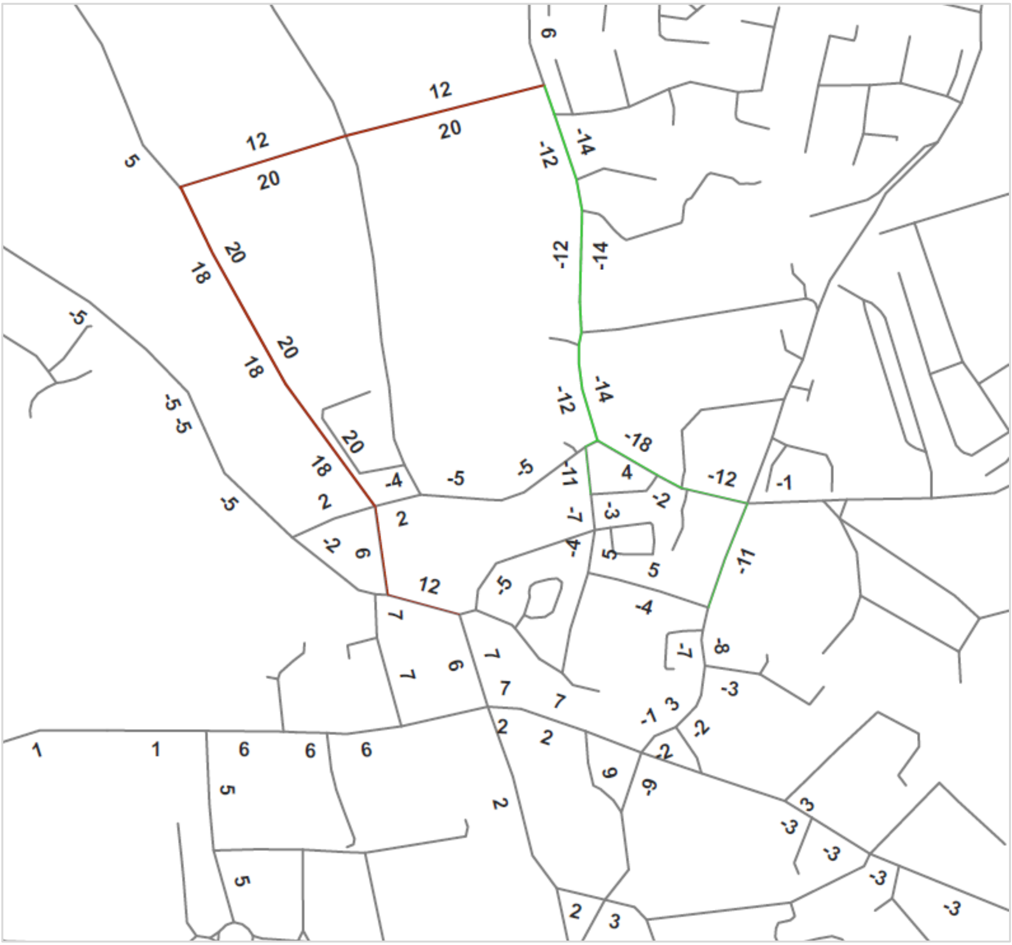

Figure 3.22 Flow comparison (Option 1 Vs DM Special Scenario) – 2025 – AM Peak

3.5.2 Option 2: Northern Link Street

Option 2 was compared against the Do-Minimum scenario for 2025 for the AM peak and the difference plot is shown in Figure 3.23. The difference plot highlights that the introduction of the Northern Link Street has reduced traffic volumes on the R445 and in the town centre, by facilitating traffic movements between the west and north of the town without the need to travel through central areas.

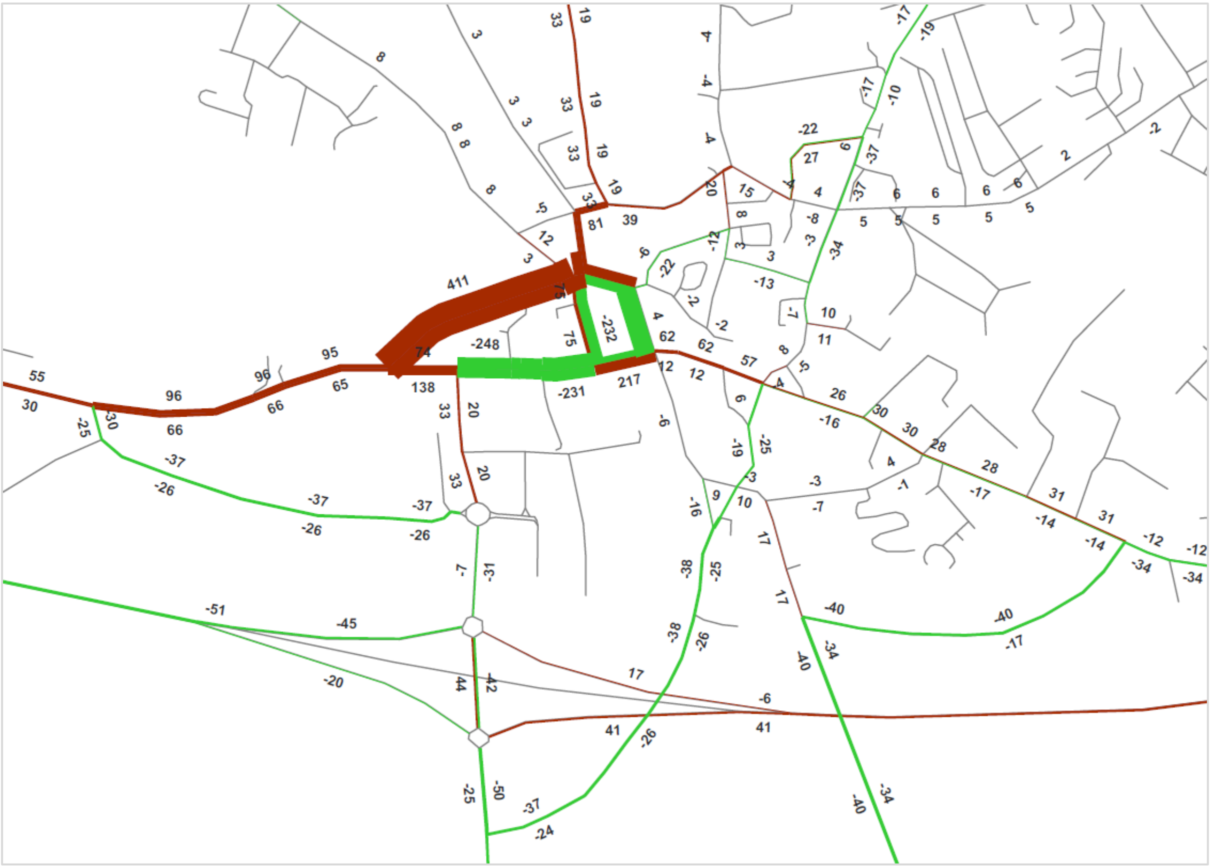

Figure 3.23 Flow comparison (Option 2 Vs DM)– 2025 – AM Peak

3.5.3 Option 3: Bride Street Road Closure and One-Way System

Option 3 was compared against the Do-Minimum scenario for 2025 in the AM peak with the flow difference plot shown in Figure 3.24. Due to the road closure and one-way system introduced in this option, total vehicle km has increased as traffic has to reroute, with the difference plot showing that traffic has moved from Bride Street to Bang Up Lane and Meadow Road. The increase in traffic volumes on Bang Up Lane and Meadow Road is concerning as these are low capacity routes which cannot cater for a large number of additional vehicles.

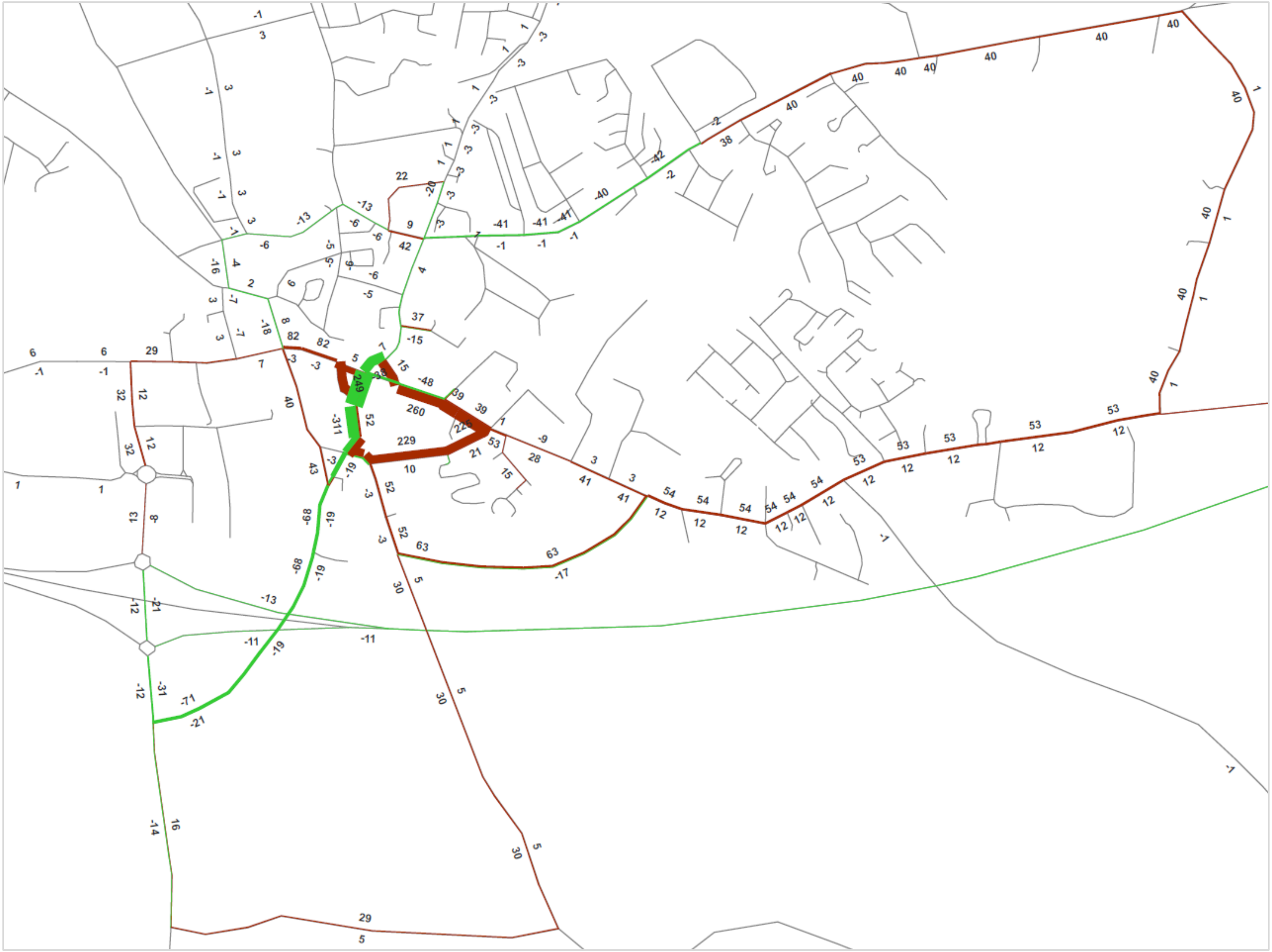

Figure 3.24 Flow comparison (Option 3 Vs DM)– 2025 – AM Peak

3.5.4 Option 4: Bride Street Southbound One-Way System

Option 4 is tested in 2025 against the Do-Minimum scenario in the AM peak with the flow difference plot shown in Figure 3.25. The difference plot highlights a substantial increase in traffic on the eastern section of Market Square, the R445 and Meadow Road. Public realm improvements are planned for Market Square and increasing traffic volumes through this area may be an issue. Higher traffic volumes on Meadow Road, which is a narrow street with limited capacity, would also be a problem.

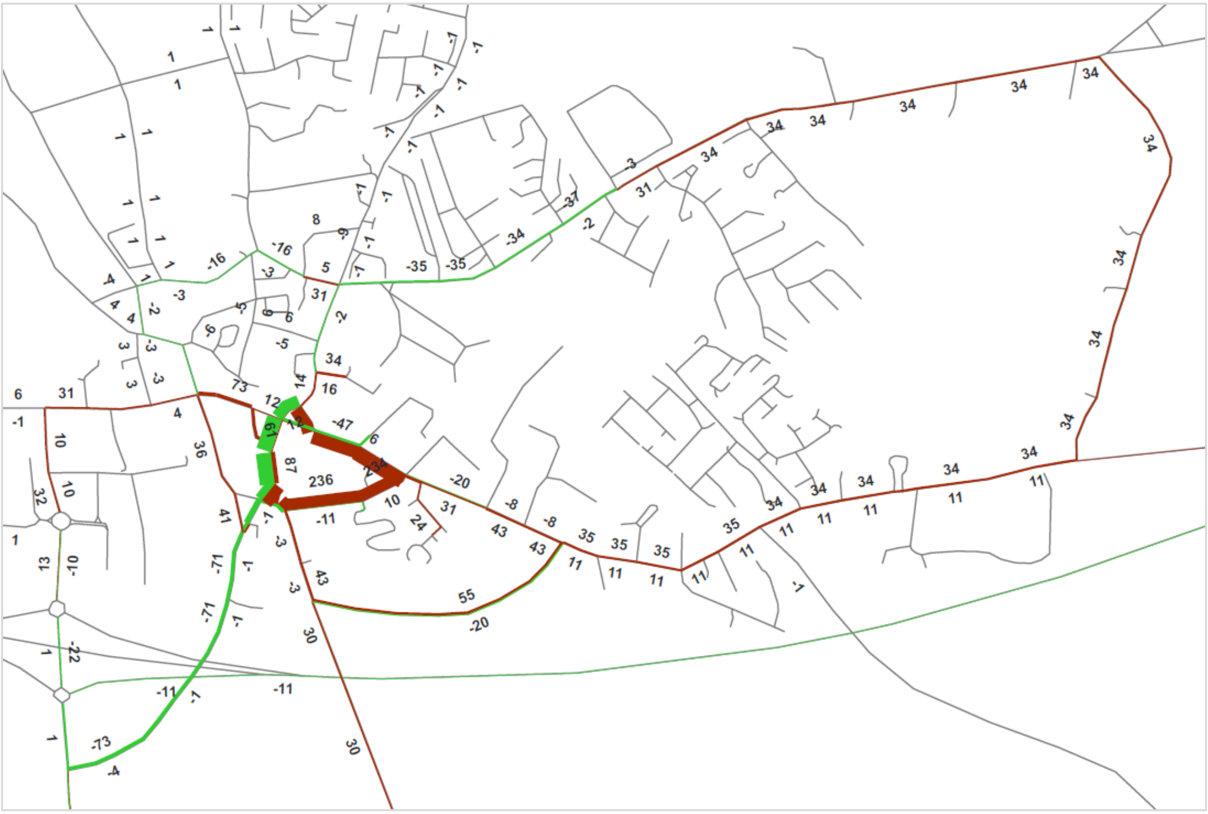

Figure 3.25 Flow comparison (Option 4 Vs DM)– 2025 – AM Peak

3.5.5 Option 5: One-Way Northbound System on Bride Street

Option 5 is tested in 2025 against the DM scenario for the AM peak with the flow difference plot shown in Figure 3.26. Traffic volumes on Bride Street have reduced slightly along the route, with a significant shift in traffic from Bride Street onto Bang Up Lane for southbound traffic.

Figure 3.26 Flow comparison (Option 5 Vs DM)– 2025 – AM Peak

Bang Up Lane is a very low capacity street, as can be observed in Figure 3.27, and diverting large volumes of traffic onto this street may be problematic in respect to safety and congestion.

Figure 3.27 Bang Up Lane in Kildare Town (Source: Google)

3.5.6 Option 6: One-Way Westbound System on Meadow Road

Option 6 was tested in the 2025 scenario in the AM peak with the flow difference plot shown in Figure 3.28. The introduction of a one-way westbound system on Meadow Road has meant that a certain amount of traffic was rerouted onto the Hospital Street-Tully Road link to the south.

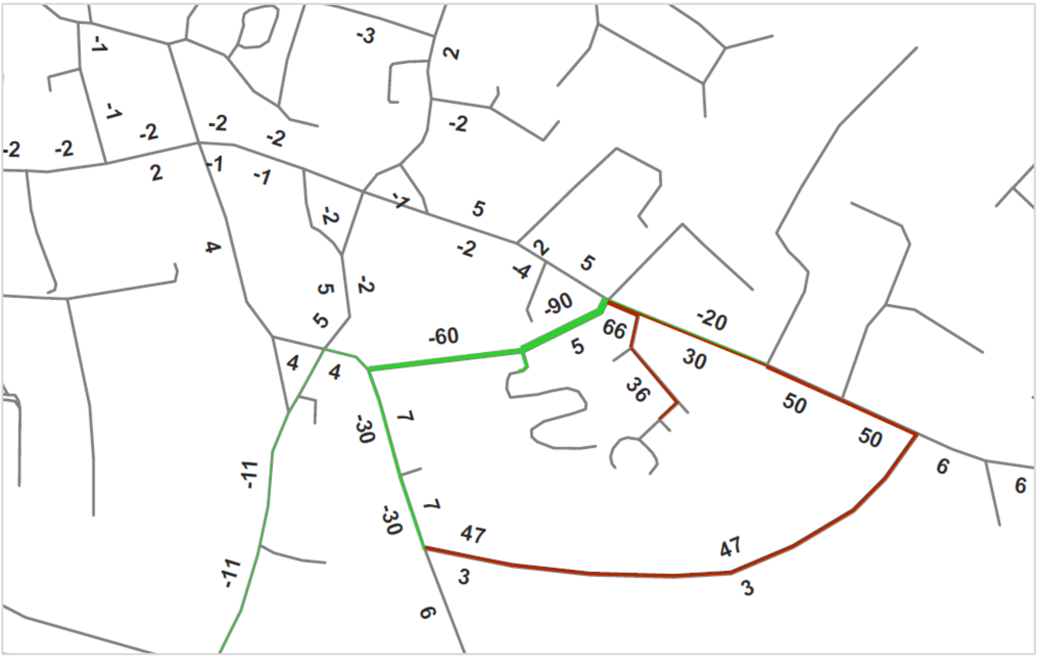

Figure 3.28 Flow comparison (Option 6 Vs DM)– 2025 – AM Peak

An alternative scenario was tested in the 2025 AM peak where the one-way system on Meadow Road is implemented without the creation of the Hospital Street – Tully Road link road. Without this alternative route in place, traffic either diverts via the R445 and Bride Street which increases traffic in the town centre, or takes a longer circuitous route to the south-east of the town via the L3006 and L7024.

Figure 3.29 Flow Comparison of Alternative Option 6 Scenario without Hospital Street – Tully Road link road in place in AM Peak 2025

3.5.7 Option 8: Bride Street to Melitta Road One-Way Northbound System

Option 8 was tested in the 2025 scenario in the AM peak with the flow difference plot shown in Figure 3.30. Due to the lack of alternative north-south routes through the town in 2025, significant diversion of southbound traffic from Bride Street has led to a substantial increase in traffic volumes on Old Road and Green Road to the west, and a low capacity lane on the eastern periphery of the town.

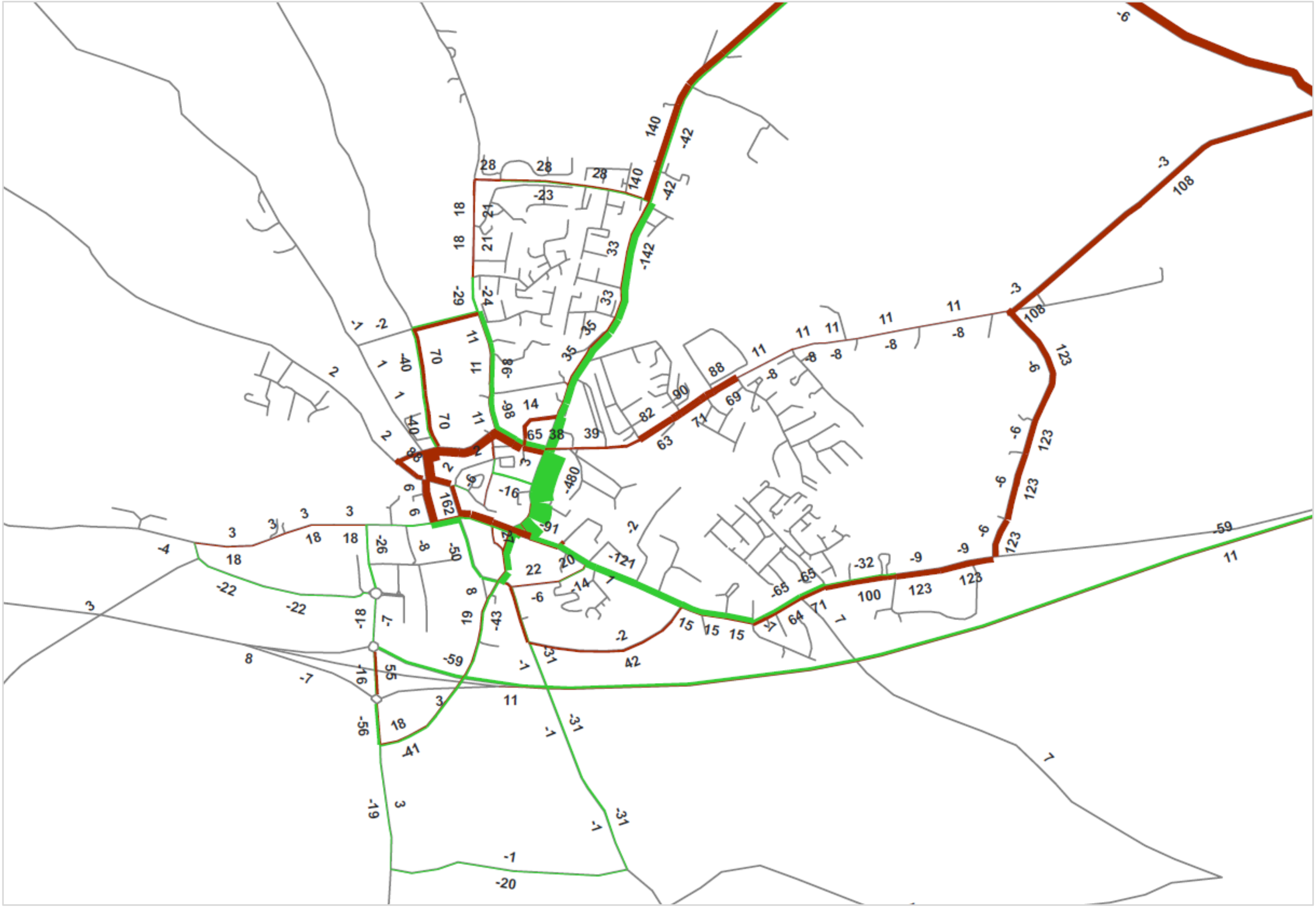

Figure 3.30 Flow comparison (Option 8 Vs DM) – 2025 – AM Peak

3.5.8 Option 9: Northern Clockwise One-Way Loop System on R401 and R415

Option 9 was tested in the 2025 scenario in the AM peak with the flow difference plot shown in Figure 3.31. The introduction of a large one-way system in the north of the town has reduced traffic volumes on the roads where the one-way system has been implemented, but it has also caused a significant amount of traffic to reroute onto surrounding roads. For instance, there has been a large increase in motor vehicle volumes on Old Road to the west of the R401 and to the east; traffic has diverted from Bride Street onto a narrow lane located on the eastern periphery of the town which has low capacity.

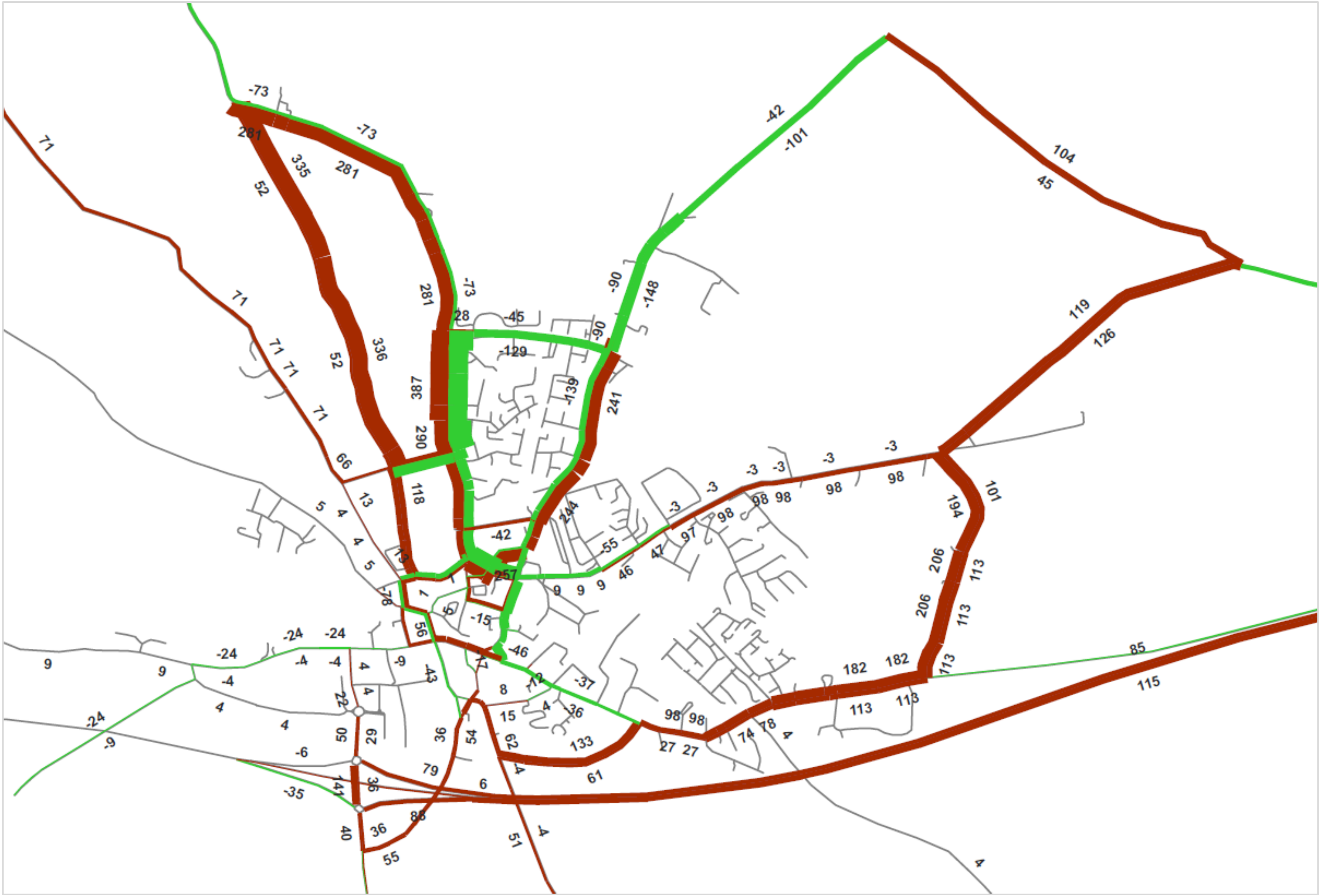

Figure 3.31 Flow comparison (Option 9 Vs DM)– 2025 – AM Peak

3.5.9 Option 10: Town Centre Clockwise One-Way Loop System

Option 10 was tested in the 2025 scenario in the AM peak with the flow difference plot shown in Figure 3.32. The introduction of a large one-way loop system in the town centre has caused a major redistribution of traffic to alternative routes. In particular, a large volume of traffic has been rerouted to the east onto a minor lane due to the lack of north-south alternatives to the R415 which may cause safety issues as this is a low capacity lane. Furthermore, traffic has increased on the Hospital Street-Tully Road link road in the south of the town which will increase vehicle volumes through a residential housing estate.

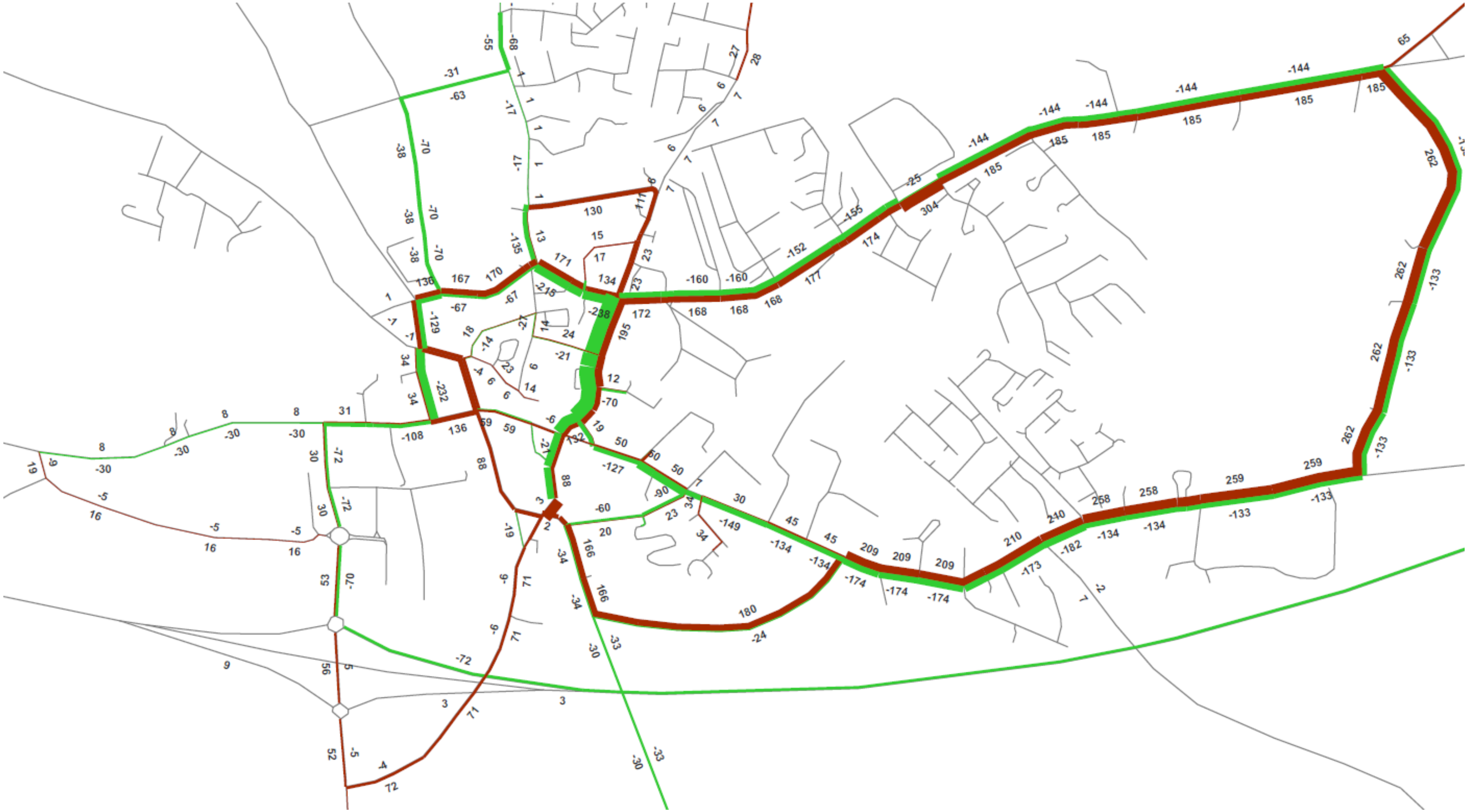

Figure 3.32 Flow comparison (Option 10 Vs DM)– 2025 – AM Peak

3.5.10 VISUM Network Statistics

Table 3.6 provides a summary of the network statistics in 2025 across the AM and PM peaks. The most beneficial option presented in the network statistics is the Northern Link Street because this is the only option which involves the construction of new road. The Northern Link Street results show that this road produces a reduction in vehicle distance and delay, with a slight increase in average network speed.

Option 1, the replacement of Southgreen Bridge, results in a small increase in vehicle kilometres due to the rerouting caused by closing Old Road Bridge to facilitate active mode improvements, but there is minimal impact on vehicle delay or speeds. Similarly, the one-way system on Meadow Road (Option 6) also has a minor impact on the network statistics and is designed to facilitate pedestrian and cyclist improvements.

While the network statistics for Options 3-5, which test various one-way systems and road closures on Bride Street, are not particularly negative, the difference plots have highlighted that they will divert vehicles onto roads which are less suitable for carrying high volumes of traffic. Options 8-10 which test a series of one-way systems in the centre and north of the town, all result in longer trip distances and delay from rerouting of traffic and lower vehicle speeds. This is particularly the case for Option 9 (Northern One Way Loop System) in the AM peak, which results in major travel time delays across the network, lower average vehicle speeds and much longer trips from rerouting.

Table 3.6 Network statistics for the DM and DS Options in 2025

AM Peak				
Model	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
DM 2025	*8,545*	*77,024*	*1,394*	*55.26*
Option 1: Replace Southgreen Bridge	8,545	77,083	1,394	55.30
Option 2: Northern Link Street	8,545	76,965	1,376	55.94
Option 3: Bride Street Road Closure and One-Way System	8,545	77,311	1,408	54.90
Option 4: Bride Street Southbound One-Way System	8,545	77,295	1,406	55.00
Option 5: Bride Street One-Way Northbound System	8,545	77,017	1,395	55.20
Option 6: One-Way Westbound on Meadow Road	8,545	77,056	1,395	55.30
Option 8: Bride Street to Melitta Road One-Way Northbound System	8,545	77,573	1,450	53.49
Option 9: Northern Clockwise One-Way Loop System on R401 and R415	8,545	80,408	1,684	47.74
Option 10: Town Centre Clockwise One-Way Loop System	8,545	77,584	1,416	54.78
PM Peak				
DM 2025	*8,998*	*95,910*	*1,606*	*59.72*
Option 1: Replace Southgreen Bridge	8,998	96,048	1,606	59.82
Option 2: Northern Link Street	8,998	95,637	1,591	60.13
Option 3: Bride Street Road Closure and One-Way System	8,998	95,905	1,611	59.52
Option 4: Bride Street Southbound One-Way System	8,998	95,919	1,620	59.20
Option 5: Bride Street One-Way Northbound System	8,998	95,850	1,608	59.60
Option 6: One-Way Westbound on Meadow Road	8,998	95,939	1,606	59.70
Option 8: Bride Street to Melitta Road One-Way Northbound System	8,998	96,568	1,622	59.54
Option 9: Northern Clockwise One-Way Loop System on R401 and R415	8,998	97,381	1,635	59.57
Option 10: Town Centre Clockwise One-Way Loop System	8,998	96,759	1,630	59.38

3.6 Preferred Road Transport Measures

3.6.1 Road Strategy Measures

In the development of the transport strategy, it was determined that the Bride Street section of Market Square should be closed to vehicular traffic to improve the public realm. In addition to this measure, the MCA and transport modelling assessment (in Section 9.7 of the Kildare Town Transport Strategy Volume 1) identified four additional options which will form the preferred suite of road measures in the transport strategy. The road strategy consists of the following measures:

- Option 1: Closure of old road bridge to vehicular traffic and the replacement of Southgreen bridge to facilitate two-way traffic with improvements to approach roads (Road Measure 1)
- Option 2: Construction of Northern Link Street (Road Measure 2)
- Closure of Bride Street section of Market Square to vehicular traffic (Road Measure 3)
- Option 6: One-way westbound system on Meadow Road (Road Measure 4)
- Option 7: Upgrade signalised junctions to MOVA or SCOOT as appropriate (Road Measure 5)

The measures which form the road transport strategy are shown visually in Figure 3.33, except for RD 5 because the precise traffic signals to be upgraded will be identified in a detailed study at a later date.

Figure 3.33 Road Strategy Measures

Figure 3.34 shows the Kildare Town Road Strategy Measures in combination with the Do-Minimum Road Network to provide an overview of the future changes to the road network in Kildare Town.

Figure 3.34 Future Road Network– Combined DM Network and Road Strategy Measures

3.6.2 Phasing of Road Strategy Measures

The preferred road options have been renamed as road measures for the strategy. Each of the road measures is phased as short, medium or long term in respect to implementation. The phasing of each of the road measures is outlined in Table 3.7.

Table 3.7 Phasing of Road Measures

			Delivery Timeframe		
Option	Measure	Short Description	Short Term (1-2 Years)	Medium Term (3-5 Years)	Long Term (6-10 Years)
Option 1	RD 1	Closure of Old Road Bridge to vehicular traffic and the upgrade of Southgreen bridge to two-way traffic with improvements to approach roads		x	
Option 2	RD 2	Construction of Northern Link Street		x	
Option N/A	RD 3	Closure of Bride Street section of Market Square to vehicular traffic (linked to development of Magee Barracks Roads)		x	x
Option 6	RD 4	One-way system on Meadow Road running east to west	x		
Option 7	RD 5	Upgrade signalised junctions to MOVA or SCOOT as appropriate	x	x	

4 Impact of Combined Road Strategy

In this section, the combined Roads Strategy is tested in the future year VISUM transport models to assess the impact on the Kildare Town transport network. Table 4.1 shows the road strategy measures which are included in the 2025 and 2035 scenarios, with RD 3 (Bride Street Market Square closure) added in 2035 when the Magee Barracks Roads are in place.

Table 4.1 Road Measures Included in 2025 and 2035 Scenario

Measure	Short Description	2025 Scenario	2035 Scenario
RD 1	Closure of Old Road Bridge to vehicular traffic and the upgrade of Southgreen bridge to two-way traffic with improvements to approach roads	x	x
RD 2	Construction of Northern Link Street	x	x
RD 3	Closure of Bride Street section of Market Square to vehicular traffic (linked to the development of Magee Barracks Roads)		x
RD 4	One-way system on Meadow Road running east to west	x	x
RD 5	Upgrade signalised junctions to MOVA or SCOOT as appropriate	N/A – Not Modelled	

4.1 2025 VISUM Scenario

4.1.1 Network Statistics

The combined road strategy was compared against the DM 2025 scenario and the network statistics are presented in Table 4.2. It can be observed that the combined road strategy results in a slight increase in vehicle speeds in the AM and PM peak as well as a slight reduction in travel time delay.

Table 4.2 Network statistics – Combined Roads Strategy - 2025

Peak	Option	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
AM	DM- 2025	8,545	77,024	1,394	55.26
	Combined Road Strategy	8,545	77,093	1,382	55.80
PM	DM- 2025	8,998	95,910	1,606	59.72
	Combined Road Strategy	8,998	95,778	1,601	59.83

4.1.2 Difference Plots

Difference plots comparing the combined roads strategy with the 2025 DM scenario are provided in Figure 4.1 for the AM peak and Figure 4.2 for the PM peak. In these plots, the red bars represent an increase in traffic, whilst the green bars represent a decrease in flow. The width of the bars indicates the magnitude of change in traffic flow.

The most notable difference was observed along two sections i.e. Southgreen road to which the majority of the Old Road traffic was reassigned after the closure of the Old road bridge, and the North link street introduction of which provided a more direct route to access north and western region of the Kildare town.

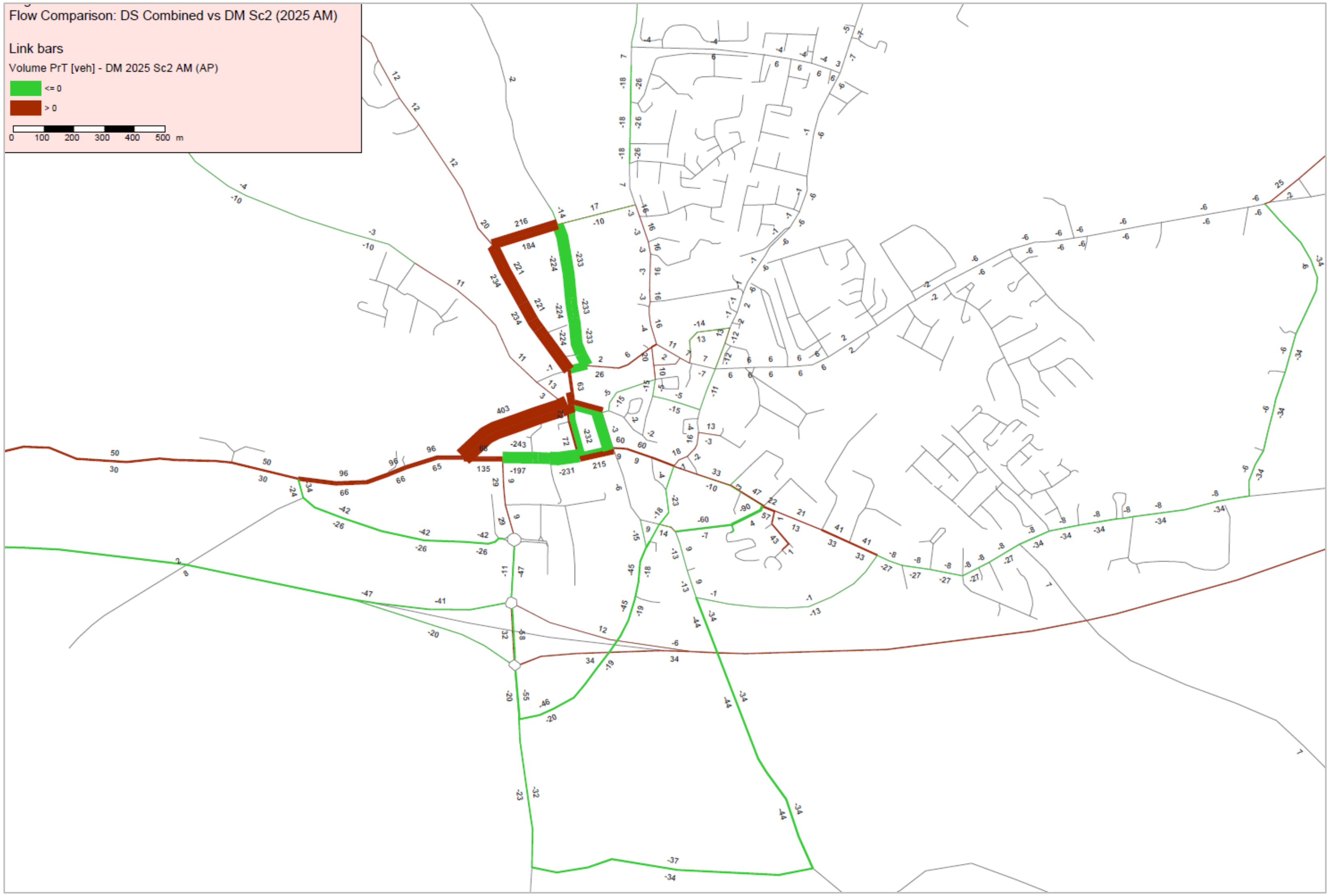

Figure 4.1 Combined Road Strategy vs DM Scenario 2025 – AM Peak

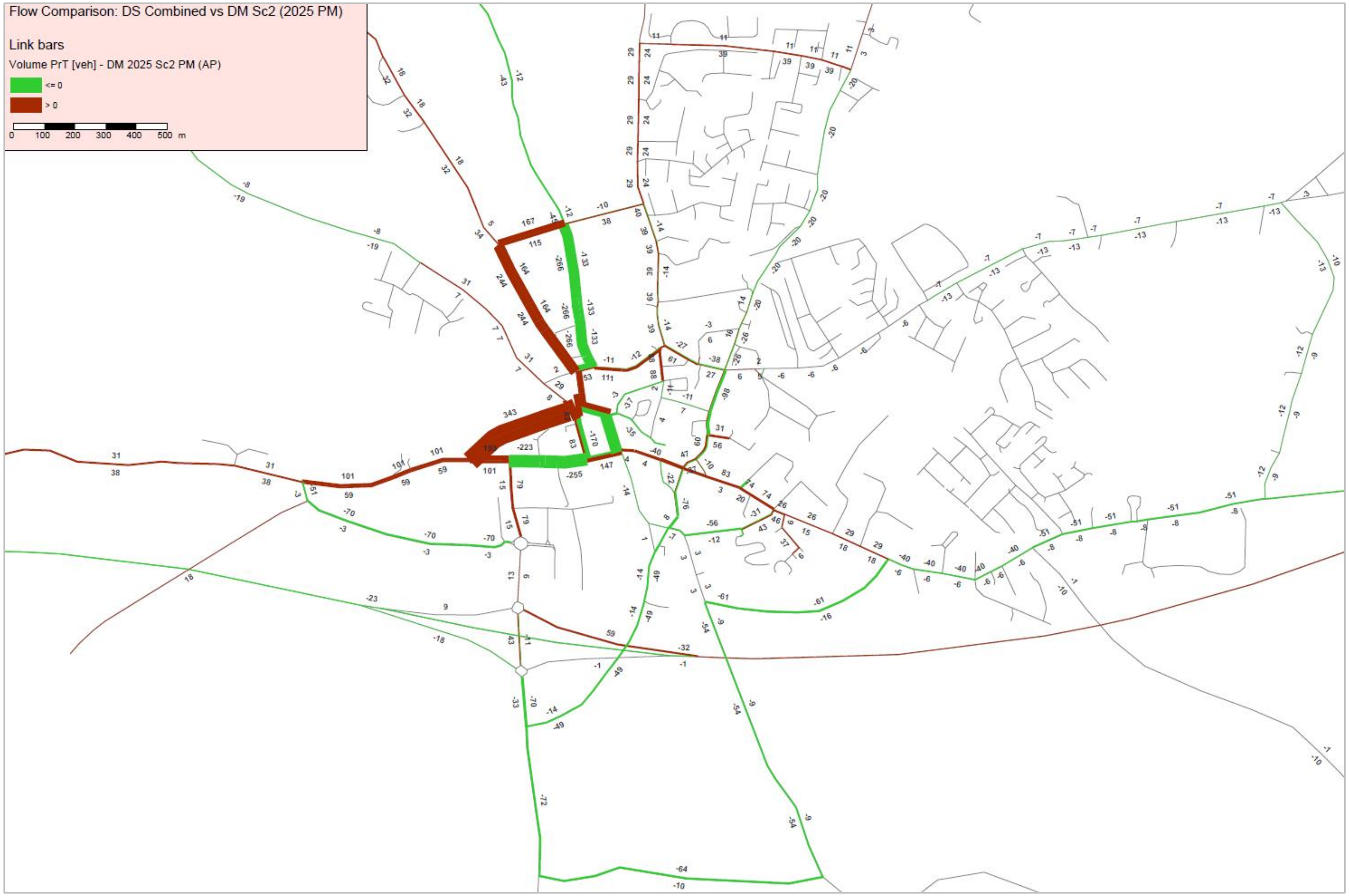

Figure 4.2 Combined Road Strategy vs DM Scenario 2025 – PM Peak

4.1.3 Traffic Flow Plots

The peak hour traffic flow plots for the combined roads strategy were extracted from the VISUM model and are presented in subsequent figures Figure 4.3 and Figure 4.4. In these plots, the width of the green bars indicates the magnitude of the traffic flow.

In these figures, it can be observed that the highest east-west traffic flows through the town are on the R445, but the provision of the Northern Link Street has provided for an alternative key east-west route via Melitta Road which is also carrying a substantial amount of traffic. North-south traffic also makes use of the new Northern Link Street to avoid the town centre via a route which uses the following roads: Dunmurray Road-Dunmurray Link Road-Southgreen Road, Northern Link Street and the R415. However, a substantial amount of north-south traffic is still travelling via Market Square on Station Road. Other new roads such as the Modus Link Road or the Hospital Street – Tully Link Road are also attracting a considerable amount of traffic flow, showing their value in improving the town road network.

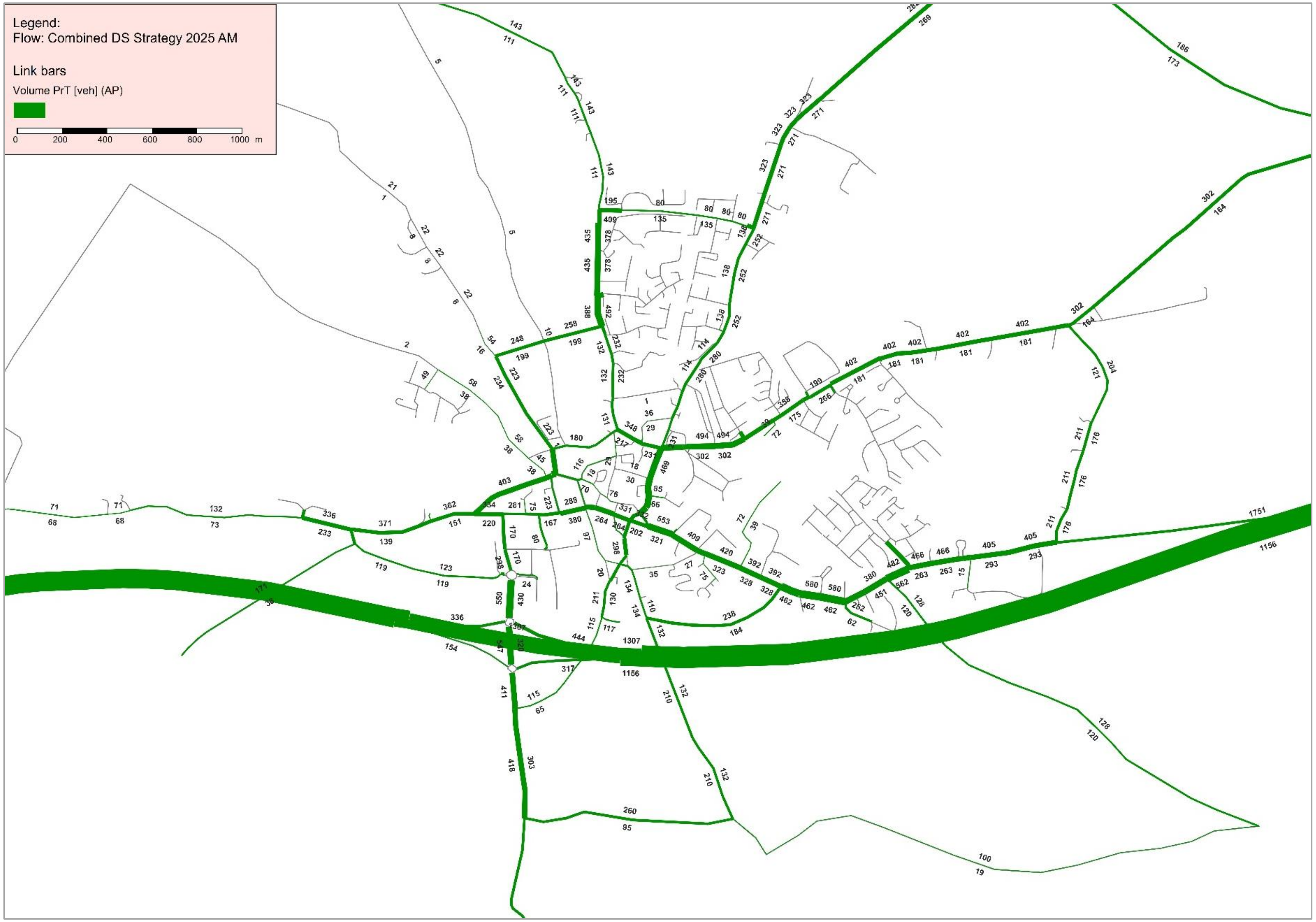

Figure 4.3 Traffic flow plot Combined Road Strategy 2025 – AM Peak

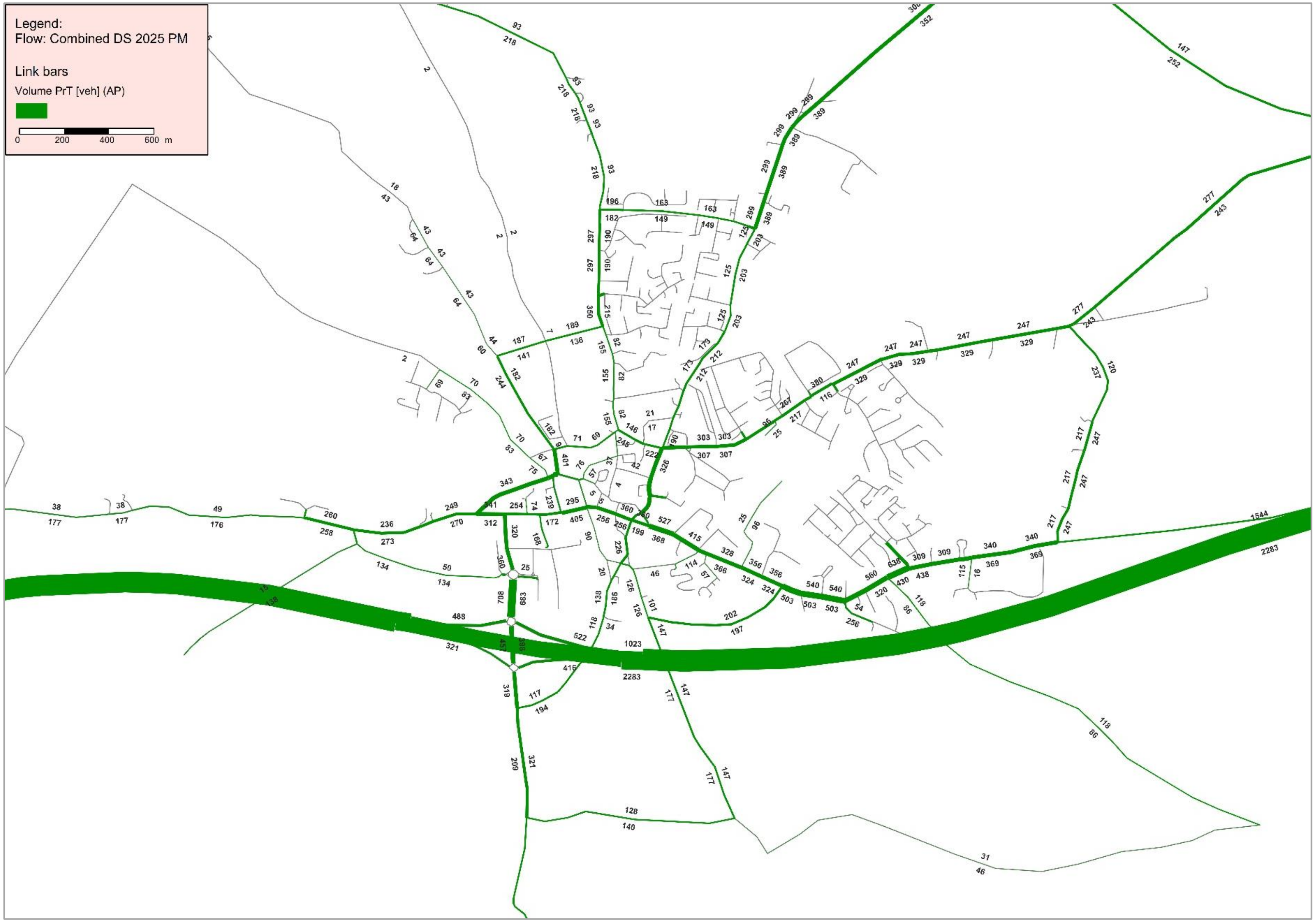

Figure 4.4 Traffic flow plot Combined Road Strategy 2025 - PM Peak

4.1.4 Junction Turning Movements

The turning movement volumes for major junctions in the combined road strategy were extracted from the VISUM model for both AM and PM peak hours. The locations of these junctions along with the corresponding turning flows are presented in subsequent figures Figure 4.5 to Figure 4.15.

The junctions with the highest turning movements and through-traffic are Junction 1 (Northern Link Street-R445), Junction 3 (Kildare Retail Village access), Junction 6 (Melitta Road/Station Road) and Junction 7 (R445/Bride Street). The retail village is a major trip attractor and it is unsurprising that this junction records a high number of turning vehicles. The other busy junctions are located along the Northern Link Street, R445 and Melitta Road which form the main east-west routes through the town, as noted in the traffic flow plots, and these junctions will cater for higher volumes of vehicles as a result.

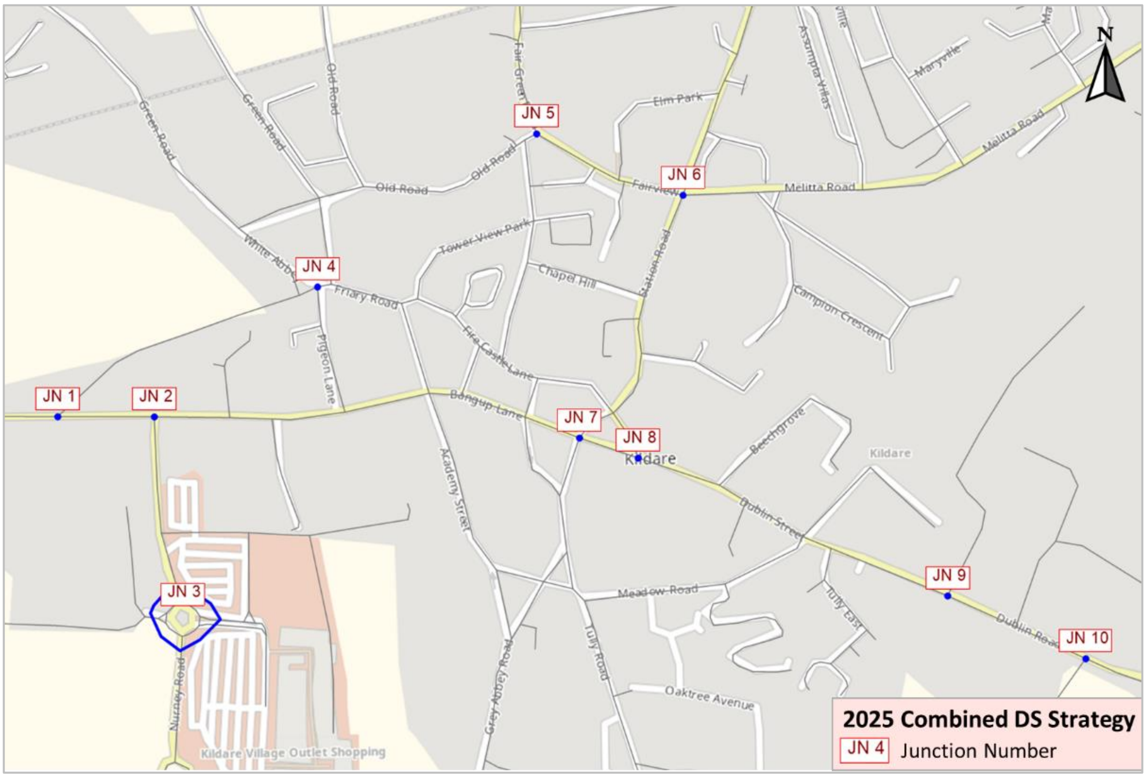

Figure 4.5 Junction Location Map 2025 Combined Road Strategy

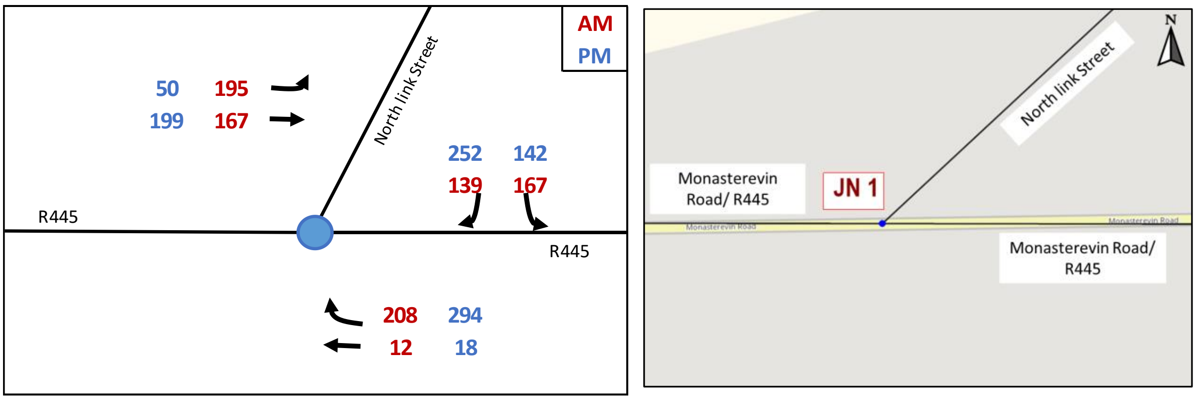

Figure 4.6 Turning Flow Diagram Junction 1

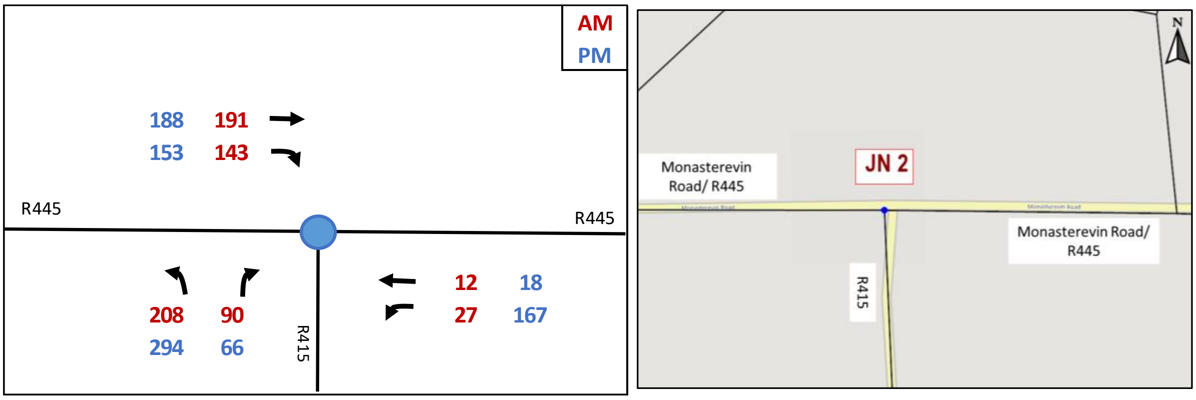

Figure 4.7 Turning Flow Diagram Junction 2

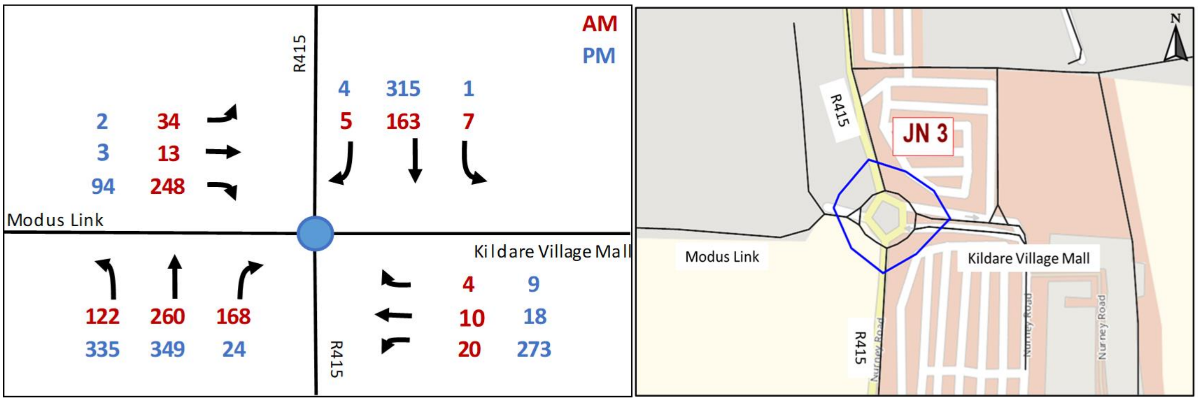

Figure 4.8 Turning Flow Diagram Junction 3

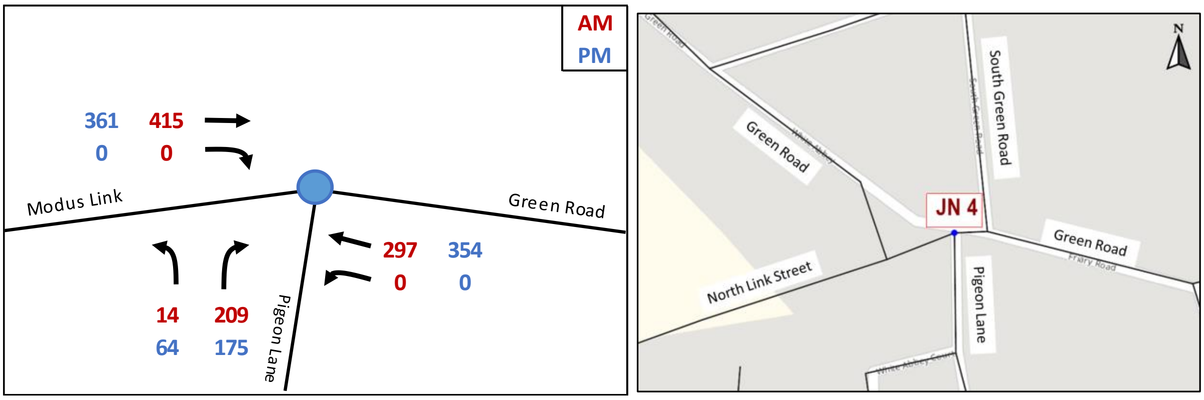

Figure 4.9 Turning Flow Diagram Junction 4

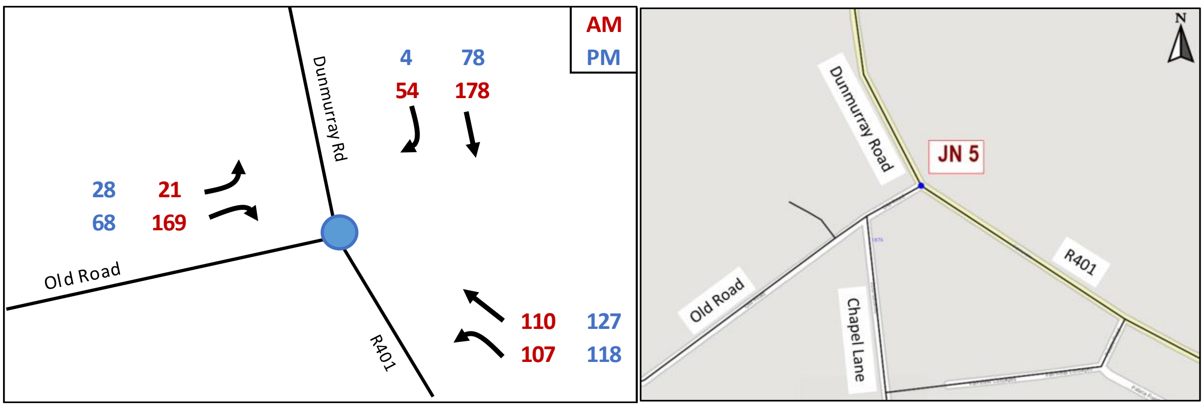

Figure 4.10 Turning Flow Diagram Junction 5

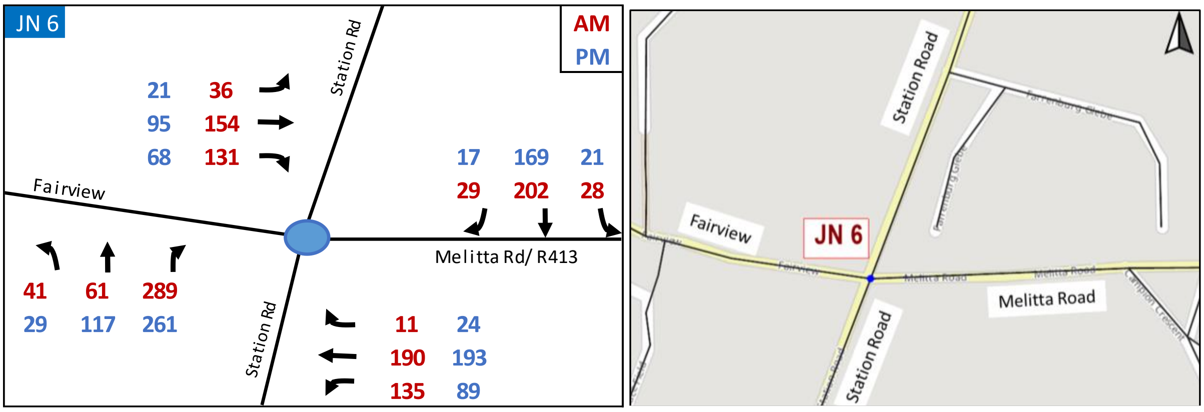

Figure 4.11 Turning Flow Diagram Junction 6

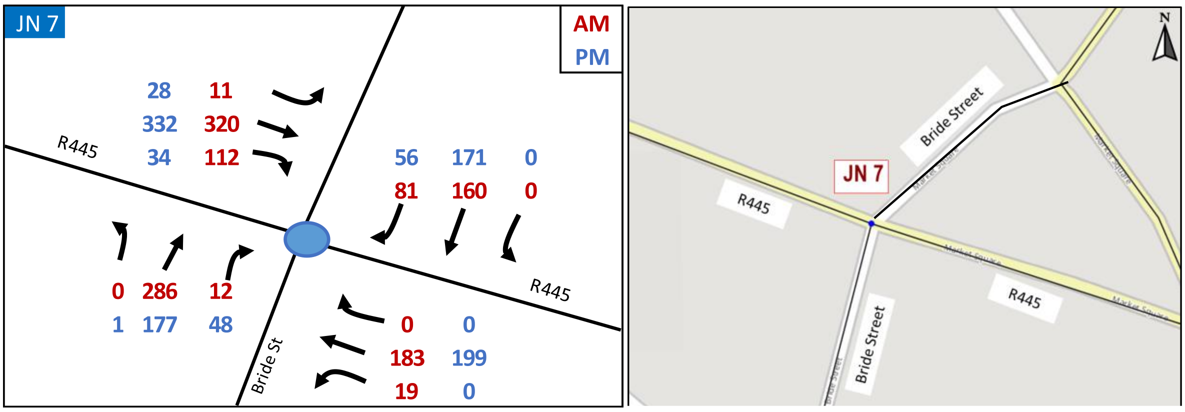

Figure 4.12 Turning Flow Diagram Junction 7

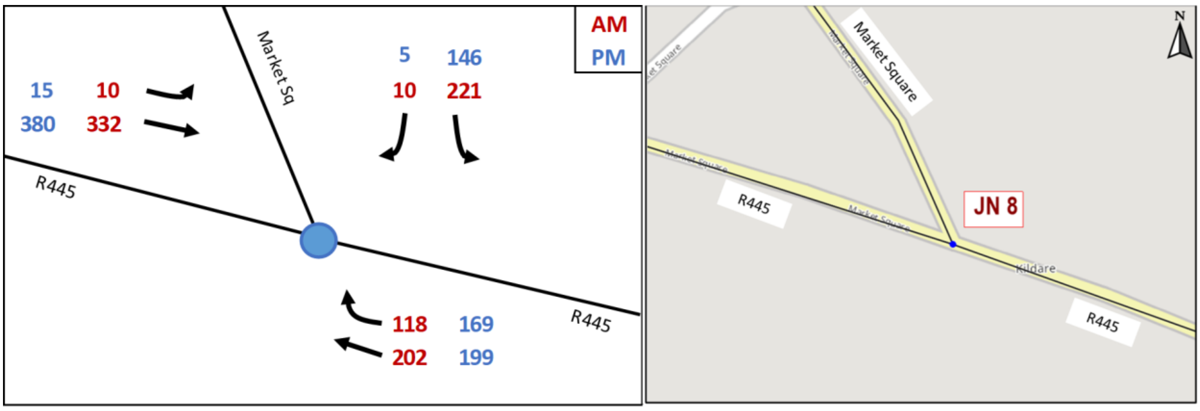

Figure 4.13 Turning Flow Diagram Junction 8

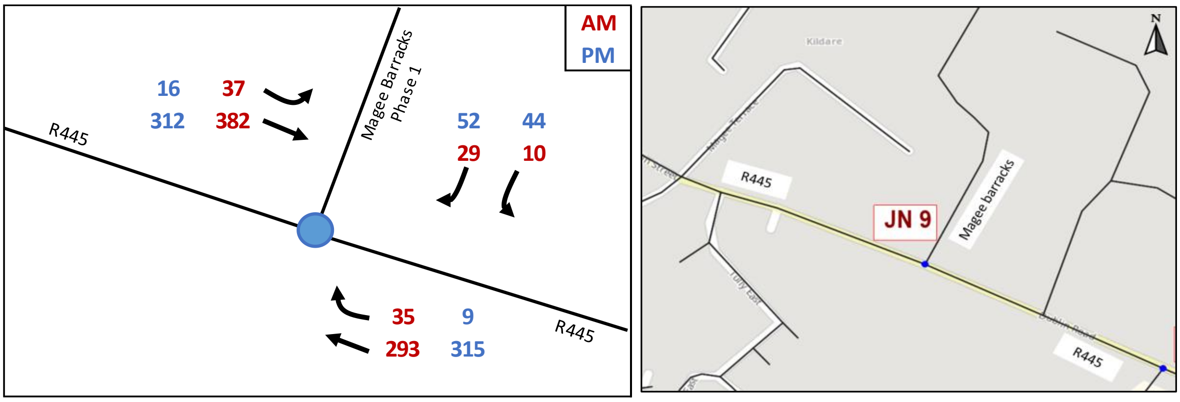

Figure 4.14 Turning Flow Diagram Junction 9

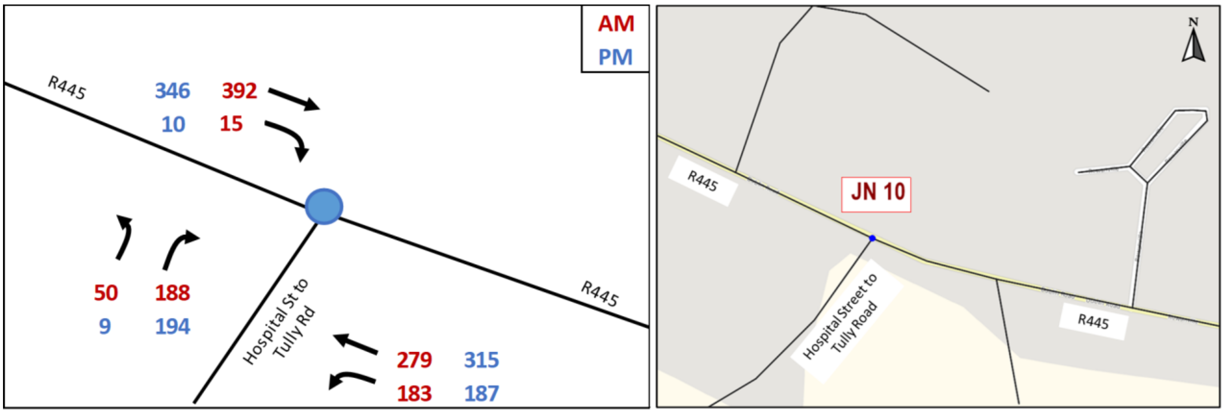

Figure 4.15 Turning Flow diagram Junction 10

4.1.5 Queue Length Plots

From the previously shown junctions, queue lengths for a few critical signalised junctions which were directly affected by the combined road strategy were extracted. The location of these junctions along with their corresponding queue lengths are presented in subsequent figures Figure 4.16 to Figure 4.24.

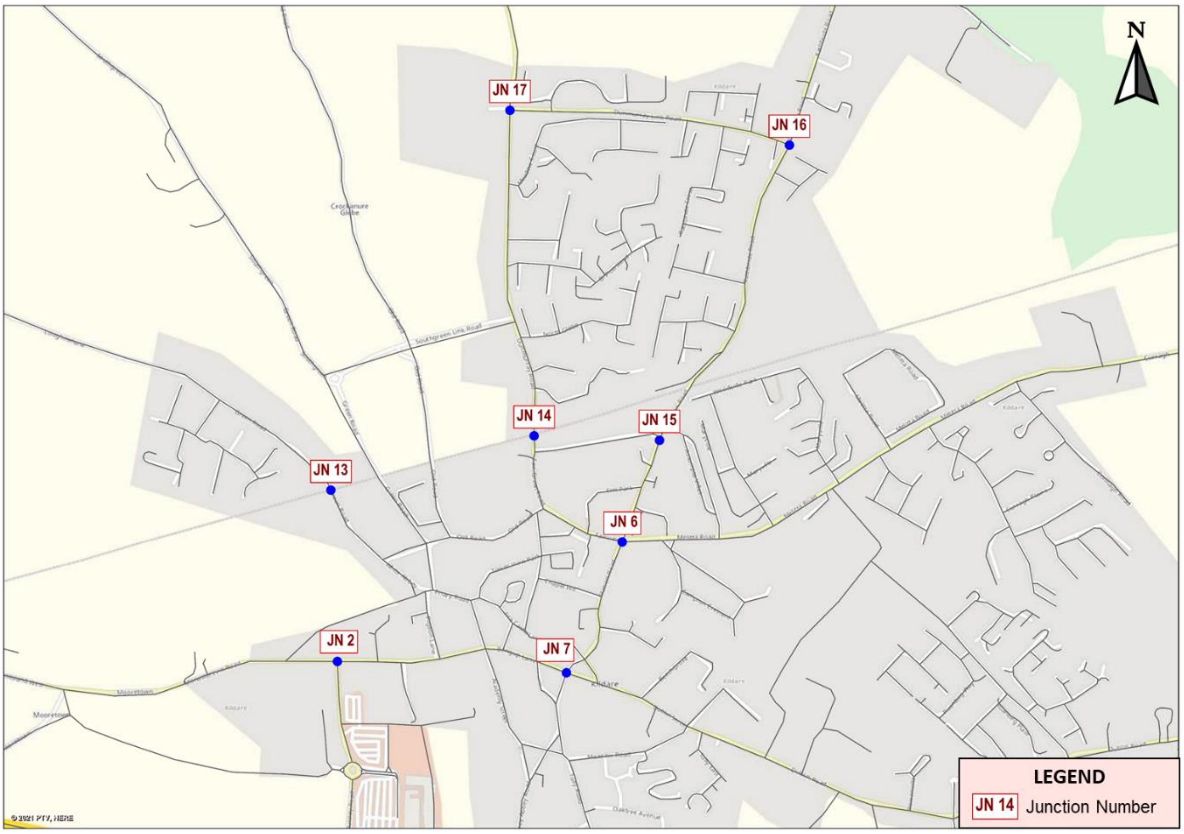

Figure 4.16: Junction location Map for 2025 Combined Road Strategy

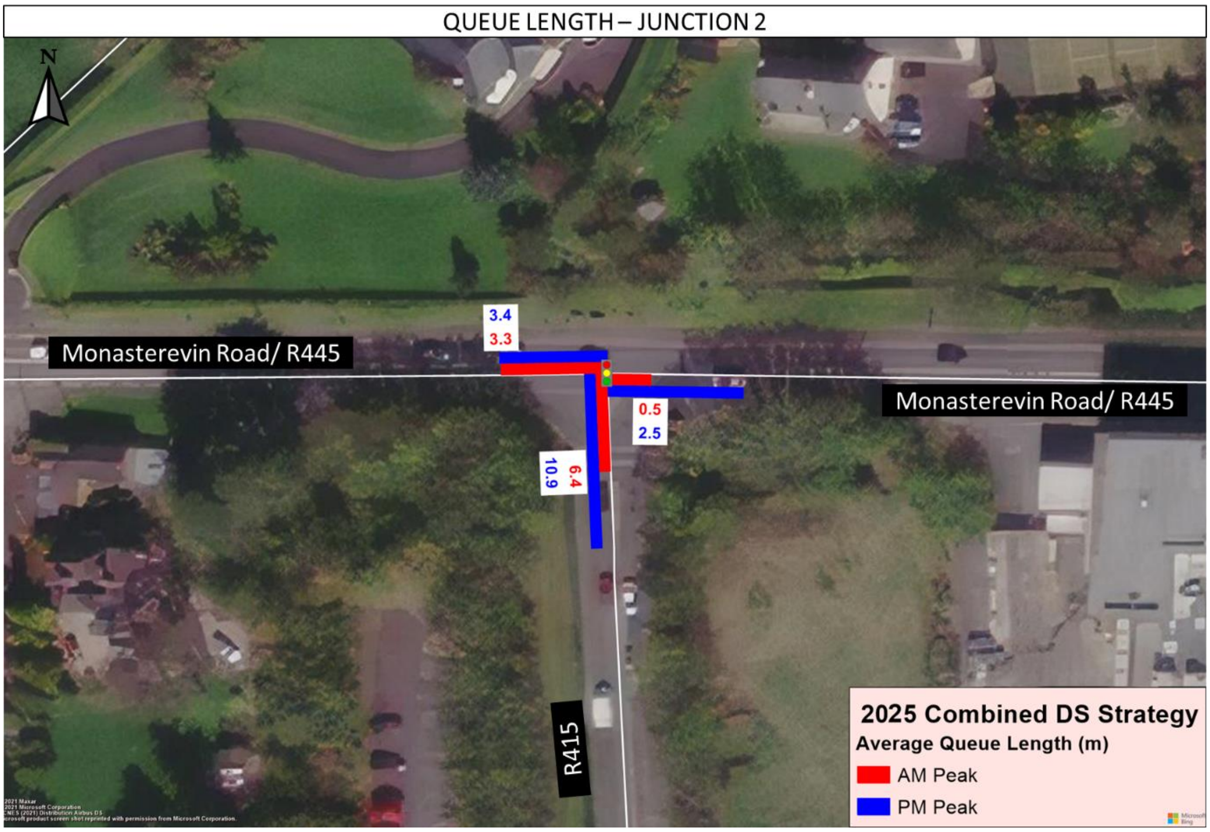

Figure 4.17 Queue Lengths at Junction 2

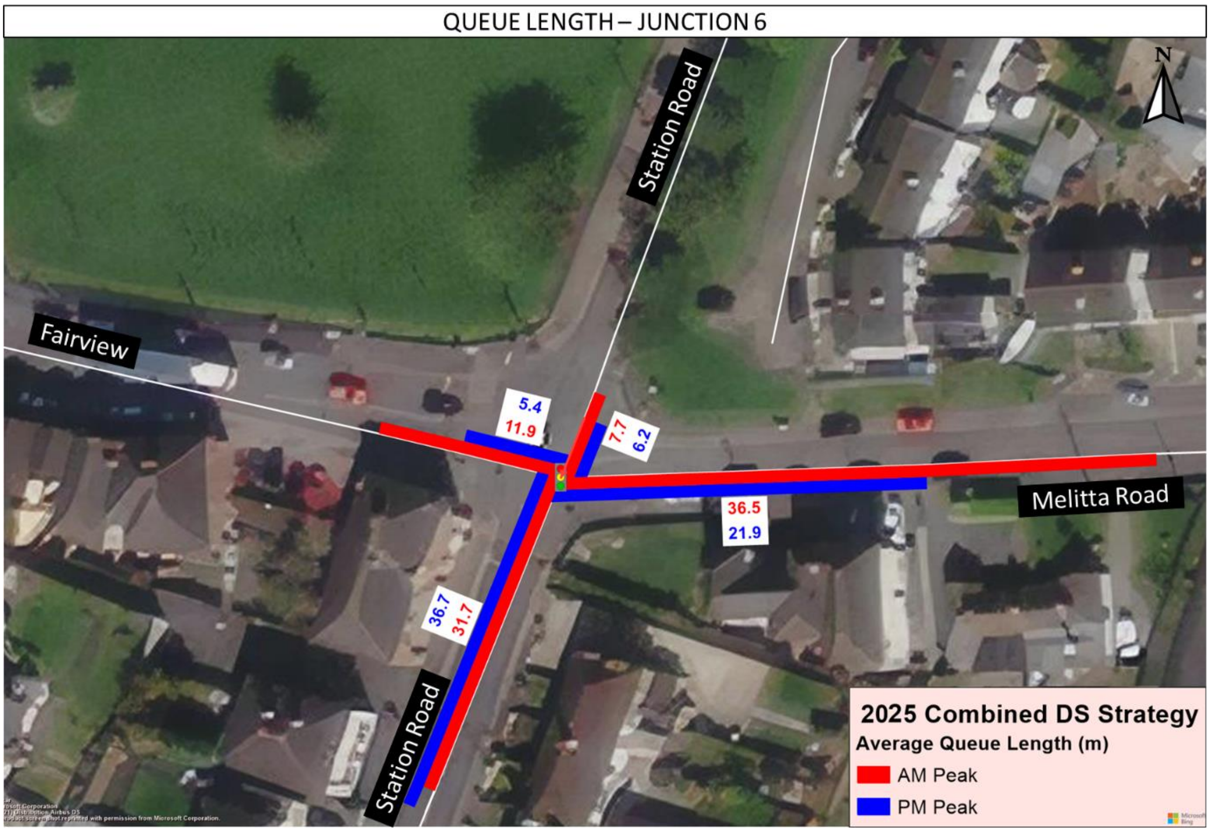

Figure 4.18 Queue Lengths at Junction 6

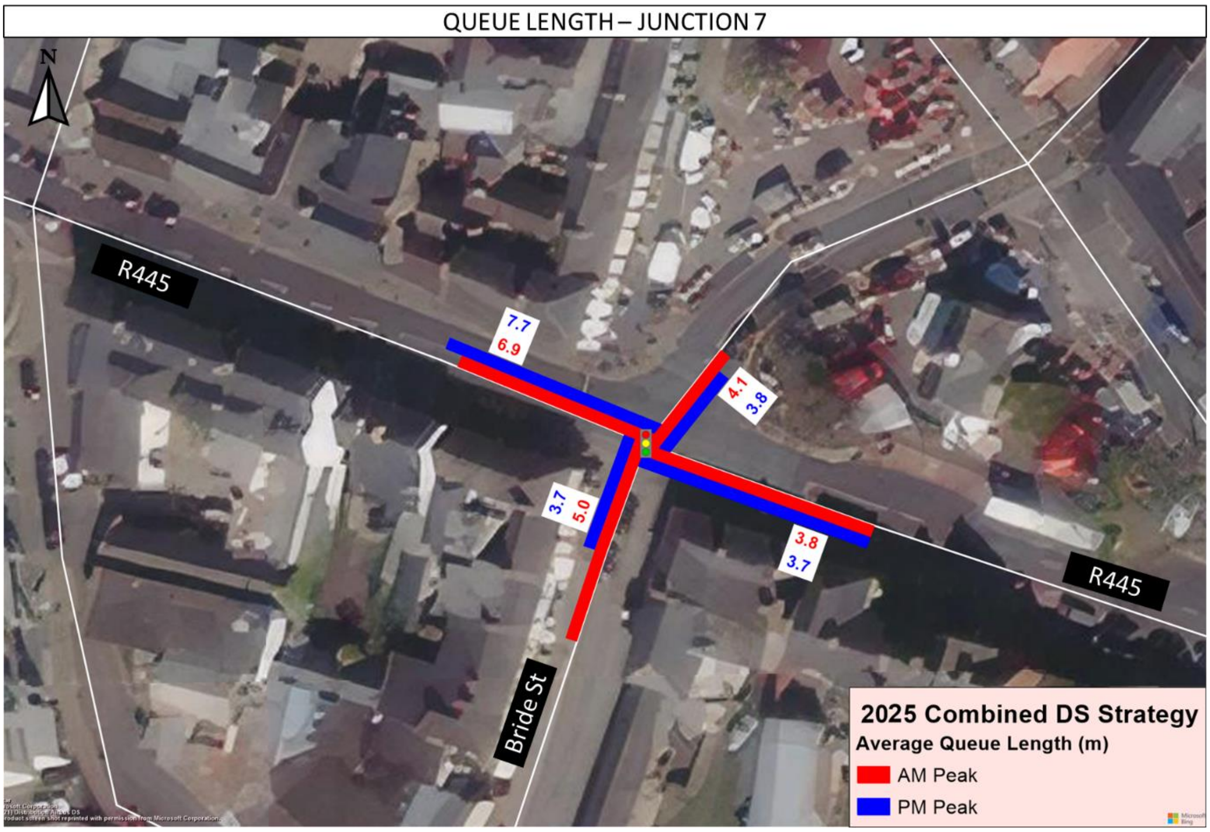

Figure 4.19 Queue Lengths at Junction 7

Figure 4.20 Queue Lengths at Junction 13

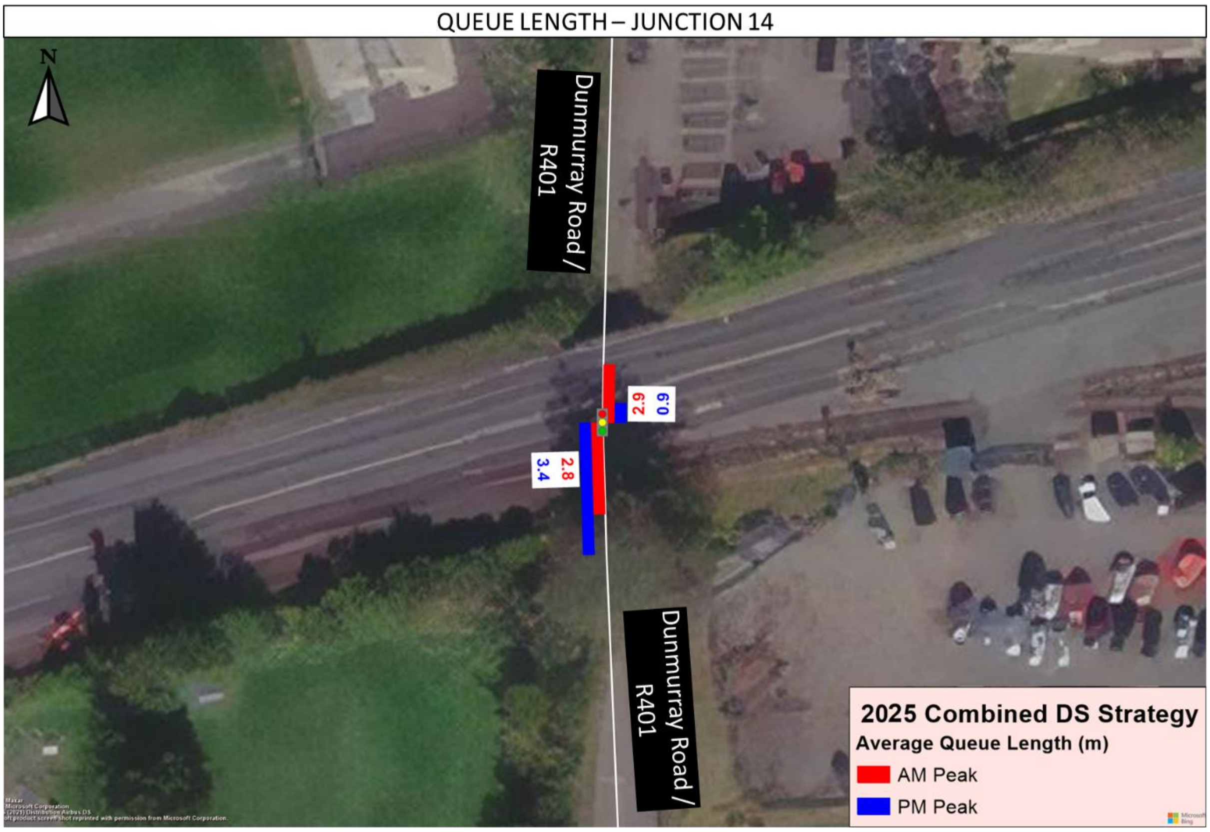

Figure 4.21 Queue Lengths at Junction 14

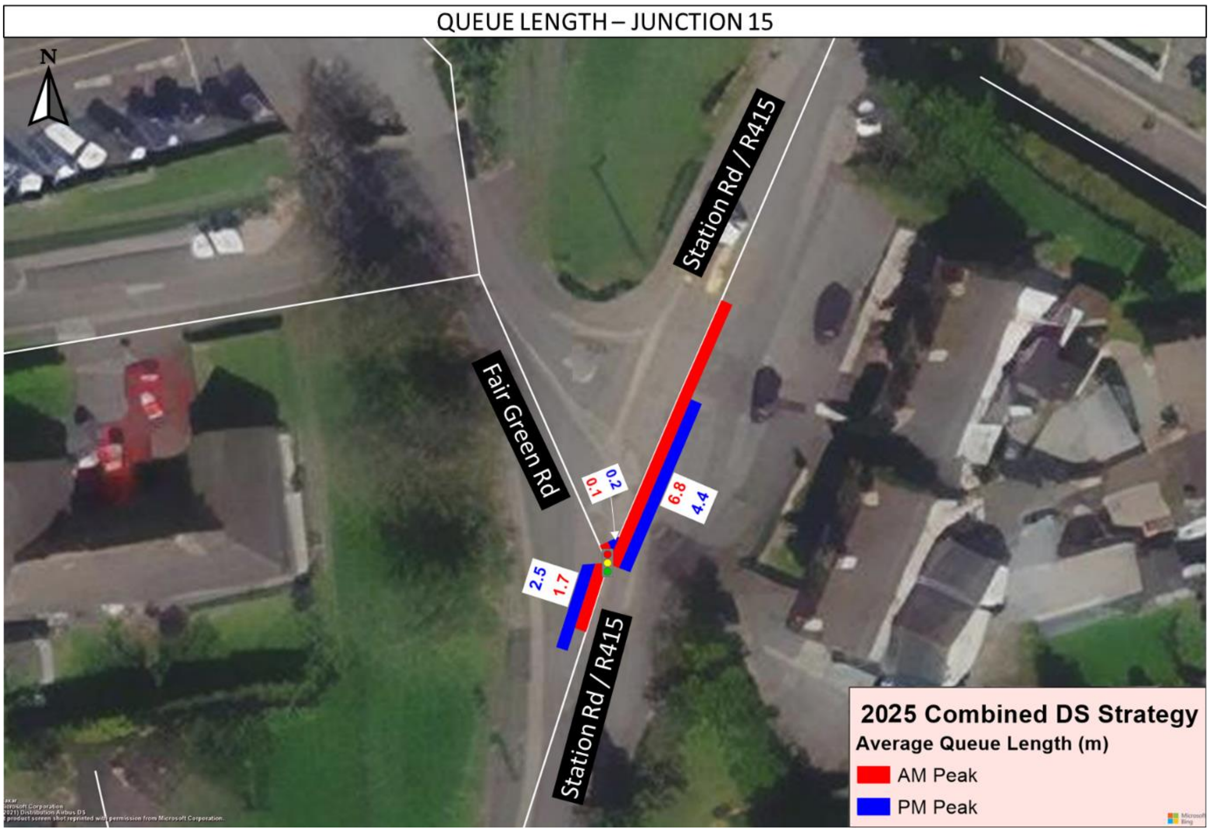

Figure 4.22 Queue Lengths at Junction 15

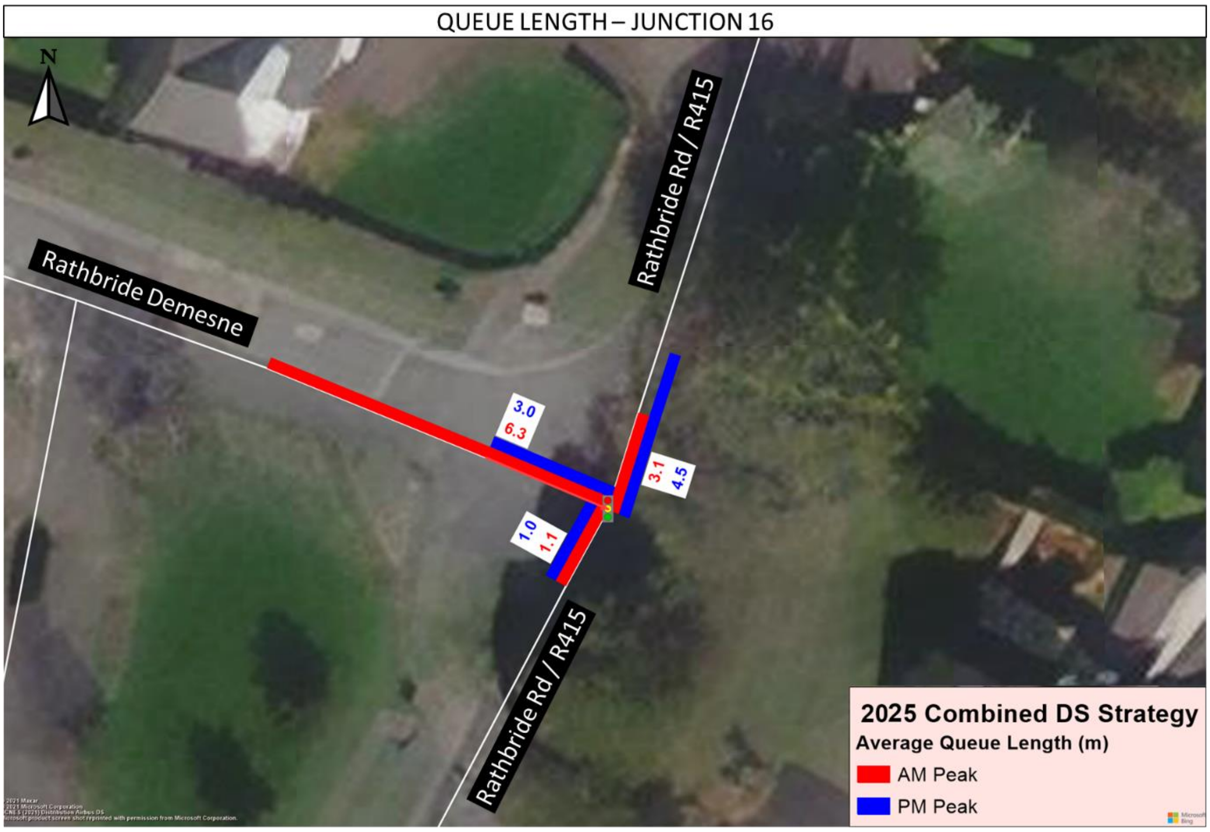

Figure 4.23 Queue Lengths at Junction 16

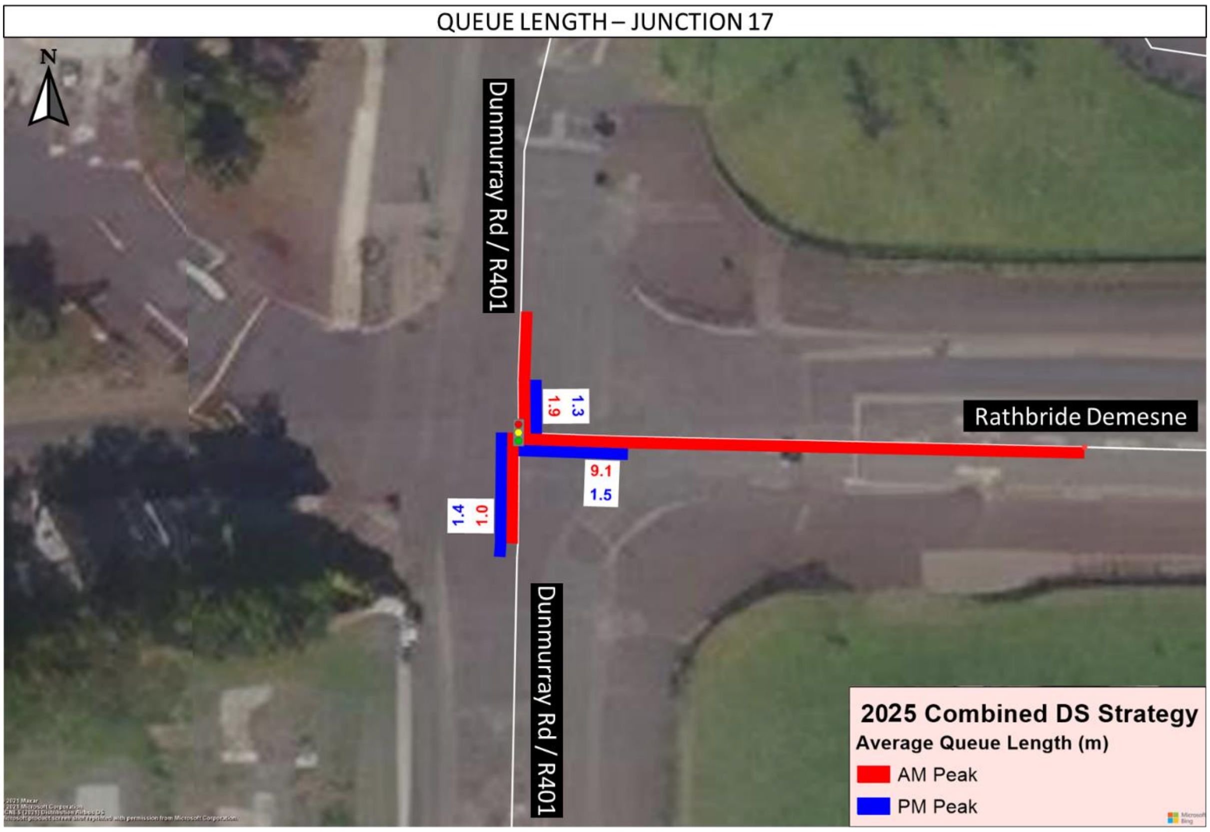

Figure 4.24 Queue Lengths at Junction 17

These figures show that the queue lengths at each of the junctions, in most cases, are relatively short and do not lead to significant spillback to upstream junctions.

4.2 2035 VISUM Scenario

4.2.1 Network Statistics

The combined road strategy was compared against the DM 2035 scenario and the network statistics are presented in Table 4.3. It can be observed that the combined road strategy results in a slight increase in vehicle speeds in the AM and PM peak as well as a slight reduction in travel time delay. In the 2035 scenario, the Kildare town transport network has improved with the opening of Phase 2 of the Magee Barracks Road which provides a bypass of the town centre for the east of the town.

Table 4.3 Network statistics – Combined Roads Strategy – 2035

Peak	Option	Total Network Trips	Total Network Vehicle km	Total Network Travel Time (hrs)	Average Network Vehicle Speed (kph)
AM	DM- 2035	9,727	85,150	1,512	56.30
	Combined Road Strategy	9,727	85,226	1,501	56.80
PM	DM- 2035	9,785	104,939	1,734	60.50
	Combined Road Strategy	9,785	104,898	1,718	61.05

4.2.2 Difference Plots

Difference plots comparing the combined roads strategy with the 2035 DM scenario are provided in Figure 4.25 for the AM peak and Figure 4.26 for the PM peak. Unsurprisingly, traffic flow has reduced significiantly on roads where traffic restrictions have been introduced such as Old Road, Meadow Road, Pigeon Lane, White Abbey Road and Bride Street in Market Square. In the west of the town, a substantial volume of traffic has diverted onto the Northern Link Street which provides an alterative route to the

R445 and allows traffic to avoid travelling through the town centre. Also, Southgreen Road is accommodating larger volumes of traffic now that a two-way bridge has been implemented and Old Road Bridge has been closed to traffic. In the town centre, the closure of Bride Street has resulted in more traffic travelling via the eastern side of Market Square, with a slight reduction in traffic volumes on Station Road. Furthermore, the creation of a one-way westbound system on Meadow Road has resulted in a certain amount of traffic diverting onto the R445 for eastbound trips.

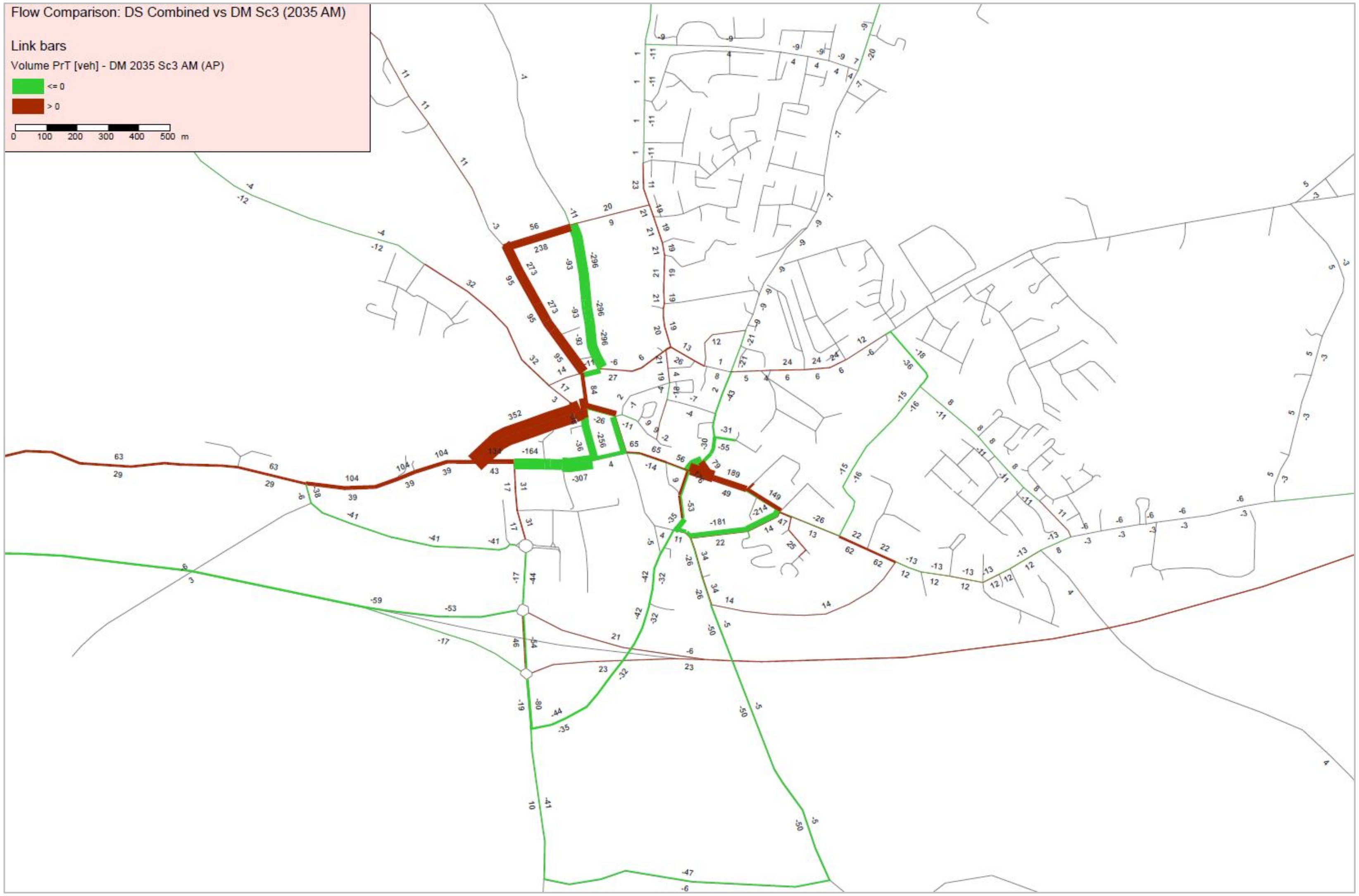

Figure 4.25 Flow comparison (Combined Road Strategy Vs DM)– 2035 – AM Peak

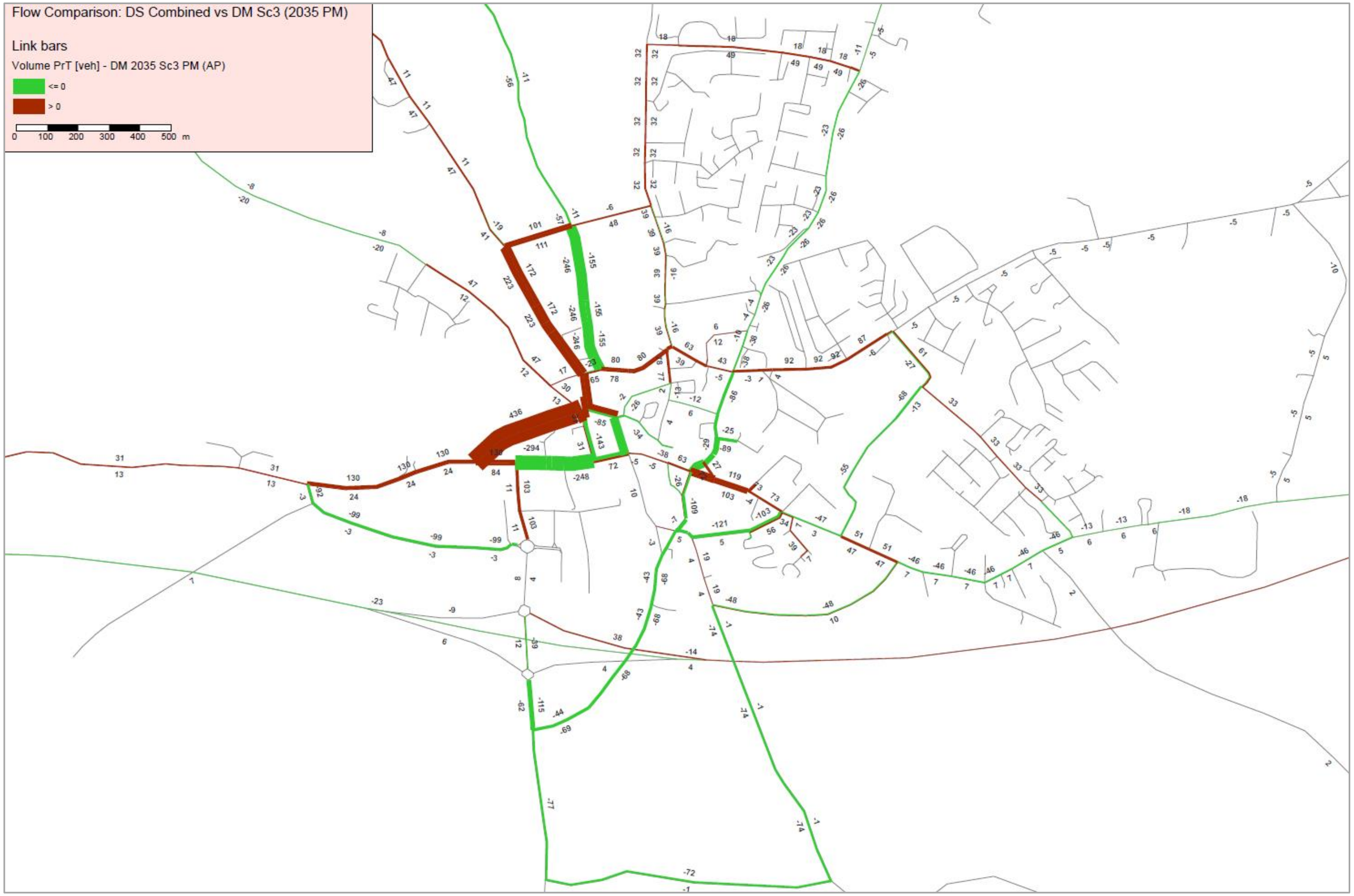

Figure 4.26 Flow comparison (Combined Road Strategy Vs DM)– 2035 – PM Peak

4.2.3 Traffic Flow Plots

Traffic flow plots presenting the traffic flow for the combined roads strategy for the 2035 DS scenario are provided in Figure 4.27 for the AM peak and Figure 4.28 for the PM peak. The figures show a similar theme to 2025 in some respects, with Northern Link Street forming part of one of the main north-south routes via Southgreen Road and the Dunmurray Road. The addition of the Magee Barracks Roads in 2035 has created another north-south route to the east of the town in combination with station road. To the south of the town, a certain amount of M7 traffic is avoiding the town centre by travelling south of the town along the Japanese Gardens Road and the Hospital Street – Tully Road link road to reach the east of Kildare town.

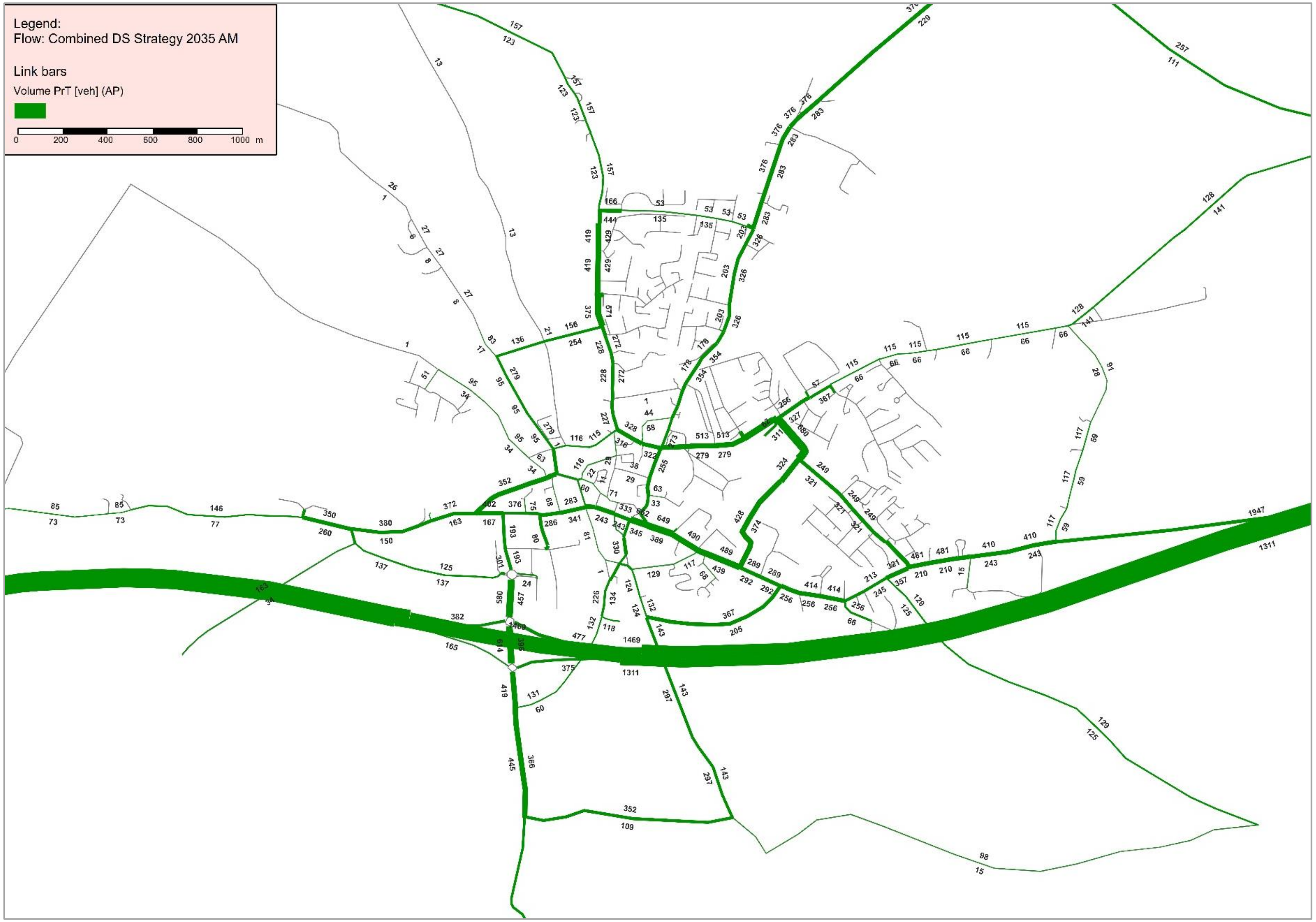

Figure 4.27 Traffic flow plot Combined Road Strategy 2035 - AM Peak

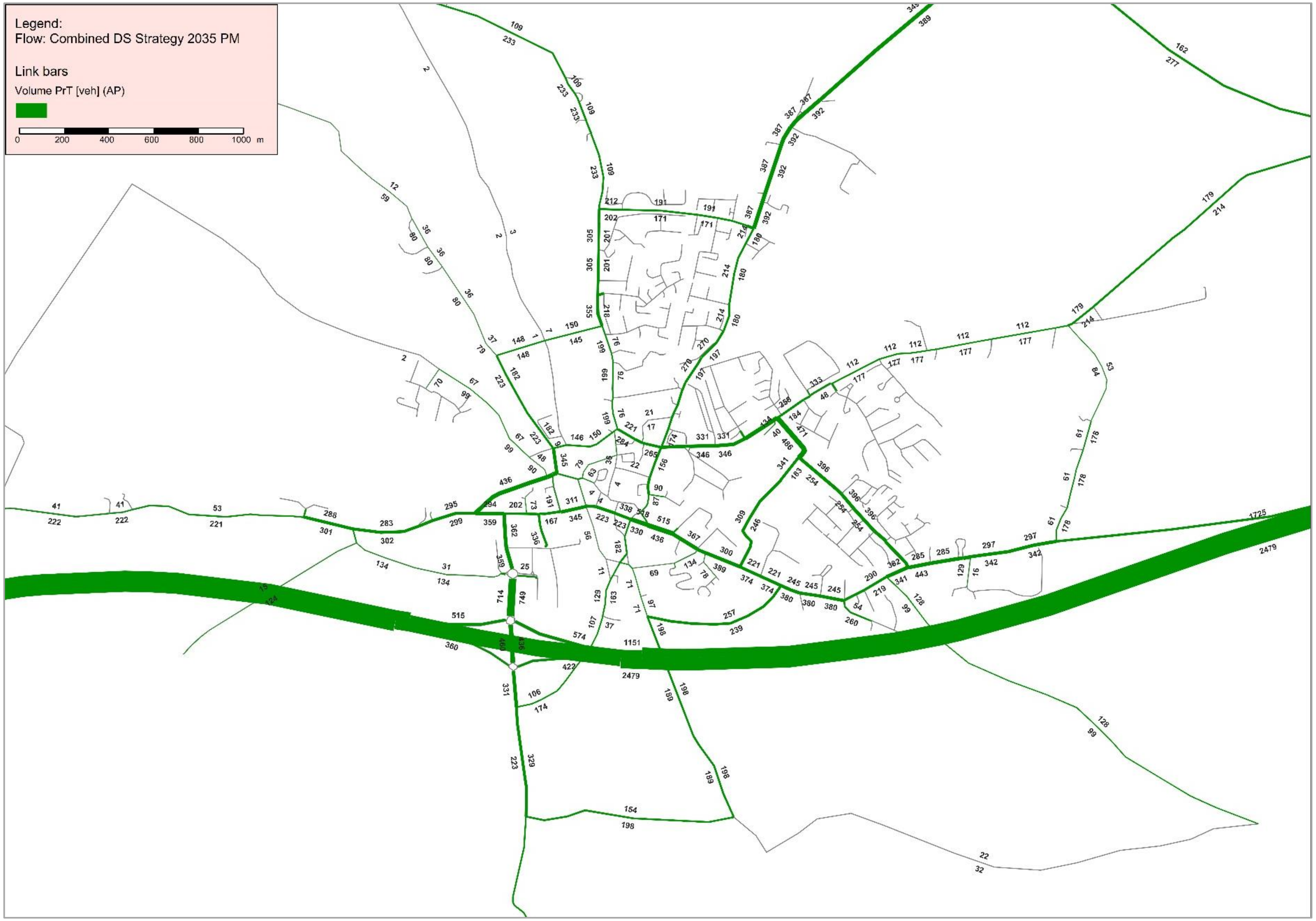

Figure 4.28 Traffic flow plot Combined Road Strategy 2035 – PM Peak

4.2.4 Junction Turning Movements

The turning movement volumes for major junctions were extracted from the 2035 combined road strategy VISUM model for both AM and PM peak hours. The locations of these junctions along with the corresponding turning flows are presented in the subsequent figures Figure 4.29 to Figure 4.41. These figures show similar results to 2025, with Junction 1 (Northern Link Street/R445), Junction 3 (Retail Village Entrance), Junction 6 (Melitta Road/Station Road) and Junction 7 (R445/Bride Street) showing the highest volumes of turning vehicles and through-traffic. However, there are some differences in 2035, such as the closure of Bride Street in Market Square which has resulted in a busier Junction 8 at the eastern side of Market Square. Furthermore, the completion of the Magee Barracks Roads has resulted in a large number of turning movements at Junction 9 (Magee Barracks Roads south/R445) and Junction 11 (Magee Barracks Roads north/Melitta Road).

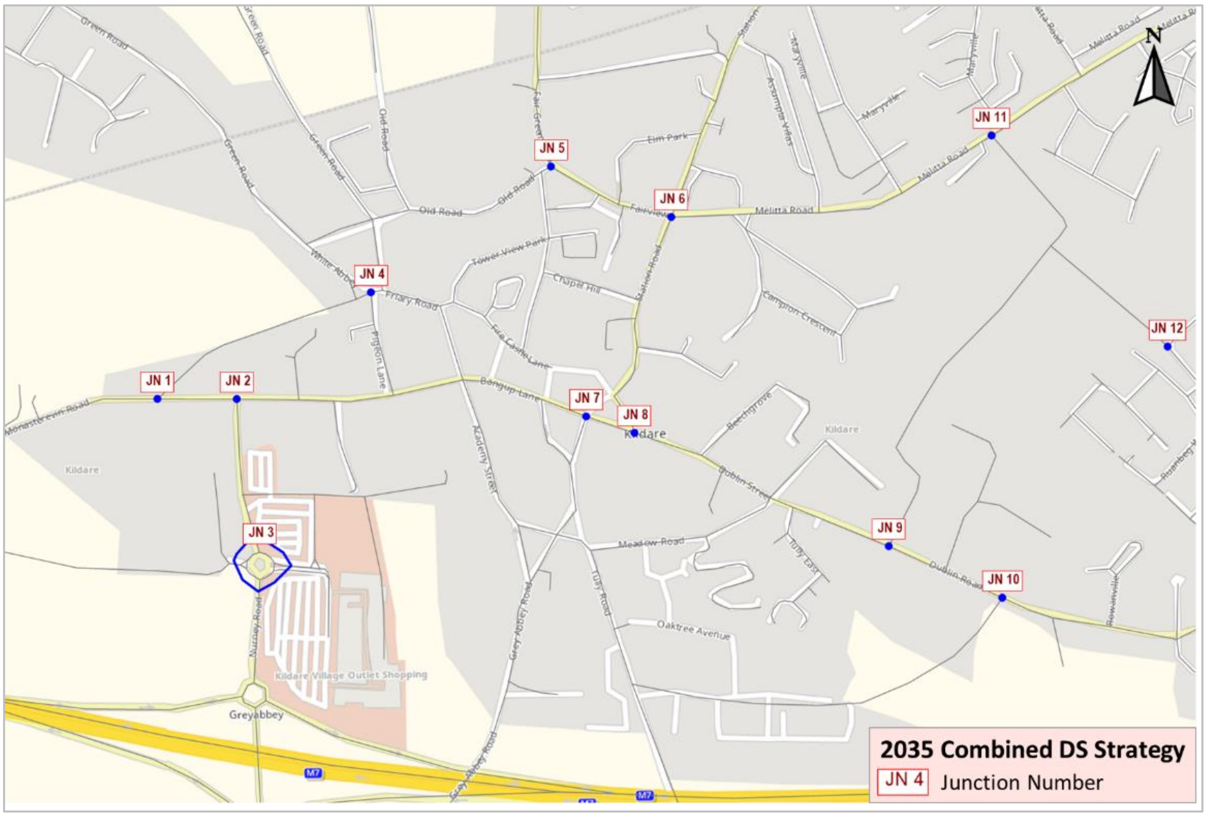

Figure 4.29 Junction location map 2025 Combined Road Strategy

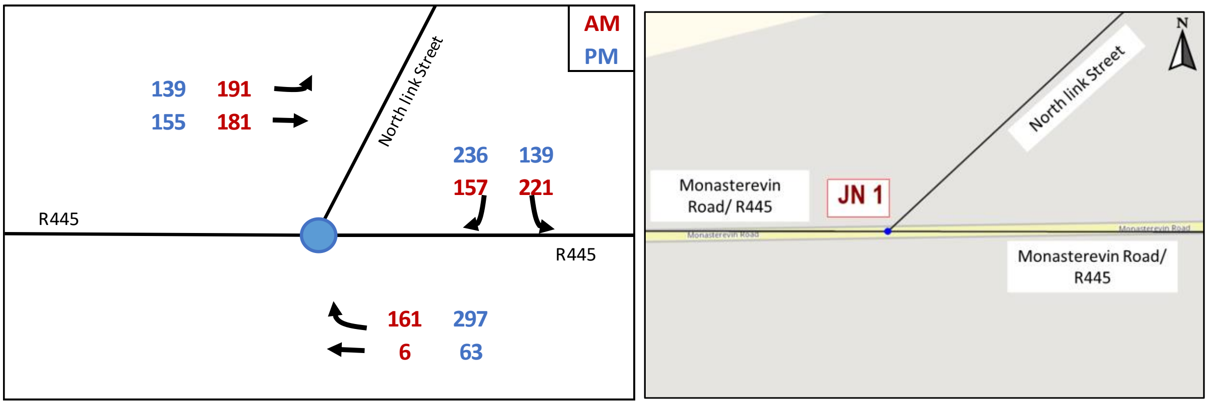

Figure 4.30 Turning Flow Diagram Junction 1

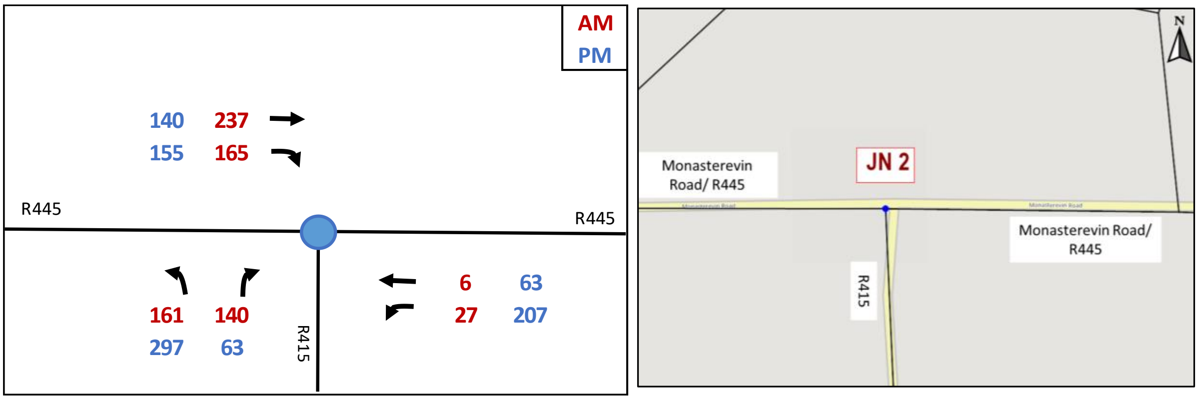

Figure 4.31 Turning Flow Diagram Junction 2

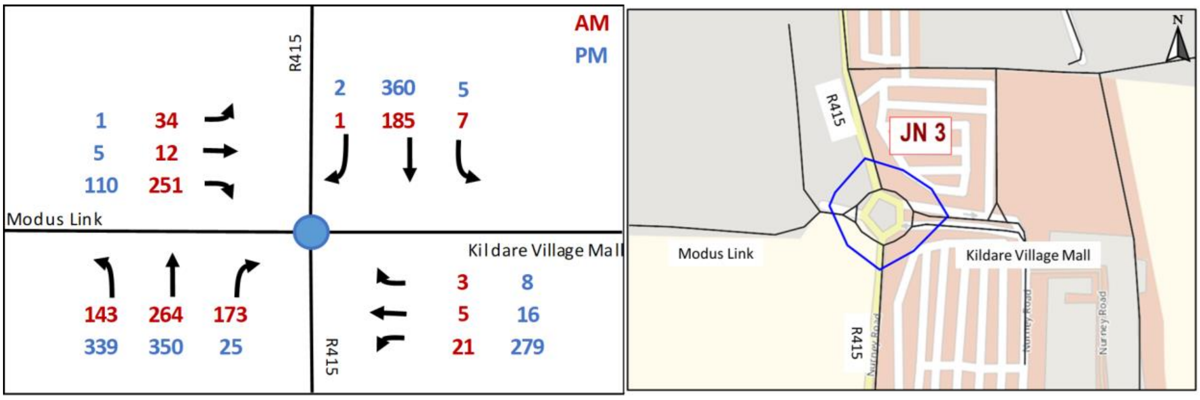

Figure 4.32 Turning Flow Diagram Junction 3

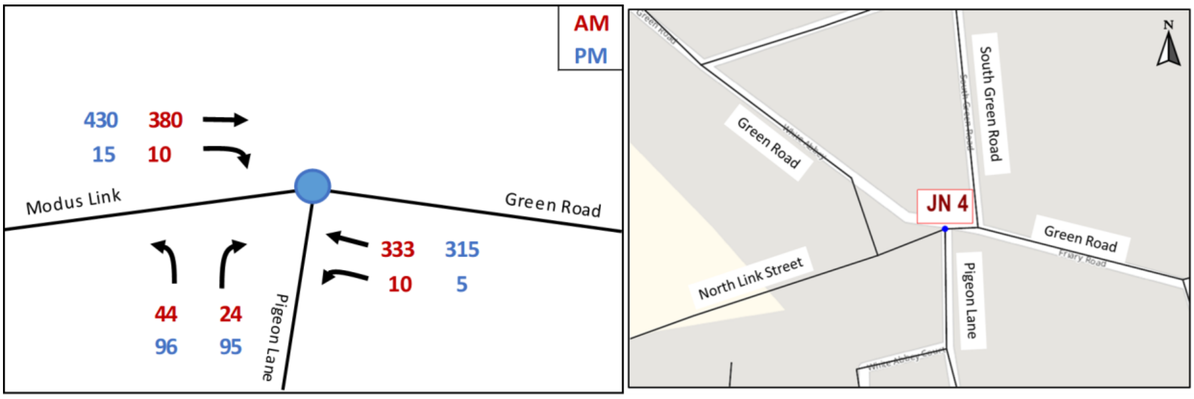

Figure 4.33 Turning Flow Diagram Junction 4

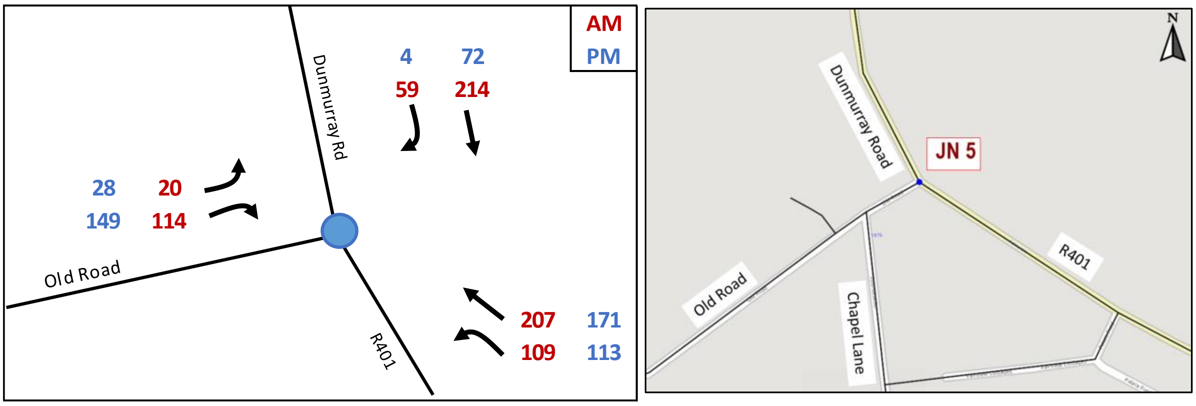

Figure 4.34 Turning Flow Diagram Junction 5

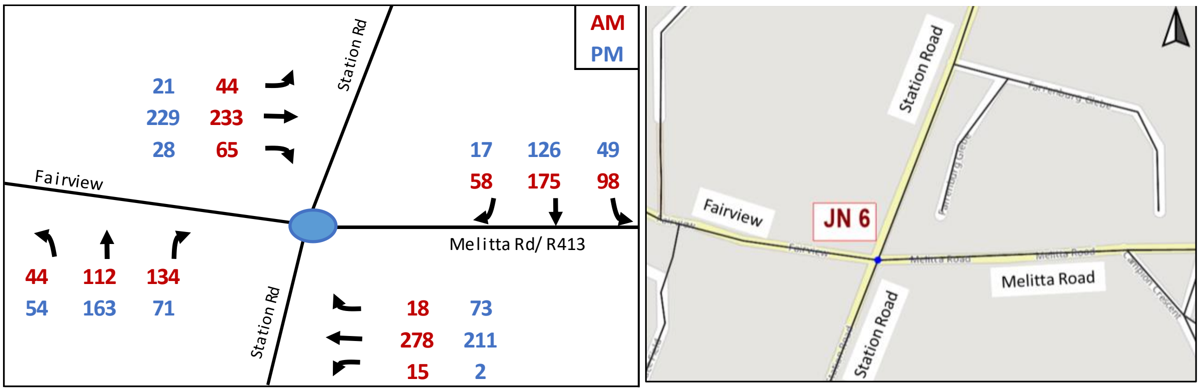

Figure 4.35 Turning Flow Diagram Junction 6

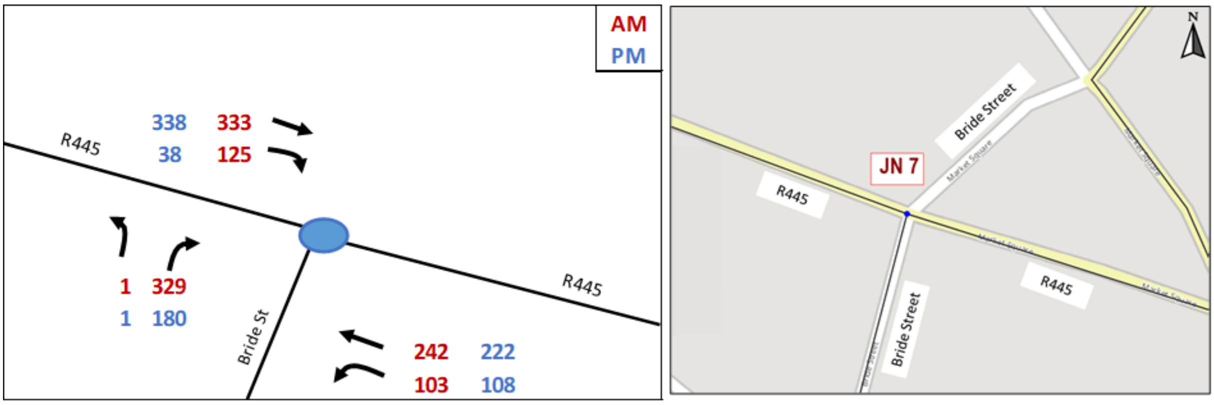

Figure 4.36 Turning Flow Diagram Junction 7

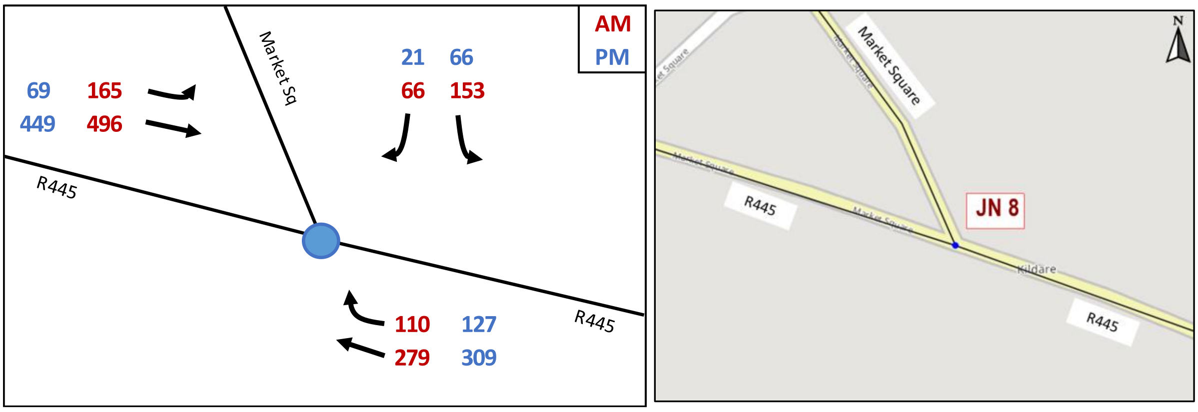

Figure 4.37 Turning Flow Diagram Junction 8

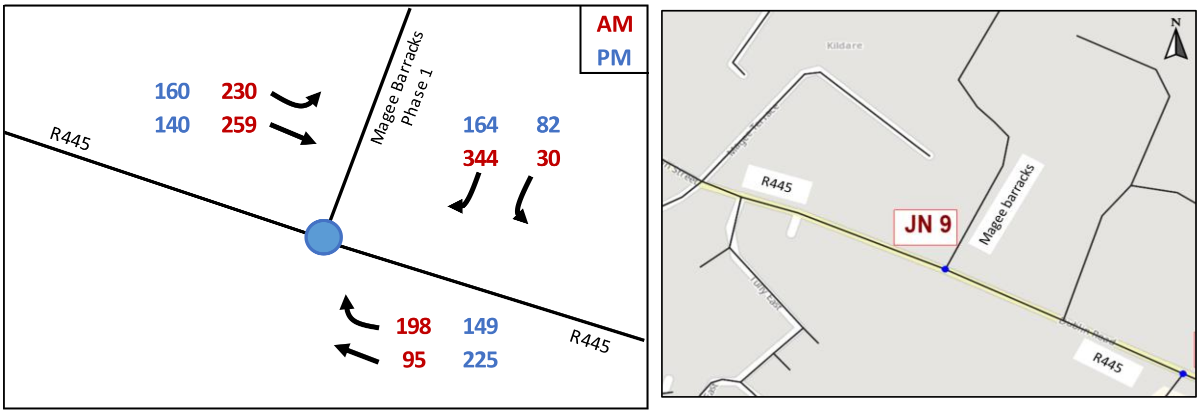

Figure 4.38 Turning Flow Diagram Junction 9

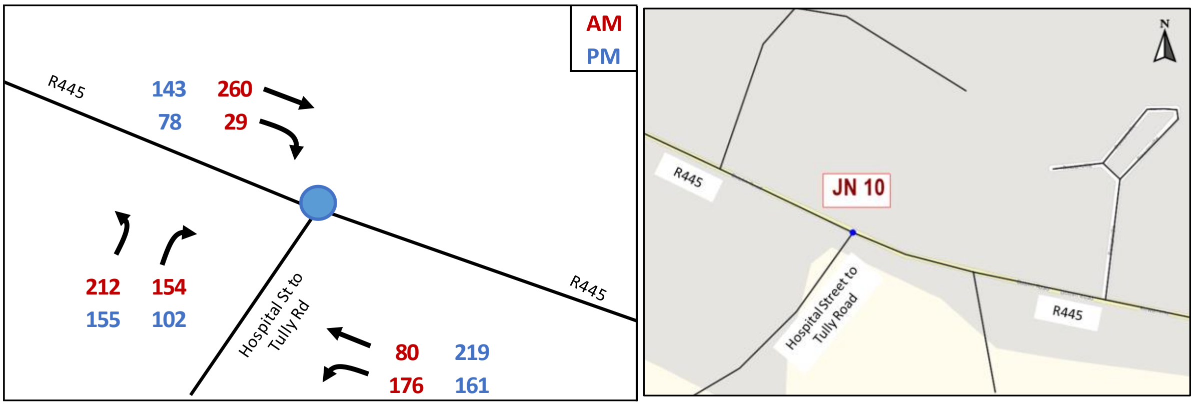

Figure 4.39 Turning Flow Diagram Junction 10

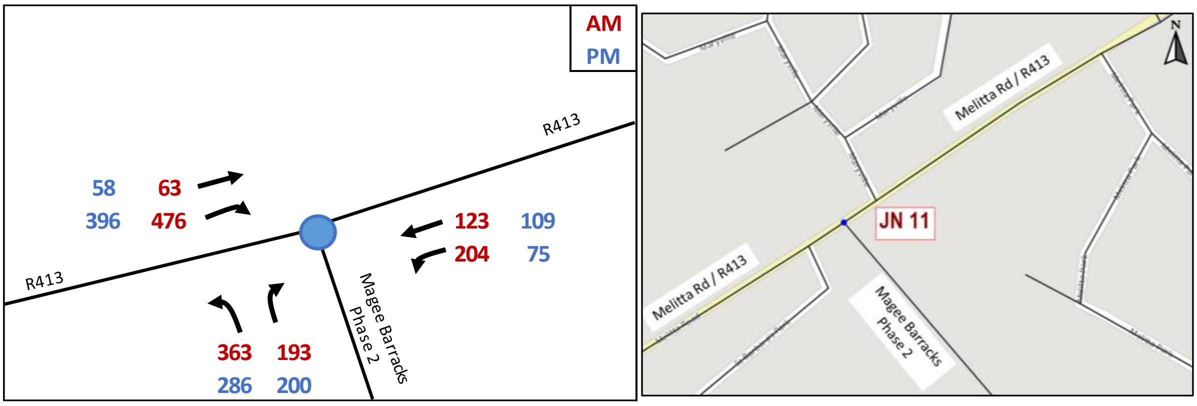

Figure 4.40 Turning Flow Diagram Junction 11

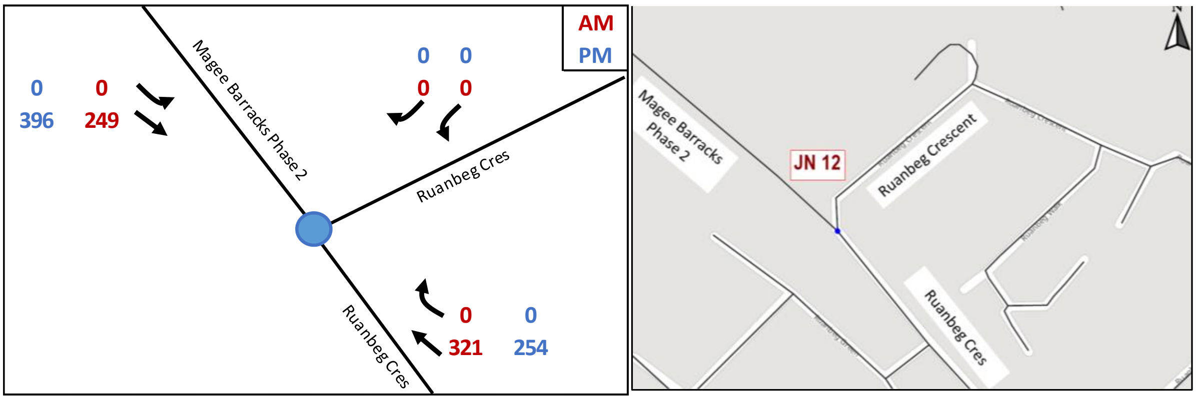

Figure 4.41 Turning Flow Diagram Junction 12

4.2.5 Queue Length Plots

Similar to 2025, queue lengths for few critical signalised junctions that were directly affected by the combined road strategy affected were extracted from the VISUM model for both the AM and PM peak hours. The location of these junctions along with their corresponding queue lengths are presented in subsequent figures Figure 4.42 to Figure 4.50.

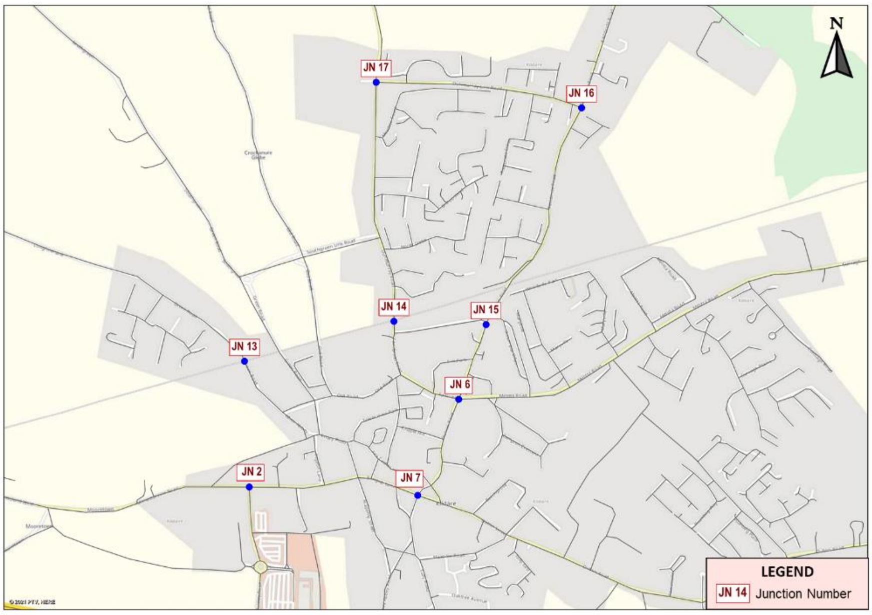

Figure 4.42 Junction Location Map for 2035 Combined Road Strategy

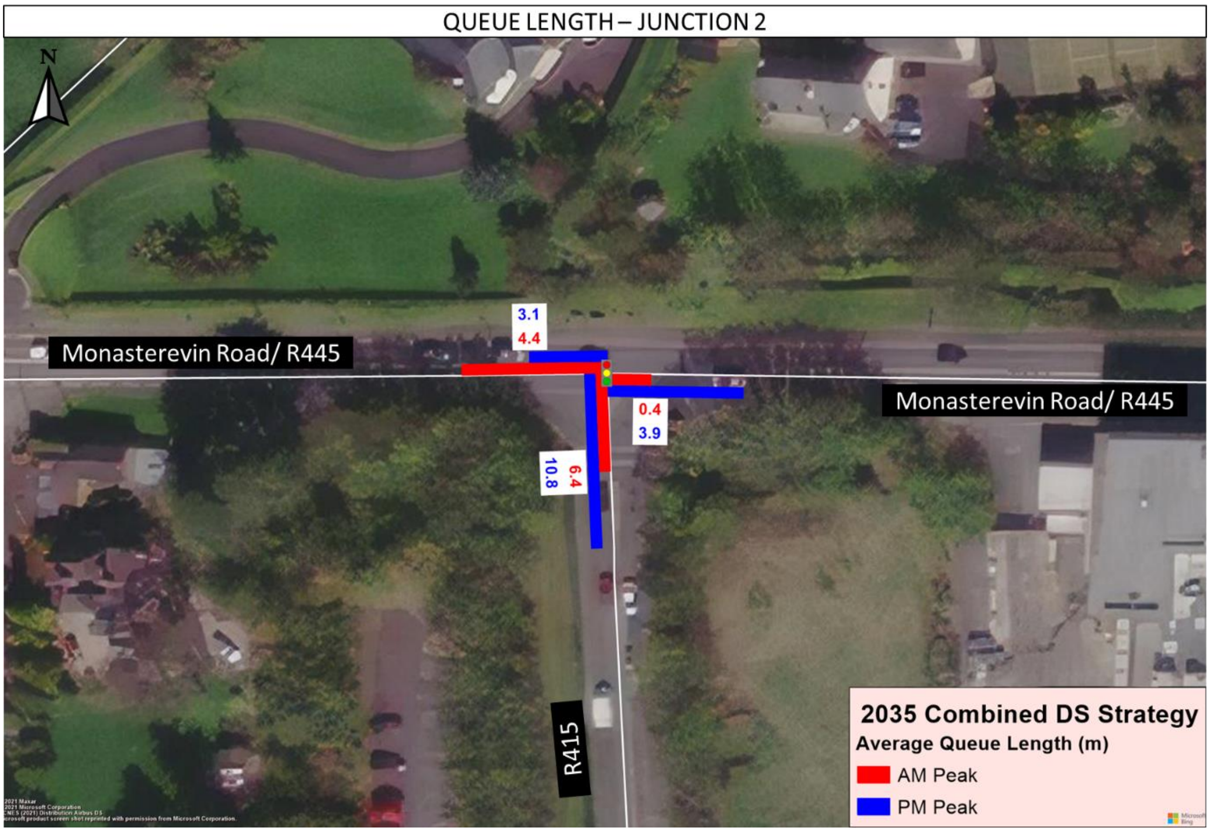

Figure 4.43 Queue Lengths at Junction 2

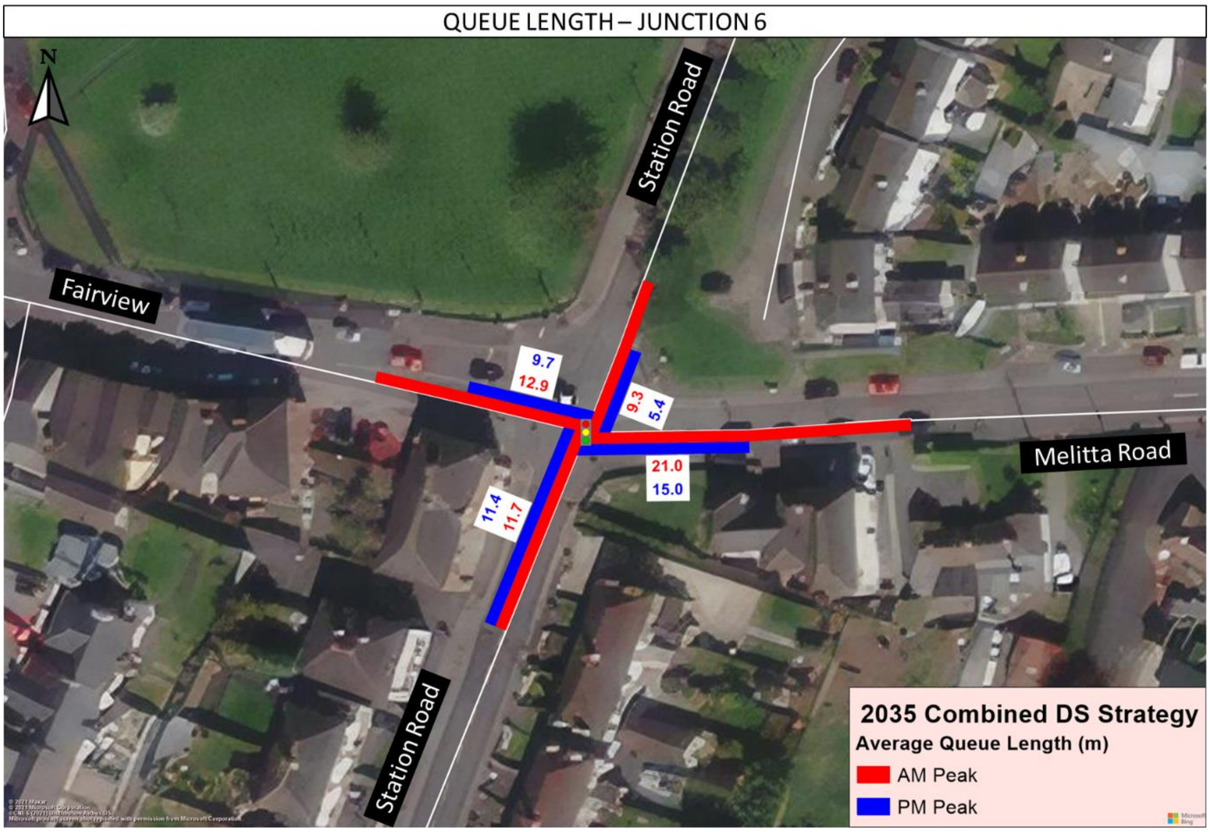

Figure 4.44 Queue Lengths at Junction 6

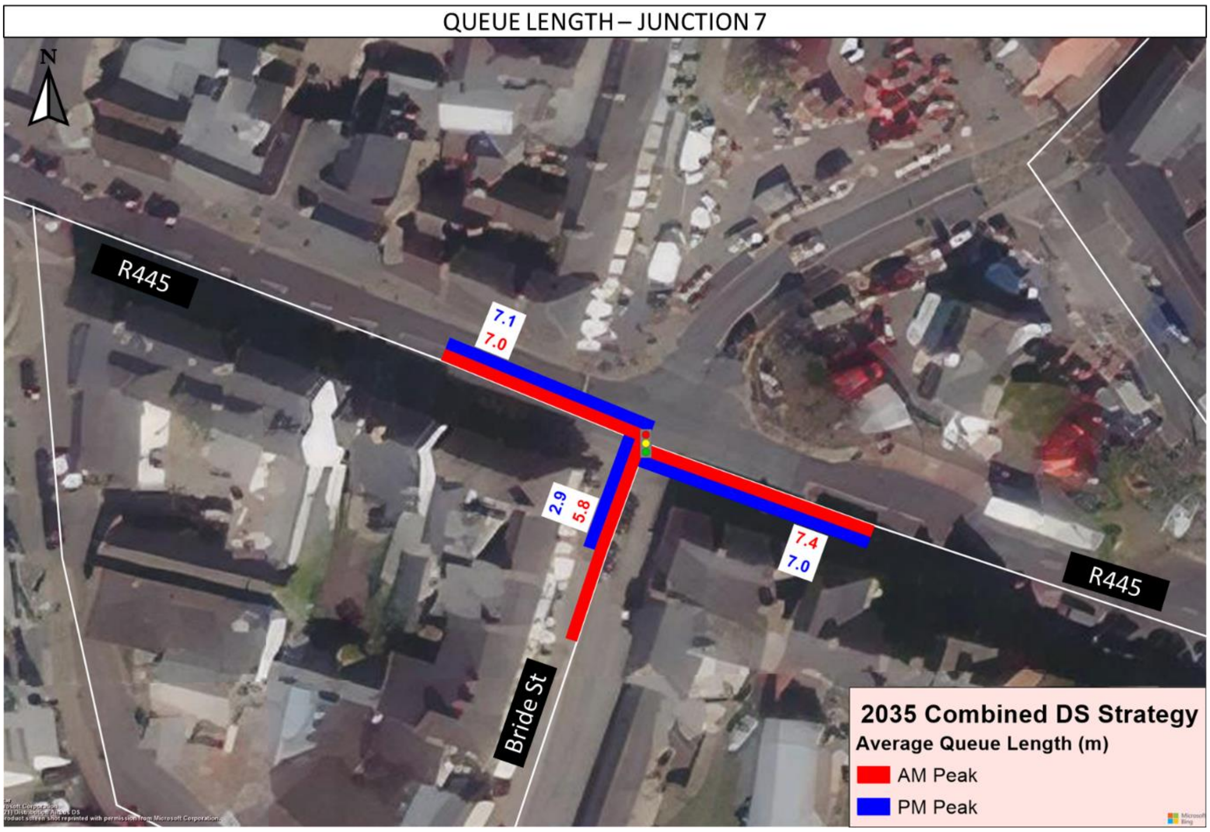

Figure 4.45 Queue Lengths at Junction 7

Figure 4.46 Queue lengths at Junction 13

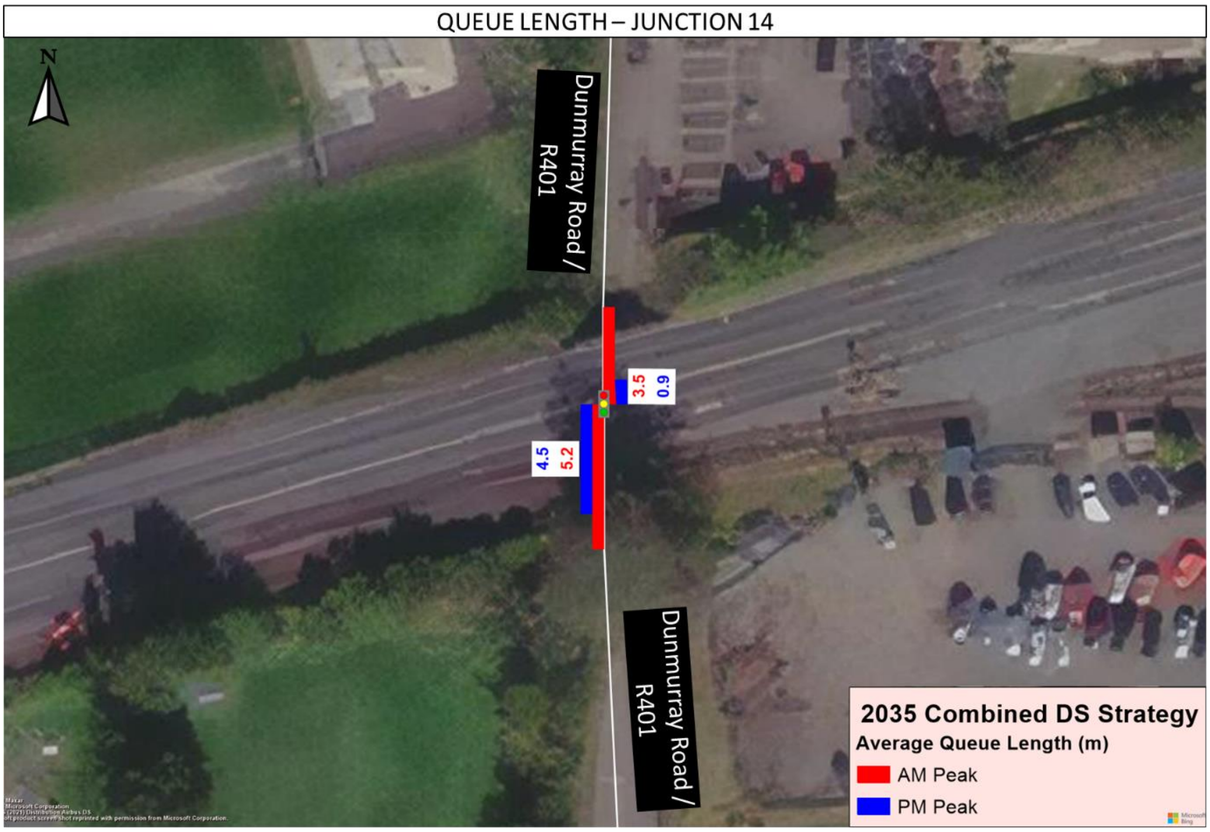

Figure 4.47 Queue lengths at Junction 14

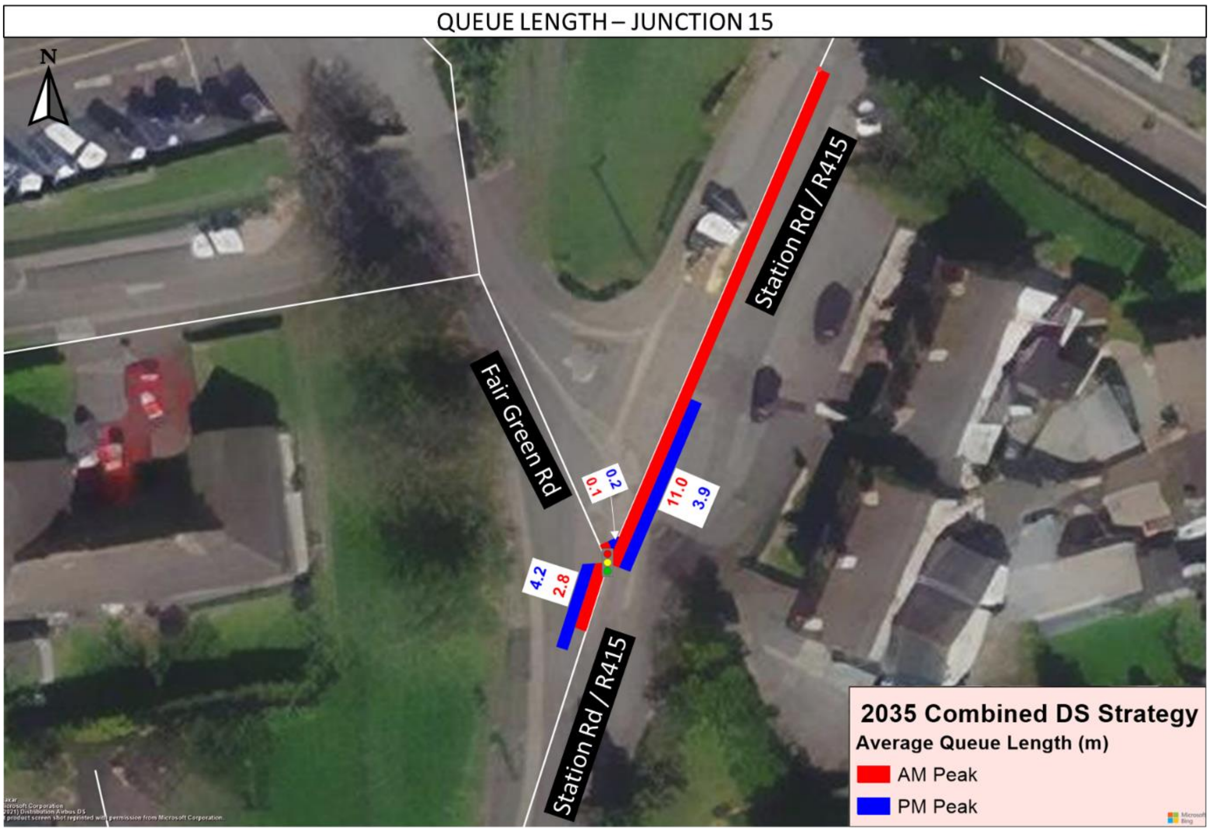

Figure 4.48 Queue lengths at Junction 15

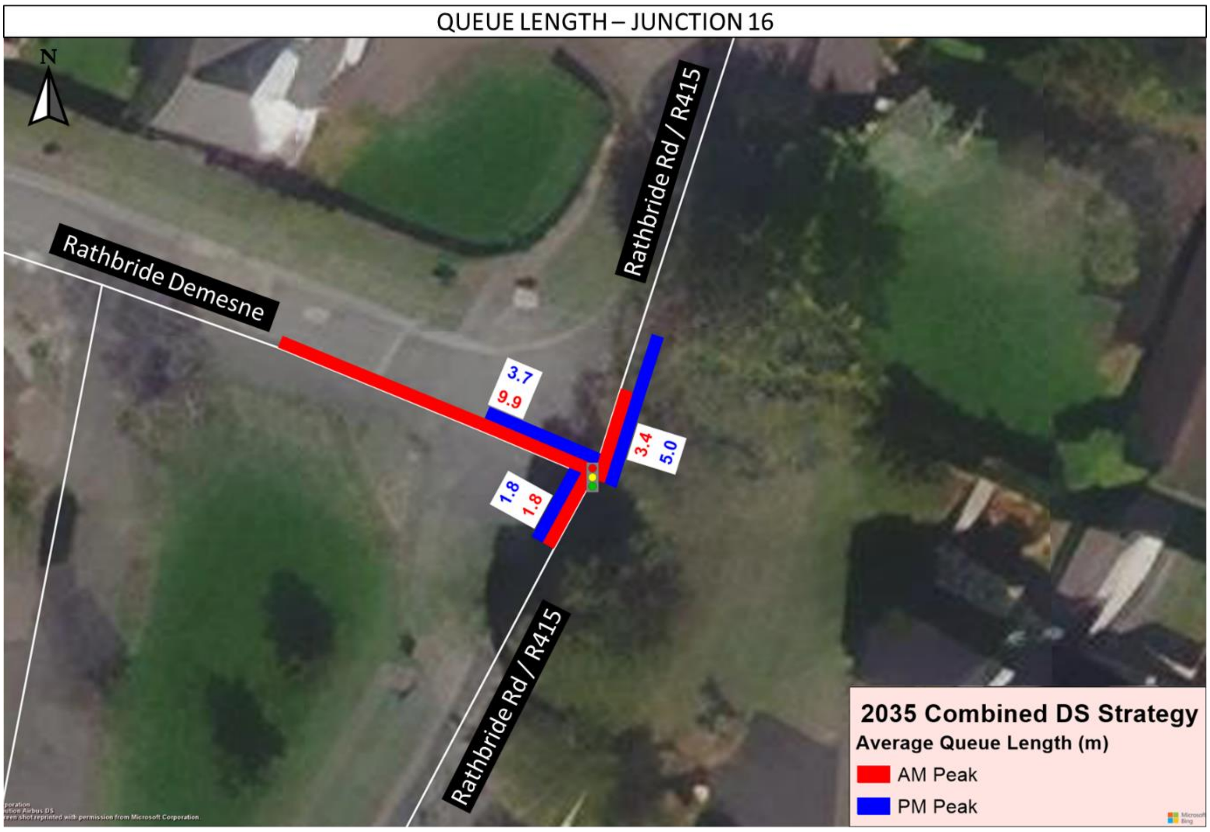

Figure 4.49 Queue lengths at Junction 16

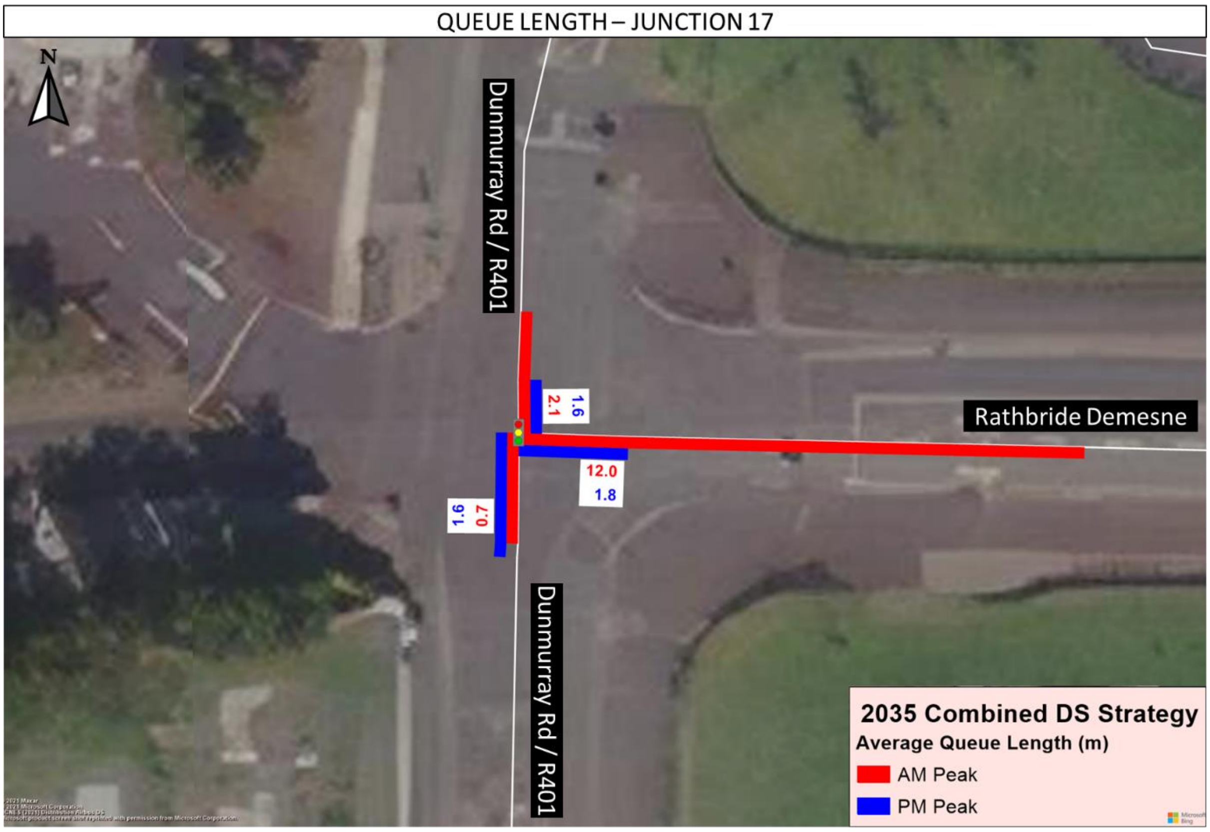

Figure 4.50 Queue lengths at Junction 17

Similar to the 2025 combined road strategy, queue lengths at each of the above-shown junctions were well within acceptable limits and do not cause any spillback.

Appendix E VISSIM Option Assessment

Traffic Modelling Report

VISSIM Traffic Modelling Report – Option Assessment

Kildare Town Transport Strategy

Kildare County Council

Project number: 60629806

Prepared for:

Kildare County Council

Prepared by:

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Table of Contents

Figures

Tables

1. Introduction

AECOM were commissioned by Kildare County Council (KCC) to develop a microsimulation of Kildare Town in VISSIM which is referred to as the Kildare Town Model (KTM). This report summarises the future year model development scenarios and options testing results.

1.1 Background

A base model of the KTM was created for a base year of 2018. The model was developed with peak periods in-line with a previously developed strategic (VISUM) model, 08:00-09:00 and 17:00-18:00 for the AM and PM hours, respectively. The future models have been developed from these base models to utilised to test the impact of traffic growth and development schemes in Kildare Town.

1.2 Study Area

The extent of the KTM study area is provided in Figure 1-1. The modelled area covers the main junctions in Kildare Town and main roads entering and running through the town. The study area extent includes the following key roads:

- R445 between the railway line to the west and the Curragh to the east;
- R401 Dunmurray Road and R415 Station Road;
- R413 Melitta Road to northeast; and Green Road and Southgreen Road to northwest; and
- R415 between the R445 and the M7, Tully Road, Bride St and Grey Abbey Road to the south.

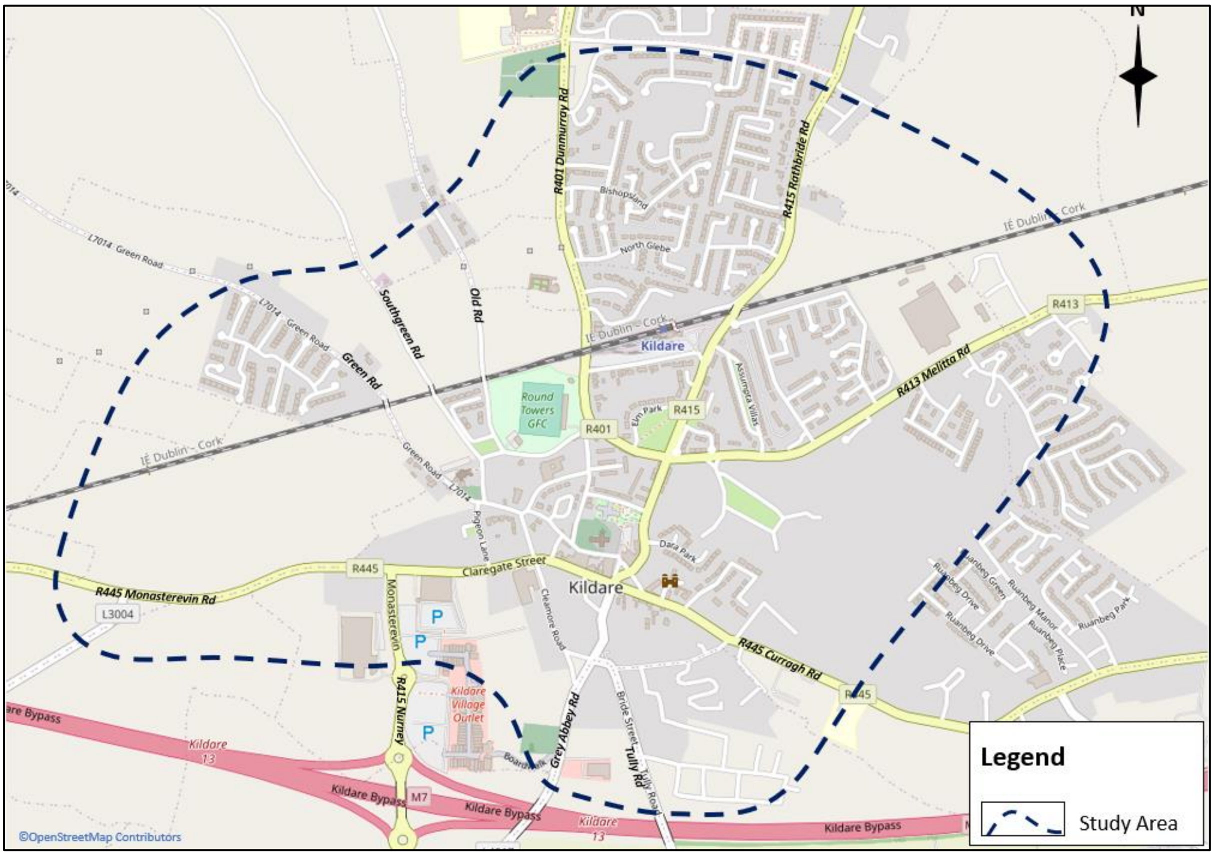


Figure 1-1: Kildare Town Model Study Area Extents

1.3 Report Structure

This report is structured as follows:

- Chapter 2 – Future Scenarios;
- Chapter 3 – Future Year Modelling Assumptions and Development;
- Chapter 4 – Future Year Model Results; and
- Chapter 5 – Conclusion.

2. Future Scenarios

2.1 Overview

This section outlines the scenarios which are tested in KTM future years, which are based on variations of the road's strategy identified in the Kildare Town Transport Strategy. There are two future years which are modelled and assessed: 2025 and 2035.

2.2 Future Year Scenarios for Kildare Town

The list below outlines the scenarios which were tested in and around Kildare Town over the forecast years (2025 and 2035). Assessments were made for the AM and PM peak periods in each of the following scenarios:

- Do Minimum Scenario (DM) 2025;
- Do Minimum Scenario (DM) 2035;
- Do Something – 1 Scenario (DS1) 2025;
- Do Something – 1 Scenario (DS1) 2035;
- Do Something – 2 Scenario (DS2) 2025; and
- Do Something – 2 Scenario (DS2) 2035,

Each scenario has a package of measures which were tested across the town. Details of measures in each scenario and the year of implementation are explained in the following section.

2.2.1 Do Minimum (DM) Scenarios

Table 2-1 outlines the Do Minimum (DM) network changes which are assumed to have been implemented in 2025 and 2035. A number of VISUM DM network changes from the Kildare Town Transport Strategy are not included in the VISSIM model because they are located outside the microsimulation model study area.

Table 2-1 Do Minimum (DM) Interventions

Year	Do Minimum Interventions
2025	• Phase 1 Magee Barracks – Regeneration of Magee Military Barracks as part of development strategy in Kildare Local Area Plan. Phase 1 has a new road connection from the Magee Barracks development to the R445. • One-way system for Cleamore Road – allowing northbound traffic movements only • Traffic signal at Southgreen Bridge • Traffic signals at Pigeon Lane/Green Road junction
2035	All projects included in 2025, plus: • Phase 2 Magee Barracks – Regeneration of Magee Military Barracks as part of development strategy in Kildare Local Area Plan. Phase 2 has a new road connection from the Magee Barracks development to Melitta Road.

The 2025 and 2035 DM network changes are presented in Figure 2-1. The VISSIM network is smaller than the VISUM network because it is focused on the town centre and it does not cover the entire study area. As a result of this, the VISSIM network maps exclude Do-Minimum roads such as the Modus Link Road or the Dunmurray Link Road, which are outside the extent of the VISSIM model. Furthermore, other DM roads are geographically inaccurate in this report, such as the Magee Barracks Roads, which are shown as two cul-de-sac roads in Figure 2-1, when in reality this road will provide a continuous north-south route to the east of the town centre. These route differences only apply to the maps shown throughout the VISSIM traffic modelling report, due to the limited extent of the microsimulation model network, and an accurate representation of the Do-Minimum and future Road Strategy road network can be found in the Kildare Town Transport Strategy, Volume 1.

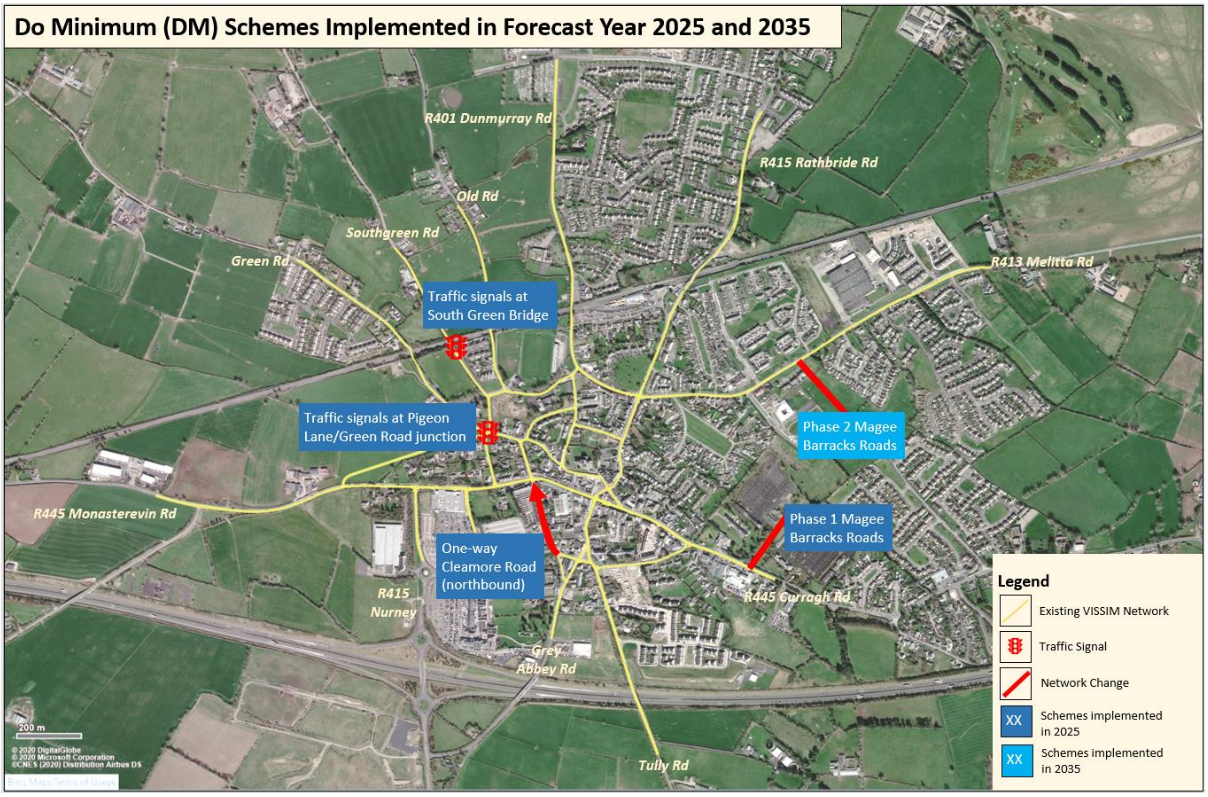


Figure 2-1: Network Changes and Do Minimum (DM) Schemes, 2025 and 2035

In addition to the DM network changes, which are based on committed schemes, a number of road strategy measures are proposed which are documented in the following section.

2.2.2 Do Something - 1 (DS1) Scenarios

Table 2-2 outlines the Do Something - 1 (DS1) measures, by year:

Table 2-2: Do Something - 1 (DS1) Interventions

Year	DS1 Interventions
2025 and 2035	Respective 2025 and 2035 interventions carried forward from DM, plus: • Identified road strategies: – 1B – Closing Old Road bridge to traffic and upgrading Southgreen Bridge to accommodate two-way traffic. – 2A – Opening a new Northern Link road between Monasterevin Road and Pigeon Lane. This strategy includes the implementation of a one way traffic route northbound along Pigeon Lane and southbound along White Abbey Road, traffic signals at Southgreen Road / Green Road Junction and R401 Dunmurry Road / Old Road Junction, Pelican Signals on R401 and R445 and separate right turn lanes on R445 into Pigeon Lane. – 6A – Converting Meadow Road into a one-way, westbound street. – 3I – Closing the eastern section of Market Square

The 2025 and 2035 DS-1 network changes and schemes are presented in Figure 2-2.

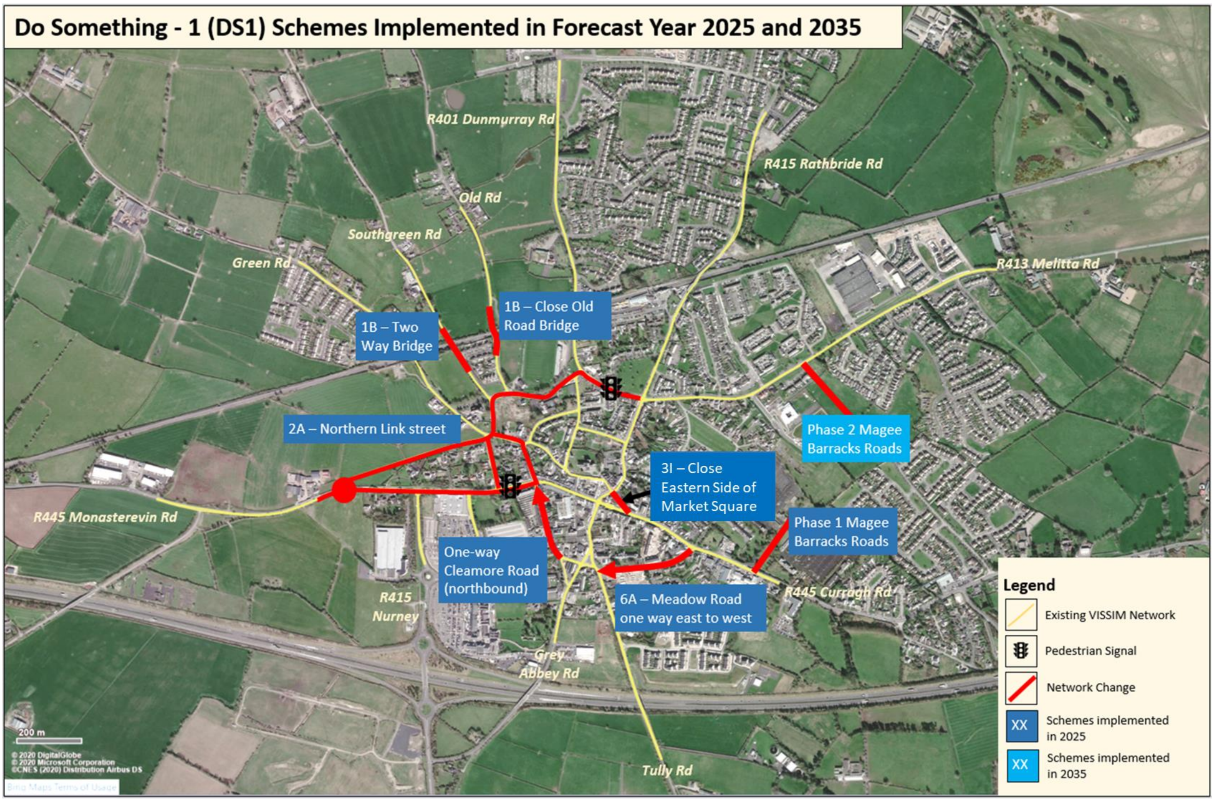


Figure 2-2: Network Changes and Do Something - 1 (DS1) Schemes, 2025 and 2035

2.2.3 Do Something - 2 (DS2) Schemes

Table 2-3 outlines the Do Something - 2 (DS2) measures, by year:

Table 2-3: Do Something - 2 (DS2) Interventions

Year	DS2 Interventions
2025 and 2035	Respective 2025 and 2035 interventions carried forward from DM, plus: • Identified road strategies: – 1B – Closing Old Road bridge to traffic and upgrading Southgreen Bridge to accommodate two-way traffic. – 2A – Opening a new Northern Link road between Monasterevin Road and Pigeon Lane. This strategy includes the implementation of a one way traffic route northbound along Pigeon Lane and southbound along White Abbey Road, traffic signals at Southgreen Road / Green Road Junction and R401 Dunmurry Road / Old Road Junction, Pelican Signals on R401 and R445 and separate right turn lanes on R445 into Pigeon Lane. – 6A – Converting Meadow Road into a one-way, westbound street. – 3H – Closing the Bride Street section of Market Square.

The 2025 and 2035 DS2 network changes and measures are presented in Figure 2-3.

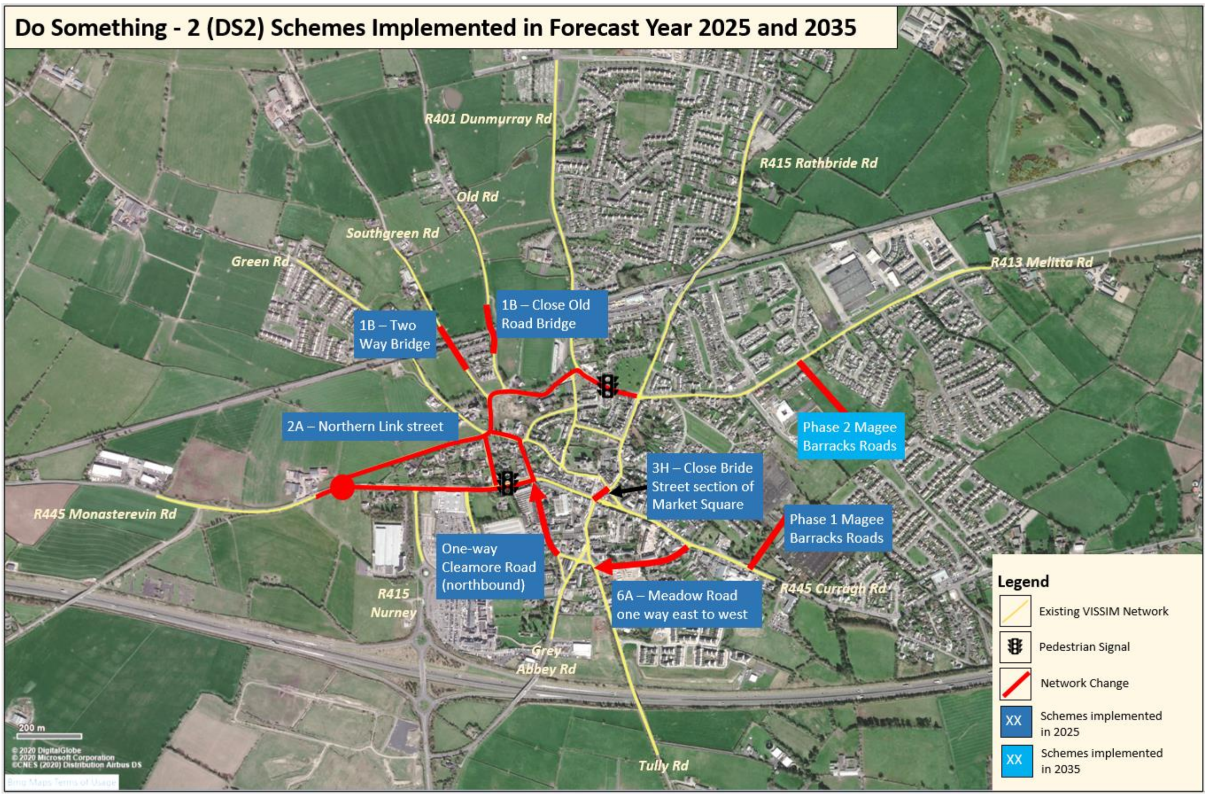


Figure 2-3: Network Changes and Do Something - 2 (DS2) Schemes, 2025 and 2035

2.3 Summary

Several network interventions were identified for implementation in the years 2025 and 2035 as part of the Kildare Town Transport Strategy and will be tested as part of the DS1 and DS2 scenarios within the KTM. The main difference between the DS1 and DS2 scenarios is the closure of a section of road at Market Square. As part of DS1, the eastern section will be closed to traffic, while in DS2 the Bride Street section will be closed to traffic.

3. Future Year Modelling Assumptions and Development

3.1 Overview

This section focuses on the modelling of each scenario and the approach taken. For traffic demand in each future year scenario (2025 and 2035), traffic flows were extracted from previously developed strategic (VISUM) models.

3.2 Additional VISSIM Zones

Flows were extracted from VISUM models by cordoning the model zones based on the KTM study area extents. Due to the addition of new access roads for the Magee Barracks Development, it was necessary to add additional zones in VISSIM to accommodate the new traffic movements.

Zone 15, Maryville Road, was added to consider the impact of a large number of trips originating and ending in this zone as per the VISUM model in the year 2035.

The following zones have been added into future year models:

- Magee Barracks Phase 1 access on R445 – Zone 13
- Magee Barracks Phase 2 access on Melitta Road – Zone 14
- Maryville Road – Zone 15

The revised zone structure for future year models is presented in Figure 3-1.

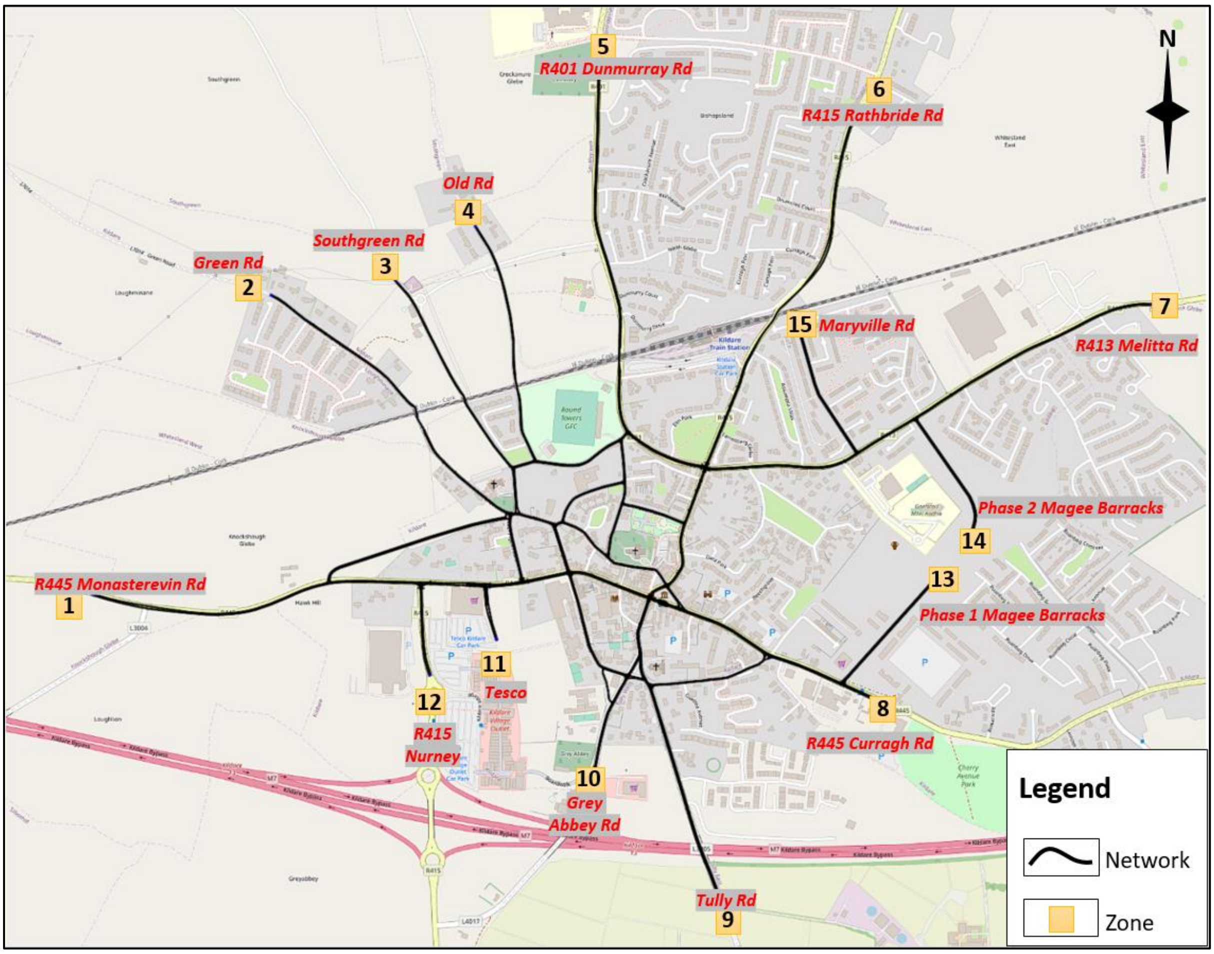


Figure 3-1: Future Year Model Zone Layout

The zone structure required some minor amendments to reflect the future year developments and network:

- In 2025 models, Zone 13 becomes active and used as the origin and destination for the Magee Barracks development.
- In 2035, Zones 13, 14 & 15 become active.

Hence, 2025 VISUM cordons are extracted with one additional zone and 2035 VISUM cordons are extracted with three additional zones.

Trips to and from Zone 11 (Tesco) were considered in the study for both future years, 2025 and 2035, as there was a significant increase in trips to and from Zone 11 as per the VISUM models.

3.3 Demand Development Methodology

The demand flows for all future year KTM VISSIM models were extracted using a consistent methodology from the VISUM models. The correspondence between the VISUM and VISSIM zones was developed to derive the matrices for the VISSIM Model. The flows extracted from VISUM models were divided into two user classes: light vehicles (LV) and heavy vehicles (HV).

The calculated absolute growth from 2018 to 2025, and 2018 to 2035 for the trip-ends were applied to the trip-ends of the base year VISSIM models. A matrix Furness method was used to arrive at the new trips for each OD pair, and to match the origin totals.

The VISSIM inputs for both the vehicle classes (LVs and HVs) were profiled for each 15-minute period in the peak hour, as well as warm up and cool down periods. The proportion of 15-minute matrices compared to the peak hour matrix was calculated (using the base year matrices). These proportions have been applied to the future scenario peak hour matrices to obtain the 15-minutes matrices for entire simulation periods in AM and PM respectively.

3.4 Forecast Demand Key Assumptions

The total traffic increase from 2018 to 2025 and 2035 has been maintained across the VISUM and VISSIM models (as informed by the strategic VISUM models).

For new zones 13, 14 and 15, there are no pre-defined OD pairs in VISSIM base models, nor were any trips originating from these zones. Hence, OD patterns were assumed to be same as the future year VISUM cordoned model, and trips generated from a Furness forecasting process.

For the new zones noted above, the VISUM model does not contain the distribution of trips within the peak hour, and therefore a uniform distribution of trips is assumed for each of the four intervals in the VISSIM peak hour model.

Uniform distribution is not applied to the warm up and cool down periods for these zones, as this would overestimate traffic in the network. The proportions of traffic in warm up and cool down periods have been calculated from all other (known) zone OD pairs, and those factors applied to the zones where no prior information is available. This maintains the proportional traffic increase and decreases across the modelled peaks, as in base year.

3.5 Modelled Networks

This section explains the development of forecast models, including any changes made to the base model's network to test proposed future interventions and developments.

The interventions to be incorporated and tested across Kildare Town were outlined in Table 2-1 through Table 2-3 earlier in the report. The following section details how the interventions have been accommodated into the KTM in more specific modelling terms.

3.5.1 Do Minimum (DM) – Model setup

Network:

- The Do Minimum network is consistent with the 2018 base network, with the exception of two new links added to the network as indicative access roads for the Magee Barracks development.
- Connectors on Cleamore Road southbound link are closed for dynamic assignment as per the forecast scheme proposal.

Signals:

- The existing signal controllers and signal heads are re-used in the Do Minimum model. The signal timings have been optimised.
- New signals are added at Southgreen Road/ Pigeon Lane junction and Southgreen Bridge as per the proposal.

Speeds:

- All speed parameters remain consistent with the 2018 Base model with the exception of speed decisions and speed controllers introduced on new links.

Driving Behaviour Parameters:

- All driving behaviour parameters remain consistent with the 2018 Base model.

Priority Control:

- Additional priority rules have been added into the Do Minimum model at new access road junctions. At some existing junctions, combination of priority rules and conflict areas have been added to replicate yellow box behaviour, required to control queuing pattern because of increase in traffic in forecast models.

The Do Minimum VISSIM modelled network is shown in Figure 3-2.

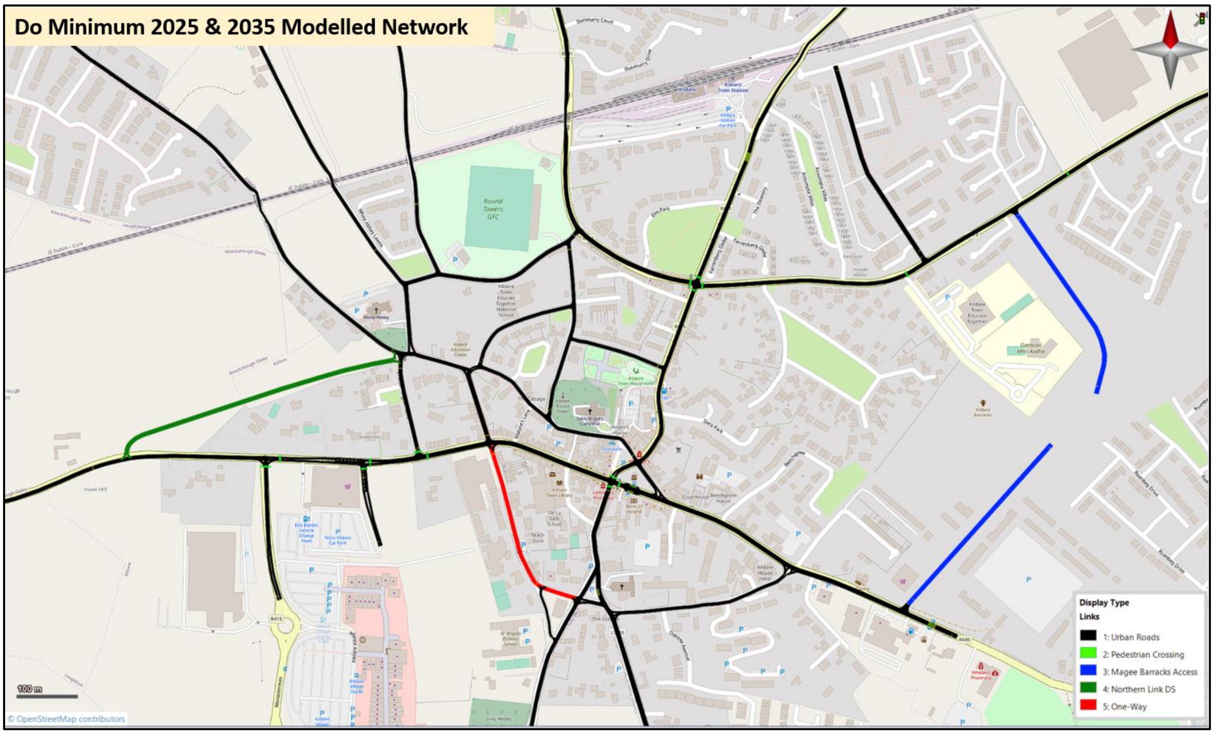


Figure 3-2: Do Minimum VISSIM Modelled Network

3.5.2 Do Something 1 (DS1) – Model setup

Network:

- The link and connector structures have been amended in the Do Something 1 scenario to replicate the network changes from road strategy measure 2A Northern Link Street scheme. This includes changes such as: a new roundabout at the junction connecting Northern Link Street to the R445, an extra lane for right turning traffic from R445 to Pigeon Lane and from the R445 to the R415.
- Connectors on Cleamore Road southbound link and Meadow Road westbound (road strategy 6A) are closed for dynamic assignment as per the forecast scheme proposal.
- Pigeon Lane is converted to a one-way traffic lane northbound and White Abbey Road has been converted to a one-way traffic lane southbound as per the 2A Northern Link Street scheme.
- Green Road/ Pigeon Lane Junction is modified, changing the Green Road alignment to connect Green Road to the Northern Link Street to the west.
- Eastern section of Market Square is closed for traffic as part of road strategy 3I.
- Southgreen Bridge signal is removed, and the bridge is upgraded to cater to two-way traffic as per road strategy1B.
- Old Road Bridge is closed for traffic as per road strategy 1B.

Signals:

- The existing signal controllers and signal heads are re-used in the Do Minimum model. The signal timings have been optimised.
- New signals are added at the Southgreen Road/ Green Road junction and the Dunmurray Road/ Old Road junction as per the proposal.
- Traffic signal at the Pigeon Lane/ R445 junction is converted to a pedestrian signal, allowing people to cross the R445.
- Pedestrian crossings are added at the R401 Fairview Cottages/ Lourdesville Road Junction and the R445/ New Link Road West Roundabout.

Speeds:

- All speed parameters remain consistent with the 2018 Base model.
- New speed decisions and speed controllers are added on the access roads added as part of forecast schemes.

Driving Behaviour Parameters:

- All driving behaviour parameters remain consistent with the 2018 Base model.

Priority Control:

- Additional priority rules have been added into the Do Minimum model at new access road junctions. At some existing junctions, a combination of priority rules and conflict areas have been added to replicate yellow box behaviour required to control queuing pattern because of increase in traffic in forecast models.

Edges/ Routes

- U-turns at the R445/ Northern Link Street roundabout are not allowed for traffic. The rest of the routes are similar to the 2018 base model.

The Do Something 1 VISSIM modelled network is shown in Figure 3-3.

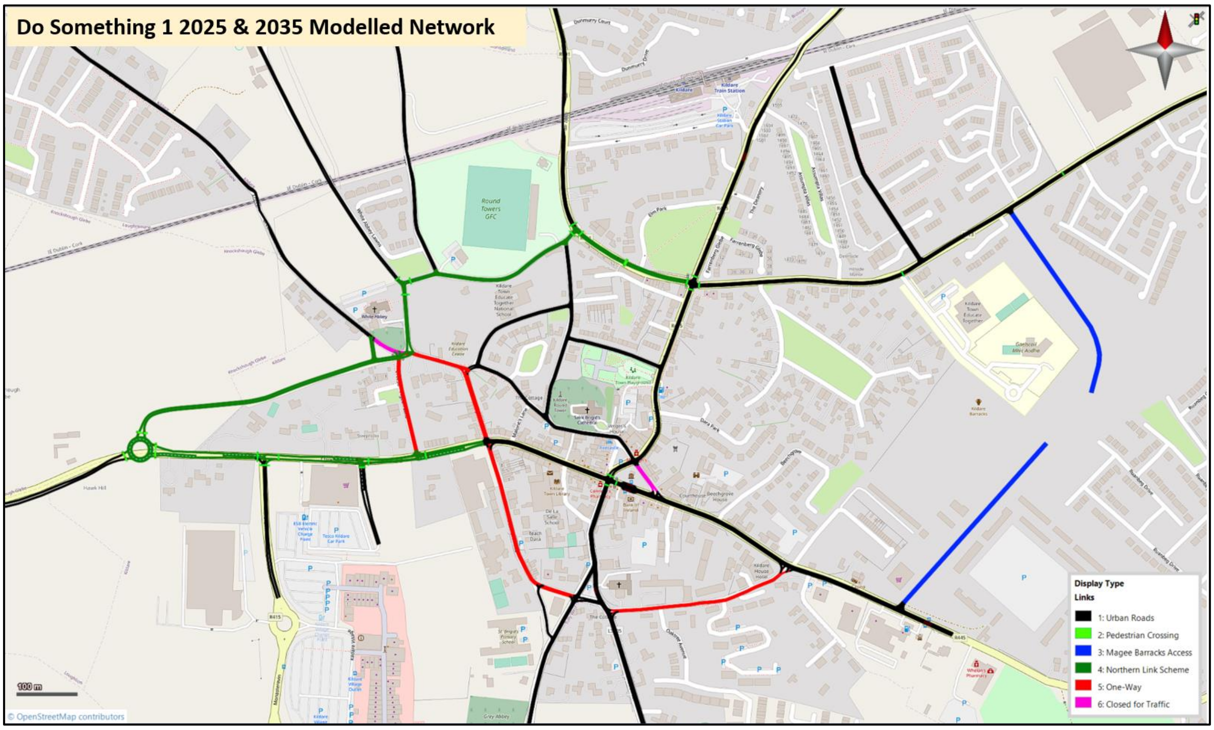


Figure 3-3: Do Something 1 VISSIM Modelled Network

3.5.3 Do Something 2 (DS2) – Model setup

Network:

- The link and connector structures have been amended in the Do Something 1 scenario to replicate the network changes from road strategy measure 2A Northern Link Street scheme. This includes changes such as: a new roundabout at the junction connecting Northern Link Street to the R445, an extra lane for right turning traffic from R445 to Pigeon Lane and from the R445 to the R415.
- Connectors on Cleamore Road southbound link and Meadow Road westbound (road strategy 6A) are closed for dynamic assignment as per the forecast scheme proposal.
- Pigeon Lane is converted to a one-way traffic lane northbound and White Abbey Road is converted to a one-way traffic lane southbound as per the 2A Northern Link scheme.
- Green Road/ Pigeon Lane Junction is modified, changing the Green Road alignment to connect Green Road to the Northern Link Street to the west.
- Bride Street section of Market Square is closed for traffic as part of road strategy 3H.
- Southgreen Bridge signal is removed, and the bridge is upgraded to cater to two-way traffic as per road strategy 1B.
- Old Road Bridge is closed for traffic as per road strategy 1B.

Signals:

- The existing signal controllers and signal heads are re-used in the Do Minimum model. The signal timings have been optimised.
- New signals are added at the Southgreen Road/ Green Road junction and the Dunmurray Road/ Old Road junction as per the proposal.

- Traffic signal at the Pigeon Lane/ R445 junction is converted to a pedestrian signal, allowing people to cross the R445.
- Pedestrian crossings are added at the R401 Fairview Cottages/ Lourdesville Road Junction and the R445/ New Link Road West Roundabout.

Speeds:

- All speed parameters remain consistent with the 2018 Base model.
- New speed decisions and speed controllers are added on the access roads added as part of forecast schemes.

Driving Behaviour Parameters:

- All driving behaviour parameters remain consistent with the 2018 Base model.

Priority Control:

- Additional priority rules have been added into the Do Minimum model at new access road junctions. At some existing junctions, a combination of priority rules and conflict areas have been added to replicate yellow box behaviour required to control queuing pattern because of increase in traffic in forecast models.

Edges/ Routes

- U-turns at the R445/ Northern Link Street roundabout are not allowed for traffic. The rest of the routes are similar to the 2018 base model.

The Do Something 2 VISSIM modelled network is shown in Figure 3-4.

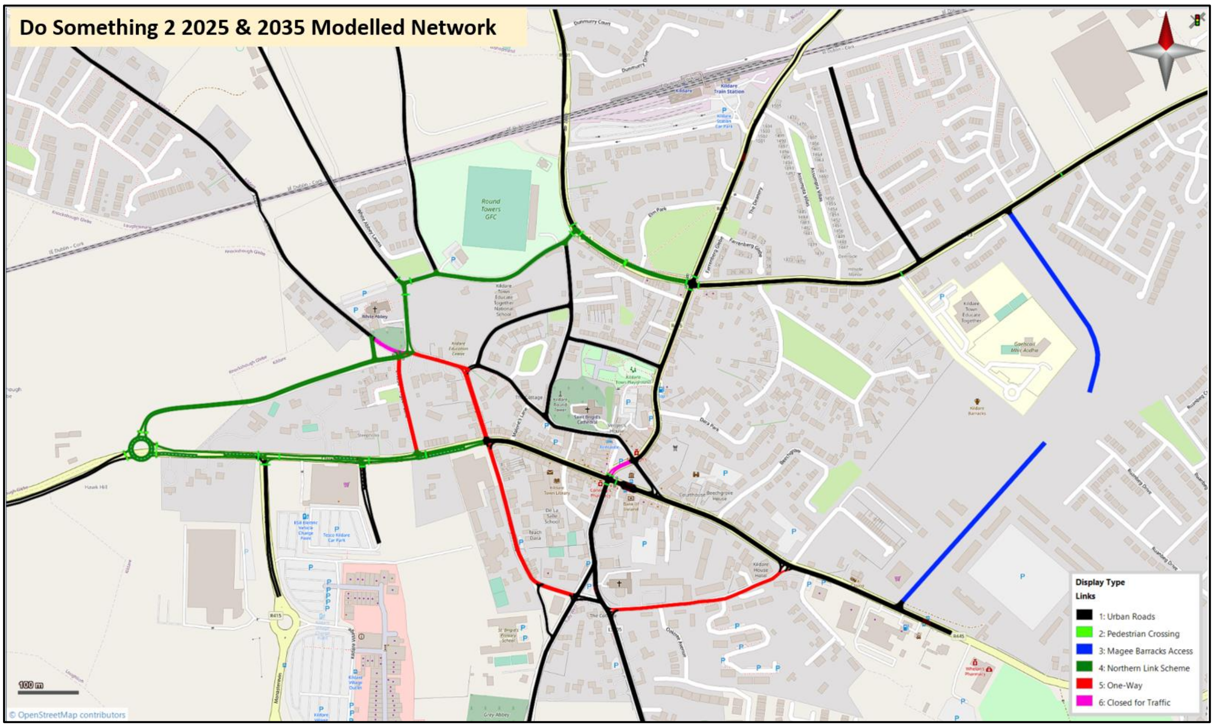


Figure 3-4: Do Something 2 VISSIM Modelled Network

4. Future Year Model Results

4.1 Model Convergence

A model convergence process is required to ensure that traffic within the dynamic VISSIM model reroutes appropriately. This is because there are changes such as updated travel demand, network changes (closed links and new roads), routing changes (one-way roads) and signal changes in the future year networks which will affect traffic flows in the model.

In dynamic assignment, traffic demand and infrastructure are not constant over time. Traffic conditions will vary in the network and travel times will change across the modelling time period. Vehicles will find different routes through the network, dynamically seeking the lowest-cost (travel time) route. To suitably accommodate these dynamic traffic conditions, the total simulation time is divided into smaller evaluation intervals in which travel times are observed separately. An evaluation interval also specifies the point in time after which the path selection of vehicles can change.

Evaluation intervals of less than 15 minutes are rarely advised, as variability of the measured values (such as travel times), increase with shorter intervals. In many cases, evaluation intervals from 15 to 60 minutes are appropriate. Especially when signal controls are used, evaluation intervals must be significantly longer than the signal cycle times.

The future year models developed with the future year demand were tested for convergence, keeping parameters and settings consistent with the Base models. One exception is noted – in the future year models, new access roads and a significant increase in demand has led to additional routes in the model. The introduction of additional signals in a relatively small network has also contributed to fluctuations in the route choice, thereby making models sensitive to change and difficult to converge. To overcome these fluctuations and stabilise the route choice, evaluation intervals in forecast models have been adjusted to 900 seconds, as opposed to 600 seconds in the base models.

As in the base models, the forecast scenario models were initially run using VISSIM's default random seed and assigned travel demand matrices in batch mode. The simulation was started with 85% of the total O-D demand which was gradually increased by 2.5% per run until 100% of the demand was reached. This was done to establish the initial costs (BEW files) and paths (WEG files) within the network. Using the path and cost files from the first simulation run, the batch run of the models continued until the convergence criteria was achieved. Details of the convergence criteria can be found in the prior Kildare Town Transport Strategy 'VISSIM Model Development Report'.

4.2 Model Evaluation

The future year scenario models were evaluated for the same 10 random seeds to maintain a consistent comparison with the base model runs. The models were evaluated for:

- Network Performance
- Vehicle Travel Time
- Speed
- Density

The results are outlined and discussed in the following sections.

4.3 Network Performance Results

The network performance results compare the 2018 base model and 2025 and 2035 forecast models. These are presented in Table 4-1: and Table 4-2: for AM and PM peaks, respectively.

Network performance results show that there is an increase in demand in the forecast models compared to the base models. Demand increases significantly in the 2035 models, increasing by 60-70% from the

2018 demand. As a result, there is a decrease in speeds and an increase in travel time observed in both the AM and PM peaks in the forecast models.

In 2035 models, construction of the Magee Barracks Phase 2 (with a link joining R445 to Melitta Road), has led to a reduction in traffic traversing Market Square to access the north of Kildare Town. Thus, the 2035 models recorded less average delay per vehicle than the 2025 models.

A 'peak within the peak' forces some vehicles to wait to enter the network (latent demand), until queues dissipate in the network itself. Delay related to latent demand has low recorded values, with a total latent delay of less than 18 min (0.29h, recorded in 2035 DS2 PM).

Comparing DS1 and DS2 scenarios, DS2 performs better than DS1, as can be seen in the tables below. The closure of the eastern side of Market Square in DS1 increases the difficulty for turning movements to and from Station Road, resulting in longer queues on Station Road. Movements between Station Road and R445 east (Dublin Road) were previously able to take place at two junctions (in the DM). In DS1, the closure of Market Square means more turning movements must take place at the crossroads of R445 and R415 (Bride Street). Right-turn movements are particularly hindered due to the increased levels of conflicting movements and fewer gaps in opposing traffic streams.

With Bride Street closed in DS2, traffic from Station Road seeking to turn right onto the R445 must take a longer route along Market Square (south-eastbound) and give way to traffic. Similarly, traffic from the R445 (east) seeking to turn right onto Station Road must give way to increased levels of opposing R445 (eastbound) traffic, due to the closure of Bride Street in the town centre.

Closing either section of Market Square causes inconvenience for motorised traffic, but this is in line with the priorities of the strategy which aim to reduce traffic in the town centre to allow for the reallocation of space to public realm improvements and active mode schemes. The Northern Link scheme will provide some relief in the wider town by providing a bypass of the town centre for traffic approaching from the west.

DS2 allows traffic from Station Road to make a right turn manoeuvre and to effectively queue on the R445. Providing extra green time (at the adjusted, proposed 3-arm junction of the R445 and Bride Street) helps dissipate some traffic originating from Station Road. With Bride Street partially closed in Market Square, there is no opposing traffic for Bride Street northbound flows, so this phase can dissipate traffic quickly during the peak hour. Further optimisation of the signals gave priority to the R445 westbound phase, resulting in reduced queues at Market Square in DS2. Hence, DS2 performs better than DS1 at the Market Square junction.

Summarising the network performance results, DS1 may force high levels of traffic through the existing crossroads, whereas splitting the traffic movements into two junctions on the R445 in DS2 provides some relief and improved traffic control through signal optimisation.

Table 4-1: AM Peak Network Performance Results Summary

Modelled Year	Scenario	Average Speed (kmph)-AM	Total travel time (h)-AM	Total Demand AM	Latent Demand AM	Average delay (s)-AM	Total Delay (h) AM	Latent Delay (h) AM
2018	Base	26	191	2654	0	97	72	0.13
2025	Do Minimum	26	204	3001	0	93	78	0.12
	Do Something 1	24	217	2948	1	113	93	0.15
	Do Something 2	26	203	2949	0	92	75	0.13
2035	Do Minimum	25	258	4447	0	70	87	0.27
	Do Something 1	23	287	4525	0	89	111	0.28
	Do Something 2	23	283	4527	0	84	105	0.28

Table 4-2: PM Peak Network Performance Results Summary

Modelled Year	Scenario	Average Speed (kmph)-PM	Total travel time (h)-PM	Total Demand PM	Latent Demand PM	Average delay (s)-PM	Total Delay (h) PM	Latent Delay (h) PM
2018	Base	27	163	2422	0	85	57	0.11
2025	Do Minimum	26	186	2782	0	96	74	0.10
	Do Something 1	26	187	2798	0	93	73	0.10
	Do Something 2	27	182	2796	0	86	67	0.10
2035	Do Minimum	26	205	3780	0	64	67	0.31
	Do Something 1	26	214	3914	0	66	71	0.28
	Do Something 2	26	214	3909	0	64	69	0.29

4.4 Journey Time Evaluation

Journey time sections were identified in the model based on the schemes being put forward. Journey time sections were then grouped to form routes covering through-routes in Kildare Town. Twelve such routes were identified covering the likes of the R445, Southgreen Road, Dunmurray Road, Rathbride Road, Melitta Road, Station Road and Bride Street.

Figure 4-1 shows the 12 identified journey time evaluation routes in Kildare Town and Table 4-3 shows the route description.

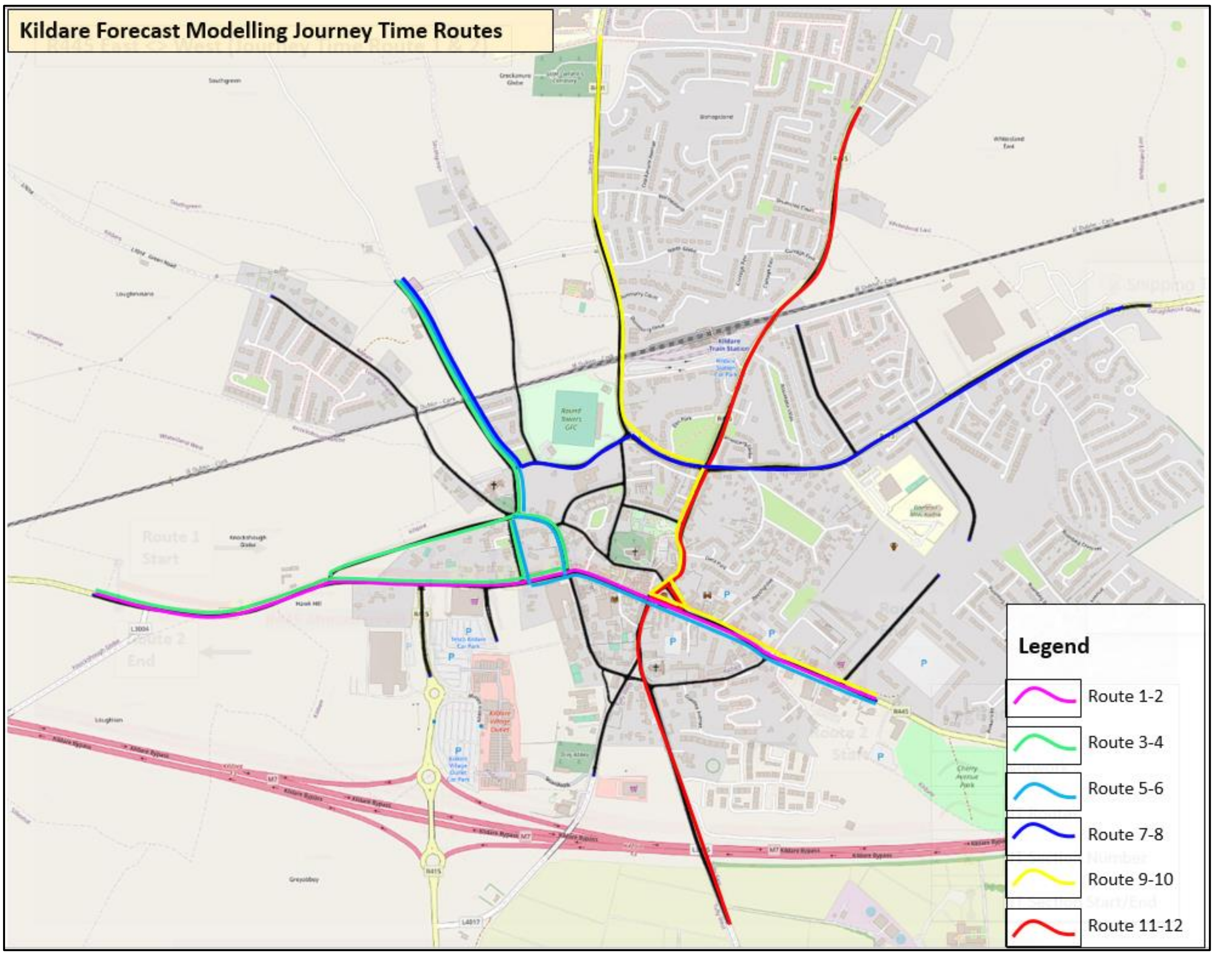


Figure 4-1: Kildare Town JT Routes Identified to Compare Travel Time in Forecast Years

Table 4-3: Journey Time Route Descriptions

Route No.	Route no. & Name
1	R445 Eastbound – from R445 Monasterevin Road west of R415 to R445 Curragh Road east of Magee Barracks Phase 1 access
2	R445 Westbound – from R445 Curragh Road east of Magee Barracks Phase 1 access to R445 Monasterevin Road west of R415
3	Southgreen Rd north to R445 Curragh Road east of Magee Barracks Phase 1 access via Pigeon Lane/ White Abbey Road/ Northern Link in DS options
4	R445 Curragh Road East of Magee Barracks Phase 1 access to Southgreen Rd north via Pigeon Lane/ White Abbey Road/ Northern Link in DS options
5	Southgreen Rd north to R445 Monasterevin Road west of R415 Access via Pigeon Lane/ White Abbey Road
6	R445 Monasterevin Road west of R415 to Southgreen Road access via Pigeon Lane/ White Abbey Road
7	Southgreen Rd north to Melitta Road east of Phase 2 Magee Barracks access
8	Melitta Road east of Phase 2 Magee Barracks access to Southgreen Road north
9	Dunmurray Road north to R445 Curragh Road east of Magee Barracks Phase 1 access
10	R445 Curragh Road east of Magee Barracks Phase 1 access to Dunmurray Road north
11	Rathbride Road north to Tully Road south
12	Tully Road south to Rathbride Road north

Travel times were recorded for each route and scenario and are shown for AM and PM peaks, respectively in Table 4-4 and Table 4-5. Graphical representations of journey times for each route are shown in Figure 4-2 to Figure 4-5, for the AM and PM peaks. A summary of the journey time results is provided below:

- Route 1 – R445 eastbound traffic records similar travel times across all options in AM and PM peak ranging between 3.5 to 4.5 minutes (215s to 254s).
- Route 2 – R445 westbound traffic shows higher journey time in the DS1 2025 and 2035 scenarios in the AM peak compared to the DM and DS2. This reinforces the notion of more congested movements in the vicinity of the tested Bride Street closure between the R445 and Station Road (from the Network Performance Results). In the PM peak, the R445 westbound DM has slightly higher journey times than DS options in both 2025 and 2035.
- Routes 3 and 4 – These routes indicate the positive improvement of the Northern Link Scheme in relation to travel times. For vehicles travelling from R445 west to the north of Kildare and vice versa, journey times have reduced by more than a minute (journey times have reduced in the DS options by approximately 60-120 seconds across both peaks).
- Routes 5 and 6 – The addition of two new sets of signals along this travel time route has led to an overall increase in travel times. DS options recorded higher journey times for vehicles by around 50 seconds in 2025 and 20 seconds in PM peak.

  With DS2 in place (and its influence on growth and changing traffic patterns) there is a net improvement of 5 seconds across both peaks and directions, noting a specific improvement in DS2 southbound movements, of 50 seconds and 30 seconds in 2025 and 2035, respectively.
- Routes 7 and 8 - Vehicles travelling westbound from Melitta Road to Southgreen Road (Route 8) may experience an increase in journey times. In the 2025 AM peak, an increase in travel time of 90 seconds is seen in DS1 and 30 seconds in DS2. In 2035, increases of approximately 50-60 seconds are observed in both DS options. In the PM peak, travel times increase by approximately 40 seconds in both years for DS options. The increases in travel times for Route

7 and Route 8 is not only attributed to new signals at Fairview Cottages (R401), but also to the increased traffic demand at the Melitta Road/ Station Road junction.

- Routes 9 to 12 – The impact of closing part of Market Square, including the eastern section in DS1 and Bride Street in DS2, can be seen in Route 9, Route 10, Route 11 and Route 12 travel times. Both DS options in 2025 and 2035 record higher journey times in both AM and PM peaks than DM. Right-turning traffic from R445 to Station Road and left-turning traffic from Station Road to the R445 use Market Square in the DM, whereas other movements continue on Bride Street to use the crossroads. The DS scenarios have fewer route options for traffic originating from or travelling towards Station Road (than the DM option), and therefore lower levels of journey time performance are observed.

  The DS1 scenario restricts traffic movement from the R445 east and Station Road. Right-turning vehicles from each of the four arms are required to gap-seek among opposing traffic streams, leading to increased queues on all arms, and subsequent increased delays on approach to the junction. DS2 prevents traffic from using a section of Bride Street, meaning traffic from Station Road seeking to travel along the R445 westbound and Bride Street southbound are rerouted along Market Square and must give way to R445 traffic. This leads to increased queues on Market Square southbound and Station Road southbound. With modified signal staging and restricting some eastbound R445 movements from the junction, queuing on Market Square can be somewhat controlled.

  Similar increases in travel times are observed for vehicles travelling from Station Road to Tully Road and Tully Road to Station Road (Routes 11 and 12) in DS options. DS2's PM peak sees significant increases in travel times by 102 seconds to 132 seconds for vehicles travelling south to Tully Road from Station Road in both forecast years. DS2 shows a similar increase in the AM peak for the forecast year 2035. These increases can be attributed to the closure of the Bride Street section of Market Square. The transport model shows increases in travel times by 20-40 seconds in both DS options when compared with DM in both peaks for both the forecast years.

  Vehicles travelling northward from Tully Road to Station Road are less impacted by the DS scheme than vehicles travelling southbound from Station Road to Tully Road – this is because northbound movements are generally signal controlled or left-turns, whereas southbound movements must gap-seek in busy conditions. DS1 travel times increase by approximately 20 seconds when compared to DM in both peaks for both forecast years. DS2 shows an increase in travel times of approximately 30-40 seconds in 2025 and by 50-70 seconds in 2035.

Table 4-4: AM Journey Time Summary (seconds)

Route no. & Name	Base	2025			2035		
		DM	DS1	DS2	DM	DS1	DS2
Route 1 - R445 EB	242	263	254	230	228	259	247
Route 2 - R445 WB	234	241	266	224	255	309	234
Route 3 – Southgreen Rd to R445 W	186	237	159	149	269	203	168
Route 4 - R445 W to Southgreen Rd	182	237	152	151	232	141	142
Route 5 - Southgreen Rd to R445 E	176	241	252	215	233	324	261
Route 6 - R445 E to Southgreen Road	173	218	273	229	239	295	218
Route 7 - Southgreen Rd to Melitta Rd	287	253	294	293	250	347	307
Route 8 - Melitta Rd to Southgreen Rd	238	275	365	307	285	338	342
Route 9 - Dunmurray Rd to R445 E	325	295	386	327	283	357	353
Route 10 - R445 E to Dunmurray Rd	307	285	352	286	302	414	323
Route 11 - Rathbride Rd to Tully Rd	358	336	358	366	341	363	441
Route 12 - Tully Rd to Rathbride Rd	308	300	303	330	320	349	391

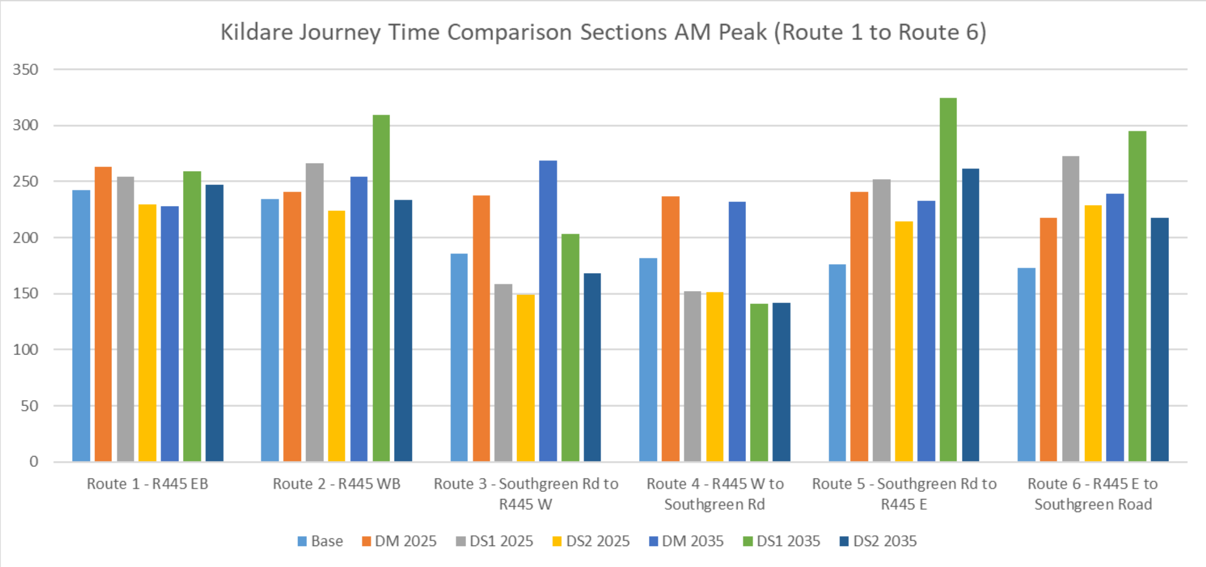


Figure 4-2: Route 1 to Route 6 Journey Time Comparison AM peak (seconds)

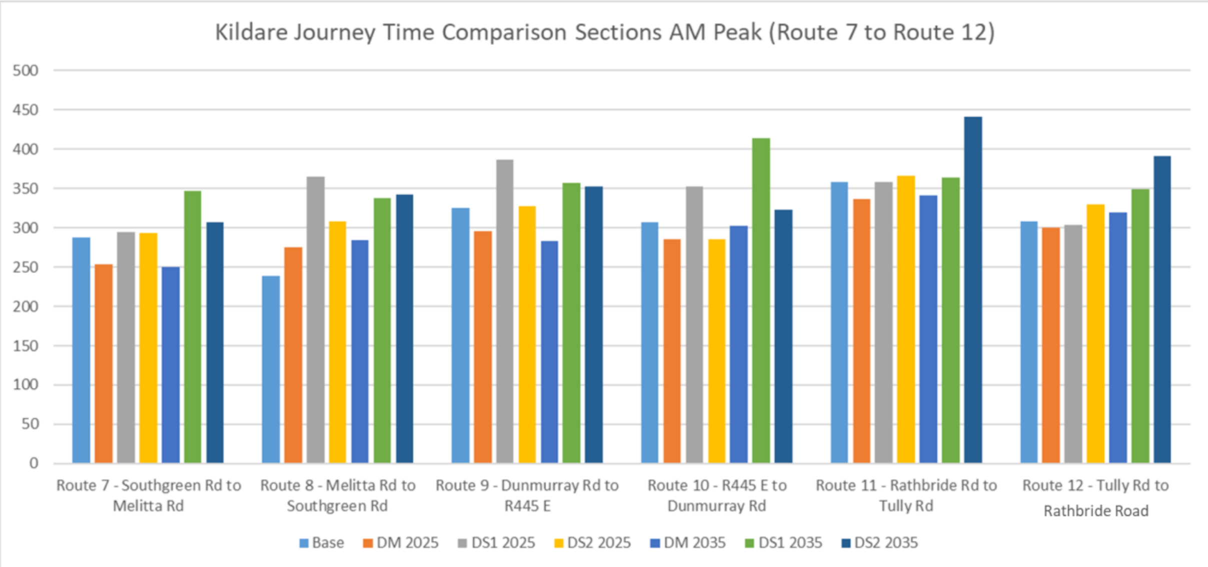


Figure 4-3: Route 7 to Route 12 Journey Time Comparison AM peak (seconds)

Table 4-5: PM Journey Time Summary (seconds)

Route no. & Name	Base	2025			2035		
		DM	DS1	DS2	DM	DS1	DS2
Route 1 - R445 EB	215	278	270	223	249	253	222
Route 2 - R445 WB	240	269	255	238	258	250	243
Route 3 – Southgreen Rd to R445 W	200	265	148	148	229	147	147
Route 4 - R445 W to Southgreen Rd	170	200	143	142	206	144	144
Route 5 - Southgreen Rd to R445 E	164	250	252	199	219	231	193
Route 6 - R445 E to Southgreen Road	167	194	242	225	209	235	225
Route 7 - Southgreen Rd to Melitta Rd	238	243	270	271	245	273	272
Route 8 - Melitta Rd to Southgreen Rd	246	243	281	284	240	275	278
Route 9 - Dunmurray Rd to R445 E	279	279	332	332	273	317	302
Route 10 - R445 E to Dunmurray Rd	299	276	331	285	274	325	295
Route 11 - Rathbride Rd to Tully Rd	359	339	382	476	341	362	445
Route 12 - Tully Rd to Rathbride Rd	319	296	311	339	296	318	345

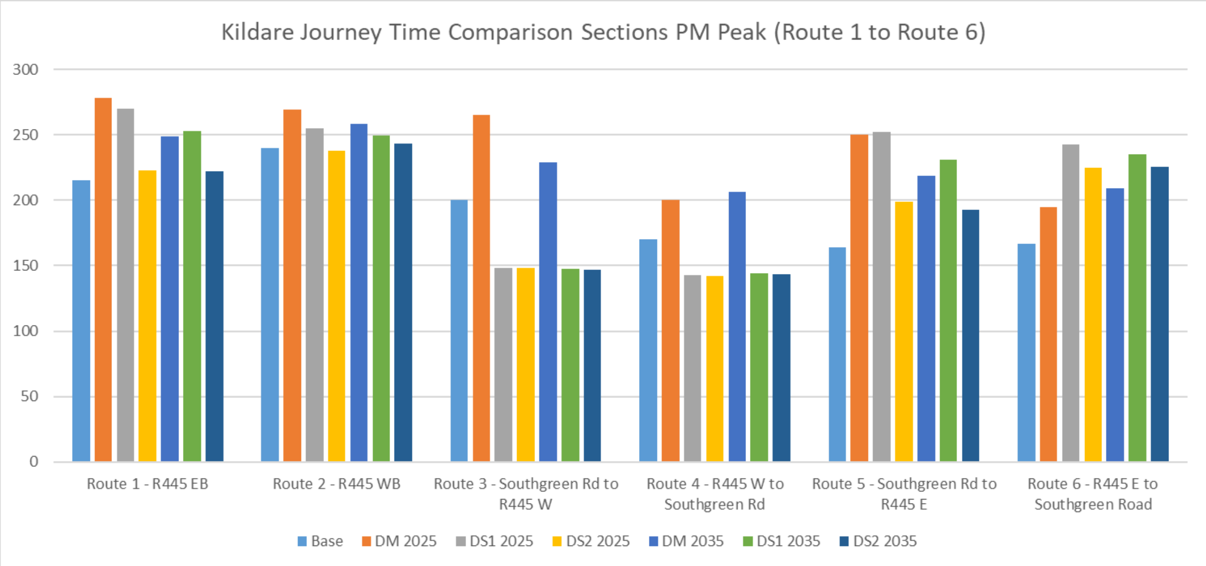


Figure 4-4: Route 1 to Route 6 Journey Time Comparison PM peak (seconds)

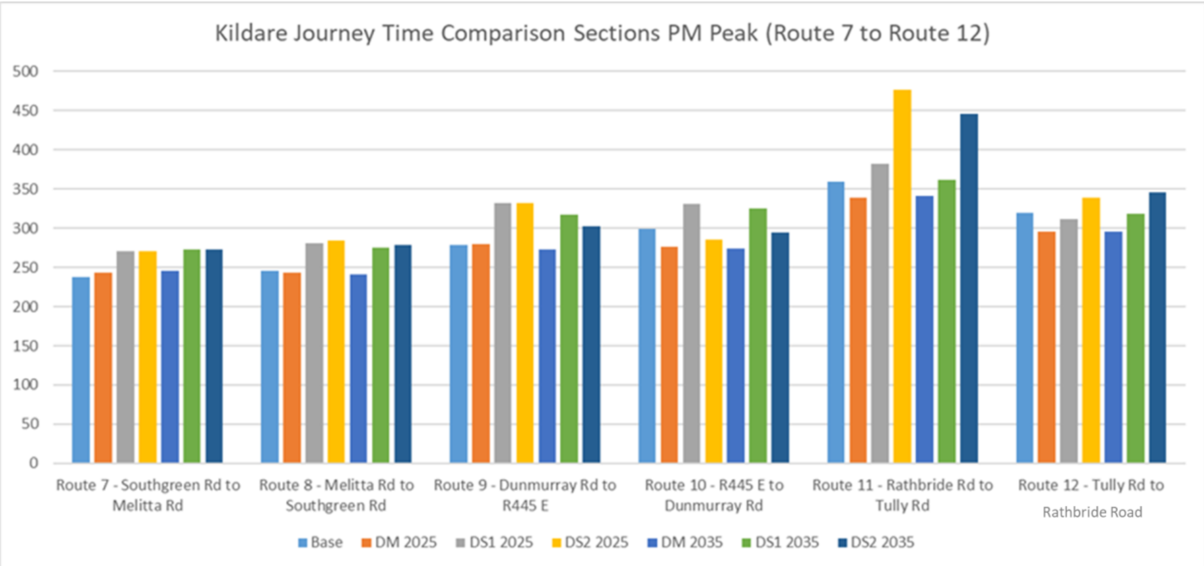


Figure 4-5: Route 7 to Route 12 Journey Time Comparison PM peak (seconds)

To summarise the outcomes of the travel time analysis, the Magee Barracks access roads connecting the R445 and Melitta Road support the re-routing of some traffic from Market Square (as determined from the VISUM model), thereby reducing congestion in the town centre. Closing a section of the town centre in the vicinity of Market Square in either of the Do Something options results in increased queues at the Market Square junctions. Hence, DM performs better than DS options at the Market Square junctions. Yet, because the focus of the strategy is on facilitating public realm improvements in this area which allow for walking and cycling improvements, this is an expected outcome.

The Northern Link Street Scheme to the west of the town supports a reduction of traffic on the R445 near the R415 and Tesco entrance by taking northbound / north-eastbound traffic off the R445 west of these junctions. Thus, the new access road reduces numerous travel times for vehicles travelling from the R445 west of Kildare to northern and eastern destinations.

4.5 Speed and Density Results

Speed and density plots of the town centre are shown in Figure 4-6 to Figure 4-13. As shown in the figures, DM plots show higher speed and lower densities in the town centre around Market Square junction compared to DS1 and DS2. In DS1, queues formed on the R445's eastbound approach to the Market Square junction, often blocking-back to White Abbey Road. Speeds on Station Road southbound are often observed to be lower in DS1 compared to DM and DS2, causing high vehicle densities on this approach to Market Square. As discussed in previous sections, DS1's closure of the eastern section of Market Square requires all approaching traffic to pass through the crossroads of the R445 and Bride Street, causing increasing delays particularly where right-turning vehicles gap-seek in opposing traffic streams.

The addition of signals at the junction of R401 Dunmurry Road / Old Road in all DS options led to reduced speeds on approaching links. Density plots show a similar trend of increased densities on links approaching the new signalised junction.

The Northern Link Scheme helps reduce traffic along some sections of the R445 in the DS options, thereby maintaining reasonable traffic conditions and junction performances in future years. This is despite the significant growth in traffic demand in Kildare Town over time. Both the R445 and Melitta roads to the east and west of the Magee Barracks accesses show healthy speed and density conditions despite the significant growth.

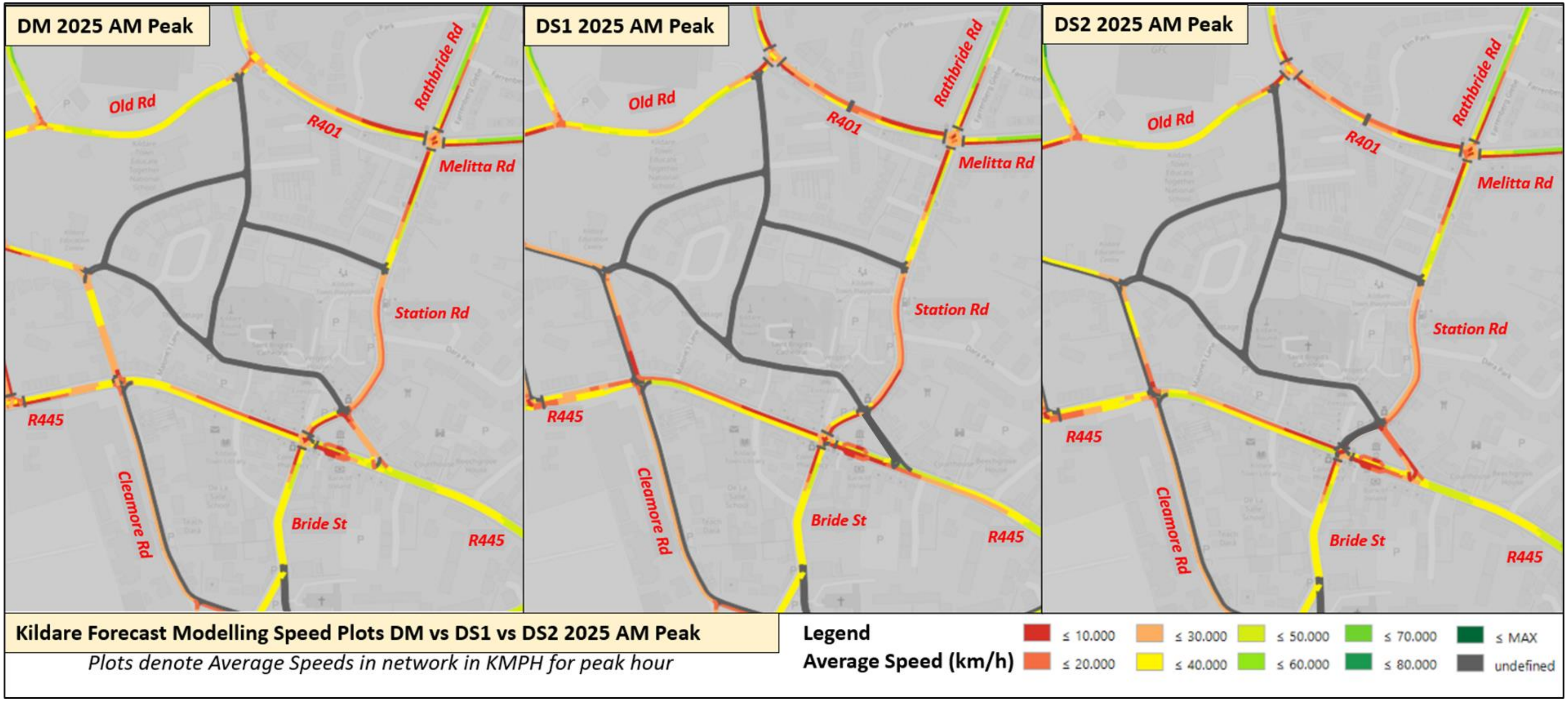


Figure 4-6: 2025 AM Peak Speed Plots

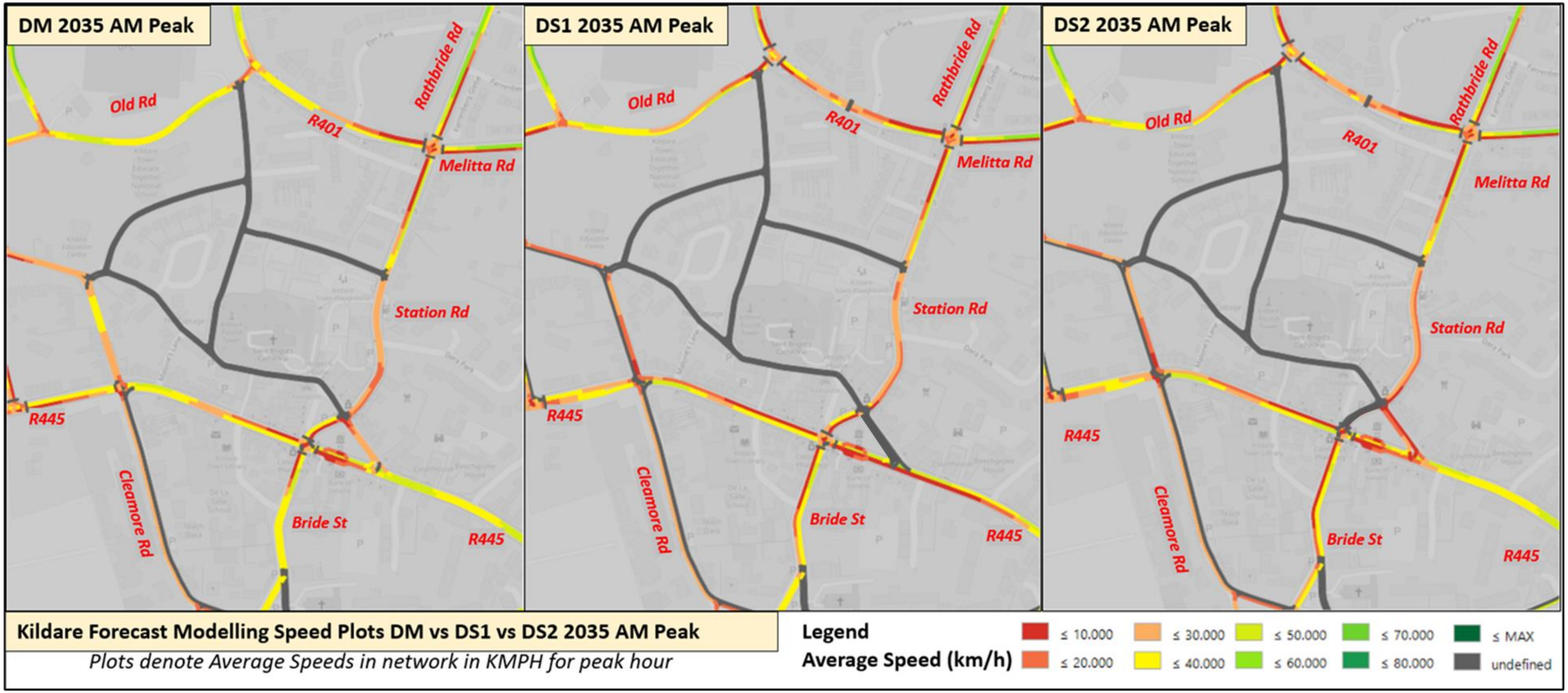


Figure 4-7: 2035 AM Peak Speed Plots

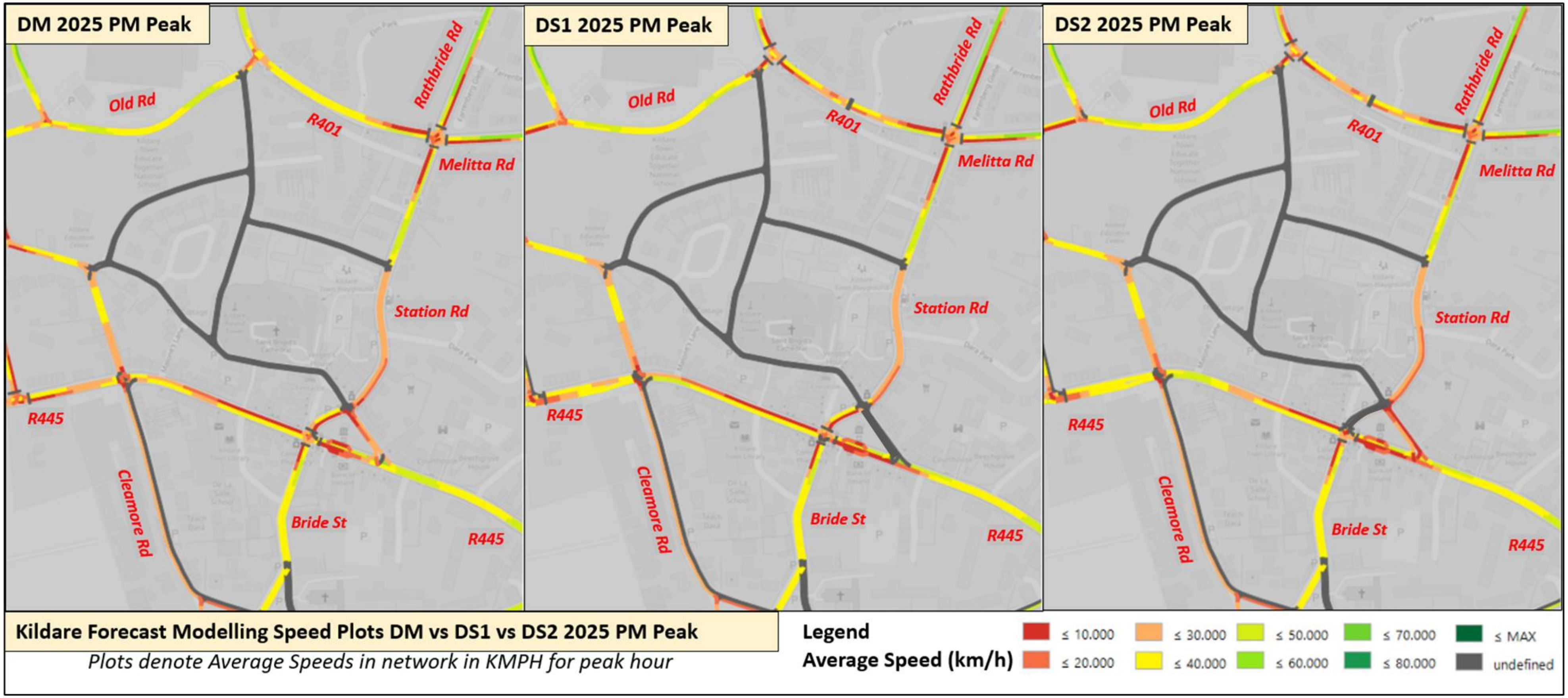


Figure 4-8: 2025 PM Peak Speed Plots

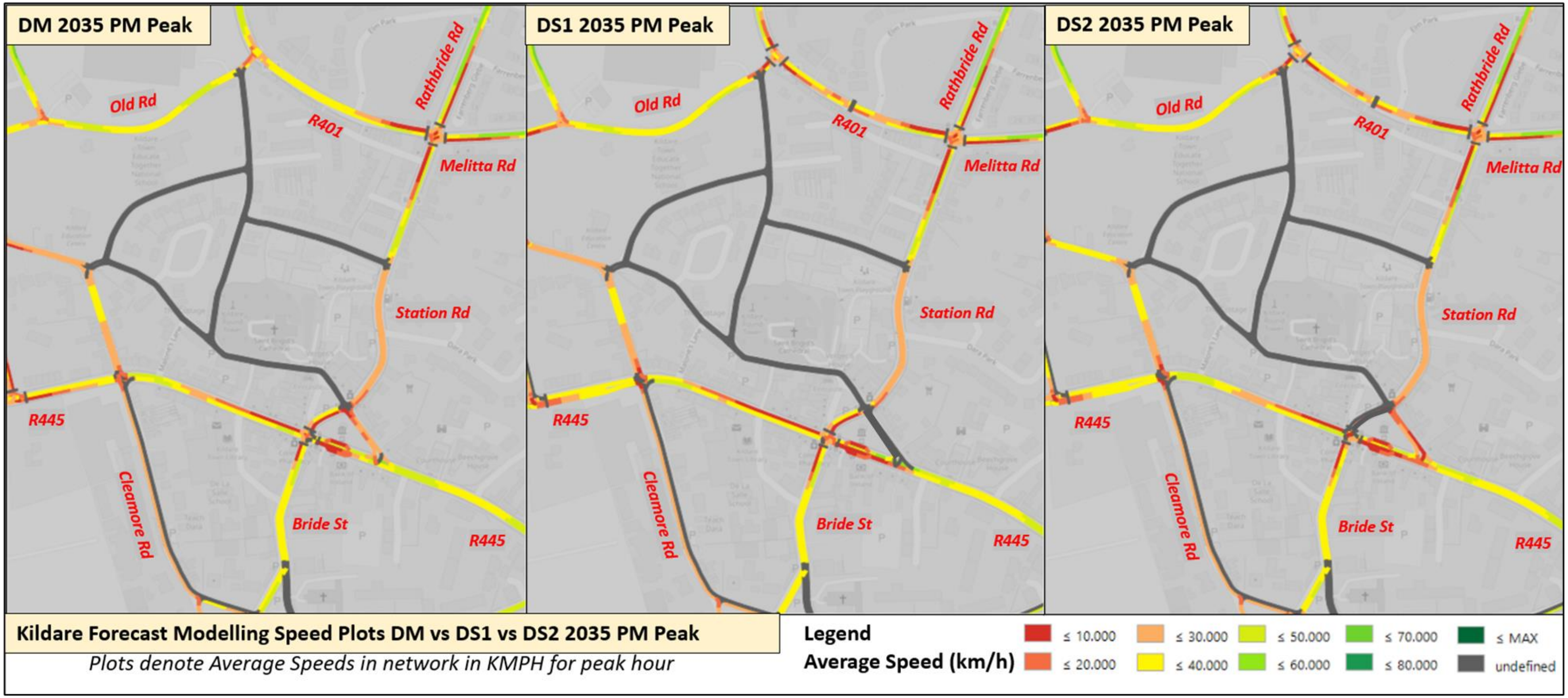


Figure 4-9: 2035 PM Peak Speed Plots

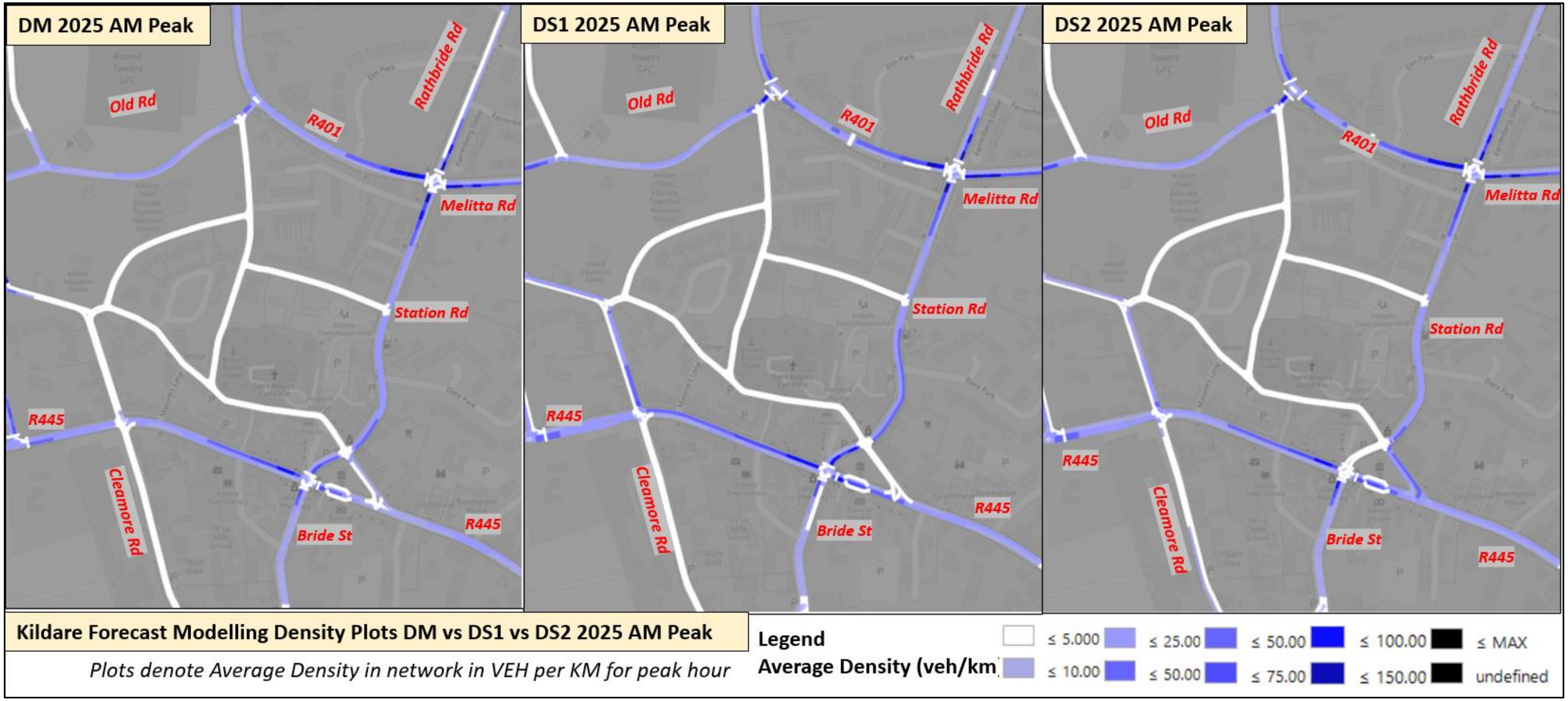


Figure 4-10: 2025 AM Peak Density Plots

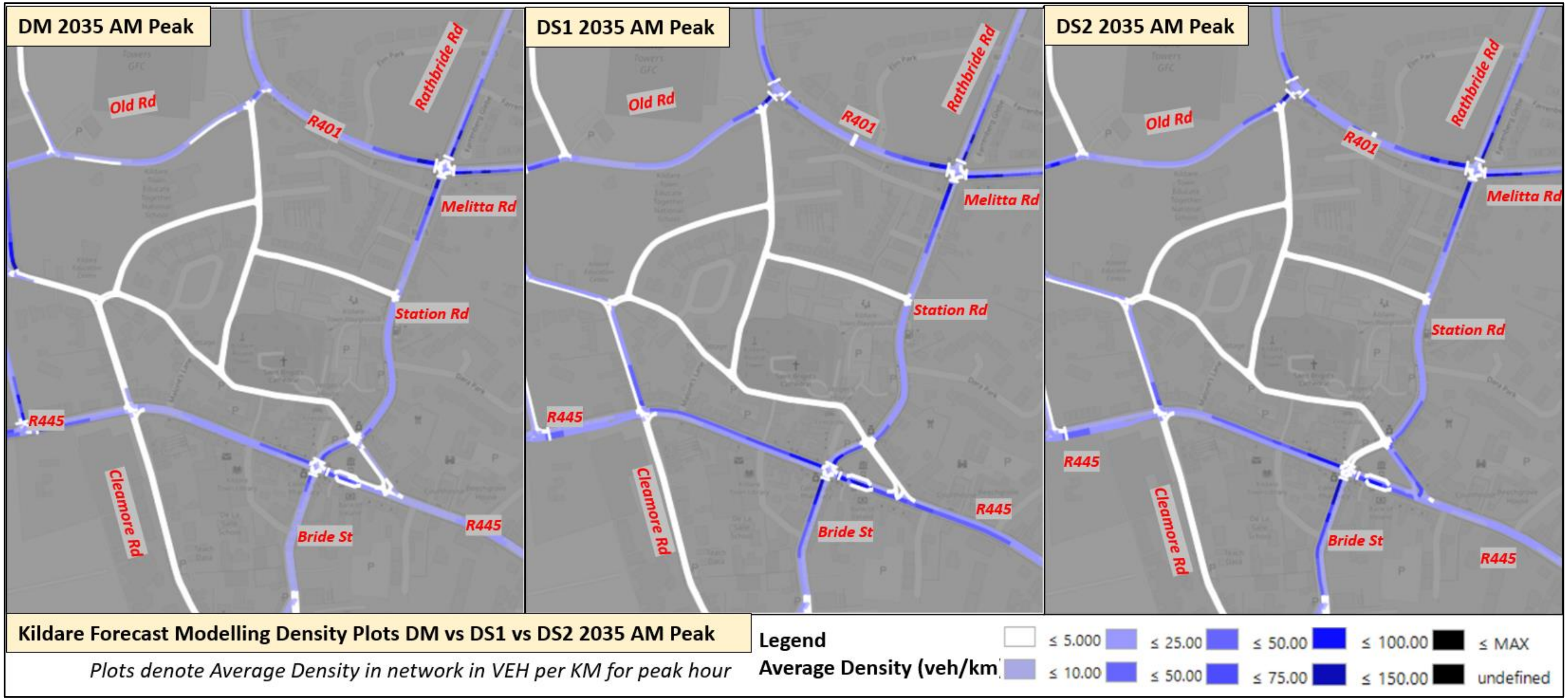


Figure 4-11: 2035 AM Peak Density Plots

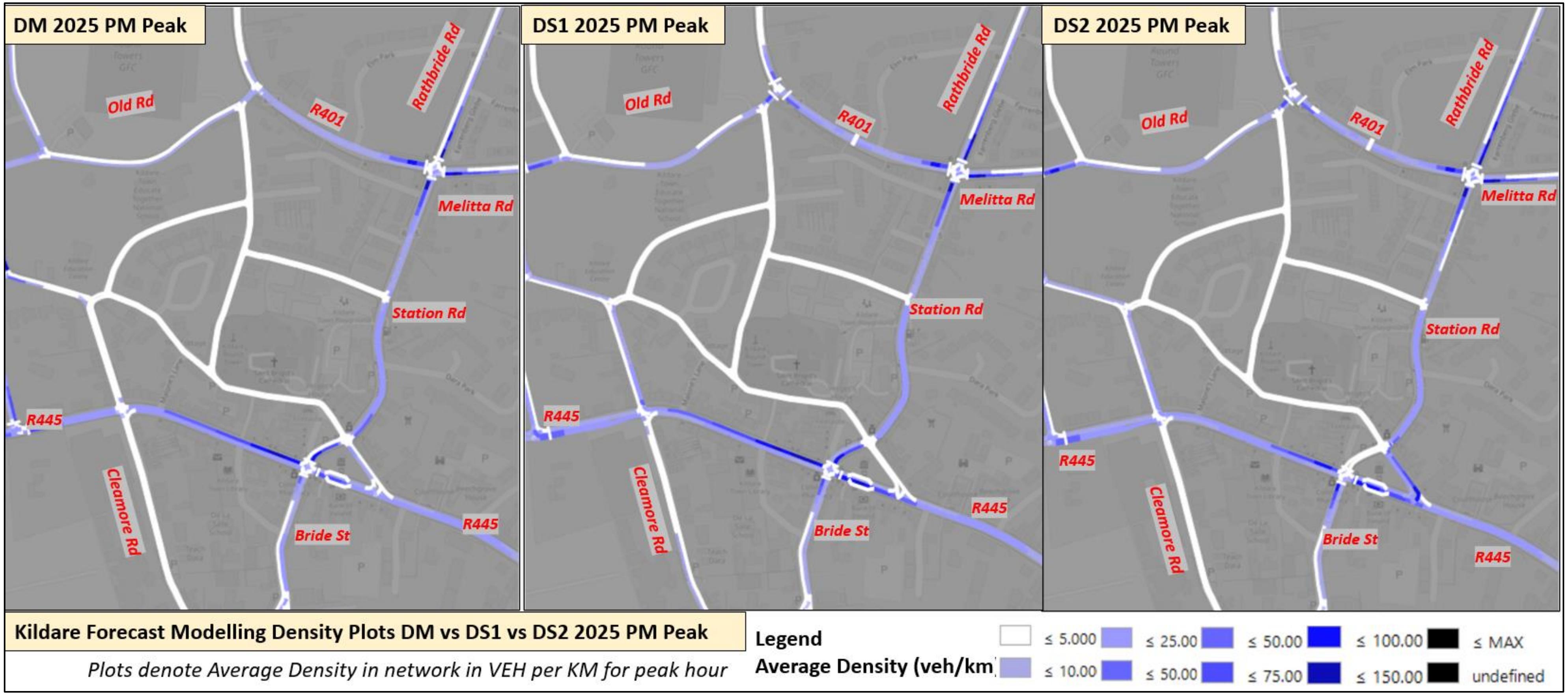


Figure 4-12: 2025 PM Peak Density Plots

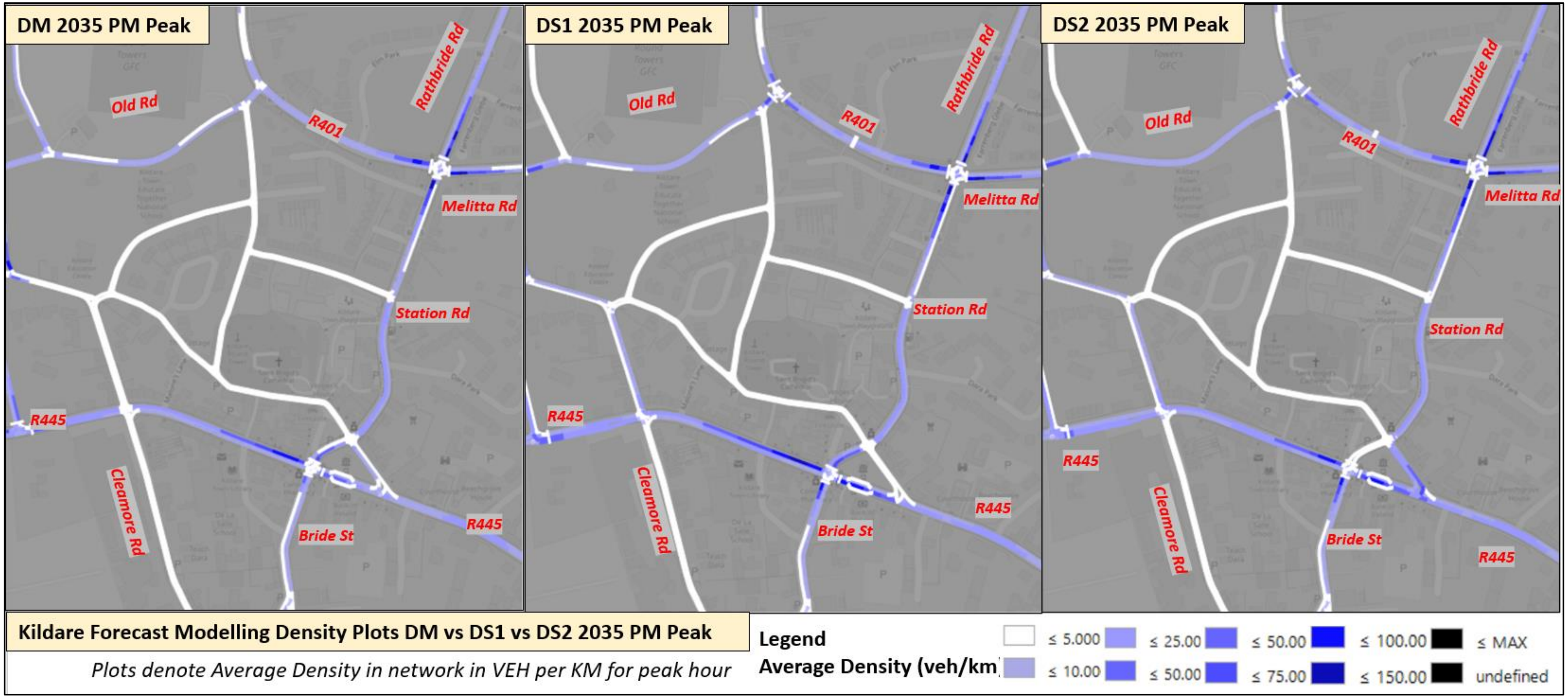


Figure 4-13: 2035 PM Peak Density Plots

5. Summary and Conclusions

Base year (2018) and future years 2025 and 2035 VISSIM Microsimulation models have been developed to help inform and understand the impacts of the proposed Kildare Town Transport Strategy.

The base year models were used as the basis for the future year models, however a number of updates to the base model zoning structure were required to represent a proposed development at Magee Barracks. Forecast demand matrices were developed from cordons of the Kildare VISUM Models and furnessing with the base VISSIM model data

Models were successfully converged and run for all three future scenarios: Do Minimum (DM), Do Something 1 (DS1) and Do Something 2 (DS2), for AM and PM peaks in forecast years 2025 and 2035. A total of 12 forecast scenario models were created. Future scenarios were assessed from reviews of their network performance results, journey time results and speed & density plots.

The network performance data indicated a trend of decreasing network speeds in 2035 models compared to 2025 (by an average of around 1km/h across the network) as a result of increased demand. Some interventions, such as signalised junctions or crossings, have also had the effect of decreasing average speeds in DS1, particularly in the AM of 2025 and 2035, by around 2km/h. PM average speeds remain more consistent with Base and DM for each respective scenario.

Average delay per vehicle is seen reducing in forecast year 2035 when compared to 2025 models. Among scenarios, the DS2 scenario has less average delay per vehicle and total delay when compared with the DS1 and DM models. This improvement is, in part, due to better traffic flow in DS2 where vehicle demand is spread across two junctions, whereas in DS1 all traffic has to travel through the R445/Bride Street junction and there is greater delay.

Journey time evaluation, speed plots and density plots results are summarised as below:

- The R445 / Bride Street / Market Square junctions perform well in the DM scenario compared with DS1 and DS2, where links are subsequently closed to traffic. This leads to increased queues in DS scenarios at Market Square junction. Particular delays occur in DS1 models where the number of nearby routes is diminished and increasing levels of right-turn vehicles must gap-seek in heightened opposing traffic flows.
- The addition of a new link road to the west of Kildare Town connecting the R445 to Green Road/ Pigeon Lane junction (as part of the Northern Link Scheme) reduces congestion at the R445/R415 and R445/Tesco junctions. Vehicles travelling between the R445 and Kildare Town's northern and north-eastern areas experience a reduction in journey times of around 1-2 minutes.
- Signals proposed on R401 Dunmurry Road / Old Road junction as part of the Northern Link Scheme has led to an increase in travel times and delay on these sections of the network. The reduction in vehicular traffic performance is expected to be offset by the improved active mode connectivity (though this was not tested as part of this modelling exercise).
- A Magee Barracks access road is proposed in 2035 and will support the rerouting of traffic away from busy junctions within the town centre (i.e. Bride Street / Market Square). This leads to generally improved network performance and reduced delays.

To summarise, increased levels of traffic in 2025 and 2035 will likely lead to increases in congestion in Kildare Town. Some schemes implemented as part of the DM network will maintain generally low levels of congestion. The DS interventions have varying effects on the increased future traffic demand. The testing of closures in Market Square and new signalised junctions and crossings will increase levels of vehicular congestion, though connectivity and accessibility benefits would be expected to occur for active modes across the town.

This outcome is in line with the aims of the Kildare Town Transport Strategy which prioritise improving transport infrastructure for public transport, walking, cycling and the public realm over vehicular traffic.

In Kildare town, there is a finite amount of road space, and the reallocation of that space to non-car modes is necessary to improve accessibility and safety. Prioritising transport modes in this fashion is in line with Government policy and the requirement to reduce car dependency and transport emissions. Overall, the strategy seeks to avoid undue impact on town centre traffic to support the local economy, while balancing this need with the requirement to improve conditions for non-car modes. The results show that while the do-something strategy results in a minor increase in delay for vehicles in the town centre, this negative impact is quite modest when compared to the major improvement in infrastructure for walking and cycling which will affect more people positively overall.

Appendix F A3 Versions of Maps

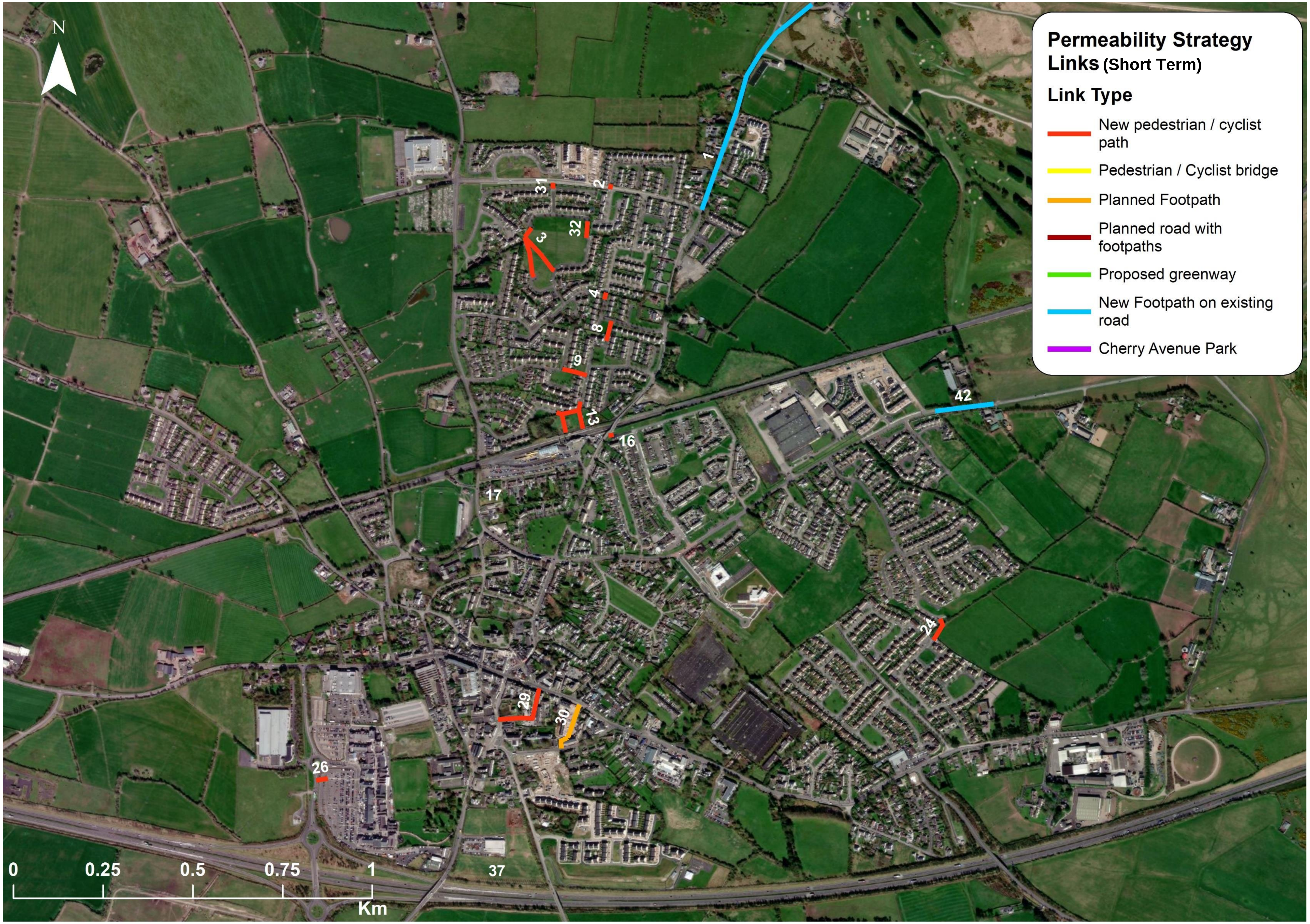
Appendix F: Cycling Strategy Phasing Maps (Short, Medium and Long Term)

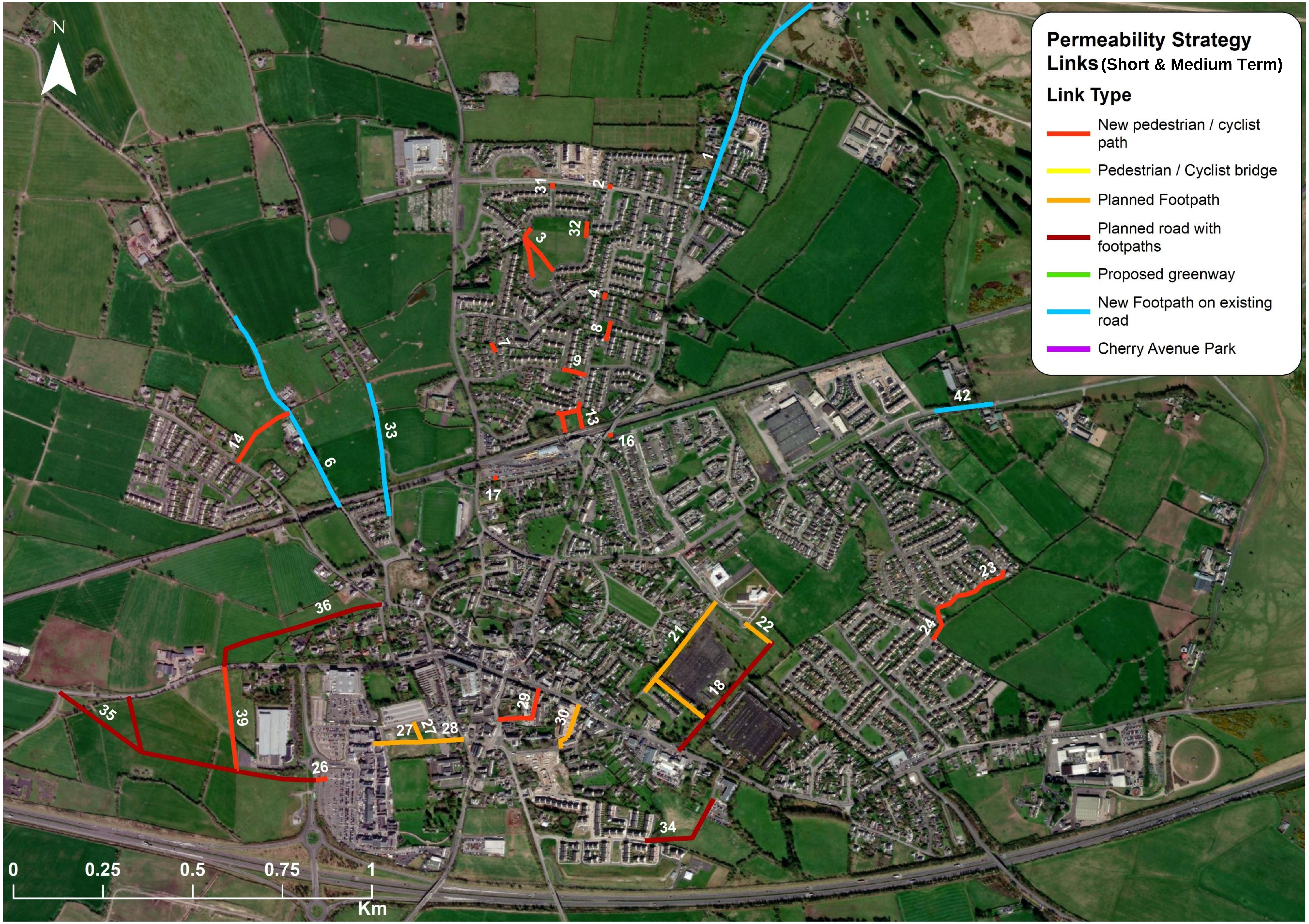

N
0
0.5
1 km
57
15
33
40
51
9
41
37
35
11
18
45
42
52
10
44
Legend
Existing Cycle Network
Cycle track/lane
Shared Street
Shared Street, One Way
Proposed KTTS Cycle Network Measures
Short term/short-medium term
Cycle track/lane
Active mode priority (local vehicle access)
TBD by detailed study
TBD by detailed study - one way
Shared walk/cycle path adjacent to road
Main Destinations
Train Station
Primary School (or part of)
Secondary School
Supermarket
KildareVillage
PrimaryCareCentre
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N
0
0.5
1 km
Legend
Existing Cycle Network
Cycle track/lane
Shared Street
Shared Street, One Way
Proposed KTTS Cycle Network Measures
Short & medium term
Greenway (walk/cycle path)
Cycle track/lane
Cycle track/lane as part of road scheme/new road
Active mode priority (local vehicle access)
TBD by detailed study
TBD by detailed study - one way
Shared walk/cycle path adjacent to road
Main Destinations
Train Station
Primary School (or part of)
Secondary School
Supermarket
KildareVillage
PrimaryCareCentre
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

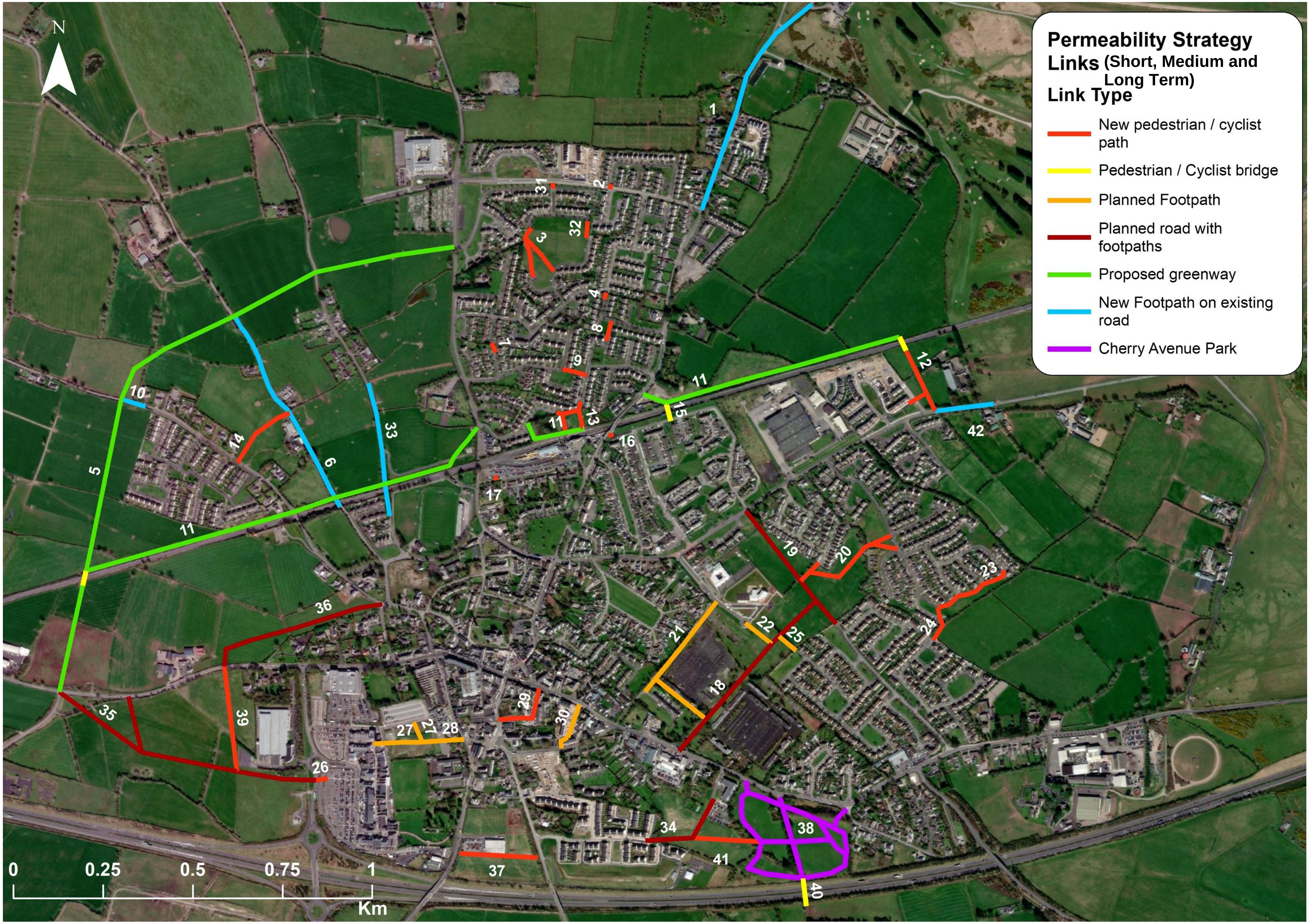

N
0
0.5
1 km
Legend
Existing Cycle Network
Cycle track/lane
Shared Street
Shared Street, One Way
Proposed KTTS Cycle Network Measures
Short, medium & long term
Greenway (walk/cycle path)
Cycle track/lane
Cycle track/lane as part of road scheme/new road
Active mode priority (local vehicle access)
TBD by detailed study
TBD by detailed study - one way
Proposed bridge accessible to cycles
Shared walk/cycle path adjacent to road
Main Destinations
Train Station
Primary School (or part of)
Secondary School
Supermarket
KildareVillage
PrimaryCareCentre
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix F: Permeability Strategy Phasing Maps (Short, Medium, Long Term)


N
Permeability Strategy Links (Short Term)
Link Type
New pedestrian / cyclist path
Pedestrian / Cyclist bridge
Planned Footpath
Planned road with footpaths
Proposed greenway
New Footpath on existing road
Cherry Avenue Park
1
2
3
4
8
9
13
16
17
24
26
29
30
31
32
37
42
0
0.25
0.5
0.75
1
Km

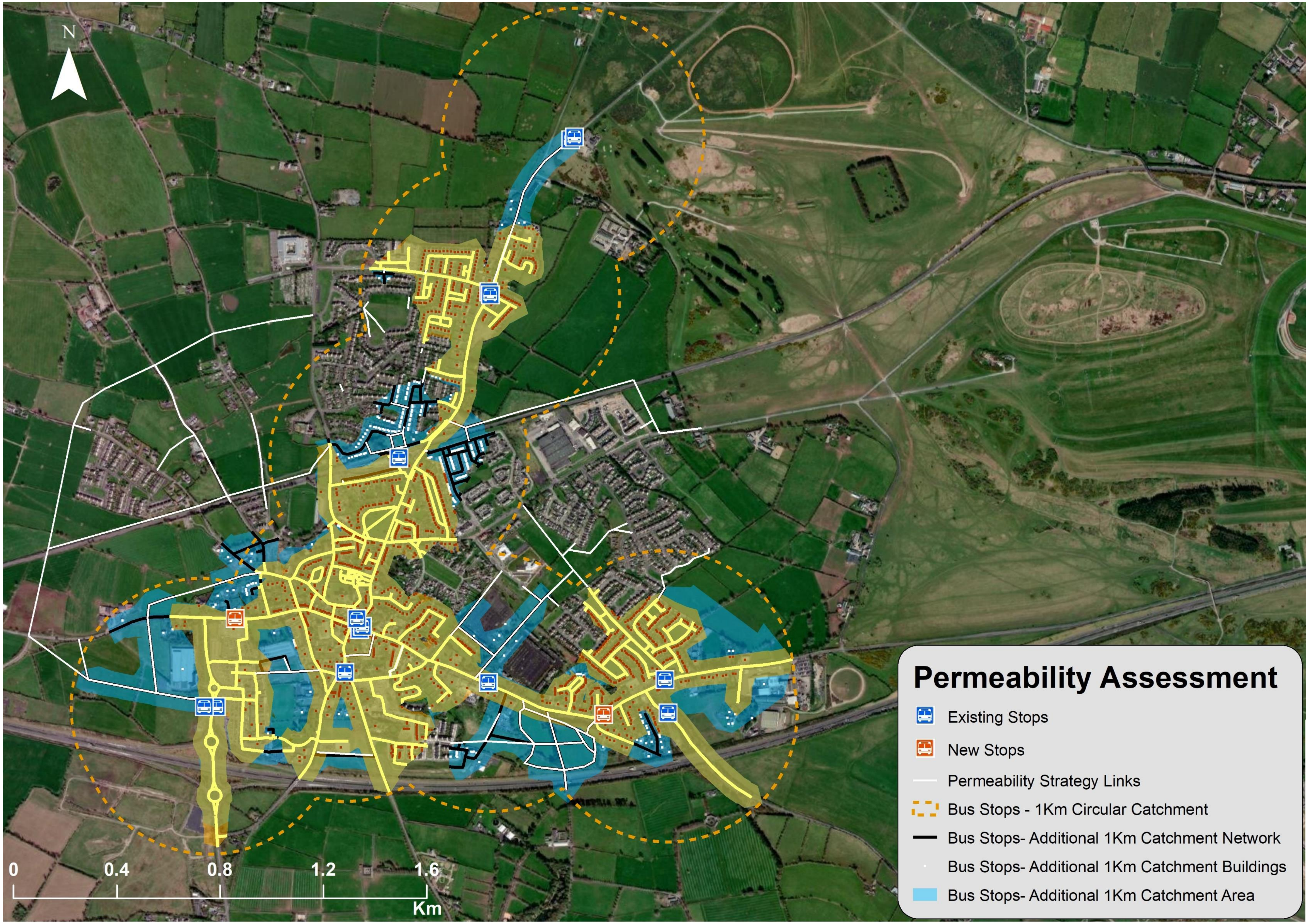


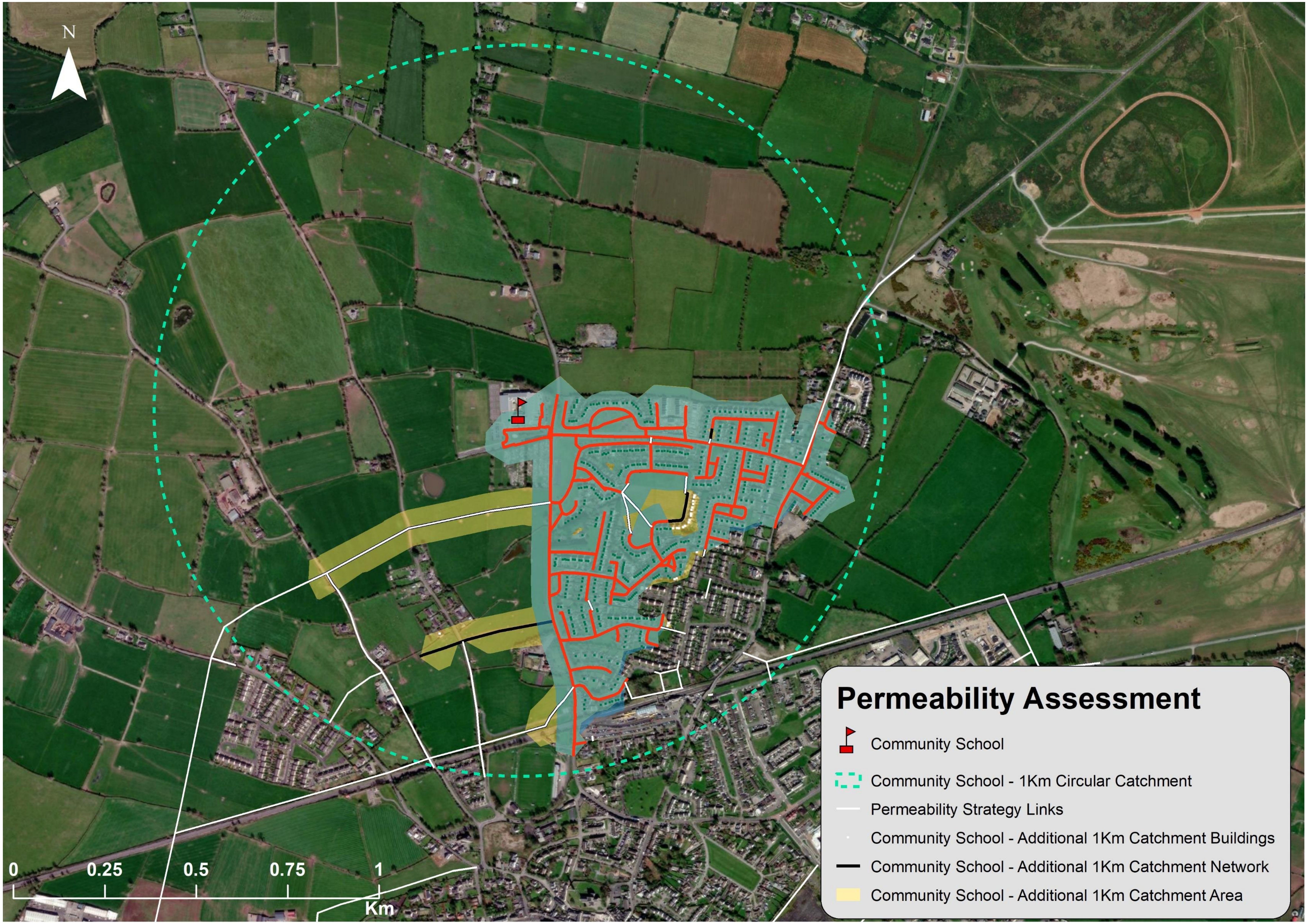
Permeability Strategy Links (Short & Medium Term)
Link Type
New pedestrian / cyclist path
Pedestrian / Cyclist bridge
Planned Footpath
Planned road with footpaths
Proposed greenway
New Footpath on existing road
Cherry Avenue Park
N
0
0.25
0.5
0.75
1
Km
1
2
3
4
6
7
8
9
13
14
16
17
18
21
22
23
24
26
27
28
29
30
31
32
33
34
35
36
39
42

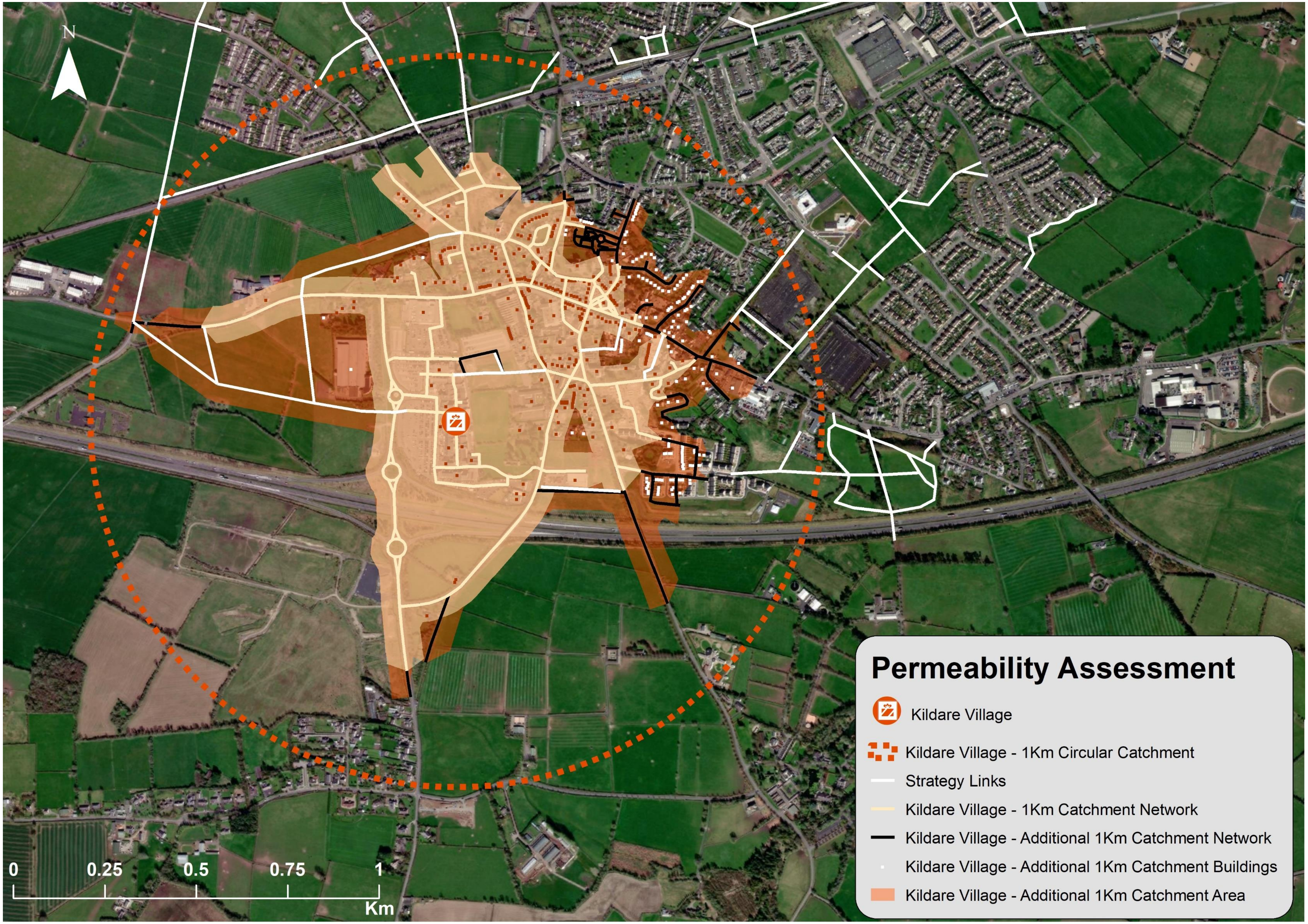

N
Permeability Strategy
Links (Short, Medium and Long Term)
Link Type
New pedestrian / cyclist path
Pedestrian / Cyclist bridge
Planned Footpath
Planned road with footpaths
Proposed greenway
New Footpath on existing road
Cherry Avenue Park
0
0.25
0.5
0.75
1
Km
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42

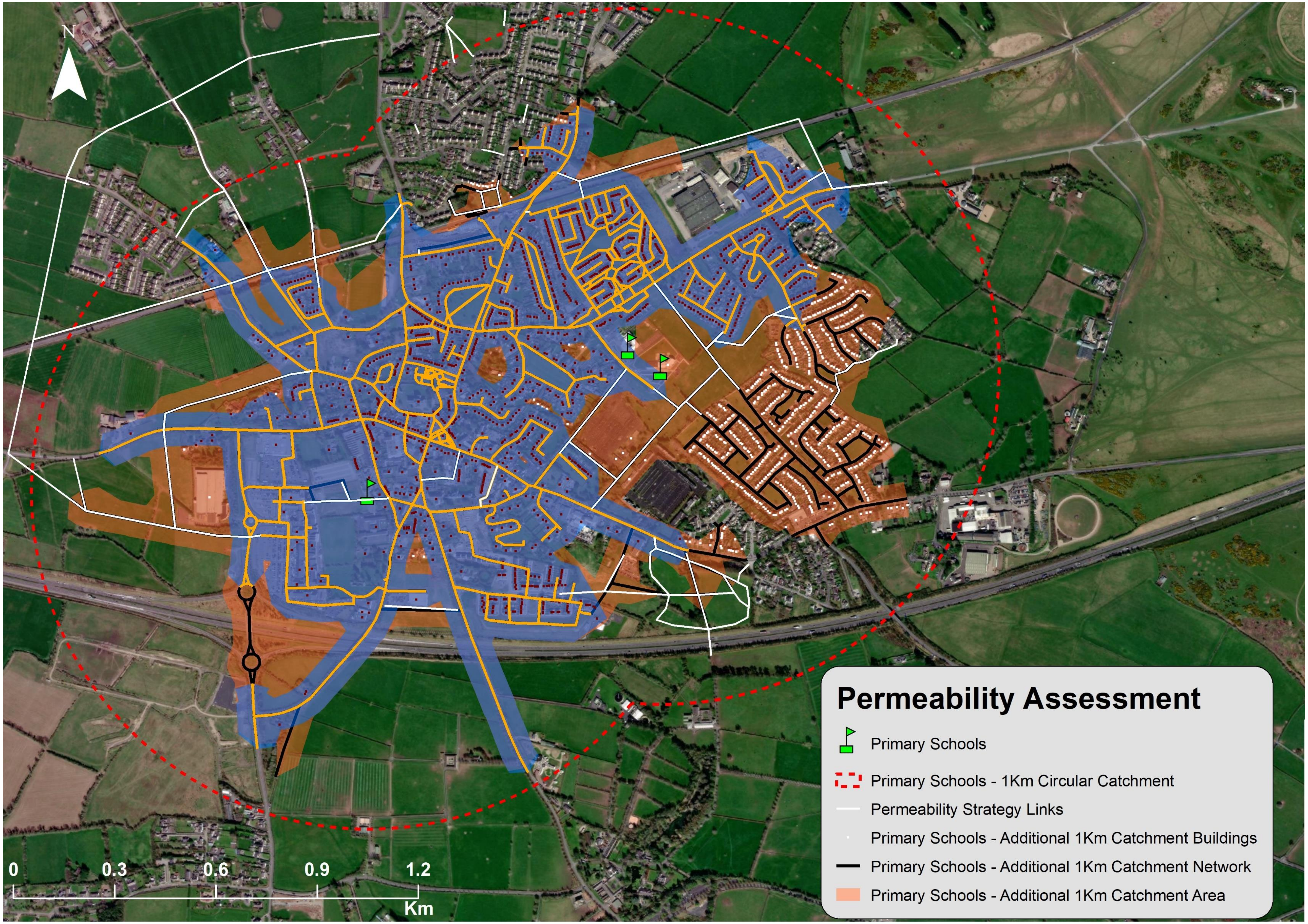
Appendix F: Permeability Strategy A3

Catchment Maps

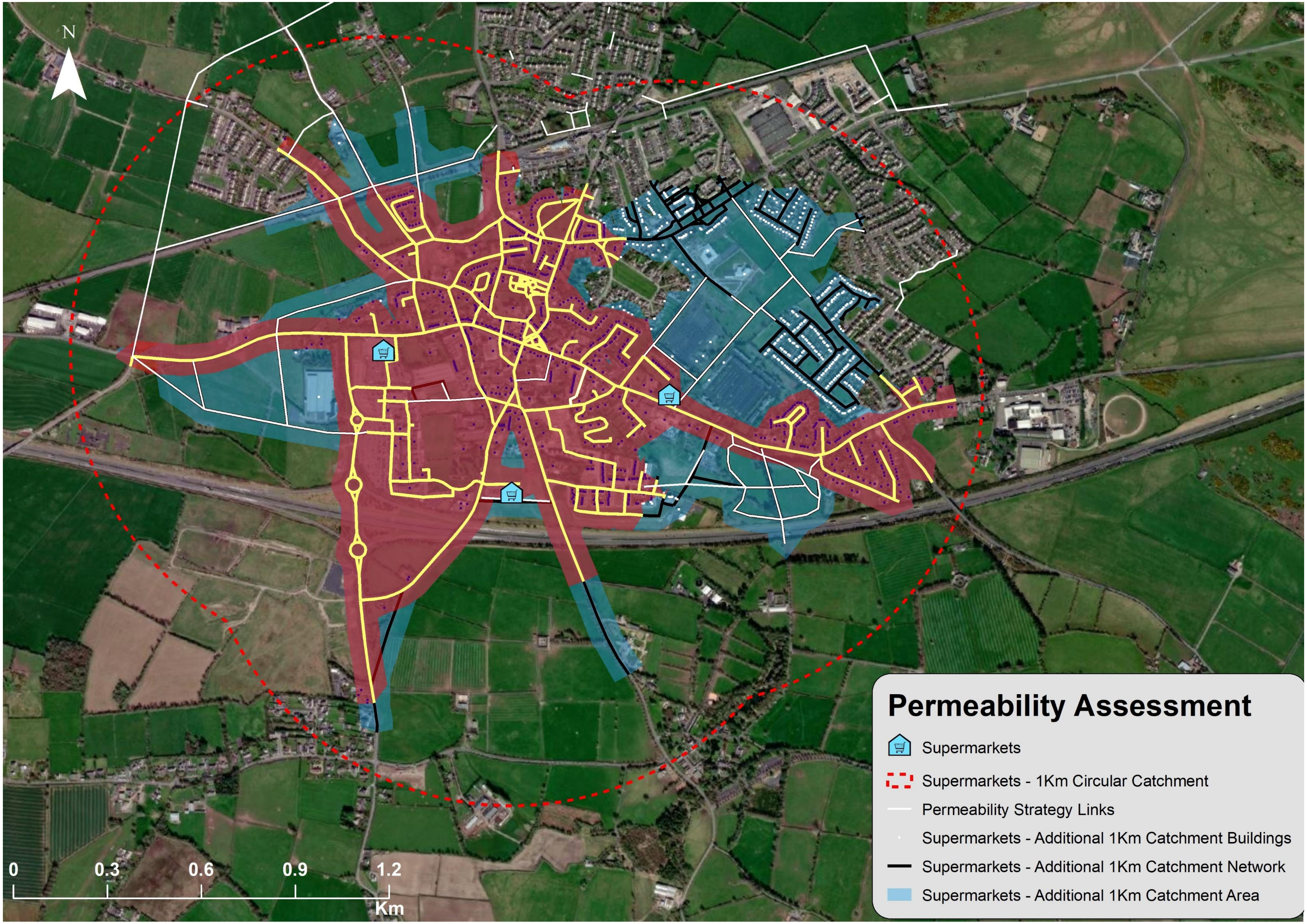

N
Permeability Assessment
Existing Stops
New Stops
Permeability Strategy Links
Bus Stops - 1Km Circular Catchment
Bus Stops- Additional 1Km Catchment Network
Bus Stops- Additional 1Km Catchment Buildings
Bus Stops- Additional 1Km Catchment Area
0
0.4
0.8
1.2
1.6
Km

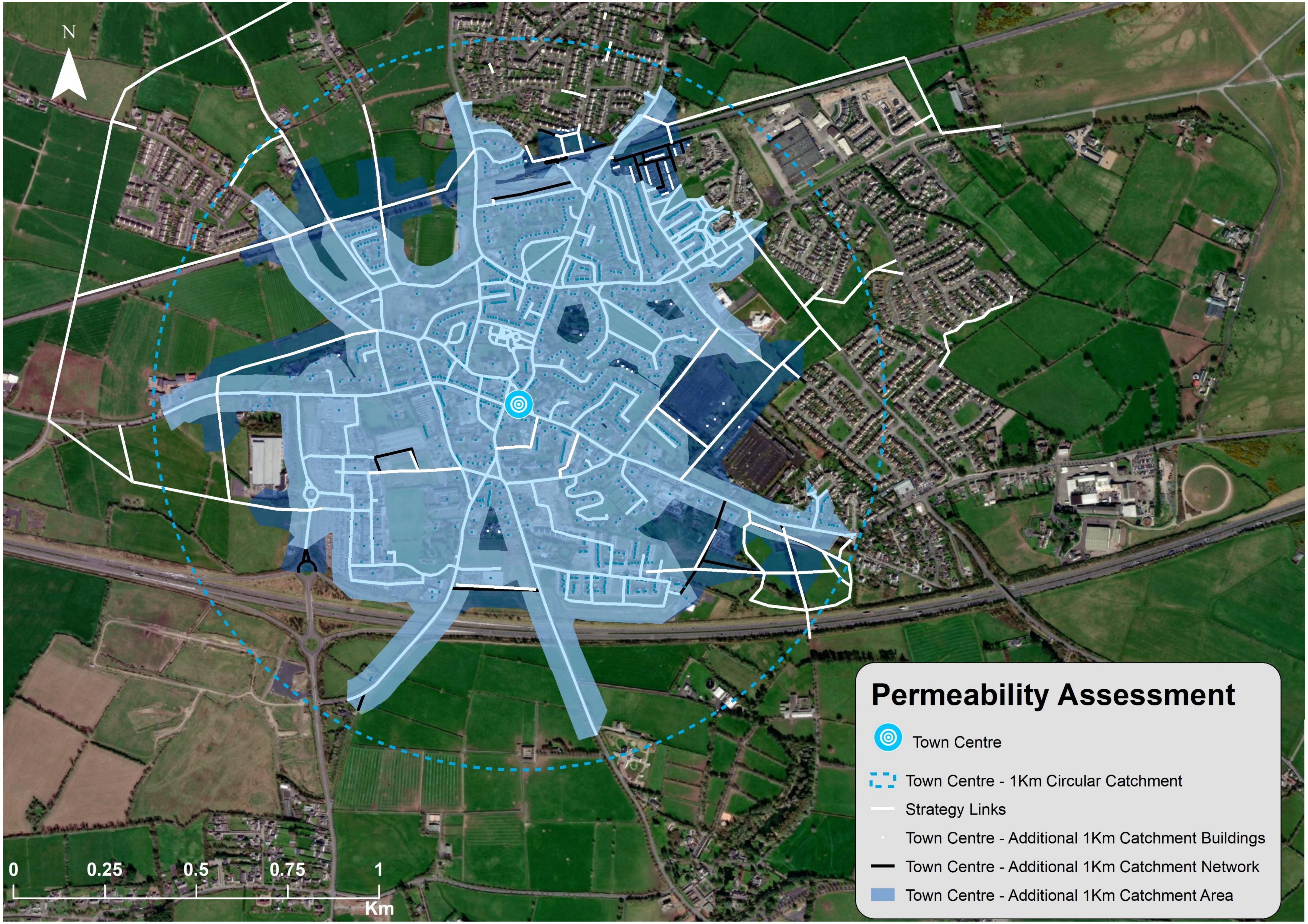

N
Permeability Assessment
Community School
Community School - 1Km Circular Catchment
Permeability Strategy Links
Community School - Additional 1Km Catchment Buildings
Community School - Additional 1Km Catchment Network
Community School - Additional 1Km Catchment Area
0
0.25
0.5
0.75
1
Km


N
Permeability Assessment
Kildare Village
Kildare Village - 1Km Circular Catchment
Strategy Links
Kildare Village - 1Km Catchment Network
Kildare Village - Additional 1Km Catchment Network
Kildare Village - Additional 1Km Catchment Buildings
Kildare Village - Additional 1Km Catchment Area
0
0.25
0.5
0.75
1
Km

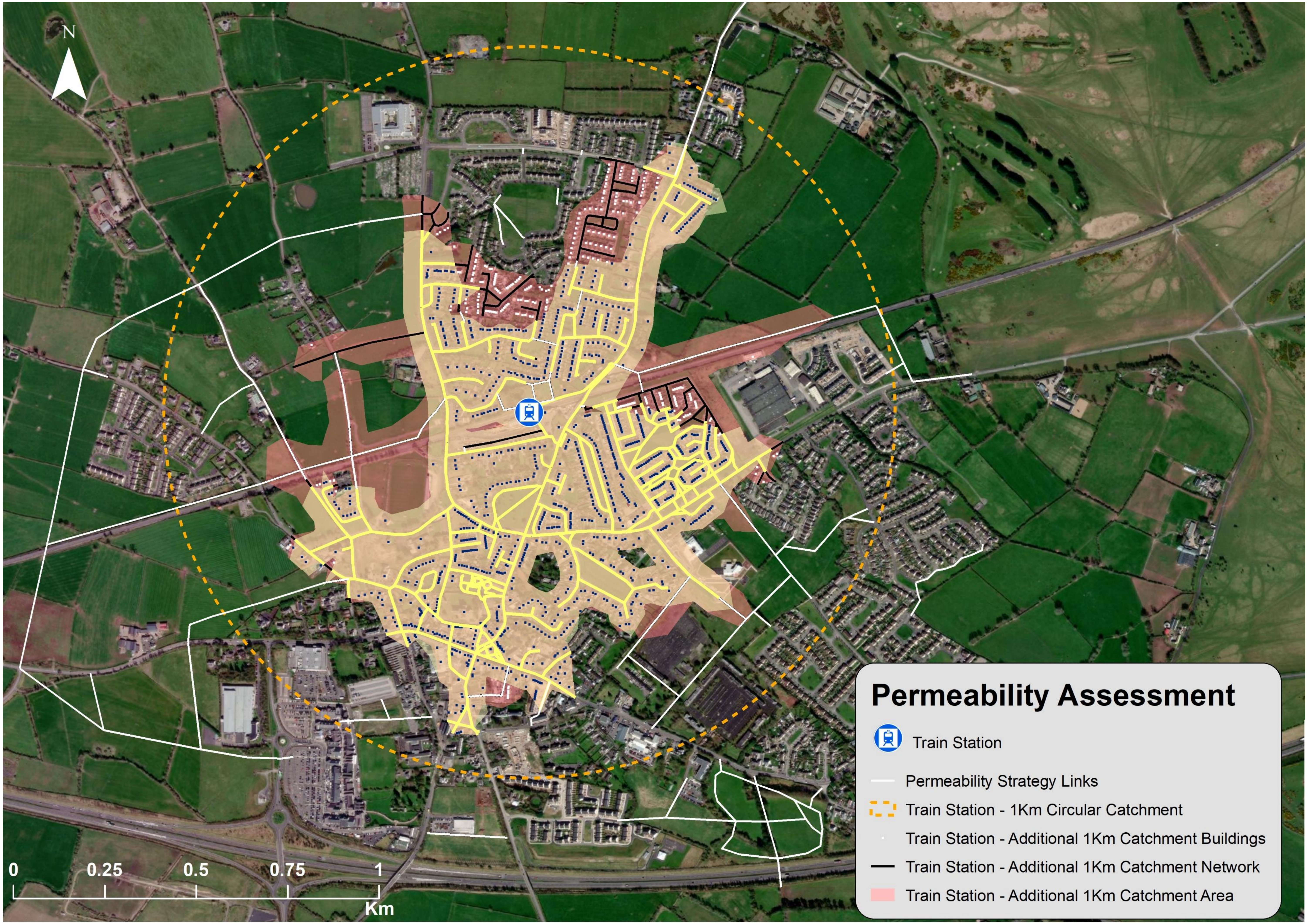


N
Permeability Assessment
Primary Schools
Primary Schools - 1Km Circular Catchment
Permeability Strategy Links
Primary Schools - Additional 1Km Catchment Buildings
Primary Schools - Additional 1Km Catchment Network
Primary Schools - Additional 1Km Catchment Area
0
0.3
0.6
0.9
1.2
Km


N
Permeability Assessment
Supermarkets
Supermarkets - 1Km Circular Catchment
Permeability Strategy Links
Supermarkets - Additional 1Km Catchment Buildings
Supermarkets - Additional 1Km Catchment Network
Supermarkets - Additional 1Km Catchment Area
0
0.3
0.6
0.9
1.2
Km



N
Permeability Assessment
Town Centre
Town Centre - 1Km Circular Catchment
Strategy Links
Town Centre - Additional 1Km Catchment Buildings
Town Centre - Additional 1Km Catchment Network
Town Centre - Additional 1Km Catchment Area
0
0.25
0.5
0.75
1
Km


N
0
0.25
0.5
0.75
1
Km
Permeability Assessment
Train Station
Permeability Strategy Links
Train Station - 1Km Circular Catchment
Train Station - Additional 1Km Catchment Buildings
Train Station - Additional 1Km Catchment Network
Train Station - Additional 1Km Catchment Area