TECHNICAL NOTE

Bradford on Avon Traffic Study

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1. Introduction & Background Context

1.1 Introduction of the Study

In 2021, Bradford on Avon Town Council consulted residents of the town regarding the 'Future of Transport' - to understand local priorities to improve transport within the town. The consultation followed a temporary traffic management system introduced during the Covid pandemic which made some town centre streets one-way for motorised traffic, reallocating road space to pedestrians and cyclists to aid social distancing in the town centre. Analysis of responses to the consultation highlighted three key issues which local people want to see addressed;

- Pedestrian and cyclist safety
- Traffic volumes
- Air quality

AtkinsRéalis has been commissioned by Wiltshire Council and Bradford on Avon Town Council to build and use a microsimulation traffic model to consider interventions to achieve the optimum traffic system in the town in order to address the three key issues identified in the Future of Transport consultation. The study considers the feedback to the temporary Covid traffic management scheme and seeks to identify a traffic management arrangement that can address the issues in the town on a long-term basis.

Study Aims

An inception meeting took place in early June 2023 with representatives from AtkinsRéalis, Wiltshire Council and Bradford on Avon Town Council which confirmed the vision and aims for this study. The aims of this study are based on the three key issues identified in the Future of Transport consultation, albeit more focused in order to make them measurable in the context of this study.

1. To safely reallocate space to provide high-quality walking and cycling routes;
2. To facilitate slow but steady traffic movements in the town; and,
3. To improve air quality in the town.

Traffic volume was identified as a key issue by the consultation. The scope of this study cannot consider measures to reduce traffic volume in the town in full – much of the town centre traffic are through trips, and a wider consideration of re-routing and knock-on impacts throughout the network is required. This study is focussed on trips within the town network, and therefore is based on an assumption that across town movements remain, and any re-routing will be within the Bradford on Avon town network. Hence the focus of this study is to facilitate slow but steady traffic movement – to minimise congestion, but prevent fast vehicle movements that would generate safety concerns and potentially attract further traffic.

The overall aim of the study is to create a new traffic management system that moderates traffic speeds whilst simultaneously improving air quality and improving the street environment for people walking, cycling and spending time in the town centre.

1.2 Existing Transport Context

The town is made up of narrow streets with insufficient capacity for the number of vehicles passing through the town, leading to congestion which consequently has a detrimental impact on air quality. Footways are generally very narrow, and there have been numerous collisions in the town centre in recent years, including pedestrians and cyclists being clipped by wing mirrors and/or knocked off their bikes. Crossing opportunities are limited and the traffic dominated streets can be uncomfortable for pedestrians.

Although the town bridge caters for two-way traffic, the town bridge has very narrow footways and little opportunity to widen them within the existing bridge structure. The bridge carries between 15,000 – 20,000

vehicle trips per day, with 2,500 – 4,000 pedestrian trips per day[1]. Despite weight restrictions on the bridge (vehicle must not exceed 18 tonnes), HGVs are known to cross the bridge, causing congestion through the narrow streets of the town and putting pressure on the structure of the bridge. There are also several other narrow pinch points in the town which have an impact on traffic movements, including Market Street and Silver Street.

1.3 Policy Context

1.3.1 Bradford on Avon Neighbourhood Plan 2013-2026

One of the objectives of the Bradford on Avon Neighbourhood Plan 2013 – 2026[2] is to improve the pedestrian environment in the town, encouraging people to walk or cycle rather than use their cars thereby assisting in the improvement of the overall environment and air quality. It also aims to ensure that future developments are located where they can easily be accessed by pedestrians, cyclists, and public transport, including where possible extending the footpath and cycle route networks.

1.3.2 The Wiltshire Local Transport Plan 3 (LTP3) Strategy

The Wiltshire LTP3 Strategy discusses the Bradford on Avon Historic Core Zone (HCZ) Project. The key aims of this project were to create a zone that re-balances the relationship between vehicles and pedestrians and reduces traffic dominance, improve accessibility and safety for pedestrians, cyclists, public transport users and mobility impaired people and to ensure that traffic can still move through the town with sufficient parking provision for these vehicles. It also aimed to ensure that traffic speeds and flows are in balance with the proximity of people within the HCZ and that the character and appearance of the town was preserved and enhanced. Following consultation and a referendum, the HCZ did not gain sufficient local support to be implemented.

1.4 Social Distancing Scheme

The scheme was requested by the Town Council in April 2020 and implemented by Wiltshire Council in August 2020 (See Figure 1.1). The legal basis of the scheme was a Temporary Traffic Regulation Order which was put in place for 12 months with a maximum possible duration of 18 months. This scheme was removed in July 2021.

Wiltshire Council and Bradford on Avon Town Council worked in partnership on this project. It aimed to allow residents and visitors to socially distance whilst walking through the town, in order to reduce the risk of transmission of COVID-19.

The scheme included measures to turn narrow streets into one-way traffic to allow space to be reallocated to pedestrians. Market Street became one-way northbound, and Silver Street became one-way westbound. This change impacted the surrounding roads such as Woolley Street and Masons Lane.

The town bridge is a pedestrian pinch point and as part of the social distancing scheme a signal-controlled shuttle was introduced on the bridge. This was however removed within a few weeks due to the wider congestion that resulted.

The scheme required eastbound buses on Silver Street to divert up Market Street, along New Road / Springfield to the roundabout junction with Holt Road, perform a U-turn and return along New Road / Springfield along their normal route. This diversion added to the service journey time and is not sustainable on long-term / permanent basis.

[1] Data recorded from existing automatic traffic sensors.
[2] The Town Council are currently in the process of reviewing the neighbourhood plan.

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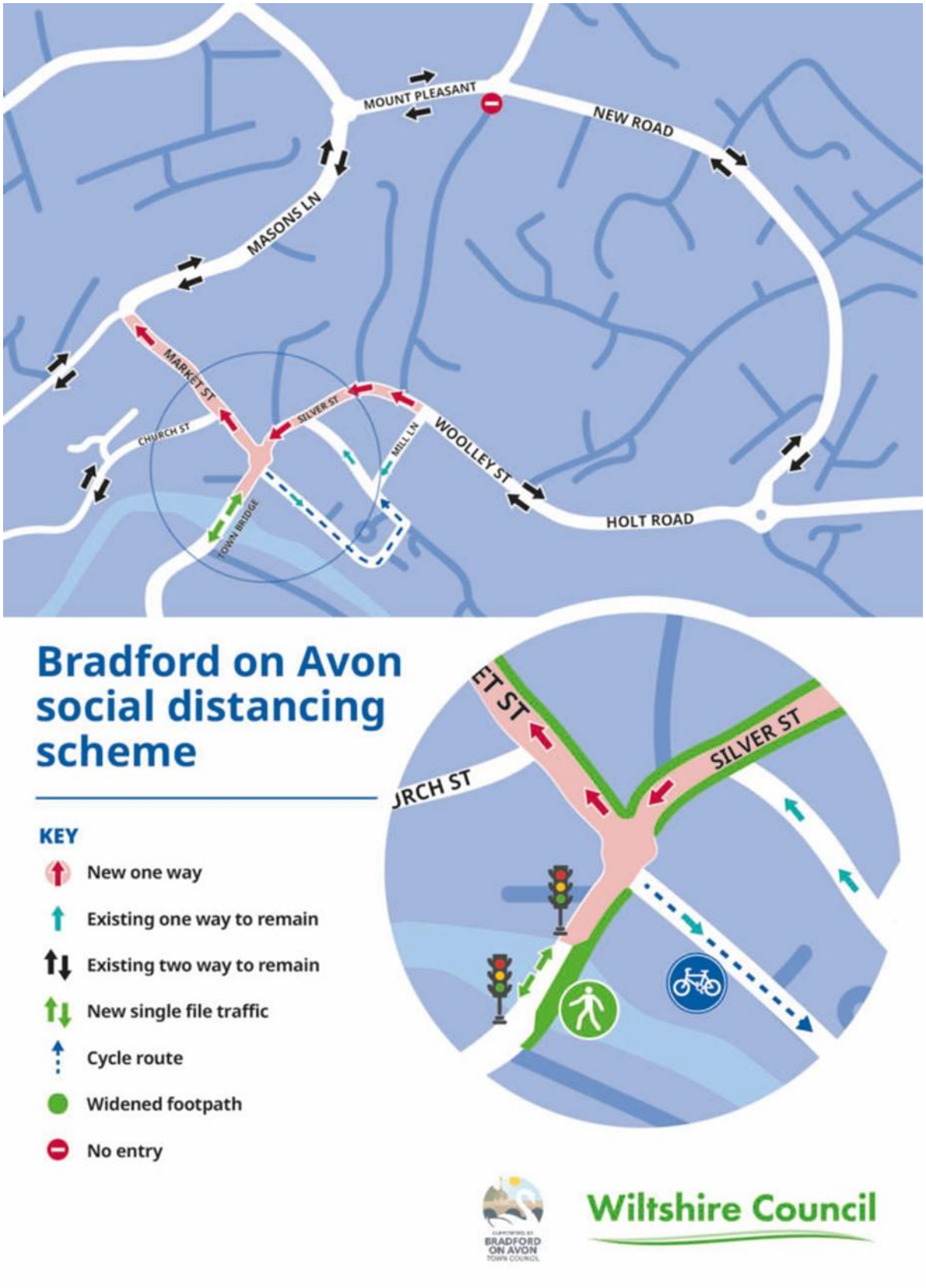
Feedback collected by the Future of Transport Consultation showed that the scheme was generally popular at the time. However, this scheme caused some roads in the town to see a very high increase in traffic volume – notably in the north-east (New Road, Springfield) and to the east (Holt Road).

Figure 1.1 – Bradford on Avon Social Distancing Scheme[3]



[3] Social Distancing Scheme implementation - Bradford on Avon Town Council

1.5 Future of Transport Consultation

The Future of Transport consultation launched in late 2021 to gather the views, needs and priorities related to transport issues of residents and businesses in the area.

Over 2,000 people responded to the consultation. 95% of participants identified traffic as either a 'major problem' or 'a problem' in town. 88% of respondents were concerned about climate change, however only 27% of participants believe their travel behaviours contribute to the climate crisis.

For those respondents travelling into, out of and through Bradford on Avon on a weekly basis, the private car (55%) was the most frequent form of transport. Respondents stated they would use their car less frequently if there was better access to public transport (52%) and cycling and walking facilities in the area (43%).

Respondents top three priorities were:

- Pedestrian and cyclist safety,
- Air quality, and
- Traffic volume.

Respondents top four suggested improvements were:

- A new bridge for pedestrians and cyclists,
- Reduced speed limits,
- Wider pavements, and
- Better air quality.

A new bridge for pedestrians and cyclists was considered as part of the option longlist (discussed in section 4.1) but was discounted for this study as it did not achieve the objectives of improving air quality and achieving slow and steady traffic flows. The Town Council recognise that pedestrian and cyclist movement across the bridge is currently dangerous, and as a result this issue is being addressed by a separate project.

1.6 Collision Data

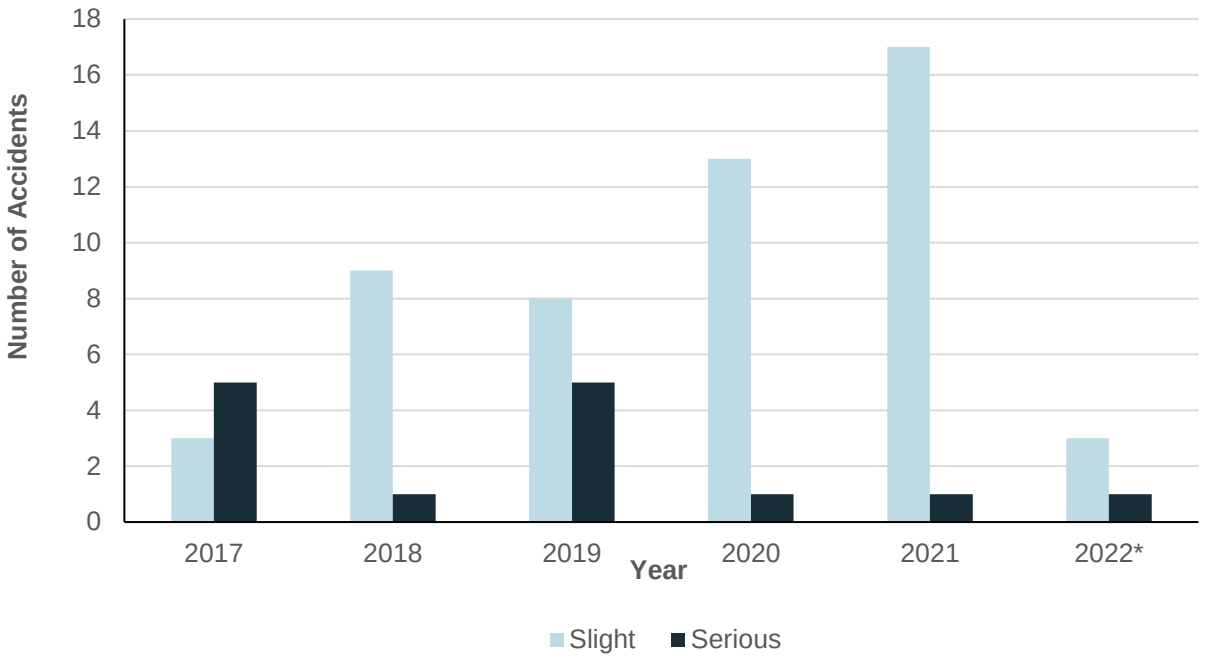
This section presents collision data within Bradford on Avon. For the period between January 2017 and June 2022, a total of 67 collisions were recorded, of which 53 were slight collisions, 14 were categorised as serious (significant and long-term injuries) and none were fatal. It should be noted that at the time of analysis, 2022 data was provisional and only covered the period between January – June 2022. The statistics are shown in Table 1.1 and Figure 1.2.

Table 1.1 - Reported road traffic collisions for Bradford on Avon (2017 to 2022)[4]

Severity	2017	2018	2019	2020	2021	2022*	Total
Fatal	0	0	0	0	0	0	0
Serious	5	1	5	1	1	1	14
Slight	3	9	8	13	17	3	53
Total	**8**	**10**	**13**	**14**	**18**	**4**	**67**

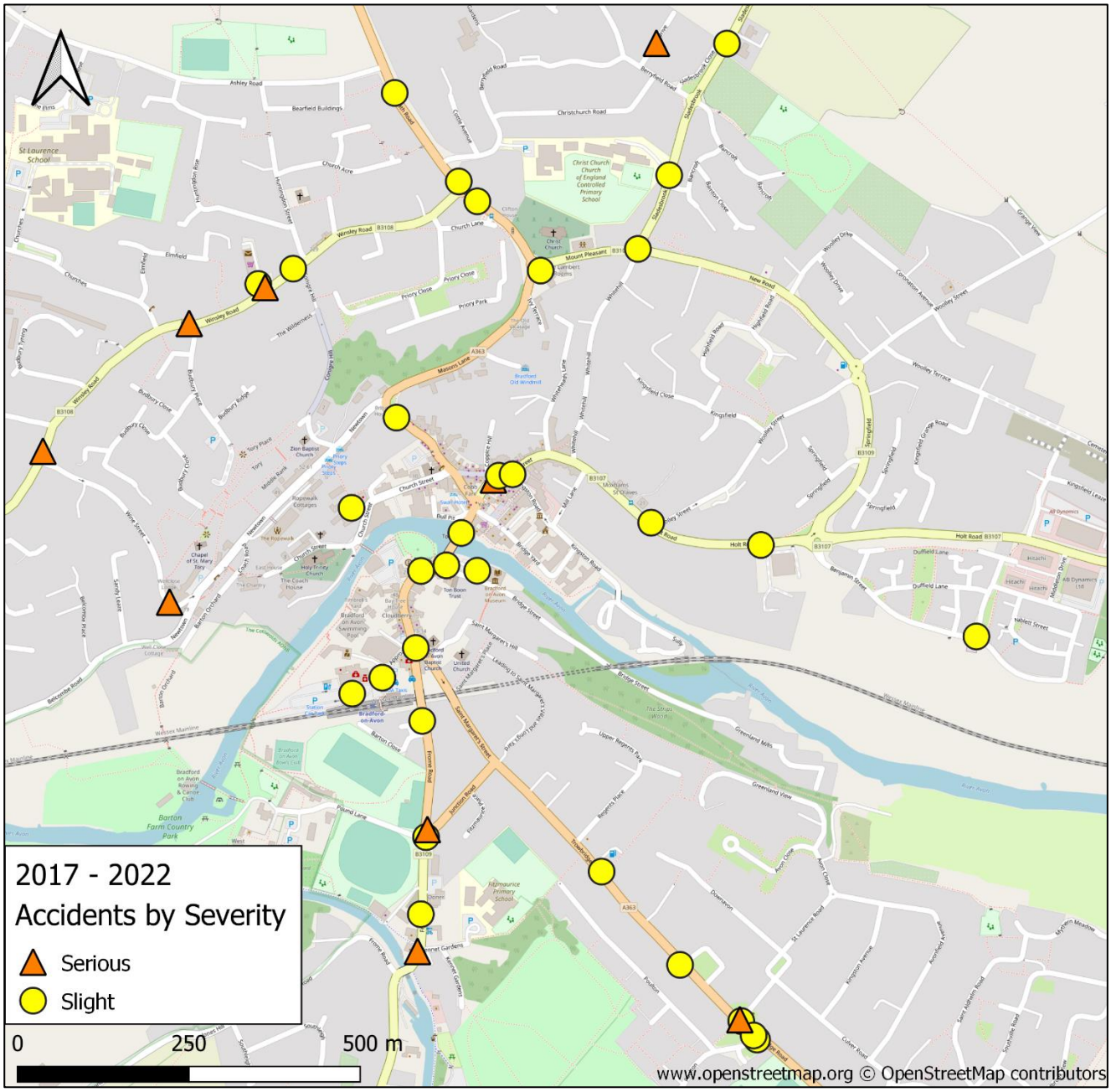
[4] Road Safety Data - data.gov.uk * Provisional mid-year data (Jan-June only)

Figure 1.2 - Reported road traffic collisions for Bradford on Avon



This analysis shows an increase in collisions from 2017 to 2021. Overall, collision locations are evenly distributed across the town and neighbouring areas, with clusters around Town Bridge and around the Station area. The locations of collisions, shown by severity, are presented in Figure 1.3.

Figure 1.3 - Locations of collisions by severity (2017 to June 2022)

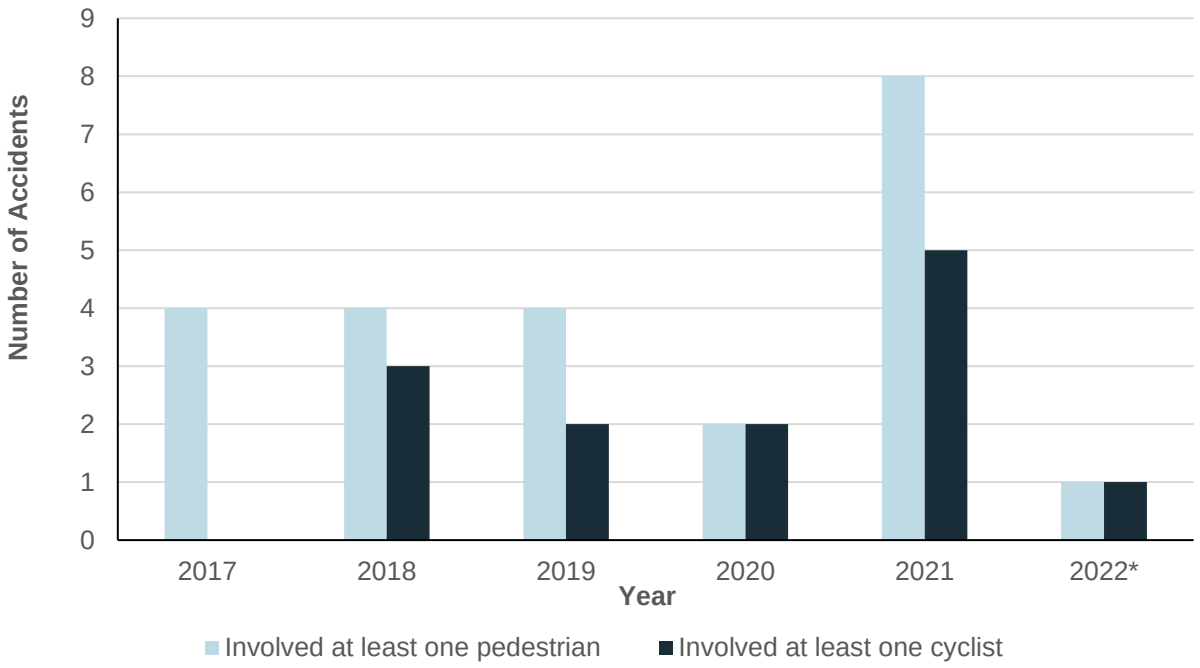


Pedestrian and cyclist involvement in these collisions has also been analysed. A summary of this analysis is shown in Table 1.2 and Figure 1.4.

Table 1.2 – Reported pedestrian and cyclists' involvement in traffic collisions for Bradford on Avon (2017 to 2022)[5]

Involvement	2017	2018	2019	2020	2021	2022*	Total
Pedestrian	4	3	4	2	8	1	22
Cyclist	0	2	2	2	5	1	12
Both	0	1	0	0	0	0	1
Total	**4**	**6**	**6**	**4**	**13**	**2**	**35**

Figure 1.4 – Reported pedestrian and cyclists' involvement in traffic collisions for Bradford on Avon (2017 to 2022)

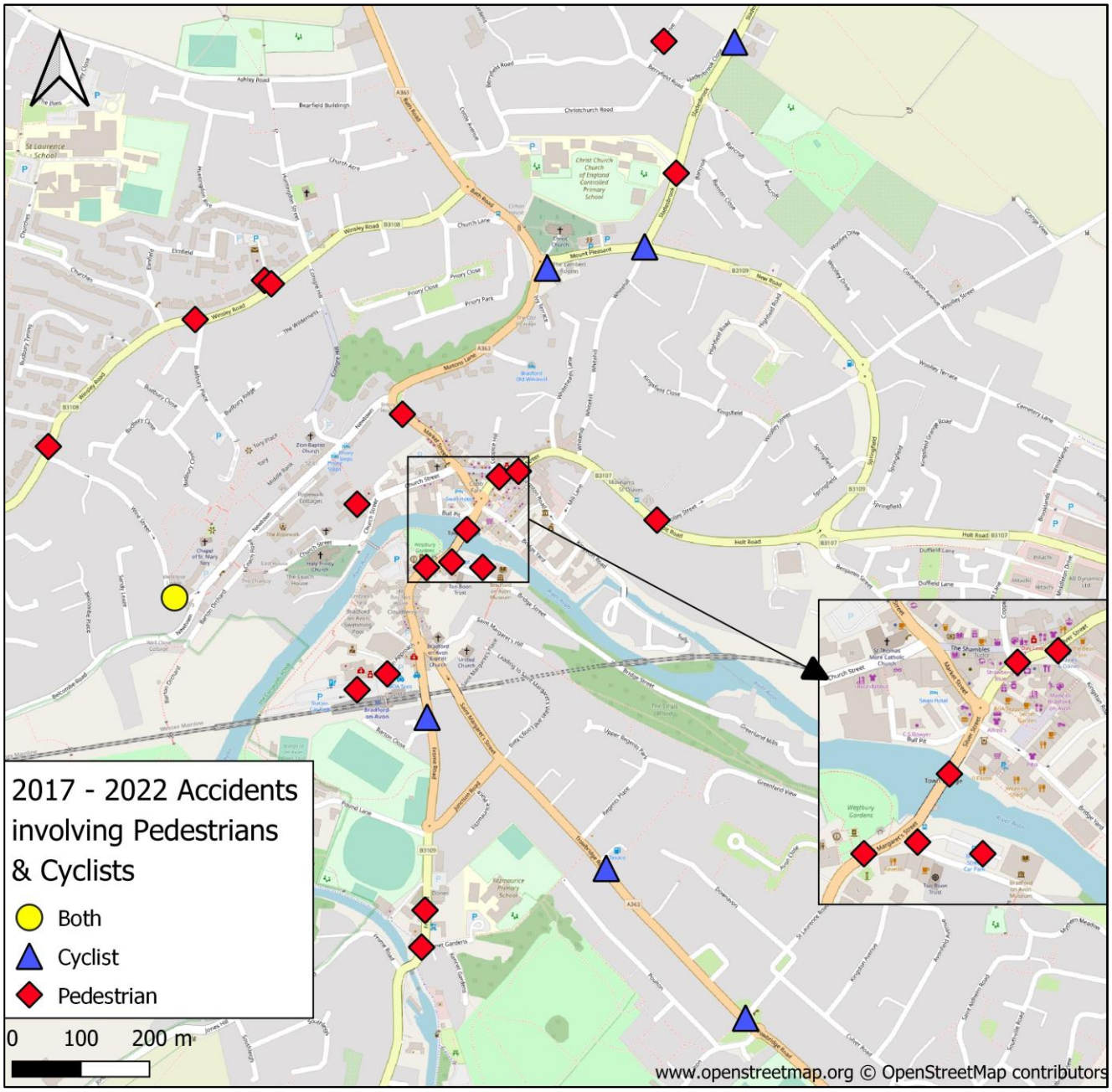


This analysis shows a notable increase in pedestrian/cyclist involvement in 2021. However, none of these 2021 collisions took place in locations where the Social Distancing Scheme one-way system was implemented. One collision in May 2021 which involved a pedestrian took place on the town bridge.

A map showing the locations of collisions involving pedestrians and/or cyclists is presented in Figure 1.5.

[5] Road Safety Data - data.gov.uk *Provisional mid-year data (Jan-June only)

Figure 1.5 - Locations of collisions involving pedestrians and cyclists (2017 to June 2022)[6]



It should be recognised that not all traffic collisions are reported. The data presented above only shows traffic collisions which were reported to the police and resulted in personal injury in the period of January 2017 to June 2022.

In summary, the total number of reported road traffic collisions between 2017 and 2021 steadily increased, including the number of collisions involving pedestrians and cyclists specifically. 2021 had the highest number of total reported collisions and collisions involving pedestrians and cyclists, however only one accident occurred within the social distancing scheme extent and duration.

Pedestrian and cyclist safety has been a long-standing issue in the town, evidenced by the array of pedestrian and cyclist casualties over an extended period of time - Figure 1.6 show pedestrian and cycle collisions recorded over the previous 20 years (2002 – 2022).

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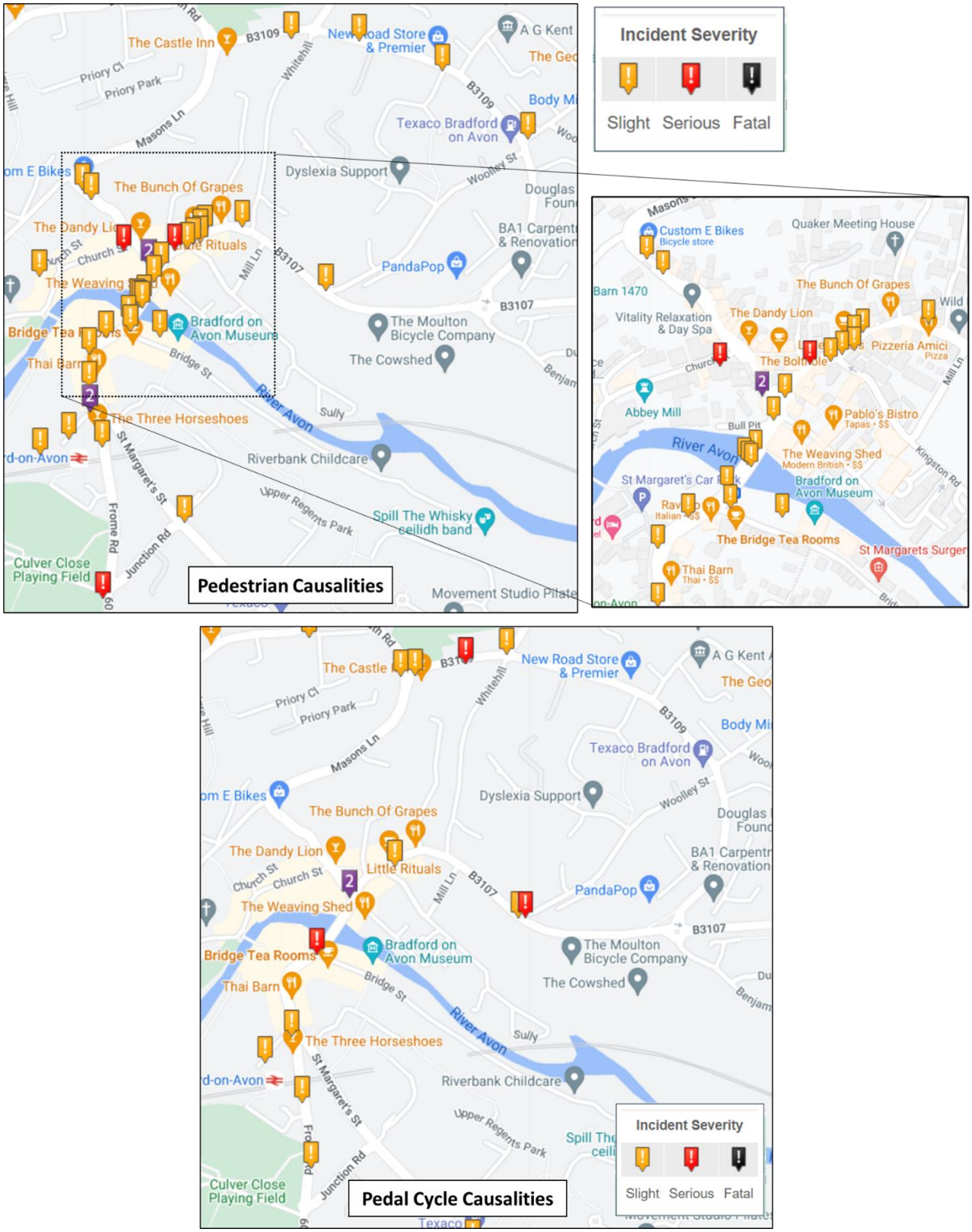
[6] Road Safety Data - data.gov.uk *Provisional mid-year data (Jan-June only)

Figure 1.6 – Pedestrian and pedal cycle casualties in Bradford on Avon town centre (2002 - 2022)



Source: CrashMap

2. Data Gathering

This section details the data obtained in preparation of developing the micro-simulation models.

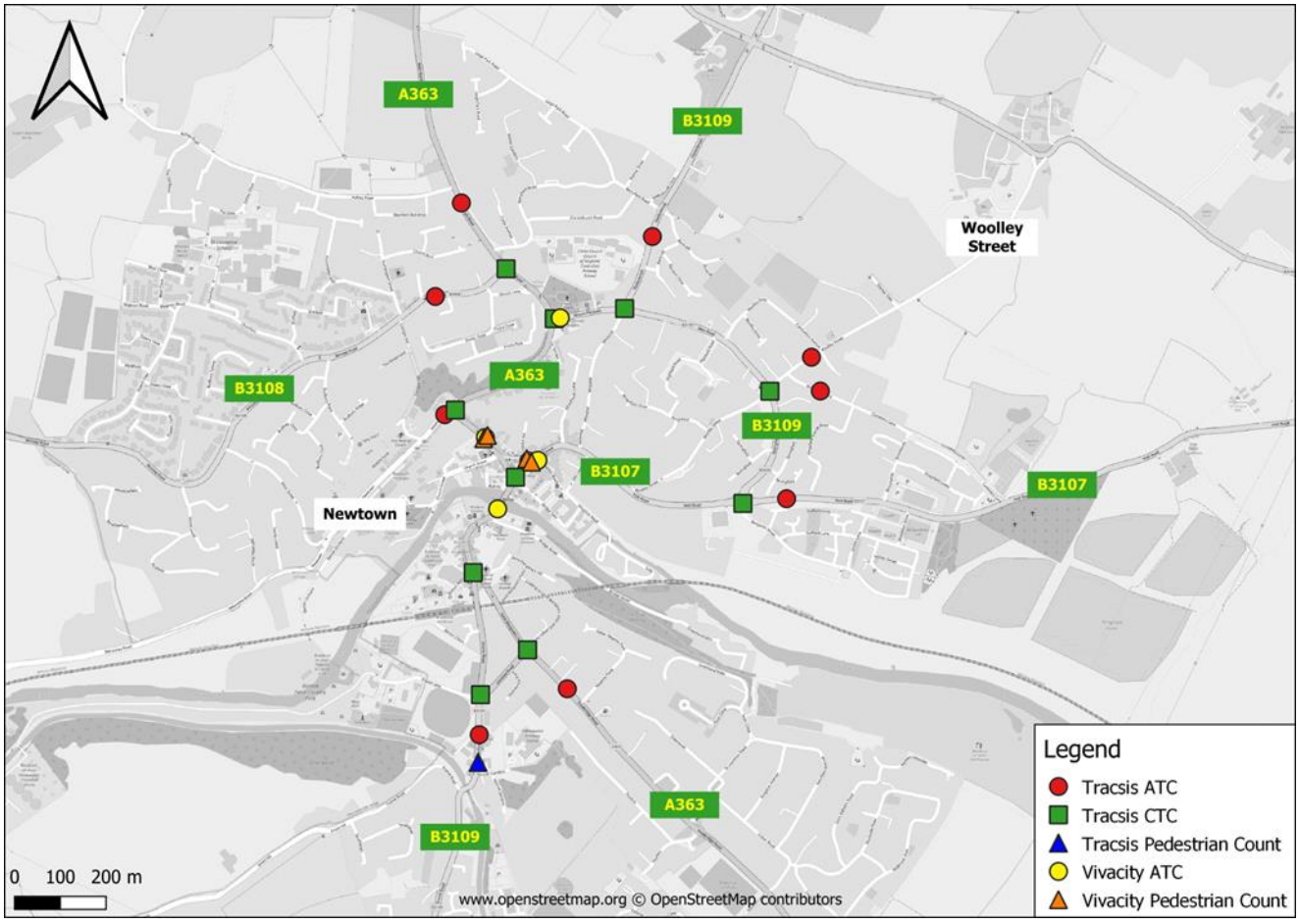
2.1 Turning Count Data

Traffic count data was obtained in July 2023 at 10 key junctions in Bradford on Avon and 9 key entry/exit points into the town.

Traffic surveys were conducted in Bradford on Avon between Saturday 1st July and Friday 14th July 2023. These dates were selected to avoid school holidays and major road works – specifically planned road works in Staverton which were due to have significant impacts on local traffic. St Margaret's Street was closed for the duration of the survey period due to roadworks on the railway bridge.

Classified junction turning counts (CTCs) were conducted at 10 locations across the town on Thursday 6th July 2023, covering a three-hour period in the morning (07:00-10:00) and a three-hour period in the afternoon / evening (16:00-19:00). Automatic traffic counts (ATCs) were conducted at 9 locations for the entire duration of the two-week period. Pedestrian count data was also obtained for the signalised pedestrian crossing on Frome Road given its close proximity to Fitzmaurice Primary School (as the frequency the signalised crossing is called will be represented in the traffic model). This data was verified against permanent automatic traffic counts available to the Council (Vivacity data) from the same time period. The locations of the traffic count sites are shown in Figure 2.1.

Figure 2.1 - Traffic Count Data Locations



From data analysis, it was found that the morning peak hour was 07:45-08:45 and the evening peak hour was 16:15-17:15. These are the two time periods in the day where there is the most traffic, typically aligning with commuting times and the morning school run.

2.2 Journey Time Data

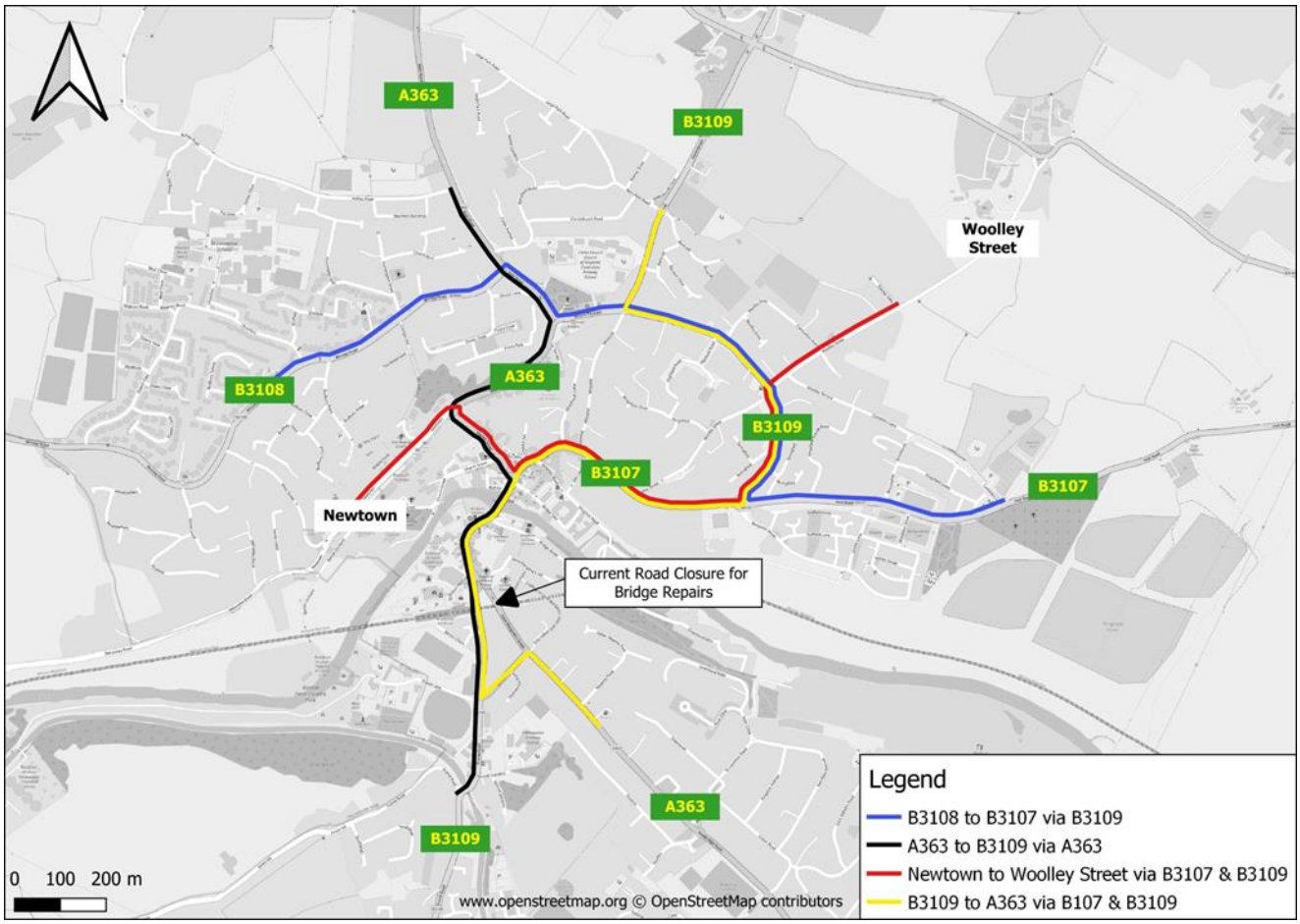
Journey time data has been sourced from Satellite-Navigation (Sat-Nav) devices from TomTom. Motorists who use Sat-Nav devices have the option to voluntarily allow anonymous data about their journeys to be collected and used to provide a range of services, including the analysis of historic journey times along specific routes. Journey times, excluding weekends, Mondays and Fridays, and school holidays, have been obtained from Tuesday 2nd May 2023 to Thursday 13th July 2023, to ensure data was consistent with normal peak period traffic conditions.

The routes chosen for journey time evaluation are shown in Figure 2.2 and include:

- B3108 to B3107 via B3109;
- A363 to B3109 via A363;
- Newtown to Woolley Street via B3107 & B3109; and,
- B3109 to A363 via B3107 & B3109.

Note that journey times have been evaluated for both directions.

Figure 2.2 - Journey Time Routes



2.3 Additional Data

Information on bus services was obtained from http://www.travelinesw.com/ and confirmed in discussions with Wiltshire Council. In addition to the town bus services, school bus routes and timetable information was also obtained from Wiltshire Council.

During the traffic count data collection, video surveys were also taken at 10 key junctions in the town (at each of the locations of the Classified Junction Turning Counts - 'Tracsis CTC' symbols in Figure 2.1). Observations from these were used to better understanding driving behaviour in the town.

3. Model of the Existing Situation

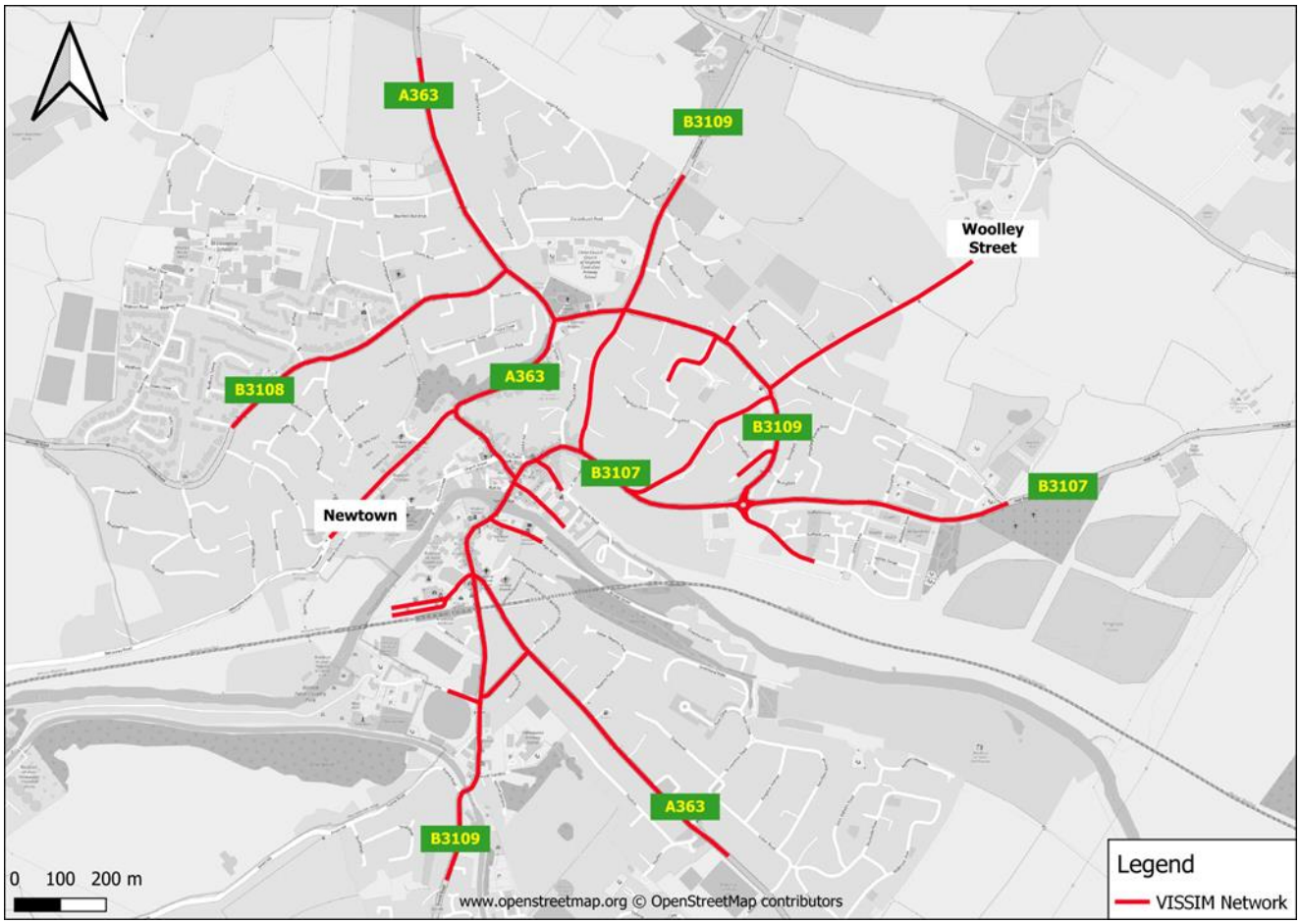
Traffic microsimulation models simulate vehicle behaviour within a predefined road network to predict the impacts of changes to traffic flows or from changes to the physical environment – in this case traffic management schemes within the centre of Bradford on Avon. Microsimulation models are useful for analysing traffic operation in urban areas, including traffic interactions of individual vehicles at junctions, roundabouts and pedestrian crossings.

This section details the process and outcome of modelling the existing situation i.e., the 'base' model. This model has been validated using industry best practice, the Department for Transport's Transport Analysis Guidance, to ensure that it is a good representation of the existing situation. The model can then be used to assess proposed interventions.

3.1 Model Network

The extent of the microsimulation base model network is shown in Figure 3.1.

Figure 3.1 - Model Network



3.2 Model Calibration and Validation

As mentioned previously, the base model traffic flows and journey times have been validated against the traffic count data and journey time data received. Industry best practice has been followed to ensure that the base

model is a good representation of the existing situation. This includes modelled journey times being within 15% of the observed journey times.

During this process, the model was further refined using observations from video surveys so that driving behaviour in the model represented driving behaviour observed on the ground.

The calibration results demonstrated a good match between modelled and observed turning movements within both peak periods. Accordingly, the 2023 base model was considered fit for purpose and deemed suitable to take forward for forecast year testing.

Due to road closure on St Margaret's Street for the bridge repairs during the survey period, the turning movements at the Station Approach roundabout, the Frome Road / Junction Road junction and the St Margaret's Street / Junction Road / Trowbridge Road junctions have not been included in the calibration process.

3.3 Base Model Results

Model runs cover the AM and PM peak hour periods (AM = 07:45 - 08:45, PM = 16:15 - 17:15). These peak hours were determined by an analysis of empirical traffic counts (discussed in section 2.1) which identified the busiest hour within each peak period (AM = 7:00 - 10:00, PM = 16:00 - 19:00).

Each separate model run recreates the operation of traffic within the network in real time. Within VISSIM, random seeds are used to account for day-to-day variability of traffic conditions. To improve the accuracy of the results, 20 iterations of the model were completed for each time period using different random seeds. The average result of these 20 iterations was used to produce the reported results.

Within the model traffic loads in from a designated origin and moves to a target destination (based on a pre-defined origin-destination matrix[7]) within the network. Within the microsimulation model, there is an inherent assumption that vehicles will not re-route outside of the model network (study area) to find an alternative route – for example avoiding Bradford on Avon completely.

Figure 3.2 and

Figure 3.3 show screenshots of the base model in operation for the AM and PM peak hours.

[7] An origin-destination matrix is a table which describes the pattern of vehicle trips within a defined time period (e.g. the AM-peak) between all origin / destination pairs.

Figure 3.2 - 2023 Base AM – Average Speed

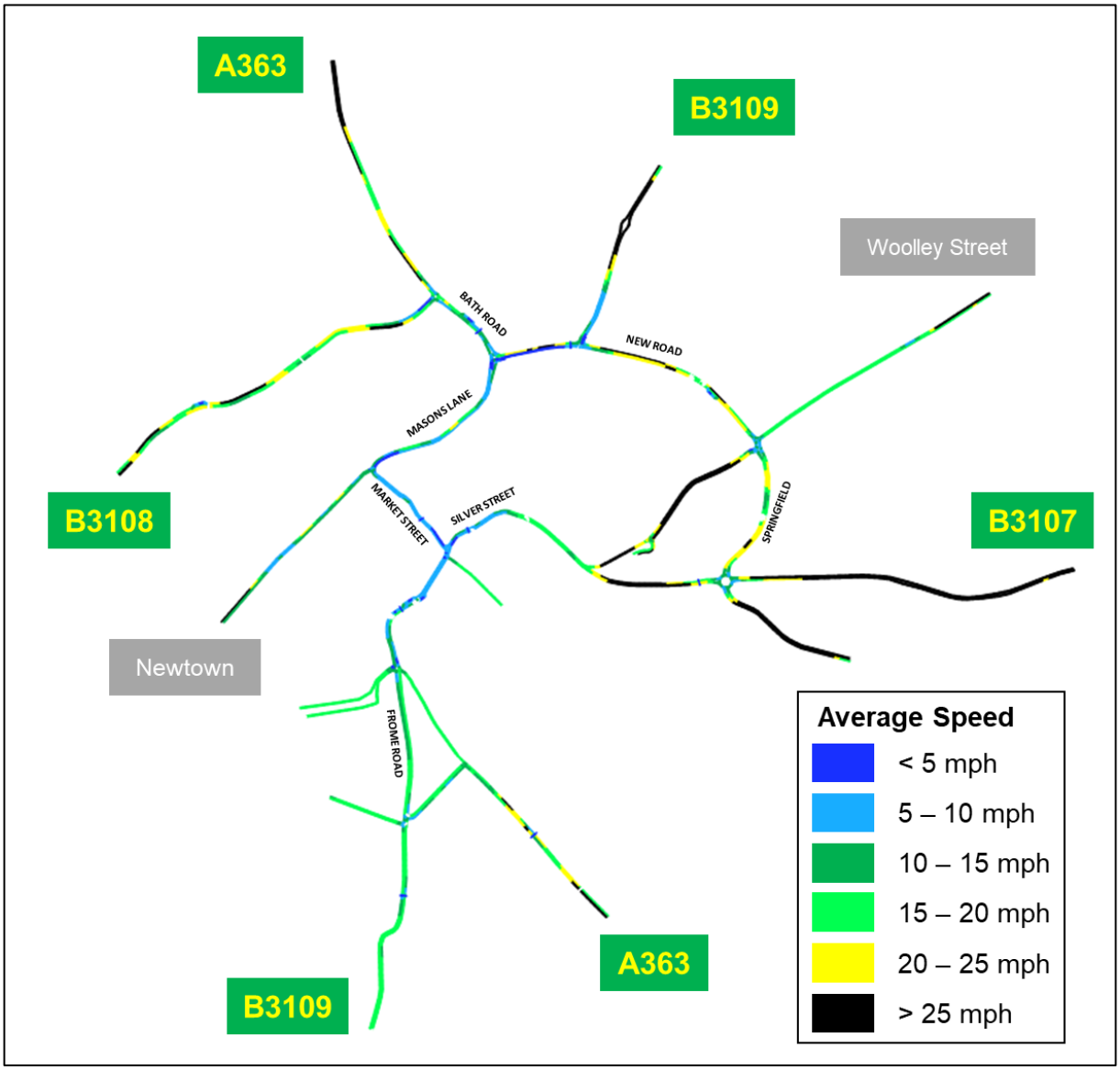
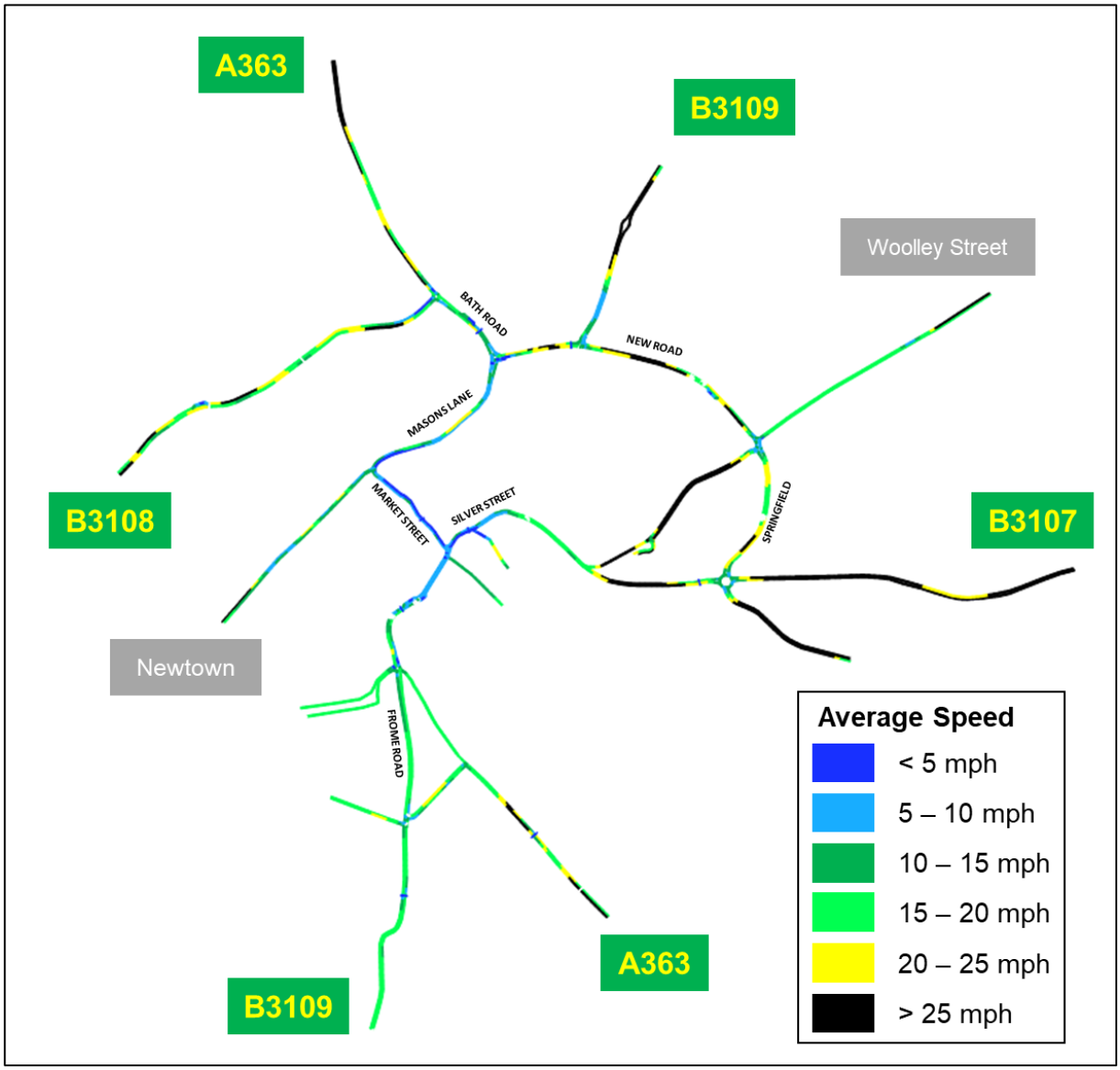


Figure 3.3 – 2023 Base PM – Average Speed



Currently, most traffic uses the A363 (Market Street and Masons Lane) when travelling north and south through the town. This route is particularly congested, especially given that sections of Market Street are very narrow and require vehicles to give way to each other without a particular direction having priority. This congestion extends south over the town bridge on to B3109 Frome Road.

4. Proposed Interventions

The section details the interventions proposed which have been assessed using the micro-simulation models.

4.1 Option Development

Following an inception meeting with Bradford on Avon Town Council and Wiltshire Council officers, site visits and analysis of the Future of Transport Consultation responses, a longlist of proposed interventions was developed and presented to the project team (Appendix A). A high-level assessment of the longlisted options against the study aims was completed, and following discussion with the project team, three shortlisted options were agreed to be evaluated using the microsimulation model:

- **Option A** - Market Street & Silver Street One-way
- **Option B** - Pinch Point Priority Narrowing
- **Option C** - Silver Street One-way & Market Street Priority Narrowing

The decision was made to model Option A and Option B initially, as they offered a useful comparison between schemes with varying degrees of change in terms of traffic operation, on-the-ground infrastructural changes, and potential for footway widening. Following the analysis of the model results for these two options and discussion with the project team, the decision was made to proceed by modelling Option C - a hybrid of Option A and Option B. Initially a variant of Option C which included two priority narrowing sections on Market Street (similar to Option B) was tested, however, this layout resulted in excessive congestion on Market Street and traffic heading southbound was unable to get past the priority narrowing section at the bottom of Market Street due to the constant flow of northbound traffic. To overcome this issue, Option C was optimised by removing the southern priority narrowing section on Market Street, retaining the northern priority narrowing section only.

The results are presented below in the order the model runs were completed.

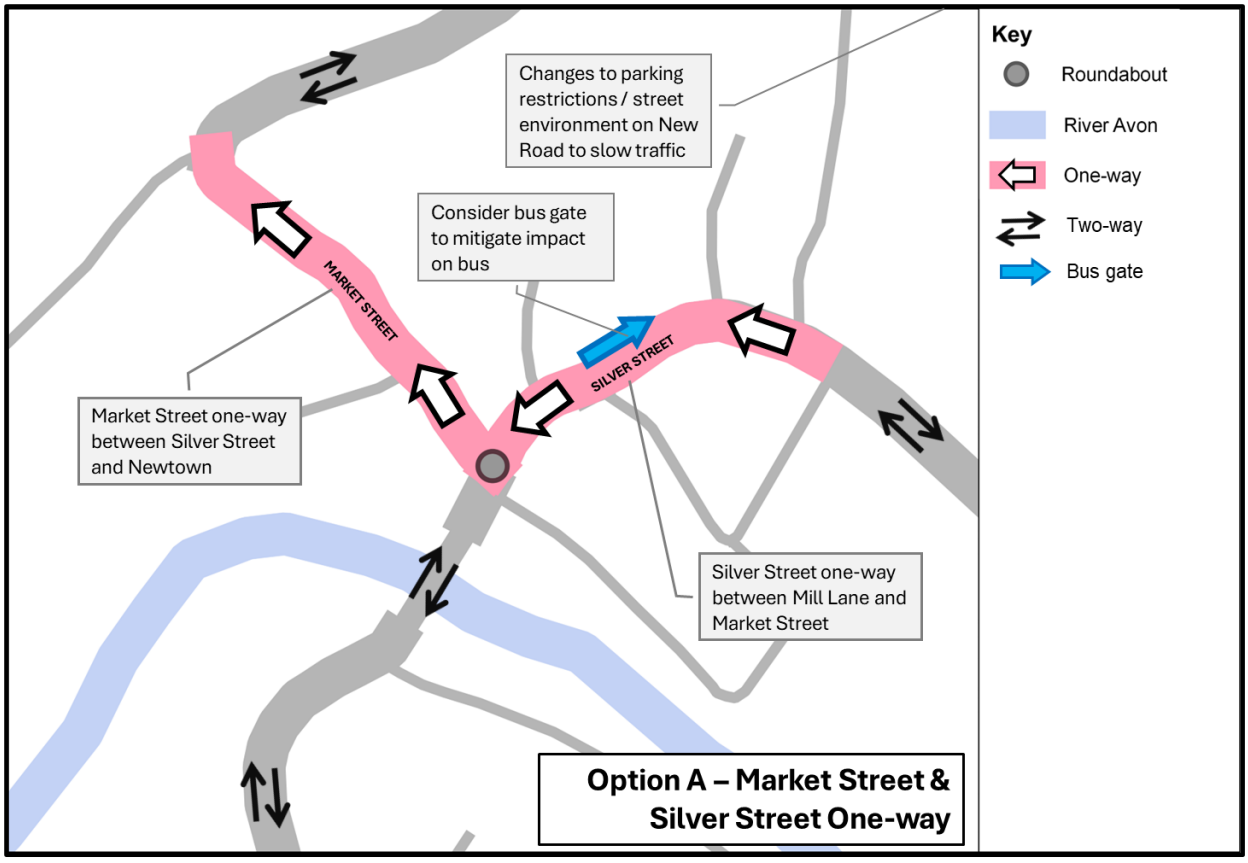
4.1.1 Option A – Market Street & Silver Street One-way

Figure 4.1 provides a high-level visual representation of Option A.

This option is an improved version of the Social Distancing Scheme one-way system that was in place between August 2020 and July 2021 – without the town-bridge shuttle. As part of this option Silver Street and Market Street will operate as a one-way system, with traffic only permitted to travel westbound on Silver Street and northbound on Market Street. This option also includes a bus gate on Silver Street which will use a sensor-activated signal to stop traffic at the top of Silver Street, allowing buses to travel eastbound on Silver Street. The bus gate enables buses to retain their current route in addition to reducing any negative impacts on bus journey times. To mitigate against increased traffic flow on New Road and Springfield as a result of the one-way system, traffic calming mitigation measures will be developed, such as management of on-street parking, speed limit reductions or the provision of new pedestrian crossings and street environment improvements. No specific measures have been included in the model at this stage – they are represented by reduced traffic speeds along this section.

Note: These mitigation measures will be subject to further design.

Figure 4.1 - Option A – Market Street & Silver Street One-Way

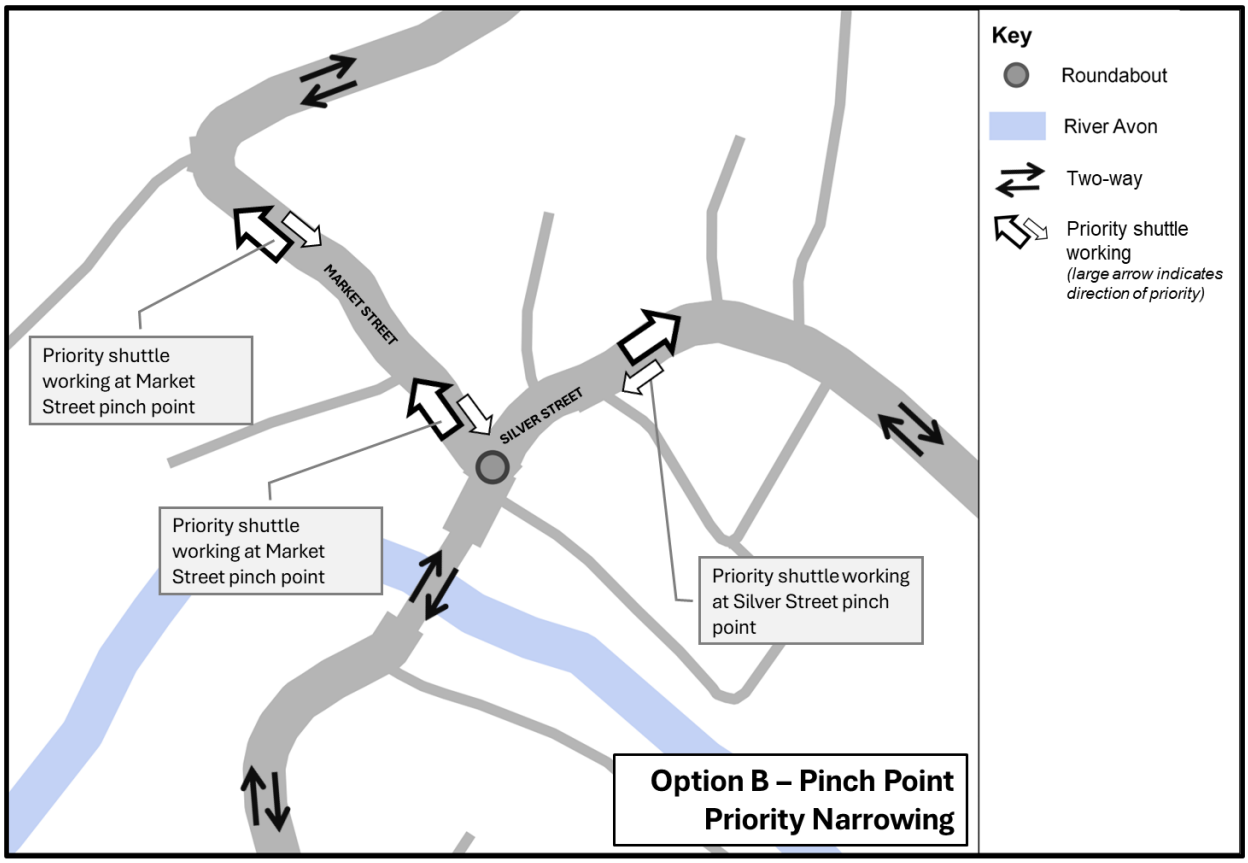


4.1.2 Option B – Pinch Point Priority Narrowing

Figure 4.2 provides a high-level visual representation of Option B.

This option offers a more light-touch approach to traffic management in the town centre, with formalised priority narrowing[8] at several of the key pinch points on Market Street and Silver Street. At the three narrow sections highlighted on the diagram below (two on Market Street, one on Silver Street), there will be signage and widened footways to formalise the current operation of traffic at these pinch points, preventing vehicles from squeezing through and getting extremely close to the already narrow footway. Traffic heading uphill (northbound on Market Street and eastbound on Silver Street) will be given priority on both Market Street and Silver Street.

Figure 4.2 - Option B - Pinch Point Priority Narrowing



[8] Priority narrowing involves reducing the width of the carriageway to create a one-way priority system at a particular location, using road marking and signing to signify the direction of priority.

4.1.3 Option C – Silver Street One-way & Market Street Priority Narrowing

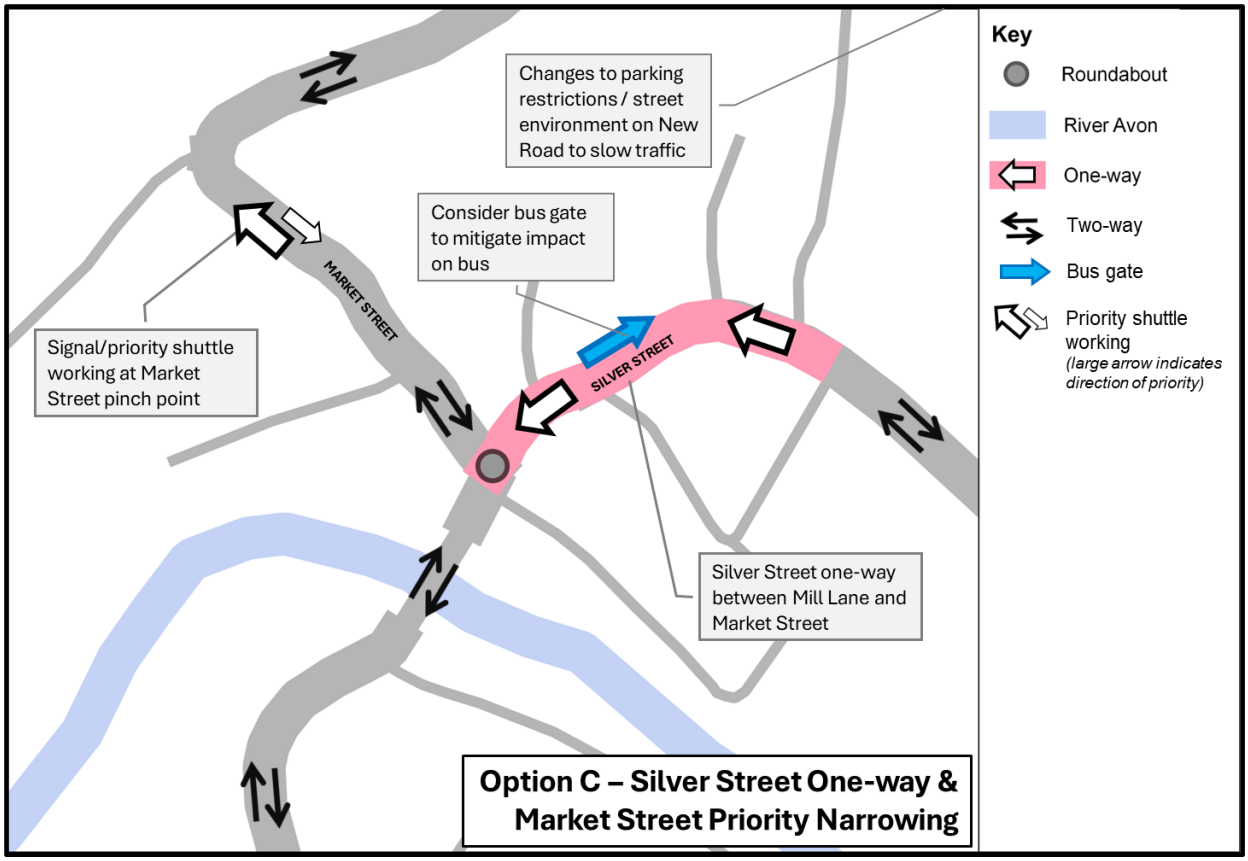
Figure 4.3 provides a high-level visual representation of Option C.

This option is a hybrid of Option A and Option B, with one-way traffic on Silver Street (westbound) and priority narrowing on Market Street (with northbound traffic given priority). This option also retains the bus gate included in Option A. Unlike Option B, for this option there is only one priority narrowing section on Market Street – located at the top of Market Street between the Custom E-Bikes shop and Le Visage Aesthetics. Similarly, this will give priority to northbound traffic.

Like Option A, this option will also include measures on New Road and Springfield to mitigate the impact of increased traffic flow as a result of the one-way system in place on Silver Street.

Note: These mitigation measures will be subject to further design.

Figure 4.3 - Option C – Silver Street One-way & Market Street Priority Narrowing



5. Proposed Scheme Modelling and Comparison

5.1 Objective 1: Safely reallocate space for walking and cycling

One of the key aims of this study is to safely reallocate space to provide high-quality walking and cycling routes. By making changes to the way that vehicular traffic moves through Bradford on Avon, each of the three options provides different opportunities to reallocate space to pedestrians and cyclists.

5.1.1 Potential Footway Widening

Figure 5.1, Figure 5.2 and Figure 5.3 provide a high-level assessment of the potential footway widening that could be achieved on both Market Street and Silver Street for each of the three different options. For these diagrams, the assumption has been made that no on-street parking will be removed, however removal of parking bays would further increase the level of footway widening that can be achieved.

As the shortlisted options focus specifically on changes at Market Street and Silver Street, only footway widening opportunities at these locations have been assessed. However, there are likely to be other footway widening opportunities at other locations in the town which would not require traffic management solutions to be achieved – for example narrowing of the carriageway and widening of the footway on St Margaret's Street south of Town Bridge).

The following footway widening opportunities are consistent between each of the three options:

- Tightening of the junction radii at Church Street and significant widening of the footway around the junction entrance. A side road treatment could be applied on Church Street to give pedestrians priority and enhance the character of the area.
- Side road treatments on Bridge Yard, Kingston Road, Whiteheads Lane and Whitehill to provide a continuous footway and emphasise pedestrian priority.
- Side road treatment and significant widening of the footway at Coppice Hill to create a more accessible and pedestrian-friendly area leading into The Shambles from Silver Street.
- Widening of the southern footway at the top of Silver Street (between Whiteheads Lane and Whitehill) to provide safe access to several properties and businesses which have access points currently on the main road.

The following provides a summary of the additional footway widening opportunities associated with the three scheme options:

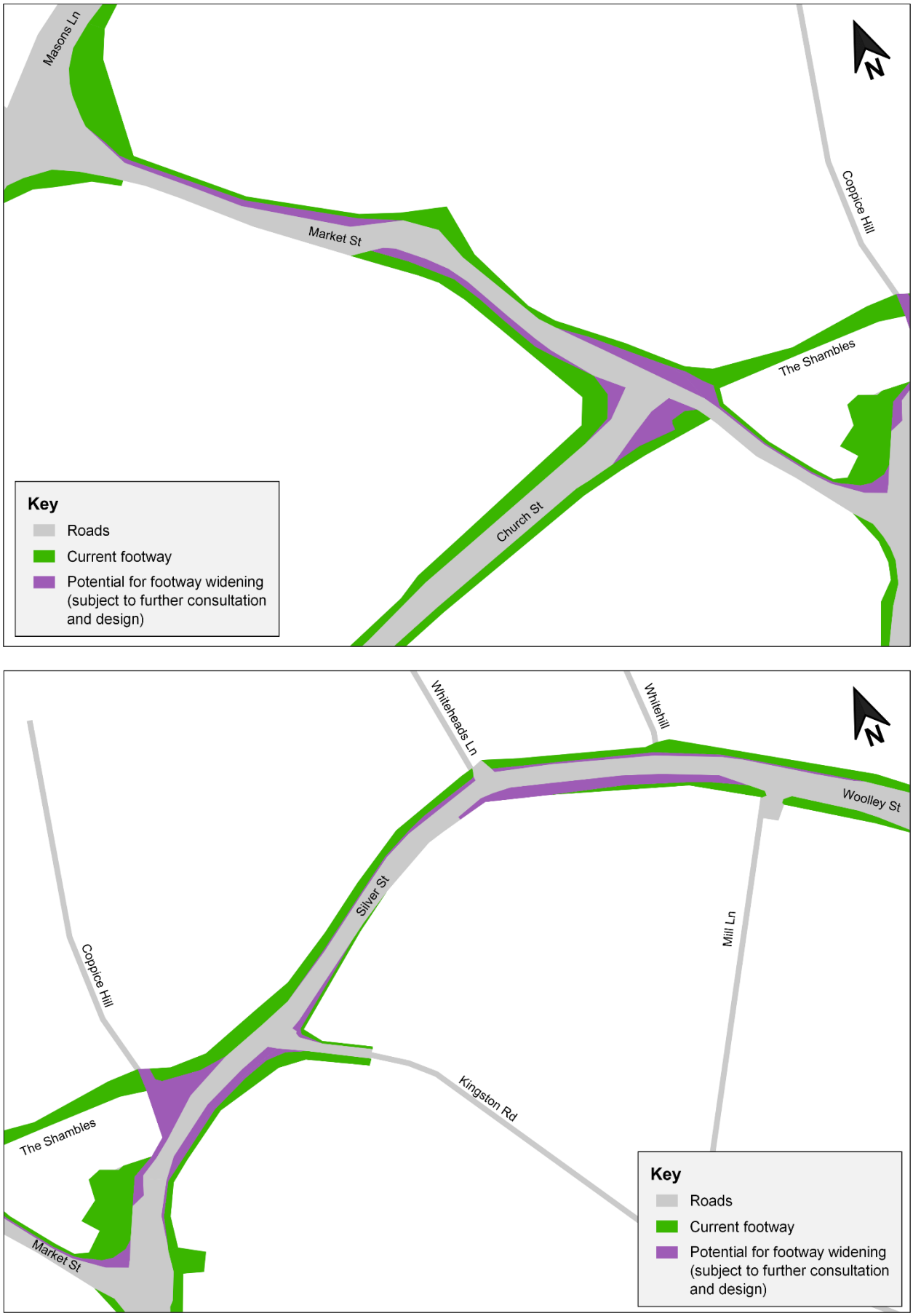
Option A - Market Street & Silver Street One-way (see Figure 5.1)**:**

- Significant widening of the footway along the length of Market Street due to carriageway narrowing which can be achieved as a result of the one-way traffic movements. This includes sections of the western footway north of Church Street where access to various shop frontages can be improved.
- Potential for widening of the footway along the length of Silver Street due to the carriageway narrowing which can be achieved as a result of the one-way traffic movements. However, there are some limitations on footway widening towards the top of Silver Street (Whiteheads Lane junction) where currently the carriageway is very narrow, and sufficient space is required for buses to manoeuvre around the bend.
- Despite Silver Street being one-way the majority of the time, the bus-gate allowing buses to travel eastbound (while westbound traffic is held at a traffic signal) will create limitations on the degree of

footway widening that can be achieved on Silver Street (due to the need to accommodate large vehicle movements).

- The implementation of the one-way system on Silver Street will enable a new footway connection between The Shambles and the paved area adjacent to the Cobb Farr estate agents. This area can currently only be accessed via a very narrow footway at the bottom of Market Street, or by crossing Silver Street where there is high traffic flow and poor visibility.

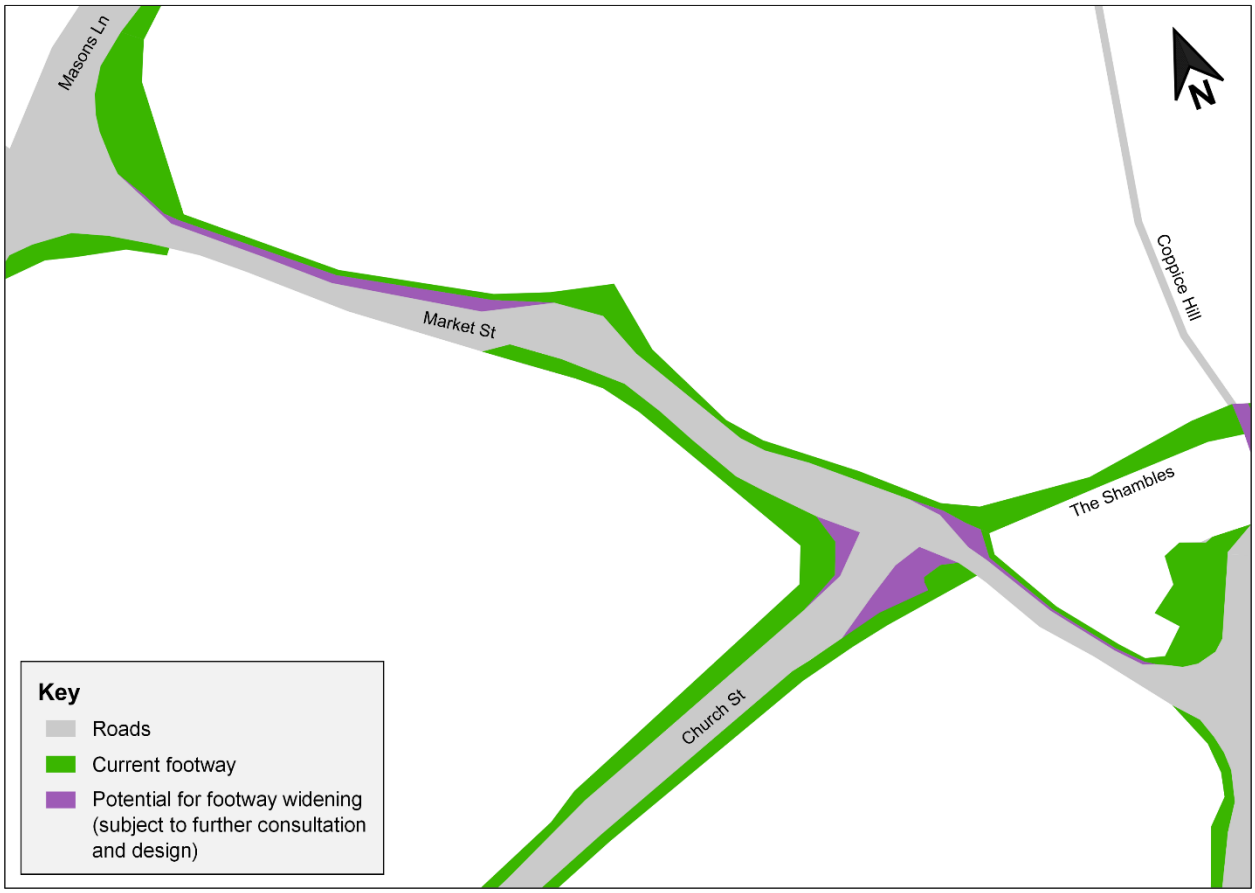
Figure 5.1 - Potential Footway Widening (Option A)



Option B - Pinch Point Priority Narrowing (see Figure 5.2)**:**

- There is opportunity for footway widening at the two priority narrowing locations where traffic will only be moving in a single direction. The current footway at these locations (towards the top of Market Street between the Custom E-Bikes shop and Le Visage Aesthetics, and at the bottom of Market Street between The Shambles and Silver Street) is excessively narrow and poses a considerable safety risk for pedestrians.
- Unlike Option A, footway widening is unlikely to be achievable on the western footway on Market Street (north of Church Street) without removal of parking, due to the requirement for two-way traffic movements along this stretch.
- Some footway widening can be achieved along the length of Silver Street, although to a lesser extent than made possible with Option A due to the requirement for two-way traffic on the southern section of Silver Street. Accordingly, it will not be possible to connect the western footway to the paved area adjacent to Cobb Farr estate agents with this option.

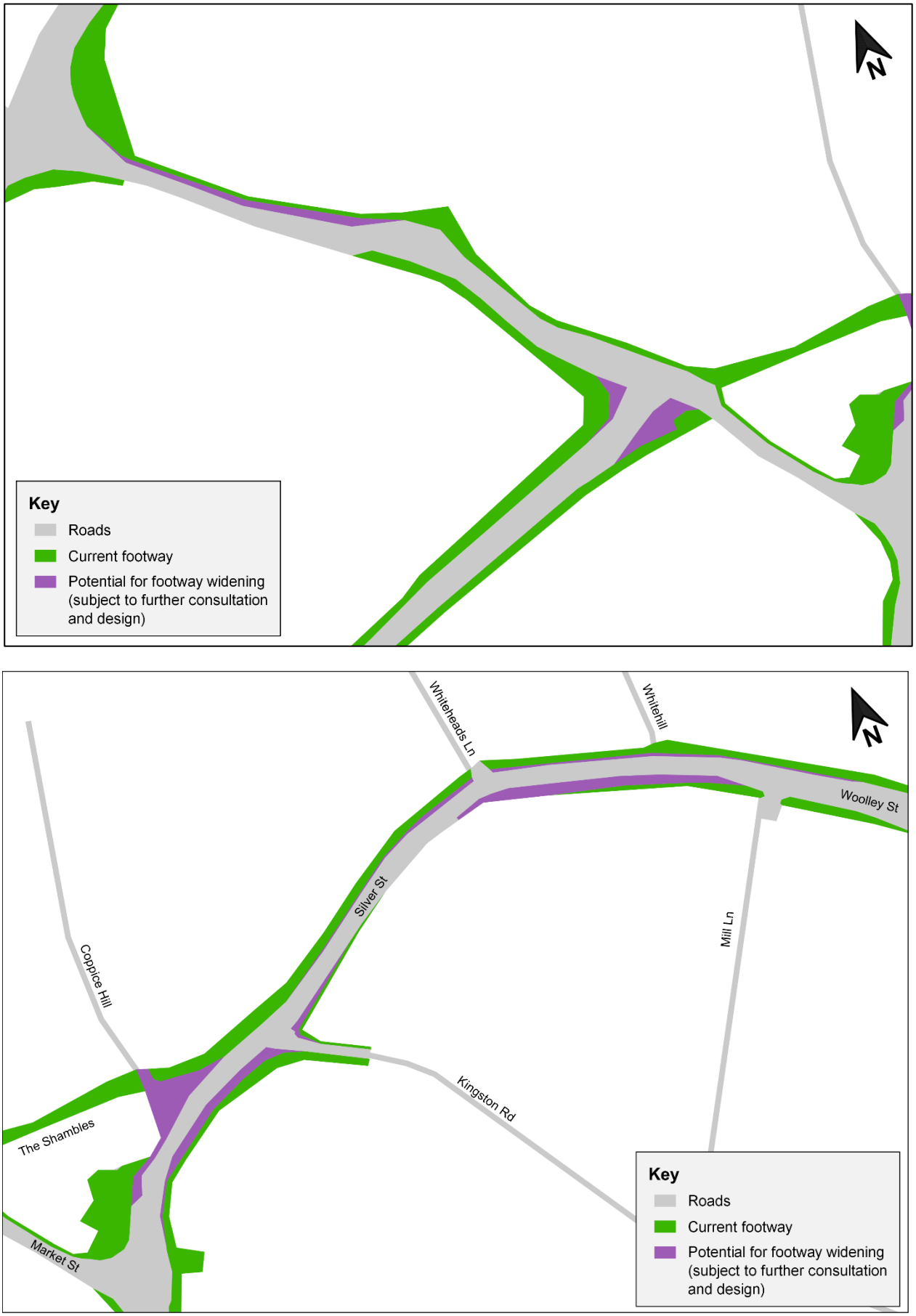
Figure 5.2 - Potential Footway Widening (Option B)



Option C – Silver Street One-way & Market Street Priority Narrowing (see Figure 5.3)**:**

- Opportunity for footway widening at the priority narrowing location (between the Custom E-Bikes shop and Le Visage Aesthetics) where traffic will only be moving in a single direction. The current footway at this location is excessively narrow and poses a considerable safety risk for pedestrians.
- Unlike Option B, this option does not allow widening at the pinch point at the bottom of Market Street (between The Shambles and Silver Street) where the pavement is extremely narrow, as two-way vehicle operation will remain at this location.
- Despite Silver Street being one-way the majority of the time, the bus-gate allowing buses to travel eastbound (while westbound traffic is held at a traffic signal) will create limitations on the degree of footway widening that can be achieved on Silver Street (due to the need to accommodate large vehicle movements).
- Like Option A, the implementation of the one-way system on Silver Street will enable a new footway connection between The Shambles and the paved area adjacent to Cobb Farr estate agents, in addition to footway widening along the length of Silver Street.

Figure 5.3 - Potential Footway Widening (Option C)



5.1.2 Cycle facilities

There is not space for, coherent, dedicated cycle facilities within the town centre streets (Market Street and Silver Street), even with traffic restrictions and reallocation of road space.

Hence, improvements for cycling will focus on making on-road cycling safe and comfortable. Typically, daily traffic flows of less than 2000 vehicles, and speeds under 20mph are required for most cyclists to feel comfortable and safe. Other measures such as reducing turning movements, consolidation of junctions, and safe crossing points also contribute to good on-road cycling conditions.

To compare the relative merits of each option in terms of improvements for cycling, an assessment will be made considering how much junctions are simplified and forecast traffic flows / congestion from the modelling results.

5.2 Objective 2: Facilitate slow but steady traffic movements

This section details the process of modelling the proposed interventions and a comparison of their operational performance in respect of the study objective of facilitating slow but steady traffic movements.

5.2.1 Forecast Traffic Growth

To assess how the different options would operate in the future, the traffic flows in the model need to represent the likely situation following implementation of the interventions. Therefore, a future year is chosen, and the existing traffic is multiplied by a factor to create the future year baseline traffic level so that the operation of the proposed interventions can be compared with the future year baseline. Following discussions with Wiltshire Council, it was agreed that 2041 would be the future year. This aligns with the Wiltshire Local Plan and is assumed to be multiple years following potential implementation of any interventions.

Traffic growth factors have been obtained using industry best practice methods and correspond with the following assumptions for traffic growth from 2023 to 2041:

- An approximate 10% increase in car traffic;
- An approximate 18% increase in large goods vehicle (LGV) traffic; and,
- An approximate 1% increase in heavy goods vehicle (HGV) traffic.

The frequency of public transport services in the future year was agreed with Wiltshire Council.

5.2.2 Model Results

The following sections present the results of model runs for four future scenarios; Do Nothing (assuming no change to the network, but traffic flows increased to forecast 2041 levels), and the three options being tested (also using the forecast 2041 traffic flows). For each of the options, the modelling assumes no traffic diverts away from, or to Bradford on Avon as a result of the interventions.

5.2.2.1 Traffic Flows

Table 5.1 and Table 5.2 presents the modelled traffic flows at key locations for each model scenario for the AM-peak and PM-peak model runs respectively.

Within the AM-peak, the most significant reallocation of traffic flows within the town are associated with Option A, where the one-way system reduces overall traffic on Market Street, whilst significantly increasing the number of vehicles travelling eastbound on New Road, southbound on Springfield and westbound on Silver Street – in comparison to the Do Nothing scenario. Option B also leads to a reduction in traffic on Market Street and Masons Lane, whilst the eastbound priority on Silver Street leads to an increase in eastbound traffic on Silver Street, northbound traffic on Springfield and westbound traffic on New Road, although to a lesser degree than Option A. Option C reallocates traffic in a similar way to Option A in the AM-peak, with a decrease in

southbound traffic on Market Street and Masons Lane and no eastbound traffic on Silver Street, but increases on Mount Pleasant and New Road. Like Option A, Option C increases clockwise flows on all roads within the loop..

In the PM-peak period, Option A results in an increase in traffic travelling clockwise around the loop of Market Street, Masons Lane, Mount Pleasant, New Road, Springfield and Silver Street, whilst reducing vehicles on the same roads in an anticlockwise direction. Option B performs in a similar way to the AM-peak, reducing traffic on Market Street and Masons Lane, in addition to westbound traffic on Mount Pleasant, whilst increasing flows elsewhere. Option C results in a net decrease in traffic on Silver Street, but an increase in vehicles on Market Street, Masons Lane, Mount Pleasant, Springfield and New Road when compared to the Do Nothing scenario. Like Option A, Option C reduces anti-clockwise flows whilst increasing clockwise flows due to the one-way on Silver Street and northbound priority on Market Street.

Table 5.1 - Modelled traffic flow at key locations (AM-peak)[9]

		2023 Base	2041 Do Nothing	2041 Option A		2041 Option B		2041 Option C	
Location	**Direction**	**Traffic Flow**	**Traffic Flow**	**Traffic Flow**	**Difference from 2041 Do Nothing**	**Traffic Flow**	**Difference from 2041 Do Nothing**	**Traffic Flow**	**Difference from 2041 Do Nothing**
Anti-clockwise									
Silver Street	Eb	142	148	0	-148	290	+142	0	-148
Springfield	Nb	248	279	274	-5	422	+143	269	-10
New Road	Wb	281	289	331	+42	433	+144	329	+40
Mount Pleasant	Wb	353	371	395	+24	398	+27	410	+39
Masons Lane	Sb	400	345	21	-324	308	-37	218	-127
Market Street	Sb	414	364	0	-364	326	-38	234	-130
Clockwise									
Market Street	Nb	655	706	729	+23	635	-71	783	+77
Masons Lane	Nb	683	733	799	+66	664	-69	814	+81
Mount Pleasant	Eb	404	542	895	+353	557	+15	780	+238
New Road	Eb	248	371	783	+412	386	+15	623	+252
Springfield	Sb	281	414	763	+349	437	+23	606	+192
Silver Street	Wb	260	373	646	+273	420	+47	465	+92

[9] Values represent number of vehicles within a 1-hour peak period

Table 5.2 - Modelled traffic flow at key locations (PM-peak)[10]

		2023 Base	2041 Do Nothing	2041 Option A		2041 Option B		2041 Option C	
Location	**Direction**	**Traffic Flow**	**Traffic Flow**	**Traffic Flow**	**Difference from 2041 Do Nothing**	**Traffic Flow**	**Difference from 2041 Do Nothing**	**Traffic Flow**	**Difference from 2041 Do Nothing**
Anti-clockwise									
Silver Street	Eb	169	174	0	-174	239	+65	0	-174
Springfield	Nb	155	191	166	-25	212	+21	167	-24
New Road	Wb	202	255	220	-35	269	+14	226	-29
Mount Pleasant	Wb	320	448	315	-133	374	-74	399	-49
Masons Lane	Sb	455	433	11	-422	363	-70	380	-53
Market Street	Sb	484	458	0	-458	385	-73	402	-56
Clockwise									
Market Street	Nb	533	582	746	+164	568	-14	752	+170
Masons Lane	Nb	573	630	837	+207	619	-11	803	+173
Mount Pleasant	Eb	438	619	824	+205	625	+6	821	+202
New Road	Eb	350	458	819	+361	551	+93	682	+224
Springfield	Sb	383	476	837	+361	571	+95	687	+211
Silver Street	Wb	323	376	699	+323	444	+68	457	+81

Using the same data presented in Table 5.1 and Table 5.2, Figure 5.4 and Figure 5.5 present the traffic flow data in a graphical format, showing the modelled vehicle flow under the different scenarios moving in a clockwise and anti-clockwise direction respectively at key locations in the network during the AM-peak.

Figure 5.6 and Figure 5.7 present the modelled vehicle flow under the different scenarios moving in a clockwise and anti-clockwise direction respectively at key locations in the network during the PM-peak.

[10] Values represent number of vehicles within a 1-hour peak period

Figure 5.4 - AM-peak clockwise modelled traffic flows at key locations

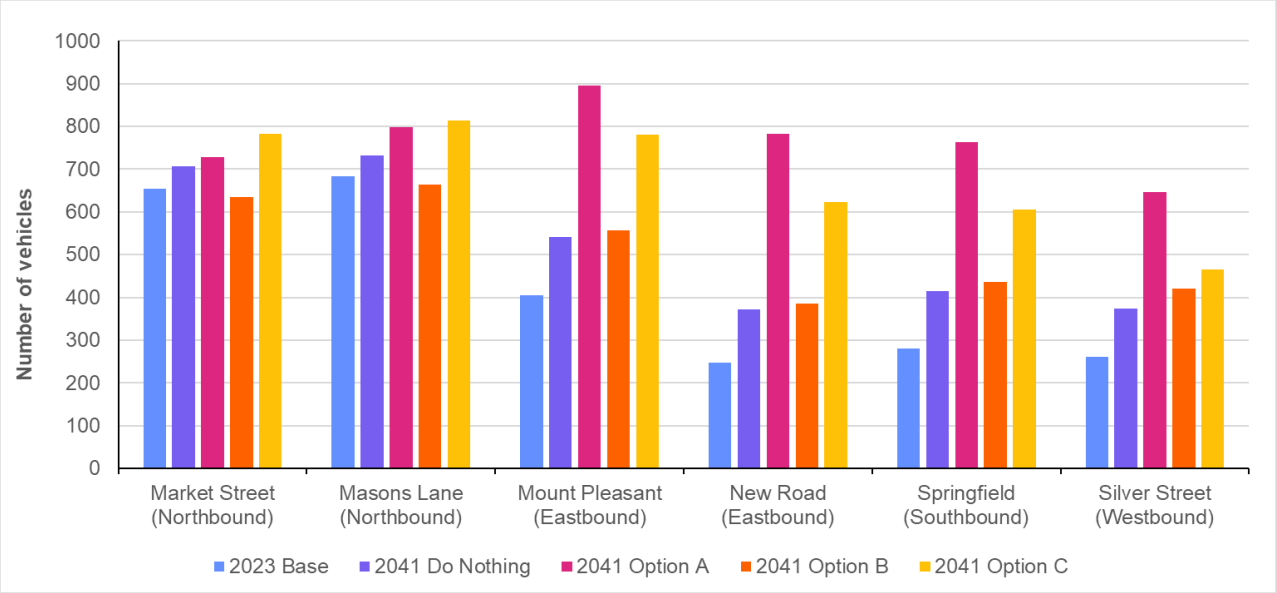


Figure 5.5 - AM-peak anti-clockwise modelled traffic flows at key locations

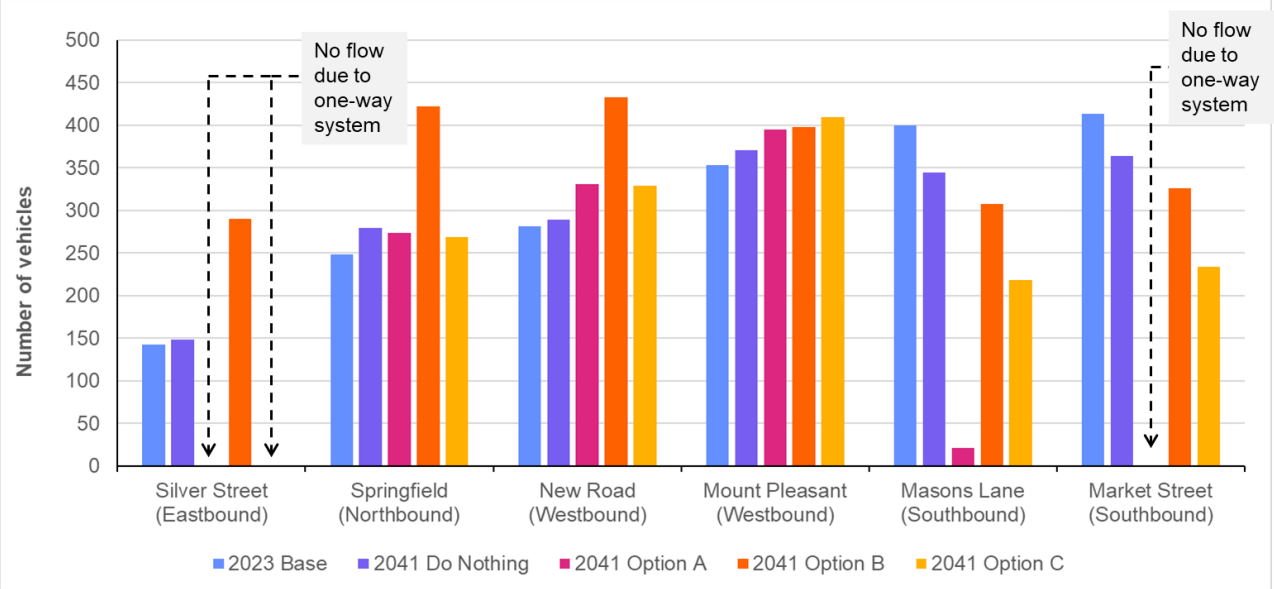


Figure 5.6 - PM-peak clockwise modelled traffic flows at key locations

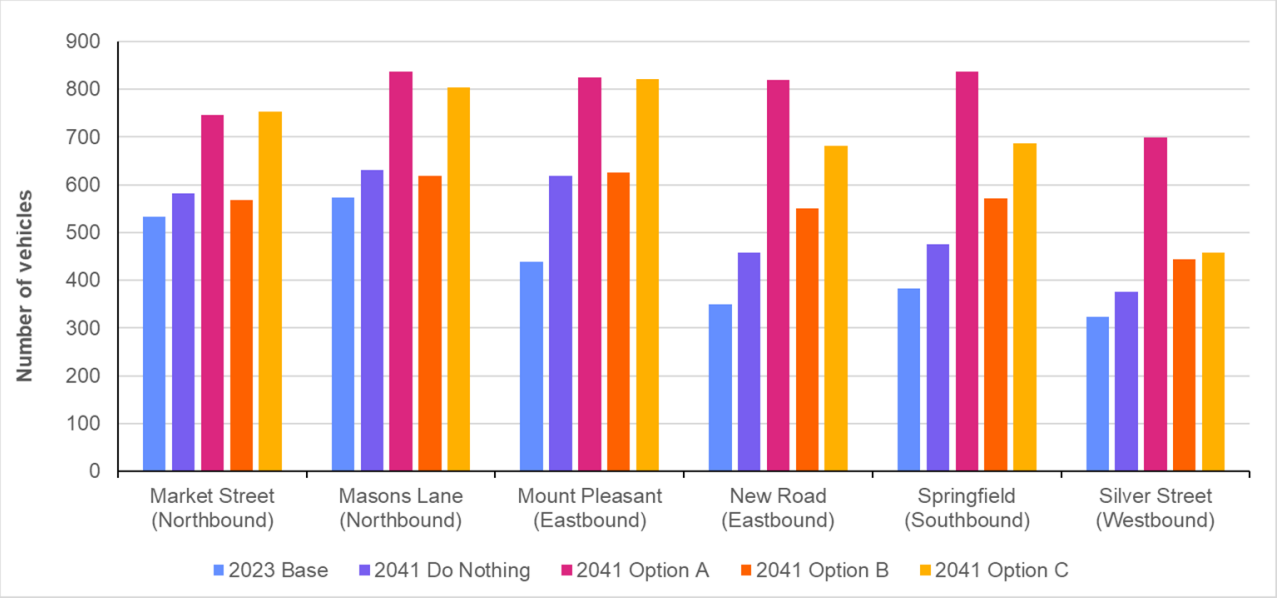
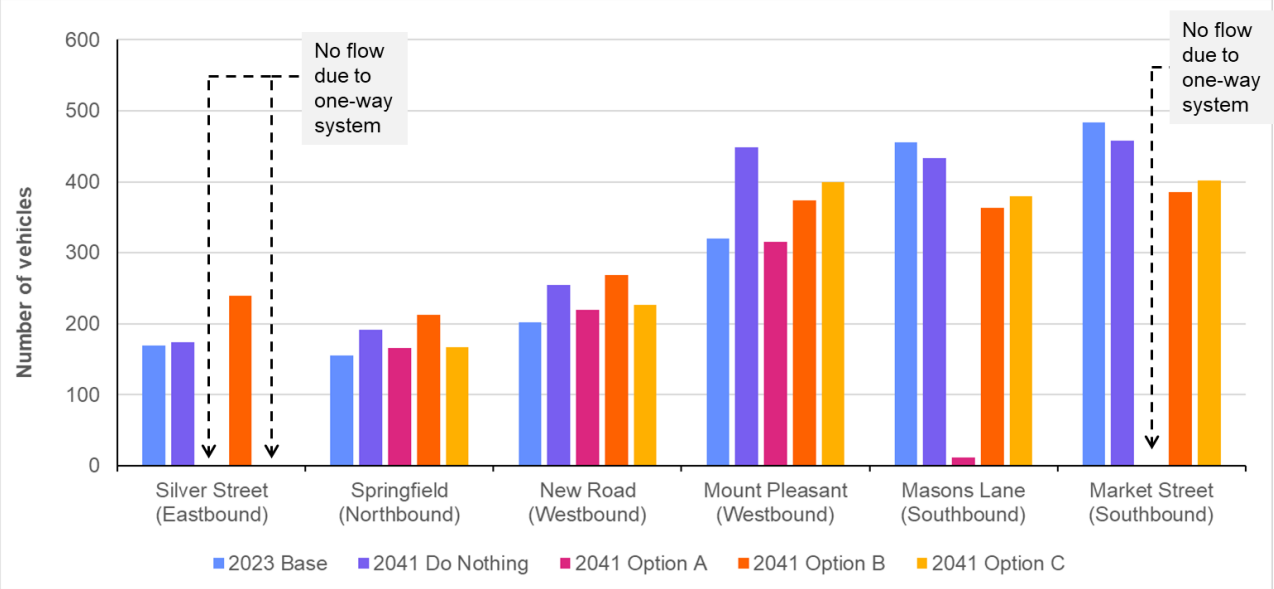


Figure 5.7 - PM-peak anti-clockwise modelled traffic flows at key locations



5.2.2.2 Average Speed

An aim of the scheme is to provide slow but steady traffic movements through the town, hence a speed of 15-20mph throughout the network would represent an ideal situation. This speed range represents traffic that is not congested but also not moving excessively fast for the road conditions within the town creating an intimidating and dangerous environment for pedestrians and cyclists. Faster speeds in the network would also have the wider impact of encouraging more through traffic. As a result, slow and steady traffic (c. 15 mph) will act to reduce the dominance of traffic within the town centre.

5.2.2.2.1 2041 Do Nothing

Figure 5.8 and Figure 5.9 show average traffic speed outputs of the base model in operation for the AM and PM peak hours.

There is congestion on the Masons Lane/Bath Road/Mount Pleasant roundabout. In the AM-peak there is further congestion heading northbound over the Town Bridge, northbound on Masons Lane, northbound on Frome Road and especially northbound on the A363. In the PM-peak, there is an increase in congestion southbound on Masons Lane and Market Street, westbound on Silver Street, and in both directions on Frome Road. Due to the increase in traffic forecasted in 2041, the average speed, particularly in the AM-peak on Frome Road and Trowbridge Road, is approximately 5 mph, c.15 mph slower than in the 2023 base model.

Figure 5.8 - 2041 Do Nothing AM – Average Speed

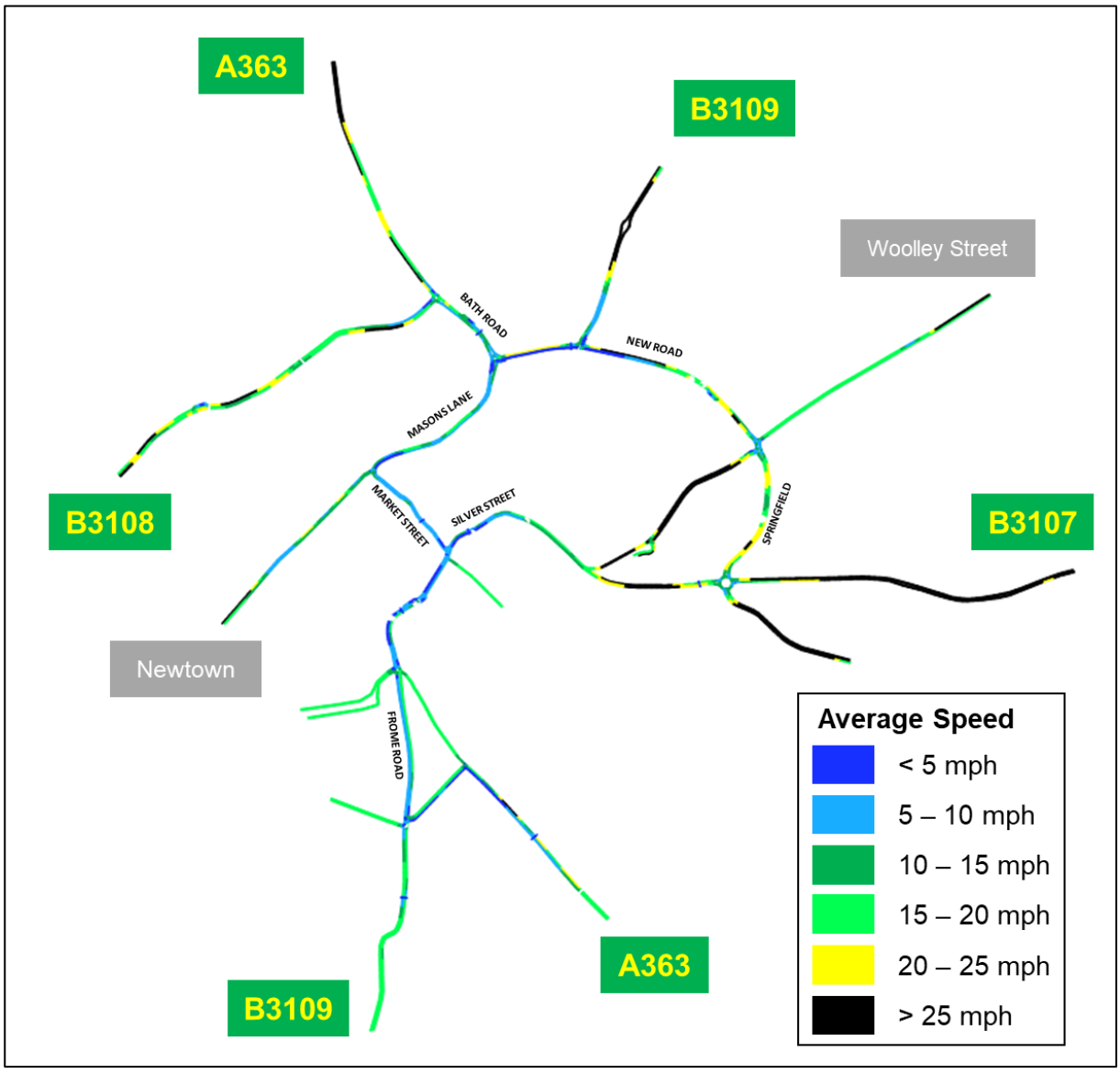
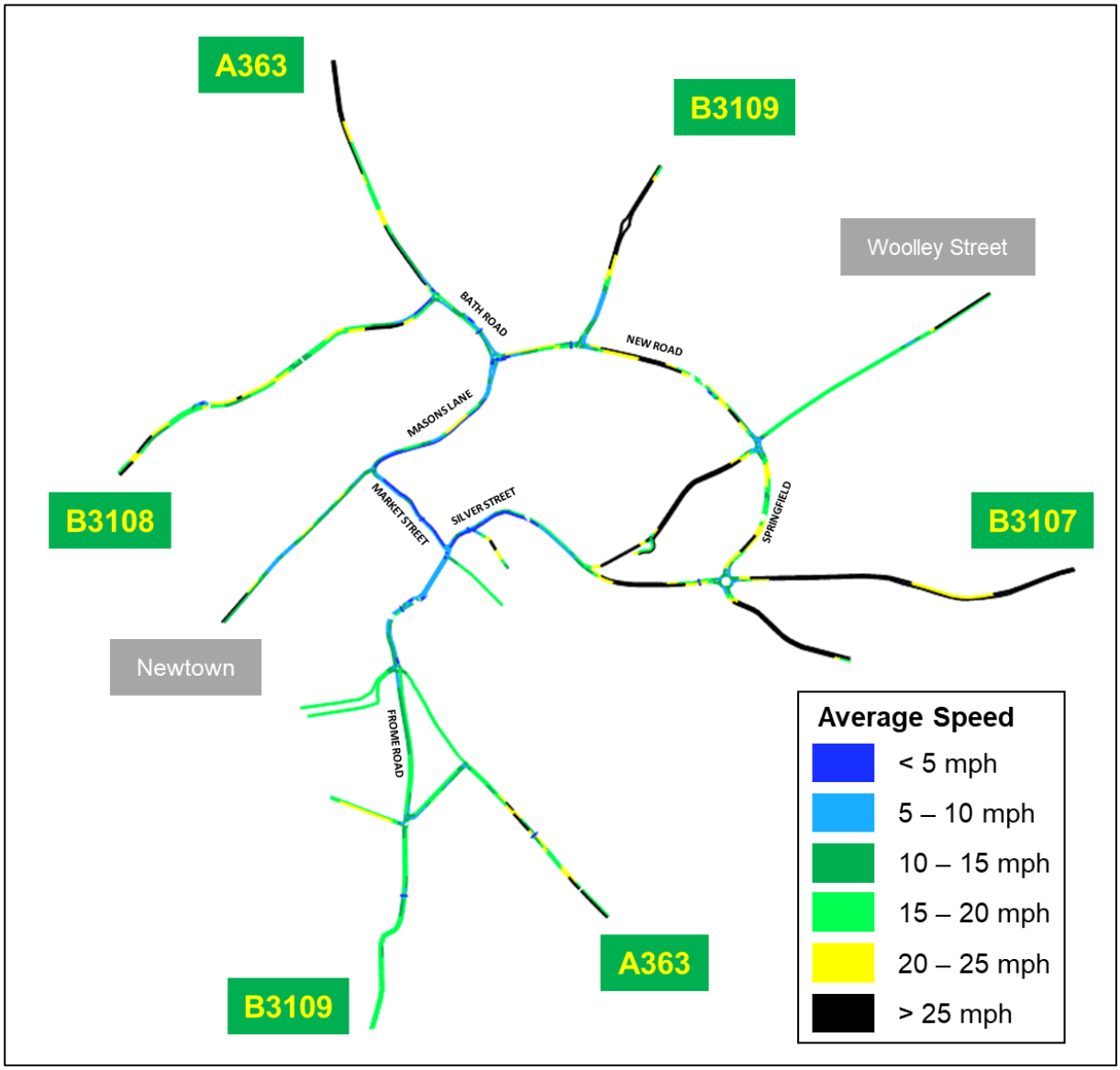


Figure 5.9 - 2041 Do Nothing PM – Average Speed



5.2.2.2.2 Option A – Market Street & Silver Street One-Way

When comparing Figure 5.10 and Figure 5.11 with Figure 5.8 and Figure 5.9, there is less congestion on Mount Pleasant going eastbound in the Option A scenario because more vehicles are turning left from Bath Road on to Mount Pleasant due to the one-way system on Market Street. Therefore, there are more opportunities for vehicles to enter the Masons Lane / Bath Road / Mount Pleasant roundabout which reduces the time required to wait for a gap. Option A does not however improve the congestion on Frome Road northbound heading into the town centre. Due to vehicles being routed around the town centre on the B3109 instead of using the A363, average speeds on the B3109 traveling clockwise are slower in Option A than in the Do Nothing scenario. The one-way system does decrease congestion on Market Street and Silver Street. In both the AM and PM-peak periods, average speeds increase on Silver Street to a slow and steady speed. Average speeds increase for westbound traffic on New Road, but beyond what would be considered 'slow and steady'.

Figure 5.10 - Option A (AM-peak) – Average Speed

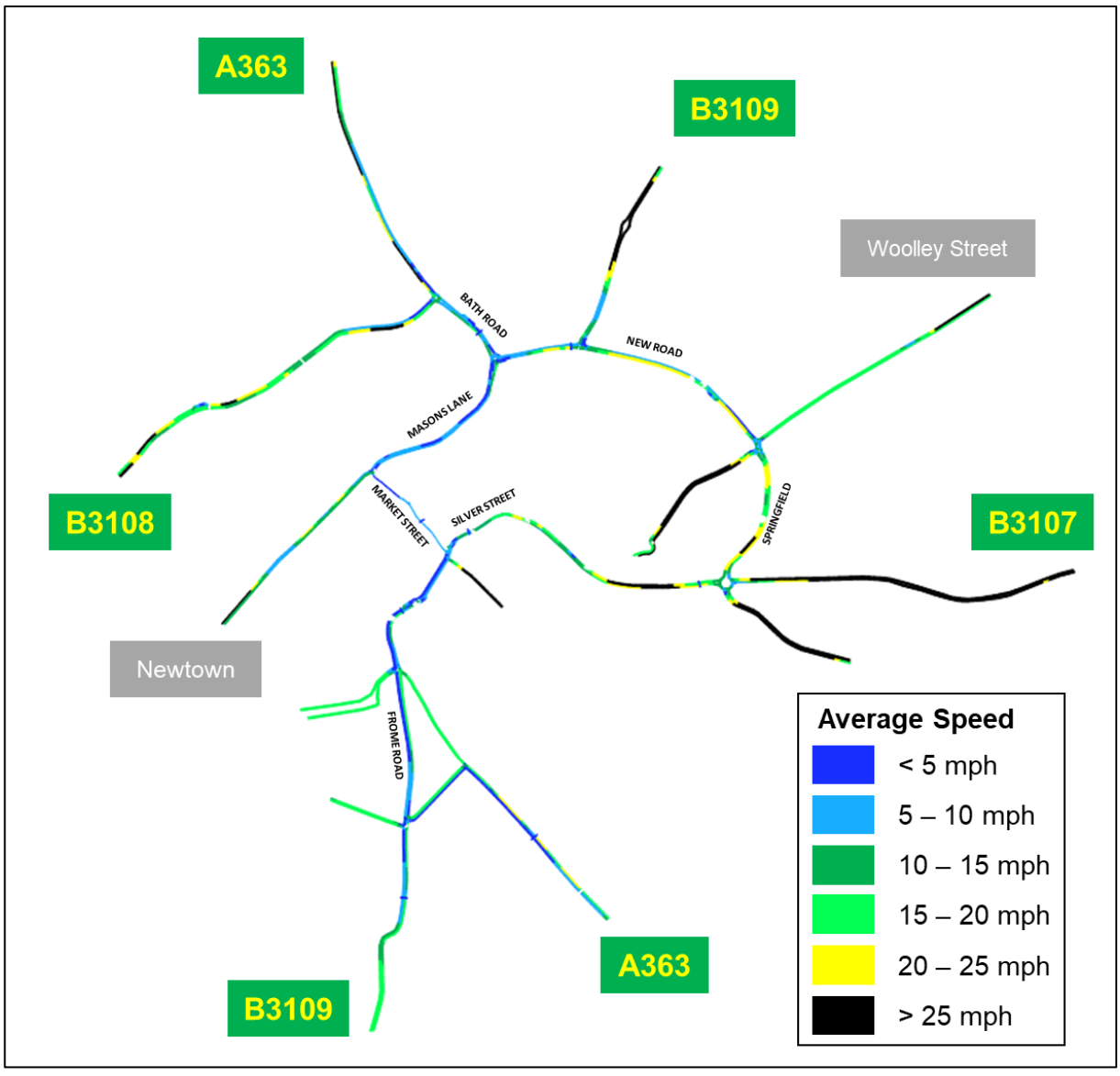
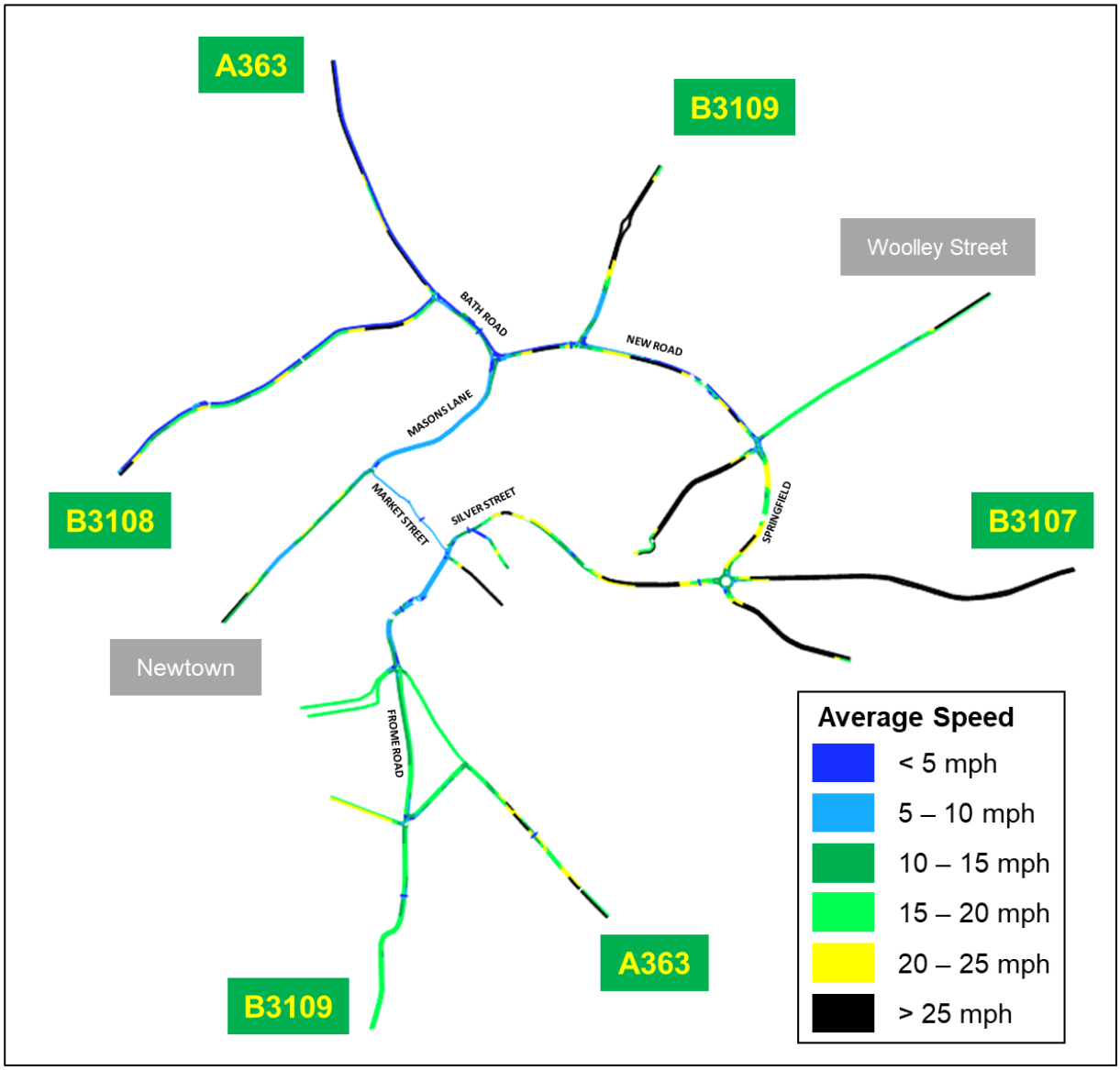


Figure 5.11 - Option A (PM-peak) – Average Speed



5.2.2.2.3 Option B – Pinch Point Priority Narrowing

When comparing Figure 5.12 and Figure 5.13 with Figure 5.8 and Figure 5.9, there appears to be less congestion in general for traffic travelling northbound in the AM Peak with Option B interventions. This is due to northbound traffic on Market Street and eastbound traffic on Silver Street having priority with the Option B interventions. Average speeds on Silver Street are increased in the PM-peak with the priority narrowing intervention, indicating a reduction in congestion. However, average speeds travelling southbound from Bath Road and Sladesbrook are reduced in Option B due to congestion concentrated at the Masons Lane / Bath Road / Mount Pleasant roundabout.

Figure 5.12 - Option B (AM-peak) – Average Speed

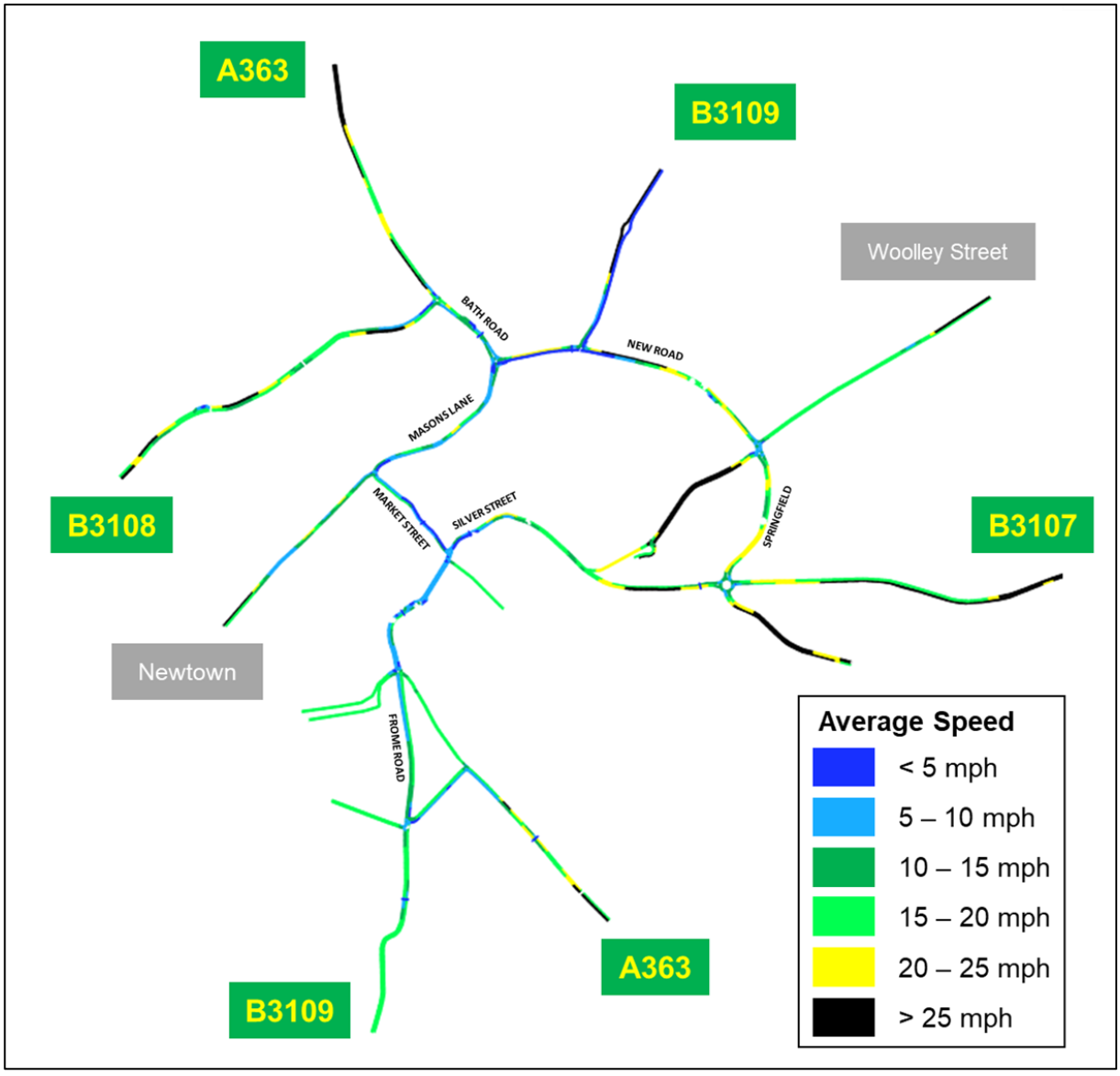
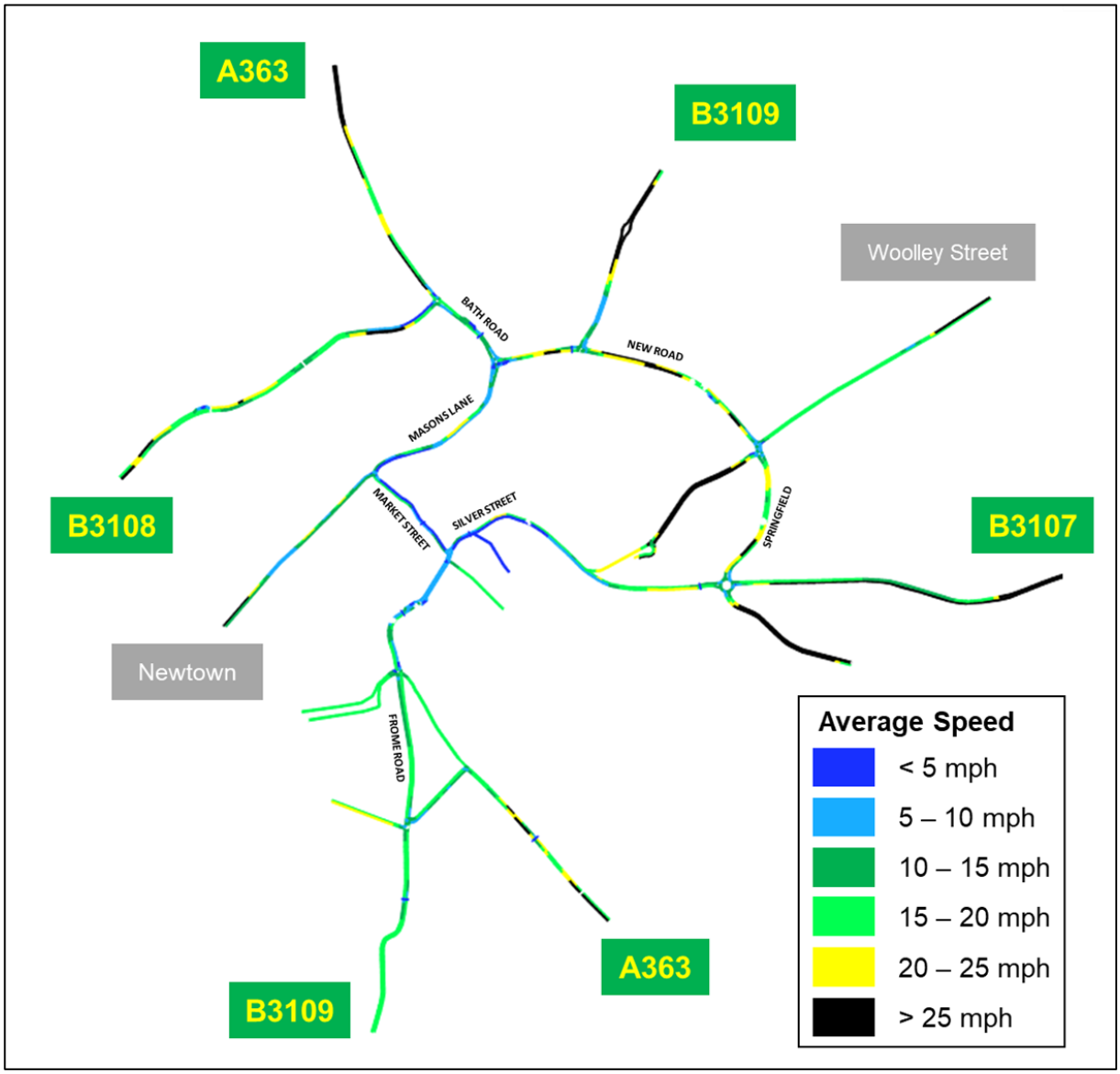


Figure 5.13 - Option B (PM-peak) – Average Speed



5.2.2.2.4 Option C – Silver Street One-way & Market Street Priority Narrowing

When comparing Figure 5.14 and Figure 5.15 with Figure 5.8 and Figure 5.9, overall average speeds are similar in the AM-peak and PM-peak. There is a slight increase in average speeds on Mount Pleasant due to more gap-seeking opportunities at the Masons Lane / Bath Road / Mount Pleasant roundabout because the majority of traffic approaching from Bath Road will make a left turn at the roundabout. In the PM Peak, the average speed is slightly higher travelling southbound on Masons Lane and Market Street for Option C. Westbound traffic on Silver Street also experiences less congestion in both the AM and PM-peak period due to the one-way system, resulting in more desirable traffic speeds in this location.

Figure 5.14 - Option C (AM-peak) – Average Speed

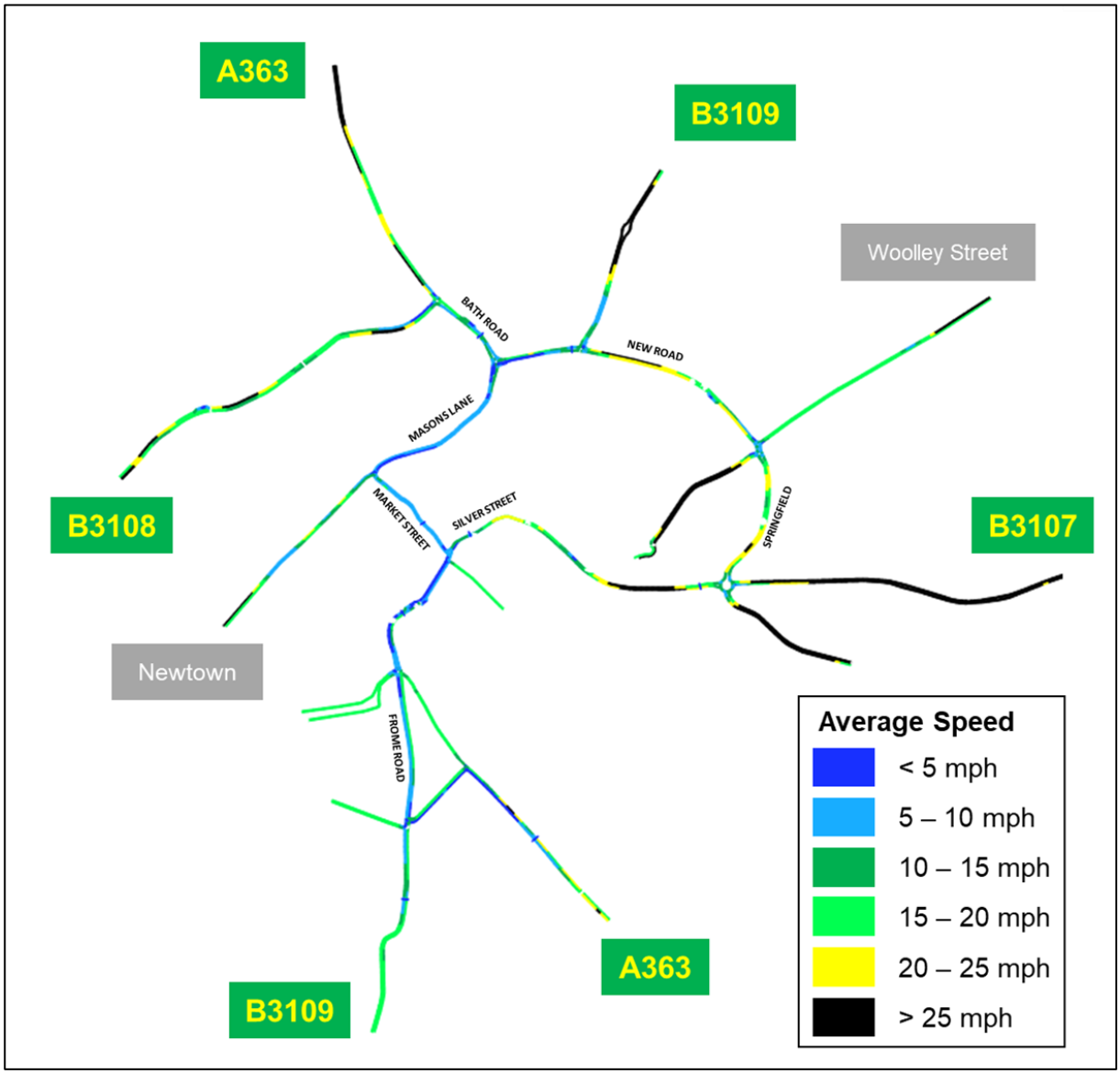
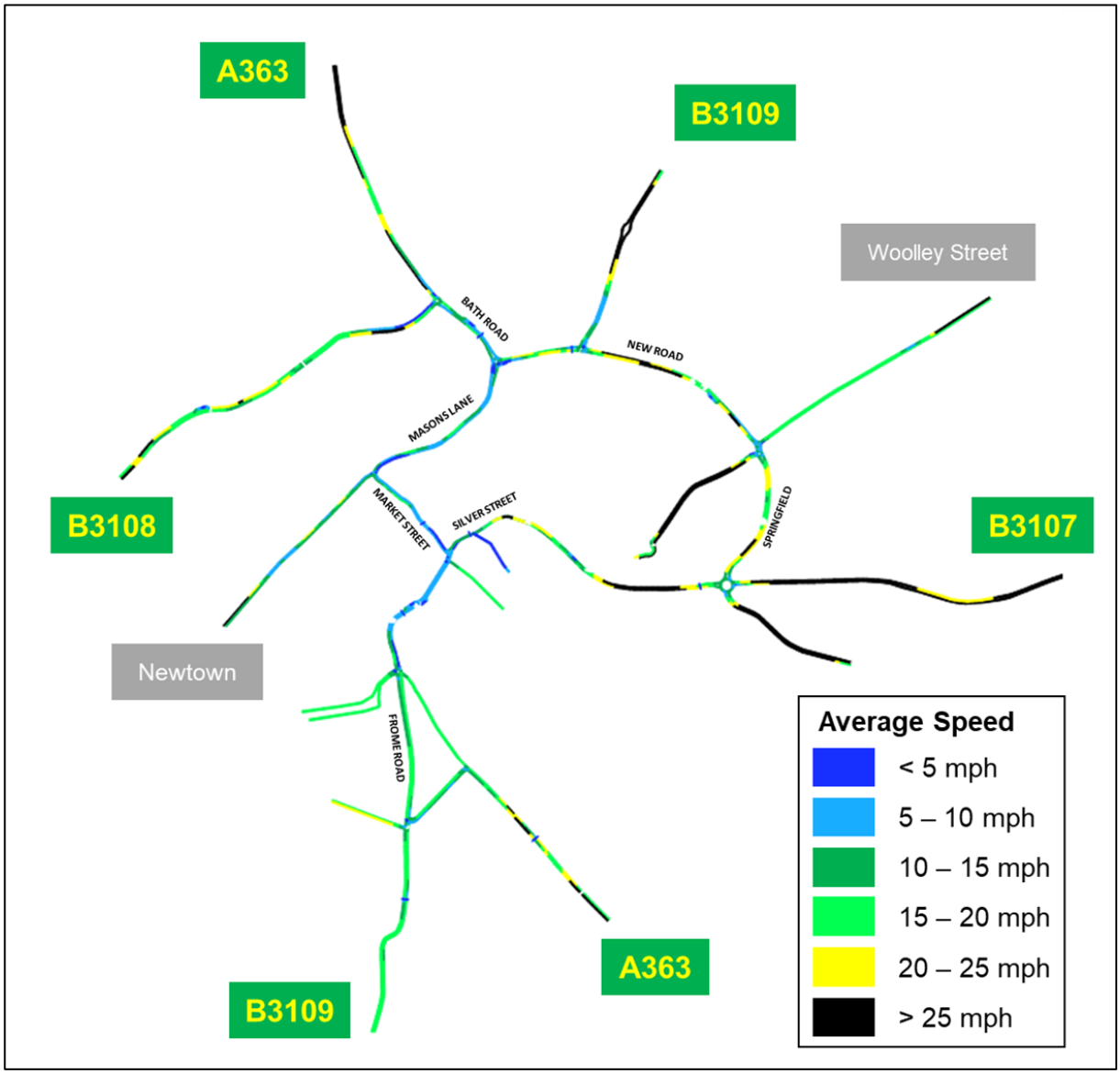


Figure 5.15 - Option C (PM-peak) – Average Speed



5.2.3 Network Comparison

This section compares the overall network statistics for the different modelled scenarios.

5.2.3.1 Network Performance

This section compares the network performance results of the different modelled scenarios. The following parameters are used for this comparison:

- Average speed – The average speed of vehicles across the entire model network.
- Total travel time – The total aggregated travel time of all vehicles moving through the network during the modelled hour period.

Table 5.3 and

Table 5.4 show that Option A has the highest overall figures for total travel time and the lowest values for average speed, whereas Option B and Option C's figures are largely similar to the results of the Do Nothing. The average speed within the network is significantly lower in all scenarios compared to the 2023 Base scenario due to the increased traffic volumes in 2041, and furthermore the total travel time for each of the 2041 scenarios is greater than the 2023 Base model.

Table 5.3 - AM Network Performance Results

Parameter	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
Average Speed (mph)	13	10	9	11	10
Total Travel Time (hr)	228	313	379	311	328

Table 5.4 – PM Network Performance Results

Parameter	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
Average Speed (mph)	13	11	7	11	12
Total Travel Time (hr)	231	288	415	304	282

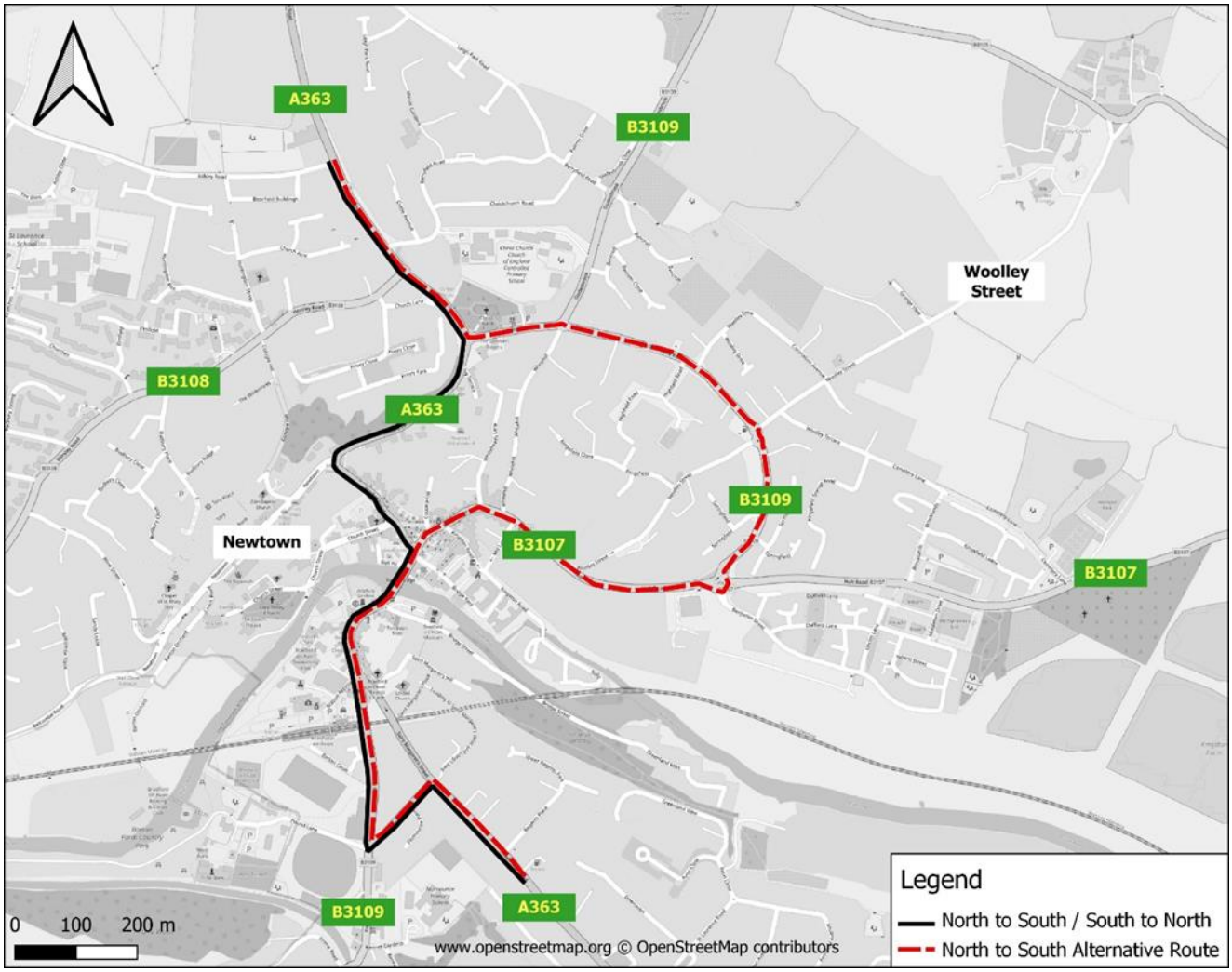
5.2.3.2 Average Journey Time Comparison

This section compares the average journey time results of the different modelled scenarios.

Figure 5.16 and Figure 5.17 display the journey time routes used to provide a comparison between the different model scenarios. The results of the journey time analysis for these routes are then outlined in Table 5.5 and

Table 5.6 for vehicles, and Table 5.7 and Table 5.8 for the D1 bus service specifically.

Figure 5.16 - North-South Journey Time Routes



Due to the one-way system implemented with Option A, vehicles travelling North to South are required to take an alternative route on the B3109 and B3107.

Figure 5.17 - East-West Journey Time Routes

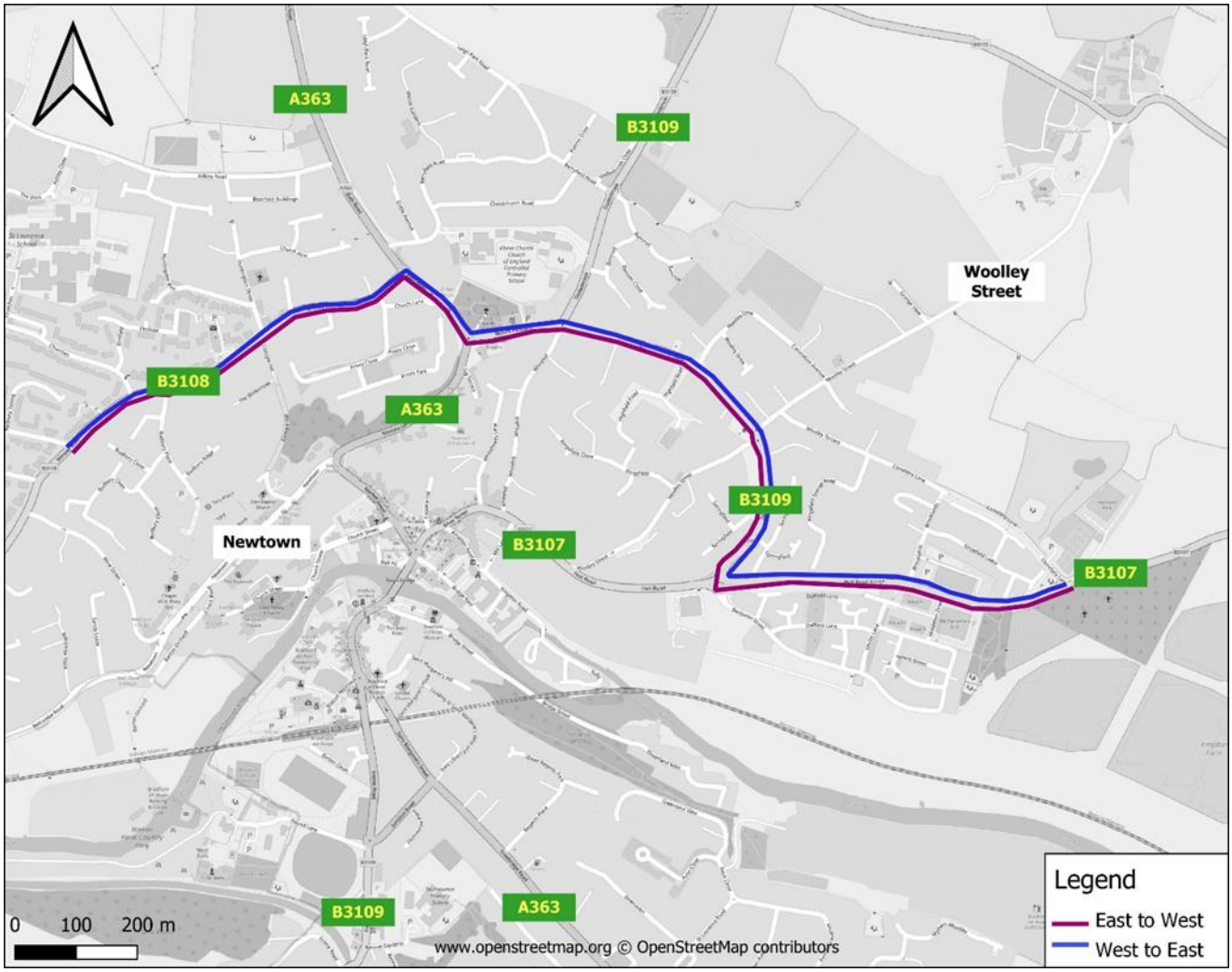


Table 5.5 and

Table 5.6 show the journey time for each modelled scenario. The key findings are:

- There is a general increase in journey time in the 2041 Do Nothing scenario compared to 2023 base model result.
- For Option A, there is an increase in journey time in the West to East, South to North and North to South movements due to the increased traffic flow as a result of the traffic diversional impact (see Section 5.2.2.1). There is an improvement in journey times for the East to West movement because majority of traffic approaching from Bath Road will make a left turn at the roundabout, hence providing more gap-seeking opportunities for traffic approaching from Mount Pleasant.
- For Option B, there is a noticeable improvement for the South to North movement in both peak periods as the interventions prioritise northbound movement at the two pinch points along Market Street. There is a slight increase in journey time for the rest of the reported journey time sections, except the East to West route and the South to North route in the PM peak where there is a slight improvement in journey time compared to the 2041 DN scenario.
- For Option C, there is increase in journey time in the West to East, South to North and North to South movements due to the increased traffic flow because of the traffic diversional impact. Like Option A, there is an improvement in journey times for the East to West movement because the majority of traffic approaching

from Bath Road will make a left turn at the roundabout, hence providing more gap-seeking opportunities for traffic approaching from Mount Pleasant.

Table 5.5 - AM Average Journey Time Results (mm:ss)

Route	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
North to South	06:18	06:52	10:57	07:27	07:43
South to North	06:19	10:34	14:14	06:55	11:55
West to East	04:36	04:52	07:42	05:16	05:21
East to West	06:18	07:43	05:06	08:22	05:57

Table 5.6 - PM Journey Time Results (mm:ss)

Route	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
North to South	08:22	09:54	19:42	10:05	08:07
South to North	05:36	06:09	07:09	05:43	06:12
West to East	04:41	05:14	18:04	05:46	05:44
East to West	04:43	05:01	04:44	04:54	04:55

5.2.3.3 Bus Journey Time Comparison

This section compares the bus journey time results of the different modelled scenarios. Table 5.7 and Table 5.8 show the Service D1 bus journey time for each modelled scenario. The key findings are:

- There is a general increase in journey time in the 2041 compared to 2023 base model result.
- For Option A, there is an increase in D1 bus journey time for the outbound service (southbound) movement due to the increased traffic flow because of the traffic diversional impact. The northbound movement is largely unaffected due to the introduction of bus gate at Silver Street.
- For Option B, there is a slight reduction in journey time for the D1 inbound service (northbound) following the intervention where the priority is given to the eastbound movement at the pinch point on Silver Street.
- For Option C, the D1 inbound service (northbound) is unaffected due to the introduction of the bus gate at Silver Street. There is a reduction in journey time for the D1 outbound service (southbound) in comparison to the Do Nothing due to the one-way system in place on Silver Street.

Table 5.7 - Bus AM Journey Time Results (mm:ss)

Route	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
D1 Outbound (Southbound)	12:49	13:15	15:27	13:05	13:13
D1 Inbound (Northbound)	14:09	19:41	18:40	16:56	17:19

Table 5.8 - Bus PM Journey Time Results (mm:ss)

Route	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
D1 Outbound (Southbound)	13:12	15:31	25:16	15:44	14:32
D1 Inbound (Northbound)	13:42	13:54	13:52	13:48	13:49

5.3 Objective 3: Improve air quality in the town

This section compares the emission data outputs of the different modelled scenarios. High-level estimates of Nitrogen Oxides (NOx) and Particulate Matter have been produced using the Bosch Emission Model add-on package for PTV VISSIM to evaluate the air quality impact. The Emission Model uses the traffic model outputs from VISSIM in addition to emission parameters associated with different vehicle types to provide a high-level estimate of total emissions over the given model period. In this example, each of the model scenarios represents a 1-hour peak period, and therefore the outputs provide a worst-case scenario value in terms of grams of pollutant per hour across the entire modelled area. It was outside of the scope of this project to complete detailed air quality modelling, and therefore any commentary on location-specific impacts is not grounded in empirical data but instead estimated from congestion patterns.

The high-level emissions modelling completed as part of this study does not consider the potential impacts of mode shift or strategic traffic rerouting which may occur as part of the three interventions. Both of these factors could potentially lead to a reduction of emissions which could offset any negative impacts of the proposed interventions.

Table 5.9 presents the emissions for the 2023 Base model, the 2041 Do Nothing scenario and the three intervention model runs.

The significant drop in emissions between the 2023 Base and 2041 Do Nothing scenarios is associated with predicted changes to the vehicle fleet composition between 2023 and 2035[11]. The main driver of this change is the increase in electric vehicles, from 1% in 2023 to 14% of all vehicles in 2035 as set out in Department for Environment, Food & Rural Affairs (DEFRA) guideline.

[11] 2035 vehicle fleet data was the latest available forecast year at the time of this study, and therefore has been used as a proxy for the 2041 vehicle fleet composition.

Table 5.9 - Traffic Emissions Data

Pollutant	Time Period	2023 Base	2041 Do Nothing	2041 Option A	2041 Option B	2041 Option C
Nitrogen Oxides *(grams per hour)*	AM-peak	1,083	359	413	386	379
	PM-peak	1,036	290	368	299	298
Particulate Matter *(grams per hour)*	AM-peak	19	15	17	15	16
	PM-peak	18	13	15	14	14

All three options result in small increases in emissions compared to the Do Nothing scenario.

The increases are most significant for Option A, which results in a 15% increase in NO2 emissions in the AM-peak and 27% increase in the PM-peak, in addition to a 13% increase in Particular Matter emissions in the AM-peak and a 15% increase in the PM-peak.

The outputs of Option B and Option C are similar and the increases in emissions are less significant than Option A. Option B experiences the same level of Particular Matter emissions as the Do Nothing scenario in the AM-peak, and only a slight increase in Particulate Matter emissions in the PM-peak. Option C experiences a small increase in Particulate Matter emissions in both the AM-peak and PM-peak, although the differences are small. However, Option C does result in a smaller increase in NO2 emissions in comparison to Option B – this result is more pronounced in the AM-peak period.

Overall, each of the interventions contributes to a minor increase in both Nitrogen Oxide and Particulate Matter emissions in comparison to the Do Nothing scenario. However, these increases are relatively modest, and given the level of tolerance within the modelling, the results can be seen as broadly similar across the options. In comparison to the situation in 2023, all of the 2041 scenarios result in a significant decrease in both Nitrogen Oxide and Particulate Matter emissions.

Despite the relatively small overall changes in emissions within the study area, changes in the level of congestion at certain locations will likely result in relative differences in local air quality in proportion to the level of congestion at any given location.

For example, Option A results in increased congestion on New Road and Mount Pleasant for eastbound traffic, and on Frome Road for northbound traffic, leading to an increase in emissions at these locations. However, Option A also reduces congestion on Silver Street and Market Street due to the implementation of the one-way system, reducing emissions in these areas which are part of Bradford on Avon's Air Quality Management Area (AQMA).

6. Assessment Against Scheme Objectives

6.1 Objective 1: Safely reallocate space for walking and cycling

[Relates to section 4.2.]

Option A provides the most opportunities for footway widening on Market Street and Silver Street due to the simplification of traffic movements, in particular the requirement for only a single traffic lane on Market Street and Silver Street.

Option B proposes the least restrictive measures on traffic movements, and as a result requires two traffic lanes to be retained on most of the network and offers a much lower potential for footway widening in comparison to the other two options. Unlike Option C, it does offer widening at the narrowest sections of footway on Market Street where there are considerable concerns about pedestrian safety.

Option C also utilises a one-way system on Silver Street and therefore unlocks considerable potential for widening on Silver Street. However, due to the minimal changes on Market Street there are limited opportunities for footway widening associated with this option in this area. Notably, this option does not achieve the same level of footway widening at the southern section of Market Street that is offered by the other two options. The current footway at this location is very narrow and there are considerable safety concerns for pedestrians at this narrow section of carriageway.

Overall, Option A goes the furthest towards fulfilling the scheme objective of safely reallocating space for pedestrians. However, each of the three options contributes to footway widening at different locations on Market Street and Silver Street, to varying extents.

As mentioned in section 5.1.2 it was not possible to accommodate compliant segregated cycling facilities within the town without completely restricting vehicular traffic. Conditions for on-road cycling will be improved through simplification of vehicle movements, reduction in turning movements at junctions and through speed reductions, although the traffic volume will generally remain higher than would be considered comfortable for cycling for most people[12].

On Market Street traffic flows are high enough to exclude most people from cycling in all the future scenarios/options. On Silver Street, Option C performs the best with forecast traffic flows of approximately 4,200 being suitable for some (but not all) potential cyclists. The other options have higher flows and are around the levels where most potential cyclists would be excluded. On New Road / Springfield, each of the three options results in an increase in traffic flows to a level that is likely to exclude most people from cycling.

6.2 Objective 2: Facilitate slow but steady traffic movements

[Relates to section 5.3]

Option A results in the most significant decreases in average speeds across the network in comparison to the Do Nothing scenario, with a 10% reduction in average speed in the AM-peak and a 36% reduction in the PM-peak. With average speeds being relatively low in the Do Nothing scenario, this further reduction in average speeds as a result of Option A implies an increase in congestion. Whilst reducing congestion on Market Street

[12] See LTN 1/20 Table 4.1 (https://www.gov.uk/government/publications/cycle-infrastructure-design-ltn-120)

and Silver Street and therefore improving traffic flow in these areas, particularly on Silver Street where average speeds are slow but steady (between 10 and 20mph), Option A contributes to an increase in stop-start congestion approaching roundabouts on New Road and Springfield in particular (specifically in an eastbound direction). Option A contributes to a significant increase in traffic flows eastbound on Mount Pleasant and New Road where traffic reroutes due to the implementation of the one-way system, increasing congestion in this direction. In contrast, it significantly increases average speeds westbound on Mount Pleasant and New Road to between 20 and 30mph.

Both Option B and Option C appear to improve vehicle flow through the town overall, resulting in reduced congestion across the network in comparison to the Do Nothing scenario. Through providing westbound priority on Silver Street and northbound priority on Market Street, Option B results in an increase in vehicle speeds and additionally traffic flows in these locations in comparison the Do Nothing scenario. However, where traffic on these streets now gives priority to opposing traffic, there is a reduction in average speed and an increase in delay. The same trend applies for Option C in terms of Market Street, however the one-way system on Silver Street contributes to increased congestion on Town Bridge, St Margaret's Street and Frome Road where northbound traffic heading towards Market Street experiences less gaps in traffic at the Market Street / Silver Street roundabout.

Overall, Option A contributes to the most significant changes to traffic speed in comparison to the Do Nothing scenario, increasing congestion on the majority of the network (with the exception of westbound traffic on Springfield, New Road and Mount Pleasant). Option A also contributes to the most significant redistribution of vehicles in the network, increasing clockwise vehicle flows on Mount Pleasant, New Road, Springfield and Silver Street. Option B and Option C have a similar level of impact on traffic movements within the town, increasing the average speed of vehicles on the network. Option B contributes to increased anti-clockwise vehicle flows on Silver Street, Springfield and New Road, whereas Option C creates congestion on Market Street which encourages more traffic to travel clockwise on Mount Pleasant, New Road, Springfield and Silver Street. However, both Option B and Option C do contribute to patches of increased congestion, specifically for southbound trips on Market Street (both options) and to the south of Town Bridge (Option C).

6.3 Objective 3: Improve air quality in the town

[Relates to section 5.3.4].

Overall, each of the options tested result in a marginal increase in Nitrogen Oxide and Particulate Matter emissions in comparison to the Do Nothing scenario. Option A resulted in marginally greater increases from the Do Nothing scenario in comparison to Option B and Option C. However, these increases are relatively modest, and given the level of tolerance within the modelling, the results can be seen as broadly similar across the options.

Ultimately, forecast 2041 emissions are substantially lower than in 2023 due to an expected increase in electric vehicles and a cleaner vehicle fleet overall. Therefore, despite resulting in marginally higher levels of emissions than the Do Nothing scenario, each of the three options are forecast to be significantly below existing emission levels.

In addition, the high-level modelling of changes in vehicle emissions does not account for any wider mode-shift or re-routing that may be achieved by any of the three options which would result in a reduction in both Nitrogen Oxide and Particulate Matter emissions within the town and may off-set any negative impacts of the proposed interventions.

6.4 Conclusion

	Scheme Aims			Other Impacts	
Scheme options	**Safely reallocate space for walking and cycling**	**Facilitate slow but steady traffic movements**	**Improve air quality in the town**	**Bus service impacts**	**Deliverability risks**
Option A – Silver Street and Market Street one-way	Through the implementation of the one-way system, and reduction to a single traffic lane, Option A enables significant footway widening on Market Street and Silver Street. Most importantly, this option enables widening at several key locations where pedestrian safety is currently a concern. **Significant opportunity to re-define the character of the whole town centre.**	Decrease in average speed across the network, primarily driven by significant increases in congestion due to significant increase in vehicle flows on Mount Pleasant, New Road and Springfield (as a result of one-way system), and also on Frome Road where northbound traffic experiences difficulty finding gaps in traffic at the Market Street / Silver Street roundabout. Some increase in average speed on Market Street and Silver Street due to one-way system. **Less impact from traffic on Market Street and Silver Street, but increased traffic flows and congestion on New Road loop and Town Bridge.**	Compared to the Do Nothing scenario, results in a greater increase in Nitrogen Oxides and Particulate Matter emission than Options B and C, although significantly less emissions than the current situation due to predicted changes to the vehicle fleet by 2041. **Small adverse impact vs 2041 Do Nothing that may be offset by mode shift / re-routing. Overall significantly below existing emissions.**	Significant journey time delay for southbound D1 bus trips, with a 17% and 63% increase in journey times in the AM and PM peak respectively. No change or slight reduction in journey time for northbound D1 bus trips as a result of the Silver Street bus gate. **Unacceptable impact upon bus journey times – option is not viable if this can't be addressed through other bus priority measures.**	Management of side roads with during bus gate operation (Coppice Hill, Kingston Road, Whiteheads Lane, Whitehill). Implications for delivery drivers on Silver Street / Market Street. Need to provide sufficient space for holding bus at signals at the bottom of Silver Street. Network resilience in the event of major incidents. Bus transponder technology and implementation. Developing suitable traffic calming to address impacts on New Road loop.
Option B – Pinch Point Priority Narrowing	More substantial footway widening possible at priority narrowing locations where carriageway narrowing permits vehicles in one direction. These locations are where existing footway is very narrow and therefore provides key safety improvements. However, widening less substantial than for Option A. Silver Street widening not as significant as Option A or Option C. **Addresses key pinch-points only.**	Slight increase in average speeds across the network. Primarily driven by improved journey times for northbound traffic on Market Street and Silver Street. Contributes to increases in traffic travelling anti-clockwise on Silver Street, Springfield and New Road. Ultimately the use of priority narrowing system will contribute to increased stop-start congestion in these areas. **Minor impacts on traffic flows but dominance of traffic remain in the town centre.**	Minor increases in Nitrogen Oxides in the AM and PM peaks, and minor increase in Particulate Matter in the PM Peak. No increase in Particulate Matter emissions in the AM-peak. Significantly less emissions than the current situation due to predicted changes to the vehicle fleet by 2041. **Small adverse impact vs 2041 Do Nothing that may be offset by mode shift / re-routing. Overall significantly below existing emissions.**	Small impacts to southbound D1 bus trips in both the AM and PM peak. Significant decrease in bus journey times in the AM peak (-14%) and small journey time decrease in the PM peak (1%). **Acceptable impacts on bus services.**	Degree of compliance with priority shuttle. Ensuring that vehicles have sufficient visibility of approaching traffic.
Option C – Silver Street One-way & Market Street Priority Narrowing	More substantial widening possible at priority narrowing location where carriageway narrowing permits vehicles in one direction. However, due to use of single priority narrowing location, this option does not permit footway widening in the southern section of Market Street, which is currently a key safety concern. This option also enables considerable footway widening on Silver Street as a result of one-way system. **Significant opportunity to re-define the character of Silver Street / town centre. Doesn't address all pinch points on Market Street.**	Slight increase in average speeds across the network. Primarily driven by improved journey times for northbound traffic on Market Street, and westbound traffic on Silver Street. Contributes to increases in clockwise traffic on Market Street, Mount Pleasant, New Road and Springfield. Increases congestion on Town Bridge, St Margaret's Street and Frome Road where northbound traffic experiences difficulty finding gaps in traffic at the Market Street / Silver Street roundabout. Ultimately the use of priority narrowing system will contribute to increased stop-start congestion in these areas. **Less impact from traffic on Silver Street, but increased traffic flows and congestion on New Road loop and south of the town.**	Minor increases in Nitrogen Oxides and Particulate Matter in the AM and PM peaks. Significantly less emissions than the current situation due to predicted changes to the vehicle fleet by 2041. **Small adverse impact vs 2041 Do Nothing that may be offset by mode shift / re-routing. Overall significantly below existing emissions.**	Slight decrease in bus journey times in both the AM and PM peak (0% and 6% respectively). Significant decrease in bus journey times in the AM peak (-12%) and small journey time decrease in the PM peak (1%). **Acceptable impacts on bus services.**	See all risks from Option A and Option B

6.5 Next Steps

This note has provided an initial investigation into three options to address the impacts on traffic in Bradford on Avon town centre and seek opportunities to;

1. Safely reallocate space to provide high-quality walking and cycling routes;
2. Facilitate slow but steady traffic movements in the town; and,
3. Improve air quality in the town.

The analysis has highlighted key opportunities and weaknesses with each of the options. In each case further work to refine potential concepts and investigate more thoroughly potential resolutions to the weaknesses identified would be useful.

Option A – Silver Street and Market Street one-way

- Offers the greatest potential to redefine the character of the town centre and reduce the dominance of traffic in that location;
- But generates knock on impacts in terms of congestion in the north and south of the town – it is likely wider alterations to junctions would be required to ensure the network functions as a whole (particularly the Bath Road/Masons Lane/Mount Pleasant roundabout). This increases the potential cost and risks associated with the scheme as a whole;
- The knock-on impacts result in unacceptable impacts on bus journey times. **If these cannot be addressed through refinement of the wider junction operation, or through bus priority measures, this option in not viable**.

Option B – Pinch Point Priority Narrowing

- Enables the opportunity to address the worst pinch-points where the town centre footways feel unsafe, without having a major impact on traffic flows;
- But fails to significantly improve the character or reduce traffic dominance in the town centre, and therefore **fails to achieve a central aim of the project**.

Option C – Silver Street One-way & Market Street Priority Narrowing

- The initial assessments suggest this hybrid option could offer a good compromise, by enabling a significant change in character on the streets in the town core (Silver Street and the northern section of Market Street) whilst resulting in a small impact on traffic movements through the town;
- Traffic is still diverted to the New Road/Springfield Loop and mitigation measures will need to be developed to calm traffic and enhance pedestrian safety in those locations – the next stages of scheme development should consider these measures in detail to demonstrate how the street can be improved to accommodate any increase in traffic and mitigate any impacts;
- As for the other options, further work is required to refine the operation of junctions throughout the network, and to understand the need for wider changes within the network in order for the network to function optimally as whole are needed.

Overall, Option C better fulfils the aims of this study, and by extension the aims of the Town Council that emerged from the Future of Transport consultation. Accordingly, our recommendation would be that Option C would be the most suitable scheme to progress to the next stages of scheme design, with the caveat that further work should focus on refining the design of the scheme and associated mitigation measures in addition to considering the array of deliverability risks identified within this report.

Appendices

Appendix A. Option Longlist

Note: Longlist table on following 3 pages.

TECHNICAL NOTE

Option			Scheme Aims						Other		
			Slow but steady traffic		Safely reallocate space for walking and cycling		Improve air quality in the town		Network Impact (Buses / road works etc)		Deliverability
Number	Name	Description	Impact	Notes	Impact	Notes	Impact	Notes	Impact	Notes	
Fundamental Traffic Management Options											
1	Market Street & Silver Street One-way	Improved version of the COVID Emergency Active Travel Fund scheme. One-way southbound on Silver Street and westbound on Market Street. Additional measures on New Road to mitigate traffic impacts (e.g. consider pedestrian crossing(s), on-street parking management, public realm improvements) Bus gate on Silver Street / Market Street to be considerd.	Slight beneficial impact	Locations where one-way system is implemented should have slow but steady traffic movement. However, New Road could become more congested from re-directed traffic. Traffic calming measures could be implemented to off-set this.	Strong beneficial impact	Facilitates reallocation of space through a large part of the town centre for safer pedestrian and cyclist movements - In particular significant footway widening.	Slight beneficial impact	Reduces instances of stop-start congestion which may improve air quality. Benefits in the town centre are partially offset by increased traffic movements elsewhere (e.g. New Road)	Negative impact	One-way system would require alterations to bus routes and timetable. Potential to overcome through signalised bus-only movements counter to one-way (via bus-gate). Permanent reallocation of road space reduces resilience of the network for emergency road closures etc.	Generally positive feedback during the COVID scheme, although significant concerns from residents of New Road. Key technical challenge is the impact on bus routing and network resilience.
2	Silver Street one-way (Market Street two-way)	One-way westbound on Silver Street. Market Street either as normal, or combined with another option (e.g. priority shuttle working). Bus gate on Silver Street to be considerd.	No / neutral impact	Congestion due to width constraints on Silver Street will be improved but will remain on Market Street. Movements at the roundabout simplified slightly, improving traffic flow.	Slight beneficial impact	Allows space to be reallocated on Silver Street but not elsewhere.	No / neutral impact	Minimal impact on congestion / traffic flow	Negative impact	One-way section would require alterations to bus routes and timetable. Potential to overcome through signalised bus-only westbound movement. Permanent reallocation of road space reduces resilience of the network for emergency road closures etc.	Little impact on surrounding routes as little traffic is required to re-route
3	Silver Street closure	Pedestrianisation of Silver Street between Market Street and Coppice Hill. Potential exemption for buses (subject to safety risk assessment)	Slight beneficial impact	Vehicle movements at the roundabout junction simplified and less delay. Some trips re-routed from Market Street / Silver Street - potential impact on New Road. Pinchpoints on Market Street still remain (could be combined with Options 4 or 5)	Slight beneficial impact	Step change re-characterisation in town centre on Silver Street. As a stand alone measure, limited impact on Market Street	Slight beneficial impact	Simplified movements through roundabout junction - congestion due to pinch-points on Market Street will remain.	No / neutral impact	No impact if buses are permitted to continue to use Silver Street. Subject to safety risk assessment - there are examples where buses use otherwise pedestrianised areas but risks need to be managed. Potentially design could allow vehicle use of Silver Street in emergencies as a diversion route - subject to safety risk assessment.	Significant concerns from residents on New Road / Springfield linked to COVID scheme would be relevant to this option. Key technical challenge is the impact on bus routing and resilience.
4	Signalised shuttle working at pinch points	Two-way traffic as present but with signalised shuttle working at key pinch points. Potential pinch points - Market Street (uphill section), Silver Street (south of The Shambles/north of Kingston Road?).	Negative impact	Signals will interrupt traffic flow more than current operation outside of peak hours.	Slight beneficial impact	Increases space for safe pedestrian and cyclist movements at key pinch points. More limited opportunities at other locations where existing footways are still constrained. Safer interaction between vehicles, and with pedestrians at key pinch points.	No / neutral impact	Unlikely to have significant impact on its own. Additional queueing traffic in off-peak times risks worsening air quality.	Negative impact	Bus journey times may be interrupted by signals. No impact on service routing. No impact on network resilience	Potential objection to placing traffic signals in historic street environment, and technical challenge to find suitable locations for signal heads. Limited impact on peoples route choices.
5	Pinch point priority shuttles	Two-way traffic as at present but with formalised priority shuttle working at pinch points. I.e. road narrowed to a single lane and signage/road markings to designate priority. Potential pinch points = Market Street (uphill section), Silver Street (south of The Shambles/north of Kingston Road?).	No / neutral impact	Similar operation to existing as most drivers observed to wait at pinch-points for oncoming vehicles to clear. Exception being that with one direction given priority (e.g. uphill) then during peak hours their would likely be an imbalance in flow causing large queues on Mason Lane.	Slight beneficial impact	Increases space for safe pedestrian and cyclist movements at key pinch points. More limited opportunities at other locations where existing footways are still constrained. Safer interaction between vehicles, and with pedestrians at key pinch points.	No / neutral impact	Similar operation to existing as most drivers observed to wait at pinch-points for oncoming vehicles to clear.	No / neutral impact	Bus journey times may be interrupted by shuttle working. No impact on service routing. No impact on network resilience	Limited impact on peoples route choices. Technically feasible.
6	One-way loop	Clockwise one-way loop of Market Street, Masons Lane, New Road, Springfield, Silver Street.	Strong beneficial impact	Simplified traffic movements throughout the town centre, resulting in simpler junctions. Traffic calming required to maintain slow speeds. Some trips to/from the north of the town will be forced to use the town centre when previously they didn't.	Strong beneficial impact	Opportunity for whole scale reallocation of space throughout the loop - subject to funding.	Slight beneficial impact	Reduces instances of stop-start congestion may improve air quality. Benefits in town centre partially offset by increased traffic movements elsewhere (e.g. New Road). Some trips will be re-routed to the town centre.	Negative impact	Requires re-routing of bus, with no opportunity for bus exemptions etc. Resilience of network to emergency closures would be reduced.	Significant concerns from residents on New Road / Springfield linked to COVID scheme would be relevant to this option. Key technical challenge is the impact on bus routing and resilience.

TECHNICAL NOTE

Option			Scheme Aims						Other		
			Slow but steady traffic		Safely reallocate space for walking and cycling		Improve air quality in the town		Network Impact (Buses / road works etc)		Deliverability
Number	Name	Description	Impact	Notes	Impact	Notes	Impact	Notes	Impact	Notes	
Complimentary Traffic Management Options - could form part of various fundamental options											
7	Turning restrictions at Silver Street / Market Street / Town Bridge roundabout	Silver Street approach - ahead only to Town Bridge (no right turn) Market Street approach - right turn only to Town Bridge (no left turn to Silver Street) Town Bridge approach - all turns permitted.	Slight beneficial impact	Heavy two-way flow on Market Street would remain, albeit some northbound movements from Silver Street would be re-directed. Similarly, some eastbound movements on Silver Street from Market Street would be re-routed, but significant two-way traffic would remain.	No / neutral impact	Does not generate many opportunities to re-allocate space. (May be combined with Options 4 or 5).	Slight beneficial impact	Some re-routing of trips away from town centre.	No / neutral impact	**No impact to routing of existing bus services. Turning restrictions could be suspended if needed for diversion routes etc.**	
8	Town Bridge shuttle working	Shuttle working system using traffic lights on either side of Town Bridge.	Negative impact	Signals will interrupt traffic flow more than current operation outside of peak hours. Town bridge may become more of a pinch point.	Strong beneficial impact	Increases space for safe pedestrian and cyclist movements on Town Bridge, currently a key safety issue.	No / neutral impact	Unlikely to have significant impact on its own. Additional queueing traffic in off-peak times risks worsening air quality.	Negative impact	Bus journeys for services using the Town Bridge will be interrupted by signals.	
9	New Road - Parking restrictions / reconfiguration	Parking restrictions / reconfiguration on New Road.	Slight beneficial impact	Carefully considering the locations of restrictions/reconfigurations to avoid causing issues in other areas of Bradford-on-Avon. This should formalise areas where opposing traffic must give way to each other and allow for steady slow moving traffic.	Slight beneficial impact	Reallocating space used for parking to improve traffic flow and/or allocate more space to pedestrians and cyclists.	No / neutral impact	Unlikely to have significant impact on its own.	No / neutral impact	If this would create opportunities for other network improvements it could be slight beneficial.	
10	Springfield - Parking restrictions / reconfiguration	Parking restrictions / reconfiguration on Springfield.	Slight beneficial impact	Carefully considering the locations of restrictions/reconfigurations to avoid causing issues in other areas of Bradford-on-Avon. This should formalise areas where opposing traffic must give way to each other and allow for steady slow moving traffic.	Slight beneficial impact	Reallocating space used for parking to improve traffic flow and/or allocate more space to pedestrians and cyclists.	No / neutral impact	Unlikely to have significant impact on its own.	No / neutral impact	If this would create opportunities for other network improvements it could be slight beneficial.	
11	Mill Lane contra-flow cycle lane	Contraflow cycle lane on Mill Lane allowing northbound (uphill) cycle movements, allowing cyclists to bypass the one-way system on Silver Street (Options 1 and 2). Only effective in conjunction with one-way system.	No / neutral impact	No impact on existing traffic conditions.	Slight beneficial impact	Provides cyclists with a wide cycle lane. Limited to one small location with limited demand.	No / neutral impact	Unlikely to have significant impact on its own.	No / neutral impact	None.	
12	Relocation of bus layby to the south of Town Bridge (NAPTAN code: wiladmwp)	Reconfiguration or relocation of bus stop on southern side of Town Bridge to prevent bus overhang into carriageway. Options could either be to move bus bay away from carriageway, or place bus bay in the carriageway - temporarily stopping traffic.	Strong beneficial impact	Prevents traffic flow being disrupted by bus overhanging on to carriageway.	No / neutral impact	Potential for small amount of footway widening on southern side of bridge if bus stop were to be moved.	No / neutral impact	Unlikely to have significant impact on its own.	Slight beneficial impact	Provides sufficient space at a relocated bus stop	
13	Management of parking restrictions (more generally)	Parking restrictions / reconfiguration throughout town centre (nextent/level of restriction not yet defined).	Slight beneficial impact	Carefully considering the locations of restrictions/reconfigurations to avoid causing issues in other areas of Bradford-on-Avon. This should formalise areas where opposing traffic must give way to each other and allow for steady slow moving traffic.	Slight beneficial impact	Reallocating space used for parking to improve traffic flow and/or allocate more space to pedestrians and cyclists.	No / neutral impact	Unlikely to have significant impact on its own.	No / neutral impact	If this would create opportunities for other network improvements it could be slight beneficial.	
14	20mph limit within the town centre	20mph on all roads within study area.	Slight beneficial impact	Will lead to an overall reduction in traffic speed, however issues with congestion/stop-start will remain during busy hours.	No / neutral impact	No change in space allocation. However, some improvement to perception of safety due to slower moving traffic during off-peak hours.	Slight beneficial impact	Increased likelihood of steady traffic flow and therefore vehicle accelerations.	Negative impact	Limiting buses to 20mph may reduce bus journey times.	
15	Market Street - Puffin Crossing	Signal controlled puffin crossing on Market Street to replace zebra crossing adjacent to Church Street junction.	Negative impact	Signals will interrupt traffic flow more than current operation outside of peak hours.	Strong beneficial impact	Will resolve issues with current zebra crossing where stationary traffic heading southbound on Market Street obscures view of the crossing for northbound crossing	No / neutral impact	Unlikely to have significant impact on its own.	Negative impact	Signals will interrupt traffic flow/bus journeys more than current operation outside of peak hours.	
16	Traffic calming measures	Traffic calmin measures throughout the town centre. Extent of measures will be dependent on level of impact, cost and available space.	Strong beneficial impact	Will lead to an overall reduction in traffic speed, however issues with congestion/stop-start will remain during busy hours.	No / neutral impact	If traffic calming measures include or permit narrowing lanes and allocating space to peds & cycles this could be slight beneficial.	Slight beneficial impact	Depending on measures implemented, this may reduce instances of stop-start congestion may improve air quality and stop emissions 'hanging' around.	No / neutral impact	If this would create opportunities for other network improvements it could be slight beneficial.	
17	Enhanced pedestrian measures on Market Street.	Widening of pavement on Market Street (near Church Street) on both sides (enabled through slight road realignment). Significant reduction in Church Road junction radii, increasing footway space. Could be combined with Option 15.	No / neutral impact	Minor impact on waiting time for vehicles approaching from Church Street due to single lane for right/left turns. No impact on Market Street.	Slight beneficial impact	Significant reallocation of space to pedestrians on this section of market street, issues remain on northern section and section near The Shambles.	No / neutral impact	Unlikely to have significant impact on its own.	No / neutral impact	None.	
18	St Margarets Street pedestrianisation Frome Road to St Margarets Hill	Closure of roundabout arm and pedestrianisation from junction to entrace to St Margarets Hill (access to St Margarets Hill from south only). Cycle access in both directions to St Margarets Street provided. Some form of crossing for cyclists heading northbound towards Town Bridge to be considered. Similar to what was proposed as part of Historic Core Zone.	Slight beneficial impact	Slight improvement to traffic flow due to reduced number of arms on Frome Road/St Margarets Street roundabout. Small increase in traffic flow on Frome Road with diverted trips away from St Margarets Street one-way section.	Slight beneficial impact	Reallocation of small section of road space and closure of arm of roundabout will provide space for considerable widening of footway and implementation of cycle access route.	Slight beneficial impact	Minor improvement to air quality through reduced number of conflicting movements at roundabout.	Negative impact	St Margarets Street would not be able to be used as an alternative route in the event of any closure on Frome Road.	Likely to be some objection from residents on St Margaret's Street/St Margaret's Hills due marginal inconvenience on travel time. Offset by improvement in travel time travelling in reverse direction (i.e. from South).

TECHNICAL NOTE

Option			Scheme Aims						Other		
			Slow but steady traffic		Safely reallocate space for walking and cycling		Improve air quality in the town		Network Impact (Buses / road works etc)		Deliverability
Number	Name	Description	Impact	Notes	Impact	Notes	Impact	Notes	Impact	Notes	
Other Options											
19	Clean Air Zone	Designated zone where some vehicle types are required to pay a charge to enter. Targeted at NO2 emissions.	No / neutral impact	**May slightly reduce traffic flow within zone but likley to be minor.**	No / neutral impact	If redirecting traffic away from the town will allow space to be reallocated to peds & cycles this could be slight beneficial.	Slight beneficial impact	Encourages traffic away from the town centre which would improve air quality in the town.	Slight beneficial impact	Encourages bus patronage.	Could be very expensive (and devisive) to implement and monitor/enforce.
20	Bridge toll	Charging users for crossing Town Bridge (either in one or both directions). Variable pricing based on vehicle size/emissions could be considered. Discount / exemption for local residents would be considered. Assumption that this would be ANPR-based digital system to reduce processing/payment time.	No / neutral impact	Likely to reduce traffic flow through the town, improving flow. Traffic speed impact will depend on method of toll enforcement.	No / neutral impact	No change in space allocation	Slight beneficial impact	Encourages traffic away from the town centre which would improve air quality in the town.	No / neutral impact	Reduction in traffic in Town centre due to bridge toll would reduce bus journey times (*assuming toll would cause considerable strategic reallocation*). Additional income source for Town Council.	Could be very expensive (and devisive) to implement and monitor/enforce.
21	Alternative traffic route	Redirection of traffic away from Bradford-on-Avon at a strategic-level. Achieved either through soft measures (e.g. signage) or hard measures (traffic restrictions).	Slight beneficial impact	Likely to reduce traffic flow through the town, improving flow. May lead to issues arise outside of the town depending on measures and locations.	No / neutral impact	If redirecting traffic away from the town will allow space to be reallocated to peds & cycles this could be slight beneficial.	Slight beneficial impact	Encourages traffic away from the town centre which may improve air quality in the town.	Negative impact	Alternative route chosen may route more vehicles on existing bus routes.	Wider strategic impacts would need to be assessed. Concerns about knock-on impact in other locations.
22	Park-and-ride	New park-and-ride scheme with locations on north and/or south side of the town.	Slight beneficial impact	Some reduction in traffic volumes due to mode shift.	No / neutral impact	No change in space allocation in town centre	Slight beneficial impact	Some reduction in traffic volumes due to mode shift may improve air quality in the town.	Slight beneficial impact	May increase bus patronage but would require alterations to bus timetables.	Suitable location for Park-and-ride would need to be identified and purchased.
23	Public transport improvements	Improvements to the existing public transport system. Options ranging from bus service improvements to a new tram system to increase public transport users.	Slight beneficial impact	Some reduction in traffic volumes due to mode shift.	No / neutral impact	No change in space allocation in town centre	Slight beneficial impact	Some reduction in traffic volumes due to mode shift may improve air quality in the town.	Slight beneficial impact	May increase bus patronage but would require alterations to bus timetables.	
24	E-bike hire scheme	E-bike ranks in various locations around the town (e.g. Station mobility hub). Improving access to/from the town centre.	No / neutral impact	Some (very minor) reduction in traffic volumes due to mode shift.	No / neutral impact	No change in space allocation in town centre	No / neutral impact	Unlikely to have significant impact on its own.	No / neutral impact		Will require paid staff to maintain bikes and periodically relocate bikes.
25	Segregated cycle facilities	Implementation of LTN 1/20 compliant segregated cycle facilities throughout the town.	Slight beneficial impact	Possible reduction in traffic volumes due to mode shift.	Strong beneficial impact	Will reallocate space to cyclists in order to achieve LTN 1/20 compliance	Slight beneficial impact	Some reduction in traffic volumes due to mode shift may improve air quality in the town.	Negative impact	May require changes to bus routes and timetable if space reallocation requires.	Will not be possible without road space reallocation. Lack of available space without extreme reduction in traffic levels
26	Frome Road - Permanent pedestrian crossing and full footway on eastern side.	Zebra / puffin crossing on Frome Road (either north or south of railway bridge) to provide safe access to businesses and residential properties. Widening of footway on northern side, especially over the railway bridge.	No / neutral impact	Minor increase in stop/start of vehicles due to crossing, but limited impact due to high level of congestion on Frome Road in peak periods.	Slight beneficial impact	Significantly improved footway provision for pedestrians on Frome Road, and increased safety due to formal crossing provision. Improvements specific to Frome Road rather than elsewhere in the town.	No / neutral impact	Slight increase in stop/start congestion and accelerations due to the crossing, but very minor.	No / neutral impact	No impact on buses/road works.	Issues associated with improvement on rail bridge.
27	New pedestrian footbridge	New pedestrian footbridge across the River Avon (either to the east or west of Town Bridge)	No / neutral impact	No impact on existing traffic conditions.	Slight beneficial impact	Will significantly improve access over the river for pedestrians and cyclists, particulary for wheelchair users and those with pushchairs - Although limited to Town Bridge only.	Slight beneficial impact	No impact on traffic, but moves pedestians/cyclists away from the road (temporarily).	No / neutral impact	No impact on buses/road works.	Will require some further changes to pavement layout where bridge meets land on either side of the river - paritcularly to enable cyclists to reach the new bridge.