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Wiltshire Local Plan

Transport Review

Wiltshire Council

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Contents

Chapter		Page
1.	**Introduction**	**6**
1.1.	Scope of assessment	6
1.2.	Model review and refinements of the Wiltshire model	6
1.3.	Forecast scenarios	6
2.	**Assessing impacts of Local Plan growth**	**8**
2.1.	Model scenario definitions	8
2.2.	Forecasting highway demand for each scenario	8
2.3.	Do-Nothing and Do-Minimum infrastructure assumptions	9
2.4.	Assessing the impacts of Local Plan growth (Do-Minimum vs Do-Nothing)	13
3.	**Mitigating impacts of Local Plan growth**	**17**
3.1.	Approach to identification of the mitigation package	17
3.2.	Walking and cycling mitigation measures	17
3.3.	Public transport mitigation measures	19
3.4.	Highway mitigation measures	23
3.5.	Assessing the performance of the combined mitigation package	25
4.	**Conclusions and Summary**	**30**
4.1.	Impacts of Local Plan growth without mitigation	30
4.2.	Proposed mitigation	30
4.3.	Impacts of mitigation	32
4.4.	Next steps	32
Appendices		**33**
Appendix A.	**Guiding principles and hierarchy of interventions**	**34**
A.1.	Defining ‘severe impacts’	34
A.2.	Principles for identifying mitigation schemes	35
Appendix B.	**Assumptions used in testing**	**38**
B.1.	Chippenham site options	41
B.2.	Trowbridge site options	41
B.3.	Salisbury site options	41
Appendix C.	**Additional Considerations**	**42**
C.1.	Wiltshire modal share	42
C.2.	Parking policy recommendations	42
Appendix D.	**Highway scheme designs**	**43**
D.1.	Melksham Bypass (SOBC)	44
D.2.	A350 Phase 4&5 Dualling (SOBC)	45
D.3.	M4 Junction 17 (SOBC)	46
D.4.	Salisbury Junctions (SOBC)	47
D.5.	Staverton bridge bypass	49
Appendix E.	**Methodology to assess active travel impacts**	**50**
E.1.	Methodology to assess impacts	50
E.2.	Findings	51
Appendix F.	**Methodology for estimation of rail and bus patronage**	**52**
F.1.	Current rail patronage	52

F.2. Station accessibility 52
F.3. Estimated potential rail demand with prospective Local Plan 53
F.4. Current bus provision and services 55

Appendix G. Estimated scheme costs 58

G.1. Estimated cost of proposed walking and cycling measures 58
G.2. Estimated cost of public transport measures 58
G.3. Estimated highway scheme costs 59

Appendix H. Economic Appraisal 61

H.1. Economic appraisal of combined mitigation package 61
H.2. Value for Money 63

Tables

Table 1-1 - Summary of household forecasts 7
Table 2-1 - Model scenario definitions and assumptions 8
Table 2-2 - Development trip rates per hour (derived from TRICS) 9
Table 3-1 - Chippenham and Trowbridge public transport improvements 22
Table A-1 - Defining severe impacts through V/C ratio 34
Table A-2 - Proposed hierarchy of interventions 36
Table C-1 - Estimated travel modal share in Wiltshire (2018) 42
Table E-1 - Calculation of derived all-purpose trips cycle mode share (Chippenham example) 50
Table E-2 - Calculation of all-purpose cycle mode split post-scheme (Chippenham example) 51
Table E-3 - Expected impact of active travel measures on highway demand 51
Table F-1 - Journey time comparison by mode between main railway stations (station to station) 53
Table F-2 - Proportion of population within distance bands from a railway station 53
Table F-3 - Estimated car trips generated by prospective Local Plan housing by town 54
Table F-4 - Estimated total person trips generated by prospective Local Plan housing by town 54
Table F-5 - Estimated additional rail passengers by town 54
Table F-6 - Wiltshire bus service punctuality (by percentage) 57
Table G-1 - Estimated cost of active travel mitigation measures (2020 prices and values) 58
Table G-2 - Indicative bus capital and revenue costs (2020 prices and values) 58
Table G-3 - High-level cost assumptions for Local Plan highway schemes 59
Table G-4 - Estimated Local Plan highway scheme costs 60
Table H-1 - Estimated combined cost of MRN schemes 62
Table H-2 - Estimated combined cost of Local Plan mitigation package 62
Table H-3 - Standard DfT Value for Money (VfM) categories 63
Table H-4 - Value for Money statement (*PVC 2010 prices and values, millions)* 63

Figures

Figure 2-1 - Impacts of Local Plan forecast growth to 2036 11
Figure 2-2 - The need for a Southern Distributor Road (SDR) 12
Figure 2-3 - Changes in traffic flows from Local Plan growth to 2036 on the A350 corridor 13
Figure 2-4 - Changes in traffic flows from Local Plan growth to 2036 in Salisbury and Amesbury 14
Figure 2-5 - Impacts of forecast Local Plan growth on the A350 corridor 15
Figure 2-6 - Impacts of forecast Local Plan growth in Salisbury and Amesbury 16
Figure 3-1 - Chippenham new walking and cycling infrastructure 17
Figure 3-2 - Trowbridge new walking and cycling infrastructure 18
Figure 3-3 - Salisbury new walking and cycling infrastructure 18
Figure 3-4 - Bus corridors to support Local Plan growth: Chippenham 20
Figure 3-5 - Bus corridors to support Local Plan growth: Trowbridge 21
Figure 3-6 - Schemes already developed as improvements to the Major Road Network (MRN) and further interventions to mitigate Local Plan growth 24
Figure 3-7 - Changes in traffic flows with suggested combined mitigation on the A350 corridor 25
Figure 3-8 - Changes in traffic flows with suggested combined mitigation in Salisbury and Amesbury 26
Figure 3-9 - Impacts of mitigation on the A350 corridor 27
Figure 3-10 - Impacts of mitigation in Salisbury and Amesbury 28
Figure A-1 - Process for identification of severe impacts 35
Figure B-1 - Chippenham: housing sites and schemes in uncertainty log 38
Figure B-2 - Trowbridge: housing sites and schemes in uncertainty log 39
Figure B-3 - Salisbury: housing sites and schemes in uncertainty log 40
Figure F-1 - Patronage at rail stations in Swindon and Wiltshire 52
Figure F-2 - West Wiltshire bus routes by frequency 55
Figure F-3 - South Wiltshire bus routes by frequency 56

1. Introduction

1.1. Scope of assessment

Wiltshire Council is undertaking a Local Plan Review. The Council commissioned Atkins to provide transport planning support for the review process, using Wiltshire's strategic transport model. This included:

- Review of the Wiltshire strategic model to ensure that it accurately reflects existing (2018) traffic conditions on the road network;
- Development of forecast scenarios to reflect future development and planned transport improvement schemes;
- Analysis of the impacts of prospective Local Plan growth on the road network;
- Initial assessment of the scope to improve active travel and public transport to enhance travel choices; and
- Development of options for mitigation of the impacts on the road network.

1.2. Model review and refinements of the Wiltshire model

The Wiltshire strategic model was reviewed to confirm the model's capability and robustness throughout the process. This review focussed on ensuring that the transport networks in the settlements subject to detailed assessment (Chippenham, Salisbury and Trowbridge) accurately reflect actual base 2018 conditions.

High-level sense checks were also undertaken for Wiltshire's market towns; these reviewed the level of network coding detail and zoning structures for each town.

The Wiltshire strategic model is based on a 2018 base year. Forecasts of future travel demand were developed based on standard DfT modelling assumptions, together with specific forecasts of housing and employment growth (see section 1.3 below). However, the COVID-19 pandemic has caused unprecedented levels of disruption to the economy and the ways in which people travel since March 2020. The long-term impacts of the pandemic are likely to cause potentially significant changes in travel demand and behaviour, which are currently impossible to predict. The analyses are therefore based on 2018 base year data and (unadjusted) forecasts of demand to 2036. It is recommended that future analysis includes scenario testing to assess the potential implications of future changes in travel behaviour that could emerge following the pandemic.

1.3. Forecast scenarios

Wiltshire Council provided a list of planned developments and infrastructure associated with the existing Wiltshire Core Strategy (January 2015) and subsequent site allocation plans[1]. The following scenarios formed the basis of testing:

- Do Nothing:
  - includes all Wiltshire Core Strategy growth and infrastructure; and
  - excludes post Wiltshire Core Strategy growth and associated infrastructure (see Table 2-1);
- Do Minimum (Do Nothing with prospective Local Plan growth and minimal access infrastructure (see Table 2-1); and
- Do Something (Do Minimum with prospective Local Plan growth plus transport mitigation measures (See section 3).

A summary of household forecasts for these demand scenarios is shown in Table 1-1. The household totals for each scenario in Wiltshire are as follows:

- 2018 Base: ~208,000 households;
- 2036 Do Nothing: ~228,000 (~20,000 additional households); and
- 2036 Do Minimum: ~246,000 (~A further 18,000 additional households, to be tested for the prospective Local Plan).

[1] Chippenham Site Allocations Plan (May 2017) and Wiltshire Housing Site Allocations Plan (February 2020).

Table 1-1 - Summary of household forecasts

HMA Region	Region	Base 2018 (Households)	2036 Do Nothing) (Note 2)	2036 Do Minimum and Do Something (Notes 3,4)
Chippenham HMA	Chippenham	15,452	18,439	23,539
	Corsham	2,700	2,870	3,060
	Melksham	8,618	9,814	12,489
	Calne	8,379	8,998	9,418
	Devizes	6,416	6,759	7,004
	Malmesbury	8,772	9,122	9,122
	Rest of HMA	13,109	13,284	14,754
Salisbury HMA	Tidworth/ Ludgershall	64,389	72,208	74,923
	Amesbury			
	Salisbury			
	Rest of HMA			
Trowbridge HMA	Trowbridge	17,418	21,018	22,818
	Westbury	7,385	8,240	9,365
	Warminster	8,058	9,778	10,038
	Bradford on Avon	30,241	30,391	31,051
	Rest of HMA			
West of Swindon HMA	Royal Wootton Bassett	6,059	6,059	7,085
	Marlborough	10,576	10,576	11,179
	Rest of HMA			
Wiltshire		**207,572**	**227,556**	**245,845**

1. An Uncertainty Log was used to project the locations of housing included in the current core model. It shows the numbers of forecast **dwellings**. For the purposes of this analysis, one dwelling is assumed to be equivalent to one household.
2. 2036 Do Nothing (including Core Strategy growth in Uncertainty Log and excluding prospective Local Plan + Base 2018).
3. Estimates for Local Plan housing derived from housing figures in Appendix B provided by Wiltshire Council. This shows the number of proposed **dwellings**. For the purposes of this testing, one dwelling is assumed to be equivalent to one household.
4. Note that this forecast has a higher household trajectory than the 2036 National Trip End Model (NTEM) Core forecasts used by the Department for Transport.

2. Assessing impacts of Local Plan growth

2.1. Model scenario definitions

The model scenario definitions and assumptions are presented in Table 2-1. The demand assumptions are based on the housing forecasts presented in Table 1-1 and are detailed in section 2.2. The infrastructure assumptions are based on an uncertainty log[2], which was developed in accordance with TAG[3]. Further detail is provided in section 2.3.

Table 2-1 - Model scenario definitions and assumptions

Scenario	Demand assumptions (section 2.2)	Infrastructure assumptions (section 2.3)
2036 Do-Nothing	Wiltshire Core Strategy growth excluding prospective Local Plan growth.	Base + Core infrastructure (as defined in the Uncertainty Log used for modelling).
2036 Do-Minimum	Do Nothing with prospective Local Plan growth. Location-specific sites use TRICS trip rates (see Table 2-2). "Rest of Housing Market Area" (see section 1.2) trips use background NTEM trip rates.	Do-Nothing + Local Plan site-specific access. Assumes improvements to A350 Lackham and Bumpers Roundabouts and the new Chippenham Eastern and Southern Distributor Roads (See section 2.3.1).
2036 Do - Something	Do Minimum - prospective Local Plan growth minus the effect on demand of transport mitigation measures for walking, cycling & public transport (see section 3).	Do-Minimum + schemes already developed as improvements to the Major Road Network (MRN) and further interventions to mitigate Local Plan growth (see Figure 3-6).

2.2. Forecasting highway demand for each scenario

In order to test the impacts of the prospective Local Plan growth and determine suitable mitigation measures the following steps were undertaken to derive highway demand for the model scenarios defined above.

- The housing numbers assumed for each scenario are defined in section 1.3 and summarised in Table 1-1.
- In the Do Nothing (DN) scenario, the housing and growth assumptions assume only committed housing and infrastructure identified within the Wiltshire Core Strategy and Local Transport Plan. The existing strategic model was reviewed. This used the existing forecast model and revised the level of overall housing (using alternate assumptions within DfT's National Trip End Model, NTEM) to forecast the expected number of overall trips.
- The Do Minimum (DM) scenarios include the prospective Local Plan growth. Housing locations were provided by Wiltshire Council for the Principal Settlements (Chippenham, Trowbridge and Salisbury) and information provided for Melksham because of the interrelated impacts on the A350 corridor between Trowbridge and Chippenham arising from its own growth. Principal Settlement information is presented in Appendix B.
- The specific locations for new housing have not been identified in the market towns. The locations of loading of new trips to the network have therefore been assumed to be spread in each location.
- The Do Minimum (DM) scenarios for prospective Local Plan growth use:
  - TRICS trip rates (for the principal settlements and market towns) as opposed to DfT trip end forecasts to represent a robust assessment of potential trip impacts (see Table 2-2).
  - For "Rest of HMA" housing and changes in employment (which at this stage of plan preparation is assumed to be proportionate to housing growth) this "background" change uses alternate scenario NTEM trip growth.
- The distribution of trips is based on the movements within each settlement which have been derived from the Wiltshire strategic model. It is assumed that trip patterns are consistent with the core forecasts and no

[2] An 'uncertainty log' sets out the known assumptions and uncertainties in the modelling and forecasting approach. This includes future development that will influence future demand and changes to infrastructure that could influence future travel patterns.
[3] TAG (Transport Analysis Guidance) (https://www.gov.uk/guidance/transport-analysis-guidance-tag) is the suite of documentation provided from the Department for Transport (DfT) that sets out best practice in undertaking transport modelling and appraisal. TAG Unit M4 (https://www.gov.uk/government/publications/tag-unit-m4-forecasting-and-uncertainty) provides detail on the process of developing the uncertainty log.

allowance is made for changes in self-containment, for example in relation to local trips for employment, shopping, schools, healthcare or attractions across the area as a result of the Local Plan. Further assessment of future changes in employment could inform later stages of work.

- Additional freight traffic is linked to the housing TRICS trip rates and the proportion is based on the base model for similar residential areas.

Table 2-2 - Development trip rates per hour (derived from TRICS)

Development Type (Unit)	AM Peak (08:00-09:00)			Inter-Peak (Average 10:00-16:00)			PM Peak (17:00-18:00)		
	In	Out	Tot	In	Out	Tot	In	Out	Tot
Residential (dwelling)	**0.13**	**0.36**	**0.49**	0.15	0.15	0.30	**0.31**	**0.15**	**0.46**

Residential rates are per dwelling. Private owned houses are based on 67 days of data from 31 regions in England and Wales. The average number of dwellings from the sample was 79.

2.3. Do-Nothing and Do-Minimum infrastructure assumptions

The core transport schemes in the **Do-Nothing scenario** are presented in Figures B-1, B-2 and B-3 in Appendix B.

In **Chippenham**, these include:

- Junction improvements across the town;
- Dualling of the A350 from Malmesbury Road to the A420 Bristol Road roundabout (this is already open to traffic);
- Dualling of the A350 on the approaches to the A4 Bath Road roundabout (this is already open to traffic);
- A new road connection from the A350 Malmesbury Road Roundabout to B4069 Maud Heath's Causeway in the north of the town (currently under construction); and
- A new connection to the A350 from Showell Farm.

In the **Trowbridge** area, planned schemes include infrastructure to support major development on West Ashton Road and the A350 Yarnbrook and West Ashton Bypass. Schemes in **Salisbury** include improvements to junctions on A36 Churchill Way and the A338 south of the city centre.

The **Do-Minimum scenario** includes the infrastructure described above for the Do-Nothing scenario, together with access into the Local Plan sites. It also includes strategic infrastructure at Chippenham, described in Section 2.3.1 below.

2.3.1. Chippenham

Chippenham has been identified as having the potential for significant growth to meet future housing needs. The road network is congested with 'bottlenecks' in and around the town centre. Previous work has shown that any meaningful growth would require a new Eastern Distributor Road (EDR) connecting the east of the town to the A350 to the north. It demonstrated a threshold for a new EDR would be 400 new homes above the current Chippenham Site Allocations Plan (CSAP). This means that 5,100 new homes, identified in the Local Plan Review, would trigger the need for the new road. Without this access, it is expected there would be considerable capacity constraints and congestion and delay through the town centre.

Figure 2-1 compares the Volume/Capacity (V/C%) ratios for links on the road network in the Do Nothing and Do Minimum scenarios. The V/C% is a measure of the level of congestion on a road link. As traffic flows (or volumes) approach the capacity of the link, there is an increase in congestion. A ratio approaching or greater than 100% means that flows approach or exceed capacity, which causes significant delays. Figure 2-1 shows that with the prospective Local Plan growth there would be significant increases in congestion.

The CSAP identified a preferred arrangement would be for the EDR to follow a route from the A4 east of Pewsham to the A350 Malmesbury Road roundabout, to the north of the town. The delivery of 5,100 homes in Chippenham would necessitate the delivery of this route to the north of the town, which would address many of the congestion issues in the town centre. However, this would not tackle all the impacts resulting from an additional 5,100 dwellings.

There would still be several challenges: significant congestion problems on the A4 to the east (due to traffic routing via the A4, A342 and A3102 towards Melksham), residual issues in the central area and constraints on the A350 and A4 west. This is shown visually in Figure 2-2. The Do-minimum scenario therefore introduces a more comprehensive solution. This would require an EDR (a northern link from the A4 at Pewsham to the A350

Malmesbury Road roundabout) **and** a new Southern Distributor Road (to connect from the A4 at Pewsham to the A350 at Lackham Roundabout).

A Southern Distributor Road (SDR) provides a route between the A4 and A350 corridors which avoids the town centre. An SDR is further justified, as advised by Wiltshire Highway Authority, to ensure that the scale of development proposed in Chippenham has access to two principal corridors to avoid point loading detrimentally affecting the strategic use of either corridor.

Figure 2-1 - Impacts of Local Plan forecast growth to 2036

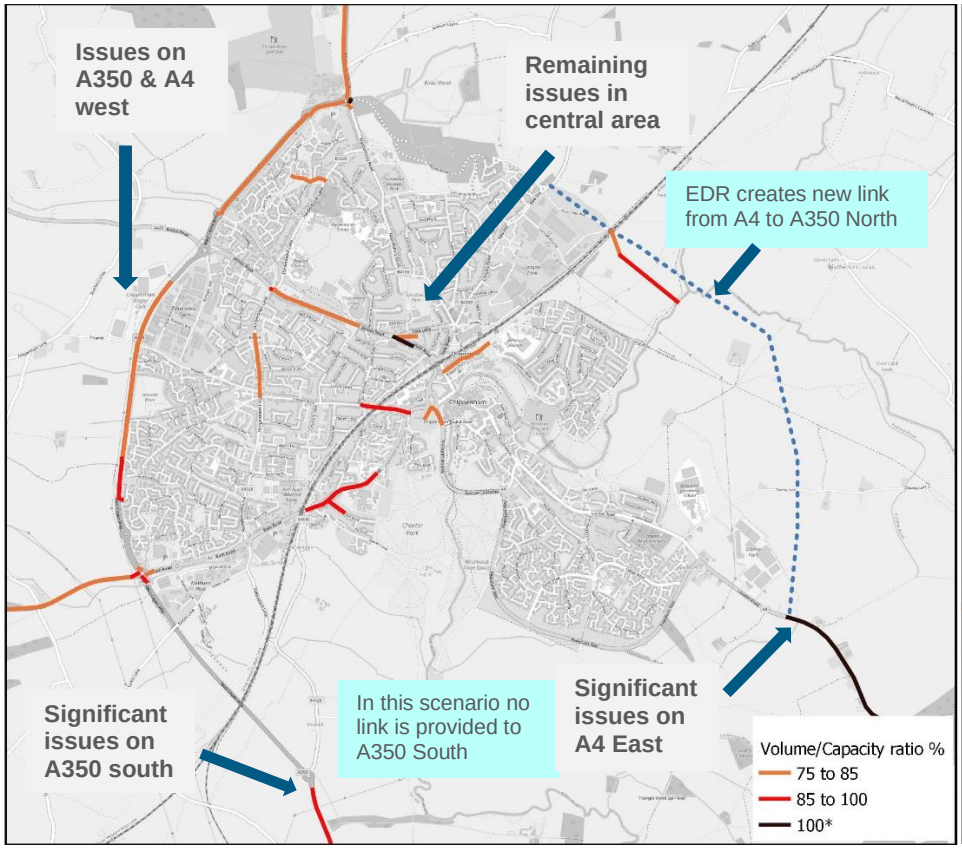
Without Local Plan (Do-Nothing)

With Local Plan growth (Do-Minimum)

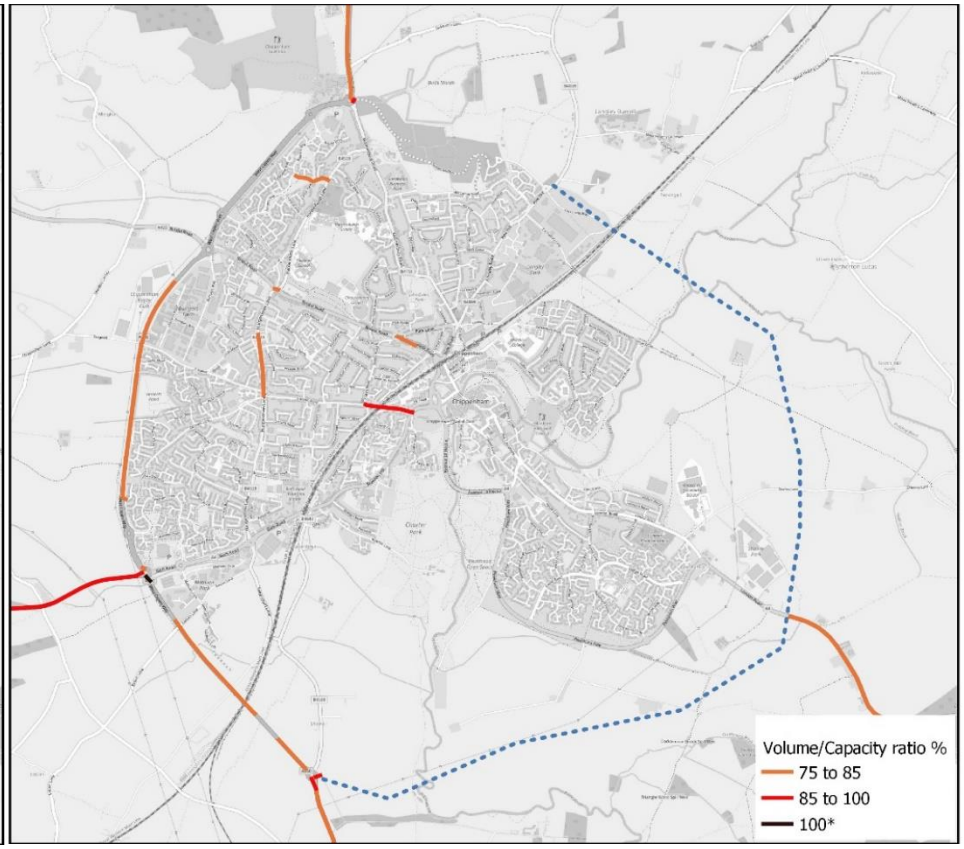
Impacts forecast by traffic volume to road capacity ratio (V/C%), AM peak period (08:00-09:00)

Figure 2-2 - The need for a Southern Distributor Road (SDR)

Eastern Distributor Road only (A4 link to A350 Malmesbury Road)



Eastern Distributor Road and Southern Distributor Road (A4 to A350)



Impacts forecast by traffic volume to road capacity ratio (V/C%), AM peak period (08:00-09:00)

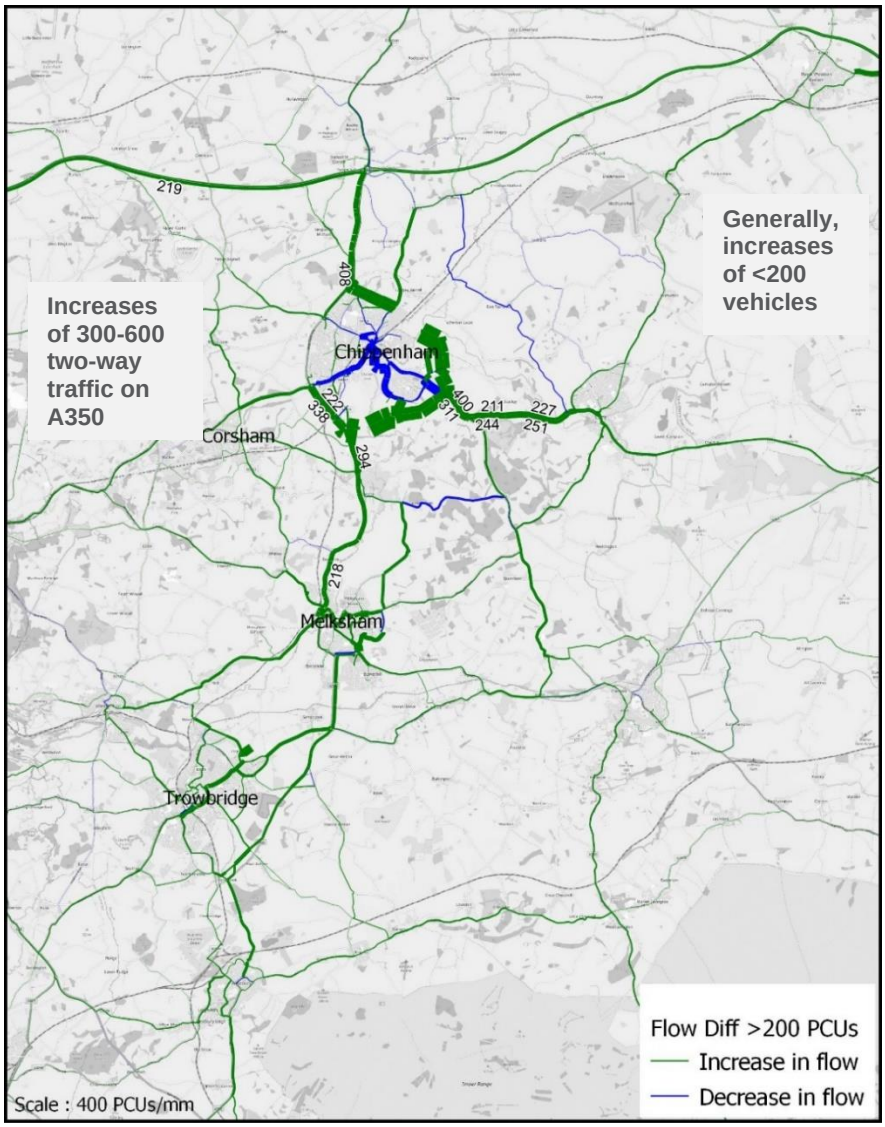
2.4. Assessing the impacts of Local Plan growth (Do-Minimum vs Do-Nothing)

2.4.1. Main traffic flow changes

Traffic is expected to increase primarily along the A350 corridor, particularly around Chippenham with an additional 300-600 passenger car units (PCUs) per hour two-way. There is also expected to be an increase of 200-250 PCUs per hour in each direction on the A4 east of Chippenham. The other main strategic routes across Wiltshire (A303, A36 etc.) are expected to carry an additional 100 PCUs.

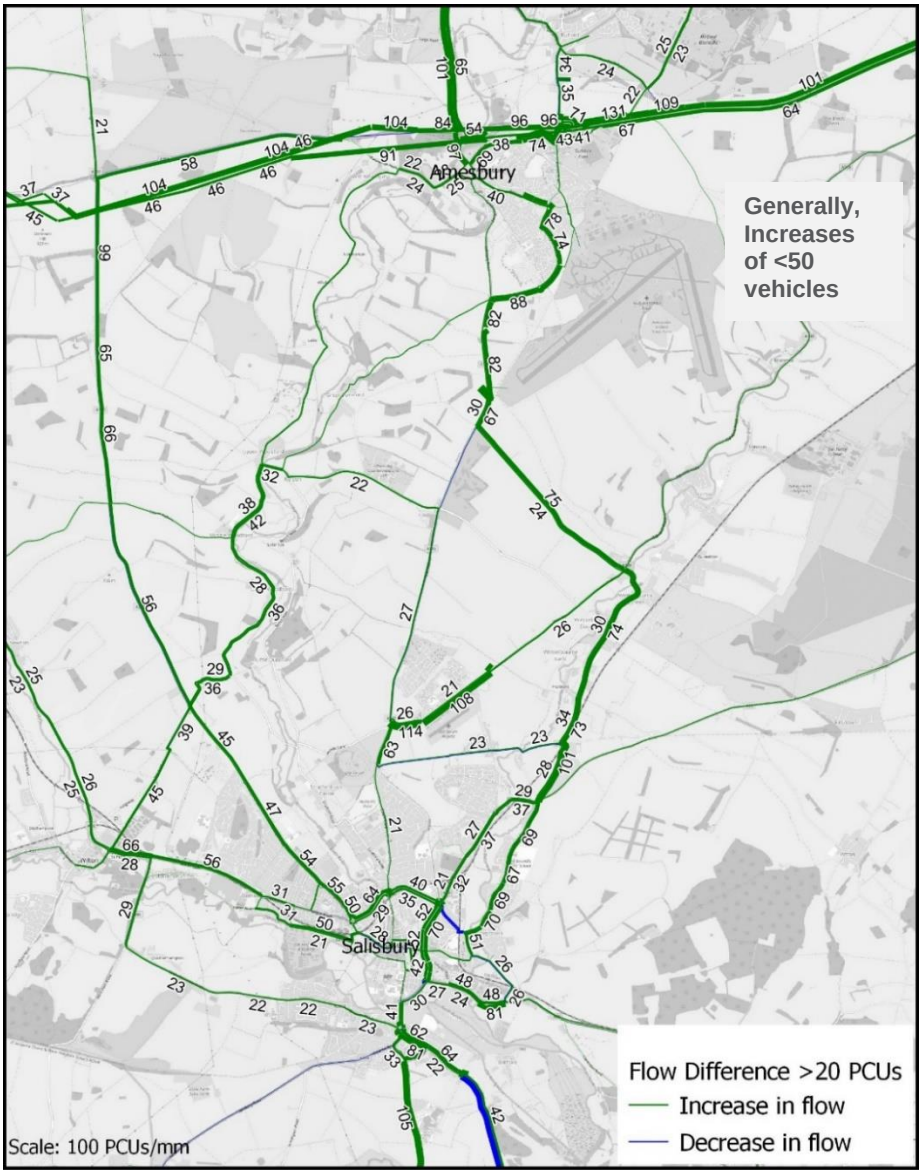
The maps that follow are based on comparisons between the Do-minimum and Do-nothing scenarios. The changes in traffic flows are presented in Figure 2-3 (A350 corridor) and Figure 2-4 (Salisbury and Amesbury area); the wider the banding the greater the increase or decrease in flow, with decreases illustrated in blue and increases in green. Both figures are presented for the AM peak only; the PM peak displays a similar pattern and it is not deemed necessary to illustrate both.

Figure 2-3 - Changes in traffic flows from Local Plan growth to 2036 on the A350 corridor



Increase over the AM peak period (08:00-09:00), numbers displayed are for trip changes >200

Figure 2-4 - Changes in traffic flows from Local Plan growth to 2036 in Salisbury and Amesbury



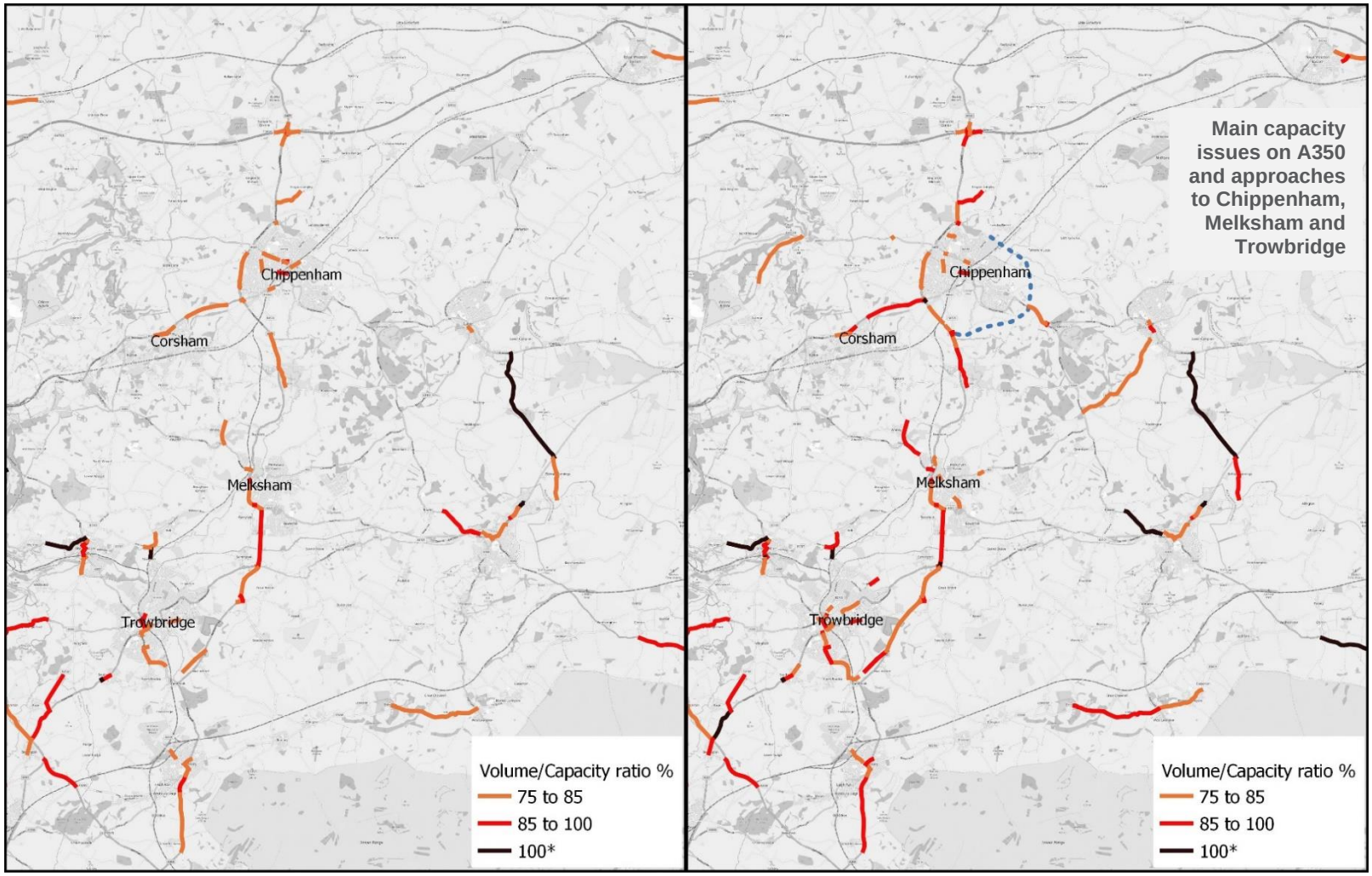
Increase over the AM peak period (08:00-09:00), numbers displayed are for trip changes >20

2.4.2. Assessment of 'severe' impacts

The maps in Figure 2-5 and Figure 2-6 present the impacts of this additional traffic on the network, with specific reference to where there could be potential for severe impacts. There are several locations where the impacts can be considered "severe", where the Volume to Capacity Ratio exceeds capacity as illustrated by the black lines and red lines which are reaching capacity.

Figure 2-5 - Impacts of forecast Local Plan growth on the A350 corridor

Without Local Plan (Do-Nothing) ***With Local Plan (Do-Minimum)***



Impacts forecast by traffic volume to road capacity ratio (V/C%), AM peak period (08:00-09:00)

Figure 2-6 - Impacts of forecast Local Plan growth in Salisbury and Amesbury

Without Local Plan (Do-Nothing) ***With Local Plan (Do-Minimum)***

Impacts forecast by traffic volume to road capacity ratio (V/C%), AM peak period (08:00-09:00)

3. Mitigating impacts of Local Plan growth

3.1. Approach to identification of the mitigation package

The following mitigation measures have been proposed in order of priority according to the Wiltshire Local Transport Plan modal hierarchy: active travel (section 3.2); public transport (section 3.3) and highway measures (section 3.4). The impacts of the combined package of measures are presented in section 3.5.

Whilst a policy shift to encourage active modes and public transport is highest on the hierarchy of measures, car trips are dominant for journeys over 1 mile in Wiltshire (which is the focus for this modelling work). Walking and cycling constitute less than 10% of journeys, bus and rail less than 10% and journeys by car more than 80% (see Appendix C). The proposed measures therefore reflect the feasibility of achieving of mode shift for different types of movement within and between the towns. Further guidance on the approach to determination of interventions is provided in Appendix A.

3.2. Walking and cycling mitigation measures

Key walking and cycling routes have been identified in each of the three principal settlements; Chippenham, Trowbridge and Salisbury. The proposed radial corridors all serve the inner urban areas including the main attractors: schools, employment, town centres and railway stations. The measures include fully segregated cycle routes, advisory lanes and pedestrian/toucan crossings.

In Chippenham, a crossing of the River Avon, at the south end of Charter Park, would provide pedestrians and cyclists in the preferred sites east of Chippenham with a more direct route to the western side of Chippenham. The preferred sites at Trowbridge are located to the north-east of the town and the new radial cycle routes focus on connecting these new developments with the town centre and Trowbridge railway station. Multiple secondary routes also provide improved cycling infrastructure for the existing population in the south-west of Trowbridge. Salisbury already has some of the highest levels of commuter cycling in Wiltshire at 4.8%. Its walking and cycling improvement package will enhance this with eleven sections of new cycle infrastructure

Figure 3-1 - Chippenham new walking and cycling infrastructure

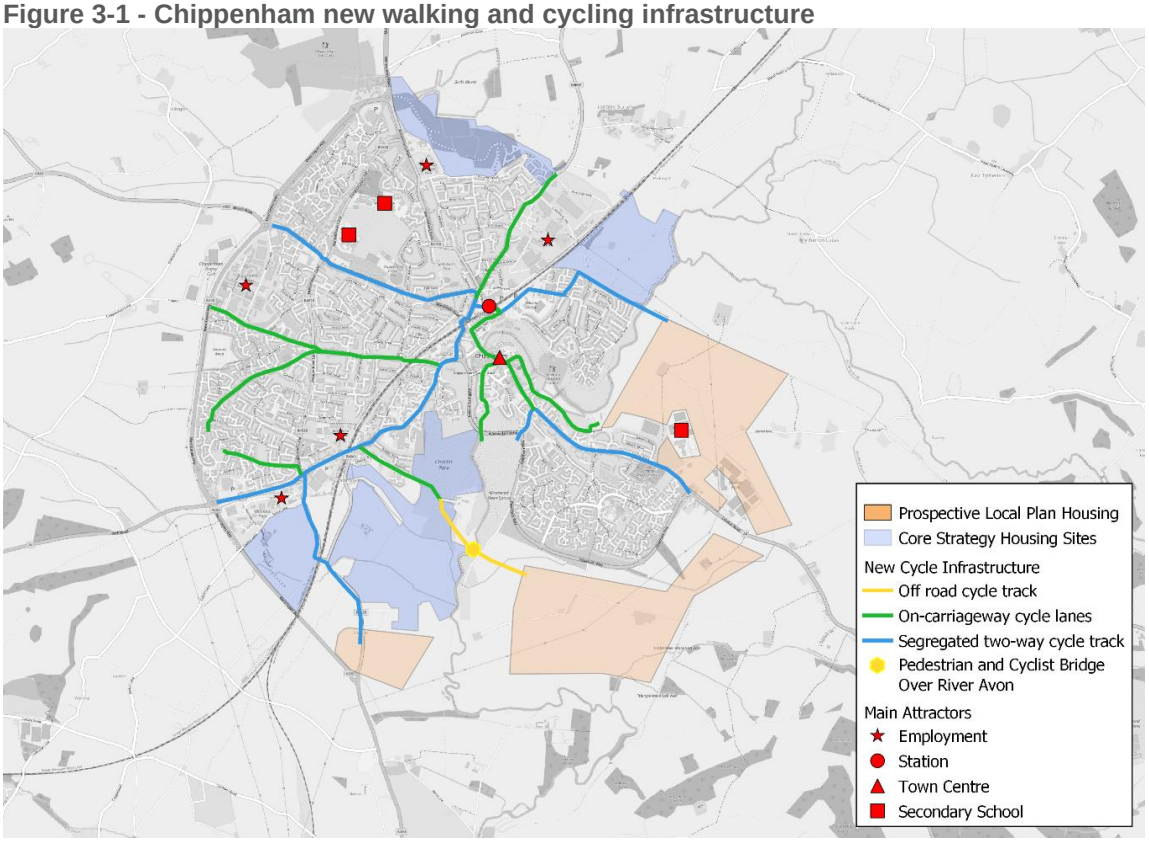


Figure 3-2 - Trowbridge new walking and cycling infrastructure[4]

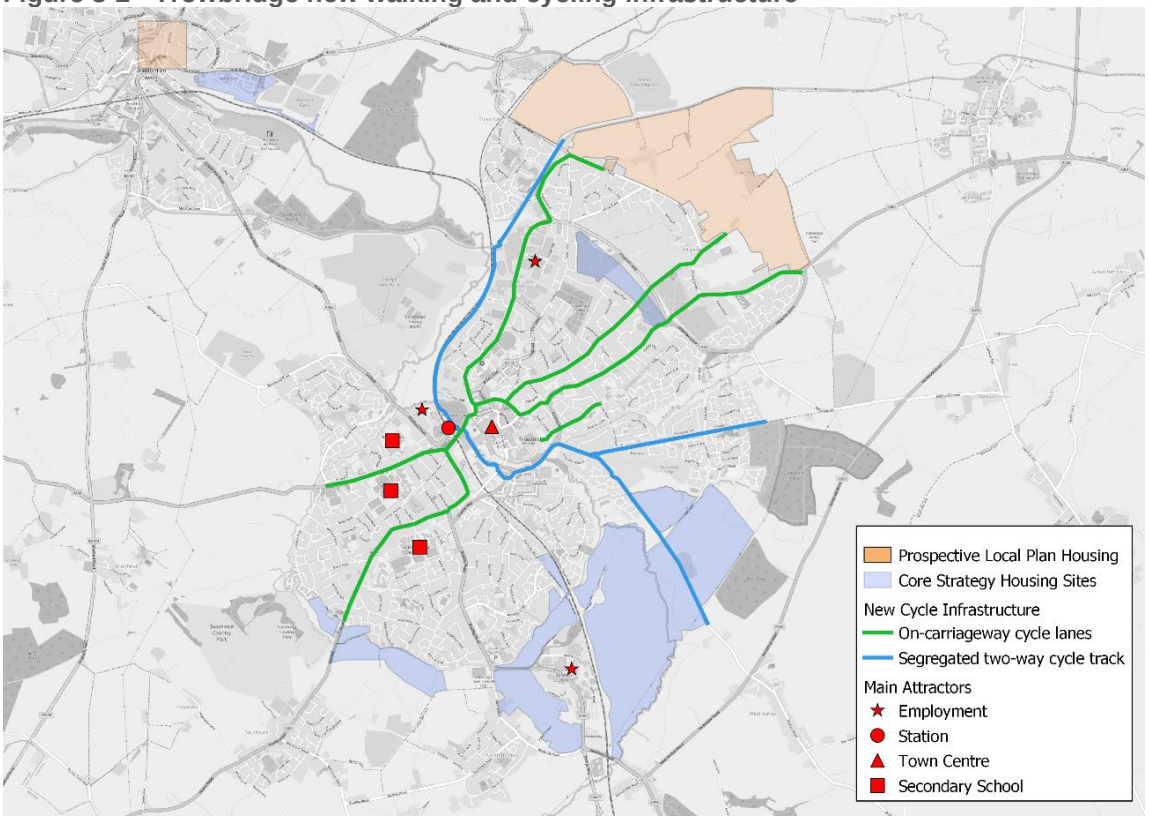
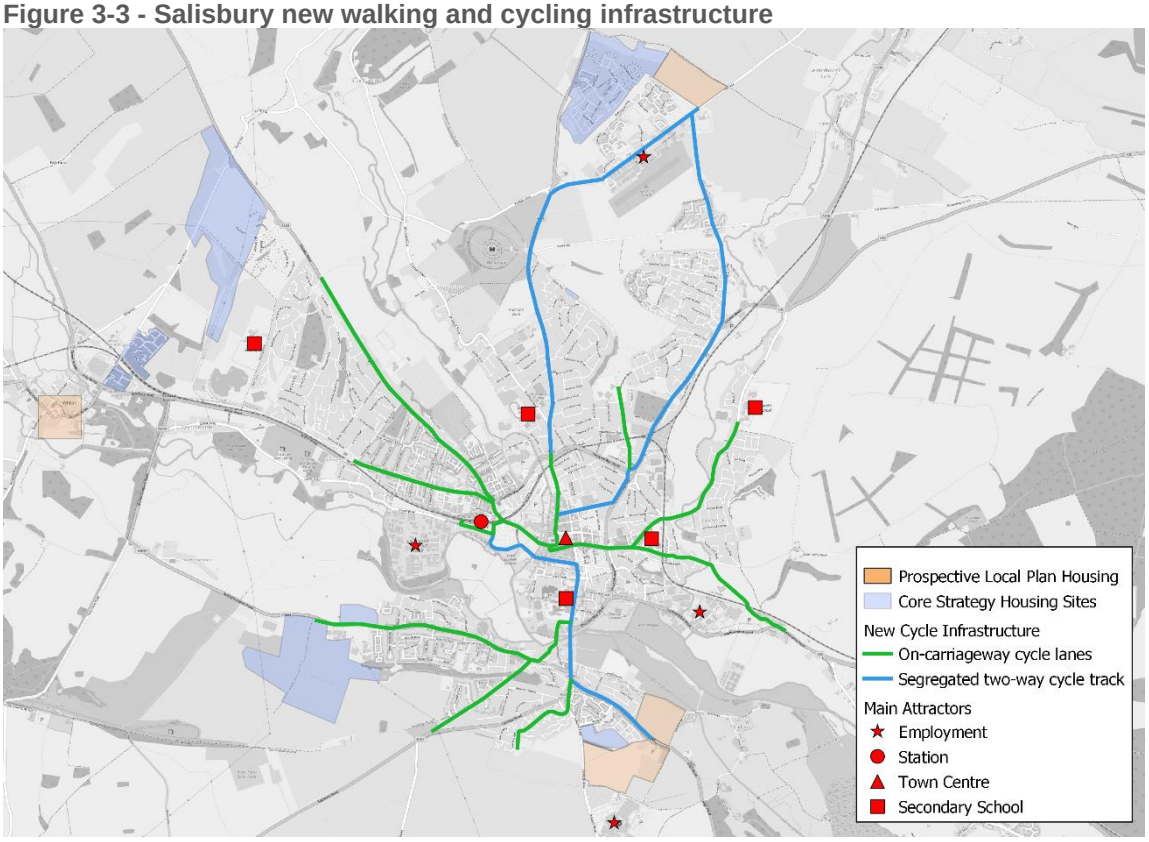


Figure 3-3 - Salisbury new walking and cycling infrastructure



[4] The prospective Local Plan housing 'square' in Bradford-on-Avon represents an indicative housing allowance for the town, with no specific sites yet identified.

3.2.1. Complementary Measures

The routes outlined in the previous section will provide safe, well signed routes to railway stations from across the three principal settlements of Chippenham, Trowbridge and Salisbury. Improved local walking and cycling access will be targeted at these three key stations, with the aim of creating sustainable transport hubs that help increase the numbers of active travel users of these new cycle routes to/from the stations to capture these sustainable modes as part of a longer commute, which would otherwise by undertaken in full or part by private car. These could include secure indoor bicycle parking areas, secure lockers, improved cycle and scooter hire facilities, and digital initiatives including parking and charging for electric bicycles and scooters.

It is estimated that a combined total of approximately 6,000 cycle trips per day could be added to Chippenham, Trowbridge and Salisbury's transport networks. This is equivalent to an average increase of over 100% on existing cyclist numbers for all-purpose trips. The improved active travel infrastructure would also support increased walking, although the limitations on existing data mean that this cannot be reliably estimated.

The DfT aims to double cycling in the UK by 2025[5] and these measures would support this goal. Other areas for intervention, such as parking initiatives, could further increase the uptake in walking and cycling. The methodology used to calculate this impact is presented in Appendix E.

3.3. Public transport mitigation measures

3.3.1. Principles for identifying schemes

The principles for identifying public transport mitigation schemes are summarised below:

- Public transport is suitable for connecting developments to key trip generators (e.g. employment hubs, major hospital sites and education establishments), particularly in conjunction with active modes;
- Public transport can contribute to reducing congestion through a reduction in local and inter-urban car trips;
- It contributes to reducing carbon emissions and impacts on air quality through a reduction in local car trips;
- Any new services need to be commercially viable – it may not be possible to introduce new services for individual small-scale developments; and
- Consideration should be given to providing links to public transport services that enable longer distance journeys, e.g. rail stations.

3.3.2. Rail strategy

It is likely to prove challenging to increase the frequency of rail services in response to the Local Plan. The approach is instead to improve access to the main rail hubs in Chippenham, Trowbridge and Salisbury. These are the busiest stations: they collectively accommodate well over half of all rail passengers in Wiltshire and offer the most frequent and widest destination choice connections.

The number of people who board trains at the stations is not in proportion to the population of each town. For example:

- Chippenham has ~15,000 households with annual rail patronage at the station of 1.9 million passengers (with services to Bristol, Bath, Swindon, Reading and London);
- Trowbridge has ~17,000 households with 0.9 million passengers (direct services to Bristol, Bath, Salisbury and Southampton); and
- Melksham has ~8,000 households with only 74,000 passengers using Melksham station (which has much more limited services).

There is clearly a high demand for rail from residents or employers outside these main stations who either travel from outside these areas or would benefit from improved, sustainable access to them. The strategy therefore focuses on encouraging people to access Chippenham, Trowbridge and Salisbury stations, and the central areas and associated attractions and employment, via active modes or bus.

[5] Department for Transport: Cycling & Walking Investment Strategy (2020) – '***Double cycling:*** *where cycling activity is measured as the estimated total number of cycle stages made each year, from 0.8 billion stages in 2013 to 1.6 billion stages in 2025*'

3.3.3. Bus strategy

The main locations of growth are on the A350 corridor: Chippenham, Melksham, Trowbridge and Westbury, towns that are likely to support more than half of Wiltshire's prospective Local Plan growth.

There are currently low levels of bus patronage on the A350 corridor. However, the focus on growth in the A350 corridor provides the opportunity to maintain the viability of bus services along the corridor. The focus of the strategy is therefore to improve access to Chippenham and Trowbridge town centres through a combination of active travel measures (previously described) and improvements to bus provision. Developers should be required to contribute funding for enhancements to services and supporting infrastructure.

Salisbury benefits from more frequent bus services across the city, which is reflected in higher levels of bus patronage. It is considered that the preferred sites can be served by existing services with enhanced frequencies and/or extended provision. Again, Developers should be required to contribute funding for enhancements to services and supporting infrastructure.

The methodology for determining current and forecast rail and bus patronage and evidence for the proposed mitigation strategy can be found in Appendix F.

Bus service and infrastructure improvements along the A350 corridor are identified as the most important priority, with a focus on the corridor between Chippenham and Trowbridge. The Market Towns will be addressed at a later date and are likely to identify further requirements. The key trip generators (train stations, employment centres, town centres and secondary schools) are shown in Figure 3-4 and Figure 3-5 below.

The X34 route is the main bus service using the A350 corridor and other bus services will also be considered in serving Chippenham and Trowbridge.

Figure 3-4 - Bus corridors to support Local Plan growth: Chippenham

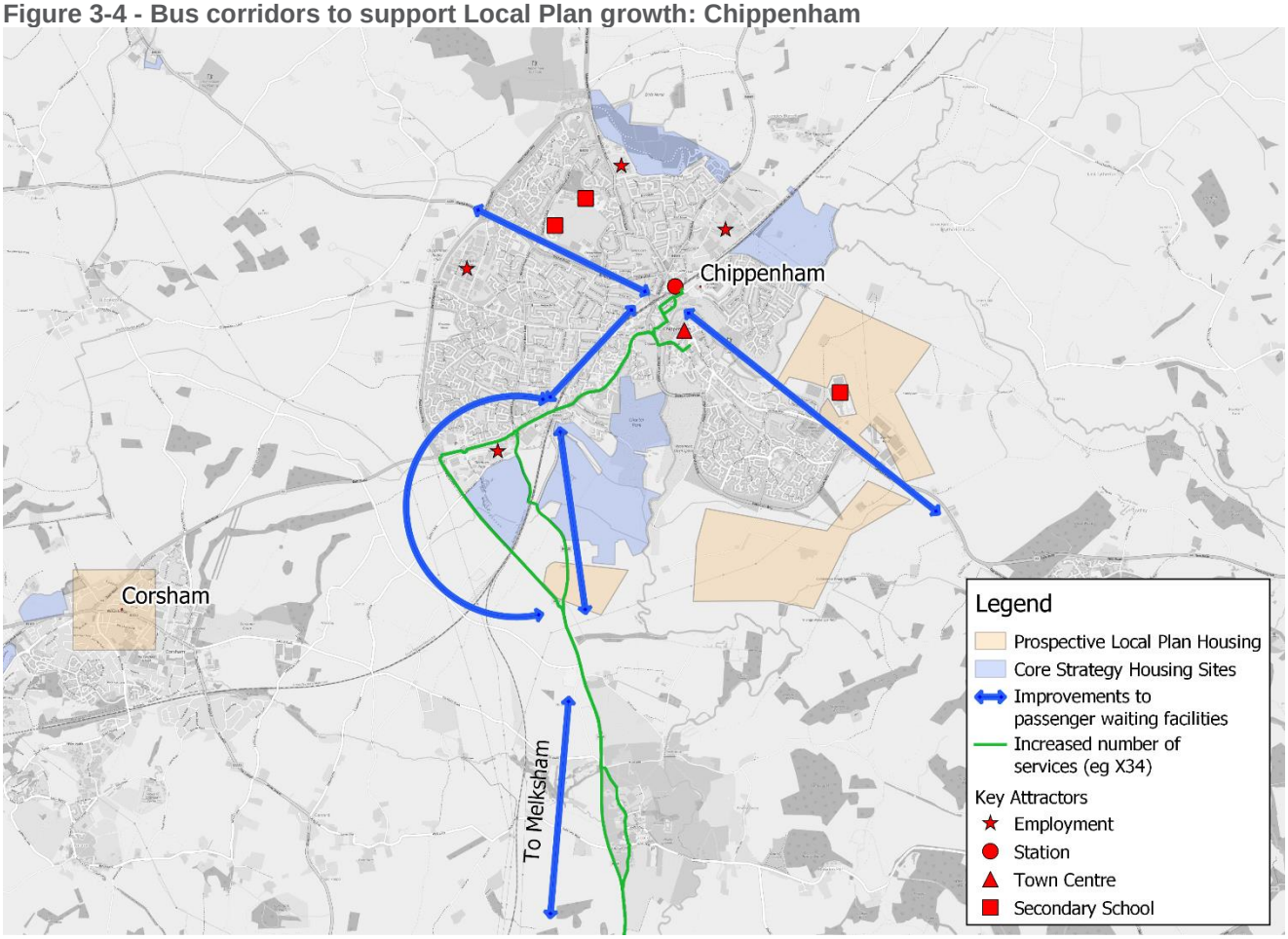
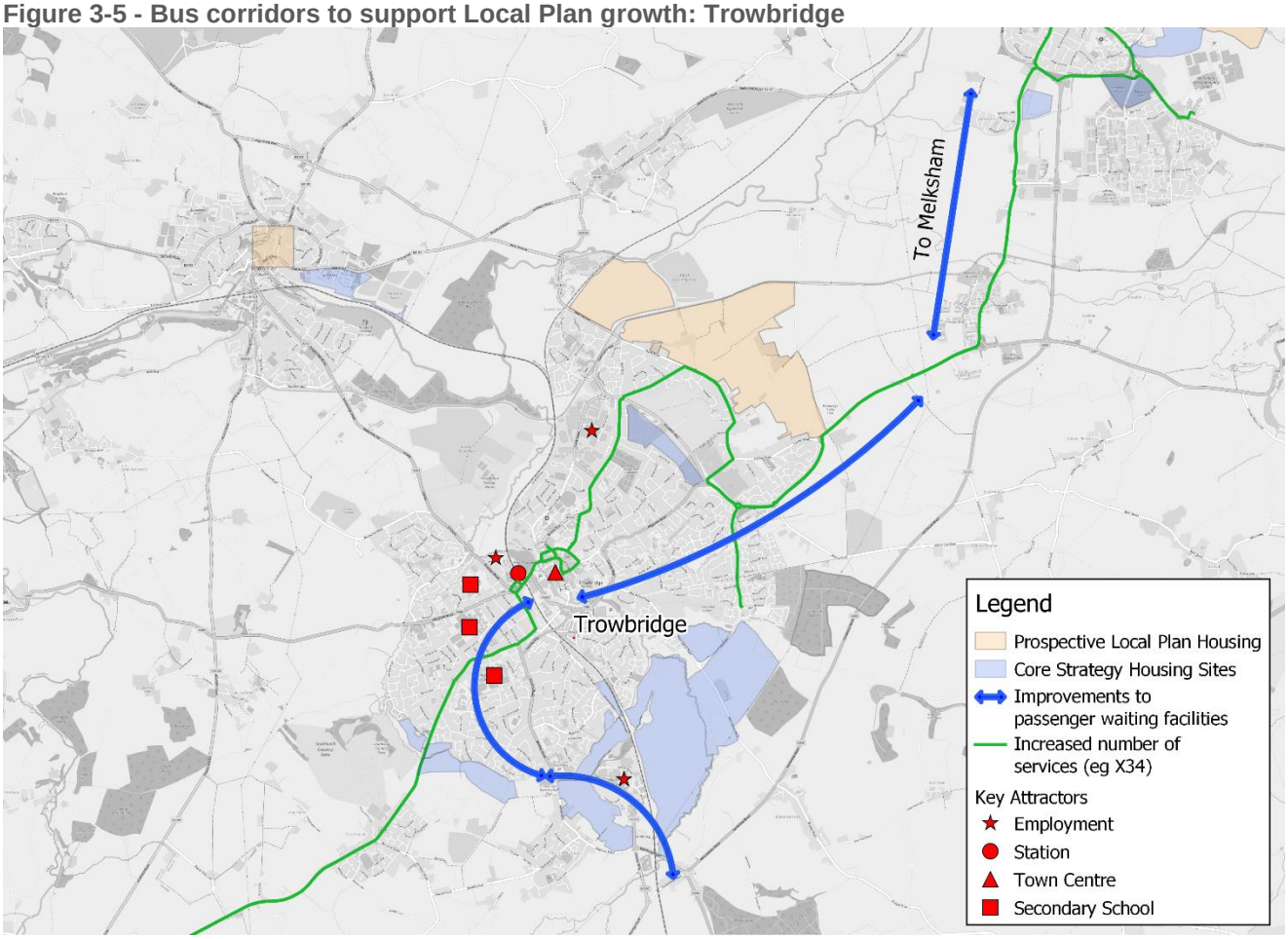


Figure 3-5 - Bus corridors to support Local Plan growth: Trowbridge



Note: bus service provision to support growth in Melksham will be considered at a later date.

3.3.4. Mitigation recommendations

Five key bus corridors are recommended as priorities for investment (currently served by different routes):

- Chippenham east (Route 44M);
- Chippenham south-east (Routes 33, X33, 55, 55A, X10);
- Chippenham west (Routes X10, X31, 35, 44);
- Trowbridge north-east (Routes X34, 49, X49, 68); and
- Trowbridge south-east (Routes D1, 87, 87A).

The corridors in Chippenham connect new development south and east of the town to destinations including the town centre and railway station. Bus services in Chippenham currently have the worst reliability of all services in Wiltshire, which must be addressed.

Between Chippenham, Melksham and Trowbridge, services could also potentially provide a more attractive mode of travel between the towns as an alternative to the private car.

Potential improvements on the five corridors could include:

- Improvements to passenger waiting facilities at stops and interchanges;
- Real time information at key bus stops and interchanges;
- Increased number of services;
- Diversion of existing services to serve new housing sites;
- Investigation of potential dynamic demand responsive transport (DDRT) solutions; and
- Potential for additional bus depots to be provided within Wiltshire to help improve service efficiency.

Table 3-1 summarises the bus corridors identified for improvement in Chippenham and Trowbridge, introducing infrastructure schemes and service improvements that could be implemented to support uptake in bus patronage from the new housing developments.

Table 3-1 - Chippenham and Trowbridge public transport improvements

	Chippenham			Trowbridge	
Access sites	East	South-East	West	North-East	South-East
Existing services	44M	33, X33, 55, 55A, X10.	X10, X31, 35, 44	X34, 49, X49, 68	D1, 87, 87A
Bus corridors	London Road / The Causeway	Cocklebury Road / Station Hill	Bristol Road	Hilperton Drive / Marsh Road / Canal Road / The Down	Westbury Road / Bradley Road
Infrastructure schemes	Passenger waiting facilities, Possibility for bus priority measures along route, but not included in assessment or costing. Bus depot provision (not included in costing).				
Bus service improvements	New or diverted service for new development sites. Increase bus frequencies.				

3.3.5. Additional recommendations and next steps

It is recommended that two aspects of further work are undertaken in the next phase. First, more work will be required to develop the options to improve bus services in the five corridors identified above. Second, further work is required to review connectivity between the principal settlements and market towns, to examine the scope for mode shift and to reduce traffic congestion on the approaches to the principal settlements.

In addition to public transport infrastructure and service frequency improvements, dynamic demand responsive transport (DDRT) options could also be considered to further increase the penetration of public transport services to new developments. DDRT solutions use smaller vehicles, often minibuses, that passengers can book using an app and are picked up from local collection points to connect to the wider public transport network. In some cases, the scale of individual developments may not be viable for existing public transport services to re-route, given the relatively low levels of demand. DDRT solutions therefore operate to serve direct demand (like a minibus taxi, booked through an app) and are not running empty vehicles to a timetable, unlike the requirements of a conventional public transport service.

DDRT measures could form a component in the public transport strategy for developments in the principal settlements and are also likely to support the transport strategies for Wiltshire's Market Towns (and surrounding rural catchments), which will be addressed in the next phase of work.

3.3.6. Assessment of current public transport mitigation measures

At present, there are high levels of car dependence for many trips and the current public transport network is not sufficiently frequent to attract significant numbers of car users. Bus patronage across large parts of Wiltshire is therefore relatively low. Improvements to bus services and infrastructure, as described above, would improve the attractiveness of buses to potential users, but the scale of change is likely to be modest. This means that there is likely to be limited mode shift from travel by car in the absence of more significant improvements and measures to manage traffic demand. This, in turn, would mean that there are likely to be limited impacts on traffic congestion and delays on the road network.

However, the Covid-19 pandemic has caused unprecedented changes in the ways that people live their lives. Many people have been working from home, shopping on-line and staying in their local areas. This has created huge changes in travel demand during the last year (including the large reduction in rail and bus demand since March 2020). There are likely to be significant changes in the ways that people travel following the pandemic. There are, however, huge uncertainties: the extent to which home working will continue and future use of workplaces, the relative importance of online versus 'bricks and mortar' retail and the nature of leisure travel.

The next stage of assessment should consider these issues. This should include a 'scenario planning' process to review the emerging trends, scope different alternative futures and identify the implications for travel demand. This will include the potential implications for future public transport use, as well as walking, cycling and cars and goods vehicle traffic.

3.4. Highway mitigation measures

Based on the impacts that were identified in the previous section and the large scale of housing modelled for Chippenham (5,100 dwellings), Melksham (2,675 dwellings), Trowbridge (1,800 dwellings) and Westbury (1,125 dwellings), improvements to the A350 are likely to be required. Capacity improvements at key pinchpoints on the A350 have been tested in the Do-something (DS) scenario.

The Do-Something scenario includes a series of planned highway interventions to mitigate the impacts of current policy led growth and Local Plan growth on the highway network. These interventions include a series of schemes that have been developed in further detail as part of a programme of improvements to the Major Road Network (MRN). Each of these schemes is the subject of a Strategic Outline Business Case (SOBC) approval from DfT and these are progressing through the next stage of business case submission. The schemes reflect the design evolution at the end of SOBC and do not reflect current and ongoing design evolution and consultation:

- A350 Melksham Bypass (Appendix D.1);
- A350 Phase 4 and 5 Dualling (Appendix D.2);
- M4 Junction 17 (Appendix D.3); and
- A338 Salisbury Junctions (Appendix D.4).

In addition, the testing has identified the potential need for further interventions to mitigate impacts on other parts of the network. These are:

- Dualling of the A350 from Lackham roundabout to the proposed Melksham Bypass;
- Dualling of the A350 from the Littleton roundabout near Semington to the new junction with the proposed Melksham Bypass and capacity improvements at the A350/A361 roundabout near Semington; and
- Improvements to the operation of Staverton Bridge (Appendix D.5).

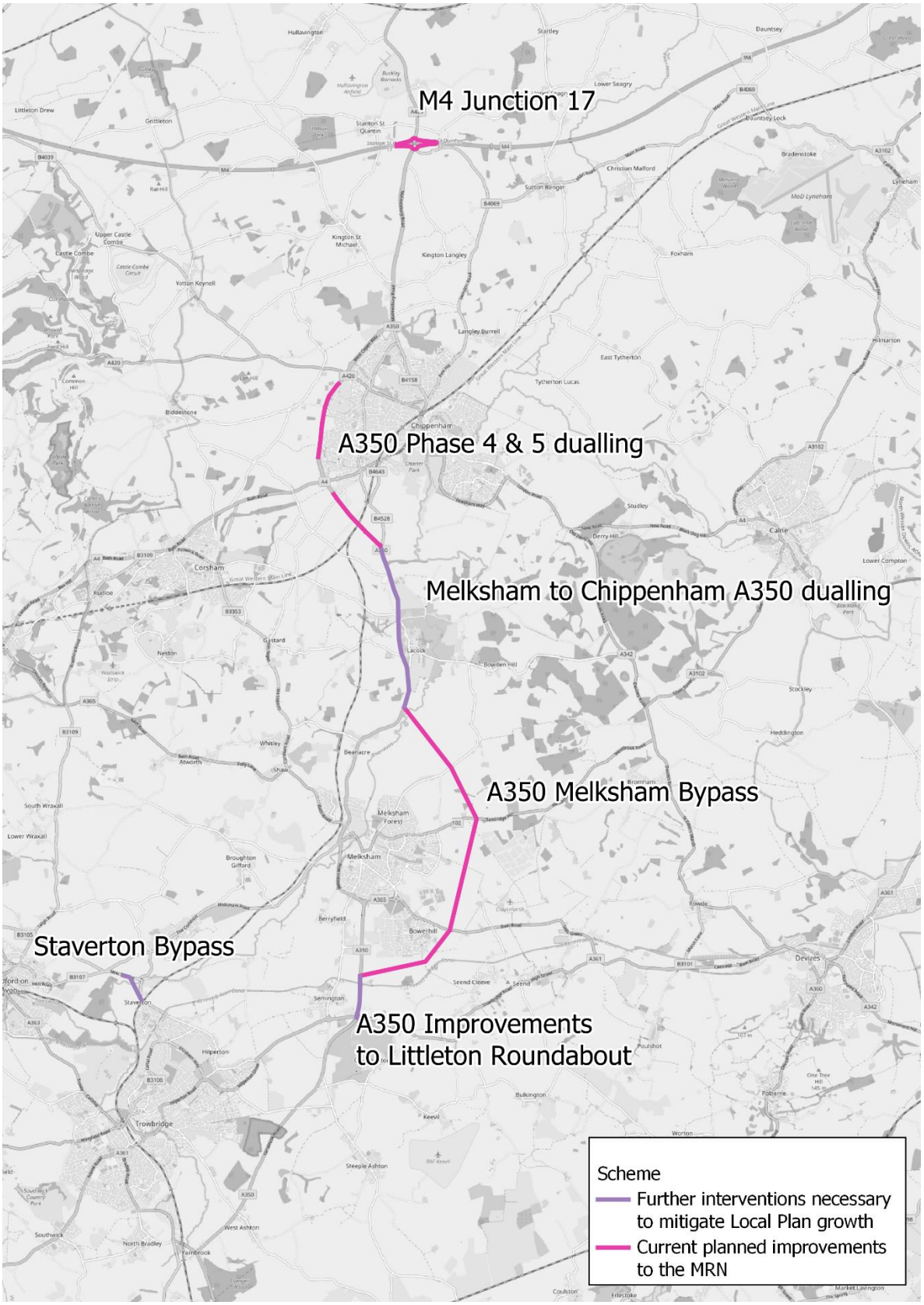
3.4.1. Assessment of highway interventions

All these schemes have been coded into the highway model using standard coding assumptions. Several model iterations have been undertaken to optimise and refine the highway requirements and ensure that the expected highway reassignment based on possible capacity improvements has been undertaken.

The indicative designs for the improvements to the Major Road Network were used to inform the coding of these schemes. Designs have not yet been developed for dualling of the A350 (Lackham Roundabout to proposed Melksham Bypass) and A350 improvements between Littleton Roundabout and proposed Melksham Bypass. In these cases, indicative capacity improvements were coded in the strategic model, including increased link and junction capacities.

A map showing the locations of the proposed highway schemes (in Western Wiltshire) is shown in Figure 3-6. The Salisbury Junctions scheme is shown in Appendix D.4. Additional schemes which could be included in future assessments are discussed in the conclusions (see Chapter 4).

Figure 3-6 - Schemes already developed as improvements to the Major Road Network (MRN) and further interventions to mitigate Local Plan growth

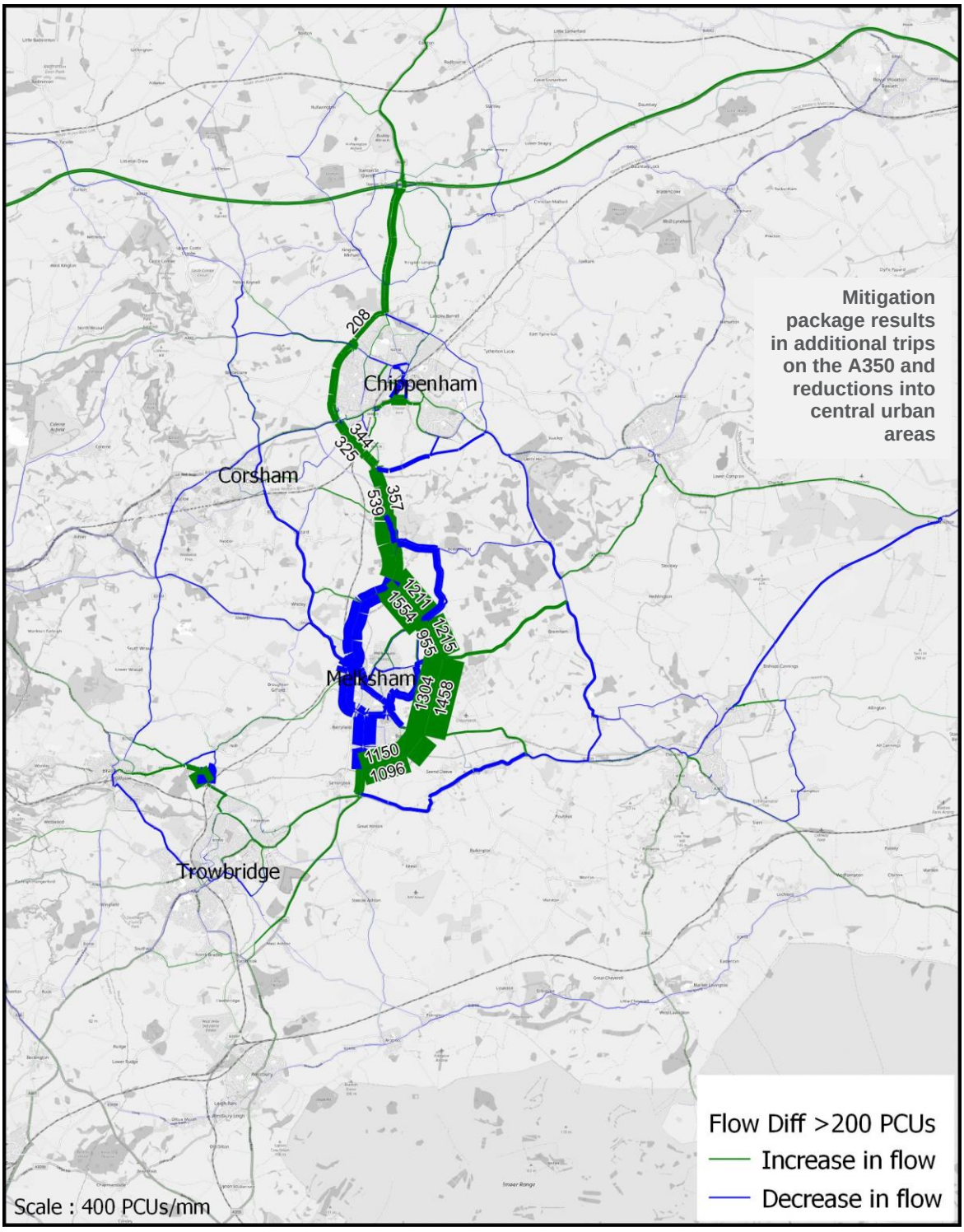


3.5. Assessing the performance of the combined mitigation package

3.5.1. Transport impacts

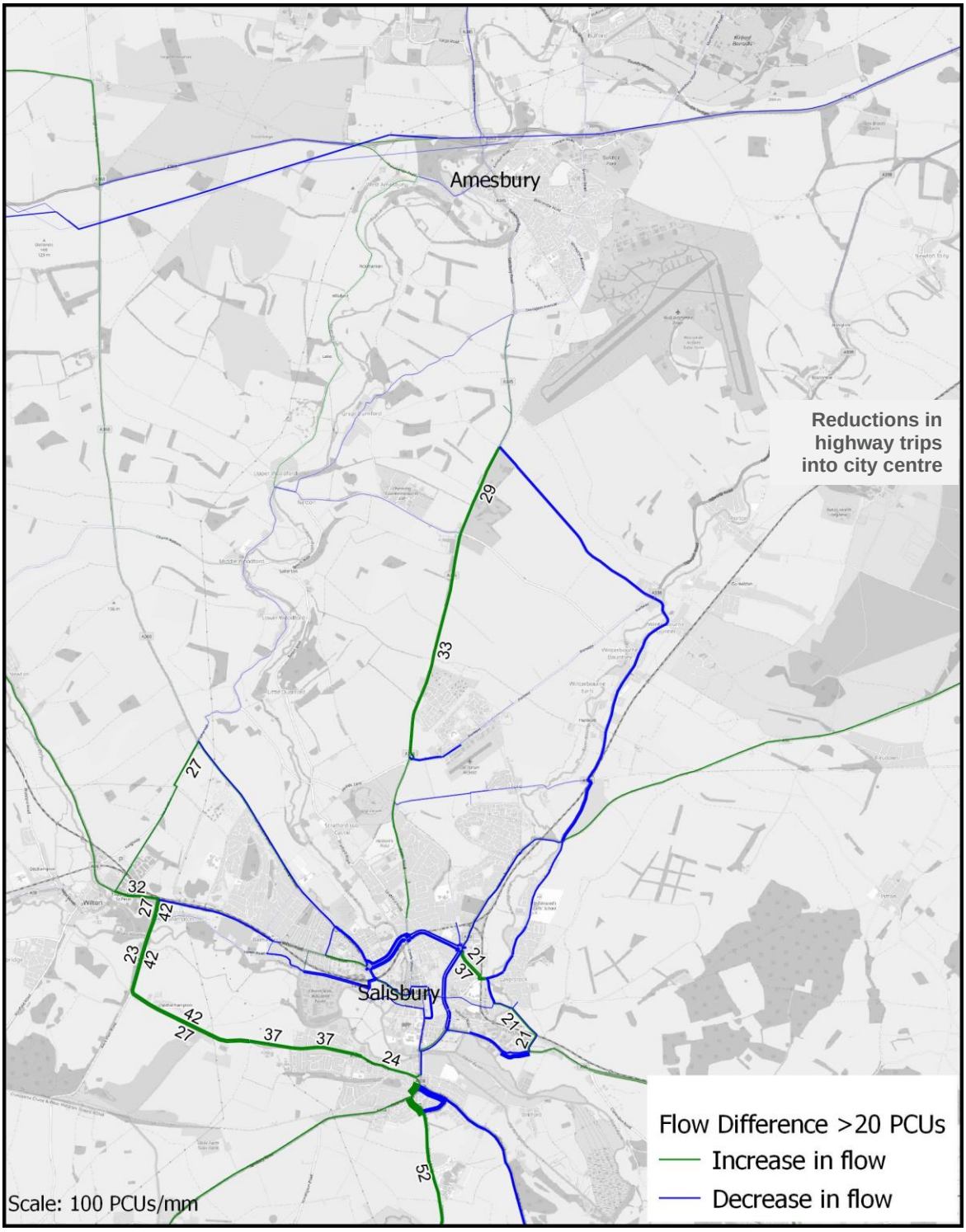
The forecast impacts of the combined mitigation measures (active travel, public transport and highway schemes), are presented in the plots below. The changes in traffic flows and operational performance are presented in Figure 3-7 to Figure 3-10. This is for the AM Peak, the changes in other time periods are similar.

Figure 3-7 - Changes in traffic flows with suggested combined mitigation on the A350 corridor



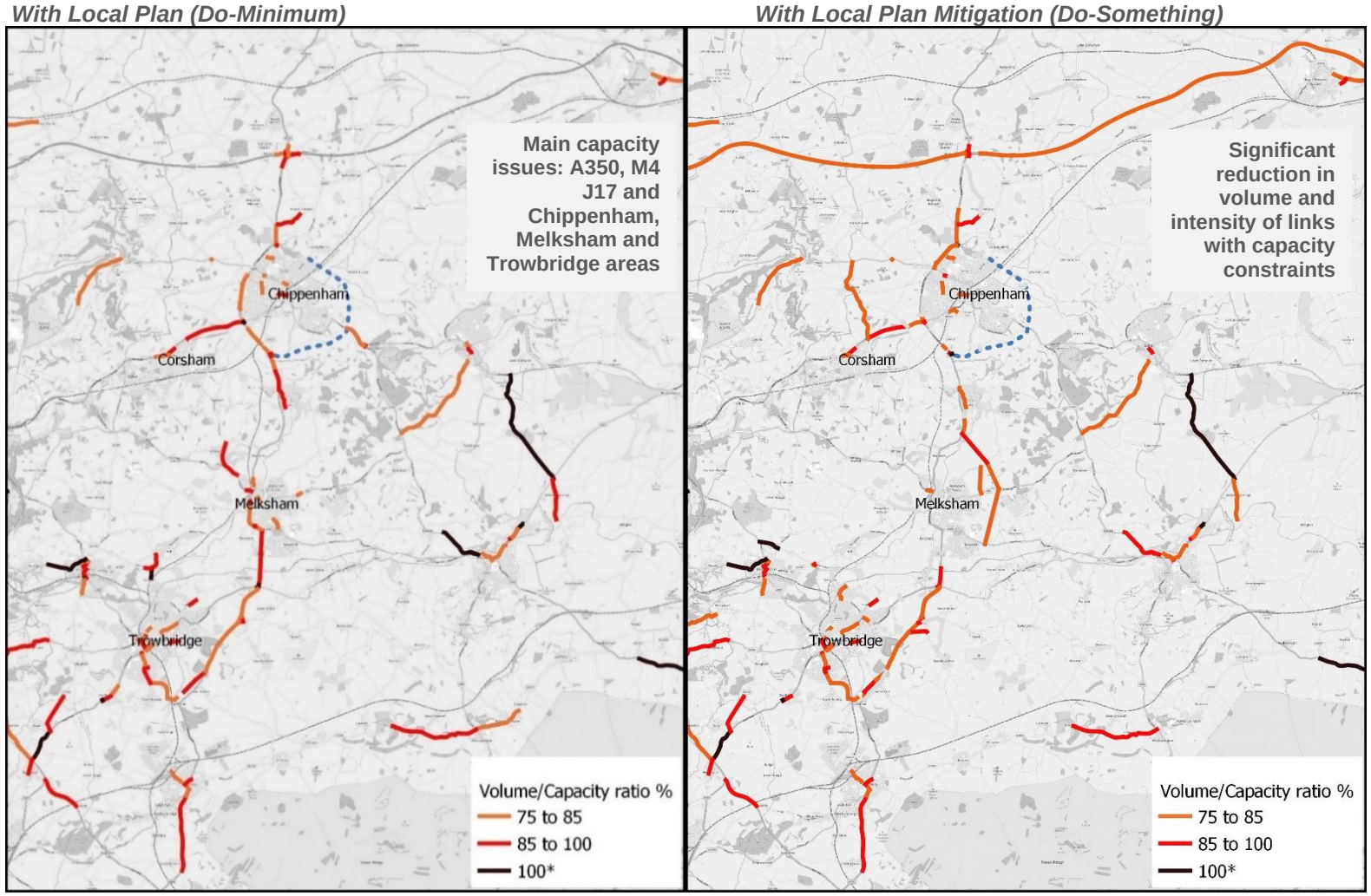
Increase over the AM peak period (08:00-09:00), numbers displayed are for trip changes >200

Figure 3-8 - Changes in traffic flows with suggested combined mitigation in Salisbury and Amesbury



Increase over the AM peak period (08:00-09:00), numbers displayed are for trip changes >20

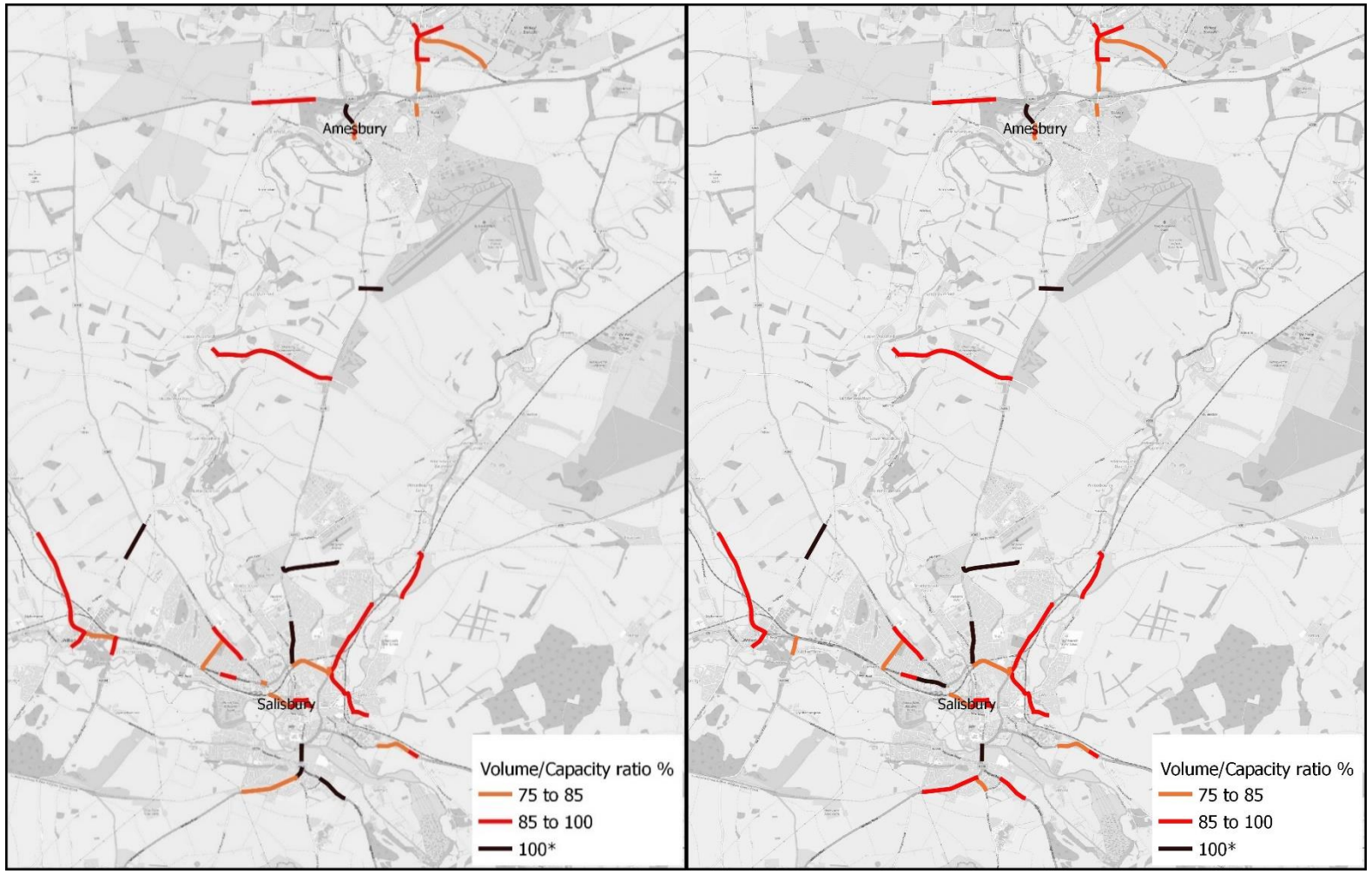
Figure 3-9 - Impacts of mitigation on the A350 corridor



Impacts forecast by traffic volume to road capacity ratio (V/C%), AM peak period (08:00-09:00)

Figure 3-10 - Impacts of mitigation in Salisbury and Amesbury

With Local Plan (Do-Minimum) ***With Local Plan Mitigation (Do-Something)***



Impacts forecast by traffic volume to road capacity ratio (V/C%), AM peak period (08:00-09:00)

Further to the trip impacts illustrated in the previous figures, Appendix H provides an economic assessment of the schemes, as derived from the scheme costs given within Appendix G, and illustrates a positive costs to benefits ratio; i.e. the schemes deliver economic benefits which outweigh their delivery costs.

4. Conclusions and Summary

4.1. Impacts of Local Plan growth without mitigation

The forecast scenarios were developed using the Department for Transport's required approach to travel forecasting and TRICS trip rate assumptions. This assessment has tested the impacts on the transport network of approximately 18,000 additional homes identified in the prospective Local Plan Review.

Different modelling scenarios were developed to represent the effects of the Local Plan growth on Wiltshire and the wider region. This included a Do Nothing (excluding the Local Plan growth) and Do Minimum (including prospective Local Plan growth).

Without mitigation measures there could be considerable capacity constraints and congestion issues on the local and strategic road network between settlements. The main highway pinchpoints are located along the A350 corridor and M4 Junction 17, which will serve over half of the additional proposed Local Plan growth: Chippenham (5,100 dwellings), Melksham (2,675 dwellings) and Trowbridge (1,800 dwellings). Further assessment will be required to test the impacts of development at the Market Towns.

4.2. Proposed mitigation

4.2.1. Active modes

Walking and cycling corridors (see section 3.2) were identified in each of the three principal settlements; Chippenham, Trowbridge and Salisbury. Identifying safe and effective cycle routes along these corridors will increase the attractiveness of cycling as a mode of travel within Wiltshire's principal settlements. High level cycle route designs have been included in this mitigation package. Analyses using the DfT's recommended appraisal methodology estimate a combined increase of approximately 6,000 cycle trips per day across the three principal settlements, resulting in around 600 car trips removed from Wiltshire's roads per hour. The cost of the active mode schemes is estimated to be approximately £31.7 million (in 2020 values).

4.2.2. Public transport

The bus and rail services (see section 3.3) that are near to most of the housing follow (or are parallel to) the A350 serving Chippenham, Melksham and Trowbridge. Proposed improvements include improvements to passenger waiting facilities at stops and interchanges, Real Time Information at key bus stops, increased numbers of services, diversion of existing services to serve new housing and investigation of Dynamic Demand Responsive Transport (DDRT) solutions. The estimated cost of these measures is approximately £10.5 million (in 2020 values).

However, a lack of data regarding up to date patronage numbers for Wiltshire's bus and rail services allows for only very high-level analysis. The data that was available suggests only a low level of existing bus use across most parts of the county. It is therefore likely that improvements to public transport provision would have a limited impact on car use. This would, in turn, mean limited impacts on congestion on the road network, and the effects have not been included in the appraisal.

However, it is recognised that the Covid-19 pandemic has caused major impacts on travel demand since the first lockdown in March 2020. The future implications for travel demand, including bus and rail use, are not currently clear. It is recommended that further work is undertaken to review trends and develop future potential scenarios to inform more detailed assessment of the implications for public transport in the area.

4.2.3. Highway impacts and mitigation

The proposed scale of development at the settlements along the A350 corridor is forecast to create significant pressures on this part of the road network. In the case of Chippenham and Melksham, new road connections will help to mitigate the impacts of additional development in each town. However, the analyses have indicated potential requirements for significant capacity improvements on the A350 between the towns along the route.

At **Chippenham**, it has been established that major infrastructure will be required to unlock strategic housing development. The previous Chippenham Site Allocations Plan (CSAP) established the requirement for a new **Eastern Distributor Road**, connecting around the north of the town from the A4 east of Pewsham to the A350 at Malmesbury Road. The analyses in this study have also established the requirement for a new **Southern Distributor Road**, connecting around the south of the town from the A4 east of Pewsham to the A350 at Lackham Roundabout.

In addition, the planned mitigation at Chippenham includes the existing proposals for **Phase 4 & 5 improvements to the A350 Chippenham Bypass**, as a major improvement to the Major Road Network. This major infrastructure, together with complementary measures to promote mode shift to walking, cycling and public transport for local journeys, will be critical in mitigating the impacts of strategic development in the town.

In the case of **Melksham**, the existing proposals for the **Melksham Bypass** will play an important role in helping to mitigate the impacts of strategic development in the town. This planned Major Road Network (MRN) scheme will tackle congestion in the town and provide new capacity to accommodate traffic from new development. An indicative design has been developed for the scheme; this will need to be reviewed and refined to take account of the requirements of the proposed development.

In **Trowbridge**, the assessments have not identified the requirement for further strategic highway infrastructure in the town. The recently constructed B3105 Elizabeth Way between Hilperton Marsh and the A361 Fieldways roundabout will play an important role in catering for new strategic development in the town. Measures to promote mode shift to walking, cycling and public transport for local journeys will help to mitigate the impacts of strategic development in the town. However, the requirement has been identified for a **Staverton Bypass** to mitigate the impacts of additional traffic at this pinchpoint on the network. This scheme, which forms a viaduct across floodplain, is the subject of a development funding bid for Local Levy Fund through Wessex Regional Flood and Coastal Committee.

The assessments have demonstrated that there will be further impacts on the A350 corridor outside the settlements. The initial focus has been on addressing impacts at the following locations:

- **M4 Junction 17.** A Major Road Network (MRN) scheme has already been developed, which has been included in the proposed mitigation package. The testing demonstrates that this would be effective in mitigating the impacts of additional traffic generated by strategic development in the A350 corridor.
- **A350 between Lackham Roundabout and proposed Melksham Bypass.** The testing indicates that this section of the A350 near to Lacock would be approaching capacity. Dualling of this section (or other options to improve link and junction capacities) would help to mitigate increased traffic delays.
- **A350 between proposed Melksham Bypass and Littleton Roundabout.** A limited section of dualling of this section of the Semington Bypass would help to ensure effective management of traffic heading southwards on the A350 towards Westbury and A361 towards Trowbridge.

The assessments have also shown that there will be significant impacts on the A350 south of Semington towards Westbury and Warminster. The forecasts indicate the likelihood of increased congestion on the approaches to Stoney Gutter traffic lights and on the planned Yarnbrook to West Ashton Bypass. Increased congestion is also forecast on the A350 through Westbury and onwards towards Warminster. Interventions have not, to date, been identified for these sections (apart from the Yarnbrook to West Ashton Bypass). It is recommended that a comprehensive strategy should be considered to assess the longer-term issues and options for the route.

The more modest proposed scale of growth at **Salisbury** would have less significant impacts on the road network in southern Wiltshire. The proposed programme of active travel improvements will help to reduce car dependency and reduce traffic on key routes into the city. The proposed **A338 Southern Salisbury junction improvements** (Exeter Street and Harnham Gyratory) will help to mitigate the impacts of additional traffic from new development to the south of the city.

The existing Major Road Network (MRN) schemes (M4 Junction 17, A350 Phase 4&5 dualling, A350 Melksham bypass and A338 southern Salisbury junctions) are estimated to cost approximately £213 million, in 2020 values. The additional schemes (Staverton Bypass, capacity improvements to Littleton roundabout (A350/A361 roundabout near Semington) and dualling of 1km of the A350 north of Littleton roundabout and dualling of 4.5km section between Lacock roundabout and the Melksham Bypass) is estimated to cost approximately £93 million (in 2020 prices).

4.3. Impacts of mitigation

The combined mitigation packages are considered to mitigate a large proportion of the impacts, although there remain residual impacts that would require further investigation. Links and junctions shown to be severely impacted by the Local Plan growth, for example the A350 south of Melksham and M4 Junction 17, will be successfully mitigated when both the Local Plan schemes and MRN schemes are combined.

If these wider impacts are taken into account, it is considered that there could be potential to achieve High Value for Money, hence a relatively strong Economic Case and good potential for securing funding.

4.4. Next steps

Further assessment will be required to test, analyse and mitigate the impacts of development within the Market Towns. This further work will feed into this consideration of the Principal Settlements and allow for further investigation of mitigation proposals. This should include:

- Assessment of potential scenarios for changes in future travel demand, including increased home-working and online retail, following the COVID-19 pandemic;
- Explore the potential for increased modal shift within settlements towards active travel, particularly given a future focus on '15-minute neighbourhoods', with more local living and shopping;
- Planning for a step-change in the quality and attractiveness of public transport, including more flexible services that better respond to people's needs, 'Mobility as a Service' information and ticketing apps and high-quality interchange between modes;
- More explicit consideration of the carbon reduction agenda, including adoption of an 'Avoid-Shift-Improve' approach[6] to reducing the need to travel, shifting to zero carbon modes and accelerating the uptake of electric vehicles;
- Further consideration of the implications for strategic corridors in Wiltshire, most importantly the A350 north-south corridor but also the A303 in South Wiltshire and A4 and A36 connecting to the West of England;
- Further development of options, work to inform the forward infrastructure pipeline and programming of the mitigation package.

4.4.1. Locations recommended for further investigation

As highlighted above, several locations require further investigation to develop appropriate mitigation measures (as shown in Figure 3-9). These include:

- The proposed Melksham Bypass has been identified as approaching capacity with the proposed scale of growth along the A350. Further refinement of the design of this scheme will be required to ensure that it can adequately accommodate the proposed growth; this will be developed in coordination with higher impact active travel and sustainable travel measures;
- A350 south of A361 Littleton roundabout – Stony Gutter Lights – Yarnbrook (including Yarnbrook to West Ashton Bypass; capacity improvements are likely to be required to the planned bypass);
- Westbury (the location of preferred option housing will require further consideration of how this will impact on the local network); and
- A350 south of Westbury, towards Upton Scudamore and Warminster.

It is recommended that a comprehensive Route Strategy is developed for the A350 corridor between Warminster and Chippenham. This should consider options to secure higher levels of modal shift along the corridor, together with the long-term requirements for improved highway infrastructure to tackle congestion and journey time reliability, whilst at the same time supporting Wiltshire Council's ambitions for Net Zero carbon emissions.

In addition, potential issues have been identified in other market towns across Wiltshire. These issues relate to the growth that was assumed in the modelling work to date and will need to be investigated as growth options are explored for the towns. For example, issues have been identified around Devizes, Corsham, Calne and Royal Wootton Basset. These should be addressed in the next phase of work.

[6] The Avoid-Shift-Improve approach has been adopted by many organisations as an integrated framework for reducing greenhouse gases emitted by the transport system. 'Avoid' (or 'Reduce') refers to the need to reduce motorised travel through, for example, transport-oriented development and Transport Demand Management. 'Shift' interventions are focused on encouraging a shift from cars to more environmentally friendly modes, e.g. walking, cycling and public transport. 'Improve' interventions focus on improving efficiency through vehicle technology, including accelerating the adoption of electric and zero emissions vehicles.

Appendices

Appendix A. Guiding principles and hierarchy of interventions

A.1. Defining 'severe impacts'

Local Plan development should seek to avoid 'severe impacts' as defined by the National Planning Policy Framework (NPPF)[7]. This section sets out the proposed definition and process to identify severe impacts of the Local Plan development on the network. The aim of the process is to identify parts of the network that are likely to be severely impacted by Local Plan development in order to target mitigation measures at locations where they are most needed.

The first step will be to identify any underlying issues in parts of the network before assessing the impacts of network caused when adding in the Local Plan development.

As required by the Duty to Cooperate, locations will be identified for junctions and links that are severely impacted at or near to the SRN (for Highways England) as well as on the network near to (or within) neighbouring authorities.

It is proposed that analysing **volume/capacity** (V/C) at both strategic and local levels is an important indicator for identifying severe impacts. The proposed methodology, which will flag junctions and links that operate above 85% V/C as having the potential for severe impacts.

Assessments of V/C will be made for both with and without Local Plan growth scenarios to establish whether severe impacts may be caused by the Local Plan growth (the junction or link is tipped over 85% V/C by the Local Plan growth) or whether there is an underlying performance issue (the junction or link is already over 85%).

Mitigation schemes will then be devised with the aim of ensuring junctions or links that were above 85% V/C (a 'severe impact') would operate below 85% with the scheme or minimise the impact.

Table A-1 - Defining severe impacts through V/C ratio

V/C ratio		Severe impact definition
2036 Do Nothing **excluding** Local Plan growth	2036 Do Minimum **including** Local Plan growth	
Below 85%	**Above 85%**	Potential for **Severe impact** (Local Plan growth)
Above 85%	**Above 85%**	Potential for **Severe impact** (underlying issues)
Below 85%	Below 85%	**No severe impact**

As part of the **Duty to Cooperate**, severe impacts are highlighted at locations relevant to either Highways England or Wiltshire Council's neighbouring planning authorities. This will form part of the consultation between Wiltshire and its Duty to Cooperate stakeholders, in which Wiltshire would discuss where the Local Plan growth will severely impact the network and explore possible mitigation schemes.

For Highways England, it will be imperative to understand where there will be performance issues on the SRN and whether this will cause safety problems (for example queuing on to mainline carriageways). The following locations will be important to assess:

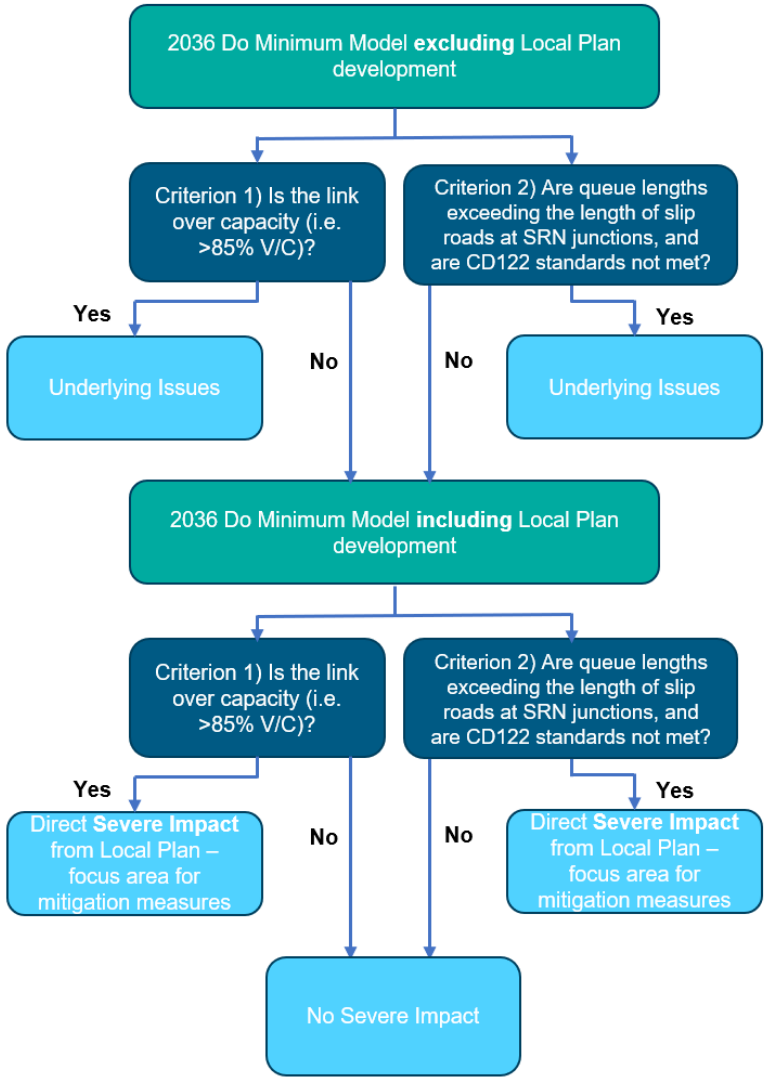
- M4 Junction 17 (and the operation of its A350 and A429 junction arms);
- M4 Junction 16 (and the operation of A3102, B4005 and A3102 junction arms);
- A36 through Wiltshire, with a focus on the operation of the A36 and its surrounding network in Salisbury;
- Any cumulative impacts of housing growth on the A303.

[7] The term 'severe impacts' refers to National Planning Policy Framework (NPPF) guidance, paragraph 109. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf. Previous engagement with Highways England has indicated that, in terms of severe impacts, Highways England considers both the incremental impact of development and the cumulative impacts, also taking account of background growth.

Wiltshire Council's neighbouring planning authorities Bath and North East Somerset (BANES) and Swindon Borough Council (SBC) are likely to be most affected by Wiltshire's Local Plan growth. The following locations will be important to assess:

- BANES: Impact of additional trips to Bath caused by development in Trowbridge, Bradford on Avon and Chippenham, as well as cumulative impacts of housing growth on the A4, A363 and A36; and
- SBC: M4 Junction 16 and potentially A419 through Cricklade.

Figure A-1 - Process for identification of severe impacts[8]



A.2. Principles for identifying mitigation schemes

It is important to set out the principles for how this process will identify, prioritise and test mitigation schemes. A hierarchy of interventions has been formed, in accordance with Wiltshire's LTP, to provide the rationale for mitigation selection.

A.2.1. Hierarchy of interventions

The identification of mitigation schemes will follow the user hierarchy, with the prioritisation of active modes (walking and cycling), followed by public transport and private vehicles. Prioritising a shift away from car

[8] The Design Manual for Roads and Bridges CD122 (Geometric design of grade separated junctions) sets out the standards for merges and diverges. Traffic flows for the two model scenarios will be tested to assess their implications on merges and diverges and subsequently tests whether these are within the current design standards.

dependence will contribute towards addressing the Climate Emergency[9] as well as supporting wider placemaking policies.

Table A-2 - Proposed hierarchy of interventions

Priority level	Mitigation type	Scale of impact	Critical assessment
High	Active mode schemes: provision for pedestrians and cyclists	Local trips	• Contributes to reducing congestion through a reduction in local car trips. • Contributes to reducing carbon emissions and impacts on air quality through a reduction in local car trips. • Improve local health and wellbeing by increasing levels of physical activity. • Can be used in conjunction with public transport to make interurban trips. • Not suitable for mitigating large increases in the number of trips at large scale development or for supporting longer distance trips (as a lone intervention) without complementary land uses such as employment, retail and leisure. • Suitable for connecting developments to public transport routes. • Contributes to improvement in critical safety impacts.
Medium	Public transport schemes	Local/ interurban trips	• Suitable for connecting developments to key trip generators – particularly in conjunction with active modes. • Contributes to reducing congestion through a reduction in local car trips. • Contributes to reducing carbon emissions and impacts on air quality through a reduction in local car trips. • Any new services need to be commercially viable – may not be appropriate for small scale developments unless services form part of a wider corridor-based approach. • For towns without rail stations, likely not suitable for supporting longer distance trips unless it provides links to public transport services that enable longer distance journeys e.g. rail station.
Low	Highway schemes	Any trips – predominantly longer distance	• Suitable for large scale development access requirements, as part of a multi-modal package of intervention. • Addresses cumulative Local Plan traffic impacts i.e. any 'severe' impacts. • Provide development site access. • Potential increases in traffic and potential inconsistencies with policies to address Climate Emergency. • The aim is therefore to mitigate impacts of Local Plan development by reducing demand and encouraging mode shift, rather than using infrastructure measures to facilitate a greater number of vehicle trips. • Contributes to improvement in critical safety impacts.

A technical methodology has also been established for estimating potential reductions of highways trips in response to improved walking and cycling infrastructure and enhanced public transport services and infrastructure. This could include both trips from the new development and background highway trips if improved infrastructure or public transport services cater for a wider catchment in each settlement.

[9] In February 2019, a full council meeting resolved to acknowledge there is a Climate Emergency and declared that Wiltshire Council will seek to make the county carbon neutral by 2030. Information available at: http://www.wiltshire.gov.uk/green-economy-climate-emergency

In the case of **walking and cycling infrastructure,** the Propensity for Cycling Tool (PCT) would be used to determine trip numbers on each cycle corridor link. The PCT collates cycle trip origin/destination data from the Census with the length and gradient of potential cycle routes to estimate likely cycle routing patterns.

This would then be fed into the WebTAG Active Model Appraisal Toolkit (TAG Unit 5.1) which will estimate the potential increase in cycle trips on each proposed corridor link.

As cycle flow data is based on Census Travel to Work data, the results would be factored to estimate non-commuting trips. This is based on National Travel Survey methodology.

Each scheme will include a high-level specification that will be used to inform high-level costings. This will be based on unit rate data from similar schemes (for example, typical costs for off-road cycle routes, junction improvements and lengths of new road). The approach would draw on existing costs where these have already been calculated (for example, major transport infrastructure at Chippenham). These costs will be presented transparently and will be recorded in spreadsheets. Key deliverability issues will also be flagged in a RAG (Red-Amber-Green) assessment, for example significant environmental impacts and deliverability risks.

Appendix B. Assumptions used in testing

Figure B-1 - Chippenham: housing sites and schemes in uncertainty log

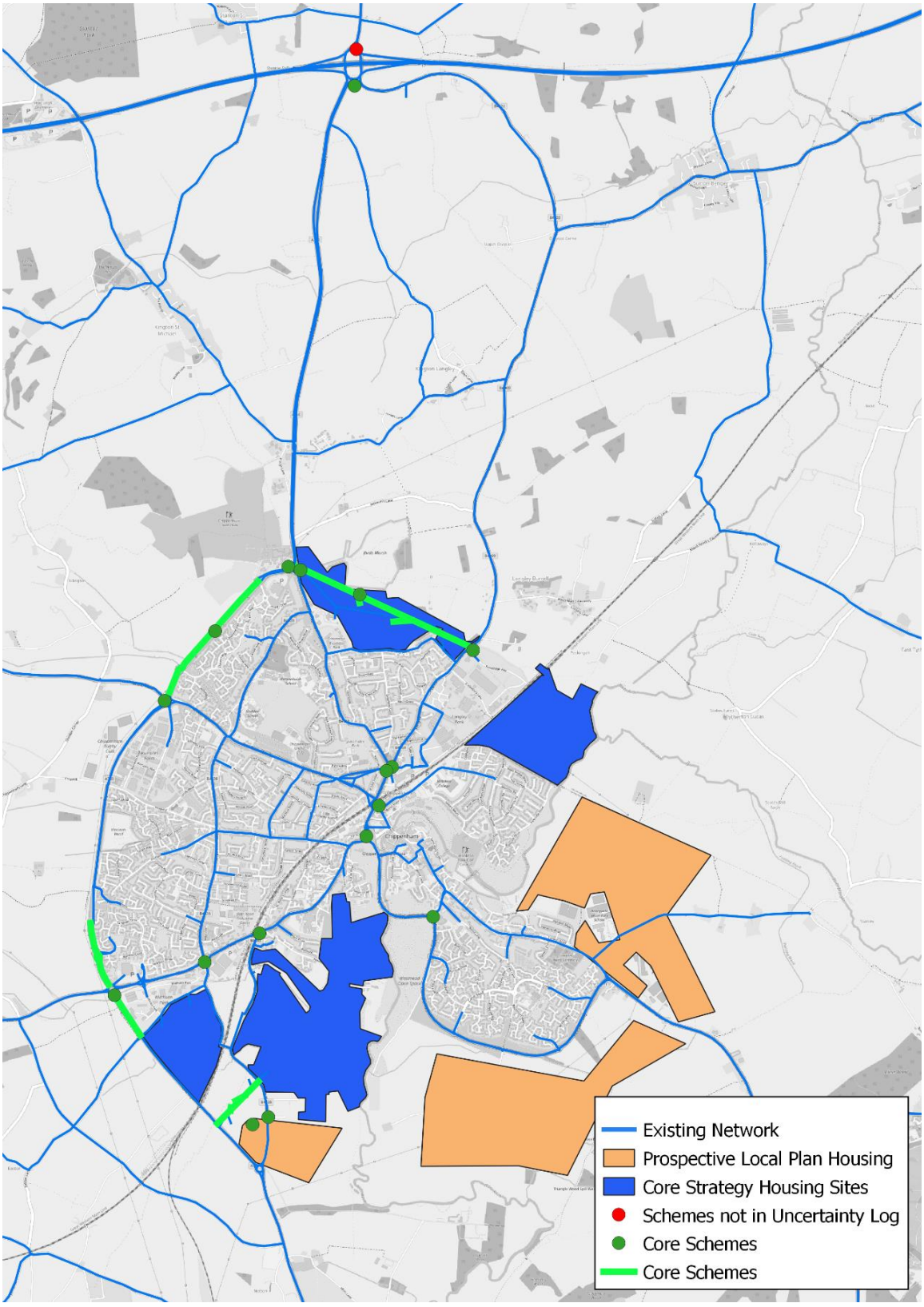


Figure B-2 - Trowbridge: housing sites and schemes in uncertainty log

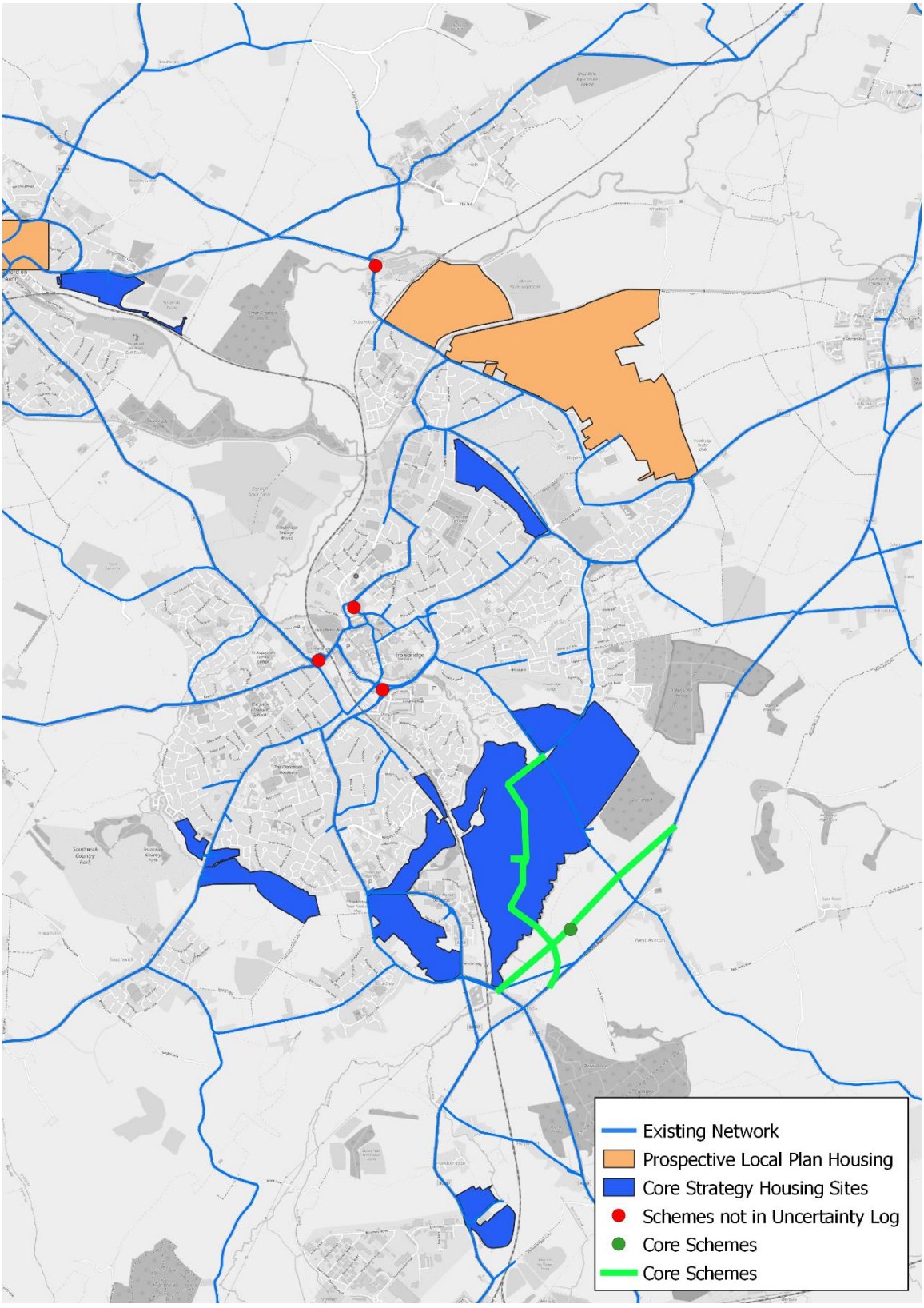
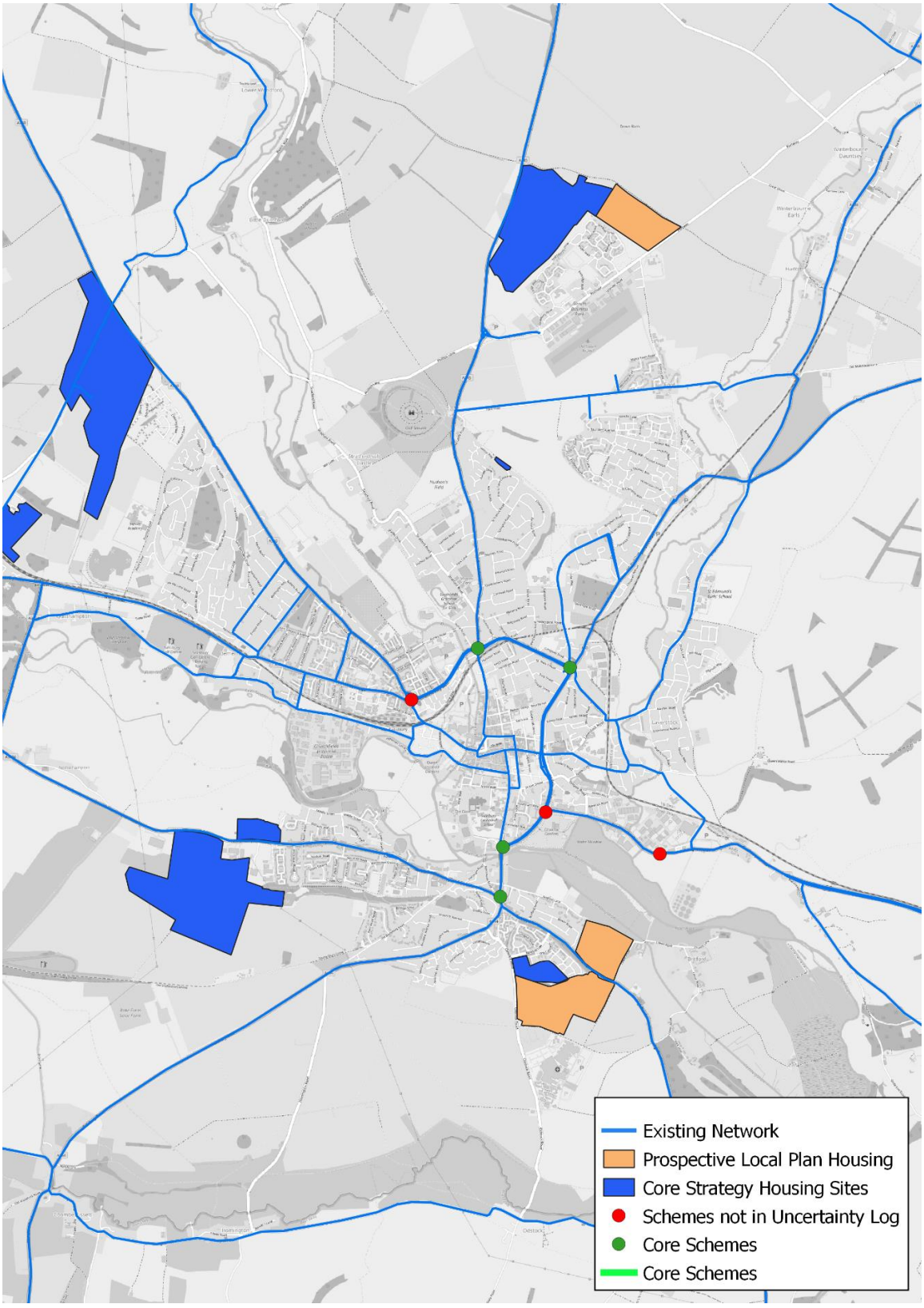


Figure B-3 - Salisbury: housing sites and schemes in uncertainty log



B.1. Chippenham site options

The table below summarises the site options in Chippenham that were used for testing in the transport model. These were based on indicative assumptions developed in April 2020.

Option	Site	Up to 2036	Post 2036	Total	Net Developable Area	Density per Hectare Up to 2036	Density Per Hectare Up and Beyond 2036
1 (used in the DM3 alternate test)	Site 1 East Chippenham	2500	800	3300	111	23	30
	Site 2 South of Pewsham	2500	1010	3510	123	20	29
	Total	5000	1810	6810			
	Southern Link Road – Access through SW Chippenham/Rowden Park site						
2 used in all other LP testing (i.e. DN1-3, DM1&2)	Site 1 East Chippenham	3300		3300	111	30	
	Site 2 South of Pewsham	1300	2300	3600	123	11	29
	Site 3 East of Showell Farm	500		500	16	31	
	Total	5100	2300	7400			
	Southern Link Road – Access via Site 3 and directly onto Lackham Roundabout.						

B.2. Trowbridge site options

The table below summarises the site options in Trowbridge that were used for testing in the transport model. These were based on indicative assumptions developed in April 2020.

		Density per hectare	Net developable area	Up to 2036	After 2036	Total
Site 7	Land to the north of Trowbridge	30	63ha	1300	590	1890
Site 8	Land north of Marsh Road, Staverton	30	22 ha	500	160	660
				1800	750	2,550

B.3. Salisbury site options

The table below summarises the site options in Salisbury that were used for testing in the transport model. These were based on indicative assumptions developed in April 2020.

Site	Site descriptor	Net developable	To 2036 @ 30dph
1	NE of Sarum	10.0ha	300
6	N of Downton Road	8.3ha	250
7	SE Salisbury	5.2ha	160
	Total		710

Appendix C. Additional Considerations

C.1. Wiltshire modal share

Table C-1 - Estimated travel modal share in Wiltshire (2018)

Data Source	NTEM 7.2	Census	NTS	Weighted Estimate
Atkins Weighting	*50%*	*40%*	*10%*	
Walk over 1 mile	5%	3%	7%	**5%**
Cycle	2%	3%	1%	**3%**
Car Driver	59%	77%	59%	**66%**
Car passenger	28%	7%	28%	**19%**
Bus/coach	4%	2%	4%	**3%**
Rail	2%	7%	1%	**4%**

C.2. Parking policy recommendations

An overabundance of car parking within a town centre can encourage car journeys and reduce the utility of walking, cycling and public transport. Limiting access to parking in the principal settlement and market town centres may discourage people from travelling by car into the centres. The Salisbury Central Area Framework (2020) and the Trowbridge Transport Strategy Refresh (2018) state the aims to 'consolidate car parking in the city centre' and 'manage car park supply and demand' to encourage and facilitate more public transport, walking and cycling journeys within the towns.

All three principal settlements in Wiltshire have been shown to have spare parking capacity when surveyed[10], but also face differing obstacles to the implementation of effective parking policy. This policy will need to be tailored to each principal settlement in order to have the most impact on the conversion of car trips to public transport and active mode trips.

The Atkins 2018 Wiltshire Parking Technology Study recommended four next steps for Wiltshire Council to take to 'begin using medium and long-term solutions to revolutionise the parking experience for both the user and the council'. These were:

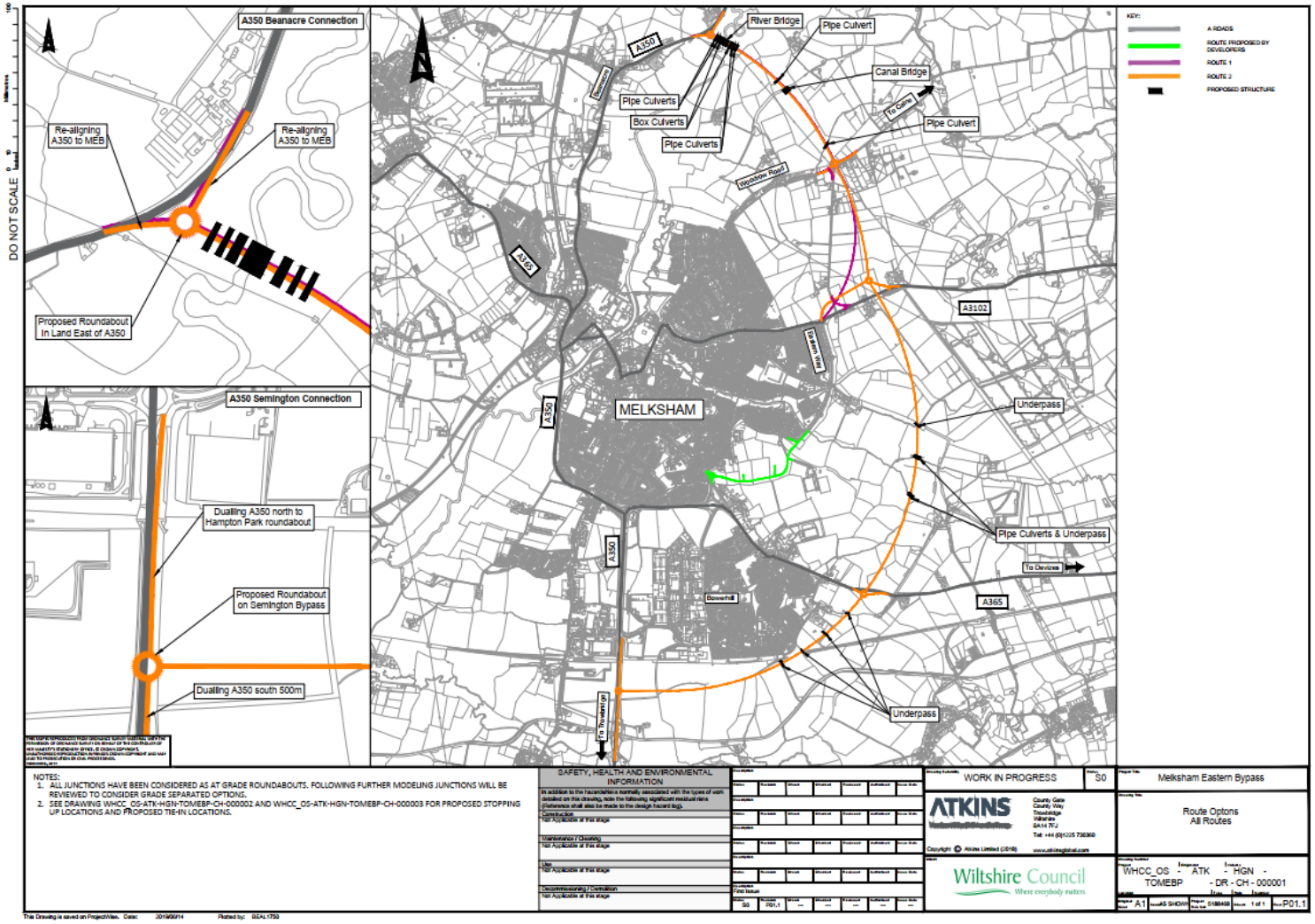
- Undertake a review of current parking review processes and increase synergies within the Council;
- Employ tools such as mobile Automated Number Plate Recognition (ANPR) and parking payment apps to build up an accurate and comprehensive data bank;
- Perform analysis of data using geospatial tools in ArcMap in order to draw accurate and up to date conclusions on the parking landscape in Wiltshire; and
- Use findings from data review to inform future strategies, including parking restriction types, pricing and location.

Once these next steps have been implemented and a good understanding of the parking situation within each principal settlement has been developed, a robust parking policy that aids in the reduction of car trips into the principal settlement and market town centres can be established. It is recommended that these parking policies are used to help manage traffic demand and to mitigate the impacts of growth in each town.

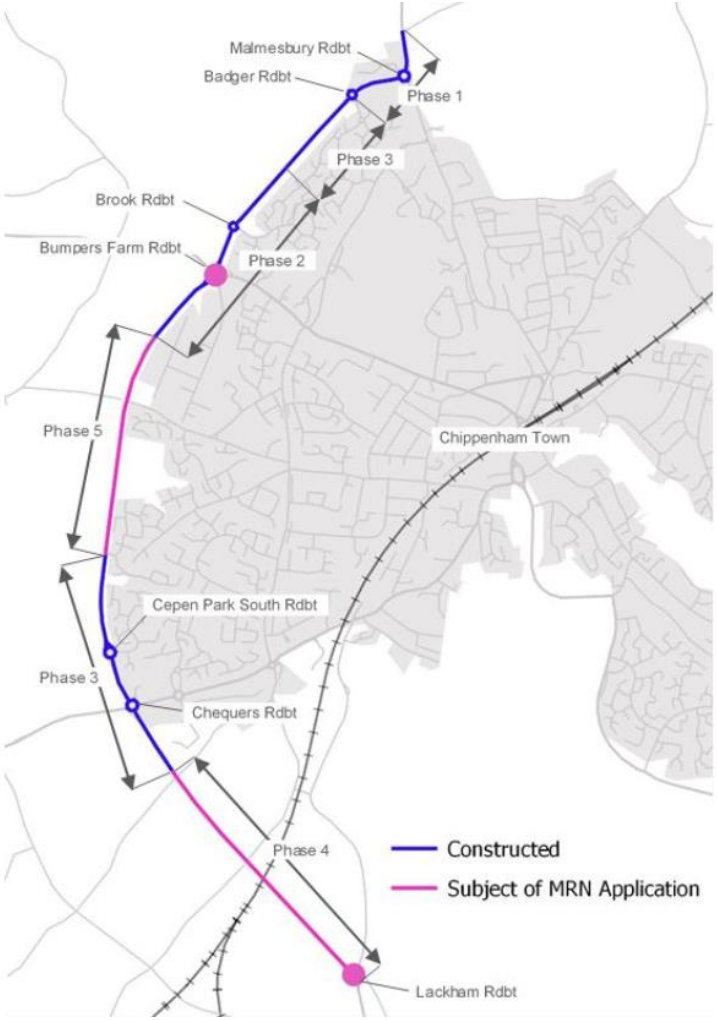
[10] Wiltshire Parking Technology Study (2018), Trowbridge Transport Strategy Refresh (2018)

Appendix D. Highway scheme designs

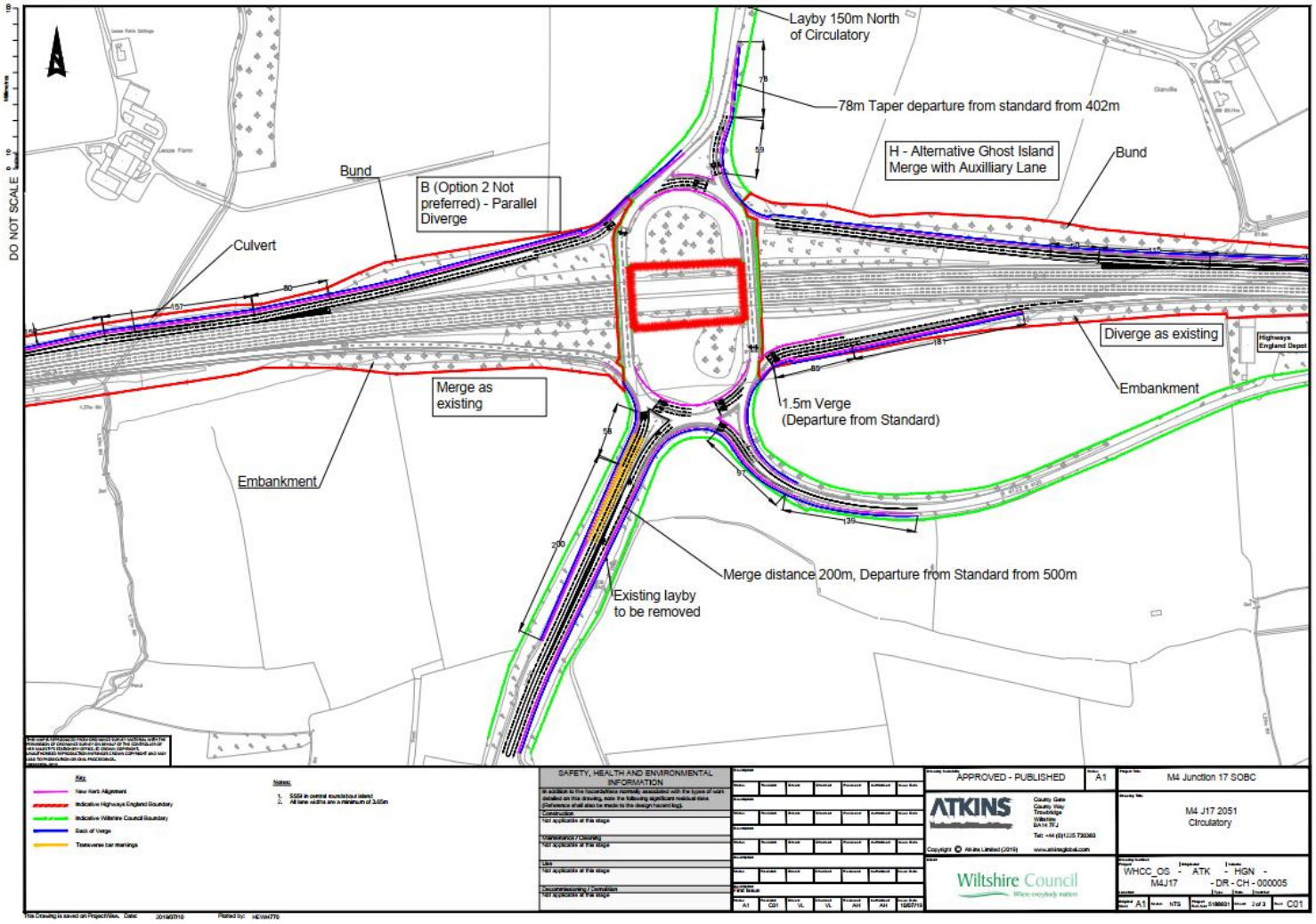
D.1. Melksham Bypass (SOBC)



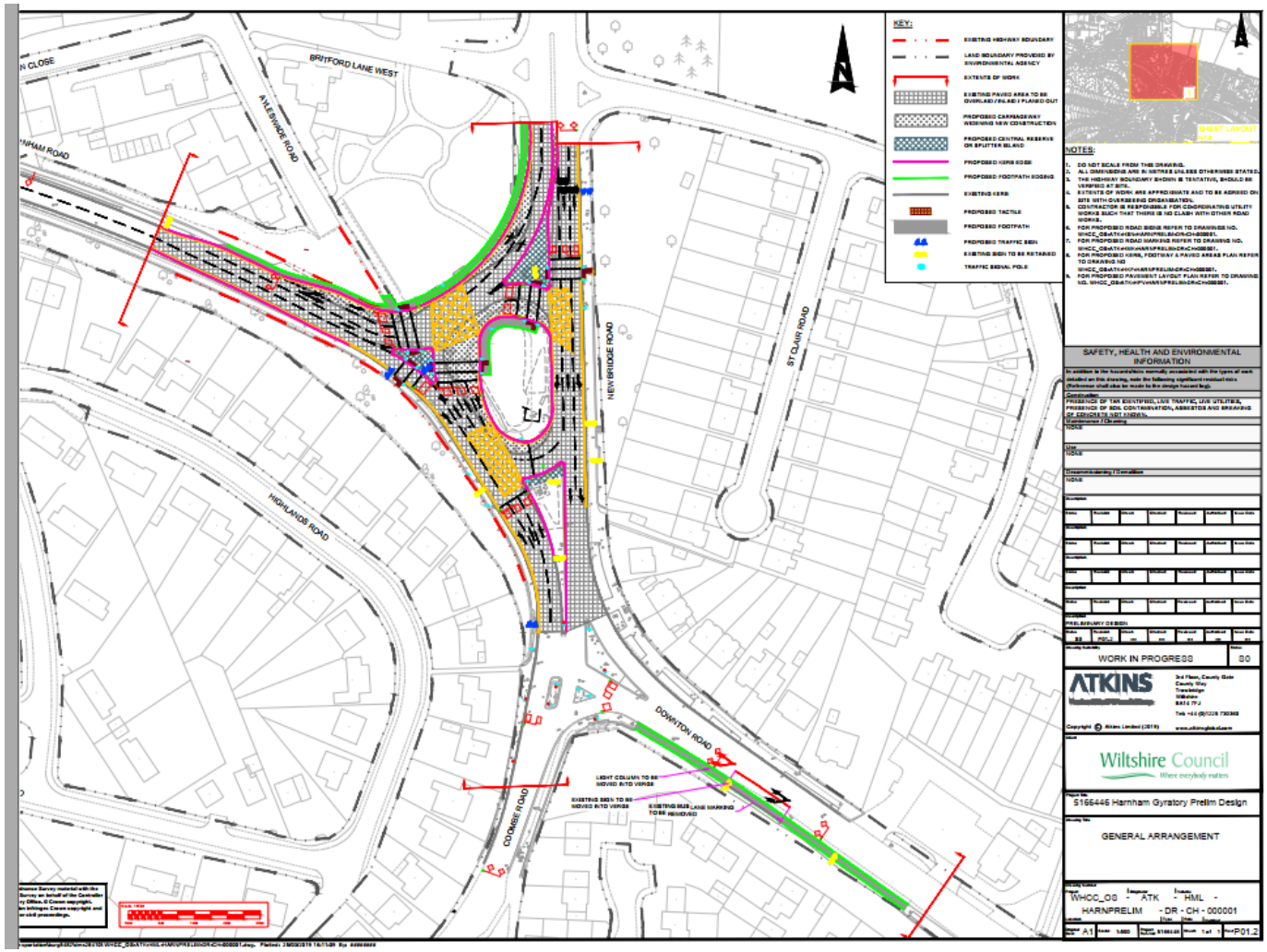
D.2. A350 Phase 4&5 Dualling (SOBC)

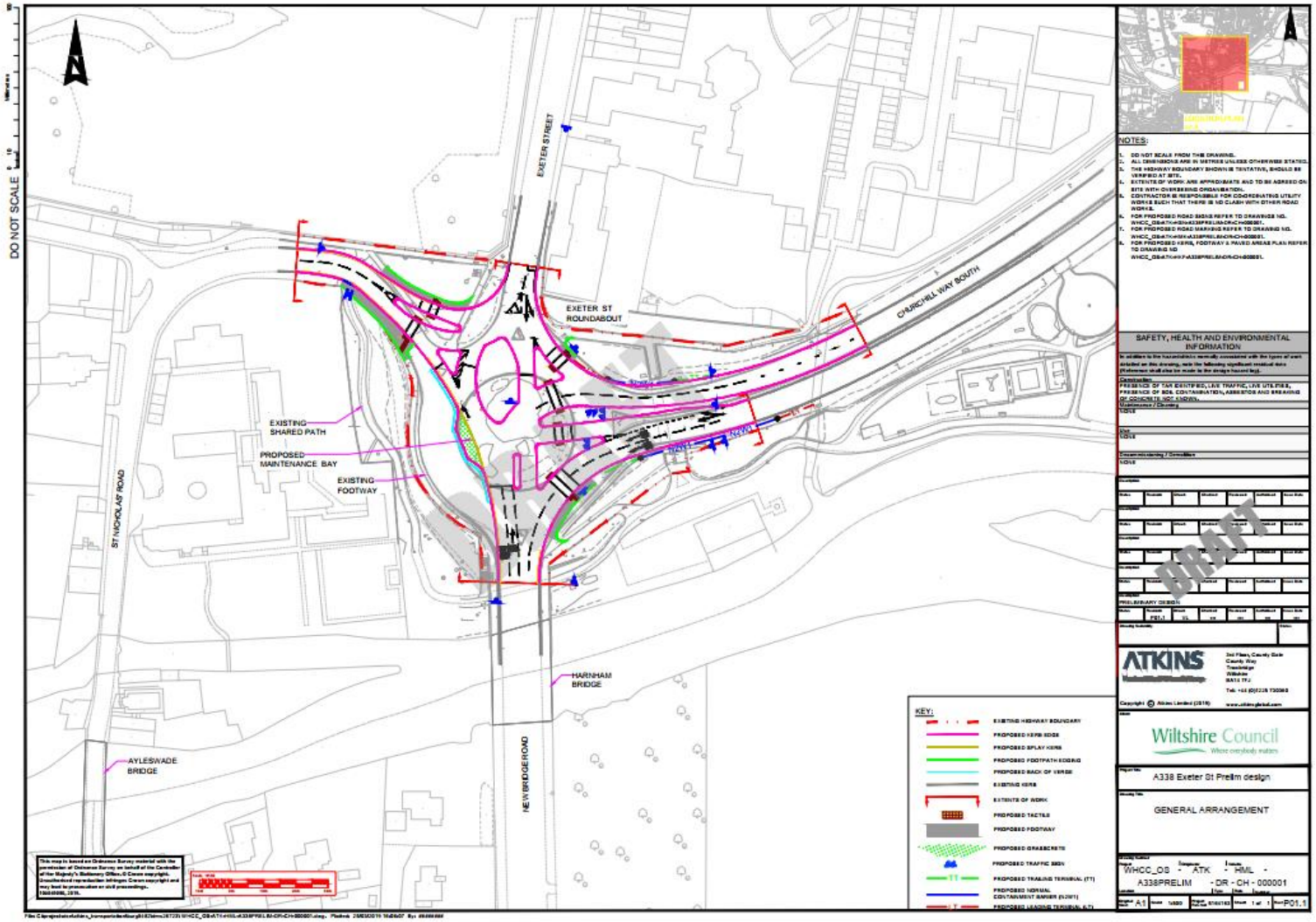


D.3. M4 Junction 17 (SOBC)

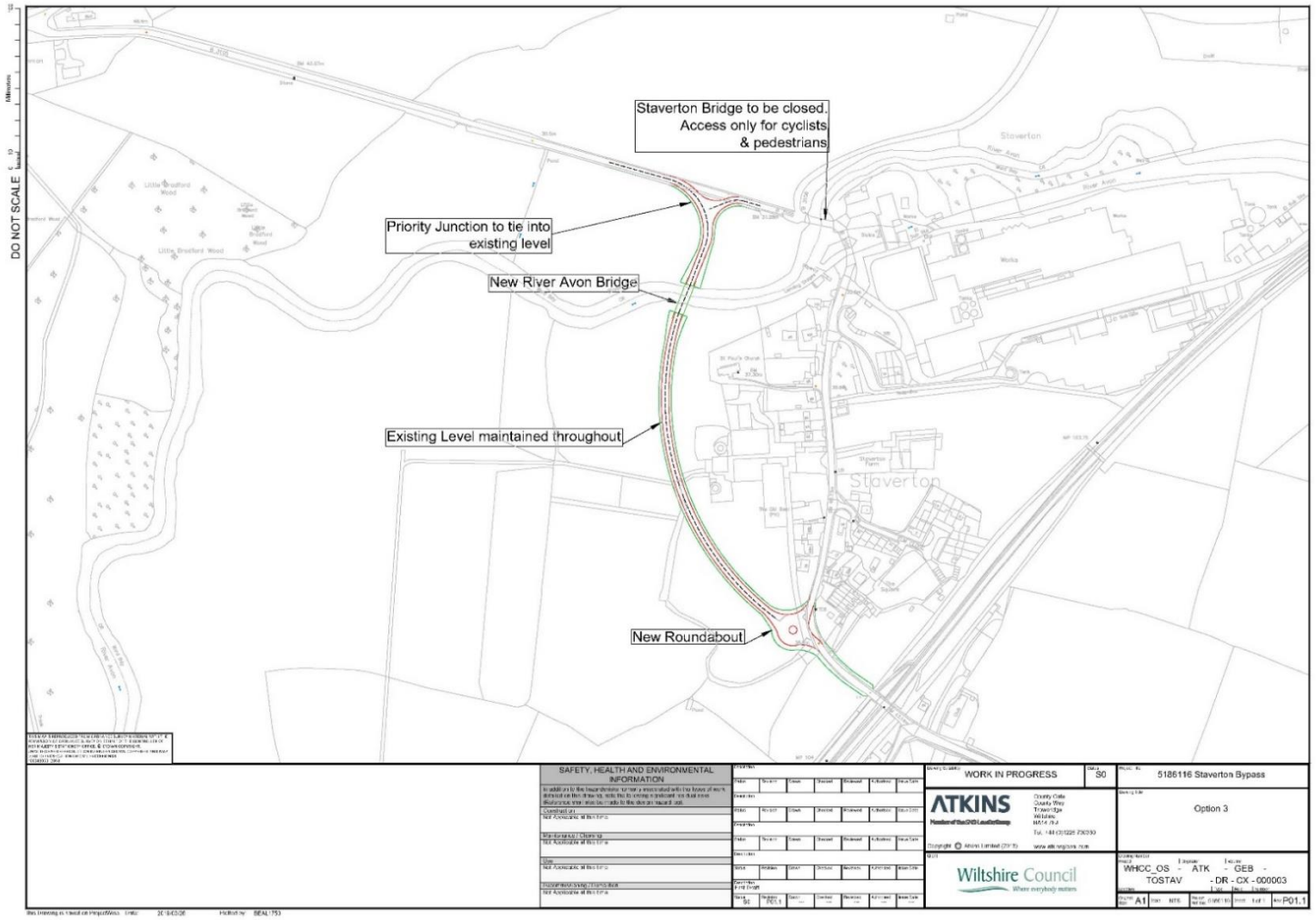


D.4. Salisbury Junctions (SOBC)




DO NOT SCALE
EXETER STREET
EXETER ST ROUNDABOUT
CHURCHILL WAY SOUTH
EXISTING SHARED PATH
PROPOSED MAINTENANCE BAY
EXISTING FOOTWAY
ST NICHOLAS ROAD
HARNHAM BRIDGE
NEWBRIDGE ROAD
AYLESWADE BRIDGE
KEY:
NOTES:
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
DRAFT
ATKINS
Wiltshire Council
A338 Exeter St Prelim design
GENERAL ARRANGEMENT
WHCC_OB - ATK - HML -
A338PRELIM - DR - CH - 000001
P01.1

D.5. Staverton bridge bypass



Appendix E. Methodology to assess active travel impacts

E.1. Methodology to assess impacts

The Propensity to Cycle Tool (PCT) routeing data (based on Census Travel to Work) was used to determine the existing commuter cycle mode share within each settlement. Lower Super Output Area (LSOA) level data was collected for the geographical zones within each principal settlement and the average existing commuter cycle mode share calculated for Chippenham, Trowbridge and Salisbury.

As the results were to be applied to the Wiltshire Strategic Highway Model, they were factored from commuter trips to estimate all-purpose trips for Chippenham, Trowbridge and Salisbury. This allowed the same factor to be applied to all non-freight user classes within the highway model. The difference between the cycle commuter percentage for each principal settlement (PCT) and the national average (Census Travel to Work Data) was used as a factor to calculate the estimated proportion of all-purpose cyclist trips in the Do Minimum scenario for Chippenham, Trowbridge and Salisbury separately (Table E-1 - Calculation of derived all-purpose trips cycle mode share (Chippenham example)

Table E-1 - Calculation of derived all-purpose trips cycle mode share (Chippenham example)

Value type	Value	Calculations / comments
2011 Commuting cycle mode share for route Chippenham pre-scheme *Source: 2011 Census (PCT)*	3.3%	
2011 National commuting cycle mode share *Source: 2011 Census Travel to Work Data*	3.0%	
Factor - Chippenham/National cycle mode share	1.07	3.3% / 3.0%
2018 National cycle mode share - all trip purposes *Source: National Travel Survey 2018*	2.2%	
Derived Chippenham all-purpose trips cycle mode share pre-scheme	2.3%	2.2 x 1.07

A Disaggregate Mode Choice Model[11] was used to estimate the potential increase in cycle mode share in response to the proposed infrastructure improvements. The model considers the change in the generalised cost of cycling due to the new infrastructure, with higher standard cycling schemes resulting in an increase in the utility of cycling, and also the length of the scheme, with longer stretches of new infrastructure resulting in faster travel times. Infrastructure located at destinations or transport hubs, such as secure bicycle parking and showers, also increase the utility of cycling.

The model only applies to those who would consider the cycle mode as an option. In reality, a significant proportion of people will never select cycling as a viable transport option. TAG Unit A5.1 Active Mode Appraisal uses 40% as the proportion of the population who would consider cycling as an option, therefore only this proportion of the population is considered when estimating the increase in cycle trips created by the new cycle infrastructure.

[11] TAG Unit A5.1 Active Mode Appraisal – Approach 2

Table E-2 - Calculation of all-purpose cycle mode split post-scheme (Chippenham example)

Value Type	Value	Calculations
Derived Chippenham all-purpose trips cycle mode share pre-scheme	2.3%	
Percent of commuters that would consider cycling[1]	40.0%	
Proportion of those choosing to cycle pre-scheme compared to those for which cycling is viable (All Purpose) [1]	5.8%	2.3% / 40%
Proportion of those choosing to cycle post-scheme compared to those for which cycling is viable (All Purpose) [1]	14.1%	$\frac{(5.8\% \; x \; e^{1*})}{(5.8\% \; x \; e^{1*}) + (1 - 5.8\%)}$ **1 = Change in Utility of cycling mode*
Cycle mode share for route post-scheme (All Purpose)	5.7%	14.1% x 40%

1) *As defined in TAG Unit A5.1 Section 2.3*

A Disaggregate Mode Choice Model was developed to assess the new cycling infrastructure corridors in all three principal settlements. Chippenham, for example, comprised 14 new cycle corridors. To obtain the estimated proportion of all-purpose cyclist trips in the Do-something scenario, to be applied to Chippenham as a whole, an average was calculated from the results of the 14 corridors. This total reduction in Wiltshire car trips due to mode shift to cycling was then applied to the Wiltshire Strategic Highway Model to assess its impacts.

E.2. Findings

The table below shows the forecast change in cycle and highway trips due to the proposed measures.

Table E-3 - Expected impact of active travel measures on highway demand

	Chippenham	Trowbridge	Salisbury
Estimated car driver mode share %	66%	66%	66%
Number of daily car trips within sector (derived from highway model)[12]	33,488	24,102	34,616
Total number of daily trips within sector (derived from highway model)	50,739	36,518	52,448
Estimated proportion of all-purpose cyclist trips in the Do Minimum scenario	2.3%	2.3%	3.4%
Estimated absolute number of cyclists in the Do Minimum scenario (per day)	1,179	826	1,792
Estimated proportion of all-purpose cyclist trips in the Do-something scenario	5.5%	5.9%	9.7%
Estimated absolute number of cyclists in the Do-something scenario (per day)	2,770	2,137	5,106
Estimated absolute number of new cyclists (per day)	1,591	1,311	3,314
Total reduction in Wiltshire car trips due to mode shift to cycling (per day)	6,216		

[12] Only internal trips for each settlement extracted from the highway model.

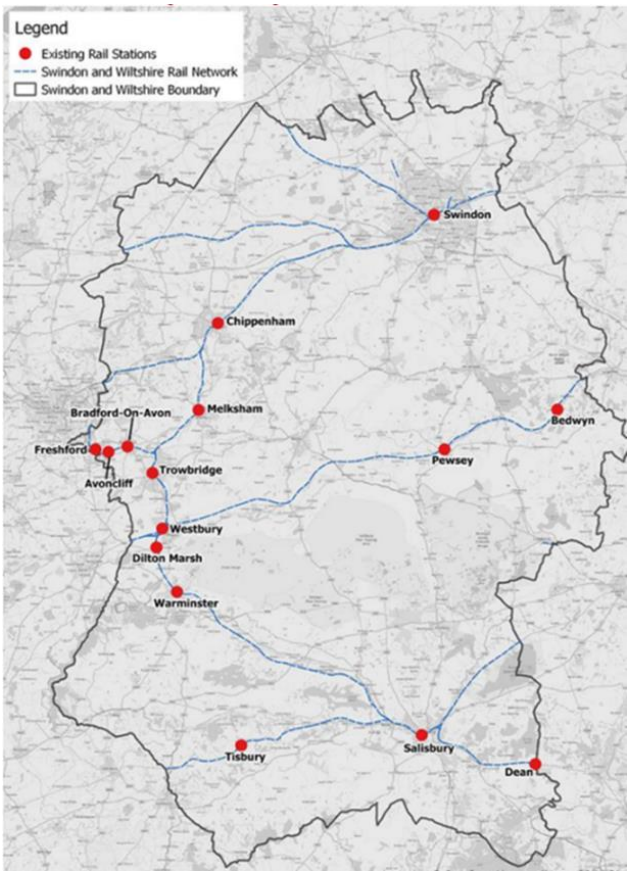
Appendix F. Methodology for estimation of rail and bus patronage

F.1. Current rail patronage

Wiltshire has 14 railway stations, served by two main train operators, Great Western Railway and South Western Railway[13]. Existing patronage at Wiltshire's rail stations is presented in this section.

Figure F-1 - Patronage at rail stations in Swindon and Wiltshire

Station Name	2018/19 Estimates of station usage per annum[14]	5-year change in patronage (2014 - 2019)
Salisbury	1,979,880	1%
Chippenham	1,972,350	4%
Trowbridge	933,894	3%
Westbury	548,720	4%
Bradford-On-Avon	534,086	0%
Warminster	348,658	-10%
Tisbury	221,736	-8%
Pewsey	221,712	1%
Bedwyn	109,320	-6%
Melksham	74,534	44%
Freshford	53,368	20%
Dean (Wilts)	29,768	15%
Avoncliff	24,396	26%
Dilton Marsh	17,004	-13%



F.2. Station accessibility

The journey times between the main rail stations are presented below and compare different modal travel times. Stakeholder engagement undertaken for the 2019 Swindon and Wiltshire Rail Study presented the theme of needing to consider journeys as door to door rather than station to station. It was concluded that 'improving access to the rail network, for example by improving access by sustainable modes, is as important as improving the quality of the rail service itself'. This approach has been adopted in this review.

[13] Source: Swindon and Wiltshire Rail Study (2019)

[14] The estimates of station usage consist of the total numbers of people travelling from or to the station (entries and exits); and Interchanging at the station (interchanges).

Table F-1 - Journey time comparison by mode between main railway stations (station to station)

Trips between stations		Journey time (minutes)[15]		
Origin	Destination	Car	Bus	Train
Chippenham	Swindon	32	100	12
Chippenham	Melksham	16	27	9
Melksham	Trowbridge	16	34	9
Trowbridge	Westbury	13	27	8
Westbury	Salisbury	45	63	29

Wiltshire however has a low proportion of its population within close proximity to a railway station when compared to the national average according to the study. It is highlighted that the national average can be skewed by the density of stations in London and other major conurbations, Wiltshire has a lower proportion of population within the 1km, 3km and 5km distance bands than the South West average. This is more pronounced at longer distances, highlighting the fact that many of Wiltshire small to medium sized towns do not have a railway station. The report examined accessibility to the rail network for the non-rail served towns by comparing equivalent car and bus journey times, finding that there are a number of locations that take more than 50% longer by bus than by car. These include Amesbury and Devizes, home to 690 and 245 prospective Local Plan households.

Table F-2 - Proportion of population within distance bands from a railway station

	Up to 1km	Up to 3km	Up to 5km
Wiltshire	18%	47%	53%
Swindon	7%	46%	96%
Swindon & Wiltshire	15%	47%	66%
South West	20%	54%	68%
England and Wales	30%	72%	85%

F.3. Estimated potential rail demand with prospective Local Plan

An estimate of new rail passengers expected from the prospective Local Plan housing around Chippenham, Melksham, Trowbridge, Salisbury and Westbury is presented below. This was estimated using a simple proportion of car and total person trips generated by each settlement's prospective Local Plan housing. These were then factored to calculate the total trips generated by each settlement's prospective developments, for each peak period.

[15] Routes are between railway stations to enable a comparison of mode type. Route timings taken from https://www.google.co.uk/maps and are all journeys between 6am and 9am. Covid-19 schedule so may differ from normal timings.

Table F-3 - Estimated car trips generated by prospective Local Plan housing by town

Prospective housing		Chippenham	Melksham	Trowbridge	Salisbury	Westbury
No. households		5,100	2,675	1,800	710	1,125
Total car trips (Two-way trips per/hour)	AM peak hour (08:00- 09:00)	2,074	1,088	732	289	458
	Inter period (10:00- 16:00)	1,264	663	446	176	279
	PM peak hour (17:00- 18:00)	1,947	1,021	687	271	430

Table F-4 - Estimated total person trips generated by prospective Local Plan housing by town

Prospective housing		Chippenham	Melksham	Trowbridge	Salisbury	Westbury
No. households		5,100	2,675	1,800	710	1,125
Total Person trips (two-way Trips per/hour)	AM peak hour (08:00- 09:00)	3,143	1,648	1,109	438	693
	Inter period (10:00- 16:00)	1,914	1,004	676	267	422
	PM peak hour (17:00- 18:00)	2,950	1,547	1,041	411	651

Assuming Car trips are 66% of total trips and using a 1.515 factor from previous table.

The numbers of rail trips that could be generated by the prospective Local Plan housing in Chippenham, Melksham, Trowbridge, Westbury and Salisbury.

Table F-5 - Estimated additional rail passengers by town

		Chippenham	Melksham[1]	Trowbridge	Salisbury	Westbury
Rail trips mode share		4%				
Total rail trips (Two-way Trips per/hour)	AM peak hour (08:00- 09:00)	126	66	44	18	28
	Inter period (10:00- 16:00)	77	40	27	11	17
	PM peak hour (17:00- 18:00)	118	62	42	16	26

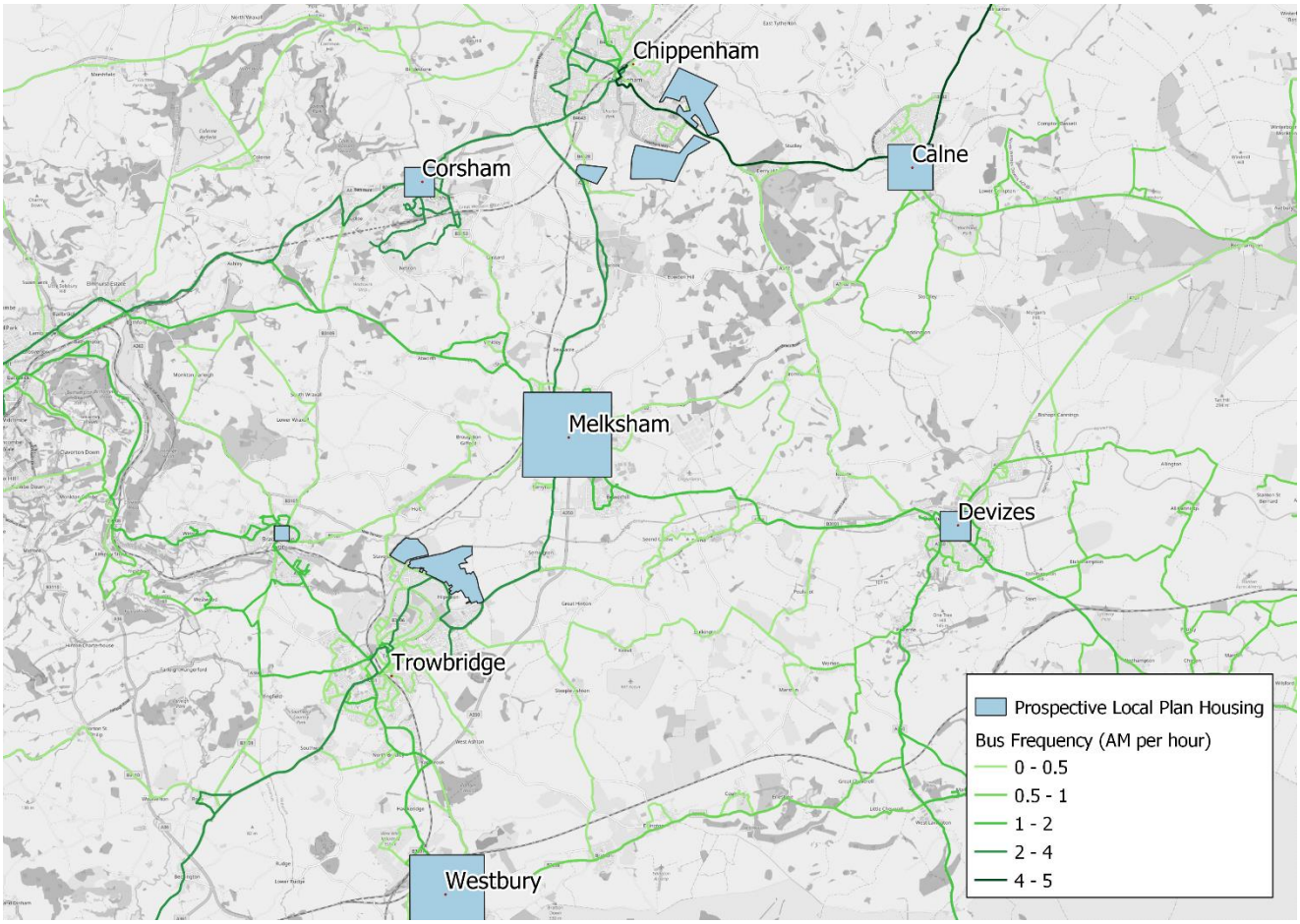
1) Rail patronage forecasts at Melksham are not necessarily expected to utilise Melksham station directly (the existing patronage levels are very low); this is an estimate of people who intend to travel by rail, but could use rail services at Chippenham or Trowbridge stations.

The estimated additional increase in rail patronage (due to the Wiltshire Local Plan prospective developments), without mitigation is relatively low. It can be assumed that the proposed active travel interventions (described previously) will encourage more people to make rail trips, but this has not been explicitly modelled and is included within the changes proposed.

F.4. Current bus provision and services

Inter-urban bus services provide access between the principal settlements and market towns of Wiltshire but currently operate at low frequencies with most services operating as a minimum one service on average per hour in the morning peak period. Intra-urban bus services providing for journeys within the principal settlements also operate at low frequencies. The frequencies in Chippenham and Trowbridge are lower than the service offer in Salisbury. This is recognised in the Chippenham[16] and Trowbridge[17] Transport Strategies which also highlight that inter-urban and intra-urban bus services are subject to delays and poor reliability due to congestion.

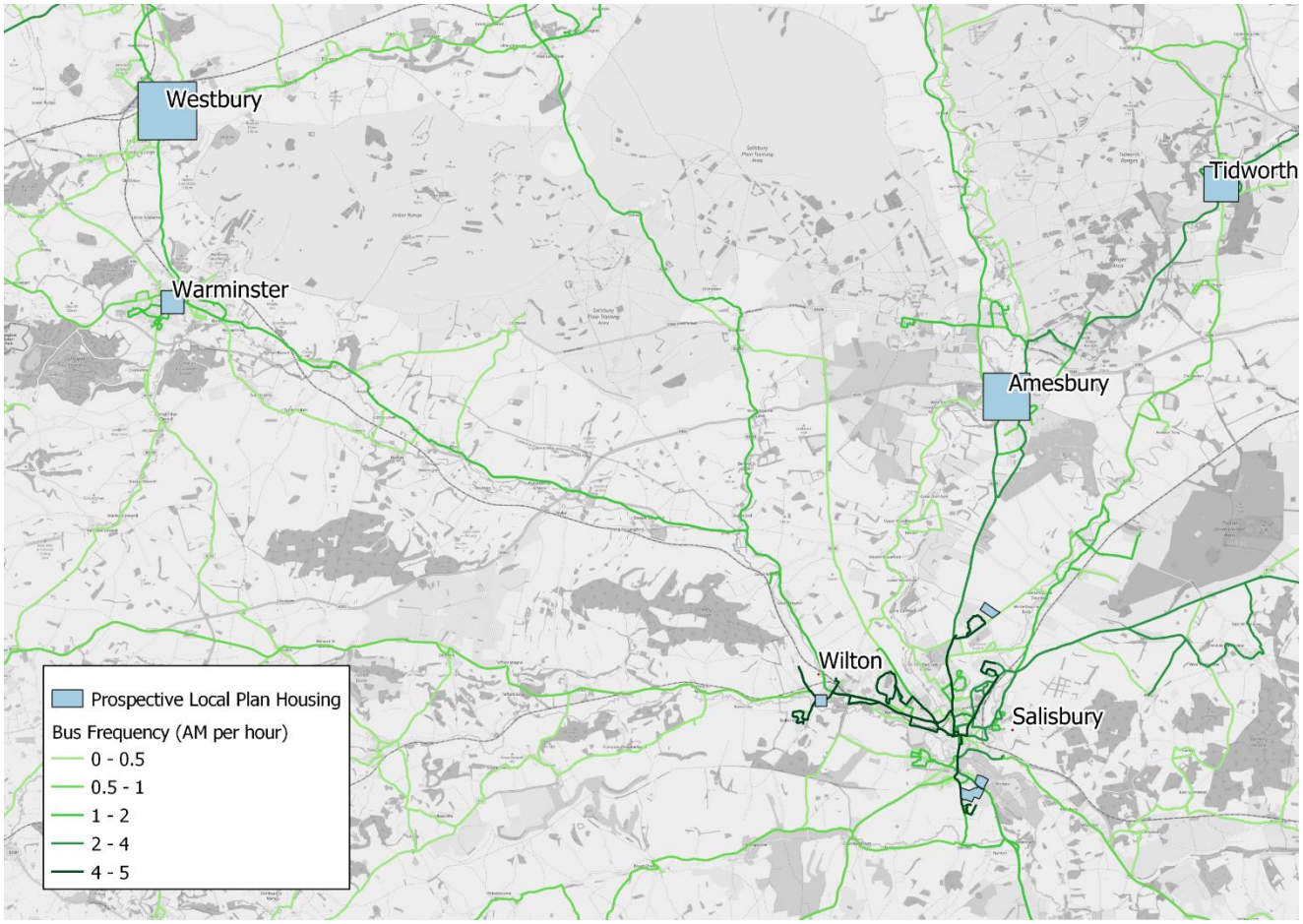
Figure F-2 - West Wiltshire bus routes by frequency



Typical AM 0700 to 0859– average number of services per hour

[16] Chippenham Transport Strategy DRAFT (2015)
[17] Trowbridge Transport Strategy (2018)

Figure F-3 - South Wiltshire bus routes by frequency



Typical AM 0700 to 0859– average number of services per hour

According to the 2011 Census travel to work data[18], Salisbury has a much higher proportion of commuters who choose bus (6.4%) when compared to Chippenham (1.7%) and Trowbridge (2.1%), both of which are also much lower than the national average (8%). Increasing bus patronage in Chippenham and Trowbridge to the same level as Salisbury would help mitigate the increase in car trips generated by the new developments on the periphery of the two towns. By increasing the frequency of buses on routes serving the Chippenham and Trowbridge areas overall journey times would be reduced and the utility of bus as a mode of travel increased.

The latest Wiltshire Council Bus Punctuality Surveys (2014-2015) show that 24.7% of buses in Chippenham on average are over 5 minutes late

[18] The Propensity to Cycle Tool: https://www.pct.bike/

Table F-6 - Wiltshire bus service punctuality (by percentage)[19]

Location	Percentage of buses late
Chippenham	24.7%
Trowbridge	5.9%
Salisbury	13.5%
Tidworth	10.2%
Amesbury	9.8%
Wilton	46.3%
Westbury	11.6%
Wiltshire	**14.4%**

This is much higher than the Wiltshire average of 14.4%. This highlights that buses are both infrequent and late in many cases, which is reflected in Chippenham's low bus commuter mode share. There are currently no significant bus priority measures in Chippenham which means that services are affected by congestion.

This is typical across Wiltshire, with low frequency bus services, services subject to delays and limited bus priority. Delays to local bus services affect commercial viability of the routes for the bus companies, increase costs for operators and passengers and reduce the attractiveness of the bus as a convenient and reliable mode of transport.

[19] Latest available data. Wiltshire Council Bus Punctuality Survey Reports, April 2014 to March 2015. Late defined as service running up to 5 minutes later than timetabled.

Appendix G. Estimated scheme costs

G.1. Estimated cost of proposed walking and cycling measures

The estimate below presents indicative capital costs for measures to enhance active travel in Chippenham, Trowbridge and Salisbury.

Table G-1 - Estimated cost of active travel mitigation measures (2020 prices and values)[20]

	Chippenham	Trowbridge	Salisbury
Total construction cost[1]	£6.21m	£5.23m	£5.66m
Land	£0	£0.06m	£0
Prelims (16%)	£0.99m	£0.84m	£0.91m
Site supervision (4%)	£0.25m	£0.20m	£0.23m
Total Implementation Cost (no risk budget)	£7.45m	£6.34m	£6.79m
Risk (44%)	£3.28m	£2.79m	£2.99m
Total Implementation Cost (Inc. Risk budget)	£10.73m	£9.12m	£9.78m
Design (10%)	£0.75m	£0.63m	£0.68m
Principal settlement totals	£11.47m	£9.76m	£10.46m
Wiltshire total	**£31.69m**		

1) Construction costs – high level estimates per/km rates benchmarked against published high level rates from Sustrans guidance. The Lengths/type of infrastructure were identified as the most appropriate routes and type of infrastructure were considered deliverable.

G.2. Estimated cost of public transport measures

The estimate below presents indicative capital and annual revenue costs for measures to enhance bus provision on the five corridors.

Table G-2 - Indicative bus capital and revenue costs (2020 prices and values)

Measure	Cost	All 5 corridors
RTPI stop upgrade (x10 per corridor, 5 corridors)	Capital	£4.5m[1]
Operating 2 additional buses per corridor (x5) over 5 years	Revenue	£6.0m[2]
Total		**£10.5m**

1. Assumptions £90,000 per RTPI bus stop
2. Assumptions £120,000 annual operating cost per bus
3. Estimates are based on other work within Wiltshire undertaken by Atkins. Does not account for new COVID19 measures.

[20] Figures in the table are rounded to two decimal places which could cause differences from the 'Wiltshire total' row.

G.3. Estimated highway scheme costs

The estimated costs of the highway schemes are presented in the table below. The costs in this table are likely to overlap with the costing of the Melksham Bypass. It is recommended that the overall design of schemes recommended are included in the future MRN business case submissions.

Table G-3 - High-level cost assumptions for Local Plan highway schemes

Metric	Assumptions
Extents	• Melksham Bypass and associated junctions is approximately 8km long, costing approx. £135 million (This is costed separately). • Structure over Semington Brook required for dualling from southern extents of Melksham Bypass (not included in current scheme estimate). • Provision of approximate 4.5km length of dual carriageway (widening from current single carriageway) between Lackham roundabout and the junction with the proposed Melksham Bypass, to the north of Melksham. - three structures – potentially road over culverts – which would need to account for extension or strengthening; - Melksham Road junction – leading to Lacock Village and Abbey – possible need for signalisation; - Gastard junction – possible need for signalisation; - Reybridge signalised crossroads junction – possible need for upgrade; - Reybridge/Notton junction – possible need for signalisation; and - Existing roundabout to the north of the scheme – assume minimal modifications. • Potential geometric changes to three of the arms to the roundabout east of Semington.
Assumptions	• A350 Dualling (Lackham roundabout to Melksham Bypass) - It is assumed that 50% of the route would need widening within 3rd party land (assumption £5M/KM for land cost - £11.25M as a total). - Three existing culverts crossed by the road will need to be extended/strengthened as appropriate (£200k/culvert). - Three existing priority junctions to be converted to signals (£1M per junction). - One existing signalised crossroads junction to be modified/upgraded (£200k for modification). - Minimal earthworks assumed, nominal allocation (£400k for retaining wall). - Minimal modifications to Lackham roundabout. Works could include road markings, minor widening, etc. Estimated value not included. - £4.5M included for Utility protection/diversion (£1M/KM). • Land to the east of the existing single carriageway Semington Bypass is suitably wide (future-proofed) to accommodate proposed dualling, therefore there are no associated structural costs. However, the existing bridge over Semington Brook is not wide enough and therefore an additional structure will need to be accounted for to take the additional lanes. (Possible 3rd party land costs). • As above, costs do not include for Melksham Bypass or necessary resulting junction with Melksham Bypass. • Land appears flat, therefore no earthwork implications. • Modifications to roundabout to the east of Semington – Unknown at this stage, could include road markings, minor widening, or dedicated left turns etc. Estimated value: assume £1M for more significant works. • SPONS rates used for structures and carriageway. • 25% prelims, 44% risk allowance. • £1m included for utility protection/diversion.

Metric	Assumptions
Estimate	***A350 Dual carriageway (Melksham Bypass to Lackham Roundabout):*** • 4500m length, 10m width (7.3m + hard strips). • SPONS rate for – Wide single carriageway all-purpose road (10m width) - £2,225/m (2020). • Carriageway cost = £10.02M (2020). • *Structures - culverts*. – Assumes 20m length. (3no.) Assume £200k/culvert – Total = £600k. • *Structures - retaining wall*. – Assumes 3m retained height, 200m length = 600m2. - SPONS rate for – Reinforced in-situ concrete retaining wall - £535/m2 (2010 prices) - Retaining Wall cost = £321k (2010) = £410k (2020 – using RPI to inflate). • Signalisation of existing junctions – Unknown - Assume £1M per junction - £3M. • Modifications to existing signalised crossroads – Unknown. Include estimate of £200k. • Modifications to the northern roundabout – Unknown. Include estimate of £250k. • Utilities – Unknown. – Assumption - £1M/KM - **£4.5M** • 3rd Party Land Costs – Unknown – - Assumption - £5M/KM – 50% of the route needing 3rd Party Land - £**11.25M** • Total Cost - **£30.23m** (2020). ***Structure over Semington Brook:*** • Assumes 75m length x 14m width = 1050m^2. • SPONS rate for – Reinforced concrete bridge with prefabricated steel beams - £5400/m^2 (2020). • Structure cost = £5.7m (2020). • Utilities = unknown – Assumption included within costs. ***Modifications to Littleton roundabout:*** • Localised widening and realignment - Estimate of £1m. • Utilities – Unknown. – assumption - £1m. • 3rd party land costs – Unknown – assumption - £0.3m.

The costs for the Staverton bypass are presented in more detail in the Staverton bypass scheme assessment report v0.5 July 2019.

The following table summarises the costs of the proposed highway schemes.

Table G-4 - Estimated Local Plan highway scheme costs

Prospective Local Plan Highway Scheme Package		Cost (2020 price base, millions)	PVC (2010)
	A350 dual carriageway (Melksham to Lackham)	£ 30.2m	£ 22.4m
	A350 Semington structure	£ 5.7m	£ 4.2m
	A350 Littleton roundabout modifications	£ 2.3m	£ 1.8m
A350 changes sub total		*£ 38.2m*	*£ 28.4m*
including 25% Prelims, 44% OB)	A350 dual carriageway (Melksham to Lackham)	£ 54.4m	£ 40.3m
	A350 Semington structure	£ 10.3m	£ 7.6m
	A350 Littleton roundabout modifications	£ 4.1m	£ 3.2m
A350 changes sub-total (including 25% Prelims, 44% OB)		*£ 68.8m*	*£ 51.1m*
Staverton bypass (Option 3)		£ 24.0m	£ 14.3m
Total estimated highway scheme costs		**£ 92.8m**	**£ 65.4m**

Appendix H. Economic Appraisal

H.1. Economic appraisal of combined mitigation package

H.1.1. Approach

The DfT's TUBA software (v1.9.13) was used to produce a high-level estimate of the user benefits of the proposed mitigation measures. The Do Something scenario (Local Plan with mitigation) was assessed against the Do Minimum scenario (Local Plan without mitigation). TUBA provides a complete set of default economic parameters in its standard economics file, including values for variables such as values of time, vehicle operation cost data, tax rates and economic growth rates. TUBA covers the impacts of travel times, vehicle operating costs, impacts on greenhouse emission and indirect taxation occurring due to changes in the amount of fuel and other direct vehicle operating costs purchased.

It should be noted that this is not a formal economic appraisal or business case submission. It is merely an indicative guide as to the economic benefits of the suggested scheme. This analysis does not include:

- Wider economic impacts of the schemes;
- Benefits to bus operators and users;
- TUBA was run with the DN1 demand (i.e. excluding the prospective Local Plan growth) such that only the costs and benefits to non-Local Plan users were included in this analysis.
- Accident benefits;
- Reliability benefits;
- There has been no masking or consideration of model noise which could have a substantial impact, particularly in external areas to Wiltshire; and
- Localised signal optimisation and minor refinements to local junction operation have not been considered and can again result in considerable benefits.

Analysis was completed and discounted to a common base year of 2010, with standard discount rates of 3.5% applied to benefits for the initial 30 years from the current year and 3.0% to subsequent years. All present values are quoted in the market price unit of account unless otherwise stated. The price base is also 2010 and therefore all prices in the appraisal are adjusted for inflation to be presented in 2010 prices, after allowing for real growth above standard inflation.

H.1.2. Scheme parameters

User defined TUBA scheme parameters applied in the appraisal are as follows:

- Appraisal Period: 60 years;
- First Year (scheme opening year): 2024;
- Horizon Year: 2083; and
- Modelled Years: 2036[21].

The annualisation factors used are consistent with those used in the Transport External Costs calculation.

[21] It was assumed that beyond the year 2036 no further growth in traffic or benefits would occur apart from an allowance from continued growth in the real value of time (in line with WebTAG A1.1). To extrapolate backwards, the 2036 benefits extracted from TUBA were factored for each year in line with Value of Time changes and the do-minimum model congestion over time. The DM congestion was represented by the "Total Travel Times" statistic extracted from SATURN, for years 2024 and 2036, interpolating linearly between the two years to derive an adjustment factor that scales down benefits reflecting reduced demand before 2036.

H.1.3. Present Value of Costs

The Present Value of Costs (PVC) of the Major Road Network (MRN) schemes are shown below and are taken from the SOBCs developed in 2017 for each scheme, except for the A350 Phases 4&5 dualling which had an OBC completed in 2019. All base costs from the business cases include whole life costs and are in 2017 prices. In the table, the costs have been converted separately to 2020 prices using the Tender Prices Index (TPI).

In the calculation of the 2010 PVC, optimism bias was applied at 44% for the schemes at SOBC and at 15% for A350 Phases 4&5. These are high-level indicative values and the forthcoming OBCs for the remainder of the MRN schemes will be expected to provide greater confidence in these values. They should not be used at this stage to inform definitive cost estimates and are intended simply to inform an indicative economic appraisal.

Table H-1 - Estimated combined cost of MRN schemes

Scheme package	Base Costs (2017 prices)	Base Costs (converted to 2020 prices)	PVC (2010 prices, values)[1]
M4 Junction 17	£ 25.0m	£ 26.6m	£ 25.1m
A350 Phase 4&5 dualling	£ 33.6m	£ 35.7m	£ 25.5m
A350 Melksham bypass	£ 125.9m	£ 134.0m	£ 116.6m
A338 southern Salisbury junctions	£ 14.7m	£ 15.6m	£ 15.8m
Total costs	**£ 199.1m**	**£ 212.6m**	**£ 182.9m**

1. PVC Includes Optimism Bias and risk

The estimated costs of the additional Local Plan mitigation measures (expressed in 2010 prices), together with the Present Value of Costs, expressed in 2010 prices and values are below.

Table H-2 - Estimated combined cost of Local Plan mitigation package

Scheme package	Base Costs (2020 prices)	PVC (2010 prices, values)
Walking and cycling measures	£31.7m	£26m
Public transport measures	£10.5m	£6.8m
Structure over Semington Brook	£10.3m	£7.6m
Littleton roundabout improvements	£4.1m	£3.2m
Staverton bypass (Option 3)	£24.0m	£14.3m
Total Local Plan costs (excluding A350 dualling)	**£80.6m**	**£57.9m**
A350 Dualling (Melksham bypass to Lackham roundabout)	£54.4m	£40.3m
Total Local Plan costs (including all dualling)	**£135.0m**	**£98.2m**
M4 Junction 17	£26.6m	£25.1m
A350 Phase 4&5 dualling	£35.7m	£25.5m
A350 Melksham bypass	£134.0m	£116.6m
A338 southern Salisbury junctions	£15.6m	£15.8m
Total costs (All MRN schemes + Local Plan measures)	**£347.6m**	**£281.1m**

H.2. Value for Money

The DfT Value for Money Framework defines the standard VfM categories as shown below.

Table H-3 - Standard DfT Value for Money (VfM) categories

VfM category	Implied by…*
Very High	BCR greater than or equal to 4
High	BCR between 2 and 4
Medium	BCR between 1.5 and 2
Low	BCR between 1 and 1.5
Poor	BCR between 0 and 1
Very Poor	BCR less than or equal to 0

*Relevant indicative monetised and/or non-monetised impacts must also be considered and may result in a final value for money category different to that which is implied solely by the BCR.

Table H-4 summarises the key Value for Money metrics: Present Value of Benefits (PVB), Present Value of Costs and Net Present Value (NPV, derived from PVB-PVC). It also shows the Benefit to Cost Ratio, calculated by dividing the PVB by PVC, together with the initial assessment of the VfM category.

Table H-4 - Value for Money statement (*PVC 2010 prices and values, millions)*

	DM2 vs DM1	DS1 vs DM1	DS2 vs DM1	DS3 vs DM1
Description	MRN schemes only	LP mitigation (excl A350 dualling)	MRN and LP mitigation (excl A350 dualling)	MRN and LP mitigation (incl A350 Dualling)
Walking and cycling Benefits (AMAT)	-	£81.6m	£81.6m	£81.6m
Highway Assignment (TUBA) Benefits (PVB)	£260.2m	£135.4m	£339.3m	£427.8m
Total Present Value of Benefits (PVB)	**£260.2m**	**£217.0m**	**£420.9m**	**£509.4m**
PVC	£182.9m	£57.9m	£240.8m	£281.1m
Net Present Value (NPV)	£77.3m	£159.1m	£180.1m	£228.3m
Benefit to Cost Ratio (BCR)	1.4	3.7	1.7	1.8
VfM Category	Low	High	Medium	Medium

This assessment only takes account of transport user benefits and walking and cycling benefits. It does not take account of accident benefits or wider economic benefits from supporting the Local Plan development. Bearing these caveats in mind, this shows that:

- The Local Plan mitigation package alone (DS1) is expected to represent high value for money;
- Both MRN and LP packages together (DS2) represent medium value for money; and
- With the further addition of dualling on the A350 between Melksham and Chippenham (DS3), the value for money category is expected to be medium.

In terms of the combined package (DS2), if the wider impacts are captured, it is considered that there could be potential to achieve high value for money. This means that there is potential to achieve a relatively strong Economic Case with good potential for securing government investment.

The MRN schemes alone (DM2) do not fully mitigate the network impact, with significant pinch points remaining on the A350 such as to the south of Melksham and to the east of Trowbridge. It is recognised that further intervention could be required as part of the Local Plan mitigation package with further measures may be necessary in consultation with Wiltshire Council. This is illustrated by the inclusion of dualling the A350 between Melksham and Chippenham in the DS3 scenario, which leads to an improvement in the BCR and the corresponding value for money category.

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